MTS4SA PC Based
MPEG Analysis Tools

The MTS4SA provides the opportunity to purchase individual MTS400 Series tools as software to run stand-alone on PCs with Microsoft Windows 2000, or Windows XP operating systems.

MTS4SA provides a flexible and cost-effective way to purchase only those tools required for the job. The following file based (deferred time) tools are available:
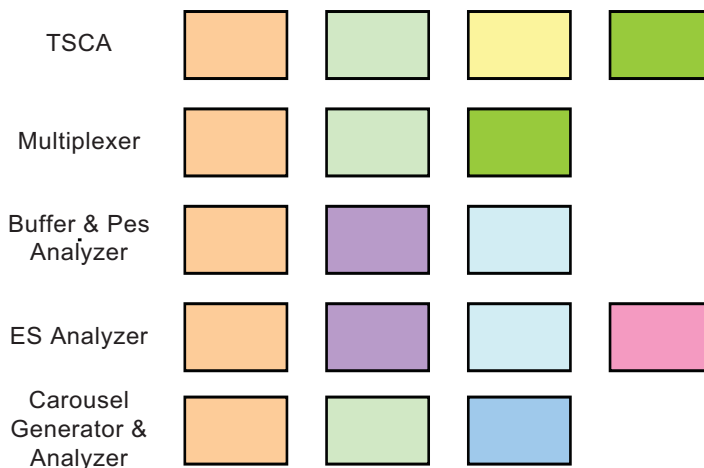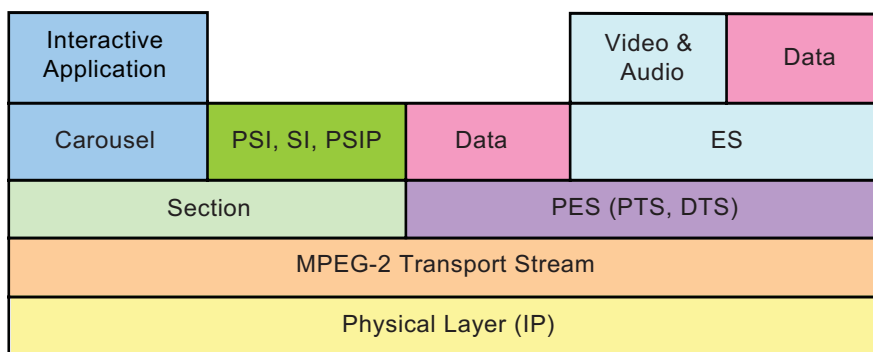
- Transport Stream Compliance Analyzer (TSCA)
- Multiplexer
- T-STD Buffer Analyzer
- PES Analyzer
- MPEG-2 Elementary Stream Analyzer*
- Carousel Analyzer
- Carousel Generator

A real-time version of the TSCA is also available for analyzing streams received through the PC's Ethernet (IP) interface.

A wide range of DTV standards are supported, including MPEG, DVB, ATSC and ISDB. Specific SI for Terrestrial, Cable and Satellite, plus regional variations of these standards are also supported.

Try before you buy. Demo versions of the TSCA, Multiplexer and Buffer Analyzer are available to download.

DTV Protocol Stack

Interactive Application					Video & Audio	Data
Carousel	PSI, SI, PSIP		Data		ES	
Section			PES (PTS, DTS)			
MPEG-2 Transport Stream						
Physical Layer (IP)						

TSCA

Multiplexer

Buffer & Pes Analyzer

ES Analyzer

Carousel Generator & Analyzer

* Please refer to the MTS4EA for MPEG-4, AVC/H.264 and VC-1 ES Analysis.
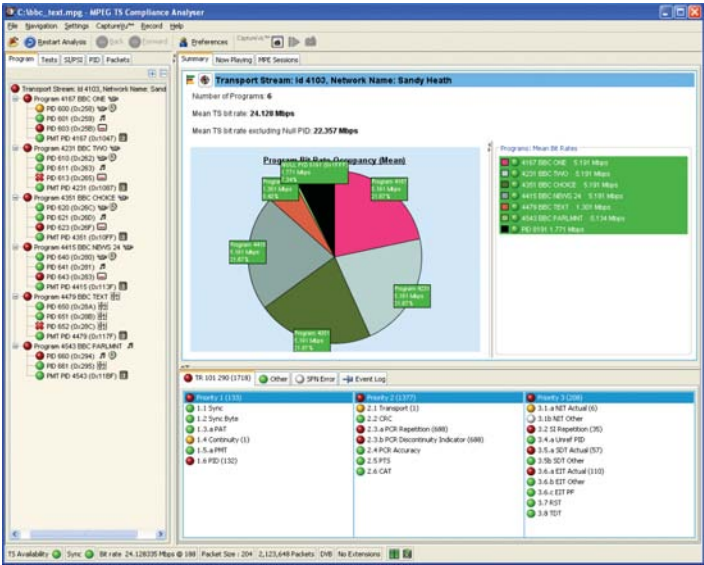
Transport Stream Compliance Analyzer (TSCA, TSCR)

The TSCA offers significant enhancements over traditional software based deferred-time (stored streams) MPEG analyzers. The combination of an innovative high-speed analysis engine and built-in intelligence, allows ultra-fast pinpointing and debugging of intermittent faults in MPEG Transport Streams used in next generation DTV and IPTV systems and services.

The TSCR is a real-time version of the TSCA analyzer operating on Transport Streams received through the PC's Ethernet port. The real-time analysis also includes Cross Layer time-correlated IP and TS measurements, alarms and error logging together with stream recording.

Both the TSCA and TSCR offer the CaptureVu™ technology and PCR measurement and graphing capabilities. CaptureVu™ technology captures and analyzes system events in real time and deferred time to debug the intermittent and complex problems that traditional analyzers miss.

Standards compliance is ensured through in-built customizable scripting supporting the broadest ranges of ratified and evolving DTV standards, including ATSC, DVB-C, DVB-H, DVB-S, DVB-T, ISDB-S, ISDB-T, ISDB-TB (Brazil), and MPEG. To maintain compatibility with the latest standards, flexibility is the key. New standards and proprietary tables can easily be catered for by loading Tektronix supplied updates, or creating your own custom scripts.

Users can configure the TSCA software to display stream information in user-selected fonts. This feature enables you to view stream information in your local language or to use custom fonts.
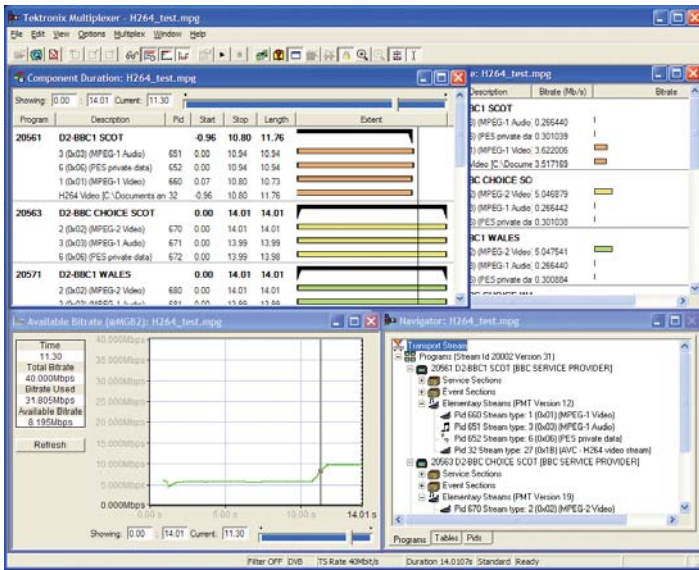
Multiplexer and SI Table Editor

When testing network elements or set-top boxes, a transport stream of the representative type needed is often not available. Even if there is a similar one, vital components within it may be missing or suffer from a lack of SI (Service Information) or other tables, or are multiplexed to the incorrect transport stream rate for the application.

Use the Multiplexer/Re-multiplexer/De-multiplexer application to create and modify multi-program Transport Streams with custom SI/PSI/PSIP information for DVB, ATSC, ISDB*, and MPEG compliant Transport Streams.

Video and audio Elementary Streams, may also be multiplexed into a Transport Stream. H.264 streams both with and without SEI timing messages are supported. Bitrate and framerate auto-detection features aid the import process.

This enables the user to create their own test streams that they can use to validate and debug their designs more quickly, and also to create errored streams to perform parametric stress testing and ensure robustness and quality of their MPEG-2 or H.264 implementation.

The **Make Seamless** wizard is provided with the Multiplexer. When looping a transport stream to simulate continuous playout, errors can be generated at the loop point caused by discontinuities in timing information. The Make Seamless wizard provides the opportunity of creating a seamless version of a Transport Stream file by adjusting SI and ES components within the stream.

* This includes ISDB-TB (Brazil) and Single Segment mode.
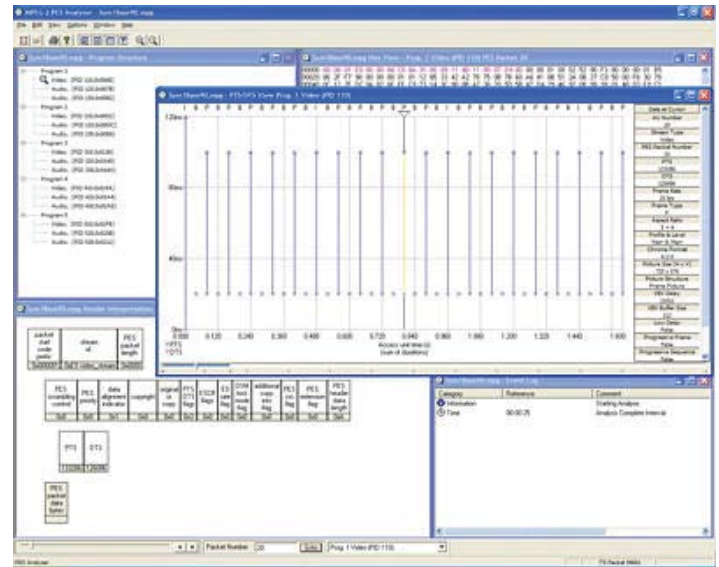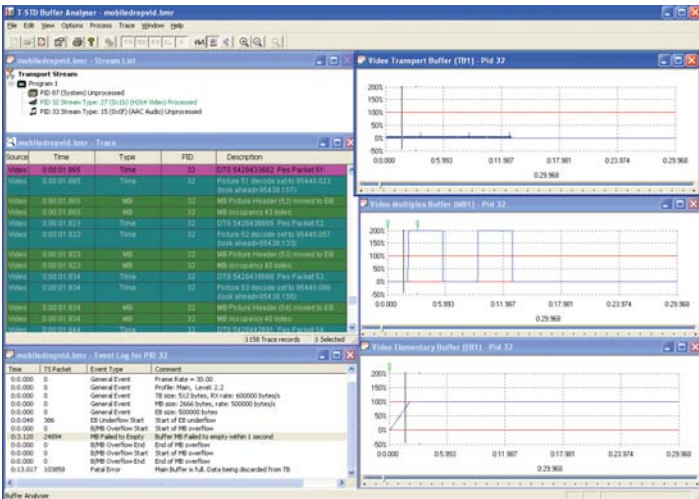
Buffer Analyzer

When developing professional and consumer equipment, particularly encoders and set top boxes, the characteristics of the test streams being either generated or used as stimulus need to be ascertained. Of critical importance amongst these characteristics is adherence to the buffer model. That is, when the stream is processed by a receiver, will any of the internal buffers be caused to either under or overflow. Consequences of these conditions will be freeze frames and receiver resets.

There are two types of buffer model; the one to use by the receiver is signaled within the Elementary Stream itself. The T-STD method is based upon the DTS values within the PES header and can be used for any contained CODEC type. Additionally, certain video CODECs such as MPEG-2 and H.264/AVC may signal buffer parameters within the ES. The Buffer Analyzer verifies conformance of a stream to the T-STD model. Verification of the H.264/AVC HRD method is covered by the MTS4EA product.

Packetized Elementary Stream (PES) Analyzer

When developing professional and consumer equipment, particularly encoders and set top boxes, the characteristics of the test streams being either generated or used as stimulus need to be ascertained. The header associated with each PES packet is of particular interest, as it contains the decode and presentation timestamps (DTS and PTS) for the contained Elementary Stream. Errors in these time-stamps may cause resets or picture freeze problems at the receiver in extreme cases. They are more typically the cause of lip sync problems where the timestamps of associated video and audio streams are not synchronized. The Pes Analyzer is designed to help address these problems as well as verify conformance of the PES header contents to the MPEG, DVB and ATSC standards.
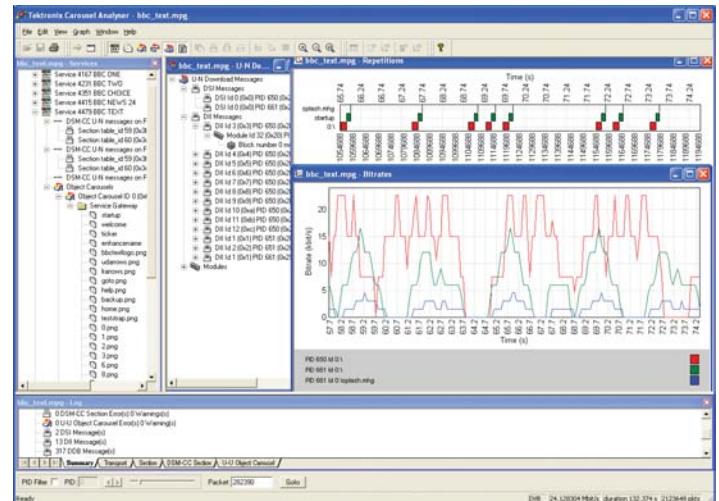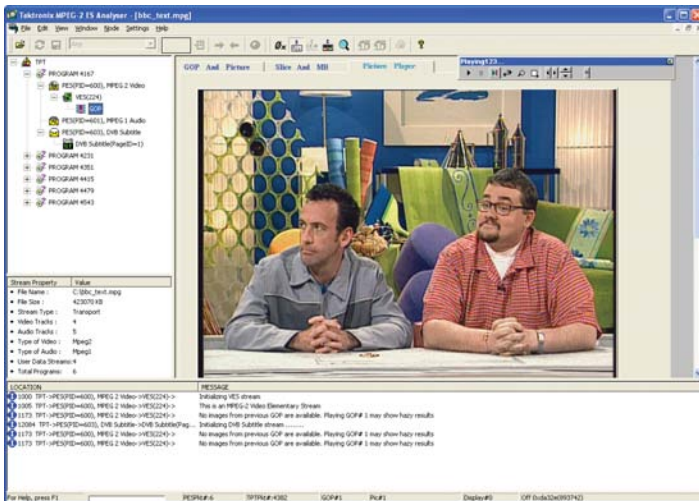
Elementary Stream (ES) Analyzer

The ES Analyzer is intended for CODEC design, optimization and conformance purposes. It provides the ability to view the moving picture from within a PES stream and carry out a whole range of sophisticated tests on the lower layers of an elementary stream within a Transport Stream. In addition, it both analyses and displays a range of extended media formats, including ATSC Closed Captions, DVB Subtitles and Teletext associated with video Elementary Streams.

For analysis of MPEG-4, AVC/H.264 and VC-1 as well as MPEG-2 Elementary Streams, please refer to the MTS4EA (datasheet 2AW-18069).

Carousel Analyzer

When developing either data or object carousels for interactive applications, designers not only need to verify the content of carousels, but also whether they are compliant with the relevant standards, and to optimize the settings between transmission bandwidth and responsiveness of the user experience. These settings are mainly concerned with the repetition rates of the various carousel groups. The Carousel Analyzer is designed to address all of these needs for a Transport Stream file containing carousel components. It analyses carousels compliant with MPEG-2 DSM-CC, DVB (including MHP), DTT (MHEG-5) or ARIB standards.
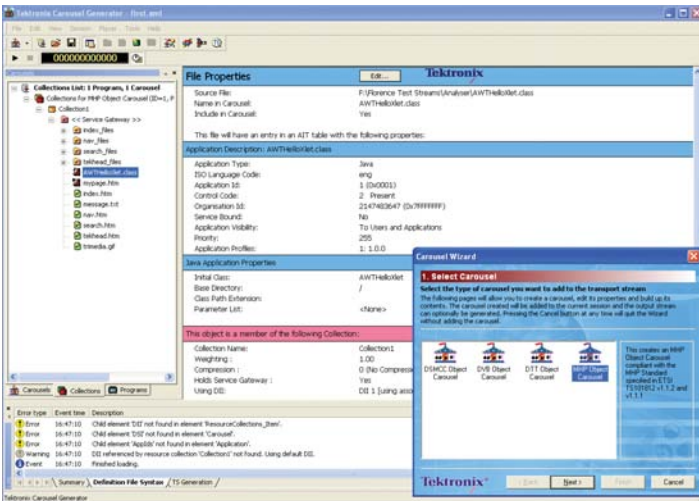
Carousel Generator

The Carousel Generator product is used for creating object carousel contents within an output Transport Stream. This is particularly useful in test situations where the effects of varying parameters, such as individual repetition intervals, may be quickly ascertained. The Generator will create object carousels conforming to the MPEG-2 DSM-CC, DVB, DTT (MHEG-5) or MHP standards.

Other Applications
Creating, Editing and Re-Sizing Transport Streams

Two direct stream manipulation packages are supplied as standard with all MTS4SA products. TS Cutter allows re-sizing of Transport Streams. TS Editor allows direct editing of Transport Streams using a hexadecimal view as well as a header interpretation guide.

Ordering Information

Stand-alone Software for Installation on a User's Own PC

Item	Option	Description
MTS4SA		Stand-alone Deferred-time Software Package for installation on a user's own PC (see minimum system requirements)
MTS4SA	USB	USB Security dongle supplied with Stand-alone Software Package
MTS4SA	PPD	Parallel Port Security dongle supplied with Stand-alone Software Package
MTS4SA	TSCA	Security Dongle key to add Deferred-time Transport Stream Compliance Analyzer with CaptureVu® technology
MTS4SA	TSCL	Security Dongle key to add Deferred-time Transport Stream Compliance Analyzer with CaptureVu technology (file size limited to 200 MB)
MTS4SA	TSCR	Security Dongle key to add Real-time Video over IP Transport Stream Compliance Analyzer with CaptureVu technology (for use with a standard network interface card)
MTS4SA	MX	Security Dongle key to add Deferred-time Multiplexer
MTS4SA	ES	Security Dongle key to add ES Analyzer
MTS4SA	PA	Security Dongle key to add PES Analyzer
MTS4SA	BA	Security Dongle key to add Buffer Analyzer
MTS4SA	DB	Security Dongle key to add Carousel Analyzer
MTS4SA	CG	Security Dongle key to add Carousel Generator
MTS4SA	DBCG	Security Dongle key to add Carousel Analyzer and Carousel Generator
MTS4SA	L0	English documentation
MTS4SA	L5	Japanese documentation
MTS4SA	L99	Electronic user documentation supplied only (no printed hard copy)

Upgrade or add Standard Options after initial purchase of MTS4SA

Item	Option	Description
MTS4UP		MTS4SA Series Field Upgrade Kit
MTS4UP	TSCA	Upgrade to add Deferred-time Transport Stream Compliance Analyzer
MTS4UP	TSCL	Upgrade to add Deferred-time Transport Stream Compliance Analyzer (file size limited to 200 MB)
MTS4UP	TSCR	Upgrade to add Real-time Video over IP Transport Stream Compliance Analyzer (available for MTS4SA only)
MTS4UP	MX	Upgrade to add Deferred-time Multiplexer (available for MTS4SA only)
MTS4UP	PA	Upgrade to add PES Analyzer (available for MTS4SA only)
MTS4UP	BA	Upgrade to add Buffer Analyzer (available for MTS4SA only)
MTS4UP	ES	Upgrade to add ES Analyzer to any MTS4SA Series product
MTS4UP	DB	Upgrade to add Carousel Analyzer to any MTS4SA Series product
MTS4UP	CG	Upgrade to add Carousel Generator to MTS4SA series
MTS4UP	DBCG	Upgrade to add Carousel Analyzer and Carousel Generator to MTS4SA series
MTS4UP	UPG	Upgrade to latest version of MTS4SA Series base software and installed options. Includes CD and manual (does not include upgrades to MTS4EA software)

For Further Information
Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit **www.tektronix.com**

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