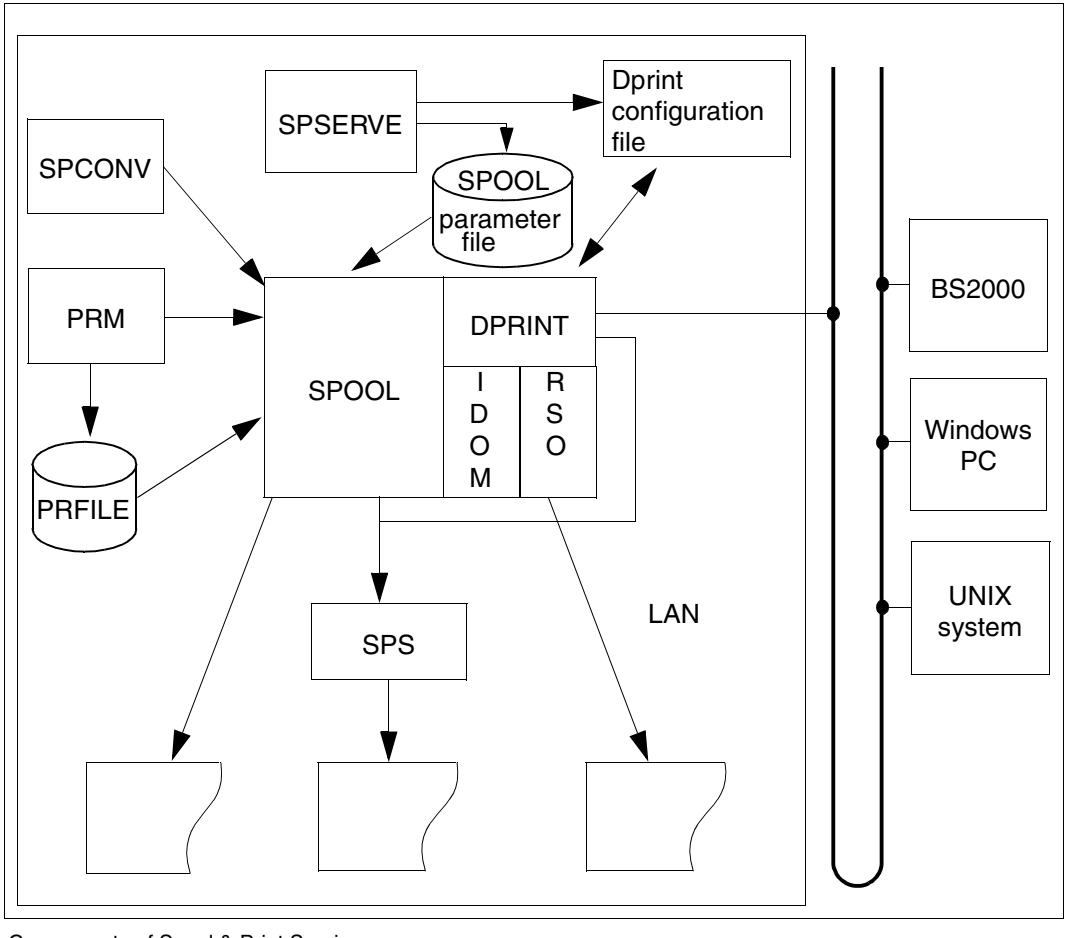
1 Preface

Distributed Print Services (or “Dprint” for short) is a subsystem of Spool & Print Services and implements print applications within a network of computers.

The following figure shows the components of Spool & Print Services.



Components of Spool & Print Services

1.1 Brief product description

Distributed Print Services (known as “Dprint” for short) implements print applications in a network consisting of computers which use the BS20000/OSD, UNIX and Windows operating systems. Dprint utilizes TCP/IP, ISO or NEA (TRANSDATA) transport protocols.

Dprint requires SPOOL as its execution unit and expands the print capabilities of SPOOL in respect of host-wide and network-wide utilization of the local BS2000 high-performance printers.

Dprint supports network-wide access to BS2000 printers, printers attached to UNIX systems and Windows printers, i.e. interoperability between BS2000, Xprint and Wprint is possible. This means that data from a Windows PC can be output to a BS2000 printer. It is also possible to output data from BS2000 on a printer which is connected to a Windows PC. This then runs via a UNIX system.

Dprint is designed as a client/server model and comprises the following components:

– DPRINTCL (client component: print job generation)
– DPRINTSV (server component: print job management)
– DPRINTCM (implements management services, file transfer, communication, etc.)

These components are installed as independent subsystems. DPRINTCL and DPRINTCM are combined to form the selectable unit DPRINT-CL, and DPRINTSV is supplied as the selectable unit DPRINT-SV. DPRINT-SV cannot be used without DPRINT-CL.

Dprint uses the cluster as its organization form (management unit); a cluster is a number of interconnected BS2000 hosts together with their local printers. A cluster can be defined on a cross-network basis. There are local and remote clusters. The cluster configuration is created using SPSERVE statements. The following points, among others, are applicable to clusters:

– single point of administration:
  cluster management is the responsibility of the person identified as the cluster administrator
– single point of configuration:
  creation and maintenance of the cluster configuration are the exclusive responsibility of the cluster administrator
– single system image:
  the distribution of the printers in the cluster is transparent to the end user
– cluster interoperability:
  print jobs can be exchanged between different clusters

Dprint can be used in the following software environment:

– BS2000/OSD-BC ≥ V4.0, OSD-SVP V4.0 and OSD/XC V1.0 with SPOOL ≥ V4.4A
– *open*FT for BS2000 as of V7.0 und *open*FT-AC for BS2000 as of V7.0

1.2 Target group

This manual is intended for BS2000 systems support, for device administrators and for all (nonprivileged) users wishing to operate BS2000 high-performance printers on a networked basis and use them on different hosts.

1.3 Summary of contents

The manual is organized into 7 chapters plus an appendix, with the following contents:

This chapter contains a brief description of the product “Distributed Print Services”.
It introduces the target group, a summary of contents and an overview of the range of manuals for Spool & Print Services. It also describes the changes made since the last version of the manual, the notational conventions and the method used to print a copy of the README file.

Chapter "The Distributed Print Services concept"
contains general information on the Distributed Print Services product. Certain terms relevant to Dprint are explained, hardware and software prerequisites are listed, and the logical units of Dprint are illustrated. Finally, after the application groups, the principal usage models illustrating the use of Dprint are described.

Chapter “Usage models”
describes the main usage models available in conjunction with Dprint.

Chapter "Use of Distributed Print Services by nonprivileged users"
describes the facilities which are available to nonprivileged users for the distribution of their file printing activities with the aid of Distributed Print Services. Users also have the capability to react in certain error situations.

Chapter "Dprint management functions and activities"
: illustrates the additional administration activities which can be performed with reference to Distributed Print Services over and above those involving nonprivileged users. For example, clusters are set up and managed, definitions relating to interoperability between BS2000 clusters or between BS2000, Xprint for UNIX systems and Windows-Wprint can be specified, and printers and printer groups can be defined. Additional capabilities are also provided in respect of job control, requesting information, command input and response to error situations.

Chapter "BS2000 support functions"
: explains which additional activities BS2000 systems support can perform in relation to Dprint. These concern the installation of Distributed Print Services and control of the subsystems DPRINTCL, DPRINTSV and DPRINTCM. Also described are security and privileges, accounting, tracing and logging, as well as recovery processing in relation to Dprint.

Chapter "Increasing the availability of print jobs"
: provides an overview of the functional enhancements implemented to increase the availability of print jobs and defines the requirements in terms of the hardware and software configuration that must be fulfilled. A further section deals with the usage models.

Chapter "Accounting functions"
: describes the layout of the Dprint accounting parameter file as well as the SYSSSI enhancements.

Chapter "Examples"
: illustrates in stepwise fashion how to define and extend clusters, printer pools and connections between clusters, and how to obtain relevant information.

The "Appendix"
: contains information on file transfer naming conventions, on file transfer saturation, on Excat/Imcat postprocessing, on support for XHCS in SPOOL, and also tables relating to Dprint.

Literature references are specified in the form of abbreviated titles in the text. The full title of each publication may be found under "Related publications" at the back of the manual. This is followed by the index.

1.4 Overview of the Spool & Print Services manuals

Spool & Print Services are documented in the following manuals:

Subsystem manuals

– SPOOL
– Distributed Print Services
– RSO (Remote Spool Output)
– SPS/BS2000-APA
– SPCONV
– IDOM

Utility routine manuals

– PRM
– SPSERVE

Additional manuals

– Spool & Print - Macros and Exits (SPOOL, RSO, Dprint)
– Spool & Print - Commands (SPOOL, RSO, Dprint, SPS, IDOM)
– Spool & Print - Messages (SPOOL, RSO, SPSERVE, PRM, Dprint, IDOM)

The complete titles of the above manuals as well as further manuals from the SPOOL and BS2000/OSD environment can be found in the list of related publications at the end of this manual.

1.5 Changes since the last version of the manual (Dprint V1.0B, V1.0C, V1.0D, V1.0E, V1.0H, V1.0J)

General changes and additions since publication of the Dprint V1.0B manual:

The following chapters and sections now have their own manuals.

Chapter, section	New manual
Commands	Spool & Print - Commands
PRNTDOC, PRNTDPC macros	Spool & Print - Macros and Exits
System exits	
SPLO accounting record	

For the sake of clarity, parts of the old chapters “The Distributed Print Services concept” and “Dprint Management functions and activities” have been summarized in the new chapter “Usage models”.

Below, changes have been described in conjunction with the relevant version of Dprint. In this manual the latest status of the changes has been incorporated at the relevant places.

Special changes and additions since the Dprint V1.0B manual

Changes and additions since Dprint V1.0B

– The use of BSD-LPD gateways is permitted. There is a description which details installation of BSD-LPD gateways and the Windows driver. Starting and stopping the gateway, the gateway status and status information for print jobs are described, as is the impact of the BSD-LPD gateway on Spool & Print. Some of the restrictions of BSD-LPD implementation are also described.

– Usage models which describe access by Windows-Clients to SPOOL, SPS and RSO are introduced.

– The customization of Wprint is described.

– ISAM/PLAM support has been introduced for connecting Dprint/BS2000 to Xprint.

Changes and additions since Dprint V1.0C

– It is possible to print HP-formatted documents in line format on PCL printers. The steps needed to do this are described and an example given.

Changes and additions since Dprint V1.0D

– Complete support for PCL printers.

– There is a description showing how it is possible to print from BS2000 via a UNIX system using a PCL printer which is connected via the SCSI interface.

Changes to the Dprint V1.0E manual

– Enhancements to the Fujitsu Siemens Pagestream driver

– Enhancements to "late binding" and converters in Dprint

– Functional enhancements to increase the availability of print jobs

– Availability of more precise accounting functions.

Changes and additions since Dprint V1.0H manual

– MODIFY-DPRINT-SERVER statement Erratum:

  It is not possible to modify the HOST-NAME of a DPRINT Server. The operand is thus suppressed from the statement syntax and operand descriptions.

– Spool & Print Explorer V2.0:

  PRINT administration and monitoring can be operated with Spool & Print (S&P). The Dprint administration and monitoring can be operated with the Spool & Print Explorer V2.0:

  The Spool & Print Explorer is the graphical User Interface for the Spool & Print BS2000 management that allows browsing through BS2000 S&P objects from a Windows Explorer (95,98,NT) for one or more BS2000 S&P running on /390 or SR2000 machines.

  The S&P Explorer delivered with the SPOOL-GA V4.3A is able to give a complete view of one S&P cluster from a dedicated BS2000 point of view. The connected BS2000 and the priviledges associated to the userid on which the connection has been established will define the information's scope that will be displayed and the action's scope of the caller.

  For a complete cluster management, it is requested to open a connection on the master host with the cluster administrator userid.

  For additional information, please refer to the SPOOL-GA V4.3A documentations.

Changes and additions since DPRINT V1.0J

This document describes the new features introduced in Dprint V1.1B:

– The support of the Notification Service for print jobs

– A structured output display for the SHOW-DPRINT-PRINTERS command.

– Extended information selection for output tuning (SHOW-DPRINT-PRINTERS command)

– SYSLST/SYSOUT, temporary files, erase and lock options supported in inter-cluster (BS2000 and Xprint domains) for the PRINT-DOCUMENT command.

In the appendix,

– a complete information about the interoperability between Dprint and Xprint is given

– the optional processing allowed within DPRINTCL and DPRINTCM is extensively described (SYSSSI files)

– the additional information for File Transfer naming conventions is detailed

1.6 Notational conventions

This symbol indicates that the subsequent indented paragraph contains vital information.

This symbol indicates danger of data loss or damage to equipment.

Note

The word "*Note*" before an indented paragraph indicates that the subsequent paragraph contains important information.

"Reference"
References to chapters, sections or other manuals are enclosed in quotation marks.

[ ]
Square brackets in syntax diagrams: the characters between the brackets may be omitted.

Bold type
Where syntax notations are explained, the lines currently being explained are printed in boldface.
Otherwise syntax notations conform to the rules as described in the corresponding chapters of the reference section.

`SYNTAX/Example`
Syntax notations and examples of inputs and outputs are highlighted by means of a different typeface. Syntax notations are also surrounded by a frame.

1.7 README file

Functional changes and supplements to the current product version not documented in this manual are explained in the product-specific README file. The name of this file on your BS2000 host is SYSRME.DPRINT.011.E. Ask systems support for the user ID under which the README file is cataloged. You can view the README file by means of the /SHOW-FILE command or in an editor of your choice, or you can use the following command to print the contents of the file on a standard printer:

```
/PRINT-DOCUMENT FROM-FILE=filename, -
/DOCUMENT-FORMAT=*TEXT(LINE-SPACING=*BY-EBCDIC-CONTROL)
```

2 The Distributed Print Services concept

This chapter provides an overview of the concept of Distributed Print Services (Dprint). Firstly, certain terms which are of relevance to the Dprint concept are explained. The hardware and software prerequisites are listed in the next section.

The logical units of Dprint are described in section “Client/server architecture” on page 14, while section “Cluster model” on page 17 describes the Dprint cluster, the combination of two or more interconnected computers to form an administration unit.

2.1 Terms used in Dprint

Some of the terms of relevance to the Dprint concept are explained below in alphabetical order.

client/server

The client/server architecture of Dprint allows distributed printing by way of networked computers which may include several BS2000/OSD systems, Windows systems and UNIX systems. A series of servers offer print services for requests originating from BS2000 clients, UNIX system based clients and Windows clients. Servers are service providers, clients are service requestors.

Dprint job

Dprint jobs can be output on Dprint printers. These are jobs for which

– a Dprint printer pool which has been defined in the configuration file has been specified in the PRINT-DOCUMENT command
– the standard destination is a printer pool which has been defined in the configuration file
– the standard destination is a cluster.

Dprint cluster

A Dprint cluster consists of a number of interconnected BS2000 hosts with their local printers. The distribution of the printers within the cluster is transparent to the user. The configuration and administration of the cluster are performed on a selected master host within the cluster.

Dprint printer

In contrast to local printers, Dprint printers are defined in a configuration file which contains the definitions of all Dprint objects. Every printer definition is associated with a device definition which is to be found in the SPOOL parameter file on the computer to which the device is connected.

filter

The term “filter” refers to a program which selects information and then handles this information in accordance with certain rules. A filter can carry out a conversion from one output format to another, or from one format to another.

gateway host

Interoperability is possible between different clusters. The requisite communication is handled by a gateway host within the cluster.

interoperability

Interoperability signifies the capability which allows applications to interact with other applications on other hosts. Using Dprint, print jobs can for example be sent from a BS2000 cluster to another BS2000 cluster or to a Xprint domain.

ISO-DPA Class 1 (ISO standard for Distributed Print Application)

Dprint functions according to the ISO-DPA Class 1 guidelines. This means that any foreign spooler that functions according to the same guidelines can, after making minor changes, interoperate with Dprint. This functionality is made possible by means of proprietary structures. Please refer to the documentation on ISO-DPA 10175 for more detailed information on this ISO standard.

local printer

In contrast to Dprint printers, local printers are defined only in a SPOOL parameter file. This definition is not associated with a definition in the configuration file.

local server

Local servers are located in the same cluster as the client from which the Dprint job is issued.

master host

The master host is the host at which the command to create the cluster was entered. On this host the cluster is configured and administered centrally. The “original” copy of the configuration file is likewise located on the master host.

remote server

Remote servers are located in a different cluster to the client from which a Dprint job is issued.

single-point administration

Only the cluster administrator (on the master host) may define the cluster objects.

single-point configuration

The configuration of the cluster is performed on the master host. Only one configuration file is used.

SPOOL job

SPOOL jobs can be output on local printers or Dprint printers. In contrast to Dprint jobs, SPOOL jobs are jobs for which

– a local printer pool which has been defined not in the configuration file but only in the SPOOL parameter file has been specified in the PRINT-DOCUMENT command
– the standard destination is a printer pool which has been defined not in the configuration file but only in the SPOOL parameter file.

SPOOL jobs/ Dprint jobs

Four types of jobs can be processed by SPOOL and Dprint:

– jobs which are handled by the local SPOOL (SPOOL jobs)
– jobs which are sent to a server in a remote cluster (Dprint jobs)
– jobs which come from a client in a remote cluster (Dprint jobs)
– jobs which are handled by a server in the local cluster and which come from a client located on the same host as the server (Dprint jobs)

2.2 Client/server architecture

Dprint is based on a client/server architecture. The system issuing the print job is the client, the system processing the job is the server. A network connection must exist between client and server.

The client part is implemented partly in SPOOL, as of V4.4, and partly in a separate subsystem DPRINTCL. The server part is similarly implemented partly in SPOOL, as of V4.4, and partly in a separate subsystem DPRINTSV. In addition, basic mechanisms are required which are integrated in a separate subsystem DPRINTCM.

DPRINTCM must be available both on the client and on the server. DPRINTCL and DPRINTSV, on the other hand, can be loaded independently of one another. In order to ensure full functionality, DPRINTCL must also be available on the server. However, on one BS2000 computer (host) there may be only one Dprint client and one Dprint server.

Functions of DPRINTCL

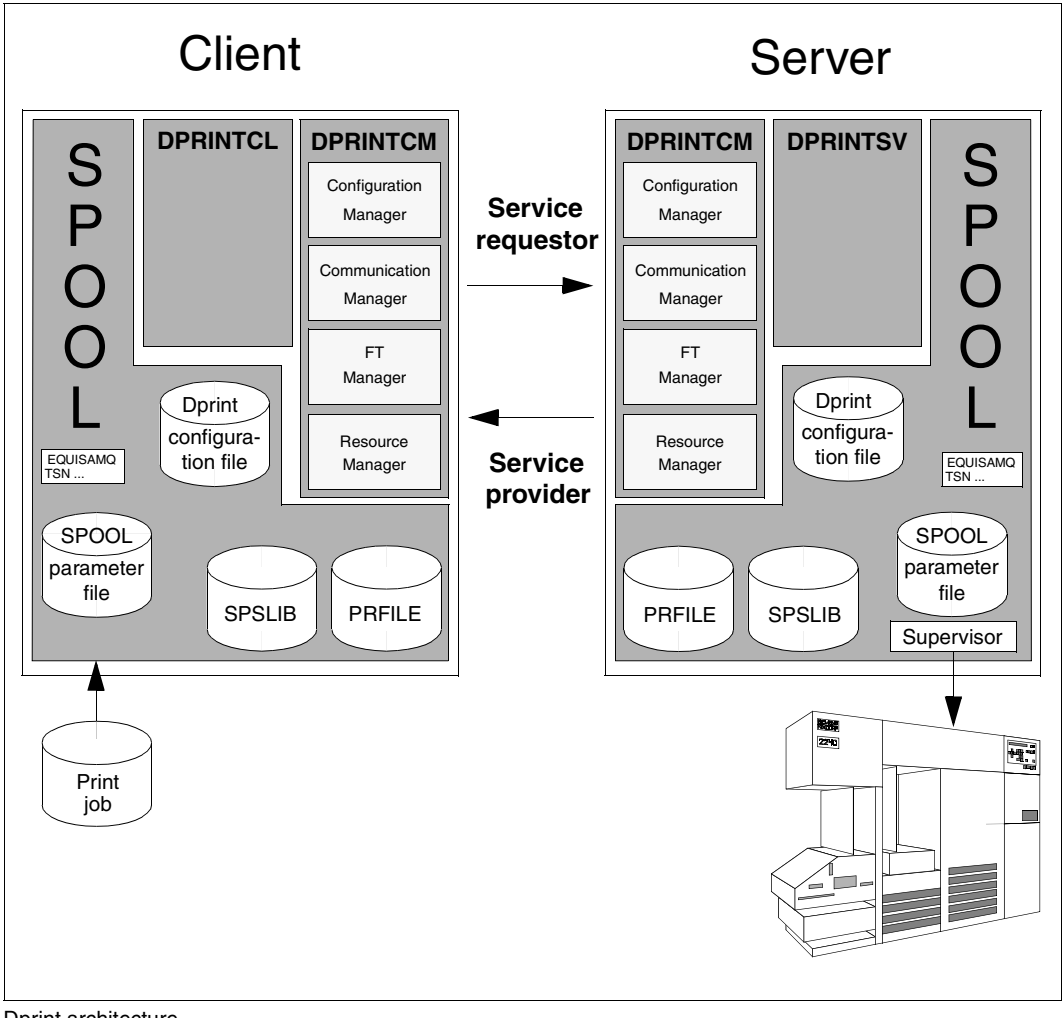
- syntax checking of the print job
- resource-dependent validation (optional)
- resource-independent validation
- selection of a suitable server
- transferring the job description to the server
- saving a copy of the job in the local EQUISAMQ

Functions of DPRINTSV

- receipt of the job
- resource-dependent validation (optional)
- saving the job description in the local EQUISAMQ
- scheduling the job to the supervisor
- acknowledgment to the client

Functions of DPRINTCM

- the Configuration Manager performs all accesses to the configuration file
- the Communication Manager performs accesses to the partners
- the FT Manager performs the file transfer operations
- the Resource Manager manages the required resources



Dprint architecture

Execution of a Dprint job

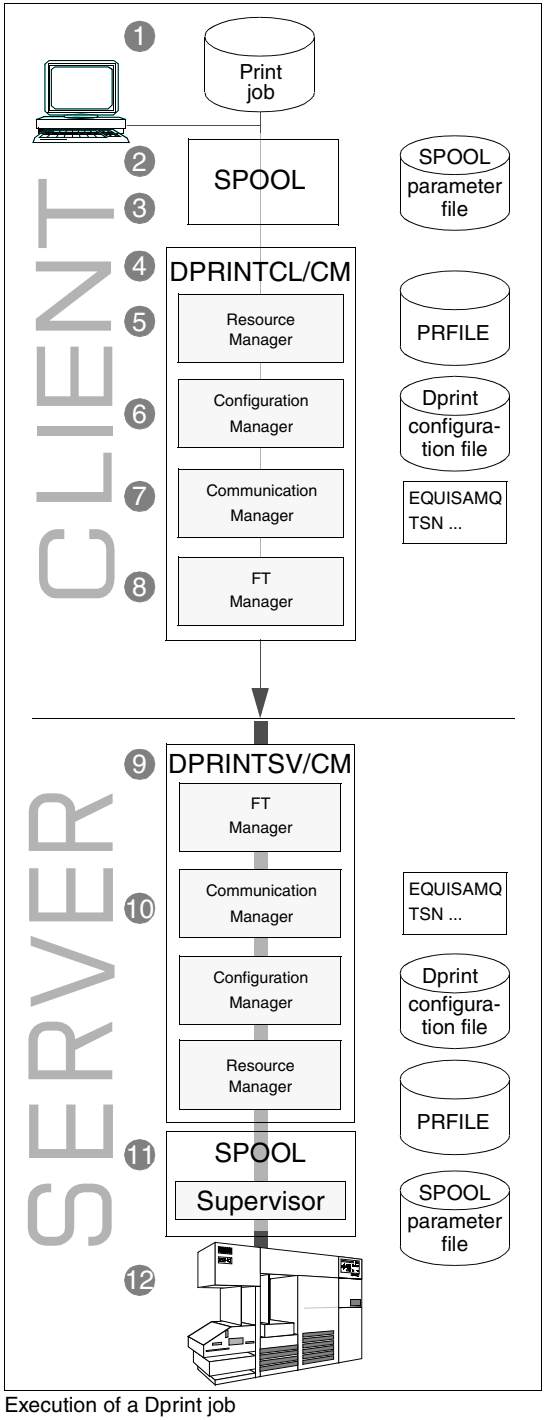
A Dprint print job can be executed using the client resources or the server resources. In the following example, the print job is executed using the client resources.

Client activities:

1. On the client the print job is generated with the PRINT-DOCUMENT command.
2. The job is accepted by SPOOL. SPOOL manages the print job in the client EQUISAMQ with a client TSN (after server activation).
3. The job is recognized as a Dprint job and forwarded to DPRINTCL.
4. DPRINTCL checks the job for correct syntax and calls modules of DPRINTCM.
5. The Resource Manager assembles the requisite resources (fonts, loop record, etc.) in a resource container.
6. The Configuration Manager checks whether the print job can be executed on the selected printer.
7. The Communication Manager controls communication between the partners.
8. The FT Manager transfers print job, print file and resource container to the server.

Server activities:

9. DPRINTCM receives the print job, the print file and the resource container.
10. The Communication Manager controls communication between the partners.
11. SPOOL manages the print job in the server EQUISAMQ with a server TSN. SPOOL sends the print file and the resource container to the Supervisor.
12. The Supervisor formats the data and sends it to the printer. It also monitors the printer and permits any error handling that may be required.



Execution of a Dprint job

2.3 Cluster model

Dprint employs the cluster as its organization unit (management unit). A Dprint cluster consists of a number of BS2000 hosts together with their printer peripherals. The hosts must be interconnected via a network which utilizes the TCP/IP, ISO or NEA (TRANSDATA) protocols.

There are local and remote clusters; viewed from a given cluster, any other Dprint cluster is a remote cluster. Normally the cluster will contain client hosts and server hosts, depending on the installation of the Dprint subsystems. A host can be a client host and a server host at one and the same time, but it can only ever belong to one cluster. The printers attached to the server host can be declared as Dprint printers. In the cluster there are two specially designated hosts: the master host and the gateway host.

A Dprint cluster does not need to be spatially contiguous; it can also be defined on a network basis. Typical criteria: acceptable response times, cost-effective networks, efficient cluster administration and security features. Configuration and administration are always handled centrally on the master host.

Within the cluster the distribution of the Dprint printers is transparent to the user; users require no knowledge of the assignment of server hosts to Dprint printers. The print job is executed on the requested printer type. When selecting the printer, Dprint also considers criteria such as optimization of the transfer path and the printer workload.

Client host

The subsystems DPRINTCL and DPRINTCM are loaded on the client host. This is where the Dprint jobs are generated and transferred to the server host. Cluster management is likewise handled on a client host (the master host).

Server host

The subsystems DPRINTSV and DPRINTCM are loaded on the server host. The local printers attached to the server host can be defined as Dprint printers. They are then managed either centrally by the cluster administrator on the master host or by the SPOOL administrator of the host to which the printers are connected.

Master host

The master host is the host on which the command for creating the cluster (/CREATE-DPRINT-CLUSTER . . .) was entered. Here the cluster is configured and administered centrally by the cluster administrator. The “original” of the cluster configuration file is located on the master host. Any client host can act as the master host. If the current master host fails, another client host assumes its function.

Cluster administrator

Cluster administration is always performed on the master host. There it is associated with the privilege “PRINT-SERVICE-ADMINISTRATION” and with the user ID under which the /CREATE-DPRINT-CLUSTER command was entered. Only the cluster administrator can modify the cluster configuration and also delete the cluster again. The cluster administrator also has the authority to modify or cancel all Dprint jobs (job attributes).

Gateway host

The file transfer and message communication with remote Dprint clusters are handled via the gateway host. A gateway host must be at least a client host. Any client host can act as the gateway host. The gateway host of the remote cluster also provides the print resources if printing is to take place in the remote cluster. In the case of exclusively local usage, no gateway host is required.

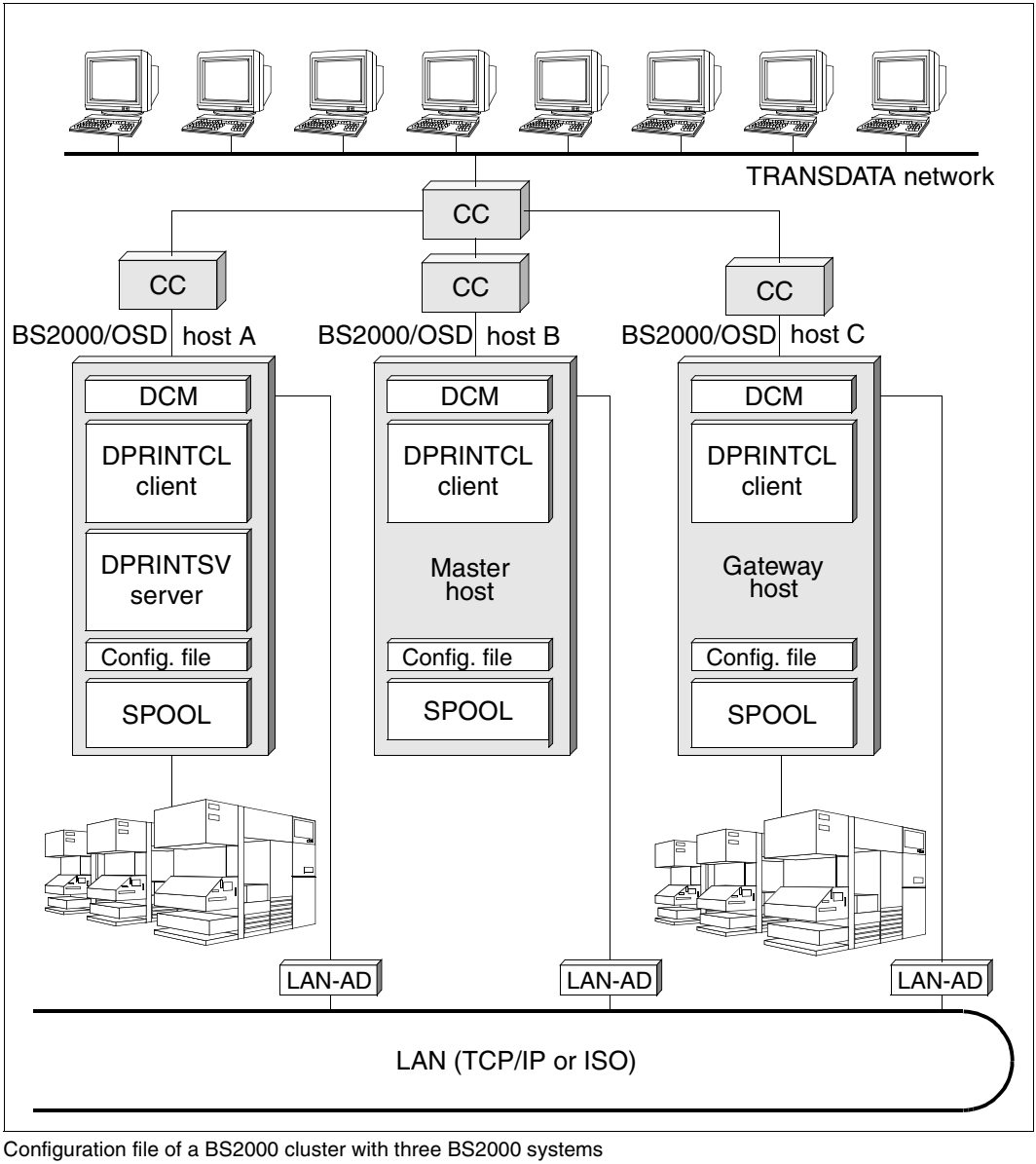
Configuration file

The entire configuration of a Dprint cluster together with its objects (hosts, servers, printers, printer pools, access lists) is described in the Dprint configuration file. The configuration file is created by means of SPSERVE statements. The “original” of the configuration file is located on the master host, while a current copy is kept on the other hosts in the cluster. The configuration file can only be modified by the cluster administrator.

Clusters	Names of the remote clusters which can be accessed
Hosts	Names of the hosts belonging to the (local) cluster
Servers	Assignment of server names to host names
Printers	Assignment of local printer names to Dprint printer names
Printer pools	Definition of Dprint printer groups
Access controls	Access rules for servers, gateways, remote clusters

Dprint configuration file

The following illustration shows a BS2000 cluster comprising three BS2000 systems. The communication is handled via a TRANSDATA network and a LAN. Communication computers and LAN adapters are present at the interfaces. Three high-performance printers are connected to each of hosts A and C.



Configuration file of a BS2000 cluster with three BS2000 systems

2.4 Cluster interoperability

The ability to pass print jobs to a remote cluster for execution is referred to as cluster interoperability. Cluster interoperability presupposes the existence of a gateway host in the remote cluster. A gateway host is assigned to certain other (remote) clusters via the entry in the configuration file. In one cluster, two or more gateway hosts can be defined, each having different assignments. When printing takes place in a remote cluster, the print resources of the remote gateway host are always utilized.

The entire inter-cluster communication is handled via the gateway host; however, a cluster without a gateway host can send a Dprint job to a different cluster.

Exception situations

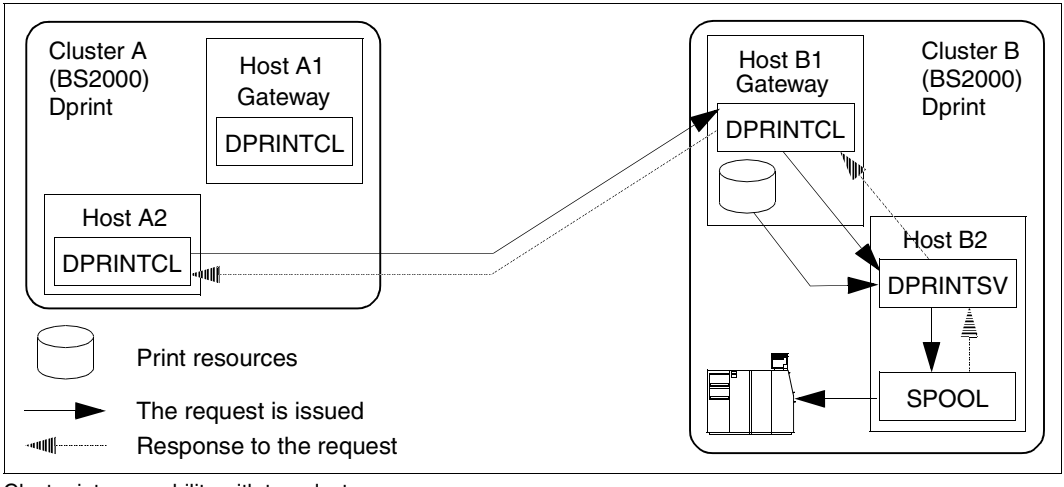
A configuration of special clusters can occur if each cluster consists of a single host. If all the host-to-host connections have been defined by the administrators, the configuration is almost the same as the case of a single cluster containing these hosts.
The difference is that because Dprint is managed separately on each host (no “inter-cluster” administrators), no central management is possible. From the user viewpoint, there is no “single-system image”; in other words the configuration is not transparent to the user.

Communications path between two BS2000 clusters

A user sends a print job from host A2 in BS2000 cluster A via a network to BS2000 cluster B.

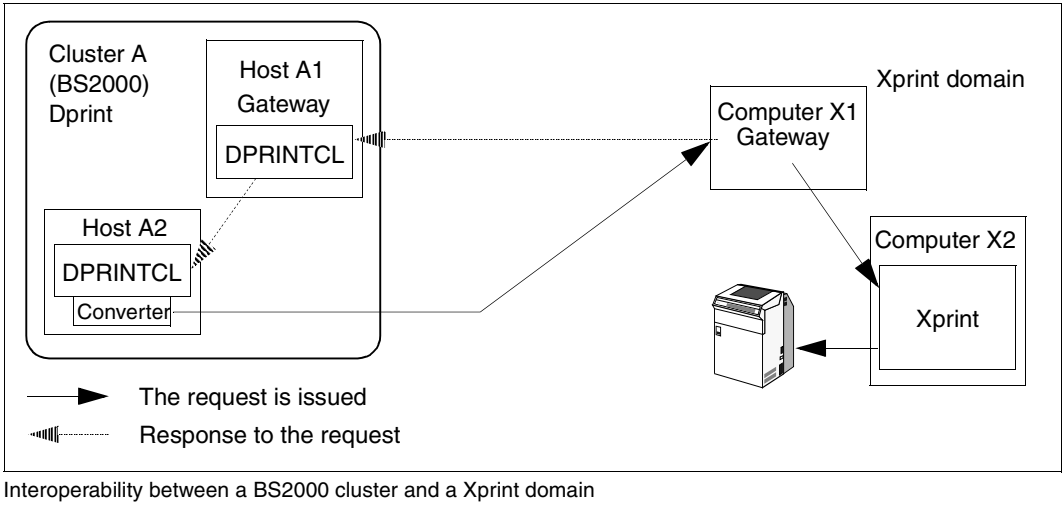
The gateway host B1 in cluster B receives the print job and checks the access authorization. In the event of a positive response, a resource container is created. This is sent to a server (host B2) together with the print job and forwarded via SPOOL to a printer.

On acceptance of the print job, or on request, a response is sent from gateway host B1 in cluster B to cluster A. The response is received by host A2 in cluster A.



Cluster interoperability with two clusters

Communications path between BS2000 cluster and Xprint domain



Interoperability between a BS2000 cluster and a Xprint domain

The communications path here is approximately the same as in the case of the communication between two BS2000 clusters each having one gateway. However, no resource container is created at the gateway in the configuration of the UNIX system. A conversion of the print file is performed.

If no gateway is defined in the BS2000 cluster A, the job cannot then be monitored there.

2.5 Selecting a server

When a print job is submitted the following steps are carried out to select the appropriate server for the job:

1. The printers which satisfy the device type and parameters specified in the PRINT-DOCUMENT command are selected from those printers available in the network.
2. A list of servers will be created according to the selected printers and the access control list. The spoolout class of the server is also used as a selection criterion. If the local server is included in the list, then it will always be put at the top of the list.
   Print jobs can be automatically assigned to a certain server, but only if this server has been assigned a spoolout class. The cluster administrator can dynamically modify the spoolout class without impacting Dprint operation.
   If a printer is started which has a spoolout class which does not match that of the server, then print jobs which are assigned to this server will remain in the “wait” state until a printer with the correct spoolout class is started.
3. The list of selected servers is sorted step-by-step. Each server which is not yet on the list is assigned a probability value. This probability value is calculated from the number of printers which match the server and the number of all matching printers whose server is not included in the list at this stage. A server will then be selected at random and entered in the list.

   For example, the following applies for servers S1, S2 and S3:

   There are three matching printers for S1, two matching printers for S2 and four matching printers for S3. This results in the following sort steps:

Sort step	Free printers	Probability value			Sorted list
1	9	S1:=3/9	S2:=2/9	S3:=4/9	S3
2	5	S1:=3/5	S2:=2/5		S3,S2
3	3	S1:=3/3			S3, S2, S3

4. Exit 096 can then be called. This exit allows the administrator to select a particular server in accordance with print parameters. Further information can be found in the “Spool & Print - Macros and Exits” manual.
5. The servers are accessed in the sequence which resulted from the previous steps.

In a distributed environment it is possible to use filters which are not installed on all client computers in a cluster. The two devices $HP and $HP90 will be created automatically. To be able to access the server you must define in the Dprint configuration printers which belong to the automatically created devices $HP and $HP90. The corresponding server will then be entered in the list.

2.6 User groups

In this manual the user groups are subdivided according to their function areas. A distinction is made here between the activities of the BS2000 systems support, the functions and activities relating to Dprint management, and the use of Dprint by nonprivileged users.

Functions of BS2000 systems support relating to the use of Dprint

– Installation of the Dprint components; meeting the hardware and software prerequisites
– Loading, managing and unloading the Dprint subsystems
– Evaluating SPOOL accounting records
– Controlling logging and evaluating log files
– Monitoring recovery processing

The functions and activities of BS2000 systems support are described in detail starting on page 263.

Tasks and activities relating to Dprint and SPOOL management

The following activities are differentiated with regard to control of Dprint operation:

– management of the clusters by the cluster administrator
– editing of the Dprint configuration file by the cluster administrator
– management of the printers and printer groups by the cluster administrator and the SPOOL administrator
– job control and information provision by the cluster administrator and the SPOOL administrator
– Error recovery by the cluster administrator and the SPOOL administrator

The privilege PRINT-SERVICE-ADMINISTRATION is used as part of the decentralization of the system administration functions; the privilege is assigned to the user ID who is to be the SPOOL administrator. As standard, this privilege is allocated both to the user ID SYSSPOOL and, for reasons of compatibility, also to the user ID TSOS.

The functions and activities of cluster administrator and SPOOL administrator are described starting on page 187.

Use of Dprint by nonprivileged users

Nonprivileged users can generate Dprint jobs by means of the PRINT-DOCUMENT command and control their jobs using, for example, the RESUME-PRINT-JOB and CANCEL-PRINT-JOB commands. They can obtain information about their jobs by means of the SHOW-PRINT-JOB-STATUS command.

Further options are described in chapter “Use of Distributed Print Services by nonprivileged users” on page 133.

2.7 BSD-LPD gateway

Dprint offers a BSD-LPD gateway which runs under POSIX (BS2000) and allows interoperation between BSD clients and the BS2000 distributed print environment (Dprint) using the TCP/IP protocol.

The gateway is available for every standard BSD client (e.g. Wprint) because it conforms to the LPD protocol description of the document RFC1179.

The gateway provides services which support the transfer and deletion of print jobs and can also display print queue information. This means that anyone using the BSD spooler is in a position to:

– print a document within a distributed Dprint printer pool

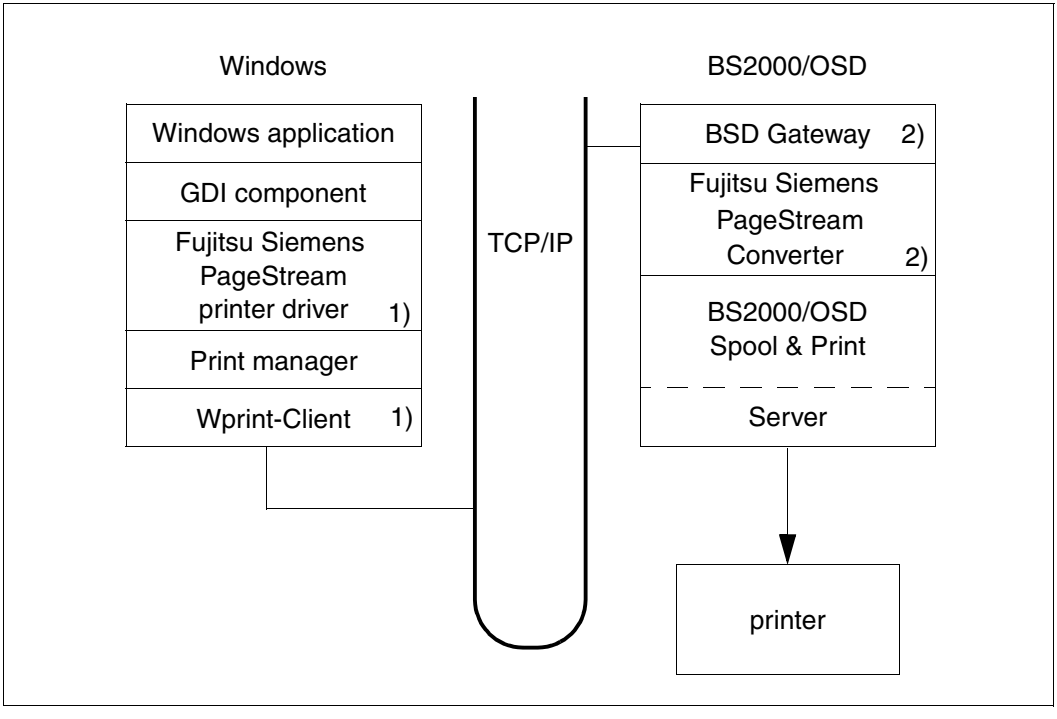
– print a document using an RSO printer or printer pool, providing that RSO is available on the Dprint gateway host on which the BSD-LPD component is installed and running

– call up information about the jobs which have been sent to the print queue and to cancel jobs. However the user cannot call up information about the Dprint print queue.

In particular this makes it possible to send print jobs from Windows clients to BS2000/OSD highspeed printers such as LP, LP65, HP, APA or PCL printers or IDOM servers.
Thanks to additional windows drivers, the so-called Fujitsu Siemens PageStream drivers, specific functions of LP65, PCL and APA printers can be used, in that any Windows document can be printed subject to document layout, mapping and fonts. This is based on the WYSIWYP principle - “What You See Is What You Print”!

2.7.1 Product packaging for using the BSD-LPD gateway

For using the BSD-LPD gateway under POSIX and the following Dprint and Wprint components are necessary:



1) Wprint components
2) Dprint components

Fujitsu Siemens PageStream Printer Drivers for Windows are provided with the release units of Dprint V1.1B. They generate a Fujitsu Siemens independent data stream that will be handled later by the gateway.

The gateway acts firstly as a BSD-LPD server, supporting an industry state protocol for incoming print requests from the TCP/IP network, and subsequently resubmits them in a format suitable for BS2000 print services. It is part of Dprint and runs under POSIX(BS2000).

A PageStream converter receives the Fujitsu Siemens independent data stream and translates it into an AFPDS, PCL or PDF data stream. It is part of Dprint and also runs under POSIX(BS2000).

For external print requests coming from printing domains of UNIX or Windows systems or other BS2000 clusters, a "gateway" host must be defined in a cluster. Within Dprint, the same is necessary to admit Windows clients submitting print jobs on an existing BS2000 Dprint cluster. However, this can only be allowed if certain hardware and software prerequisites are respected.

The gateway host that accepts and handles print requests from BSD clients must have the following features:

Hardware

– BS2000/OSD Business Server / SR2000 Business Server / sparc64 server
– LAN(TCP/IP)
– LAN channel adapter

Software

– BS2000/OSD-BC as of V4.0, OSD-SVP as of V4.0 and OSD/XC as of V1.0.

The following products may be added to increase the functionalities on such a gateway host:

RSO as of V3.1:
: permits access to remote printers, see the corresponding section in the “Usage models” chapter.

SPS as of V3.8:
: permits printing of AFPDS/SPDS documents, see the corresponding section in the “Usage models” chapter.

IDOM as of V1.3:
: permits access to the services of the Document Output Manager.

3 Usage models

The principal usage models for the use of Dprint are illustrated in the following. The models illustrate that Dprint supports features and tuning measures in existing real applications.

The usage models are divided into the following categories:

– central printer servers
– printer sharing
– interoperability between BS2000 clusters
– SPS support
– print resource utilization
– interoperability between BS2000 and Xprint for UNIX systems
– Dprint/RSO coexistence
– usage models for supporting Windows clients

It is assumed for all the described usage models that the necessary hardware and software prerequisites are satisfied.

The following aspects of usage models are discussed:

1. Topology of the systems involved:
   Definition of the cluster; depending on customer requirements, installation of the subsystem DPRINTCL and/or DPRINTSV.
2. Management of print resources:
   Dprint offers customer-specific setup of print resources management (client or server print resources). In this way, many of the already existing usage models can be customized and re-planned.
3. Definition and management of the printers:
   The distributed printers must be defined and managed in such a way as to permit them to be accessed from remote systems.
4. Management of print jobs:
   Certain interesting features are illustrated for existing customer solutions.
5. In the case of models which refer directly to customer solutions, the additional capabilities which are prerequisites for the use of Dprint are likewise discussed.

Each cluster configuration described is created and managed by means of the following cluster administrator commands:

```
CREATE-DPRINT-CLUSTER
MODIFY-DPRINT-CLUSTER
DELETE-DPRINT-CLUSTER
```

For each Dprint configuration described, it is similarly assumed that the cluster administrator defines and manages each configuration object (cluster, server, printer, ACL, host) using the available SPSERVE statements:

ADD-DPRINT-*object*
EDIT-DPRINT-*object*
MODIFY-DPRINT-*object*
SHOW-DPRINT-object

where *object* can represent the following values:

ACCESS-CONTROL, HOST, PRINTER, PRINTER-POOL, REMOTE-CLUSTER or SERVER.

3.1 Usage models for central printer servers

These usage models encompass configurations with central printer servers, each controlling a number of Dprint printers. Such models are extremely useful for computer centers which manage many systems and printers.

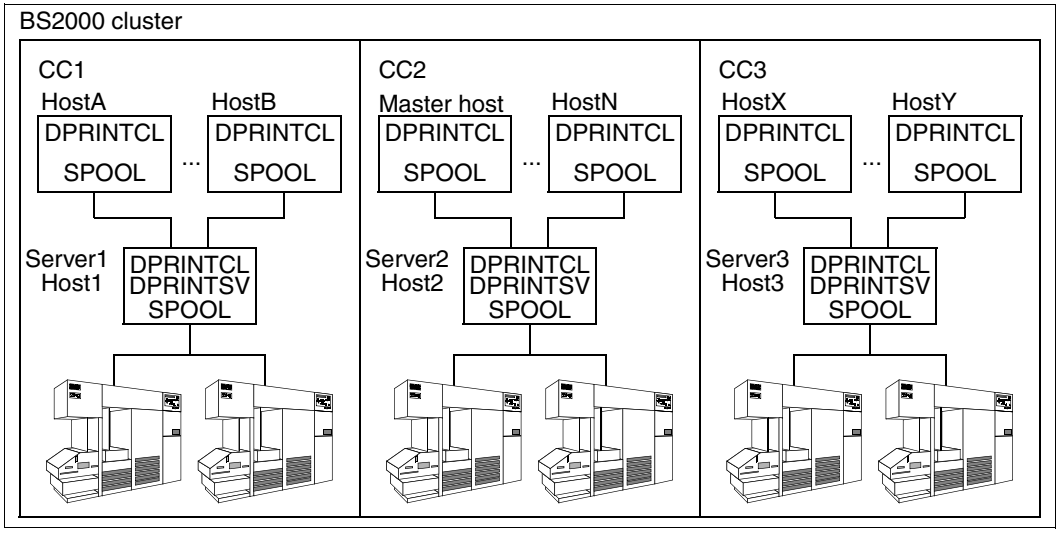
3.1.1 Multiple central printer servers in one cluster

Topology

Firstly, SPOOL must be installed and started on each host in the configuration. The DPRINTCL subsystem is installed on each local system. The DPRINTSV subsystem is installed on the central system. On this basis, a BS2000 cluster is created which contains a number of clients (with DPRINTCL) and a central print server (with DPRINTSV), to which all the Dprint printers are connected.

If some client systems are sited at different locations and if the connections have a low performance rate (such as 64K/s), special BS2000 clusters can be created which contain these clients. It should be noted however that the print resources usage models inside and outside the cluster are different: within a BS2000 cluster, a special resource management process is carried out and a print job can be processed either using the client resources or using the server resources. Outside a BS2000 cluster, no print resources are transferred and the print job is processed utilizing the print resources of the gateway host.

The cluster administrator of the entire BS2000 cluster can, from his/her master host, manage all Dprint printers which are connected to the central print server.



Configuration with several central printer servers in one cluster

The illustration shows a Dprint configuration with one BS2000 cluster. In this model, any of the systems CC1, CC2 or CC3 can issue print jobs with client resources to a print server on CC1, CC2 or CC3.

In order that print jobs having a particular SPOOL class may be accepted, the three Dprint servers are defined as follows:

```
//ADD-DPRINT-SERVER SERVER-NAME=Server1,HOST-NAME=Host1,PRINT-JOB-CLASS=1
//ADD-DPRINT-SERVER SERVER-NAME=Server2,HOST-NAME=Host2,PRINT-JOB-CLASS=2
//ADD-DPRINT-SERVER SERVER-NAME=Server3,HOST-NAME=Host3,PRINT-JOB-CLASS=9
```

In accordance with these server definitions, print jobs issued for SPOOL classes 0, 1 and 9 are automatically directed to server1, server2 and server3 respectively.

Management of print resources

The Dprint cluster can be created in such a way that it utilizes the client resources. To this end, the following command is issued on each client system:

```
/MODIFY-SPOOL-PARAMETERS PRINT-CMD-DEFAULTS=PAR(RESOURCES-LOCATION=*HOME).
```

The forms, however, must be defined both on the client host and on the server host. If the client resources are utilized, the forms used must be defined on client and server with the same name and scope (see also section “Usage models for the utilization of print resources” on page 41).

Dprint also permits changing of the resource names between a client and a server. By activating the exit 94 on client and server, a print job with form A can be accepted on the server with a form having the name B and incorporated into the queue. In this case, the check between client and server resources is bypassed.

Definition and management of printers

Each Dprint printer which is connected to the central print server is defined in the Dprint configuration file by the cluster administrator by means of the SPSERVE statement ADD-DPRINT-PRINTER. The SPOOL parameter definitions already existing on the central server are associated with the Dprint definition with the aid of a pointer.

Management of print jobs

When a print job is issued, the automatic server selection facility then sends all print jobs to the central print server. Each print job in the central system can be managed either by the job originator on any host, by the cluster administrator of the BS2000 cluster or by the SPOOL administrator on the server system. If the DPRINTCL subsystem is not loaded on the central print system, the DPRINTCL operands are not permitted at the SDF user interface.

For example, if a cluster administrator on the master host issues the command SHOW-PRINT-JOB-STATUS SEL=*PAR(USER-ID=*ALL,HOST-NAME=*ALL, SERVER-NAME= *ALL), this provides information about all print jobs which are processed within the entire BS2000 cluster.

Each user in the cluster has available a set of commands which allow actions to be performed on print jobs:

```
CANCEL-PRINT-JOB
MODIFY-PRINT-JOB-ATTRIBUTES
REDIRECT-PRINT-JOB
SHOW-PRINT-JOB-ATTRIBUTES
SHOW-PRINT-JOB-STATUS
```

The entire accounting procedure is handled by the central print server system, on which DPRINTSV is installed and running.

Additional options when using Dprint

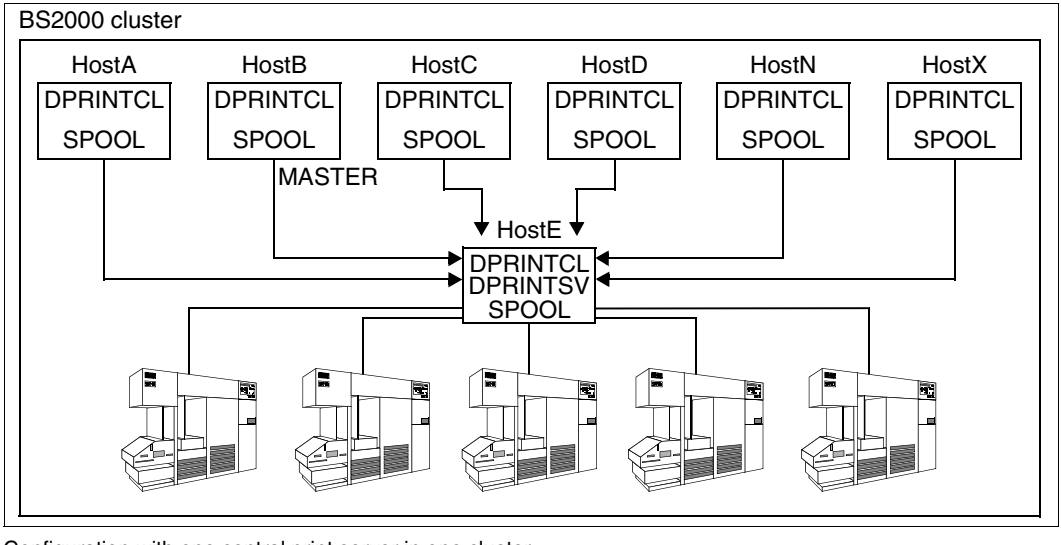
1. Dprint offers the facility to define printing and scheduling measures on the print server. By starting a printer with certain scheduling parameters (e.g. HOST-NAME, USER-ID, SPOOLOUT-CLASS...) it is possible to combine print jobs into packets for a specified user ID or spoolout class.
2. Print jobs can be monitored in their entirety by using special BS2000 commands (see above under “Management of print jobs”) with recovery measures.

3.1.2 One central printer server in one cluster

All available printers are connected to the central system. This configuration, which is normally used in computer centers, is described below.

Topology

The subsystem SPOOL is installed and started on each host in the configuration. The DPRINTCL subsystem is installed on each client system (“home system”). The DPRINTSV subsystem is installed on the central print server (“print system”). The master host is one of the client hosts on which DPRINTCL is installed and started. The DPRINTCL subsystem can also be installed on the central print server if the latter is also to be the master host for the cluster. One BS2000 cluster is created with all the systems in the configuration.



Configuration with one central print server in one cluster

Management of print resources

In this environment, each client system can be adapted for the use of either the client resources or the server resources. The use of server resources, however, necessarily results in a matching resource definition on all hosts within the cluster. When client resources are utilized, on the other hand, each host is able to define and use its own resources. However, the forms on the clients and on the central server must then have matching definitions.

Definition and management of printers

All printers are connected to the central print server. In an environment of this type the cluster administrator defines all these printers as Dprint printers. Here too, cluster administrators or SPOOL administrators can define scheduling and printing measures on the server by starting printers with particular scheduling operands (e.g. HOST-NAME, USER-ID...), or changing them appropriately.

Additional options when using Dprint

1. When server resources are utilized, Dprint offers the facility to define central print resources on the central print server. The print resources do not then need to be defined in every system.
2. Dprint also offers facilities for rerouting from one printer pool to another.
3. As described above, Dprint allows the definition of scheduling measures on the central print server (in respect of user ID, host name,...).
4. Dprint offers the cluster administrator the ability to protect the server objects by means of access control lists.

3.2 Usage models for printer sharing

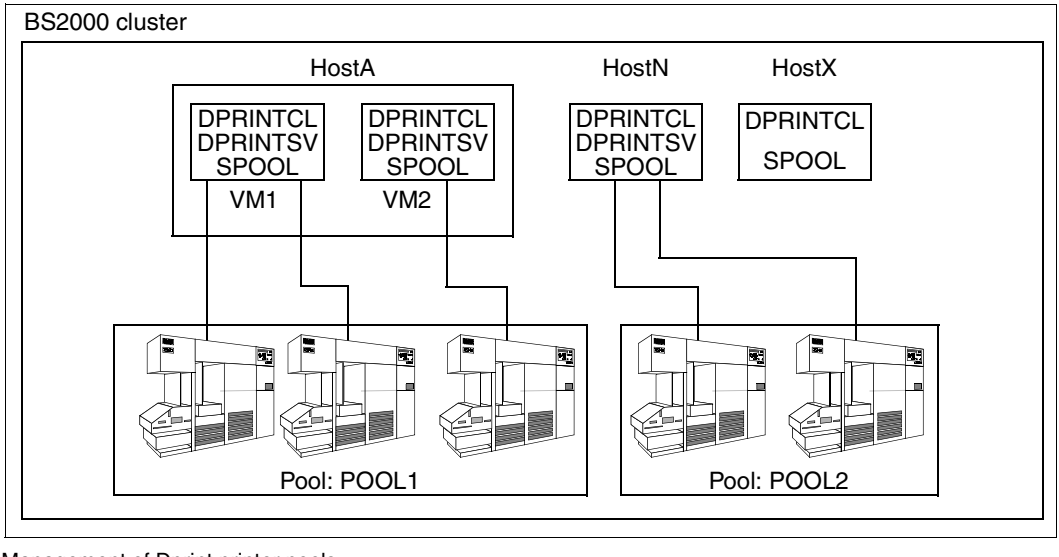
With these models, one or more printers can be shared between the systems. The printers do not necessarily all have to be connected to one central print server, but there can be more than one print server within the configuration.

3.2.1 Multiple printer pools

The main purpose of this model is to facilitate shared usage of printers between systems (BS2000 or VM2000). A Dprint configuration offers the capability of sharing one or more Dprint printers between systems (BS2000 or BS2000 running under VM2000).

Topology

The subsystems SPOOL and DPRINTCL are installed and started on each system (BS2000 or BS2000 running under VM2000) which is to be able to utilize Dprint printers. The DPRINTSV subsystem is installed and started on the system where the printers are connected and made available.



Management of Dprint printer pools

Management of print resources

With regard to satisfying customers' requirements it is possible to choose whether the client resources or the server resources are to be available for use. If the client resources are utilized, the system behavior is to act as if each print job were being transferred to the home system because the printer is switched dynamically from one system to the other. Regardless of what is set in the SPOOL parameter file, end users can always specify the applicable resource type in their print request.

Definition and management of printers

The printer only has to be defined in the SPOOL parameter file on the system to which it is connected and in the configuration file (only its Dprint name and a reference to its local definition). It is also possible to define Dprint printer pools (using the SPSERVE statement ADD-DPRINT-PRINTER-POOLS) to enable users to send print jobs to available destination printers.

Management of print jobs

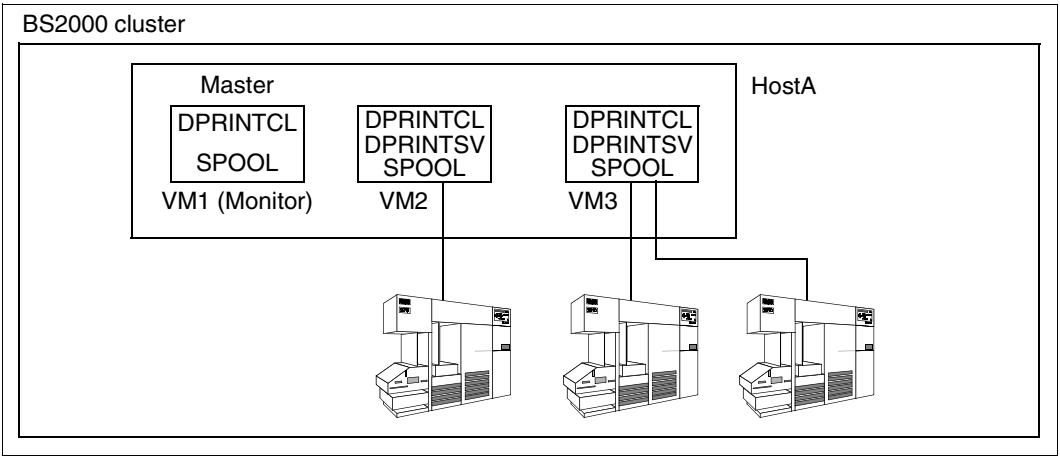
Print jobs which have been issued on any system on which DPRINTCL was installed and started can be transferred to either Dprint pool "POOL1" or "POOL2".

3.2.2 Dprint under VM2000

The virtual machine VM2000 permits simultaneous operations from different, completely self-contained system environments on a mono-computer. The systems are totally independent of one another. The functionality of the systems running under VM2000 corresponds to the original BS2000 commands as far as command set, data communication capabilities in the network, and trace and diagnostic tools are concerned. In this environment, printer sharing is an extremely useful capability which is offered by the VM2000 system. The VM2000 model thus contains different BS2000 systems and one or more printers which are connected to the host and situated between the virtual machines (VMs). Dprint can support more efficient capabilities in a VM2000 environment.

Topology

The subsystem SPOOL must be installed and started on each virtual machine (VM) on which the print capabilities are utilized. The DPRINTSV subsystem is installed and started on each VM on which Dprint printers are started and available. The DPRINTCL subsystem is installed and started on each VM from which Dprint printers that are connected to a different VM are to be addressed.



VM as a BS2000 cluster

Management of print resources

With regard to satisfying customers' requirements it is possible to choose whether the client resources or the server resources are to be available for use. If the client resources are utilized, the system behavior is to act as if each print job were being transferred to the home system because the printer is switched dynamically from one system to the other. Regardless of what is set in the SPOOL parameter file, end users can specify which resources are to be used.

Definition and management of printers

The printers to be shared are defined in the VM2000 device pool which contains all the devices that are generated in the Monitor system. The Dprint printers are assigned to particular VMs. In the figure above, for example, the HP printer is assigned to the VM2 and the LP65 and HP90 printers are assigned to the VM3. The printers are then made available to the VM to which they are assigned. Presupposing that the Dprint printers have been correctly defined in the SPOOL parameter file and in the Dprint configuration, they are then simultaneously accessible from VM1, VM2 and VM3 without any further switching being required from the VM2000 console.

Management of print jobs

Dprint offers the same facilities in the VM2000 environment as in a BS2000 environment.

3.3 Usage models for interoperability between BS2000 clusters

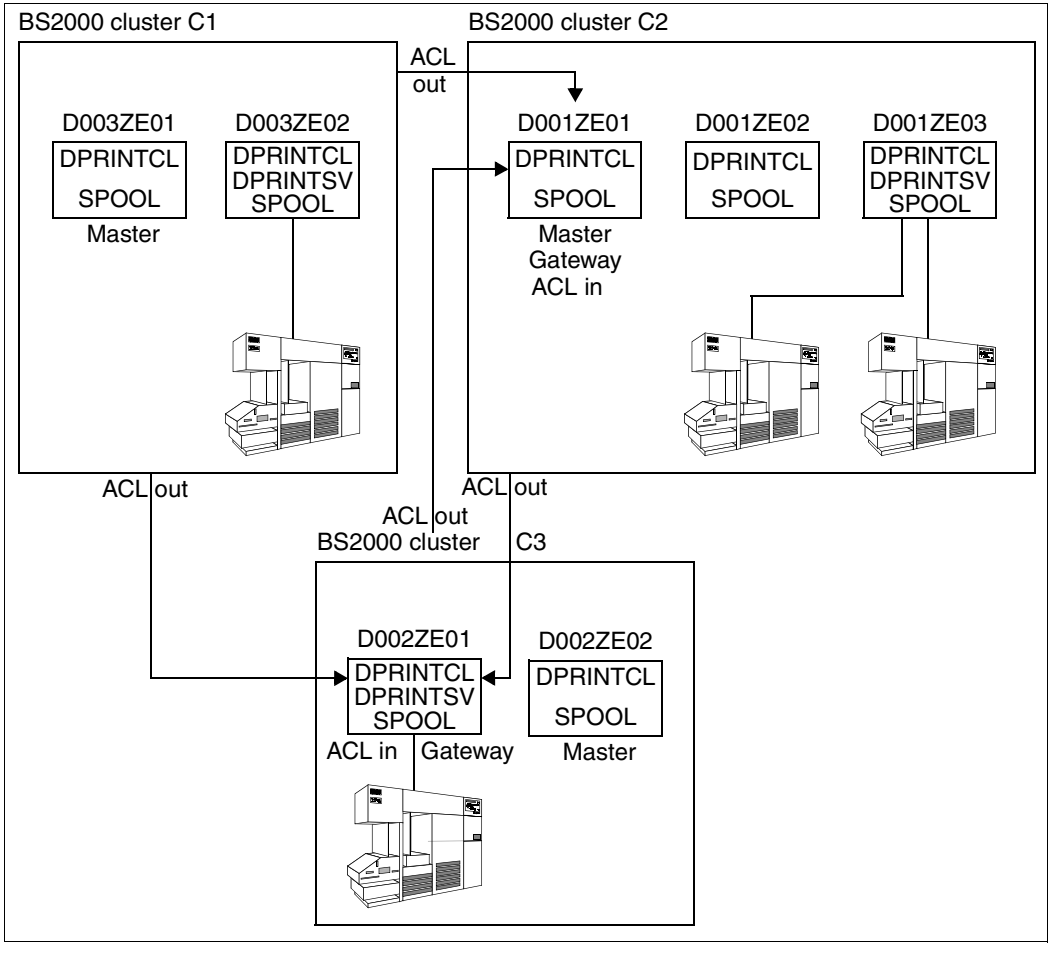
Most of the models illustrated above relate to configurations having one BS2000 cluster. In the case of networked corporate information systems, the capabilities for interoperability between BS2000 clusters are however extremely useful for the distribution of print jobs and for monitoring between clusters. Configurations having two or more clusters enable interoperability between decentralized computer centers. In this situation, each computer center can define its own configuration and manage its resources independently of the other computer centers.

3.3.1 Multiple BS2000 clusters

Topology

Each BS2000 Dprint cluster is defined independently of others. In this environment, all systems are defined as one BS2000 Dprint cluster by a cluster administrator. Each BS2000 Dprint cluster thus represents a management and configuration area which is regarded and used as a single system.

With regard to interoperability, in an existing Dprint cluster other Dprint clusters are additionally defined in the configuration in order that print jobs may be issued to these clusters. Some systems are also defined as a gateway for remote requests. Access control lists on remote clusters and gateways (hosts) can be used in order to guarantee a two-door protection mechanism.



Interoperability between BS2000 clusters

The illustration shows three BS2000 Dprint clusters which are rendered capable of interoperation with one another through the definition of gateways and the use of special communication mechanisms (LAN, TCP/IP-ISO and WAN).

The definition for cluster interoperability is carried out in two stages:

1. Within each Dprint cluster, a gateway is defined which permits the acceptance of remote print jobs in the cluster. Access control lists can be assigned to the gateway hosts (ACL in).

   Example (within cluster C2)

   ```
   //ADD-DPRINT-HOST HOST-NAME=D001ZE01,ACCESS-FROM-CLUSTER=*ALL-USERS
   ```

2. In each Dprint cluster, the other remote clusters which can receive print jobs are defined with optional access control lists (ACL out).

   Example (within cluster C1)

   The access control lists are defined by means of the following SPSERVE statements:

   ```
   //ADD-DPRINT-ACCESS-CONTROL ACCESS-CONTROL-NAME=ACL1,
                  SUBJECT=*ALL-USERS(ADMISSION=*YES)

   //MODIFY-DPRINT-ACCESS-CONTROL ACCESS-CONTROL-NAME=ACL1,
                  SUBJECT=*HOST(HOST-NAME=D003ZE01,ADMISSION=*NO)
   ```

   The users of host D003ZE01 are not allowed to send requests to cluster C2. Only the users of host D003ZE02 are authorized to do this.

   ```
   //ADD-DPRINT-REMOTE-CLUSTER CLUSTER-NAME=C2,TYPE=*BS2000,
               NETWORK-ADDRESS=D001ZE01, ACCESS-TO-CLUSTER=
               *BY-ACCESS-CONTROL(ACC-CONT-NAME=ACL1)
   ```

In the figure, interoperability is permitted between all three Dprint clusters, apart from the fact that cluster C1 is not accessible from clusters C2 and C3 because there is no gateway defined within cluster C1.

Management of print resources

In the case of print jobs which have been issued to a remote cluster, no print resources are transferred (see section “Usage models for the utilization of print resources” on page 41). Each print job is executed using the print resources which are present on the gateway host. If the print job is processed on a server which is not the gateway host, it will be processed with the gateway resources; a resource container is created and transferred to the selected server.

Several SPOOL commands are available for providing information about the gateway resources (only forms and character sets). The program PRM (Print Resources Management) does not permit the output of physical resources (loop, FOB, font, string...) on a remote system. Therefore, only the “logical” resources such as forms and character sets which are defined in the SPOOL parameter file can be output by a remote system.

The following SPOOL commands allow the forms and character sets of the gateway of cluster C3 to be output on cluster C1:

```
/SHOW-SPOOL-FORM CLUSTER-NAME=C3

/SHOW-SPOOL-CHARACTER-SETS CLUSTER-NAME=C3
```

Definition and management of printers

The printers are defined and managed in each cluster by the cluster administrator or SPOOL administrator independently of other clusters.

Amongst BS2000 Dprint clusters, users can request information about Dprint printers with the following SPOOL commands:

```
/SHOW-DPRINT-PRINTERS CLUSTER-NAME=...
/SHOW-DPRINT-PRINTER-POOLS CLUSTER-NAME=...
/SHOW-ACTIVE-SPOOL-DEVICES CLUSTER-NAME=...
```

Management of print jobs

Amongst BS2000 Dprint clusters, various SPOOL commands are available to users which allow them to manage their print jobs, i.e. print, modify, cancel and display them:

```
/PRINT-DOCUMENT TO-PRINTER(CLUSTER-NAME=...)
/MODIFY-PRINT-JOB-ATTRIBUTES JOB-ID=*TSN(TSN=...,CLUSTER-NAME=...)
/CANCEL-PRINT-JOB JOB-ID=*TSN(TSN=...,CLUSTER-NAME=...)
/SHOW-PRINT-JOB-ATTRIBUTES JOB-ID=*TSN(TSN=...,CLUSTER-NAME=...)
/SHOW-PRINT-JOB-STATUS ...
```

3.4 Usage models for the utilization of print resources

This section details which resources are used for the different usage models. With regard to the use of Dprint, the following usage models are differentiated for the utilization of print resources:

– within a BS2000 Dprint cluster

– between a number of BS2000 Dprint clusters

3.4.1 Print resource usage within a BS2000 cluster

Dprint supports a simplified model for the management of print resources in conjunction with the product PRM (Print Resources Management); in other words, Dprint uses no special services for management of the print resources.

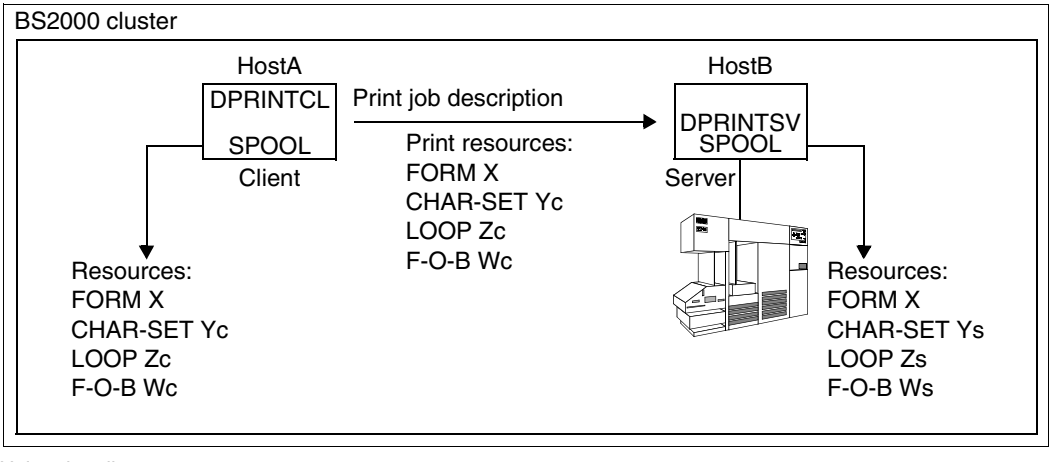
Within a BS2000 Dprint cluster, Dprint supports two models for print resources usage:

– print jobs are processed using the client resources

– Print jobs are processed using the server resources

Using the client resources

In this model the print jobs are processed using the client resources. A resource container is created and transferred to the selected server.



Using the client resources

With this model it should be noted that the form has to be defined on the client and the server with a minimum matching requirement (same form name, device type, page size, line length, band ID, PCL# and character image). Consequently, the definitions in the SPOOL parameter file on each system belonging to a cluster must match in these respects. This concerns only the form name and the aforementioned attributes. The identity must not be defined by way of other logical resource names, such as character set xyz for example.

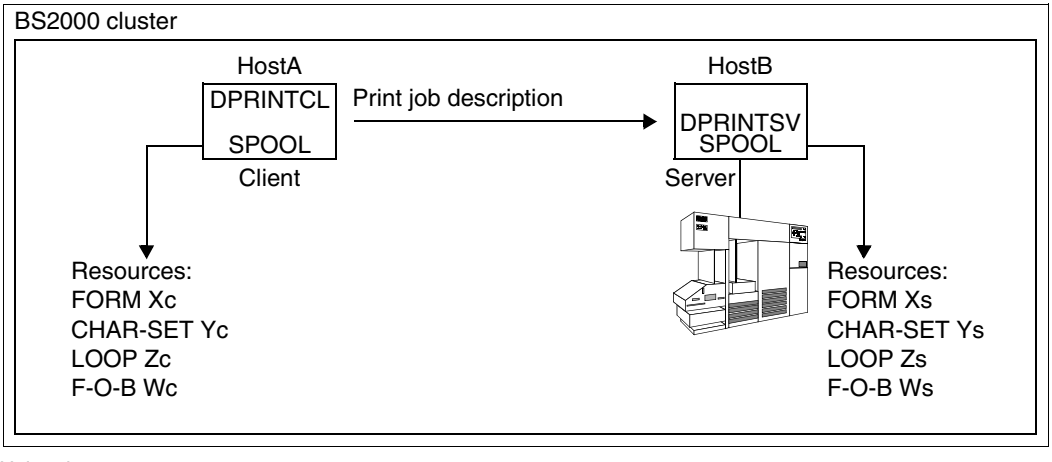
This model permits a “natural” conversion of a non-Dprint operation (wherever the resources of the home system are used) into a Dprint operation where any Dprint printer is used and the print resources are automatically transferred from the client to the server.

Example

```
/PRINT-DOCUMENT FROM-FILE=file,RES-DESCRIPTION=*PAR(FORM-NAME=X,
                OVERLAY-RESOURCES=*PAR(FORMS-OVERLAY-BUFFER=Wc),
                RESOURCE-LOCATION=*HOME)
```

Using the server resources

In this model the print jobs are processed using the server resources. When server selection is made, it is assumed that the required print resources are defined on the selected server. Once the server has been selected, the print jobs are processed entirely using the server resources.



Using the server resources

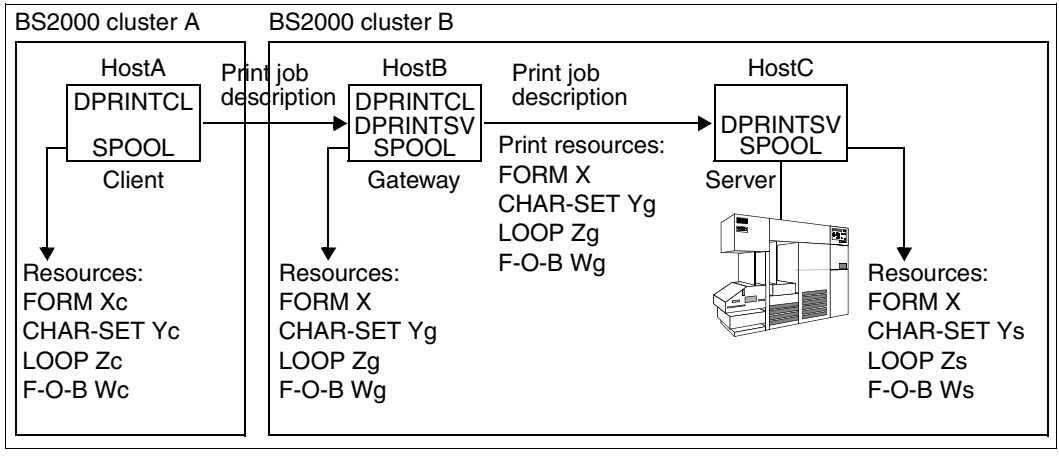
With this model, therefore, the print resources do not have to be available on the client host from which the print job is issued.

Example

```
/PRINT-DOCUMENT FROM-FILE=file,RES-DESCRIPTION=*PAR(FORM-NAME=Xs,
                OVERLAY-RESOURCES=*PAR(FORMS-OVERLAY-BUFFER=Ws),
                RESOURCE-LOCATION=*SERVER)
```

3.4.2 Print resource usage between BS2000 clusters

No resources are transferred between BS2000 Dprint clusters. A Dprint cluster is regarded as one administration and configuration unit (single system image). The usage models described above apply within this unit. Outside this unit, in other words outside the local cluster, no resources are transferred. Print jobs to other clusters are processed using the print resources which are defined on the gateway host of the remote cluster.



Resource usage between BS2000 clusters

Example

```
/PRINT-DOCUMENT FROM-FILE=file,RES-DESCRIPTION=*PAR(FORM-NAME=X,
                OVERLAY-RESOURCES=*PAR(FORMS-OVERLAY-BUFFER=Wg)),
                TO-PRINTER=*PAR(CLUSTER-NAME=B)
```

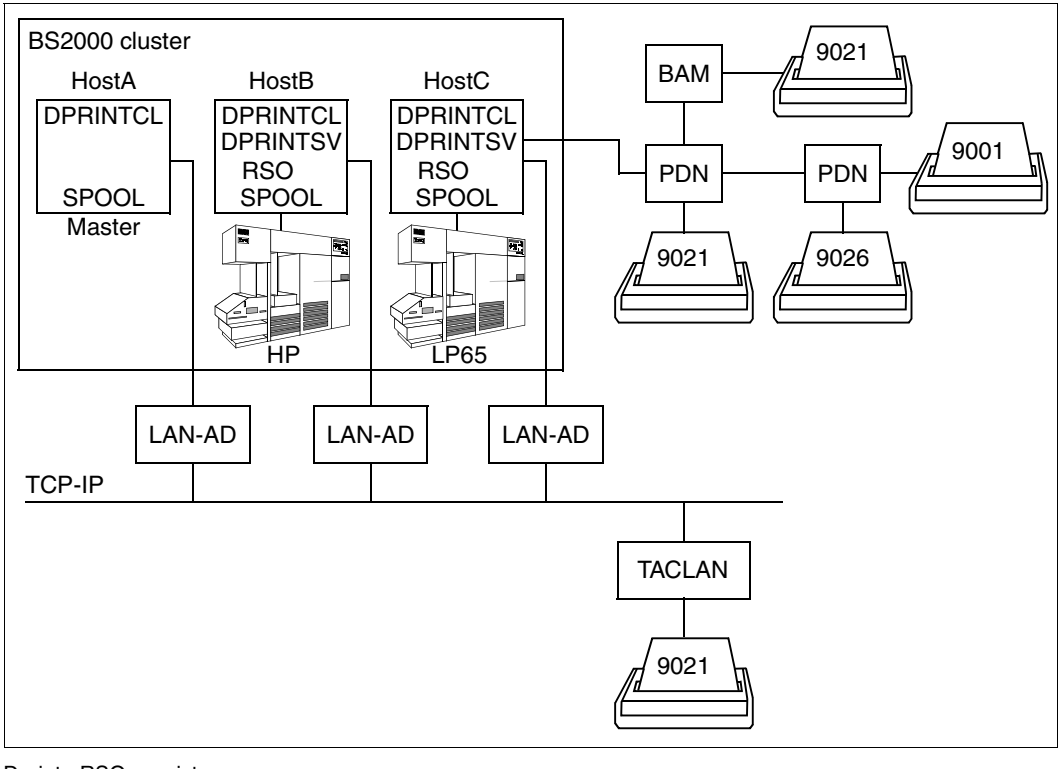
3.5 Usage models for Dprint - RSO coexistence

The subsystems DPRINTCL and DPRINTSV offer a capability for coexistence with the RSO subsystem. RSO is the center in a “star network” because it can access all printers which are connected in the TRANSDATA network, irrespective of the path used to access them. It is not necessary to go via another host.

There is no client/server architecture for RSO. Print jobs directed to RSO are always processed by the RSO subsystem which is installed and started on the system on which the print request was issued.

Topology

The RSO subsystem must be installed and started on each host through which printers which are connected to a TRANSDATA network or to a LAN (ISO or TCP-IP) have to be addressed. The subsystem SPOOL must similarly be installed and started on these hosts. The Dprint subsystems (DPRINTCL and/or DPRINTSV) can be installed and started regardless of whether or not the RSO subsystem is present.



Dprint - RSO coexistence

Management of print resources

Print jobs to an RSO printer (the RSO printer must be addressed directly) are thus processed in their entirety by the local RSO subsystem and are then printed using the print resources present on that system.

Definition and management of printers

Because RSO offers no distribution capabilities even in the case of a client/server model, an RSO printer must be defined and started on each BS2000 system through which the printer has to be addressed. The definition and management of the printers remain the same; in other words, the management functions (SPOOL administrator, systems support or RSO device administrator) remain the same as in local operation (only with the subsystem SPOOL).

Management of print jobs

The management of print jobs remains exactly the same as without Dprint (only RSO and SPOOL). In this situation, the cluster administrator has no control over the print jobs which are processed by a remote RSO subsystem (on a remote BS2000 system).

SPOOL offers the capability of redirecting print jobs between RSO printers or printer pools and SPOOL printer pools. With the Dprint subsystems, only print jobs which are managed by the home server can be redirected from/to RSO printers or printer pools; in other words, no new server may be selected with the REDIRECT-PRINT-JOB command.

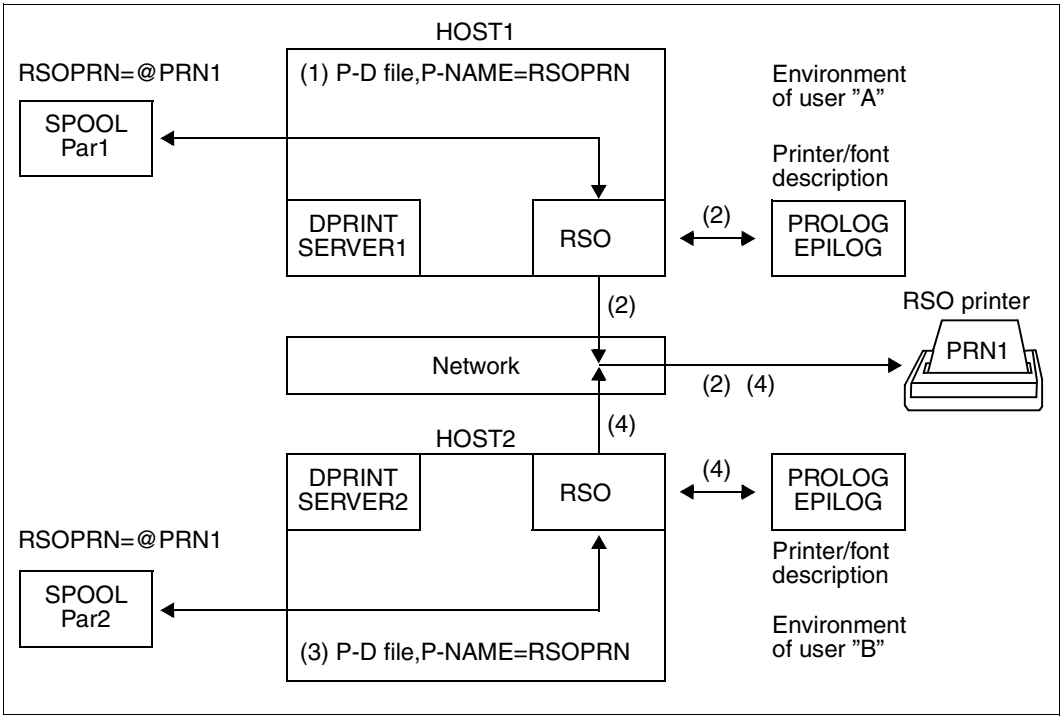
The following redirection options thus exist in Dprint operation:

– Redirection of RSO printers or printer pools to SPOOL or Dprint printer pools containing at least one printer which is managed by the home server.

– Redirection of SPOOL or Dprint printer pools, containing at least one printer which is managed by the home server, to RSO printers or printer pools.

By using the SPOOL command MODIFY-PRINT-JOB-ATTRIBUTES it is possible to modify the destination specification for a print job and thus redirect the print job from one destination to another within a BS2000 cluster. Under Dprint-RSO coexistence, it is possible to modify the destination specification for RSO print jobs to any printer pool within the BS2000 cluster (SPOOL printer pools which are managed by the home server, or any Dprint printer pools).

Example



RSO jobs in a Dprint environment

From HOST1

1. User “A” directs a print job to the printer PRN1:

   ```
   /PRINT-DOCUMENT FROM-FILE=file,TO-PRINTER=*PAR(PRINTER-NAME=RSOPRN)
   ```

2. Using the RSO-specific information from the SPOOL parameter file of HOST1, RSO sends the contents of the user file to the printer PRN1, along with all the data associated with the definition of the environment on HOST1 (PROLOG, EPILOG, font string,...).

From HOST2

3. User “B” directs a print job to the printer PRN1:

   ```
   /PRINT-DOCUMENT FROM-FILE=file,TO-PRINTER=*PAR(PRINTER-NAME=RSOPRN)
   ```

4. Using the RSO-specific information from the SPOOL parameter file of HOST2, RSO sends the contents of the user file to the printer PRN1, along with all the data associated with the definition of the environment on HOST2 (PROLOG, EPILOG, font string,...).

In these cases, sharing of the printer PRN1 between HOST1 and HOST2 is handled by the RSO subsystem which is running on the host involved. If RSO attempts to establish the connection with the printer PRN1 from a system, this action will be rejected by the network if a connection already exists between the printer and another partner (e.g. RSO on another host).

RSO repeats the attempt to establish the connection (for as long as specified in the SPOOL parameter file) and obtains the connection as soon as the previous partner has cleared down its connection.

3.6 Usage models for interoperability between Dprint and Xprint

Print interoperability between BS2000 and Xprint for UNIX systems is supported. It is implemented by means of the gateways between the clusters. The interoperability is based on interchanging structures. This is offered through the ISO-DPA Class 1 accordance with extensions. The extensions comprise features which are already supported by the two spoolers of BS2000 and Xprint.

The global topology and the communications paths between the clusters which serve to enable print interoperability between BS2000, UNIX and Windows systems are illustrated in section “Interoperability between BS2000 systems, UNIX systems and Windows systems” on page 215. Information is also given concerning the format attribute of the documents, about the filter functionality, definition and selection, the supplied standard system filters, and the activation of the customer filters via system exit 093.

3.6.1 Access to Xprint via Dprint and BS2000-SPOOL

Topology

One or more BS2000 clusters are defined (for description see page 37). From the BS2000 side, the Xprint configuration is viewed as a cluster of UNIX systems. This is defined as follows in the Dprint configuration of the BS2000 cluster:

```
//ADD-DPRINT-REMOTE-CLUSTER
      CLUSTER-NAME=UNIX-cluster-name ,
      TYPE=*UNIX-TCP(
             INTERNET-ADDRESS=UNIX-gateway-internet-address ,
             PORT-NAME=UNIX-gateway-portname ,
             GATEWAY-NAME=logical UNIX-gateway-name ,
             HOST-NAME=logical UNIX-gateway-host-name ,
             HOME-GATEWAY-ADD=logical BS2000-gateway-address) ,
      NETWORK-ADDRESS=logical UNIX-gateway-address
      [,...]
```

In the Xprint domain, the UNIX gateway must be defined as follows in the Xprint database:

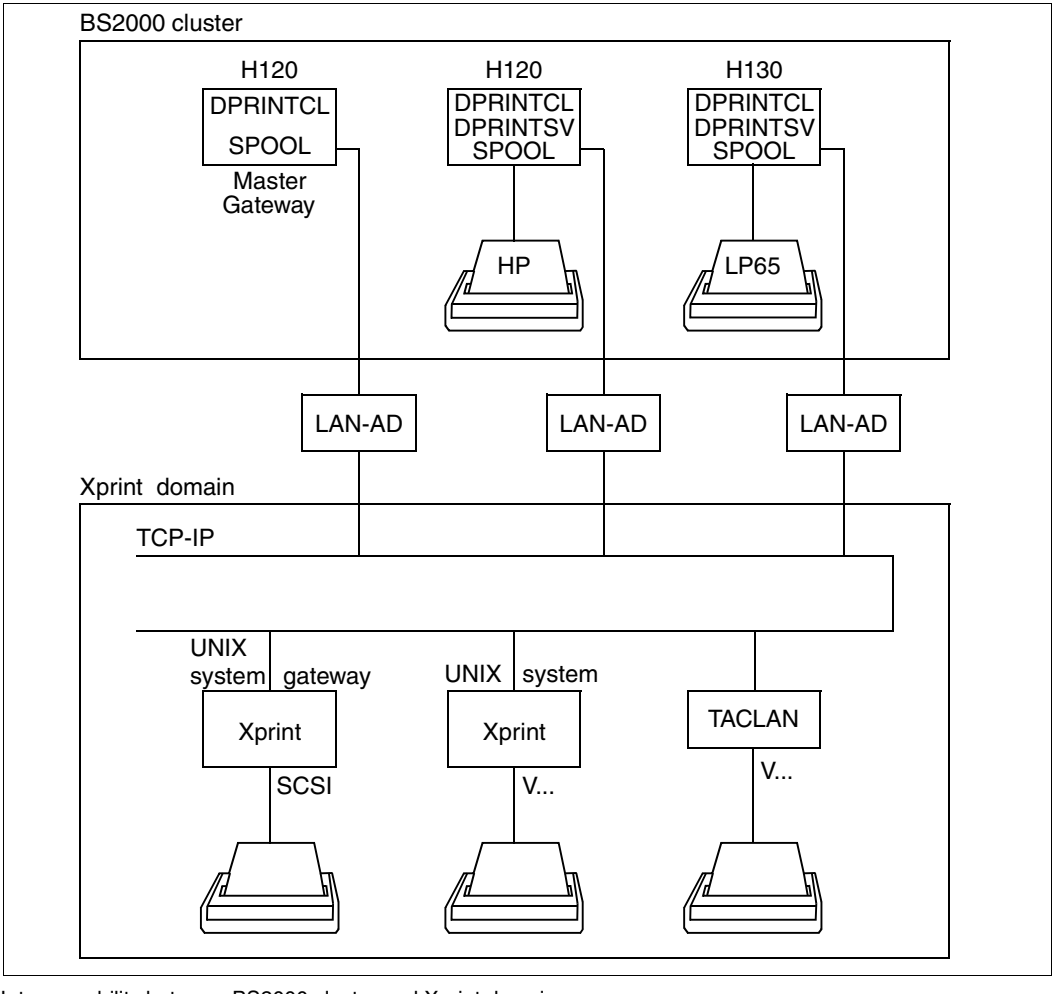
```
xpadd -gateway UNIX-gateway-name ...
```

The BS2000 gateway must similarly be defined in the Xprint database:

```
xpadd -gateway BS2000-gateway-name ...
```

The host with UNIX operating system on which the gateway is located must be defined in BCAM. In order to enable access to the computer, the latter must be activated by means of the /BCIN command.

As well as being defined in the Xprint database, the gateway of the BS2000 cluster must also be defined in the Naming Service, which corresponds to the Transport Service Provider that is used by Xprint (ISO or TCP-IP).



Interoperability between BS2000 cluster and Xprint domain

A BS2000 cluster can interoperate with a Xprint domain: BS2000 users can issue and monitor a job in a Xprint configuration, and also request information about printer objects (see section “Printing with Dprint in heterogeneous clusters” on page 149).

Availability of printers

All printers supported by Xprint are accessible from a BS2000 cluster. This presupposes that the local administrator of the UNIX system has defined them as Dprint objects for the corresponding BS2000 cluster.

All standard printer types or emulations (HP Laserjet, PostScript, IBM-Proprinter, EPSON-FX/LQ, RENO, ECMA, DIABLO-630,...) with the usual interface types (RS232, RS422, CENTRONICS, SCSI,...) can be used.

The list of names of printers and printer groups made available by the Xprint administrator for BS2000 cluster users can be displayed by means of the commands SHOW-DPRINT-PRINTERS and SHOW-DPRINT-PRINTER-POOLS.

Management of print resources

Resources are not distributed between clusters. The resources specified in the print request (form, character set) are not validated by the BS2000 cluster. Xprint does, however, compare these resources with the resources defined in its database:

– The ‘form’ name specified in the print request is regarded as a Xprint ‘form’ name.

– The ‘character set’ name specified in the print request is regarded as a Xprint ‘font’ name.

Because there is neither resources distribution nor administration distribution between clusters, it should be noted that there is no command which allows BS2000 users to obtain information about available Xprint form names and font names. The UNIX system based cluster administrator must therefore provide the BS2000 cluster administration with a list of form names and font names. The BS2000 cluster administrator can then pass this information on to the users in the cluster.

Definition and management of printers

The UNIX system based printers and/or printer pools that are to be made accessible to BS2000 clusters must be defined as follows in the Xprint database:

`xpadd –dev` *Xprint-printer-name*
`xpadd –dgr` *Xprint-printer-pool-name*

Complete definition and management of the printers is performed by the Xprint administrator in the Xprint domain.

The end user in the BS2000 cluster has the following BS2000-SPOOL commands available for the output of information about addressable UNIX system based printers:

Static printer definition:

```
/SHOW-DPRINT-PRINTERS CLUSTER-NAME=...
/SHOW-DPRINT-PRINTER-POOLS CLUSTER-NAME=...
```

Dynamic printer status:

```
/SHOW-ACTIVE-SPOOL-DEVICES CLUSTER-NAME=...
```

Management of print jobs

The functionality offered by ISO Class 1 means that it is possible to issue, cancel and output print jobs using Dprint. The corresponding BS2000 commands, which are available to all BS2000 users, are the following:

```
/PRINT-DOCUMENT
/CANCEL-PRINT-JOB
/SHOW-PRINT-JOB-STATUS
/SHOW-PRINT-JOB-ATTRIBUTES
```

Supported standard filters

The DPRINTCL subsystem is supplied with two filters (SYS0110H and SYS0610H) for this interoperability. The filter SYS0110H supports only SAM files which are cataloged in BS2000. It permits the printing of text documents (identified by means of DOCUMENT-FORMAT=*TEXT(...)) and of printer-language-dependent documents (identified by means of DOCUMENT-FORMAT= *SPECIAL-FORMAT(...)). And only these operands are checked by the filter.

The filter also converts the original file, dependent on the value of the LINE-SPACING and CONTROL-CHAR-POS operands.

In addition, conversion from EBCDIC to ASCII is performed by the filter if DOCUMENT-FORMAT=*TEXT(...) is specified. If DOCUMENT-FORMAT=*SPECIAL-FORMAT(...) is specified, this conversion is performed on the UNIX system based gateway.

The new filter (SYS0610H) makes it possible to use Xprint to print existing BS2000 HP documents on a high-performance PCL printer connected to a UNIX system.

For further information, refer to section “Document format and filter mechanism” on page 221.

3.6.1.1 Prerequisites and definitions

As is also the case with the interoperability between BS2000 clusters, no administration is supported between BS2000 clusters and Xprint domain.

The following describes the prerequisites for accessing a printer connected to a UNIX system based host from BS2000-SPOOL when using Dprint. The definitions appear in chronological order.

Product versions

– BS2000-SPOOL V4.4 or higher
SPOOL must be loaded at least on the gateway host of the BS2000 cluster and on the BS2000 host from which the print job is issued.

– Xprint V6.0
Xprint must be loaded at least on the gateway host of the UNIX domain (with the gateway package) and on the UNIX system based hosts on which the print job is executed (server and supervisor).

– Distributed Print Services V1.0J or higher
The client part of Dprint (subsystems DPRINTCL and DPRINTCM) must be loaded at least on the gateway host of the BS2000 cluster and on the BS2000 host from which the print job is issued.

– Exit 093
If customer filters are to be used, the subsystem corresponding to exit 093 (name freely selectable by system administration) must be loaded on the BS2000 host from which the print job is issued.

The software prerequisites pertaining to the individual products are described in the respective manuals.

Dprint definition

In order to transfer print requests to a Xprint domain, the BS2000 cluster administrator must define a “remote cluster” object in the Dprint configuration. The Xprint domain is made available through definition of the address of its gateway amongst other things (see below under “Xprint definition”).

This is done with the aid of the SPSERVE statement ADD-DPRINT-REMOTE-CLUSTER. Here the operand CLUSTER-NAME is used to specify the logical name of the remote cluster which must be unique within the cluster configuration. TYPE specifies whether the ISO protocol or the TCP/IP protocol is used for accessing the gateway of the Xprint domain. The BCAM address of the gateway of the Xprint domain is defined by means of the operand

NETWORK-ADDRESS. In addition, the operand ACCESS-TO-CLUSTER allows the specification of an access control list which can be used to restrict access to the Xprint domain for some users.

In order for the gateway of the Xprint domain to be able to respond to requests from the BS2000 cluster, the BS2000 cluster administrator must define a BS2000 gateway in his/her configuration. This is done by using the SPSERVE statements ADD-DPRINT-HOST or MODIFY-DPRINT-HOST.

BCAM definition

The UNIX system based host which acts as a gateway in the Xprint domain must be defined in BCAM. This is done either statically in the RDF (resources definition file) by means of the XPRO macro or dynamically using the BCIN command. In order to enable access to the computer, this must be activated by means of the BCIN command.

Xprint definition

In order to enable external clusters to access a Xprint domain, the Xprint administrator must define at least one UNIX system based gateway in the Xprint database. This is done by using the command 'xpadd -gtw...'. The UNIX system based gateway corresponds to the object “Dprint remote cluster”, which is defined in the Dprint configuration file (see “Dprint definition” on page 52).

A gateway must be defined on the BS2000 cluster (see above) for responses to BS2000 requests which are returned from the Xprint domain. In addition to the definition in the Dprint configuration file, the gateway must also be defined in the Xprint database. This is likewise done using the command 'xpadd -gtw...'.

Xprint printers and/or printer groups which are to be accessed from BS2000 clusters must be defined in the Xprint database. For printers this is done using the command 'xpadd -dev...' and for printer groups by using 'xpadd -dgr...'. It should be noted here that the names of printers and printer groups which are to be available to BS2000 clusters should not exceed 8 characters in length, thus allowing them to be specified in the PRINT-DOCUMENT command.
Any BS2000 cluster user can use the commands SHOW-DPRINT-PRINTERS and SHOW-DPRINT-PRINTER-POOLS to request a list of the available Xprint printers and printer groups.

Forms and character sets, which are specified in the PRINT-DOCUMENT command by way of the operands FORM-NAME and CHARACTER-SETS, relate to objects 'form' and 'font' which are defined in the Xprint database. Since the maximum lengths of form name and character set name are 6 and 3 characters respectively in the PRINT-DOCUMENT command, at least one Xprint 'form' and 'font' should be defined, taking this constraint into consideration.

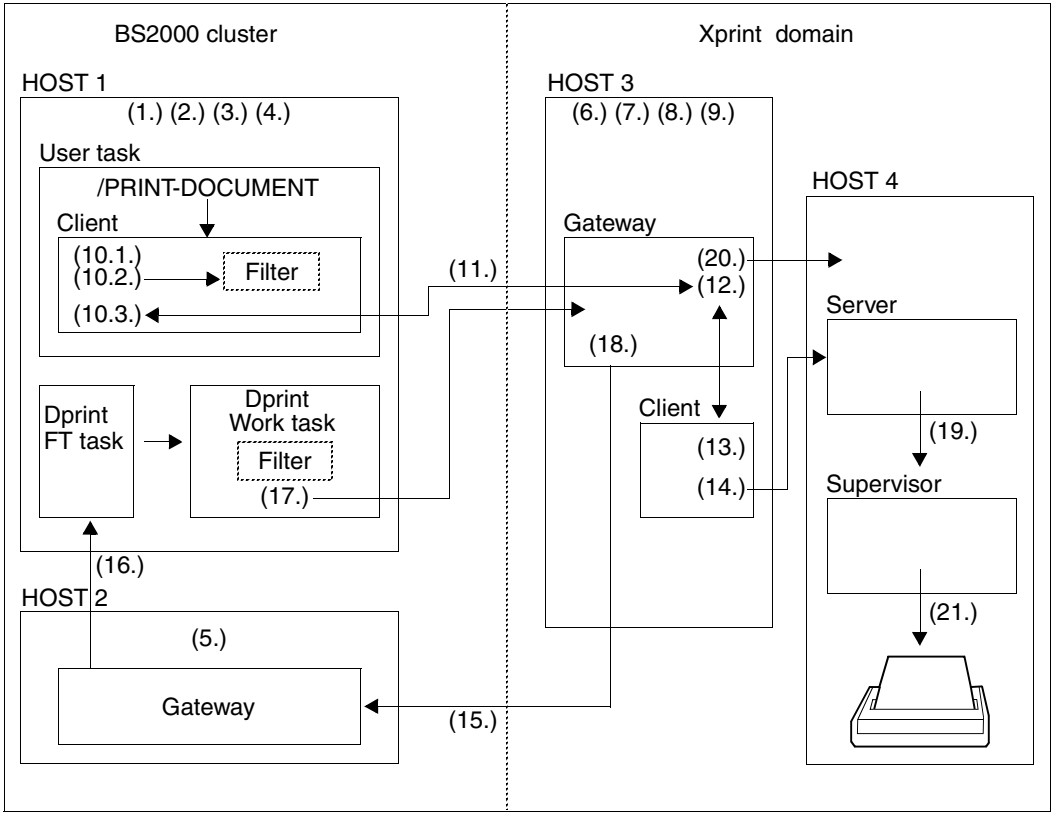
For details on the definitions of UNIX system based gateways and BS2000 gateways, UNIX system based printers and printer pools, and also 'form' and 'font', refer to the Xprint manuals.

Definition in UNIX systems

As well as being defined in the Xprint database, the BS2000 cluster gateway must also be defined in the Naming Service, which corresponds to the Transport Service Provider that is used by Xprint. In the case of ISO/OSI network protocols, the gateway must be defined in TNSDIR by using the product TNSADMIN. With TCP/IP network protocols, an entry describing the BS2000 gateway host must be created in the file /etc/hosts.

3.6.1.2 Example of definition and use

The steps, in chronological order, involved in the definition and use of interoperability between BS2000 and UNIX systems are shown and subsequently explained on the basis of the following illustration.



Example of definition and use of interoperability between BS2000 and UNIX systems

Definition

1. Definition of the Xprint domain by means of SPSERVE:

```
//ADD-DPRINT-REMOTE-CLUSTER
//            CLUSTER-NAME=Xprint-domain-name
//           ,TYPE=*UNIX-TCP(
//                INTERNET-ADDRESS=UNIX-gateway-internet-address
//               ,PORT-NAME=UNIX-gateway-port-name
//               ,GATEWAY-NAME=local-UNIX-gateway-name
//               ,HOST-NAME=local-UNIX-gateway-host-name
//               ,HOME-GATEWAY-ADD=logical BS2000-gateway-address
//           ,NETWORK-ADDRESS=logical UNIX-gateway-address
//          [,...]
```

2. Definition of the BS2000 cluster gateway with SPSERVE

```
//ADD-DPRINT-HOST
//            HOST-NAME=logical BS2000-gateway-address
//          [,...]
```

3. Definition and activation of the UNIX system based gateway host

```
[XPRO  PRONAM=logical UNIX-gateway-address,...]
/BCIN logical UNIX-gateway-address,...
```

4. Definition and activation of the BS2000 gateway host

```
[XPRO  PRONAM=logical BS2000-gateway-address,...]
/BCIN logical BS2000-gateway-address,...
```

5. Definition and activation of the BS2000 client host

```
[XPRO  PRONAM=logical BS2000-client-address,...]
/BCIN logical BS2000-client-address,...
```

6. Definition of the UNIX system based gateway

```
e.g.: xpadd -gtw ... -tp LOCAL
```

7. Definition of the BS2000 gateway

```
e.g.: xpadd -gtw ... -tp PARTNER
```

8. Definition of the BS2000 gateway in the Naming Service
9. Definition of the logical name of the printer attached to the UNIX system:

```
xpadd -dev Xprint-printer-name ...
```

Use

10. Validity checks

    1. The PRINT-DOCUMENT command is issued:

    ```
    /PRINT-DOCUMENT FROM-FILE=file
          [,RESOURCES-DESCPRIPTION=*PARAMETERS(
                    FORM-NAME=Xprint-form-name)]
          ,TO-PRINTER=*PARAMETERS(
                    PRINTER-NAME=Xprint-printer-name
                   ,CLUSTER-NAME=Xprint-domain-name)
    ```

    The first validity check is performed.

    2. Depending on the value of the operand DOCUMENT-FORMAT (not specified here, so *TEXT), the corresponding filter is selected and activated in order to perform the second validity check. The filter can be a customer filter utilizing exit 093 or a standard system filter.

    3. Following confirmation by the filter, the third validity check in respect of interoperability is performed. The print job is converted into GIP format (Global Interchange Protocol) to enable interoperability.

11. The converted print request is then sent to the Xprint gateway for renewed validity checking. It must contain all the information required for the transfer of the file to be printed.

12. Once the print job has been completely received, the gateway converts it into the corresponding structure for Xprint. The gateway performs only a mapping of structures.

13. The validity check is then performed by the Xprint client. The result of this check is returned via the same communication mechanisms by the UNIX system based gateway to the BS2000 client.
    The PRINT-DOCUMENT command is thus confirmed as invalid or successful. If it successfully accepted, the user also receives the Xprint job identification as confirmation.

14. The print job is processed by Xprint. The gateway places the print job in the “non printable” status.

15. The file transfer of the file to be printed is performed when then is requested by the UNIX system based gateway. To this end, the UNIX system based gateway sends an 'Init File Transfer' request to the BS2000 gateway and waits for this to be acknowledged.

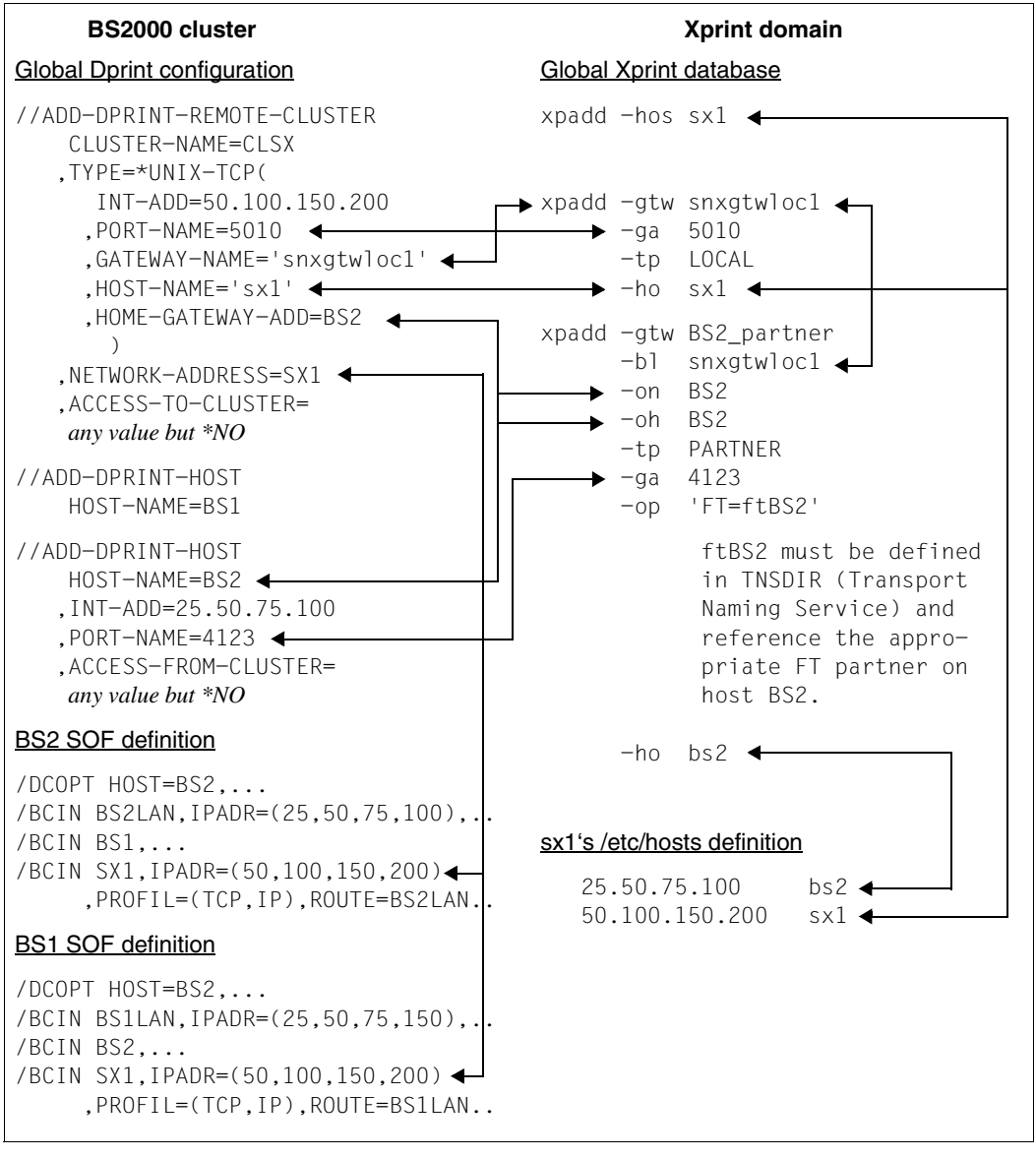
16. This request is forwarded to the file transfer task of Dprint on the BS2000 client host.

17. This task creates a Dprint 'Working Task' in order to perform the second filter call, which then converts the original document into a new document. This new file is then transferred to the UNIX system based gateway by the BS2000 client host.

18. After receipt of the file transfer, the UNIX system based gateway places the print job in the “printable” status.
19. The print job is passed to the supervisor if the printer has been started (by means of the command 'xpchange -dev ...'). If the printer has not been started, the job remains in wait status.
20. The file to be printed is passed to the UNIX system based server host when it is requested by the supervisor. To this end, the transfer processing facility is used.
21. The job is output on the printer attached to the UNIX system.

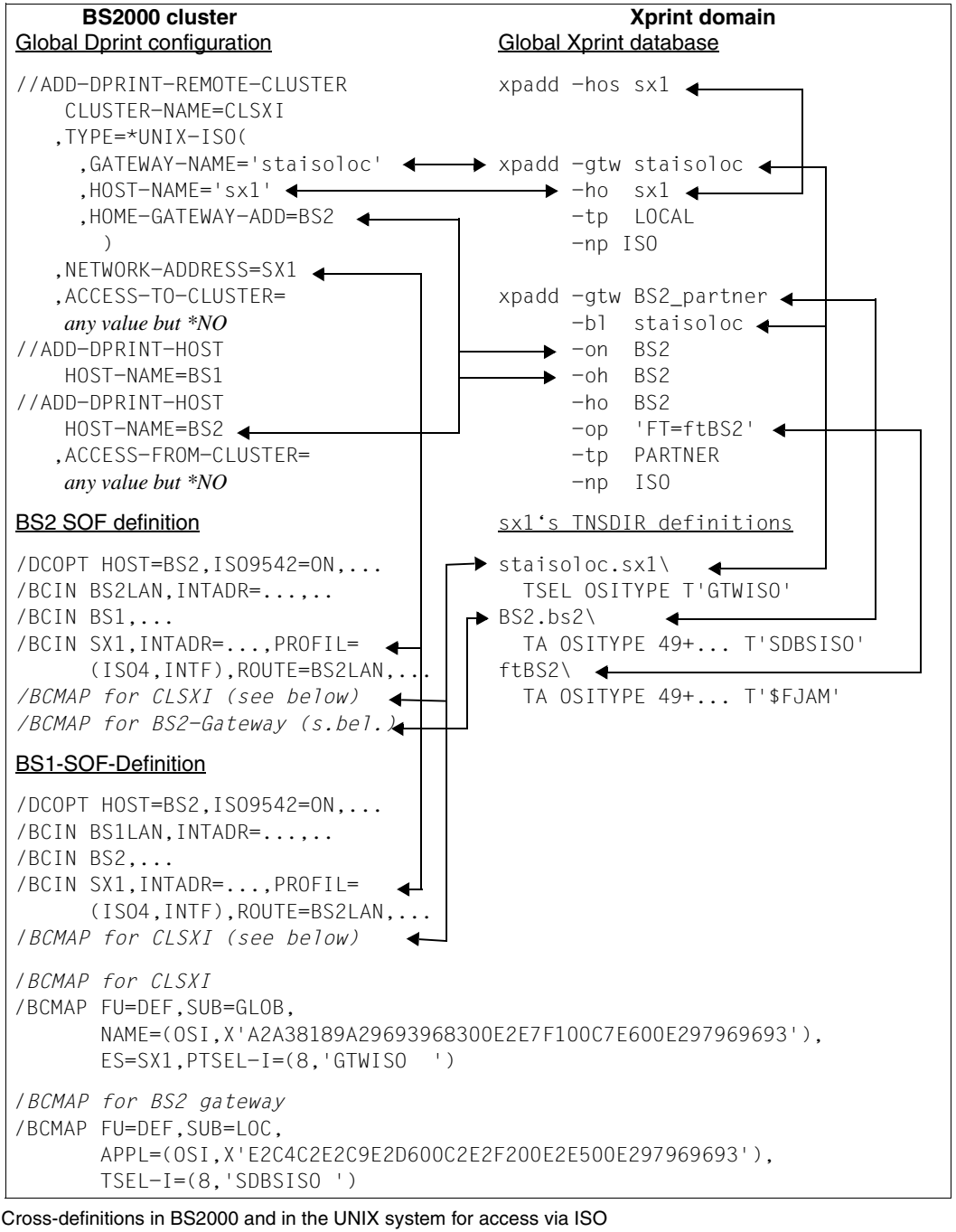
The figure below gives examples of the cross-definitions in BS2000 and in the UNIX system:

Access via TCP/IP



Cross-definitions in BS2000 and in the UNIX system for access via TCP/IP

Access via ISO



Cross-definitions in BS2000 and in the UNIX system for access via ISO

Restrictions and limits

Resources

Since no resources are transferred between clusters, the job is processed using the resources of the destination cluster.

Restricted printer capabilities

The supplied standard filter (SYS0110H) supports only text documents, containing only text data or text data with feed control characters, and printer-language-dependent documents, containing special printer control characters. In other words, the filter supports only print jobs with DOCUMENT-FORMAT=*TEXT(...) (text documents) and with DOCUMENT-FORMAT= *SPECIAL-FORMAT(...) (printer-language-dependent documents). Moreover, the filter converts specified operands LINE-SPACING or CONTROL-CHAR-POS into the corresponding line feeds and/or form feeds.

Therefore the printing of 'Fujitsu Siemens-PAGEMODE' documents, which can only be printed by HP printers such as 3353 Printers, is not currently supported by the supplied filter. This type of document content is also not supported by any Xprint printer. Similarly, no documents which contain VTSU codes and/or different character sets references (e.g. specified by way of the CONTROL-MODE operand values *LOGICAL, *LINE-MODE and *PHYSICAL) are supported. Moreover, any documents containing line data and 'structured fields' (by way of CONTROL-MODE=*APA) are also not supported.

Supported file types

The supplied standard filter supports only BS2000 files which are cataloged in SAM format. For other file types, new filters must be written.

Definition of printer and printer pool names

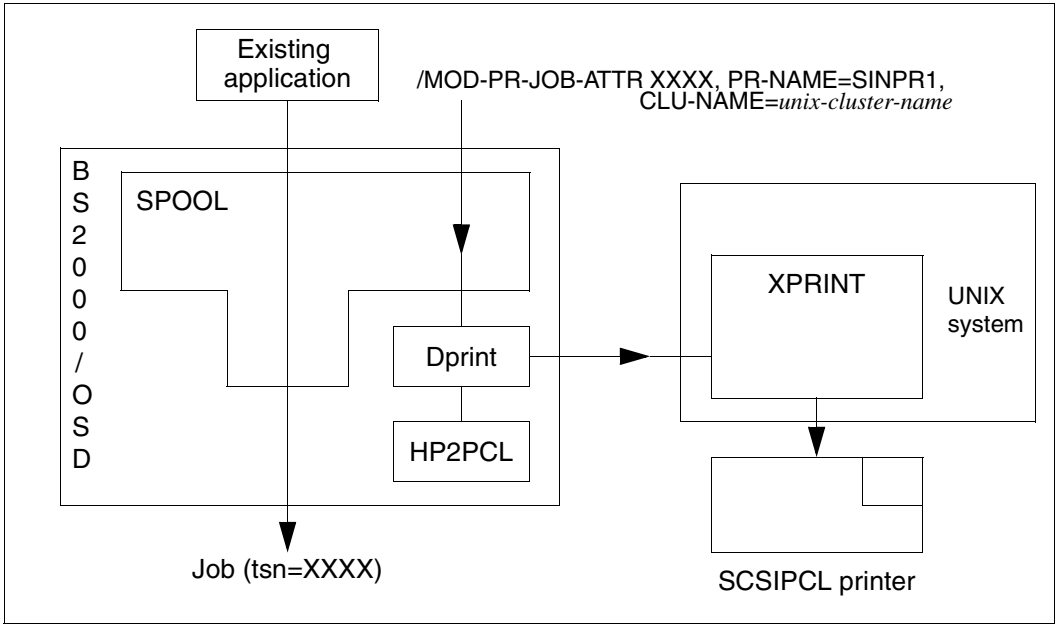
In order to be able to reference the printers attached to UNIX systems with the BS2000 user interface, the names of printers or printer pools must not exceed 8 characters in length.

Selection of the resources in UNIX systems

When a print job is passed to a Xprint domain, the resources in the UNIX system are used. In this case, restrictions apply in respect of the syntax. The form used must not exceed 6 characters in length and the font used must not exceed 3 characters in length.

3.6.2 Dprint access to a PCL printer connected via the SCSI interface in UNIX systems

The output is in HP format and has been created by an existing application. It is to be printed on a SCSI printer. The printer is connected to a UNIX computer.



Output on a PCL SCSI printer connected to a UNIX computer

Product versions

1. SPOOL V4.4 or higher
2. SPSERVE V2.7 or higher
3. Dprint 1.0J or higher (with HP2PCL converter)
4. Xprint V6.0 or higher

Environment definition

Printers and interoperation between BS2000 clusters and UNIX system based clusters are defined in section “Access to Xprint via Dprint and BS2000-SPOOL” on page 48. In addition the converter must be defined using the SPSERVE statement /ADD-SPOOL-FILTER.

```
/START-SPSERVE
//OPEN-PARAMETER-FILE PARAMETER-FILE=*SPOOL-PARAMETERS
//ADD-SPOOL-FILTER FILTER=HP2PCLX,
      FILTER-LOCATION=*SYSTEM,
      INPUT-FOMAT='HP-PAGEMODE',
      OUTPUT-FOMAT=UNIX-content-type
//END
```

Assigning print jobs

The print job assigned by the application must first be accepted by the local SPOOL, before it passed on to the UNIX system based cluster. As the print job exists in HP format and is to be printed on a PCL printer, the data must first be translated by the HP2PCL converter.

```
/PRINT-DOCUMENT FROM=myfile,
      DOCUMENT-FORMAT=*PAGE-FORMAT(
            CONTROL-MODE=PAGE-MODE)
```

The following lines are used to redirect the print job to a printer in the UNIX system based cluster.

```
/MODIFY-PRINT-JOB-ATTRIBUTES JOB-IDENTIFICATION=*TSN(yyyy),
      TO-PRINTER=*PARAMETERS(
            PRINTER-NAME=printer-name
            CLUSTER-NAME=UNIX-remote-cluster-name
            OUTPUT-FOMAT=UNIX-content-type
```

Management of print resources

The print job is to be printed with BS2000 resources. To do this both the resources for the HP format and those for the PCL format must be defined on the BS2000 computer.

3.6.3 Access to SPOOL from Xprint

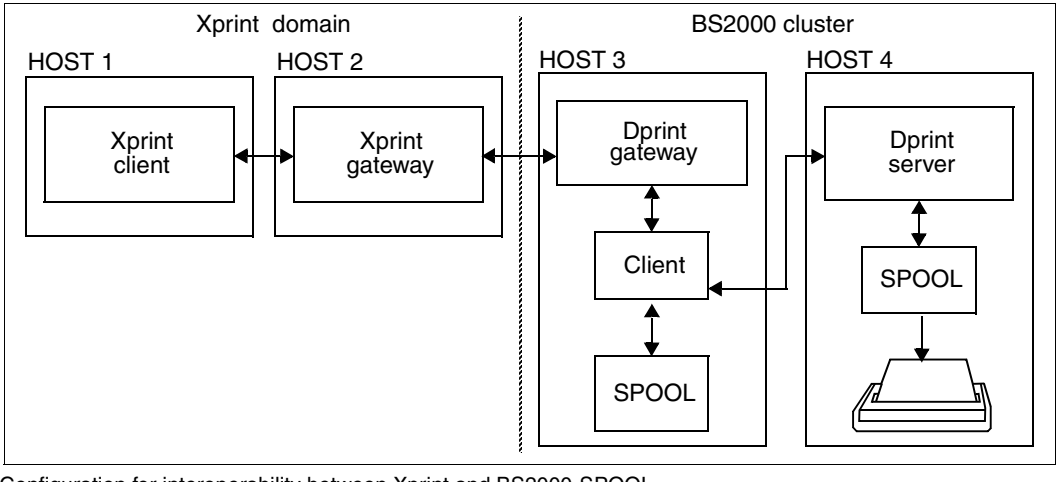
Thanks to the interoperability between BS2000 and UNIX systems via clusters, the Xprint configuration has at its disposal high-performance printers which are connected to the BS2000 within a Dprint cluster. BS2000 is used as a print server.

Interoperability between UNIX systems and BS2000 enables the user to access highspeed laser printers and line printers (for more information see *http://extranet.fujitsu-siemens.com/cafe/bs2000/prodarch/drucker/hdchannd.htm*).

Users on UNIX systems can pass jobs to a Dprint configuration (xpadd -job) and control them (xpstat -job, xpshow -job, xpdel -job). Similarly, they can obtain information about the printers and printer pools with 'xpshow -dev' or 'xpstat -dev' and 'xpshow -dgr' or 'xpstat -dgr'. For a detailed description of the commands, refer to the Xprint manuals.

One restriction affects the UNIX system based cluster gateway: at the moment, this must be a host with Xprint V6.0 or higher. This is necessary for the use of FT/FTAC and *open*FT for file transfer between BS2000 and UNIX systems.

Which printer functions can be used depends on the available system filters (see below).



Configuration for interoperability between Xprint and BS2000-SPOOL

Topology

The global topology of this usage model is similar to that of the usage model described in section “Access to Xprint via Dprint and BS2000-SPOOL” on page 48.

Availability of printers

Any printer supported by SPOOL can be reached by a user on a UNIX system if the printer is defined in the Dprint configuration file of the BS2000 cluster. However, it should be noted that SPOOL printers can only be addressed from UNIX systems by way of a printer pool name. This means that the printers must be defined in the configuration file as part of a Dprint printer pool. The user on a UNIX system then specifies the printer pool together with the BS2000 cluster name as the destination specification.

The user on a UNIX system can ascertain which printer pools are available by means of the command 'xpshow -dgr'. The attributes of the available SPOOL printers can be interrogated with the command 'xpshow -dev'. For a detailed description of the commands, refer to the Xprint manuals.

The supported printer functions are heavily dependent on the available filters, however. The printing of text documents (consisting of data without printer commands) is possible on any SPOOL printer. In order to be able to utilize the attributes of the LP65 printers a special filter is supplied which supports the EXCCW format. See below under “Supported standard filters”.

Management of print resources

Resources are not transferred between the clusters. The resources specified in the print request (form, font) are not validity checked by Xprint. The resources are checked on the gateway host of the BS2000 cluster.

All requested resources must be defined (in the SPOOL parameter file, PRFILE,...) on the BS2000 gateway host.

Definition and management of printers

The BS2000 printers which are accessed from the Xprint domain are defined by the BS2000 cluster administrator with the following SPSERVE statements:

```
//ADD-DPRINT-PRINTER PRINTER-NAME=distributed-printer-name,SERVER-NAME=
              BS2000-server-name,LOCAL-PRINTER-NAME=local-printer-name

//ADD-DPRINT-PRINTER-POOL POOL-NAME=pool-name,
              PRINTER-NAME=distributed-printer-name
```

From the Xprint domain, users can request information about addressable Dprint BS2000 printers by means of the commands xpstat and xpshow.

Management of print jobs

Xprint offers the end user a series of commands for the management of print jobs:

`xpadd`, `xpdel`, `xpstat` and `xpshow`.

Please refer to the Xprint manuals for examples of the Xprint commands for obtaining information about the destination BS2000 cluster and SPOOL printers, and for submitting, controlling and monitoring print jobs.

3.6.3.1 Supported standard filters

For printing text documents and EXCCW documents on SPOOL printers, two standard system filters are supplied with the DPRINTCL subsystem.

1. Printing text documents (filter SYS0210H)

   Text documents created on UNIX systems (ASCII text data separated only by ASCII line feed control characters X'0A') can be printed by BS2000-SPOOL on any printer. This presupposes that the document format 'PLAIN-TEXT' is specified in the print request: 'xpadd -job -ct PLAIN-TEXT ...'.

   The filter converts the value PLAIN-TEXT of the document format attribute into the corresponding SPOOL print request parameters: DOCUMENT-FORMAT=*TEXT(LINE-SPACING=1).

   It also converts the original document into a format which is compatible with SPOOL. In doing so it deletes the line feed characters (X'0A') at the end of each record and performs the conversion from ASCII to EBCDIC (from ISO-8859-1 to EBCDIC-DF041).

2. Printing documents in EXCCW format (filter SYS0410H)

   A document in EXCCW format contains only SPDS-like data which is compatible with the 3365-1 Printer (LIP controller) running in its 'Extended Mode' (supported by SPOOL as LP65 printer type).

   Documents created on UNIX systems in EXCCW format can be printed by BS2000-SPOOL on any LP65 printer, provided that the document format 'EXCCW' is specified in the print request ('xpadd -job -ct EXCCW ...').

   The filter converts the value EXCCW of the document format attribute into the corresponding BS2000 print request parameters: DOCUMENT-FORMAT=*TEXT(LINE-SPACING=1) and PRINTER-TYPE=*LP65-PRINTER.

3.6.3.2 Prerequisites and definitions

The following describes which prerequisites are required in order to be able to access a local printer, which is connected to a BS2000 host, from Xprint via Dprint and BS2000-SPOOL. The definitions appear in chronological order.

Product versions

– BS2000-SPOOL V4.4 or higher
SPOOL must be loaded on the gateway host of the BS2000 cluster and on the BS2000 host to which the printer is connected (can also be the gateway).

– Xprint V6.0 or higher
Xprint must be loaded at least on the gateway host of the Xprint domain (with the gateway package) and on the host with UNIX operating system on which the print job is issued (client).

– Distributed Print Services V1.0J or higher
The client part of Dprint (subsystems DPRINTCL and DPRINTCM) must be loaded on the gateway host of the BS2000 cluster. The server part of Dprint (subsystem DPRINTSV) must be loaded on the BS2000 host to which the printer is connected.

– Exit 093
If customer filters are to be used, the subsystem corresponding to exit 093 (name freely selectable by system administration) must be loaded on the gateway host of the BS2000 cluster.

The software prerequisites pertaining to the individual products are described in the respective manuals.

BS2000-SPOOL definition

All printers and/or printer pools which are to be accessible for the Xprint domain must be defined in the SPOOL parameter file of the BS2000 host to which the printer is connected and on which the Dprint server is running. This definition is specified by means of the SPSERVE statement ADD-SPOOL-DEVICE.

The names of the forms and character sets which correspond to the Xprint forms and fonts must similarly be defined in the SPOOL parameter file of the BS2000 gateway host. These definitions are specified by means of the SPSERVE statements ADD-SPOOL-CHARACTER-SET and ADD-SPOOL-FORM.

Dprint definition

In order to transfer print requests from a Xprint domain to a BS2000 cluster, two definitions must be specified:

1. The BS2000 cluster administrator must define a BS2000 gateway in his/her Dprint configuration. This is done by using the SPSERVE statements ADD-DPRINT-HOST or MODIFY-DPRINT-HOST.
2. The BS2000 cluster administrator must similarly define the Xprint domain in his/her Dprint configuration. This is done by using the SPSERVE statement ADD-DPRINT-REMOTE-CLUSTER. Here the operand CLUSTER-NAME is used to specify the logical name of the remote cluster which must be unique within the cluster configuration. TYPE specifies whether the ISO protocol or the TCP/IP protocol is used for accessing the gateway of the Xprint domain. The BCAM address of the gateway of the Xprint domain is defined by means of the operand NETWORK-ADDRESS. In addition, the operand ACCESS-TO-CLUSTER allows the specification of an access control list which can be used to restrict access to the Xprint domain for some users.

In order to make BS2000 printers accessible to a Xprint domain, they must be defined in the Dprint configuration file. Firstly, the attributes of each “Dprint printer” must be defined using the SPSERVE statement ADD-DPRINT-PRINTER. For access from a Xprint domain, these Dprint printers must be defined individually or multiply in a Dprint printer pool since only such a Dprint printer pool can be specified as the destination in the print request issued on the UNIX system. This definition is specified by means of the statement ADD-DPRINT-PRINTER-POOL.

The print job class (PRINT-JOB-CLASS) is currently a selection criterion for selecting a server within the target BS2000 cluster. As Xprint does not recognize this PRINT-JOB-CLASS definition, this operand value is set to binary zero by default in order to enable server selection. However, the print job is only accepted if at least one server in the target BS2000 cluster is defined without the PRINT-JOB-CLASS parameter. If this is not the case, then the print job will be rejected.

You can still send print jobs to Xprint even if all servers in the target BS2000 cluster are defined with a print job class if

– the optional revision A0336209 for Dprint is installed. This sets the PRINT-JOB-CLASS operand to 255 by default, when a print job arrives from Xprint, and
– one of the server definitions is modified to support the PRINT-JOB-CLASS value 255.

If, for some reason, the value 255 cannot be used in the environment, then revision A0336209 can be modified and set to a different value. In this case, the server definition must be modified to support this value instead of 255.

BCAM definition

The host with UNIX operating system which acts as a gateway in the Xprint domain must be defined in BCAM. This is done either statically in the RDF (resources definition file) by means of the XPRO macro or dynamically using the BCIN command. In order to enable access to the computer, this must be activated by means of the BCIN command.

Xprint definition

In order to enable Xprint domains to access a BS2000 cluster, the Xprint administrator must define at least one UNIX system based gateway in the Xprint database. This is done by using the command 'xpadd -gtw...'. The UNIX system based gateway corresponds to the object “Dprint remote cluster”, which is defined in the Dprint configuration file (see “Dprint definition” on page 67).

A gateway must be defined on the BS2000 cluster (see above) for the transfer of requests issud in UNIX systems to BS2000 clusters. In addition to the definition in the Dprint configuration file, the gateway must also be defined in the Xprint database. This is likewise done using the command 'xpadd -gtw...'.

For details on the definitions of UNIX system based gateways and BS2000 gateways, refer to the Xprint manuals.

UNIX system definition

As well as being defined in the Xprint database, the BS2000 cluster gateway must also be defined in the Naming Service, which corresponds to the Transport Service Provider that is used by Xprint. In the case of ISO/OSI network protocols, the gateway must be defined in TNSDIR by using the product TNSADMIN. With TCP/IP network protocols, an entry describing the BS2000 gateway host must be created in the file /etc/hosts.

Restrictions and limits

Xprint user names and host names

Neither the login name nor the host name of the Xprint user may exceed 8 characters in length in order that requests (Print, Show, Cancel) can be passed to a BS2000 cluster.

Resources

Resources are not transferred between the clusters. The resources specified in the print request (form, font) are not validity checked by the UNIX system based cluster. The resources are checked on the BS2000 client, i.e. on the gateway host of the BS2000 cluster.

All requested resources must be defined (in the SPOOL parameter file, PRFILE,...) on the host on which the checking is performed.

Restricted printer capabilities

The supplied standard system filter SYS0210H permits the printing of text documents created on UNIX systems (ASCII text data separated only by ASCII line feed control characters X'0A'). Text documents can be printed on any SPOOL printer type.

The supplied standard system filter SYS0410H permits the printing of documents created on UNIX systems which were created in EXCCW format (identified through content type 'EXCCW'). Such documents can only be printed by a local LP65 printer.

The printing of documents in ‘Fujitsu Siemens-PAGEMODE' (possible only on SPOOL-HP printers such as the type 3353) is not currently supported.

3.6.4 Access to RSO from Xprint

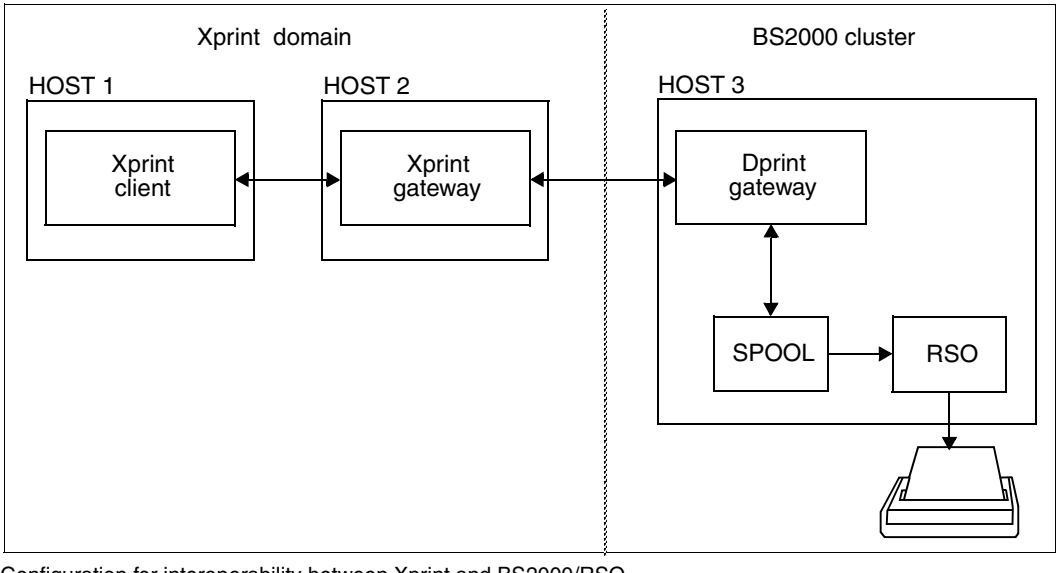
Using the RSO product, it is possible to print on office printers which can be connected either in a TRANSDATA-NEA environment or to a TCP/IP LAN, which in turn is connected to the BS2000 host.

The interoperability between UNIX and BS2000 systems enables users on UNIX systems to access these RSO printers. A Xprint client can send a print request to an RSO device in a BS2000 cluster if the required definitions are available.

Because the RSO subsystem is not incorporated into Dprint operation, the RSO printers to which access is required must be defined in the SPOOL parameter file of the BS2000 gateway. RSO must similarly be loaded on this host.

Users on UNIX systems can pass jobs to a Dprint configuration (xpadd -job) and control them (xpstat -job, xpshow -job, xpdel -job). Similarly, they can obtain information about the RSO printers and printer pools with 'xpshow -dev' or 'xpstat -dev' and 'xpshow -dgr' or 'xpstat -dgr'. For a detailed description of these commands, refer to the Xprint manuals.

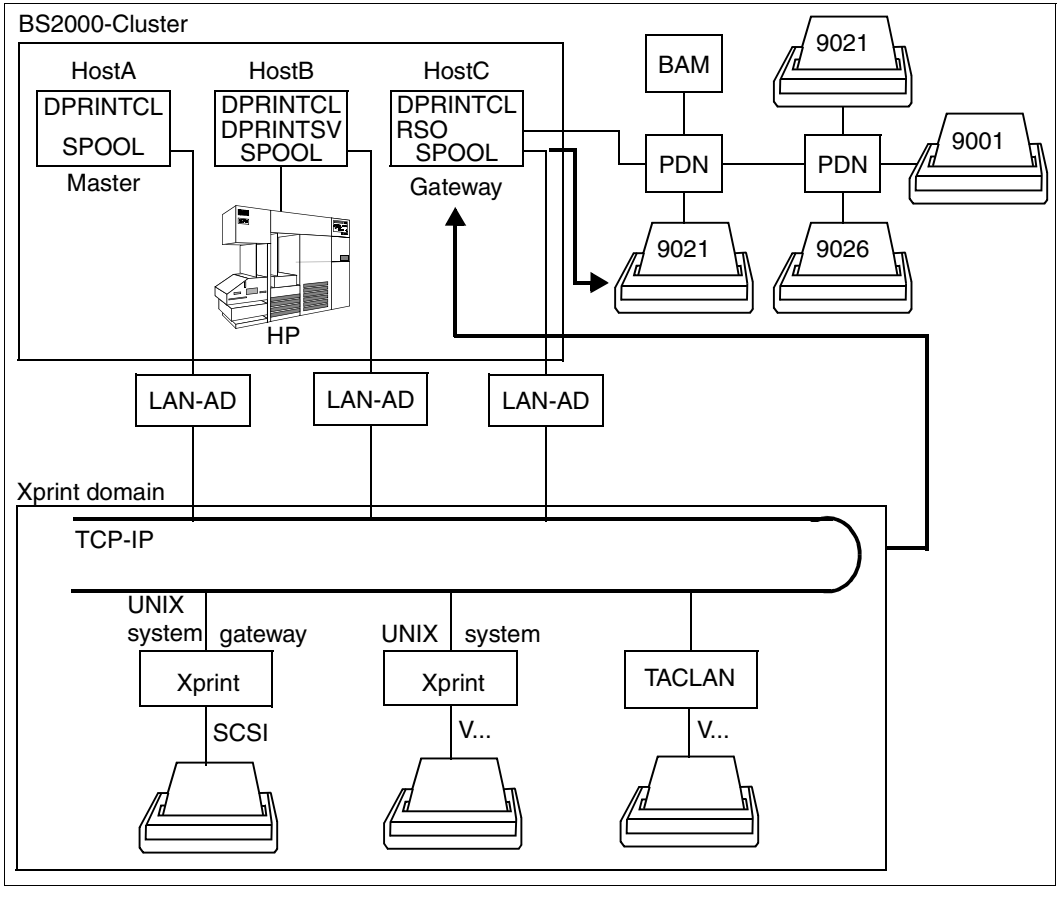
One restriction affects the UNIX system based cluster gateway: at the moment, this must be a host with Xprint V6.0 or later. This is necessary for the use of FT/FTAC and *open*FT for file transfer between BS2000 and UNIX systems.



Configuration for interoperability between Xprint and BS2000/RSO

Topology

In a cluster configuration which has already been set up RSO V3.4A or higher must be installed and started on the BS2000 gateway between Dprint and UNIX systems.



Access from UNIX systems to RSO

Availability of printers

Any RSO printer supported by RSO can be reached by a user on a UNIX system if the printer is defined in the SPOOL parameter file of the BS2000 gateway host. For details of the supported printer types, refer to the RSO manual.

The user on a UNIX system can use the command 'xpshow -dev' or 'xpshow -dgr' to ascertain which RSO printers or printer pools are available. For a detailed description of the command, refer to the Xprint manuals.

Print resources

Resources are not transferred between the clusters. The resources specified in the print request (form, font) are not validated by Xprint. However, they are compared by the RSO product running on the gateway host of the BS2000 cluster with the resources defined in the SPOOL parameter file:

– The form name specified in the print request is regarded as the RSO form name which is defined in the SPOOL parameter file.

– The font name specified in the print request is regarded as the RSO character set name which is defined in the SPOOL parameter file.

Because there is no transfer of resources or resources management functions between clusters, it should be noted that there is no command allowing users on UNIX systems to obtain information about RSO forms and character sets. The BS2000 cluster administrator must therefore provide the Xprint administrator with a list of the form names and character set names. The Xprint administrator can then pass on this information to the users in his/her domain.

Depending on the form name specified and on the type of the destination printer, RSO searches for any PROLOG, EPILOG and MEMBER files which may be present; it does this first of all under the user ID from which the print job was issued. In the case of the interoperability between UNIX systems and BS2000(RSO), the user ID SYSDPRNT is regarded as the job originator. Searching takes place there for any PROLOG, EPILOG and MEMBER files which may be present.

Definition and management of printers

On account of the functionality offered within the scope of the interoperability, the capabilities of the RSO printers are supported only in limited form.

The supplied standard system filter SYS0210H enables printing of text documents created on UNIX systems (ASCII text data separated only by the ASCII line feed control character X'0A'). Text documents can be printed out on any RSO printer type.

The supplied standard system filter SYS0310H enables printing of fully formatted printer-language-dependent documents created on UNIX systems (in ASCII code). These documents can be printed on any RSO printer type, provided that the destination printer supports the printer language in which the document has been generated.

Consequently, the printing of documents containing VTSU codes and/or several different character sets (specified, for example, via the CONTROL-MODE operand values *LOGICAL, *LINE-MODE and *PHYSICAL) is not supported.

In order to enable the RSO printers and/or printer pools to be accessed from UNIX systems, they must be defined in the SPOOL parameter file on the BS2000 gateway host. This definition is effected using the SPSERVE statement ADD-SPOOL-DEVICE.

Management of print jobs

Users on UNIX systems can issue (command xpadd -job) and control (commands xpstat -job, xpshow -job, xpdel -job) print jobs in the Dprint configuration, and also request information about RSO printers or printer pools by means of the commands xpshow -dev and xpstat -dev or xpshow -dgr and xpstat -dgr.

3.6.4.1 Supported standard filters

Two standard system filters are supplied with the DPRINTCL subsystem for printing text documents and printer-language-dependent documents on RSO printers.

1. Printing text documents (filter SYS0210H)

   Text documents created on UNIX systems (ASCII text data separated only by ASCII line feed control characters X'0A') can be printed by RSO on any RSO printer. This presupposes that the document format 'PLAIN-TEXT' is specified in the print request: 'xpadd -job -ct PLAIN-TEXT ...'.

   The filter converts the value PLAIN-TEXT of the document format attribute into the corresponding RSO print request parameters:
   DOCUMENT-FORMAT=*TEXT(LINE-SPACING=1).

   It also converts the original document into a format which is compatible with RSO. In doing so it deletes the line feed characters (X'0A') at the end of each record and performs the conversion from ASCII to EBCDIC (from ISO-8859-1 to EBCDIC-DF041).

2. Printing printer-language-dependent documents (filter SYS0310H)

   Printer-language-dependent documents from UNIX systems (in ASCII code) can be printed by RSO, provided that the destination printer supports the printer language in which the document was created. It is assumed that any print request having a value other than PLAIN-TEXT, EXCCW and SPDS for the document format attribute is a printer-language-dependent document printing request.

   The filter converts the value of the document format attribute into the corresponding RSO print request parameters:
   DOCUMENT-FORMAT=*SPECIAL-FORMAT(LINE-SPACING=*NO).

   Conversion from ASCII to EBCDIC is performed by RSO in accordance with the “coded character set name” (CCSNAME) which is defined in the catalog entry of the transferred file which was created by the filter, and also XHCS tables (if XHCS is present) or an internal table (from ISO-8859-1 to EBCDIC-DF041). This one-to-one conversion is carried out without regard to the printer language in which the document was written.

   If the RSO destination printer is defined with DEVICE-ACCESS=TCP-ACCESS(...), the document will therefore be printed correctly, i.e. the document in ASCII code is sent to the printer in ASCII code.

If the RSO destination printer is defined with DEVICE-ACCESS=NEA-ACCESS(...), however, it can happen that the document will not be printed correctly. In this case the document in ASCII code must first be converted by RSO into EBCDIC (one-to-one conversion without regard to the printer language in which the document was written) before it is sent via the TRANSDATA network to the printer.

3.6.4.2 Prerequisites and definitions

The following describes which prerequisites are required in order to be able to access an RSO printer or printer pool, which for example is connected to a TRANSDATA-NEA network, from Xprint via Dprint and RSO. The definitions appear in chronological order.

Product versions

– BS2000-SPOOL V4.4 or higher
SPOOL must be loaded on the gateway host of the BS2000 cluster.

– RSO V3.1 or higher
RSO must be loaded on the gateway host of the BS2000 cluster.

– Xprint V6.0 or higher
Xprint must be loaded at least on the gateway host of the Xprint domain (with the gateway package) and on the host with UNIX operating system on which the print job is issued (client).

– Distributed Print Services V1.0J or higher
The client part of Dprint (subsystems DPRINTCL and DPRINTCM) must be loaded on the gateway host of the BS2000 cluster.

– Exit 093
If customer filters are to be used, the subsystem corresponding to exit 093 (name freely selectable by the system administration) must be loaded on the gateway host of the BS2000 cluster.

The software prerequisites pertaining to the individual products are described in the respective manuals.

RSO definition

RSO printers and/or printer pools which are to be accessible for Xprint must be defined in the SPOOL parameter file of the BS2000 gateway host. This definition is specified by means of the SPSERVE statement ADD-SPOOL-DEVICE.

The names of the RSO forms and character sets which correspond to the Xprint forms and fonts must similarly be defined in the SPOOL parameter file of the BS2000 gateway host. These definitions are specified by means of the SPSERVE statements ADD-SPOOL-CHARACTER-SET and ADD-SPOOL-FORM.

Dprint definition

In order to transfer print requests from a Xprint domain to a BS2000 cluster, two definitions must be specified:

1. The BS2000 cluster administrator must define a BS2000 gateway in his/her Dprint configuration. This is done by using the SPSERVE statements ADD-DPRINT-HOST or MODIFY-DPRINT-HOST.
2. The BS2000 cluster administrator must similarly define the Xprint domain in his/her Dprint configuration. This is done by using the SPSERVE statement ADD-DPRINT-REMOTE-CLUSTER. Here the operand CLUSTER-NAME is used to specify the logical name of the remote cluster which must be unique within the cluster configuration. TYPE specifies whether the ISO protocol or the TCP/IP protocol is used for accessing the gateway of the Xprint domain. The BCAM address of the gateway of the Xprint domain is defined by means of the operand NETWORK-ADDRESS. In addition, the operand ACCESS-TO-CLUSTER allows the specification of an access control list which can be used to restrict access to the Xprint domain for some users.

BCAM definition

The UNIX system based host which acts as a gateway in the Xprint domain must be defined in BCAM. This is done either statically in the RDF (resources definition file) by means of the XPRO macro or dynamically using the BCIN command. In order to enable access to the computer, this must be activated by means of the BCIN command.

Xprint definition

In order to enable Xprint domains to access a BS2000 cluster, the Xprint administrator must define at least one UNIX system based gateway in the Xprint database. This is done by using the command 'xpadd -gtw...'. The UNIX system based gateway corresponds to the object “Dprint remote cluster”, which is defined in the Dprint configuration file (see “Dprint definition” above).

A gateway must be defined on the BS2000 cluster (see above) for the transfer of requests issued on UNIX systems to BS2000 clusters. In addition to the definition in the Dprint configuration file, the gateway must also be defined in the Xprint database. This is likewise done using the command 'xpadd -gtw...'.

For details on the definitions of UNIX system based gateways and BS2000 gateways, refer to the Xprint manuals.

UNIX system definition

As well as being defined in the Xprint database, the BS2000 cluster gateway must also be defined in the Naming Service, which corresponds to the Transport Service Provider that is used by Xprint. In the case of ISO/OSI network protocols, the gateway must be defined in TNSDIR by using the product TNSADMIN. With TCP/IP network protocols, an entry describing the BS2000 gateway host must be created in the file /etc/hosts.

Restrictions and limits

Xprint user names and host names

Neither the login name nor the host name of the Xprint user may exceed 8 characters in length in order that requests (Print, Show, Cancel) can be passed to a BS2000 cluster.

Resources

Since no resources are transferred between clusters, the specified resources must be available on the gateway host of the BS2000 cluster.

Forms and fonts which are specified in the print request issued in the UNIX system are regarded as RSO forms and character set names. They should therefore be defined in the SPOOL parameter file on the BS2000 gateway host.

Depending on the form name specified and on the type of the destination printer, RSO searches for any PROLOG, EPILOG and MEMBER files, which may be present, searching firstly under the user ID from which the print job was issued. In the case of interoperability from UNIX systems to BS2000(RSO) the user ID SYSDPRNT is regarded as the job originator and searching takes place there for any PROLOG, EPILOG and MEMBER files present.

Restricted printer capabilities

The supplied standard system filter SYS0210H permits the printing of text documents created on UNIX systems (ASCII text data separated only by ASCII line feed control characters X'0A'). Text documents can be printed on any RSO printer type.

The supplied standard system filter SYS0310H permits the printing of printer-language-dependent documents created on UNIX systems (in ASCII code). These can be printed on any RSO printer type, provided that it supports the printer language in which the document was created.

Consequently, no documents which contain VTSU codes and/or different character set references (e.g. specified by way of the CONTROL-MODE operand values *LOGICAL, *LINE-MODE and *PHYSICAL) are supported.

The supplied standard filters support only BS2000 files which are cataloged in SAM format. For other file types, new filters must be written.

RSO subsystem

In order to allow print jobs to be passed from a Xprint domain to RSO printers, the RSO subsystem must be loaded on the gateway host of the BS2000 cluster.

3.7 Usage models for SPS support

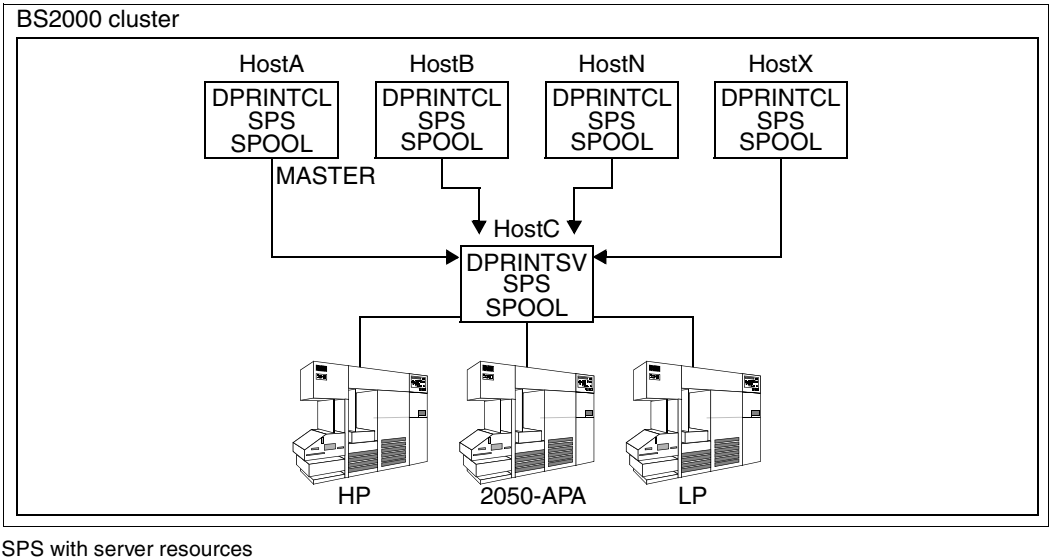
The coexistence between Dprint subsystems (DPRINTCL and/or DPRINTSV) and the subsystem SPS is described in the following. The use of Dprint with SPS permits distribution of SPS print jobs and thereby gives access to high-performance printers with graphics mode amongst different BS2000 systems.

3.7.1 SPS with server resources

The APA printers are used in conjunction with a central print server (see the model “One central printer server in one cluster” on page 32), where the resources are checked by the server. SPS only permits the use of server resources; no SPS resources are transferred between client and server.

Topology

The installation is exactly the same as in the case of the model “One central printer server in one cluster” (see page 32). In addition, however, the subsystem SPS V3.8 or higher must be installed and started on each system (client and server) wishing to use the APA printers.



SPS with server resources

3.7.2 Access to SPS from Xprint

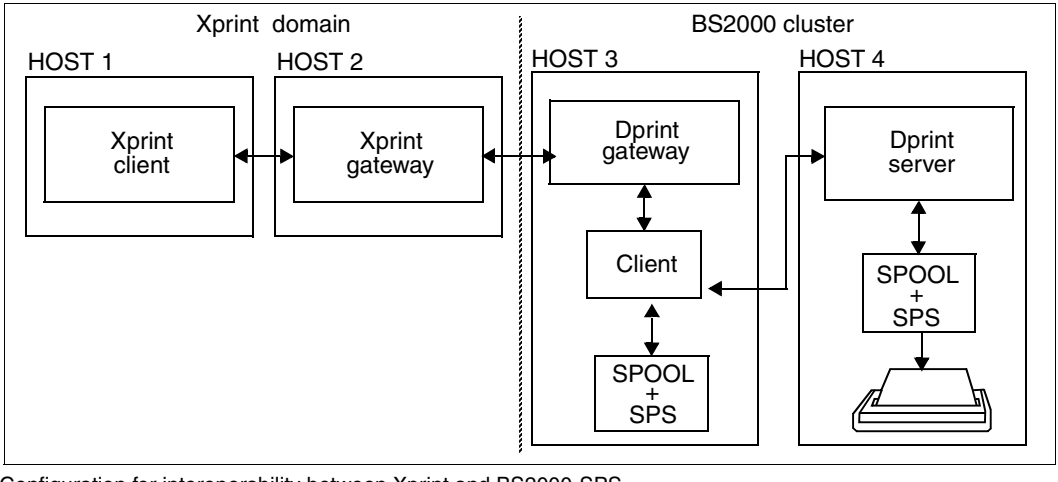
Interoperability between UNIX systems and BS2000 enables users to access highspeed APA printers (e.g. 2050-APA, 2090-APA or 2090-TWIN printers) supported by the product SPS.

SPS must be loaded on the BS2000 gateway host and the BS2000 server to which the printer is connected.

Users on UNIX systems can pass jobs to a Dprint configuration (xpadd -job) and control them (xpstat -job, xpshow -job, xpdel -job). Similarly, they can obtain information about the APA printers and printer pools with 'xpshow -dev' or 'xpstat -dev' and 'xpshow -dgr' or 'xpstat -dgr'. For a detailed description of the commands, refer to the Xprint manuals.

One restriction affects the UNIX system based cluster gateway: at the moment, this must be a host with Xprint V6.0 or later. This is necessary for the use of FT/FTAC and *open*FT for file transfer between BS2000 and UNIX systems.

Which printer functions can be used depends on the available system filters (see below).



Configuration for interoperability between Xprint and BS2000-SPS

Availability of printers

Any printer supported by SPS can be reached by a user if the printer is defined in the Dprint configuration file of the BS2000 cluster. However, it should be noted that APA printers can only be addressed from UNIX systems by way of a printer pool name. This means that the printers must be defined in the configuration file as part of a Dprint printer pool. The user on a UNIX system then specifies the printer pool together with the BS2000 cluster name as the destination specification.

The user on a UNIX system can ascertain which printer pools are available by means of the command 'xpshow -dgr'. The attributes of the available APA printers can be interrogated with the command 'xpshow -dev'. For a detailed description of the commands, refer to the Xprint manuals.

The supported printer functions are heavily dependent on the available filters, however. The printing of text documents (consisting of data without printer commands) and of documents having structured fields (SPDS format) is possible on any APA printer. For further information, see section “Supported standard filters” on page 81.

Print resources

You can only use server resources with the SPS subsystem. Print jobs which require APA resources must, therefore, use the resources of the server. Otherwise the print job is rejected.

Resources are not transferred between the clusters. The resources specified in the print request (form, font) are not validity checked by Xprint. The resources are always checked on the BS2000 Dprint server to which the APA printers are connected.

If RESOURCES-LOCATION=*HOME is explicitly specified, the print request is rejected.

All requested resources must be defined (in the SPOOL parameter file, PRFILE,...) on this host.

Definition and management of printers

The APA printers are defined only in the SPOOL parameter file of the central print server. The cluster administrator defines these printers as Dprint printers in the configuration file.

The way to define and manage printers is described in chapter “Dprint management functions and activities” on page 187ff.

Management of print jobs

The APA print jobs can be managed in exactly the same way as all the other Dprint print jobs.

3.7.2.1 Supported standard filters

For printing text documents and documents having structured fields (SPDS format) on APA printers, two standard system filters are supplied with the DPRINTCL subsystem.

1. Printing text documents (filter SYS0210H)

   Text documents on UNIX systems (ASCII text data separated only by ASCII line feed control characters X'0A') can be printed by SPS on any APA printer. This presupposes that the document format 'PLAIN-TEXT' is specified in the print request: 'xpadd -job -ct PLAIN-TEXT ...'.

   The filter converts the value PLAIN-TEXT of the document format attribute into the corresponding SPS print request parameters: DOCUMENT-FORMAT=*TEXT(LINE-SPACING=1).

   It also converts the original document into a format which is compatible with SPS. In doing so it deletes the line feed characters (X'0A') at the end of each record and performs the conversion from ASCII to EBCDIC (from ISO-8859-1 to EBCDIC-DF041).

2. Printing documents having structured fields (SF, filter SYS0510H)

   A document in SF format contains SPDS-like data (with printer control characters in EBCDIC code). Documents on UNIX systems in SF format can be output by SPS on any APA printer, provided that the document format SPDS is specified in the print request (e.g. 'xpadd -job -ct SPDS ...').

   The filter converts the document format attribute SPDS into the following corresponding BS2000 print request parameters: DOCUMENT-FORMAT=*PAGE-FORMAT (CONTROL-MODE=*APA) with LINE-SPACING=*BY-EBCDIC.

3.7.2.2 Prerequisites and definitions

The following describes which prerequisites are required in order to be able to access an APA printer, which is connected to a BS2000 host, from Xprint via Dprint and SPS. The definitions appear in chronological order.

Product versions

– BS2000-SPOOL V4.4 or higher
  SPOOL must be loaded on the gateway host of the BS2000 cluster and on the BS2000 host to which the printer is connected (can also be the gateway).

– SPS V3.8 or higher
  SPS must be loaded on the gateway host of the BS2000 cluster and on the BS2000 host to which the printer is connected (can also be the gateway).

– Xprint V6.0 or higher
  Xprint must be loaded at least on the gateway host of the Xprint domain (with the gateway package) and on the UNIX system based host on which the print job is issued (client).

– Distributed Print Services V1.0J or higher
  The client part of Dprint (subsystems DPRINTCL and DPRINTCM) must be loaded on the gateway host of the BS2000 cluster. The server part of Dprint (subsystem DPRINTSV) must be loaded on the BS2000 host to which the printer is connected.

The software prerequisites pertaining to the individual products are described in the respective manuals.

BS2000-SPOOL definition

All APA printers and/or printer pools which are to be accessible for the Xprint domain must be defined in the SPOOL parameter file of the BS2000 host to which the printer is connected and on which the Dprint server is running. This definition is specified by means of the SPSERVE statement ADD-SPOOL-DEVICE.

Dprint definition

In order to transfer print requests from a Xprint domain to a BS2000 cluster, two definitions must be specified:

1. The BS2000 cluster administrator must define a BS2000 gateway in his/her Dprint configuration. This is done by using the SPSERVE statements ADD-DPRINT-HOST or MODIFY-DPRINT-HOST.
2. The BS2000 cluster administrator must similarly define the Xprint domain in his/her Dprint configuration. This is done by using the SPSERVE statement ADD-DPRINT-REMOTE-CLUSTER. Here the operand CLUSTER-NAME is used to specify the logical name of the remote cluster which must be unique within the cluster configuration. TYPE specifies whether the ISO protocol or the TCP/IP protocol is used for accessing the gateway of the Xprint domain. The BCAM address of the gateway of the Xprint domain is defined by means of the operand NETWORK-ADDRESS. In addition, the operand ACCESS-TO-CLUSTER allows the specification of an access control list which can be used to restrict access to the Xprint domain for some users.

In order to make APA printers accessible to a Xprint domain, they must be defined in the Dprint configuration file. Firstly, the attributes of each “Dprint printer” must be defined using the SPSERVE statement ADD-DPRINT-PRINTER. For access from a Xprint domain, these Dprint printers must be defined individually or multiply in a Dprint printer pool since only such a Dprint printer pool can be specified as the destination in the print request issued on a UNIX system. This definition is specified by means of the statement ADD-DPRINT-PRINTER-POOL.

BCAM definition

The UNIX system based host which acts as a gateway in the Xprint domain must be defined in BCAM. This is done either statically in the RDF (resources definition file) by means of the XPRO macro or dynamically using the BCIN command. In order to enable access to the computer, this must be activated by means of the BCIN command.

Xprint definition

In order to enable Xprint domains to access a BS2000 cluster, the Xprint administrator must define at least one UNIX system based gateway in the Xprint database. This is done by using the command 'xpadd -gtw...'. The UNIX system based gateway corresponds to the object “Dprint remote cluster”, which is defined in the Dprint configuration file (see “Dprint definition” on page 82).

A gateway must be defined on the BS2000 cluster (see above) for the transfer of requests issed on a UNIX system to BS2000 clusters. In addition to the definition in the Dprint configuration file, the gateway must also be defined in the Xprint database. This is likewise done using the command 'xpadd -gtw...'.

For details on the definitions of UNIX system based gateways and BS2000 gateways, refer to the Xprint manuals.

UNIX system definition

As well as being defined in the Xprint database, the BS2000 cluster gateway must also be defined in the Naming Service, which corresponds to the Transport Service Provider that is used by Xprint. In the case of ISO/OSI network protocols, the gateway must be defined in TNSDIR by using the product TNSADMIN. With TCP/IP network protocols, an entry describing the BS2000 gateway host must be created in the file /etc/hosts.

Restrictions and limits

Xprint user names and host names

Neither the login name nor the host name of the Xprint user may exceed 8 characters in length in order that requests (Print, Show, Cancel) can be passed to a BS2000 cluster.

Resources

Resources are not transferred between the clusters. The resources specified in the print request (form, font) are not validity checked by Xprint. The resources are always checked on the BS2000 Dprint server to which the APA printers are connected.

If RESOURCES-LOCATION=*HOME is specified explicitly, the print request is rejected.

All requested resources must be defined (in the SPOOL parameter file, PRFILE,...) on this host.

Restricted printer capabilities

The supplied standard system filter SYS0210H permits the printing of text documents created on UNIX systems (ASCII text data separated only by ASCII line feed control characters X'0A'). Text documents can be printed on any APA printer type.

The supplied standard system filter SYS0510H permits the printing of documents created on UNIX systems having structured fields (SPDS format with printer control characters in EBCDIC code). Such documents can be printed on any APA printer type.

SPS subsystem

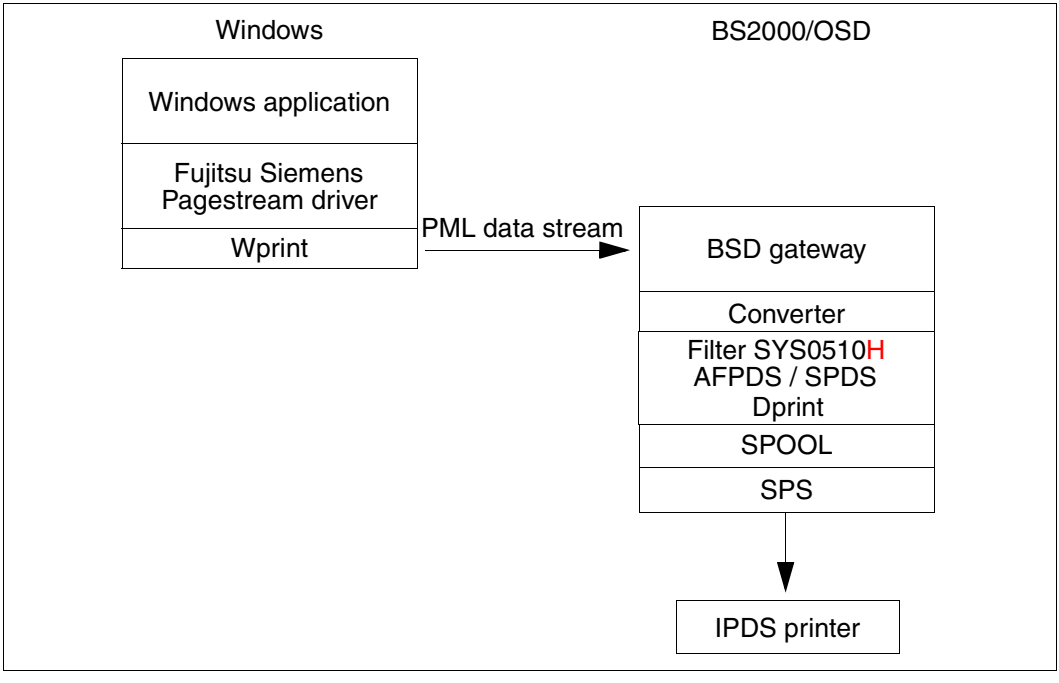
In order to allow print jobs to be passed from a Xprint domain to APA printers, the SPS subsystem must be loaded on the gateway host of the BS2000 cluster and on the server host to which the APA printer is connected.

3.7.3 Access to SPS from Windows-Clients

Printing interoperability between Windows-Clients and BS2000 enables users to access highspeed APA printers supported by the product SPS.

SPS V3.8 must be loaded on the BS2000 gateway and the BS2000 server host to which the printer is connected. Any printer supported by SPS may be reached by Windows-Clients, provided the printer is defined in the Dprint configuration of the BS2000 cluster. The only difference is that the APA printer may only be accessed via a printer pool name, either alone or among other APA printers.

Please bear in mind that there is no command that allows Windows-Clients to obtain information on available APA pools. It is up to the BS2000 cluster administrator to provide a list of the available queues in order to set the queue properties of the clients properly.



Access to SPS from Windows-Clients

Below are the prerequisites for accessing an APA printer pool connected to a BS2000 host by Windows-Clients.

Product versions

1. BS2000 SPOOL V4.4 or higher.
   SPOOL must be loaded on the BS2000 cluster gateway host and on the BS2000 host to which the printer is connected (could also be the BS2000 gateway host).
2. SPS V3.8 or higher.
   SPS must be loaded on the BS2000 cluster gateway host and on the BS2000 host to which the printer is connected (could also be the cluster gateway host).
3. WPRINT V3.1 or higher.
   The WPRINT client component must have been installed at least on the PC clients.
4. Dprint V1.0J or higher.
   The Dprint client part (DPRINT-CL, DPRINT-CM) must be loaded on the BS2000 cluster gateway host. The Dprint server part (DPRINT-SV, DPRINT-CM) must be loaded on the BS2000 host to which the printer is connected. The BSD gateway must be installed on a POSIX partition on the BS2000 cluster gateway host.

SPOOL definition

From the SPOOL side, the available printers have to be defined in the SPOOL parameter file of the host to which the printers are connected and on which the Dprint server runs. This definition can be made using the ADD-SPOOL-DEV statement of SPSERVE.

Dprint definition

In order to allow Windows-Clients to submit print requests to a BS2000 cluster, two different definitions need to be made:

1. The BS2000 cluster administrator must define a BS2000 cluster gateway in the Dprint configuration. This is possible using the SPSERVE statements ADD-DPRINT-HOST or MODIFY-DPRINT-HOST.
2. In order that a Windows-Client can access several printers, they must be defined in the Dprint configuration. First of all, the properties of each distributed printer must be defined using the ADD-DPRINT-PRINTER statement of the SPSERVE product. Then, in order to be accessible from Windows-Clients, one or more distributed printers must be defined in a printer pool using the ADD-DPRINT-PRINTER-POOL statement of the SPSERVE product.

BSD gateway definition

The possible Windows-Clients host names (with regular expression) that may interoperate with the server must be entered in the "clients" configuration file in order to allow print requests to be accepted by the server. Then a server definition must be recorded in the server configuration file before the gateway is started using the spchg command under POSIX.

The "Queue" file must include an entry containing the queue definition together with the Dprint printer pool and the associated form. The content type for SPDS must be entered in the content_type file; this is assigned by the BSD gateway administrator.

Wprint definition

A Wprint queue with the following settings (Alt-Ins) must be defined:

– a local SPOOL file name

– a remote queue name which corresponds to the one recorded in the "Queue" file

– a remote host name which is the gateway host name of the cluster where the BSD gateway is running

– the queue property as defined in the "content_type" file of the BSD gateway for SPDS.

Through the control panel's printer icon in Windows, the Fujitsu Siemens PageStream driver must be selected and connected to the Wprint queue (local SPOOL file name). It can be set as the default printer.

Windows definition

The gateway of the BS2000 cluster must be defined in the Naming Service corresponding to the Transport Service Provider (TCP/IP) used to communicate between Windows-Clients and the BSD gateway.

BCAM definition

All Windows-Clients hosts must be defined in BCAM either statically in the RDF (Resource Definition File) via XPRO macro or dynamically via the /BCIN command.

Thereafter, any print submissions from any Windows applications will be printed on the corresponding BS2000 distributed printer pool with the associated form.

Restrictions

There is no way to specify from Windows-Clients the usage of a specific BS2000 form. However, the queue used to submit the job specifies the Dprint printer pool and the form name. No font specification is possible.

The form resource is validated by the BS2000 host running the Dprint client (to which the APA printer is connected). All necessary resources must therefore be defined in the SPOOL parameter file and SPSLIB on the BS2000 host.

What you see, is what you print? (WYSIWYP)

Due to the APA printer functions involved in this usage model and to the selection of the Fujitsu Siemens PageStream driver under Windows, the document layout (fonts, typographic features) and images are respected as follows:

BS2000 Print Services functions when addressing IPDS printers by tuning options in PRINT-DOCUMENT	**Windows-Clients functions when addressing IPDS printers by tuning options in**	**Agent type and localization**
DOCUMENT-PART		
by page	Windows application - page selection	End user
by line	Windows application - page selection	End user
by section	Windows application - page selection	End user
by column	seldom applicable	End user
DOCUMENT-FORMAT=*PAGE		
line spacing	1	
control mode	APA	
print job control		
start processing	not tunable (default of S&P)	
checkpointing	not tunable (default of S&P)	
job name	title in Wprint queue definition	End user
job priority	not tunable (default of S&P)	
monjv	not tunable (default of S&P)	
error processing (msg page)	not tunable (default of S&P)	

BS2000 Print Services functions when addressing IPDS printers by tuning options in PRINT-DOCUMENT	**Windows-Clients functions when addressing IPDS printers by tuning options in**	**Agent type and localization**
RESOURCE-DESCRIPTION		
form name	"Queue" file of the BSD gateways	Gateway administrator
character sets	not tunable (default of S&P)	
page def./form def.	not tunable (default of S&P)	
resource location	not tunable (default of S&P)	
user resource file	not tunable (default of S&P)	
COPIES		
additional copies	Wprint queue definition	End user
TO-PRINTER		
printer ID	Wprint queue definition	End user
printer type	fixed to APA	
Additional functions		
compression	Converter	Gateway administrator
raster image/font downloading	Fujitsu Siemens PageStream driver	End user
landscape/portrait	Fujitsu Siemens PageStream driver	End user
simplex/duplex	Fujitsu Siemens PageStream driver	End user
input/output tray	Fujitsu Siemens PageStream driver	End user

Supported printer types

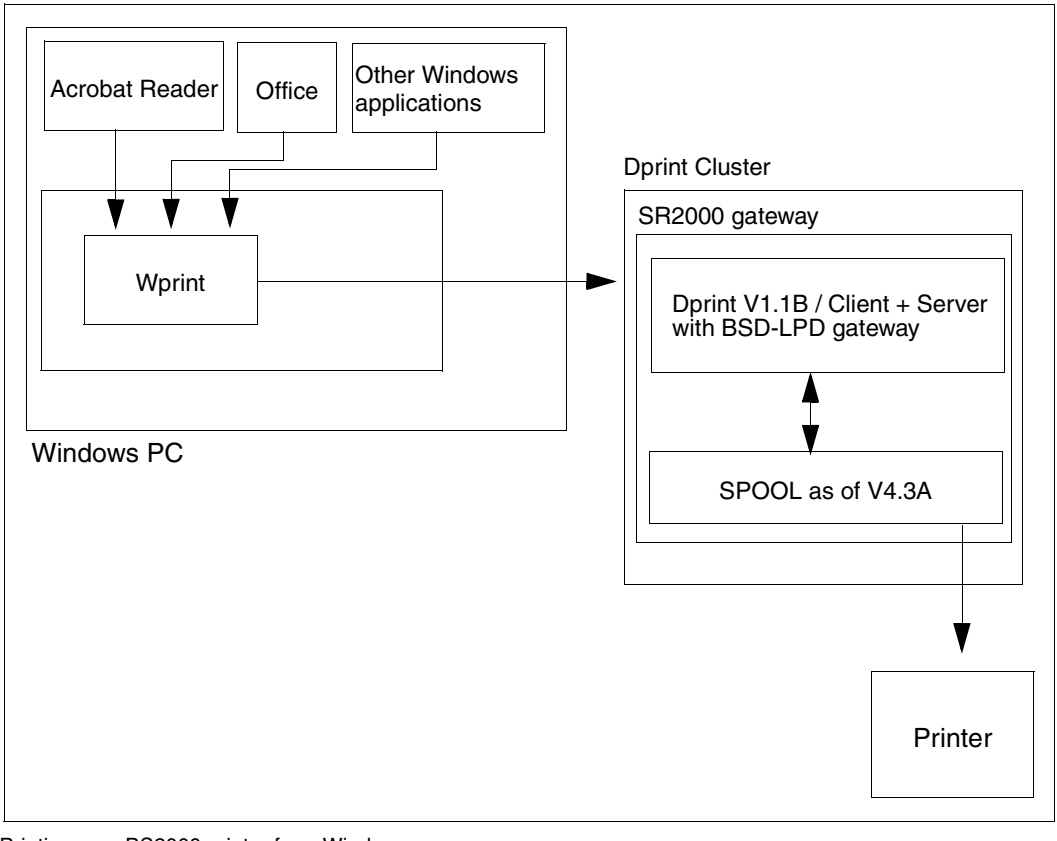
2050-APA 2090-APA 2090-TWIN

3.8 Usage models for the support of Windows-Clients

Connecting Windows-Clients gives you, for example, the option of printing out large files created on a PC on a BS2000 printer. This has the advantage that a BS2000 printer is considerably more powerful than an ordinary office printer. This function makes it possible to, for example, read BS2000 manual files which are available as softbooks (PDF format) on a CD-ROM or on the Fujitsu Siemens server in the Web, on a PC but to print them out on a BS2000 high-performance printer.

If the PC has Wprint installed, a mouse click in the PC application is all you need to start the print job on a BS2000 printer.

The diagram shows the following scenario: a document (e.g. a softbook) can be opened in Acrobat Reader on a PC. You then select the *File* menu followed by *Print* and then the printer driver *Wprint*. Your document is then printed on a BS2000 high-performance printer.



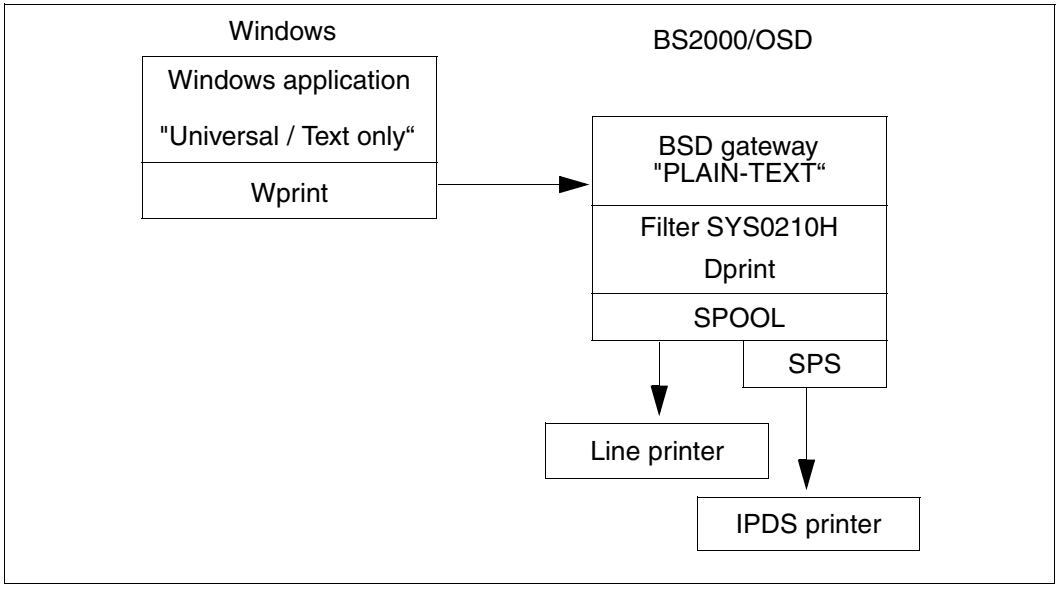
Printing on a BS2000 printer from Windows

3.8.1 Access to SPOOL from Windows-Clients

Printing interoperability between Windows-Clients and BS2000 provides the end user with the opportunity to access highspeed laser printers and line printers. Any printer supported by SPOOL may be reached by Windows-Clients, provided the printer is defined in the Dprint configuration of the BS2000 cluster and referred to the BSD gateway queue file definition. The only difference is that the SPOOL printer may only be accessed via a printer pool name, either alone or among other SPOOL printers.

Please bear in mind that there is no command that allows Windows-Clients to obtain information on available SPOOL pools. It is up to the BS2000 cluster administrator to provide a list of the available queues in order to set the queue properties of the clients properly.

3.8.1.1 Printing in line mode



Printing in line mode

Below are the prerequisites for accessing a SPOOL printer pool connected to a BS2000 host by Windows-Clients.

Product versions

1. BS2000-SPOOL V4.4 or higher.
   SPOOL must be loaded on the BS2000 cluster gateway host and on the BS2000 host to which the printer is connected (could also be the BS2000 gateway host). If APA printers are to be used the SPS V3.8 or higher is also required.
2. WPRINT V3.1 or higher.
   The WPRINT client component must have been installed at least on the PC clients.
3. Dprint V1.0J or higher.
   The Dprint client part (DPRINT-CL, DPRINT-CM) must be loaded on the BS2000 cluster gateway host. The Dprint server part (DPRINT-SV, DPRINT-CM) must be loaded on the BS2000 host to which the printer is connected. The BSD gateway must be installed on a POSIX partition on the BS2000 cluster gateway host.

SPOOL definition

From the SPOOL side, the available printers have to be defined in the SPOOL parameter file of the host to which the printers are connected and on which the Dprint server runs. This definition can be made using the ADD-SPOOL-DEV statement of SPSERVE.

Dprint definition

In order to allow Windows-Clients to submit print requests to a BS2000 cluster, two different definitions need to be made:

1. The BS2000 cluster administrator must define a BS2000 cluster gateway in the Dprint configuration. This is possible using the SPSERVE statements ADD-DPRINT-HOST or MODIFY-DPRINT-HOST.
2. In order to make some SPOOL printers accessible from Windows-Clients, they have to be defined in the DPRINT configuration. First of all, the characteristics of each distributed printer must be defined using the ADD-DPRINT-PRINTER statement of the SPSERVE product.

Then, in order to be accessible from Windows-Clients, one or more distributed printers must be defined in a printer pool using the ADD-DPRINT-PRINTER-POOL statement of the SPSERVE product.

BSD-LPD gateway definition

The possible Windows-Clients host names (with regular expression) that may interoperate with the gateway must be entered in the clients configuration file in order to allow print requests to be accepted by the gateway. Then a server definition must be recorded in the server configuration file before being started using the spchg command under POSIX.

A queue definition must be recorded in the "Queue" file referring the previous distributed printer pool with a form associated. The content_type file must refer to the "f" property, the PLAIN-TEXT content type.

Wprint definition

A Wprint queue with the following settings (Alt-Ins) must be defined:

– a local SPOOL file name

– a remote queue name which corresponds to the one recorded in the "Queue" file

– a remote host name which is the gateway host name of the cluster where the BSD gateway is running

– a queue property: CR/LF into LF, file type set as formatted print (option f).

Through the control panel's printer icon in Windows, a "Universal/Text only" driver must be selected and connected to the Wprint queue (local SPOOL file name). It might be set as the default printer.

Windows definition

The gateway of the BS2000 cluster must be defined in the Naming Service corresponding to the Transport Service Provider (TCP/IP) used to communicate between Windows-Clients and the BSD-LPD gateway.

BCAM definition

All Windows-Clients hosts must be defined in BCAM either statically in the RDF via XPRO macro or dynamically via the /BCIN command.

Thereafter, any print submission (Ctrl-P) from any Windows applications will be printed on the corresponding BS2000 distributed printer pool with the associated form.

Restrictions and limits

There is no way to specify from Windows-Clients the usage of a specific BS2000 form. However, the queue used to submit the job specifies a duplet (distributed printer pool, form name). No font specification is possible.

Depending on the RESOURCE-LOCATION option value of the BS2000 cluster gateway host, the form resource is validated by the BS2000 host running the Dprint client when *HOME is specified or by the BS2000 host running the Dprint server when *SERVER is specified. All resources referenced and required by the form, must be defined in the SPOOL parameter file and related PRFILE (SPSLIB if APA printers are used) on the BS2000 host requested for validation (either client or server).

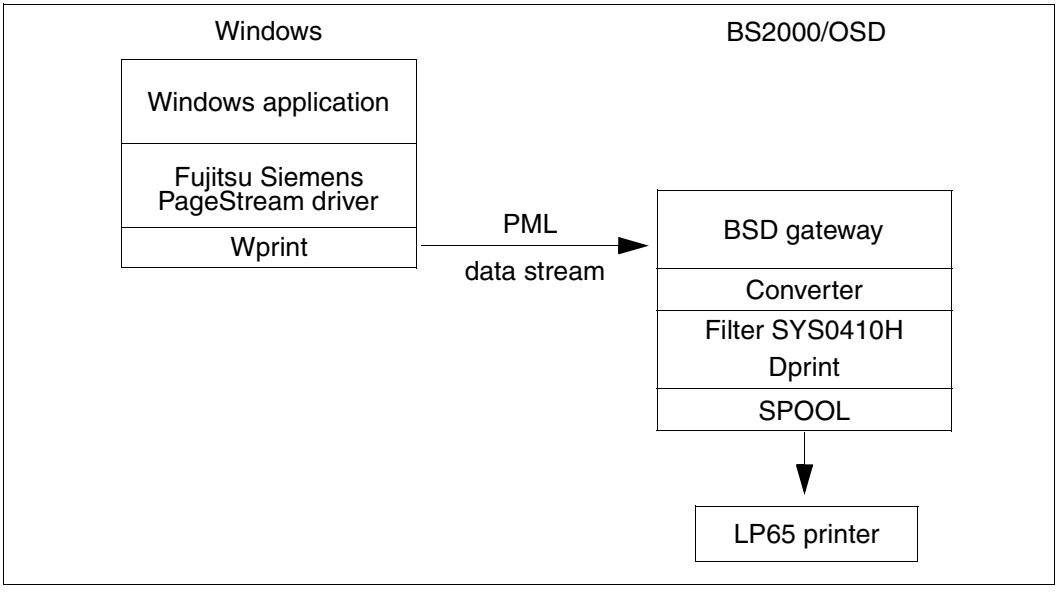
What you see is what you print (WYSIWYP)

Due to the printer capabilities involved in this usage model and to the selection of a Windows universal text-only driver, the document layout (fonts, typographic features) and images are no longer respected.

Supported printer types

LP-PRINTER	LP-EMULATED	LP48-PRINTER	LP65-PRINTER
HP-PRINTER	HP90-PRINTER		
2050-APA	2090-APA	2090-TWIN	

3.8.1.2 Printing in EXCCW



Printing in EXCCW

Below are the prerequisites for accessing a EXCCW printer pool connected to a BS2000 host by Windows-Clients.

Product versions

1. BS2000-SPOOL V4.4 or higher.
   SPOOL must be loaded on the BS2000 cluster gateway host and on the BS2000 host to which the EXCCW printer is connected (could also be the BS2000 gateway host).
2. WPRINT V3.1 or higher.
   The WPRINT client component must have been installed at least on the PC clients.
3. Dprint V1.0J or higher.
   The Dprint client part (DPRINT-CL, DPRINT-CM) must be loaded on the BS2000 cluster gateway host. The Dprint server part (DPRINT-SV, DPRINT-CM) must be loaded on the BS2000 host to which the printer is connected. The BSD gateway must be installed on a POSIX partition on the BS2000 cluster gateway host.

SPOOL definition

From the SPOOL side, the available EXCCW printers must be defined in the SPOOL parameter file of the host to which the printers are connected and on which the Dprint server runs. This definition can be made using the SPSERVE statement ADD-SPOOL-DEV.

Dprint definition

In order to allow Windows-Clients to submit print requests to a BS2000 cluster, two different definitions must be made:

1. The BS2000 cluster administrator must define a BS2000 cluster gateway in the Dprint configuration. This is possible using the SPSERVE statement ADD-DPRINT-HOST or MODIFY-DPRINT-HOST.
2. In order to make two or more EXCCW printers accessible from Windows-Clients, they have to be defined in the DPRINT configuration. First of all, the characteristics of each distributed printer must be defined using the SPSERVE statement ADD-DPRINT-PRINTER. Then, in order to be accessible from Windows-Clients, one or more distributed EXCCW printers must be defined in a printer pool using the SPSERVE statement ADD-DPRINT-PRINTER-POOL.

BSD gateway definition

The possible Windows-Clients host names (with regular expression) that may interoperate with the gateway must be entered in the client configuration file in order to allow print requests to be accepted by the gateway. Then a gateway definition must be recorded in the server configuration file before being started using the spchg command under POSIX.

A queue definition must be recorded in the "Queue" file referring the previous distributed printer pool with a form associated. The content_type file must refer to a property (determined by the BSD gateway administrator), the EXCCW content type.

Wprint definition

A Wprint queue with the following settings (Alt-Ins) must be defined:

– a local SPOOL file name

– a remote queue name which corresponds to the one recorded in the "Queue" file

– a remote host name which is the gateway host name of the cluster where the BSD gateway is running

– a queue property depending on the content_type file referring to EXCCW on the BSD gateway site.

Through the control panel's printer icon in Windows, the Fujitsu Siemens PageStream driver must be selected and connected to the Wprint queue (local SPOOL file name). It might be set as the default printer.

Windows definition

The gateway of the BS2000 cluster must be defined in the Naming Service corresponding to the Transport Service Provider (TCP/IP) used to communicate between Windows-Clients and the BSD gateway.

BCAM definition

All Windows-Clients hosts must be defined in BCAM either statically in the RDF via XPRO macro or dynamically via the /BCIN command.

Thereafter, any print submission (Ctrl-P) from any Windows applications will be printed on the corresponding BS2000 distributed EXCCW printer pool with the associated form.

Restrictions and limits

There is no way to specify from Windows-Clients the usage of a specific BS2000 form. However, the queue used to submit the job specifies a duplet (distributed printer pool, form name). No font specification is possible.

Depending on the RESOURCE-LOCATION option value of the BS2000 cluster gateway host, the form resource is validated by the BS2000 host running the Dprint client when *HOME is specified or by the BS2000 host running the Dprint server when *SERVER is specified. All resources referenced and required by the form must be defined in the SPOOL parameter file and related PRFILE on the BS2000 host requested for validation (either client or server).

What you see is what you print (WYSIWYP)

Due to the EXCCW printer capabilities involved in this usage model and to the selection of the Windows Fujitsu Siemens PageStream driver, the document layout (fonts, typographic features) and images are respected.

BS2000 Print Services offered capabilities when addressing EXCCW-printers by tuning options in PRINT-DOCUMENT	**Windows-Clients offered capabilities when addressing EXCCW-printers by tuning options in**	**Agent type and localization**
DOCUMENT-PART		
by page	Windows application - page selection	End user
by line	Windows application - text selection	End user
by section	Windows application - text selection	End user
by column	seldom applicable	End user
DOCUMENT-FORMAT=*TEXT		
line spacing	1	
line per page	not applicable (default of S&P)	
header line	not applicable (default of S&P)	
output format	not applicable (default of S&P)	
print job control		
start processing	not tunable (default of S&P)	
checkpointing	not tunable (default of S&P)	
job name	Title in Wprint queues definition	End user
job priority	not tunable (default of S&P)	
monjv	not tunable (default of S&P)	
LAYOUT-CONTROL		
copies	Fujitsu Siemens PageStream driver or started in EXCCW	End user or gateway administrator
two-sided	Fujitsu Siemens PageStream driver	End user
rotation	Fujitsu Siemens PageStream driver, only P/L	End user
input tray	Fujitsu Siemens PageStream driver	End user
output tray	Fujitsu Siemens PageStream driver	End user

BS2000 Print Services offered capabilities when addressing EXCCW-printers by tuning options in PRINT-DOCUMENT	**Windows-Clients offered capabilities when addressing EXCCW-printers by tuning options in**	**Agent type and localization**
RESOURCE-DESCRIPTION		
form name	queue definition of BSD gateway	Gateway administrator
overlay (face-side/reverse-side)	only EFO can be selected by the LCL[1] to switch in EXCCW	Gateway administrator
LCL	LCL defined in converter (tunable)	Gateway administrator
resource location	not tunable (default of S&P)	
user resource file	not tunable (default of S&P)	
COPIES		
additional copies	Wprint queue definition	End user
TO-PRINTER		
printer ID	Wprint queue definition	End user
printer type	fixed to LP65	
Additional functions		
compression	Converter	Gateway administrator
raster image/font downloading	Fujitsu Siemens PageStream driver	End user
stacker offset	selected by form	S&P administration

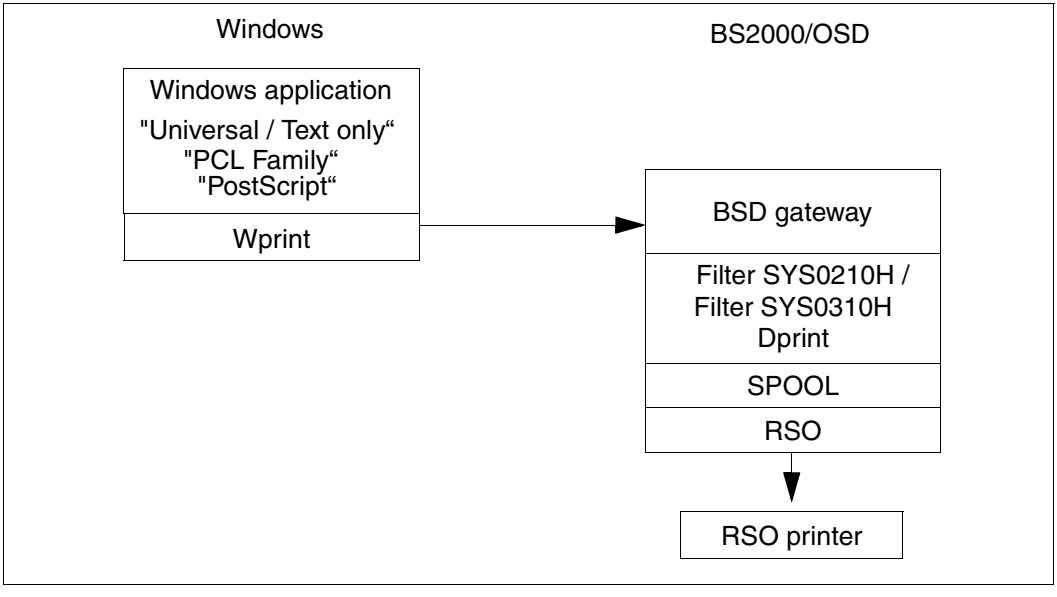
[1] LCL is a small program residing on a storage medium in the printer, that is started when printing a document and that allows several tuning (i.e. copies, offset stacking, EXCCW switching) for each page.

Supported printer types

LP65-PRINTER

3.8.2 Access to RSO from Windows-Clients

The RSO product offers the opportunity to print on "office" printers also connected to the TRANSDATA-NEA world and to a TCP/IP LAN (connected, in turn, to the BS2000 host). A BSD-LPD client may address a print request to an RSO device in a BS2000 cluster, provided that the required definitions exist. As the RSO subsystem is not distributed, the accessible RSO printers are those defined in the SPOOL.parameter file of the BS2000 host where the BS2000 gateway is located. RSO must also be loaded on this host.



Access to RSO from Windows

Please bear in mind that there is no command allowing any BSD-LPD client to obtain information on available RSO devices. It is up to the BS2000 cluster administrator to provide a list of the available devices.

Below are the prerequisites for accessing an RSO printer (pool) connected to a BS2000 host by Windows-Clients.

Product versions

1. BS2000-SPOOL V4.4 or higher.
   SPOOL must be loaded on the BS2000 cluster gateway host and on the BS2000 host to which the printer is connected (could also be the BS2000 gateway host).
2. RSO V3.1 or higher.
   RSO must be loaded on the BS2000 cluster gateway host.
3. WPRINT V3.1 or higher.
   The WPRINT client component must have been at least installed on the PC clients.
4. Dprint V1.0J or higher.
   The Dprint client part (DPRINT-CL, DPRINT-CM) must be loaded on the BS2000 cluster gateway host. The BSD gateway must be installed on a POSIX partition on the BS2000 cluster gateway host.

RSO definition

From the RSO side, the available remote printers have to be defined in the SPOOL parameter file of the host running the BS2000 cluster gateway. This definition can be made using the ADD-SPOOL-DEV statement of SPSERVE.

Dprint definition

In order to allow Windows-Clients to submit print requests to a BS2000 cluster, the BS2000 cluster administrator must define a BS2000 cluster gateway in the Dprint configuration. This is possible using the SPSERVE statement ADD-DPRINT-HOST or MODIFY-DPRINT-HOST.

BSD gateway definition

The possible Windows-Clients host names (with regular expression) that may interoperate with the gateway must be entered in the client configuration file in order to allow print requests to be accepted by the gateway. Then a gateway definition must be recorded in the server configuration file before being started using the spchg command under POSIX.

A queue definition must be recorded in the "Queue" file referring the former RSO printer (pool) with a form associated. The content_type file must refer to a property (determined by the BSD gateway administrator), the appropriate content type.

Wprint definition

A Wprint queue with the following settings (Alt-Ins) must be defined:

– a local SPOOL file name

– a remote queue name which corresponds to the one recorded in the "Queue" file

– a remote host name which is the gateway host name of the cluster where the BSD gateway is running

– a queue property depending on the document type being submitted.

Through the control panel's printer icon in Windows, a Windows printer driver must be selected which is the appropriate printer PDL for the remote printer concerned (e.g. HP LaserJet IIIsi) that is connected to the Wprint queue (local SPOOL file name). It might be set as the default printer.

Windows definition

The gateway of the BS2000 cluster must be defined in the Naming Service corresponding to the Transport Service Provider (TCP/IP) used to communicate between Windows-Clients and the BSD gateway.

BCAM definition

All Windows-Clients hosts must be defined in BCAM either statically in the RDF via XPRO macro or dynamically via the /BCIN command.

Thereafter, any print submission (Ctrl-P) from any Windows applications will be printed on the corresponding BS2000 RSO printer (pool) with the associated form.

Restrictions and limits

There is no way to specify from Windows-Clients the usage of a specific BS2000 form. However, the queue used to submit the job specifies a duplet (distributed printer pool, form name). No font specification is possible.

Therefore all the required resources must be defined in the SPOOL parameter file and RSOFILE on the BS2000 host. Depending on the specified form name and the target printer type, RSO looks for any PROLOG, EPILOG and MEMBER files under the SYSDPRNT user ID.

What you see is what you print (WYSIWYP)

Due to some RSO printer capabilities that are involved in this usage model and to the selection of an adequate Windows Printer PDL dependent driver, the document layout (fonts, typographic features) and images are respected. Of course using the universal text-only driver, will not respect the page layout but keep the text data.

Supported remote device types (RSO nomenclature)

Postscript documents

9000-PS

PCL documents

9021	9022-200	9000-PCL	DJET	4824-PCL
9026-PCL	4812	4818-PCL	4821-PCL	4822-PCL
4825-PCL	2030-PCL			

Line data documents

4812	4824-PCL	9022-200	9026-PCL	DJET
9000-PCL	4821-PCL	9021	4011	8121
9001-31	4813	9001	9001-31	9002/3/4
9011/2/3	9014	9097	9022	9025
9026-RENO	9645	2030-PCL	9015	4818-PCL
4822-PCL	4825-PCL	9045-ANSI	9046	9000-PS/-PRO
9000-EPFX	9000-EPSQ	9000-EPLQ		

4 Support of the SPOOL Notification Service

This section describes the support of the notifications. The following aspects are described:

– The different object classes and their associated events
– The registration into the Notification Service
– The available object instance attributes
– The extension in the PRINT-DOCUMENT command and PRNTDOC macro
– The privilege policy
– Global usage models in intra-/inter-cluster and from/to other spoolers

For details of the Notification Service product SNS, please refer to the manual “SNS V1.0B (BS2000/OSD)”.

There is no distribution of the notification information. The subscriptions are created locally on the host where the print jobs are issued.

Two kinds of subscriptions can be created:

– permanent subscription created by means of the Notification Resource Manager program and valid for all print jobs

– temporary subscription created at print job submission and dedicated to a specific print job. A temporary subscription only exists during the print job life. The Notification Service erases it after the print job has been completed (either successfully printed or cancelled). The Notification Service creates a subscription object associated to the newly created print job.

4.1 Dprint notification resources

This section describes the Dprint notification resources and their registration into the Notification Service.

4.1.1 Registration into the notification service

In order to make the notification for distributed print jobs available, it is necessary to define some notification resources that are specific for Dprint. Those resources have to be registered in the Notification Service. A specific procedure has been released for this purpose: SYSPRC.DPRINTCM.011.NOTIF. This procedure has to be executed only once, after the installation of Dprint V1.1B and SNS. See the release notice of both products for details.

The following paragraphs describe the specific Dprint notification resources.

4.1.2 Object Class

The object class corresponding to distributed print jobs is named DPRNTJOB and it belongs to the domain SPPRINT.

4.1.3 Events

The following events are supported by Dprint:

Event names	**Meaning**
PRINTJOBACCEPTED	Raised when a new print job is accepted
PRINTJOBMODIFIED	Raised when an existing print job is modified. This occurs after filtering or when one of the following command is given: – MODIFY-PRINT-JOB-ATTRIBUTES – REDIRECT-PRINT-JOB This event is only raised on the server side.
PRINTJOBSTARTED	Raised when a print job spoolout is started on a printer, a tape or a virtual device. This includes also the activation of a print job on an IDOM application entry. This event is only raised on the server side.
PRINTJOBABORTED	Raised when a print job terminates abnormally. This occurs when: – a CANCEL-PRINT-JOB command is given – a spoolout controller terminated a print job abnormally – a cold or selective start of the SPOOL subsystem is given
PRINTJOBCOMPLETED	Raised when a print job terminates successfully

Event names	Meaning
PRINTJOBSUSPENDED	Raised when a spoolout controller interrupts the processing of a print job and puts it in wait state This event is only raised on the server side.
PRINTJOBKEPT	Raised when a print job is put in keep state. This occurs when: – a spoolout controller keeps a print job after an error – an EXPORT-PUBSET command is given This event is only raised on the server side.
PRINTJOBRESUMED	Raised when a print job changes from keep state to wait state. This occurs when one of the following commands is given: – RESUME-PRINT-JOB – IMPORT-PUBSET This event is only raised on the server side.
PRINTJOBUPDATED	Raised on the client side when the server updates print job information on the client. This event corresponds to the following server events: – PRINTJOBMODIFIED – PRINTJOBSTARTED – PRINTJOBSUSPENDED, PRINTJOBKEPT – PRINTJOBRESUMED This event is also sent at Dprint server start.
PRINTJOBINTRANSFER	Raised when a print job file transfer is started
PRINTJOBTRANSFERRED	Raised at the end of a successful file transfer

4.2 Supported print job attributes

At each raise event action triggered by the Dprint processing, a set of attributes are made available for the notification processing. This means that all of these attributes can be used in the text of the method templates as well as in the creation of the subscriptions provided that the exact attribute names described below are used.

Those attributes are the following:

- The same attributes as those provided as OPS variables resulting of a `SHOW-PRINT-JOB-ATTRIBUTES TSN=(XXXX),INFORMATION=ALL`

  Examples

  ```
  var(*LIST).TSN
  => attributes TSN

  var(*LIST).OVERLAY-RESOURCE.OVERLAY.FACE
  => attribute OVERLAY-RESOURCE.OVERLAY.FACE
  ```

  The returned values of those attributes are the same as those returned in the OPS variable.

- A set of additional attributes:

Attribute names	Values	Meaning
FILE-TYPE	*OMF *PLAM *SYSLST *SYSOUT *EAM *UFS *BS2 *TMP	Type of the spoolout file
FCB-TYPE	*PAM *SAM *ISAM *EAM *TAPE *BTAM	File access method
REC-FORM	*V *F *U	Record format
JOB-TYPE	*SPOOL-JOB *DPRINT-JOB *CLIENT-COPY *SERVER-COPY	Print job type

Attribute names	Values	Meaning
CLUSTER-TYPE	*HOME *UNIX *BS2000	Cluster type from which the print job has been submitted
SBSD-CALLER	*YES *NO	Print job has been processed by the BSD gateway
SYSLST-NUMBER	Syslst-number(1..2) value 1..99	Syslst number
EAM-NUMBER	EAM number (1..5) Value 1..65535	Eam number
REC-SIZE	Number(1..5) Value 1..65535	Record size
BLOCK-SIZE	Number(1..5) Value 1..65535	Block size
FOB-SIZE	Number(1..5) Value 1..65535	Fob size
PRINTER-PAGE-NBR	Number(1..n)	Number of pages to be spooled out
ESTIM-SIZE	Number(1..n)	Estimated spoolout size
KEYPOS	Number(1..5) Value 1..65535	Key pos for ISAM file
KEYLEN	Number(1..3) Value 1..255	Key length for ISAM file
PPAGE-USED	Char(10)	Number of PAM pages used
SEQUENCE-NBR	Number(1..3) Value 0..255	Order number of family print jobs
MAILING-ADDRESS	Char(64)	Mailing address
CCSNAME	Char(8)	Coded character set
USERID	Char(8)	Userid
ACCOUNT	Char(8)	Account number
ACCOUNT-ID	Char(8)	Account id number
LONG-USER-ID	Char(1..255)	Long user id for print jobs on UNIX systems
LONG-HOST-NAME	Char(1..255)	Long host name for print jobs on UNIX systems
POSIX-FILE-NAME	Char(1..1024)	Full file name of POSIX file
RSO-PRINT-JOB	*YES *NO	RSO job indicator
CLIENT-HOSTNAME	Char(8)	Name of the client host

All these attributes are present at each raised event. However, some of them may have no value because they are not relevant in the context. In this case, the returned value is one blank.

4.3 Print job submission - extension for the Notification Service

The PRINT-DOCUMENT command and the PRNTDOC macro have been extended to support the notification and the macro SNPPRNT is provided.

4.3.1 PRINT-DOCUMENT command extension

The PRINT-DOCUMENT command has been extended with the operand NOTIFICATION. This operand is to be used also for distributed print jobs. For details, refer to the manual “SNS V1.0B (BS2000/OSD)“.

4.3.2 PRNTDOC macro extension

The PRNTDOC macro has been extended to support the notification service and the macro SNPPRNT is provided. Use those macros for distributed print jobs. For details, refer to the manual “Spool & Print - Macros and Exits V4.6 (BS2000/OSD)“.

4.4 Dedicated privilege policy

A specific privilege policy checks if the owner of a subscription can be notified on the events of a specific print job. This policy is provided as call back subroutine used by SNS.

The following privilege rules are implemented:

1. A user with the PRINT-SERVICE-ADMINISTRATION privilege on the master host of a Dprint cluster can be notified on:
   – all his own print jobs
   – all the distributed print jobs of all other users that are submitted inside his cluster, i.e. all the print jobs running on all the servers belonging to his cluster.
   – he is not allowed to be notified on the non distributed print jobs running on other hosts than his own.
   – he loses his privilege for the print jobs addressed to a remote cluster
2. A user with the PRINT-SERVICE-ADMINISTRATION privilege on a not master host can be notified on:
   – all his own print jobs
   – all the print jobs of all other users submitted on his own server
   – he loses his privilege for the print jobs addressed to a remote server or a remote cluster
3. A user without Spool & Print privileges can be notified on all his own print jobs

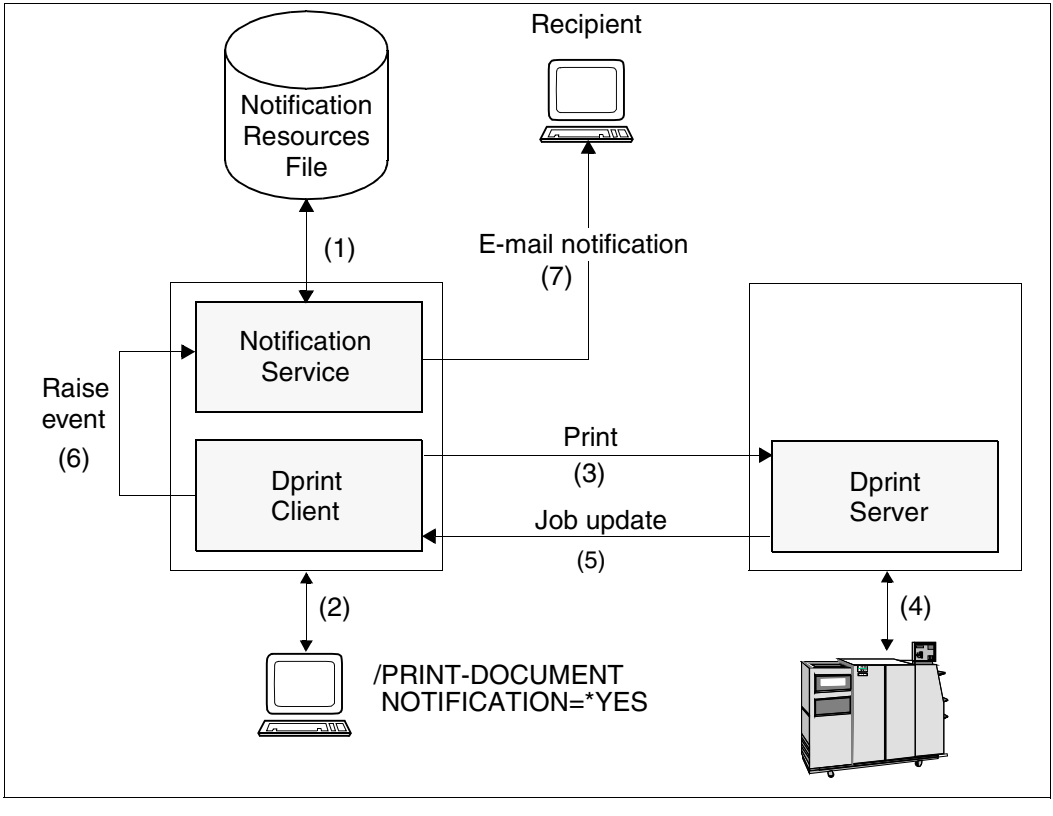
4.5 Usage models

This section describes the various usage models in Dprint for the SPOOL Notification Service:

– Notifications in intra-cluster
– Notifications in inter-cluster
– Notification subscription from other spoolers
– Notification subscription to other spoolers

4.5.1 Notifications in intra-cluster

Both subscription types (permanent and temporary) can be used by the end user on the client. The events are forwarded from the server where they are detected to the client where the notification takes place. The events may also be forwarded to the SPOOL administrator on the server and/or the cluster administrator provided that the corresponding permanent subscriptions have been defined. See section “Dedicated privilege policy” on page 111.



Notifications in intra-cluster

Setup of the notification environment

There is no distribution of the notification information. Each host contains its own notification environment created and managed by the local system administrator (1).

Print job subscription

The subscriptions are created locally on the host where the print jobs are issued.
A temporary subscription is created at the print job submission (2) and dedicated to a specific print job. It only exists during the print job life. The Notification Service erases it after the print job completion (either successfully printed or cancelled).
The Notification Service creates a subscription object associated to the newly created print job

Event notification

Notification is realised locally on the host where the print job was issued.

The print job is distributed to the server (3).

When an event occurred (4), the Spool & Print products forward the information to the client via the job update processing (5). The Spool & Print products running on the client then warn the Notification Service via a raise event call (6). The Notification Service finds all the subscription objects listening for the event. For each such subscription object, it generates an event notification according to the information specified in the subscription and the information provided by the raise event call. Then it delivers the event notification using the delivery method and target address identified in the subscription object's recipient attribute (7).

Examples of permanent subscription registrations

Permanent subscriptions can be registered with the Notification Resources Manager tool.

1. By the cluster administrator

```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES TYPE=*SUBSCRIPTION(
          OBJECT-CLASS-NAME=DPRNTJOB,
          OBJECT-ID=*ALL,
          OBJECT-USER=*ALL,
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=(PRINTJOBCOMPLETED),
          USER-DATA='Notification addressed to the Cluster Administrator',
          RECIPIENT=*PARAMETERS(
                    ADDRESS=cluadmin@yyy,
                      METHOD-NAME=MAILTO)
```

   With that subscription the cluster administrator will be notified on all the distributed jobs of all users that have been successfully processed inside his cluster.

2. By the SPOOL administrator

```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES TYPE=*SUBSCRIPTION(
          OBJECT-CLASS-NAME=DPRNTJOB,
          OBJECT-ID=*ALL,
          OBJECT-USER=*ALL,
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=(PRINTJOBKEPT),
          USER-DATA='Notification addressed to the Spool Administrator',
          RECIPIENT=*PARAMETERS(
                    ADDRESS=Spooladmin@yyy,
                      METHOD-NAME=MAILTO)
```

   With that subscription the SPOOL administrator will be notified on all the distributed jobs of all users processed on his own server that have been put in keep status.

3. By the nonprivileged user

```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES TYPE=*SUBSCRIPTION(
          OBJECT-CLASS-NAME=DPRNTJOB,
          OBJECT-ID=*ALL,
          OBJECT-USER=*OWN,
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=(PRINTJOBCOMPLETED,PRINTJOBABORTED),
          USER-DATA='Permanent user subscription',
          RECIPIENT=*PARAMETERS(
          ADDRESS=user@yyy,
           METHOD-NAME=MAILTO)
```

   With that subscription the user will be notified on all his own distributed jobs that have been normally or abnormally terminated.

Example of a temporary subscription

Any user submitting a distributed print job inside his local cluster can specify a notification request:

```
/PRINT-DOCUMENT file,NOTIFICATION=*PARAMETERS(
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=*ALL,
          USER-DATA='Personal notification',
          RECIPIENT=*PARAMETERS(
                     ADDRESS=user@yyy,
                       METHOD-NAME=MAILTO)
```

With that subscription the user will be notified on all the events that occurred for the current print job.

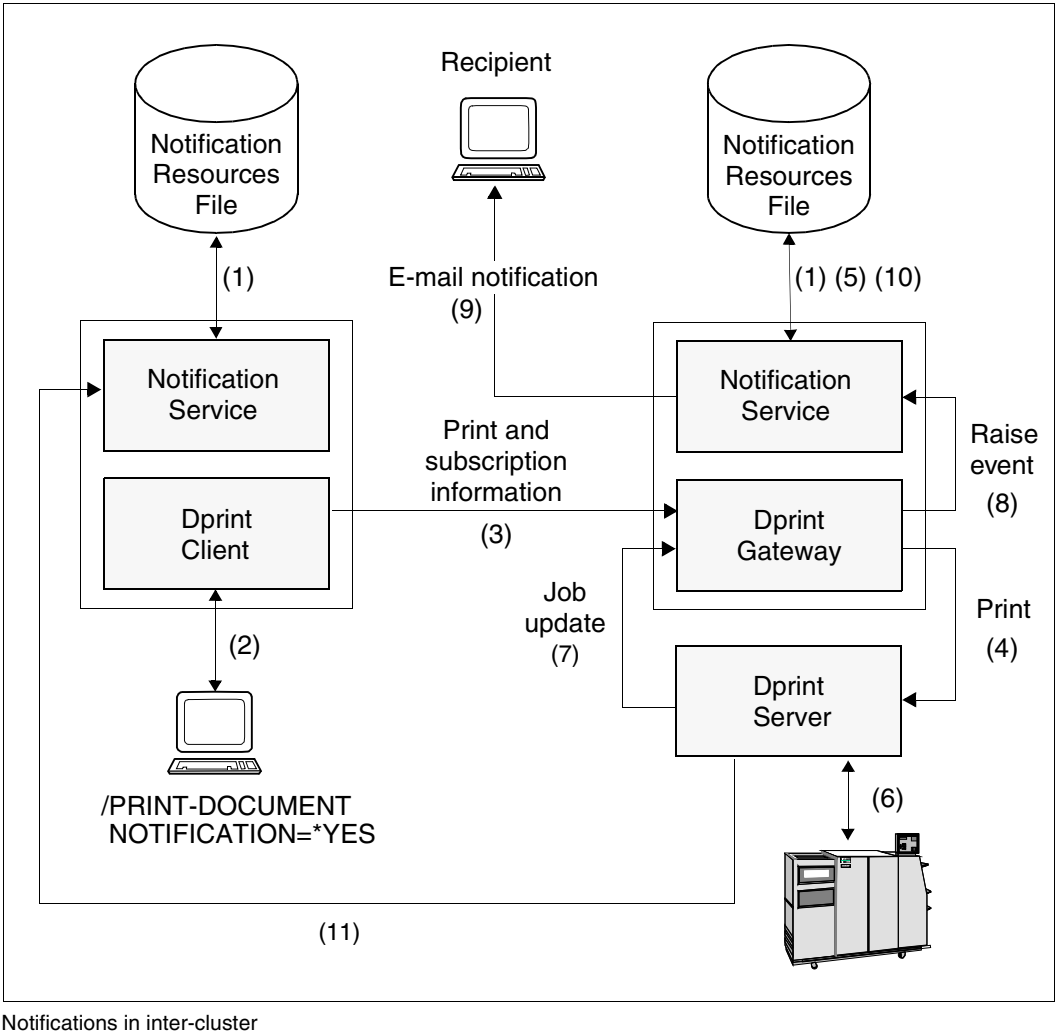
Pay attention that if the user also registered the above permanent subscription, he will be notified twice for the events PRINTJOBCOMPLETED and PRINTJOBABORTED.

4.5.2 Notifications in inter-cluster

Both subscription types (permanent and temporary) can be used by the end user on the client. The „at print job submission“ subscriptions are forwarded to the gateway where dynamic temporary subscriptions are created. The “end user” permanent subscriptions are registered on the client host. The events are forwarded from the server where they are detected to the gateway where the notification takes place. The events may also be forwarded to the SPOOL administrator on the server and/or the cluster administrator of the cluster provided that the corresponding permanent subscriptions have been defined. The events are also forwarded to the client host. See section “Dedicated privilege policy” on page 111.

Limitation

When a user submits a PRINT-DOCUMENT command to a remote Dprint cluster with the operand NOTIFICATION=*NO, his possibly existing permanent subscriptions registered on his local Notification Service will not be inhibited.



Notifications in inter-cluster

Setup of the notification environment

There is no distribution of the notification information. Each host contains its own notification environment created and managed by the local system administrator (1).

Print job subscription in the PRINT-DOCUMENT command

A temporary subscription is provided at the print job submission (2) and dedicated to a specific print job.
During the print processing, this subscription is forwarded to the Dprint gateway (3). When the print job is accepted on the Dprint server (4), a temporary subscription is created locally on the gateway host notification environment (5).

Event notification

When an event occurred (6), the Spool & Print products forward the information to the Dprint gateway via the job update processing (7). The Spool & Print products running on the Dprint gateway then warn the Notification Service via a raise event call (8). The Notification Service finds all the subscription objects listening for the event. For each such subscription object, it generates an event notification according to the information specified in the subscription and the information provided by the raise event call. Then it delivers the event notification using the delivery method and target address identified in the subscription object's recipient attribute (9). When the print job has been completed the dynamic temporary subscription is deleted (10).

When an event occurs on the server, this event is forwarded to the client host to generate the notification relative to possibly existing permanent subscriptions registered on the client (11).

Examples of permanent subscription registrations

Permanent subscriptions can be registered with the Notification Resources Manager tool:

1. By the cluster administrator

```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES TYPE=*SUBSCRIPTION(
          OBJECT-CLASS-NAME=DPRNTJOB,
          OBJECT-ID=*ALL,
          OBJECT-USER=*ALL,
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=(PRINTJOBCOMPLETED),
          USER-DATA='Notification addressed to the Cluster Administrator',
          RECIPIENT=*PARAMETERS(
                    ADDRESS=cluadmin@yyy,
                    METHOD-NAME=MAILTO)
```

   With that subscription the cluster administrator will be notified on all the distributed jobs of all users that have been successfully processed inside his cluster.

Note

Such a subscription will have no effect for the cluster administrator of the cluster from which the print job is issued.

2. By the SPOOL administrator

```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES TYPE=*SUBSCRIPTION(
          OBJECT-CLASS-NAME=DPRNTJOB,
          OBJECT-ID=*ALL,
          OBJECT-USER=*ALL,
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=(PRINTJOBKEPT),
          USER-DATA='Notification addressed to the Spool Administrator',
          RECIPIENT=*PARAMETERS(
                     ADDRESS=Spooladmin@yyy,
                       METHOD-NAME=MAILTO)
```

With that subscription the SPOOL administrator will be notified on all the distributed jobs of all users processed on his own server that have been put in keep status.

Note

Such a subscription will have no effect for the SPOOL administrator of the host from which the print job is issued.

3. By the nonprivileged user

```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES TYPE=*SUBSCRIPTION(
          OBJECT-CLASS-NAME=DPRNTJOB,
          OBJECT-ID=*ALL,
          OBJECT-USER=*OWN,
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=(PRINTJOBCOMPLETED,PRINTJOBABORTED),
          USER-DATA='Permanent user subscription',
          RECIPIENT=*PARAMETERS(
                     ADDRESS=user@yyy,
                       METHOD-NAME=MAILTO)
```

With that subscription the user will be notified on all his own distributed jobs that have been normally or abnormally terminated.

Example of a temporary subscription

Any user submitting a distributed print job addressed to a remote BS2000 cluster can specify a notification request:

```
/PRINT-DOCUMENT file,
          TO-PRINTER=*PARAMETERS(
          PRINTER-NAME=P08HP9,
          CLUSTER-NAME=REMBS2CL),
           NOTIFICATION=*PARAMETERS(
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=*ALL,
          USER-DATA='Personal notification',
          RECIPIENT=*PARAMETERS(
                    ADDRESS=user@yyy,
                      METHOD-NAME=MAILTO)
```

With that subscription the user will be notified on all the events that occurred for the current print job.

Pay attention that if the user also registered the above permanent subscription, he will be notified twice for the events PRINTJOBCOMPLETED and PRINTJOBABORTED.

4.5.3 Notification subscription from other Spoolers

Extensions have been made in Dprint in order to handle notification subscriptions issued from other Spoolers (Xprint, Wprint, BSD client). They are limited to the print job submission. No extension has been foreseen for displaying subscription information to the foreign system.

Only the mail notification method is supported. A mail method, defined in the Notification Services resources file, must be associated to the generic mail method selection. For this purpose a new parameter INTEROP-DEFAULT-MAIL-METHOD has been defined in the SYSSSI.DPRINTCM.011 file . Refer to section “Parameter file for optional processing (SYSSSI)” on page 382 for details.

4.5.3.1 Xprint/PRISMAnet spooler

Dprint up to V1.0J ignored the options related to the notification. Due to the print job notification support they are taken into account as of Dprint V1.1A. Some modifications exist in the interface:

-nm: Only the MAIL method is supported. Otherwise the print job is rejected.

-na: The address must be filled. Otherwise the print job is rejected.

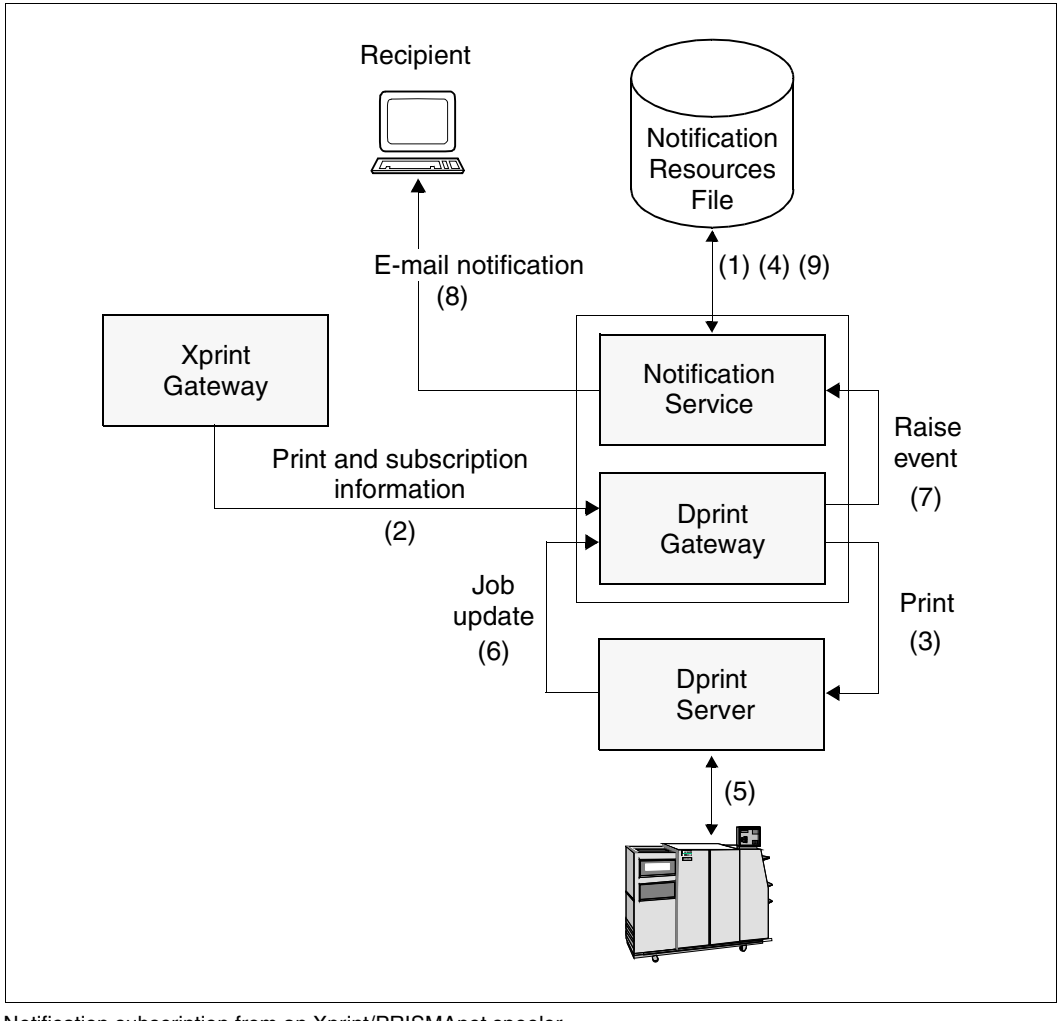
-ev: In Dprint up to V1.0J only the events REJECTED_FROM_REMOTE_DOMAIN and SENT_TO_REMOTE_DOMAIN were fully supported. All other events were ignored.
From Dprint V1.1A the Xprint/PRISMAnet events are mapped to Dprint events.

Xprint/PRISMAnet event names	Mapped to Dprint event names
ABORTED	PRINTJOBABORTED
ALL	ALL
COMPLETED	PRINTJOBCOMPLETED
DEVICE_ERROR	PRINTJOBKEPT
MODIFIED	PRINTJOBMODIFIED
NONE	NONE
REJECTED_FROM_REMOTE_DOMAIN	Managed by Xprint
RESUMED	PRINTJOBRESUMED
STARTED	PRINTJOBSTARTED
SUSPENDED	PRINTJOBSUSPENDED
USER_ERROR	Ignored as no correspondence
MOUNTING	Ignored as no correspondence
SENT_TO_REMOTE_DOMAIN	Managed by Xprint

Please note that the Dprint notification processing differs from the Xprint notifiction processing: when no notification method is selected, no notification takes place.

When an error is detected in the subscription validation, the print job is rejected
– either with the message SDD6001 in case of syntactical error
– or with the message SCP0884 if the temporary subscription cannot be created.

When client and server are not located on the same host, only the events “aborted” and “completed” may be specified during the xpadd command. The other events are ignored.



Notification subscription from an Xprint/PRISMAnet spooler

Setup of the notification environment

There is no distribution of the notification information. Each host contains its own notification environment created and managed by the local system administrator (1).

Print job subscription

A temporary subscription is provided at the print job submission and dedicated to a specific print job.
During the print processing, this subscription is forwarded to the Dprint gateway (2). When the print job is accepted on the Dprint server (3), a temporary subscription is created locally on the Dprint gateway host notification environment (4).

Event notification

When an event occurred (5), the Spool & Print products forward the information to the Dprint gateway via the job update processing (6). The Spool & Print products running on the Dprint gateway then warn the Notification Service via a raise event call (7). The Notification Service finds all the subscription objects listening to the event. For each such subscription object, it generates an event notification according to the information specified in the subscription and the information provided by the raise event call. Then it delivers the event notification using the delivery method and target address identified in the subscription object's recipient attribute (8). When the print job has been completed the dynamic temporary subscription is deleted (9).

Example of permanent subscription registrations

It is not possible to specify permanent subscriptions in the Xprint world. Permanent subscriptions can be registered with the Notification Resources Manager tool on the BS2000 cluster. However, nonprivileged BS2000 users cannot register a subscription that allows them to be notified on print jobs coming from Xprint hosts.

1. By the cluster administrator

```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES TYPE=*SUBSCRIPTION(
          OBJECT-CLASS-NAME=DPRNTJOB,
          OBJECT-ID=*ALL,
          OBJECT-USER=*ALL,
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=(PRINTJOBCOMPLETED),
          USER-DATA='Notification addressed to the Cluster Administrator',
          RECIPIENT=*PARAMETERS(
                    ADDRESS=cluadmin@yyy,
                      METHOD-NAME=MAILTO)
```

With that subscription the cluster administrator will be notified on all the distributed jobs of all users that have been successfully processed inside his cluster including print jobs coming from remote Xprint hosts.

2. By the SPOOL administrator

```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES TYPE=*SUBSCRIPTION(
          OBJECT-CLASS-NAME=DPRNTJOB,
          OBJECT-ID=*ALL,
          OBJECT-USER=*ALL,
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=(PRINTJOBKEPT),
          USER-DATA='Notification addressed to the Spool Administrator',
          RECIPIENT=*PARAMETERS(
                    ADDRESS=Spooladmin@yyy,
                    METHOD-NAME=MAILTO)
```

With that subscription the SPOOL administrator will be notified on all the distributed jobs of all users processed on his own server that have been put in keep status inside his cluster including print jobs coming from remote Xprint hosts.

Example of a temporary subscription

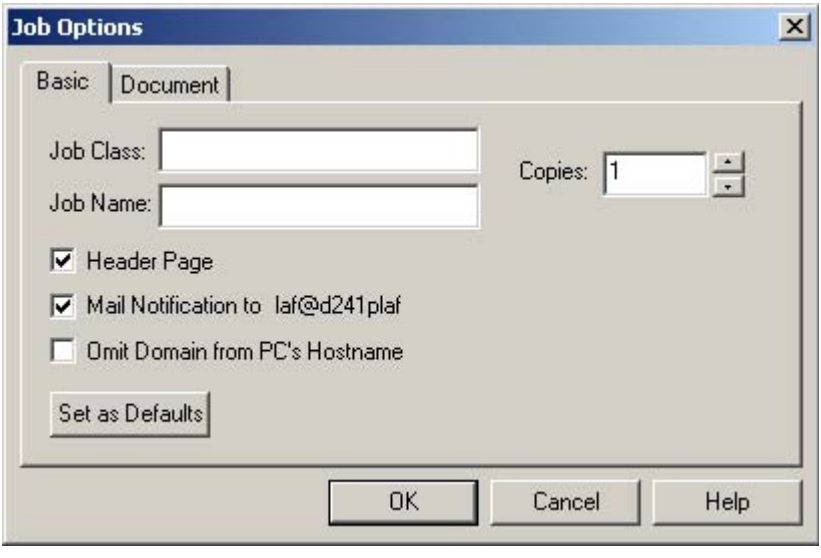
The temporary subscription must be specified in the Xprint command:

```
xpadd -de … -dr … -ct … -nm MAIL -na "…@…" [-ev … … …]
```

With that subscription, the user will be notified on the events REJECTED_FROM_REMOTE_DOMAIN and SENT_TO_REMOTE_DOMAIN by Xprint and of all other events by the BS2000 Notification Service.

4.5.3.2 Wprint spooler

Dprint up to V1.0J ignored the options related to the notification. Due to the print job notification support they are taken into account as of Dprint V1.1A.

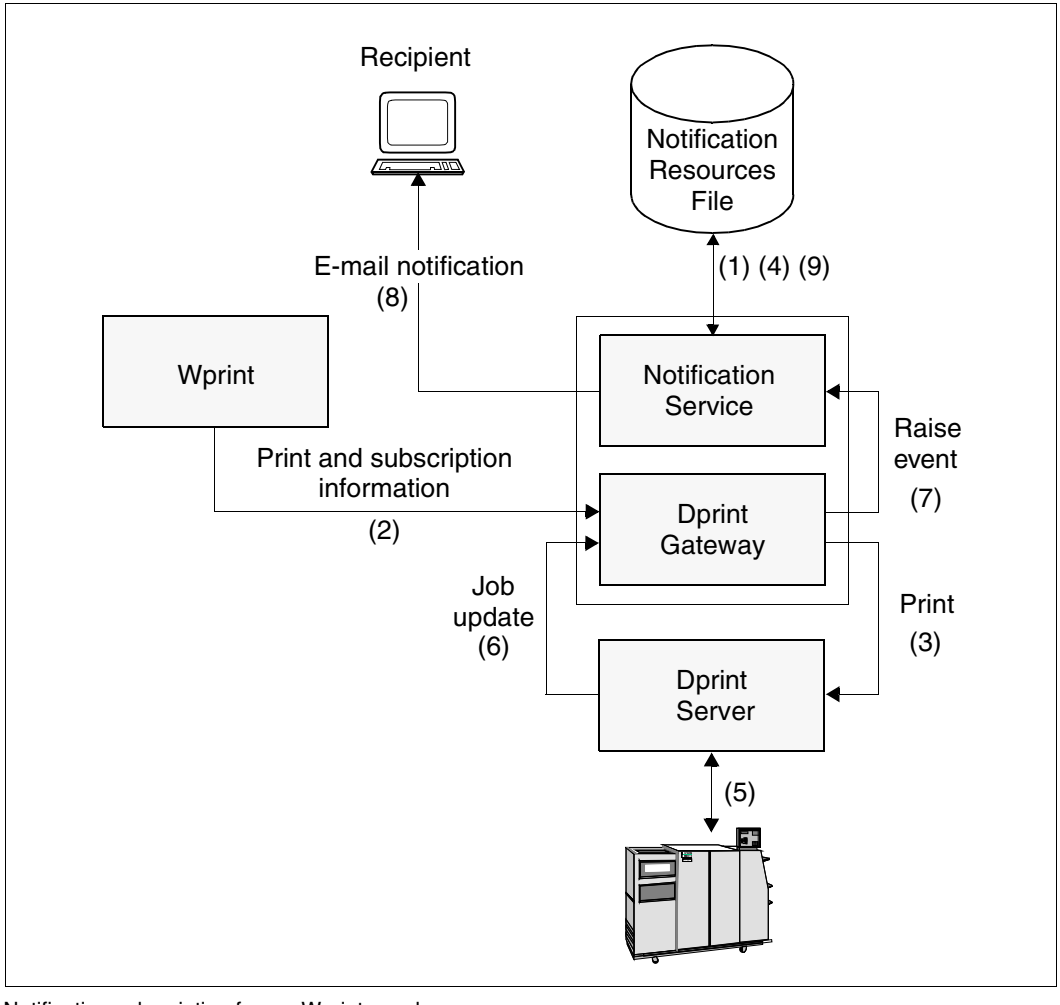


When selecting the “Mail Notification” checkbox in the “Job Options Basic” Tab, for each print request issued to this device a temporary subscription is created on the BS2000 host (provided that SNRTP is available), for the following events: PRINTJOBCOMPLETED, PRINTJOBABORTED and PRINTJOBSUSPENDED.

This usage model has some restrictions:

– Due to the email address structure that cannot be freely constructed (`user@host` , where user corresponds to the identification of the user and host corresponds to the PC name) the mail service must be configured accordingly (by defining aliases in the mail server). Please refer to the corresponding mail service documentation.

– When the printer is a shared printer there is no means for configuring the email address construction and get a dedicated mail to the real end user. The notification will be sent back to the print server.



Notification subscription from a Wprint spooler

Setup of the notification environment

There is no distribution of the notification information. The notification environment available on the Dprint gateway is created and managed by the local system administrator (1).

Print job subscription

Wprint allows the end user to be notified on the result of a print job by selecting the Mail Notification checkbox in the Job Options Basic tab. The corresponding information is set in the BSD-LPD control file.
During the print processing this subscription is forwarded to the Dprint gateway (2). When the print job is accepted on the Dprint server (3), a dynamic temporary subscription is created locally on the Dprint gateway host notification environment (4).

Event notification

When an event occurred (5), the Spool & Print products forward the information to the Dprint gateway via the job update processing (6). The Spool & Print products running on the Dprint gateway then warn the Notification Service via a raise event call (7). The Notification Service finds all the subscription objects listening for the event. For each such subscription object, it generates an event notification according to the information specified in the subscription and the information provided by the raise event call. Then it delivers the event notification using the delivery method and target address identified in the subscription object's recipient attribute (8). When the print job has been completed, the dynamic temporary subscription is deleted (9).

Restriction

Due to the email address structure that cannot be freely constructed (`user@host`) the mail system must be configured accordingly.
In case of sharing printers, the received address received on POSIX may be an invalid address.

Example of permanent subscription registrations

It is not possible to specify permanent subscriptions in the PC world. Permanent subscriptions can be registered with the Notification Resources Manager tool on the BS2000 cluster. However, nonprivileged BS2000 users cannot register a subscription that allows them to be notified on print jobs coming from Wprint.

1. By the cluster administrator

```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES TYPE=*SUBSCRIPTION(
          OBJECT-CLASS-NAME=DPRNTJOB,
          OBJECT-ID=*ALL,
          OBJECT-USER=*ALL,
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=(PRINTJOBCOMPLETED),
          USER-DATA='Notification addressed to the Cluster Administrator',
          RECIPIENT=*PARAMETERS(
                    ADDRESS=cluadmin@yyy,
                      METHOD-NAME=MAILTO)
```

   With that subscription the cluster administrator will be notified on all the distributed jobs of all users that have been successfully processed inside his cluster including print jobs coming from Wprint.

2. By the SPOOL administrator

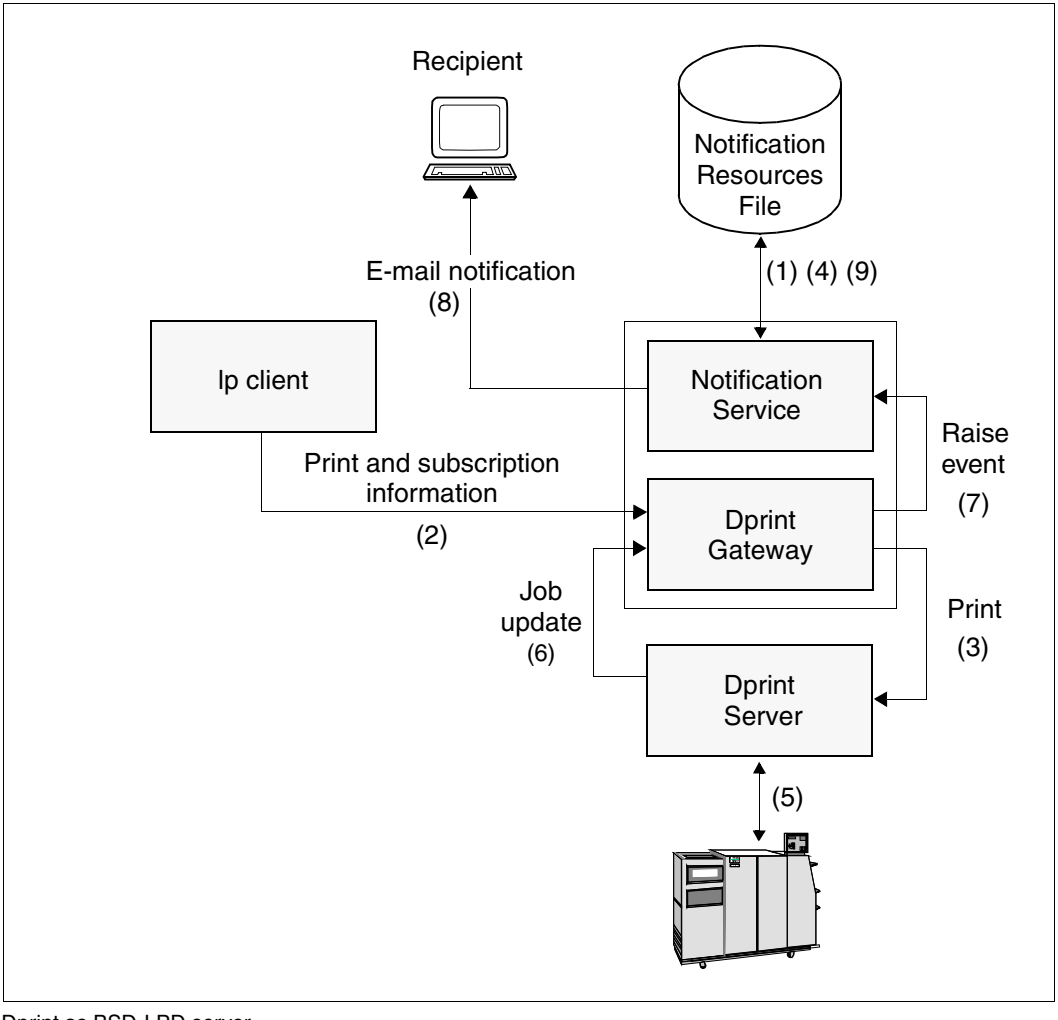
```
/START-NOTIFICATION-MANAGER
//ADD-NOTIFICATION-RESOURCES TYPE=*SUBSCRIPTION(
          OBJECT-CLASS-NAME=DPRNTJOB,
          OBJECT-ID=*ALL,
          OBJECT-USER=*ALL,
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=(PRINTJOBKEPT),
          USER-DATA='Notification addressed to the Spool Administrator',
          RECIPIENT=*PARAMETERS(
                    ADDRESS=Spooladmin@yyy,
                      METHOD-NAME=MAILTO)
```

   With that subscription the SPOOL administrator will be notified on all the distributed jobs of all users processed on his own server that have been put in keep status inside his cluster including print jobs coming from remote Wprint.

Example of a temporary subscription

By checking the "Mail Notification to" check box in the "Job Options" dialog box, the user will be notified on the events, provided that an alias name has been defined for the Wprint generated mail address on the mail server.

4.5.3.3 Dprint as BSD-LPD server



Dprint as BSD-LPD server

Setup of the notification environment

There is no distribution of the notification information. The notification environment available on the Dprint gateway is created and managed by the local system administrator (1).

Print job subscription

The RFC1179 protocol allows the end user to be notified of the result of a print job. Selecting the M option in the control file causes mail to be sent to the user given as the operand at the host specified by the H option when the printing operation ends (successfully or unsuccessfully).
When receiving such a control file the information is forwarded to Dprint by means of an option at the print job submission specifying the events as well as how and where the notification message is to be delivered (2). The mail notification delivery method is forced.
When the print job is accepted on the Dprint gateway (3), a dynamic temporary subscription is created locally on the gateway host notification environment (4).

Event notification

When an event occurred (5), the Spool & Print products forward the information to the Dprint gateway via the job update processing (6). The Spool & Print products running on the Dprintgateway then warns the Notification Service via a raise event call (7). The Notification Service finds all the subscription objects listening for the event. For each such subscription object, it generates an event notification according to the information specified in the subscription and the information provided by the raise event call. Then it delivers the event notification using the delivery method and target address identified in the subscription object's recipient attribute (8). When the print job has been completed, the dynamic temporary subscription is deleted (9).

Restriction

Due to the email address structure that cannot be freely constructed (`user@host` with user from M option and host from H option) the mail service must be configured accordingly.

4.5.4 Notification subscription to other Spoolers

Extensions have been made in Dprint in order to issue notification subscription to Xprint/PRISMAnet. They are limited to the job submission. No extension has been foreseen to display subscription information from the foreign system.

Furthermore, permanent subscriptions are not supported. Only subscriptions associated to the current print job by giving the subscription attributes at the print job submission are taken into account.

4.5.4.1 Xprint/PRISMAnet spooler

As the foreign spooler generates the notification, only the parameters available at the foreign spooler interface can be used. So some restrictions exist, when submitting the PRINT-DOCUMENT command:

– The value(s) selected in the OBJECT-ATTRIBUTES are discarded.

– The events selected in EVENT-NAMES are mapped to Xprint events

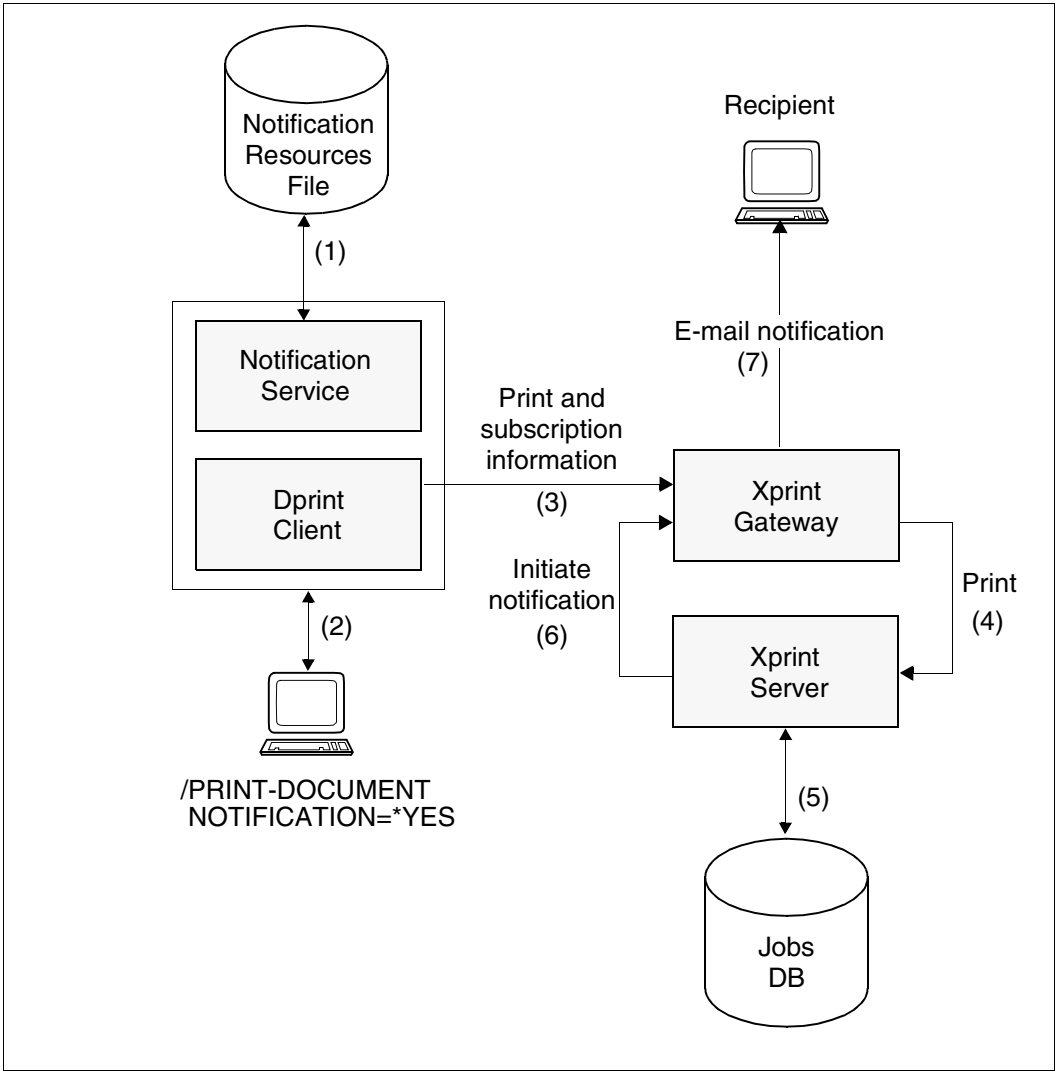
Dprint event names	**Mapped to Xprint event names**
PRINTJOBACCEPTED	Ignored as no correspondence
PRINTJOBMODIFIED	MODIFIED
PRINTJOBSTARTED	STARTED
PRINTJOBABORTED	ABORTED
PRINTJOBCOMPLETED	COMPLETED
PRINTJOBSUSPENDED	SUSPENDED
PRINTJOBKEPT	DEVICE_ERROR
PRINTJOBRESUMED	RESUMED
PRINTJOBINTRANSFER	Ignored as no correspondence
PRINTJOBTRANSFERRED	Ignored as no correspondence
PRINTJOBUPDATED	Ignored as no correspondence

– The value selected in the USER-DATA is discarded.

– The METHOD-NAME must be set to *MAIL.

– The RECIPIENT-ADDR must be filled.

When an error is detected in the subscription validation, the warning message SCP0883 is issued, but the print job is submitted to the foreign spooler.



Notification subscription to other Spoolers - Xprint/PRISMAnet spooler

Setup of the notification environment

There is no distribution of the notification information. Each host contains its own notification environment created and managed by the local system administrator (1).

Print job subscription in the PRINT-DOCUMENT command

No subscription is created on the host where the print jobs are issued (2).

During the print processing, when a subscription is associated to the current print job, this subscription is forwarded to the foreign domain (3). It is realised by means of an option at the print job submission specifying the events the job owner wants to be notified on as well as how and where the notification message is to be delivered. The notification delivery method specified in the PRINT-DOCUMENT command must be *MAIL.

Event notification

The event notification processing is completely realised by Xprint (4) (5) (6) (7).

Example of a temporary subscription

Only temporary subscriptions are relevant. All permanent subscriptions have no effect.

Any user submitting a distributed print job addressed to a remote Xprint cluster can specify a notification request:

```
/PRINT-DOCUMENT file,
          TO-PRINTER=*PARAMETERS(
          PRINTER-NAME='hpprinter',
          CLUSTER-NAME=REMXPRCL),
          NOTIFICATION=*PARAMETERS(
          OBJECT-ATTRIBUTES=*ALL,
          EVENT-NAMES=*ALL,
          USER-DATA='Personal notification',
          RECIPIENT=*PARAMETERS(
                     ADDRESS=user@yyy,
                       METHOD-NAME=*MAIL)
```

With that subscription the user will be notified by Xprint on all the events that occurred for the current print job (see Xprint events). The operands OBJECT-ATTRIBUTES, USER-DATA are ignored. The METHOD-NAME must have the *MAIL value, otherwise the print command is rejected.

5 Use of Distributed Print Services by nonprivileged users

This chapter describes how nonprivileged users can use Distributed Print Services. Nonprivileged users are not provided with any special privileges. They can:

– print out files on Dprint printers

– control their jobs (see page 165)

– obtain information (see page 172)

– use certain commands and SPSERVE statements (see page 171)

– react in certain error situations (see page 175).

A full syntax description of the commands mentioned in this chapter can be found in the "Spool & Print - Commands" manual. More information on the local printers supported can be found under the following URL:
http://extranet.fujitsu-siemens.com/cafe/bs2000/prodarch/drucker/hdchannd.htm.

5.1 Printing files

This section illustrates the functions which are available to nonprivileged users when using Dprint. A distinction is made between printing in homogeneous (BS2000) clusters and printing in heterogeneous clusters (BS2000/UNIX systems).

Destination for the print job

In the PRINT-DOCUMENT command, the TO-PRINTER operand serves to define the destination for the print job. Here the printer name, printer type and name of the cluster can be specified for the print operation.

Depending on the destination for the job, certain operands can or must be specified. In addition, there may be restrictions or instructions which should be observed.

Standard destination

If Dprint is loaded and PRINTER-NAME is not specified, the destination is taken from the DPRINT-DESTINATION parameter of the GEN record in the SPOOL parameter file. The following can be defined for DPRINT-DESTINATION:

– *DESTINATION, i.e. the destination is taken from the DESTINATION parameter of the GEN record in the SPOOL parameter file. The destination can thus be an RSO printer or a printer pool which is defined in the SPOOL parameter file.

– *POOL, i.e. the name of a Dprint printer pool. The name must be defined in the configuration file.

– *CENTRAL, i.e. the print job is output in the local cluster on a Dprint or non-Dprint printer.

If Dprint is not loaded and PRINTER-NAME is not specified, the destination is also taken from the DESTINATION parameter of the GEN record of the SPOOL parameter file. The destination can thus be an RSO printer or a printer pool which is defined in the SPOOL parameter file.

Specified destination

If Dprint is loaded and PRINTER-NAME has been specified, first the configuration file is scanned. If no printer pool is found, then the SPOOL parameter file is scanned. It should be noted that, in the event of a Dprint printer pool and an RSO device or an RSO printer pool having identical names, the print job will be sent to the Dprint printer pool if Dprint is loaded.

By specifying a pool name, users can send their print jobs to the assigned printers. In doing so they restrict the list of possible servers which can process the Dprint print job.

If a cluster contains geographically scattered hosts, the cluster administrator is responsible for the definition of the assigned pools in order that users may have the facility to direct their print jobs explicitly to the desired locations.

If a print job is sent to a Dprint printer pool containing printers which are connected to different hosts, then the set of printers which are able to process the print job will automatically be restricted to those printers which belong to this pool and are connected to the same host.

Users can explicitly send their print jobs to a different cluster by specifying the operand CLUSTER-NAME. In this case, a Dprint printer pool may be specified, but not an RSO printer or an RSO printer pool.

Within the framework of heterogeneous interoperability, a printer attached to a UNIX system or printer pool may be specified.

5.1.1 Printing with Dprint in homogeneous clusters

Various SPOOL commands are available to users which allow them to manage (i.e. print, modify, cancel and display) their print jobs both within a BS2000 cluster and also between multiple BS2000 clusters:

```
/PRINT-DOCUMENT TO-PRINTER=*PAR(CLUSTER-NAME=...)
/MODIFY-PRINT-JOB-ATTRIBUTES JOB-ID=*TSN(TSN=...,CLUSTER-NAME=...)
/CANCEL-PRINT-JOB JOB-ID=*TSN(TSN=...,CLUSTER-NAME=...)
/SHOW-PRINT-JOB-ATTRIBUTES JOB-ID=*TSN(TSN=...,CLUSTER-NAME=...)
/SHOW-PRINT-JOB-STATUS ...
```

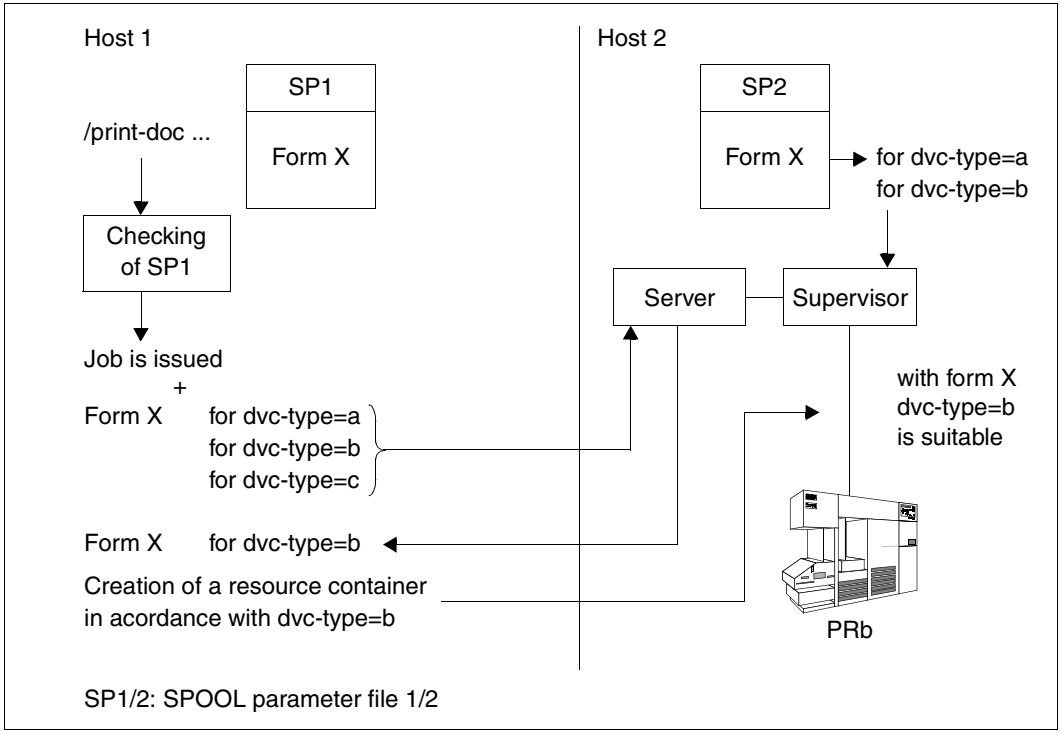
The following describes which resources can be used in homogeneous clusters for printing. This is followed by an explanation of how print profiles can be used in Dprint operation and what benefits are offered by the use of shared pubsets in Dprint operation.

5.1.1.1 Resources in a BS2000 Dprint environment

This section describes which print resources are used for processing the print jobs. In a Dprint environment, print jobs can be executed using either the client resources or the server resources with Dprint (Dprint resources are not managed in the current Dprint version).

The system exits defined by the system administration must also be taken into consideration for Dprint operation. Further information can be found in the „Spool & Print - Macros and Exits“ manual.

Execution of a print job using client resources (RES-LOC=*HOME)



Execution of a print job using client resources

During the execution of a print job a complete check is carried out at the client, as part of which a list of the suitable device types according to the PRINT-DOCUMENT command is produced. In this instance, the GEN records of the local SPOOL parameter file SP1 on the client are not taken into consideration. The print request is sent to the server with the list of the device types and the corresponding form definitions.

A second check is carried out on the server under the same attributes in respect of the form name requested by the client and the matching form name (see application note 1.). If there are differences, the print job will be rejected for this server. In the event of successful confirmation from the server, a common subset is formed between the device types in the print job issued and the device types permitted on the server, and the print job is accepted on the server.

A special resource container containing the required resources for the matching device type is transferred to the server (form, loop, character set, FOB, etc.). These resources are then used by the server for outputting the file. The system pages (header and trailer), however, are printed out using the server form.

Application notes

1. Naming of the resources

   In the user model illustrated above it should be noted that the forms on client and server must be identical in respect of certain values (same form name, device type, page size, line size, band ID, PCL#, character image table). This means that the SPOOL parameter files of each host which belongs to a cluster must be identical in these respects. This equivalence is achieved only via the form names and the attributes described above. For other logical resources, such as character set xyz from different hosts for example, no equivalence can be defined. One character set could be coded in English and the other in German.

2. Using user resource files

   User resource files can be specified in the PRINT-DOCUMENT command by means of the operand USER-PARAMETER-FILE. This affects both PRFILEs/SPSLIBs which have been created by a user (private files) and also application PRFILEs which are located under the installation user ID. The definition of PRFILEs is described in the “PRM” manual.

3. Transferring resources

   All resources required for printing out the file (form, character set, loop, translation table, FOB, etc.) are transferred either from a system or a user PRFILE to the selected server. Resources are never transferred from an SPSLIB; printing on APA printers always uses resources located on the server.

   In an SPSLIB it is also possible to reference objects outside this SPSLIB. In this case, all the required resources wish to create a complete resource list from existing libraries. This is restricted by the fact that all resources which are referenced by a resource must exist in the same library. Users can also define the required resources in their own documents in data streams for output on APA printers (SPDS).

4. Duration of object storage on the server side

   Normally those objects which are required for printing are kept available only for the current print operation. On termination of the print job, the objects are deleted in order to allow users to modify their own resources and to start new print jobs which take these changes into account.

5. Reservation of the resources during spoolout

   The user or system PRFILEs are locked against access only during loading of the resources into the printer memory. With Dprint, all modifications made to the resources are taken into consideration when a print job is next transferred to a remote server. Print jobs which have not yet been selected for processing take account of any change made to the PRFILE after the transfer has taken place.

6. Timing of resource transfer

   When a print request is sent by a client within a BS2000 cluster to a remote server, a transfer of resources is also performed. If a BS2000 client sends a print request to another BS2000 cluster, no resources are transferred. The requested resources must be present on the gateway host which accepts the print job and forwards it to the servers within the cluster.

Execution of a print job using server resources (RES-LOC=*SERVER)

When a print job is transferred, a list of suitable device types is selected in accordance with the command that was issued. The GEN record in the SPOOL parameter file of the client are not taken into consideration here.

On the server, a second check is performed with regard to the required resources which have been specified in the command. If these are not available, the print job will be rejected for this server and another server will be sought in accordance with the selection list (see “Server selection” on page 160).

In this case, therefore, the resources used (form, character set, etc.) need not be defined on the client host.

Examples of checking the print resources by Dprint

Note

The search for the (system) print resources files is carried out via the IMON path name manager. As standard, the system print resources files are installed under the SYSSPOOL user ID, but they may also be installed under another user ID.

Print jobs within a cluster

```
1) /PRINT-DOCUMENT filename,RES-DESC(RES-LOC=*HOME)
```

The resources must be available in the system resources file (PRFILE) on the client host under the installation user ID (see Note above). If the selected server is not the local server, a resource container with the required resources is created and transferred to the selected server.

```
2) /PRINT-DOCUMENT filename,RES-DESC(USER-RES-FILE=user.res.filename,
                   RES-LOC=*HOME)
```

The resources must be available in the user resources file on the client host:

```
USER-RES-FILE = :catid:$uid.filename
```

The file :catid:$uid.filename.PRFILE must be located under the specified user ID and the specified catalog ID. If catid is not specified, the home catalog ID is assumed; if no user ID is specified, the user ID of the caller is assumed. If the resource file is not found under the user ID of the caller, it will then be sought under the installation user ID (see Note on page 138).

If the selected server is not the local server, a resource container with the required resources is created and transferred to the selected server.

3) `/PRINT-DOCUMENT filename,RES-DESC(RES-LOC=*SERVER)`

The resources must be available in the system resources file (PRFILE) on the server host under the installation user ID. No resource container is created.

4) `/PRINT-DOCUMENT filename,RES-DESC(USER-RES-FILE=user.res.filename,`
`RES-LOC=*SERVER`

The resources must be available in the user resources file user.res.filename on the server host. This file is sought on the server system in accordance with the following rules:

`USER-RES-FILE = :catid:$uid.filename`

The file :catid:$uid.filename.PRFILE must be located under the specified user ID and the specified catalog ID. If “catid” is not specified, the home catalog ID is assumed; if no user ID is specified, the file is sought under the installation user ID (see Note above).

No resource container is created.

5) `/PRINT-DOCUMENT filename`

The value for the operand RESOURCES-LOCATION is taken from the GEN record in the SPOOL parameter file (*HOME or *SERVER). One of the situations described above occurs.

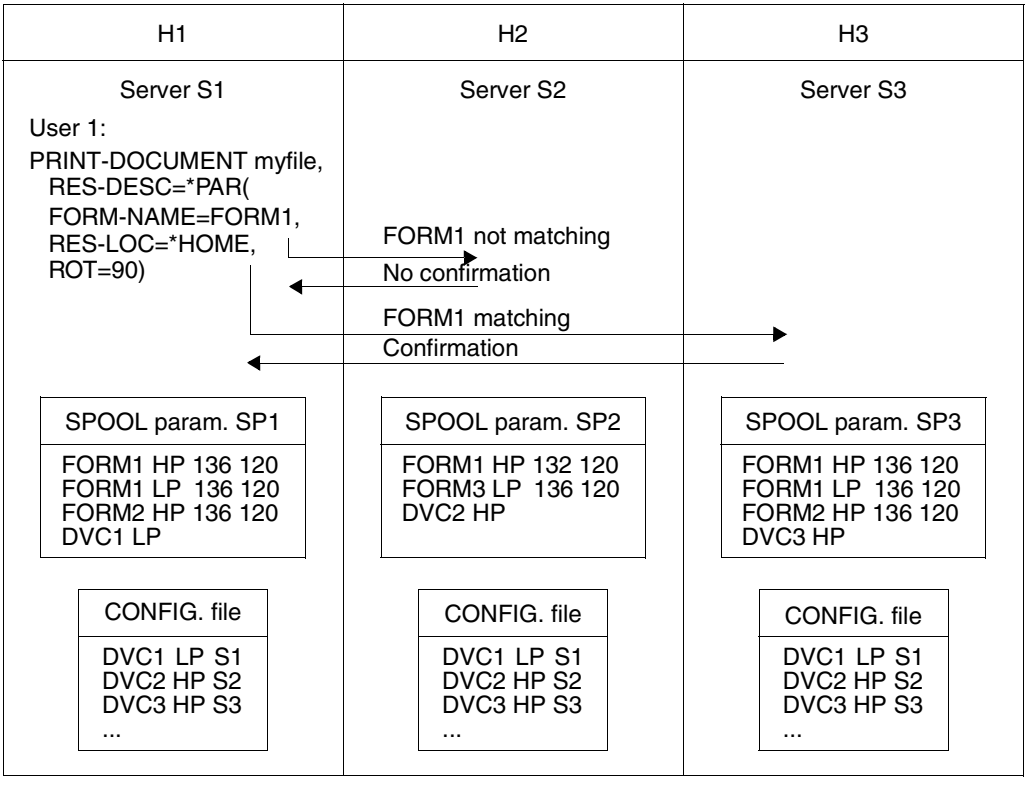
Print jobs between BS2000 clusters

`/PRINT-DOCUMENT filename CLUSTER-NAME=clustername`

The resources must be available in the standard resources file (PRFILE) on the gateway host under the installation user ID and the home catalog ID. If the RESOURCES-LOCATION operand is specified, this will be ignored. If the selected server is not on the gateway host, a resource container is created and transferred from the gateway host to the server host.

5.1.1.2 Examples of server selection and resource checking

Print job with no explicit destination specification



Server selection and resource checking for print job without destination specification

User 1 issues a print job with no destination explicitly specified. Checking of the print request on client (H1) reveals that the print job must go to an HP printer. The value *CENTRAL is defined for DPRINT-DESTINATION in the GEN record in the SPOOL parameter file on H1, i.e. the selection of the destination printer must be made with regard to the device type which is defined the configuration file (Dprint printer).

The list of the preselected servers which are able to process the print job contains S2 and S3 since both manage an HP printer. Server S3 is then selected because the form FORM1 which is defined in the SPOOL parameter file SP3 matches the form FORM1 which has been specified in the PRINT-DOCUMENT command and is defined in the SPOOL parameter file SP1 on S1.

The print job is processed on H3 using the resources of H1 (character set, loop, FOB, etc.) and the form definition from the SPOOL parameter file SP1.

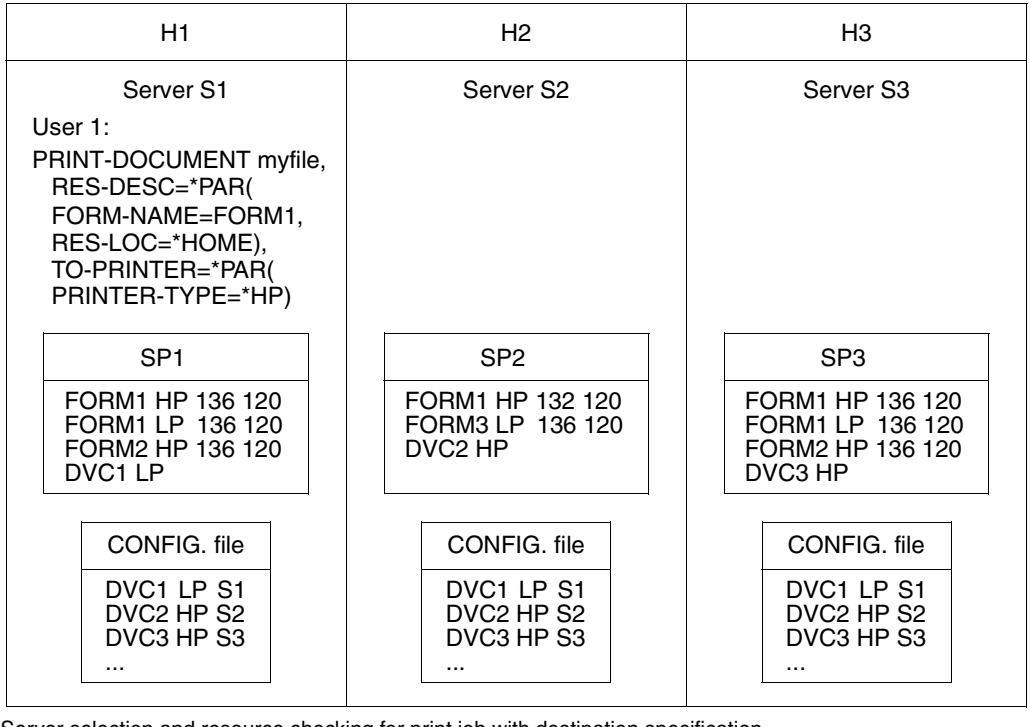
The permitted device types are determined by way of the operands of the PRINT-DOCUMENT command and not via the GEN record in the SPOOL parameter file on H1. The server uses the device types which are defined in the SPOOL parameter file. In the case of print jobs which are sent to the local server, the check relating to the device type is not modified with regard to the GEN record.

Each host should have a complete definition of the form resources in the cluster which is independent of its device configuration.

*Definition of *DESTINATION in SP1*

If in the above example the parameter DPRINT-DESTINATION is defined with the value *DESTINATION in SP1, the selection of the destination is made by means of the DESTINATION parameter in the GEN record and the device type which is defined in SP1. The print job is then processed by the local SPOOL and not transferred to a Dprint server.

Explicit specification of DESTINATION



Server selection and resource checking for print job with destination specification

Even if DPRINT-DESTINATION is defined with the value *CENTRAL in the GEN record, User 1 effects output of the print job on an HP printer. On account of the required form which is specified, server S3 is selected.

5.1.1.3 Use of S variables in Dprint operation

S variables can be used for defaulting operand values in commands. An example is given below using the PRINT-DOCUMENT command.

- Using an S variable as the default value for the operands of the PRINT-DOCUMENT command.

  If no variable is defined or if elements are not defined and initialized, the default value will be taken from the SDF syntax file; refer to the syntax description below. For those elements of the variable which are initialized, the default value is taken from the SDF-P variable element.

  The simple variable (structured variable element) which is assigned to an operand that introduces SDF substructures must contain the linear SDF string in order for it to be able to use the operand values of the substructure
  (e.g. REC-PART='*SELECT(FIRST-CHAR=1,LAST-CHAR=200)).

  Example

```
/DECLARE-VARIABLE myvar,TYPE=STRUCTURE(*DYNAMIC)

/myvar.DOC-FORMAT='*PAGE-FORMAT'
/myvar.ADD-COP='1'
/myvar.PR-JOB-NAME='HENRY'

/myvar.PAGE-DEF='P1DEF1'
/myvar.FORM-DEF='F1DEF1'
```

  The following two commands are equivalent. The first command uses the values contained in the corresponding element of the structured S variable myvar as the default values for non-specified operands.

```
1. /PRINT-DOCUMENT FROM-FILE=myfile,&(VAR-TO-STR('myvar'))

2. /PRINT-DOCUMENT FROM-FILE=myfile, -
                   DOC-FORMAT=*PAGE-FORMAT, -
                   PRINT-JOB-CONTROL(PRINT-JOB-NAME='HENRY'), -
                   RES-DESC(PAGE-DEF=P1DEF1,FORM-DEF=F1DEF1), -
                   ADDITIONAL-COPIES=1
```

- Using variable containers.
  The S variables can be stored for archiving and for subsequent use in a container (SDF-P V2.0). On validation of the PRINT-DOCUMENT command, the S variable which represents the operands of the command or a part thereof is automatically converted by SDF-P into an SDF string before it is subsequently analyzed by SDF and sent to the SPOOL subsystem.

Example

Creation of an S variable container

```
/OPEN-VARIABLE-CONTAINER
/  CONTAINER-NAME=mycontainer,-
/  FROM-FILE=*LIB-ELEM(mylibrary,*CONTAINER-NAME),-
/  LOCK-ELEM=*NO,-
/  SCOPE=*CURRENT,-
/  AUTOMATIC-DECLARATION=*ALL
```

Creation of the S variable(s)

```
/DECLARE-VARIABLE profile1,TYPE=STRUCTURE(*DYNAMIC),-
/  CONTAINER=mycontainer

/DECLARE-VARIABLE profile2,TYPE=STRUCTURE(*DYNAMIC),-
/  CONTAINER=mycontainer
/profile1.DOC-FORMAT='*TEXT'
/profile1.ADD-COP='2'
/profile1.USER-RES-F='myresources'
/profile2.DOC-FORMAT='*SPECIAL-FORMAT'
/profile2.PR-JOB-NAME='myname'
/profile2.DEST='myrsoprn'

/SAVE-VARIABLE-CONTAINER CONTAINER-NAME=mycontainer
/CLOSE-VARIABLE-CONTAINER CONTAINER-NAME=mycontainer
```

Using previously defined variable containers

```
/OPEN-VARIABLE-CONTAINER
/  CONTAINER-NAME=mycontainer,-
/  FROM-FILE=*LIB-ELEM(mylibrary,*CONTAINER-NAME),-
/  LOCK-ELEM=*NO,-
/  SCOPE=*CURRENT,-
/  AUTOMATIC-DECLARATION=*ALL

/PRINT-DOCUMENT FROM-FILE=mydocument,&(VAR-TO-STR('profile1'))

/PRINT-DOCUMENT FROM-FILE=pulsdoc,&(VAR-TO-STR('profile2'))

/CLOSE-VARIABLE-CONTAINER CONTAINER-NAME=mycontainer
```

The example above illustrates how previously defined S variables (profile1 and profile2) can be saved in a container and used again with the PRINT-DOCUMENT command. The SDF-P variables profile1 and profile2 are structured variables.

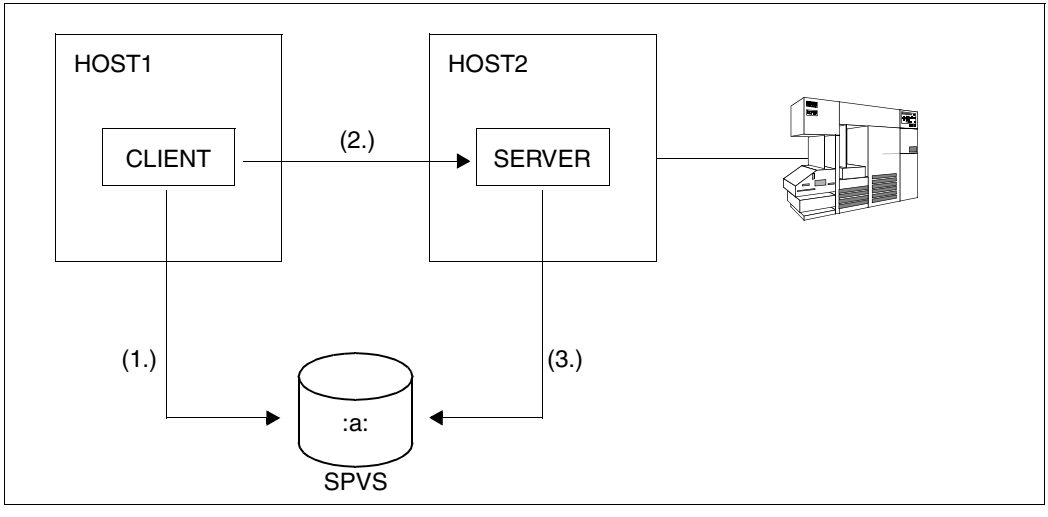
Please refer to the “SDF-P” manual for more information on using S variables.

5.1.1.4 Support of shared pubsets

The subsystem MSCF permits simultaneous access to a pubset from a number of computers. A maximum of 16 computers which are interconnected by means of a common MSCF network can access a shared pubset directly.

With such a shared pubset it is possible to avoid unnecessary transfers of files. If the file to be printed is located on a shared pubset which can be accessed both by the host containing the Dprint client and also by the host containing the Dprint server, then the only file transfer performed is that of a resource file which might be required.

Example



Dprint access to a shared pubset

1. The user on the client host has created a file on the shared pubset and wishes to print this file out.
2. The user issues a PRINT-DOCUMENT command to HOST1. The user's request is sent to HOST2.
3. In this case, no file transfer needs to be performed for the file to be printed since HOST1 and HOST2 have access to the same shared pubset.

Note

A true solution complies with the guidelines on shared pubsets (for more information, see the general information on shared pubsets in the HIPLEX MSCF manual).

5.1.1.5 Specifying the keyword *CENTRAL in commands and statements

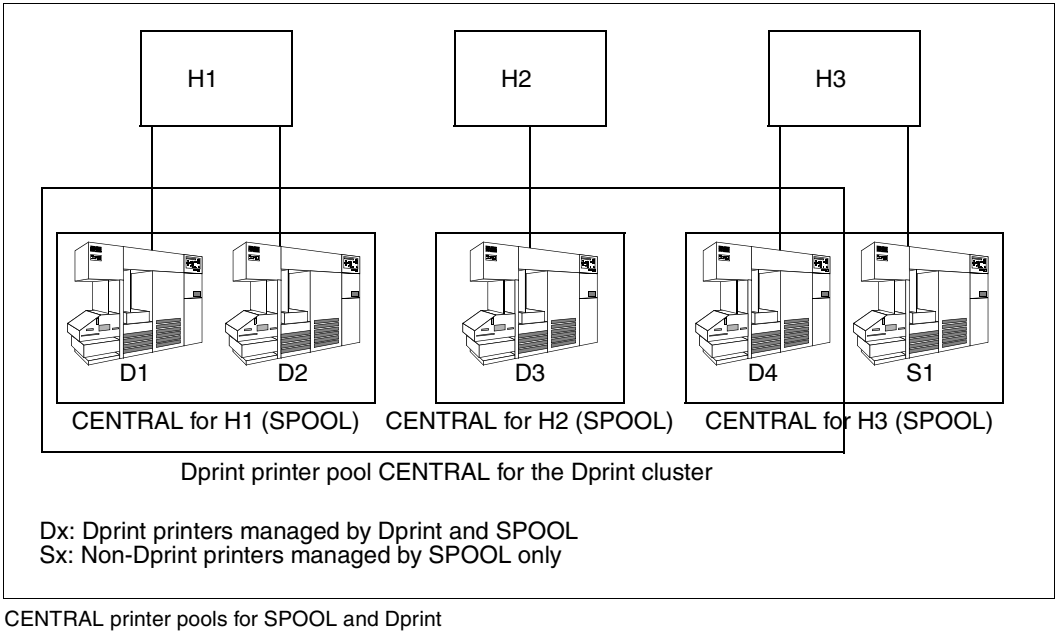
The keyword *CENTRAL is interpreted differently at the shared Dprint/SPOOL user interface depending on the level involved. There are two levels to be taken into consideration: the SPOOL level where only one BS2000 system is involved and the Dprint level where several BS2000 systems are grouped together as a cluster.

– At SPOOL level, the printer pool CENTRAL is a pool containing all the (non-RSO) SPOOL printers defined in the SPOOL parameter file.

– At Dprint level, the printer pool CENTRAL of a BS2000 Dprint cluster is a pool containing all the Dprint printers defined in the Dprint configuration file.

If no list of printer pools is specified when a SPOOL printer is started, the printer is by default automatically assigned to the SPOOL printer pool CENTRAL. It is, however, possible for a SPOOL printer to be assigned to both a list of printer pools and the printer pool CENTRAL.

If no list of printer pools is specified when a Dprint printer is started, the printer is by default automatically assigned to the Dprint printer pool CENTRAL. It is, however, possible for a Dprint printer to be assigned to both a list of printer pools and the printer pool CENTRAL. If a Dprint printer is assigned to the Dprint printer pool CENTRAL, it is also automatically assigned to the SPOOL printer pool CENTRAL of the local server.



CENTRAL printer pools for SPOOL and Dprint

Consequently a non-Dprint printer can be regarded as a printer restricted to requests made by the local host.

START-PRINTER-OUTPUT command

The START-PRINTER-OUTPUT command is used to start either a local printer or a Dprint printer. Depending on the printer type, the printer is assigned by default to either a SPOOL CENTRAL printer pool or a Dprint CENTRAL printer pool.

```
/START-PRINTER-OUTPUT ...,DESTINATION = *NONE / *STD /list-poss(16):
                      *CENTRAL / alphanum-name 1..8
```

If *CENTRAL is specified, the SPOOL or Dprint printer is assigned to the appropriate CENTRAL printer pool (SPOOL or Dprint). If the value *CENTRAL is specified in a list of defined pools, the printer can process print jobs directed to one of the specified pools as well as print jobs for which no destination is specified (and which are directed to CENTRAL).

SHOW-ACTIVE-SPOOL-DEVICES command

The SHOW-ACTIVE-SPOOL-DEVICES command is used to request information on active printers. The printers can be selected according to printer type and the printer pool to which they belong (pool or CENTRAL).

```
/SHOW-ACTIVE-SPOOL-DEVICES ...,DESTINATION = *LOCAL / *ALL / *REMOTE /
                           *PUBLIC-REMOTE / list-poss(16): *CENTRAL /
                           alphanum-name 1..8
```

PRINT-DOCUMENT command

The PRINT-DOCUMENT command is used to specify a certain printer (RSO or on UNIX system when printing between heterogeneous clusters) or printer pool (SPOOL or Dprint) as the destination printer. If *STD is specified, the destination printer is selected from either the value DESTINATION or DPRINT-DESTINATION from the SPOOL parameter file, depending on the print job.

```
/PRINT-DOCUMENT ...,TO-PRINTER = *PAR(PRINTER-NAME = *STD /
                    alphanum-name 1..8
```

SHOW-PRINT-JOB-STATUS command

The SHOW-PRINT-JOB-STATUS command is used to request information on print jobs. The DESTINATION operand can be used to select print jobs according to their destination.

```
/SHOW-PRINT-JOB-STATUS ...,SELECT =*PAR(DESTINATION= *ALL / *LOCAL(...) /
                         *REMOTE(...) / *CENTRAL(...) / ...)
                       ,EXCEPT =*PAR(DESTINATION= *NONE / *DEVICE(...) /
                       *CENTRAL(...) / ...)
```

By specifying *CENTRAL, you can select or exclude print jobs that do not have any particular destination, i.e. those directed to the printer pool CENTRAL.
If you specify *LOCAL, you can select print jobs that are to be processed on local SPOOL printers and by specifying *REMOTE, you can select those to be processed on RSO printers.

MODIFY-SPOOL-PARAMETERS statement

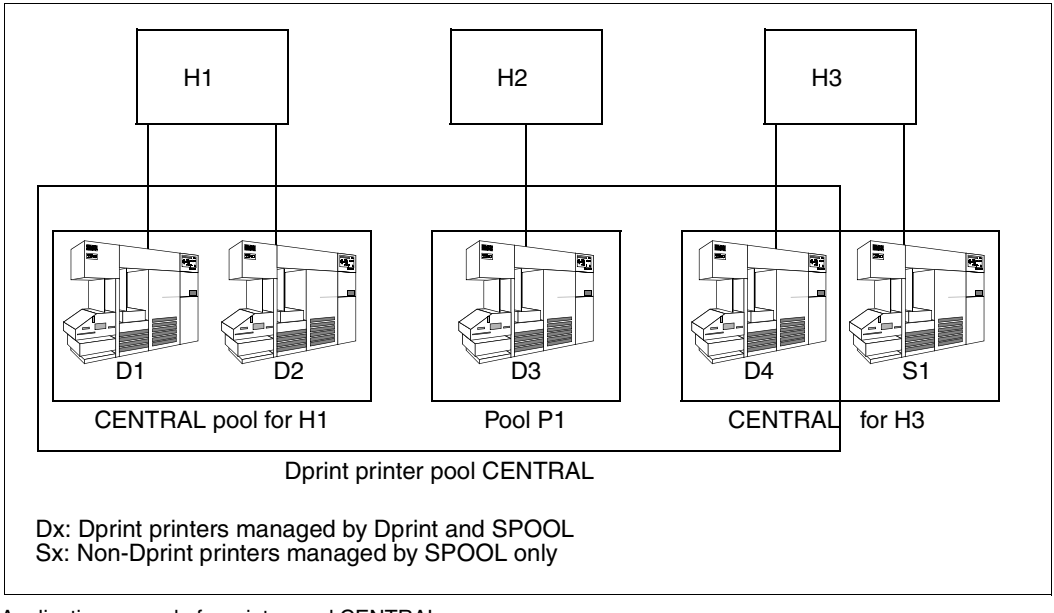
This SPSERVE statement is used to modify the global SPOOL default values in the SPOOL parameter file.

```
//MODIFY-SPOOL-PARAMETERS ...,DESTINATION = *UNCHANGED / *CENTRAL /
                              *REMOTE(...) / *POOL(...)
                           ,DPRINT-DESTINATION = *UNCHANGED / *CENTRAL /
                           *DESTINATION / *POOL(...)
```

DPRINT-DESTINATION=*CENTRAL indicates that the Dprint printer pool CENTRAL is the default destination for Dprint print jobs.

DESTINATION=*CENTRAL indicates that the SPOOL printer pool CENTRAL is the default destination for non-Dprint print jobs.

Application examples



Application example for printer pool CENTRAL

In the configuration shown in the diagram above, a printer pool is defined which contains only one Dprint printer, D3. In this case, the printer D3 can be accessed by specifying the pool P1 as the destination. The CENTRAL printer pools (Dprint and SPOOL) are defined implicitly.

The cluster administrator can start the Dprint printers D1, D2 and D4 and assign them to the Dprint printer pool CENTRAL:

```
/START-PRINTER-OUTPUT DEV-NAME=ANY-LOC-PRINTER(NAME=Di,DESTINATION=*CENTRAL)
```

The printer name defined in the Dprint configuration file must be specified for Di.

The Dprint printer D3, which belongs to the pool P1, is started as follows:

```
/START-PRINTER-OUTPUT DEV-NAME=ANY-LOC-PRINT(NAME=D3,DESTINATION=P1,*CENTRAL)
```

D3 can subsequently process print jobs directed to either *CENTRAL (no destination specified) or to pool P1.

The SPOOL administrator of H3 starts the local printer S1 as follows:

```
/START-PRINTER-OUTPUT DEV-NAME=ANY-LOC-PRINTER(NAME=S1,DESTINATION=*CENTRAL)
```

S1 is the name defined in the local SPOOL parameter file. S1 is assigned to the SPOOL printer pool CENTRAL.

The following command is entered on H1, H2 or H3:

```
/PRINT-DOCUMENT ...,TO-PRINTER=*PAR(PRINTER-NAME=P1)
```

The print job is directed to the printer D3 via the printer pool P1.

The following command is entered on H3:

```
/PRINT-DOCUMENT ...,TO-PRINTER=*PAR(PRINTER-NAME=*STD)
```

The print job is directed to the default destination defined in the SPOOL parameter file:

– If DPRINT-DESTINATION=*CENTRAL is defined, the print job is directed to the Dprint printer pool CENTRAL, which contains the printers D1, D2, D3 and D4.

– If DPRINT-DESTINATION=*DESTINATION and DESTINATION=*CENTRAL are defined, the print job is directed to the SPOOL printer pool CENTRAL, which contains the printers D4 and S1.

The SHOW-PRINT-JOB-STATUS command can be used to select print jobs according to their destinations, for example.

The following command is entered on H1, H2 or H3:

```
/SHOW-PRINT-JOB-STATUS SELECT(DESTINATION=*CENTRAL)
```

Print jobs for which no explicit printer pool specification was made are output. In other words, print jobs started with PRINTER-NAME=*STD or print jobs for which DPRINT-DESTINATION=*CENTRAL or DPRINT-DESTINATION=*DESTINATION and DESTINATION=*CENTRAL was specified in the SPOOL parameter file.

5.1.2 Printing with Dprint in heterogeneous clusters

Dprint allows interoperability between a BS2000 cluster and a Xprint domain of UNIX systems. Such an Xprint domain is specified as the destination for the print job by means of the operand CLUSTER-NAME of the PRINT-DOCUMENT command.

When a print job is sent to a Xprint domain of UNIX systems, a filter is selected and called in order to analyze, check and modify the print job parameters. To this end, the print job is checked three times.

1. Check by Dprint before the filter is called

   Several of the operand values of the PRINT-DOCUMENT command are not permitted in the case of interoperability between BS2000 and UNIX systems. If these are specified, the print job is rejected. The following operand values are not permitted:

   – INPUT-SECTION ≠ *WHOLE
   – CHECKPOINT
   – LINE-TRUNCATION
   – PROCESSING-ADMISSION
   – LINE-PER-PAGE
   – HEADER-LINE
   – HEADER-NUMBER-EXIT
   – TRAILER-NUMBER-EXIT
   – ROTATION ≠ 0 AND ≠ 90
   – TWO-SIDED ≠ *STD
   – INPUT-TRAY
   – OUTPUT-TRAY
   – OUTPUT-FORMAT
   – LOOP
   – ROTATION-LOOP
   – CHARACTER-SET=*POOL(...)
   – ELECTRONIC-FORM-OVERLAY
   – FORM-OVERLAY
   – FORM-OVERLAY-BUFFER
   – PAGE-DEF
   – USER-RESOURCE-FILE ≠ *STD
   – TRANSLATION-TABLE
   – PRINTER-TYPE
   – OUTPUT-PART with DIM ≠ *PAGE or FORM < 0
   – FAMILY-PROCESSING = *YES
   – MONJV ≠ *NONE
   – JV-PASSWORD ≠ *NONE

2. Check by the called filter itself

   Each filter can perform some print request validations. One of the standard filters supplied, for example, makes sure that the file to be printed is a SAM file and that DOCUMENT-FORMAT=*TEXT() or *SPECIAL-FORMAT() is specified.

   Several operand values are rejected by the third checking process (see below). Depending on the print request image, the filter may check whether these invalid operand values were specified and can then modify them so that they are accepted by the third checking process. For example, one of the standard output filters supplied changes any LINE-SPACING operand value in the print request image to LINE-SPACING=*NO.

   You will find information on which operand values are permitted or modified by which supplied standard filters in section “Supplied standard system filters” on page 226. You will find a description of how to create special customer filters in the manual "Spool & Print - Macros and Exits".

3. Check by Dprint again after the filter has been called.

   When printing between heterogeneous clusters, the operands that can be used for a print request are restricted by the printer capabilities of both systems. Therefore, it is possible for a print job to be rejected after being returned by the filter if certain operand values are specified.

By dividing the checking procedure into three different checking processes, it is possible for the filters to process certain operand values (e.g. RECORD-PART=*PARAMETERS(...)) which would be rejected by the third checking process (after the filter has been called).

The following indicates which operand values of the PRINT-DOCUMENT command are permitted or rejected.

FROM-FILE
The standard filters supplied accept only SAM, ISAM and PLAM files. The selected filter (i.e. a standard filter or customer filter via system exit 093) creates the file that will be transferred to Xprint for printing from the file to be printed when it is called for the second time. The file to be transferred must be a SAM, ISAM and PLAM file with RECFORM=F/U. The selected filter performs the file type validation and necessary conversion (second checking process). The third checking process does not check the file types. SYSOUT, SYSLST and EAM files are not supported. For details refer to section “Supplied standard system filters” on page 226.

DOCUMENT-FORMAT
This operand serves to specify the type of document contents involved. Specifying *SPECIAL-FORMAT(...) means that a printer-specific language is being used. In this case, SPOOL provides a transparent means of control for the document.

Any value is permitted by the first and third checking processes. It is the function of the activated filter (second checking process) to permit or reject the value. For relevant details refer to section “Supplied standard system filters” on page 226.

LINE-PER-PAGE
The specification of any value other than *STD will be rejected.

LINE-SPACING
Any value is permitted by the first checking process. It is the function of the activated filter (second checking process) to permit or reject the value. For relevant details refer to section “Supplied standard system filters” on page 226.

CONTROL-MODE
This operand specifies the control mode which is applied by SPOOL for the document contents. Any value is permitted by the first checking process. It is the function of the activated filter (second checking process) to permit or reject the value. For relevant details refer to section “Supplied standard system filters” on page 226.

FORMAT-NAME = *NONE
No format is specified. The document is sent to Xprint without a specific format (no content type is specified).

FORMAT-NAME = <c-string 1..63 with-lower-case>
This operand specifies that the document to be processed has a special type of contents (e.g. HP LASERJET). The operand value is determined by the document format attribute which is passed to the Xprint domain. It is interpreted by Xprint as an attribute 'content type' of the job (xpadd -job -ct...). Therefore, the specification of *c-string 1..63 with-lower-case* for FORMAT-NAME is permitted only on condition that no BS2000 cluster is specified as the operand value for CLUSTER-NAME. In fact, this document content type is part of the information needed to satisfy ISO DPA Class 1, which is required for interoperability between the BS2000-SPOOL subsystems and foreign SPOOL and PRINT systems.

START-PROCESSING
The specification of any value other than =*IMMEDIATE will be rejected (before the filter is called).

FAMILY-PROCESSING
A specification of *YES will be rejected by the first checking process (before the filter is called), i.e. “FAMILY” processing is not permitted.

MONJV
Any specification other than *NONE will be rejected by the first checking process (before the filter is called).

JV-PASSWORD
Any specification other than *NONE will be rejected by the first checking process (before the filter is called).

PRINT-JOB-NAME
Any supported value can be specified.

PRINT-JOB-PRIORITY
The specified priority is converted in accordance with the Xprint conventions to a value from 100 to 1.

PAGE-COPIES
Any supported value can be specified.

LEFT-MARGIN
The value is specified in units of 1/10 inch and is therefore converted into the unit millimeters (Xprint convention).

ROTATION
*NO means that the default page rotation which is defined for the form (operand FORM-NAME) is to be used. The value 0 means that portrait orientation is to be used, and the value 90 means that landscape orientation is to be used. Any other value will be rejected by the third checking process.

INPUT-TRAY-NUMBER
The specification of any input tray will be rejected.

FORM-NAME
This operand specifies which Xprint form is to be used for the printout. Since no resources are transferred in the case of interoperability from BS2000 to UNIX systems, a form which is defined in Xprint (-frm object) should be specified for the FORM-NAME operand.
*STD means that the default form for the selected printer is used.
It should be noted that the maximum permissible length of the form name on UNIX systems is 6 alphanumeric characters.

CHARACTER-SETS
This operand specifies which font is to be used for the printout. Since no resources are transferred in the case of interoperability from BS2000 to UNIX systems, a font which is defined in Xprint (-fnt object) should be specified for the CHARACTER-SETS operand.
*STD means that the Xprint default font which is assigned to the specified form is used.
It should be noted that the maximum permissible length of the font name on UNIX systems is 3 alphanumeric characters.

USER-RESOURCE-FILE
The specification of any value other than the default value (*STD) will be rejected by the first checking process (before the filter is called).

PRINTER-NAME
The name of a printer or of a printer group which is defined in the Xprint configuration must be specified.

CLUSTER-NAME
The name of the Xprint domain to which the user wishes to send a print job must be specified. The name of the domain must be defined in the Dprint configuration file.

ADDITIONAL-COPIES
A maximum of 255 additional copies can be requested.

Other operands
With all the other operands of this command only the default values are permitted by the third checking process (after the filter has been called). However, any value can be specified for these other operands if it is converted into the default value by the activated filter (second checking process), thereby enabling the third checking process to be successfully performed.

Examples of heterogeneous interoperability

Requesting information on the UNIX system based destination cluster

1. List the UNIX system based clusters (accessible via a TCP/IP connection) defined in the Dprint configuration which the user can access:

   ```
   /SHOW-DPRINT-REMOTE-CLUSTERS SELECT=*BY-ATT(TYPE=*UNIX-TCP(...))
   ```

2. List all Xprint printers which can be accessed via the specified cluster (provided that their name is not longer than 8 characters):

   /SHOW-DPRINT-PRINTERS CLUSTER-NAME=*UNIX-cluster-name*

3. List all the Xprint printer groups which can be accessed via the specified cluster (provided that their name is not longer than 8 characters):

   /SHOW-DPRINT-PRINTER-POOLS CLUSTER-NAME=*UNIX-cluster-name*

4. List all active Xprint printers which can be accessed by the user (provided that their name is not longer than 8 characters)

   /SHOW-ACTIVE-SPOOL-DEVICES CLUSTER-NAME=*UNIX-cluster-name*

5. The Xprint administrator should then give the list of available Xprint forms and fonts to the BS2000 cluster administrator, who can then pass this information on to the BS2000 users.

Issuing a print job to a UNIX system based cluster

1. Print a document containing text records whose tenth byte is interpreted as an IBM printer control character:

```
/PRINT-DOCUMENT FROM-FILE=file
                ,DOCUMENT-FORMAT=*TEXT
                     (LINE-SPACING=*BY-IBM-CONTROL(CONTROL-CHAR-POS=10))
                ,TO-PRINTER=*PAR(PRINTER-NAME=Xprint-printer-name
                    ,CLUSTER-NAME=UNIX-cluster-name)
               [,RESOURCE-DESCRIPTION=*PAR
                     (FORM-NAME=Xprint-form-name]
```

2. Print a fully formatted document which is dependent on the printer language HP-PCL4:

```
/PRINT-DOCUMENT FROM-FILE=file
                ,DOCUMENT-FORMAT=*SPECIAL-FORMAT
                     (FORMAT-NAME='HP-LASERJET')
                ,TO-PRINTER=*PAR(PRINTER-NAME=Xprint-printer-name
                    ,CLUSTER-NAME=Xprint-name)
               [,RESOURCE-DESCRIPTION=*PAR
                     (FORM-NAME=Xprint-form-name]
```

or

```
/PRINT-DOCUMENT FROM-FILE=file
                ,DOCUMENT-FORMAT=*SPECIAL-FORMAT
                ,TO-PRINTER=*PAR(PRINTER-NAME=Xprint-printer-name
                    ,CLUSTER-NAME=UNIX-cluster-name)
               [,RESOURCE-DESCRIPTION=*PAR
                     (FORM-NAME=Xprint-form-name]
```

In the second case, Xprint does not check whether the requested printer supports the printer language HP-PCL4.

3. Print a document containing text data (one record per line) and several HP-PCL4 printer commands (e.g. underscoring certain words, bold and/or italics, etc.):

```
/PRINT-DOCUMENT FROM-FILE=file
                ,DOCUMENT-FORMAT=*SPECIAL-FORMAT
                     (FORMAT-NAME='HP-LASERJET',LINE-SPACING=1)
                ,TO-PRINTER=*PAR(PRINTER-NAME=Xprint-printer-name
                    ,CLUSTER-NAME=UNIX-cluster-name)
               [,RESOURCE-DESCRIPTION=*PAR
                     (FORM-NAME=Xprint-form-name]
```

or

```
/PRINT-DOCUMENT FROM-FILE=file
                ,DOCUMENT-FORMAT=*SPECIAL-FORMAT
                     (LINE-SPACING=1)
                ,TO-PRINTER=*PAR(PRINTER-NAME=Xprint-printer-name
```

```
                    ,CLUSTER-NAME=UNIX-cluster-name)
               [,RESOURCE-DESCRIPTION=*PAR
                    (FORM-NAME=Xprint-form-name]
```

In the second case, Xprint does not check whether the requested printer supports the printer language HP-PCL4.

4. Print a PostScript document:

```
/PRINT-DOCUMENT FROM-FILE=file
               ,DOCUMENT-FORMAT=*SPECIAL-FORMAT
                    (FORMAT-NAME=POSTSCRIPT)
               ,TO-PRINTER=*PAR(PRINTER-NAME=Xprint-printer-name
                    ,CLUSTER-NAME=UNIX-cluster-name)
               [,RESOURCE-DESCRIPTION=*PAR
                    (FORM-NAME=Xprint-form-name]
```

or

```
/PRINT-DOCUMENT FROM-FILE=file
               ,DOCUMENT-FORMAT=*SPECIAL-FORMAT
               ,TO-PRINTER=*PAR(PRINTER-NAME=Xprint-printer-name
                    ,CLUSTER-NAME=UNIX-cluster-name)
               [,RESOURCE-DESCRIPTION=*PAR
                    (FORM-NAME=Xprint-form-name]
```

In the second case, Xprint does not check whether the requested printer supports the Postscript printer language.

Monitoring print jobs

1. Request information on all of your own print jobs which were issued to a certain UNIX system based cluster:

```
/SHOW-PRINT-JOB-STATUS CLUSTER-NAME=UNIX-cluster-name
```

2. Request information on one of your print jobs:

```
/SHOW-PRINT-JOB-STATUS CLUSTER-NAME=UNIX-cluster-name
               ,SELECT=*PAR(IDENTIFICATION=Xprint-job-id)
```

Controlling print jobs

1. Request information on the print job parameters:

```
/SHOW-PRINT-JOB-ATTRIBUTES JOB-IDENTIFICATION=*FOREIGN(IDENTIFICATION=
               Xprint-job-id,CLUSTER-NAME=UNIX-cluster-name)
```

2. Abort print jobs issued to a UNIX system based cluster:

```
/CANCEL-PRINT-JOB JOB-IDENTIFICATION=*FOREIGN(IDENTIFICATION=
               Xprint-job-id,CLUSTER-NAME=UNIX-cluster-name)
```

Layout of the trailer page

When printing on a Dprint printer, the fields shown in **bold** in the layout of the trailer page are significant.

```
MAIL: @@@@
```

Impact of BSD-LPD gateway on Spool & Print header and trailer pages.

The name which is used to print out a job is the user ID of the file owner (e.g. RD13TEAM). This name is appears on the header and trailer pages (if used). The address on the header/trailer page is derived from the user ID and the client host: e.g. RD13TEAM@D241P016

Only the first 8 characters of the user ID are evaluated. If the user ID has less than 8 characters, it will be padded with blanks, for example, DUKE____@D234P567 (where _ = blank).

The BSD job name corresponds to the header text field of the header or trailer page, the BSD job title corresponds to the field PNAME, the account field remains unchanged or is empty:

Entry in BSD client	**Field in header/trailer page in Spool & Print**
User ID	User ID
Job name	Header text
Job title	PNAME
Host name	In the mailing address, client-host

5.1.3 Document types, document formats and printer types when printing from Windows

Parameters for ASCII text

Windows PC	**ASCII text**	
Application type	any	
Driver	generic/text only or universal/text only	
Wprint print queue attribute	cr/lf:lf filetype:f	
BS2000	**ASCII text data**	
BSD server	-ct plain-text	
Dprint converter	Filter SYS0210H + ASCII --> EBCDIC conversion	
Server	SPOOL as of V4.4	RSO as of V3.2A
Spool device type	Printer pool	Printer (pool)
	LP-PRINT LP-EMUL LP48-PR LP65-PR HP-PRINT HP90-PR 2050-APA 2090-TWIN 2090-APA	4812 4824-PCL 9022-200 9026-PCL DJET 9000-PCL 4821-PCL 9021 4011 8121 9645 2030-PCL 9001 9001-31 9002/3/4 9011/2/3 9014 9097 9022 9025 9026-RENO 9000-EPSQ 9000-EPLQ 9015 4818-PCL 4822-PCL 4825-PCL 9045-ANSI 9046 9000-PS 9000-PRO 9000-EPFX 4813

Parameters for PCL and PostScript

Windows PC	**PCL**	**Postscript**
Application type	Any	Any
Driver	PCL family	Postscript
Wprint print queue attribute	filetype:l	filetype:o
BS2000	**ASCII PCL**	**ASCII Postscript**
BSD server	-ct compatible -raw	-ct postscript
Dprint converter as of V1.0J	Filter SYS0310H	Filter SYS0310H
Server	RSO as of V3.2A	RSO as of V3.2A
Spool device type	Printer (pool) 9021 9022-200 9000-PCL DJET 4824-PCL 9026-PCL 4812 4818-PCL 4821-PCL 4822-PCL 4825-PCL 2030-PCL	Printer (pool) 9000-PS

Parameters for AFPDS and EXCCW

Windows-PC	**AFPDS**	**EXCCW**
Application type	Any	Any
Driver	Fujitsu Siemens PageStream V1.1	
Wprint queue attribute	Predefined filetype: c/d/g/n/p/r/t/v	
BS2000	**SPDS**	**EXCCW**
BSD server	Parameterization c/d/g/n/p/r/t/v	
	-ct spds	-ct exccw
Dprint converter as of V1.0J	Filter SYS0510H	Filter SYS0410H
Server	SPS V3.8	SPOOL as of V4.4
Spool device type	Printer pool 2050-APA 2090-TWIN 2090-APA	Printer pool LP65-PRINTER

5.1.4 General notes relevant to Dprint for the PRINT-DOCUMENT command

1. The Dprint functionality can be applied only by way of the new PRINT-DOCUMENT command.
2. If a common TSN is assigned to a number of print jobs (FAMILY), these print jobs can only be processed by the local SPOOL.
3. Following acceptance of the print job, all users (nonprivileged user, device administrator, SPOOL administrator and cluster administrator) receive the client TSN, the name of the selected server and the server TSN.
4. Server selection

   The server is selected as follows:

   a) A series of Dprint printers is selected in accordance with the device type and the requested operands of the PRINT-DOCUMENT command.

   b) A list of servers is selected in accordance with the device series obtained under a), the access control lists and the spoolout class of the server. If the local server belongs to the list, it will always be placed at the head of the list.

      Print jobs can be automatically directed to specific servers in accordance with the spoolout classes associated with the servers (see also the “SPSERVE” manual). The cluster administrator can dynamically assign and modify the spoolout classes associated with the servers without interrupting Dprint activities.

      It should be noted that the printers belonging to a selected server must be started with a spoolout class equivalent to that of the server. If this is not the case, print jobs directed to the server remain in wait state until one of the printers with the correct spoolout class is started.

   c) A list of sorted servers is created as follows:
      Step by step, each server is assigned a relative probability which corresponds to the number of suitable printers for this server divided by the remaining total number of printers for servers which have not yet been selected. In each step, one server is selected in a pseudo-random procedure, taking into consideration the probability described above.

Example

There exist three servers: S1, S2 and S3. S1 has 3 suitable printers, S2 has 2 suitable printers and S3 has 4 suitable printers. That is 9 printers in total.

In the first step S1, S2 and S3 are assigned the probabilities 3/9, 2/9 and 4/9. A pseudo-random procedure places S3 in first position in the list.

In the second step S1 and S2 are assigned the probabilities 3/5 and 2/5. A pseudo-random procedure selects S2. S2 is thus placed in second position in the list.

In the third step S1 is placed in third position in the list.

The sorted list of servers is then as follows: S3, S2, S1.

d) The servers are interrogated in succession in the order defined under the previous point c).

5. SYSLST and SYSOUT files

   Only SYSLST and SYSOUT files created with START-PROCESSING=*IMMEDIATE or during LOGOFF processing can be printed out on Dprint printers.

   As for normal print jobs, if not specified during PRINT-DOCUMENT command (PRINTER-NAME operand), the default destination is taken from the GEN record in the SPOOL parameters file of the client (DPRINT-DESTINATION parameter), when DPRINTCL is loaded.

   SYSLST/SYSOUT files may be sent to remote BS2000 clusters or Xprint domains, using the PRINT-DOCUMENT command. The SYSLST/SYSOUT files are erased once the file transfer in the remote cluster has been successfully processed.

   When SYSLST/SYSOUT files are output on a Dprint printer, the FAMILY parameter in the GEN record is not taken into consideration. A list of servers is selected and checked. On each server, a complete check is performed using the default forms (SYSLST form and SYSOUT form) which are taken from the GEN record in the SPOOL parameters file of the server. The print jobs (SYSLST and/or SYSOUT) are accepted on this server if these forms are defined for printer types, corresponding to Dprint printers on this server.

   In the event of successful processing, two print jobs with two different TSNs are sent to the selected servers (same or different for SYSLST and SYSOUT).

6. More than one file for printing

   When two or more file names are specified implicitly or explicitly in the PRINT-DOCUMENT command, none of the files will be printed on a Dprint printer if at least one of the files is not allowed to be printed there.

7. FT problems

   If an error occurs during the file transfer, the status of the print job switches from FT to KP or WFT (job statuses, see page 168).

8. Exit processing

   When HEADER-EXIT-NUMBER and TRAILER-EXIT-NUMBER are used, it should be noted that the exit processing is performed on the server side (supervisor level) and that it can vary from one system to another.

9. Print jobs with MONJV and REPEAT-JOB

   In the case of print requests having the operands MONJV and REPEAT-JOB, the number of print copies in the MONJV will not be updated for print jobs on a remote server. The update is effected when the status of the print job changes. If there is a great amount of network traffic, however, this update is not particularly relevant since the number of copies on the client probably does not exactly reflect the actual number of copies on the server.

10. SECTION optimization

    Print commands with SECTION requests are optimized so as to transfer only the relevant portion of the file to the server (in the case of a remote server) (except in the case of PLAM library elements and transfers between BS2000 clusters for which there is no optimization). If the relevant section cannot be found, no file is transferred to the server. However, an error page (trailer page) is printed at the server.

11. Files migrated with HSMS

    If a PRINT-DOCUMENT command is issued for a file migrated with HSMS or for a PLAM library element whose library was migrated with HSMS, the recall of the file is processed synchronously during validation of the command. This is done to avoid file recall at spoolout time which would lead to start/stop problems on printers.

    If, however, the file or library is migrated after the PRINT-DOCUMENT command and before the start of the spoolout, the recall will be processed when the job begins its spoolout, which leads to start/stop problems. This problem will be dealt with in a new HSMS version.

    However, if a print job is sent to a remote server and the file or library was migrated after the print job was accepted but before processing on the remote server, the recall is processed by a work task before the job is really sent to the printer.

12. Use of PROCESSING-ADMISSION

    This operand, which is permitted only for the SPOOL administrator, can be used only to a limited extent. The specified user ID and account number are checked in the local user catalog.

13. Operands in conjunction with CLUSTER-NAME

    The command will be rejected if the following operands are specified together with the operand CLUSTER-NAME=*name 1..8*:

    – MONJV
    – FAMILY-PROCESSING=YES
    – START-PROC
    – PROCESSING-ADMISSION (except *SAME)

    If CLUSTER-NAME corresponds to an Xprint domain, USER-RES-FILE=*full-filename 1..44 without-gen-vers* is also rejected.

    The LOCK-FILE operand is ignored.

    The RESOURCE-LOCATION operand is ignored. However, when CLUSTER-NAME corresponds to a BS2000 cluster name, the resources defined on the gateway host are always used; indeed, only the gateway resources may be accessed (seen) from a remote cluster, even if the selected server is not located on this gateway host.

    The USER-RESOURCES-FILE=*full-filename 1..44 without-gen-vers* may be specified when submitting print jobs to BS2000 remote clusters. However, the corresponding file must exist on the server host; otherwise the print job is accepted but the printout is unpredictable.

    The DELETE-AFTER-PRINT operand is ignored when CLUSTER-NAME corresponds to an Xprint domain; when CLUSTER-NAME coresponds to a BS2000 cluster, the file is erased once printed.

14. Filters on different servers

    In a distributed environment, it is possible to use filters that are not installed on every client computer on the cluster. The two generic devices $HP and $HP90 are created automatically by SPOOL. To ensure that the server is accessible, printers which belong to the automatically created $HP and $HP90 devices have to be defined in the Dprint configuration. The corresponding server is then added to the list of servers.

15. Temporary files

    Temporary files may be sent to remote BS2000 clusters or Xprint domains, using the PRINT-DOCUMENT command.

    On the client host, these temporary files are copied under $SYSDPRNT.W. ….

    If the CLUSTER-NAME corresponds to a BS2000 one, the original temporary file is erased once printed, if no logoff of the user task occurred in the meantime; the .W files are erased once the FT processing has been correctly terminated.

    If the CLUSTER-NAME corresponds to an Xprint domain, the original temporary file is not erased, except if logoff of the user task occurred in the meantime; the .W files are also erased once the FT processing has been correctly terminated.

However, the remaining files (if communication loss occurred for example) may be erased at the next Dprint start-up, if the ERASE-W-FILES=*YES option has been specified in the SYSSSI.DPRINTCM.011 file. Refer to section “Parameter file for optional processing (SYSSSI)” on page 382 for details.

5.1.5 POSIX files in Dprint operation

The following operands are not supported for UFS files: LOCK-FILE=*YES, CLUSTER-NAME, DELETE-AFTER-PRINT=*DESTROY, MONJV=*STD and RESOURCES-LOCATION.

When printing out a UFS file, the complete path name of the file must be specified, e.g. user11 must specify: /PRINT-DOCUMENT '/user11/ufs_filename'.

When a POSIX path name (up to 1024 characters) is specified, depending on the type of file system involved, an automatic ASCII-EBCDIC conversion is performed. This can be either a POSIX container file created by the routines of the POSIX subsystem or a file system that was not created by POSIX and was mounted with NFS.

In the case of a POSIX container file, it is assumed that it is always coded in EBCDIC format and no automatic conversion is performed.

If the file is not a POSIX container, it is assumed that it is always coded in ASCII format and an automatic ASCII-EBCDIC conversion is performed. This conversion is not performed when printing in TRANSPARENT mode (DOC-FORMAT=*SPECIAL-FORMAT) on RSO printers. The conversion covers the entire UFS file (including metacharacters).

The automatic ASCII-EBCDIC conversion is performed by a preprocessing server task which simultaneously creates a copy of the UFS file(s) which are stored in DMS work file(s) under the user ID SYSSPOOL or under the installation user ID ($SYSSPOOL.S.UFS.*tsn*).

Multiple UFS files can be processed by specifying a path name with wildcards. If FAMILY-PROCESSING=*YES is specified, all print jobs will be created with the same TSN and cannot be distributed. If FAMILY-PROCESSING=*NO is specified, all print jobs will be created with different TSNs and can be distributed.

Print jobs for UFS files cannot be mounted on tape.

If the path name is longer than 54 characters, only the last 51 (prefixed by “...”) will be output with the SHOW-JOB-STATUS command and on header and trailer pages. The file attributes which are output are from the DMS work files created under the user ID SYSSPOOL or under the installation user ID. These are always SAM files with variable-length records.

5.2 Controlling jobs

5.2.1 Job identification

Because in a Dprint environment, which is based on a client/server architecture, a print job can be issued on a client and processed on a remote server, each print job is provided with two means of identification (a copy of the print job is kept on both sides, on the client and on the server):

– a local TSN on the client side and
– a partner TSN on the server side.

If the selected server is the local server of the clients (on a host), the partner TSN is the same as the local TSN (current situation with SPOOL).

A print job can therefore be referenced either only by way of a TSN or via a TSN and a server name. If only a TSN is specified, a copy of the print job must exist on the host on which the command is issued (e.g. CANCEL-..., MODIFY-..., SHOW-...). This means that the print job must either have been issued from the local client or from a remote client to the local server. If both a TSN and a server name are specified, the TSN always relates to the server TSN, i.e. the TSN on the server side.

These rules apply to print jobs within a BS2000 cluster. For print jobs which are sent to another BS2000 cluster, no local copy of the print job is kept on the client. In this case, only the TSN (local identification) on the gateway with the cluster name can be used in order to identify the print job. For further information, refer to the section “Interoperability between BS2000 clusters” on page 207.

For print jobs which are sent to a UNIX system based cluster, no local copy of the print job is kept on the client. In this case, only the global ID on the UNIX system indicated by the UNIX system based gateway together with the cluster name can be used to identify the print job.

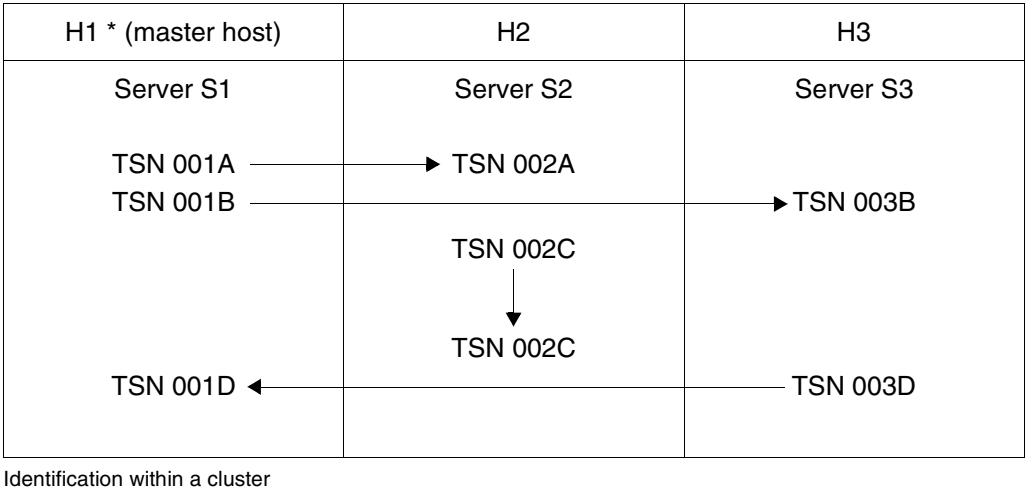
A print job can therefore be referenced from within a BS2000 cluster by means of the information specified below.

1. TSN:
   The local TSN on the client side for print jobs which are processed within the cluster or the local TSN on the gateway for print jobs which are processed in another BS2000 cluster.
2. TSN and server name:
   The TSN on the server and the name of the server. Only print jobs which are processed within the local cluster can be referenced in this manner.

3. TSN and client name:
   The TSN on the client and the host name of the client. Only the cluster administrator can reference jobs in this manner with the command MODIFY-PRINT-JOB-ATTRIBUTES.
4. MONJV:
   Only print jobs which are processed within the local cluster can be referenced by way of a MONJV. The monitoring job variable must also be accessible.
5. A foreign identification (valid on the UNIX system) for print jobs which are processed in a UNIX system based cluster.

Example of identification within a BS2000 cluster

In the following illustration the arrows represent the distribution of jobs from one host to another. This is followed by a listing of the commands with which nonprivileged users can reference the jobs. The additional capabilities of the SPOOL administrator and cluster administrator for controlling jobs are described on page 168.



Identification within a cluster

The user user1, who has issued the print jobs 1A and 1B, can enter the following commands:

```
CANCEL-JOB TSN(1A)
           TSN(1B)

CANCEL-PRINT-JOB  TSN(1A)
                  TSN(1B)
                  TSN(2A,SERVER-NAME=S2)
                  TSN(3B,SERVER-NAME=S3)
```

```
SHOW-JOB-STATUS   TSN(1A)
                  TSN(1B)

SHOW-PRINT-JOB-ATTRIBUTES
                  TSN(1A)
                  TSN(1B)
                  SERVER-TSN(2A,SERVER-NAME=S2)
                  SERVER-TSN(3B,SERVER-NAME=S3)

MODIFY-PRINT-JOB-ATTRIBUTES
                  TSN(1A)
                  TSN(1B)
                  SERVER-TSN(2A,SERVER-NAME=S2)
                  SERVER-TSN(3B,SERVER-NAME=S3)
```

5.2.2 Job statuses

In Dprint and SPOOL operation, jobs may have the statuses described in the following. The job statuses can be interrogated by means of the SHOW-PRINT-JOB-STATUS command (see the "Spool & Print - Commands" manual for further details).

Status	Meaning
ACT	Active: The job is being processed by a printer.
DIR	Direct: The job is coming from a replay tape in direct mode and is waiting for a printer.
FT	In File Transfer: The job files are being transferred to the server.
KP	Keep: The job was halted by a special command or because a problem occurred during the spoolout or file transfer.
PRE	Preprocessing: The job was issued with a section specification. The job is being preprocessed by the section controller.
TRM	Terminated: The job was canceled or is being terminated. This status is not output explicitly.
WFT	Wait File Transfer: The job has been accepted by the server and is waiting for its files to be transferred.
WP	Wait Preprocessing: The job was issued with a section specification. The job is waiting for preprocessing into sections.
WT	Wait: The job is waiting for a printer.

Job statuses

Changing the job status

The following table shows the status applicable to jobs after certain commands have been issued compared to the status before the respective command.

Command causing the change in status	**Print jobs from status**									
	UNK	**WFT**	**FT**	**WP**	**PRE**	**WT**	**ACT**	**KP**	**TRM**	**DIR**
PRINT-DOCUMENT (for remote printer)	WFT	-	-	-	-	-	-	-	-	-
PRINT-DOCUMENT (with section specification)	WP	-	-	-	-	-	-	-	-	-
PRINT-DOCUMENT (for local printer)	WT	-	-	-	-	-	-	-	-	-
MODIFY-PRINT-JOB (with section specified)	-	WFT	-	-	-	-	-	-	-	-
MODIFY-PRINT-JOB	-	WFT	FT/WFT	WP	-	WT/WFT	-	KP	-	-
CANCEL-PRINT-JOB	-	TRM	FT	TRM	PRE	TRM	ACT	TRM	-	-
MODIFY-JOB-PRIORITY	-	WFT	FT	WP	-	WT	-	KP	-	-
HOLD-PRINT-JOB	-	-	-	-	-	-	KP	-	-	-
RESUME-PRINT-JOB	-	-	-	-	-	-	-	WT/WP/WFT	-	-
START-TAPE-REPLAY (direct mode)	DIR	-	-	-	-	-	-	-	-	-
STOP-TAPE-REPLAY (direct mode)	-	-	-	-	-	-	ACT	-	-	UNK
START-TAPE-REPLAY (copy)	WT	-	-	-	-	-	-	-	-	-

Changes in job status

Job variables

Monitoring job variables can display the statuses listed below.

Status	Meaning
$A	Aborted: The job was canceled or terminated abnormally.
$K	Keep: The job was halted (problem during spoolout or file transfer).
$P	Preprocessing: The job was issued with a section specification. The job is being preprocessed by the section controller.
$R	Running: The job is active.
$S	Spooled-in: The job was accepted and is currently waiting.
$T	Terminated: The job was successfully processed.

Job statuses in job variables

The following table shows which of the job variable contents are set for the job statuses (shown in the table above).

Job variable contents	Job status									
	UNK	WFT	FT	WP	PRE	WT	ACT	KP	TRM	DIR
$A	-	-	-	-	-	-	-	-	x	-
$K	-	-	-	-	-	-	-	x	-	-
$P	-	-	-	-	x	-	-	-	-	-
$R	-	-	-	-	-	-	x	-	-	-
$S	-	x	x	x	-	x	-	-	-	x
$T	-	-	-	-	-	-	-	-	x	-

Job variable contents depending on job status

5.3 Commands and SPSERVE statements for the nonprivileged user

The following table shows the commands and SPSERVE statements which are of relevance to the nonprivileged user when using Dprint.

Command/Statement	**Function**
CANCEL-PRINT-JOB	Cancel or prevent print job
MODIFY-PRINT-JOB-ATTRIBUTES	Change attributes of a print job
OPEN-PARAMETER-FILE	Assign SPOOL parameter file for SPSERVE
PRINT-DOCUMENT	Generate spoolout on the specified device
RESUME-PRINT-JOB	Resume a suspended print job
SHOW-ACTIVE-SPOOL-DEVICES	Output information on active printers
SHOW-DPRINT-PRINTERS	Output information on Dprint printers
SHOW-DPRINT-PRINTER-POOLS	Output information on Dprint printer pools
SHOW-DPRINT-REMOTE-CLUSTERS	Output information on remote Dprint clusters
SHOW-DPRINT-SERVERS	Output information on Dprint servers
SHOW-PRINTER-POOLS	Output information on printer pools
SHOW-PRINT-JOB-ATTRIBUTES	Output information on the attributes a print job
SHOW-PRINT-JOB-STATUS	Output information on the status of print jobs
SHOW-SPOOL-CHARACTER-SETS	Output information on character sets
SHOW-SPOOL-DEVICES	Output information on printers
SHOW-SPOOL-FORMS	Output information on forms
SHOW-SPOOL-PARAMETERS	Output information on current SPOOL parameters

Commands and statements for the nonprivileged user

Notes

1. Nonprivileged users can only reference jobs which are running under their own user ID.
2. Nonprivileged users only receive information about devices in whose authorization list their user ID or *ALL is entered.

5.4 Obtaining information

The commands which nonprivileged users can use to obtain information relevant to Dprint are summarized below. A more detailed description of the commands can be found in the "Spool & Print - Commands" manual.

SHOW-ACTIVE-SPOOL-DEVICES command

The SHOW-ACTIVE-SPOOL-DEVICES command requests information about active printers. Here it is possible to make a selection of the print jobs in respect of the host, the server and the cluster on which they are active. The printer about which information is required may be located inside or outside the cluster configuration to which the user belongs. A description of the commands and output information can be found in the " Spool & Print" - Commands" manual.

SHOW-DPRINT-PRINTER-POOLS command

The SHOW-DPRINT-PRINTER-POOLS command requests information about Dprint printer pools. Here it is possible to make a selection in respect of the cluster about whose printer pools information is required. A description of the commands and output information can be found in the "Spool & Print - Commands" manual.

SHOW-DPRINT-PRINTERS command

The SHOW-DPRINT-PRINTERS command requests information about Dprint printers. Here it is possible to make a selection in respect of the server and the cluster about whose printers information is required. A description of the commands and output information can be found in the "Spool & Print - Commands" manual.

SHOW-DPRINT-REMOTE-CLUSTERS command

The SHOW-DPRINT-REMOTE-CLUSTERS command requests information about remote clusters. Here it is possible to make a selection in respect of the cluster type, the network address and the access control for the cluster about which information is required. A description of the commands and output information can be found in the "Spool & Print - Commands" manual.

SHOW-DPRINT-SERVERS command

The SHOW-DPRINT-SERVERS command requests information about servers. Here it is possible to make a selection in respect of the cluster to which the server belongs. description of the commands and output information can be found in the "Spool & Print" - Commands" manual.

SHOW-PRINTER-POOLS command

The SHOW-PRINTER-POOLS command requests information about printer pools. Here it is possible to make a selection in respect of the server to which the pool belongs. The information can be requested for any host (local or remote) in the local cluster. A description of the commands and output information can be found in the "Spool & Print - Commands" manual.

SHOW-PRINT-JOB-ATTRIBUTES command

The SHOW-PRINT-JOB-ATTRIBUTES command requests information about the print job operands specified in the PRINT-DOCUMENT command. Here it is possible to make a selection of the print jobs in respect of their TSN or server TSN and also in respect of the server and the cluster on which they are processed. A description of the commands and output information can be found in the "Spool & Print - Commands" manual.

SHOW-PRINT-JOB-STATUS command

The SHOW-PRINT-JOB-STATUS command requests information about print jobs. Here it is possible to make a selection of the print jobs in respect of the server and the cluster on which they are processed. By using the operand INFORMATION=DISTRIBUTED it is possible to request client and server information for the specified print job. A description of the commands and output information can be found in the "Spool & Print - Commands" manual.

The SHOW-JOB-STATUS command cannot be used to request information about print jobs which were issued to a remote cluster because it does not support the CLUSTER-NAME operand with which the remote cluster is specified.

SHOW-SPOOL-CHARACTER-SETS command

The SHOW-SPOOL-CHARACTER-SETS command can be used to request information about character sets for any desired hosts (local or remote) in the local cluster or a remote cluster. A description of the commands and output information can be found in the "Spool & Print - Commands" manual.

SHOW-SPOOL-DEVICES command

The SHOW-SPOOL-DEVICES command provides information about specifications (data) from the device entry of the specified printer or printer type for any desired hosts (local or remote) in the local cluster. A description of the commands and output information can be found in the "Spool & Print - Commands" manual.

SHOW-SPOOL-FORMS command

The SHOW-SPOOL-FORMS command provides information about specifications (data) from the form entry of the specified form or the form which is assigned to the specified printer type. Here it is possible to make a selection of the print jobs in respect of the server and the cluster on which the form is defined. A description of the commands and output information can be found in the "Spool & Print - Commands" manual.

SHOW-SPOOL-PARAMETERS command

The SHOW-SPOOL-PARAMETERS command requests the values of the global SPOOL defaults and scheduling criteria for local SPOOL and RSO from the current SPOOL parameter file of a desired cluster or server.

5.5 Behavior in error situations

This section contains basic information for troubleshooting when using Dprint. It will help in solving problems for which the assistance of trained service personnel is not required.

5.5.1 Print job was accepted but not started

If a successful PRINT-DOCUMENT command has been issued, and everything appears ready for printing but nothing happens, then the measures described in the following may be applied in an attempt to solve the problem.

1. Check whether the print job is in the KEEP status.

   On the occurrence of a problem, the print job may have been placed in the KEEP queue. Consequently, it is not possible to start the print operation without having first returned the job to the WAIT status by means of the RESUME-PRINT-JOB command. This measure is restricted to requests within a cluster. The status of the print job can be interrogated by means of the following commands:

```
/SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION,SEL=*PAR(JOB-TYPE=*KEEP,
                       USER-ID=*ALL,SERVER-NAME=*ALL,HOST-NAME=*ALL)
/SHOW-PRINT-JOB-ATTRIBUTES
```

   Example

```
/SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION,SEL=*PAR(JOB-TYPE=*KEEP,
                       USER-ID=*ALL,SERVER-NAME=*ALL,HOST-NAME=*ALL)

TSN  SERVER   M STA R DEVICE   DESTIN   ERCOD    ERMSG    DEVICE TYPE
4916 *HOME    L KP            *CENTRAL 1120     SDD3013  HP,HP90,LP,LP-EM
                                                          LP48,LP65
%  SCP0947 1 JOBS FOUND WITH 2 PAM PAGES. COMMAND TERMINATED
```

   The field “ERMSG” can assist in solving the problem if the user enters the HELP-MSG-INFORMATION command for the message number indicated. SDD3013, for example, would mean that a file transfer error was detected.

   If the ERCOD is 31L0, it means that the file transfer is abnormally terminated. In this case, the FT/FTAC administrator can give more informations about the error reason via the command /SHOW-FT-LOGGING-RECORDS for the job‘s transferred file $SYSDPRNT.DPRNT.S.xxxx.FILE or .RESOURCE (where xxxx is the server TSN of the job).

```
/SHOW-PRINT-JOB-ATTRIBUTES JOB-ID=*TSN(TSN=4916)
TSN          : 4916 (4916)  SERVER-NAME : *HOME       STATE : KP
FILE-NAME    : :3:$USER.userfile
ADD-COPIES   :   0          LOCK-FILE : *NO
DEL-AFTER-PR: *NO
  ------------------------------ DOCUMENT-PART ----------------------------
INPUT-SECT   : *WHOLE-FILE
INPUT-PART   : *ALL
RECORD-PART : *ALL
OUTPUT-PART : *ALL
  ------------------------------ DOCUMENT-FORMAT --------------------------
DOC-FORMAT   : *TEXT
LINE-P-PAGE :     0      HEADER-LINE : *NO
LINE-SPACING: 1
OUTPUT-FORM : *CHARACTER
  ------------------------------ PRINT-JOB-CONTROL ------------------------
PR-JOB-NAME : PRINT3   PR-JOB-PRIO :  240          CHECKPOINT : *ON-PAGES
FAILURE-PROC: (MSG-PAGE : *YES)
  ------------------------------ LAYOUT-CONTROL ---------------------------
PAGE-COPIES :   0      LEFT-MARGIN :  0            ROTATION : *NO
TAB-REF-CHAR: *NO
  ---------------------------- RESOURCES-DESCRIPTION ----------------------
FORM-NAME    : STD
RES-LOC      : *HOME
CHAR-SET-ATT: *ALL
  ------------------------------ TO-PRINTER -------------------------------
PRINTER-NAME: *CENTRAL
PRINTER-TYPE: *ANY
REDIRECTION : *YES
```

The field “STATE” indicates the current status of the job.

2. Check whether the job is in an intermediate status.

   The command SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION can be used to check the status of the print job in field “STA”. If the print job is being processed by a remote server, the server name must be included in the list of the selection criteria.

   Example

```
/SHOW-PRINT-JOB-STATUS SEL=*PAR(TSN=4830),INFORMATION=*DESTINATION

TSN  SERVER   M STA R DEVICE   DESTIN   ERCOD    ERMSG    DEVICE TYPE
4830 *HOME    L WT            *CENTRAL                    HP,HP90,LP,LP-EM
                                                          LP48,LP65
%  SCP0947 1 JOBS FOUND WITH 2 PAM PAGES. COMMAND TERMINATED
```

   The field “STA” indicates the status of the print job:

   WFT: The job is waiting for the file transfer to be started for its files.

   FT: The job’s files are being transferred to the server.

   WP: The job was issued with a section specification. The job is waiting for preprocessing into sections.

   PRE: The job was issued with a section specification. The job is being preprocessed by the section controller.

   WT: The job is waiting for a printer.

   ACT: The job is being processed by a printer.

   KP: The job is in the “KEEP” status.

   DIR: The job is coming from a replay tape in DIRECT mode and is waiting for a printer.

3. Check whether the printer is “logically” started.

   By using the command SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION it is possible to check, in the field “SERVER”, the logical name of the server which is processing the print job. The field “DEVICE TYPE” shows the device types on which the specified print job can be processed.

   With the command SHOW-PRINT-JOB-STATUS INFORMATION=*DISTRIBUTED it is possible to interrogate the type of job in the field “J-TYPE”. If the job is being processed by a remote server, the server name must be included in the list of the selection criteria.

   Example

```
/SHOW-PRINT-JOB-STATUS SEL=*PAR(TSN=4830),INFORMATION=*DISTRIBUTED

TSN  SERVER   P-TSN J-TYPE HOST     USER-ID  ACCOUNT  ERCOD    ERMSG
4830 *HOME    4830  *LOC   D241ZE22 TSOS     ADMINSTR
%  SCP0947 1 JOBS FOUND WITH 2 PAM PAGES. COMMAND TERMINATED

/SHOW-PRINT-JOB-STATUS SEL=*PAR(TSN=1805,SERVER-NAME=B13SER),
                       INFORMATION=*DISTRIBUTED

TSN  SERVER   P-TSN J-TYPE HOST     USER-ID  ACCOUNT  ERCOD    ERMSG
1805 B13SER   5068  *DIST  D241ZE22 TSOS     ADMINSTR
%  SCP0947 1 JOBS FOUND WITH 2 PAM PAGES. COMMAND TERMINATED
```

   A list of the devices which are managed by the specified server can be requested by means of the following command:

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=logical server name
```

   In the case of requests between clusters, the cluster name must also be specified:

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=logical server name ,
                           CLUSTER-NAME=selected cluster .
```

Example

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=B13SER

%  SCP1051 OPERAND CLUSTER-NAME,SERVER-NAME,HOST-NAME MAY ONLY BE USED
   WITH DPRINTCL SUBSYSTEM. COMMAND REJECTED.
```

If the DPRINTCL subsystem is not loaded, Dprint printers on remote hosts cannot be shown. In this case, the cluster administrator or SPOOL administrator should be notified so that loading of the subsystem can be initiated.

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=B13SER

%  SCP1052 WARNING : INFORMATION MAY BE NOT COMPLETE. ONE OR SEVERAL
   SERVERS ARE NOT ACCESSIBLE
%  SCP0912 NO DEVICE MATCHES SPECIFIED OPERAND VALUES. COMMAND NOT
   EXECUTED
```

If the DPRINTSV subsystem is not loaded on the remote system, the cluster administrator or SPOOL administrator of the server host should be notified so that loading of the subsystem can be initiated.

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=*HOME

DEV-NAME DEV-TYPE  C-USERID C-TSN EXIT C-FORM C-CL SSU ADM CRI
S1PRT1   HP-PRINT                 YES STD       0 LI      EXP
```

At least one device type output in the “DEVICE TYPE” field shown by the SHOW-PRINT-JOB-STATUS command must be active. If the device type is missing, the cluster administrator or SPOOL administrator of the server host should be notified so that the printer can be started.

4. Check whether it is actually permissible to output the print job on the activated printers.

   A printer can be activated with lists of permitted forms, user IDs, account numbers, spoolout classes etc.. It is therefore necessary to check whether output of the print job is permitted on the printers. This information can be interrogated by means of the following commands.

   The SHOW-PRINT-JOB-ATTRIBUTES command can be used to request the attributes of the print job.

   Example

```
/SHOW-PRINT-JOB-ATTRIBUTES JOB-ID=*TSN(TSN=4916)
TSN          : 4916 (4916)  SERVER-NAME : *HOME       STATE : KP
FILE-NAME    : :3:$USER.user3file
ADD-COPIES   :   0          LOCK-FILE : *NO
DEL-AFTER-PR: *NO
  ------------------------------ DOCUMENT-PART ----------------------------
INPUT-SECT   : *WHOLE-FILE
INPUT-PART   : *ALL
RECORD-PART : *ALL
OUTPUT-PART : *ALL
  ----------------------------- DOCUMENT-FORMAT ---------------------------
DOC-FORMAT   : *TEXT
LINE-P-PAGE :     0      HEADER-LINE : *NO
LINE-SPACING: 1
OUTPUT-FORM : *CHARACTER
  ----------------------------- PRINT-JOB-CONTROL -------------------------
PR-JOB-NAME : PRINT3   PR-JOB-PRIO :  240          CHECKPOINT : *ON-PAGES
FAILURE-PROC: (MSG-PAGE : *YES)
  ------------------------------ LAYOUT-CONTROL ---------------------------
PAGE-COPIES :   0      LEFT-MARGIN :  0            ROTATION : *NO
TAB-REF-CHAR: *NO
  --------------------------- RESOURCES-DESCRIPTION ----------------------
FORM-NAME    : STD
RES-LOC      : *HOME
CHAR-SET-ATT: *ALL
  ------------------------------ TO-PRINTER -------------------------------
PRINTER-NAME: *CENTRAL
PRINTER-TYPE: *ANY
REDIRECTION : *YES
```

A list of the devices which are managed by the specified server can be requested by means of the following command:

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=logical server name
```

Example

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=*HOME

DEV-NAME DEV-TYPE  C-USERID C-TSN EXIT C-FORM C-CL SSU ADM CRI
S1PRT1   HP-PRINT                  YES STD       0 LI      EXP
```

The field “SSU” indicates the printer scope and the printer status.

The following may be output for the printer scope:

L: The printer is started for local use.

C: The printer is started for Dprint printing.

The scope of the printer must be checked with regard to the type of print job.
If the print job has been processed by SPOOL (J-TYPE set to *LOC), it can be passed to a local printer (scope L) or to a Dprint printer (scope C).
If the print job has been processed by DPRINT (J-TYPE set to *DIST or *INTER), it can only be passed to a Dprint printer (scope C).

The command SHOW-ACTIVE-SPOOL-DEVICES DEVICE-NAME=*printer name* can be used to request a list of the supported user IDs, forms, etc.

Example

```
/SHOW-ACTIVE-SPOOL-DEVICES DEVICE-NAME=S1PRT1

DEV-NAME: S1PRT1     DEV-TYP:HP-PRINT  REV:   1 SCHED:NEXT-JOB
C-USERID:           PRIORITY:  30/ 255 USE: OUT  C-TSN:
CLASSES (A):

FORM(P ):  UPBOR

PNAME(A):

USER (A):

ACC  (A):

DESTS: *CENTRAL
CURRENT-FORM: UPBOR  SAMPLE: NO   EXIT: YES  TRACE: NO
CURRENT-DIA :          T-UP-P: ANY
ROTATION: ANY   FOB:     0/  672  CHAR-SET:     0/   64
DIAS    (P    ): D1

SERVER-NAME: *LOCAL    HOST-NAME: D001ZE05
PRINTER-STATE: I       PRINTER-SCOPE: L
HOSTS(A):
```

If output of the print job is not permitted on the printer, the cluster administrator or SPOOL administrator of the server host should be consulted as to the reasons.

5. Check that the printer is not currently processing another print job.

   ```
   /SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION
   ```

   The status of the current print job is output.

   ```
   /SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=logical server name
   ```

   This command outputs a list of the devices which are managed by the specified server.

   Example

   ```
   /SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=*HOME

   DEV-NAME DEV-TYPE  C-USERID C-TSN EXIT C-FORM C-CL SSU ADM CRI
   S1PRT1   HP-PRINT                 YES STD       0 LR      EXP
   ```

   The field “SSU” indicates the printer scope and the printer status.

   The following may be output for the printer status:

   I: The printer is ready for printing but there is no spoolout currently present.

   R: Spoolout active.

   If the possible device is in status “I” and the print job is still not selected, the cluster administrator or SPOOL administrator should be notified since certain access restrictions could be in force.

6. Check whether an error has occurred in the printer.

   The printer status can be interrogated by means of the following command:

   ```
   /SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=logical server name
   ```

   This outputs a list of the devices which are managed by the specified server.

   Example

   ```
   /SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=*HOME

   DEV-NAME DEV-TYPE  C-USERID C-TSN EXIT C-FORM C-CL SSU ADM CRI
   S1PRT1   HP-PRINT                 YES STD       0 LM      EXP
   ```

   The field “SSU” indicates the printer scope and the printer status. If the printer status is set to “M”, this means that an error has been detected. A console message has been output for the device.

   The operator of the server host can be notified in order to eliminate the error.

5.5.2 Print job was not output correctly

If the print job was not output correctly, then the measures described in the following may be applied in an attempt to solve the problem.

1. Check which resources were specified.
2. Check where the resources which are used in the case of a print request within the cluster are located.

   If no value was specified explicitly in the PRINT-DOCUMENT command, the value must be checked in the GEN record of the SPOOL parameter file in the user's own host.

   If server resources have been selected, no transfer of resources is performed. It is necessary to check whether the resources defined in the SPOOL parameter file of the server are the desired resources. For further information, refer to the PRINT-DOCUMENT command described in the manual "Spool & Print - Commands".

   Moreover, it is possible that an existing exit 094 could have modified the selection of the resources. Users should therefore contact their own SPOOL administrator or the SPOOL administrator of the server host.
3. In the case of printing between clusters, for example if a print job was issued to a remote cluster (PRINT-DOCUMENT with CLUSTER-NAME operand), no print resources are transferred between clusters. The print job is processed using the print resources which are available on the gateway system.

   It is necessary to check for compatibility between the resources which are defined in the SPOOL parameter file of the gateway and those which are defined in the SPOOL parameter file of the user's own host.

   In the case of a remote BS2000 cluster, the forms and character sets which are defined in the SPOOL parameter file of the gateway can be interrogated by means of the following commands:

   /SHOW-SPOOL-FORMS CLUSTER-NAME=*remote BS2000 cluster*

   /SHOW-SPOOL-CHARACTER-SETS CLUSTER-NAME=*remote BS2000 cluster*

5.5.3 Important points in the case of heterogeneous interoperability with Windows

– The system is case-sensitive, so please remember to use uppercase and lowercase letters correctly.

– Make sure that the gateway is started before sending a print job.

– Avoid canceling the active job, as the system resources required for transfer can delay the deletion process and could cause the subsequent active job to also be canceled.

– A connection error often occurs as a result of an incorrect definition in the "server" file or from a missing Dprint subsystem.

– Please remember that names of BS2000 computers and BS2000 user IDs are allowed to be a maximum of 8 characters long. If a job is received from a computer or user whose name is contains more than 8 characters, then the job is rejected.

5.5.4 Important points in the case of heterogeneous interoperability with UNIX systems

In the case of heterogeneous interoperability with UNIX systems, the following are the main problems which may occur or are points that you should keep in mind:

– On UNIX systems, the names of objects may include lowercase letters. If such an object is specified in a BS2000 command, the c-string format must be used. Otherwise, SDF automatically converts input into uppercase letters resulting in the incorrect object being used as the selection criterion.

– If a command is rejected with a message regarding a connection error, you must inform the cluster administrator.

– You should inform the cluster administrator if a print job issued to a domain of UNIX systems remains in the state “FT” for a long time.

– Spooler errors that occured on UNIX systems are reported via the SDD6001 message. The message key ID of the foreign spooler is output. Please refer to the Xprint manuals for information on its meaning. The first two characters (CL) must be replaced accordingly by SP/XP.

6 Dprint management functions and activities

6.1 Cluster management

6.1.1 Dprint configuration file

Each cluster system in a Dprint (print) environment must have a knowledge of and information about the configuration of each member in the cluster and of the general configuration of the cluster. This information is held in a configuration file (standard file: $SYSDPRNT.DPRINT.PARAMETERS) in the form of objects with certain attributes. This file is managed on the master host; all other hosts receive a copy of this file.

All objects are specified exclusively by means of SPSERVE statements (see the “SPSERVE” manual). Each object is associated with the other objects in the configuration file.

By specifying OPEN-PARAMETER-FILE *DPRINT-PARAMETERS it is possible to access the entries of the current Dprint configuration file during a Dprint session.

At DPRINTCM startup time, Dprint opens the Dprint configuration file and reads the data into the memory of the task DPMG (CI5 memory).

The Dprint configuration file (like the SPOOL parameter file) is an ISAM file (KEY-LEN=20, KEY-POS=5). Each entry can be identified by way of the ISAM key (of the 20 bytes of the key, 8 to 14 are used depending on the type of the entry, the remainder are filled with blanks).

The following points should be noted with regard to the creation and processing of a cluster configuration.

1. In order to allow creation of a cluster configuration, the DPRINTCL subsystem must be started on at least one of the hosts which are to be included in the cluster. The commands for creating the cluster configuration are contained in the DPRINTCL syntax file.

   DPRINTCL must be loaded on the host of the potential cluster administrator. The cluster administrator will be the SPOOL administrator who requested creation of the cluster.

2. Before the start of a cluster configuration the SPOOL administrators of the different hosts must plan together with the potential cluster administrator which management objects they need to define in their own configuration files.

   When the cluster configuration has been created, these SPOOL administrators must inform the cluster administrator which of their local objects within the cluster are to be made available in order that the latter can define them in the configuration file.

3. No overlapping is possible between the clusters, i.e. a host cannot be included in a cluster configuration if it is already defined in another cluster.

4. The Configuration Manager controls all access to the configuration file for inquiries, updates creation of new objects etc. Since the Configuration Manager belongs to the DPRINTCM subsystem, any updating and transfer of the configuration file are only performed if this subsystem is loaded.

6.1.2 Configuration objects

All configuration and Dprint objects are listed below.

Cluster
The cluster object permits interoperability between clusters.
Remote clusters must be defined in this object in the configuration file.

Host
If a host forms part of a cluster, it must be defined in the host object in the configuration file.

Server
The Dprint server object makes it possible to select servers, delete SPOOL jobs etc.
Each server in a cluster (wherever it may be situated in the cluster) must be defined in the server object in the configuration file.

Printer
The printer object gives users a single system overview of clusters. Each Dprint printer must be defined in the printer object in the configuration file of each host for the cluster.

Printer pool
A Dprint printer pool is an object composed exclusively of Dprint printers (exclusively local printers on different hosts).
Each Dprint printer pool (also known as a Dprint printer group) must be defined in the printer pool object in the configuration file of each host in a cluster.

Access control
Access control is an object which contains a set of rules. Its ID is also used in other object definitions to enable these objects to control access on the basis of these rules.

In the access control object, users (user groups) are specified which may or may not perform actions under the other objects.
The rules for specifying these users (user groups) are stored within Dprint access control. The object whose access is to be controlled must be defined with a name suitable for access control.
The same access conditions can be employed for different actions under different objects, even under different types.

In Dprint, access control is used in order firstly to control the job flow within the cluster (server access control), secondly to control cluster access (gateway access control) and thirdly to control leaving the cluster (access control over remote clusters).

Each access control record contains:

– Access control ID
  defines the logical name of the access control. This ID must be used in the case of server, gateway, host and cluster definition in order to control the respective access.

– Set of access rules
  is a hierarchically organized set of rules on three levels.
  On the first level is the general rule, on the second level the host rules, and on the third level the user rules. Each rule specifies whether or not one or more subjects have access to the objects when access control is in use.

In detail, this means:

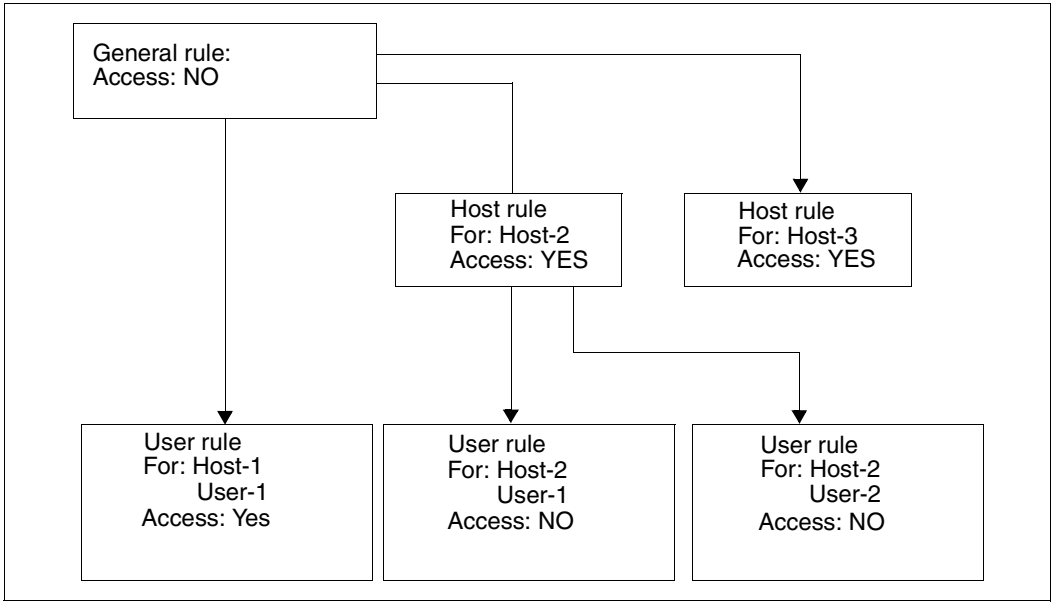
The general rule specifies the default setting. This applies to any user if no other rules are put forward for that user.

The host rules constitute exceptions to the general rule for all users on the host in question. In this way, any access by any user on this host is controlled unless there are any other rules applicable to the situation.

The user rules constitute an exception to the general rule and to the host rules for each individual user. Each individual user must be capable of being identified by way of the host ID and the user ID on the host.

There is always one general rule for one access control. Host and user rules may be combined. Each new rule on a higher level triggers simplification of the *rule tree,* or of the rules on lower levels. So all user rules for a host are replaced or removed when a new host rule is introduced. If a new general rule is introduced, all other rules (host and user rules) are replaced or removed.
A new rule which does not constitute an exception to a higher-level rule is not stored.

Example



Rules for Dprint access control hierarchy

Explanation

The general rule states that nobody has access.

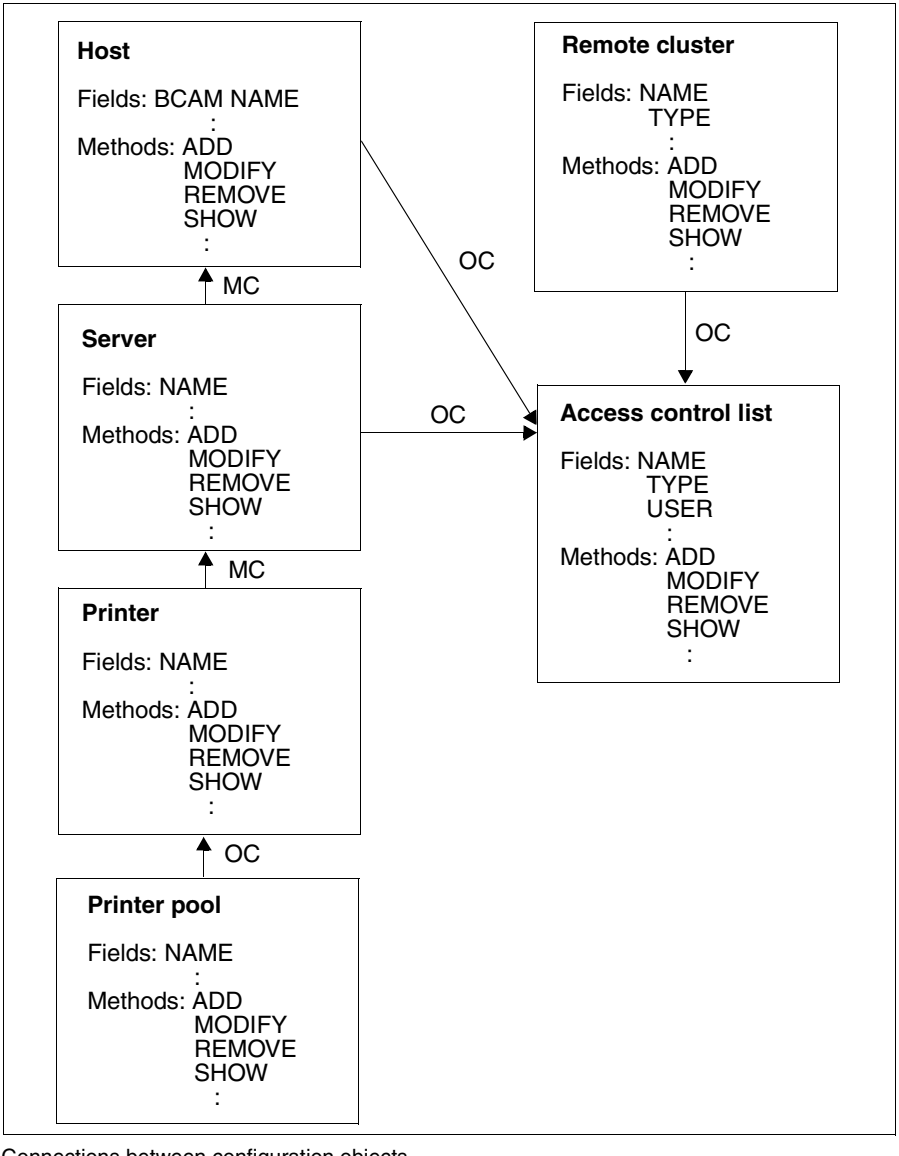
Exceptions:

1. Exception: User-1 of Host-1 has access (the other users of Host-1 have no access according to the general rule).
2. Exception: all users of Host-2 have access.

   (Sub-)Exceptions

   4. (Sub-)Exception: User-1 of Host-2 has no access.
   5. (Sub-)Exception: User-2 of Host-2 has no access.
3. Exception: all users of Host-3 have access.

6.1.3 Connections between configuration objects



Connections between configuration objects

Legend

MC: mandatory connection
OC: optional connection

A printer pool is composed of printers.
A printer must be connected to a server.
A server must be connected to a host.
A server can be connected with an access control list.
A remote cluster can be connected with an access control list.

6.1.4 Cluster administrator

The objects of a configuration are created and modified exclusively by the cluster administrator, and this is done by using the appropriate ADD, EDIT, MODIFY and REMOVE statements. The cluster administrator, who also has the task of performing initialization of the cluster, must have the SRPM privilege PRINT-SERVICE-ADMINISTRATION for the present master host in order to do so, or this privilege must be defined for the cluster administrator on the master host.

If a host does not belong to a cluster, then it can be regarded as a cluster consisting of a single host. The SPOOL administrator of a single host is, in this case, also the cluster administrator on that host; in other words, the administrator may define hosts in his/her configuration which are required in order to create a cluster.

Although all users can have the Dprint objects displayed in accordance with their access rights, they cannot have the access control objects displayed. Only the cluster administrator can have these objects displayed. And it is only the cluster administrator who can modify the original configuration file on the master host.

6.1.5 Initializing the configuration

When Dprint is loaded on a host for the first time, a default configuration is defined. This contains only the objects with the default configuration options. Automatic distribution of the SPOOL objects is not possible. The cluster administrator must initialize the Dprint environment by means of SPSERVE statements. The cluster administrator is also responsible for creating the cluster. To this end, the configuration file which was generated on the cluster administrator's host must be transferred to all hosts which are to belong to the cluster. This is how all objects which are available in the cluster and all the global information about the cluster organization are conveyed.

Once a cluster has been created, the cluster administrator can update the configuration at any time and define new objects which are to be available for the entire cluster.

The configuration file is retained between Dprint sessions. But it is updated each time the cluster configuration is restarted.

6.1.6 Allocating object names in the Dprint environment

The cluster administrator allocates names for the various Dprint printers and printer pools and must add each new Dprint printer and each new Dprint printer pool under a new name. (For details, refer to the “SPSERVE” manual under the statements ADD-DPRINT-PRINTER and ADD-DPRINT-PRINTER-POOL.)

It is therefore possible to ignore the risk of name conflicts occurring during initialization and updating of the configuration file by the cluster administrator.

6.1.7 Example of cluster management

In the following configuration scenarios, three BS2000 hosts (H1, H2 and H3) are interconnected by means of a LAN (TCP/IP protocol). The attached printers can only be used locally on the respective host.

Dprint is to be used to create a configuration in which the printers attached to hosts H2 and H3 can be used by all hosts.

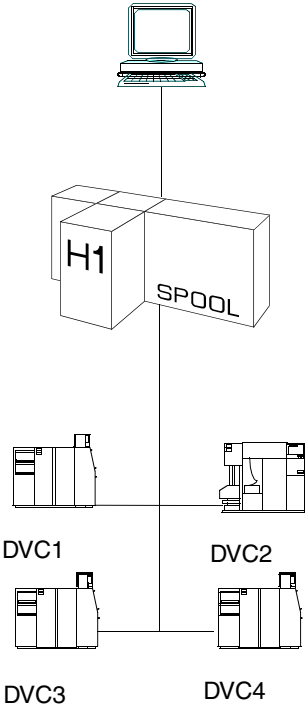
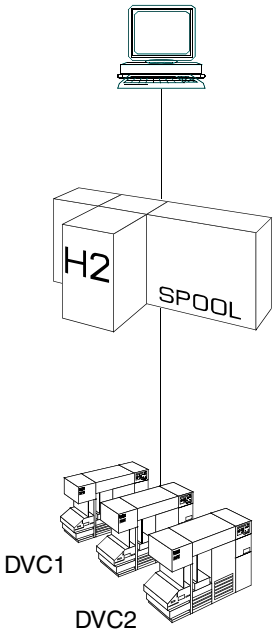
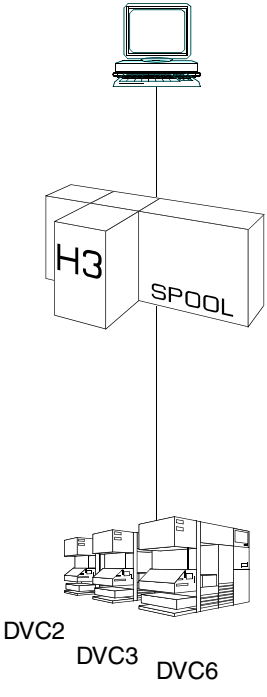
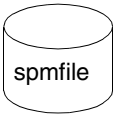
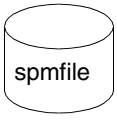
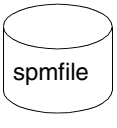
The configuration is implemented through the creation of a Dprint cluster to which the hosts H1, H2 and H3 along with the printers attached to hosts H2 and H3 are to belong. The printers attached to host H1 are to continue to be used locally.

DPRINTCL was installed on all the hosts and DPRINTSV was installed on hosts H2 and H3. Host H1 is to be assigned the role of Dprint master in the Dprint cluster. Hosts H2 and H3 are to act as Dprint servers. A gateway computer need not be defined since no communication takes place with a remote cluster.

Abbreviations

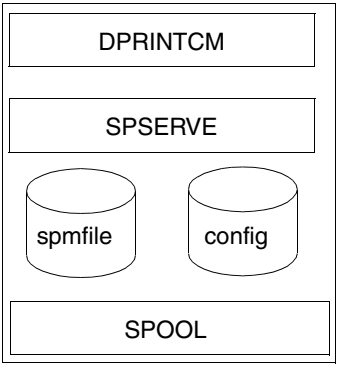
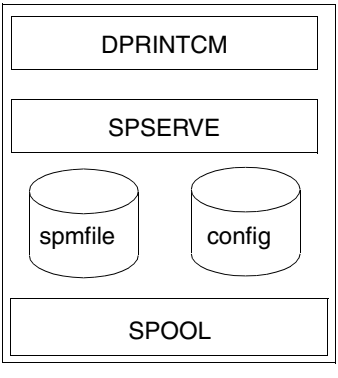
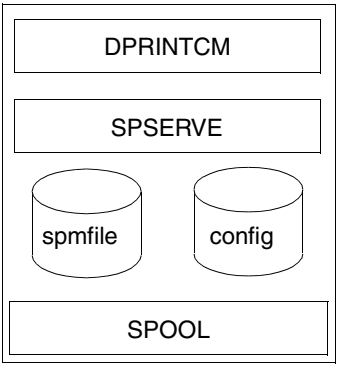
spmfile:	Local SPOOL parameter file
config:	Dprint configuration file
DVC1 thru DVC6:	Printers

Initial situation

Host H1 = D000ZE01	Host H2 = D000ZE02	Host H3 = D000ZE03
 Local printers	 Local printers	 Local printers
The locally attached printers are already entered in the SPOOL parameter files.		
 DVC1 DVC2 DVC3 DVC4	 DVC1 DVC2 DVC5	 DVC2 DVC3 DVC6

Definition of a Dprint cluster

1. Call subsystems (SPOOL, DPRINTCM)
2. Define Dprint hosts (with SPSERVE: /START-SPSERVE)
3. Define Dprint servers (with SPSERVE: /START-SPSERVE)
4. Call subsystems (DPRINTCL, DPRINTSV)
5. Define Dprint clusters
6. Distribute printers in the cluster

<table>
<tr><th>Host H1 = D000ZE01</th><th>Host H2 = D000ZE02</th><th>Host H3 = D000ZE03</th></tr>
<tr><td colspan="3">On all hosts which are to form a Dprint cluster, the Dprint subsystems must be started in the following order:
A) DPRINTCM
B) DPRINTCL or/and DPRINTSV (refer here to 4.)</td></tr>
<tr><td>1. /START-SU DPRINTCM</td><td>/START-SU DPRINTCM</td><td>/START-SU DPRINTCM</td></tr>
<tr><td colspan="3">The illustrations below show which components on which hosts are involved in the cluster formation which now follows.</td></tr>
<tr><td> 
</td><td> 
</td><td> 
</td></tr>
<tr><td colspan="3">Before a cluster is created, the SPOOL administrators must define the Dprint master (H1) and the home host name in the configuration.</td></tr>
<tr><td>2.</td><td>/START-SPSERVE
//OPEN-PARAMETER-FILE
PARAMETER-FILE=
*DPRINT-PARAMETERS
//ADD-DPRINT-HOST
HOST-NAME=D000ZE02
//END</td><td>/START-SPSERVE
//OPEN-PARAMETER-FILE
PARAMETER-FILE=
*DPRINT-PARAMETERS
//ADD-DPRINT-HOST,
HOST-NAME=D000ZE03
//END</td></tr>
</table>

Host H1 = D000ZE01	**Host H2 = D000ZE02**	**Host H3 = D000ZE03**

	/START-SPSERVE
	//OPEN-PARAMETER-FILE
	PARAMETER-FILE=
	*DPRINT-PARAMETERS
	//ADD-DPRINT-HOST
	HOST-NAME=D000ZE01
	//END
		/START-SPSERVE
		//OPEN-PARAMETER-FILE
		PARAMETER-FILE=
		*DPRINT-PARAMETERS
		//ADD-DPRINT-HOST
		HOST-NAME=D000ZE01
		//END

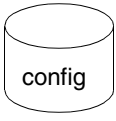
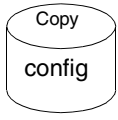
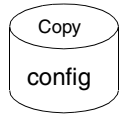
All computers which are to belong to the Dprint cluster must be entered on the Dprint master.		

/START-SPSERVE
//OPEN-PARAMETER-FILE
PARAMETER-FILE=
*DPRINT-PARAMETERS
//ADD-DPRINT-HOST
HOST-NAME=D000ZE01
//ADD-DPRINT-HOST
HOST-NAME=D000ZE02
//ADD-DPRINT-HOST
HOST-NAME=D000ZE03		

To allow any user of the Dprint cluster to have access to servers H2 and H3, the cluster administrator must enter these as servers - S2 and S3 in the example here - in the master configuration file. Without these entries, the printers attached to H2 and H3 can only be used locally.		

3.
//ADD-DPRINT-SERVER
SERVER-NAME=S2,
HOST-NAME=D000ZE02
//ADD-DPRINT-SERVER
SERVER-NAME=S3
HOST-NAME=D000ZE03
//END		

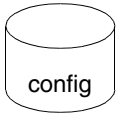
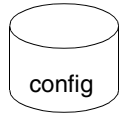
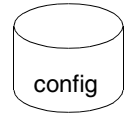
4. /START-SU DPRINTCL	/START-SU DPRINTSV /START-SU DPRINTCL	/START-SU DPRINTSV /START-SU DPRINTCL
The commands for cluster formation is now issued on the Dprint master.		
5. /CREATE-DPRINT-CLUSTER (D000ZE02,D000ZE03)		

Host H1 = D000ZE01	**Host H2 = D000ZE02**	**Host H3 = D000ZE03**
After the cluster has been defined, the configuration files of H2 and H3 are checked. If all the entries are correct, then the Dprint configuration file is copied from H1 to H2 and H3. Host H1 has automatically become the cluster administrator.		
 D000ZE01 D000ZE02 D000ZE03 S2 S3	 D000ZE01 D000ZE02 D000ZE03 S2 S3	 D000ZE01 D000ZE02 D000ZE03 S2 S3

6. Defining printers as Dprint printers

Host H1 = D000ZE01	Host H2 = D000ZE02	Host H3 = D000ZE03
The cluster administrator of H1 can decide whether to make only some or all of the printers which are connected to the different hosts in the cluster Dprint printers. Only those printers which are connected to a server (i.e. to a host on which DPRINTSV is loaded) may be defined in the configuration. (Printers which are connected to a host on which only the DPRINTCL subsystem is loaded are not accessible.)		

/START-SPSERVE
//OPEN-PARAMETER-FILE
PARAMETER-FILE=
*DPRINT-PARAMETERS
//ADD-DPRINT-PRINTER
PRINTER-NAME=D1,
SERVER-NAME=S2,
LOCAL-PRINTER-NAME=DVC1
//ADD-DPRINT-PRINTER
PRINTER-NAME=D2,
SERVER-NAME=S2,
LOCAL-PRINTER-NAME=DVC2
//ADD-DPRINT-PRINTER
PRINTER-NAME=D5,
SERVER-NAME=S2,
LOCAL-PRINTER-NAME=DVC5
//ADD-DPRINT-PRINTER
PRINTER-NAME=D3,
SERVER-NAME=S3,
LOCAL-PRINTER-NAME=DVC3
//ADD-DPRINT-PRINTER
PRINTER-NAME=D6,
SERVER-NAME=S3,
LOCAL-PRINTER-NAME=DVC6		

 D000ZE01 D000ZE02 D000ZE03 S2 S3 D1(H2,DVC1) D2(H2,DVC2) D5(H2,DVC5) D3(H3,DVC3) D6(H3,DVC6)	 D000ZE01 D000ZE02 D000ZE03 S2 S3 D1(H2,DVC1) D2(H2,DVC2) D5(H2,DVC5) D3(H3,DVC3) D6(H3,DVC6))	 D000ZE01 D000ZE02 D000ZE03 S2 S3 D1(H2,DVC1) D2(H2,DVC2) D5(H2,DVC5) D3(H3,DVC3) D6(H3,DVC6)

Displaying the SPOOL parameter file on the screen

Host H1 = D000ZE01	Host H2 = D000ZE02	Host H3 = D000ZE03
The information in the SPOOL parameter file for each server in the cluster can be output on any host in the cluster on which DPRINTCL is loaded or SPSERVE is used. This means: If DPRINTCL is not loaded on a host, SPSERVE must be used for such an output. However, if DPRINTCL is loaded, SHOW-...commands can be used for this purpose.		
	/START-SPSERVE //OPEN-PARAMETER-FILE PARAMETER-FILE= *DPRINT-PARAMETERS	/START-SPSERVE //OPEN-PARAMETER-FILE PARAMETER-FILE= *DPRINT-PARAMETERS
/SHOW-SPOOL-DEV SERVER-NAME=*HOME DVC1 DVC2 DVC3 DVC4	//SHOW-SPOOL-DEV SERVER-NAME=*HOME DVC1 DVC2 DVC5	//SHOW-SPOOL-DEV SERVER-NAME=*HOME DVC2 DVC3 DVC6
If a server name is specified instead of *HOME, then the printers for the corresponding server are output.		

/SHOW-SPOOL-DEV
SERVER-NAME=S2
	//SHOW-SPOOL-DEV
	SERVER-NAME=S3
	//END
		//SHOW-SPOOL-DEV
		SERVER-NAME=S2
		//END

DVC1 DVC2 DVC5	DVC2 DVC3 DVC6	DVC1 DVC2 DVC5
The printers attached to host H1 cannot be output on hosts H2 and H3 because host H1 is not a Dprint server.		

Starting printers with START-PRINTER-OUTPUT

Host H1 = D000ZE01	Host H2 = D000ZE02	Host H3 = D000ZE03
If no printer has yet been defined in the configuration file, a START-PRINTER-OUTPUT command can only be issued by the SPOOL administrator on any host responsible for the devices in the respective SPOOL parameter file.		
START-PRINTER-OUTPUT UNIT = DVC1 or UNIT = DVC2 or UNIT = DVC3 or UNIT = DVC4	START-PRINTER-OUTPUT UNIT = DVC1 or UNIT = DVC2 or UNIT = DVC5	START-PRINTER-OUTPUT UNIT = DVC2 or UNIT = DVC3 or UNIT = DVC6

Link references between configuration file and SPOOL parameter file

We will now show how to check whether link references exist between configuration file and SPOOL parameter file.

In general, we can distinguish the following cases:

Case A: The SPOOL administrator of Hi wishes to start a printer.

1. DPRINTSV is not loaded on Hi:
   Only those printers which are defined in the SPOOL parameter file of Hi can be started. This means when the following command is issued:

   ```
   /START-PRINTER-OUTPUT UNIT=XXX
   ```

   If XXX is defined in spmfile, the SPOOL administrator can start XXX on Hi; if XXX is not defined, a warning is output that Printer XXX does not exist.

2. DPRINTSV is loaded on Hi:
   The printers which are defined in the SPOOL parameter file of Hi can be started, as also can the Dprint printers which are connected to the servers of Hi. This means when the following command is issued:

   ```
   /START-PRINTER-OUTPUT UNIT=XXX
   ```

   If XXX is defined in config and this is connected to Hi, the SPOOL administrator can start XXX on Hi. However, if XXX is defined in config and this is not connected to Hi, the SPOOL administrator is unable to do this.

If XXX is not defined in config but is defined in the SPOOL parameter file of Hi, the SPOOL administrator can then start XXX on Hi. But if XXX is defined neither in config nor in the SPOOL parameter file of Hi, a warning is output that printer XXX does not exist.

Case B: The cluster administrator wishes to start a Dprint printer and DPRINTSV is loaded on H1.

1. XXX is defined in config:
   This means when the following command is issued:

   ```
   /START-PRINTER-OUTPUT UNIT=XXX
   ```

   The cluster administrator may start the printer on H1 even if the printer is not connected to H1.

2. XXX is not defined in config:
   This means when the following command is issued:

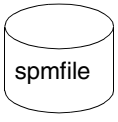
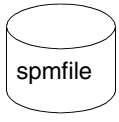
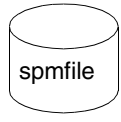
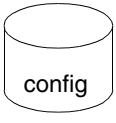
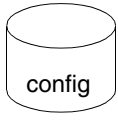
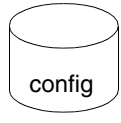
   ```
   /START-PRINTER-OUTPUT UNIT=XXX
   ```

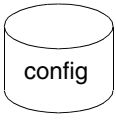
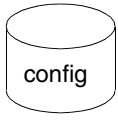
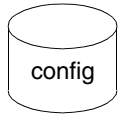
   If XXX is defined in the SPOOL parameter file of H1, the cluster or SPOOL administrator can start the printer by using this command. But if XXX is not defined, a warning is output that printer XXX does not exist.

Any printer which is entered only in the SPOOL parameter file can only print “local” jobs and can only be started by the SPOOL administrator of the host to which it is connected.

The SPOOL administrator on any host can decide whether to modify or remove a device in his/her SPOOL parameter file by means of SPSERVE. If the printer is defined in the configuration file, the information is sent to all hosts in the cluster. But the printer remains unchanged in the configuration file.

This will now be illustrated in association with the previous configuration scenario and taken a stage further:

Host H1 = D000ZE01	Host H2 = D000ZE02	Host H3 = D000ZE03
DVC2 is to be removed from the spmfile in H2 and in H3, leaving only the following printers present there.		
	//REMOVE-SP-DEV DVC2	//REMOVE-SP-DEV DVC2
 DVC1 DVC2 DVC3 DVC4	 DVC1 DVC5	 DVC3 DVC6
But the following Dprint objects are still entered in config.		
 D000ZE01 D000ZE02 D000ZE03 S2 S3 D1(H2,DVC1) D2(H2,DVC2) D5(H2,DVC5) D3(H3,DVC3) D6(H3,DVC6)	 D000ZE01 D000ZE02 D000ZE03 S2 S3 D1(H2,DVC1) D2(H2,DVC2) D5(H2,DVC5) D3(H3,DVC3) D6(H3,DVC6)	 D000ZE01 D000ZE02 D000ZE03 S2 S3 D1(H2,DVC1) D2(H2,DVC2) D5(H2,DVC5) D3(H3,DVC3) D6(H3,DVC6)
Since printers are now also defined in the configuration file. printers can be started by the cluster administrator even if they are not connected to the cluster administrator's host. But no printer can be started unless it has an entry in the SPOOL parameter file.		
/START-PRINTER-OUTPUT UNIT = D1 or UNIT = D5 or UNIT = D6 or UNIT = D3		

Host H1 = D000ZE01	**Host H2 = D000ZE02**	**Host H3 = D000ZE03**
The following information from the configuration is now output by means of SHOW-DPRINT-PRINTERS or the corresponding SPSERVE statement.		
	/START-SPSERVE //OPEN-PARAMETER-FILE PARAMETER-FILE= *DPRINT-PARAMETERS	/START-SPSERVE //OPEN-PARAMETER-FILE PARAMETER-FILE= *DPRINT-PARAMETERS
/SHOW-DPRINT-PRINTERS D1 D2 D3 D5 D6	/SHOW-DPRINT-PRINTERS D1 D2 D3 D5 D6	/SHOW-DPRINT-PRINTERS D1 D2 D3 D5 D6
The cluster administrator can decide whether (s)he wants to modify or remove a device in his/her configuration file by means of SPSERVE. The actions performed are then copied from the configuration file in the master host to the slave hosts. For example, after DVC2 has been removed the configuration file contains the following entries.		
//REMOVE-DPRINT-PRINTER D2		
 D000ZE01 D000ZE02 D000ZE03 D1(H2,DVC1) D5(H2,DVC5) D3(H3,DVC3) D6(H3,DVC6) S2 S3	 D000ZE01 D000ZE02 D000ZE03 D1(H2,DVC1) D5(H2,DVC5) D3(H3,DVC3) D6(H3,DVC6) S2 S3	 D000ZE01 D000ZE02 D000ZE03 D1(H2,DVC1) D5(H2,DVC5) D3(H3,DVC3) D6(H3,DVC6) S2 S3

Modifying a cluster configuration

The modification of a cluster configuration means either adding a new host to the cluster or removing a host from the cluster.

Adding a host to an existing cluster configuration

1. The hosts H1, H2 and H3 are defined in a cluster configuration:
2. If host H4 is to be included in the cluster, H4 must first start Dprint and define itself and host H1 (=cluster administrator) in its configuration:

   ```
   //ADD-DPRINT-HOST HOST-NAME=D000ZE01
   //ADD-DPRINT-HOST HOST-NAME=D000ZE04

   /START-SUBSYSTEM DPRINTSV
   ```

   The host of the cluster administrator must similarly define H4 in its configuration using SPSERVE.

   ```
   //ADD-DPRINT-HOST HOST-NAME=H4
   //ADD-DPRINT-SERVER SERVER-NAME=S4,HOST-NAME=D000ZE04
   ```

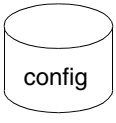
3. The host H4 can now be included in the cluster. This request can be made only by the cluster administrator, i.e. on host H1.

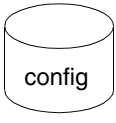
   ```
   /MODIFY-DPRINT-CLUSTER HOST-NAME=D000ZE04,ACTION=*ADD
   ```

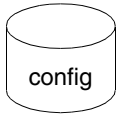
   The configuration objects of H1, H2 and H3 are now transferred to H4 and are available for the entire cluster. The configuration files of H2, H3 and H4 are overwritten.

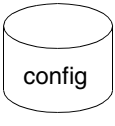
4. The cluster comprises the hosts H1, H2, H3 and H4. The cluster administrator is defined on H1. The configuration contains objects of H1, H2, H3 and H4.

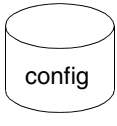
Removing a host from a cluster configuration

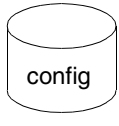
<table>
<tr><td colspan="3">The cluster administrator can decide whether to remove or delete a host from the cluster: for example, the cluster administrator can remove all objects of H3 from the configuration of the master host, and of the other hosts in the cluster. All objects which do not belong to H3 are then removed from the configuration of H3.</td></tr>
<tr><td>/MOD-DPRINT-CLUSTER
D000ZE03,*DELETE</td><td></td><td></td></tr>
<tr><td> 

D000ZE01
D000ZE02
S2
D1(H2,DVC1)
D5(H2,DVC5)</td><td> 

D000ZE01
D000ZE02
S2
D1(H2,DVC1)
D5(H2,DVC5)</td><td> 

D000ZE03
S3
D3(H3,DVC3)
D6(H3,DVC6)</td></tr>
<tr><td colspan="3">The SPOOL administrator can finally decide to stop Dprint on a host. This does not make any changes to the entries in the configuration file, however.</td></tr>
<tr><td></td><td>/STOP-SU DPRINTSV</td><td></td></tr>
<tr><td> 

D000ZE01
D000ZE02
S2
D1(H2,DVC1)
D5(H2,DVC5)</td><td> 

D000ZE01
D000ZE02
S2
D1(H2,DVC1)
D5(H2,DVC5)</td><td> 

D000ZE03
S3
D3(H3,DVC3)
D6(H3,DVC6)</td></tr>
</table>

Notes

– There are two possible ways in which the SPOOL administrator of a host which is defined in a cluster configuration can be made unavailable for Dprint.

  1. Temporary disconnection:
     If the SPOOL administrator simply unloads the Dprint subsystems on his/her host, the host remains part of the cluster configuration. The configuration file remains unchanged between two Dprint sessions. The next time Dprint is loaded, the host is automatically restored to the cluster configuration.

  2. Permanent disconnection:
     If a SPOOL administrator no longer wishes to remain in a cluster configuration, (s)he must instruct the cluster administrator to remove his/her host from the cluster. Just as SPOOL administrators cannot include themselves in a cluster, they also cannot remove themselves from a cluster.

When the host has been disconnected from the cluster, the configuration file of the host is cleaned up (if DPRINTCM is loaded or when DPRINTCM is next loaded). The objects of the removed host are no longer available for the cluster.

A temporary disconnection requires no modification of the cluster configuration. A permanent disconnection, however, does not require Dprint to be unloaded.

– The removal of a host from a cluster configuration, i.e. permanent disconnection, is only advisable if no further jobs of the following types are available:

  1. Jobs which have been issued from the host in question and are directed at a different host in the cluster.
  2. Jobs which have been issued from a different host in the cluster and are directed at the host in question.

  In this situation the cluster administrator has the facility to stop Dprint jobs which are coming from, or going to, the host that is to be removed. This is done by specifying the operand ACTION=*DETACH in the /MODIFY-DPRINT-CLUSTER command.

  When a host is removed from a cluster without this command having previously been issued, the Dprint jobs will be continued. However, no further updating will be performed between client and server.

Deleting a cluster

The deletion of a cluster configuration is explained with the aid of an example.

1. The hosts H1, H2 and H3 are defined in a cluster configuration:
2. If the cluster administrator on H1 wishes to delete the cluster configuration, the other hosts in the cluster will be automatically instructed by H1 to modify their own configuration, i.e. to remove the objects of the other hosts.

   ```
   /DELETE-DPRINT-CLUSTER
   ```

3. The cluster no longer exists, and there is also no longer a cluster administrator. Each configuration now only contains those objects which belong to the respective host.

With regard to the deletion of a cluster, the same Notes are applicable as for the modification of a cluster; see above.

6.2 Interoperability between BS2000 clusters

As already described in section “Cluster model” on page 17, both a management area for the Dprint objects and also delimitation of the user’s single-system image are defined by means of a cluster.

Dprint also supports print functionality beyond the bounds of the cluster, whilst offering visual control facilities for the user.

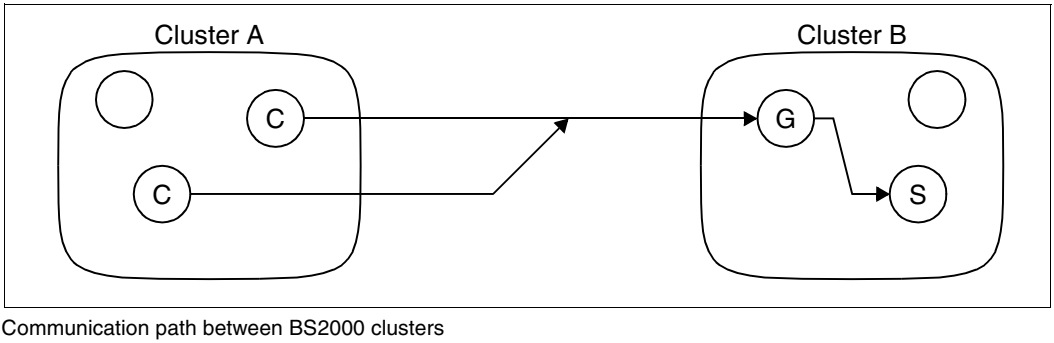
This section describes in detail the interoperability between BS2000 Dprint clusters. Firstly, the global topology and implementation are explained. This is followed by a description of the tasks and functions for the administration and also of the functionality for the user.

6.2.1 Arrangement and communication paths of the clusters

The functionality is based on the client/server concept. The client can issue certain requests to a remote cluster which acts as a server and has several “external” printers (printers which are not known in the configuration of the client). The Dprint is issued from one cluster and executed by another. For this situation, a specific destination cluster (remote cluster) can be specified by way of a command operand.

When a print request has been sent to a remote cluster, it “belongs” to this cluster and is thereafter simply “known” on the cluster issuing the job. If the user subsequently requires information about the print job, this must be requested from the remote cluster. This is made possible by specifying the name of the remote cluster in the SHOW-PRINT-JOB-STATUS command.

A suitably adapted configuration is required for cluster interoperability. To facilitate comprehension of the Dprint configuration, the path utilized by Dprint to support communication between the clusters is illustrated.



Communication path between BS2000 clusters

In order for it to be available for an external client, a cluster requires a special host, known as a gateway (host G from cluster B in the above example). The purpose of the gateway host is to find the appropriate server for the external request within its cluster. So a direct connection exists between the clients and the gateway of another cluster, while there is never a direct connection between a client and an external server which is not a gateway.

In order to permit communication between a client and a cluster gateway, from the viewpoint of the Dprint configuration both clusters must “open a door” allowing the exit from one cluster and the entry into another.

The door on the client cluster (cluster A in the above example) is opened by defining an object “remote cluster“ in the Dprint configuration. This object defines the network address of the gateway of the “remote cluster“.

The door on the server cluster (cluster B in the above example) is opened by defining a host as the gateway for external requests. Several gateways (on different hosts) can be defined in one cluster. As far as the external clients are concerned, however, these gateways are regarded as different clusters because different “remote cluster“ objects must be defined.

If both definitions match (i.e. if the address of the remote cluster corresponds to a cluster gateway), the request can extend beyond the boundaries of the cluster.

There is no Dprint organizational structure which is superordinate to a cluster (such as a group of clusters, for example). Between Dprint clusters, information can be made available or distributed only to a limited extent since this would require an excessively complex, additional management capability to deal with this information on a higher level than a cluster. This has certain consequences both for Dprint administrators and also for end users.

In its initial level of implementation Dprint does not support the administration as regards maintaining the consistency of object references which transcend cluster boundaries. If, for example, an administrator changes the gateway of his/her cluster (the server door), the “remote cluster” object (the client door) is not automatically updated. The correspondence must be maintained by means of agreement between the cluster administrators involved.

The consequence of this for the end user is that once a request has been issued to the external cluster no information in respect of this request exists any longer in the local Dprint system. The local Dprint cluster retains no recollection of the existence of any such print job. When a user issues a request to a remote cluster, the user must be aware of the fact that the request will be executed in a different Dprint system. The effect of this is the same as if Dprint had simply transported the request to the destination cluster.

So, for example, print jobs which are processed in a remote cluster will not be displayed with the SHOW-PRINT-JOB-STATUS command. But users can monitor the progress of their print job by specifying the remote cluster explicitly by way of the CLUSTER-NAME operand (see page 209).

6.2.2 Cluster management: tasks, functions and examples

No management actions are permitted between clusters, i.e. the privileges of the SPOOL administrator and cluster administrator do not extend beyond the boundaries of a cluster. The functions which they can apply to an external cluster are those of the nonprivileged user.

SPOOL administrator and cluster administrator are involved in the configuration of Dprint in that they enable clusters to work with external clusters, and manage Dprint print jobs which come from an external cluster.

6.2.2.1 Dprint configuration

Definition of the remote cluster

In order to allow a request to be issued to a remote cluster, the cluster administrator must define a “remote cluster” object in his/her Dprint configuration. This can be done by using the SPSERVE statement ADD-DPRINT-REMOTE-CLUSTER. In this case the operands CLUSTER-NAME, TYPE, NETWORK-ADDRESS and ACCESS-TO-CLUSTER which are described below can be specified.

CLUSTER-NAME:
Logical name of the remote cluster, which must be unique within a cluster configuration. The administrator has a free choice of name independent of the configuration of the remote cluster.

TYPE:
Specifies the type of the cluster, *BS2000 for BS2000 clusters.

NETWORK-ADDRESS:
Specifies the BCAM address of the gateway host of the remote cluster. This information must correspond to the definition of the gateway on the destination cluster. Dprint does not check for correspondence between the definition of the “remote cluster” objects and the definition of the gateways.

ACCESS-TO-CLUSTER:
Denotes an access list for use in checking whether a user is permitted to send some requests to the remote cluster. Note that two other access lists are also involved in respect of requests between clusters.

Using the access list which is associated with the gateway definition, the gateway checks whether an external client is authorized for entry into the cluster.

The access list which is associated with the server (both are defined in the remote cluster) is also used when requests come from an external client.

The request is accepted if the three following conditions are satisfied:

1. The client cluster authorizes the user to send requests to the specified remote cluster.
2. The gateway of the remote cluster allows this user to issue requests.
3. The server of the remote cluster permits processing of the request which has been issued by this user.

Examples

The following SPSERVE statements are issued.

```
//ADD-DPRINT-REMOTE-CLUSTER CLUSTER-NAME=RZ2,TYPE=*BS2000,NET-ADD=D000ZE00,
                            ACCESS-TO-CLUS=*ALL-USERS
```

This defines a remote cluster with the name RZ2. The BCAM address of its gateway is D000ZE00. Since *ALL-USERS is specified for the access list, any user (of the client cluster) is allowed to send requests to this cluster (e.g. using the command PRINT-DOCUMENT ...,CLUSTER=RZ2).

```
//ADD-DPRINT-REMOTE-CLUSTER CLUSTER-NAME=RZ3,TYPE=*BS2000,NET-ADD=D000ZE00,
                            ACCESS-TO-CLUS=GROUP3
```

This defines a remote cluster with the name RZ3. Access to this cluster is controlled by way of the access list having the name GROUP3. Only users which are permitted by GROUP3 can issue commands for cluster RZ3, such as PRINT-DOCUMENT ...,CLUSTER=RZ3 for example.

Definition of the gateway

In order to allow the entry of external requests into his/her cluster, the cluster administrator must define at least one gateway in the Dprint configuration. Each host in a cluster can act as a gateway, but the DPRINTCL subsystem must be loaded on this host. When selecting the host, the cluster administrator must take the following aspects into consideration.

Connections:
A network connection must exist between each (potential) external client and the gateway. The gateway should support a large number of connections with the maximum possible efficiency.

Disk storage space:
The file to be printed is first stored in the gateway (under the user ID SYSDPRNT) before it is sent to the server. The space required should therefore be taken into consideration.

Attached printers:
If a large number of printers is attached to the gateway, this can also be a server for the external requests. In this way, data transfers from the cluster gateway to the desired server are avoided.

Subsystem:
The DPRINTCL subsystem must be loaded on the gateway.

CPU performance:
For external requests, a certain amount of processing must be performed by the cluster gateway. The minimum this involves is forwarding the request to the server in question. However, if possible, the entire request is processed by the cluster gateway, e.g. the SHOW-PRINT-JOB-STATUS command.

The definition of a cluster gateway is achieved by means of the SPSERVE statement ADD-DPRINT-HOST or MODIFY-DPRINT-HOST, in which the operand ACCESS-FROM-CLUSTERS can be used to specify that the host is a gateway.

It is possible to associate an access control with such a host; this control is used by Dprint in checking whether an external user is appropriately authorized to send requests.

This access list is used only for requests which come from an external client. Therefore it should only contain certain user IDs and hosts which do not constitute part of the local cluster.

Examples

The following SPSERVE statements are issued.

```
//ADD-DPRINT-HOST HOST-NAME=DXXXZEXX,ACCESS-FROM-CLUSTERS=*ALL-USERS
```

This defines a new host in the Dprint configuration which acts as gateway for the local cluster. Any external user can transfer requests via this gateway since there is no access control associated with this host.

Using the SPSERVE statement //ADD-DPRINT-HOST, it is now possible to define a new host. The /MODIFY-DPRINT-CLUSTER command must be used in order to include this new host in the Dprint cluster.

```
//MODIFY-DPRINT-HOST HOST-NAME=DYYYZEYY,ACCESS-FROM-CLUSTERS=
                     *BY-ACC-C(ACC-CONTROL-NAME=GROUP1)
```

The function of cluster gateway is assigned to the existing host DYYYZEYY. The access list with the name GROUP1 is used for defining which users are allowed to transfer requests via this gateway. If the gateway selects a server for an external request, the access lists which are associated with the server in the configuration file are also checked. There is no point in granting an external user entry to the local cluster via the gateway access list if none of the servers accepts this user via the server access list.

Configuration of network and file transfer

Network and file transfer must be configured in such a way as to permit communication between all potential external client hosts and their destination gateways. No direct communication between a client and an external server is necessary.

6.2.2.2 Management of print jobs

This section illustrates which functions of Dprint are provided for the management of print jobs which come from an external cluster. Certain Dprint parameters and processing operations are illustrated with regard to interoperability between BS2000 clusters.

Defining the environment for the print jobs

The cluster gateway defines the environment which is used for the external requests. The environment is formed from the Dprint configuration, the SPOOL parameters (forms, character sets and general parameters) and the print resource files (PRFILEs and SPSLIBs).

When defining the environment for this host the following aspects must therefore be taken into consideration.

1. The DPRINTCL subsystem must be loaded.
2. A Dprint destination must be defined in the SPOOL parameter file as the standard destination for the print jobs started with /PRINT-DOCUMENT. Printers which are reserved for SPOOL cannot be accessed by an external client.
3. The SPOOL forms and SPOOL character sets must be defined in such a way that they contain everything that could be requested by print jobs which are transferred by external clients.
4. The files with the standard resources (PRFILE and SYSPRT.SPS.021) must be available under the user ID $SYSSPOOL. They must contain all the resources that could be required by an external print job.

Selecting the print jobs

For each printer, the administrator can specify which print jobs that come from an external client are to be processed and which are not. This can be done by using the HOST-NAME operand of the commands START-PRINTER-OUTPUT and MODIFY-PRINTER-OUTPUT because an external client is referenced by way of its host name and not by way of the cluster. The values described in the following can be specified for HOST-NAME.

HOST-NAME=*ALL:
Specifies that all print jobs can be processed regardless of their origin.

HOST-NAME=*LOCAL-CLUSTER:
Specifies that only print jobs which have been created by clients in the local cluster will be processed.

HOST-NAME=name / list of names:
Specifies that print jobs from a particular origin will be processed. The creation location of the permitted print jobs is specified by way of the host name. These hosts may be located in the local cluster or they may be external clients.

HOST-NAME=*EXCEPT(name / list of names):
Specifies that print jobs from a particular origin will not be processed. The creation location of the rejected print jobs is specified by way of the host name. These hosts may be located in the local cluster or they may be external clients.

Examples

The following commands are issued.

```
/START-PRINTER-OUTPUT ANY-LOCAL-PRINTER(NAME=P1)
```

Starts the Dprint printer P1. This printer can be used for processing jobs which come from any client hosts.

```
/START-PRINTER-OUTPUT ANY-LOCAL-PRINTER(NAME=P1,HOST-NAME=*LOCAL-CLUSTER)
```

Starts the Dprint printer P1. This printer cannot be used for processing jobs which come from external clients.

Job information

The administrator of a host/cluster can request information about print jobs which have been transferred from an external cluster. This can be done by using the SHOW-PRINT-JOB-STATUS command. It is even possible in the HOST-NAME operand to specify either a client which is defined in the local Dprint configuration, or the name of an external client.

The SHOW-PRINT-JOB-ATTRIBUTES command can similarly be used by the administrator in order to display the attributes of a particular print job, regardless of whether or not the print job comes from an external client.

Examples

The following commands are issued.

```
/SHOW-PRINT-JOB-STATUS SELECT=(SERVER-NAME=*ALL,HOST-NAME=D111ZE11)
```

The command can be used by a cluster administrator in order to list all the print jobs which have been issued by the host D111ZE11. This host can also be an external client (i.e. not defined in the configuration).

```
/SHOW-PRINT-JOB-STATUS SELECT=(USERID=USER1)
```

When the command is used by a cluster administrator, all print jobs which are processed on the local cluster and which have been created by the user ID USER1 are listed.

When the command is used by a SPOOL administrator, then all print jobs which are processed on the local server and which have been created by the user ID USER1 are listed.

In the case of both user groups the list can contain both print jobs which come from the local cluster and also print jobs which come from external clusters, presupposing that the user ID USER1 exists on both hosts.

Accounting

On the server host an accounting record is created for print jobs which have been issued by an external client. This accounting record contains the host name and the user ID, from which the PRINT-DOCUMENT command was issued. The user ID may be located on the local cluster or on an external cluster.

No special information is stored in the accounting record to indicate whether the print job was “external”. Although this is of no relevance to accounting, it can nevertheless be ascertained by checking whether the host on which the print job was created belongs to the local Dprint cluster. More detailed information on the subject of accounting can be found in chapter “Accounting functions” on page 341.

6.3 Interoperability between BS2000 systems, UNIX systems and Windows systems

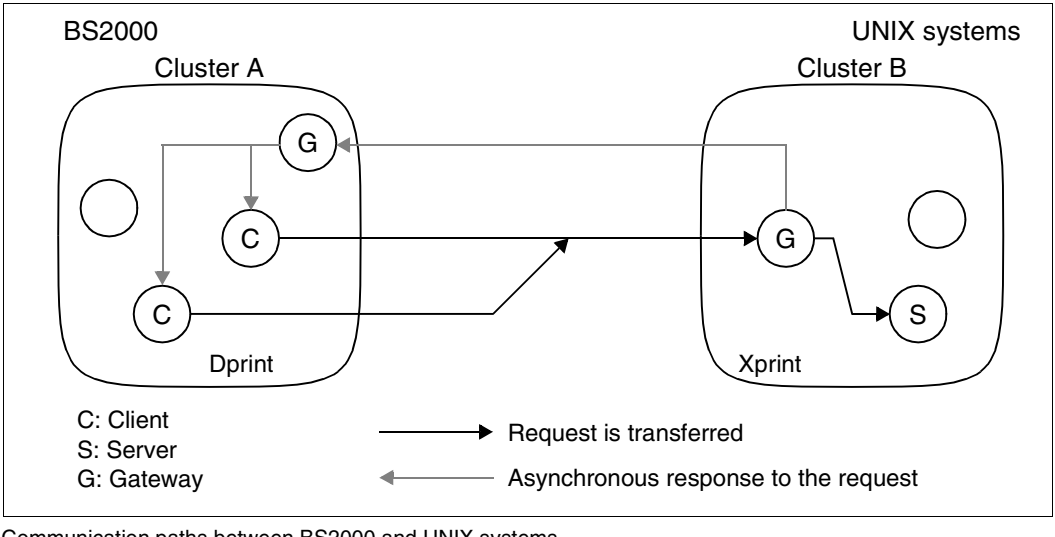
Print interoperability between BS2000 clusters, UNIX systems based clusters and Windows clusters is implemented by means of the gateways between the clusters. Interoperability with UNIX systems is based on the interchange of structures which are packed in a proprietary protocol. This is offered through the ISO-DPA Class 1 conformance with extensions. The extensions comprise features which are already supported by the two spoolers BS2000-SPOOL and Xprint. Interoperability with Windows is based on the BSD-LPD.

The following sections define precisely how each cluster must be defined for interoperability and which limited BS2000 commands and operands the user may use. Firstly the global approach and the communications paths of the clusters with which the print interoperability between BS2000, UNIX and Windows systems is enabled are illustrated. Then information is provided about the format attribute of the documents, about the functionality, definition and selection of the filters, the supplied standard system filters and the activation of customer filters via system exit 093.

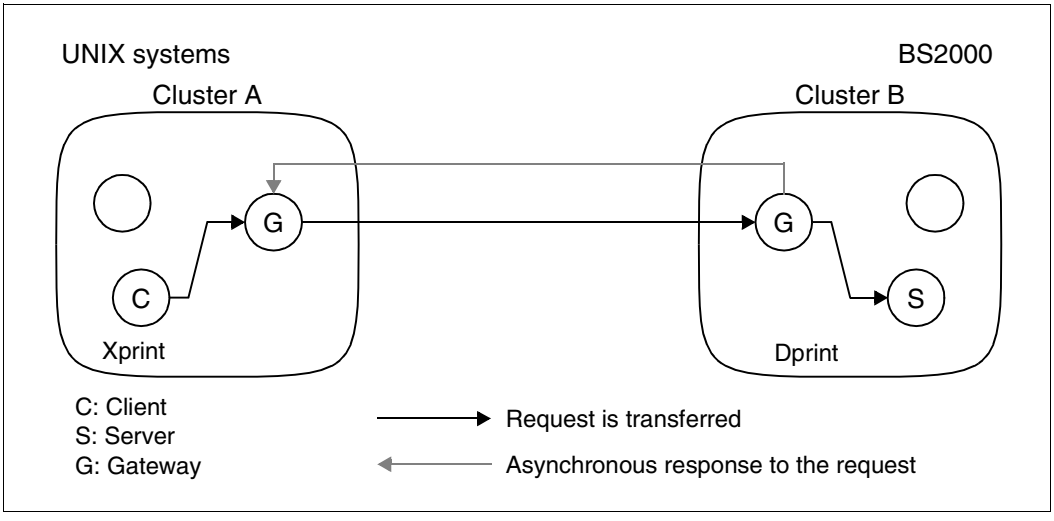
Global topology and communication paths of the clusters

Heterogeneous interoperability between clusters enable Dprint to communicate with Xprint and Wprint. In this way it is possible for users to distribute their print operations between UNIX systems, Windows systems and BS2000 systems.

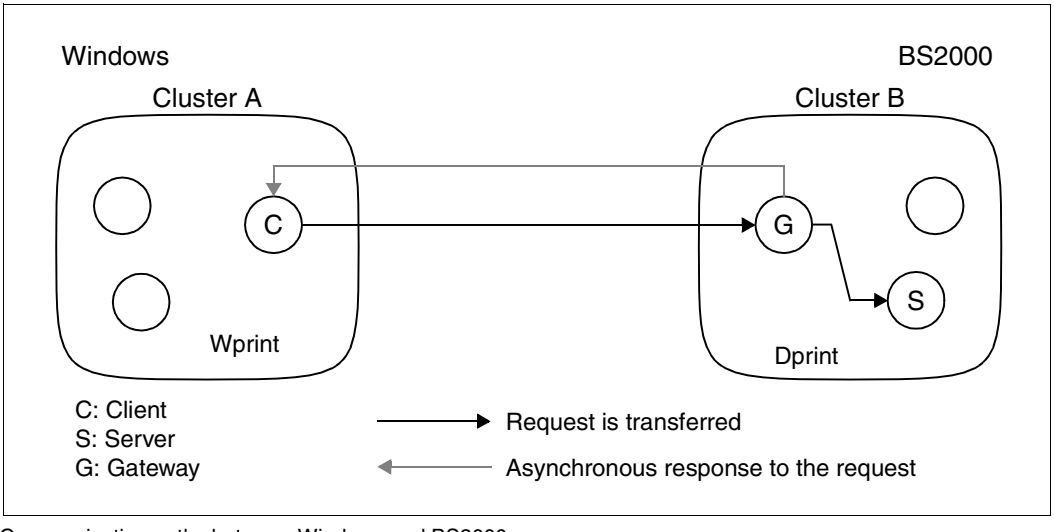
The communication between the clusters is based on the gateways between the clusters.



Communication paths between BS2000 and UNIX systems



Communication paths between UNIX systems and BS2000



Communication paths between Windows and BS2000

The general concept and the approach are similar to the case of interoperability between BS2000 clusters (see above). The same management rules (no management between clusters) and the resource validity rules (no transfer of resources between clusters) are applicable. The gateway and communication mechanism is somewhat different, however:

– In the case of interoperability from BS2000 towards UNIX systems, a BS2000 client transfers the request directly to the UNIX system based gateway without passing via a BS2000 gateway. A BS2000 gateway is nevertheless still required in order to enable the UNIX system based gateway to respond asynchronously to the requests of the BS2000 client.

– In the case of interoperability from UNIX systems towards BS2000, a UNIX system based client transfers its requests to the UNIX system based gateway which in turn transfers them to the BS2000 gateway, i.e. no direct access to the BS2000 gateway is performed.

– In the case of interoperability from Windows towards BS2000, a Windows-Client transfers its requests directly to the BS2000-BSD-LPD gateway which in turn transfers them to the BS2000 gateway.

But there is a somewhat more serious difference, compared to interoperability between BS2000 clusters, in connection with printing between heterogeneous clusters (e.g. BS2000/UNIX systems) because the original document to be printed cannot in most cases be processed unchanged by the destination server. Several formatting changes must first be performed in order to bring the document into a printable format which can be accepted by the destination server. Thus, for example, a BS2000 file containing text data in EBCDIC code and IBM printer control characters cannot be printed by Xprint and must therefore be converted.

For the conversion there exists a general interoperability mechanism which allows different document formats to be switched and recognized between heterogeneous clusters. This mechanism is based on the document format of the ISO DPA job attributes. The attributes are specified on the BS2000 side by means of the operands DOCUMENT-FORMAT and FORMAT-NAME of the PRINT-DOCUMENT command, and on the Xprint side by way of the specification '-ct' in the command 'xpadd -job'. This enables each spooler to check the print request and to select and activate the corresponding document formatting process. These document formatting processes are known as “standard system filters” and “customer filters”.

In order to permit the distributed printing of text and printer-language-dependent documents and to be able to make more printer types available to heterogeneous clusters (e.g. LP65 printer available for Xprint via Dprint), standard system filters are supplied with the DPRINTCL subsystem. New standard system filters may be released in conjunction with a new version of the DPRINTCL subsystem.

In order to support customer wishes and different document formats which have been created by special applications or print services, it is also possible to define customer-developed customer filters via system exit 093.

For each document formatting operation, system exit 093 is called by Dprint in order to execute any customer filters present. If system exit 093 is not loaded or if its return code demands the standard system filter, the corresponding standard system filter which is defined in the DPRINTCL subsystem is executed. This mechanism allows users, depending on their requirements, to extend their own set of available filters without having to wait for a new version of DPRINTCL.

Since there is no avoiding the necessity of converting print operations between heterogeneous clusters, such requests are rejected by Dprint unless the DPRINTCL subsystem is loaded. Two situations are distinguished here:

– For interoperability from BS2000 to UNIX systems the DPRINTCL subsystem must be loaded on the client host which wishes to transfer print jobs to a Xprint domain.
– For interoperability from UNIX systems to BS2000 the DPRINTCL subsystem must be loaded on the BS2000 gateway.
– For interoperability from Windows to BS2000 the DPRINTCL subsystem must be loaded on the BS2000 gateway, and the BSD-LPD gateway must be loaded and started.

For further information on the definition of document formats and filter mechanisms, refer to the next section.

Dprint does not maintain the consistency of object references which transcend cluster boundaries. If, for example, an administrator changes the gateway of his/her cluster (the server door), then the “remote cluster” object (the client door) is not automatically updated. The correspondence must be maintained by means of agreement between the cluster administrators involved. The consequence of this for the end user is that once a request has been issued to the external cluster no information in respect of this request exists any longer in the local Dprint cluster.

Within the scope of interoperability between BS2000 and UNIX systems, the following usage models are supported:

– BS2000/Dprint → Xprint → printer attached to a UNIX system
– Xprint → BS2000/Dprint/RSO → RSO printer
– Xprint → BS2000/Dprint/SPOOL → local printer
– Xprint → BS2000/Dprint/SPS → APA printer

Within the scope of interoperability between BS2000 and Windows, the following usage models are supported:

– Wprint → BS2000/Dprint/RSO → RSO printer
– Wprint → BS2000/Dprint/SPOOL → local printer
– Wprint → BS2000/Dprint/SPS → APA printer

6.3.1 BCAM definitions

For interoperability with a UNIX system based client host

In the case of interoperability with a UNIX system based host which is connected to an ISO-LAN, BCAM definitions (via /BCMAP commands) are required for defining remote UNIX applications. Further information can be found in the “BCAM” manual.

The following must be defined depending on whether the BS2000 host is a client host, a server host or a gateway host:

BS2000 as a client host

Each UNIX system based gateway application must be defined with the following /BCMAP command:

```
/BCMAP FUNCT=DEFINE, SUBFUNCT=GLOBAL,
       NAME=(OSI, X'com_srv'),
       ES=remote_hostname, PTSEL-I=(appl_len,C'appl')
```

Explanation

com_srv: OSI name of the application, consisting of:

```
  t5          t4           t3   t2
appl.remote_hostname.GW.Spool
```

remote_hostname: BCAM name of the partner system. This corresponds to the field NETWORK-ADDRESS.

appl: Transport selection for the gateway application. This corresponds to the field GATEWAY-NAME and is limited to the first 30 characters.

appl_len: Length of the application name (up to 30 characters).

BS2000 as a server host

No /BCMAP command is required.

BS2000 as a gateway host

In order for queries from the UNIX system based cluster to be received, the Dprint server application must be defined with the following /BCMAP commands:

```
/BCMAP FUNCT=DEFINE, SUBFUNCT=LOCAL,
       APPL=(OSI, X'dp_srv'),
       TSEL-I=(8,C'SDBSISO ')
```

Explanation

dp_srv: OSI name of the Dprint server application used with /BCMAP, consisting of:

```
  t5          t4           t3   t2
SDBSISO.local_hostname.SV.Spool
```

local_hostname: BCAM name of the BS2000 gateway host. This corresponds to the field HOME-GATEWAY-ADDRESS.

Each UNIX system based gateway application must be defined with the following /BCMAP commands:

```
/BCMAP FUNCT=DEFINE, SUBFUNCT=GLOBAL,
       NAME=(OSI, X'com_srv'),
       ES=remote_hostname,
       PTSEL-I=(appl_len,C'appl')
```

Explanation

com_srv: OSI name of the application, consisting of:

```
  t5          t4           t3   t2
appl.remote_hostname.GW.Spool
```

remote_hostname: BCAM name of the partner system. This corresponds to the field NETWORK-ADDRESS.

appl: Transport selection for the gateway application. This corresponds to the field GATEWAY-NAME and is limited to the first 30 characters.

appl_len: Length of the application name (up to 30 characters).

In the case of interoperability with a UNIX system based host connected to a TCP/IP LAN, no /BCMAP command is needed. SOCKETS applications are addressed here via their SOCKET port names.

Notes

1. For /BCMAP commands, each component of the OSI name must be separated by the value x'00'.
2. /BCMAP commands can only be used by the system and network administrators.
3. The BCAM definition functions must be activated with FUNCT=INIT and terminated with FUNCT=TERM.
4. /BCMAP are permitted in the SOF (START OPTION FILE).

Refer to the “TRANSDATA Network Management” manual for further information.

Examples

1. BCAM definitions for the UNIX system based cluster:

```
/BCMAP FUNCT=DEFINE, SUBFUNCT=GLOBAL,
       NAME=(OSI,X'A2A38189A29693968300E2E7F100C7E600E297969693'),
       ES=SX1,PTSEL-I=(8,'GTWISO ')
```

2. BCAM definitions for a BS2000 gateway

```
/BCMAP FUNCT=DEFINE, SUBFUNCT=LOCAL,
       APPL=(OSI,X'E2C4C2E2C9E2D600C2E2F200E2E500E297969693'),
       TSEL-I=(8,'SDBSISO ')
```

6.3.2 Document format and filter mechanism

As described above, printing between heterogeneous cluster requires filtering of the documents. For this to take place, the original document must be identified by way of the ISO DPA document format attribute. The attributes are specified on the BS2000 side by means of the operands DOCUMENT-FORMAT and FORMAT-NAME of the PRINT-DOCUMENT command. On the Xprint side by way of the specification '-ct' in the command 'xpadd -job'. On the Wprint side by means of the print queue attributes, as defined in the “context_type” file of the BSD-LPD gateway.

Printing between heterogeneous cluster is recognized if,

– for BS2000 print requests, the target cluster is an Xprint domain
– for Wprint print requests, the target cluster is a BS2000 cluster
– for Xprint print requests in the print queue, a BS2000 printer is addressed.

Functionality of the filters

In order to provide the Dprint interoperability mechanism with the necessary flexibility and adaptability characteristics, the filters must fulfill a dual functionality:

– modifying and checking the print operation parameters
– performing data and file conversion

Modifying and checking the print operation parameters (first filter call)

Each filter has the capability to check and modify the parameters of the print requests. This means that the filter can decide which parameters it supports, ignores and/or rejects. To this end the filter receives, via the $DPFL parameter list amongst other means the direction of the print request (from/to UNIX systems, from Wprint via a BSD-LPD gateway) and a image of the print job which describes the parameter values of the print job (see the “SPCONV” manual).

In the case of printing between heterogeneous clusters, the possible parameter specifications for the print request are restricted to the printer capabilities which are shared by both partner domains. It can happen, therefore, that print requests submitted to heterogeneous clusters are rejected immediately before a filter is called if certain parameter values are specified.

The specification of some other parameter values could similarly lead to the print job being rejected, but this happens after the filter has been called. Here the filter has the capability, regardless of the given image of the print request, to execute a special process with which the invalid parameter values can be handled and corrected to enable acceptance of the print job. This “post-filter” checking is carried out independent of which filter has been selected.

In the case of output filters (e.g. from BS2000 to UNIX systems) this filtering of the print request parameters is carried out on the BS2000 client host. This is done under the control of the user task (e.g. during checking of the PRINT-DOCUMENT command) before the print request is sent to the UNIX system based gateway.

Each output filter must define the output CCSNAME (field in the $DPFL interface parameter list, which defines the CCSNAME of the new converted file) according to EBCDIC-DF041 (CCSNAME=EDF041) or ISO-8859-1 (CCSNAME=ISO88591). Otherwise, Dprint rejects the print request.

In the case of input filters (e.g. from UNIX systems to BS2000) the filtering of the parameters for the print request is carried out on the BS2000 gateway host. This is done under the control of a system “service” task before the print request is sent to the BS2000 server host.

Performing data and file conversion (second filter call)

After a print request has been accepted and before the document is sent to the destination server the filter is called again in order to convert the original document into a new document depending on certain parameters in the print request. This new document is then transferred. To this end the filter receives, via the $DPFL parameter list amongst other means (see also the manual „SPCONV“) the image of the original print request, the name of the new converted file which should be created by the filter, and the direction of the print request (from/to UNIX systems). By original print request, we mean the representation of the print request which was saved by Dprint before the filter was called for the first checking operation.

The filter is then responsible for performing the DMS actions (OPEN, GET, PUT, CLOSE...) required for managing both document files (original and converted), and also for performing the requested conversion.

The new converted document which is created by the filter should be defined as follows:

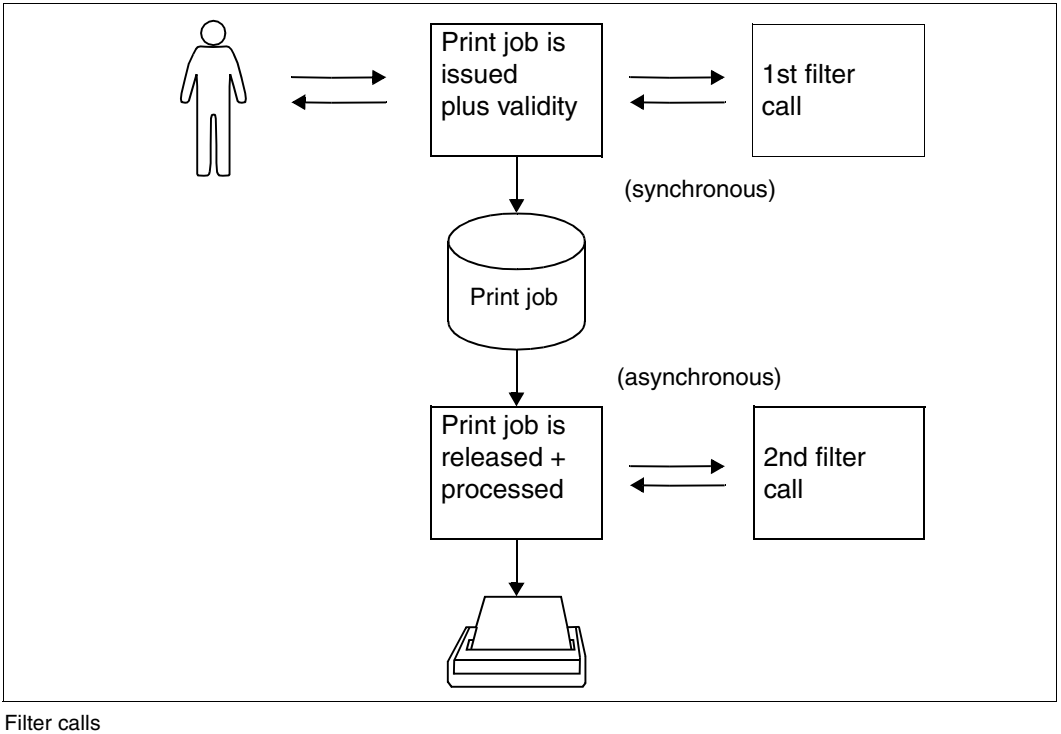
– for output filters, as a SAM file with RECFORM=U or F and with the same CCSNAME as for the first filter call
– for input filters, as a SAM file with RECFORM=V and with the CCSNAME corresponding to the possible conversion which is performed by the filter.

Other file types or formats may also be used. These are the responsibility of their authors, however.

In the case of output filters, the document conversion is performed on the BS2000 client host. This is done under the control of a system “preprocessing“ task before the converted document is sent to the UNIX system based gateway.

In the case of input filters, the document conversion is performed on the BS2000 gateway host. This is done under the control of a system “preprocessing“ task before the converted document is sent to the BS2000 server host.

The filters are responsible for sending messages (DMS errors, validity problems, ...). Only output filters can send messages to SYSOUT during their first call because they run under the control of the user task. Output filters during their second call and input filters can only send messages to the operator terminal because they run under the control of a system task.



Filter calls

Definition and selection of filters

As is explained in detail in the following sections, standard system filters are supported with the DPRINTCL subsystem, while “customer” filters are defined in system exit 093.

Because “customer” filters have a higher priority than standard system filters, each time the filter mechanism is called (i.e. for the two different filter functions) exit 093 is called by Dprint in order to perform any “customer” document filtering which may be required. A standard system document filtering is only performed if

– the subsystem for exit 093 is not loaded

– exit 093 requires this document filtering through its return code. This means that exit 093 has not performed any filtering and expects Dprint to perform it.

There is no stipulated system rule governing the selection of a “customer” filter, i.e. the system administrator implements the system exit 093 as he/she thinks most appropriate. However, the following rule, which applies to the selection of a standard system filter, can also be used as an implementation aid when employing customer filters:

– Since the effect of filters is to convert the original document format into another format, they are selected in accordance with the document format attribute value of the print request and the direction of job distribution (from a BS2000 client to an external server or from an external client to a BS2000 server).

You will find a detailed description on how to program a system exit 093 in the manual “Spool & Print - Macros and Exits”.

Depending on whether or not exit 093 is loaded, one filter can be used for the validity check (first call) and another for the file conversion (second call). However, this could result in inconsistencies. So it is possible for example for the customer filter (exit 093) to accept a print job with certain attributes. If the subsystem for exit 093 does not then remain loaded for a long time, the standard filter could be used for the second call for a print job which it would have rejected in the first call.

In order to avoid such inconsistencies, an identification mechanism must be used by the different filters. Each filter (standard or customer filter) must identify itself by entering its identification in the $DPFL parameter list when it is first called and checking this on the second call.

This identification comprises eight characters with a freely selectable format. Only the standard filters employ a specific format for their identification: SYSxxyyy (xx=filter number, yyy=version of the filter according to the DPRINTCL version). So for example the standard output filter, running with DPRINTCL V1.0E, has the identification SYS0110H.

When using this mechanism it may happen that print jobs which have already been accepted are rejected again later because the current (second) filter does not recognize the identification of the (first) filter which carried out the validity check.

Special consideration must be given to such situations when writing customer filters. For example, if a customer who has been working with standard filters for a while decides to write a new customer filter which replaces the standard output filter in order to additionally support PLAM library members, it must recognize its own identification during the first call (such as 'USRFLT01') and accept it in addition to the system standard output filter during the second call (e.g. by checking the first three letters SYS).

Examples

The following print requests are issued. The first command calls for the printout of a fully formatted HP PCL document on a printer attached to a UNIX system. The second command requires the printout of an EXCCW document on a BS2000 printer from a BS2000 printer pool.

1. /PRINT-DOCUMENT FROM-FILE=file1,DOCUMENT-FORMAT=*SPECIAL-FORMAT(
   FORMAT-NAME='HP-LASERJET'),RESOURCE-DESCRIPTION=*PAR(
   ,FORM-NAME=*UNIX-form*),TO-PRINTER=*PAR(PRINTER-NAME=
   Xprint-printer,CLUSTER-NAME=*UNIX-cluster*)

   This calls the single standard system filter (BS2000 →UNIX system).

2. xpadd -job -dr file2 -de BS2gtw!BS2pool -ct EXCCW

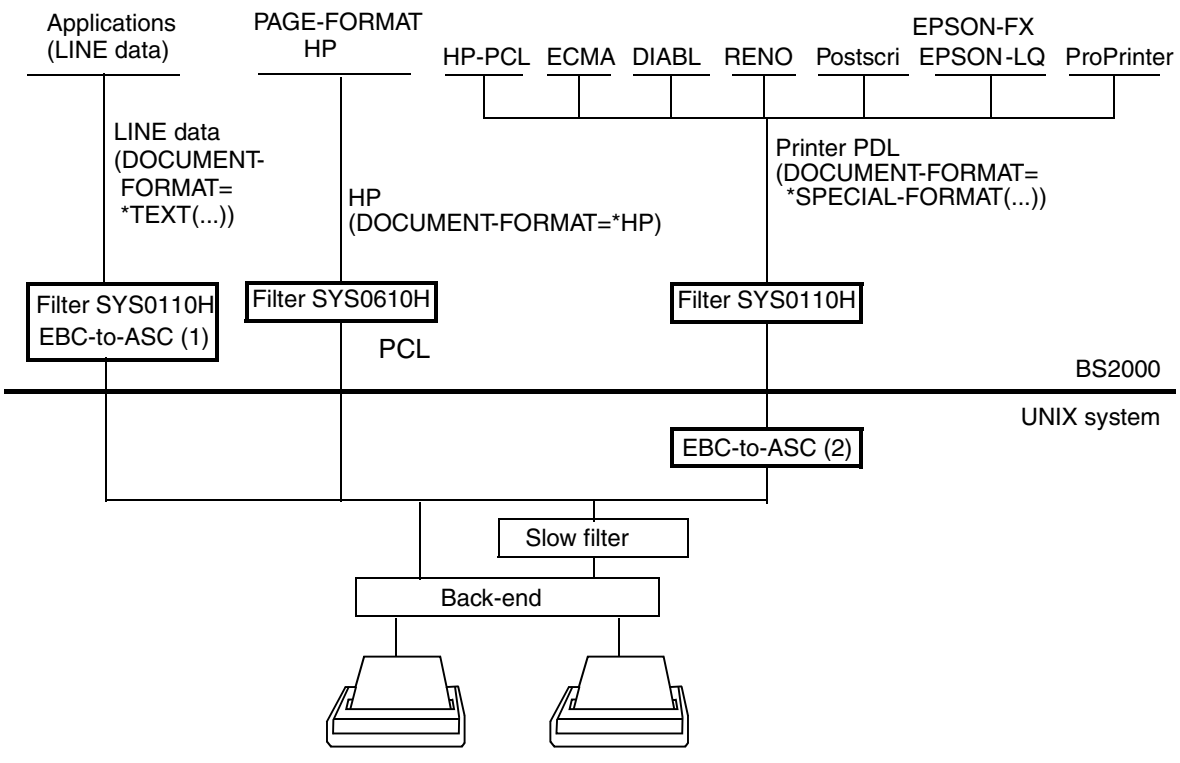
   This calls the standard system filter for processing the EXCCW document format.

6.3.3 Supplied standard system filters

The standard filters are supplied together with the DPRINTCL subsystem. These implement the conversions required to ensure basic interoperability for printing BS2000 → UNIX system and UNIX system → BS2000 and Windows → BS2000.

6.3.3.1 BS2000 to Xprint

The filters SYS0110H and HP2PCL (SYS0610H) are supplied.



(1): One-to-one character conversion EBCDIC-to-ASCII if the original document is EBCDIC- coded. Characters below X'40' are translated into space characters.

(2): EBCDIC-to-ASCII conversion, taking account of the printer PDL

System filters for interoperability BS2000 →UNIX system

SYS0110H

This filter makes available a basic conversion of the document format which be used to transfer BS2000 client print requests to a UNIX system based gateway. The following restrictions apply depending on the function call.

First call: Checking and modification of the print request

Only SAM files which are cataloged in BS2000 are supported. The distribution of a print request involving BS2000 files having a different file structure (ISAM, PAM, PLAM,...) will be rejected by the filter during validity checking of the PRINT-DOCUMENT command.

These SAM files must also be defined with a particular CCSNAME value. In the case of EBCDIC-coded files, this may either consist of blanks or begin with the characters ‘EDF’ or ‘EEH’. With ASCII-coded characters, the value must begin with ‘ISO’.

If the original document is EBCDIC-coded, characters below X’40’ are converted into space characters.

The filter permits only the printing of text documents (only printable data) and printer-language-dependent documents which contain a mixture of printable data and printer control characters. Therefore, when the filter is called for the first time (for checking and/or modification of the print request parameters) any print job will be rejected for which DOCUMENT-FORMAT=*TEXT(...) or =*SPECIAL-FORMAT(...) has not been specified. A PRINT-DOCUMENT command with the operand DOCUMENT-FORMAT=*PAGE-FORMAT will be rejected by the filter, i.e. the specifications CONTROL-MODE= *PAGE-MODE(...) / *APA(...) / *LOGICAL(...) / *PHYSICAL(...) / *LINE-MODE are not permitted.

The filter modifies the operands DOCUMENT-FORMAT and FORMAT-NAME in order to ensure that they are compatible with the attribute values for 'content-type' in Xprint. The value of the Xprint content type attribute '-ct' is thus formed from the value for FORMAT-NAME:

PRINT-DOCUMENT command: Values for DOCUMENT-FORMAT and FORMAT-NAME	**FORMAT-NAME operand = Xprint job attribute '-ct'**
*TEXT(...) or operand not specified	SIMPLE
*SPECIAL-FORMAT(FORMAT-NAME=*format*)	*format*
*SPECIAL-FORMAT(FORMAT-NAME=*NONE)	not specified

The other operand values of a print request are left unchanged by the filter.

Second call: Execution of the data and file conversion

The filter again checks the file structure of the original document and rejects the print job if there is no longer a SAM file present.

The filter then converts the original document with regard to the LINE-SPACING operand values. This means that it detaches any feed control characters which may be present from the data and inserts form feeds (X'0C') or line feeds (X'25' with EBCDIC code, X'0A' with ASCII code) at the end of each record according to the following rules.

– If LINE-SPACING=1, 2 or 3 is specified, the corresponding number of line feeds (X'25' with EBCDIC code, X'0A' with ASCII code) are appended to the end of each record.

– If LINE-SPACING=*BY-EBCDIC-CONTROL(...), *BY-IBM-CONTROL(...) or *BY-ASA-CONTROL(...) is specified, the feed control characters (position specified with CONTROL-CHAR-POS) are detached from the data and interpreted as follows with no LOOP resources available:

Function of feed control character	**Converted into**
Skip 'n' lines before printing the record	.'n' LFs at beginning of record .1 LF at end of record
Skip 'n' lines after printing the record	.'n' LFs at end of record (or 1 CR if 'n'=0)
Skip to channel 1 before printing the record	.1 FF at beginning of record
Skip to channel 1 after printing the record	.1 FF at end of record
Skip to channel 'n' (n>1) after printing the record	.1 LF at beginning of record
Skip to channel 'n' (n>1) after printing the record	.1 LF at end of record

CR: Carriage Return (X'0D')
FF: Form Feed (X'0C')
LF: Line Feed (X'25' with EBCDIC code, X'0A' with ASCII code)

– If DOCUMENT-FORMAT=*TEXT(...) is specified and if the CCSNAME value for the file consists of blanks or begins with the characters ‘EDF’ or ‘EEH’, the filter performs the conversion from EBCDIC to ASCII (from EBCDIC-DF04 to ISO-8859-1). Excepted from this conversion are the EBCDIC codes X'00' through X'3F' which are converted into ASCII blanks X'20'.
In the case of DOCUMENT-FORMAT=*SPECIAL-FORMAT(...) the EBCDIC → ASCII conversion is performed by Xprint. Here the printer language in which the document was written is taken into consideration (FORMAT-NAME must be specified) in order to prevent binary data within printer control character sequences from being converted.

It should be noted that the specification DOCUMENT-FORMAT=*SPECIAL-FORMAT(...) does not mean that the document will be printed in “raw mode” by Xprint. Moreover, the same layout as is obtained when printing out with RSO on an equivalent printer is not guaranteed.

During the second filter call it can happen that certain user errors occur which are not reported to the user because the processing is taking place under the control of a system task. In order to obviate this problem the standard filter behaves as follows in the event of a user error:

– for incorrect feed control characters (e.g. skip to channel 14), see table above

– if the position of the feed control character is greater than the length of the record, the record is processed and subsequently a single line feed is added.

SYS0610H

If a document is to be printed in HP format on a PCL printer, Dprint calls SPCONV using the SYS0610H filter. SPCONV then carries out the conversion to PCL using the HP2PCL filter. SYS0610H provides a basic conversion mechanism for documents which then allows the existing local BS2000-HP printer applications to transfer print jobs to a PCL printer which is connected using SCSI on UNIX systems.

HP2PCL

Within the scope of Dprint interoperability in a heterogeneous environment, Dprint has been enhanced by the addition of the HP2PCL filter (with SPCONV) as standard filter. As a result HP-formatted print jobs can be printed on a PCL printer which is connected to a UNIX system via Xprint. This filter allows you to print existing BS2000-HP documents on a high-performance printer which is connected to a UNIX system via Xprint. The following rules apply to the function calls:

First call: Checking and modification of the print request

This filter only allows you to print page-formatted documents (with print data and print control characters). When first called, the filter always rejects all print jobs which do not have the entry DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PAGE-MODE(CONTROL-TYPE=*HP or *COMPATIBLE)).

The result of this filter application is a SAM file (coded in ASCII), which is defined with a CCSNAME value (ISO88591).

In addition to checking the DOCUMENT-FORMAT operands the filter modifies these operands so that it is compatible with the content of the Xprint format names.

The statement

```
/PRINT-DOC DOCUMENT-FORMAT=*PAGE-MODE(CONTROL-MODE=*HP),TO-PRINTER=
*P(OUTPUT-FORMAT=´HP_LASERJET´,CLUSTER=remote cluster, PRINTER-
NAME=´Xprint PCL device´)
```

is modified to

```
/PRINT-DOC DOCUMENT-FORMAT=*SPECIAL-FORMAT (´HP_LASERJET´), TO-PRINTER
(CLUSTER=remote cluster, PRINTER-NAME=´Xprint PCL device´)
```

Other values for the print job are not changed by the filter.

Second call: Execution of data and file conversion

The filter again checks the original document format value. It rejects the job if the entry DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PAGE-MODE(CONTROL-TYPE=*HP or *COMPATIBLE)) is missing.

The result of this filter run is a SAM file with the name $SYSDPRNT.DPRNT.X.timestamp.FILE where timestamp=job descriptor on the UNIX system. All other file structures (ISAM, PAM, PLAM, ...) are converted by the filter into a SAM file. If the input file is not a SAM file then a working file is saved before the filter conversion takes place. This working file is named using the following conventions:
$SYSDPRNT.filtername.timestamp.TEMP where
filtername=HP2PCL and
timestamp=job descriptor on the UNIX system (30 characters).

This BS2000 SAM file must be defined with a CCCSNAME (ISO88591) and coded in ASCII.

Then the document is converted in accordance with the entries in the LINE-SPACING operands, e.g the PCC (Print Control Characters), if there are any, are extracted from the data and form feeds (X‘0C‘) or vertical cursor positions inserted according to the following rules.

– If LINE-SPACING=1, 2 or 3 is specified, the corresponding PCL escape sequence for the vertical cursor positions is inserted before each data record.

– If LINE-SPACING=*BY-EBCDIC-CONTROL() / *BY-IBM-CONTROL () / *BY-ASA-CONTROL () the PCC are extracted from the data and interpreted according to the assigned HP loop resource (the position is specified in the CONTROL-CHAR-POS operand).
If LINE-SPACING=*BY-IBM-CONTROL () or *BY-ASA-CONTROL () is specified, PCCs are converted to the appropriate Fujitsu Siemens PCC value before being interpreted.

The filter carries out the conversion from EBCDIC to ASCII (EBCDIC-DF041 to ISO-8859-1) if the CCSNAME of the file is made up of blank spaces or begins with ’EDF’ or ’EEH’. If there is no CCSNAME specified or if the CCSNMAE is not made up of blank spaces or does not begin with 'EDF' or 'EEH', then each character is printed exactly as it appears in the file.

All PCL resources are accepted according to the HP resources, as they are specified by the application or by the user. PCL resources are contained in a file which contains all information required to successfully print the document on a PCL printer.

The filter also converts HP printer escape sequences to the corresponding PCL4 printer escape sequences.

Not all HP printer attributes can be mapped onto a PCL printer. The following table shows those functions which are/are not supported.

Functions of type HP/HP90 printers	**PCL migration**
Print parameter (/PRINT-DOCUMENT)	
Partial processing of input file (input part)	partly (only for sections)
Partial processing of input data record (record part)	supported
partial processing of the output file (output part)	not supported, print job rejected with error message
Form	supported
Loop	supported
Rotation Loop	supported
Line spacing	supported
Line indentation (left margin)	supported
Multiple copies, maximum of 255 copies (page copies)	limited to 99 copies
Character set	supported
Form Overlay	not supported, print job rejected with error message
Form Overlay Buffer (FOB)	supported
Rotation	supported
Alternate rotation	simulated
Feed Control Character	supported
Use of EFO	not supported, print job rejected with error message

Functions of type HP/HP90 printers	PCL migration
Control character evaluation	
Line Indentation	supported
Character density	supported
Underscoring	supported
Inverse printing	not supported, document is printed without taking these escape sequences into consideration
Spaced printing	partly simulated (characters are not widened)
Character set selection	supported
Use of an FOB	supported
FOB suboverlay attributes	not supported, document is printed without taking these parameters into consideration
Page rotation	supported
Data compression	simulated
Two-up printing	not supported, document is printed without taking these parameters into consideration
Data suppression	not supported, document is printed without taking these parameters into consideration

Incompatibility of print resources

In heterogeneous interoperability the resources specified in the print job correspond to the Xprint resources. The use of the HP2PCL filter (the migrated HP resources are inserted in the output file) means that the resources specified in the print job correspond to the BS2000 resources which exist on the client host.

If the document format is specified as *PAGE-FORMAT(CONTROL=*HP), the user must specify in the /PRINT-DOC command the HP resources needed for the file (FORM, FONT, LOOP, FOB). All HP resources must be defined in the standard resources file $SYSSPOOL.PRFILE. A user resource file cannot be specified in the /PRINT-DOC command (USER-RESOURCE-FILE operand). This information is used by the HP2PCL filter to put all the resources required to print the file and the input file itself together in an output file. This output file is then transferred to Xprint.

Unless otherwise specified, the filter accesses the system PRFILE. If a user-defined resource file is to be used to output a file, then the configuration file to which the HP2PCL filter is assigned must be updated to allow the filter access to the correct user file (the one in which the resources specified in the command are defined).

HP resources which are used by BS2000 applications are, for example, forms, loops, character sets/fonts and form overlay buffers (FOBs). Migration of HP resources to PCL resources can only be carried out off-line. This is described in the “PRM” manual.

Installation and administration

The following definitions are needed:

Printers and interoperation between BS2000 and UNIX system based clusters are described in section “Access to Xprint via Dprint and BS2000-SPOOL” on page 48.

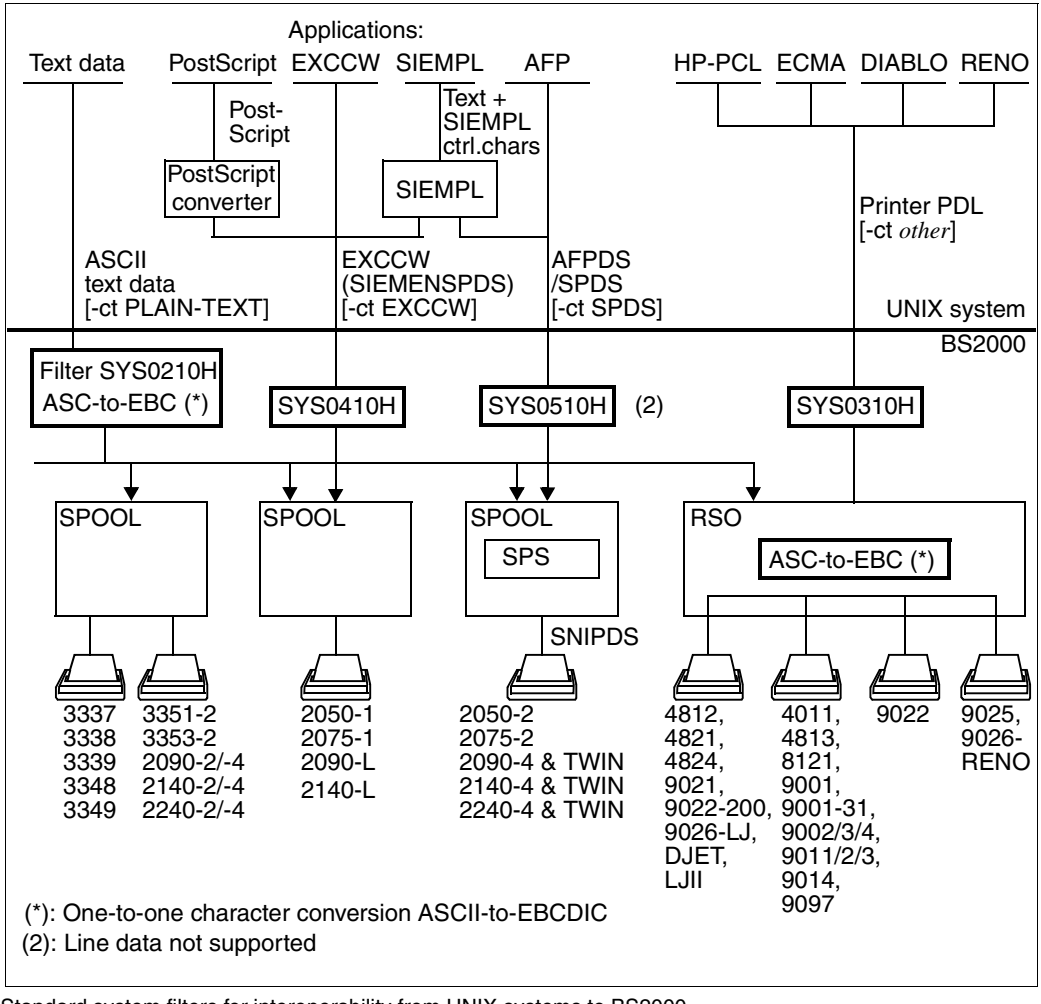
In addition, the filter must be defined using the following SPSERVE statement

```
//ADD-SPOOL-FILTER

/START-SPSERVE

//OPEN-PARAMETER-FILE

      PARAMETER-FILE=*SPOOL-PARAMETERS

//ADD-SPOOL-FILTER

      FILTER=HP2PCLX,
      FILTER-LOCATION=*SYSTEM, INPUT-FORMAT='HP-PAGEMODE',
      OUTPUT-FORMAT=UNIX-content-type
//END
```

The print job is to be printed using BS2000 resources. To do this the resources for both the HP and PCL formats must be defined on the BS2000 computer (see the manuals “PRM” and “SPCONV”).

6.3.3.2 Xprint to BS2000

Interoperability between UNIX systems and BS2000 is based on the same method as for the reverse direction. The documents from the Xprint domain (client) are characterized by means of a document format attribute (job attribute '-ct', content type), are recognized by the BS2000 gateway, where the filtering operations are performed, and are converted into a format which is compatible with the output printer. Selection of the format conversion process (filters) is similarly based on the document format attribute.



Standard system filters for interoperability from UNIX systems to BS2000

In order that a large number of BS2000 printer types may be made available to the users on UNIX and Windows systems (via SPOOL or RSO), four standard filters are supplied with the DPRINTCL subsystem. Depending on the value of the document format attribute (specified by way of '-ct' in the command 'xpadd -job'), each filter performs the additional checking of the print request the first time it is called, and the required document conversion on the second call.

1. Printing text documents (filter SYS0210H)

   Text documents created on UNX systems (ASCII text data separated only by ASCII line feed control characters X'0A') can be printed by the BS2000 spooler on any printer in a BS2000 cluster. This presupposes that the document format 'PLAIN-TEXT' is specified in the print request 'xpadd -job -ct PLAIN-TEXT ...'.

   The filter converts the value PLAIN-TEXT of the document format attribute into the corresponding BS2000 print request parameters:
   DOCUMENT-FORMAT=*TEXT(LINE-SPACING=1).

   It also converts the original document into a format which is compatible with the BS2000 spooler. In doing so it deletes the line feed characters (X'0A') at the end of each record and performs conversion from ASCII to EBCDIC (from ISO-8859-1 to EBCDIC-DF041).

2. Printing documents in EXCCW format (filter SYS0410H)

   A document in EXCCW format contains only SPDS-like data which is compatible with the 3365-1 Printer (LIP controller) running in its 'Extended Mode' (supported by SPOOL as LP65 printer type).

   Documents created on UNIX systems in EXCCW format can be printed by the BS2000 spooler on any LP65 printer, provided that the document format 'EXCCW' is specified in the print request ('xpadd -job -ct EXCCW ...').

   The filter converts the value EXCCW of the document format attribute into the corresponding BS2000 print request parameters: DOCUMENT-FORMAT=*TEXT(LINE-SPACING=1) and PRINTER-TYPE=*LP65-PRINTER.

3. Printing printer-language-dependent documents (filter SYS0310H)

   Printer-language-dependent documents from UNIX systems (in ASCII code) can be printed by the BS2000 spooler, provided that the destination printer supports the printer language in which the document was created. It is assumed that any print request having a document format attribute value other than PLAIN-TEXT, EXCCW or SPDS is a printer-language-dependent document printing request.

   The filter converts the value of the document format attribute into the corresponding BS2000 print request parameters:
   DOCUMENT-FORMAT=*SPECIAL-FORMAT(LINE-SPACING=*NO).

Since the operand value DOCUMENT-FORMAT=*SPECIAL-FORMAT(...) is currently supported only by RSO, printer-language-dependent documents from UNIX systems can only be printed on RSO printers which are defined in the SPOOL parameter file of the BS2000 gateway.

Conversion from ASCII to EBCDIC is performed by RSO in accordance with the “coded character set name” (CCSNAME) which is defined in the catalog entry of the transferred file which was created by the filter, and also XHCS tables (if XHCS is present) or an internal table (from ISO-8859-1 to EBCDIC-DF041). This one-to-one conversion is carried out without regard to the printer language in which the document was written.

If the RSO destination printer is defined with DEVICE-ACCESS=*TCP-ACCESS(...), the document will therefore be printed correctly, i.e. the document in ASCII code is sent to the printer in ASCII code.

If the RSO destination printer is defined with DEVICE-ACCESS=*NEA-ACCESS(...), however, it can happen that the document will not be printed correctly. In this case the document in ASCII code must first be converted by RSO into EBCDIC (one-to-one conversion without regard to the printer language in which the document was written) before it is sent via the TRANSDATA network to the printer.

4. Printing documents having structured fields (SF, filter SYS0510H)

   A document in SF format contains SPDS-like data (with printer control characters in EBCDIC code). Documents created on UNIX systems in SF format can be output by the BS2000 spooler (SPS) on any APA printer, provided that the document format SPDS is specified in the print request (e.g. 'xpadd -job -ct SPDS ...').

   The filter converts the document format attribute SPDS into the following corresponding BS2000 print request parameters:
   DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*APA) with LINE-SPACING=*BY-EBCDIC.

5. Printing printer-language-dependent documents to SPOOL (filter SYS0710H)

   PCL 5e documents from UNIX systems (coded in ASCII) can be output on any PCL printer, provided PCL is the document format specified in the print request (e.g. 'xpadd -job -ct PCL ...').

   The filter converts the document format attribute PCL into the following corresponding BS2000 print request parameters:

   DOCUMENT-FORMAT=*SPECIAL-FORMAT(FORMAT-NAME='PCL',LINE-SPACING=*NO).

The following table summarizes the conversion performed by the standard filters for interoperablity from UNIX systems to BS2000:

Document format (from 'xpadd -job -ct ...')	**Converts into operand values for PRINT-DOCUMENT command**	
	DOCUMENT-FORMAT	**PRINTER-TYPE**
PLAIN-TEXT	*TEXT(LINE-SPACING=1)	*STD (any)
EXCCW	*TEXT(LINE-SPACING=1)	*LP65-PRINTER
SPDS	*PAGE-FORMAT (CONTROL-MODE=*APA (LINE-SPACING=*BY-EBCDIC))	*STD (any APA printer)
any other value, or no value specified	*SPECIAL-FORMAT (LINE-SPACING=*NO) or *SPECIAL-FORMAT(FORMAT-NAME=any other value, LINE-SPACING=*NO)	*STD (any RSO printer)

The same filters are used to convert from Windows to BS2000. The content type is selected using the print queue definition. The BSD-LPD gateway provides an internal xpadd command for this purpose.

6.3.4 Possibilities for job redirection in the event of a server/gateway crash

The following describes the various redirection possibilities in the context of interoperability in the event that a problem with a server or gateway occurs, e.g. a crash or unavailability.

Print jobs submitted to Xprint by Dprint

Server and gateway on same UNIX system based host

Server and gateway host no longer available:
– redirection from the BS2000 client host is not possible
– the jobs are again available when the host is again available.

Server and gateway on different UNIX system based hosts

1. Gateway host no longer available:
   – redirection from the BS2000 client host is not possible
   – redirection from the server host is possible for the Xprint administrator or for the root/subroot administrator of the server host with:
     xpmod -job *job-id* -de *new destination*
     The new destination must accept the same content type (-ct) as the old destination.
   – the jobs are again available when the gateway host is again available.
2. Server host is no longer available:
   – redirection from the BS2000 client host is not possible
   – redirection from the gateway host is not possible
   – the jobs are again available when the server host is again available.

Print jobs submitted to Dprint by Xprint

Server and gateway on same BS2000 host, UNIX system based client host

Server and gateway hosts are no longer available:
– redirection from the client host is not possible
– the jobs are again available when the BS2000 host is again available.

Server and gateway on different BS2000 hosts, UNIX system based client host

1. Gateway host is no longer available and jobs are in the WFT or FT state:
   – redirection from the client host is not possible
   – redirection from the BS2000 server host is not possible
   – the jobs are again available when the BS2000 gateway host is again available.
2. Gateway host is no longer available and jobs are in the WAIT or KEEP state:
   – redirection or administration from the client host is not possible, but the printing is done by the server
   – the jobs can again be managed from the client host once the BS2000 gateway host is again available (if printing has not already been done).
3. Server host is no longer available:
   – redirection from the client host is not possible
   – redirection from the BS2000 gateway host is possible for the cluster administrator with:
     MODIFY-PRINT-JOB-ATTRIBUTES JOB-ID=*CLIENT-TSN(*tsn*,*host-name*)
   – the jobs are again available when the BS2000 server host is again available.

Print jobs within BS2000

The behavior of print jobs within BS2000 is the same as when print jobs are submitted to Dprint by Xprint.

6.4 Defining printers and printer pools

Printers and printer pools are defined in the SPOOL parameter file by the SPOOL administrator using the product SPSERVE. Certain relevant information is given below and the statements are listed. For a detailed description of the definition process, refer to the “SPSERVE” manual.

Note relating to Dprint

Immediately on becoming the owner of Dprint objects, the SPOOL administrator is allowed to define devices in his/her SPOOL parameter file. However, a device may already be defined in the configuration file, for example if a printer has been linked with the configuration file. In this case, a device record for a linked Dprint printer is added in the SPOOL parameter file, and information about it is sent to all hosts in the cluster.

Printer definition (DVC entries)

For each generated SPOOL or RSO printer, a device entry (DVC entry) must be defined in the SPOOL parameter file. The parameter file contains a standard device entry for each device type used. This entry has a name field which is filled with blanks, while all other fields contain default settings. In addition to the standard device entry, the parameter file also contains a type-independent standard device entry for new device types. This standard device entry is modified appropriately in order to generate new device entries. For a detailed description of the definition process, refer to the “SPSERVE” manual.

Possible ways of accessing device entries:

Generate DVC entry:	ADD-SPOOL-DEVICE
Modify DVC entry:	MODIFY-SPOOL-DEVICE
Delete DVC entry:	REMOVE-SPOOL-DEVICE
Output DVC entry (SYSOUT):	SHOW-SPOOL-DEVICES
Output (SYSOUT) and modify DVC entry, write back as old or new DVC entry:	EDIT-SPOOL-DEVICE
Copy DVC entry:	COPY-SPOOL-DEVICE

Printer pool definition (DVP entries)

For each printer which belongs to one or more pools, one or more device pool entries (DVP entries) must be contained in the SPOOL parameter file.

Possible ways of accessing POL entries and DVP entries:

Generate POL entry/DVP entry:	ADD-PRINTER-POOL
Modify POL entry/DVP entry:	MODIFY-PRINTER-POOL
Delete POL entry/DVP entry:	REMOVE-PRINTER-POOL
Output (SYSOUT) POL entry/DVP entry:	SHOW-PRINTER-POOLS

Defining printers as Dprint printers (entries in configuration file)

The cluster administrator can define printers which are connected to a server (in other words a host on which DPRINTSV is loaded) in the configuration. (Printers which are connected to a host on which only the DPRINTCL subsystem is loaded are inaccessible.) This is done by means of the following SPSERVE statement:

```
ADD-DPRINT-PRINTER PRINTER-NAME=...,SERVER-NAME=...,LOCAL-PRINTER-NAME=...
```

Printer statuses

Within the framework of Dprint, new printer statuses have been introduced in support of an ISO reference. The following statuses are displayed by the SHOW-ACTIVE-SPOOL-DEVICES command:

Status	Meaning
D	DETACHED: Status between the input of the START-PRINTER-OUTPUT command and its execution by the controller task, or status following input of the STOP-PRINTER-OUTPUT command
I	IDLE: Printer is ready for output; no print job is currently being processed.
M	Message: A console message exists in respect of the printer.
R	RUN: Printer is active
T	TRANSFER: A started spoolout is waiting for a transport confirmation.
U	UNKNOWN: Status not known

The relationship between the aforementioned statuses and the statuses as per ISO reference is illustrated in the following table:

Displayed statuses	Print jobs for printers of type			Status as per ISO
	SPOOL	APA	RSO	
A (ATTACHED)			X	idle
I (IDLE)	X	X	X	idle
T (TRANSFER)	X		X	running
R (RUN)	X	X	X	running
M (MESSAGE)	X	X	X	needs attention
S (STOPPED)			X	needs attention
W (WORKING FOR ADM)			X	needs attention
D (DETACHED)	X	X	X	shutdown
U (UNKNOWN)	X	X	X	shutdown

Changing the printer statuses

The following table shows the status that printers switch to from a given status following a given user operation.

Command causing the change in status	Printer from status					
	U	D	I	R	M	T
ADD-SPOOL-DEVICE statement	D	-	-	-	-	-
MODIFY-SPOOL-DEVICE statement	-	D	-	-	-	-
REMOVE-SPOOL-DEVICE statement	-	U	-	-	-	-
START-PRINTER-OUTPUT command	-	I	I	R	M	T
Response to message	-	-	-	-	R	-
Response to message	-	-	-	-	D	-
Response to message	-	-	-	-	I	-
STOP-PRINTER-OUTPUT command	-	-	D	R	M	T
CANCEL-PRINT-JOB command	U	D	I	I	M	T
HOLD-PRINT-JOB command	-	-	-	I	M	T

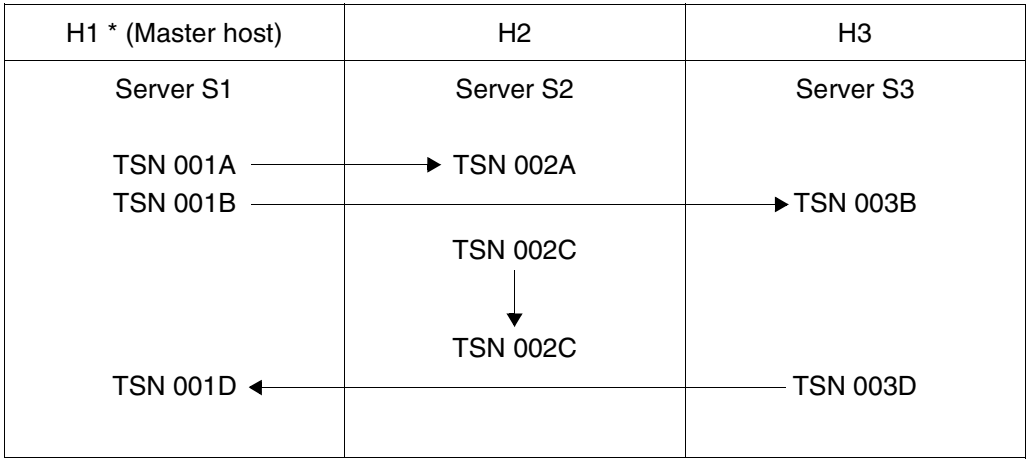
6.5 Controlling jobs

With regard to the control of jobs, the SPOOL administrator and cluster administrator have more options for referencing Dprint jobs than the nonprivileged user (see page 165). This is illustrated below by means of an example.

The cluster administrator is also the only one who can specify a client TSN and the host name of the client in the MODIFY-PRINT-JOB-ATTRIBUTES command.

Example of identification within a BS2000 cluster

In the following illustration the arrows represent the distribution of jobs from one host to another. This is followed by a listing of the commands with which SPOOL administrator and cluster administrator can reference the jobs.



Identification within a cluster

The SPOOL administrator of H2 can issue the following commands:

```
CANCEL-JOB TSN(2A)
           TSN(2C)

CANCEL-PRINT-JOB   TSN(2A)
                   SERVER-TSN(2A,SERVER-NAME=S2)
                   TSN(2C)
                   SERVER-TSN(2C,SERVER-NAME=S2)

SHOW-PRINT-JOB-ATTRIBUTES
                   TSN(2A)
                   SERVER-TSN(2A,SERVER-NAME=S2)
                   TSN(2C)
                   SERVER-TSN(2C,SERVER-NAME=S2)
```

The cluster administrator of H1 can issue the following commands:

```
CANCEL-JOB TSN(1A)
           TSN(1B)
           TSN(1D)

CANCEL-PRINT-JOB   TSN(1A)
                   TSN(1B)
                   TSN(1D)
                   SERVER-TSN(1D,SERVER-NAME=S1)
                   SERVER-TSN(2A,SERVER-NAME=S2)
                   SERVER-TSN(2C,SERVER-NAME=S2)
                   SERVER-TSN(3B,SERVER-NAME=S3)

SHOW-PRINT-JOB-ATTRIBUTES
                   TSN(2A)
                   SERVER-TSN(2A,SERVER-NAME=S2)
                   TSN(2C)
                   SERVER-TSN(2C,SERVER-NAME=S2)

MODIFY-PRINT-JOB-ATTRIBUTES
                   SERVER-TSN(2A,SERVER-NAME=S2)
                   SERVER-TSN(3B,SERVER-NAME=S3)
                   CLIENT-TSN(2C,HOST-NAME=H2)
                   CLIENT-TSN(3D,HOST-NAME=H3)
```

The following commands issued by the cluster administrator will be rejected:

```
CANCEL-PRINT-JOB   TSN(2A)
                   SERVER-TSN(3D,SERVER-NAME=S3) (3D is a client TSN)

MODIFY-/SHOW-PRINT-JOB-ATTRIBUTES TSN=2A
```

6.6 Obtaining information

With regard to the management of Dprint, the same commands and SPSERVE statements can be used to request information as are also available to nonprivileged users, see page 171.

In addition, the cluster administrator can also request information relevant to Dprint by means of the commands mentioned below.

SHOW-DPRINT-ACCESS-CONTROLS

The SHOW-DPRINT-ACCESS-CONTROLS command requests information about access control for a cluster. For a description of the command and the information output, refer to the manual „Spool & Print - Commands“.

SHOW-DPRINT-CLUSTER

The SHOW-DPRINT-CLUSTER command can be used to request information about the configuration of the local cluster. The names of the hosts belonging to the cluster are output. The hosts are output in the order of their recovery hierarchy. For a description of the command and the information output, refer to the manual „Spool & Print - Commands“.

SHOW-DPRINT-HOSTS

The SHOW-DPRINT-HOSTS command can be used to request information about hosts. Here it is possible to make a selection in respect of the Internet address, the port name and the access controls. For a description of the command and the information output, refer to the manual „Spool & Print - Commands“.

6.7 Overviews of commands and SPSERVE statements

Commands and SPSERVE statements for the device administrator

In addition to the commands and SPSERVE statements for the nonprivileged user (see page 171), the device administrator can also issued those listed below. A more detailed description of the commands can be found in the “Spool & Print - Commands” manual. The statements are described in the “SPSERVE” manual.

Command	Function
HOLD-PRINT-JOB	Hold print job
MODIFY-PRINTER-OUTPUT-STATUS	Modify management parameters for printer
MODIFY-SPOOL-CHARACTER-SET	Modify character sets
MODIFY-SPOOL-DEVICE	Modify device attributes
MODIFY-SPOOL-FORM	Modify forms
REMOVE-SPOOL-CHARACTER-SET	Delete character sets from the SPOOL parameter file
REMOVE-SPOOL-DEVICE	Delete RSO device entries from the SPOOL parameter file
REMOVE-SPOOL-FORM	Delete form entries from the SPOOL parameter file
START-PRINTER-OUTPUT	Assign printer for print jobs
STOP-PRINTER-OUTPUT	Detach printer

Commands and SPSERVE statements for the device administrator

Commands for the SPOOL administrator

The SPOOL administrator can issue the commands for the nonprivileged user (see page 171) and those for the device administrator (see above). In addition, the SPOOL administrator can also issue the commands listed below. A more detailed description of the commands can be found in the “Spool & Print - Commands” manual.

Command	Function
SHOW-DPRINT-CLUSTER	Display information about the configuration of the local cluster
SHOW-DPRINT-HOSTS	Display information about Dprint hosts
START-DPRINT-LOGGING	Activate Dprint logging
STOP-DPRINT-LOGGING	Terminate Dprint logging
VERIFY-DPRINT-CONSISTENCY	Check configuration file and set new master

Commands for the SPOOL administrator

Commands and SPSERVE statements for the cluster administrator

The cluster administrator can issue the commands for the nonprivileged user (see page 171), for the device administrator and for the SPOOL administrator (see above). In addition, he/she can also issue the commands (with page reference) and SPSERVE statements listed below. A more detailed description of the commands can be found in the “Spool & Print - Commands” manual. The statements are described in the “SPSERVE” manual.

Command	Function
ADD-DPRINT-ACCESS-CONTROL	Define Dprint access control
ADD-DPRINT-HOST	Define Dprint hosts
ADD-DPRINT-PRINTER	Define Dprint printers
ADD-DPRINT-PRINTER-POOL	Define Dprint printer pool
ADD-DPRINT-REMOTE-CLUSTER	Define remote Dprint cluster
ADD-DPRINT-SERVER	Define Dprint server
CREATE-DPRINT-CLUSTER	Create Dprint cluster
DELETE-DPRINT-CLUSTER	Delete Dprint cluster
EDIT-DPRINT-HOST	Display and modify Dprint hosts
EDIT-DPRINT-PRINTER	Display and modify Dprint printer definition
EDIT-DPRINT-REMOTE-CLUSTER	Display and modify remote Dprint cluster
EDIT-DPRINT-SERVER	Display and modify Dprint server
MODIFY-DPRINT-ACCESS-CONTROL	Modify Dprint access control
MODIFY-DPRINT-CLUSTER	Modify cluster configuration
MODIFY-DPRINT-CONFIGURATION	Modify host hierarchy
MODIFY-DPRINT-HOST	Modify Dprint hosts
MODIFY-DPRINT-PRINTER	Modify Dprint printer definition
MODIFY-DPRINT-PRINTER-POOL	Modify Dprint printer pool
MODIFY-DPRINT-REMOTE-CLUSTER	Modify remote Dprint cluster
MODIFY-DPRINT-SERVER	Modify Dprint server
REMOVE-DPRINT-ACCESS-CONTROL	Remove Dprint access control
REMOVE-DPRINT-HOST	Remove Dprint hosts
REMOVE-DPRINT-PRINTER	Remove Dprint printer
REMOVE-DPRINT-PRINTER-POOL	Remove Dprint printer pool
REMOVE-DPRINT-REMOTE-CLUSTER	Remove remote Dprint cluster
REMOVE-DPRINT-SERVER	Remove Dprint server
SHOW-DPRINT-ACCESS-CONTROL	Display information about Dprint access control

Commands and SPSERVE statements for the cluster administrator

6.8 Behavior in error situations

Cluster administrators and SPOOL administrators are essentially nonprivileged users with certain privileges at their disposal. So they may also be confronted with the same problems as nonprivileged users, see page 171.

The following section contains only the troubleshooting information which is different for the cluster/SPOOL administrators and for nonprivileged users.

6.8.1 Print job was not started

If a successful PRINT-DOCUMENT command has been issued, and everything appears ready for printing but nothing happens, then the measures described below may be applied in an attempt to solve the problem.

1. Check whether the print job is in KEEP status.

   On the occurrence of a problem, the print job may have been placed in the KEEP queue. Consequently, it is not possible to start the print operation without having first returned the job to the WAIT status by means of the RESUME-PRINT-JOB command. This facility is however restricted to requests within a cluster.

   The cluster administrator can request a list of all print jobs in KEEP status within the entire BS2000 cluster by means of the following commands:

   ```
   /SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION,SEL=*PAR(JOB-TYPE=*KEEP,
                          USER-ID=*ALL,SERVER-NAME=*ALL,HOST-NAME=*ALL)
   /SHOW-PRINT-JOB-ATTRIBUTES
   ```

   The SPOOL administrator can request a list of all print jobs in KEEP status in his/her host by means of the following commands:

   ```
   /SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION,SEL=*PAR(JOB-TYPE=*KEEP,
                          SERVER-NAME=*ALL,HOST-NAME=*ALL)
   /SHOW-PRINT-JOB-ATTRIBUTES
   ```

   Example

   ```
   /SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION,SEL=*PAR(JOB-TYPE=*KEEP,
                          USER-ID=*ALL,SERVER-NAME=*ALL,HOST-NAME=*ALL)

   TSN  SERVER   M STA R DEVICE   DESTIN   ERCOD    ERMSG    DEVICE TYPE
   4916 *HOME    L KP            *CENTRAL 1120     SDD3013  HP,HP90,LP,LP-EM
                                                             LP48,LP65
   %  SCP0947 1 JOBS FOUND WITH 2 PAM PAGES. COMMAND TERMINATED
   ```

The field “ERMSG” can assist in solving the problem if the user enters the HELP-MSG-INFORMATION command for the message number indicated. SDD3013, for example, would mean that a file transfer error was detected.

```
/SHOW-PRINT-JOB-ATTRIBUTES JOB-ID=*TSN(TSN=4916)
TSN          : 4916 (4916)  SERVER-NAME : *HOME       STATE : KP
FILE-NAME    : :3:$USER.userfile
ADD-COPIES   :   0          LOCK-FILE : *NO
DEL-AFTER-PR: *NO
  ------------------------------ DOCUMENT-PART ---------------------------
INPUT-SECT   : *WHOLE-FILE
INPUT-PART   : *ALL
RECORD-PART : *ALL
OUTPUT-PART : *ALL
  ----------------------------- DOCUMENT-FORMAT --------------------------
DOC-FORMAT   : *TEXT
LINE-P-PAGE :     0      HEADER-LINE : *NO
LINE-SPACING: 1
OUTPUT-FORM : *CHARACTER
  ---------------------------- PRINT-JOB-CONTROL -------------------------
PR-JOB-NAME : PRINT3   PR-JOB-PRIO :  240          CHECKPOINT : *ON-PAGES
FAILURE-PROC: (MSG-PAGE : *YES)
  ------------------------------ LAYOUT-CONTROL --------------------------
PAGE-COPIES :   0      LEFT-MARGIN :  0            ROTATION : *NO
TAB-REF-CHAR: *NO
  --------------------------- RESOURCES-DESCRIPTION ----------------------
FORM-NAME    : STD
RES-LOC      : *HOME
CHAR-SET-ATT: *ALL
  ------------------------------ TO-PRINTER ------------------------------
PRINTER-NAME: *CENTRAL
PRINTER-TYPE: *ANY
REDIRECTION : *YES
```

The field “STATE” indicates the current status of the job.

2. Check whether the job is in an intermediate status.

   The command SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION can be used to check the status of the print job in field “STA”. If the print job is being processed by a remote server, the server name must be included in the list of the selection criteria.

   Example

```
/SHOW-PRINT-JOB-STATUS SEL=*PAR(TSN=4830),INFORMATION=*DESTINATION

TSN  SERVER   M STA R DEVICE   DESTIN   ERCOD    ERMSG    DEVICE TYPE
4830 *HOME    L WT            *CENTRAL                    HP,HP90,LP,LP-EM
                                                          LP48,LP65
%  SCP0947 1 JOBS FOUND WITH 2 PAM PAGES. COMMAND TERMINATED
```

   The field “STA” indicates the status of the print job:

   WFT: The job is waiting for the file transfer to be started for its files.

   FT: The job’s files are being transferred to the server.

   WP: The job was issued with a section specification. The job is waiting for preprocessing into sections.

   PRE: The job was issued with a section specification. The job is being preprocessed by the section controller.

   WT: The job is waiting for a printer.

   ACT: The job is being processed by a printer.

   KP: The job is in “KEEP” status.

   DIR: The job is coming from a replay tape in DIRECT mode and is waiting for a printer.

3. Check whether the printer is “logically” started.

   By using the command SHOW-PRINT-JOB-STATUS INFORMATION=*DESTINATION it is possible to check, in the field “SERVER”, the logical name of the server which is processing the print job. The field “DEVICE TYPE” shows the device types on which the specified print job can be processed.

   With the command SHOW-PRINT-JOB-STATUS INFORMATION=*DISTRIBUTED it is possible to interrogate the type of the job in the field “J-TYPE”. If the job is being processed by a remote server, the server name must be included in the list of the selection criteria.

   Example

```
/SHOW-PRINT-JOB-STATUS SEL=*PAR(TSN=4830),INFORMATION=*DISTRIBUTED

TSN  SERVER   P-TSN J-TYPE HOST     USER-ID  ACCOUNT  ERCOD    ERMSG
4830 *HOME    4830  *LOC   D241ZE22 TSOS     ADMINSTR
%  SCP0947 1 JOBS FOUND WITH 2 PAM PAGES. COMMAND TERMINATED

/SHOW-PRINT-JOB-STATUS SEL=*PAR(TSN=1805,SERVER-NAME=B13SER),
                       INFORMATION=*DISTRIBUTED

TSN  SERVER   P-TSN J-TYPE HOST     USER-ID  ACCOUNT  ERCOD    ERMSG
1805 B13SER   5068  *DIST  D241ZE22 TSOS     ADMINSTR
%  SCP0947 1 JOBS FOUND WITH 2 PAM PAGES. COMMAND TERMINATED
```

   A list of the devices which are managed by the specified server can be requested by means of the following command:

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=logical server name
```

   In the case of requests between clusters, the cluster name must also be specified:

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=logical server name ,
                           CLUSTER-NAME=selected cluster .
```

Example

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=B13SER

%  SCP1051 OPERAND CLUSTER-NAME,SERVER-NAME,HOST-NAME MAY ONLY BE USED
   WITH DPRINTCL SUBSYSTEM. COMMAND REJECTED.
```

If the DPRINTCL subsystem is not loaded, Dprint printers on remote hosts cannot be shown. In this case, loading of the subsystem must be initiated.

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=B13SER

%  SCP1052 WARNING : INFORMATION MAY BE NOT COMPLETE. ONE OR SEVERAL
   SERVERS ARE NOT ACCESSIBLE
%  SCP0912 NO DEVICE MATCHES SPECIFIED OPERAND VALUES. COMMAND NOT
   EXECUTED
```

If the DPRINTSV subsystem is not loaded on the remote system, the cluster administrator or SPOOL administrator of the server host should be notified so that loading of the subsystem can be initiated.

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=*HOME

DEV-NAME DEV-TYPE  C-USERID C-TSN EXIT C-FORM C-CL SSU ADM CRI
S1PRT1   HP-PRINT                  YES STD       0 LI      EXP
```

At least one device type output in the “DEVICE TYPE” field shown by the SHOW-PRINT-JOB-STATUS command must be active. If the device type is missing, a device of the requested type must be activated by means of the START-PRINTER-OUTPUT command.

4. Check whether it is actually permissible to output the print job on the activated printers.

   A printer can be activated with lists of permitted forms, user IDs, account numbers, spoolout classes, etc. It is therefore necessary to check whether output of the print job is permitted on the printers. This information can be interrogated by means of the following commands.

   The SHOW-PRINT-JOB-ATTRIBUTES command can be used to request the attributes of the print job.

Example

```
/SHOW-PRINT-JOB-ATTRIBUTES JOB-ID=*TSN(TSN=4916)
TSN         : 4916 (4916)  SERVER-NAME : *HOME       STATE : KP
FILE-NAME   : :3:$USER.user3file
ADD-COPIES  :   0          LOCK-FILE : *NO
DEL-AFTER-PR: *NO
  ------------------------------ DOCUMENT-PART ----------------------------
INPUT-SECT  : *WHOLE-FILE
INPUT-PART  : *ALL
RECORD-PART : *ALL
OUTPUT-PART : *ALL
  ------------------------------ DOCUMENT-FORMAT --------------------------
DOC-FORMAT  : *TEXT
LINE-P-PAGE :     0      HEADER-LINE : *NO
LINE-SPACING: 1
OUTPUT-FORM : *CHARACTER
  ------------------------------ PRINT-JOB-CONTROL ------------------------
PR-JOB-NAME : PRINT3   PR-JOB-PRIO :  240          CHECKPOINT : *ON-PAGES
FAILURE-PROC: (MSG-PAGE : *YES)
  ------------------------------ LAYOUT-CONTROL ---------------------------
PAGE-COPIES :   0      LEFT-MARGIN :  0            ROTATION : *NO
TAB-REF-CHAR: *NO
  ------------------------------ RESOURCES-DESCRIPTION --------------------
FORM-NAME   : STD
RES-LOC     : *HOME
CHAR-SET-ATT: *ALL
  ------------------------------ TO-PRINTER -------------------------------
PRINTER-NAME: *CENTRAL
PRINTER-TYPE: *ANY
REDIRECTION : *YES
```

A list of the devices which are managed by the specified server can be requested by means of the following command:

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=logical server name
```

Example

```
/SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=*HOME

DEV-NAME DEV-TYPE  C-USERID C-TSN EXIT C-FORM C-CL SSU ADM CRI
S1PRT1   HP-PRINT                  YES STD       0 LI      EXP
```

The field “SSU” indicates the printer scope and the printer status.

The following may be output for the printer scope:

L: The printer is started for local use.

C: The printer is started for Dprint printing.

The scope of the printer must be checked with regard to the type of print job.
If the print job has been processed by SPOOL (J-TYPE set to *LOC), it can be passed to a local printer (scope L) or to a Dprint printer (scope C).

If the print job has been processed by DPRINT (J-TYPE set to *DIST or *INTER), it can only be passed to a Dprint printer (scope C).

The command SHOW-ACTIVE-SPOOL-DEVICES DEVICE-NAME=*printer name* can be used to request a list of the supported user IDs, forms, etc.

Example

```
/SHOW-ACTIVE-SPOOL-DEVICES DEVICE-NAME=S1PRT1

DEV-NAME: S1PRT1     DEV-TYP:HP-PRINT  REV:   1 SCHED:NEXT-JOB
C-USERID:           PRIORITY:  30/ 255 USE: OUT  C-TSN:
CLASSES (A):

FORM(P ):  UPBOR

PNAME(A): TEST

USER (A):

ACC  (A):

DESTS: *CENTRAL

CURRENT-FORM: UPBOR  SAMPLE: NO   EXIT: YES  TRACE: NO
CURRENT-DIA :          T-UP-P: ANY
ROTATION: ANY   FOB:     0/  672  CHAR-SET:     0/   64
DIAS    (P    ): D1

SERVER-NAME: *LOCAL    HOST-NAME: HOST5
PRINTER-STATE: I       PRINTER-SCOPE: L
HOSTS(A):
```

Jobs having the PNAME “TEST”, which request the form “UPBOR”, can be processed by the device.

If output of the print job is not permitted on the printer, the printer definition can be changed by means of the MODIFY-PRINTER-OUTPUT-STATUS command.

5. Check that the printer is not currently processing another print job.

   /SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=*logical server name*

   This outputs a list of the devices which are managed by the specified server.

   Example

   ```
   /SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=*HOME

   DEV-NAME DEV-TYPE  C-USERID C-TSN EXIT C-FORM C-CL SSU ADM CRI
   S1PRT1   HP-PRINT  USER1     0EJ3  YES STD       0 LR  YES EXP
   ```

   The field “SSU” indicates the printer scope and the printer status.

   The following may be output for the printer status:

   I: The printer is ready for printing but there is no spoolout currently present.

   R: Spoolout active.

   The fields “C-USERID” and “C-TSN” show the user ID and the TSN of the current job.

6. Check whether an error has occurred in the printer.

   The printer status can be interrogated by means of the following command:

   /SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=*logical server name*

   This outputs a list of the devices which are managed by the specified server.

   Example

   ```
   /SHOW-ACTIVE-SPOOL-DEVICES SERVER-NAME=*HOME

   DEV-NAME DEV-TYPE  C-USERID C-TSN EXIT C-FORM C-CL SSU ADM CRI
   S1PRT1   HP-PRINT                 YES STD       0 LM      EXP
   ```

   The field “SSU” indicates the printer scope and the printer status. If the printer status is set to “M”, this means that an error has been detected. A console message has been output for the device.

   The operator of the server host can be notified in order to eliminate the error.

6.8.2 Network errors are reported to the user

If the problem is reproducible, the following actions can be performed:

1. Activate Dprint logging by means of the START-DPRINT-LOGGING command.
2. Issue command again.
3. Deactivate Dprint logging by means of the STOP-DPRINT-LOGGING command.

In all cases, further information about the network error can be interrogated by means of the following commands:

```
/SHOW-DPRINT-HOSTS HOST-NAME=host name,INFORMATION=*ALL
/SHOW-DPRINT-SERVERS SERVER-NAME=server name,INFORMATION=*ALL
```

Example

```
/SHOW-DPRINT-HOSTS HOST-NAME=HOST1,INFORMATION=*ALL

HOST-NAME ADM  ACCESS   INTERNET-ADDR   PORT-NAME
HOST1     *YES *ALL                           0
HOST-STATE CONN-STATE COMM-ERR FT-STATE
*ATT       *NOT-ACC   DR  0001 *NORMAL
```

A connection interrupted by a “timeout” was reported by CMX on attempting to communicate with HOST1 (DR is followed by the reason for the interruption reported by CMX). The host is not accessible. Either DPRINTCL and/or DPRINTSV is not loaded on the remote system or a network problem has occurred (remote host not loaded, connection error, etc.). Please refer to the CMX manual for a description of the possible values.

```
/SHOW-DPRINT-SERVERS SERVER-NAME=B13SER,INFORMATION=*ALL

SERVER-NAME HOST-NAME ACCESS
*B13SER               *ALL
PRINT-JOB-CLASS
*ANY
SERVER-STATE CONN-STATE COMM-ERR
*ATT         *UNDEF
```

The server is not accessible. Either the server object is defined in the configuration but not yet included in a cluster, or the DPRINTSV subsystem is not loaded on the remote system.

If a “timeout” is detected (COMM-ERR set to TIMEOUT), the timeout value which is set in the GEN record of the SPOOL parameter file must be checked. If too low a value is set, it can be increased and thus solve the problem.

Depending on the type of error, it may be necessary to contact the SPOOL administrator of the remote system or your own network administrator.

6.8.3 Print job remains in an intermediate status

If a print job remains in an intermediate status for an extended period, then the measures described in the following may be applied in an attempt to solve the problem.

1. Job remains in WFT status

   A check must be made as to whether the DPRINTSV subsystem is loaded. If not, it must be loaded.

   Next it is necessary to check whether communication can be established between the server host and the client host. If not, the network administrator must be informed of the communications problems.

   The saturation status of the user ID SYSDPRNT on the client host must also be checked. When saturation was reached, message SDD3008 was sent to the console of the client host. In addition, the information in the configuration file in the corresponding host object was saved.

2. Jobs remains in WFT or in FT for a long time

   – This may be a performance problem. It eventually occurs when big amount of print jobs are issued simultaneously. In this case, if the server is not powerful enough to support the load, the processing of the Dprint system tasks becomes expensive in CPU consumption.

     A solution is provided by means of an optional processing (see page 382) allowing to regulate timeout values on which Dprint processing is based.

   – Another reason involving this abnormal behavior is an FT saturation on the client side. In this case, a solution is offered by a system exit mechanism (EXIT97) anchored in SPOOL. This exit allows at the server level to limit the number of jobs simultaneously in file transfer. A complete description may be found in the “Spool & Print - Macros and Exits” manual.

Example

```
/SHOW-DPRINT-HOSTS HOST-NAME=HOST1,INFORMATION=*ALL

HOST-NAME ADM  ACCESS   INTERNET-ADDR   PORT-NAME
HOST1     *YES *ALL                           0
HOST-STATE CONN-STATE COMM-ERR FT-STATE
*ATT       *ACC               *SAT
```

The problem was reported to the server and message SDD3012 was sent to the console. The saturation status must be monitored, and the attributes of the user ID SYSDPRNT changed if necessary.

It may be that the FT/FTAC subsystems on the client host have been unloaded. In this case, message SDD3011 was sent to the console. FT and FTAC can be loaded again using the START-SUBSYSTEM command.

FT and FTAC must be activated on the client host; in other words, the START-FT command must have been issued. This can be checked by means of the command SHOW-SUBSYSTEM-STATUS FT. If no START-FT was issued, no task is associated with the subsystem. The START-FT command must then be issued.

The saturation status of the user ID SYSDPRNT on the server host must similarly be checked. When saturation was reached, message SDD3008 was sent to the console of the server host. In addition, the information in the configuration file in the corresponding host object was saved. The saturation status must be monitored, and the attributes of the user ID SYSDPRNT changed if necessary.

3. Job remains in FT status

   It may be that the FT/FTAC subsystems on the client host have been unloaded. In this case, message SDD3011 was sent to the console. FT and FTAC can be loaded again using the START-SUBSYSTEM command.

   FT and FTAC must be activated on the client host; in other words, the START-FT command must have been issued. This can be checked by means of the command SHOW-SUBSYSTEM-STATUS FT. If no START-FT was issued, no task is associated with the subsystem. The START-FT command must then be issued.

   It may also be that the FT/FTAC subsystems on the server host have been unloaded. In this case, message SDD3011 was sent to the console. FT and FTAC can be loaded again using the START-SUBSYSTEM command.

   FT and FTAC must also be activated on the server host; in other words, the START-FT command must have been issued. This can be checked by means of the command SHOW-SUBSYSTEM-STATUS FT. If no START-FT was issued, no task is associated with the subsystem. The START-FT command must then be issued.

   The saturation status of the user ID SYSDPRNT on the server host must similarly be checked. When saturation was reached, message SDD3008 was sent to the console of the server host. The saturation status must be monitored, and the attributes of the user ID SYSDPRNT changed if necessary.

   Loading of the FT product must be controlled because Dprint is not the only user of FT.

6.8.4 Errors during file transfer processing

If an error was reported during file transfer processing (job is in KEEP status), the file transfer administrator should be informed and the following checks performed.

1. The file transfer environment (number of permitted file transfers, number of permitted remote systems, number of permitted tasks, etc.) must be adapted to a Dprint environment. This must be checked in both systems (sender and receiver).
2. The transfer authorization defined for Dprint must correspond to that given in the SPOOL parameter file.
3. The partner host must be defined in the file transfer configuration file $SYSDPRNT.SYSPAR.DPRINT.011.

Cluster not created correctly

There are various reasons why the CREATE-DPRINT-CLUSTER command may have been aborted.

1. A check must be performed to ascertain whether DPRINTCL and/or DPRINTSV is/are loaded on the remote systems.
2. The requisite definitions must exist in the configuration file of the remote host. This configuration file must contain the definitions of the master host and the local host.
3. Different clusters having the same name following a startup:
   If, in a cluster containing a number of hosts, the Dprint subsystems are started simultaneously on several of these hosts, it can happen that different clusters having the same name are created during the startup processing on account of the synchronization of the hosts. In this case, a VERIFY-DPRINT-CONSISTENCY command must be issued to the original master host of the cluster. The previous cluster will be restored.

Error documentation

In the event of an error, the following documentation should be enclosed with the error report:

– SLED, system dump or user dump of the affected task

– console log or CONSLOG file

– log of the PRINT-DOCUMENT command, the SHOW command and the device, form and character set definitions from the SPOOL parameter file

– log of the GEN record from the SPOOL parameter file

– REP files SYSREP.DPRINTCM.011 and SYSREP.DPRINTCL.011 for the client host

– REP files SYSREP.DPRINTCM.011, SYSREP.DPRINTCL.011 and SYSREP.DPRINTSV.011 for the server host

– REP files SYSREP.DPRINTCM.011 and SYSREP.DPRINTCL.011 for the gateway host in the event of a print operation between clusters

– printout of the file $SYSDPRNT.SYSPAR.DPRINT.011

– trace file $SYSDPRNT.SYSTRC.DPRINT.011 for the client, server and gateway hosts

Since with some errors it may be necessary to produce additional documentation or test REPs, it is absolutely essential in the case of reproducible errors to specify the method of reproduction.

6.8.5 Possible problems for heterogeneous interoperability

in the case of heterogeneous interoperability, the following are the main problems which may occur or are points that you should keep in mind:

– On UNIX systems, the names objects may include lowercase letters. If such an object is specified in a BS2000 command, the c-string format must be used. Otherwise, SDF automatically converts input into uppercase letters resulting in the incorrect object being used as the selection criterion.

– If no requests are accepted by the domain of UNIX systems, you should first check communication with the gateway host. Then contact the administrator of the domain so that he/she can check the required connection definitions in both products.

  It should be noted that the name of objects in the definition of a remote UNIX system based cluster may include lowercase letters (operands GATEWAY-NAME and HOST-NAME).

  You should also check the definition of the BS2000 gateway in the Xprint database. The original name and the original host (operands -on and -oh) must consist exclusively of uppercase letters.

– If the SPECIAL-FORMAT operand is specified in the PRINT-DOCUMENT command, no conversion from ASCII to EBCDIC is performed on the BS2000 host. Therefore, a filter with the same name as the document format must be available on the UNIX system based gateway.

  If a print job with the document format SPECIAL-FORMAT submitted to a UNIX system is rejected with the message SDD6001 and the message key ID CL000151, you should inform the administrator of the domain so that he/she can check that the appropriate filter is available on the gateway host.

– If a print job submitted to a domain of UNIX systems remains in the “WFT” state for a long time, you should inform the cluster administrator so that he/she can check the definition of the BS2000 gateway host in the Xprint database; the option -op 'FT=...' must be set.

– If a print job submitted to a domain of UNIX systems remains in the “FT” state for a long time, you should check the availability of the products FT/FTAC on the BS2000 client host and the connection with the partner host. You should then inform the administrator of the gateway so that he/she can check the availability of the products FT/FTAC on the gateway. The access permissions of the “root” user ID should also be checked (ftshwa root command). In addition, you should also check whether “binary GIP recover” is available on the UNIX platform.

7 BS2000 support functions

7.1 Installation

SPOOL, which permits the use of Dprint, is a part of the BS2000 basic configuration.

Dprint is an optional product providing support for distributed printing with a client/server architecture. Dprint permits the distribution of print jobs within a cluster configuration or between cluster configurations.

This concept has consequences for the products and for the loading structure. This is because each host in a Dprint environment can be maintained either as a client host or as a server host, or it may incorporate both units (client and server).

With a client host, print jobs can be issued to a server host (local or remote) and also controlled. Cluster management can be performed from a host that has at least client functionality. On a server host, jobs can be processed which have been issued by a client host (local or remote).

So it is possible to define one host for issuing and controlling jobs and for performing cluster administration (client host) and another for processing the jobs (server host).

7.1.1 Hardware and software prerequisites

The following prerequisites must be met to allow the use of Dprint.

Required hardware

– BS2000/OSD Business Server / Business Server SR2000 / OSD/XC
– LAN(TCP/IP or ISO)/WAN
– LAN channel adapter

Required software

BS2000/OSD-BC

– BS2000/OSD-BC as of V4.0
– PDN as of V8.0C
– PRMMAN as of V1.3
– SPOOL V4.4
– SPSERVE as of V2.7
– *open*FT for BS2000 and *open*FT-AC for BS2000 as of V7.0

UNIX systems

– Xprint as of V6.0 with the necessary gateway components
– Product floppy disk

Please refer to the relevant product manuals for information on any additional software required by the UNIX platform.

Windows

– Wprint as of V3.1

Please refer to the relevant product manuals for information on any additional software required by the PC.

Details on the individual products:

DCAM

In order to recognize host-to-host communication, Dprint requires the existence of a BCAM network. Each host which belongs to a Dprint configuration must be defined as a BCAM node. However, it is still possible to have computers in a BCAM network which do not belong to a Dprint configuration. BCAM and Dprint are started independent of one another and one after the other on each host in the network. BCAM must be started before Dprint and stopped after it. The connections between the units must be generated with the aid of BCAM. In the case of interoperability with a UNIX system based host which is connected to an ISO LAN, BCAM definitions are required, see section “BCAM definitions” on page 219.

SPOOL

Dprint requires a BS2000 having a SPOOL Version ≥ V4.4 because the functions which Dprint needs for its distribution capabilities are available with SPOOL. SPOOL must be loaded before Dprint.

openFT and /openFT-AC

The use of *open*FT and *open*FT-AC (formerly FT-BS2000 and FTAC) for transferring the data requires that file transfer be available prior to starting Dprint. The file containing the network description must include all the remote systems with the associated security levels, where applicable, as well as the local system. File transfer must be activated.

These conditions must be satisfied on all (local and remote) systems.

The entire file transfer environment (number of permitted file transfers, number of permitted remote systems, number of permitted tasks, etc.) must be adapted to a Dprint environment.

Systems support (or the system-global user administrator) on each host must create a new user ID SYSDPRNT by means of the ADD-USER command. Similarly, a profile must be defined which must be associated with this used ID (mandatory for *open*FT-AC).

The profile can be created by means of the command /CREATE-FT-PROFILE, where the operand value for “TRANSFER-ADMISSION” must match the parameter of the same name in the SPSERVE statement //MODIFY-SPOOL-PARAMETERS (see the “SPSERVE” manual, the initialized value is ’FTDPRINT’).

No profile need be created on the BS2000 gateway for transferring files that are to be printed on the UNIX platform.

The user ID SYSDPRNT is not a system user ID, i.e. it is not created automatically but must be created by systems support or by the system-global user administrator with the special account number SYSACC and with protection mechanisms. If the user ID SYSDPRNT has not yet been created when the Dprint subsystem is loaded, loading will be aborted. The user ID SYSDPRNT must exist on a single pubset which may not be exported.

File transfer is initiated by the user ID TSOS on the client and is directed to the user ID SYSDPRNT on the server. The user ID SYSDPRNT thus receives all files which come from Dprint clients. The file transfer access authorizations for these user IDs must allow a transfer of this type. This must be defined by the file transfer manager.

A file transfer configuration file must be created under the user ID SYSDPRNT if the BCAM addresses of the accessible hosts and the assigned FT partner names are not the same. This file is a SAM file named $SYSDPRNT.SYSPAR.DPRINT.011. In its first 8 characters, each record contains the logical host name (BCAM address, e.g. D000ZE01). Then follow two blanks, then a further 8 characters giving the partner name which is recognized by file transfer.

Example

```
↓Column 1
HOST1␣␣␣␣␣␣HOST1FT␣␣
HOST2␣␣␣␣␣␣HOST2FT␣␣  (␣ = blank)
```

If the BCAM address of a host is exactly the same as its FT partner name, the corresponding host need not be defined in the file transfer configuration file.

If there is no file transfer configuration file or if the BCAM address cannot be found, file transfer is initiated with the partner name as the BCAM address.

The file transfer configuration file must be generated and maintained by the SPOOL administrator with the assistance of the file transfer administrator.

For reasons of performance, it is advisable to create a special job class with the name JBCDPRNT so that the final processing of the file transfer is started under the user ID SYSDPRNT in this job class. If this job class does not exist, processing is started in the system default job class. However, the job class JBCDPRNT should be restricted to the user ID SYSDPRNT as there is no point in using it unless it has a higher priority than the job classes permitted for nonprivileged users.

Notes

1. Because RSO does not run in Dprint operation, the TRANSDATA printers are accessed via the local RSO. In order to permit printing on a TRANSDATA printer, the printer must be defined in the RSO configuration of the host on which the print job was started.
2. The support for VM2000 is transparent to the SPOOL system. SPOOL systems run in parallel on each VM (Virtual Machine). However, only one system at a time can access a local printer. In order to assign a printer to a VM, the operator must first disconnect it from the current VM (with STOP-PRINTER-OUTPUT) and then assign it to the new VM (with START-PRINTER-OUTPUT). In a Dprint configuration, each VM can be viewed as a single computer which may be both client and also server. In this way it is possible to print on a local printer which is connected to a different VM.

7.1.2 Dprint subsystems

Dprint is dependent on the SPOOL subsystem, but it can be loaded and unloaded independently while SPOOL is running.

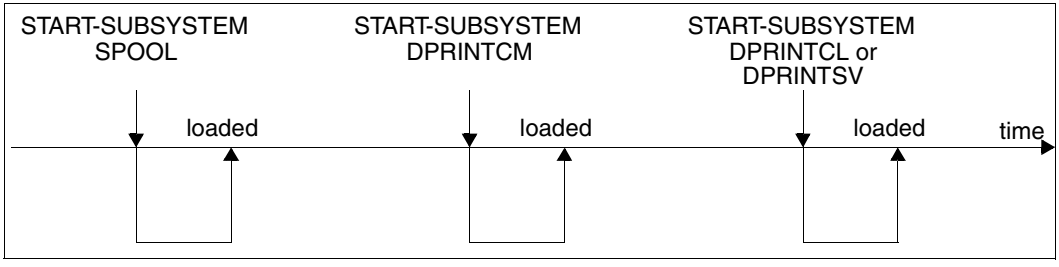
In order to implement the client/server architecture, the global Dprint product is split into subsystems: DPRINTCL (client), DPRINTSV (server), and DPRINTCM which contains the general services for DPRINTCL and DPRINTSV and is therefore mandatory for both. The subsystems must be loaded and unloaded with consideration being given to their dependencies. The DPRINTCM subsystem must be loaded before DPRINTCL and/or DPRINTSV is/are loaded. DPRINTCL and DPRINTSV must be unloaded before DPRINTCM is unloaded.

When the DPRINTCL subsystem is loaded, the “client functionality” is available to the user. When DPRINTSV has been loaded, the “server functionality” is available. The full functionality of Dprint is available when both subsystems are loaded.

The following rules may therefore be summarized:

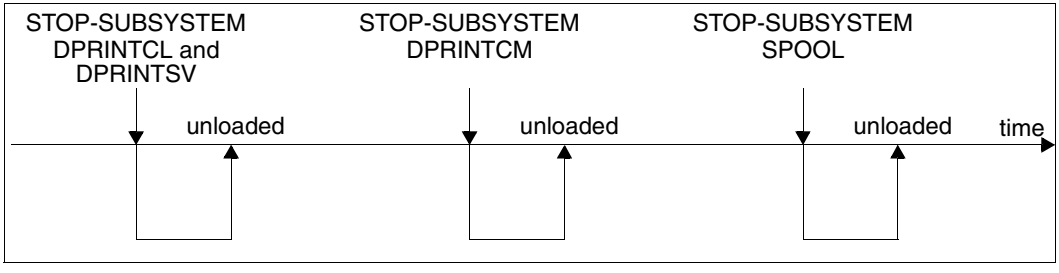
1. The SPOOLSYS subsystem must be loaded prior to “SYSTEM READY”.
2. The SPOOL subsystem can only be loaded if SPOOLSYS has been loaded.
3. The DPRINTCM subsystem can only be loaded if SPOOL has been loaded.
4. The DPRINTCL and/or DPRINTSV subsystems can only be loaded if the DPRINTCM subsystem has been loaded.
5. The DPRINTCL and DPRINTSV subsystems can be unloaded independently of others.
6. The DPRINTCM subsystem can only be unloaded if the DPRINTCL and DPRINTSV subsystems have been unloaded.
7. The SPOOL subsystem can only be unloaded if the DPRINTCM subsystem has been unloaded.

Synchronization on loading the subsystems



Loading the Dprint subsystems

Synchronization on unloading the subsystems



Unloading the Dprint subsystems

7.1.3 Installation of the subsystems

In the following, the files supplied are listed and notes on installation are given for the individual subsystems which are of relevance to the use of Dprint.

Subsystem SPOOLSYS

The following files are supplied for SPOOLSYS V2.2.

File	Contents
SYSSSC.SPOOLSYS.022	Subsystem declaration for SPOOLSYS V02.2
SYSLNK.SPOOLSYS.022 SRMLNK.SPOOLSYS.022 SPMLNK.SPOOLSYS.022	Object module library for SPOOLSYS V02.2
SYSRMS.SPOOLSYS.022	REP file for SPOOLSYS V02.2
SYSMES.SPOOLSYS.022	Message file for SPOOLSYS V02.2
SYSPAR.SPOOLSYS.022	Parameter file for SPOOLSYS V02.2
SIPLIB.SPOOLSYS.022	Library type R GC
SYSSII.SPOOLSYS.022	IMON installation information
SYSFGM.SPOOL.044.D/E	Release notices (German and English)

Files supplied for the SPOOLSYS subsystem

The following installations must be performed prior to system startup:

1. The subsystem declaration for SPOOLSYS must be included in the system's subsystem catalog.
2. The object module library and the REP file must be stored under the appropriate user ID.
3. The message file must be activated.
4. The file SYSREP.SPOOLSYS.022 must be created from the file SYSRMS.SPOOLSYS.022 using RMS.

Under DSSM the SPOOLSYS subsystem can be replaced without causing any interruption of availability. After the switch, the "old" SPOOLSYS version is unloaded as soon as there are no further tasks working with it.

SPOOLSYS parameter file

The SPOOLSYS subsystem provides a parameter file which allows the continuation of print services for SPOOL and PRINT commands and program interfaces to be defined (see also “Continuation of SPOOL and PRINT print services”, page 279). The parameter file may contain the following records:

1. * (comment)
2. BATCH.SPOOL.REQUEST = WAIT-SPOOL-READY / ABORT-REQUEST
   (default = WAIT-SPOOL-READY)

   WAIT-SPOOL-READY means that all SPOOL and PRINT commands remain in batch mode if the SPOOL subsystem is not loaded.

   ABORT-REQUEST means that all SPOOL commands apart from PRINT-DOCUMENT, PRINT-FILE, WRITE-DISKETTE and WRITE-SPOOL-TAPE are rejected if SPOOL is not loaded.
3. PRNT.MACRO.SPOOL.REQUEST = WAIT-SPOOL-READY / ABORT-REQUEST
   (default = WAIT-SPOOL-READY)

   WAIT-SPOOL-READY means that the call for the PRNT macro waits until SPOOL has been loaded again.

   ABORT-REQUEST means that the call for the PRNT macro is rejected if SPOOL is not loaded.

The continuation of the print services for the commands PRINT-DOCUMENT, PRINT-FILE, WRITE-DISKETTE, WRITE-SPOOL-TAPE and LOGOFF is always guaranteed, regardless of what is set in the parameter file.

Subsystem SPOOL

The following files are supplied for SPOOL V4.6A.

File	Contents
SYSSSC.SPOOL.044	Subsystem declaration for SPOOL V4.4
SYSLNK.SPOOL.044 SRMLNK-SPOOL.044 SPMLNK.SPOOL.044	Object module library for SPOOL V4.4 (/390, /SR2000, /Sparc)
SYSRMS.SPOOL.044	REP file for SPOOL V4.4
SYSNRF.SPOOL.044	NOREF file for SPOOL V4.4
SYSMES.SPOOL.044	Message file for SPOOL V4.4 (BS2000/OSD-BC V2.0)
SYSSDF.SPOOL.044	Syntax file for SPOOL V4.4
SIPLIB.SPOOL.044 SYSLIB.SPOOL.044 SYSOML.SPOOL.044	Library type R Library type U GC Library ipexec10
SYSSII.SPOOL.044	IMON installation information
SYSRME.SPOOL.044.D SYSRME.SPOOL.044.E	Readme files (German and English)
SYSFGM.SPOOL.044.D SYSFGM.SPOOL.044.E	Release notices (German and English)
SYSSMB.SPOOL.044	SYMBOL file for DAMP

Files supplied for the SPOOL subsystem

The following installations must be performed prior to loading SPOOL:

1. The subsystem declaration for SPOOL must be included in the system's subsystem catalog.
2. The syntax file, the object module library and the REP file must be stored under the appropriate user ID.
3. The syntax and message files must be activated.
4. The file SYSREP.SPOOL.044 must be created from the file SYSRMS.SPOOL.044 using RMS.

Subsystem DPRINTCM

The following files are supplied for DPRINTCM V1.1B.

File	Contents
SYSSSC.DPRINTCM.011.130	Subsystem declaration for DPRINTCM V01.1
SYSLNK.DPRINTCM.011 SRMLNK.DPRINTCM.011 SPMLNK.DPRINTCM.011	Object module library for DPRINTCM V01.1 (/390) Object module library for DPRINTCM V01.1 (SR2000) Object module library for DPRINTCM V01.1 (Sparc)
SYSRMS.DPRINTCM.011	REP file for DPRINTCM V01.1
SYSSDF.DPRINTCM.011	Syntax file for DPRINTCM V01.1
SYSMES.DPRINTCM.011	Message file for DPRINTCM V1.1
SIPLIB.DPRINTCM.011 SYSLIB.DPRINTCM.011	Library type R GC Library type U GC
SYSSII.DPRINTCM.011	IMON installation information
SYSFGM.DPRINTCM.011.D SYSFGM.DPRINTCM.011.E	Release notices (German and English)
SYSSSI.DPRINTCM.011	Parameter file with optional REPs

Files supplied for the DPRINTCM subsystem

The following installations must be performed prior to loading DPRINTCM:

1. The subsystem declaration for DPRINTCM must be included in the system's subsystem catalog.
2. The syntax file, the object module library, the message file and the REP file must be stored under the appropriate user ID.
3. The syntax and message files must be activated.
4. The file SYSREP.DPRINTCM.011 must be created from the file SYSRMS.DPRINTCM.011 using RMS.

Subsystem DPRINTCL

The following files are supplied for DPRINTCL V1.1B.

File	Contents
SYSSSC.DPRINTCL.011	SSCM catalog declaration for the DPRINTCL V1.1 subsystem
SYSLNK.DPRINTCL.011 SRMLNK.DPRINTCL.011 SPMLNK.DPRINTCM.011 SYSDAT.DPRINTCL.011.DS2000 SUXPRC.DPRINTCL.011.DS2000 SUXPRC.DPRINTCL.011.SHW.DS2000 SYSPRC.DPRINTCL.011.DS2000 SYSSSI.DPRINTCL.011	Object module library for DPRINTCL V01.1 Object module library for DPRINTCL V01.1 (/SR2000) Object module library for DPRINTCL V01.1 (/Sparc)
SINLIB.DPRINTCL.011	Load module library for the BSD-LPD gateway components
SYSRMS.DPRINTCL.011	RMS delivery set for DPRINTCL V01.1
SYSSDF.DPRINTCL.011	Syntax file for DPRINTCL V01.1
SYSMES.DPRINTCL.011	Message file for DPRINTCL V1.1
SYSLIB.DPRINTCL.011.PML2X	Converter library for conversion to BS2000
SYSLIB.DPRINTCL.011	User macro library
SIPLIB.DPRINTCL.011	Restricted macro library
SYSSII.DPRINTCL.011	IMON installation information
SPCDAT.DPRINTCL.011.EXE	Installation package for the Windows driver and its related files
SYSFGM.DPRINTCL.011.D SYSFGM.DPRINTCL.011.E	Release notice (German) Release notice (English)

Files supplied for the DPRINTCL subsystem

The following installations must be performed prior to loading DPRINTCL:

1. The subsystem declaration for DPRINTCL must be included in the system's subsystem catalog.
2. The syntax file, the object module library, the message file and the REP file must be stored under the appropriate user ID.
3. The syntax and message files must be activated.
4. The file SYSREP.DPRINTCL.011 must be created from the file SYSRMS.DPRINTCL.011 using RMS.

Subsystem DPRINTSV

The following files are supplied for DPRINTSV V1.1B.

File	Contents
SYSSSC.DPRINTSV.011	Subsystem declaration for DPRINTSV V01.1
SYSLNK.DPRINTSV.011 SRMLNK.DPRINTSV.011 SPMLNK.DPRINTCM.011	Object module library for DPRINTSV V01.1 (/390) Object module library for DPRINTSV V01.1 (/SR2000) Object module library for DPRINTSV V01.1 (/Sparc)
SYSRMS.DPRINTSV.011	REP file for DPRINTSV V01.1
SYSMES.DPRINTSV.011	Message file for DPRINTSV V1.1 (BS2000/OSD-BC as of V2.0)
SYSSII.DPRINTSV.011	IMON installation information
SYSFGM.DPRINTSV.011.D SYSFGM.DPRINTSV.011.E	Release notices (German and English)

Files supplied for the DPRINTSV subsystem

The following installations must be performed prior to loading DPRINTSV:

1. The subsystem declaration for DPRINTSV must be included in the system's subsystem catalog.
2. The object module library, the message file and the REP file must be stored under the appropriate user ID.
3. The message file must be activated.
4. The file SYSREP.DPRINTSV.011 must be created from the file SYSRMS.DPRINTSV.011 using RMS.

7.1.4 Management of the subsystems

The commands together with the subsystem-specific operands which are used for subsystem management are detailed below for the individual subsystems.

Loading subsystems

The subsystems are loaded by means of the START-SUBSYSTEM command, where there are different operand specifications for the SPOOL subsystem and the Dprint subsystems.

Subsystem SPOOL

```
/START-SUBSYSTEM SUBSYSTEM-NAME=SPOOL
                 [,VERSION=<version>]
                 [,SUBSYSTEM-PARAMETER=string]
                 [,SYNCHRONOUS=YES]
```

For <*version*> you can specify a version ≥ 04.4

For *string* you can specify:

```
'[START=start][,RSO=rso][,SPS=sps]'
```

For the individual operands you can specify:

```
start: WARM or COLD or SELECTIVE(Q#,Q#,...)
     Q#:  3 (queue for jobs printing to printer)
          4 (queue for jobs printing to floppy disk)
          5 (queue for jobs printing to tape)
          8 (queue for RSO jobs)
          11 (queue for jobs in KEEP status)

rso:   NONE or STD or the specified RSO version in 4 or 7 characters

SPS:   NONE or STD or the specified SPS version in 4 or 7 characters
```

Dprint subsystems

```
/START-SUBSYSTEM SUBSYSTEM-NAME=dprint
                 [,VERSION=01.1]
                 [,SUBSYSTEM-PARAMETER=string]
                 [,SYNCHRONOUS=YES]
```

For *dprint* you can specify:

```
DPRINTCM, DPRINTCL or DPRINTSV
```

For *string* you can specify (only for DPRINTCL and DPRINTSV):

```
'START=start'
```

For *start* you can specify:

```
WARM or COLD or SELECTIVE(Q#,..)
          Q#:  3 (queue for jobs printing to printer)
              11 (queue for jobs in KEEP status)
```

The START parameter is described under “Start modes” on page 278.

Suspending a subsystem

The subsystems are suspended by means of the HOLD-SUBSYSTEM command. There are different operands for the different subsystems.

```
/HOLD-SUBSYSTEM SUBSYSTEM-NAME=subsystem
```

For *subsystem* you can specify:

```
SPOOL, DPRINTCM, DPRINTCL or DPRINTSV
```

Releasing a subsystem

The suspended subsystems are released by means of the RESUME-SUBSYSTEM command. There are different operands for the different subsystems.

```
/RESUME-SUBSYSTEM SUBSYSTEM-NAME=subsystem
```

For *subsystem* you can specify:

```
SPOOL, DPRINTCM, DPRINTCL or DPRINTSV
```

Unloading subsystems

The subsystems are unloaded by means of the STOP-SUBSYSTEM command. In this case there are different operand specifications for the subsystem SPOOL and the Dprint subsystems.

Subsystem SPOOL

```
/STOP-SUBSYSTEM SUBSYSTEM-NAME=SPOOL
                [,SUBSYSTEM-PARAMETER=string]
```

For *string* you can specify:

```
'[CALL=call]'
```

For *call* you can specify:

```
WAIT or EJECT
```

Dprint subsystems

```
/STOP-SUBSYSTEM SUBSYSTEM-NAME=dprint
```

For *dprint* you can specify:

```
DPRINTCM, DPRINTCL or DPRINTSV
```

Start modes

As described above, the start mode can be selected as WARM, COLD or SELECTIVE when loading the subsystems SPOOL, DPRINTCL and DPRINTSV, where the following meanings apply:

WARM: All jobs from the file EQUISAMQ are processed.

COLD: All jobs in the file EQUISAMQ are deleted.

SELECTIVE: All jobs from the specified job queues are taken over. The other jobs from the file EQUISAMQ are deleted.

However, different jobs are taken over, depending on the subsystem:

– On loading SPOOL, only SPOOL jobs are taken into consideration (no Dprint jobs).

– On loading DPRINTCL, only Dprint jobs which are issued on a host and processed by a remote server are taken into consideration.

– On loading DPRINTSV, Dprint jobs which are issued on the local host or a remote host and processed by the local server are taken into consideration.

Note

If a host on which DPRINTCL is loaded is also the gateway for its cluster, jobs which are sent from a remote cluster to this gateway host are also regarded as client jobs.

On a gateway host on which DPRINTCL is loaded, the following jobs are therefore regarded as client jobs and handled accordingly during startup and shutdown:

– jobs which have been issued on this host within the local cluster and

– jobs which have been issued from a remote cluster to this gateway.

Continuation of SPOOL and PRINT print services

SPOOLSYS is a mandatory TPR subsystem which is loaded automatically at system startup time.

If the subsystem SPOOL is not loaded, the SPOOL commands which have been issued in batch mode are held in a queue in SPOOLSYS in order that they may be executed when SPOOL is next loaded. This procedure also applies to the PRNT macro and for print requests pertaining to LOGOFF.

Prerequisite for the above are the following specifications in the SPOOLSYS parameter file (see also “SPOOLSYS parameter file”, page 271):
BATCH.SPOOL.REQUEST=WAIT-SPOOL-READY and
PRNT.MACRO.SPOOL.REQUEST=WAIT-SPOOL-READY.

All the SPOOL commands guarantee the continuation of print services:

CANCEL-PRINT-JOB
HOLD-PRINT-JOB
MODIFY-DISKETTE-OUTPUT-STATUS
MODIFY-PRINT-JOB-ATTRIBUTES
MODIFY-PRINTER-OUTPUT-STATUS
MODIFY-TAPE-OUTPUT-STATUS
PRINT-DOCUMENT
REDIRECT-PRINT-JOB
RESUME-PRINT-JOB
SHOW-ACTIVE-SPOOL-DEVICES
SHOW-PRINT-JOB-ATTRIBUTES
SHOW-PRINT-JOB-STATUS
SHOW-PRINTER-POOLS
SHOW-SPOOL-CHARACTER-SETS
SHOW-SPOOL-DEVICES
SHOW-SPOOL-FORMS
SHOW-SPOOL-PARAMETERS
START-DISKETTE-INPUT
START-DISKETTE-OUTPUT
START-PRINTER-OUTPUT
START-TAPE-OUTPUT
START-TAPE-REPLAY
STOP-DISKETTE-INPUT
STOP-DISKETTE-OUTPUT
STOP-PRINTER-OUTPUT
STOP-TAPE-REPLAY
WRITE-DISKETTE
WRITE-SPOOL-TAPE

Switching Dprint subsystems with or without continuation of the print services

Since the Dprint subsystems are unloaded before SPOOL, the continuation of print services is guaranteed only for jobs which require no specific Dprint components (such as CLUSTER-NAME, RESOURCES-LOCATION...).

Creating the Dprint subsystems and environment on a host

Loading subsystems

In order to take the dependencies between the subsystems SPOOL, DPRINTCM, DPRINTCL and DPRINTSV into consideration, these must be

– loaded in a particular sequence:

```
1. /START-SUBSYSTEM SUBSYSTEM-NAME=SPOOL,VERSION=04.4,SYNCHRONOUS=YES

2. /START-SUBSYSTEM SUBSYSTEM-NAME=DPRINTCM,VERSION=01.1,SYNCHRONOUS=YES

3. /START-SUBSYSTEM SUBSYSTEM-NAME=DPRINTCL,VERSION=01.1,SYNCHRONOUS=YES
   or
   /START-SUBSYSTEM SUBSYSTEM-NAME=DPRINTSV,VERSION=01.1,SYNCHRONOUS=YES
```

The operand “SYNCHRONOUS” guarantees that DPRINTCM will not be started until SPOOL has been loaded and that DPRINTCL or DPRINTSV will not be started until DPRINTCM has been loaded.

– unloaded in a particular sequence:

```
1. /STOP-SUBSYSTEM SUBSYSTEM-NAME=DPRINTCL,SYNCHRONOUS=YES
   and
   /STOP-SUBSYSTEM SUBSYSTEM-NAME=DPRINTSV,SYNCHRONOUS=YES

2. /STOP-SUBSYSTEM SUBSYSTEM-NAME=DPRINTCM,SYNCHRONOUS=YES

3. /STOP-SUBSYSTEM SUBSYSTEM-NAME=SPOOL,SYNCHRONOUS=YES
```

The operand “SYNCHRONOUS” guarantees that DPRINTCM will not be stopped until DPRINTCL and DPRINTSV have been unloaded and that SPOOL will not be stopped until DPRINTCM has been unloaded.

Definition of the Dprint environment

In order to allow management of the Dprint objects, the DPRINTCM subsystem and the SPSERVE product must first be installed. The Dprint environment can then be defined:

```
/START-SPSERVE

//OPEN-PARAMETER-FILE PARAMETER-FILE=*DPRINT-PARAMETERS

//ADD-DPRINT-xxx ...
//ADD-DPRINT-xxx ...
...

//END
```

It should be noted that the local server must be defined on the host before DPRINTSV is loaded (SPSERVE statement //ADD-DPRINT-SERVER). For further information refer to the “SPSERVE” manual.

Unloading a Dprint subsystem on a host

If the DPRINTCL or DPRINTSV subsystem is unloaded on a host which belongs to a cluster, the cluster configuration is not changed. The host is always regarded as part of the cluster, even if there are no longer any access facilities from other hosts in the cluster.

One exception concerns the unloading of Dprint on a host on which the cluster administrator is defined. Here, two situations are differentiated:

1. The cluster administrator is also the master of the cluster. Unless the host is the last host in the cluster on which Dprint is loaded, Dprint automatically transfers its management to the next host. A successor host can be defined by using the commands CREATE-DPRINT-CLUSTER or MODIFY-DPRINT-CONFIGURATION.
2. The cluster administrator is also the master of the cluster. If the host is the last host in the cluster on which Dprint is loaded, this information will be stored in its configuration file. This is used on restarting Dprint (see “Reloading a Dprint subsystem on a host” below).

When the DPRINTCL / DPRINTSV subsystem is unloaded on a host, this host receives either the functionality of a server or client (if DPRINTSV / DPRINTCL is still loaded), or the functionality of the local SPOOL (if no other Dprint subsystem is still loaded).

Reloading a Dprint subsystem on a host

The loading or unloading of a Dprint subsystem is independent of the cluster configuration. A host still belongs to the cluster, even if Dprint is unloaded for a time on this host.

When a Dprint subsystem is loaded on a host again, it may be necessary to eliminate certain inconsistencies in the configuration. If the host does not belong to a cluster, no action is required. If the host belongs to a cluster, the following points should be noted.

– The host first attempts to establish a connection with the first available host in the cluster configuration to which it previously belonged.

– If no connection is possible or if no cluster configuration exists, two situations are differentiated:

  1. If Dprint is reloaded on the last host in the cluster on which it was previously loaded, then the configuration information still exists and the cluster can be restored.

  2. If Dprint is reloaded on a host which was not the last host in the cluster on which it was previously loaded, configuration information could be lost. In this case, a warning message inquires whether or not loading is to be continued.

– If a connection is possible and a cluster configuration exists, the host receives the configuration file of the current cluster administrator (its own is overwritten).

  If the host was additionally the master of the earlier cluster, its successor also allows it to become cluster administrator again.

  After a reload, the host which has the higher priority in the host hierarchy becomes the cluster administrator. If the current cluster administrator has a lower priority than the newly connected host, it loses its privilege and becomes the slave host.

7.2 BSD-LPD gateway installation

This entity **must** be installed on a host defined as one of the gateway hosts of the current BS2000 cluster.

The specific gateway and its related files are stored in a BS2000 LMS library. This is later named SINLIB.DPRINTCL.011 and must be copied under the SYSROOT user ID using the standard POSIX installation utility, provided that the POSIX subsystems concerned have been installed and started. The message-file language can be either English (E) or German (D). English is the default setting and can be modified by editing the INSTALL.SBSDUTIL.011 element of the SINLIB.DPRINTCL.011 and setting the language parameter (E or D) of the CREMSG command.

Start the POSIX installation program as follows:

```
/START-POSIX-INSTALLATION
```

Choose the program package installation option and enter the name of the product (DPRINTCL) and its version number (011). The system terminates and reports whether the installation is complete or whether an error occurred. For more details refer to the BS2000 "POSIX" manual.

CAUTION!
Reinstalling the gateway does **not** overwrite the configuration files and the ‘bs2bincp’ shell script. This shell script must be manually copied from the /var/spool//SBSD/util directory and edited before any customization activities can be started.

Deinstalling the BSD gateway package via the same POSIX function (DELETE PACKAGE option) will not remove the files and directories created at gateway runtime.

7.2.1 Files for gateway installation

Binary files

/var/spool/SBSD/bin/spchg:
The gateway starter/stopper (see the spchg command of the user interface section to activate it).

/var/spool/SBSD/bin/GW:
The gateway itself.

/var/spool/SBSD/bin/spstat:
The gateway status program.

/var/spool/SBSD/bin/bs2bincp:
Shell script utility needed by the gateway.

/var/spool/SBSD/bin/bs2doccp:
Copy a document from the POSIX file system to the BS2000 file system.

/var/spool/SBSD/bin/WIN2PGST:
Converter for PML data stream generated by the Fujitsu Siemens PageStream driver under Windows.

Configuration files

/var/spool/SBSD/servers: gateway definitions.
This file contains the description of the gateways that may be started (see below for a complete layout description).

/var/spool/SBSD/clients: client partner definitions.
This file is the list of the clients known to the gateway (see below for a complete layout description).

/var/spool/SBSD/content_type: the content type and form definitions.
This file is the list of properties supported and their corresponding content types (see below for a complete layout description).

/var/spool/SBSD/Queue: queue definitions.
This file is the list of the queues known to the gateway and which can be used by BSD clients (see below for a complete layout description).

/var/spool/SBSD/Sbsd.msg:
message file of BSD gateway.

Logging & debugging

/var/spool/SBSD/GW/gatewayname/Sbsd.log:
Gateway logging. Where gatewayname stands for the started gateway name.
Example: For a gateway named 'teddy', the path would be:
/var/spool/SBSD/GW/teddy/Sbsd.log

/var/spool/SBSD/GW/gatewayname/Sbsd.dbg:
Debugging info if the -Z option is specified in the spchg command, where gatewayname stands for the started gateway name.
Example: For a gateway named 'teddy', the path would be:
/var/spool/SBSD/GW/teddy/Sbsd.dbg

/var/spool/SBSD/GW/gatewayname/SpoolGWR2X.dbg:
Deep debugging info (when -Z specified), where gatewayname stands for the started gateway name.
Example: For a gateway named 'teddy', the path would be:
/var/spool/SBSD/GW/teddy/SpoolGWR2X.dbg

/var/spool/SBSD/Sbsd.log:
Startup/shutdown logging of all gateways.

7.2.2 Creating the gateway configuration

/var/spool/SBSD/servers

The filename "servers" is intended to represent the correlated entity of BSD clients, even if, functionally, it describes the path used by the gateway to reach the BS2000 distributed printing environment. Such a file may be edited using the "edt" utility available within POSIX.

Each line of this file is either a comment (line starting with the # char) or a description of a gateway. A comment line can be anything you wish. However, the description of a gateway is governed by rules that must be observed. The data sequence is fixed and cannot be changed. The data needed for a correct and complete definition is:

– the name of the gateway
– the listen port and the send port
– the range of ports that clients may use
– the client's request threshold before the cleanup of the files sent
– the maximum number of requests treated simultaneously
– the percentage of disk space that may be used for the $SYSDPRNT user ID.

These entries must be separated from each other by at least one blank.

Example

```
/var/spool/SBSD> cat servers
 #server name listen port send port PI  PA  CLEANUP MAXCHILD %DISK LIMIT
 teddy        515         5010      721 731 20      20       80
```

The first line is a comment that should be in the file for user readability. The second line is a gateway description: the gateway is called 'teddy' and will be started and stopped with this name. The path for its logging (and debugging) file(s) is /var/spool/SBSD/GW/teddy/.

The teddy gateway will listen for client requests on port 515. This can later be parameterized to be able to start gateway listening on other ports (to avoid conflict, a port number can only be used by one gateway at a time).

The teddy gateway will work with the BS2000 cluster gateway host via the port number 5010. This is the port number of the host in the Dprint configuration file.

The clients of the teddy gateway will use a port number between 721 and 731, otherwise any requests will be rejected.

After every 20 (the CLEANUP value) client requests, the system will clean the server directory of the remaining data and control files.

The value (MAXCHILD) limits the number of requests that will be handled simultaneously. This prevents later memory overflow and other saturation problems of the CPU.

The last value (%DISK LIMIT) represents (in percent) a limit for the disk space usage on the $SYSDPRNT user ID. When a new print request comes from the net, the disk space used under the $SYSDPRNT user ID is calculated; it is divided by the disk space allowed for this user ID. If the result is greater that the %DISK LIMIT value, the print request is rejected.

Note

These values are only read when the gateway is started. Any modifications to the values will only be taken into account the next time the gateway is started.

/var/spool/SBSD/clients

A list of regular expressions describing the gateway's clients. There is one regular expression per line, and a line that starts with the # character is considered to be a comment line.

Example

```
/var/spool/SBSD> cat clients

 # Description of the clients.
 PC0812
 D241S[0-5]
```

From this list, the following clients are accepted by the server:

```
PC0812
d241s0,d241s1,d241s2,d241s3,d241s4,d241s5
```

See the "POSIX commands" manual for the complete description of regular expressions.

var/spool/SBSD/content_type

A list of entries and comments. A line that starts with the # character is considered to be a comment line. An entry consists of:

– a property (one of the following characters: c/d/f/g/l/n/o/p/r/t/v),

– a content type (max. 16 characters).

Every element of an entry is mandatory and is separated from the other ones by at least one blank.

Example

```
/var/spool/SBSD> cat content_type

# Property  Content type
f           PLAIN-TEXT
l           COMPATIBLE
o           POSTSCRIPT
c           SPDS
d           EXCCW
v           PCL
```

The first line is a comment and should be kept for user readability. The first single character is the property (property of the local BSD queue). The content type gives information for the processing of the gateway and the filter's selection in Dprint. An unknown content type is considered by Dprint to be "COMPATIBLE".

Note

The first 3 entries are the default ones (when the gateway is installed). They should be left unchanged. Any requests arriving with an undefined property are rejected.

As of Dprint V1.0E you can enter Qname.content_type instead of content_type. Dprint always searches for this file first. If no file with this name exists, then Dprint searches for the file content_type.

/var/spool/SBSD/Queue

A list of entries and comments. A line that starts with the # character is considered to be a comment line. An entry consists of:

– a queue name

– a printer name (max. 8 characters, uppercase)

– a form name (max. 6 characters, uppercase).

Every element of an entry is mandatory and is separated from the other ones by at least one blank.

Example

```
/var/spool/SBSD> cat Queue

# Client Q          Real Q         Form
LANT0812            LANT0812       STD
AFPDS_printer_A4    P22L8APA       A4
AFPDS_printer_STD   P22L8APA       STD
EXCCW_printer       P22L1EXC       STD
```

The Client queue column represents the possible queues that a BSD client may use to submit a print job. Relating to a client queue, a real printer pool name, known either in the Dprint configuration or an RSO printer (pool) name recorded in the local SPOOL parameter file, is associated as well as a form name. This means that a BSD client that submits a print job to this queue will produce the submission of the job on the printer (pool) name with a particular form.

The client queue name therefore represents an abstraction of a duplet: real S&P printer (pool) name with a particular form to be used.

/var/spool/SBSD/bs2bincp

The file bs2bincp is a specific shell script which is activated at a certain point in the BSD gateway processing when a job submission is received. It copies the received data file in the BS2000 environment, but also and mainly to convert the data stream produced by the Windows Fujitsu Siemens PageStream driver into a compliant AFPDS (resp. EXCCW) data file according to some tunable environment variables used to communicate parameters to the converter:

W2S_MAXINBIN
: Maximum number of input trays supported by the printer. For single-sheet printers only. Possible values: 1 to 8 (see “Remark 1” on page 292). Default value: 3

W2S_INTRAYA
: Internal code for input tray A (upper tray).
Possible values: see “Remark 1” on page 292.
Default value: see “Remark 1” on page 292.

W2S_INTRAYB
: Internal code for input tray B. Possible values: see “Remark 1” on page 292.
Default value: see “Remark 1” on page 292.

W2S_INTRAYC
: Internal code for input tray C. Possible values: see “Remark 1” on page 292.
Default value: see “Remark 1” on page 292.

W2S_INTRAYD
: Internal code for input tray D. Possible values: see “Remark 1” on page 292.
Default value: see “Remark 1” on page 292.

W2S_INTRAYE
: Internal code for input tray E. Possible values: see “Remark 1” on page 292.
Default value: see “Remark 1” on page 292.

W2S_INTRAYF
: Internal code for input tray F. Possible values: see “Remark 1” on page 292.
Default value: see “Remark 1” on page 292.

W2S_INTRAYG
Internal code for input tray G. Possible values: see “Remark 1” on page 292.
Default value: see “Remark 1” on page 292.

W2S_INTRAYH
Internal code for input tray H. Possible values: see “Remark 1” on page 292.
Default value: see “Remark 1” on page 292.

W2S_FULLPRT
Specifies whether the printer is an edge-to-edge printer (YES) or whether there are non-printable areas (NO). PCL printers only (see “Remark 2” on page 292).
Possible values: must be YES or NO (without quotation marks).
Default value: YES

W2S_FANFOLDLANDSCAPE
Specifies whether the landscape orientation in PCL is standard or whether it will be inverted. This environment variable is only of significance with PCL printers and is only useful with continuous printers (see “Remark 3” on page 292).
Possible values: must be STD or REVERSE (without quotation marks).
Default value: STD

W2S_MSGPAGE
Permits the print of a message page containing information on errors that occurred during the conversion (see “Remark 4” on page 295).
Possible values: must be YES or NO (without quotation marks). Default value: YES

W2S_COLOR
In order to use this option, color files must be generated by the driver.
Highlight color generated in target files. (Applies only for AFP and PCL).
Possible values: must be "YES" or "NO". Default value: Printing in black/white

W2S_COLORNUMBER
Number corresponding to an AFP color for IM/IO objects.

Possible values:

1: Black	2: Blue	3: Brown	4: Cyan
5: Green	6: Magenta	7: Red	8: Yellow

Default value: Printing in red (only if W2S_COLOR was specified).

W2S_INFILE
Input file name (data from windows driver), from 1 to 1023 characters. Unless otherwise specified, data is read from stdin.

W2S_OUTFILE
Output file name (converted data), from 1 to 1023 characters.Unless otherwise specified, data is written to stdout.

W2S_ERRFILE
: Error message stream, from 1 to 1023 characters. Unless otherwise specified, errors are written to stderr.

W2S_LANGUAGE
: Select the output language - it must be either 'EXCCW' or 'SPDS' (without quotes). Unless otherwise specified, 'EXCCW' is assumed.

W2S_EXCCWLCL
: LCL number that switches the LIP printer to EXCCW mode.
Possible values: 0 to 50,000. Unless otherwise specified, the LCL number 0 is used

W2S_EXCCWFONTSTART
: ID allocated to the first loaded $font. Subsequent ones are calculated by incrementing this number. Possible values: 1 to 32256. Unless otherwise specified, 9472 is assumed.

W2S_INLINEFONTS
: Specifies if inline fonts can be used. Inline font means that the document to be printed contains the font definition within the data stream. When no inline fonts are used, any text received from the windows driver is converted to bitmap graphics by the converter; this creates a larger output file and results in lower printing performance.
The value must be either 'YES' or 'NO' (without quotes). For performance reasons, you are advised to use inline fonts. If the converter generates documents for printing with SPS V02.1 or lower, this parameter must be set to 'NO'. Unless otherwise specified, YES is assumed for EXCCW printing, NO for SPDS.

W2S_COMPRESSION
: specifies the compression algorithm that should be applied to the graphics data. The permitted value is:

  'NONE'
  : no compression (default)

  'FAX-G4'
  : for CCITT fax group 4. The value 'FAX-G4' may only be used if the printer supports compression. This is the case with new EXCCW/IPDS printers with SRA controllers.

Remark 1

These variables were introduced because the values for the "Paper Source PCL" command depend on the printer in question. For example, the manner in which the input trays for the Hewlett Packard LaserJet 5Si are identified internally differs from how the input trays for printers connected with BS2000 are identified (SRA controllers).

These variables are not reserved for PCL printers and can also be used to specify additional input trays for the languages EXCCW and SPDS. The following table indicates the default values used by the program if no values are entered for the variables:

Tray	A (upper tray)	B	C	D	E	F	G	H
EXCCW	0	1	2	3	4	5	6	7
SPDS	1	2	3	4	5	6	7	8
PCL	1	4	5	8	1	1	1	1

The PCL default values are required when printing via the SRA controller. The values for trays D through H are as yet unknown.

If an input tray higher than that defined in W2S_MAXINBIN is specified in the PageStream driver, the conversion of the document into EXCCW and SPDS will be rejected and "Default" will be selected in PCL.

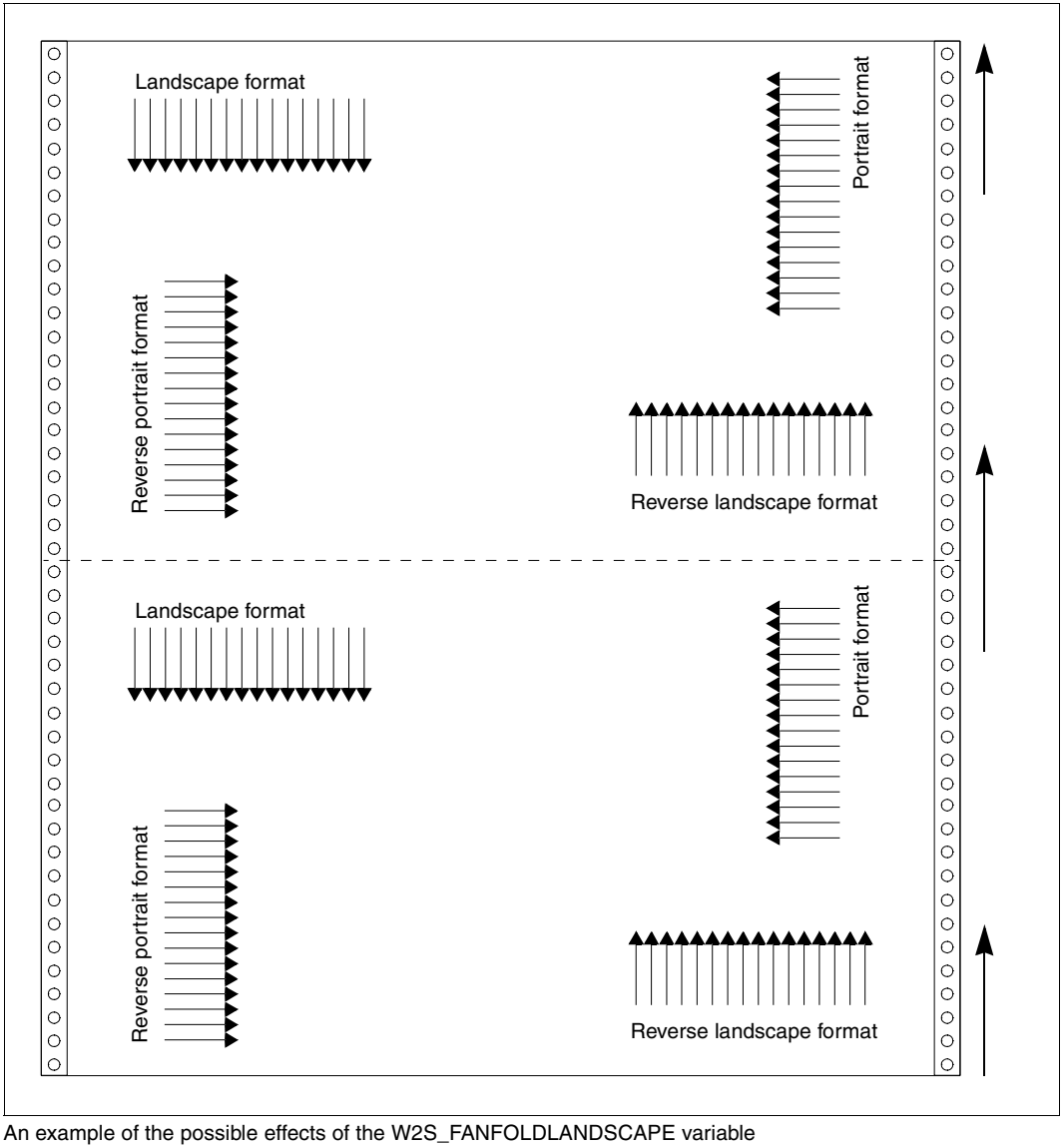
Remark 2

On PCL printers with non-printable areas, the X position 0 identifies the start of the printable area. If the W2S_FULLPRT configuration parameter is set to NO, the contents of the page will be moved to the left and aligned to the left edge of the page. If the document to be printed has smaller page edges than the non-printable area, text and graphics may be clipped.

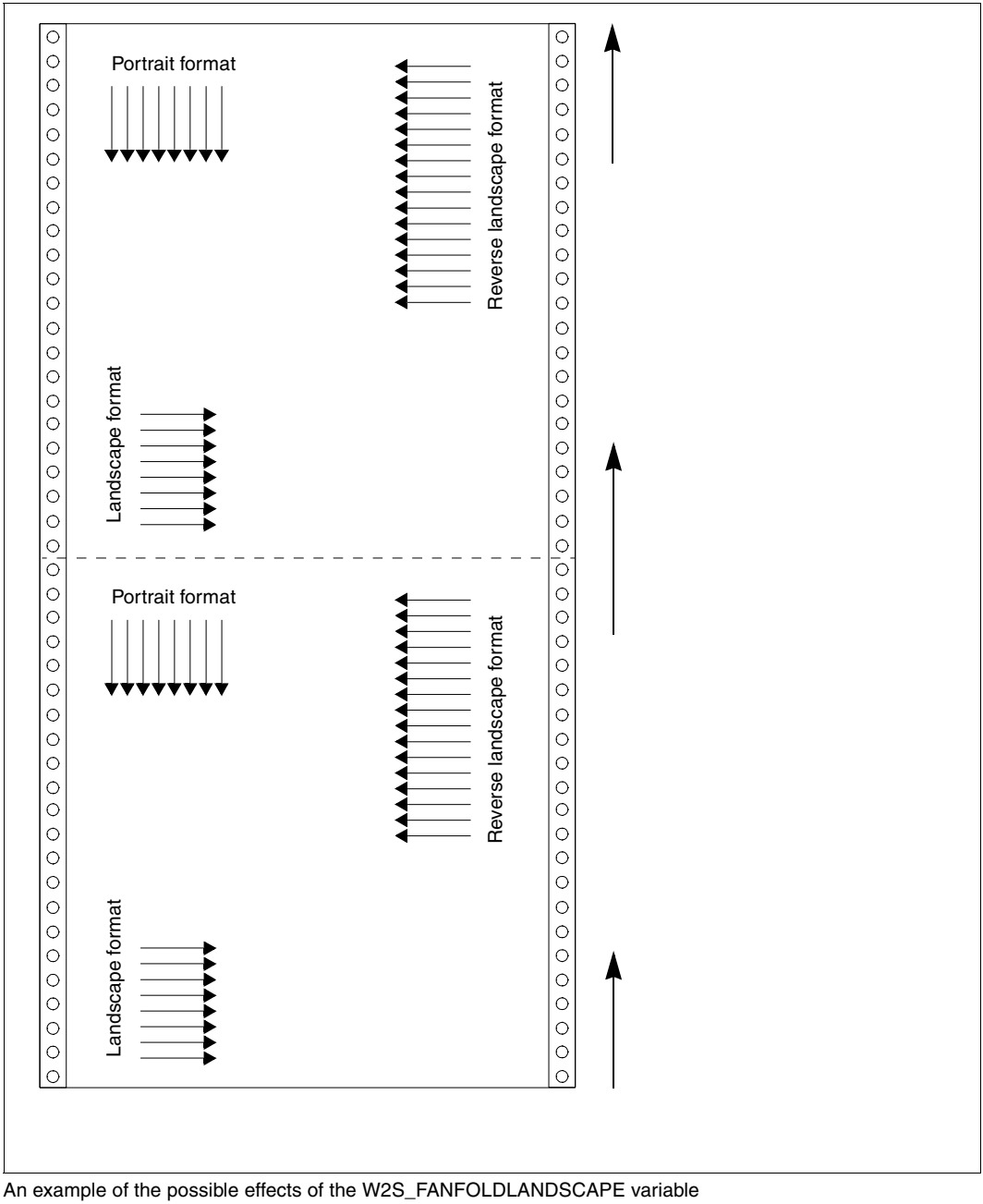
Remark 3

In PCL, the landscape print format is usually achieved by rotating the page 90 degrees to the left. This setting is of no consequence on single-sheet printers. On continuous printers, on the other hand, this print direction may be incorrect depending on the paper format used as illustrated in the figures on the following pages.

Some printers offer a facility for selecting a standard print direction, others do not (the Pagestream printer is one of these). For that reason, this facility is also offered via software. The following figures illustrate the possible effect of the W2S_FANFOLDLANDSCAPE variable:



An example of the possible effects of the W2S_FANFOLDLANDSCAPE variable



An example of the possible effects of the W2S_FANFOLDLANDSCAPE variable

Remark 4

There are 3 categories of error:

1. If the document cannot be printed correctly (e.g. unknown resolution, unknown paper format or input tray, incorrect input file structure), only a message page will be printed.
2. If the document cannot be printed correctly (e.g. invalid output tray), the message page will be printed after the document.
3. Nothing will be printed if the error is a non-recoverable software error (e.g. insufficient main memory, file input/output error).

All errors will be logged in the POSIX error file for the corresponding print job no matter what the category.

Exit code

When the program exits, it returns the following error codes:

0	No error
1	Parameter error
2	error on in/out/temp files
3	error on error stream
4	request memory error
5	unsupported input file format
6	no disk space

When an error occurs, the problem is logged in a error message file supplied to the converter via the WS2_ERRFILE variable. This error file is built in by default with the BS2000 TSN under which the job has been submitted and a string 'error_file'. The lifetime of such a file depends on the cleanup interval determined at gateway definition. A trailer page will be printed out with a message SDD3018 error code 2 reporting that a file transfer has been abnormally terminated.

7.2.3 Restrictions affecting BSD-LPD implementation

The BSD gateway cannot process more than one data file per control file. Only one data file is permitted for each control file or in other words only one data file per print job. The gateway supports RFC1179 which is the suggested default for lpr on UNIX systems.

However, the following flags are not processed and as such are ignored:

Class for banner page (C), Indent Printing (I), Print banner page (L), Mail when printed (M), Symbolic link data (S), Unlink data file (U), Width of output (W), Troff fonts (1,2,3,4).

The following document formats, which do not exist within BS2000, can be used: CIF file (c), DVI file (d), Plot file (g), ditroff output file (n), file with FORTRAN carriage control (r), troff output file (t), raster file (v).

The assignment of these types to the types known in BS2000 is made in the “content_type” file when setting up the gateway. For example, a CIF file (c) can be used to view a document as SPDS, even though the DVI file is an EXCCW data stream.

7.2.4 Late binding

This section is only relevant if the optional product IDOM is also available. More detailed information on IDOM can be found in the manual of the same name.

What is late binding?

Some process steps in Spool&Print can be executed asynchronously or in parallel. In some processes, for example conversions, these steps must be executed at the appropriate stage, i.e. when printing the document instead of when creating the document. This is called late binding.

The decision relating to the type of conversion should be made as late as possible as otherwise the content can only be transferred to one type of output system. Late binding permits greater flexibility when it comes to structuring the content so that it can be output in different ways to satisfy the requirements of the current printer pool configuration.

The process of late binding involves delaying the decision as to whether Windows documents to be printed under BS2000 will be converted prior to printing. This means that these documents can be output in a manner appropriate to the current printer configuration (CT2, LAN) and that the target printer language supported is taken into consideration.

The print jobs sent from Wprint are currently received by the gateway on the POSIX system. In the case of Windows documents created by the Windows drivers from Fujitsu Siemens, they will be converted into a suitable target printer language on the POSIX system. In the case of IDOM frame, the conversion will be performed as late as possible as only IDOM itself can decide which target printer is to be used.

To achieve this, the BSD gateway supports PML files and the WIN2PGST converter can now be used in a BS2000 environment as a filter within IDOM (further information can be found in the Command manual under "CONVERT-IDOM-DOCUMENT").

How can late binding be selected?

Information is contained in the content type file (/var/spool/SBSD/content_type or /var/spool/SBSD/Qname.content_type).

The new content type 'PML' (Printing Meta Language) can be assigned to the properties. This content type indicates that the flexible form of the file will be held by the gateway and that the file, if necessary, will be converted to an output format appropriate to the current printer environment.

Example

```
# Property   Content_type
f            PLAIN-TEXT
c            PML
```

In this way a print request with the content type 'PML' will be sent for all Windows documents created by the Windows drivers from Fujitsu Siemens with the property 'c'. No conversion will be performed on the POSIX system. 'PML' can also be selected as a free format in the Wprint devices definition.

7.2.5 Converter

This section is only relevant if the optional product IDOM as of V1.0 is also available. More detailed information on IDOM can be found in the manual of the same name.

Description of the PML2X converter

The PML2X converter (and its associated default parameter files) is supplied with DPRINTCL as an add-on for IDOM in the SYSLIB.DPRINTCL.011.PML2X (resp. SRMLIB.DPRINTCL.011.PML2X, SPMLIB.DPRINTCL.011.PML2X) library. It can produce printer data streams from the PML (Printing Meta Language) generated by Windows drivers from Fujitsu Siemens. The output languages are AFP, PCL, EXCCW and PDF data stream.The PML2X supports a series of options such as duplex printing, FAX4 compression or highlight color.

Using a converter such as this is directly connected with the late binding function described above. Windows documents do not necessarily have to be converted if the corresponding BS2000 file was created, instead they can be processed for as long as possible before they are printed under BS2000.

The result of a conversion using the PML2X converter is the same as the result of a conversion using WIN2PGST on the POSIX system, provided that the documents and the environments correspond to each other. A parameter file must be assigned so that an environment for a PML2X converter can be configured.

Description of the parameter file

The released parameter files (SYSPAR.PML2xxx in the respective PML2X libraries) are text files, containing options used to optimize the data stream generated by the converter. They are templates (one for each target language: AFP, PCL, EXCCW or PDF) that can be modified before executing the converter:

W2S_LANGUAGE

...

Possible values:
EXCCW, PCL, SPDS or PDF
...

W2S_EXCCWLCL

...

Possible values:
between 0 and 50000
Relevant only for PML2EXC
...

W2S_EXCCWFONTSTART

...

Possible values:
between 1 and 32256
Relevant only for PML2EXC

...

W2S_INLINEFONTS

...

Possible values:
YES or NO. For performances reasons, you are advised to use inline fonts.
Relevant only for PML2EXC, PML2AFP, PML2PCL

...

W2S_COMPRESSION

...

Possible values:
NONE or FAX-G4 for PML2EXC, PML2AFP, PML2PCL, ZLIB (more efficient, not so fast) or RLE (faster, less efficient) for PML2PDF

...

W2S_MAXINBIN

...

Possible values:
Between 1 and 8
Relevant only for PML2EXC, PML2AFP, PML2PCL

...

W2S_INTRAYA

…

W2S_INTRAYB

…

W2S_INTRAYC

…

W2S_INTRAYD

…

W2S_INTRAYE

…

W2S_INTRAYF

…

W2S_INTRAYG

…

W2S_INTRAYH

...

Possible values:
…
Relevant only for PML2EXC, PML2PCL

W2S_FULLPRT

...

Possible values:
YES or NO
...

W2S_MSGPAGE

...

Possible values:YES or NO
Relevant only for PML2EXC, PML2AFP, PML2PCL
...

W2S_OVL

Specifies if an overlay must be generated from a PML bitmap.

Possible values:
YES or NO
Relevant only for PML2EXC, PML2AFP, PML2PCL

W2S_OVL_NUMBER

Defines the overlay ID.

Possible values:
Between 0 and 255 for PML2EXC and PML2AFP
Between 0 and 32767 for PML2PCL
Relevant only for PML2EXC, PML2AFP, PML2PCL

W2S_FANFOLDLANDSCAPE

...

Possible values:
STD or REVERSE
Relevant only for PML2AFP, PML2PCL
...

W2S_COLOR

...

Possible values:
YES or NO
Not relevant for PML2EXC.
In order to use this option, color files must be generated by the driver.
...

W2S_COLOR_NUMBER

...

Possible values:
Between 1 and 8
Relevant only for PML2AFP, PML2PCL
...

W2S_OVL_TRANS

Specifies if the overlay or macro must be generated into TRANS format.

Possible values:
YES or NO
Relevant only for PML2AFP, PML2PCL

W2S_TITLE

Defines the document title. This one belongs to the "Properties" of the PDF document.

Possible values:
Between 0 and 64 characters
Relevant only for PML2PDF

W2S_AUTHOR

Defines the document author.This one belongs to the "Properties" of the PDF document.

Possible values:
Between 0 and 64 characters
Relevant only for PML2PDF

W2S_SUBJECT

Defines the document subject.This one belongs to the "Properties" of the PDF document.

Possible values:
Between 0 and 64 characters
Relevant only for PML2PDF

Rules to be observed when adding or changing parameters:

- Each parameter must have the following format:

  PARAMETERNAME=PARAMETERVALUE,

  The equal to sign after the parameter name and the comma after the parameter value are mandatory. Each line may contain only one parameter.

  The converter will return an error message if these rules are not observed.

- Comment lines in the parameter file begin with the "#" ... character

  The default value of a parameter is used if the comma is placed directly after the equal to sign.

  The following parameter file is an example of the standard file supplied with the PML2X converter (enter a "D" in the SYSLIB.DPRINTCL.011.PML2X library):

```
#
# Sample configuration file for parameters for PML2X
# ------------------------------------------------------------------------
#
# Select the output language.
W2S_LANGUAGE= SPDS,
#
# Use the default LCL number for EXCCW.
W2S_EXCCWLCL=,
#
# Use the default ID for the first font loaded.
W2S_EXCCWFONTSTART=,
#
# Define whether inline fonts can be used.
W2S_INLINEFONTS= NO,
#
# Define the compression algorithm to be used for graphics data.
W2S_COMPRESSION=FAX-G4,
#
# Use the default highest value for the input tray.
W2S_MAXINBIN=3,
#
# Use the default value for input tray codes.
W2S_INTRAYA=,
W2S_INTRAYB=,
W2S_INTRAYC=,
W2S_INTRAYD=,
W2S_INTRAYE=,
W2S_INTRAYF=,
W2S_INTRAYG=,
W2S_INTRAYH=,
```

```
#
# Use the default value for the ’Full Print Area’ option.
W2S_FULLPRT=NO,
#
# Use the default value for the 'Fanfold Display’ option in landscape format.
# Only for PCL printers
W2S_FANFOLDLANDSCAPE=,
#
# Use the default value for the 'Message page' option
# The default value is ’YES’ for PCL and ’NO’for other formats.
W2S_MSGPAGE=,
#
# Specify whether the generation of highlight colour is required.
W2S_COLOR=NO,
#
# Define the number assigned to an AFP color for IM/IO objects.
# Only for SPDS printers.
# Use the default value (7).
W2S_COLOR_NUMBER=,
#
# End of the configuration file for parameters
#
```

Description of the configuration file

The configuration file is a text file containing options that govern the configuration of the converter.

The PML2X converter is not assigned a configuration file.

Using the PML2X converter with IDOM (Integrated Document and Output Management)

The PML2X converter increases the reliability of IDOM by permitting access to different printers. The converter must be used in conjunction with the Windows drivers from Fujitsu Siemens Computers that generate the PML data stream. The following conditions must be satisfied before a generated data file in PML format can be forwarded to an IDOM input:

– Wprint must be correctly installed and configured on the PC.

– The Windows drivers from Fujitsu Siemens Computers must be installed and set as the default drivers for the Wprint unit(s).

– The Wprint unit port must correspond to an IDOM input: the value of the field ‘real queue name’ (always in uppercase in /var/spool/SBSD/Queue on the POSIX system) must match the distributed name of the IDOM input (defined in the configuration file for the IDOM server).

The PML2X converter can be used in IDOM via the command /CONVERT-IDOM-DOCUMENT (further information on this can be found in the Command manual). There are two ways of doing this:

– Enter the path for the converter in the library supplied with DPRINTCL (SYSLIB.DPRINTCL.011.PML2X):
/CONVERT-IDOM-DOCUMENT... CONVERTER-NAME=*LIB-ELEM
(LIB=SYSLIB.DPRINTCL.011.PML2X,ELEM=PML2X) or

– Save the PML2X element in the default library for IDOM converters (SYS-LIB.IDOM.<version>.CONVERTERS) supplied with IDOM. In this case, only the name of the converter must be entered:
/CONVERT-IDOM-DOCUMENT …CONVERTER-NAME=*LIB-ELEM
(LIB=*STD,ELEM=PML2X).

A parameter file must be available in each case. This file is the default parameter file supplied, selected from the SYSLIB.DPRINTCL.011.PML2X library (under the name <default parameter file>) and, if necessary, changed.

/CONVERT-IDOM-DOCUMENT …PARAMETER-FILE=<default parameter file>,
CONFIGURATION-FILE=*NONE

Please note that there can be different instances of parameter files in existence. Each of these instances corresponds to specific values of the parameter name in the parameter file. Only one of these instances can be used via the /CONVERT-IDOM-DOCUMENT command.

The data file assigned to the document (identified by DOCUMENT-ID/FROM-VERSION) must be in PML format, i.e. it must have been generated by the Windows drivers from Fujitsu Siemens Computers.

An error file with the name <document ID>.<output version>.ERRLOG will be created if an error occurs during the conversion. For example, an error file with the name ABCD0000.002.ERRLOG will be generated if an error occurs during conversion of the document ABCD0000 into output version 002.

Allocation model within IDOM

PML documents have the considerable advantage that they can be converted to AFP, PCL or EXCCW format depending on the printer.

If Mr A. (in Belgium) wants to print out a document for his customer on an AFP printer in Germany, he must convert the document to AFP format using the appropriate command (of course the output language must have been defined as SPDS in the associated parameter file):

```
CONVERT-IDOM-DOCUMENT DOCUMENT-ID=ABCD0000,-
FROM-VERSION=001,-
TO-VERSION=*INCREMENT-
CONVERTER=*PARAMETERS(CONVERTER-NAME=*LIBRARY-ELEMENT(-
LIBRARY=*STD,-
ELEMENT=PML2X,-
TYPE=L),-
PARAMETER-FILE=PML-PARAM-FILE)
```

PML-PARAM-FILE corresponds to the default parameter file that was selected from the library and, if necessary, changed.

This document (with the ID ABCD0000 and the version 002) can be printed in AFP format as soon as this command has been processed.

If Mr. A also wants to print the same document on his local printer and if this local printer supports only the PCL language, thanks to IDOM this can be done as easily as follows:

– The output language must be changed in the parameter file (from SPDS to PCL).

– The same /CONVERT-IDOM-DOCUMENT command must be executed.

– The document (with the ID ABCD0000 and the version 003) can then be printed in PCL format.

Once the document has left IDOM, it should be sent back to the local PCL printer.

7.2.6 Required disk space

This section gives certain values which can be used to help estimate the amount of disk space required to print a Windows document. To best understand it you need to know the path a document takes when it is sent to the BSD-LPD gateway.

When a file is received from the network it is first saved in the POSIX file system. In the second stage the document is converted for the target printer and then saved under the user ID $SYSDPRNT. The file saved in the POSIX file system is then deleted. After the document has been printed, the file saved under $SYSDPRNT is deleted.

The size of the print file naturally depends on the content (text, graphics, bitmaps,...), on the printer language used (PostScript, PCL,...) and on the resolution of the target printer (300, 600 dpi). The figures mentioned in this section apply to a typical Windows document in A4 format made up of 70% text and 30% graphics. Both printer resolutions, 300 dpi and 600 dpi, are taken into account. All figures are approximations. The figures mentioned in this section apply to a typical Windows document in A4 format made up of 70% text and 30% graphics (both resolutions, 300 dpi and 600 dpi, are taken into account) as well as to documents that contain mainly graphics (i.e. up to approx. 95%, for example a Microsoft PowerPoint presentation).

These figures are meant only as a guideline and may vary depending on the page size, the number of fonts used and the information density. Note that when printing several sorted copies of a document, the document will be repeated a corresponding number of times in the file. For "n" sorted copies, the file size calculated using the formula specified below must also be multiplied by the value "n".

POSIX file system

On the POSIX file system disk space is required for the time it takes to transfer a Windows document from the PC to the BS2000 server and to prepare this document for the target printer. The amount of disk space required depends on the following:

– the number of jobs being processed concurrently (this can be limited by the MAXCHILD parameter, see section “Creating the gateway configuration” on page 286)

– the number of pages the print job has and

– the size of the page.

Documents containing a 70/30 mix of text/graphics

Formula for Fujitsu Siemens PageStream, PostScript or PCL documents:

With 300 dpi: 75 KB * average number of pages per job * maximum number of jobs
With 600 dpi: 200 KB * average number of pages per job * maximum number of jobs

Documents containing mainly graphics

Formula for documents containing approx. 95% graphics (e.g. a Microsoft PowerPoint Presentation):

At 300 dpi: 300 KB / page
At 600 dpi: 1.1 MB / page

$SYSDPRNT user ID

Documents are saved under $SYSDPRNT until they are printed. The amount of disk space required depends on:

– the number of jobs waiting to be printed
– the number of pages per job
– the size of the page

Documents containing a 70/30 graphics mix

Formula for printers which support downloading of character sets (e.g. the majority of PCL and PostScript printers and also the LP65):

At 300 dpi: 75 KB * average number of pages per job * number of jobs waiting

At 600 dpi: 200 KB * average number of pages per job * number of jobs waiting

Formula for printers which do not support downloading of character sets (e.g. printers with SPS up to V2.1):

At 300 dpi: 200 KB * average number of pages per job * number of jobs waiting

At 600 dpi: 700 KB * average number of pages per job * number of jobs waiting

Documents containing mainly graphics

Formula for documents containing approx. 95% graphics (e.g. a Microsoft PowerPoint Presentation):

At 300 dpi: 300 KB / page (or 200 KB / page compressed)
At 600 dpi: 1.1 MB / page (or 750 KB / page compressed)

7.3 Windows driver installation

This paragraph only applies if the Windows driver is provided via the release unit of Dprint. Such a driver is provided by means of the SPCDAT.DPRINTCL.011.EXE file. This must be copied by file transfer or ftp, for instance in binary under the target platform (i.e. PC).

After the file transfer, start the installation and follow the instructions. The driver files are installed in the directory chosen during installation, by default "C:\Program Files\Fujitsu Siemens Computers\FSC PML Drivers".

After the installation, you will find the following files in the installation path:

Name	Description
Driver.pdf	The driver user guide for Windows 2000/XP
Old.pdf	The driver user guide for older Windows systems
Install-log	The log file created during installation
License.log	The legal license for Microsoft Universal Driver
Readme.txt	A file giving information about the package
Unwise.exe	The uninstaller program

Files in the Windows installation path

Depending of the drivers you have chosen to install, you will find one or more sub-directories for different Windows systems. More information is provided in the Readme.txt file.

The installation program is a patch, this means that the program can be reinstalled transparently on a previous installation, for example if the files have been deleted or damaged.

7.3.1 Modifying Wprint

- The title parameter of the print queue attributes should be given a name which helps you to identify the job. This can be useful when searching for a document.
- Please remember to set a high enough value for the cut-off point because it could take a long time for the print job to “travel” across the various platforms.
- The mailing address (userid@client-hostname) which is used by some BS2000 exits may not be handled correctly.
- Please remember to link the attributes with the remote print queue (and not with the local print queue).
- Several copies:
  If you request copies via a Windows application, the print file contains the corresponding number of the complete document. You can improve performance by using the settings in the Wprint print queue to control the number of copies. The number of copies then becomes an distributed print job attribute, or in other words the copies of your document are created by the printer server.

7.4 Starting and stopping the gateway; gateway status

The user $TSOS (with the POSIX root privilege) has to be used to start/stop/or get the status of any BSD gateway.

7.4.1 The "spchg" command

The spchg command is used to start or stop a BSD gateway.

Syntax : spchg -n gtwname

-s ACTIVE | NOT_ACTIVE

[-Z]

where :

-n gtwname:
the name of the gateway from the server configuration file that has to be started or stopped.

-s
This option specifies the startup (ACTIVE, default action) or shutdown (NOT_ACTIVE) immediate of the gateway. A gateway is unique and cannot be restarted unless previously stopped.

-Z
This option activates the debugging. It can only be started with the gateway; thereafter it is too late. It is very useful to trace any event or action occurring on the network and protocol translation for diagnostics help purposes.

Example

```
/var/spool/SBSD/bin> spchg –n teddy –s ACTIVE
```

or

```
/var/spool/SBSD/bin> spchg –n teddy
```

This will activate the teddy gateway (but 'teddy' has to be defined in the server configuration file to be able to be started).

CAUTION!
Make sure you use the correct case, since the system is case-sensitive.

7.4.1.1 Gateway startup

The gateway referenced with its name in the -n option is started; no message is issued unless an error occurs. In the event of an error, the problem can be checked through the logging (and debugging when activated with the -Z option) file(s).

A gateway is unique and its uniqueness is guaranteed, but another gateway using another name and another listen port can thus be started (see layout of the gateway definition file in the installation section). Even when no message has been issued (no error case), the liveness of the gateway can still be checked (see the spstat description below).

7.4.1.2 Graceful shutdown

The gateway referenced with its name in the -n option is closed whenever the gateway was running, otherwise the shutdown process is aborted. Once stopped, it can be started again whenever you like: this may be useful if you have forgotten to set the debugging with the -Z option of the spchg command.

7.4.2 The "spstat" command

spstat returns the status of gateways.

Syntax: spstat [-n gatewayname]

where :

-n gatewayname
This option specifies the name of the gateway whose status spstat has to look for. Without this option the spstat command will return the status of all the activated gateways.

returns:

Server name	Status
gatewayname	ACTIVE|NOT_ACTIVE

Example

```
/var/spool/SBSD/bin> spchg   -n teddy -s ACTIVE
/var/spool/SBSD/bin> spstat  -n teddy
```

Server name	Status
teddy	ACTIVE

7.5 Status information of print jobs

As mentioned in the introduction, a BSD client can ask for information concerning the print jobs he/she has submitted earlier. Part of the user interface, the layout of the information returned for a short or long status request, is described below. These statuses provide information on the remote queue and its print jobs (as long as they belong to the status caller host).

7.5.1 Short status description

```
[Device state]
Rank    User    Job    State    File              Global_job Size
[entry(ies) or no entry]
```

Example returned at the client

```
LANT0812 is Ready and Printing.
Rank   User     Job    State    File              Global_job Size
1st    RD13TEAM 009    Active   C:\TEMP\REPORT.TXT 0444       253 bytes
```

where:

– [Device state] reports the status of the remote queue. In this case: "LANT0812 is Ready and Printing."

– Rank: the jobs are sorted according to submission time. This does not reflect the printing order, since different printers (printer pool) may be used.

– User: user ID that owns the job.

– Job: local job identity. This reference is used to remove the job.

– State:

"Active"	The job is being processed.
"Wait"	The job waits its turn to be printed.
"Keep"	The job is either being transferred or has been deferred.

Note

Even when the printer is "Ready and Printing", all the jobs may still be in a "Wait" state (none in the "Active" state). This means either that the printer is off-line (e.g. Paper out) or that a job submitted by someone else is being processed.

– File: full local name. Example: "C:\TEMP\REPORT.TXT"

– Global_job: also known as the TSN in the BS2000 world. It gives the remote ID of the job. This information is vital for the BS2000 administrator. Example: if your job has been in the "Keep" state for a while, it may have been deferred. The only way to find out is to contact the BS2000 administrator, giving the global_job information. He/she will then tell you what happened to your job.

– Size: size in bytes of the print job. It may be bigger than the document size since the driver has to add some control data.

7.5.2 Long status description

```
[Device state]
[entry(ies) or no entry]
```

Example

```
AFPDS_printer_A4 is Ready and Printing.
1st : RD13TEAM    teddy/XGWP22L8APA.cfA009D241P016!0444!RD13TEAM
         C:\TEMP\REPORT.TXT       253 bytes
```

where:

[Device state] reports the status of the remote queue.
In this case: "AFPDS_printer_A4 is Ready and Printing."

The information returned is similar to the that described in the previous section (Short status description), except for the full name used by DPRINTCL, which contains the gateway name (teddy), the remote queue name (P22L8APA), the job ID (009), the client host (D241P016), the global job ID (0444), and the user ID of the owner (RD13TEAM).

7.6 Security and privileges

Certain topics are discussed below which should be taken into consideration by systems support in respect of security and privileges concerning the use of Dprint.

User ID

The product SAT (Security Audit Trail) observes and identifies users by way of the catalog ID and the user ID. The security of the user IDs in a networked Dprint environment cannot therefore be guaranteed when a worst-case situation occurs where two different hosts have identically named home pubsets and identically named user IDs.

The system administrators in a Dprint environment should bear this consideration in mind in order to ensure security in their systems.

Identification of the cluster administrator

Because it is not possible to define a cluster administrator privilege (networked hosts, no transfer of privileges), the cluster administrator is identified by way of the configuration.

The cluster administrator must at least be provided with the SPOOL privilege PRINT-SERVICE-ADMINISTRATION. The cluster administrator must also be defined in the cluster's configuration file. In practice, the cluster administrator only becomes the SPOOL administrator in order to be able to issue a valid CREATE-DPRINT-CLUSTER command. As described below (under SPOOL administrator) and remembering that there may only be one cluster administrator, it makes sense to assign the privilege PRINT-SERVICE-ADMINISTRATION to a single user ID, namely the user ID which is also to issue the CREATE-DPRINT-CLUSTER command.

It must be noted that each SPOOL administrator of a single host (a cluster comprising a single host) is also the cluster administrator on that host.

The commands and SPSERVE statements listed below can only be issued by a cluster administrator.

1. Commands:

```
/CREATE-DPRINT-CLUSTER
/MODIFY-DPRINT-CLUSTER
/DELETE-DPRINT-CLUSTER
/MODIFY-DPRINT-CONFIGURATION
/SHOW-DPRINT-ACCESS-CONTROLS
```

2. SPSERVE statements:

```
//ADD-DPRINT-ACCESS-CONTROL
//MODIFY-DPRINT-ACCESS-CONTROL
//REMOVE-DPRINT-ACCESS-CONTROL
//SHOW-DPRINT-ACCESS-CONTROLS

//ADD-DPRINT-HOSTS *)
//MODIFY-DPRINT-HOSTS
//EDIT-DPRINT-HOSTS
//REMOVE-DPRINT-HOSTS
//SHOW-DPRINT-HOSTS

//ADD-DPRINT-PRINTER
//MODIFY-DPRINT-PRINTER
//EDIT-DPRINT-PRINTER
//REMOVE-DPRINT-PRINTER

//ADD-DPRINT-PRINTER-GROUP
//MODIFY-DPRINT-PRINTER-GROUP
//REMOVE-DPRINT-PRINTER-GROUP

//ADD-DPRINT-REMOTE-CLUSTER
//MODIFY-DPRINT-REMOTE-CLUSTER
//EDIT-DPRINT-REMOTE-CLUSTER
//REMOVE-DPRINT-REMOTE-CLUSTER

//ADD-DPRINT-SERVER
//MODIFY-DPRINT-SERVER
//EDIT-DPRINT-SERVER
//REMOVE-DPRINT-SERVER
```

All these commands and statements are available to those users who are provided with the privilege PRINT-SERVICE-ADMINISTRATION. Therefore, a further internal check is made in the configuration in order to admit these commands only for use by the cluster administrator.

*) Only if a cluster has already been created; otherwise the SPOOL administrator may use the statement.

PRINT-SERVICE-ADMINISTRATION privilege

The privilege PRINT-SERVICE-ADMINISTRATION has been introduced in order to enhance security features in SPOOL operation. It is managed by SRPM under the user ID SYSPRIV. Multiple user IDs may have this privilege at the same time. Those possessing the privilege are then referred to as SPOOL administrators.

Normally, the privilege is assigned to the user IDs SYSSPOOL and TSOS. It can be withdrawn from user ID TSOS but not from user ID SYSSPOOL.

However, it is advisable to centralize SPOOL administration, in other words to assign the PRINT-SERVICE-ADMINISTRATION privilege to only a single user ID.

Since there can be only one cluster administrator, whose user ID must also be provided with the PRINT-SERVICE-ADMINISTRATION privilege, it is also advisable to assign the new privilege to only a single user ID.

On receiving a privileged request, the SPOOL subsystems check whether this is coming from a user ID having the PRINT-SERVICE-ADMINISTRATION privilege.

The commands and SPSERVE statements listed below can only be issued by user IDs having the PRINT-SERVICE-ADMINISTRATION privilege.

1. Commands:

```
/HOLD-PRINT-JOB
/MODIFY-DISKETTE-OUTPUT-STATUS
/MODIFY-PRINTER-OUTPUT-STATUS
/MODIFY-TAPE-OUTPUT-STATUS
/SHOW-DPRINT-CLUSTER
/SHOW-DPRINT-HOSTS
/START-DISKETTE-INPUT
/START-DISKETTE-OUTPUT
/START-PRINTER-OUTPUT
/START-TAPE-OUTPUT
/START-TAPE-REPLAY
/STOP-DISKETTE-INPUT
/STOP-DISKETTE-OUTPUT
/STOP-PRINTER-OUTPUT
/STOP-TAPE-OUTPUT
/STOP-TAPE-REPLAY
/VERIFY-DPRINT-CONSISTENCY
```

2. SPSERVE statements:

   If a user parameter file (offline, static mode) is being edited using SPSERVE, the full functionality is available to every user.

   If the SPOOL parameter file (online, dynamic mode) is being edited using SPSERVE, only the SPOOL administrator can issue the following statements:

```
//ADD-PRINTER-POOL
//ADD-SPOOL-CHARACTER-SET
//ADD-SPOOL-DEVICE
//ADD-SPOOL-FORM
//MERGE-SPOOL-PARAMETER-FILE
//MODIFY-PRINTER-POOL
//MODIFY-SPOOL-CHARACTER-SET
//MODIFY-SPOOL-DEVICE
//MODIFY-SPOOL-FORM
//MODIFY-SPOOL-PARAMETERS
//REMOVE-PRINTER-POOL
//REMOVE-SPOOL-CHARACTER-SET
//REMOVE-SPOOL-DEVICE
//REMOVE-SPOOL-FORM
```

It must be noted that the SPOOL administrator commands are not also permitted for TSOS privilege use. This means that the user ID TSOS is not allowed to issue any further SPOOL administrator commands unless it is assigned the PRINT-SERVICE-ADMINISTRATION privilege.

Which privileges are assigned to the individual commands is indicated in the command overview and under the respective command description in the „Spool & Print - Commands“ manual.

7.7 Tracing and Logging

In cases where complicated or unusual faults occur, it is possible to start external logging.

The SPOOL administrator can use the START-DPRINT-LOGGING and STOP-DPRINT-LOGGING commands to activate and deactivate Dprint logging on his/her host.

For the description of the START-DPRINT-LOGGING command and the STOP-DPRINT-LOGGING command refer to the manual „Spool & Print - Commands“.

The logging file is given the default name:
$SYSDPRNT.SYSTRC.DPRINT.*yyyy-mm-dd.hh.mm*
(*yyyy-mm-dd* = date, *hh.mm* = time).

In the event of an error, the file should be included among the documents accompanying the error. For further information see “Error documentation” on page 260.

7.8 Recovery processing

Recovery aspects have been considered for any object which may be destroyed by any problem occurring at any time during processing. New concepts have been introduced for Dprint (communications, duplication of information on client and server) which required the introduction of additional recovery measures for Dprint operation on top of the existing SPOOL recovery processing.

The following objects can be affected by a malfunction:
– hosts (including clients, servers and clusters)
– devices
– jobs
– communications

A malfunction can be caused by the object itself (system dump for a job, unrecoverable input/output error for a device or shutdown for a host) or the cause may lie in a different product (file transfer aborted or not available). Each case is handled separately.

7.8.1 Host malfunction

Detected by the host itself

Two situations may occur: The first is a normal STOP-SUBSYSTEM command issued by systems support. The second is a real malfunction, detected by means of a “system error” as return information to a call for a system interface.

In the case of the STOP-SUBSYSTEM request, a special recovery processing facility is generated for each “Dprint task”. Each of these tasks contains a processing facility which is activated in the event of STOP-SUBSYSTEM. This terminates processing of the task by releasing the task’s work areas, after first saving any required information in memory or in special SPOOL files (slots, etc.).

On the occurrence of a system error, continuation of processing or a restoration is not normally possible. In this situation, current SPOOL processing sends a system error message to the console, waits for shutdown, or interrupts the task. The Dprint tasks behave in the same manner on the occurrence of an error. Tasks affected here are: DWDG, DNET, DFTM, DPMG, DPRP, DWTC and DPxx.

Detected by another host

The only possible way in which one host can detect a malfunction on another host is by way of a communication return code. Refer here to section “Communication malfunction” on page 321.

7.8.2 Device malfunction

If a malfunction occurs on a Dprint printer or on a non-Dprint printer, a special “device error recovery” component is activated for each device type. This component determines the problem and communicates with the console of the host to which the device is assigned. The recovery processing facility activated is the existing SPOOL facility.

7.8.3 Job malfunction

In the event of a malfunction during a Dprint job, it is essential to identify the task in which it occurred (user task, controller task or “S” task).

Under a user task

In the DPRINTCL subsystem

If the server concerned has already been called, the spoolout job created is not modified by the malfunction. The existing recovery processing facility is sufficient in this case. Otherwise, the spoolout job will not yet have been created and so there is nothing that can be modified.

In the DPRINTSV subsystem

In this case, the recovery processing facility recognizes whether or not an SCB has already been created. If the spoolout job has already been created, the recovery processing facility then sends the client a corresponding message. To this end the information must be stored in the SPOOL TCB when the job has been created so that it is available for recovery processing. If the spoolout job has not yet been created, information indicating that the job has not been correctly created and that the user must repeat the command must be sent to the client.

Under the controller task

In addition to those processing facilities which are already activated when a malfunction occurs in a SPOOL job under the controller task, the client is informed that the status of the job has changed.

Under the “S” task

In this case, recovery processing is exactly the same as for the SPOOL and RSO subsystems.

7.8.4 Communication malfunction

Synchronous communications

When a communication error of this type occurs, the caller terminates the processing and informs the user of the type of error which has occurred. Independently of this, the communication processing facility informs the Dprint configuration that the host is no longer available. This allows a “Watchdog” processing facility to continue to attempt to establish communication until this “dummy” request solicits a correct return code for this host.

Asynchronous communications

When a problem occurs in the case of asynchronous requests (asynchronous for the requestor), a recovery processing facility is activated. When a communication is recognized as being errored, the asynchronous request is saved in an internal table. At the same time, the “Watchdog” processing facility periodically sends a dummy request in order to check the communication. When the connection to the external host has become stable again, the “Watchdog” processing facility informs the asynchronous communication processing facility accordingly. Until it receives this message, the communication processing facility saves in its request table any request intended to be sent to the errored host.

7.8.5 File transfer malfunction

The file transfer product is extremely important for printing with Dprint. When a problem occurs in the client or in the server, all Dprint processes are terminated on the host on which the error occurred. A message is sent to the operator or SPOOL administrator in order that file transfer may be correctly activated again.

This applies to problems which cannot be recovered by file transfer itself. File transfer is actually capable of ascertaining and restoring its jobs itself when problems occur between two file transfer products of two hosts.

7.8.6 Restoration of Dprint tasks

Each Dprint task contains a special recovery processing facility which is activated whenever a system dump occurs under this task. The Dprint tasks can restart and continue their jobs on recognizing a system dump in exactly the same way as is already the case for “S” tasks. This concerns the tasks DWDG (“Watchdog” processing), DNET (System Network), DFTM (File Transfer), DPMG (Configuration Manager), DWTC (Wait for asynchronous Communication) and DPxx (Service task).

In addition, in order to avoid continuous loops during processing, the recovery processing facilities take into consideration the occurrence and the situation of the dumps so as to stop the processing if necessary.

7.8.7 Restoration of the Dprint configuration

The Dprint configuration must remain the same on every host within the cluster. This means that if one cluster administrator changes his/her Dprint configuration, this change is conveyed to every affected host. If it is not possible to access a host immediately in order to pass on its configuration to the other hosts, appropriate measures ensure that this is done as soon as possible and in the same order (in the case of multiple changes) as requested by the administrators. The cases described in the following may be differentiated.

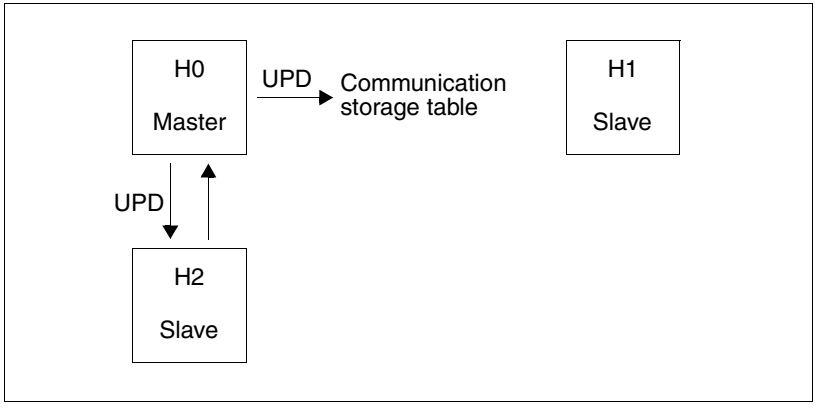
Slave host not accessible at times (communication malfunction)

The recovery processing facility is already safeguarded by asynchronous communication recovery (see above under “Communication malfunction”). The changes to the configuration are stored in an internal table of the asynchronous communication processing facility.

Example

The following configuration exists within a cluster:
– host H0 is the master of the cluster
– host H1 belongs to the cluster but is not accessible at times
– host H2 belongs to the cluster and is accessible.

The configuration updates (UPD) sent by the master to host H1 are stored by the asynchronous communication processing facility. The changes are sent following restoration of communication.



Slave host not accessible at times

Shutdown on the master host

On shutdown of the master, the first host which can be the master within the host hierarchy of the recovery list is automatically designated as the new master of the cluster. The list is created using the CREATE-DPRINT-CLUSTER command and can be modified by means of the MODIFY-DPRINT-CONFIGURATION command. The description of the commands can be found in the „Spool & Print - Commands“ manual.

Master host not accessible at times (communication malfunction)

The cluster can continue operating but the product SPSERVE can no longer be used to modify the configuration.

The internal updates to the configuration (host status, server status) are accepted automatically by the highest-priority host accessible in the recovery hierarchy. The list is created using the CREATE-DPRINT-CLUSTER command and can be modified by means of the MODIFY-DPRINT-CONFIGURATION command. The description of the commands can be found in the „Spool & Print - Commands“ manual.

If it is necessary to use the product SPSERVE to update the configuration file, the VERIFY-DPRINT-CONSISTENCY command can be used to define a “temporary” master.

In this case, however, recovery processing is performed when the “original” master is available once again. The aim of this recovery processing is to retain the master with the higher priority as the master of the cluster (and that master’s configuration as the reference configuration).

It comprises the following points:

– The “temporary master” and connected slaves are assigned back to the original master in exactly the same way as in the startup phase; this is done by transferring the configuration file of the original master.

– Any changes which were made on the “temporary master” are lost.

– Use of the MODIFY-DPRINT-CONFIGURATION command in such a situation may result in undesired recovery behavior and should therefore be avoided.

Example

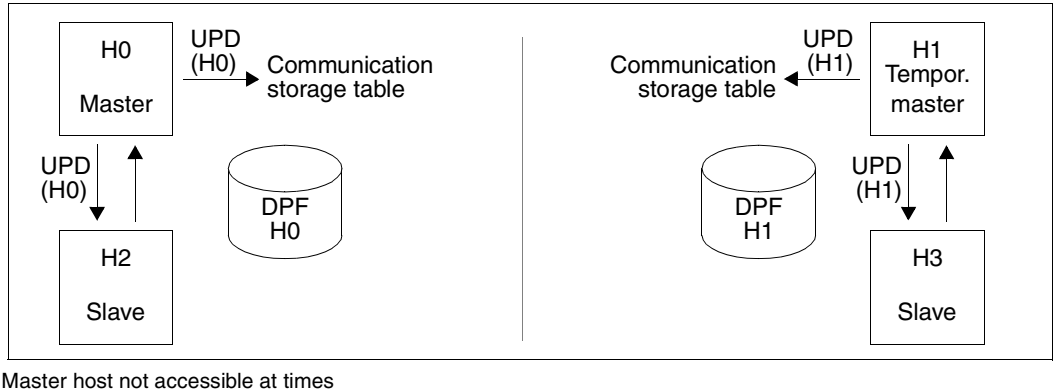
The following configuration exists within a cluster:

– The host hierarchy is H0, H1, H2, H3.

– Host H0 is the original master of the cluster. Following a communication malfunction, it forms a “subcluster” with host H2.

– Following input of the VERIFY-DPRINT-CONSISTENCY command to host H1, a second “subcluster” containing hosts H1 and H3 is formed. Host H1 is the “temporary master” of this “subcluster”.

– The two “subclusters” continue with the updating of their configuration file, using the product SPSERVE.

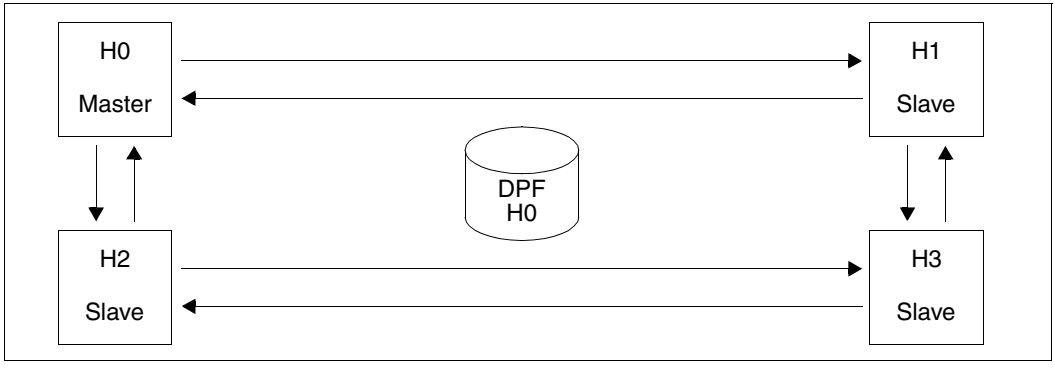


Master host not accessible at times

The communication is now restored:

– Recovery processing recognizes that there are two conflicting masters in the cluster. The facility decides to retain host H0 as master as it has the higher priority in the host hierarchy.

– Hosts H1 and H3 are re-assigned to the master host H0 and the configuration file (DPF) of H0 overwrites the configuration file of hosts H1 and H3.



Master host accessible again

Master host failure (system crash)

The cluster can continue to function, but the original configuration file can no longer be modified by means of SPSERVE.

The internal updates to the configuration (host status, server status) are accepted automatically by the highest-priority host accessible in the recovery hierarchy. The list is created using the CREATE-DPRINT-CLUSTER command and can be modified by means of the MODIFY-DPRINT-CONFIGURATION command. The description of the commands can be found in the „Spool & Print - Commands“ manual.

If the product SPSERVE is used for updating the configuration file, the VERIFY-DPRINT-CONSISTENCY command can be used to define a “new master”.

In this case, the “new master” actually becomes the master of the cluster. Changes to the configuration made through the new master are no longer lost, even if the original master starts Dprint again.

Example

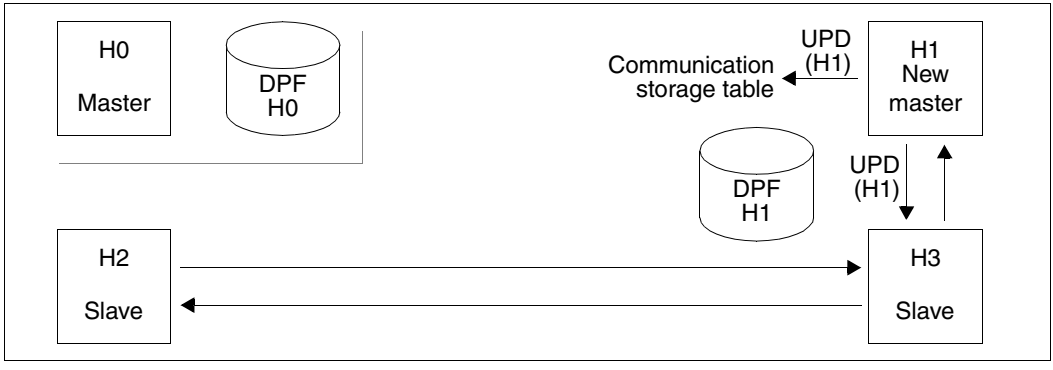
The following configuration exists within a cluster:

– The host hierarchy is H0, H1, H2, H3.

– Host H0 is the original master of the cluster. Following a system crash, it is isolated.

– Following input of the VERIFY-DPRINT-CONSISTENCY command to host H1, a second “subcluster” containing hosts H1, H2 and H3 is formed. Host H1 is the “new master” of this “subcluster”.

– The new master continues with the updating of the Dprint configuration file (DPF), using the product SPSERVE.

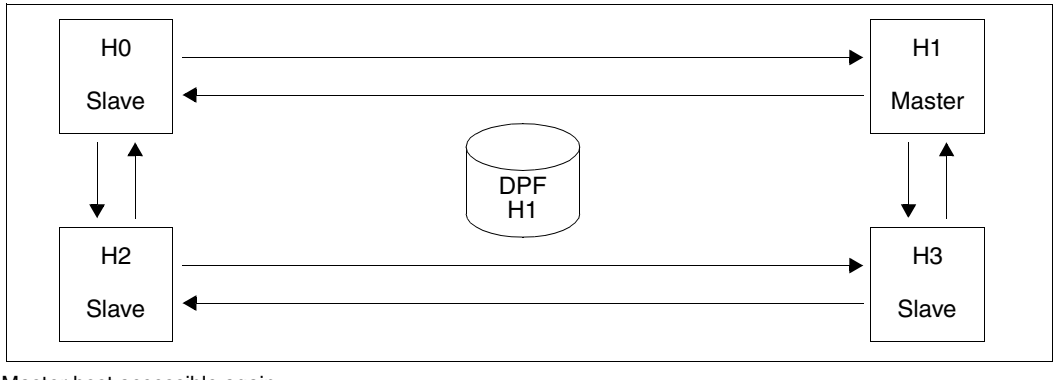


Master host failure

Host H0 now starts Dprint again:

– Host H0 is assigned to the cluster as a slave host and receives the configuration file of the master host H1.

– In order to make H0 the master again, an explicit VERIFY-DPRINT-CONSISTENCY command must be issued.



Master host accessible again

8 Increasing the availability of print jobs

8.1 Redirection of multiple distributed print jobs

Contrary to the command MODIFY-PRINT-JOB-ATTRIBUTES (resp. CANCEL-PRINT-JOB) that only processes one print job at a time, the command MODIFY-MULTIPLE-PRINT-JOBS (resp.CANCEL-MULTIPLE-PRINT-JOBS) allows modifying (resp. cancelling) simultaneously several existing print jobs, and in particular redirecting them to a new Dprint server. Provided the original client/gateway system is still available, this feature can be used in the following cases:

- the original print server is crashed and, therefore, totally inaccessible: in this case, the MODIFY commands will have the effect to select another Dprint server available at this time. The corresponding CANCEL command will be used after restarting the DPRINT server to eliminate any information on the original server and to prevent that the job is printed twice.
- the original server is overloaded, or is not adequate anymore for some reason, although it remains active and accessible. In this case, the MODIFY command will perform both transferring the job to another server and eliminating any information on the original one.

The MODIFY-MULTIPLE-PRINT-JOBS command treats all the jobs satisfying a set of selection criteria. The CANCEL-MULTIPLE-PRINT-JOBS command can use the same criteria values as the MODIFY command, or it can use a file generated by the MODIFY command, that contains the list of processed print jobs.

This feature belongs to Dprint and guarantees the following:

- The user permissions, the availability of resources, the destination, etc. are validated by the existing Spool & Print processing mechanisms.
- The client TSN is kept in any case; the end user, as well as any software process will continue watching and controlling the job transparently
- The priorities and order of the redirected print jobs are kept.
- The commands can also be integrated in a Hiplex environment using procedures so that they can be automated.

8.1.1 Concerned Print jobs

The commands can only treat distributed print jobs (processed via Dprint). These may have been initiated as well within the local cluster as in a remote cluster (via BS2000 or Xprint). The print jobs may be selected on the basis of the SERVER-NAME, the JOB-TYPE (*WAIT, *ACTIVE and *KEEP) and the DESTINATION (i.e. Printer Pool).

This feature can only redirect the distributed jobs; this includes the so-called “local distributed” jobs, that is, distributed print jobs whose client and server are on the same host. This excludes the pure local print jobs and the RSO print jobs.

8.1.2 Permissions

The modification of the destination (redirection) and the suppression of distributed print jobs are validated on the basis of user permissions:

- The end user may redirect and suppress his/her own distributed print jobs as long as the server system is available.
- The printer administrator may redirect and suppress the distributed print jobs currently being processed on his/her local server, of whichever origin (his/her host, another host in the local cluster or a remote cluster, BS2000 or other).
- The Dprint cluster administrator may redirect and suppress any distributed print jobs in the local cluster, of whichever origin (his/her host, another host in the local cluster or a remote cluster, BS2000 or other).

Action	**Server crash**			**Server overload**		
	Client	Server	Other	Client	Server	Other
MODIFY-MULTIPLE-PRINT-JOBS	CA	(1)	CA	CA, US	CA, SA	CA
CANCEL-MULTIPLE-PRINT-JOBS	(2)	CA, SA (3)	(2)	CA, US	CA, SA	CA

Client, server and *other* host:
host on which the print job was started, on which it is currently being processed or the cluster master host (if none of the other definitions apply).

CA: cluster administrator (he can treat all distributed print jobs within the local cluster)

SA: spool administrator; he can treat his own print jobs (in which case he/she is considered as normal user) and the distributed print jobs that are currently being processed on his/her local server.

US: normal user (he can treat his own print jobs)

(1): Server crash; no action possible

(2): The print job cannot be suppressed if the server cannot be accessed

(3): If the server host executes a restart.

The end user can redirect his/her own distributed print jobs when the client host, the original server and the new server host are available. The administrators can redirect distributed print jobs whose client host and new server host are available. This feature does not allow redirection of a job whose client is not available. In this last case, other mechanisms can be used (see section “Virtual Hosts support” on page 330).

8.1.3 Using the commands

The function can be used within a Dprint cluster that has at least two server-hosts. More general usage contexts are as follows:

1. The server system on which the print job is currently being processed is unavailable for some reason and critical print jobs must be processed. The following steps must be done:
   – The cluster administrator redirects the distributed print jobs currently being processed or queued on the concerned server to another active one.
   – When the original server is available again, the cluster administrator or printer administrator cancels the redirected distributed print jobs to prevent them from being printed twice. This must be done before starting any printer.
2. The server system on which the print job is currently being processed is overloaded and critical print jobs must be processed. Only the first step must be done:
   The jobs owner, the cluster administrator or the printer administrator of the server system redirects the waiting distributed print jobs to a less loaded server. Dprint will automatically suppress the redirected print jobs on the overloaded server.

8.1.4 Automization with Hiplex

The various processes described above can only be automated when using the HIPLEX AF switching program. This product automatically detects system crashes and starts procedures to transfer applications from one system to another one. On active systems, this mechanism can be triggered by using a command.

8.2 Virtual Hosts support

The various hosts constituting a Dprint cluster are usually identified by their BCAM host name. The Dprint configuration file contains the list of hosts that can be activated in the cluster, each one being defined as client, server or both. For each server, the file contains the lists of printers controlled by the host.
It is also possible to use Virtual Hosts names instead of Real hosts names for any host of the cluster. The benefits are:

- Possibility to host a Dprint-server on different physical hosts; either corresponding printers can be switched to each one, or the Dprint configuration contains the sum of all attached printers (but only a part can be active at a time).
- Possibility to host a Dprint-client on different physical hosts. In general, the user applications of this host are accessed by this virtual host name, too, so that the print services can transparently follow the user application.
- Possibility to host a gateway on different physical hosts. The advantage concerns the external Dprint clusters or Xprint domains that keep accessing the cluster with the same address.

8.2.1 SYSSSI file contents

The virtual host name to be used by the Dprint client or server must be provided by a new parameter in the SYSSSI file (SYSSSI.DPRINTCL.011 and SYSSSI.DPRINTCM.011).

VIRTUAL-HOST-NAME=*NONE/ *alphanum-name_8..8*

The value *NONE means that no virtual host is associated and that the physical host name will be taken into account as usual.

When specified, the virtual host name must be 8 characters long, left justified and blank padded.

Should the name of the virtual host be changed, both SYSSSI files have to be updated and Dprint must be started again.

8.2.2 Dprint configuration

The Dprint configuration file, managed by SPSERVE, has to contain references to virtual host names instead of real BCAM host names. For that purpose, the configuration objects have to be defined with that name.

The concerned SPSERVE statements are:

ADD-DPRINT-HOST, MODIFY-DPRINT-HOST, ADD-DPRINT-REMOTE-CLUSTER, MODIFY-DPRINT-REMOTE-CLUSTER, MODIFY-DPRINT-ACCESS-CONTROL

In those statements the host name can be virtual as well as real.

The other objects (server, printers, printer-pools) implicitly follow from the host definition.

In a “cold” status (no job in the queues at Dprint Startup time), the change-over simply consists in stopping Dprint on the first host, and starting it on the second one, after having provided an adequate configuration file.

In a “warm” situation, the waiting jobs will not be processed until the virtual host name is back to the first physical host. To avoid this problem, the jobs definitions must be transferred, as described in the next sections.

8.3 MOVE-PRINT-JOBS command enhancements

8.3.1 Concerned Print jobs

The following kinds of print jobs may be relocated by the MOVE-PRINT-JOBS command of SPOOLSYS:

- Local-server print jobs:
  - Print jobs issued from a BS2000 client host and processed by its home server (client host = server host)
  - Print jobs issued from BS2000 remote clusters, domains of UNIX systems or Windows, and processed by the server located on the gateway host (gateway host = server host)
- Remote-server print jobs:
  - Print jobs issued from a BS2000 client host and processed by a remote server (client host ≠ server host);
  - Print jobs issued from BS2000 remote clusters, domains of UNIX systems or Windows, and processed by a remote server – not located on the gateway host – (gateway host ≠ server host)

TSN changes may occur during relocation, if the original TSN of the print job already exists on the target system. DPRINTCM has then to be started with the *PRINT-JOBS-RECOVERY subsystem parameter operand. During DPRINTCL/DPRINTSV startup, the information related to relocated print jobs is updated, so that the coherence between client and server host is kept.

In case of the use of virtual host names, change of client system, support of local jobs, operation without Spool/ Dprint ready, the MOVE-PRINT-JOB command must be used, combined with an adequate organization.

8.3.2 Organization

1. Files to be printed

   In an HA architecture, the files to be printed (just like DBs and other files used by applications) should be located on independent PVS that can be switched or shared between several hosts. Those PVS, that constitutes the environment for print jobs must follow the relocations of the corresponding virtual hosts.

2. Print Resources

   The print resources needed by the print jobs must be available on the host that needs them. Either they are replicated on several hosts, or they are located on the virtual host that contains the files to be printed.

3. Printers

   The printers should be switched from a physical host to another one, according to the location of the corresponding virtual host name. Alternatively, the Dprint configuration of the virtual host name can contain the sum of all configurations of the possible physical hosts. Of course, only a part of the printers can be started at a time. Normally, each host should be able to treat the same types of jobs.

8.3.3 Command processing

1. Selection criteria

   The parameters indicate which print jobs must be selected.

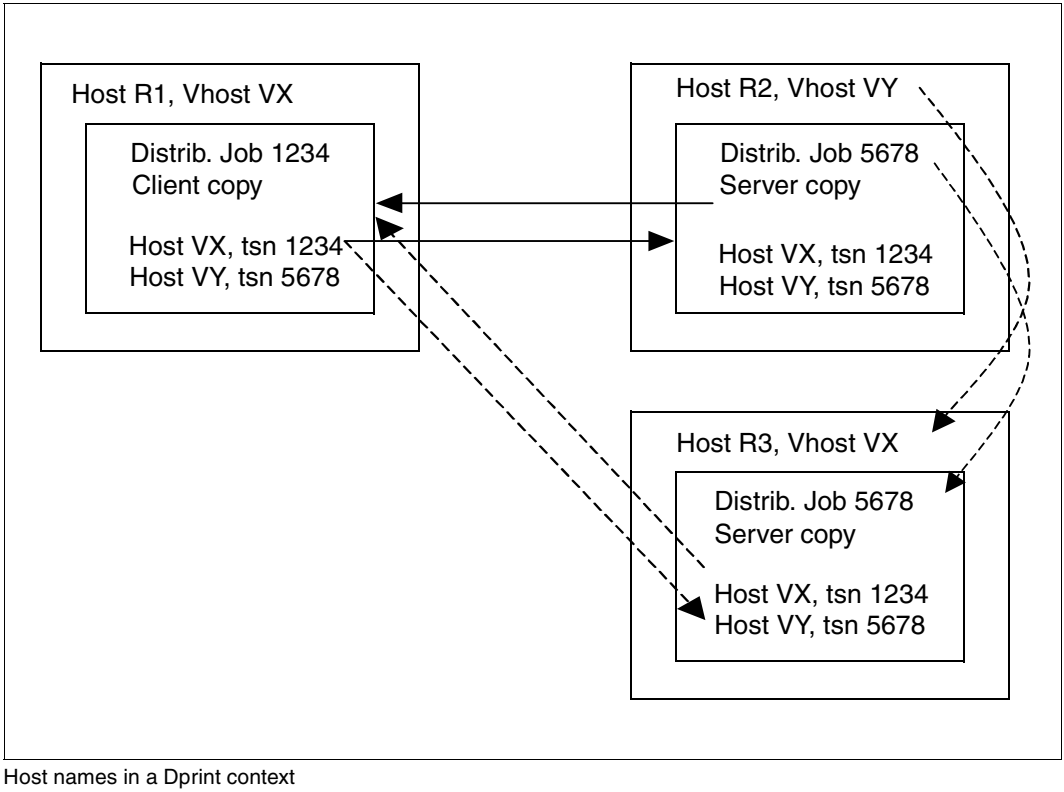
2. From and To

   If the 'from' system is down, its PVS is attached to the 'to' system and the command directly transfers the Spool Control Blocks from the 'from' to the 'to'. If both systems are in operation, the jobs are exported from the 'from' system to an intermediary file by a first MOVE-PRINT-JOBS command. In a second step, those jobs are imported from this intermediary Datei to the queues of the 'to' system.

3. Virtual host names in a Dprint context

   A distributed print job definition contains the name of the client/gateway host and of the server host. In case of system crash or switch, it is expected that the job definition will be moved to the host with the same virtual host name. The situation is thus coherent after the move because the cross-references between the client/server are still valid.

   When real BCAM names are used, the move is generally not recommended because the operation should be done on both hosts at the same time, which is only practicable by Dprint itself.



Host names in a Dprint context

4. TSNs collisions

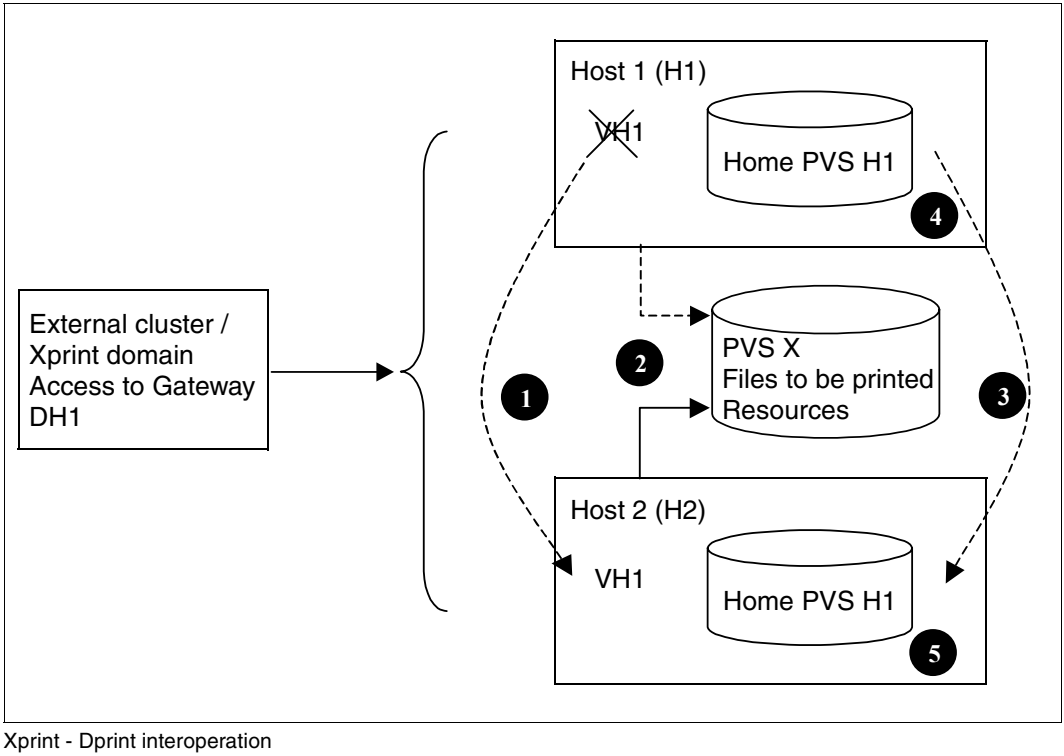
   It can occur that the original TSN is not free on the host where the job is moved to. A new TSN is then allocated while the original one is saved in the job definition.

8.4 Usage Models

8.4.1 Xprint - Dprint interoperation

Dprint interoperates with an Xprint domain, so as to provide the print services to the UNIX systems or Windows systems. In the simplest configuration, the Dprint cluster is made of a unique host that concentrates the gateway and server functions (and possibly the client).

This host is identified by a virtual host name. When it becomes unavailable, another host is used that takes over the virtual host name and the Dprint functions. The files to be printed and resources are supposed to be on a PVS that is switched to the new host.



Xprint - Dprint interoperation

The following operations must be done before starting Dprint on host 2 (in any order):

1. Stop BCAM on H1 and start it on H2 with the virtual host name VH1
2. Switch the PVS X from Host 1 to host 2 (this PVS contains all current files to be printed and resources)
3. Attach the home PVS H1 to H2 and execute the following command to transfer the print jobs from the print jobs queue of H1 to the one of H2:

```
/MOVE-PRINT-JOBS from-file=*inactive(pubset=H1>),
to-file=*std,
select=*by-attr(job-scope=*any,…),
virtual-host-name=*unchanged
```

4. Open the SYSSSI on host H3 and remove the string VIRTUAL-HOST-NAME = "VH1" (before restarting Dprint)
5. Open the SYSSSI on host H4 and insert the string VIRTUAL-HOST-NAME = "VH1"

When Dprint is started on host 2, it identifies itself as VH1 and takes over the VH1 configuration. Normally the local printers should have been switched from host 1 to host 2.

Status requests or modify requests from the external clusters or Xprint domains are routed to VH1, that is H2. They are thus treated as before.
If the TSN of the job has been changed, SPOOL is needed. With previous versions, jobs whose TSN has been changed cannot be controlled or modified.

Note

When receiving a job from an external cluster or Xprint, the gateway stores the files to be printed and the resources under the SYSDPRNT userid. If those data are on the switched PVS X or another PVS that is switched, they will be available on host 2 after the change-over. Otherwise, Dprint has to build them a new time on host 2.

The old files on host 1 will be deleted at the next Dprint Startup (because there is no job anymore that references them).

8.4.2 Changing a print server

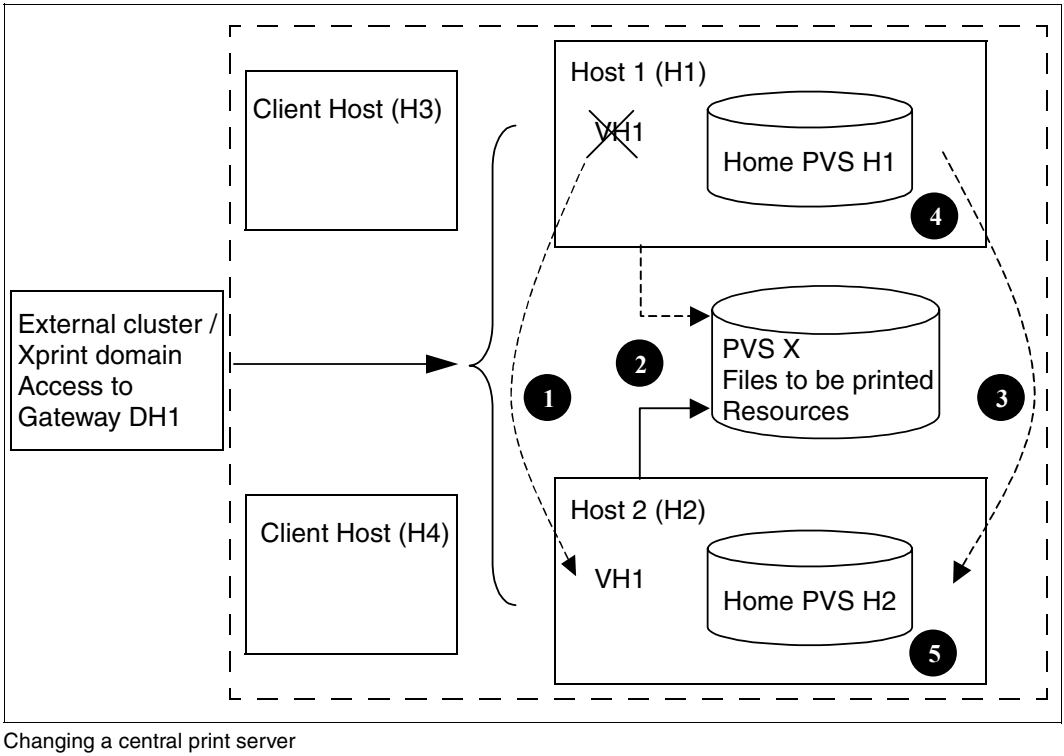
A Dprint cluster is organized with a unique server and several clients. A stand-by server can be used to replace the normal one.

Let us assume that the server must be identified by a virtual host name (for example, the server is also a gateway).

The files to be printed and the resources are supposed to be on a PVS that is switched to the new host.

Note

The same cluster can contain real and virtual hosts. The client hosts can thus be identified by both.



Changing a central print server

The operations are the same as in the previous case:

1. Stop BCAM on H1 and start it on H2 with the virtual host name VH1
2. Switch the PVS X from host 1 to host 2 (this PVS contains all current files to be printed and resources
3. Attach the home PVS H1 to H2 and execute the following command to transfer the print jobs from the print jobs queue of H1 to the one of H2.

```
/MOVE-PRINT-JOBS from-file=*inactive(pubset=H1>),
to-file=*std,
select=*by-attr(job-scope=*any,…),
virtual-host-name=*unchanged
```

4. Open the SYSSSI on host H3 and remove the string VIRTUAL-HOST-NAME = "VH1" (before restarting Dprint)
5. Open the SYSSSI on host H4 and insert the string VIRTUAL-HOST-NAME = "VH1"

When Dprint is started on host 2, it identifies itself as VH1 and takes over the VH1 configuration. Normally the local printers should have been switched from host 1 to host 2.

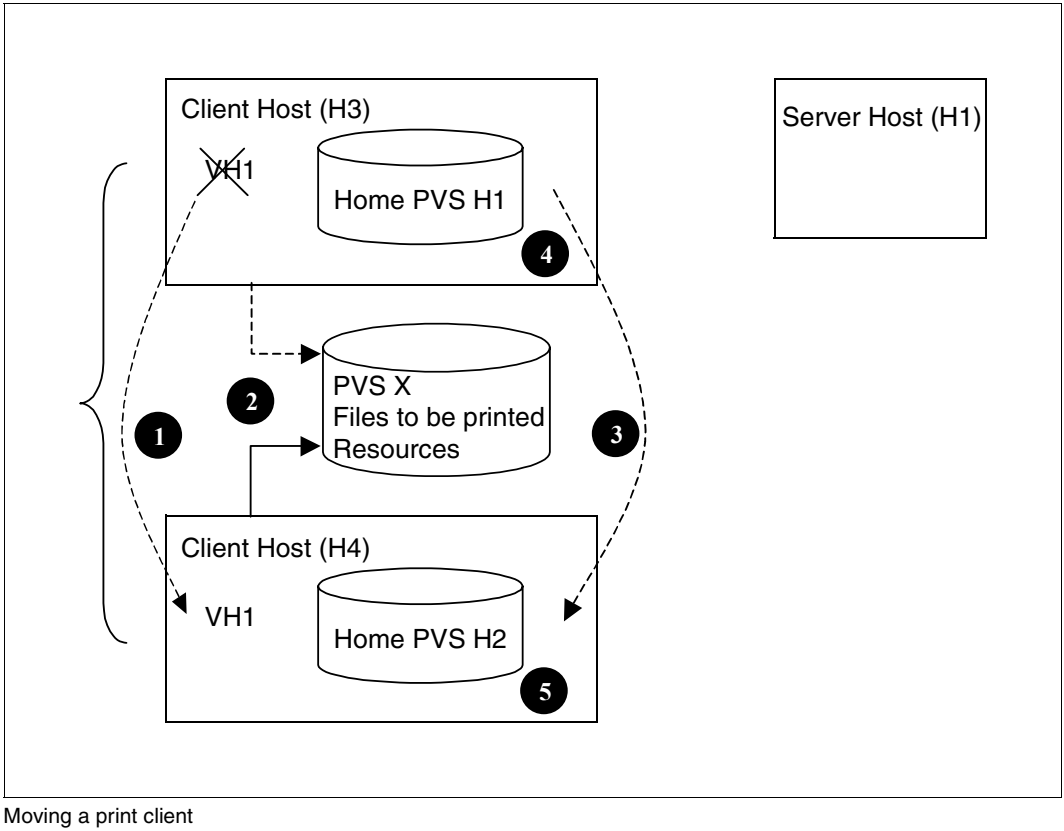
Status requests or modify requests from the external clusters or Xprint domains are routed to VH1, that is H2. They are thus treated as before. If the TSN of the job has been changed, SPOOL is needed. With previous versions, jobs whose TSN has been changed cannot by controlled or modified.

8.4.3 Moving a print client

An application is accessible to the end users by the virtual host VH1. It can thus be loaded successively on different hosts, transparently for the end user.

This application submits print jobs to a Dprint Client that sends them to a Dprint Server in the cluster.

If the application running on the real host H3 is stopped and restarted on the real host H4, the print jobs submitted before the change over and not yet finished at this time, must be completed after the change over, and they must remain under control for the end users.



Moving a print client

The operations are the same as in the previous case.

1. Stop BCAM on H1 and start it on H2 with the virtual host name VH1
2. Switch the PVS X from H1 to H2 (this PVS contains all current files to be printed and resources)
3. Attach the home PVS H1 to H2 and execute the following command to transfer the print jobs from the print jobs queue of H1 to the one of H2.

```
/MOVE-PRINT-JOBS
from-file=*inactive(pubset=H1>),
to-file=*std,
select=*by-attr(job-scope=*any,…),
virtual-host-name=*unchanged
```

4. Open the SYSSSI on host H3 and remove the string VIRTUAL-HOST-NAME = "VH1" (before restarting Dprint)
5. Open the SYSSSI on host H4 and insert the string VIRTUAL-HOST-NAME = "VH1"

When Dprint is started on host H4, it identifies itself as VH1 and takes over the VH1 configuration.

The jobs that have been moved onto H4 contain the identification of the server, so that status or modify requests done by the end user will be done as before. In the reverse way, events notifications sent by the server will be addressed to VH1, that is now, H4 and will thus be treated correctly. If the TSN of the job has been changed, SPOOL is needed. With previous versions, jobs whose TSN has been changed cannot by controlled or modified.

Note

For Dprint, the client host is the same one, before and after the change-over (since it is identified by the same name). For this reason, it would not be possible to move the job via some Dprint function.

9 Accounting functions

9.1 Dprint accounting parameter file

The accounting mechanism for various requirements was enhanced in Spool & Print so that more detailed accounting information can be made available and requests that are based on host and user IDs of up to 512 characters in length (long host names and long user IDs are only permitted if this was specified in the SYSSSI.DPRINTCM.011 parameter file) are supported.

A new parameter file is needed for this purpose (the Dprint accounting parameter file). This parameter file is created under the user ID SYSDPRNT and contains an {accounting number, accounting ID} for each {host name, user ID}. The information in this file is used by Spool & Print if the BS2000 accounting function is called.

This Dprint accounting parameter file is a SAM file with the name $SYSDPRNT.SYSPAR.DPRINT.011.ACCOUNTING that is created and administered by the printer administrator with the help of the system administrator.

Layout of the file

The first character in each data record contains the data record code (‘H’ for the host name, ‘U’ for the user ID and ‘A’ for the accounting information) or '*' for comments. The second character is a blank.

This is followed by the parameter value:

– Host name (H):

  The host name that is received by Xprint and Wprint can be up to 512 characters in length. This means that multiple data records may be needed to define the complete name. Each data record must begin with H, and the actual host name is the result of the concatenation of successive H data records.

– User ID (U):

  The user ID that is received by Xprint and Wprint can be up to 512 characters in length. This means that multiple data records may be needed to define the complete user ID. Each data record must begin with U, and the actual user ID is the result of the concatenation of successive U data records.

– Accounting (A):

  This specification comprises eight characters, followed by two blanks, as well as eight characters for the accounting ID. Both the accounting number and the accounting ID comprise eight characters that are left-justified and filled with blanks.

Example

H	LongHostNameUpTo512Characters	Multiple H data records for one host name
H	LongHostNameUpTo512Characters	
H	LongHostNameUpTo512Characters	
U	LongUserIDUpTo512Characters	Multiple U data records for one user ID
U	LongUserIDUpTo512Characters	
A	12345678 ACCTID12	{Accounting number and ID}
H	D241P11	
U	User1	
A	999 ACCTID99	

The default values for the accounting number and the accounting ID are defined in the SYSSSI.DPRINTCM.011 Dprint parameter file and are read at system startup (see the section “SYSSSI enhancement” on page 343).

The default values of the SYSSSI.DPRINTCM.011 file will be used if no Dprint accounting parameter file is available or no appropriate entry ({host name, user ID}) is found. If a structural error (file format error or DVS error) occurs in the Dprint accounting parameter file or the file does not exist, a warning (SDD0500) will be sent to the console and the default values will be used.

Up to SPOOL V04.0A, only the accounting numbers and user IDs (note uppercase/lowercase) reduced to eight characters will be saved in the BS2000 accounting data records. As of SPOOL V04.1A, accounting IDs and user IDs up to 24 characters (note uppercase/lowercase here also) will be saved in the BS2000 accounting data records.

9.2 SYSSSI enhancement

Four new parameters will be introduced for SYSSSI by Dprint:

1. FUNCTIONS-NAME: DEFAULT.ACCOUNT.NUMBER.FROM.XPRINT.DOMAIN

   This parameter permits the adaptation of the accounting number that will be used for the print jobs transferred from Xprint. This number comprises eight characters that are left-justified and filled with blanks.

   XPRINT-DEFAULT-ACCOUNT-NUMBER=*alphanum8...8*/XPRINT
   XPRINT-DEFAULT-ACCOUNT-NUMBER=XPRINT

2. FUNCTIONS-NAME: DEFAULT.ACCOUNT.ID.FROM.XPRINT.DOMAIN

   This parameter permits the adaptation of the accounting ID that will be used for the print jobs transferred from Xprint. This number comprises eight characters that are left-justified and filled with blanks.

   XPRINT-DEFAULT-ACCOUNT-ID=*alphanum8..8*/XPRINT
   XPRINT-DEFAULT-ACCOUNT-ID=XPRINT

3. FUNCTIONS-NAME: DEFAULT.ACCOUNT.NUMBER.FROM.BSD/LPD.DOMAIN

   This parameter permits the adaptation of the accounting number that will be used for the print jobs transferred from the BSD-LPD gateway. This number comprises eight characters that are left-justified and filled with blanks.

   SDSBGTW-DEFAULT-ACCOUNT-NUMBER=*alphanum8..8*/BSDLPDGW
   SBSDGTW-DEFAULT-ACCOUNT-NUMBER=BSDLPDGW

4. FUNCTIONS-NAME: DEFAULT.ACCOUNT.ID.FROM.BSD/LPD.DOMAIN

   This parameter permits the adaptation of the accounting ID that will be used for the print jobs transferred from the BSD-LPD gateway. This number comprises eight characters that are left-justified and filled with blanks.

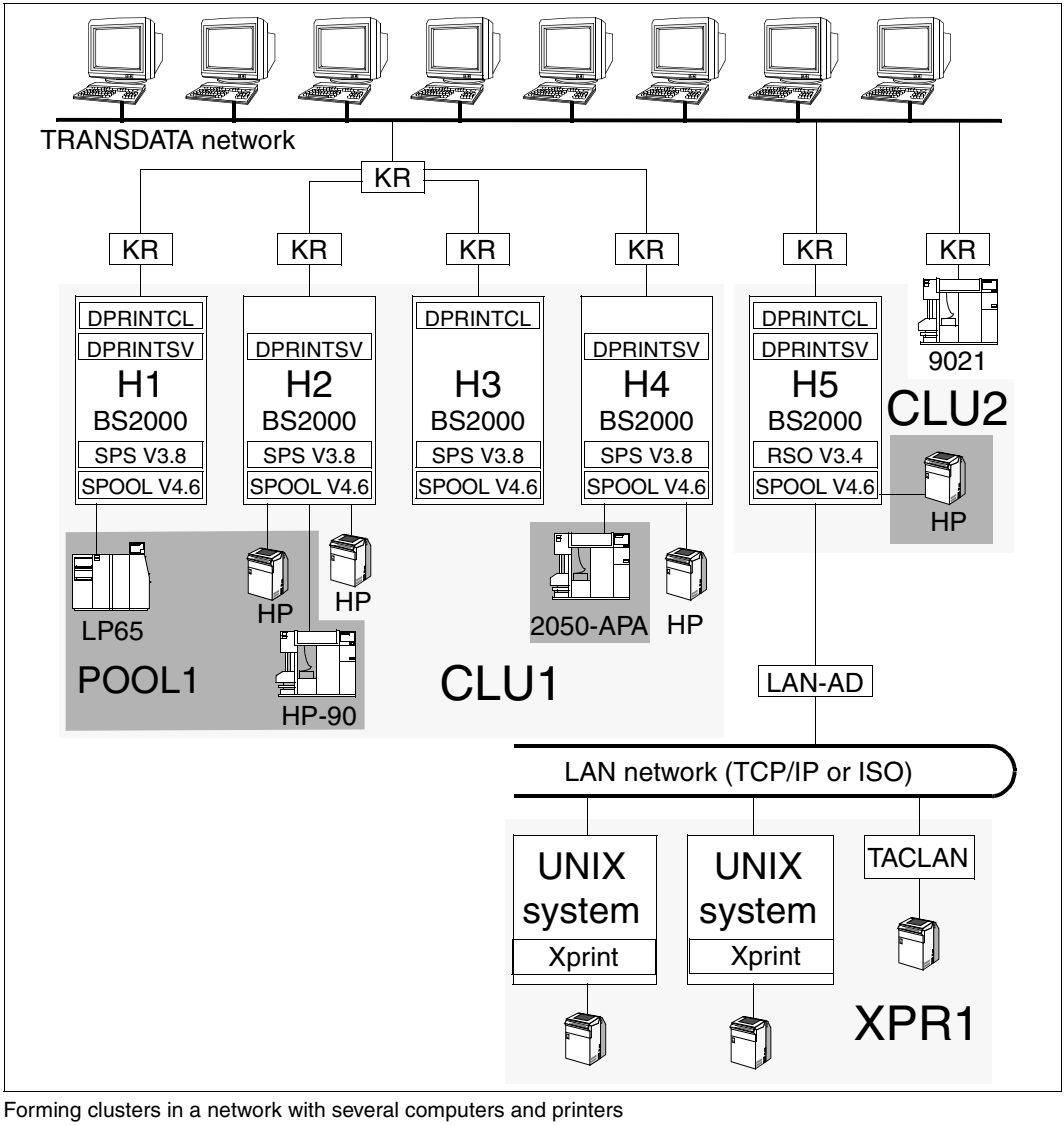
   SBSDGTW-DEFAULT-ACCOUNT-ID=*alphanum8..8*/BSDLPDGW
   SBSDGTW-DEFAULT-ACCOUNT-ID=BSDLPDGW

10 Examples

The following illustration shows a heterogeneous network comprising a BS2000 and UNIX computers and a number of printers. By forming clusters (CLU1, CLU2 and XPR1), the intention is to make it possible for all cluster users to be able to access the Dprint printers (those shown on a dark gray background).

A configuration is created in the following steps in the following administration examples:

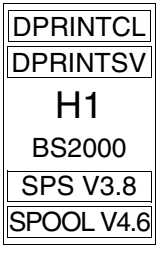
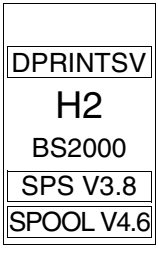
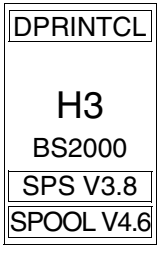
1. Definition of a BS2000 cluster CLU1 comprising the hosts H1, H2 and H3
2. Definition of the printer pool POOL1 in cluster CLU1
3. Extension of cluster CLU1 using host H4
4. Definition of a BS2000 cluster CLU2 comprising the host H5
5. Definition of a cluster link from CLU1 to CLU2
6. Creation of a Dprint interface between cluster SLU2 and a Xprint domain.



Forming clusters in a network with several computers and printers

10.1 Definition of cluster CLU1

The cluster CLU1 is to initially contain: Three hosts H1, H2 and H3. Definition of the cluster is performed in the following steps:

<table>
<tr><th>H1 (Dprint master)</th><th>H2</th><th>H3</th></tr>
<tr><td>Dprint client, Dprint server
 
</td><td>Dprint server
 
</td><td>Dprint client
 
</td></tr>
<tr><td colspan="3">Step 1: Start SPOOL on all hosts</td></tr>
<tr><td>/START-SUBSYSTEM SPOOL,
VERSION=04.6,
SYNCHRONOUS=YES</td><td>/START-SUBSYSTEM SPOOL,
VERSION=04.6,
SYNCHRONOUS=YES</td><td>/START-SUBSYSTEM SPOOL,
VERSION=04.6,
SYNCHRONOUS=YES</td></tr>
<tr><td colspan="3">Step 2: Start Dprint subsystems DPRINTCM and DPRINTCL</td></tr>
<tr><td>/START-SUBSYS DPRINTCM,
VERSION=01.1,
SYNCHRONOUS=YES
/START-SUBSYS DPRINTCL,
VERSION=01.1,
SYNCHRONOUS=YES</td><td>/START-SUBSYS DPRINTCM,
VERSION=01.1,
SYNCHRONOUS=YES</td><td>/START-SS DPRINTCM,
VERSION=01.1,
SYNCHRONOUS=YES
/START-SUBSYS DPRINTCL,
VERSION=01.1,
SYNCHRONOUS=YES</td></tr>
<tr><td colspan="3">Step 3: Define Dprint servers</td></tr>
<tr><td>/START-SPSERVE
//OPEN-PARAMETER-FILE
PARAMETER-FILE=
*DPRINT-PARAMETERS
//ADD-DPRINT-HOST
HOST-NAME=HOST1
//ADD-DPRINT-SERVER
SERVER-NAME=SRV1,
HOST-NAME=HOST1,
PRINT-JOB-CLASS=9
//END</td><td>/START-SPSERVE
//OPEN-PARAMETER-FILE
PARAMETER-FILE=
*DPRINT-PARAMETERS
//ADD-DPRINT-HOST
HOST-NAME=HOST2
//ADD-DPRINT-SERVER
SERVER-NAME=SRV2,
HOST-NAME=HOST2,
PRINT-JOB-CLASS=0
//END</td><td></td></tr>
</table>

H1 (Dprint master)	H2	H3
Step 4: Start DPRINTSV		
/START-SUBSYS DPRINTSV, VERSION=01.1, SYNCHRONOUS=YES	/START-SUBSYS DPRINTSV, VERSION=01.1, SYNCHRONOUS=YES	
Step 5: Declare clients, servers and Dprint master		

/START-SPSERVE
//OPEN-PARAMETER-FILE
PARAMETER-FILE=
*DPRINT-PARAMETERS
//ADD-DPRINT-HOST
HOST-NAME=HOST2
//ADD-DPRINT-HOST
HOST-NAME=HOST3
//ADD-DPRINT-SERVER
SERVER-NAME=SRV2,
HOST-NAME=HOST2,
PRINT-JOB-CLASS=0
//END
	/START-SPSERVE
	//OPEN-PARAMETER-FILE
	PARAMETER-FILE=
	*DPRINT-PARAMETERS
	//ADD-DPRINT-HOST
	HOST-NAME=HOST1
	//END
		/START-SPSERVE
		//OPEN-PARAMETER-FILE
		PARAMETER-FILE=
		*DPRINT-PARAMETERS
		//ADD-DPRINT-HOST
		HOST-NAME=HOST3
		//ADD-DPRINT-HOST
		HOST-NAME=HOST1
		//END

Step 6: Define cluster CLU1		
/CREATE-DPRINT-CLUSTER HOST-NAME=(HOST2,HOST3)		

This defines the BS2000 cluster. It comprises the hosts H1, H2 and H3. The SPOOL administrator of H1 is also the cluster administrator at the same time. H1, H2 and H3 are host objects, SRV1 and SRV2 are server objects. If the Dprint master fails, then host H2 automatically becomes the new Dprint master.

Obtaining information about the current Dprint configuration

```
/SHOW-DPRINT-CLUSTER
```

This command allows the cluster administrator to have information displayed about the cluster configuration.

```
HOST-NAME ADM-HOST HOST-STATE CLUSTER-LINK
HOST1     *YES     *ATT       *CREATED
HOST2     *NO      *ATT       *CREATED
HOST3     *NO      *ATT       *CREATED
```

```
/SHOW-DPRINT-HOSTS INFORMATION=*SUMMARY
```

This command allows the cluster administrator to have information displayed about the host objects.

```
HOST-NAME ADM  ACCESS   INTERNET-ADDR   PORT-NAME
*STD      *NO  *NO                            0
HOST1     *YES *NO                            0
HOST2     *NO  *NO                            0
HOST3     *NO  *NO                            0
```

```
/SHOW-DPRINT-HOSTS HOST-NAME=HOST1,INFORMATION=*ALL
```

This command allows the cluster administrator to have information displayed, for example, about host H1 (Dprint master).

```
HOST-NAME ADM  ACCESS   INTERNET-ADDR   PORT-NAME
HOST1     *YES *NO                            0
HOST-STATE CONN-STATE COMM-ERR FT-STATE
*ATT       *ACC               *NORMAL
```

```
/SHOW-DPRINT-SERVERS
```

This command allows any user to have information displayed about the Dprint servers. The output differs for cluster administrator and nonprivileged user.

Screen display for the cluster administrator:

```
SERVER-NAME HOST-NAME ACCESS
*STD                 *ALL
SRV1        HOST1    *ALL
SRV2        HOST2    *ALL
```

Screen display for the nonprivileged user:

```
SERVER-NAME HOST-NAME ACCESS
*STD
SRV1        HOST1
SRV2        HOST2
```

```
/SHOW-DPRINT-SERVERS INFORMATION=*ALL
```

This command allows any user to have all information displayed about the Dprint servers. The output differs for cluster administrator and nonprivileged user.

Screen display for the cluster administrator:

```
SERVER-NAME HOST-NAME ACCESS
*STD                  *ALL
PRINT-JOB-CLASS
*ANY
SERVER-STATE CONN-STATE COMM-ERR
*ATT         *UNDEF
------------------------------------------------------------------------
SERVER-NAME HOST-NAME ACCESS
SRV1        HOST1     *ALL
PRINT-JOB-CLASS
 9
SERVER-STATE CONN-STATE COMM-ERR
*ATT         *ACC
------------------------------------------------------------------------
SERVER-NAME HOST-NAME ACCESS
SRV2        HOST2     *ALL
PRINT-JOB-CLASS
 0
SERVER-STATE CONN-STATE COMM-ERR
*ATT         *ACC
```

Screen display for the nonprivileged user:

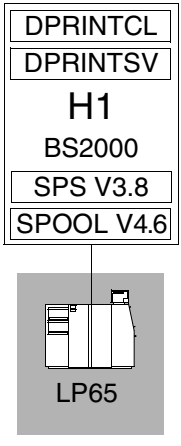
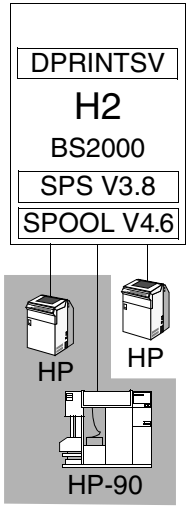
```
SERVER-NAME HOST-NAME ACCESS
*STD
PRINT-JOB-CLASS
*ANY
SERVER-STATE CONN-STATE COMM-ERR
*ATT         *UNDEF
------------------------------------------------------------------------
SERVER-NAME HOST-NAME ACCESS
SRV1        HOST1
PRINT-JOB-CLASS
 9
SERVER-STATE CONN-STATE COMM-ERR
*ATT         *ACC
------------------------------------------------------------------------
SERVER-NAME HOST-NAME ACCESS
SRV2        HOST2
PRINT-JOB-CLASS
 0
SERVER-STATE CONN-STATE COMM-ERR
*ATT         *ACC
```

Server SRV1 is located on host HOST1 (H1). Any user can access this server. The server only executes print jobs of print job class 9. Access to the server is possible at this time.

Server SRV2 is located on host HOST2 (H2). Any user can access this server. The server only executes print jobs of print job class 0. Access to the server is possible at this time.

Print jobs of print job class 0 or 9 are directed to the appropriate server.

10.2 Definition of Dprint printer pool POOL1

H1 (Dprint master)	**H2**	**H3**
Step 1: Define local printers in the SPOOL parameter file of the server		
		

`/START SPSERVE`
`//OPEN-PARAMETER-FILE`
`  PARAMETER-FILE=`
`  *SPOOL-PARAMETERS`
`//ADD-SPOOL-DEVICE`
`  DEVICE-NAME=DVC1,`
`  DEVICE-TYPE=`
`  LP65-PRINTER, ...`
`//END`
	`/START SPSERVE`
	`//OPEN-PARAMETER-FILE`
	`  PARAMETER-FILE=`
	`  *SPOOL-PARAMETERS`
	`//ADD-SPOOL-DEVICE`
	`  DEVICE-NAME=DVC1,`
	`  DEVICE-TYPE=`
	`  HP90-PRINTER, ...`
	`//ADD-SPOOL-DEVICE`
	`  DEVICE-NAME=DVC2,`
	`  DEVICE-TYPE=`
	`  HP-PRINTER, ...`
	`//ADD-SPOOL-DEVICE`
	`  DEVICE-NAME=DVC3,`
	`  DEVICE-TYPE=`
	`  HP-PRINTER, ...`
	`//END`	

H1 (Dprint master)	H2	H3
Step 2: Define Dprint printers in the Dprint parameter file on the Dprint master		

/START SPSERVE
//OPEN-PARAMETER-FILE
PARAMETER-FILE=
*DPRINT-PARAMETERS
//ADD-DPRINT-PRINTER
PRINTER-NAME=S1PRT1,
SERVER-NAME=SRV1,
LOCAL-PRINTER-
NAME=DVC1
//ADD-DPRINT-PRINTER
PRINTER-NAME=S2PRT1,
SERVER-NAME=SRV2,
LOCAL-PRINTER-
NAME=DVC1
//ADD-DPRINT-PRINTER
PRINTER-NAME=S2PRT2,
SERVER-NAME=SRV2,
LOCAL-PRINTER-
NAME=DVC2
//END		

Step 3: Definition of Dprint printer pool POOL1		

/START SPSERVE
//OPEN-PARAMETER-FILE
PARAMETER-FILE=
*DPRINT-PARAMETERS
//ADD-DPRINT-PRINTER-
POOL,POOL-NAME=POOL1
,PRINTER-NAME=
(S1PRT1,S2PRT1,S2PRT2)
//END		

Obtaining information about the current Dprint printer configuration

On hosts on which DPRINTCL has not been started, SPSERVE must first be called. The commands are then as follows:

```
/START-SPSERVE
//OPEN-PARAMETER-FILE,PARAMETER-FILE=*DPRINT-PARAMETERS
//<statement>
//END
```

```
/SHOW-DPRINT-PRINTERS
```

This command allows any cluster user to have information displayed about the Dprint printers.

```
PRINTER-NAME SERVER-NAME LOCAL-PRINTER-NAME
*STD
S1PRT1       SRV1        DVC1
S2PRT1       SRV2        DVC1
S2PRT2       SRV2        DVC2
```

```
/SHOW-DPRINT-PRINTERS PRINTER-NAME=S1PRT1,INFORMATION=*ALL
```

This command allows any cluster user to have information displayed about the printer S1PRT1. The Dprint server must be started for the following screen display.

```
PRINTER-NAME SERVER-NAME LOCAL-PRINTER-NAME
S1PRT1       SRV1        DVC1
DEVICE-TYPE
LP65-PR
----------------------DEVICE-ACCESS-------------------------------------
ACCESS PROC-NAME MNEM-NAME
CH-2   *HOST     L1
----------------------TWIN-DEVICE-DEF-----------------------------------
SLAVE-MNEM ESD-SIZE
*NONE             0
----------------------DEVICE-INFORMATION--------------------------------
F-O-B C-S-N ROT DUP-PROC FORM-OVER R-P-M
 1 NO  NO       NO        *NONE
----------------------SPOOLOUT-CONTROL----------------------------------
SHIFT FORM-FEED DEF-TRAY OUT-TRAY SKIP-TO-CH CHAR-IMAGE
 0 SING             1        1 NORMAL     *NONE
----------------------PROCESSING-CONTROL--------------------------------
P-EJ-TIMEOUT BAND-ID
 NO  *NONE
FORM-NAME = STD
----------------------LANGUAGE-EXTENSION--------------------------------
LANG-EXT-TYPE
*SYSTEM
------------------------------------------------------------------------
```

```
/SHOW-DPRINT-PRINTERS PRINTER-NAME=S2PRT2,INFORMATION=*ALL
```

Information about a Dprint printer is not displayed unless the corresponding Dprint server has been started. Instead, an appropriate message is issued.

```
PRINTER-NAME SERVER-NAME LOCAL-PRINTER-NAME
S2PRT2       SRV2        DVC2
%  SDD2109 SPOOL INFORMATION NOT AVAILABLE
```

```
/SHOW-DPRINT-PRINTER-POOLS
```

This command allows any user on hosts H1 and H2 to have information displayed about the Dprint printer pools.

```
POOL-NAME(S):
POOL1
```

```
/SHOW-DPRINT-PRINTER-POOLS POOL-NAME=POOL1,INFORMATION=*ALL
```

This command allows any user on hosts H1 and H2 to have information displayed about a particular Dprint printer pool (POOL1 in this case).

```
POOL-NAME : POOL1
PRINTER-NAME(S) :
S1PRT1    S2PRT1    S2PRT2
```

Starting the Dprint printers by the cluster administrator

H1 (master host)	H2	H3
/START-PRINTER-OUTPUT DEVICE-NAME= ANY-LOCAL-PRINTER (NAME=S1PRT1, HOST-NAME= *LOCAL-CLUSTER) /START-PRINTER-OUTPUT DEVICE-NAME= ANY-LOCAL-PRINTER (NAME=S2PRT1, HOST-NAME= *LOCAL-CLUSTER) /START-PRINTER-OUTPUT DEVICE-NAME= ANY-LOCAL-PRINTER (NAME=S2PRT2, HOST-NAME= *LOCAL-CLUSTER)		

Obtaining information about active SPOOL devices

```
/SHOW-ACTIVE-SPOOL-DEVICES
```

This command allows the cluster administrator to have information displayed about the active SPOOL devices.

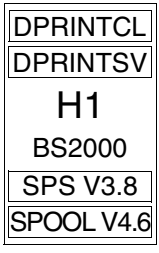
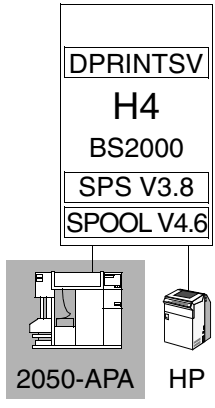
```
DEV-NAME DEV-TYPE   CUSER-ID C-TSN EXIT C-FORM C-CL SSU ADM CRI
S1PRT1   HP-PRINT   TSOS      OEJ3  YES STD       0 LR  YES EXP
S2PRT1   HP90-PRINT TSOS      OEJ3  YES STD       0 LR  YES EXP
S2PRT2   HP-PRINT   TSOS      OEJ3  YES STD       0 LR  YES EXP
T8       TAPE                     YES           0 L   YES EXP
```

```
/SHOW-ACTIVE-SPOOL-DEVICES S2PRT2
```

This command allows the cluster administrator to have information displayed about the active printer S2PRT2.

```
DEV-NAME: S3PRT2    DEV-TYP:HP-PRINT  REV:   2 SCHED:NEXT-JOB
C-USERID: TSOS     PRIORITY:  30/ 255 USE: OUT  C-TSN: OEJ3
CLASSES (A):
FORM(P ):  STD
PNAME(P): TEST
USER (A):
ACC  (A):
DESTS: *CENTRAL
CURRENT-FORM: STD     SAMPLE: NO   EXIT: YES  TRACE: NO
CURRENT-DIA:            T-UP-P: ANY
ROTATION: ANY   FOB:      0/  672  CHAR-SET:    0/    64
DIAS    (P    ): D1
SERVER NAME: *LOCAL    HOST-NAME= HOST2
PRINTER-STATE: R       PRINTER-SCOPE: L
HOSTS(A):
```

10.3 Modification of cluster CLU1

H1	H2	H3	H4
			
Definition of the local printers			

			/START-SPSERVE
			//OPEN-PARAMETER-FILE
			PARAMETER-FILE=
			*SPOOL-PARAMETERS
			//ADD-SPOOL-DEVICE
			DEVICE-NAME=DVC1,
			DEVICE-TYPE=HP-PRINTER,
			...
			//ADD-SPOOL-DEVICE
			DEVICE-NAME=DVC2,
			DEVICE-TYPE=
			2050-APA-PRINTER,...
			//END

H1	H2	H3	H4
Starting the local printers			
			/START-PRINTER-OUTPUT DEVICE-NAME= ANY-LOCAL-PRINTER (NAME=DVC1,HOST-NAME= *LOCAL-CLUSTER) /START-PRINTER-OUTPUT DEVICE-NAME= ANY-LOCAL-PRINTER (NAME=DVC2,HOST-NAME= *LOCAL-CLUSTER)
Start DPRINTCM			
			/START-SUBSYSTEM DPRINTCM, VERSION=01.1, SYNCHRONOUS=YES
Define H4 as Dprint server			

			/START-SPSERVE
			//OPEN PARAMETER-FILE
			PARAMETER-FILE=
			*DPRINT-PARAMETERS
			//ADD-DPRINT-HOST
			HOST-NAME=HOST4
			//ADD-DPRINT-SERVER
			SERVER-NAME=SRV4,
			HOST-NAME=HOST4,
			PRINT-JOB-CLASS=*ANY
			//END

Start DPRINTSV			
			/START-SUBSYSTEM DPRINTSV, VERSION=01.1, SYNCHRONOUS=YES

H1	H2	H3	H4
Include H4 in cluster CLU1			

			/START-SPSERVE
			//OPEN PARAMETER-FILE
			PARAMETER-FILE=
			*DPRINT-PARAMETERS
			//ADD-DPRINT-HOST
			HOST-NAME=HOST1
			//END

/START-SPSERVE
//OPEN PARAMETER-FILE
PARAMETER-FILE=
*DPRINT-PARAMETERS
//ADD-DPRINT-HOST
HOST-NAME=HOST4
//ADD-DPRINT-SERVER
SERVER-NAME=SRV4,
HOST-NAME=HOST4,
PRINT-JOB-CLASS=*ANY
//ADD-DPRINT-PRINTER
PRINTER-NAME=S4PRT2,
SERVER-NAME=SRV4,
LOCAL-PRINTER-NAME=DVC2
//END
/MODIFY-DPRINT-CLUSTER
HOST-NAME=HOST4,
ACTION=*ADD			

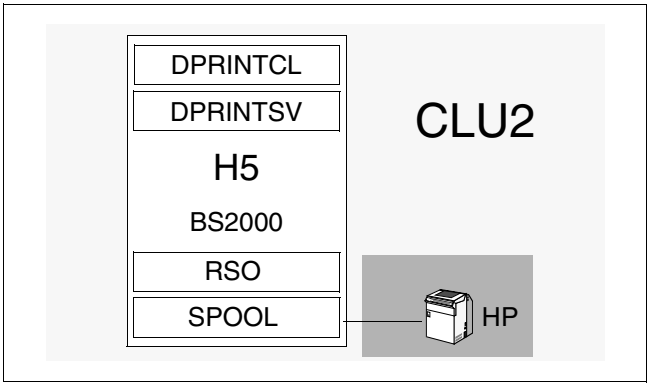
Stop APA printer and restart it with the logical name S4PRT2			
			/STOP-PRINTER-OUTPUT DEVICE-NAME= ANY-LOCAL-PRINTER (NAME=DVC1)
/START-PRINTER-OUTPUT DEVICE-NAME= ANY-LOCAL-PRINTER (NAME=S4PRT2,HOST-NAME= *LOCAL-CLUSTER),...			

10.4 Definition of the BS2000 cluster CLU2

The cluster CLU2 is to consist solely of host H5 and one Dprint printer.

SPOOL, DPRINTCL V1.1 and DPRINTSV V1.1 are installed on H5.

A HP Printer is attached.



Step 1: Start SPOOL, DPRINTCM and DPRINTCL

```
/START-SUBSYSTEM SPOOL,VERSION=...,SYNCHRONOUS=YES
/START-SUBSYSTEM DPRINTCM,VERSION=01.1,SYNCHRONOUS=YES
/START-SUBSYSTEM DPRINTCL,VERSION=01.1,SYNCHRONOUS=YES
```

Step 2: Define Dprint server

```
/START-SPSERVE
//OPEN PARAMETER-FILE,PARAMETER-FILE=*DPRINT-PARAMETERS
//ADD-DPRINT-HOST,HOST-NAME=HOST5
//ADD-DPRINT-SERVER,SERVER-NAME=SRV1,HOST-NAME=HOST5,PRINT-JOB-CLASS=*ANY
//END
```

Step 3: Start DPRINTSV

```
/START-SUBSYSTEM DPRINTSV,VERSION=01.1,SYNCHRONOUS=YES
```

Step 4: Define Dprint cluster

```
/CREATE-DPRINT-CLUSTER
```

Step 5: Define printer in the parameter files

```
/START-SPSERVE
//OPEN-PARAMETER-FILE PARAMETER-FILE=*SPOOL-PARAMETERS
//ADD-SPOOL-DEVICE DEVICE-NAME=DVC1,DEVICE-TYPE=HP-PRINTER,...
//OPEN-PARAMETER-FILE PARAMETER-FILE=*DPRINT-PARAMETERS
//ADD-DPRINT-PRINTER PRINTER-NAME=S1PRT1,SERVER-NAME=SRV1,LOCAL-PRINTER-
   NAME=DVC1
//END
```

Step 6: Start Dprint printer

```
/START-PRINTER-OUTPUT DEVICE-NAME=ANY-LOCAL-PRINTER(NAME=S1PRT1,HOST-
   NAME=*LOCAL-CLUSTER)
```

10.5 Definition of a cluster link from CLU1 to CLU2

In order to send a Dprint job from cluster CLU1 to CLU2, you first specify on the Dprint master of CLU1 which users may send jobs to CLU2. In the example it is only the users who are working on the Dprint master. The remote cluster CLU2 is then declared. The network address here is the network address of host H5 (HOST5).

On the Dprint master in cluster CLU2 a gateway is defined which may be accessed by all remote users (*ALL-USERS). In addition, new access rights are allocated for the Dprint printer.

Dprint master of cluster CLU1 (H1)

```
/START-SPSERVE
//OPEN-PARAMETER-FILE
   PARAMETER-FILE=
   *DPRINT-PARAMETERS
//CREATE-DPRINT-ACCESS-CONTROL
   ACCESS-CONTROL-NAME=ACL1,
   SUBJECT=*ALL-USERS
   (ADMISSION=YES)
//MODIFY-DPRINT-ACCESS-CONTROL
   ACCESS-CONTROL-NAME=ACL1,
   SUBJECT=*HOST(HOST-NAME=HOST1)
//ADD-DPRINT-REMOTE-CLUSTER
   CLUSTER-NAME=CLU2,TYPE=*BS2000,
   NETWORK-ADDRESS=HOST5,
   ACCESS-TO-CLUSTER=
   *BY-ACCESS-CONTROL
   (ACC-CONT-NAME=ACL1)
//END
```

Dprint master of cluster CLU2 (H5)

```
/START-SPSERVE
//OPEN-PARAMETER-FILE
   PARAMETER-FILE=
   *DPRINT-PARAMETERS
//MODIFY-DPRINT-HOST
   HOST-NAME=HOST5,
   ACCESS-FROM-CLUSTERS=*ALL-USERS
//END
/MODIFY-PRINTER-OUTPUT-STATUS
   DEVICE-NAME=ANY-LOCAL-PRINTER
   (NAME=S1PRT1,HOST-NAME=*ALL-
   CLUSTERS)
```

Obtaining information about the existing cluster link

```
/SHOW-DPRINT-REMOTE-CLUSTER
```

This command allows all users on host H1 to have the remote clusters displayed.

```
CL-NAME  NETW-ADDR TYPE   INTERNET-ADDR    PORT-NAME HOME-G-ADDR
*STD               *BS2                           0
CLU2     HOST5     *BS2                           0
```

```
/SHOW-DPRINT-REMOTE-CLUSTER CLUSTER-NAME=CLU2,INFORMATION=*ALL
```

This command allows any user on host H1 to have information displayed about the remote cluster CLU2.

```
CL-NAME  NETW-ADDR TYPE   INTERNET-ADDR    PORT-NAME HOME-G-ADDR
CLU2     HOST5     *BS2                           0
ACCESS   CONN-STATE COMM-ERR
 *ACC
GATEWAY-NAME:
HOST-NAME:
------------------------------------------------------------------------
```

```
/SHOW-DPRINT-PRINTERS CLUSTER-NAME=CLU2
```

This command allows any user on the host to have the Dprint printers attached in cluster CLU2 displayed.

```
PRINTER-NAME SERVER-NAME LOCAL-PRINTER-NAME
*STD
S1PRT1       SRV1        DVC1
```

```
/SHOW-DPRINT-PRINTERS PRINTER-NAME=S1PRT1,CLUSTER-NAME=CLU2,
INFORMATION=*ALL
```

This command provides a user on host H1 with all the information about the printer S1PRT1 in cluster CLU2.

```
PRINTER-NAME SERVER-NAME LOCAL-PRINTER-NAME
S1PRT1       SRV1        DVC1
DEVICE-TYPE
HP-PRINT
----------------------DEVICE-ACCESS-------------------------------------
ACCESS PROC-NAME MNEM-NAME
CH-2   *HOST     L8
----------------------TWIN-DEVICE-DEF-----------------------------------
SLAVE-MNEM ESD-SIZE
*NONE             0
----------------------DEVICE-INFORMATION--------------------------------
F-O-B C-S-N ROT DUP-PROC FORM-OVER R-P-M
 672    64 YES NO       YES       *NONE
----------------------SPOOLOUT-CONTROL----------------------------------
SHIFT FORM-FEED DEF-TRAY OUT-TRAY SKIP-TO-CH CHAR-IMAGE
 0 LIST             1        0 NORMAL     *NONE
----------------------PROCESSING-CONTROL--------------------------------
P-EJ-TIMEOUT BAND-ID
 NO  *NONE
FORM-NAME = STD
----------------------LANGUAGE-EXTENSION--------------------------------
LANG-EXT-TYPE
*SYSTEM
------------------------------------------------------------------------
```

```
/SHOW-ACTIVE-SPOOL-DEVICES CLUSTER-NAME=CLU2
```

This command allows any user on host H1 to have information displayed about the active printers in cluster CLU2.

```
DEV-NAME DEV-TYPE  CUSERID C-TSN EXIT C-FORM C-CL SSU ADM CRI
S1PRT1   HP-PRINT                 YES STD       0 LI      EXP
```

```
/SHOW-ACTIVE-SPOOL-DEVICES S1PRT1,CLUSTER-NAME=CLU2
```

This command allows any user on host H1 to have information displayed about the active printer S1PRT1 in cluster CLU2.

```
DEV-NAME: S1PRT1    DEV-TYP:HP-PRINT  REV:   1 SCHED:NEXT-JOB
C-USERID:          PRIORITY:  30/ 255 USE: OUT  C-TSN:
CLASSES (A):
FORM(P ):  UPBOR
PNAME(P):
USER (A):
ACC  (A):
DESTS: *CENTRAL
CURRENT-FORM: UPBOR   SAMPLE: NO   EXIT: YES  TRACE: NO
CURRENT-DIA:            T-UP-P: ANY
ROTATION: ANY   FOB:      0/  672  CHAR-SET:    0/    64
DIAS    (P    ): D1
SERVER NAME: *LOCAL    HOST-NAME= HOST5
PRINTER-STATE: I       PRINTER-SCOPE: L
HOSTS(A):
```

10.6 Definition of interoperability with Xprint

A Dprint cluster on the BS2000 side and Xprint on the UNIX systems are prerequisites for this kind of interface.

In the example below, a bidirectional connection between the BS2000 cluster CLU2 and the Xprint domain is set up. In order to do this, gateways must be available in both systems. In addition, both clusters must make themselves known to each other.

Activities on the Dprint master H5 in the BS2000 cluster CLU2

A gateway is already available, so only the Xprint domain needs to be defined:

```
/START-SPSERVE
//OPEN-PARAMETER-FILE PARAMETER-FILE=*DPRINT-PARAMETERS
//ADD-DPRINT-REMOTE-CLUSTER CLUSTER-NAME=XPR1,
                            TYPE=*UNIX-TCP(INTERNET-ADDRESS=111.222.33.4,
                                           PORT-NAME=4010,
                                           GATEWAY-NAME='gw1',
                                           HOST-NAME='sin_host1',
                                           HOME-GATEWAY-ADDRESS=HOST5),
                            NETWORK-ADDRESS=HOST6,
                            ACCESS-TO-CLUSTER=*ALL-USERS
//END
```

Activities on the master of the Xprint domain XPR1

A gateway must be defined in Xprint, if one is not already available:

```
xpadd -gtw gw1 -tp LOCAL -ga 4010 -ho sin_host1 -np TCP -PP GIP1
```

The BS2000 cluster CLU2 is made known with the following command:

```
xpadd -gtw HOST5 -tp PARTNER -ga address -bl gw1 -np TCP -pp GIP1
```

Note

In UNIX systems, printers are defined with the following command:

```
xpadd -dev Xprint-printer-name ... ... ...
```

For more information and examples, refer to section “Interoperability between BS2000 systems, UNIX systems and Windows systems” on page 215.

Obtaining information on the existing cluster connection

```
/SHOW-DPRINT-REMOTE-CLUSTER SELECT=*BY-ATTRIBUTE(TYPE(*UNIX-ISO,*UNIX-TCP))
```

This command enables all users in cluster CLU2 to display information on the Xprint domains known to the cluster.

```
CL-NAME  NETW-ADDR TYPE   INTERNET-ADDR    PORT-NAME HOME-G-ADDR
XPR1               *U-TC  111.222.33.4           4010 HOST5
```

```
/SHOW-DPRINT-REMOTE-CLUSTER CLUSTER-NAME=XPR1,INFORMATIN=*ALL
```

This command enables the cluster administrator of CLU2 to display more detailed information on the Xprint domain XPR1.

```
CL-NAME  NETW-ADDR TYPE   INTERNET-ADDR    PORT-NAME HOME-G-ADDR
XPR11     HOST6     *U-TC  111.222.33.4          4010 HOST5
ACCESS   CONN-STATE COMM-ERR
*ALL     *ACC
GATEWAY-NAME:
 gw1
HOST-NAME:
 sin_host1
------------------------------------------------------------------------------
```

10.7 Print job examples

Example 1

A user on host H1 issues a print job.

```
/PRINT-DOCUMENT FROM-FILE=user1file,...
```

```
%  SCP0810 SPOOLOUT FOR FILE ':1:$USER1.user1file' ACCEPTED. TSN: '4610',
   SPOOLOUT-NAME: 'PRINT1', MONJV: '*NONE'
%  SCP12025 PRINT JOB ACCEPTED BY SERVER '*HOME' WITH TSN '4610'
```

The print job was accepted and sent to the local server (SERVER '*HOME'). The client TSN and server TSN in each case is 4610.

Example 2

A user on host H2 issues a print job.

```
/PRINT-DOCUMENT FROM-FILE=user2file,...
```

```
%  SCP0810 SPOOLOUT FOR FILE ':2:$USER2.user2file' ACCEPTED. TSN: '1586',
   SPOOLOUT-NAME: 'PRINT2', MONJV: '*NONE'
%  SCP12025 PRINT JOB ACCEPTED BY SERVER 'SRV1' WITH TSN '4698'
```

The print job has been accepted and sent to the server on host H1 (SERVER 'SRV1'). The client TSN is 1586 and the server TSN is 4698.

Example 3

A user on host H3 issues a print job.

```
/PRINT-DOCUMENT FROM-FILE=user3file,...
```

```
%  SCP0810 SPOOLOUT FOR FILE ':3:$USER3.user3file' ACCEPTED. TSN: 'OEIB',
   SPOOLOUT-NAME: 'PRINT3', MONJV: '*NONE'
```

Since DPRINTCL has not been loaded and started on host H3, the print job is not distributed but sent directly to the local server and thus to a local printer. A local printer may also be a Dprint printer in this case. The job TSN is OEIB.

Example 4

A user on host H5 issues a print job to the Xprint domain XPR1.

```
/PRINT-DOCUMENT FROM-FILE=myfile,
                DOCUMENT-FORMAT=*TEXT(
                    LINE-SPACING=*BY-IBM-CONTROLS(CONTROL-POS=10)),
                RESOURCE-DESCRIPTION=*PARAMETERS(
                    FORM-NAME=UNIX_form_name),
                TO-PRINTER=*PARAMETERS(
                    PRINTER-NAME=sin_prt1,
                    CLUSTER-NAME=XPR1)
```

Example 5

This is an example of how a print job in SPOOL can be assigned to an Xprint PCL printer.

```
/PRINT-DOCUMENT FROM=myfile,
         DOCUMENT-FORMAT=*PAGE-FORMAT(CONTROL-MODE=*PAGE-MODE),
         LAYOUT-CONTROL=*PARAMETERS(COVER-PAGE=*PARAMETERS(
                                    HEADER-PAGE-TEXT='ROT=YES')),
         TO-PRINTER=*PARAMETERS(
            PRINTER-NAME=Xprint-printer-name,
            CLUSTER-NAME=UNIX-remote-cluster-name,
            OUTPUT-FORMAT=UNIX-content-type)
```

OUTPUT-FORMAT is a format name which is recognized and supported by the printer attached to the UNIX system and is specified in the PRINTER-NAME operand.

10.8 SHOW-PRINT-JOB examples for the nonprivileged user

Example 1

The user of host H3 wishes to have information displayed about his/her print job.

```
/SHOW-PRINT-JOB-STATUS SELECT=*PARAMETERS(TSN=OEIB)
```

```
TSN  SERVER  SP-NAME RTSN HOST   USER-ID  ACCOUNT  F-C P-C F-T FCB-T F-SIZE
OEIB *HOME   PRINT3  OEH9 HOST3  USER3    3          0   0 DSM SAM        2
%  SCP0947 1 JOBS FOUND WITH 2 PAM PAGES. COMMAND TERMINATED
```

Example 2

The user of host H3 wishes to have information displayed about his/her print job in the Dprint environment.

```
/SHOW-PRINT-JOB-STATUS INFO=DISTRIBUTED,SEL=PAR(TSN=OEIB)
```

```
TSN  SERVER   P-TSN J-TYPE HOST     USER-ID  ACCOUNT  ERCOD    ERMSG
OEIB *HOME    OEIB  *LOC   HOST3    USER3    3
%  SCP0947 1 JOBS FOUND WITH 2 PAM PAGES. COMMAND TERMINATED
```

Example 3

The user of host H3 wishes to have the attributes of his/her print job displayed.

```
/SHOW-PRINT-JOB-ATTRIBUTES JOB-ID=*TSN(TSN=OEIB)
```

```
TSN          : OEIB (OEIB)  SERVER-NAME : *HOME        STATE : WT
FILE-NAME    : :3:$USER3.user3file
ADD-COPIES   :   0          LOCK-FILE : *NO
DEL-AFTER-PR: *NO
 ------------------------------ DOCOMENT-PART -----------------------------
INPUT-SECT   : *WHOLE-FILE
INPUT-PART   : *ALL
RECORD-PART : *ALL
OUTPUT-PART : *ALL
 ---------------------------- DOCUMENT-FORMAT ---------------------------
DOC-FORMAT   : *TEXT
LINE-P-PAGE :     0       HEADER-LINE : *NO
LINE-SPACING: *CHARACTER
 ---------------------------- PRINT-JOB-CONTROL -------------------------
PR-JOB-NAME : PRINT3   PR-JOB-PRIO :  240          CHECKPOINT : *ON-PAGES
FAILURE-PROC: (MSG-PAGE : *YES)
 ------------------------------ LAYOUT-CONTROL ----------------------------
PAGE-COPIES :   0      LEFT-MARGIN :  0            ROTATION : *NO
TAB-REF-CHAR: *NO
 -------------------------- RESOURCES-DESCRIPTION ----------------------
FORM-NAME    : STD
RES-LOC      : *HOME
CHAR-SET-ATT: *ALL
 ------------------------------ TO-PRINTER --------------------------------
PRINTER-NAME: *CENTRAL
PRINTER-TYPE: *ANY
REDIRECTION : *YES
```

10.9 SHOW-PRINT-JOB examples for the cluster administrator

Example 1

The cluster administrator can have information displayed about all Dprint print jobs in cluster CLU1 and all local print jobs at his/her host.

```
/SHOW-PRINT-JOB-STATUS SELECT=*PARAMETERS(USER-ID=*ALL,HOST-
NAME=*ALL,SERVER-NAME=*ALL)
```

```
TSN  SERVER  SP-NAME RTSN HOST   USER-ID  ACCOUNT  F-C P-C F-T FCB-T F-SIZE
4610 *HOME   PRINT1  4590 HOST1  USER1    128        0   0 DMS SAM        5
4484 *HOME   TDADM   4444 HOST1  TSOS     ADMINISTER 0   0 DMS SAM        2
4485 *HOME   VMCONS  4447 HOST1  TSOS     ADMINISTER 0   0 DMS SAM        2
4486 *HOME   TDADM   4445 HOST1  TSOS     ADMINISTER 0   0 DMS SAM        2
4669 *HOME   TDADM   4531 HOST1  TSOS     ADMINISTER 0   0 DMS SAM        2
4676 *HOME   VMCONS  4532 HOST1  TSOS     ADMINISTER 0   0 DMS SAM        2
4698 *HOME   PRINT2  1582 HOST2  USER2    1          0   0 DMS SAM        1
%  SCP0947 7 JOBS FOUND with 16 PAM PAGES. COMMAND TERMINATED
```

Example 2

The cluster administrator can have information displayed about all Dprint jobs in cluster CLU1 (distinguishing between local and distributed jobs).

```
/SHOW-PRINT-JOB-STATUS INFO=DISTRIBUTED,SELECT=*PARAMETERS(USER-ID=*ALL,
HOST-NAME=*ALL,SERVER-NAME=*ALL)
```

```
TSN  SERVER   P-TSN J-TYPE HOST     USER-ID  ACCOUNT    ERCOD    ERMSG
4610 *HOME    4610 *LOC    HOST1    USER1    128
4484 *HOME    4484 *LOC    HOST1    TSOS     ADMINISTER
4485 *HOME    4485 *LOC    HOST1    TSOS     ADMINISTER
4486 *HOME    4486 *LOC    HOST1    TSOS     ADMINISTER
4669 *HOME    4669 *DIST   HOST1    TSOS     ADMINISTER
4676 *HOME    4676 *DIST   HOST1    TSOS     ADMINISTER
4698 *HOME    1586 *DIST   HOST2    USER2    1
%  SCP0947 7 JOBS FOUND with 16 PAM PAGES. COMMAND TERMINATED
```

11 Appendix

11.1 Dprint-Xprint interoperability

This section describes the interoperability between Dprint and Xprint.

11.1.1 From Dprint to Xprint

In the following you will find a description of the operations for Dprint to Xprint gateways with a list of the options supported in each case.

11.1.1.1 Requesting information on the Xprint domain

Displaying Xprint domains

List the UNIX system based clusters (accessible via a TCP/IP connection) defined in the Dprint configuration which the user can access:

```
/SHOW-DPRINT-REMOTE-CLUSTERS SELECT=*BY-ATT(TYPE=*UNIX-TCP(...))
```

Displaying printers

List all Xprint printers, which can be accessed via the specified UNIX system based cluster (provided that their name is not longer than 8 characters):

```
/SHOW-DPRINT-PRINTERS CLUSTER-NAME=UNIX-cluster-name
```

Displaying printers pools

List all the Xprint printer groups, which can be accessed via the specified UNIX system based cluster (provided that their name is not longer than 8 characters):

```
/SHOW-DPRINT-PRINTER-POOLS CLUSTER-NAME=UNIX-cluster-name
```

Displaying printer status

List all active Xprint printers which can be accessed by the user (provided that their name is not longer than 8 characters):

```
/SHOW-ACTIVE-SPOOL-DEVICES CLUSTER-NAME=UNIX-cluster-name
```

Manual information

The Xprint administrator should then give the list of available Xprint forms and fonts to the BS2000 cluster administrator, who can then pass this information on to the BS2000 users.

11.1.1.2 Print job submission

Several of the operand values of the PRINT-DOCUMENT command are not permitted in the case of interoperability between BS2000 and UNIX systems. If these are specified, the print job is rejected.

The following operand values are not permitted:

- INPUT-SECTION=*WHOLE-FILE
- OUTPUT-PART with DIMENSION=*PAGE or FROM < 0
- FAMILY-PROCESSING = *YES
- CHECKPOINT
- MONJV=*NONE
- JV-PASSWORD =*NONE
- PROCESSING-ADMISSION
- LINE-TRUNCATION
- LINE-PER-PAGE
- HEADER-LINE
- OUTPUT-FORMAT
- TWO-SIDED=*STD
- ROTATION=0 and ROTATION=90
- INPUT-TRAY
- OUTPUT-TRAY
- HEADER-NUMBER-EXIT
- TRAILER-NUMBER-EXIT
- LOOP
- ROTATION-LOOP
- CHARACTER-SET=*POOL(...)
- ELECTRONIC-OVERLAY
- OVERLAY
- FORMS-OVERLAY-BUFFER
- PAGE-DEFINITION
- USER-RESOURCES-FILE=*STD
- TRANSLATION-TABLE

– PRINTER-TYPE
– LOCK-FILE=*YES for Dprint < V1.1A
– DELETE-AFTER-PRINT=*YES or *DESTROY for Dprint < V1.1A

Operand	**Parameters**	**Add-job structure correspondence**	**Remark**
FROM-FILE	SAM ISAM PLAM library element Temporary file SYSLST/SYSOUT	Document reference (-dr) filename filename L=library name, E=element name, V=element version, T=type filename filename	 From Dprint 1.1A From Dprint 1.1A
DOCUMENT-PART	INPUT-SECTION INPUT-PART RECORD-PART	Rejected if *WHOLE-FILE	
	OUTPUT-PART	Page select (-ps)	
DOCUMENT-FORMAT	*TEXT *SPECIAL-FORMAT	Content-type (-ct) +Doc-Format = ISO/EBCDIC	
PRINT-JOB-NAME		Job title (-jt)	
PRINT-JOB-PRIORITY		Priority (-pr)	Convert 255..30 to 1..100
PAGE-COPIES		Page copy count (-fp)	BS2000 page copies + 1
LEFT-MARGIN		Form: left margin (-lm)	Convert 1/10th inch to 1/100th inch
ROTATION		Form: layup specification(-ls)	
COVER-PAGES	HEADER-PAGE-TEXT	Job comment (-jc)	
CHARACTER-SETS		Font name (-ft)	The first one is taken
FORM-NAME		Form name (-fm)	
TO-PRINTER	PRINTER-NAME	Destination (-de)	
ADDITIONAL-COPIES		File copy count (-fc)	BS2000 additional copies + 1
LOCK-FILE			From Dprint 1.1A File is not locked

Operand	Parameters	Add-job structure correspondence	Remark
DELETE-AFTER-PRINT			From Dprint 1.1A File is not deleted
NOTIFICATION	OBJECT-ATTRIBUTES	Ignored	From Dprint 1.1A
	EVENT-NAMES	Event identifiers (-ev)	From Dprint 1.1A
	USER-DATA	Ignored	From Dprint 1.1A
	RECIPIENT: ADDRESS	Notification delivery address (-na)	From Dprint 1.1A
	RECIPIENT:METHOD-NAME	Notification delivery method (-nm)	From Dprint 1.1A

The other operands are accepted but ignored.

11.1.1.3 Monitoring and controlling print jobs

Displaying print jobs

/SHOW-PRINT-JOB-ATTRIBUTES JOB-IDENTIFICATION=*FOREIGN(IDENTIFICATION=*Xprint-job-id*,CLUSTER-NAME=*UNIX-cluster-name*)

Displaying print job status

Request information on all of your own print jobs, which were issued to a certain UNIX system based cluster:

/SHOW-PRINT-JOB-STATUS CLUSTER-NAME=*UNIX-cluster-name*

Requesting information on one of your print jobs:

/SHOW-PRINT-JOB-STATUS CLUSTER-NAME=*UNIX-cluster-name*,
SELECT=*PAR(IDENTIFICATION=*Xprint-job-id*)

Deleting print jobs

/CANCEL-PRINT-JOB JOB-IDENTIFICATION=*FOREIGN(IDENTIFICATION=
Xprint-job-id,CLUSTER-NAME=*UNIX-cluster-name*)

11.1.2 From Xprint to Dprint

In the following you will find a description of the operations for Xprint gateways to Dprint with a list of the options supported in each case.

11.1.2.1 Requesting information on the Dprint cluster

Displaying printers (xpshow -dev)

Selection via criteria lists (-scl) is not supported.
Printing the reference list (-di REFERENCED_BY) is not allowed.
The only fields displayed are printer name and user comment (Dprint printer type).

Displaying printer groups (xpshow -dgr)

Selection via criteria lists (-scl) is not supported.
Printing the reference list (-di REFERENCED_BY) is not allowed.
The only fields displayed are printer group name and device list.

Displaying the printer status (xpstat -dev)

Selection via criteria lists (-scl) is not supported.
The following fields are supported: printer name, status, spoolin, spoolout, lay-up, active job and mounted form.

Displaying the printer group status (xpstat -dgr)

Selection via criteria lists (-scl) is not supported.
The following fields are supported: printer group name and spoolin (always ON).

Manual information

The BS2000 cluster administrator should then give the list of available forms and character sets to the Xprint administrator, who can then pass this information on to the Xprint end users.

11.1.2.2 Print job submission

Operand	Parameters	PRNTDOC structure correspondence	Remark
Copy (-cp)			Done by Xprint
Content-type (-ct)	PLAIN-TEXT EXCCW SPDS PCL	DOCUMENT-FORMAT	Additional content types can be used if corresponding filters are defined in the Dprint cluster
Destination (-de)		TO-PRINTER	
Document reference (-dr)		FROM-FILE	Only one name can be specified.
Event identifiers (-ev)		NOTIFICATION: EVENT-NAMES	From Dprint 1.1A
File copy count (-fc)		ADDITIONAL-COPIES	Xprint value - 1
Form name (-fm)		FORM-NAME	Max. 6 uppercase letters
Form: Job start sheet (-js)			Done by Xprint
Page copy count (-fp)		PAGE-COPIES	Xprint value - 1
Font name (-ft)		CHARACTER-SETS	Max. 3 uppercase letters
Job comment (-jc)		COVER-PAGES: HEADER-PAGE-TEXT	It is truncated to 32 characters and only the first eight characters are actually printed.
Job title (-jt)		PRINT-JOB-NAME	It is truncated to 8 characters.
Form: left margin (-lm)		LEFT-MARGIN	Default is 0 Unit is 1/10 inch Max. value 31/10 inch
Form: lay-up specification (-ls)	PORTRAIT LANDSCAPE	ROTATION	
Notification delivery address (-na)		NOTIFICATION: RECIPIENT: ADDRESS	From Dprint 1.1A
Notification delivery descriptor (-nd)		Ignored	
Notification delivery method (-nm)		NOTIFICATION: RECIPIENT: METHOD-NAME	From Dprint 1.1A
Priority (-pr)		PRINT-JOB-PRIORITY	Convert 1..100 to 255..30

Operand	Parameters	PRNTDOC structure correspondence	Remark
Page select (-ps)		OUTPUT-PART	Only one interval can be specified
Silent execution (-sx)			Done by Xprint
Job template (-te)			Done by Xprint

11.1.2.3 Monitoring and controlling print jobs

Displaying print jobs

Selection via criteria lists (-scl) is not supported.
The following fields are displayed: global job ID, document references, destination, form, font, job priority, file copies, page copies, content type and comment.

Displaying print job status

Selection via criteria lists (-scl) is not supported.
The following fields are displayed: global job ID, status, status information and destination.

Deleting print job (xpdel -job)

One and only one job ID must be specified in the form `gateway!TSN`.
Wildcard and criteria lists (-scl) are not supported.

11.2 Parameter file for optional processing (SYSSSI)

This section describes the different optional processings allowed within Dprint. These are defined in the corresponding released subsystem parameter file (SYSSSI file); the specified values are valid for a complete Dprint session (file is read during start-up).

11.2.1 DPRINTCM

```
*
* SYSSSI FILE - DPRINTCM V01.1A00
*
* SOURCE IMPLEMENTATION PM A0336209
*
* FUNKTIONS-NAME: XPADD.SDD6001.SPOOLOUT.CLASS.PRINT-DOCUMENT
*   As the "xpadd" command does not support a JOB-CLASS parameter,
*   it is set to 0 in the PRINT-DOCUMENT API. With this optional
*   correction, it is set to 255. The print will work if the
*   SERVER is also started with this JOB-CLASS.
*
* XPADD.SPOOLOUT.CLASS.PRINT-DOC=0/255
*
XPADD.SPOOLOUT.CLASS.PRINT-DOC=0
*
*
* SOURCE IMPLEMENTATION PM A0341471
*
* FUNKTIONS-NAME: FORCE.TIDU.LENGTH.TO.MAX.4KBYTES
*    The problem seems to come from the C50 UNIX2000 gateway that is
*    limits to 4K TIDU although CMX reports 16K as max TIDU.
*    This optional rep must be installed on ALL hosts included in a
*    Dprint cluster containing a C50 host with a LAN connection only
*    in the UNIX2000 part.
*
* TIDU.LENGTH=*NORMAL/*FORCE-TO-MAX-4K
*
TIDU.LENGTH=*NORMAL
*
*
* SOURCE IMPLEMENTATION PM A0354419
*
* FUNKTIONS-NAME: ALLOW.SUBMISSIONS.FOR.USERID.BIGGER.8.CHARACTERS
*   Without this optional modifications, requests issued from
*   userid bigger than 8 characters are rejected with SDD6001
*   "Privilege error". This optional modifications allow to submit
*    requests from userid and hosts with names bigger than 8
```

```
*   characters.
*   Please pay attention to the fact that the requests are no more
*   rejected, but USERID and HOST NAME are truncated (only 8 first
*   characters are taken) to fit BS2000 laws. This usage of this
*   truncation mechanism can introduce some side effects because
*   duplicate and ambiguous names can be created.
*
* LONGUSER=*NO/*YES
* LONGHOST=*NO/*YES
*
LONGUSER=*YES
LONGHOST=*YES
*
*
* SOURCE IMPLEMENTATION PM A0335011
*
* FUNKTIONS-NAME: DFTM-HALF-WAITING-TIME
*   In case of problems between client and server hosts (e.g. FT
*   product saturation, communication problems,...), a distributed print
*   job in WFT/FT state is put in KP state after 40 minutes - by
*   default-; this is to prevent the print job from remaining
*   indefinitively in WFT/FT state. The time after which such print
*   jobs are put in KP state is twice the DFTM-HALF-WAITING-TIME.
*   In case of "normal" saturation (e.g. many distributed print jobs,
*   many file transfer requests in wait state,...), it can be
*   interesting to increase this DFTM-HALF-WAITING-TIME value, just
*   to avoid distributed print jobs to be put in KP only for timeout
*   reasons.
*   The value of DFTM-HALF-WAITING-TIME is expressed in minutes,
*   from 5 minutes to 6 hours; there is no validation of the contents
*   of this parameter in Dprint.
*
* DFTM-HALF-WAITING-TIME=5..360
*
DFTM-HALF-WAITING-TIME=20
*
*
* SOURCE IMPLEMENTATION PM A0427134
*
* FUNKTIONS-NAME: BYPASS.FT.FTAC.LOADING
*   This optional parameter allows to bypass the check on FT/FTAC
*   subsystems, during DPRINTCM loading. The value *YES is to
*   be used when the software configuration with Dprint does not use FT
*   nor FTAC (ex. with Wprint).
*
* BYPASS-FT-FTAC-LOADING=*NO/*YES
*
BYPASS-FT-FTAC-LOADING=*NO
```

```
*
*
* SOURCE IMPLEMENTATION PM A0427194
*
* FUNKTIONS-NAME: BYPASS.ATTACH.STATUS.HOST
*   When the master receives the attach host from a client that wants
*   to attach to the master, the master sends a message (HOST ZZ is
*   in state attach) to all known hosts.
*   This optional parameter allows to bypass the sending of the message.
*
* BYPASS-ATTACH-STATUS-HOST=*NO/*YES
*
BYPASS-ATTACH-STATUS-HOST=*NO
*
*
* SOURCE IMPLEMENTATION PM A0407594
*
* FUNKTIONS-NAME: DIAGNOSE.NO.DELETE.OF.DPRINT
*   These optional parameters allow to modify the timeout values (in
*   seconds) for sending SDD2000 and SDD2019(SDD2016) messages.
*   The SDD2000-TIMEOUT-VALUE specifies how long the master host will
*   wait for the slave host's response.
*   SDD2000-TIMEOUT-VALUE=180...32767
*   The SDD2019-TIMEOUT-VALUE specifies how long the slave host will
*   wait for the master's dprint configuration file transfer.
*   SDD2019-TIMEOUT-VALUE=40...255
*
SDD2000-TIMEOUT-VALUE=180
SDD2019-TIMEOUT-VALUE=40
*
*
* FUNKTIONS-NAME: DEFAULT.ACCOUNT.NUMBER.FROM.XPRINT.DOMAIN
*   This parameter allows a tuning of the account number used for the
*   jobs submitted from Xprint. It consists of 8 characters,
*   left-justified and blank padded.
*
*   XPRINT-DEFAULT-ACCOUNT-NUMBER=<alphanum8..8>/XPRINT
*
XPRINT-DEFAULT-ACCOUNT-NUMBER=XPRINT
*
*
* FUNKTIONS-NAME: DEFAULT.ACCOUNT.ID.FROM.XPRINT.DOMAIN
*   This parameter allows a tuning of the account id used for the
*   jobs submitted from Xprint. It consists of 8 characters,
*   left-justified and blank padded.
*
*   XPRINT-DEFAULT-ACCOUNT-ID=<alphanum8..8>/XPRINT
*
```

```
XPRINT-DEFAULT-ACCOUNT-ID=XPRINT
*
*
* FUNKTIONS-NAME: DEFAULT.ACCOUNT.NUMBER.FROM.BSD/LPD.DOMAIN
*   This parameter allows a tuning of the account number used for the
*   jobs submitted from the BSD/LPD gateway. It consists of 8
*   characters, left-justified and blank padded.
*
*   SDSBGTW-DEFAULT-ACCOUNT-NUMBER=<alphanum8..8>/BSDLPDGW
*
SBSDGTW-DEFAULT-ACCOUNT-NUMBER=BSDLPDGW
*
*
* FUNKTIONS-NAME: DEFAULT.ACCOUNT.ID.FROM.BSD/LPD.DOMAIN
*   This parameter allows a tuning of the account id used for the
*   jobs submitted from the BSD/LPD gateway. It consists of 8
*   characters, left-justified and blank padded.
*
*   SBSDGTW-DEFAULT-ACCOUNT-ID=<alphanum8..8>/BSDLPDGW
*
SBSDGTW-DEFAULT-ACCOUNT-ID=BSDLPDGW
*
*
* FUNKTIONS-NAME: SAP.R3.JOBS.DS2000
* This parameter is relevant only for DS2000 systems, i.e. all the
* implications here below are gathered:
* 1) return CL000093 when no print job present:
* The message id CL000093 is returned to Xprint, when an xpshow -job
* command is issued from SAP users and when no print jobs are
* present.
* This is made to allow the special script xpshow_ds2 (used by SAP
* when polling to get the list of print jobs) cycling until its
* corresponding BS2000 partner (Dprint) is available.
* 2) return code = no server
* When calling from SAP, on the gateway=server host, the return code
* on server not loaded must be returned, when DPRINTSV is not loaded.
* 3) A0442662
* No check on RSO loading is made to delete the .s files, for which
* no slot correspond to the TSN.
* 4) A0443172
* In order to be able to follow print jobs from R/3 after switching
* occurred in a DS2000 context, the host name criterion must be
* ignored for R/3 callers (userids such as xxxadm).
*
* The possible values for this parameter are:
* *NO-DS2000-SYSTEM, when DPRINTCM is to be loaded on a non-DS2000
*                    machine (this is the default value)
* *DS2000-SYSTEM, otherwise
```

```
SAP-R3-JOBS-DS2000=*NO-DS2000-SYSTEM
*
*
* SOURCE IMPLEMENTATION PM A0466699
*
* FUNKTIONS-NAME: ERASE-G-FILES-INTEROP
*   In order to allow the modification of print jobs issued from
*   remote clusters (prior printing), the associated files
*   $SYSDPRNT.DPRNT.G...  are kept until the related print
*   job has effectively been printed (or cancelled).
*   This is the default processing and corresponds to the *NO value.
*
*   The value *YES means that these files will not be kept any more
*   (they are erased just when the associated $SYSDPRNT.DPRNT.S...
*   files have been created);
*   consequently, any further modification of such print job will be
*   accepted but not executed.
*
* ERASE-G-FILES-INTEROP=*NO/*YES
*
ERASE-G-FILES-INTEROP=*NO
*
*
* FUNKTIONS-NAME: VIRTUAL.HOST.SUPPORT
*
* Optional processing to support the virtual hosts within
* Spool&Print.
* If no virtual host is supported for the current system, the value
* *NONE must be specified (upper case); in this case, the real BCAM
* host name will still be used (compatibility).
* Otherwise, the name of the currently used  virtual host must be
* specified; it consists of 8 characters, left-justified and
* blank padded.
*
* VIRTUAL-HOST-NAME=*NONE/<alphanum-name_8..8>
*
VIRTUAL-HOST-NAME=*NONE
*
*
* FUNKTIONS-NAME: DEFAULT.MAIL.METHOD.FROM.FOREIGN.DOMAIN
*
* This parameter allows a tuning of the mail method used for the
* jobs submitted from foreign domains (Xprint, BSD/LPD gateway).
* If no mail notification is allowed, the value *NONE must be
* specified (upper case); in this case, any received job requiring
* a mail notification will be rejected.
* Otherwise, the name of the currently used mail method must be
* specified. It consists of 8 characters, left-justified and
```

```
* blank padded.
*
*   INTEROP-DEFAULT-MAIL-METHOD=*NONE/<alphanum8..8>
*
INTEROP-DEFAULT-MAIL-METHOD=*NONE
*
*
* FUNKTIONS-NAME: ERASE-W-FILES
*   This optional processing allows
*   the clean-up of the remaining $SYSDPRNT.W....files,
*   generated on the client host when printing temporary files
*   to remote clusters (BS2000 clusters or Xprint domains).
*
*   The value *YES means that these files will be erased during the
*   next start-up of DPRINTCL; the value *NO means that these files
*   will be kept (default value).
*
* ERASE-W-FILES=*NO/*YES
*
ERASE-W-FILES=*NO
*
* SOURCE IMPLEMENTATION PM A0511553
*
* FUNKTIONS-NAME: CHECK.DPRINT.JOB
*   This optional parameter allows to detect more quickly the result of
*   file transfer of a distributed print job
*   instead of via the loop mechanism of the DFTM task
*   (which is set via the DFTM-WAITING-TIME parameter
*   of the command /MODIFY-SPOOL-PARAMETERS).
*   The Value *NO performs the usual loop mechanism;
*   the value *YES initiates the new „eventing“ mechanism.
*
* CHECK-DPRINT-JOB=*NO/*YES
*
CHECK-DPRINT-JOB=*NO
*
*
```

11.2.2 DPRINTCL

```
*
* SYSSSI FILE - DPRINTCL V01.1A00
*
* SOURCE IMPLEMENTATION PM A0483690
*
* FUNKTIONS-NAME: STD.16.FOR.OCE.AFP.DRV
* OPTIONAL CORRECTION WHEN DEALING WITH OCE AFP PRINTER DRIVER
* GENERATED FILES OUTPUT.
*
* STD.16.FOR.OCE.AFP.DRV=*NO/*YES
*
STD.16.FOR.OCE.AFP.DRV=*NO
*
* FUNKTIONS-NAME: VIRTUAL.HOST.SUPPORT
*
* Optional processing to support the virtual hosts within
* Spool&Print.
* If no virtual host is supported for the current system, the value
* *NONE must be specified (upper case); in this case, the real BCAM
* host name will still be used (compatibility).
* Otherwise, the name of the currently used  virtual host must be
* specified; it consists of 8 characters, left-justified and
* blank padded.
*
* VIRTUAL-HOST-NAME=*NONE/<alphanum-name_8..8>
*
VIRTUAL-HOST-NAME=*NONE
*
```

11.3 File transfer naming conventions

All resource containers which are created are stored under the user ID SYSDPRNT. Any host can be either server, client or gateway.

The file names which can be generated dependent on the host function (client, server or gateway) are summarized in the following.

1. Files created on a server host

File name	Contents/Remarks
DPRNT.S.tsn.FILE	Data file on the server host, which is printed. This file is erased after printing.
DPRNT.S.tsn.FILE.OK	The file is created by the file transfer send action when the file DPRNT.S.tsn.FILE is available on the server. It is erased after it has been recognized by the server.
DPRNT.S.tsn.FILE.NOK	The file is created by the file transfer send action when problems have occurred. It is erased after it has been recognized by the server.
DPRNT.S.tsn.RESOURCE	The file contains the print resources on the server. It is erased when the spoolout has terminated.
DPRNT.S.tsn.RESOURCE.OK	The file is created by the file transfer send action when the file DPRNT.S.tsn.RESOURCE is available on the server. It is erased after it has been recognized by the server.
DPRNT.S.tsn.RESOURCE.NOK	The file is created by the file transfer send action when problems have occurred. It is erased after it has been recognized by the server.

Files created on a server host

2. Files created on a client host

Between BS2000 clusters

File name	Contents
DPRNT.C.tsn.FILE	Data file on the client host, which is created during preprocessing into sections. This file is erased after transfer to the server host.
DPRNT.C.tsn.RESOURCE	The file is created on the client host. It contains the print resources which are required for the spoolout on the server. It is erased when the transfer to the server has finished.
W.<suffix temporary file>	The file is created on the client host. It is the exact copy of the submitted temporary file. This file is erased once the file transfer processing is correctly terminated

Between BS2000 cluster and UNIX system based clusters

File name	Contents
DPRNT.X.timestamp.FILE	Data file on the client host, which is created during filter processing. The file is created on the client for a UNIX system based server. This file is erased after transfer to the UNIX system based gateway host (timestamp = 30 characters)
W.<suffix temporary file>	The file is created on the client host. It is the exact copy of the submitted temporary file. This file is erased once the file transfer processing is correctly terminated

3. Files created on a gateway

From the BS2000 client to the BS2000 gateway

File name	Contents
DPRNT.I.tsn.FILE	File which is transferred from the client to the gateway host. It is renamed DPRNT.R.tsn.FILE when Dprint recognizes the file DPRNT.I.tsn.FILE.OK.
DPRNT.I.tsn.FILE.OK	The file is created by the file transfer send action when the file DPRNT.I.tsn.FILE is available on the gateway. It is erased after it has been recognized.
DPRNT.I.tsn.FILE.NOK	The file is created by the file transfer send action on the gateway host when problems occur. It is erased after it has been recognized.
DPRNT.P.tsn.FILE	File which is transferred from the client to the gateway host, when corresponding to temporary/Syslst/Sysout files. It is renamed DPRNT.Q.tsn.FILE when Dprint recognizes the DPRNT.P.tsn.FILE.OK.
DPRNT.P.tsn.FILE.OK	The file is created by the file transfer post-action, when the file DPRNT.P.tsn.FILE is available on the gateway. It is erased after it has been recognized.
DPRNT.P.tsn.FILE.NOK	The file is created by the file transfer post-action on the gateway host, when problems occur. It is erased after it has been recognized.

From UNIX systems or Windows systems to the BS2000 gateway

File name	Contents
DPRNT.T.tsn.FILE	File which is transferred from the UNIX system or Windows client to the gateway host. It is renamed DPRNT.G.tsn.FILE when DPRINT recognizes the file DPRNT.T.tsn.FILE.OK.
DPRNT.T.tsn.FILE.OK	The file is created by the file transfer send action when the file DPRNT.T.tsn.FILE is available on the gateway. It is erased after it has been recognized.
DPRNT.T.tsn.FILE.NOK	The file is created by the file transfer send action on the gateway host when problems occur. It is erased after it has been recognized.

Files created on a gateway from UNIX systems or Windows systems to the BS2000 gateway

From Windows to the BS2000 gateway

File name	Contents
<printer/pool name>.DFA<#> <client name>	<printer/pool name> as defined in the /var/spool/SBSD/Queue file; <client name> as defined in the /var/spool/SBSD/Clients file; Data file which is later on renamed into DPRINT.G.tsn.FILE and DPRINT.S.tsn.FILE

From the BS2000 gateway to the BS2000 server

File name	Contents
DPRNT.C.tsn.FILE	Data file on the gateway host, which is created during preprocessing into sections. This file is erased after transfer to the server host.
DPRNT.C.tsn.RESOURCE	The file is created on the client or gateway host. It contains the print resources which are required for the spoolout on the server. It is erased when the transfer to the server has finished.
DPRNT.R.tsn.FILE	Data file on the gateway host.
DPRNT.Q.tsn.FILE	Data file on the gateway host (when temporary/Syslst/Sysout files)

From the UNIX system based gateway to the server

File name	Contents
DPRNT.G.tsn.FILE	Data file on the gateway host.
DPRNT.U.tsn.FILE	Data file on the gateway host which was created during filter processing. The file is created by a UNIX system based client and is erased after transfer to the server host.
DPRNT.U.tsn.RESOURCE	The file is created on the client or gateway host. It contains the print resources which are required for the spoolout on the server. It is erased when the transfer to the server has finished.

Files created from the UNIX system based gateway to the BS2000 server

Related publications

Ordering manuals

The manuals are available as online manuals, see *http://manuals.fujitsu-siemens.com*, or in printed form which must be paid and ordered separately at *http://FSC-manualshop.com*.

SPOOL (BS2000/OSD)
User Guide

Target group
This manual is intended for nonprivileged users, Spool & Print administrators, RSO device administrators and systems support staff.
Contents
The manual describes the operation of SPOOL.

SPSERVE (BS2000/OSD)
User Guide

Target group
This manual is addressed to nonprivileged users, RSO device administrators, Dprint cluster administrators and those responsible for BS2000/OSD system operation.
Contents
The manual describes the SPSERVE utility routine with all its statements. It takes account of all extensions to SPOOL, RSO, SPCONV, PRM, Distributed Print Services, IDOM and SPS.

RSO (BS2000/OSD)
Remote SPOOL Output
User Guide

Target group
This manual is directed at nonprivileged users, RSO device administrators, SPOOL administrators and systems support of BS2000/OSD.
Contents
The manual describes the functions and options of the user groups with respect to utilizing and controlling decentralized printers (RSO printers) and deals with the technical characteristics of all RSO printers.

Spool & Print - Macros and Exits V4.6 (BS2000/OSD)
User Guide

Target group
The manual is intended for programmers who wish to address the Spool & Print Services in their programs directly.
Contents
The manual describes the macros and exits of the Spool & Print Services, including the macros for virtual printers. The description of the macros is arranged according to functions.

SPOOL & PRINT Commands V4.6 (BS2000/OSD)
User Guide

Target group
This manual is intended for nonprivileged users, device administrators, cluster administrators, SPOOL administrators and system support staff.
Contents
The commands available for SPOOL, Dprint, RSO and SPS are described, but not those for subsystem management and job control.

PRM (BS2000/OSD)
User Guide

Target group
The manual addresses SPOOL users, systems support and RSO device administrators.
Contents
This manual describes the PRM utility routine for creating and managing print resources for BS2000 SPOOL. The manual deals with the description of the two PRM user interfaces: the SDF statements for interactive and batch mode, and the FHS-based menu interface for interactive mode.

SPCONV (BS2000/OSD)
User Guide

Target group
This manual is intended for systems support staff and RSO device administrators.
Contents
The manual describes the SPCONV subsystem. Use of SPCONV is mandatory when working with SPOOL as of Version 3.2A. The manual describes the structure of the filter system and the use of filters.

SNS V1.0B (BS2000/OSD)
SPOOL Notification Service
User Guide

Target group
The manual addresses nonprivileged users and systems support of BS2000/OSD.
Contents
This manual describes the SNS subsystem, which provides a tool for sending and managing notifications in the frame of BS2000/OSD.

PRISMAproduction/BS2000
SPS V3.8
Benutzerhandbuch

GERMAN ONLY

Target group
The manual addresses SPOOL users and systems support.
Contents
This manual describes printing on APA printers with the SPOOL subsystem SPS. Installation of SPS and APA printers, creation and provision of print file and print resources, printing and page presentation methods, and error handling are described.

Spool & Print - Messages
User Guide

Target group
This manual addresses systems support, RSO device administrators and nonprivileged users.
Contents
Messages for SPOOL, RSO, SPSERVE, PRM, SCSIPCL, SPCONV, SPS, SPOOLSYS, IDOM and Distributed Print Services. The English message texts and meaning and response texts are included in the manual. Guaranteed messages are marked.

Wprint (Windows)
User Guide

Target group
Users who want to print from within Windows applications and system administrators of SINIX, UNIX and BS2000/OSD systems as well as SINIX Spool administrators.
Contents
This manual describes the operation and functions of the Wprint-Server and Wprint-Client components as well as their installation and configuration.

Xprint
Application Programming Interface (API)
User Guide

Target group
This manual is for programmers who want to make use of the Xprint functionality in their programs.
Contents
The manual contains a reference of all Xprint API functions and the corresponding macros. It describes how you can use the functions in your own programs.

Xprint
User and Administrator Guide

Target group
Xprint users, system administrators, Xprint administrators
Contents
This manual provides information on the Xprint concept and documents the objects that make up to the Xprint. In addition, it describes how Xprint is installed as well as how it is used via the command interface.

Xprint
Graphical User Interface
User Guide

Target group
System administrators, Xprint administrators
Contents
This manual describes how to use Xprint via the menu interface.

Xprint
Reference Guide

Target group
Xprint users, system administrators, Xprint administrators
Contents
This manual describes the Xprint commands in alphabetical order, and documents the Xprint messages, the configuration files for Xprint objects as well as the standard Xprint data formats. The manual also presents an overview of how the Xprint system works. In addition, basic information is provided about the Xprint system as well as concrete handling instructions using selected examples.

BS2000/OSD-BC
Commands, Volume 1 - 5
User Guide

Target group
This manual is addressed to nonprivileged users and systems support staff.
Contents
Volumes 1 through 5 contain the BS2000/OSD commands ADD-... to WRITE-... (basic configuration and selected products) with the functionality for all privileges. The command and operand functions are described in detail, supported by examples to aid understanding. An introductory overview provides information on all the commands described in Volumes 1 through 5.
The Appendix of Volume 1 includes information on command input, conditional job variable expressions, system files, job switches, and device and volume types.
The Appendix of Volumes 4 and 5 contains an overview of the output columns of the SHOW commands of the component NDM. The Appendix of Volume 5 contains additionally an overview of all START commands.
There is a comprehensive index covering all entries for Volumes 1 through 5.

BS2000/OSD-BC
Commands, Volume 6, Output in S Variables and SDF-P-BASYS
User Guide

Target group
This manual is addressed to programmers and users who write procedures.
Contents
Volume 6 contains tables of all S variables that are supplied with values by the SHOW commands in conjunction with structured output. Further chapters deal with:
– introduction to working with S variables
– SDF-P-BASYS

BS2000/OSD-BC
Introductory Guide to Systems Support
User Guide

Target group
This manual is addressed to BS2000/OSD systems support staff and operators.
Contents
The manual covers the following topics relating to the management and monitoring of the BS2000/OSD basic configuration: system initialization, parameter service, job and task control, memory/device/system time/user/file/pubset management, assignment of privileges, accounting and operator functions.

DSSM/SSCM
Subsystem Management in BS2000/OSD
User Guide

Target group
This manual addresses systems support staff and software consultants of BS2000/OSD.
Contents
The following are described: BS2000/OSD subsystem concept, dynamic subsystem management (DSSM), subsystem catalog management (SSCM) and the associated commands and statements.

JV (BS2000/OSD)
Job Variables
User Guide

Target group
The manual addresses both nonprivileged users and systems support.
Contents
The manual describes management and possible uses of job variables. The command descriptions are divided according to function areas. The macro calls are described in a separate chapter.

SDF (BS2000/OSD)
Introductory Guide to the SDF Dialog Interface
User Guide

Target group
BS2000/OSD users
Contents
This manual describes the interactive input of commands and statements in SDF format. A Getting Started chapter with easy-to-understand examples and further comprehensive examples facilitates use of SDF. SDF syntax files are discussed.

SDF-P (BS2000/OSD)
Programming in the Command Language
User Guide

Target group
The manual addresses BS2000/OSD users and systems support.
Contents
SDF-P is a structured procedure language in BS2000. The introduction is followed by a detailed description of commands, functions and macros.

CMX
Communications Manager for UNIX systems
Operation and Administration
User Guide

Target group
System administrators
Contents
The manual describes the function of CMX as mediator between applications and the transport system. It contains basic information on configuration and administration of systems in network environments.

POSIX (BS2000/OSD)
POSIX Basics for Users and System Administrators
User Guide

Target group
BS2000 system administrators, POSIX administrators, BS2000 users, users of UNIX workstations
Contents
– Introduction to and working with POSIX
– BS2000 software products in a POSIX environment
– Installing POSIX
– Controlling POSIX and administering file systems
– Administering POSIX users
– BS2000 commands for POSIX

POSIX (BS2000/OSD)
Commands
User Guide

Target group
This manual addresses all users of the POSIX shell.
Contents
This manual is designed as a work of reference. It describes working with the POSIX shell and the commands of the POSIX shell in alphabetical order.

HIPLEX AF (BS2000/OSD)
High-Availability of Applications in BS2000/OSD
Product Manual

Target group
This manual addresses system administrators and operators of BS2000/OSD.
Contents
The manual provides information on the requirements for switching applications and on operating HIPLEX AF. As it provides concrete know-how on how applications can be made switchable (organisation, generation, adapting procedures), it can also be used in preparing applications for manual switching with maximum reliability.

IDOM (BS2000/OSD)
Integrated Document & Output Management
User Guide

Target group
The manual addresses SPOOL users and systems support.
Contents
This manual describes the SPOOL subsystem IDOM, which offers document and output management in BS2000/OSD.

***open*Net Server V3.0 (BS2000/OSD)**
BCAM V17.0A
User Guide

Target group
The manual is intended for network planners, generators and administrators who define BS2000 systems.
Contents
The manual describes BCAM itself, how it is embedded in TRANSDATA and TCP/IP and ISO networks, plus generation and administrative activities. Generation examples illustrate the description. Additionally BCAM tools for generation and diagnosis are described. To conclude, the manual describes BCAM commands required for generation and operation. Information is also provided on KOGS macros required for statistical generation and a list of BCAM error messages is given.

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Distributed Print Services V1.1B (BS2000/OSD)

Printing in Computer Networks
User Guide

Target group

This manual is intended for nonprivileged users, device administrators and systems support of BS2000/OSD.

Contents

The manual provides descriptions of the principles, use and administration of Distributed Print Services for each of these user groups. Possible uses of Distributed Print Services are illustrated by examples.

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