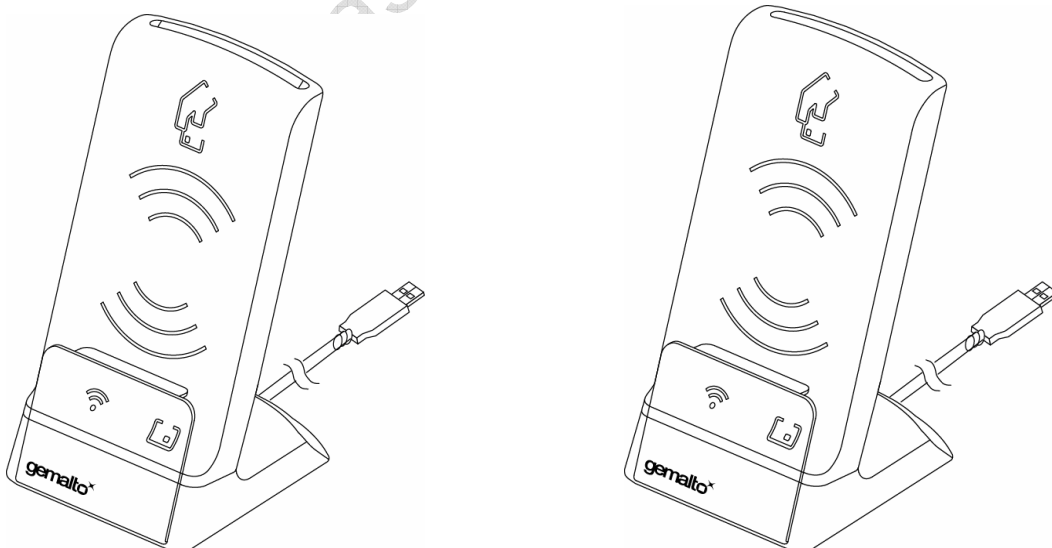


Prox-DU & Prox-SU

Dual interface USB smart card reader

Installation Guide



Prox-DU & Prox-SU

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Prox-DU & Prox-SU

TABLE OF CONTENTS

INTRODUCTION 7

OVERVIEW 8

 DESCRIPTION 8

 MAIN FEATURES 9

 PROX-DU AND PROX-SU DIFFERENCES 10

 SMART CARD PROTECTION AND SWITCH FEATURE 11

 USING SMART CARDS 12

 ENVIRONMENTAL CHARACTERISTICS 14

PHYSICAL DESCRIPTION 15

 DIMENSIONS 15

 CONNECTIONS 16

INTERFACE CAPABILITY 16

INTERFACE FEATURES 17

 USB SERIAL INTERFACE 17

 CONTACTLESS INTERFACE 17

 CONTACT INTERFACE 18

 LED INTERFACE 19

INSTALLING THE READER/WRITER 20

 WINDOWS XP INSTALLATION 22

 Windows XP installation without the Windows Update procedure 22

 Windows XP installation using the Windows Update procedure 23

 CHECKING THE INSTALLATION 25

 CHECKING THE SMART CARD DETECTION 26

SETTING UP 27

 SIM/SAM CARD INSTALLATION 27

 SETTING UP IN A METALLIC ENVIRONMENT 28

EVALUATING THE READER/WRITER 29

TABLE LIST

Table 1 – Dual interface USB smart card reader/writer models 7

Table 2 – Prox-DU and Prox-SU differences 10

Table 3 – Environmental Characteristics 14

Table 4 – Interface capability 16

FIGURE LIST

Figure 1 – Prox-DU view 8

Figure 2 – Prox-SU view 8

Figure 3 – Prox-DU with the stand for vertical use 9

Figure 4 – Prox-DU ID-1 size slot 10

Figure 5 – Prox-SU ID-000 size slot 10

Figure 6 – Dual interface smart card view 11

Figure 7 – The contactless smart card is put near or over the Prox-DU landing zone 12

Figure 8 – The contactless smart card is not fully inserted into the Prox-DU slot 12

Prox-DU & Prox-SU

Figure 9 – The contactless smart card is fully inserted into the Prox-DU slot (after the switch activation) 12

Figure 10 – The contact smart card is fully inserted into the Prox-DU slot 13

Figure 11 – The contactless smart card is put near or over the Prox-SU landing zone 13

Figure 12 – The contact SIM/SAM card is inserted into the Prox-SU connector 13

Figure 13 – Prox-DU and Prox-SU dimensions without the stand 15

Figure 14 – Prox-DU and Prox-SU dimensions with the stand 15

Figure 15 – Prox-DU and Prox-SU USB A Plug 16

Figure 16 – USB devices (Windows XP example) 17

Figure 17 – Contactless logo of the landing zone 17

Figure 18 – Contact card slot (Prox-DU and Prox-SU) 18

Figure 19 – ID-1 and ID-000 card size 18

Figure 20 – Visual indicators 19

Figure 21 – Prox-DU Installation popup dialog boxes 23

Figure 22 – Windows XP Installation wizard: first window 23

Figure 23 – Windows XP Installation wizard: second window 24

Figure 24 – Windows XP Installation wizard: third window 24

Figure 25 – Windows XP Installation wizard: final window 25

Figure 26 – USB smart card reader icons in the Device Manager window (Windows XP) .. 25

Figure 27 – USB HID icons in the Device Manager window (Windows XP) 25

Figure 28 – Contactless smart card check 26

Figure 29 – Contact smart card check 26

Figure 30 – Mounting the SIM/SAM card into the Prox-SU reader/writer 27

Figure 31 – Prox-DU in a metallic environment 28

Figure 32 – Gem_PCSC window at start up 29

Figure 33 – Gem_PCSC window after “SCardEstablishContext” 29

Figure 34 – Gem_PCSC window after “SCardConnect” 30

Figure 35 – Gem_PCSC window after “SCardTransmit” the Authentication command 31

Figure 36 – Gem_PCSC window after “SCardTransmit” the Read command 31

Figure 37 – Gem_PCSC window after “SCardDisconnect” 32

Figure 38 – Gem_PCSC window after “SCardReleaseContext” 32

Introduction

This installation guide provides instructions for the proper installation of the Prox-DU and Prox-SU dual interface (contactless and contact) USB smart card reader/writer.

This document is applicable to the following references, revision A only:

Model	Reference	Comments
Prox-DU	HWP118184A	Dual interface USB smart card reader Contact & contactless
Prox-SU	HWP118185A	Contactless interface USB smart card reader With optional SIM/SAM slot
Prox-DU with stand	HWP118830A	Prox-DU with a stand for vertical use
Prox-SU with stand	HWP118831A	Prox-SU with a stand for vertical use

Table 1 – Dual interface USB smart card reader/writer models

For information on how to use the smart card reader/writer, please refer to the “Reference Manual” document.

Who Should Read This Book

This installation guide is designed for developers of PC/SC smart card application or solution integrators.

Conventions

Bit Numbering

A byte consists of 8 bits, b7 to b0, where b7 is the most significant bit and b0 is the least significant bit.

One byte	b7	b6	b5	b4	b3	b2	b1	b0
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Byte Numbering

A string of n bytes consists of n number of concatenated bytes: Bn...B3...B0.

Bn is the most significant byte and B0 is the least significant byte:

A string of n bytes	Bn	Bn-1	-	-	-	B2	B1	B0
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Please note the document reference number, your job function, and the name of your company. (You will find the document reference number at the bottom of the document.)

Overview

Description

The Prox-DU and the Prox-SU are Gemalto smart card reader/writers embedding the Prox and the GemCore technologies developed by Gemalto to interface contactless and contact smart cards:

- The Prox-DU is a **dual interface (contact and contactless)** USB smart card reader/writer:

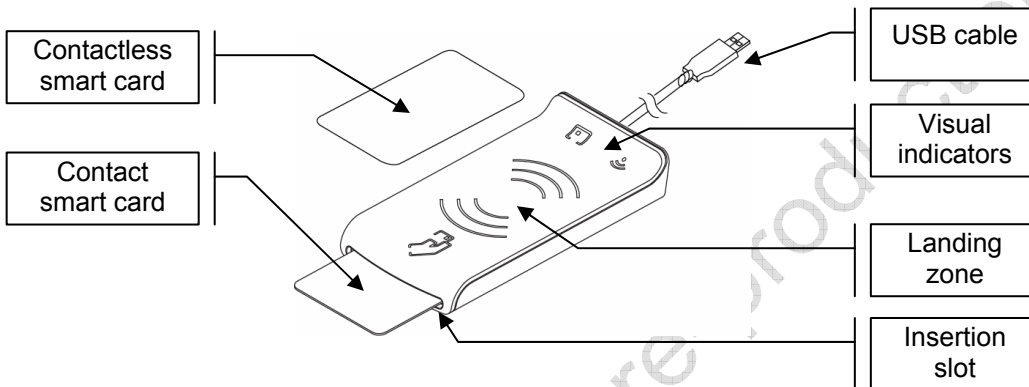


Figure 1 – Prox-DU view

- The Prox-SU is a **contactless interface** USB smart card reader including an internal SIM/SAM card slot:

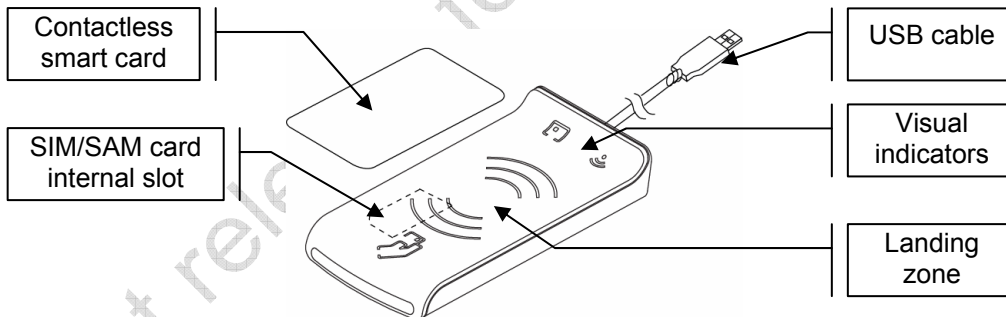


Figure 2 – Prox-SU view

The Prox technology complies with ISO14443 standard related to proximity cards applicable to type A and type B contactless smart cards.

The Prox technology uses MIFARE® (a registered trademark of NXP) technology as part of its integrated solution.

The GemCore technology complies with ISO7816 and EMV standard related to contact smart cards.

Both technologies also provide visual feedback for each smart card interface.

Prox-DU & Prox-SU

A stand can be delivered for vertical use:

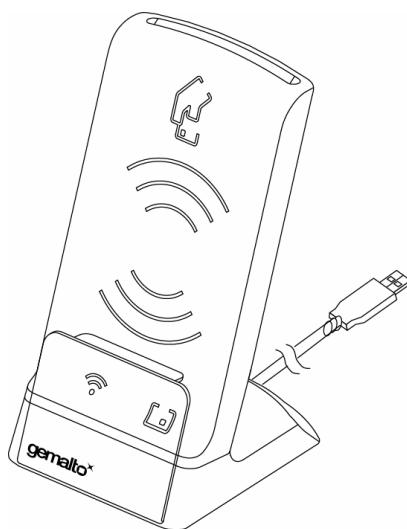


Figure 3 – Prox-DU with the stand for vertical use

Main Features

The Prox-DU and The Prox-SU have the following common features:

- Up-to-date architecture using the Gemalto Prox and GemCore technologies
- Ability to drive any type of ISO14443-A&B T=CL contactless smart cards
- Ability to drive any type of MIFARE® contactless smart cards
- Ability to drive any type of ISO7816 contact smart card or SIM/SAM card
- Support for smart card with a higher baud rate (contact and contactless)
- Easily upgradeable download of the latest features
- Standard USB Full speed interface, bus powered (no external power supply required)
- Unique USB serial number which enables that the device can be plugged into any USB slot on a computer without having to re-install the driver
- Standard CCID interface for both smart card slot (contact and contactless)
- Standard HID interface for device administration
- No need of a proprietary USB driver. The standard CCID and HID drivers of the computer can be used
- PC/SC V2.0 compliant
- Embedded protection against dual interface smart card damage with switch feature to select the active interface (contact or contactless)

Prox and GemCore are Gemalto proprietary technologies developed for contactless and contact reader/writers. It is based on a specific operating system that interfaces with contactless and contact smart cards.

Prox-DU and Prox-SU differences

The main difference between the Prox-DU and Prox-SU models is related to the smart card slot:

- Prox-DU: the smart card slot located in the top cabinet is open. The user can insert or remove its **ID-1 size** smart card directly into or from the reader slot

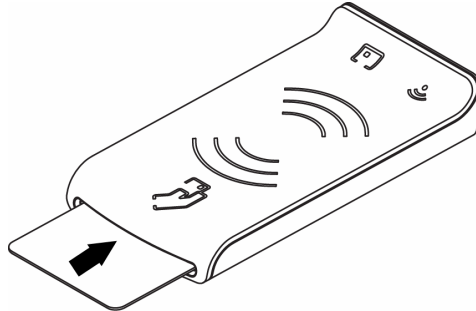


Figure 4 – Prox-DU ID-1 size slot

- Prox-SU: the smart card slot located in the top cabinet is **closed**. The user should open the casing before inserting its **ID-000 size** smart card into the dedicated connector. When the casing is closed the SIM/SAM card cannot be removed.

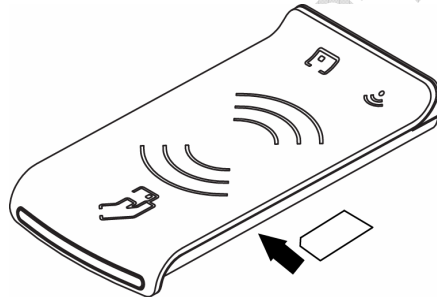


Figure 5 – Prox-SU ID-000 size slot

The following table shows all the different features supported by the Prox-DU and the Prox-SU reader/writers:

Feature	Prox-DU	Prox-SU
Contact card interface	ID-1 size format (smart card) Removable	ID-000 size format (SIM/SAM) Not removable
Dual interface protection	Managed Can be disabled according to device configuration	No management
Switch interface command	Available	Not useful
Product name in the string version	Gemalto Prox-DU	Gemalto Prox-SU
Product string in USB descriptor	Prox Dual USB PC Link Reader	Prox SU USB PC Link Reader
LEDs	The LED of contact interface is blinking when no card is inserted	The LED of contact interface is Off when no SIM/SAM is present

Table 2 – Prox-DU and Prox-SU differences

Smart card protection and switch feature

As the Prox-DU can interface two smart cards simultaneously, a dedicated protection system is included into the device to avoid to damage dual interface smart cards (both contact and contactless).

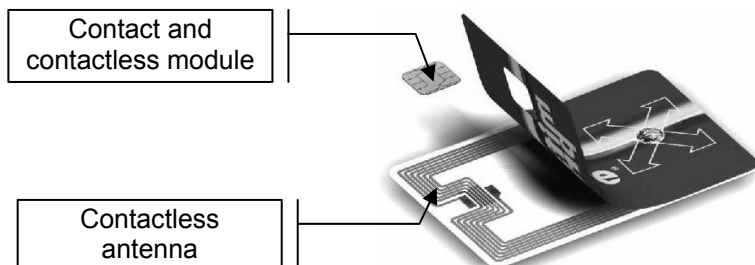


Figure 6 – Dual interface smart card view

To protect the smart card from undesired operation only one interface will be activated at a given time:

- The contact interface is deactivated when a contactless smart card is detected by the reader. The contact smart card power supply will be turned off to avoid powering the contact smart card.
- The contactless interface is deactivated when a contact card is detected by the reader. The RF field is turned off to avoid powering the contactless smart card.

The contactless interface will be activated again when the smart card is removed from the slot or when a dedicated **switch command** is sent to the device by the application.

This feature will enable the user to **communicate with the two interfaces without moving the smart card from the slot.**

The dual interface smart card protection is enabled by default into the Prox-DU device. It can be disabled if needed by changing the reader/writer's configuration. When disabled the two smart card interfaces are available simultaneously.

Note: As it is not possible to have a dual interface SIM/SAM card, the smart card protection is not active with the Prox-SU device.

Using Smart Cards

The Prox-DU and Prox-SU reader/writers must be used with contactless and contact smart cards. Depending on the model, the following pictures show the different ways to use the smart cards:

The Prox-DU and a contactless smart card:

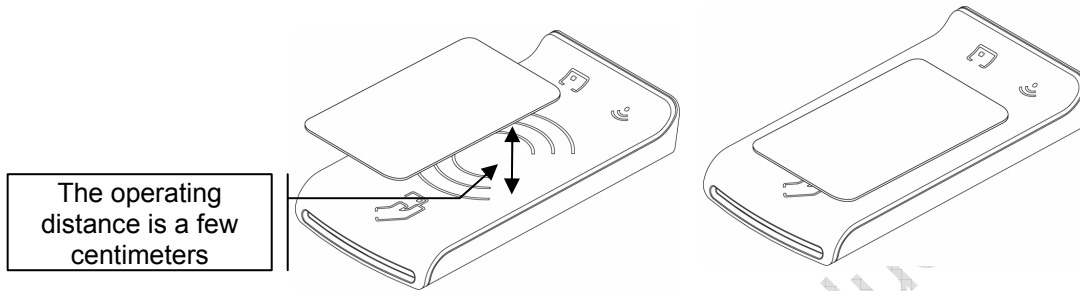


Figure 7 – The contactless smart card is put near or over the Prox-DU landing zone



Figure 8 – The contactless smart card is **not fully** inserted into the Prox-DU slot

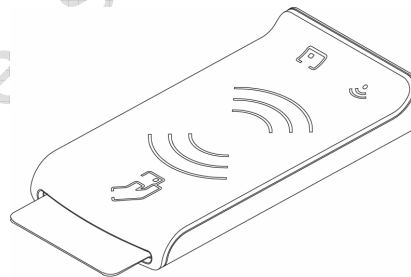


Figure 9 – The contactless smart card is **fully** inserted into the Prox-DU slot (after the switch activation)

Note: if the contactless smart card is fully inserted into the slot, the contactless interface will be deactivated because the contact interface has a higher priority than the contactless interface. To activate the contactless smart card when it is fully inserted into the slot, the switch feature of the device should be activated. Refer to the reference manual for more information.

Prox-DU & Prox-SU

The Prox-DU and a contact smart card:

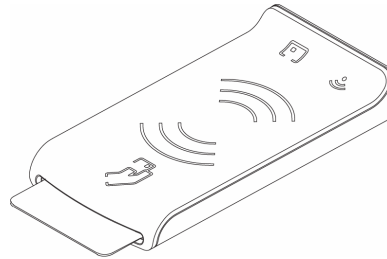


Figure 10 – The contact smart card is fully inserted into the Prox-DU slot

The Prox-SU and a contactless smart card:

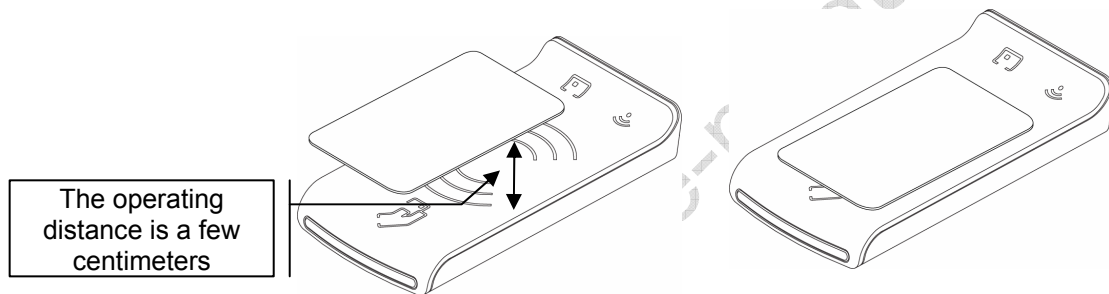


Figure 11 – The contactless smart card is put near or over the Prox-SU landing zone

The Prox-SU and a contact SIM/SAM card:

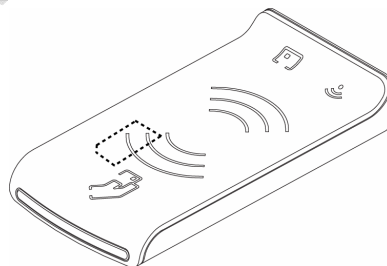


Figure 12 – The contact SIM/SAM card is inserted into the Prox-SU connector

Note: the SIM/SAM card cannot be installed or removed without opening the casing. The SIM/SAM card is permanently installed into the Prox-SU reader.

Prox-DU & Prox-SU

Environmental Characteristics

For an optimal performance, operate the Prox-DU and the Prox-SU under the following environment conditions:

Description	Value or Range
Operating Temperature	0°C to +50°C (+32°F to +122°F)
Storage Temperature	-20°C to +60°C (-4°F to +140°F)
MTBF reliability	900,000 hours at 20°C
Humidity Range	0% to 95% non-condensing
Protection Index	Prox-DU: IP20 (open-case device) Prox-SU: IP40 (dustproof device)
EEPROM data	10 years minimum retention 100000 erase/write cycles
Physical Dimensions	Without stand: 26 mm x 68 mm x 96 mm max. (height x width x depth) With stand: 132 mm x 69 mm x 79 mm max. (height x width x depth)
Weight	Without stand: 143 g With stand: 255 g
Cabling Distance	1.80 m USB cable
Power Supply Voltage	USB bus powered
Power Supply Current Operating RF On	< 200 mA
Power Supply Current Operating RF Off	< 50 mA
Power Supply Current Suspend	< 2.5 mA
EMC Regulations	CE FCC Part 15 Class B
Safety	UL 60950 Recognized
Table 3 – Environmental Characteristics	

Physical Description

Dimensions

The following figure shows the dimensions of the Prox-DU and the Prox-SU without and with the stand:

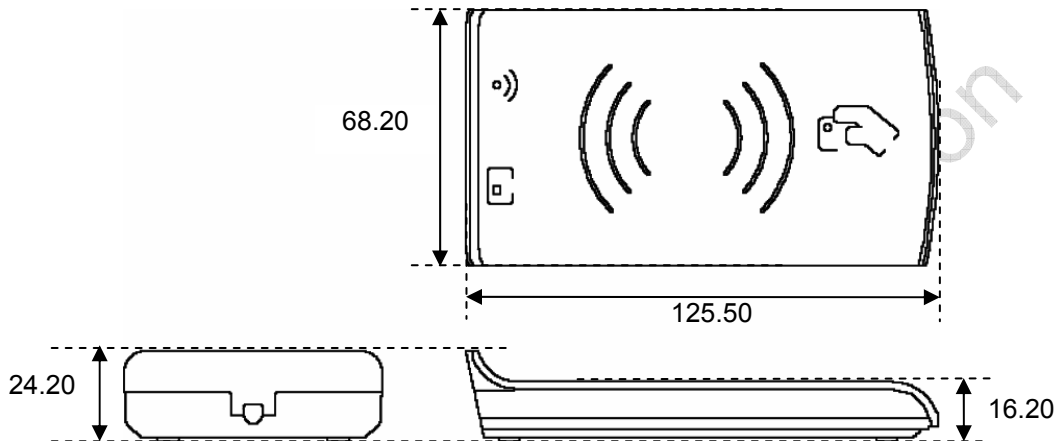


Figure 13 – Prox-DU and Prox-SU dimensions without the stand

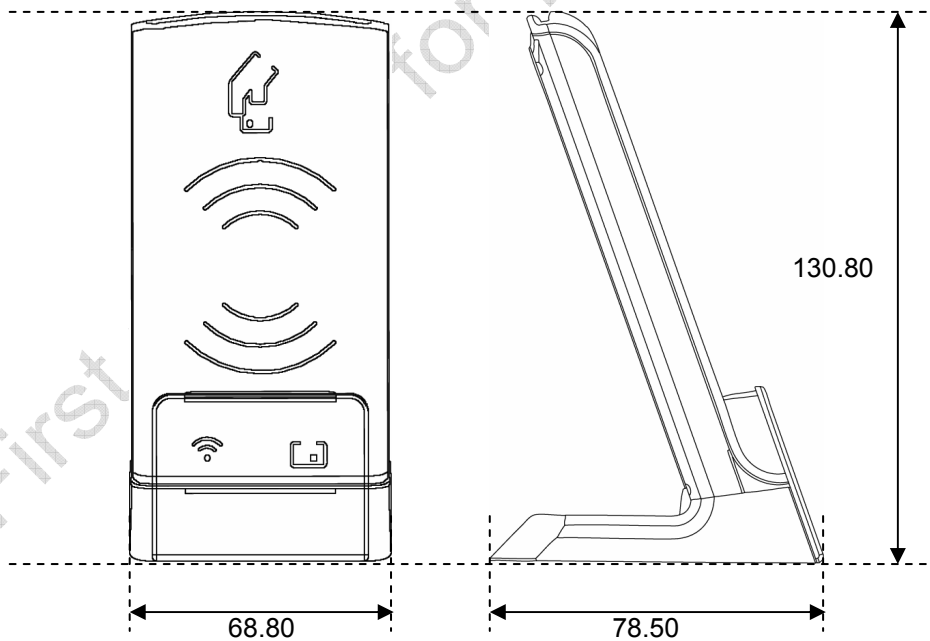


Figure 14 – Prox-DU and Prox-SU dimensions with the stand

Connections

The Prox-DU and the Prox-SU have a 1m80 USB cable with a standard USB A plug.

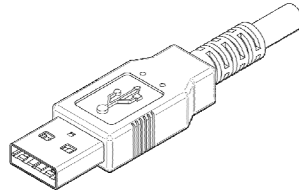


Figure 15 – Prox-DU and Prox-SU USB A Plug

Interface capability

The Prox-DU and the Prox-SU devices support the following interfaces:

- One USB interface
- One contact smart card interface
- One contactless smart card interface
- Two visual indicators

Depending on the smart card type, the connectors used will be as shown in the next table:

Interface	Prox-DU Connector type	Prox-SU Connector type
USB	USB A plug	USB A plug
Contact card	ISO7810 ID-1 size ISO7816-2 8 pins	ISO7810 ID-000 size ISO7816-2 8 pins
Contactless card	Landing zone (No connector)	Landing zone (No connector)
Visual Indicators	One blue LED One yellow LED	One blue LED One yellow LED

Table 4 – Interface capability

Interface features

USB serial interface

The USB interface is available with the Prox-DU and the Prox-SU.

The USB interface is USB 2.0 full speed compliant.

The USB interface is a **composite device** composed of the following devices:

- One USB Smart Card reader for the contact interface
- One USB Smart Card reader for the contactless interface
- One USB Human Interface Device for the reader administration



Figure 16 – USB devices (Windows XP example)

The USB interface does not require a specific driver for use with various operating systems.

The standard USB CCID driver included into the operating system of the computer is used for the smart card interface.

The standard USB HID driver included into the operating system of the computer is used for the device administration.

The selective suspend is not supported by the USB interface. Only standard suspend is supported.

Contactless interface

The contactless interface is available with the Prox-DU and the Prox-SU and is composed of a landing zone located in the front cabinet defined by the following contactless logo:

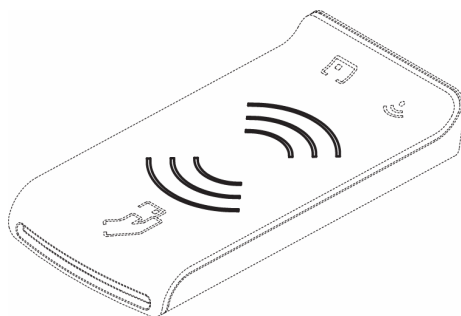


Figure 17 – Contactless logo of the landing zone

The contactless antenna is integrated into the device. It consists of inductive loops and a matching circuit mounted into the printed circuit board.

This contactless interface complies with the ISO14443-A&B standard.

The characteristics for the contactless interface are as follows:

Prox-DU & Prox-SU

- Contactless type:
 - ISO14443-A Memory cards (MIFARE®)
 - ISO14443-A Microprocessor cards (T=CL)
 - ISO14443-B Microprocessor cards (T=CL)
 - Automatic scan between ISO14443-A and ISO14443-B
- Contactless baud rate:
 - 106 kbps - 212 kbps - 424 kbps - 848 kbps
- Contactless protocol:
 - MIFARE® classic
 - ISO14443-4 (T=CL)
- Contactless commands:
 - Compliant with PC/SC V2.0 Part 3 Revision 2.01.09 specifications

Contact interface

The contact interface is available with the Prox-DU and the Prox-SU and is composed of a smart card connector with a smart card slot located in the front cabinet for the Prox-DU and located inside the casing for the Prox-SU.

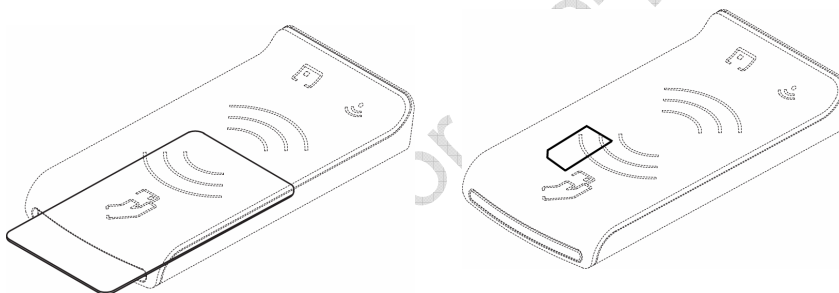


Figure 18 – Contact card slot (Prox-DU and Prox-SU)

The characteristics for the contact interface are as follows:

- Card type:
 - Asynchronous (Microcontroller based)
- Card size:
 - ID-1 for the Prox-DU (full size form factor)
 - ID-000 for the Prox-SU (SIM/SAM form factor)

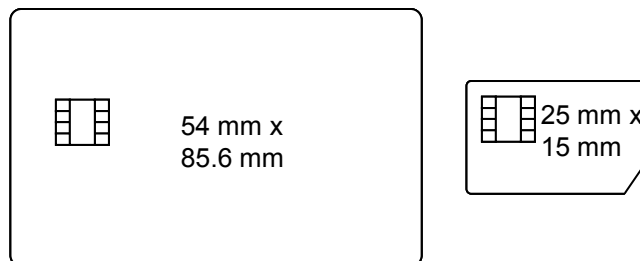


Figure 19 – ID-1 and ID-000 card size

- Card baud rate:
 - up to 500 kbps (TA1 = 97h for a clock frequency of 4 MHz)

Prox-DU & Prox-SU

- Card protocol:
 - T=0 and T=1 protocols
- Card compliance:
 - EMV and PC/SC modes. The interface is compliant with the EMV2000 version 4.0 specifications.
 - ISO 7816-3 and -4 and ability to supply the cards with 5 V, 3 V, or 1.8 V (Class A, B, or C cards respectively)
 - IAS version 1.0 certified (Identification, Authentication & Signature)

LED interface

Two LEDs are available as visual indicators:

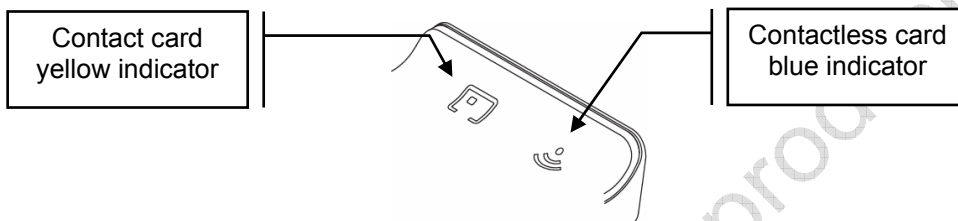


Figure 20 – Visual indicators

The indicators give information about the smart card interface as described in the next table:

Card Indicator	Description
Off	The card interface is deactivated
Slow Blink (0,2 s / 2 s)	The card interface is ready
Blink (0,5 s / 1 s)	The card is present and inactive (powered off)
On	The card is present and active (powered on)
Flashing	The card communication is in progress

Note: When no SIM/SAM card is inserted into the Prox-SU, the yellow indicator will always be off.

Installing the reader/writer

When the USB cable is plugged into the USB port of the computer:

- The two LED indicators will flash shortly to indicate the user that it has started properly,
- The installation wizard of the operating system will appear.

Follow the on-screen instructions, the wizard will automatically install the drivers required by the operating system.

The following table shows the driver to consider regarding the operating system:

Operating system	CCID driver	HID driver
Microsoft Windows 2000	Use Windows Update	Inbox
Microsoft Windows XP 32/64 bits	Use Windows Update	Inbox
Microsoft Windows Vista 32/64 bits	Inbox	Inbox
Microsoft Windows Seven 32/64 bits	Inbox	Inbox
Microsoft Windows CE 5.0 & 6.0	Upon request	Inbox
Microsoft Windows CE 6.0R2	Inbox	Inbox
Linux Debian distribution	<p><u>libccid library</u>: The USB CCID device is supported by the libccid library. This library provides a PC/SC IFD handler implementation for the USB smart card interface devices compliant to the CCID protocol (CCID driver V1.3.11 minimum). This library is packaged and distributed by most of the Linux distributions.</p> <p>Tips: Use the package manager from your specific Linux distribution to search for the libccid library and install it.</p> <p><u>libccid source code</u>: It is available on the following web site : http://pcsc-lite.alioth.debian.org/ccid.html</p>	Inbox
Linux Red Hat distribution	Use the latest CCID package (CCID driver V1.3.11 minimum). If not operating, use the Debian source code	Inbox
Linux Ubuntu distribution	Use the latest CCID package (CCID driver V1.3.11 minimum). If not operating, use the Debian source code	Inbox
Mac OS X Tiger (10.4)	Use the latest CCID package (CCID driver V1.3.11 minimum) available in the web site http://support.gemalto.com	Inbox

Prox-DU & Prox-SU

Mac OS X Leopard (10.5)	Use the latest CCID package (CCID driver V1.3.11 minimum) available in the web site http://support.gemalto.com	Inbox
Note that Gemalto is actively involved in the development and improvement of the Linux and Mac libraries.		

Note that all the drivers needed for the Prox-DU and the Prox-SU reader/writer are the standard drivers available into the operating system. No Gemalto proprietary drivers are needed, Microsoft Windows CE R5.0 & R6.0 except.

For Windows operating system the following web link can be used to get a cabinet containing the driver files:

<http://catalog.update.microsoft.com/v7/site/Search.aspx?q=Microsoft%20ccid>

If needed the following web link <http://support.gemalto.com> will give instructions how to get these drivers.

The next paragraph will detail the installation wizard for Microsoft Windows XP operating system.

Windows XP installation

The HID driver is always available in all the operating systems and the HID device will be installed automatically.

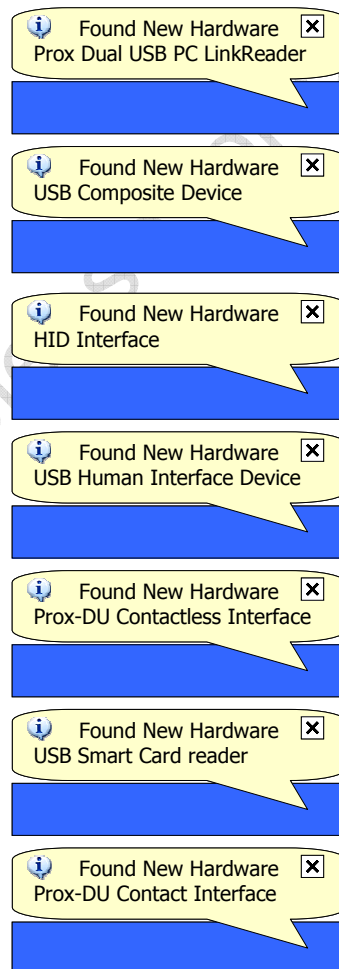
If the CCID driver is available in the operating system, the two CCID devices will be installed automatically, as described in the next paragraph “Windows XP installation without the Windows Update procedure”.

If the CCID driver is not available in the operating system, the two CCID devices will be installed after the Windows Update procedure, as described in the next paragraph “Windows XP installation using the Windows Update procedure”.

Windows XP installation without the Windows Update procedure

These installation steps will be effective only if the USB CCID driver is available in the operating system.

When the USB cable is plugged into the USB port of the computer the following popup dialog boxes will be successively displayed over the task bar:



Prox-DU & Prox-SU

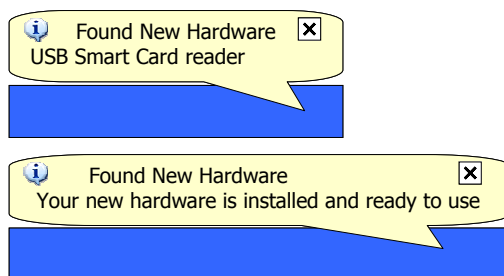


Figure 21 – Prox-DU Installation popup dialog boxes

Your Prox-DU or Prox-SU device is now ready to use.

Note: the popup dialog boxes will only appear the first time the device is connected to the computer.

Windows XP installation using the Windows Update procedure

These installation steps will be effective if the USB CCID driver not available in the operating system.

When the USB cable is plugged into the USB port of the computer the previous popup windows and the following wizard will appear:



Figure 22 – Windows XP Installation wizard: first window

- Click the **“Yes, this time only”** button to start the Windows Update procedure
- Click the **“Next”** button to continue

Prox-DU & Prox-SU

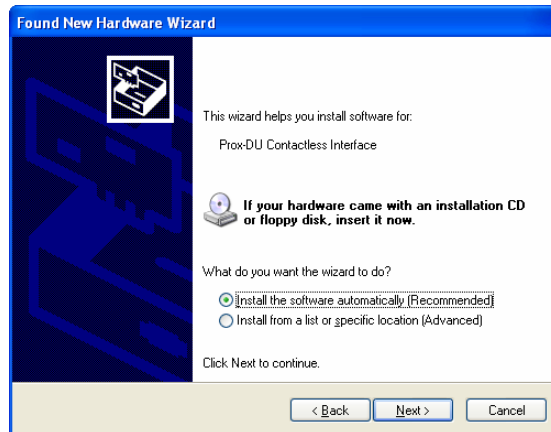


Figure 23 – Windows XP Installation wizard: second window

- Click the “**Install the software automatically (Recommended)**” button
- Click the “**Next**” button to continue

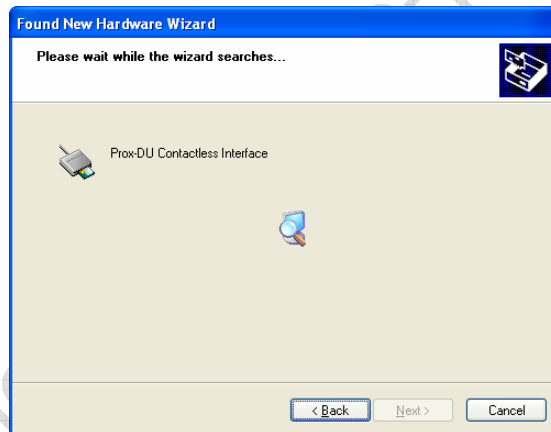


Figure 24 – Windows XP Installation wizard: third window

The Windows Update procedure will be running. Wait until the installation is completed:

Prox-DU & Prox-SU



Figure 25 – Windows XP Installation wizard: final window

Now the installation is finished. Your Prox-DU or Prox-SU device is ready to use.

Note: depending on the network configuration, the Windows Update procedure can take a **long** time. Please wait until the end of the procedure.

Checking the installation

To check if all the drivers have been properly installed, perform the following steps:

Check that the devices are recognized by the Device Manager (Windows XP):

- a) Right click the “**My Computer**” icon on the Desktop
- b) Select the “**Properties**” menu
- c) Select the “**Hardware**” tab
- d) Click the “**Device Manager**” button
- e) Click the “**Smart card readers**” icon

Two “**USB Smart Card reader**” icons should be displayed as shown in the next figure:

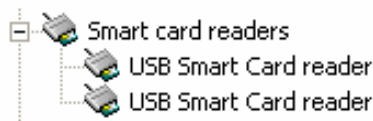


Figure 26 – USB smart card reader icons in the Device Manager window (Windows XP)

- f) Click the “**Human Interface Devices**” icon

Two “**HID devices**” icons should be displayed as shown in the next figure:

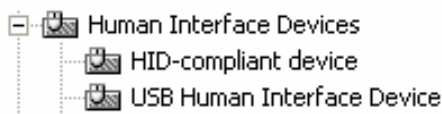


Figure 27 – USB HID icons in the Device Manager window (Windows XP)

Checking the smart card detection

To check if the Prox-DU or the Prox-SU reader/writer is able to detect contactless smart cards put a smart card near the reader/writer's antenna:

The blue LED should be set to an enlightened state.

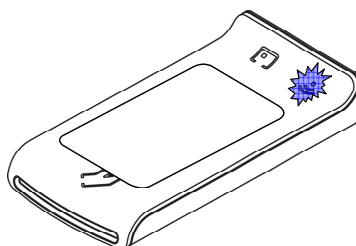


Figure 28 – Contactless smart card check

Note: The blue LED should return to the blinking state after a short time depending on the computer operating system. The smart card used for the check should be of course ISO14443-A or ISO14443-B compliant. Otherwise, no LED change will occur.

To check if the Prox-DU reader/writer is able to detect contact smart cards insert a smart card into the reader/writer's slot:

The yellow LED should be set to an enlightened state.



Figure 29 – Contact smart card check

Note: The yellow LED should return to the blinking state after a short time depending on the computer operating system. The smart card used for the check should be of course ISO7816-3 compliant. Otherwise, no LED change will occur. The second test is not available for the Prox-SU model.

Setting Up

No specific setting is required for the Prox-DU reader/writer.

The Prox-SU may require the installation of a SIM/SAM card into the reader/writer.

SIM/SAM card installation

One Subscriber Interface Module (SIM) or Security Access Modules (SAM) card can be installed into the Prox-SU.

To mount a SIM/SAM card the following steps should be performed:

- First remove the stand if the reader/writer is delivered with a stand:
 - a – Remove the four screws on the rear cabinet of the stand using a screw driver
 - b – Remove the stand front cabinet from the stand rear cabinet. Special care should be considered for the two metallic weights included into the rear cabinet
 - c – Remove the two black screws assembling the stand to the reader cabinet
 - d – Remove the stand from the reader
- Then remove the rear cabinet of the reader/writer:
 - 1 – Remove the four screws on the rear cabinet of the Prox-SU using a screw driver
 - 2 – Remove the front cabinet from the rear cabinet
- You can now insert the SIM/SAM card into the dedicated connector
- Repeat the previous instruction in the reverse order to assemble again the reader/writer

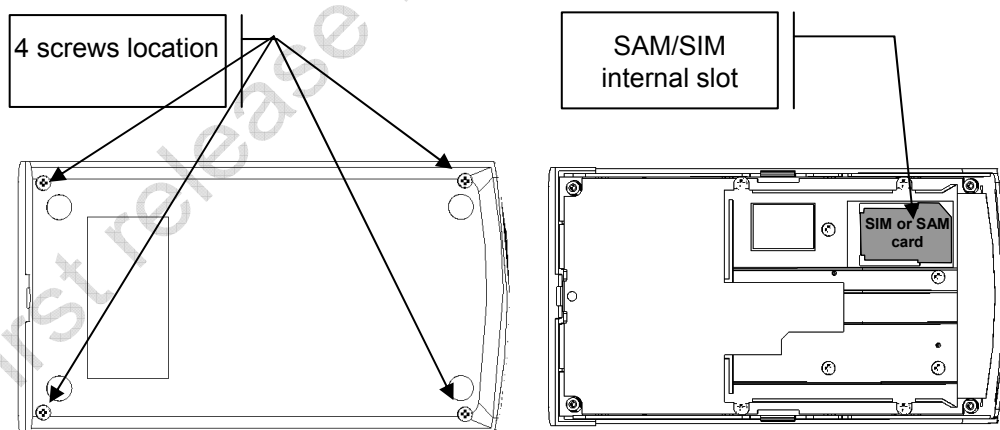


Figure 30 – Mounting the SIM/SAM card into the Prox-SU reader/writer

Setting Up in a Metallic Environment

The Prox-DU and the Prox-SU are designed to be operational even in a metallic environment.

However please follow the following installation guidelines:

- The antenna should be kept at least 10 cm away vertically and 2 cm away horizontally from any massive metal material.
- If more than one reader/writer is installed, each should be kept at least 30 cm away from the other.

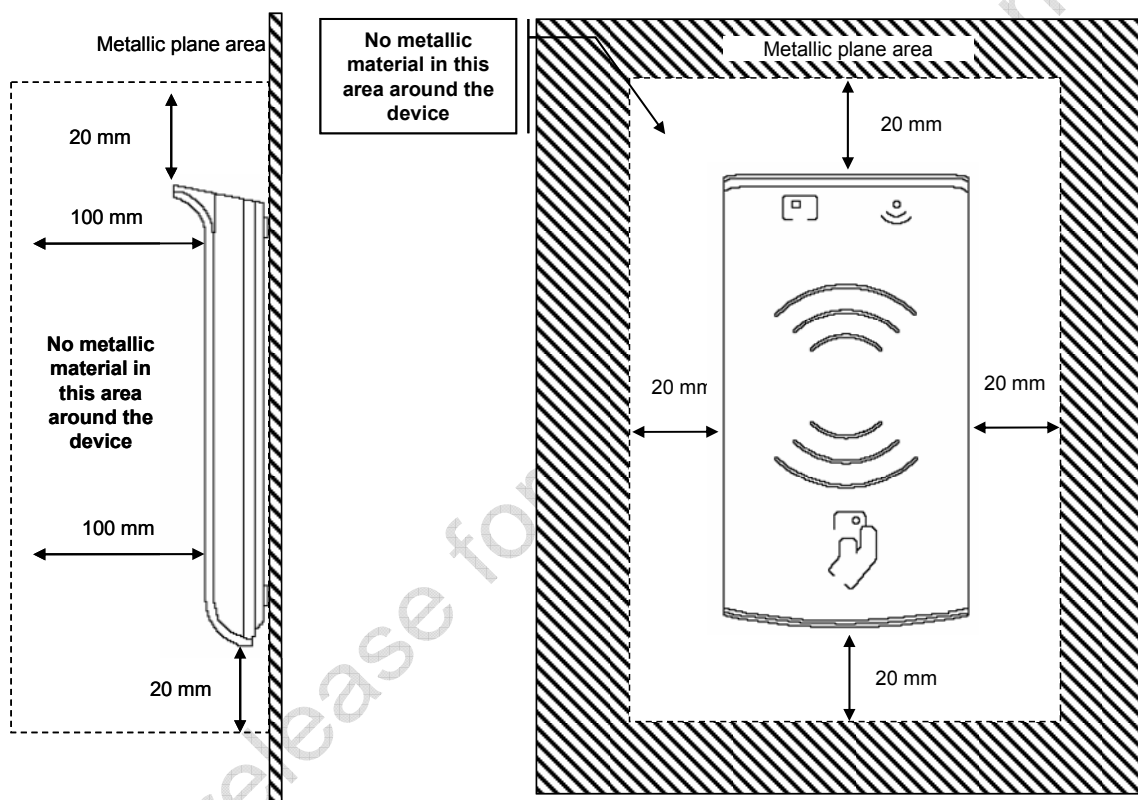


Figure 31 – Prox-DU in a metallic environment

Note: when the rear cabinet of the Prox-DU or Prox-SU is put over a metallic plate, as depicted in the above figures, the operating distance when interfacing a contactless smart card will decrease.

Evaluating the reader/writer

The Gemalto Gem_PCSC tool can be used to easily evaluate the Prox-DU and the Prox-SU in the PC/SC environment with a Windows based operating system.

In the example below the read of the memory block number 0 of a Mifare® 1K smart card will be performed.

The Gem_PCSC tool is available for download in the Gemalto support website: <http://support.gemalto.com>.

After the Gem_PCSC installation run the Gem_PCSC tool. The next window will be displayed:

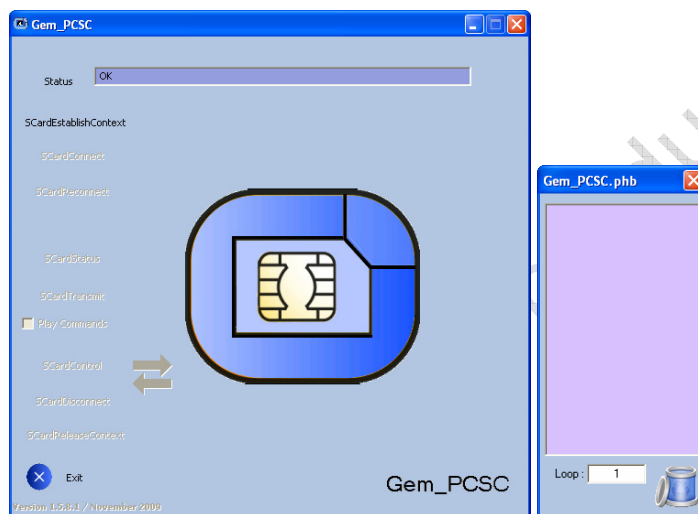


Figure 32 – Gem_PCSC window at start up

The main window displays the available PC/SC commands. The Gem_PCSC.phb small window is used to display the current commands stored by the user.

1- Click the “SCardEstablishContext” button to have the list of all the available PC/SC devices.

The next window will be displayed:



Figure 33 – Gem_PCSC window after “SCardEstablishContext”

Prox-DU & Prox-SU

2- Perform the following operations to start a communication with the smart card:

- Put a Mifare® 1K contactless smart card in front of the landing zone of the reader
- In the “Reader Name” box select the contactless interface of the Prox-DU named “Gemalto Prox-DU Contactless interface 0”
- Click the “SCardConnect” button

The next window will be displayed:

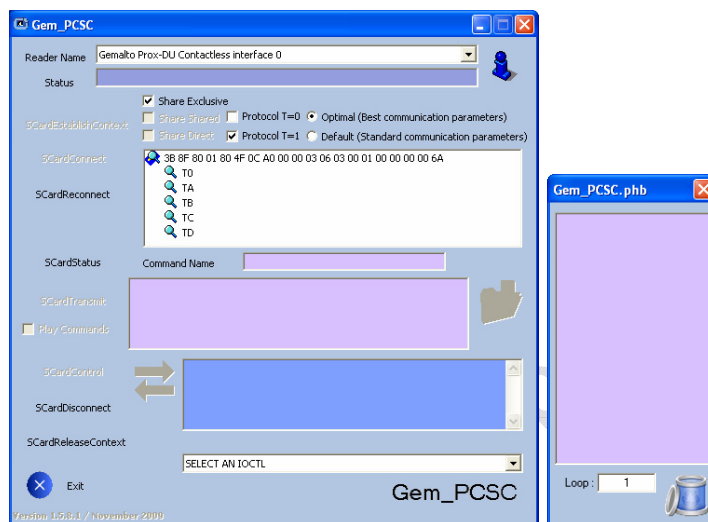


Figure 34 – Gem_PCSC window after “SCardConnect”

The ATR of the smart card will be displayed: **3B 8F 80 01 80 4F 0C A0 00 00 03 06 03 00 01 00 00 00 00 6A** corresponding to a Mifare® 1K smart card.

3- Define the Mifare® commands to be used:

3-a First authenticate the block number 0:

- In the “Command Name” box type the following smart card command:
 - “GeneralAuthenticateBlock0”
- In the field below type the corresponding APDU command (according to PC/SC V2 specification)
 - “FF 86 00 00 05 01 00 00 60 00”
 - Meaning “Authenticate block number 0 using the Key A number 0”
- Click the “SCardTransmit” button

The next window will be displayed:

Prox-DU & Prox-SU

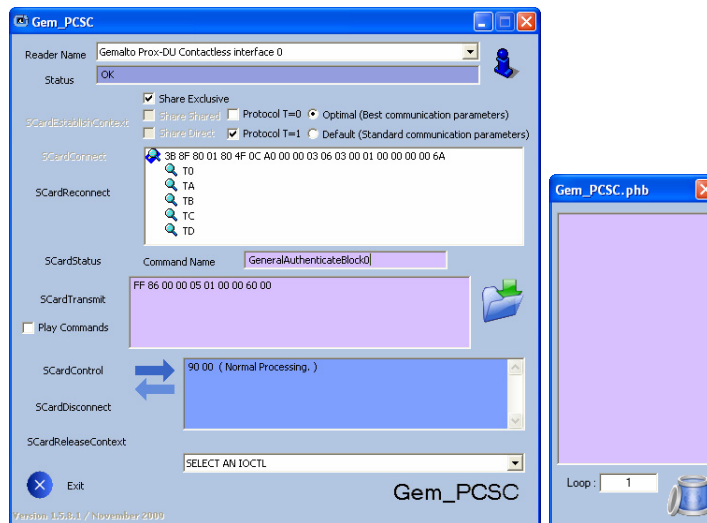


Figure 35 – Gem_PCSC window after “SCardTransmit” the Authentication command

The smart card response is displayed:

- **90 00** if the command was correctly processed
- Else an error status code

3-b Then read the block number 0:

- In the **“Command Name”** box type the following smart card command:
 - **“ReadBlock0”**
- In the field below type the corresponding APDU command (according to PC/SC V2 specification)
 - **“FF B0 00 00 10”**
 - Meaning **“Read block number 0 – 16 bytes”**
- Click the **“SCardTransmit”** button

The next window will be displayed:

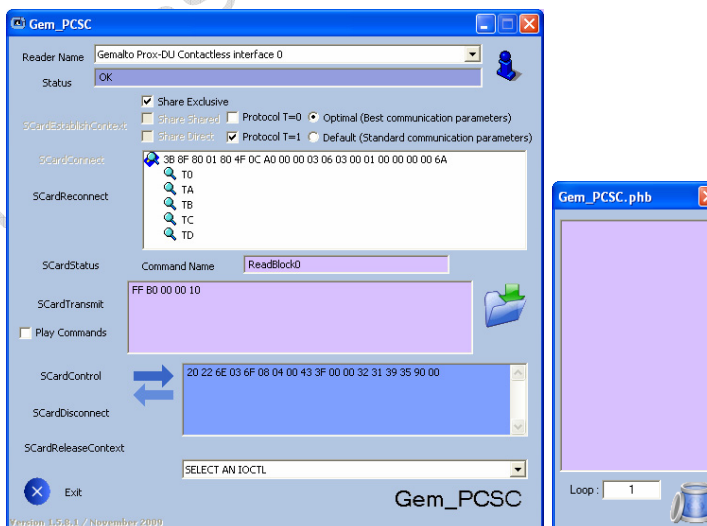


Figure 36 – Gem_PCSC window after “SCardTransmit” the Read command

The smart card response is displayed:

- **20 22 6E 03 6F 08 04 00 43 3F 00 00 32 31 39 35** are the data bytes

Prox-DU & Prox-SU

- Followed by the status code **90 00** if the command was correctly processed
- Else an error status code will only be displayed

20 22 6E 03 is the serial number of the smart card (03 is the MSB and 20 the LSB).

Note: the data bytes displayed are depending on the smart card content. The Key A into the smart card should be the same as the Key A into the reader for a proper authentication.

4- Perform the following operations to close the communication with the smart card:

- Remove the contactless smart card from the landing zone
- Click the **“SCardDisconnect”** button

The next window will be displayed:



Figure 37 – Gem_PCSC window after “SCardDisconnect”

5- Click the **“SCardReleaseContext”** button to close the connection with all the available PC/SC devices.

The next window will be displayed:



Figure 38 – Gem_PCSC window after “SCardReleaseContext”

Prox-DU & Prox-SU

You can now close the Gem_PCSC tool.

End of Document

First release for pre-production