

User Manual



MTS300 MPEG Test System Real-Time Analysis

071-0658-00

This document applies to MPEG Test System
version 5.0 firmware and above.

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Use Proper Fuse. Use only the fuse type and rating specified for this product.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Wear Eye Protection. Wear eye protection if exposure to high-intensity rays or laser radiation exists.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the Product. These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product. The following symbols may appear on the product:



Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

Do Not Service Alone. Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect Power. To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

Use Care When Servicing With Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

Preface

This document describes how to use the following Tektronix MTS300 MPEG Test System components:

- Master Client
- Expert Client
- Configuration Client
- Stream Player Client and Server
- Stream Recorder Client and Server
- Server Manager
- Analysis Server
- Private Syntax Interpreter

If you purchased a Tektronix MTS300 MPEG Test System and are looking for hardware and software installation instructions, first-time operation procedures, or specifications, refer to the *MTS300 MPEG Test System Hardware and Software Installation Technical Reference*, Tektronix part number, 071-0667-XX.

Manual Structure

This Real-Time Analysis user manual is organized into the following sections:

Getting Started. This section provides brief overviews of the MTS300 and client applications, descriptions of the rear panel connectors, procedures for starting and logging onto the MTS300 system (including enabling/disabling Auto Logon), and procedures for shutting down the MTS300 system and applications.

Operating Basics. This section describes the MTS300 system interface and provides a brief tutorial that shows how the client modules are used to monitor and analyze transport streams.

Reference. This section provides detailed descriptions and procedures for using each of the MTS300 client modules. It also provides a reference for all user-controlled analyses (called *probes*) enabled by the MTS300 system.

Appendix A: What to Do if an Application Locks Up. Appendix A describes how to recover if the MTS300 system locks up.

Appendix B: Cleaning and Maintenance. This appendix describes how to perform periodic user maintenance. This section does not include repair or replacement procedures. For these procedures, see the *MTS300 MPEG Test System Service Manual*, which is an optional accessory.

Appendix C: Networking. This appendix contains information you might need to set your system up in a TCP/IP environment and to troubleshoot basic networking problems.

Appendix D: Private Systax Interpreter. This appendix describes how to create and compile private syntax definitions for use with the MTS300 MPEG Test System.

Appendix E: ATSC Program Paradigm. This appendix describes the ATSC program paradigm, which is the method used for allocating the values of the Packet Identifier (PID) field of the transport packet header in a systematic manner for ATSC transport streams.

Glossary. The *Glossary* contains definitions of new, uncommon, and/or unique terms used in this manual.

Index. The *Index* provides a comprehensive alpha-numeric reference to the topics covered in this manual.

NOTE. Refer to the MTS300 MPEG Test System Hardware and Software Installation Technical Reference manual (Tektronix part number 071-0667-XX) that is delivered with each MTS300 system for the following information:

- *Hardware installation procedures*
 - *Instrument option, accessory, and upgrade lists*
 - *First time operation and functional check procedures*
 - *MTS300 system specifications and compliances*
 - *Software installation and recovery procedures*
-

Manual Conventions

Throughout this manual the following typographic, symbolic, and terminology conventions apply:

Typographic Conventions

- **Bold** terms are found in procedures and denote interface items that you need to select in order to cause an event to occur. For instance, to configure default directories the procedure would read as follows:

Select **Directories** from the Options menu.

In this example, even though the Options menu is an interface element, the Directories selection is the element that displays the needed dialog box (causes an event to occur) and is the only bold term in the step. When interface items are referred to outside of procedures, the terms are not boldface.

- Manual names, manual section names, and words that are defined in the text are *italicized*.
- Specific input that you need to make is indicated in the text using `mono-spaced font`. Unless otherwise stated, do not enter punctuation at the end of a mono-spaced font entry.

Symbols and Terminology Conventions

This manual uses symbols and terminology consistent with the following publications:

- For PSI elements, ISO/IEC Standard 11172 and 13818 (parts 1, 2, and 3)
- For DVB elements, ETSI Publication ETS 300 468
- For DVB-T elements, ETSI Publication TS 101 191 V1.2.1
- For ATSC elements, ATSC Document A/65
- For Windows elements, *The Microsoft Manual of Style for Technical Publications*, 2nd ed.

In cases where terms, symbols, or references are or may be ambiguous, check the *Glossary* located at the back of this manual for definitions. Also, refer to the *Glossary* for definitions unique to the MTS300 test system and applications.

Refer to the Windows NT online Help for definitions and explanations of Windows NT specific terminology.

Related Documents

For additional information about using MTS300 application software to monitor, analyze, and generate MPEG-2, DVB, and ATSC data streams, refer to the following manuals:

The *MTS300 MPEG Test System Stream Creation Applications User Manual*, Tektronix part number 071-0778-XX, contains information about using the deferred-time and real-time multiplexers, the table editors, and three smaller applications, the Jitter Adder, DVB Coder/Decoder, and Error Injector.

The *MTS300 MPEG Test System MPEG-2 DVB/ATSC System Analyzer User Manual*, Tektronix part number 071-0659-XX, contains information about using the deferred-time MPEG-2 System Analyzer.

The *MTS300 MPEG Test System Program Stream Analyzer User Manual*, Tektronix part number 071-0662-XX, contains information about using the deferred-time Program Stream Analyzer application.

The *MTS300 MPEG Test System Dolby Digital Audio Stream Analyzer User Manual*, Tektronix part number 071-0661-XX, contains information about using the deferred-time AC-3 Audio Stream Analyzer application.

The *MTS300 MPEG Test System MPEG Audio Stream Analyzer User Manual*, Tektronix part number 071-0663-XX, contains information about using the deferred-time MPEG Audio Stream Analyzer application.

The *MTS300 MPEG Test System Video Stream Analyzer User Manual*, Tektronix part number 071-0664-XX, contains information about using the deferred-time MPEG Video Stream Analyzer application.

The *MTS300 MPEG Test System Service Manual*, Tektronix part number 071-0668-XX, contains information about servicing the MTS300 system.

Software Version

Table i lists the version numbers for the MTS300 system applications supported by this manual. To verify an application version number, select **About** from the Help menu.

Table i: Supported applications version numbers

Application or server name	Version supported
Master Client	1.4 and above
Expert Client	1.4 and above
Configuration Client	1.4 and above
Stream Player Client	1.4 and above
Stream Recorder Client	1.4 and above
Private Syntax Interpreter	1.0 and above
ServerManager	1.4 and above
AnalysisServer	1.4 and above
PlayerServer	1.4 and above
RecorderServer	1.4 and above

Related Applications

The real-time applications described in this manual are part of the suite of software and hardware components that comprise the Tektronix MTS300 MPEG Test System. Table ii shows the program icons for each MTS300 application, briefly describes the purposes for each application, and lists the manual name and number that you should look to for information about that test system component.

The applications that appear in version 5.0 Tektronix MPEG Test System program group and Start menu depend on the system configuration and its installed options. Table ii summarizes all test system applications available in release 5.0.

Table ii: Tektronix MPEG Test System version 5.0 applications


















Icon	Application title	Function	User document
 Master Client	Master Client	<p>Continuously monitor an input bitstream for compliance with the MPEG-2, DVB-SI, and ATSC PSIP digital television standards. Use this client to start or assign to an input/output the following real-time applications and servers:</p> <p>AnalysisServer, used to perform real-time analysis on a transport stream input</p> <p>Expert Client, used display the results of real-time transport stream analysis performed by an analysis server.</p> <p>Configuration Client, used to configure analysis servers for specific errors.</p> <p>Stream Player, used to generate transport streams from a local file.</p> <p>Stream Recorder, used to capture transport stream input.</p> <p>OpenMux, used to configure and generate transport streams from local transport stream and elementary stream files</p>	MTS300 MPEG Test System Real-Time Analysis User Manual 071-0658-XX
 Hardware Diagnostic	Hardware Diagnostic	Perform onboard self-tests for the MPEG Test System.	MTS300 MPEG Test System Hardware and Software Installation Technical Reference 071-0667-XX (Information repeated in both manuals)
 Private Syntax Interpreter	Private Syntax Interpreter	Create table definitions used by the Real-Time Analyzer to interpret private syntax sections.	
 Deferred-Time Analyzer	MPEG-2 DVB/ATSC System Analyzer	Analyze transport streams and packetized elementary streams saved to the system disks.	MTS300 MPEG Test System MPEG-2 DVB/ATSC System Analyzer User Manual 071-0659-XX
 DVB Channel	DVB Channel Coding and Decoding	Code and decode transport stream files to DVB specifications.	MTS300 MPEG Test System Stream Creation Applications User Manual 071-0778-XX (Information repeated in both manuals)
 Program Stream Analyzer	Program Stream Analyzer	Analyze MPEG program stream files.	MTS300 MPEG Test System Program Stream Analyzer User Manual 071-0662-XX

Table ii: Tektronix MPEG Test System version 5.0 applications (Cont.)

Icon	Application title	Function	User document
 Video Stream Analyzer	MPEG Video Stream Analyzer	Analyze MPEG-1 and MPEG-2 video elementary streams files or streams extracted from the MPEG-2 System Analyzer or Program Stream Analyzer.	MTS300 MPEG Test System Video Stream Analyzer User Manual 071-0664-XX
 Audio Stream Analyzer	MPEG Audio Stream Analyzer	Analyze MPEG-1 and MPEG-2 audio elementary streams files or streams extracted from the MPEG-2 System Analyzer or Program Stream Analyzer.	MTS300 MPEG Test System Audio Stream Analyzer User Manual 071-0663-XX
 Dolby Digital Analyzer	Dolby Digital Audio Stream Analyzer	Analyze Dolby Digital (AC-3) audio elementary stream files or streams extracted from the MPEG-2 System Analyzer.	MTS300 MPEG Test System Dolby Digital Audio Stream Analyzer User Manual 071-0661-XX
 Multiplexer	MPEG-2 Transport Stream Multiplexer	Create transport stream files from PSI/SI/PSIP table files, elementary stream files, and data files.	MTS300 MPEG Test System Stream Creation Applications User Manual 071-0778-XX
 DVB Table Editor	DVB Table Editor	Create and edit PSI and DVB SI table files for use with the transport stream multiplexer.	
 ATSC Table Editor	ATSC Table Editor	Create and edit PSI and ATSC PSIP table files for use with the transport stream multiplexer.	
 Jitter Adder	Jitter Adder	Add jitter to PCR data in MPEG-2 transport stream files.	
 Error Injector	Error Injector	Insert or correct errors in transport stream packets.	
 License Manager	Tektronix Software Protection	Enter or reenter the general password to enable licensed applications.	Read This First, MTS300 MPEG Test System Software V5.0 071-0666-XX
 MPEG-2 Help	MPEG2_Part1 (ISO/IEC 13818-1)	The international MPEG-2 system standard in Windows Help format.	none
 Uninstall MTS	Uninstall MTS	Remove MPEG Test System software from the system disk.	MTS300 MPEG Test System User Manuals

Other Information Sources

For information about the Windows NT operating system, see the Windows NT online Help on the MTS300 system.

For the latest information about MTS300 Real-Time Analysis features and bugs, refer to the *MTS300 Series Software Version 5.0 Read This First* document that accompanied your Tektronix MPEG Test System product.

Two sources of online information are provided with the MTS300 MPEG Test System Stream Creation Applications. The first is the online help that accompanies each application.

- Access help topics by selecting **Contents** from the Help menu.

The second source of online information is the MPEG-2 stand-alone Help file. This help file, called *MPEG-2 Help*, is the MPEG-2, Part 1 (Systems), standard. The help file is installed when you install the software and an icon is placed in your *Tektronix MPEG Test System* program group window.

- To display the help, double click the **MPEG-2** icon in the *Tektronix MPEG Test System* program group window.

Contacting Tektronix

Phone	1-800-833-9200*
Address	Tektronix, Inc. Department or name (if known) 14200 SW Karl Braun Drive P.O. Box 500 Beaverton, OR 97077 USA
Web site	www.tektronix.com
Sales support	1-800-833-9200, select option 1*
Service support	1-800-833-9200, select option 2*
Technical support	Email: support@tektronix.com 1-800-833-9200, select option 3* 1-503-627-2400 6:00 a.m. – 5:00 p.m. Pacific time

* This phone number is toll free in North America. After office hours, please leave a voice mail message.
Outside North America, contact a Tektronix sales office or distributor; see the Tektronix web site for a list of offices.



Getting Started

Getting Started

This section contains the following information to help you get started using your Tektronix MTS300 MPEG Test System:

- Overviews of the MTS300 system and client applications
- Descriptions of the rear panel connectors
- Procedures for starting and logging onto the MTS300 system (including enabling/disabling Auto Logon)
- Procedures for shutting down the MTS300 system and applications

NOTE. Refer to the MTS300 MPEG Test System Hardware and Software Installation Technical Reference manual (Tektronix part number 071-0667-XX) that is delivered with each MTS300 system for the following information:

- *Hardware installation procedures*
 - *Instrument option, accessory, and upgrade lists*
 - *First time operation and functional check procedures*
 - *MTS300 system specifications and compliances*
 - *Software installation and recovery procedures*
-

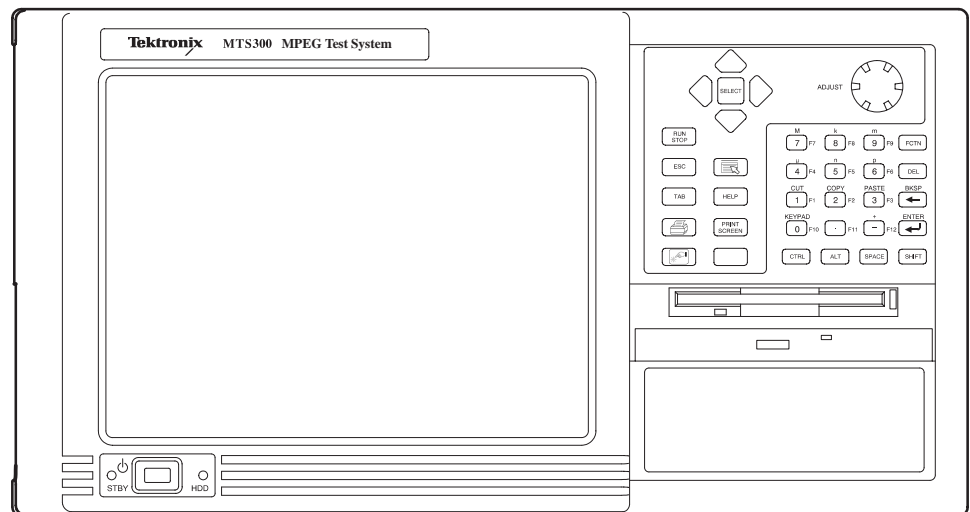


Figure 1-1: MTS300 MPEG Test System

MTS300 System Overview

The MTS300 system (see Figure 1–1) is an MPEG-2 protocol monitor and analyzer used to monitor and analyze single and multiple program transport streams in MPEG-2, DVB, and ATSC environments.

The MTS300 MPEG Test System is part of the Tektronix Video Quality of Service (VQoS) products. When used with the MTS300 options, the rack-mountable MTS300 test system provides three primary capabilities to support the design and testing of MPEG, DVB, and ATSC systems:

- Real-time monitoring and analysis of transport streams
- Deferred-time analysis of transport streams
- Custom transport stream creation and generation

See the MPEG-2, DVB, and ATSC standards for detailed information about the syntax and semantics of each system.

Each test system can monitor up to two transport stream inputs simultaneously and accepts inputs in the following electrical formats:

- ASI/M2S (the test system automatically detects the format)
- SPI (LVDS parallel) when you order the MTS3FLV upgrade
- DHEI (Digicipher II) when you order the MTS3FDH upgrade

The MTS300 system uses a client/server architecture consisting of a Server Manager, two Analysis Servers, and the following client applications:

- Master Client
- Expert Client
- Configuration Client
- Stream Recorder
- Stream Player

Combined, these client/server modules enable you to monitor multiple transport stream inputs simultaneously, perform in-depth analyses of one transport stream input, and configure the monitoring and reporting parameters of the monitored inputs. The system is tightly integrated, making it easy to use for experts and non-experts.

Server Manager The Server Manager is the process that makes the results of the Analysis Servers and other real-time application servers available to Master Clients. The Server Manager starts automatically when you start the transport monitor. Only one Server Manager can run on a test system.

The Server Manager process interacts with the following entities:

- The Analysis Server sends analysis results (called *traps*) to the Server Manager.
- The Stream Player, Stream Recorder, and optional OpenMux (MTS300, Option OM) servers send state traps to the Server Manager. Unlike the Analysis Server traps, the traps sent by these servers is limited to
- The Master Client displays the data collected by the Server Manager.

Analysis Servers The Analysis Server is the process that actually analyzes transport stream inputs. Each MTS300 system can support up to two Analysis Server processes simultaneously.

The Analysis Server processes interact with the following entities:

- The Server Manager collects the Analysis Server results (called *traps*).
- The Expert Client displays the results of the Analysis Server directly.
- The Configuration Client sets the monitoring and analysis parameters for each Analysis Server process operating on the inputs to the MTS300 system.

Master Client The Master Client application provides an intuitive interface for controlling and monitoring the status of the I/O ports on the MTS300 system. You can launch only one Master Client on each MTS300 system. In a network environment, if a remote MTS300 system has a Master Client open, you must shut down the remote Master Client before you can connect your local Master Client to the Server Manager running on the system.

NOTE. *An individual MTS300 system is limited to operating two Analysis Servers at a time, and can launch only one Stream Player, one Stream Recorder, and one OpenMux application at a time. In addition, the MTS300 system is limited to an aggregate data rate of 140 Mbs between all operating applications.*

From the Master Client, you can perform the following tasks:

- Monitor and analyze transport streams in real time using the Expert Client and Configuration Client applications.
- Record and playback transport streams using the Stream Recorder and Stream Player applications.
- Generate multiplexed transport streams in real time using the OpenMux application (MTS300, Option OM).

The Master Client uses three areas to display different type of information:

- The I/O Port Manager panel displays icons representing real-time application servers and the input and output ports your test system is configured with.
- The Services panel displays icons for the services (also called programs) encoded in the transport stream you are monitoring.
- The Details panel displays icons indicating the type, status, and severity of errors on a transport stream or service.

Expert Client

The Expert Client application allows you to analyze a single transport stream in greater detail. You will use the Expert Client as your primary tool to help troubleshoot errors in your digital transmission system.

The Expert Client characteristics are shown in the following list:

- Graphical displays that show the structure (hierarchy) of the input transport stream and display characteristics of each component of the input stream (for example: PID and type allocation, section rate analyses, and timing analyses).
- Report views that indicate the types of errors recorded by the Analysis Server and the characteristics of the input stream.
- Error views that show specific errors recorded for the various components of the transport stream; for instance, PMT section rate errors and ETR290 errors.

The Expert Client displays the results of only one Analysis Server (input) at a time.

Configuration Client

The Configuration Client allows you to perform the following tasks:

- Specify the standard to which you are testing: MPEG-2, DVB, or ATSC.
- Set, remove, or modify the probes that test transport streams for valid syntax and semantics and rates.
- Specify the way in which errors are reported in both the Expert and Master Clients. You can configure each probe to report an error as Critical, Major, Minor, Warning, or as information only.
- Stop and restart an Analysis Server running on a MTS300 system.
- Set passwords on specific inputs that prevent others from changing the Analysis Server configuration for that input.
- Set parameters for capturing part of an input transport stream.

Stream Recorder Client

The Stream Recorder application allows you to record an MPEG transport stream onto the hard drive of the MTS300 system using a VTR-like interface. You can specify the duration, file name, and location of the recorded file.

The Stream Recorder is governed by the following MTS300 system limits:

- Only one Stream Recorder can be launched at a time on each MTS300 system.
- The Stream Recorder can only record transport stream files with data rates between 1 Mbps and 140 Mbps onto the hard drive of the MTS300 system on which the application was launched. You cannot record remote transport stream files or use a remote Stream Recorder to record a local transport stream file.

NOTE. *It is recommended that you store transport stream files on the SCSI hard drives (E: drive) of the MTS300 system. The response time of the C: drive on the MTS300 system is limited and may affect the performance of the Stream Recorder and Stream Player applications when you try to capture or play back streams with bitrates greater than 30 Mbps.*

- If the SCSI hard drives (E:) are 90% or more full, it is recommended that you use a defrag utility to defragment the SCSI drives. You can use any defrag utility that is compatible with the Microsoft Windows NT 4.0 operating system.
- The MTS300 system is limited to an aggregate data rate of 140 Mbps between all operating applications. You may have to shut down other MTS300 applications if you need to record a transport stream with high data rates.

Stream Player Client

The Stream Player application allows you to play back transport streams saved on the hard disk of the MTS300 system using a VTR-like interface. You can specify which portion of the transport stream to play back, the rate of the transport stream (you can also apply an external clock to set the rate), the format (ASI or M2S) of the transport stream, and the playback mode (one time or loop).

The Stream Player is governed by the following MTS300 system limits:

- Only one Stream Player can be launched at a time on each MTS300 system.
- The Stream Player can only play back transport stream files with data rates between 1 Mbs and 140 Mbs stored on the hard drive of the MTS300 system on which the application was launched. You cannot play back remote transport stream files or use a remote Stream Player to play back a local transport stream file.

NOTE. *It is recommended that you store transport stream files on the SCSI hard drives (E: drive) of the MTS300 system. The response time of the C: drive on the MTS300 system is limited and may affect the performance of the Stream Recorder and Stream Player applications when you try to capture or play back streams with bitrates greater than 30 Mbs.*

- If the SCSI hard drives (E:) are 90% or more full, it is recommended that you use a defrag utility to defragment the SCSI drives. You can use any defrag utility that is compatible with the Microsoft Windows NT 4.0 operating system.
- The MTS300 system is limited to an aggregate data rate of 140 Mbs between all operating applications. You may have to shut down other MTS300 applications if you need to play back a transport stream with high data rates.

SNMP Capabilities

The MTS300 system includes SNMP management information bases (MIB) installed at the following directory location: C:\Mib\. The Tektronix MIB is a textual description of the Analysis Server objects (functions and parameters) that can be monitored and controlled via SNMP. Refer to *Appendix C: Networking* for more information about the networking requirements of the MTS300 system.

The MIB files are used by the real-time analysis applications and the Stream Player, Stream Recorder, and OpenMux (MTS300, Option OM only) applications.

The MIB file pairs for each application, for example, the RTAv1.mib and RTAv2.mib files, are used for SNMPv1 and SNMPv2 systems respectively.

The operations in SNMP are limited to retrieving the value of management information, modifying the value of management information, and reporting an event.

Rear Panel Connectors

Refer to the *MTS300 MPEG Test System Hardware and Software Installation Technical Reference* manual (Tektronix part number 071-0667-XX) that came with the instrument for hardware and software installation procedures.

This section describes the rear-panel input and output connectors. Refer to *Front Panel* on page 2–9 for a description of the front-panel controls.

Figure 1–2 shows the locations of the connectors on the MTS300 rear panel.

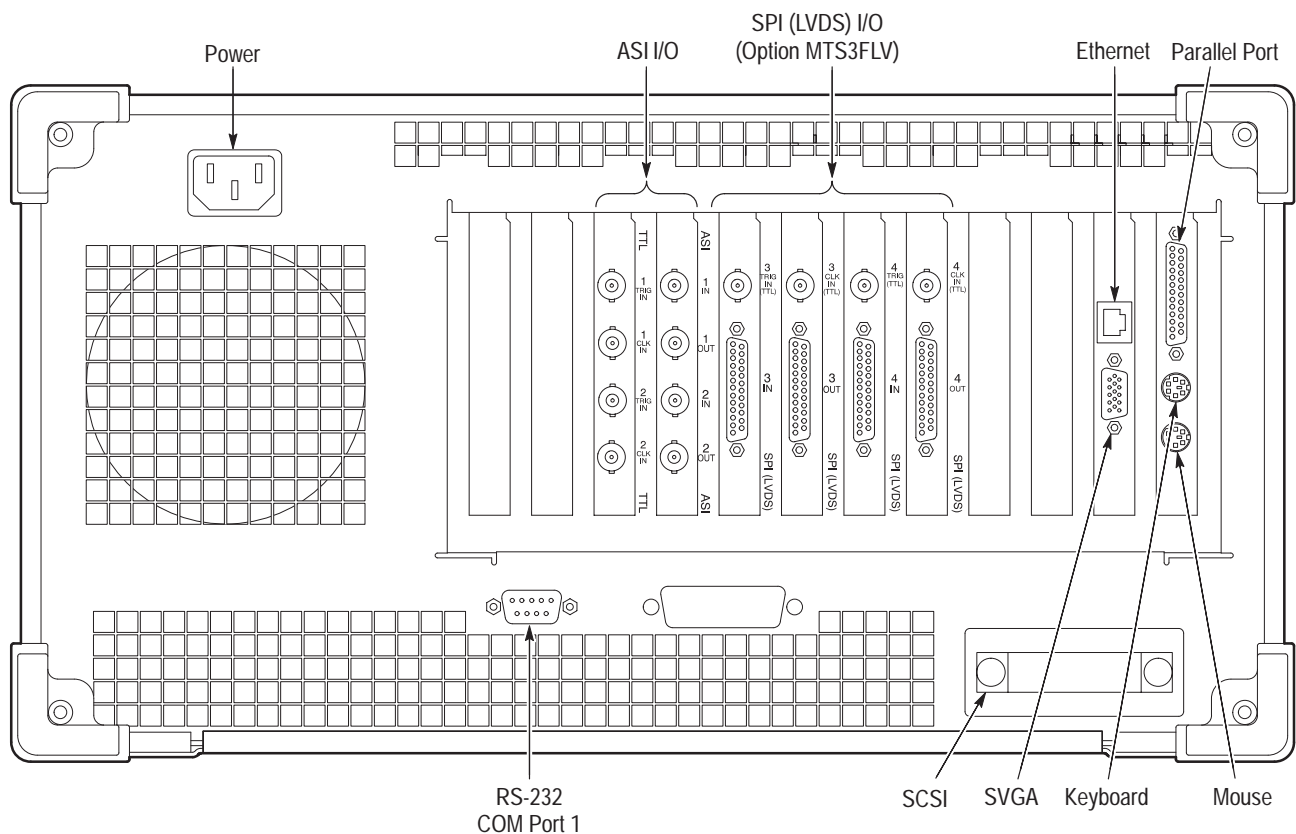


Figure 1–2: MTS300 system rear panel connectors

Table 1–1 describes the transport stream, network, and peripheral device connectors.

Table 1–1: Rear-panel connectors

Connector	Description
Transport stream input / output ASI Input/Output LVDS Input/Output DHEI Input/Output	75 Ω BNC connectors for the following signal formats: Standard configuration accepts both Burst and Packet mode ASI formats and M2S input LVDS and DHEI I/O interfaces can be ordered as an upgrade to the standard configuration Each output is an active loop-through of the corresponding input or Stream Player/Stream Recorder output
Monitor	15-pin female high density-D-sub connector for SVGA monitor
Keyboard	Mini-DIN connectors for PS2 compatible keyboard (on rear and side panels)
Mouse	Mini-DIN connectors for PS2 compatible mouse (on rear and side panels)
Printer	25-pin sub-D connector for parallel communication
LAN (Ethernet)	10 Base-T/100 Base-T, RJ45 connector for Ethernet communications
RS-232/422	9-pin D-sub type connector for serial communication
SCSI	Standard, PC compatible Ultra-Wide SCSI port, 68 Pins

Figure 1–3 shows the input and output (I/O) connectors. A description of each connector follows the illustration. Use the I/O ports suited for your operating environment and signal sources.

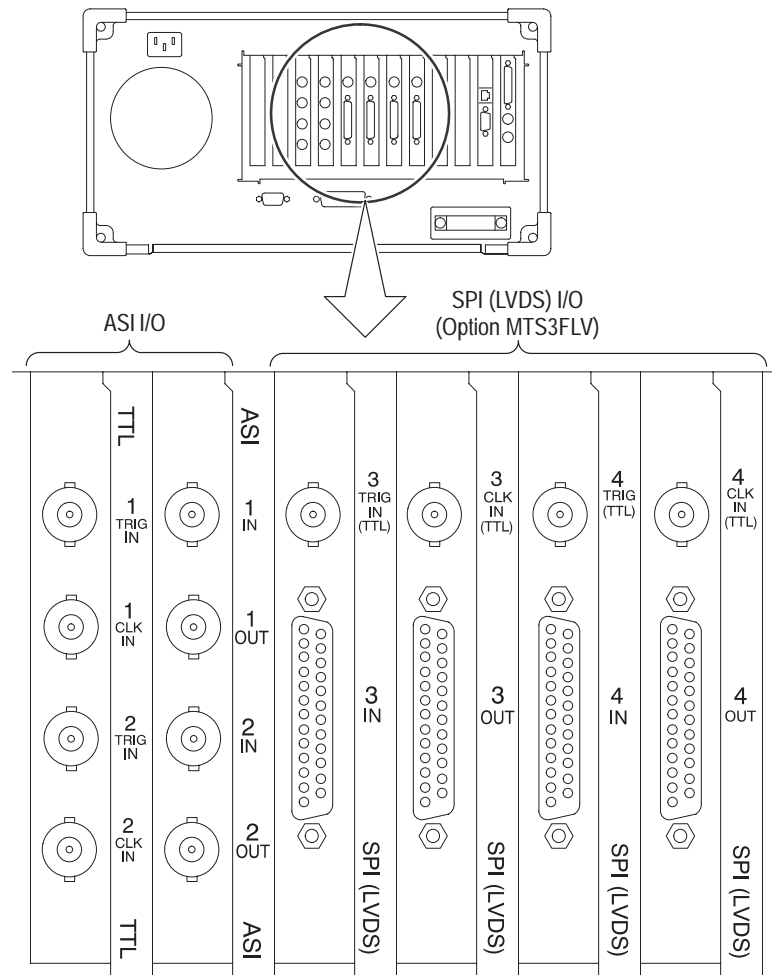


Figure 1–3: MTS 300 inputs and outputs

- Input** The MTS300 system accepts ASI or SMPTE310M (M2S) serial input. The MTS300 system automatically detects the source type. Optionally, you can purchase SPI (LVDS) or DHEI (Digicipher II) input interfaces.
- Output** The MTS300 system can output all or part of the input stream through the parallel and serial (ASI) connectors.
- With data input through the ASI connector, the serial output can be enabled or disabled. The Analysis Server or Stream Recorder can enable/disable the loop through. With a parallel input, the serial output is disabled when data storage through the parallel output occurs.
- The Serial output stream is always equivalent to the input stream and is not affected by filtering selections made on the Filtering configuration panel of the MTS300 system Configuration Client.
- Trigger Input** The trigger input accepts a TTL level (0 to +5 V) signal you can use to control capture of the MTS300 system input stream to the data storage system. You can configure the system to start/stop data capture on either the rising edge (low to high transition) or the falling edge (high to low transition) of the trigger signal.
- Refer to *Event Configuration Panel* on page 3–189 for further information on capturing transport stream inputs.
- Refer to *Manually Capturing a Transport Stream* on page 3–94 for information on manually capturing transport stream input using the Expert Client.
- Clock Input** Each output port has a corresponding clock input which can be used to clock the transport stream output when you are using Stream Player. The clock rate is at the byte rate of the transport stream.

Starting the MTS300 System

Perform the following procedure to power on the MTS300 system:

1. Connect the power cord to the rear-panel power connector.
2. Press the **On/Stby** switch to power on the instrument. Figure 1–4 shows the switch location.

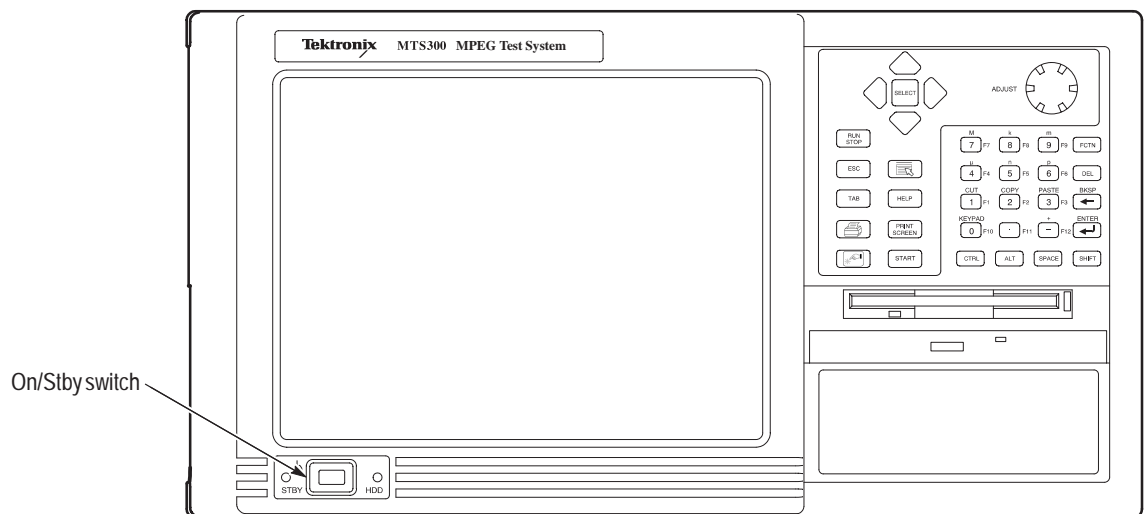


Figure 1–4: On/Stby switch

3. The Windows NT initialization process takes up to two minutes. Under normal circumstances, no action is required until the Begin Logon message appears.
4. When the Begin Logon message appears, simultaneously press the **CTRL + ALT + Delete** keys to open the Logon Information dialog box.
5. Perform the procedure in *Logging On* starting on page 1–12.

Logging On The MTS300 system provides three user name/password combinations you can use to logon to the instrument. Table 1–2 lists the default user name and passwords supplied with the MTS300 system.

Table 1–2: Default user names and passwords

User name	Password	Description
MTS300	No password	Intended for the standard user and for normal instrument operation. Users logging on as "MTS300" have full access to files and applications.
Guest	No password	Intended for users with limited system knowledge. Users logging on as "Guest" have limited access to files and applications.
Administrator	MPEG2	Intended for the master user responsible for software upgrades or reinstallations. Users logging on as "Administrator" have full administrative rights to all system files and applications. You must use this user name and password to perform any software upgrades or reinstallations.



CAUTION. To prevent potential network conflicts, it is strongly recommended that you do not use the Administrator user name and password for normal instrument operation. The administrator user logon includes all administrative privileges and may allow administrative access within the network.

To log on to the test system the first time, use these steps:

1. Enter **MTS300** in the User name box.
2. Leave the Password box blank, and press **ENTER** (these are the default values set at the factory). Use this user name for most of your work.

Changing the Passwords. After you logon to the MTS300 system using a user name and password combination, you can change the password for that user name. Refer to the Windows NT online help for instructions.

Refer to *Setting, Resetting, and Disabling Auto Logon* on page 1–13 if you want to enable automatic logon to Windows NT when you power-on the instrument.

Setting, Resetting, and Disabling Auto Logon

The Auto Logon option allows you to select a user name and password that the MTS300 system will use to automatically log on to Windows NT when you power-on the instrument. This section contains two procedures. The first procedure initializes the Auto Logon option and changes an existing Auto Logon user name and password. The second procedure disables the Auto Logon option (requiring the entry of a user name and password each time the instrument is powered on).

Setting and Resetting Auto Logon. Perform the following procedure to set or reset the automatic logon option:

1. Boot up the MTS300 system (without a recovery CD in the CD-ROM drive).
2. Select **Run** from the Windows NT Start menu, and then click **Browse** in the Run dialog box.
3. The Auto Logon utility is located in two directory locations:
 - **D:\Tools\Autologn.exe** of the *MTS300 MPEG Test System Operating System Recovery CD*
 - **C:\Mts300\Bin\AutoLogon.exe** on the MTS300 system
4. In the Browse dialog box, specify one of the directory paths shown above, and then click **Open**.
5. Click **OK** in the Run dialog box to run the selected Auto Logon utility. The Auto Logon dialog box will open.



CAUTION. *If the MTS300 system is already setup to Auto Logon, entering a new user name and password will overwrite the existing user name and password used by the MTS300 system to Auto Logon.*

To prevent potential network conflicts, it is strongly recommended that you do not use the Administrator user name and password for Auto Logon.

6. Use the Auto Logon dialog box to enter the user name and password that the MTS300 system will use to automatically logon to Windows NT when the instrument boots.
7. Click **OK** to apply the Auto Logon setting. The next time the MTS300 system boots, the new Auto Logon settings will be used.

Disabling Auto Logon. Perform the following procedure to disable Auto Logon (requiring the entry of a user name and password each time the instrument is powered on):

1. Boot up the MTS300 system (without a recovery CD in the CD-ROM drive).
2. Select **Run** from the Windows NT Start menu.
3. Enter **regedt32** in the Run dialog box, and then click **Open**. This opens the Registry Editor window.
4. In the Registry Editor window, select the **HKEY_LOCAL_MACHINE on Local Machine** panel.
5. In the HKEY_LOCAL_MACHINE on Local Machine panel, select **Winlogon** in the following directory path:

HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion
6. After you select Winlogon, the right pane of the HKEY_LOCAL_MACHINE on Local Machine panel displays the contents of the file. Highlight the line in the right pane that starts **DefaultUserName:**, and then select **Edit | Delete** from the menu.
7. Click **Yes** in the Warning message box.
8. Highlight the line in the right pane that starts **DefaultPassword:**, and then select **Edit | Delete** from the menu.
9. Click **Yes** in the Warning message box.
10. Select **Registry | Exit** from the menu to close the Registry Editor window.
11. The next time the MTS300 system boots, Auto Logon will be disabled and the user will be asked for user name and password to logon to Windows NT.

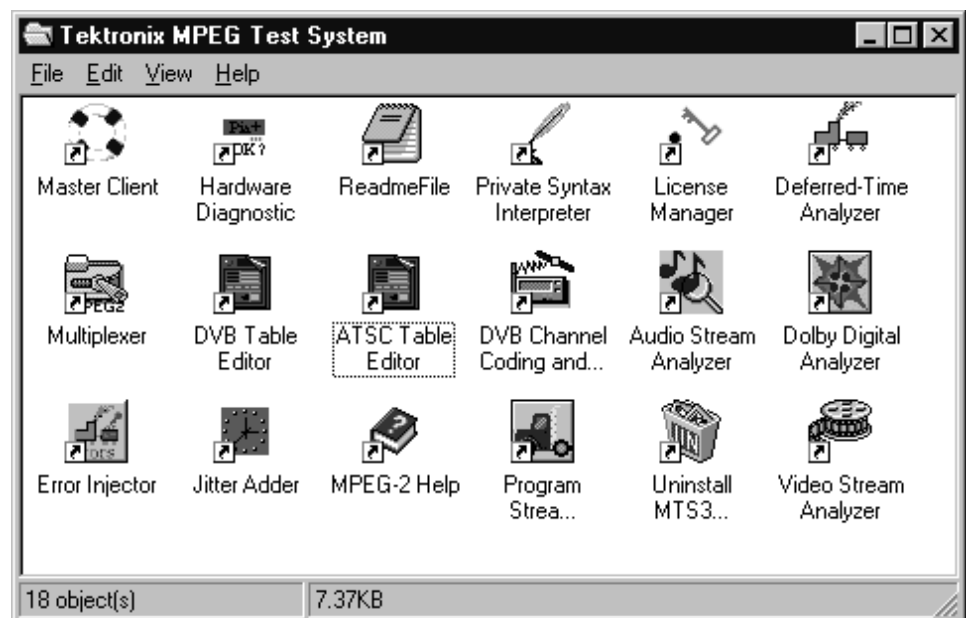


CAUTION. To prevent the loss of data, if you change the default user names and passwords, secure the new names in a safe place. If you forget your user-defined user names and passwords and cannot logon to the MTS300 system, you will have to reinstall the operating system software which will result in the loss of all data on the hard drives of the MTS300 system.

Starting MTS300 System Applications

After you have logged on, the Tektronix MPEG Test System program group window appears as shown below. Double-click the appropriate application icon to launch the desired application.

NOTE. The example below shows an MTS300 system program group with most of the available options installed. Depending on which options you ordered with your MTS300 system, your program group may not contain all of the application icons shown below.



NOTE. You must open the Master Client application to access the Expert Client, Configuration Client, Stream Recorder, and Stream Player applications.

See the *Tutorial* beginning on page 2–13 for procedures on connecting to a Server Manager and configuring a workspace, or see related procedures in *Master Client Reference* beginning on page 3–9.

Shutting Down the MTS300 System

This section contains information about how to exit MTS300 system applications and how to shutdown the MTS300 system.

Exiting MTS300 System Applications

To exit a program monitor application, select **Exit/Quit** from the File menu or click the close button in the upper-right corner of the application window.



Shutting Down the MTS300 System

There are three methods to shut down the MTS300 system: soft power down, standard Windows NT power down, and hard power down. For the standard and hard power-down methods, it is strongly recommended that you exit all MTS300 applications prior to initiating an instrument power down.

Soft Power Down. The MTS300 system is shipped from the factory with a soft power-down capability enabled. The soft power-down capability allows you to directly exit Windows NT without closing the MTS300 applications first. The MTS300 system will automatically close all open applications and put the instrument into standby mode.

To soft power-down the MTS300 system, perform the following steps:

1. Press and release the **On/Stby** switch to initiate the soft power-down process. Some applications will prompt you to save unsaved data before exiting.
2. After the MTS300 system goes into standby mode, you can restart the instrument by pressing the On/Stby switch.
3. To completely remove power to the instrument, disconnect the power cord at the rear panel.

NOTE. *If the soft power-down feature does not work properly, you can restore the Soft Power-Off Driver by performing the procedure located in the MTS300 MPEG Test System Hardware and Software Installation Technical Reference manual (Tektronix part number 071-0667-XX) supplied with the MTS300 system.*

Standard Windows NT Power Down. To power down the MTS300 system during normal instrument operations, perform the following standard Windows NT power down procedure:

1. Exit all open MTS300 applications.



CAUTION. To prevent data loss, exit all open MTS300 applications before powering down the instrument. Some applications will prompt you to save unsaved data before exiting.

2. After the MTS300 applications are closed, shut down Windows NT by selecting **Shut Down** from the Windows NT Start menu as shown below.



CAUTION. To prevent data loss and possible system problems during subsequent Windows NT initializations, always exit Windows NT before you power down the MTS300 system. Wait until the message “It is now safe to turn off your computer” appears before you press the On/Stby switch.

3. Select **Shut down the computer?** in the resulting Shut Down Windows dialog box shown below, and then click **Yes**.



4. After the Shutdown Computer window appears with the message “It is now safe to turn off your computer,” press the **On/Stby** switch to put the MTS300 system into standby mode.
5. After the MTS300 system goes into standby mode, you can restart the instrument by pressing the On/Stby switch.
6. To completely remove power to the instrument, disconnect the power cord at the rear panel.

Hard Power Down. You can use the hard power-down capability to immediately power-down the MTS300 system in an emergency situation such as fire.



CAUTION. *To prevent data loss and the corruption or deletion of application and system files, do not perform this procedure. Use the following procedure only if all other attempts to shut down the MTS300 system have failed.*

Using this hard power down procedure will likely cause file problems. When you use this method to power down the MTS300 system, the next time the instrument is powered on, the operating system will use the Scan Disk utility to perform a check for missing or corrupt files. You may be prompted to reinstall the operating system or application software.

To hard power-down the MTS300 system, perform the following steps:

1. Press and hold the **On/Stby** button for about 3 or 4 seconds.
2. After the MTS300 system goes into standby mode, you can restart the instrument by pressing the On/Stby switch. Read the power-on messages for information about possible missing or corrupted files.
3. To completely remove power to the instrument, disconnect the power cord at the rear panel.



Operating Basics

Operating Basics

NOTE. *If you are not familiar with the Windows NT 4.0 operating system, review the Windows NT online help.*

This section provides a functional overview of the MTS300 MPEG Test System client modules and a tutorial that will show you how the modules work together. The rear-panel connectors are described more completely in the *MTS300 MPEG Test System Hardware and Software Installation Technical Reference*. A brief description of the I/O connectors is provided in *Getting Started* beginning on page 1–7.

Functional Overview

Functional Overview describes the following MTS 300 applications:

- *Master Client* page 2–2
Describes the parts of the Master client application window that allow you to monitor transport stream inputs at various levels of detail.
- *Expert Client* page 2–3
Describes the parts of the Expert client application window that allow you to analyze in detail the characteristics of a transport stream input and the errors occurring on that input.
- *Configuration Client* page 2–5
Describes the parts of the Configuration client application window that allow you to quickly and easily set probes on transport stream inputs.
- *Stream Player Client* page 2–6
Describes Stream Player client application window elements that allow you output a transport stream using the MTS 300 rear-panel outputs.
- *Stream Recorder Client* page 2–7
Describes the Stream Recorder client window elements that allow you to capture and write to the SCSI drives part of transport stream.
- *Front Panel* page 2–9
Describes the front-panel controls.

Master Client The Master client views and elements enable you to monitor the results of the analyses being performed by Analysis Servers on up to eight transport stream inputs. See Figure 2–1.

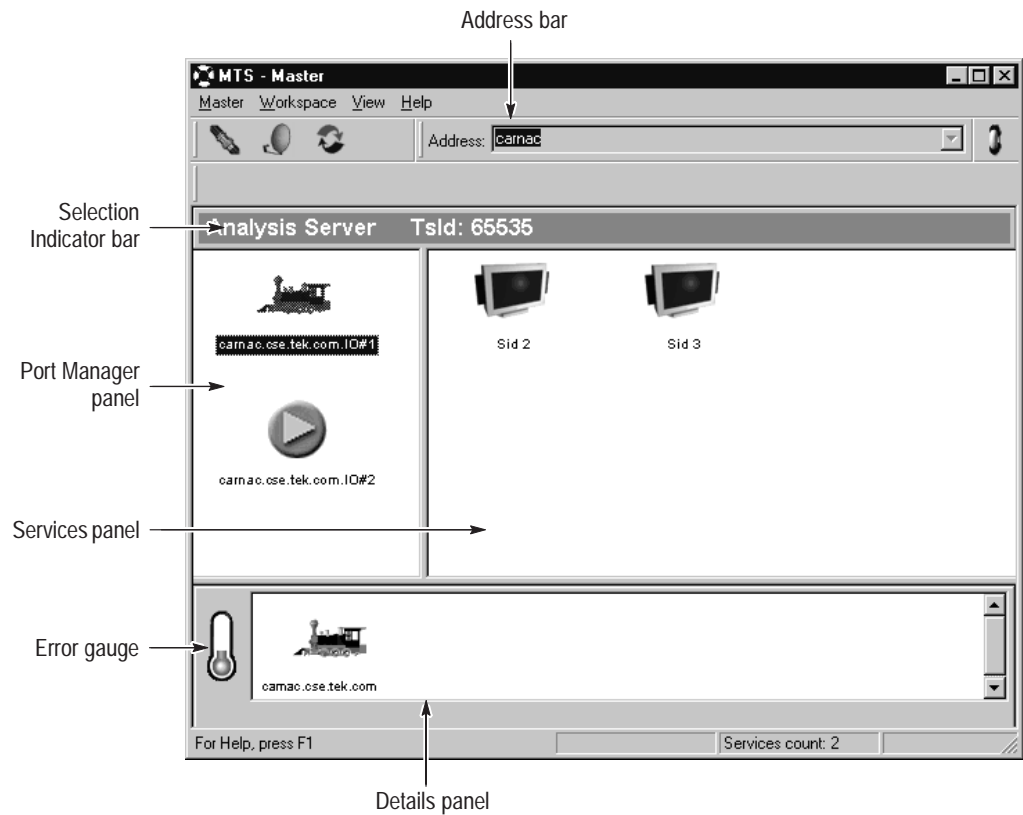


Figure 2–1: The Master client application window

Note the following characteristics of the Master client window in Figure 2–1:

- The Port Manager panel shows the inputs configured for the test system to which you are connected. In Figure 2–1, an Analysis Server is on I/O#1 is monitoring a transport stream being generated by the Stream Player on I/O#2.
- The Address bar shows that the Master client is connected to the Server Manager running on carnac.
- The Selection Indicator bar shows the currently selected items in the Port Manager and Services panels.
- The Services panel shows the services encoded on the input selected in the Multiplex panel.

- The Details panel shows the status, types, and severity of errors occurring on the currently selected service or multiplex.
- The Error gauge displays the severity of the most recent error for the service (or multiplex) displayed in the Details panel.

See Master Client Reference for more detailed instruction on using the Master client. See the tutorial later in this section for an introduction to using the Master client.

Expert Client The Expert client views and elements show the detailed results of analyses being performed on one transport stream input. See Figure 2–2.

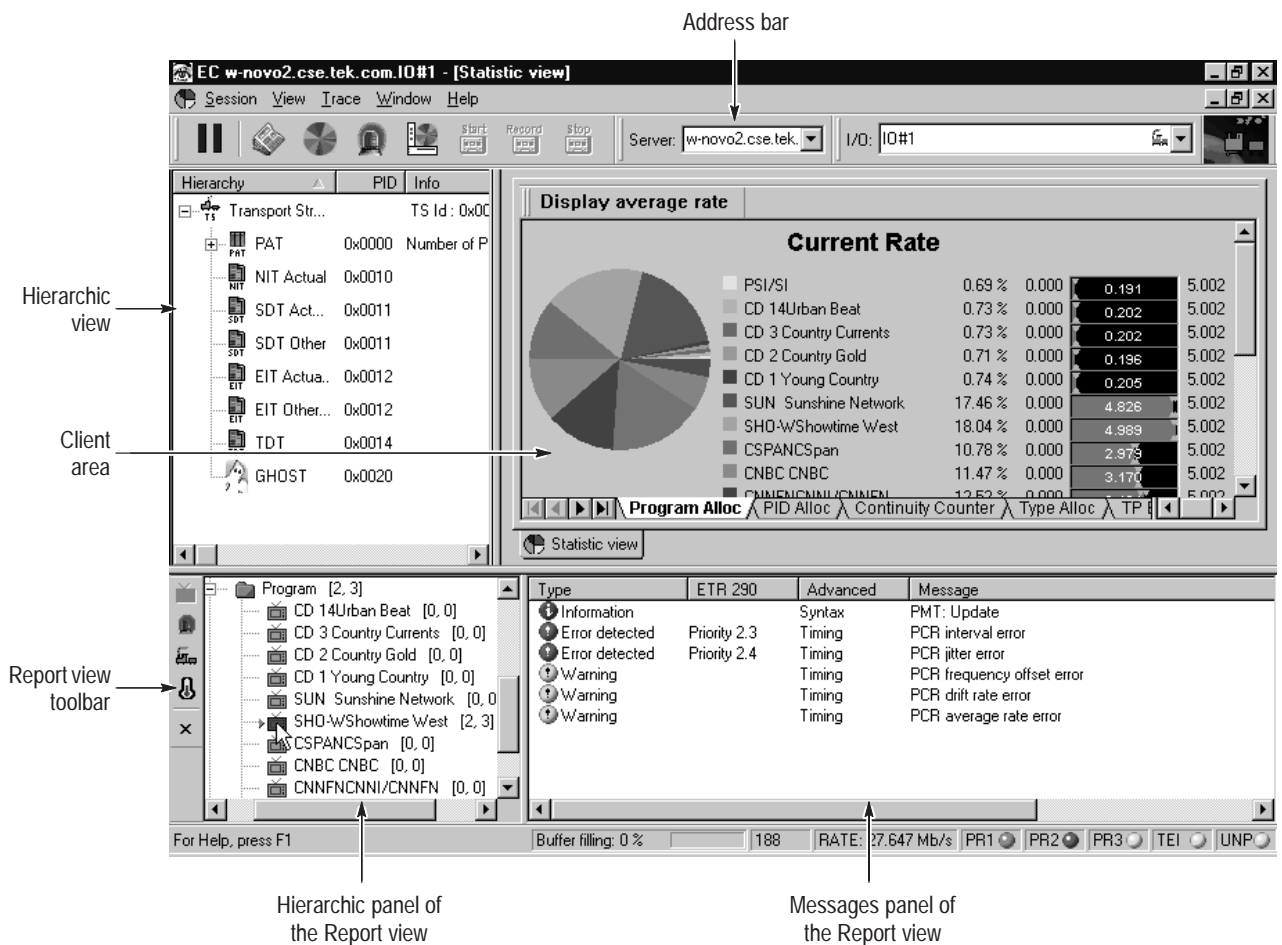


Figure 2–2: The Expert client application window

Note the following characteristics of the Expert client window in Figure 2–2:

- The Hierarchic view shows the structure of the transport stream you are monitoring. The hierarchy shown is based on the transport stream elements. For instance, since the Program Map Table (PMT), and the program elements the PMT references, are referenced by the Program Allocation Table (PAT), the PMT icons are shown subordinate to the PAT icon.
- The Address bar shows that the Expert client is connected to the Analysis Server analyzing the transport stream being input through I/O#1 on novo2.
- The Client area displays the Program Allocation panel, which is one of the panels in the Statistics view. The Statistics view panels display statistical information about the input stream to which the Expert client is connected. Other views can also be displayed in the Client area. These views are accessed using shortcut menus displayed when you right-click an icon in the Hierarchic view.
- The Messages panel of the Report view shows the errors occurring on the input selected in the Hierarchic panel of the Report view. You can display more detail about a specific error by double-clicking the line on which the error is reported.
- The Hierarchic panel of the Report view allows you to select different ways, or modes, of displaying errors or statistics about the transport stream being analyzed. The mode of the Report view is determined using the toolbar to the left. The current mode is Program and FUN TV is selected.
- The Report view toolbar allows you to change the mode of the Report view. Using this toolbar you can display errors grouped in one of four logical modes: by program, ETR290 priority, error type, or error severity.

Configuration Client The Configuration client views and elements allow you to quickly and easily set, modify, and remove probes for analyzing and monitoring transport stream inputs. See Figure 2–3.

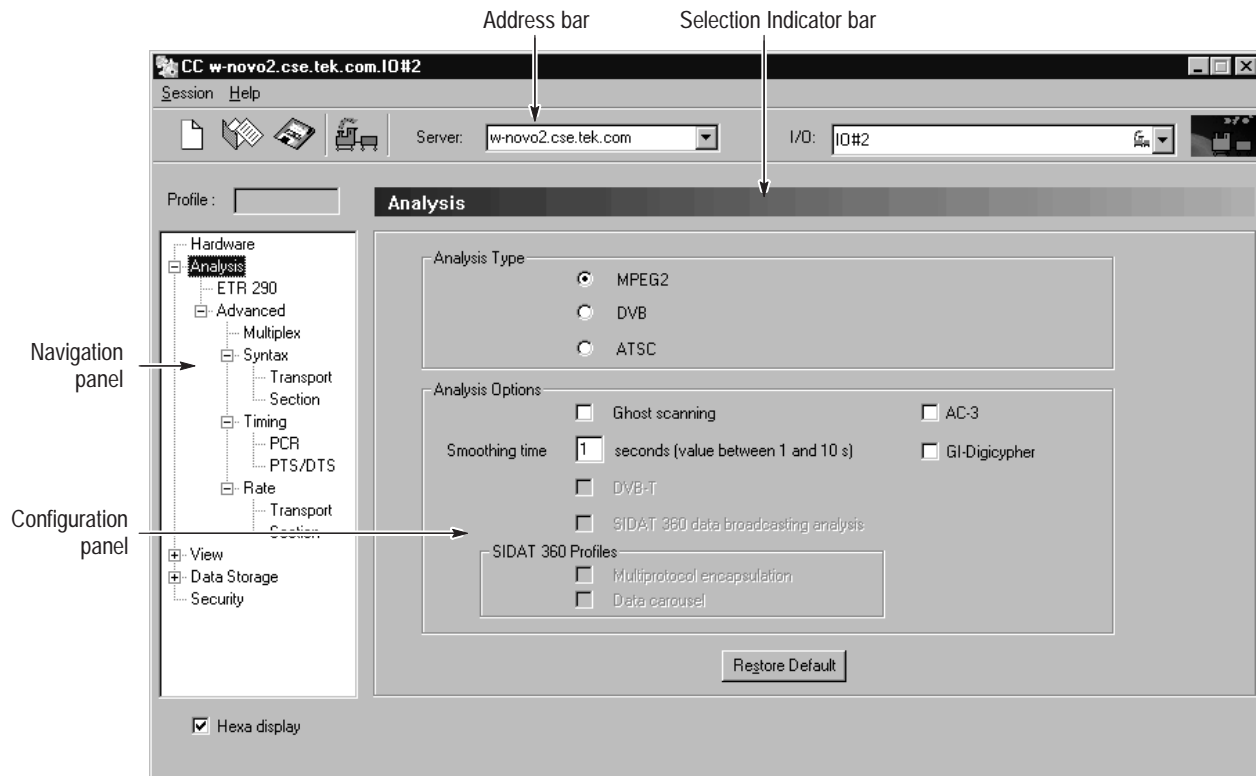


Figure 2–3: The Configuration client application window

Note the following characteristics of the Configuration client window in Figure 2–3:

- The Navigation panel allows you to quickly choose the category of error for which you want the Analysis Server to probe.
- The Address bar shows that the Configuration client is connected to the Analysis Server that is analyzing the transport stream being input through I/O#2 on novo2.
- The Selection Indicator bar shows the item currently selected in the Navigation panel.
- The Configuration panel allows you to specify probes or configure analyses for the Analysis Server indicated in the address bar. This panel changes depending on the item selected in the Navigation panel.

Stream Player Client

The Stream Player application allows you to play back transport streams saved on the hard disk of the MTS300 system using a VTR-like interface. See Figure 2–4. You can specify which portion of the transport stream to play back, the rate of the transport stream (you can also apply an external clock to set the rate), the format (ASI or M2S) of the transport stream, and the playback mode (single play or loop play).



Figure 2–4: The Stream Player client application window

Note the following characteristics of the Stream Player client window in Figure 2–4:

- The Server address boxes contain the name or IP address of the server and the I/O port number to which the Stream Player is connected. You can use the text boxes to connect to a different MTS300 system or to a different I/O port number.
- The Filename indicates the name and location of the transport stream file currently being output.
- The Start Time and End Time are editable fields that you can use to limit the part of the transport stream file that you will output. The default is to output the complete file.
- The Duration indicates how long the specified section will play.

- The Rate, Packet Size, and the Format and Mode are extracted from the transport stream file. If you change the Start or End time, you can edit the Rate field.

When you select the External Clock option, the Rate box displays EXT CLK. To reset the rate, browse to the transport stream file and reselect it.

- The Slide Bar and Selector Buttons allow you to control which portion of the file will be played back.
- Playback Time. When a stream output is in progress, the Stream Player displays the current position in time (hours, minutes, seconds, and hundredths of a second) of the output in progress.
- Control Buttons. The three Control buttons (from left to right: Stop, Play, and Loop Play) allow you to control the stream output. Click on a Control button to perform the desired task.

Stream Recorder Client

The Stream Recorder application provides a VTR-like display that allows you to control the recording of a transport stream input. The display includes the following items:

The Stream Recorder application allows you to record an MPEG transport stream onto the hard drive of the MTS300 system using a VTR-like interface. You can specify the duration, file name, and location of the recorded file. See Figure



Figure 2-5: Stream Recorder client application window

Note the following characteristics of the Stream Recorder client window:

- **Server Address.** If you launch the Stream Recorder from the Master Client, the Server address boxes contain the name or IP address of the server and the I/O port number to which the Stream Recorder is connected. You can use the text boxes to connect to a different MTS300 system or to a different I/O port number.

NOTE. Store transport stream files on the E: drive of the MTS300 system. The response time of the MTS300 system C: drive is limited and may affect the performance of the Stream Recorder and Stream Player when you try to capture or playback streams with bitrates greater than 30 Mbps.

- **Filename.** The Filename box list the directory path and filename of the file you will capture with the Stream Recorder.
- **Duration and Free.** Use the Duration box to set the size of the transport stream file you are capturing. You can set the duration time (hours, minutes, seconds, and hundredths of a second) to any value not exceeding the value listed in the Free box.

The Free box displays the amount of memory available (hours, minutes, seconds, and hundredths of a second) to record a transport stream file on the hard drive you selected in the Filename box.

- **Rate and Packet Size.** The bitstream rate and the packet size of the input transport stream are displayed in these boxes.
- **Output Activation.** When you select the Output Activation option, the transport stream on the I/O port input to which the Stream Recorder is connected is looped through to the output connector of that I/O port.
- **Progress Bar.** The Progress bar displays the progress of an active recording process. The display elements in the Progress bar light up from left to right to indicate how far the capture process of the Stream Recorder has proceeded.
- **Recording Time.** When a stream capture is in progress, the Stream Recorder displays the beginning time (0:00:00.00), the ending time (as set in the Duration box), and the current duration of the recording in progress.
- **Control Buttons.** The three Control buttons (from left to right: Stop, Record, and Loop Record) allow you to control the stream capture. Click a Control button to perform the desired task.
- **Minimize/Maximize Button.** Click the Minimize/Maximize button to remove or add the setup portion of the Stream Recorder display. When you minimize the Stream Recorder setup display, the Stream Recorder appears as shown below.

Front Panel The MTS300 MPEG Test System front-panel controls allow you to control the MTS 300 applications using either the keypad or the touch screen when a keyboard and mouse are not available. See Figure 2–6.

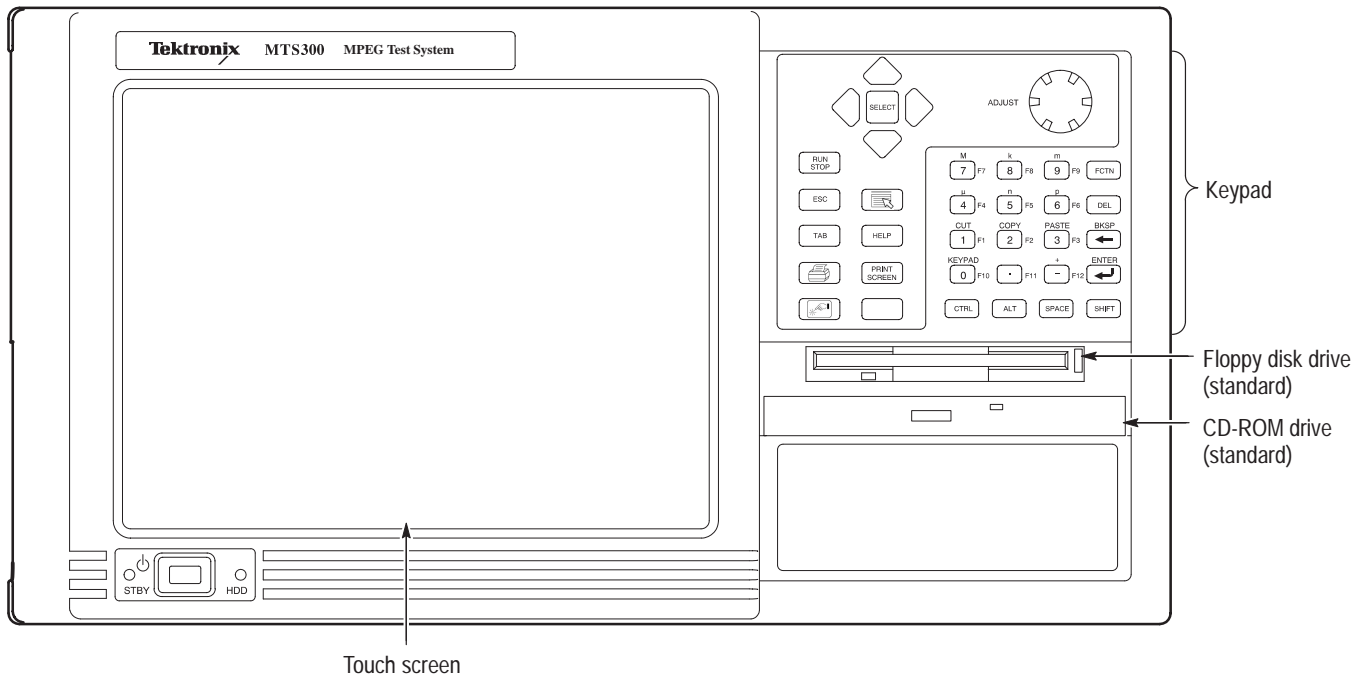


Figure 2–6: Front-panel elements

This section shows how to use the touch screen features. Table 2–1 describes the keypad controls, Table 2–2 lists touch screen techniques for working with the Master client. Use similar techniques for the other client applications.



CAUTION. Do not use sharp or abrasive objects to perform operations using the touch screen. Using sharp or abrasive objects can damage the LCD display.

Included as a standard accessory with all test systems is a stylus that gives you more precise control over the items you touch on the touch screen.

Table 2–1: Front panel-key controls

Control name	Mechanism	Description
Up Arrow	Button	Use to navigate and change focus from one window function to another.
Left Arrow	Button	
Right Arrow	Button	
Down Arrow	Button	
Select	Button	Same as the space key.
Adjust Knob	Knob (Rotary encoder)	Not enabled.
Run/Stop	Button	Not enabled.
Esc	Button	Standard Escape key.
Tab	Button	Standard Tab key.
Print	Button	Prints the current display.
Touch	Button (w/hand icon)	Toggle function not enabled. The touch screen is always on.
Menu (Application key)	Button (w/pointer icon)	Displays shortcut menus for selected items.
Help	Button	Opens the Help contents. Standard F1 key
Print Screen	Button (w/printer icon)	Copies the screen to the clipboard. Alt plus Print Screen copies the active window.
START Key	Button (w/Windows logo)	Opens the Windows Start menu.
Numbers 0 to 9, . (period), and – (minus)	Buttons	Standard number keys, most have second (Shift) and third (Function) functions.
Fctn	Button with LED	Modifier for numeral keys to create keys F1 through F12. LED indicates when active.
Del	Button	Deletes selected text or object.
←	Button	Backspace key.
↵	Button	Enter key.
Ctrl	Button with LED	Control key. LED indicates when keypad is in control mode.
Alt	Button with LED	Alternate key. LED indicates when keypad is in alternate mode.
Space	Button	Use it like a keyboard space bar or use it as mouse button 1
Shift	Button with LED	Shift key. LED indicates when keypad is in shift mode. Locked mode key feature.

NOTE. Some of the functions of the Expert and Configuration clients require the use of an external keyboard and mouse.

Table 2-2: Touch screen techniques

Task	Action
Highlighting an item	Touch the item.
Selecting an item	
Making a menu selection	Touch the menu name, and then touch the menu item.
Moving a window	Touch and drag the title bar of the window without lifting the stylus from the touch screen.
Displaying shortcut menus	Touch an icon that has a shortcut menu associated with it (for instance, a multiplex or service icon) and press the Menu button from the keypad.
Checking or clearing option boxes	Touch the option name or check box.
Entering values in text boxes	Touch the text box until a cursor appears in the text box, and then enter values using the keypad. (Only numeric values and the letters <i>M</i> , <i>k</i> , <i>m</i> , <i>u</i> , <i>n</i> , and <i>p</i> can be entered from the keypad.)
Scrolling through a list	Touch the scrolling list until a cursor appears in the list, and then press the Down Arrow button from the keypad.
Scrolling a window	Touch and drag a scroll bar without lifting the stylus from the touch screen.
Resizing windows	Touch and drag the lower right corner of the window to the desired size without lifting the stylus from the touch screen.
Following links in the online help	Touch the link text.
Expanding or collapsing a hierarchy	Double-tap the touch screen item at the point you want to expand or collapse a hierarchical display, or touch the Expand/Collapse control next to the item name.
Copying text or other values	Touch and drag over the area you want to copy, and then press the Shift button followed by the Copy button on the keypad.
Pasting text or other values	Touch the area into which you want to paste the contents of the clipboard, and then press the Shift button followed by the Paste button on the keypad.

Tutorial

This tutorial will introduce you to the capabilities and features of the three Tektronix MTS300 MPEG Test System client modules. Refer to the *Reference* section for detailed operating information for each client module.

Perform this tutorial with your own input stream, and then spend some time experimenting with the various monitoring, configuration, and analysis options. The sections of the tutorial begin on the following pages:

- *Setting Up and Logging On to the Test System* page 2–14
- *Starting the Master Client* page 2–15
- *Connecting to the Local Server Manager* page 2–15
- *Configuring the Master Client Workspace* page 2–16
- *Assigning Servers and Generating a Transport Stream* page 2–17
- *Monitoring Transport Stream Inputs* page 2–19
- *Configuring the Analysis Server* page 2–26
- *Analyzing a Stream Using the Expert Client* page 2–29
- *Capturing Input* page 2–32

NOTE. *If you are not familiar with the Windows NT 4.0 operating system, review the Windows NT online help.*

Setting Up and Logging On to the Test System

Before you start the tutorial, cable the rear of the instrument as shown in Figure 2–7, connecting the output of I/O port two to the input of I/O port one with 75 ohm BNC cable.

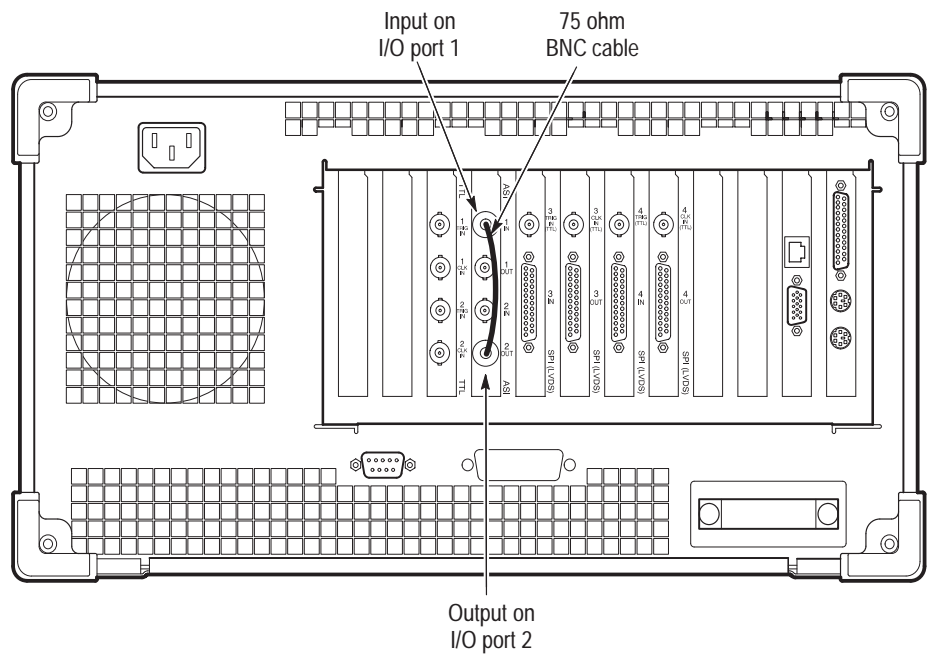


Figure 2–7: Initial rear panel connections for the tutorial

1. Power up and log on to the test system as described in *Logging On to the MTS300 System* on page 1–11.

Starting the Master Client

Use the following procedure to start the Master Client:

2. Click **Start**, point to **Programs** and **Tektronix MPEG Test System**.
3. Click **Master Client**. An empty Master Client window is displayed as shown in Figure 2–8.

You can also double-click the Master Client icon in the Program Group window on your desktop.

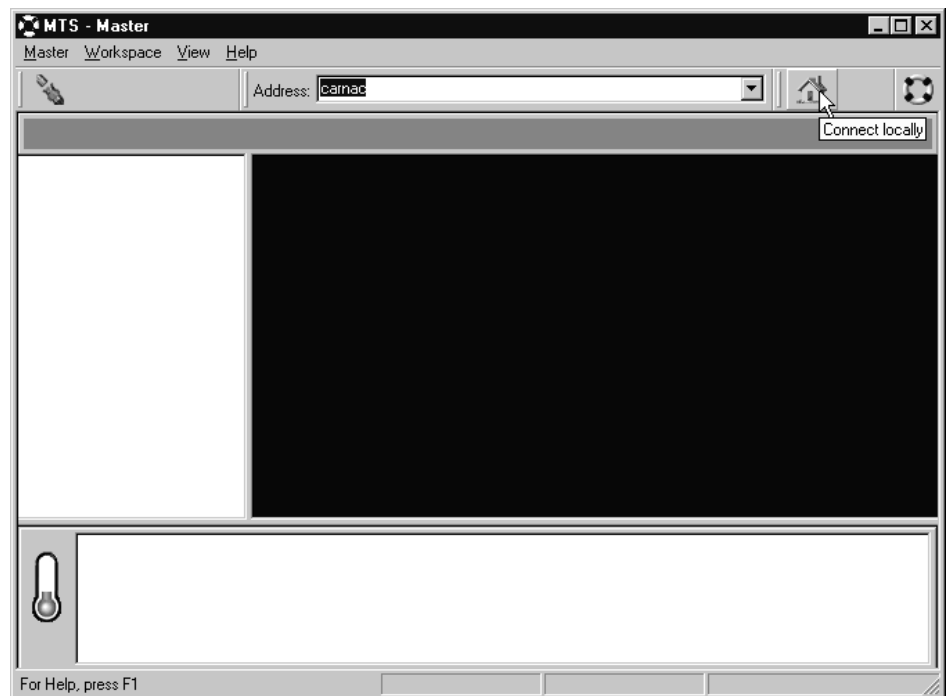


Figure 2–8: Empty Master Client application window

Connecting to the Local Server Manager

Before you can start monitoring inputs, you must connect the Master Client to a Server Manager. The Server Manager (represented by the life preserver icon in the system tray) collects the information generated by the Analysis Servers about the transport stream errors and statistics. There are several ways to connect to a local Server Manager, but for this tutorial, use the simplest technique:

4. Click the **Home** button on the Master Client toolbar as shown in Figure 2–8. The toolbar changes and the Server Manager to which you are connected is displayed in the Address bar.

Configuring the Master Client Workspace

Using the Workspace dialog box you can specify the types of errors you want to monitor in the Master Client.

5. Highlight Graphics in the Navigation panel and the Graphics panel is displayed. Using this panel you can change the way your Master Client reports errors and displays icons.
6. Change the Analysis display options to show only Critical and Major errors as shown in Figure 2–9.

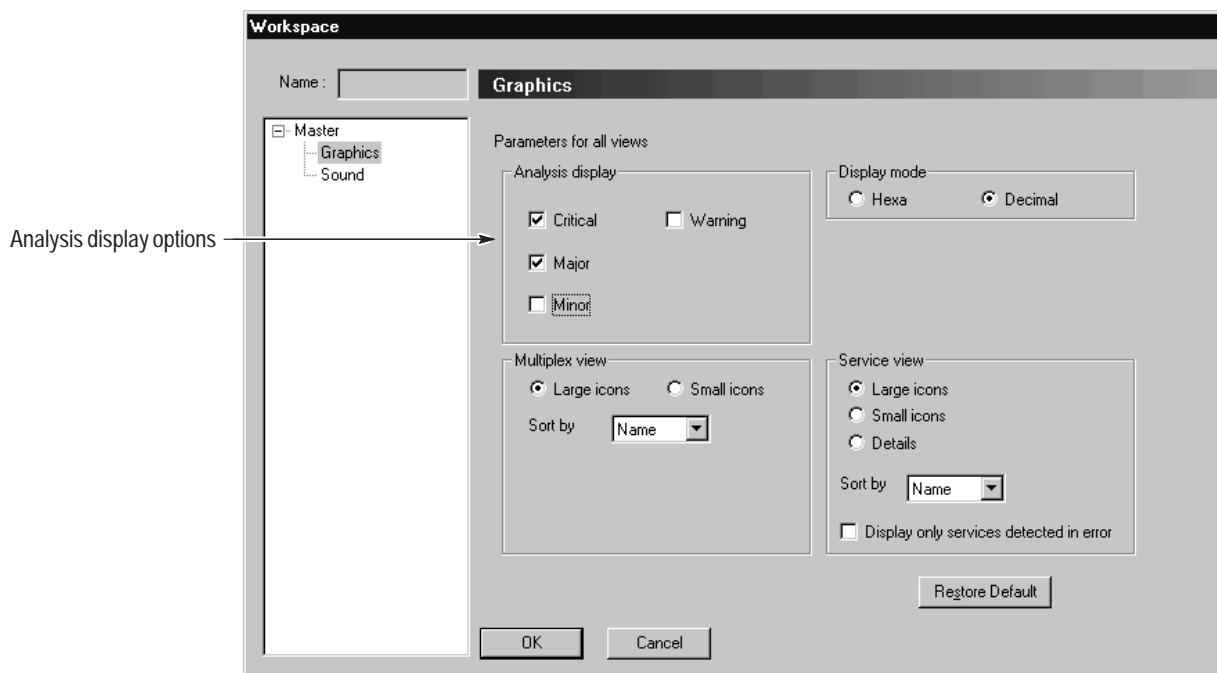


Figure 2–9: Changing the analysis display options

7. Click **OK** to apply your changes and return to the Master Client.

Experiment with the other options available in this dialog box. Return to the Master Client when you are ready to continue with the tutorial.

Assigning Servers and Generating a Transport Stream

After creating a workspace, your Master Client window should look similar to Figure 2–10. In this part of the tutorial, you will assign servers to specific I/O ports, and then you will generate a transport stream that you can use to monitor and analyze later in the tutorial.

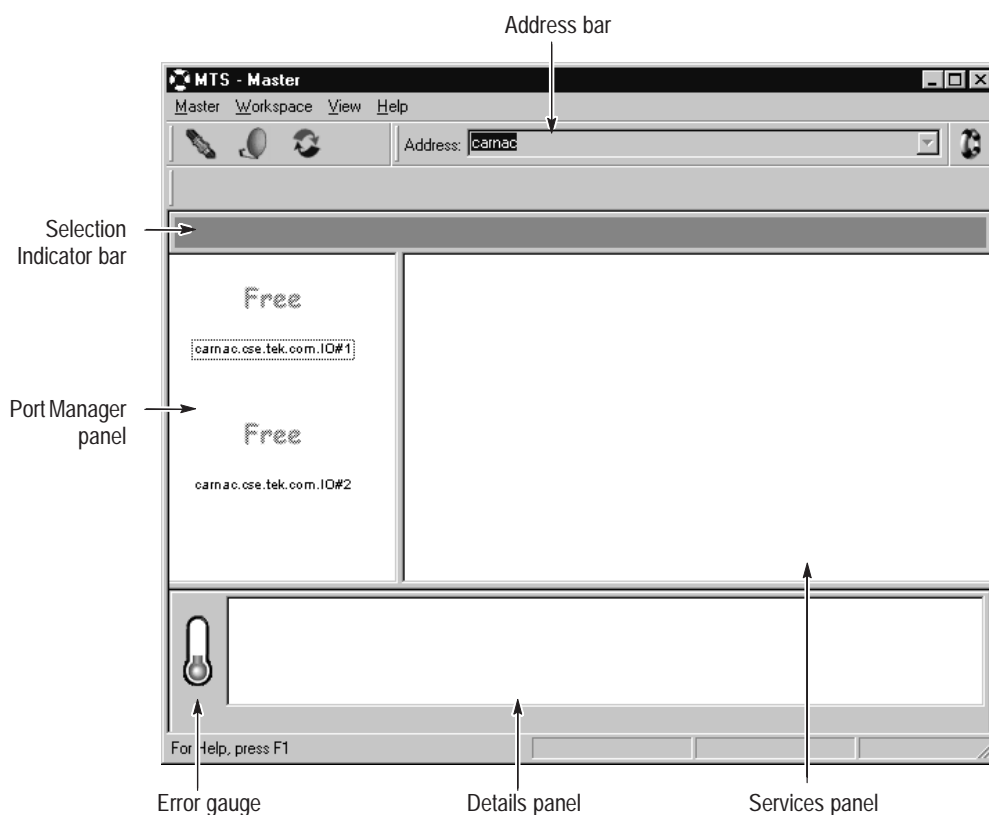


Figure 2–10: Master Client connected to a Server Manager

8. Right click the Free icons in the Port Manager panel and notice the menu selections. .

9. Assign the Analysis server to I/O#1 and the Stream Player server to I/O#2 as shown in Figure 2–11.

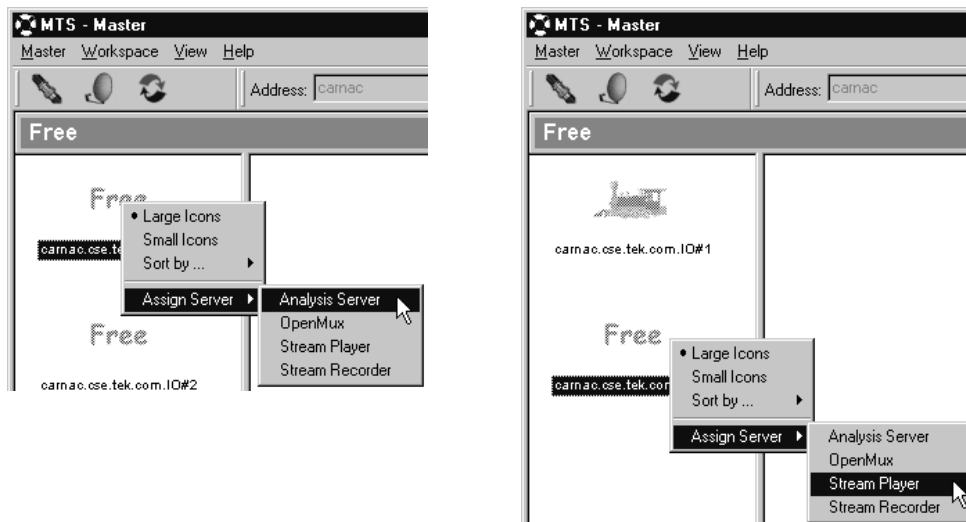


Figure 2–11: Assign servers

10. Click on the icons in the Port Manager panel and notice how the Details panel and Selection Indicator bar change as you click different icons. Click in the white area of the panel too.
11. Right-click the Stream Player icon and select **Launch Stream Player Client** from the submenu. The Stream Player client is displayed and will look similar to Figure 2–12 on page 2–19.

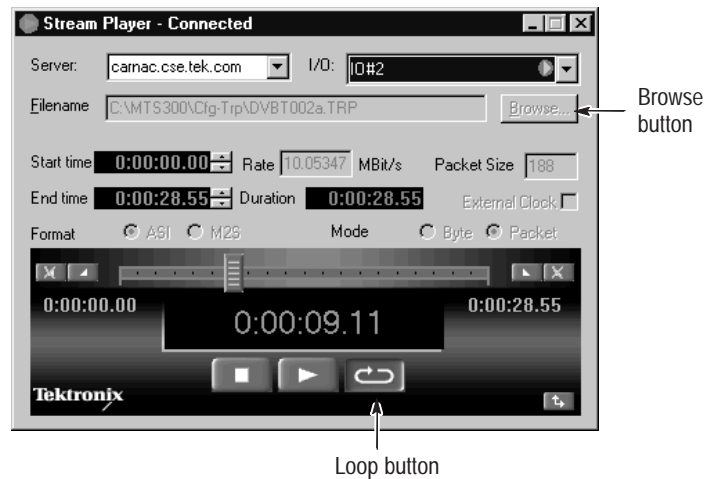


Figure 2–12: Stream Player client

In Figure 2–12, the file `DVB-T002a.trp` is some nine seconds into a 29-second loop. You can select any transport stream file on your local machine to output using the Stream Player.

12. Click the Browse button, and then navigate to and open a suitable MPEG-2, DVB, or ATSC transport stream file.
13. When you return to the Stream Player client, accept all of the default settings and click the Loop button to begin generating the transport stream.
14. Minimize the Stream Player client and return to the Master Client. Notice the change in the Stream Player client icon appearance.

Monitoring Transport Stream Inputs

In this part of the tutorial you will learn how to interpret the icons used by the Master Client, and you will learn how the different Master Client panels allow you to see different levels of error details.

15. Right-click the Analysis Server icon (the train icon) and select Start Analysis from the submenu. The Services panel (to the right of the Port Manager panel) should update showing the services that are part of the transport stream you are now monitoring. The display should now look similar to Figure 2–13 on page 2–20.
16. Experiment with the icons by right-clicking each and familiarizing yourself with the contents of the submenus.

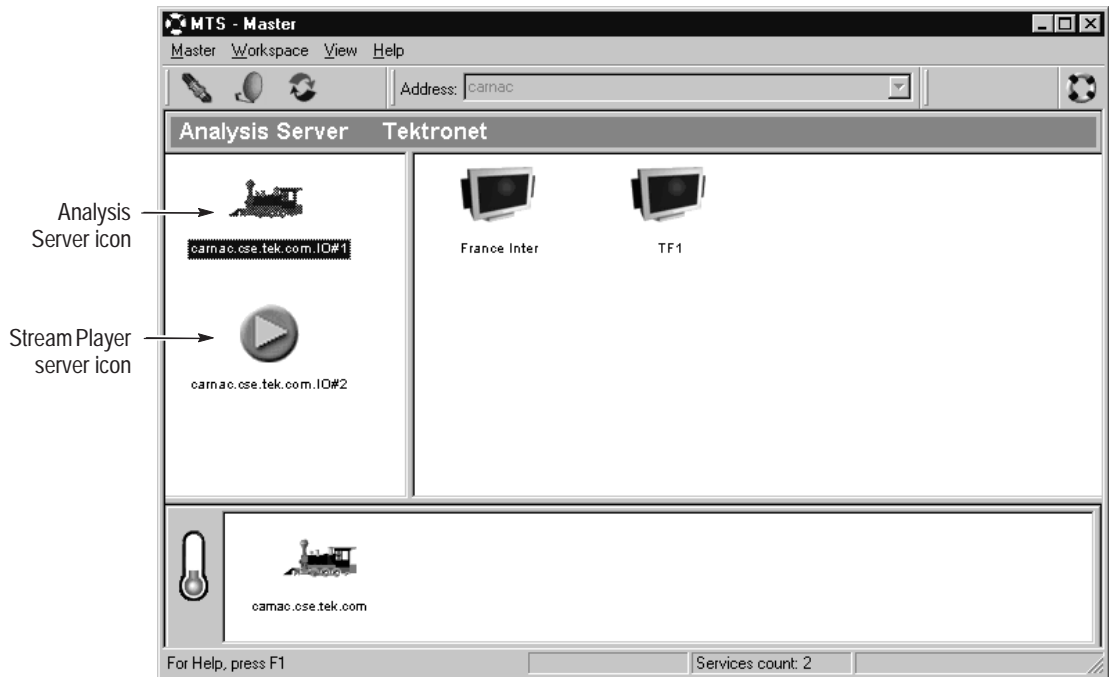


Figure 2–13: Monitoring a transport stream

If your input is displaying any critical or major errors, you will see error icons overlaying the icons in the Port Manager and Services panels. Table 2–3 describes the different icon states.

Table 2–3: Error icon states






Icon state	Description
	Red. This icon indicates that a critical, major, or minor error is currently being experienced on the indicated bouquet, multiplex, or service.
	Orange. This icon indicates that a critical, major, or minor error was recorded on the indicated bouquet, multiplex, or service, but that no error condition currently exists.
	Yellow. This icon indicates that a warning is currently being experienced on the indicated bouquet, multiplex, or service.

Using the Port Manager Panel

17. Select one of the icons in the Port Manager panel.

Notice the changes to the Details panel and the Selection Indicator bar. Notice also that when you select an icon in the Port Manager panel that the Error gauge changes. The Error gauge shows you the severity of errors being recorded on the selected item. Table 2–4 describes the Error gauge states.

Table 2–4: Error gauge icon states

Icon state	Description
	Red. This icon indicates at least one critical error is detected for the selected multiplex or service.
	Red. This icon indicates at least one major error is detected for the selected multiplex or service. No critical errors are detected.
	Red. This icon indicates at least one minor error is detected for the multiplex or service. No critical or major errors are detected.
	Yellow. This icon indicates at least one warning condition is detected for the selected multiplex or service. No critical, major, or minor errors are detected.
	Green. This icon indicates that no current errors or warning conditions are being recorded for the selected service or input.

In an earlier step, you set the workspace to show only critical or major errors. So, your error gauge should like the first, second, or last icons in Table 2–4.

Using the Services Panel

18. Click one of the icons in the Services panel experiencing errors. As you roll your cursor over an icon in the Services panel, a tool tip is displayed showing you the transport stream ID and service ID pair for the service.

Notice the changes to the Details panel and the Selection Indicator bar. The Details panel shows a different set of icons than those that were displayed when an Multiplex icon was selected.

19. Right-click an icon in the service panel, and then select Associate Logo from the shortcut menu as shown in Figure 2–14.



Figure 2–14: Associating a logo with a service

20. Navigate to the Logos folder (C:\MTS300\Bin\Logos) and choose a *.jpg or *.bmp file that you want to associate with the selected service.
21. Click **OK**. You are returned to the Master Client, and the logo is displayed in place of the default service icon.

NOTE. Some service providers do not allow their logos to be used without permission. Check with the service provider before you use their logo.

You can also go to the following URL to download logos for satellite services: <http://www.satlogo.com/>. (This link was valid as of June, 2000.)

After you have associated all of your service icons with a logo, the Master Client should look similar to Figure 2–15.

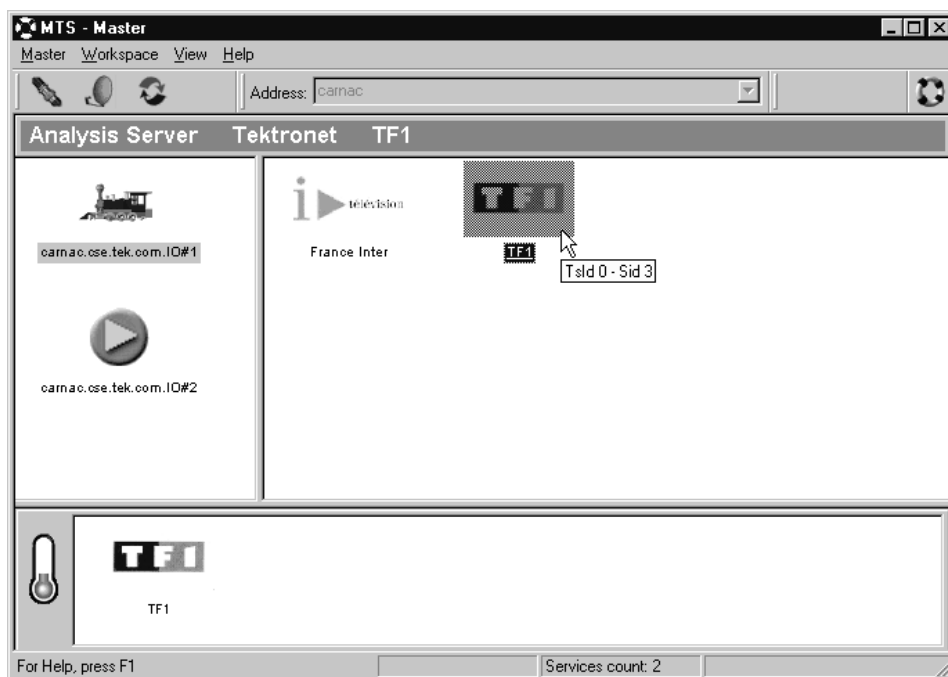


Figure 2–15: Master Client showing errors on a service

22. Right-click again in the service panel and choose **Details** from the shortcut menu. The Services panel changes to show a tabular display that lists the more information about each service. See Figure 2–16.
23. Click and drag the left border of the Services panel to display all of the columns in the Details view.

The screenshot shows the 'Tektronet TF1' window with the Services panel expanded to show a tabular display. The table has the following columns: Service Name, Tslid, ServiceId, Hostname, Ip Address, Input name, and Error level. The data rows are as follows:

Service Name	Tslid	ServiceId	Hostname	Ip Address	Input name	Error level
France Inter	0	2	carnac.cse.tek.com	128.181.217.99	IQ#1	no error
TF1	0	3	carnac.cse.tek.com	128.181.217.99	IQ#1	no error

A mouse cursor is hovering over the 'TF1' row, and a tooltip displays 'Tslid 0 - Sid 3'.

Figure 2–16: Services panel details view



You can sort the inputs shown in this view by clicking on the column headers.

24. Experiment with some of the other Services panel shortcut menu items, and then return the Services panel to display Large Icons when you are finished and ready to proceed with the tutorial.

Using the Details Panel

25. Select the Analysis Server icon and notice again the change to the Details panel. The icons in this panel indicate the types, severity, and status of errors occurring on the multiplex at the transport stream level. Table 2–5 describes the icons displayed in the Details panel when a Multiplex icon is selected.

Table 2–5: Multiplex level Details panel icons

Icon	Description
	Indicates that a current error for a PAT, CAT, or EMM is detected for the selected multiplex. This icon can also indicate general errors, such as sync loss.
	Indicates that an error in one or more SI or PSIP parameters for the selected multiplex was detected, but does not currently exist.







The colors used for these icons follow the same paradigm as do the rest of the error icons for the Master Client:

- Red indicates that a critical, major, or minor error is currently being experienced on the item.
- Orange indicates that a critical, major, or minor has occurred on the item, but that an error does not currently exist.
- Yellow indicates that a warning condition is currently being experienced on the item.

26. Now, select a Services panel icon and note again the changes to the Details panel.

When a Services icon is selected the Details panel icons show the type, severity, and status of the errors occurring on the multiplex at the service, or program level. Table 2–6 describes the icons displayed in the Details panel when a Services panel icon is selected.

Table 2–6: Service (or Program) level Details panel icons

Icon	Description
	Indicates a PCR error is detected for the selected service.
	Indicates that a rate or syntax error in the PMT, SDT, or EIT for the service is detected.
	Indicates that an error concerning a video component of the service is detected.
	Indicates that an error concerning an audio component of the service is detected.
	Indicates that a current error concerning the data components for the selected service is detected.
	Indicates that an error concerning the ECM components of the service is detected.

Configuring the Analysis Servers

In this part of the tutorial, you will learn how to start the Configuration Client from the Master Client and how to change the configuration of the Analysis Server on the input selected in the Master Client.

27. Right-click an Analysis Server icon in the Port Manager panel and select Configuration Client from the shortcut menu. The Configuration Client is displayed and is connected to the Analysis Server you selected in the Master Client. See Figure 2–17.

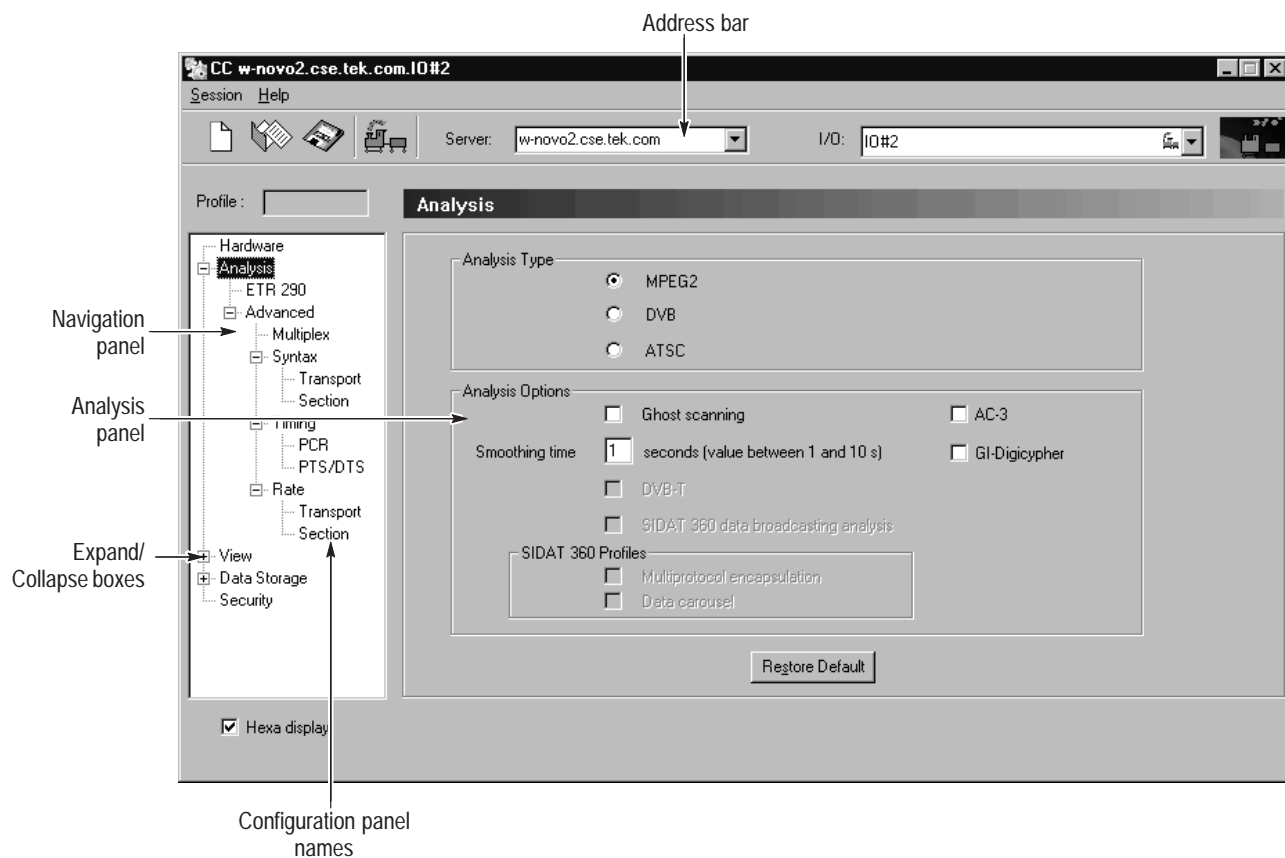


Figure 2–17: Connected to the Configuration Client

See *Configuration Client* on page 2–5 for an overview of the Configuration Client display elements. See *Configuration Client Reference* beginning on page 3–151 for detailed information about the Configuration Client and setting probes.

Selecting the Analysis Type

28. Expand the hierarchy in the Navigation panel so that it looks similar to Figure 2–17 by clicking the expand/collapse boxes next to the Configuration panel names.
29. Highlight **Analysis**, and then select MPEG-2, DVB, or ATSC in the Analysis panel as appropriate for the sample stream you are analyzing.

Setting ETR290 Probes

30. Highlight ETR 290 in the Navigation panel to display the ETR 290 panel. This panel includes probes for the ETR 290 recommendations.
31. Click **Add All** and notice the change to the Probe List selection box.
32. In the Probe List selection box, remove all ETR290 priority 3 probes by double-clicking the probe name.
33. Click **Apply** to apply the changes you have made to the Analysis Server, which in the case of Figure 2–18 is analyzing I/O#1 on carnac.

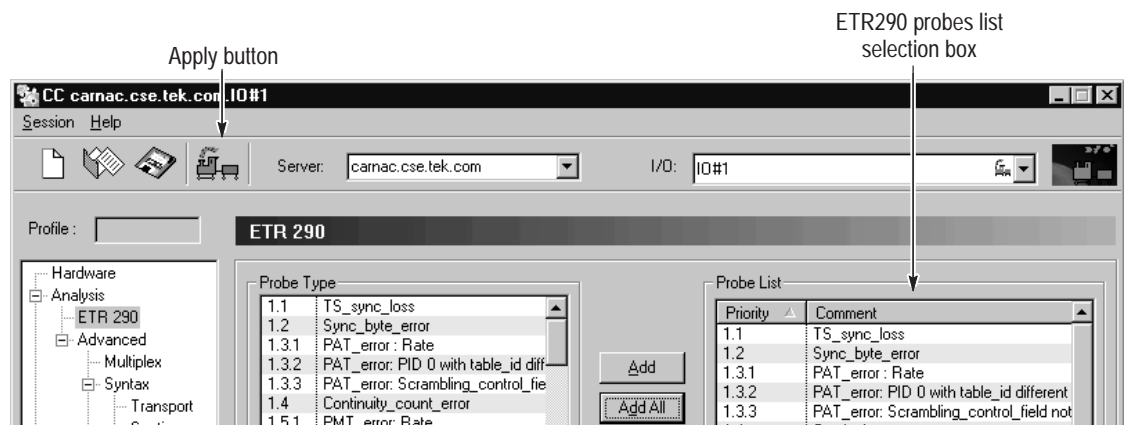


Figure 2–18: Setting ETR290 probes

Changing an Error Level

34. Expand the View hierarchy in the Navigation panel, and then select **Message level**.
35. Scroll down the list of probes in the Report Message Level panel and highlight Continuity counter.

The default for this display is to show the probes in alphabetical order by probe name. You can change this sort order by clicking one of the column headers.

36. Right-click in the Message level column on the highlighted row as shown in Figure 2–19 on page 2–28, and then select Major from the shortcut menu.

This changes the level at which a continuity counter error is displayed in the Master Client and in the Report view of the Expert Client.

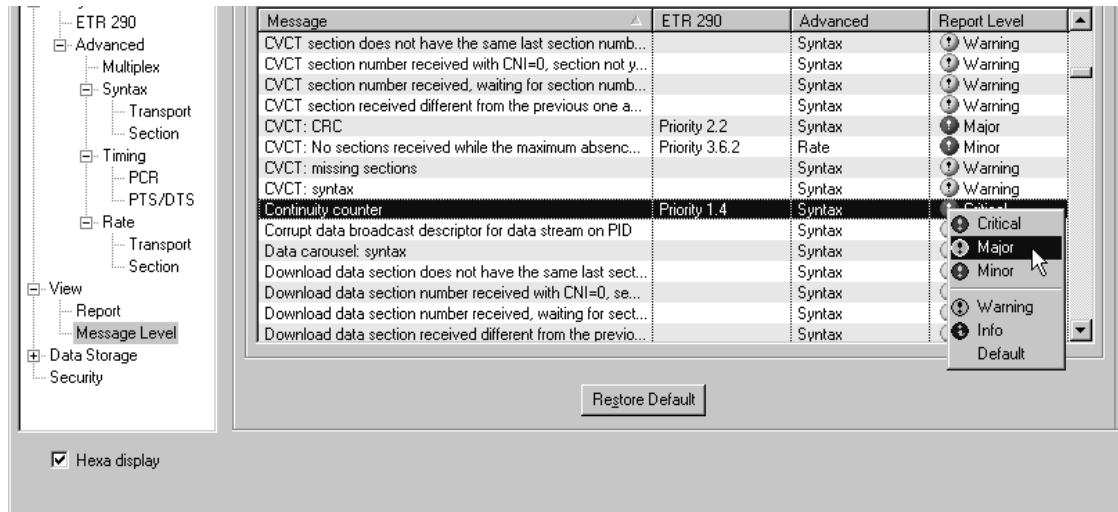


Figure 2–19: Changing the message level

Change all Critical errors to Major errors using the following procedure:

- a. Click the Report Level column header. This will sort all of the probes by error severity (the level the errors are reported by the Analysis Servers).
 - b. Left-click on all of the Critical error icons in the Report Level column. Each click steps through the list of error levels. Since you are clicking the Critical errors, the report level changes to Major errors.
37. Apply your changes to the Configuration Client and switch to the Master Client.
 38. Select **Edit** from the Workspace menu, and then highlight **Graphics** in the Workspace Navigation panel.
 39. Deselect Major in the Analysis Display group, and then click **OK**.
 40. Click the Acknowledge Errors button on the Master Client toolbar. Any error indicators in the Master Client should go away.
 41. Restore the settings in the Configuration Client by clicking Restore Default at the bottom of the Report Message Level panel. Do not forget to apply your changes before minimizing the Configuration Client (do not close it yet).

Analyzing a Stream Using the Expert Client

The Expert Client allows you to examine a specific input in more detail than is possible using the Master Client. See *Expert Client* on page 2–3 for an overview of the Expert Client. See *Expert Client Reference* beginning on page 3–83 for more detailed information about the Expert Client and how to use it to analyze transport stream inputs.

42. To display the Expert Client from the Master Client, click the input icon that you used to start the Configuration Client, and then right-click a service icon. If possible, choose a service icon that is displaying errors as shown in Figure 2–20.



Figure 2–20: Selecting the Expert Client

43. Select Expert Client from the shortcut menu. The Expert Client is displayed showing the errors occurring on the selected service (if any). See Figure 2–21 on page 2–30.

Your Expert Client display will look different in the details, but there are several items to note as you look at the Expert Client:

- The Address bar shows which Analysis Server you are connected to.
- The Hierarchic panel of the Report view indicates which service (program) you selected when you started the Expert Client.
- The Messages panel of the Report view displays the errors that are occurring on the service indicated in the Hierarchic panel.

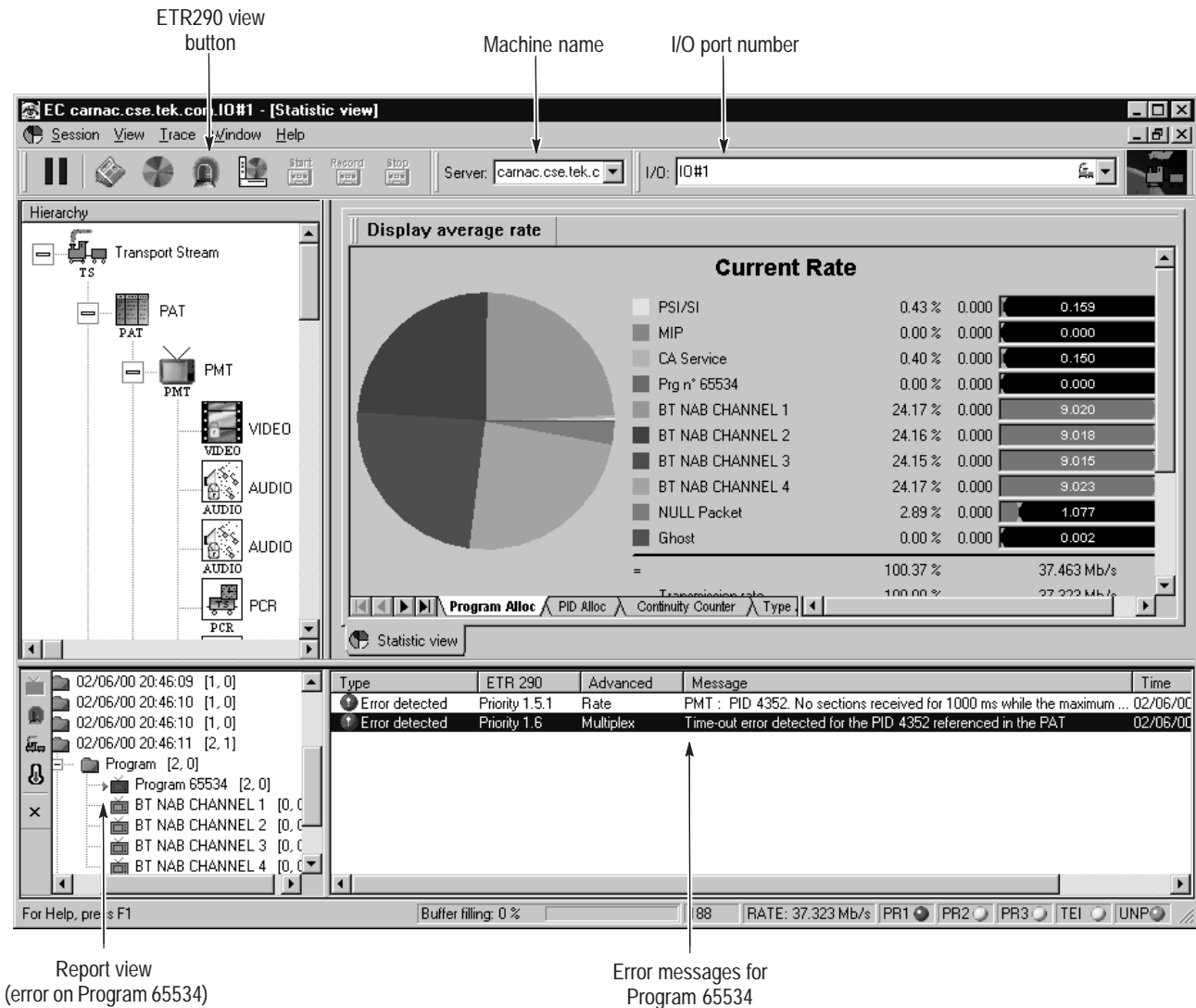


Figure 2–21: Expert Client showing errors

44. Click the ETR290 view button to display the ETR290 view in the Client area.

Note any error LEDs displayed. If you had chosen an MPEG-2 standard, there would not be a Priority 3 column for this display; for ATSC, the Priority 3 column probes address ATSC PSIP tables rather than DVB SI tables.

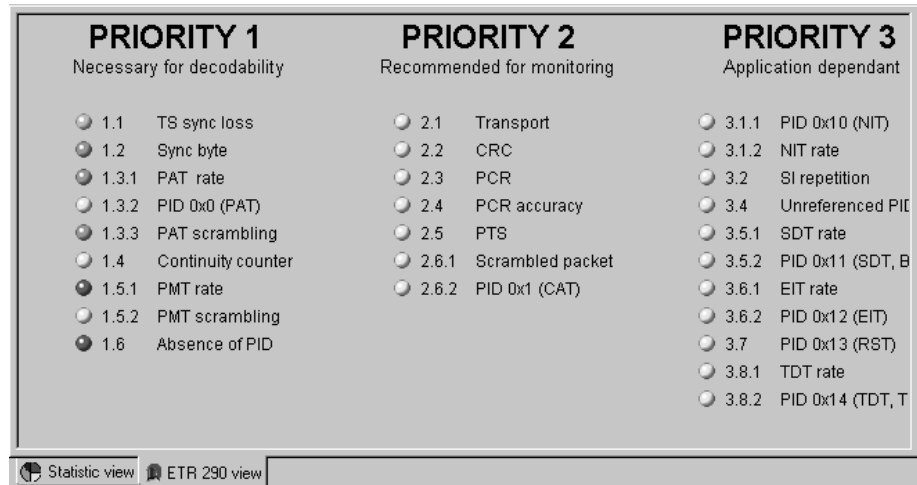


Figure 2–22: ETR290 panel

45. Switch to the Configuration Client, and then display the ETR290 panel.
46. Click **Restore Default**. This removes all ETR290 probes on the input.
47. Click **Apply** in the Configuration Client and return to the Expert Client. Notice that all of the ETR290 recommendations are grayed out, with the exception of TS_sync_loss, which is the only probe always set in the Expert Client.

Capturing Transport Stream Input

In this part of the tutorial, you will capture a portion of the stream you have been analyzing using the Stream Recorder Client. You can manually capture input based on a specified event using the Configuration Client and Expert Clients. See *Manually Capturing a Transport Stream* on page 3–94 for more details about manually capturing input.

Use the following steps to capture input using the Stream Recorder client.

48. Exit the Expert Client.
49. Stop the analysis from the Port Manager panel, and then free the I/O to which the Analysis Server is assigned.
50. Assign the Stream Recorder server to the I/O, and then launch the Stream Recorder client. The application looks very similar to the Stream Player. See Figure 2–23.

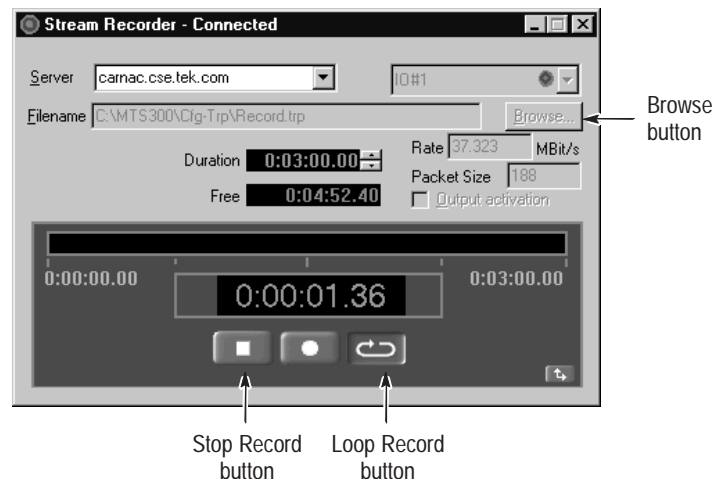


Figure 2–23: Stream Recorder client application window

The default file name and path for the .TRP file you will generate is shown in the Filename text box. You can change this by clicking the Browse button and specifying a different file name and path for the new transport stream file. For this tutorial, use the default.

51. Enter a duration in the Duration spin box that is less than the value in the Free indicator box. Both boxes use the following format:

Hours: Minutes: Seconds. tenths
52. Ensure that the Output activation box is not selected, and then click the Loop Record button.
53. Watch as the Stream Recorder syncs to the signal being input on I/O#1, and records the input.
54. Click the Stop Record button and then exit the Stream Player client.
55. Reassign I/O#1 to the Analysis Server (free the I/O first); output the new transport stream file using the Stream Player, and monitor and analyze the transport stream using the techniques you learned earlier in this tutorial.
56. Stop generating a transport stream and stop the analysis on the input.
57. Exit all of the client applications, saving the Master Client workspace if you wish.

This completes the MTS300 MPEG Test System tutorial.

In this tutorial you learned how to start and exit the MTS 300 clients, how to manage inputs using the Master Client, and how to modify the way the Master Client displays errors. You also learned how to interpret the icons used to display errors in the Master Client. You also learned how to start both the Configuration and Expert Clients from the Master Client, and you learned how changes to the Configuration Client affect various aspects of both the Expert and Master Client. Finally, you learned how to both generate and capture transport streams.

See the *Reference* section for each client for more detailed information concerning the client views and panels, menu selections, icons, and toolbar buttons used to monitor, analyze, generate, and capture transport stream inputs.



Reference

Reference

This section is a complete reference to the MTS300 MPEG Test System client modules: Master Client, Expert Client, Configuration Client, Stream Recorder, and Stream Player. The information in this section is organized as indicated in the following list:

- This *Reference* section explains why monitoring transport stream inputs is important and briefly describes the terms MPEG-2, DVB, and ATSC. This section also explains client-server computing as it relates to the MTS300 system software modules and describes the two server modules enabled by the MTS300 system software.
- The *Master Client Reference* (see page 3–9) provides procedures for monitoring transport stream inputs. It also describes the Master Client views, panels, menus, icons, and toolbar buttons.
- The *Analyses Reference* (see page 3–37) describes all of the MTS300 system analyses performed by the Analysis Servers. This section also provides procedures for setting, modifying, and removing the user-controlled analyses, called *probes*.
- The *Expert Client Reference* (see page 3–83) provides procedures for displaying and analyzing errors on transport stream inputs. It also describes the Expert Client views, panels, menus, icons, and toolbar buttons.
- The *Configuration Client Reference* (see page 3–151) provides procedures for setting, modifying, and removing probes on transport stream inputs. This section also describes the Configuration Client panels, menus, icons, and toolbar buttons.
- The *Stream Recorder Reference* (see page 3–199) provides procedures for using the Stream Recorder application to record a transport stream input onto the hard drive of the MTS300 system. This section also describes the VTR-like controls of the Stream Recorder.
- The *Stream Player Reference* (see page 3–205) provides procedures for using the Stream Player application to play back a transport stream, or a portion of a stream, stored on the hard drive of the MTS300 system. This section also describes the VTR-like controls of the Stream Player.

See *Operating Basics* for basic operating procedures for starting, logging on to, and stopping the MTS300 system.

See *Tutorial* on page 2–13 for a tutorial that enables you to quickly become familiar with the use of the five client modules .

See *Front Panel* on page 2–9 for information about the using the keypad and touch screen.

See *Appendix C: Networking* for information about installing MTS300 systems in networked environments and basic network troubleshooting procedures.

Finally, see the *MTS300 MPEG Test System Hardware and Software Installation Technical Reference* manual for hardware and software installation procedures, for complete electrical, mechanical, and environmental specifications, and for the safety compliance information for the MTS300 MPEG Test System.

MPEG Overviews

This section provides some brief overviews of MPEG monitoring and the types of transport streams monitored and analyzed by the MTS300 system.

MPEG Operational Monitoring

In today’s compressed digital TV environments you can think about operational monitoring requirements in terms of layers:

- Information layer. Is the information correct and of suitable quality?

Monitoring the information layer is an extension of picture quality measurements in the compressed digital realm.

- Transmission layer. Does the signal itself conform to standards?

Monitoring the transmission layer is standard practice in all transmission systems: cable, terrestrial, and satellite.

- Protocol layer. Can the transmitted data be decoded at the destination?

Monitoring the protocol layer is a new requirement of MPEG transmission systems. The protocol layer is monitored by the Master Client.

The protocol layer provides the following functionality:

- **Metadata.** Metadata refers to information about the transport stream that is carried by the transport stream such as PSI and SI or PSIP tables. This information describes the multiplex and the transmission environment completely so that the IRD (integrated receiver/decoder) can decode the transport stream correctly. Metadata is specified in the appropriate MPEG, DVB, and ATSC standards.
- **Timing information.** Timing information is used by the IRD to decode and present the data correctly (at the right times and in the right sequence). Timing information is carried in both the transport stream layer and the elementary stream layer.

MPEG monitoring is used to verify that the transport stream you are transmitting conforms to the appropriate MPEG-2, DVB, and ATSC standards. The following list describes operational monitoring requirements that you may have for your environment:

- Ensure that transmitted data is free of defects and can be decoded appropriately at the destination. This monitoring task is performed by the Master client.
- Identify specific errors so you can isolate the source of errors quickly. This analysis task is performed by the Expert Client.
- Specify monitoring parameters for transport streams in ways that make sense to you. This configuration task is performed by the Configuration Client.

MPEG-2 MPEG stands for Motion Picture Experts Group. Among the standards developed by this ISO body are the set of standards describing Transport Stream System Target Decoders (T-STD) with defined behaviour when handling video, audio, or data elementary streams or when handling PSI (Program Specific Information) packets. By defining a T-STD, the output of encoders and multiplexers is implied. Consequently, the output of any valid MPEG-2 encoder or multiplexer can be used as input to another manufacturer's decoder or multiplexer.

MPEG-2 transport streams are two layer structures: the Compression layer (for encoded audio, video, and data elementary streams) and the System layer (for timing and describing different elements of the multiplexed transport stream and the network over which it is carried).

Valid MPEG-2 transport streams require certain information that describes the content and organization of transport streams and certain characteristics of the network over which the transport stream is carried. This information is called Program Specific Information (PSI) and is carried in table structures:

- Conditional Access Table (CAT)
- Network Information Table (NIT)
- Program Association Table (PAT)
- Program Map Table (PMT)
- Transport Stream Descriptor Table (TSDT)

See the MPEG-2 standards documents for more specific information about encoding elementary streams, multiplexing transport stream elements, and these transport stream structures.

One of the strengths of the MPEG standards is that they are generic and can be adapted to different broadcast environments. Two groups, the Digital Video Broadcasters (DVB) and the Advanced Television Systems Committee (ATSC) have created MPEG-2 compliant standards that are used in DVB and ATSC markets.

DVB DVB stands for Digital Video Broadcasting. DVB standards define MPEG-2 compatible transport streams used in DVB markets. The DVB standards define baseline systems for cable (DVB-C), terrestrial (DVB-T), and satellite (DVB-S) transmission environments.

Like the MPEG standards, the DVB standards describe both the compression layer (for encoded audio, video, and data elementary streams) and the system layer (for timing and describing different elements of the multiplexed transport stream and the network over which it is carried) of DVB transport streams.

The DVB standards define additional service information (SI) used to describe the network, transport stream, and services carried by the transport stream. This additional information is provided by the following table structures:

- Bouquet Association Table (BAT)
- Event Information Table (EIT)
- Network Information Table (NIT)
- Running Status Table (RST)
- Service Description Table (SDT)
- Time and Date Table (TDT)
- Time Offset Table (TOT)

See the DVB standards documents for more specific information about these transport stream structures.

ATSC ATSC stands for Advanced Television Systems Committee. ATSC standards were developed by the ATSC Technology Group on Distribution (T3). These standards define baseline systems for cable and terrestrial environments. ATSC transport streams are valid MPEG-2 transport streams.

Like the MPEG standards, the ATSC standards describe both the compression layer and the system layer for ATSC transport streams. The compression layer refers to the encoded audio, video, and data elementary streams; the system layer refers to timing information and descriptions of different elements of the multiplexed transport stream and the network over which it is carried.

The ATSC standards define additional information required for ATSC environments. This information is carried in the following program and system information protocol (PSIP) table structures:

- Event Information Table
- Extended Text Table
- Master Guide Table
- System Time Table
- Rating Region Table
- Virtual Channel Table

See the ATSC standards documents for more specific information about these transport stream structures. One of the ATSC standard documents (ATSC Document A/58) describes how to ensure that valid ATSC transport streams are also valid DVB transport streams (conforming to DVB standards).

Client-Server Overview

This section briefly describes client-server software architecture and the two server modules enabled by the MTS300 system software.

Client-Server

The client-server software architectural model allows software to be developed into two or more modules:

- The server module performs CPU intensive operations, runs in the background (or remotely), and responds to requests from clients. Usually requests are due to some action you have taken.
- The client module is often a graphical user interface that allows you to configure or display the status of the server module.

The MTS300 system uses two servers (Server Manager and Analysis Server) to control any of the following client applications you operating: (Master Client, Expert Client, Configuration Client, Stream Recorder):

- The Master Client
- The Expert Client
- The Configuration client
- Stream Recorder
- Stream Player
- OpenMux (MTS300, Option OM only)

Combined, the client and server modules enable you to monitor multiple transport stream inputs simultaneously; perform in-depth analyses of one transport stream input; configure the monitoring and reporting parameters of the monitored inputs; and to create, generate, and capture transport streams.

Analysis Servers The Analysis Server is the process that performs the actual analyses on transport stream inputs. Each MTS300 system can support up to two Analysis Server processes simultaneously. The Analysis Server sends analysis results to the Server Manager.

Each Analysis Server interacts with the following entities as described:

- The Master client displays the analysis results that are collected by the Server Manager.
- The Expert client displays the results of the Analysis Server directly.
- The Configuration client sets the monitoring and analysis parameters for each input.
- The Server Manager collects the Analysis Server results (called traps).

Server Manager The Server Manager is the process that allows the MTS300 system to be managed over a network. The Server Manager also makes the results of the Analysis Servers available to Master clients. Only one Server Manager can run on an MTS300 system.

The Server Manager process is available to or responds to the following two entities:

- The Master client, which displays the data collected by the Server Manager.
- The Analysis Server, which sends messages (or traps) to the Server Manager.

NOTE. *Only one Master Client can be connected to a Server Manager at any given time.*

Master Client Reference

The Master Client interface elements are described in this section, followed by a description of the tasks you perform when monitoring transport stream inputs. The following list shows the contents and page references of the *Master Client Reference*:

- *Master Client Application Window* page 3–9
- *Master Client Toolbars and Icons* page 3–15
- *Master Client Menus* page 3–20
- *Workspace Dialog Box* page 3–24
- *Workspace Tasks* page 3–27
- *Error Reporting Tasks* page 3–35

NOTE. *An individual MTS300 system is limited to operating two Analysis Servers at a time, and can launch only one Stream Player, one Stream Recorder, and one OpenMux application at a time. In addition, the MTS300 system is limited to an aggregate data rate of 140 Mbs between all operating applications.*

Master Client Application Window

When you first start the Master Client application, the panels of the application workspace are empty. Before you can monitor inputs or generate a transport stream output, you must first connect the Master Client to a Server Manager and then assign the I/O ports to an Analysis Server or application. After you connect to an Analysis Server, the Master Client workspace displays the current status of the I/O ports on the MTS300 system to which you are connected.

The status displayed for each I/O port depends on which application is assigned to the I/O port. The status of a monitored program stream depends on the analyses being performed by an Analysis Server. The Analysis Server sends error messages or traps to the local Server Manager. This error information is presented using the interface elements of the Master Client.

The Master Client application window (see Figure 3–1) includes three primary panels: Port Manager, Services, and Details. This section describes each of the elements of the Master Client workspace.

You can resize the Master Client application window using standard Windows NT techniques.

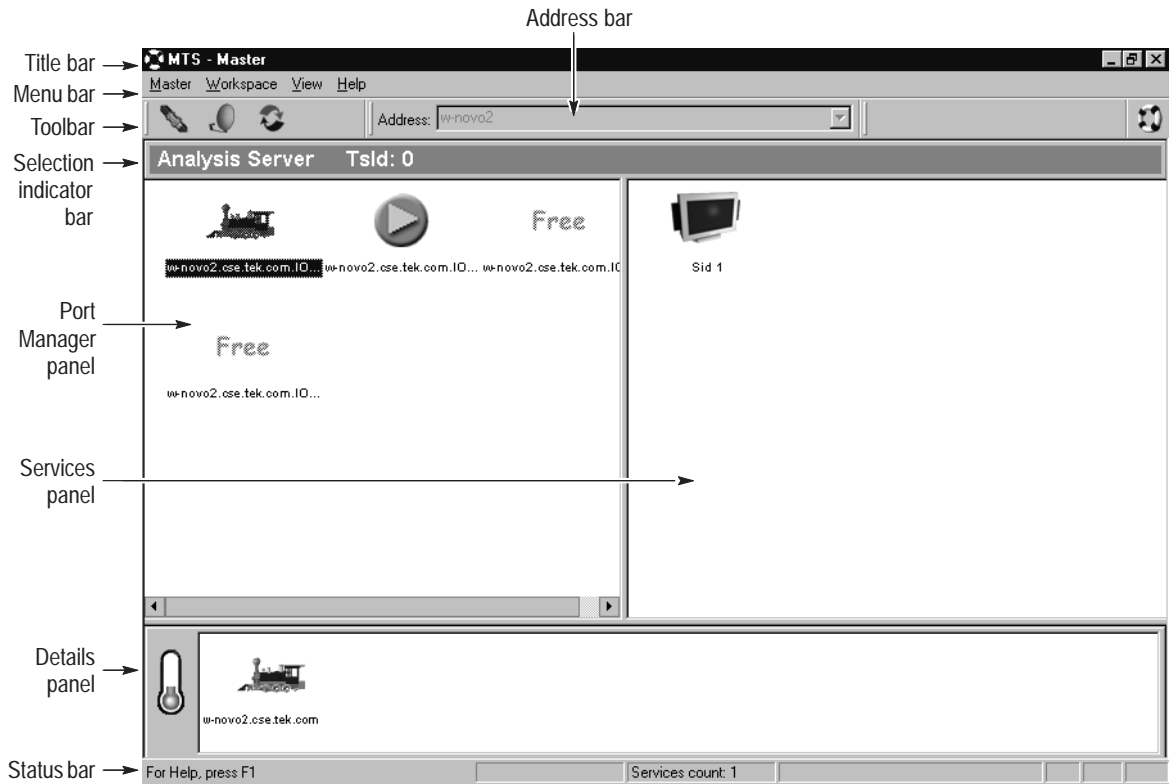


Figure 3–1: Master Client application window

- Title Bar** The Title bar is a standard Windows NT title bar:
- Clicking the application icon in the upper left-hand corner of the application window displays a Windows NT Control menu.
 - The application name is followed by the name of the open workspace file.
 - The upper right-hand corner uses standard window control buttons to minimize, maximize, or close the Master Client window.

Menu Bar The Menu bar contains menu for performing various monitoring functions. See *Master Client Menus* on page 3–20 for information regarding the Master Client menus and menu selections.

- Status Bar** The Status bar is located at the bottom of the Master Client window and displays brief messages about selected menu items. The Status bar also displays the number of inputs and services being monitored.
- Toolbar** The toolbar buttons shown in Figure 3–1 provide shortcuts to the following menu selections: Disconnect (from the Master menu), Edit (from the Workspace menu), and Acknowledge Past Errors (from the Master menu). See Table 3–1 on page 3–15 for more information about the Master Client toolbar buttons.
- Address Bar** The Address bar indicates the name or IP address of the MTS300 system running the Server Manager to which you are connected. You can enter the name or IP address directly or you can use the selection box to choose a remote machine name. The selection box is available only when the Master Client is disconnected from a Server Manager.
- The selection box keeps a record of the MTS300 systems to which you have successfully connected. So, rather than entering a host name or IP address each time you connect to a remote machine, you can choose the name from the list.
- You can choose to display or hide the Address bar using the View menu.
- Selection Indicator Bar** The Selection Indicator bar shows you which Master Client workspace items are currently selected. In Figure 3–1 on page 3–10, the Selection Indicator bar shows the name of the input (Analysis Server), and service (TSID 0) selected.
- Port Manager Panel** The Port Manager panel is located at the left of the Master Client window. The Port Manager panel displays icons representing the I/O ports for the Server Manager to which you are connected. Each I/O port icon represents one input/output channel pair. You can only assign one Analysis Server or application to one I/O pair at a time.
- Initially the I/O ports are represented by icons labeled *Free*. The Free icon shows that the server for that particular I/O port has not been assigned to an Analysis Server or application.
- Before you can monitor a transport stream input or generate a stream output, you must assign the I/O port to an Analysis Server or application using the shortcut menu, which is accessed by right-clicking a Free I/O icon.
- You can configure icons in the Port Manger panel to be shown as large or small icons, and to be sorted by error (multiplexes with errors are displayed before multiplexes without errors), by MTS300 system name, or by TSID.
- You can resize the height and/or width of the Port Manger panel by clicking and dragging the lower or right-panel border.

When you select a Port Manager panel Analysis Server icon, the Services panel and the Details panel both change:

- The Services panel changes to show icons for the services that you are monitoring on that input.
- The Details panel changes to show icons indicating the error type and severity of MPEG, DVB, or ATSC transport stream level errors.

Error Icons. The error icons that overlay the input icons in the Port Manager panel are used to show the status of errors on the input:

- Red error icons indicate that transport stream, or one or more services in the transport stream are experiencing an error.
- Orange error icons indicate that the transport stream, or one or more services in the transport stream, recorded one or more errors, but that the error condition no longer exists.
- Yellow error icons indicate that a warning condition exists for one or more services in the transport stream.

Shortcut Menus. Right-click an icon in the Port Manager panel open a shortcut menu. The selections available in the shortcut menu depend on the type of icon selected in the Port Manager panel. You will use the shortcut menus to assign I/O ports to applications and to start the Expert Client or Configuration Client for an Analysis Server. See *Port Manager Shortcut Menus* on page 3–21 for a description of the shortcut menu commands.

Services Panel

The Services panel displays icons for the selected input and is located to the right of the Master Client window. You can resize the width of the Service panel by clicking and dragging the left panel border, and you can resize the height by dragging the lower panel border.

A default service icon is used to display each monitored service in the selected Multiplex. You can also assign a custom icon to each service (see *Assigning an Icon to a Service* on page 3–31).

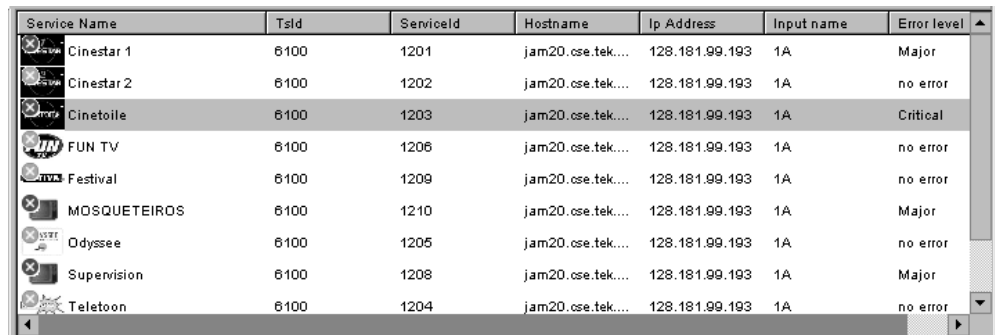
By selecting an Analysis Server icon in the Port Manager panel, and then double-clicking an icon in the Services panel, you can start the Expert Client. The Expert Client will be connected to the Analysis Server on the selected input. When the Expert Client is displayed, the Report view will be in the Program mode showing the error messages for the selected service.

The Services panel has three modes of display that you can select from the shortcut menu:

- Large Icons
- Small Icons
- Details

The first two are basic views: you can view the service icons as either small or large icons. In both cases, if the transport stream encodes the name for the service, the name appears with the icon. If no name is provided, the service icon is identified by the Transport Stream ID | Service ID (TSID | SID) pair. You can display the TSID | SID pair by pausing your cursor over a service icon; a tool tip is displayed showing the TSID | SID pair.

The Details view of the Services panel is shown in Figure 3–2. Display this view by right-clicking in the Services panel and selecting Details from the shortcut menu.












Service Name	Tsid	Serviceid	Hostname	Ip Address	Input name	Error level
 Cinestar 1	6100	1201	jam20.cse.tek...	128.181.99.193	1A	Major
 Cinestar 2	6100	1202	jam20.cse.tek...	128.181.99.193	1A	no error
 Cinetoile	6100	1203	jam20.cse.tek...	128.181.99.193	1A	Critical
 FUN TV	6100	1206	jam20.cse.tek...	128.181.99.193	1A	no error
 Festival	6100	1209	jam20.cse.tek...	128.181.99.193	1A	no error
 MOSQUETEIROS	6100	1210	jam20.cse.tek...	128.181.99.193	1A	Major
 Odyssee	6100	1205	jam20.cse.tek...	128.181.99.193	1A	no error
 Supervision	6100	1208	jam20.cse.tek...	128.181.99.193	1A	Major
 Teletoon	6100	1204	jam20.cse.tek...	128.181.99.193	1A	no error

Figure 3–2: Details view of the Services panel

The Details view provides the following information in tabular format (listed from left to right):

- Service Name. Displays an icon for each program or service and lists the service name for each input (if service names are provided in the transport stream)
- TSID. Displays the TSID for the selected I/O port.
- Service ID. Displays the SID for the program or service.
- Host name. Displays the name of the MTS300 system to which you are connected.
- IP Address. Displays the IP address of the MTS300 system to which you are connected.

- Input name. Displays the I/O port number on the MTS300 system to which you are connected (I/O#1, I/O#2, I/O#3, or I/O#4).
- Error level. Displays the error-severity level of the current error (if there is no current error, the report is “no error”).

You can sort the icons in the Service panel by name, error, TSID, or SID using the Services panel shortcut menu.

Error icons. When you select a service experiencing an error in any of the Services panel views, the Details panel updates to display more information about the errors detected for that service.

The error icons that overlay the icons in the Service panel are used to show the status of errors on the input:

- Red error icons indicate that an error is detected for the monitored service.
- Orange error icons indicate that the service recorded one or more errors, but that the error condition no longer exists.
- Yellow error icons indicate that a warning condition exists for the monitored service.

Details Panel

The Details panel displays icons representing error status, types, and levels for a selected service or multiplex. You can resize the height of the Details panel by clicking and dragging the top panel border.

The Details panel contains icons only if you have selected a multiplex or service icon that has an error associated with it. If the selected multiplex or service icon has no errors (past or present), or if you click in the white space of the Multiplex or Service panel, the Details panel goes blank.

From left to right in the Details panel, you will see the types of icons indicated in the following list (see *Master Client Toolbars and Icons* beginning on page 3–15 for more information about these elements):

- Error severity gauge indicating the highest error level, current or past, for the selected item (multiplex or service)
- Icons that represent the selected multiplex or service
- Icons indicating the service error types, current or past, for the selected service
- Icons indicating the multiplex error type, current or past, for the selected multiplex

The last two list items are mutually exclusive: the Details panel displays one or the other, not both at the same time.








Master Client Toolbars and Icons

The Master Client uses toolbar buttons as shortcuts to various menu selections and provides various icons so that you can customize the look and feel of your workspaces. Icons are used in the Master Client workspace to represent inputs and various error conditions and error types. These interface elements are described in this section.

Toolbar Buttons

Table 3–1 describes the buttons displayed on the Master Client toolbar. Not all of these buttons are displayed all of the time.







Table 3–1: Master Client toolbar buttons

Button	Description
	Connect button. Click to connect to the Server Manager running on the transport monitor indicated in the Address bar.
	Disconnect button. Click to break the connection to the currently connected Server Manager.
	Edit button. Click to open the Workspace Dialog box. If no workspace has yet been opened, clicking this button will open a new workspace in the Workspace dialog box.
	Edit button (showing a new input). Click to open the Workspace dialog box. This variation of the Edit button is displayed when a new input is detected.
	Acknowledge Errors button. Click this button to acknowledge the errors.
	Acknowledge Alarm button. Click this button to acknowledge the sound alarm for current errors. This button is not shown if you have not defined a *.wav file for the current workspace.
	Home Button. Click this button to connect to the local Server Manager. This button is removed when you connect to a Server Manager.

Workspace Icons

The tables in this section describe all of the icons used in the Master Client. Table 3–2 identifies the icons used in the Port Manager and Service panels.

Table 3–2: Master Client Port Manager and Services panel icons

Icon	Description
	Default (unassigned) I/O port
	Analysis Server
	Stream Recorder
	Stream Player
	Open Mux (MTS300, Option OM only)
	Default program or service icon (displayed in the Services panel)

Each of the Port Manager panel input icons can also show whether the input is experiencing errors, and whether the application or Analysis Server assigned to the input is active or stopped.

The Analysis Server, Stream Recorder, Stream Player, and OpenMux icons fade when the associated application is not active.

Table 3–3 describes the different modes of the error icons that overlay the Port Manager and Service panel icons.

Table 3–3: Error icons





Icon	Description
	Red. Indicates that a critical, major, or minor error is currently being experienced on the indicated bouquet, multiplex, or service.
	Orange. Indicates that a critical, major, or minor error was recorded on the indicated bouquet, multiplex, or service, but no error condition currently exists.
	Yellow. Indicates that a warning condition is currently being experienced on the indicated bouquet, multiplex, or service.
	Red. Appears over the Analysis Server icon to indicate a loss of sync between the Analysis Server and the input signal.

Table 3–4 describes the different modes of the Error Severity gauge icon.

Table 3–4: Error severity gauge icons






Icon	Description
	Red. At least one critical error is detected for the selected multiplex or service.
	Red. At least one major error is detected for the selected multiplex or service. No critical errors are detected.
	Red. At least one minor error is detected for the multiplex or service. No critical or major errors are detected.
	Yellow. At least one warning condition is detected for the selected multiplex or service. No critical, major, or minor errors are detected.
	Green. No current errors or warning conditions are being recorded for the selected service or input.

Table 3–5 describes the icons displayed in the Details panel when a multiplex icon is selected. A red border represents a current error. An orange border represents an unacknowledged error of that type with no current errors.

Table 3–5: Detail panel error icons with an input selected



Icon	Description
	Indicates that a current error for a PAT, CAT, or EMM is detected for the selected multiplex. This icon can also indicate general errors, such as sync loss.
	Indicates that an error in one or more SI or PSIP parameters for the selected multiplex was detected, but does not currently exist.

Table 3–6 describes the icons displayed in the Details panel when a service icon is selected. A red border represents a current error. An orange border represents an unacknowledged error of that type with no current errors.

Table 3–6: Detail panel error icons with a service selected












Icon	Description
	Indicates that a current PCR error is detected for the selected service.
	Indicates that a rate or syntax error in the PMT, SDT, or EIT for the service was detected.
	Indicates that an error concerning a video component of the service was detected.
	Indicates that an error concerning an audio component of the service was detected.

Table 3–6: Detail panel error icons with a service selected (Cont.)

Icon	Description
	Indicates that an error concerning the data components for the selected service is detected.
	Indicates that an error concerning the ECM components of the service was detected.

The icons in Table 3–7 are only displayed in the Windows NT system tray.

Table 3–7: Windows NT system tray icons

Icon	Description
	Server Manager. This icon indicates the Server Manager process is running.
	Analysis Servers 1 and 2. There are two Analysis Server icons representing the two available Analysis Servers on the MTS300 system. When you start analysis on an input, the background of an Analysis Server icon will turn green to indicate the Analysis Server is actively performing analysis. In the example shown in the left column, the Analysis Server on the right is currently analyzing a transport stream.
	Stream Recorder Server. This icon indicates the Stream Recorder server is running.
	Stream Player Server. This icon indicates the Stream Player server is running.
	Open Mux Server. (MTS300, Option OM only) This icon indicates the Open Mux server is running.

Master Client Menus

The Master Client uses four pull-down menus that allow you to control, configure, and access online help for the Master Client. In addition, there are shortcut menus available in the Port Manager and Service panels.

Master Menu Table 3–8 describes the Master menu selections.

Table 3–8: Master Client Master menu

Menu item	Description
Connect	Connects to the Server Manager running on the MTS300 system indicated in the Address Bar.
Connect Locally	Connects to the local Server Manager (MTS300 system).
Disconnect	Disconnects the Master Client from the Server Manager to which you are connected.
Acknowledge Past Errors	Acknowledges all errors.
Acknowledge Sound	Acknowledges all audible alarms.
Exit	Closes the Master Client.

Workspace Menu Table 3–9 describes the Workspace menu selections. Refer to *Workspace Dialog Box* on page 3–24 for more information about configuring the Master Client workspace.

Table 3–9: Master Client Workspace menu

Menu item	Description
New	Creates a new workspace and opens the Workspace dialog box.
Open	Displays a standard Open dialog box from which you can choose the *.wks file (workspace file) to open.
Edit	Opens the Workspace dialog box with the current workspace settings displayed.
Save	Saves the current workspace settings to the workspace named in the title bar.
Save As	Opens a standard Save as dialog box that allows you to save the current workspace settings to a *.wks file.

View Menu Table 3–10 describes the View menu selections.

Table 3–10: Master Client View menu

Menu item	Description
Toolbar	Hides/Displays the toolbar.
Address Bar	Hides/Displays the Address bar.
Local Connection Bar	Hides/Displays the Home button.
Status Bar	Hides/Displays the status bar.

Help Menu Table 3–11 describes the Help menu selections.

Table 3–11: Master Client Help menu

Menu item	Description
Help Topics	Displays the Master Client online help contents.
About Master	Displays version and copyright information about the Master Client.

Port Manager Panel Shortcut Menu

Which menu selections appear in the Port Manager shortcut menu depends on the type of I/O port icon selected. Table 3–12 describes the shortcut menu selections.

Table 3–12: Port Manager panel shortcut menu

I/O port icon	Menu selection	Description
All	Large icons	Displays the I/O ports using large icons.
All	Small icons	Displays the I/O ports using small icons.
All	Sort by: Error Name TSID	Sorts the I/O port display by Error, Name, or TSID. Refer to <i>Sorting Port Manager and Service Panel Icons</i> on page 3–30 for more information about sorting the panel display.
All except "Free"	Free I/O	Removes the Analysis Server or application assigned to the server of the selected I/O port.
Free	Assign server	Assigns the server of a "Free" I/O port to an Analysis Server or application.

Table 3–12: Port Manager panel shortcut menu (Cont.)

I/O port icon	Menu selection	Description
Analysis Server	Start analysis	Starts transport stream analysis using the selected Analysis Server.
	Stop analysis	Stops transport stream analysis on the selected Analysis Server.
	Launch Expert Client	Starts the Expert Client showing the transport stream being monitored by the selected Analysis Server.
	Launch Configuration Client	Starts the Configuration Client showing the analysis parameters used on the transport stream being monitored by the selected Analysis Server.
Stream Recorder	Start acquisition	Starts an acquisition of the transport stream input defined in the Stream Recorder.
	Start acquisition in loop mode	Starts a loop-mode acquisition of the transport stream input defined in the Stream Recorder.
	Stop acquisition	Stops the current acquisition of a transport stream input.
	Launch Stream Recorder client	Opens the Stream Recorder application.
Stream Player	Start generation	Starts generation of the transport stream file defined in the Stream Player.
	Start generation in loop mode	Starts loop-mode generation of the transport stream file defined in the Stream Player.
	Stop generation	Stops the current generation of a transport stream file.
	Launch Stream Player client	Opens the Stream Player application.
Open Mux	Start Mux generation	Starts Mux generation of the transport stream files/inputs defined in the OpenMux.
	Stop Mux generation	Stops the current Mux generation.
	Launch OpenMux Configuration client	Opens the OpenMux application.

Services Panel Shortcut Menu

Table 3–13 describes the Services panel shortcut menu selections. Display this shortcut menu by right-clicking an icon in the Services panel.

Table 3–13: Services panel shortcut menu

Menu item	Description
Large Icons	Displays large service icons.
Small Icons	Displays small service icons.
Details	Displays the icons in the Services panel in tabular format, showing the TSID, SID, host name, IP address, input name, and error level for each service.
Sort by: Error Name TSID SID	Sorts the panel display by Error, Name, TSID or SID. Refer to <i>Sorting Port Manager and Service Panel Icons</i> on page 3–30 for more information about sorting the panel display.
Expert Client	Starts the Expert Client showing the selected input.
Associate Logo	Opens a standard Open dialog box from which you choose the JPEG or BMP file that you will use to represent the selected service. Refer to <i>Assigning a Logo to a Service Icon</i> page 3–31 for more information.

Workspace Dialog Box

The Workspace dialog box allows you to organize your inputs and to configure the look and feel of the Master Client, and specify how errors are reported and whether you use audible alarms for error reporting. See Figure 3–3. The dialog box includes the following elements:

- A navigation panel to display the configuration panels that comprise this dialog box
- The active workspace name
- Configuration panels

Graphics Panel

The Graphics panel (see Figure 3–3) allows you to configure the display of the Master Client and to determine the level of Analysis Server errors reported in the Master Client.

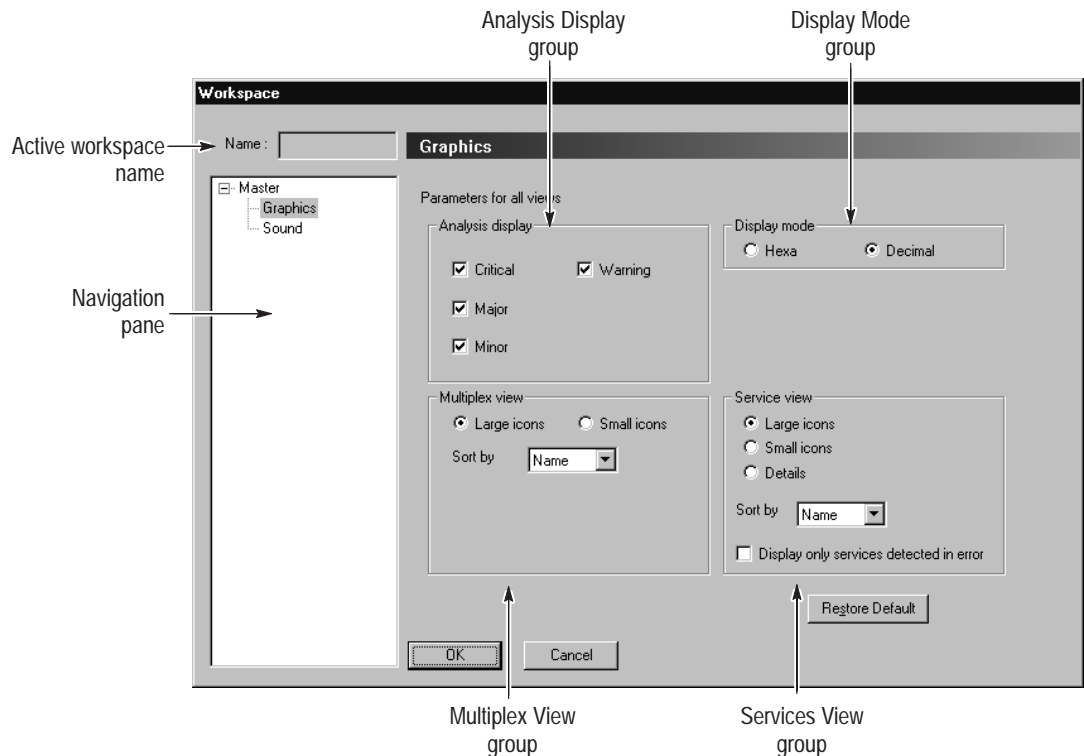


Figure 3–3: Graphics panel of the Workspace dialog box

The following list describes the elements in this panel:

- Active workspace name. If you are opening a saved workspace configuration file, the name of the workspace file is shown in the Name box. If you are not using a saved configuration, the Name box is blank.
- Navigation pane. Use the Navigation pane to select which configuration panel to display.
- Analysis Display. The selections in this group indicate which type of errors you want displayed. You can choose any combination of options.
- Display Mode. The selections in this group indicate the numeric base for the workspace. You can display the TSID and SID in decimal or hexadecimal base.
- Multiplex View. The options in this group allow you to control the look and sort order of the icons in the Port Manager panel.
- Services View. The options in this group allow you to control the look of the icons in the Services panel, the sort order of the service icons, and whether to show icons for all services all the time or only the services in error. If you choose to show only those services in error, once an error is recorded, the icon remains until you acknowledge the error.

See the procedures for creating workspaces, specifying error levels reported in the Master Client, and changing the numeric base elsewhere in this section for more information about using this panel.

Sound Panel The Sound panel (see Figure 3–4) allows you to specify a WAV file to be played each time an error is reported in the Master Client.

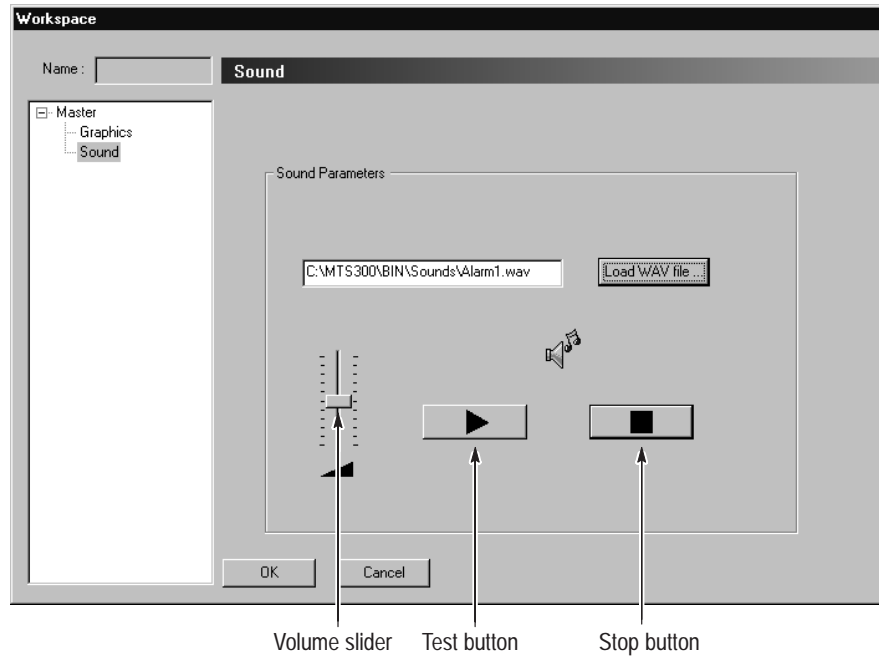


Figure 3–4: Sound panel of the Workspace dialog box

To play an audible alarm for errors when they are detected, use the following procedure:

1. In the Workspace dialog box, select **Sound**.
2. Click **Load WAV** file and then select a *.wav file.

Sample alarm files are located at C:\MTM300\Bin\Sounds

- Use the vertical slider bar to set the volume. Drag the slider up for more volume.
- Test the WAV file using the ► button.
- Stop the WAV file test using the ■ button.

To remove an audible alarm that has been enabled, delete the WAV file name from the list box.

Workspace Tasks

This section contains procedures for performing common tasks in the Master Client workspace. Unless indicated otherwise, the Master Client must be started and connected to a Server Manager to perform these procedures. The workspace tasks appear in the following order:

- *Assigning Analysis Servers and Applications to I/O Ports*
- *Saving a Workspace*
- *Copying a Saved Workspace*
- *Removing a Saved Workspace*
- *Changing Icon Sizes*
- *Changing the Numeric Base*
- *Displaying all Services in a Transport Stream*
- *Sorting Port Manager and Service Panel Icons*
- *Showing Details in the Service Panel*
- *Assigning a Logo to a Service Icon*
- *Restoring the Default Logo to a Service Icon*
- *Opening the Expert Client*
- *Opening the Configuration Client*
- *Specifying the MPEG Analysis Format*
- *Stopping and Restarting Analysis Servers and the Server Manager*

Assigning Analysis Servers and Applications to I/O Ports

The Port Manager panel of the Master Client window displays icons representing the I/O ports to which your Server Manager is connected.

Initially the I/O ports are represented by icons labeled *Free*, indicating that the ports have not been assigned to an application. Before you can monitor a transport stream input or generate a stream output, you must first assign the I/O port to the appropriate application.

NOTE. *An individual MTS300 system is limited to operating two Analysis Servers at a time, and can launch only one Stream Player, one Stream Recorder, and one OpenMux application at a time. In addition, the MTS300 system is limited to an aggregate data rate of 140 Mbs between all operating applications.*

Perform the following steps to assign the I/O ports to an Analysis Server or application:

1. Select the desired I/O port in the Port Manager panel, and then right-click to open the shortcut menu.
2. Select **Assign Server** to display the extended menu, and then select the desired application: Analysis Server, Stream Recorder, Stream Player, or OpenMux (MTS300, Option OM only).

After you assign the I/O port to an analysis server or application, the port icon changes to represent the assigned function. Reassign an I/O port from one application to another using the following steps:

1. Stop any active functions on the desired port such as stream analysis or signal generation, and then exit the client application that is assigned to the I/O port.
2. Select **Free I/O** from the shortcut menu for the desired I/O port.
3. After the port is free, you can assign the port to another application using the shortcut menu.

Saving a Workspace

The workspace configuration is defined as the current settings in the Workspace dialog box. When you save a workspace, the current workspace settings defined in the Graphics and Sound panels of the Workspace dialog box are saved to a specified file that you can recall. Perform the following steps to save the current workspace configuration:

1. Select **Save** from the Workspace menu in the Master Client window.
2. If you previously loaded a saved workspace file, clicking Save will overwrite the saved workspace settings.
3. If you have not loaded a saved workspace file, use the **Save As** dialog box to enter path and filename of the workspace file, and then click **Save**. The file must have a .wks extension.
4. The custom workspace name appears in the Title bar of the Master Client.

You can recall the saved workspace configuration file for later use by selecting Open from the Workspace menu and entering the desired workspace file name.

-
- Copying a Saved Workspace** You can copy a saved workspace configuration to use as the basis for a new configuration file by performing the following steps:
1. Select **Open** from the Workspace menu in the Master Client.
 2. Use the Open dialog box to select the existing workspace configuration file you want to copy, and then click **Open**.
 3. Click **OK** after the Workspace dialog box opens to close the dialog box.
 4. Select **Save As** from the Workspace menu, and then use the Save As dialog box to rename the workspace file to something other than the current file name.
- Removing a Saved Workspace** A workspace configuration is defined by a *.wks file. To remove a saved workspace, delete the file using standard Windows NT procedures.
- Changing Icon Sizes** You can toggle the size of the icons in the Port Manager and/or Services panels of the Master Client between large and small. You can use one of the following two methods for changing the icon size:
- Select Large Icons or Small Icons from the shortcut menus in the Port Manager and/or Services panels.
 - Use the Graphics panel of the Workspace dialog box to make the appropriate selections in the Multiplex view and/or Service view groups.
- Changing the Numeric Base** Use the following procedure to change the numeric base (decimal or hexadecimal) used to display the transport stream ID and the service ID in the Master Client:
1. Click the **Edit** button, or select **Edit** from the Workspace menu.
 2. In the Workspace dialog box, select **Graphics**.
 3. Change the numeric base using the options in the Display Mode group.
- Displaying all Services in a Transport Stream** If you are currently monitoring a transport stream input, click on the desired Analysis Server icon in the Port Manager panel to display all services in the transport stream being monitored by the selected Analysis Server. The services are displayed in the Services panel. If you have only one active Analysis Server, clicking in the white space of the Port Manager panel will display the services for the Analysis Server.

Sorting Port Manager and Service Panel Icons

Use the following procedure to sort icons in the Port Manager or Service panels:

1. Right-click in the panel (Port Manager or Service) for which you want to sort icons.
2. Point to **Sort by** in the shortcut menu, and then choose one of the following selections from the submenu:
 - **Error**. Displays icons representing inputs or services experiencing errors from left to right, top to bottom. The Master Client uses three levels of sort order criteria: error status, error severity, and MTS300 system name (alphabetical sort order).
 - **Name**. Displays the icons in alphabetical order (from left to right, top to bottom) based on the name of the MTS300 system on which the input or service is located.
 - **TSID**. Displays the icons in numeric order (from left to right, top to bottom) based on the transport stream ID of the inputs or services.
 - **SID** (Details panel only). Displays the icons in numeric order (from left to right, top to bottom) based on the Service ID of the inputs or services.

Showing Details in the Service Panel

You can set the display mode of the Services panel to Details to display more information about each program or service in the transport stream. You can use one of the following two methods to change the display mode of the Services panel to Details:

- Right-click in the white space of the Service panel, and then select **Details** from the shortcut menu.
- Open the Graphics panel of the Workspace dialog box, and then select **Details** in the Service view group.

Assigning a Logo to a Service Icon

To assign a custom logo to a service icon, you must save an appropriate bitmap or JPEG file somewhere on your local hard drive (*.bmp or *.jpg file respectively). The default logo directory is C:\MTS300\BIN\Logos.

***NOTE.** Some service providers do not allow their logos to be used without permission. Check with the service provider before you use their logo. The logos provided with the installation of the MTS300 MPEG Test System can be used to associate the icon in the Services panel of the transport monitor to the logo for that service.*

One alternative source for satellite service logos is at the following URL: www.satlogo.com (this link was valid as of May, 2000). Remember to check the copyright statements before using any logo.

Use the following procedure to assign a logo to a service in the Services panel:

1. Right-click the service icon (in the Services panel) and select **Associate Logo** from the shortcut menu.
2. Using standard Windows NT techniques, select an image file from the Open dialog box.

The location of the image files (JPEG and bitmap) included with the installation of the MTS300 system is C:\MTS300\Bin\Logos.

Restoring the Default Logo to a Service Icon

After you have assigned a custom logo to a service icon in the Services panel, perform the following procedure to restore the default service icon to the service:

1. Record the transport stream ID and the service ID of each service for which you want to restore the default service icon. You can position your cursor over the service icon to display the ID numbers.
2. Exit the Master Client.
3. Open the Windows NT Explorer and navigate to the following directory:
C:\MTS300\Bin\Logos\
4. Identify the BMP file (or files) with the following syntax that match the association(s) you want to remove:

TransportStreamID-ServiceID-Label.bmp
5. Use Windows NT procedures to delete the desired files.

When you restart the Master Client and display the inputs again, the logo/service association will be removed and the default icon will be used to represent the service.

Opening the Expert Client

You can open the Expert Client for the input you are monitoring from either the Port Manager panel or the Services panel in the Master Client. Opening the Expert Client from Services panel will display the error messages for the service you selected in the Report view of the Expert Client.

Use the following procedure to start the Expert Client from the Master Client:

1. Select an Analysis Server icon in the Port Manager panel or select a service icon in the Services panel.
2. Right-click the selected icon, and then select **Launch Expert Client** from the shortcut menu. The Expert Client default display opens showing the following views:
 - At the left of the display, the Hierarchic view shows up to six levels of the transport stream hierarchy. You can use the icons and shortcut menus to access deeper levels of detail about the selected transport stream component.
 - At the right of the display, the Statistics view shows the Program Allocation panel and provides access to other panels showing various high-level statistics about the transport stream.
 - If you selected a service icon in the Services panel, at the bottom of the display, the Report view of the Expert Client displays the Message panel for the selected service.

NOTE. You can also double-click a service icon in the Services panel to open the Expert Client directly.

See the *Expert Client Reference* on page 3–83 for more information about using this client.

Opening the Configuration Client

Use the following procedure to start the Configuration Client from the Master Client:

1. Select an Analysis Server icon in the Port Manager panel.
2. Right-click the Analysis Server icon, and then select **Launch Configuration Client** from the shortcut menu.

The Configuration Client is displayed showing the Analysis Server configuration for the selected I/O port. If another Configuration Client is connected to the Analysis Server you are connecting to, you will see a message saying that you have read-only access to the Analysis Server and cannot change any parameters.

See the *Configuration Client Reference* on page 3–151 for more information about using this client.

Specifying the MPEG Analysis Format

Use the following procedure to set the MPEG analysis format for the I/O port you are monitoring:

1. Select the Analysis Server icon in the Port Manager panel for the input you want to configure.
2. Right-click the Analysis Server icon, and then select **Launch Configuration Client** from the shortcut menu. The Configuration Client for the selected I/O port is displayed.
3. Click **Analysis** in the left pane of the Configuration Client to open the Analysis configuration panel.
4. Select the appropriate analysis format from the Analysis Type group.
5. Select any analysis options in the Analysis Options group.
6. Click the **Apply** button or select Apply from the Session menu.
7. Click **Restart Now** when you are prompted to restart the Analysis Server using the new analysis format.

For more information about specifying MPEG analysis formats, see the *Configuration Client Reference* beginning on page 3–151.

Stopping and Restarting Analysis Servers and the Server Manager

When the MTS300 system starts, Server Manager starts automatically. The Analysis Server process starts when you assign an Analysis Server to an I/O port. You can use two methods to restart the Server Manager and Analysis Servers:

1. Reboot the MTS300 system.
2. Stop and restart the MPEG Analysis Service using the Windows NT Control Panel.
 - a. Open the Windows NT Control Panel and double-click **Services**.
 - b. Find and select **MPEG Analysis Service** in the Service list box.
 - c. Click **Stop**.
 - d. Select **MPEG Analysis Service**.
 - e. Click **Start**.

***NOTE.** This procedure stops and restarts all MTS300 system servers. If you were connected to a Server Manager or had some other active processes before stopping and restarting the MPEG Analysis Service, you will have to reconnect after the service has been restarted.*

Error Reporting Tasks

This section contains procedures for performing error reporting tasks in the Master Client workspace. Unless indicated otherwise, the Master Client must be started and connected to a Server Manager to perform these procedures. The error reporting tasks appear in the following order:

- *Defining Error Levels*
- *Displaying Only Services with Errors*
- *Specifying the Level of Errors Reported in the Master Client*

Defining Error Levels

The following procedure shows you how to configure an Analysis Server to report errors at a defined level using the Configuration Client:

1. Select the Analysis Server icon in the Port Manager panel that you are using to monitor the transport stream input.
2. Right-click the Analysis Server icon and select **Launch Configuration Client** from the shortcut menu.
3. Open the Report Message Level panel by expanding the **View** hierarchy in the Navigation pane of the Configuration Client, and then selecting **Message Level**.

The right panel changes to show a list of tests performed by the Analysis Server. See Figure 3–5. For each test performed by the Analysis Server, you can define the error level as Critical, Major, Minor, Warning, or Info (information).

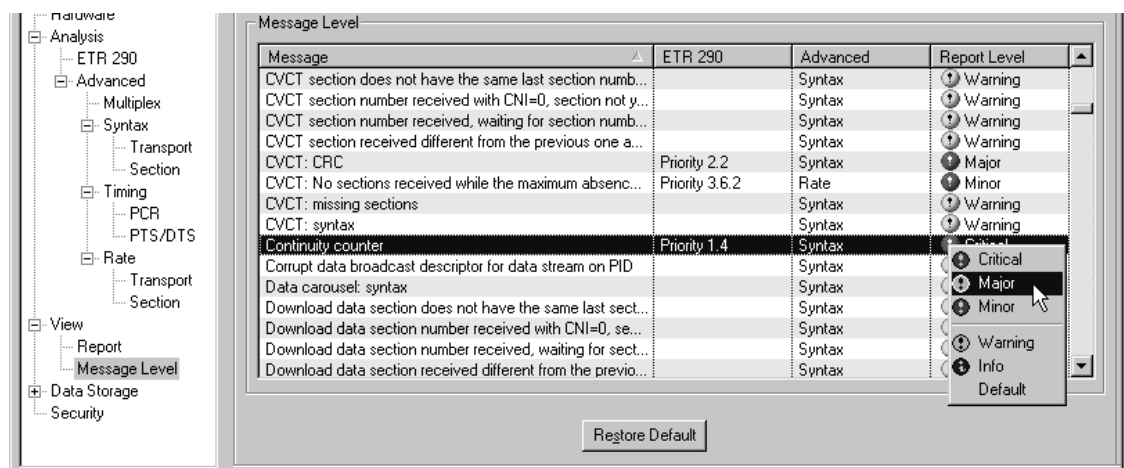


Figure 3–5: Report Message Level panel in the Configuration Client

4. In the Report Level column, right-click the current severity level definition for the error you want to change. (You can also left-click the definition term to step through each shortcut menu item.)
5. Select the appropriate error level from the shortcut menu.

To reset error levels back to the factory default levels, use one of the following techniques:

- To reset the error message level for the selected error to the default state (corresponding to ETR290), select the **Default** from the shortcut menu.
- To reset the error message levels for all errors to the default state (corresponding to ETR290), click the **Restore Default** button at the bottom of the Report Message Level panel.

Displaying Only Services with Errors

Use the following procedure to limit the service icons displayed in the Master Client to those with errors detected on them:

1. Click the **Edit Workspace** button, or select **Edit** from the Workspace menu.
2. In the Workspace dialog box, click **Graphics**.
3. Check the **Display only Services with Errors** option in the Service view group.
4. Click **OK**, and when you return to the workspace, only those icons currently experiencing errors will be displayed.

Specifying the Level of Errors Reported in the Master Client

The following procedure shows you how to specify the level of errors reported in the Master Client:

1. Click the Edit Workspace button or select **Edit** from the Workspace menu.
2. In the Workspace dialog box, select **Graphics** in the left-hand pane.
3. In the Analysis Display group, choose the level of errors that you want reported in the Master Client.

Analyses Reference

This section describes Analysis Servers and the default and user-controlled analyses performed by the MTS300 system. This section also describes the generic procedure you will use to set, remove, and modify probes. This information is provided in the following sections:

- *Analysis Servers* page 3–37
- *Default Analyses* page 3–38
- *User Controlled Analyses (Probes)* page 3–39
- *ETR 290 Probe Descriptions* page 3–44
- *Multiplex Probe Descriptions* page 3–60
- *Syntax Probe Descriptions* page 3–66
- *Transport Syntax Probe Descriptions* page 3–68
- *Section Syntax Probe Descriptions* page 3–72
- *Mega Frame Syntax Probe Descriptions* page 3–74
- *Timing Probe Descriptions* page 3–76
- *Transport Rate Probe Descriptions* page 3–79
- *Section Rate Probe Descriptions* page 3–80
- *Mega Frame Rate Probe Descriptions (DVB-T only)* page 3–82

Analysis Servers

An Analysis Server is the process that performs the actual analyses on a transport stream input. The Analysis Server sends analysis results to the Server Manager.

NOTE. *An individual MTS300 system is limited to operating two Analysis Servers simultaneously, and can launch only one Stream Player, one Stream Recorder, and one OpenMux application at a time. In addition, the MTS300 system is limited to an aggregate data rate of 140 Mbs between all operating applications.*

Analysis Servers conduct very few full-time, default analyses on inputs. The only default analyses performed are fundamental to monitoring and analyzing transport streams and cannot be disabled. Refer to *Default Analyses* on page 3–38 for a description of these default analyses.

You set and control all remaining analyses, which are called probes. The term probes, differentiates analyses that you set and control from the default analyses performed by the Analysis Servers.

You configure each Analysis Server to perform specific analyses using the Configuration Client. The results of the analyses performed by the Analysis Servers are displayed in both the Master and Expert Clients. Each client displays the analysis results at different levels of detail.

See the following sections for further information:

- See *Master Client Reference* (page 3–9) and *Expert Client Reference* (page 3–83) for more information about how each client reports errors.
- See *Probe Operating Conventions* on page 3–39 for more information about using the Configuration Client to set probes and probe limits.
- See *Configuration Client Reference* on page 3–151 for more information about the Configuration Client panels.

Default Analyses

Analysis Servers always check for synchronization and monitors transport rates.

Synchronization

If the Analysis Server cannot synchronize to an input, a general error is reported in the Report view. This error is the same as ETR 290 error 1.1, TS_sync_loss.

NOTE. *If the Analysis Server cannot synchronize with the input stream, no other tests or analyses can be conducted.*

Transport Rate

Analysis Servers calculate the average bit rate of each PID in the input stream and display the results in the Expert Client Program Allocation, PID Allocation, and Type Allocation panels of the Statistic View. The analysis is automatic and cannot be disabled.

Use the Transport Rate Analysis panel of the Configuration Client to set probes on selected stream PIDs for transport rates that fall below or exceed limits of your choosing (see page 3–79). Refer to *Transport Rate Analysis Panel* on page 3–181 for information about using the panel.

User Controlled Analyses (Probes)

You control all probes using the the Configuration Client. Refer to *Configuration Client Reference* on page 3–151 for detailed descriptions of each panel.

This section describes basic procedures you will use to set, modify, and remove probes on the MTS300 system. It also describes the options available in the Configuration Client Analysis panel.

Probe Operating Conventions

The following information pertains to all user-controlled analyses (probes):

- Probes are not part of the default analyses. To restore operation to only the default analyses, select **New Configuration** from the Configuration Client Session menu and click **Apply**. See *Saving and Restoring MTS300 Configurations* on page 3–153 for procedures on saving and loading configurations.

Alternatively, you can select **Restore Default** for each panel in the Configuration Client, and then apply your changes by clicking the **Apply** button.

- An Analysis Server for a particular input stores probe settings and uses those settings whenever analyzing an stream at that input. If a probe is set when you stop analysis and power the instrument down, it is also set the next time you use the MTS300 system.
- To maximize system performance (especially with input streams that contain many errors), limit the number of probes set at any one time.

Setting Probes. The following procedure uses the Multiplex Analysis panel of the Configuration Client as an example. You can set probes on other configuration panels using the same basic steps.

1. Start the Configuration Client from the Master Client:
 - a. Click the icon for the input you want to modify in the Multiplex panel of the Master Client.
 - b. Right-click the icon, and then select **Configuration Client** from the shortcut menu.
 - c. Click **Advanced**, and then **Multiplex** in the Navigation frame of the Configuration Client. The Multiplex Analysis panel is displayed in the right-hand part of the Configuration Client application window.

2. Select the desired probe in the Probe Type list of the Multiplex Analysis panel (see Figure 3–6).

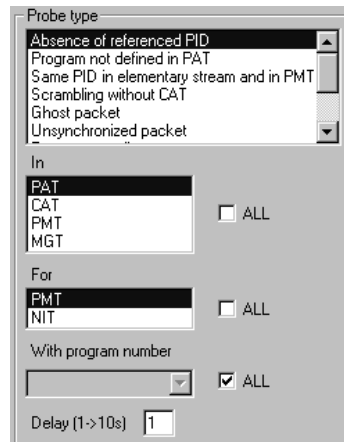


Figure 3–6: Multiplex Analysis panel, Probe Type list box

3. Make any additional selections required for the particular probe. Additional configuration settings for the selected probe appear below the Probe Type list when you select the probe, as shown in the following illustration.
 - a. In this example, when you select Absence of referenced PID, the In box appears that allows you to select the absence table to analyze. When you select an item in the In box, a For box appears that allows you to select the table.
 - b. When you select an item in the For box, a With PID or With program number box appears that allows you to select PIDs or program numbers for PMTs. A Delay box appears that allows you to set the delay from 1 to 10 s.
4. Click **Add** to add the probe to the Probe List.
5. Click the **Apply** button on the Configuration Client toolbar to activate the probe (and all other changes made since you opened the Configuration Client or last clicked Apply) or click **OK** to activate the probe (and all new settings) and close the Configuration Client.

Changing Current Probe Settings. The following procedure uses the Multiplex Analysis panel as an example. You can change current probe limits on other configuration panels without removing and resetting the probe using the same functional steps.

1. Select (select) the probe name in the Probe List.
2. Change the limit settings as desired.
3. Click **Add**. The error limit change appears in the Probe List.
4. Click **Apply** to change the probe error limits, or click **OK** to change the limits and to close the Configuration Client.

***NOTE.** You must click **Apply** or **OK** to put the changed probe limits into effect.*

Removing Probes. The following procedure uses the Multiplex Analysis panel as an example. You can remove probes on other configuration panels using the same functional steps.

1. Remove the probe or probes from the Probe List.
 - To remove a single probe from the list, select the probe in the Probe List and then click **Remove**. (You can also remove a probe by double-clicking the Probe List entry.)
 - To remove several probes from the list at one time, select each probe name in the Probes List and then click **Remove**. To select several contiguous names, click the first name and then hold the **SHIFT** key down while selecting the last name; to select non-contiguous names, hold the **CTRL** key down while making your selections.
 - To remove all probes from the Probes List, click either **Remove All** or **Restore Default**.
2. To confirm your selections, use one of the following techniques:
 - Click **OK** to deactivate the probes and close the Configuration Client.
 - Click **Apply** to confirm your selections and deactivate the probes while leaving the Configuration Client open

***NOTE.** Removing a probe from the Probe List does not end the probe/analysis; you must also click **Apply**.*

Analysis Types and Analysis Options

Use the Analysis panel of the Configuration Client to select the analysis type and analysis options. Refer to *Analysis Panel* on page 3–163 for detailed information about the Analysis panel settings.

NOTE. *Before configuring or initiating probes, always select the appropriate analysis type and analysis options using the Analysis panel of the Configuration Client. Your selections on the Analysis panel determine which analyses are available on other configuration panels.*

Analysis Type. The Analysis Type setting determines the standard used to monitor the input stream. You can select from MPEG-2 (the default), DVB, and ATSC analysis types.

Analysis Options. You can enable the following analysis options:

- Ghost scanning. Select this option to identify data in unreferenced PIDs that would be hidden as ghost PIDs.
- The Analysis Server calculates transport rates every 500 ms, but uses a smoothing period for transport rate averaging. In the default configuration, the Analysis Server averages the reported transport rate over one second, or two 500 ms sample periods. You can increase the smoothing period up to 10 seconds using the Analysis panel of the Settings window. Refer to *Analysis Panel* on page 3–163 for more information.
- Smoothing time. The Analysis Server calculates transport rates every 500 ms, but uses a smoothing period for transport rate averaging. In the default configuration, the Analysis Server averages the reported transport rate over one second, or two 500 ms sample periods. You can increase the smoothing period up to 10 seconds using the Analysis panel of the Settings window. Refer to *Analysis Panel* on page 3–163 for more information.
- AC-3. Select this option to perform analysis on Dolby AC–3 audio parameters when you are monitoring MPEG–2 or DVB transport streams containing embedded AC–3 audio.
- GI-Digicypher. Select this option to interpret Digicypher II video streams as MPEG video elementary streams (instead of private data). This allows you to perform PCR and PTS analyses on these streams.

NOTE. *The remaining analysis options are available only when you select the DVB analysis type.*

- DVB-T. Select this option to enable Mega Frame analysis. Three of the Settings panels (Mega Frame Syntax, Mega Frame Timing, and Mega Frame Rate) are available only when you select the DVB analysis type and the DVB-T analysis option.
- SIDAT 360 data broadcasting analysis. Select this option to enable SIDAT 360 analysis and to enable the two SIDAT 360 options: Multiprotocol Encapsulation and Data Carousel.

SIDAT 360 Analysis. SIDAT 360 is a set of analyses that allow you to analyze the following two main types of standard DVB Data Broadcasting streams: Multiprotocol Encapsulation and Data Carousel.

Multiprotocol Encapsulation streams usually carry IP packets, and Data Carousel streams may carry application-specific data modules that are broadcast cyclically, such as teletext pages.

Selecting SIDAT 360 data broadcasting analysis from the Analysis panel of the Configuration Client sets a probe that checks the validity and consistency of the related data_broadcast_descriptor carried in the SDT or the EIT. The three different types of tables carried on those streams have the same probing facilities as standard DVB tables, except for defining the maximum and minimum allowed rates.

Additionally, when you select the Multiprotocol Encapsulation option, you can use the IP Monitoring view to monitor the IP traffic on the input stream. Refer to *IP Monitoring View* on page 3–149 for more information about the view.

ETR 290 Probe Descriptions

The Configuration Client ETR 290 panel allows you to set and configure ETR 290 probes. Refer to *ETR 290 Panel* on page 3–165 for information about using the ETR 290 panel. This section describes the list of probes set using the ETR 290 recommendations selected from the ETR 290 panel.

The DVB Measurement Guidelines (ETR 290) provides guidelines for measurement in Digital Video Broadcasting (DVB) satellite, cable, and terrestrial digital television systems. The document is designed to define a number of measurement techniques, such that the results obtained are comparable when the measurements are carried out in compliance with the appropriate definition. Chapter 5 of ETR 290 recommends and defines tests at the Transport Stream level. The discussion for the probes included for each recommendation are arranged according to the assigned ETR 290 priority level:

- First priority: necessary for decodability (basic monitoring)
- Second priority: recommended for continuous or periodic monitoring
- Third priority: application-dependent monitoring

You can configure Analysis Servers to perform most first, second, and third priority ETR 290 measurements. Table 3–14 lists the measurements recommended in ETR 290 and indicates how the Analysis Servers perform each one.

Tests 3.3, 3.9, and 3.10 are related to the T-STD (the hypothetical Transport Stream System Target Decoder defined in the MPEG-2 standard) and are too computation-intensive to be performed by the Analysis Servers.

You can perform T-STD analysis with the MTS300 Deferred-Time Analyzer application (MTS300, Option DT only) if you first capture part of the input stream to the MTS300 system hard drives. Refer to the *MTS300 Series MPEG-2 System Analyzer User Manual* for more information about performing T-STD analysis.

Table 3–14: ETR 290 tests

Test number	Test name	Automatic	User-requested	Not performed
1.1	TS sync loss	•		
1.2	Sync byte error		•	
1.3	PAT error		•	
1.4	Continuity count error		•	
1.5	PMT error		•	
1.6	PID error		•	
2.1	Transport error		•	
2.2	CRC error		•	
2.3	PCR error		•	
2.4	PCR accuracy error		•	
2.5	PTS error		•	
2.6	CAT error		•	
3.1	NIT error		•	
3.2	SI repetition rate		•	
3.3	Buffer error			•
3.4	Unreferenced PID		•	
3.5	SDT error		•	
3.6	EIT error		•	
3.7	RST error		•	
3.8	TDT error		•	
3.9	Empty buffer error			•
3.10	Data delay error			•

The remainder of this section describes each ETR 290 recommendation performed by the MTS300 system. The discussions for each recommendation indicates how errors are defined for each test and the probes you need to set using the individual panels, should you choose to do so. However, when you select a recommendation from the ETR 290 panel, all the probes necessary to test to the recommendation are set automatically.

TS_Sync_Loss (1.1)

Each packet of the transport stream is preceded by a header consisting of four bytes. The first byte of the header is the synchronization byte, whose content is always the hexadecimal value 0x47. In the MPEG-2 decoder, the synchronization byte serves for synchronization with the packetized transport stream. DVB recommendations define synchronism such that a sequence of at least five synchronization bytes have to be detected by the MPEG-2 decoder. Synchronization is lost if the synchronization byte in a sequence of at least three TS packets are not detected according to the DVB recommendations. This status is referred to as TS_Sync_Loss.

TS_Sync_Loss is the only ETR 290 parameter that is always monitored by the Analysis Server.

Error Precondition. In the DVB Measurement Guidelines (ETR290), the preconditions for a TS_Sync_Loss message is as follows:

Indicator	Precondition	Reference
TS_Sync_Loss	Loss of synchronization with consideration of hysteresis parameters	ISO/IEC 13818-1: Sub clause 2.4.3.3 / annex G.01

Sync_byte_error (1.2)

Each packet of the transport stream is preceded by a header consisting of four bytes. The first byte of the header is the synchronization byte, whose content is always the hexadecimal value 0x47. In the MPEG-2 decoder the synchronization byte serves for synchronization with the packetized transport stream. If the synchronization byte is missing or contains errors too often, the decoder will not be able to synchronize to the transport stream. The MPEG test decoder checks the synchronization byte of every packet in the transport stream for correct contents.

Error Precondition. The precondition for a Sync_Byte_Error message is defined in ETR 290 as follows:

Indicator	Precondition	Reference
Sync_byte_error	Sync_byte not equal 0x47	ISO/IEC 13818-1: Sub clause 2.4.3.3

Analysis Server Configuration. To configure the Analysis Server to monitor for Sync_byte errors, activate the following probe:

ETR 290	Probe name	Configuration panel
1.2	Unsynchronized Packet Error	Multiplex Analysis

PAT_error (1.3) The Program Association Table (PAT) contains a list of all programs and PIDs contained in the transport stream and of associated PMTs (Program Map Tables), which contain detailed program descriptions. The PAT is of key importance for decoding TV and audio programs. If the PAT is not available or contains an error, the MPEG-2 decoder will not be able to select and decode a program from the transport stream multiplex.

The syntactic structure of a PAT is comprehensively defined in MPEG-2 systems (ISO/IEC 13818-1). The PAT is exclusively transmitted in packets with PID 0x0000. The table may be divided into a maximum of 256 sections with the table index (table_id) of each section being 0x00.

Error Precondition. The preconditions for a PAT_Error message are defined in ETR 290 as follows:

Indicator	Precondition	Reference
PAT_error	<p>PID 0x0000 does not occur at least every 0.5 seconds</p> <p>A PID 0x0000 does not contain a table_id 0x00 (that is, a PAT)</p> <p>Scrambling_control_field is not 00 for PID 0x0000</p>	ISO/IEC 13818-1: Sub clauses 2.4.3.3, 2.4.4.4

Analysis Server Configuration. To configure the Analysis Server to monitor for PAT errors, activate the following probes:

ETR 290	Probe name	Configuration panel
1.3.1	Maximum Interval Between Consecutive PAT Sections	Section Rate Analysis
1.3.2	Table ID Error (PAT)	Section Syntactic Analysis
1.3.3	Reserved PID with TSC Error	Transport Syntactic Analysis

**Continuity_count_error
(1.4)**

Each packet of the transport stream is preceded by a header consisting of four bytes. The fourth byte of the header contains the count of a four-bit continuity counter. The count must be increased by one for every packet of the transport stream that has the same PID. The count may consist of values ranging from 0 to 15; beyond 15, it will start from 0 again (modulo-16 counter). The continuity counter serves to recognize packets of a video or audio program that are either missing or repeated more than once.

The MPEG-2 standard also tolerates counter discontinuity, provided this is indicated by a discontinuity indicator in the optional adaptation field (AF) of the same packet. This method is used primarily for the suppression of error messages when changing programs preceded by remultiplexing of the transport stream.

In the case of null packets (packets that do not contain any useful data but have a PID of 0x1FFF), continuity is not checked, since the value of the continuity counter in zero packets is not defined in the MPEG-2 standard.

Error Precondition. The preconditions for a Continuity_Count_Error_Error message are defined in ETR 290 as follows:

Indicator	Precondition	Reference
Continuity_count_error	Incorrect packet order A packet occurs more than twice Lost packet	ISO/IEC 13818-1: Sub clauses 2.4.3.2, 2.4.3.3

Analysis Server Configuration. To configure the Analysis Server to monitor for continuity count errors, activate the following probe:

ETR 290	Probe name	Configuration panel
1.4	Continuity Counter Error	Transport Syntactic Analysis

PMT_error (1.5) The PMT (Program Map Table) is a table for detailed program descriptions referenced in the PAT. As essential information for the MPEG-2 decoder, it contains the PIDs of all packets of the individual TV, audio, and data streams (elementary-stream PIDs) as well as the PIDs of packets serving for the transmission of PCR values associated with the program. Like the PAT, the PMT is of key importance for decoding TV and audio programs. If PMT is not available or contains an error, the MPEG-2 decoder will not be able to select and decode a program from the transport stream multiplex.

The syntactic structure of a PMT is defined in MPEG-2 systems (ISO/IEC 13818-1). In contrast to the PAT, the PIDs of the individual PMTs are variable; MPEG-2 permits values ranging from 0x0010 to 0x1 FFE (compare to DVB ETS 300468: 0x0020 to 0x1 FFE). The table may be divided into a maximum of 256 sections with one section for each program. The table index (`table_id`) of each section must be 0x02.

Error Precondition. ETR290 states the preconditions for a PMT_Error message as follows:

Indicator	Precondition	Reference
PMT_error	Sections with <code>table_id</code> 0x02 (that is, a PMT) do not occur at least every 0.5 sec on the PID, which is referred to in the PAT Scrambling_control_field is not 00 for all PIDs containing sections with <code>table_id</code> 0x02 (i.e. a PMT)	ISO/IEC 13818-1: Sub clauses 2.4.3.3, 2.4.4.4, 2.4.4.8

Analysis Server Configuration. To configure the Analysis Server to monitor for PMT errors, activate the following probes:

Probe name	Configuration panel
Maximum Interval Between Consecutive PMT Sections	Section Rate Analysis
PMT PID with TSC Error	Transport Syntactic Analysis

PID_error (1.6) The PMT (Program Map Table) entries reveal the elementary-stream PIDs that are contained in the transport-stream multiplex. To decode a program with the corresponding PID, these packets must be contained in the transport stream, and for the MPEG-2 decoder to function error-free these packets also need to be transmitted at certain intervals. The DVB Measurement Guidelines speak of a user-specified period, which means that it can be freely selected by the user. The default value used by the Analysis Server is 1 second; you can change this value when you set the “Absence of reference PID” probe through the Multiplex Analysis configuration panel of the Settings window (refer to *Multiplex Analysis Panel* on page 3–166).

Error Precondition. ETR 290 states the precondition for a PID_Error message as follows:

Indicator	Precondition	Reference
PID_error	Referred PID does not occur for a user-specified period	ISO/IEC 13818-1: Sub clause 2.4.3.8

Analysis Server Configuration. To configure the Analysis Server to monitor for PID errors, activate the following probe:

ETR 290	Probe name	Configuration panel
1.6	Absence of Referenced PID Error	Multiplex Analysis

Transport_error (2.1) The second byte of every packet header in the transport stream contains the transport_error_indicator, which is a flag that serves to indicate bit errors in the following packet. This flag is generated and inserted by the Viterbi or Reed-Solomon decoder at the receiver end if the decoder is no longer capable of correcting all bit and byte errors in the transport stream.

Because it is not possible in the case of a set transport_error_indicator to predict which bit or byte contains an error, this packet must not be evaluated by an MPEG-2 decoder. For this reason, the MPEG test decoder only indicates the Transport_Error, which means that the packet is not checked for further transport stream errors.

Error Precondition. ETR 290 states the precondition for a Transport_error message as follows:

Indicator	Precondition	Reference
Transport_error	Transport_error_indicator in the TS-Header is set to 1.	ISO/IEC 13818-1: Sub clauses 2.4.3.2 / 2.4.3.3

Analysis Server Configuration. To configure the Analysis Server to monitor for non-zero Transport_Error_indicator fields, activate the following probe:

ETR 290	Probe name	Configuration panel
2.1	Transport Error Indicator	Transport Syntactic Analysis

CRC_error (2.2)

If program-specific information (PSI tables such as PAT, CAT, PMT, NIT, EIT, SDT, BAT, and TOT) is transmitted, a value for checking the check sum of this section is inserted at the end of each table section. The CRC (Cyclic Redundancy Check) is used for calculating the check sum at the transmitter and receiver end. Combined with the additionally transmitted CRC value, the check sum for each table section must be zero.

If the resulting check sum does not equal zero, the MPEG-2 decoder must reject the information contained in this table.

If a CRC_error is detected, it cannot be predicted which part of the information contained in the table is not correct. In this case, the MPEG test decoder signals the CRC_error, but the transport stream is not checked for further errors, which are derived from the faulty content of this table (for example, a search for PMT PIDs from a PAT or ES PIDs from a PMT).

Error Precondition. ETR 290 states the precondition for a CRC_Error message as follows:

Indicator	Precondition	Reference
CRC_error	CRC error occurred in CAT, PAT, PMT, NIT, EIT, BAT, SDT or TOT table	ISO/IEC 13818-1: Sub clause 2.4.4 / annex B ETS 300 468: Sub clause 5.2

Analysis Server Configuration. To configure the Analysis Server to monitor for CRC errors, activate the following probe:

ETR 290	Probe name	Configuration panel
2.2	CRC Error	Section Syntactic Analysis

PCR_error (2.3)

In every transport stream, coded time values derived from the system time clock are transmitted so that the MPEG-2 decoder can link its own timing to the coder system timing in order to decode the input stream. Each program contained in the transport stream may have its own independent program system timing. The Program Map Table (PMT) identifies the PID of the transport packets that contain the PCR (Program Clock Reference) values used by the particular program.

The specified packets contain the optional Adaptation Field in which 42 bit PCR values are transmitted. The 42 bits contain two parts: a 33 bit PCR base and a 9-bit PCR extension. The following formulas hold for the bit structure:

$$\text{PCR base (i)} = (\text{system clock frequency} \times t(i) \text{ DIV } 300) \% 2^{33}$$

$$\text{PCR extension (i)} = (\text{system clock frequency} \times t(i) \text{ DIV } 1) \% 300$$

$$\text{PCR (i)} = (\text{PCR base (i)} \times 300) + \text{PCR extension (i)}$$

A 42-bit PCR value coded this way starts again from count 0 after the elapse of $2^{33} \times 300$ clocks (corresponding to a time period of approximately 26.5 hours at 27 MHz).

The MPEG-2 standard also tolerates discontinuity of PCR values following one another, provided this is indicated by the discontinuity indicator in the optional adaptation field (AF) of the same packet. This method is primarily used for the suppression of PCR error messages when changing programs preceded by remultiplexing of the transport stream.

Error Precondition. ETR 290 states the preconditions for a PCR_Error message as follows:

Indicator	Precondition	Reference
PCR_error	PCR discontinuity of more than 100 ms occurring without specific indication	ISO/IEC 13818-1: Sub clauses 2.4.3.4 / 2.4.3.5
	Time interval between two consecutive PCR values more than 40 ms	ISO/IEC 13818-4: Sub clause 9.11.3
		ETR 154: Sub clause 4.5.4

The specified intervals are the default values of the Analysis Server. You can change the intervals, however, on the PCR Timing Analysis panel of the Configuration Client.

Analysis Server Configuration. To configure the Analysis Server to monitor for PCR errors, activate the following probe:

ETR 290	Probe name	Configuration panel
2.3	PCR Timing Analysis ¹	PCR Timing Analysis

¹ This probe also monitors the selected program(s) for PCR_accuracy errors.

PCR_accuracy_error (2.4)

The DVB Measurement Guidelines also recommend additional monitoring of the accuracy of the PCR values transmitted. Accuracy of PCR values may be impaired by inaccurate calculation of the 42-bit PCR word width or by errors during modification of PCR values in a remultiplex.

NOTE. The term accuracy in this case does not refer to absolute frequency accuracy of the 27 MHz system timing, but to the fluctuation width of the PCR values of a program, which is caused by the above mentioned errors.

Error Precondition. ETR 290 states the precondition for a PCR_accuracy_Error message as follows:

Indicator	Precondition	Reference
PCR_accuracy_error	PCR accuracy of selected program is not within ± 500 ns	ISO/IEC 13818-1: Sub clause 2.4.2.2

Analysis Server Configuration. To configure the Analysis Server to monitor for PCR_accuracy errors, activate the following probe:

ETR 290	Probe name	Configuration panel
2.4	PCR Timing Analysis ¹	PCR Timing Analysis

¹ This probe also monitors the selected program(s) for PCR errors.

PTS_error (2.5) Presentation Time Stamps (PTS values) in the PES headers are transmitted by transport stream packets of a program. They enable the MPEG-2 decoder to identify the exact time that a transmitted data block (picture for video streams and beginning of an audio sequence for audio streams) is to be presented. The time stamps are transmitted with a word width of 33 bits and relate to the 27 MHz system timing sequence transmitted in the transport stream together with the PCR values.

Error Precondition. ETR 290 states the precondition for a PTS_Error message as follows:

Indicator	Precondition	Reference
PTS_error	PTS repetition period more than 700 ms	ISO/IEC 13818-1: Sub clauses 2.4.3.6 / 2.4.3.7 / 2.7.4

Analysis Server Configuration. To configure the Analysis Server to monitor for PTS errors, activate the following probe:

ETR 290	Probe name	Configuration panel
2.5	PTS/DTS Timing Analysis	PTS/DTS Timing Analysis

CAT_error (2.6) If encrypted data are contained in a packet of the transport stream, this must be indicated in the packet header (2nd byte) within the field that is two bits wide and is labeled `transport_scrambling_control`. The individual values indicate the following:

Value (binary)	Description
00	No encrypted data contained in the packet
01, 10, 11	Defined by user

If encrypted data are to be transmitted, the MPEG-2 standard recommends the additional transmission of the tables containing the encryption data (Conditional Access Table, CAT) in separate packets with (0x0001) as PID and 0x01 as table index.

The MPEG-2 standard prescribes that packet header including the optional adaptation fields must not be transmitted in encrypted form. According to DVB specifications (ETS 300 468), the same applies to tables containing service information (SI tables PAT, PMT, NIT, EIT, BAT, TDT, TOT, and SDT). The only exception to this rule is the EIT (Event Information Table) when program overviews are transmitted.

Error Precondition. ETR 290 states the preconditions for a CAT_Error message as follows:

Indicator	Precondition	Reference
CAT_error	Packets with transport_scrambling_control not 00 present, but no section with table_id = 0x01 (that is, a CAT) present Section with table_id other than 0x01 (that is, not a CAT) found on PID 0x0001	ISO/IEC 13818-1: Sub clause 2.4.4

Analysis Server Configuration. To configure the Analysis Server to monitor for CAT errors, activate the following probes:

ETR 290	Probe name	Configuration panel
2.6.1	Scrambling without CAT Error	Multiplex Analysis
2.6.2	CAT Table ID Error	Section Syntactic Analysis

NIT_error (3.1)
SDT_error (3.5)
EIT_error (3.6)
RST_error (3.7)
TDT_error (3.8)

These types of service information (SI) are also inserted into the transport stream as additional data (multiplex) and contain items such as the current date, time, and description of the TV program. Each of these tables is transmitted in the form of packets with a given packet number (PID) and must be contained in the transport stream at certain intervals according to the DVB specification. However, not every SI has a different PID; packets for TDT and TOT as well as SDT and BAT have identical PIDs. These tables are differentiated by an entry in the table header, the so-called table index (table_id). This table_id enables an MPEG-2 decoder working in compliance with the DVB standard to identify the type of service information with which it is dealing.

Table 3–15 on page 3–56 is an overview of the service information according to ETS 300 468. In the standard configuration, the Analysis Servers use these values. You can change the maximum interval for each table type using the Section Rate Analysis configuration panel of the Settings window (refer to *Section Rate Analysis Panel* on page 3–182). Do not change Maximum interval settings, however, if you plan to use ETR 290 tests to judge DVB compliance of the input stream.

Table 3–15: Overview of service information defined in ETS 300 468

Service Information	PID [hex]	Table_id [hex]	Max. interval [sec]
NIT	0x0010	0x40, 0x41, 0x42	10
SDT	0x0011	0x42, 0x46	2
BAT	0x0011	0x4A	10 ¹
EIT	0x0012	0x4E to 0x4F, 0x50 to 0x6F	2 ²
RST	0x0013	0x71	—
TDT	0x0014	0x70	30
TOT	0x0014	0x73	30
Stuffing Table	0x0010 to 0x0013	0x72	—

¹ Only if present.

² For the current transport stream multiplexer.

Error Precondition. ETR 290 states the preconditions for NIT_error, SDT_error, EIT_error, RST_error, or TDT_error messages as follows:

Indicator	Precondition	Reference
NIT_error	Section with table_id other than 0x40 or 0x41 or 0x72 (that is, not an NIT or ST) found on PID 0x0010	ETS 300 468: Sub clause 5.2.1
	No section with table_id 0x40 or 0x41 (for example an NIT) in PID value 0x0010 for more than 10 sec	ETR 211: Sub clauses 4.1, 4.4
SDT_error	Sections with table_id = 0x42 (SDT, actual TS) not present on PID 0x0011 for more than 2 sec	ETS 300 468: Sub clause 5.1.3
	Sections with table_ids other than 0x42, 0x46, 0x4A or 0x72 found on PID 0x0011	ETR 211: Sub clauses 4.1, 4.4
EIT_error	Sections with table_id = 0x4E (EIT-P/F, actual TS) not present on PID 0x0012 for more than 2 sec	ETS 300 468: Sub clause 5.1.3
	Sections with table_ids other than in the range 0x4E – 0x6F or 0x72 found on PID 0x0012	ETR 211: Sub clauses 4.1, 4.4
RST_error	Sections with table_id other than 0x71 or 0x72 found on PID 0x0013	ETS 300 468: Sub clause 5.1.3
TDT_error	Sections with table_id = 0x70 (TDT) not present on PID 0x0014 for more than 30 sec	ETS 300 468: Sub clause 5.1.3
	Sections with table_id other than 0x70, 0x72 (ST) or 0x73 (TOT) found on PID 0x0014	ETR 211: Sub clauses 4.1, 4.4

Analysis Server Configuration. To configure the Analysis Server to monitor for SI Table ID errors, activate the following probes:

ETR 290	Probe name	Configuration panel
3.1.1	NIT Table ID Error	Section Syntactic Analysis
3.5.2	SDT Table ID Error	Section Syntactic Analysis
3.6.2	EIT Table ID Error	Section Syntactic Analysis
3.7	RST Table ID Error	Section Syntactic Analysis
3.8.2	TDT Table ID Error	Section Syntactic Analysis

To configure the Analysis Server to monitor for NIT, SDT, EIT, RST, and TDT Repetition errors, activate the following probes:

ETR 290	Probe name	Configuration panel
3.1.2	All NIT section rate probes	Section Rate Analysis
3.5.1	All SDT section rate probes	Section Rate Analysis
3.6.2	All EIT section rate probes	Section Rate Analysis
3.8.1	All TDT section rate probes	Section Rate Analysis

SI_repetition_error (3.2)

The ETR211 standard prescribes minimum and maximum intervals for the repetition of individual packets; Table 3–16 lists the values for service information (SI). The Analysis Server uses these values in the standard configuration. You can change the maximum interval for each table type using the Section Rate Analysis panel of the Settings window (refer to *Section Rate Analysis Panel* on page 3–182). Do not change Maximum interval settings, however, if you plan to use ETR 290 tests to judge DVB compliance of the input stream.

Table 3–16: SI repetition rates according to DVB

Service information	Maximum interval (complete table)	Minimum interval (individual sections)
PAT	0.5 s	25 ms
CAT	0.5 s ¹	25 ms ¹
PMT	0.5 s	25 ms
NIT	10 s	25 ms
SDT	2 s ²	25 ms
BAT	10 s ¹	25 ms ¹
EIT	2 s ²	25 ms

Table 3–16: SI repetition rates according to DVB (cont.)

Service information	Maximum interval (complete table)	Minimum interval (individual sections)
RST	—	25 ms
TDT	30 s	25 ms
TOT	30 s	25 ms

¹ If present.

² For current transport stream multiplex.

Error Precondition. ETR 290 states the precondition for an SI_repetition_Error message as follows:

Indicator	Precondition	Reference
SI_repetition_error	Repetition rate of SI tables outside of specified limits	ETS 300 468: Sub clause 5.1.4 ETR 211: Sub clause 4.4

Analysis Server Configuration. To configure the Analysis Server to monitor for SI Repetition errors, activate the following probes:

ETR 290	Probe name	Configuration panel
3.2	Max/Min Interval Between Consecutive SI Sections (All SI tables, all PIDs)	Section Rate Analysis (Select Add all)

Unreferenced PID (3.4) The transport stream multiplex is permitted to contain only packets with program-specific information (PSI and SI tables), packets with certain PIDs that are reserved in the MPEG-2 standard, and packets that are identified in a Program Map Table (PMT).

Error Precondition. ETR 290 states the precondition for an Unreferenced_PID message as follows:

Indicator	Precondition	Reference
Unreferenced_PID	PID (other than PAT, CAT, CAT_PIDs, PMT_PIDs, NIT_PID, SDT_PID, TDT_PID, EIT_PID, RST_PID, reserved_for_future_use PIDs, or PIDs user defined as private data streams) not referred to by a PMT within [0.5] seconds	ETS 300 468: Sub clause 5.1.3

Notice that according to the DVB Measurement Guidelines, if a program is changed (a new PMT), an unreferenced PID may appear in the transport stream during a transition period of no more than 0.5 s.

Analysis Server Configuration. To configure the Analysis Server to monitor for Unreferenced PID errors, activate the following probe:

ETR 290	Probe name	Configuration panel
3.4	Ghost Packets Error	Multiplex Analysis

Multiplex Probe Descriptions

This section discusses each of the multiplex analyses in the order that they are listed in the Configuration Client Multiplex Analysis panel. Refer to *Multiplex Analysis Panel* on page 3–166 for information about using the configuration panel. Each section describes the errors detected by each of the multiplex probes and where the error is displayed in the Expert Client.

Table 3–17 lists all of the multiplex analyses, the associated ETR 290 recommendation, and the analysis type setting required for the probe to be available (refer to *Analysis Panel* on page 3–163).

Table 3–17: Multiplex analyses

Analysis probe	ETR 290	Analysis type
Absence of referenced PID	1.6	All
Program not defined in PAT	—	All
Same PID in elementary stream and in PMT	—	All
Scrambling without CAT	2.6.1	All
Ghosts packet	3.4	All
Unsynchronized packet	1.2	All
Table ID	PAT	1.3.2
	CAT	2.6.2
	NIT	3.1.1
	TSMT	—
	SDT	3.5.2
	EIT	3.6.2
	RST	3.7
	TDT	3.8.2
	TOT	—
	MGT	—
	TVCT	—
	CVCT	—
	STT	—
	RRT	—
Inter SI consistency	—	DVB and DVB-T
Mega Frame size	—	DVB-T only
Terrestrial descriptor consistency	—	DVB-T only
Program paradigm	—	ATSC only
Scrambled ES without CA descriptor	—	ATSC only
Absence of mandatory EIT	—	ATSC only

Absence of Referenced PID Probe	<p>Error Condition: Reports an error if the time interval between a PID reference in a PAT, CAT, or PMT and the appearance of that PID in the stream exceeds the period of delay (1 to 10 seconds) you specify.</p> <p>Associated ETR 290 recommendation: PID_error, 1.6.</p> <p>How/where an error is reported in the Expert Client: In the ETR 290 view and as a general error message in the Report view.</p>
Program Not Defined in PAT Probe	<p>Error Condition: Reports an error if a PMT program number is not defined in the PAT.</p> <p>Associated ETR 290 recommendation: None.</p> <p>How/where an error is reported in the Expert Client: As a general error message in the Report view.</p>
Same PID in Elementary Stream and in PMT Probe	<p>Error Condition: Reports an error if a PMT and an elementary stream are identified with the same PID.</p> <p>Associated ETR 290 recommendation: None.</p> <p>How/where an error is reported in the Expert Client: As a general error message in the Report view.</p>
Scrambling without CAT Probe	<p>Error Condition: Reports an error if packets with non 00 transport_scrambling_control exist in the stream but no section with table_id 0x01 (a CAT) is found.</p> <p>Associated ETR 290 recommendation: CAT_error, 2.6.1.</p> <p>How/where an error is reported in the Expert Client: In the ETR 290 view and as a general error message in the Report view.</p>
Ghosts Packet Probe	<p>Error Condition: Reports an error if a PID (other than one of the defined or reserved values) appears in the stream but is not referenced in a PMT within 0.5 seconds.</p> <p>Associated ETR 290 recommendation: Unreferenced_PID, 3.4.</p> <p>How/where an error is reported in the Expert Client: In the ETR 290 view, as a general error message in the Report view, as a Ghost icon in the Hierarchic view, and as a Ghost service/program in several Statistic view panels.</p>

Unsynchronized Packet Probe

Error Condition: Reports an error if the transport packet header Sync_byte is not 0x47.

NOTE. *If synchronization is lost, no other analyses are possible.*

Associated ETR 290 recommendation: Sync_byte_error, 1.2.

How/where an error is reported in the Expert Client: As a general error message in the Report view, the UNP indicator on the application window status bar, the Unsynchrono Packets panel of the Statistic View, and the ETR 290 level 1.2 indicator.

Table ID Probe

Error Condition: Reports an error if the Table ID of the PSI/SI selected is not corrected.

Associated ETR 290 recommendation: See the table below.

Table 3–18: Table ID analyses

Table ID analysis error	ETR 290
PAT error: PAT 0 with table_id different to 0x0	1.3.2
CAT error: PID 0x1 with table_id other than 0x1	2.6.2
NIT error: PID 0x10 with table_id other than 0x40, 0x41, or 0x72 (ST)	3.1.1
SDT error: PID with 0x11 table_id other than 0x42, 0x46, 0x4A (BAT), or 0x72 (ST)	3.5.2
EIT error: PID with 0x12 table_id other than 0x4E – 0x6F or 0x72 (ST)	3.6.2
RST error: PID with 0x13 table_id other than 0x71 or 0x72 (ST)	3.7
TDT error: PID with 0x14 table_id other than 0x71 or 0x72 (ST) or 0x73 (TOT)	3.8.2

How/where an error is reported in the Expert Client: As an error message in the Report view, the ETR 290 PR1, PR2, and PR3 indicators on the application window status bar, and the ETR 290 views of the Statistic View.

Inter SI Consistency Probe (DVB only)

This analysis probe appears only when the analysis type setting is set to DVB (refer to *Analysis Panel* on page 3–163). Refer to the InterSI sections on page 3–63 for more information about the InterSI probe.

Error Condition: Reports an error if the Analysis Server detects problems between PSI and SI tables.

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a general error message in the Report view.

Setting the InterSI probe activates two types of analysis:

- Intra analysis, which detects problems *within* PSI or SI tables.
- Inter analysis, which detects problems of coherence between SI tables.

InterSI analyses within tables. When the InterSI probe is set, the Analysis Server checks the PMT, NIT, BAT, EIT and SDT for the presence of mandatory descriptors and checks all descriptors for compliance with DVB standards.

The Analysis Server also checks the following specific characteristics of the NIT and EIT:

- In the NIT, the `transport_stream_id` and the `network_id` must be unique for a given `network_id`.
- In the EIT, the field `event_id` must be unique for a given `service_id`, `transport_stream_id`, and `original_network_id`.
- If an EIT is of type “schedule,” then the `running_status` field must be set to “undefined.”
- If EIT is of type “following,” then the `running_status` field shall not be set to “running.”

InterSI analyses between tables. When the InterSI probe is set, the Analysis Server monitors the NIT, SDT, EIT, and BAT for inter-table compatibility and reports errors if the tables do not satisfy the following conditions:

- The `transport_stream_id` and `original_network_id` fields of the NIT should be referenced in an SDT.
- Each `transport_stream_id`, `original_network_id`, `service_list_descriptor`, and `service_id` of the NIT must be present in an SDT.
- The `transport_stream_id`, and `original_network_id` fields of the EIT must be declared in the NIT.
- Each `transport_stream_id`, `original_network_id`, `service_list_descriptor`, and `service_id` of the BAT must be present in an SDT.

- There should be an EIT referencing the service_id, transport_stream_id, and original_network_id fields of the SDT.
- If the EIT_schedule_flag field of the SDT is set to 1, then an EIT schedule for service_id, transport_stream_id, and original_network_id must be present.
- If the EIT_schedule_flag of the SDT is set to 0, then an EIT schedule should not be present for service_id, transport_stream_id, or original_network_id.
- If the EIT_present_following_flag of the SDT is set to 1, then an EIT present/following for service_id, transport_stream_id, and original_network_id must be present.
- If the EIT_present_following_flag of the SDT is set to 0, then an EIT present/following should not be present for service_id, transport_stream_id, or original_network_id.

**Mega Frame Size Probe
(DVB-T only)**

This analysis probe appears only when the analysis type setting is set to DVB and DVB-T is selected (refer to *Analysis Panel* on page 3–163).

Error Condition: Reports an error if the Mega Frame Size probe detects inconsistency between the indicated size of the Mega Frames in the MIP and the measured size (calculated from the packet rate and the PIA time stamps).

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a general error message in the Report view.

**Terrestrial Descriptor
Consistency Probe
(DVB-T only)**

This analysis probe appears only when the analysis type setting is set to DVB and DVB-T is selected (refer to *Analysis Panel* on page 3–163).

Error Condition: Reports an error if the parameters carried in the MIP match those carried in the terrestrial delivery system descriptor (if present in the NIT).

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a general error message in the Report view.

**Program Paradigm Probe
(ATSC only)**

This analysis probe appears only when the analysis type setting is set to ATSC (refer to *Analysis Panel* on page 3–163).

Error Condition: Reports an error if the Analysis Server detects problems of consistency with the method specified by the program paradigm. Refer to *Appendix E: ATSC Program Paradigm* for more information.

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a general error message in the Report view and as a specific report of the ES or table concerned. The messages are logged in the multiplex folder.

**Scrambled ES Without CA
Descriptor Probe
(ATSC only)**

This analysis probe appears only when the analysis type setting is set to ATSC (refer to *Analysis Panel* on page 3–163).

Error Condition: Reports an error if the CA descriptor is not found where expected for an ES PID.

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a general error message in the Report view and in the specific report of the stream in the Hierarchic window.

**Absence of Mandatory EIT
Probe
(ATSC only)**

This analysis probe appears only when the analysis type setting is set to ATSC (refer to *Analysis Panel* on page 3–163).

Error Condition: Reports an error if the mandatory EIT (0, 1, 2, 3) are not all present.

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a general error message in the Report view. The messages are logged in the multiplex folder.

Syntax Probe Descriptions

The MTS300 system provides the following levels of syntax analyses (the page references indicate where the discussions for that probe type begin):

- Private syntax analysis (beginning on page 3–67)
- Transport syntax analyses (beginning on page 3–68)
- Section syntax analyses (beginning on page 3–72)
- Mega Frame syntax analyses (DVB-T only) (beginning on page 3–74)

Refer to *Appendix D: Using the Private Syntax Interpreter* for more information about using the Private Syntax Interpreter and generating user-defined private syntax definition files.

When the Analysis Servers detect a section syntax error, the error indicator above the Expert Client Hierarchic view icon turns red and a general error message appears in the Report view. You can also double-click the Hierarchic view icon to open a Message view particular to the affected table. The Expert Client also displays the presence and nature of each section syntax error in the section analysis view (refer to *Section Analysis View* on page 3–139).

Use the Configuration Client Transport Syntactic Analysis, Section Syntactic Analysis, and Mega Frame Syntactic Analysis panels to set, modify, and remove probes that check transport stream syntax:

- Refer to *Transport Syntactic Analysis Panel* on page 3–170 for information about using the Transport Syntactic Analysis panel.
- Refer to *Section Syntactic Analysis Panel* on page 3–172 for information about using the Section Syntactic Analysis panel.
- Refer to *Mega Frame Syntactic Analysis Panel* on page 3–174 for information about using the Mega Frame Syntactic Analysis panel.

Private Syntax Probe Descriptions

This section describes the private syntax options available on the Analysis panel of the Configuration Client.

Private Syntax and General Syntactic Information

The Configuration Client Syntactic Analysis panel contains general configuration and private syntax options that affect private section interpretation and syntax error reporting:

- The Map private section as DVB section option appears only when you have set the analysis type to DVB using the Analysis panel (refer to *Analysis*, beginning on page 3–37 and *Analysis Panel* on page 3–163).

When you select Map private section as DVB section (a check appears in front of the option), the Analysis Server attempts to interpret all private sections encountered in the stream as DVB SI sections.

- The Maximum number of errors by entity setting allows you set the maximum number of errors the Analysis Server detects before stopping the analysis for an entity. This limits the number of syntax errors reported by the Analysis Server for each entity. This option is convenient when you are analyzing non-compliant streams that contain many errors.

Including Private Syntax Definition Files

You can load user-defined private syntax definition (.cta) files using the Private Syntax portion of the Configuration Client Syntactic Analysis panel. The files you load, generated with the Private Syntax Interpreter, allow you to analyze proprietary or non-standard tables and descriptors contained in the input stream. To load one or more Private syntax definition files, use the following procedure:

1. Click **Modify** in the Private Syntax group. The Syntax Selection dialog box is displayed.
2. Select the private syntax definition file you want to load from the List of available syntax list box and click **Add**. The file name is added to the List of selected syntax list box.
3. Repeat step 2 for each file you want to load into the Analysis Server configuration.
4. Click **OK** when you are finished, and then apply your changes in the Configuration Client.

Refer to *Appendix D: Private Syntax Interpreter* for more information about using the Private Syntax Interpreter and generating user-defined private syntax definition files.

Transport Syntax Probe Descriptions

Table 3–19 lists the transport syntax analyses, the associated ETR 290 recommendation, and the analysis type selected when the probe is available (refer to *Analysis Panel* on page 3–163).

Table 3–19: Transport syntax analyses

Analysis probe	ETR 290	Analysis type
Null packet with PUSI	none	All
Reserved PID	none	All
PID 0x47	none	All
Reserved (PAT, CAT, or Null Packet) PID with TSC	1.3.3	All
PMT PID with TSC	1.5.2	All
Continuity counter	1.4	All
PCR/OPCR flags	none	All
Null packet with ADF	none	All
ADF flags	none	All
Transport error indicator	2.1	All
PAT PID with AFC & DI	—	ATSC only
PMT PID with AFC & DI	—	ATSC only
PSIP tables PID with TSC	—	ATSC only
PSIP tables PID with ADF	—	ATSC only
MGT PID with PUSI & pointer field	—	ATSC only

Null Packet with PUSI Probe

Error Condition: Reports an error if a null packet (PID 0x1FFF) is received with the bit PUSI (payload_unit_start_indicator) set to 1. If the PUSI bit is set to 1, it indicates that the payload of this transport stream packet will commence.

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a general error message in the Report view.

Reserved PID Probe

Error Condition: Reports an error if any PID value is not equal to the following: 0x0000 (PAT), 0x0001 (CAT), 0x0002 (TSDT), or in the interval 0x0010–0x1FFF (user-defined).

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a general error message in the Report view.

PID 0x47 Probe	<p>Error Condition: Reports an error if a packet with PID 0x47 is received.</p> <hr/> <p>NOTE. The PID 0x47 error is not a violation of the MPEG-2 standard. However, you may want to detect PID 0x47 since it can lead to troubles during decoding if the decoder incorrectly interprets the PID as a sync byte.</p> <hr/> <p>Associated ETR 290 recommendation: None.</p> <p>How/where an error is reported in the Expert Client: As a syntax error in the appropriate Message view(s).</p>
Reserved (PAT, CAT, and Null Packet) PID with TSC Probe	<p>Error Condition: Reports an error if a PID 0x0000 (PAT), 0x0001 (CAT), or 0x1FFF (null/stuffing) packet has a transport_scrambling_control field that does not equal 00.</p> <p>Associated ETR 290 recommendation: PAT_error, 1.3.3.</p> <p>How/where an error is reported in the Expert Client: In the ETR 290 view, as a general error message in the Report view, and in the item Message view, if any.</p>
PMT PID with TSC Probe	<p>Error Condition: Reports an error if a PMT PID (described by the PAT) has a transport_scrambling_control field that does not equal 00. MPEG standards do not allow scrambled PMT.</p> <p>Associated ETR 290 recommendation: PMT_error, 1.5.2.</p> <p>How/where an error is reported in the Expert Client: In the ETR 290 view, as a general error message in the Report view, and in the PMT Message view (if it is open in the Client view).</p>
Continuity Counter Probe	<p>Error Condition: Reports an error if the Analysis Server detects an incorrectly incremented transport packet continuity_counter. Except for null packets and in cases of duplicate packets or discontinuities, the continuity counter of each successive payload-carrying packet of the same PID must increment by one, from 0x0 to 0xF (module 16).</p> <p>Associated ETR 290 recommendation: Continuity_count_error, 1.4.</p> <hr/> <p>NOTE. The Continuity Counter panel displays detected errors on a per-service basis. Refer to Continuity Counter Panel on page 3–132 for more information about this panel.</p> <hr/> <p>How/where an error is reported in the Expert Client: The ETR 290 view, the Continuity Counter panel of the Statistic view, and the appropriate Message view(s).</p>

PCR/OPCR Flags Probe	<p>Error Condition: Reports an error if the Analysis Server detects a transport packet adaptation field PCR_flag set to 0, and if the OPCR_flag is set to 1 (cannot have an OPCR without a PCR).</p> <p>Associated ETR 290 recommendation: None.</p> <p>How/where an error is reported in the Expert Client: An error message in the appropriate Message view(s).</p>
Null Packet with ADF Probe	<p>Error Condition: Reports an error if the Analysis Server detects a null packet that has an adaptation field.</p> <p>Associated ETR 290 recommendation: None.</p> <p>How/where an error is reported in the Expert Client: As a general error message in the Report view.</p>
ADF Flags Probe	<p>Error Condition: Reports an error if the Analysis Server detects no coherence between the adaptation field control and the adaptation field length. The Analysis Server detects three error conditions:</p> <ul style="list-style-type: none">■ The adaptation_field_control is 00.■ The adaptation_field_control is 10, but the adaptation_field_length is not equal to 183.■ The adaptation_field_control is 11, but the adaptation_field_length is not in the range of 0 through 182. <p>Associated ETR 290 recommendation: None.</p> <p>How/where an error is reported in the Expert Client: As a syntax error in the appropriate Message view(s).</p>
Transport Error Indicator Probe	<p>Error Condition: Reports an error if the Analysis Server detects a transport_error_indicator field (of a transport packet header) is equal to 1, which indicates that at least one uncorrectable bit error exists in the associated transport packet.</p> <p>Associated ETR 290 recommendation: Transport_error, 2.1.</p> <p>How/where an error is reported in the Expert Client: The ETR 290 view, the TEI indicator on the status bar, and the TP Error Indicator panel of the Statistic View (refer to <i>TP Error Indicator Panel</i> on page 3–134).</p>

PAT PID with AFC & DI Probe (ATSC only)	<p>This analysis probe appears only when the analysis type setting is set to ATSC (refer to <i>Analysis Panel</i> on page 3–163).</p> <p>Error Condition: Reports an error if the Analysis Server detects no coherence between the adaptation field control and the discontinuity indicator (if the AFC = 10 or 11, the DI must be set to 1) within the PAT.</p> <p>Associated ETR 290 recommendation: None.</p> <p>How/where an error is reported in the Expert Client: As a syntax error in the appropriate Message view(s).</p>
PMT PID with AFC & DI Probe (ATSC only)	<p>This analysis probe appears only when the analysis type setting is set to ATSC (refer to <i>Analysis Panel</i> on page 3–163).</p> <p>Error Condition: Reports an error if the Analysis Server detects no coherence between the adaptation field control and the discontinuity indicator (if the AFC = 10 or 11, the DI must be set to 1) within a PMT.</p> <p>Associated ETR 290 recommendation: None.</p> <p>How/where an error is reported in the Expert Client: As a syntax error in the appropriate Message view(s).</p>
PSIP Tables PID with TSC Probe (ATSC only)	<p>This analysis probe appears only when the analysis type setting is set to ATSC (refer to <i>Analysis Panel</i> on page 3–163).</p> <p>Error Condition: Reports an error if the Analysis Server detects PSIP table packet PID with a <code>transport_scrambling_control</code> field that does not equal 00.</p> <p>Associated ETR 290 recommendation: None.</p> <p>How/where an error is reported in the Expert Client: As a syntax error in the appropriate Message view(s).</p>

PSIP tables PID with ADF Probe (ATSC only)

This analysis probe appears only when the analysis type setting is set to ATSC (refer to *Analysis Panel* on page 3–163).

Error Condition: Reports an error if the Analysis Server detects PSIP table packet PID that has an adaptation field.

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a syntax error in the appropriate Message view(s).

MGT PID with PUSI & Pointer Field Probe (ATSC only)

This analysis probe appears only when the analysis type setting is set to ATSC (refer to *Analysis Panel* on page 3–163).

Error Condition: Reports an error if the Analysis Server detects no coherence between the payload_unit_start_indicator and the pointer field (if the PUSI is 1 then the pointer field must be set to 0).

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a syntax error in the appropriate Message view(s).

Section Syntax Probe Descriptions

Table 3–20 lists the section syntax analyses, the associated ETR 290 recommendation, and the analysis type selected when the probe is available (refer to *Analysis Panel* on page 3–163).

Table 3–20: Section syntax analyses

Analysis probe	ETR 290	Analysis type
Section number or version number	—	All
CRC	2.2	All
Section syntax	—	All

The Analysis Server notes the presence and nature of each section syntax error in the section analysis view. Refer to *Section Syntactic View* on page 3–139 for information about the section analysis view.

Section Number or Version Number Probe

Error Condition: Reports an error if one or more of the following section and version numbering errors are found in a PSI, SI, or PSIP table section:

- Sections received out of order; for example section number 1 arrives before section number 0
- All sections with the same version number do not have the same last section number
- The version number is improperly incremented
- The version number increments before the last section of the previous version number has been received

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As a syntax error in the appropriate Message view(s).

CRC Probe

Error Condition: Reports an error if the Analysis Server detects a CRC error in a PSI, SI, or PSIP table.

Associated ETR 290 recommendation: CRC_error, 2.2.

How/where an error is reported in the Expert Client: In the ETR 290 view, and as a syntax error in the appropriate Message view(s).

Section Syntax Probe

Section syntax probes perform a complete analysis of every field in all sections of the selected table type.

Error Condition: Reports an error if the section syntax of the PSI/SI/PSIP selected is not corrected.

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: As coloration of the associated Hierarchic view icon error indicator(s), and as a syntax error in the appropriate Message view(s).

The Analysis Server also notes the presence and nature of each section syntax error in the section analysis view. Refer to *Section Analysis View* on page 3–139 for information about the section analysis view.

Mega Frame Syntax Probe Descriptions

Table 3–21 lists the Mega Frame syntax analyses, the associated ETR 290 recommendation and the analysis type selected when the probe is available.

Table 3–21: Section syntax analyses

Analysis probe	ETR 290	Analysis type
CRC	—	DVB-T
Syntax	—	DVB-T
Time offset	—	DVB-T
Frequency offset	—	DVB-T
Power	—	DVB-T

NOTE. To access the Mega Frame syntax analyses, you must select the DVB analysis type with the DVB-T analysis option. Refer to Analysis Panel on page 3–163 for information about using the Analysis panel.

Use the Configuration Client Mega Frame Syntactic Analysis panel to set and remove probes that monitor Mega Frame syntax. Refer to *Mega Frame Syntactic Analysis Panel* on page 3–174 for information about using the Mega Frame Syntactic Analysis panel.

This section describes the Mega Frame syntax analyses in the order that they are listed in the Mega Frame Syntactic Analysis panel.

- CRC Probe** **Error Condition:** Reports an error if the computed Mega Frame CRC and the Mega Frame CRC carried in the MIP do not match.
- Associated ETR 290 recommendation:** None.
- How/where an error is reported in the Expert Client:** As a syntax error in the appropriate Message view(s).
-
- Syntax Probe** **Error Condition:** Reports an error if every field of Mega Frame syntax is not valid.
- Associated ETR 290 recommendation:** None.
- How/where an error is reported in the Expert Client:** As a syntax error in the appropriate Message view(s).

- Time Offset Probe** **Error Condition:** Reports warnings if the value carried in the time offset function of a transmitter exceeds the user-defined limits. Three parameters are required for the probe: transmitter ID (entered in hex), and the minimum and maximum values (entered in 100 nanosecond units).
- Associated ETR 290 recommendation:** None.
- How/where an error is reported in the Expert Client:** As a syntax error in the appropriate Message view(s).
-
- Frequency Offset Probe** **Error Condition:** Reports warnings if the value carried in the frequency offset function of a transmitter exceeds the user-defined limits. Three parameters are required for the probe: transmitter ID (entered in hex), and the minimum and maximum values (entered in Hertz).
- Associated ETR 290 recommendation:** None.
- How/where an error is reported in the Expert Client:** As a syntax error in the appropriate Message view(s).
-
- Power Probe** **Error Condition:** Reports warnings if the value carried in the power function of a transmitter exceeds the user-defined limits. Three parameters are required for the probe: transmitter ID (entered in hex), and the minimum and maximum values (entered in 0.1 dBm units).
- Associated ETR 290 recommendation:** None.
- How/where an error is reported in the Expert Client:** As a syntax error in the appropriate Message view(s).

Timing Probe Descriptions

Analysis Servers provide the following levels of timing analyses (the page references indicate where the discussions for that probe type begin):

- PCR timing analyses (beginning on page 3–76)
- PTS/DTS timing analyses (beginning on page 3–77)
- Mega Frame timing analysis (DVB-T only) (beginning on page 3–78)

PCR Timing Analyses

PCR probes monitor the clock references of a selected program for regularity and precision. When you set a PCR probe in the standard configuration, the Analysis Server reports a PCR error if one of the following conditions is detected:

- The interval between consecutive PCR packets is greater than 100 ms in MPEG-2 mode or greater than 40 ms in DVB mode
- The PCR inaccuracy is greater than ± 500 ns

NOTE. *The default PCR error limits used by the Analysis Server are consistent with ETR 290 recommendations. You can change the error limits, if necessary, using the PCR Timing Analysis configuration panel in the Settings window (refer to PCR Timing Analysis Panel on page 3–176).*

Setting PCR Probes. Use the PCR Timing Analysis panel to configure and set PCR probes one program at a time and, if desired, use unique error limits for each individual program. You can also set PCR probes on all stream programs at once, but you must then use the same measurement error limits for all programs.

Refer to *PCR Timing Analysis Panel* on page 3–176 for information about using the PCR Timing Analysis panel to set PCR probes.

NOTE. *The Analysis Server uses an internal settling filter to improve the accuracy of PCR jitter analysis. The Settling Filter must have at least 60 seconds of data before before the Analysis Server can detect and report PCR jitter errors. Wait 60 seconds after setting a PCR probe to judge the PCR jitter performance or compliance.*

PCR error reporting in the Expert Client. When a PCR error occurs, the colored indicator above the affected Hierarchic view PMT icon turns red and a general error message appears in the Report view. The message also appears on the PMT Message view if it is open in the Client window.

The Analysis Server also indicates PCR errors in the ETR 290 and PCR Analysis views.

PTS/DTS Timing Analyses

PTS/DTS probes monitor the time stamps of selected elementary streams for compliance with the ETR 290 recommended interval of no more than 700 ms (default setting; you can set a different value) between consecutive PES packets with non-zero PTS/DTS flags.

NOTE. You can set PTS/DTS probes only on unscrambled elementary streams.

Refer to *PTS/DTS Timing Analysis Panel* on page 3–178 for information about using the PTS/DTS Timing Analysis panel.

Setting PTS/DTS Probes. You can use either of the following two methods to set PTS/DTS probes:

- Select an audio or video elementary stream icon in the Hierarchic view, right-click to open the shortcut menu, and then select **PTS/DTS Probe** or **View PTS/DTS Analysis**. To remove the PTS/DTS probe, select **PTS/DTS Probe** a second time from the selected icon shortcut menu in the Hierarchic view.

When you select **View PTS/DTS Analysis**, a PTS/DTS Analysis view opens in the Client view and the PTS/DTS probe is enabled. Refer to *PTS/DTS Analysis View* on page 3–145 for information about using the PCR Analysis view.

- Use the PTS/DTS Timing Analysis panel of the Settings window (shown on the previous page) to configure and set PTS/DTS probes one program at a time and, if desired, use unique error limits for each individual elementary stream. You can also set PTS/DTS probes on all elementary streams at once, but you must then use the same measurement error limits for all programs.

Refer to *PTS/DTS Timing Analysis Panel* on page 3–178 for information about using the PTS/DTS Timing Analysis panel.

PTS/DTS error reporting in the Expert Client. When a PTS/DTS error occurs, the colored indicator above the affected Hierarchic view elementary stream icon turns red and a general error message appears in the Report view. The message also appears on the elementary stream Message view if it is open in the Client window.

In addition, the Analysis Server also indicates PTS/DTS errors in the ETR 290 and PTS/DTS Analysis views.

Mega Frame Timing Analysis (DVB-T Only)

The only specific timing analysis performed on DVB-T streams (in addition to the regular MPEG-2/DVB rate analyses) is the STS interval check.

Use the STS interval probe to check that the difference between two consecutive Synchronization Time Stamps carried in the MIP remains within a user-defined interval, and to report warnings every time the limits are exceeded.

The STS interval probe has two parameters: the Min and Max values allowed (expressed in 100 nanosecond units). Typically the STS interval should remain within the (0.5, 0.61) seconds interval.

Set the STS interval probe using the Mega Frame Timing Analysis configuration panel in the Settings window (refer to *Mega Frame Timing Analysis Panel* on page 3–174).

Transport Rate Probe Descriptions

When performing transport rate analysis on an input, the Analysis Server calculates the average bit rate of each PID in the input stream. Transport rate analysis is automatic and cannot be disabled.

The Analysis Server calculates transport rates every 500 ms, but uses a smoothing period for transport rate averaging. In the default configuration, the Analysis Server averages the reported transport rate over one second, or two 500 ms sample periods. You can increase the smoothing period up to 10 seconds using the Analysis panel of the Settings window. Refer to *Analysis Panel* on page 3–163 for more information.

In addition to calculating transport rates for every PID in the stream, the Analysis Server can also monitor selected PIDs and alert you when the transport rate of the selected PID(s) violates user-specified high and low error limits.

Viewing Transport Rate Analysis Results

The Analysis Server displays the results of transport rate analysis in the Program Allocation, PID Allocation, and Type Allocation panels of the Statistic View.

Program Allocation Panel. The Program Allocation panel of the Expert Client Statistic view shows the bandwidth allocation of the input multiplex. Both the numeric data and the pie chart update every 500 ms to give a near-instantaneous report of input stream composition. Double-click on a slice of the pie chart to change to the PID Allocation panel with the corresponding program already selected.

Refer to *Program Allocation Panel* on page 3–126 for more information.

PID Allocation Panel. The PID Allocation panel of the Statistic view provides a more detailed, program-level view of input stream bandwidth allocation. The panel also indicates whether or not transport rate error limits are set and shows rate errors when they occur. Click a button on the left side of the panel to select a service and see the instantaneous, previous maximum, and previous minimum multiplex rates for every PID in the service. As in the Program Allocation panel, all values update every 500 ms.

Refer to *PID Allocation Panel* on page 3–129 for more information.

Type Allocation Panel. The Type Allocation panel of the Statistic view shows the bandwidth allocation of each PID type in a pie chart display. Each slice of the pie chart represents a PID type (such as audio, video, or data). The number of PIDs, the allocation percentage, the minimal and maximal rate and its current value are displayed for each pie chart slice.

Refer to *Type Allocation Panel* on page 3–133 for more information.

Setting Transport Rate Probes

Use the Configuration Client Transport Rate Analysis panel to set probes on selected stream PIDs for transport rates that fall below or exceed the limits that you specify. You must enter a high- or low-limit value to add a probe.

Refer to *Transport Rate Analysis Panel* on page 3–181 for information about using the Transport Rate Analysis panel.

Section Rate Probe Descriptions

Use the Configuration Client Section Rate Analysis panel to specify the maximum acceptable interval between consecutive sub-table sections of each selected table type.

***NOTE.** The Intervals settings determine the threshold for errors reported on the ETR 290 view. The default settings are consistent with ETR 290 recommendations. Do not change these settings if you plan to use ETR 290 tests to judge DVB compliance of the input stream.*

Refer to *Section Rate Analysis Panel* on page 3–182 for information about using the Section Rate Analysis panel.

To open a dynamic Section Rate analysis view in the Expert Client, select an icon in the Hierarchic view, right click to open the shortcut menu, and then select **View Section Rate**.

Refer to *Section Rate View* on page 3–141 for more information about using the Section Rate view.

Table 3–22 lists each of the section rate probes, the associated ETR 290 recommendation for each applicable probe, and the analysis type setting when the probe is available (refer to *Analysis Panel* on page 3–163).

Table 3–22: Section rate analyses

Analysis probe	ETR 290	Analysis type
Maximum interval between consecutive PAT sub-table sections	1.3.1	All
Maximum interval between consecutive CAT sub-table sections	—	All
Maximum interval between consecutive TSDT sub-table sections	—	All
Maximum interval between consecutive PMT sub-table sections	1.5.1	All
Maximum interval between consecutive NIT sub-table sections. Two probes are available: NIT actual and NIT other.	3.1.2	DVB and DVB-T
Maximum interval between consecutive SDT sub-table sections. Two probes are available: SDT actual and SDT other.	3.5.1	DVB and DVB-T
Maximum interval between consecutive EIT sub-table sections. Four probes are available for DVB and DVB-T analysis: EIT actual present-following, EIT other present-following, EIT actual schedule, and EIT other schedule. One EIT probe is available for ATSC/PSIP analysis.	3.6.1	DVB, DVB-T, and ATSC
Maximum interval between consecutive BAT sub-table sections	—	DVB and DVB-T
Maximum interval between consecutive TDT sub-table sections	3.8.1	DVB and DVB-T
Maximum interval between consecutive TOT sub-table sections	—	DVB and DVB-T
Maximum interval between consecutive MGT sub-table sections	3.5	ATSC
Maximum interval between consecutive TVCT sub-table sections	3.6.1	ATSC
Maximum interval between consecutive CVCT sub-table sections	3.6.2	ATSC
Maximum interval between consecutive STT sub-table sections	3.3	ATSC
Maximum interval between consecutive RRT sub-table sections	3.7	ATSC
Maximum interval between consecutive EIT sub-table sections	—	ATSC
Minimum interval between consecutive sections with the same table ID, table ID extension	3.2	All

**Maximum Interval
Between Consecutive
Sub-tables Probe**

Error Condition: Reports an error if the maximum interval between consecutive sub-table sections of the specified stream item exceeds the value set on the Section Rate Analysis panel of the Settings window. Refer to Table 3–22 for a list of section rate probes.

Associated ETR 290 recommendation: Refer to Table 3–22 for a list of associated ETR 290 recommendations for each stream item.

How/where an error is reported in the Expert Client: In the ETR 290 view, as a general error message in the Report view, and in the appropriate Message view(s).

**Minimum Interval Between
Consecutive Sections
Probe**

Error Condition: Reports an error if the minimum interval between consecutive table sections with the same table ID is less than 25 ms.

Associated ETR 290 recommendation: SI_repetition_error, 3.2.

How/where an error is reported in the Expert Client: In the ETR 290 view and as an error message in the appropriate Message views(s).

NOTE. You cannot change the minimum interval setting from the default (25 ms).

Mega Frame Rate Probe Descriptions (DVB-T only)

The only specific rate analysis performed on DVB-T streams (in addition to the regular MPEG-2/DVB rate analyses) is the measurement of the intervals between two consecutive MIPs.

Use the MIP interval probe to check that the difference between the PIA time stamps (the arrival time of the packets) of two consecutive MIPs remains within a user-defined interval, and to report warnings every time the limits are exceeded.

The MIP interval probe has two parameters: the Min: and Max: values allowed (expressed in 100 nanosecond units). Typically the MIP interval should remain within the (0.5, 0.61) seconds interval.

Set the MIP interval probe using the Mega Frame Rate Analysis configuration panel in the Settings window (refer to *Mega Frame Rate Analysis Panel* on page 3–184).

Expert Client Reference

The Expert Client application is a full-featured, MPEG-2 protocol analyzer capable of analyzing transport streams in real time. You start the Expert Client from the Master Client.

The Expert Client has the following characteristics:

- Graphical displays that show the structure (hierarchy) of the input transport stream and display characteristics of each component of the input stream (for example: PID and type allocation, section rate analyses, and timing analyses).
- Report views that indicate the types of errors recorded by the Analysis Server and the characteristics of the input stream.
- Error views that show specific errors recorded for the various components of the transport stream; for instance, PMT section rate errors and ETR 290 errors.

The Expert Client displays the results of only one Analysis Server (input) at a time. You can connect more than one Expert Client to the same Analysis Server input from your own instrument, or from a remote MTS300 system.

This section describes the Expert Client in the following subsections:

- *Expert Client Display Elements* page 3–84
- *Expert Client Menus* page 3–90
- *Manually Capturing a Transport Stream* page 3–94
- *Configuring the Expert Client Views* page 3–96
- *Using the Hierarchic View* page 3–101
- *Using the Report View* page 3–107
- *Using the Client Area* page 3–123

Expert Client Display Elements

Figure 3–7 shows the different elements of the Expert Client display.

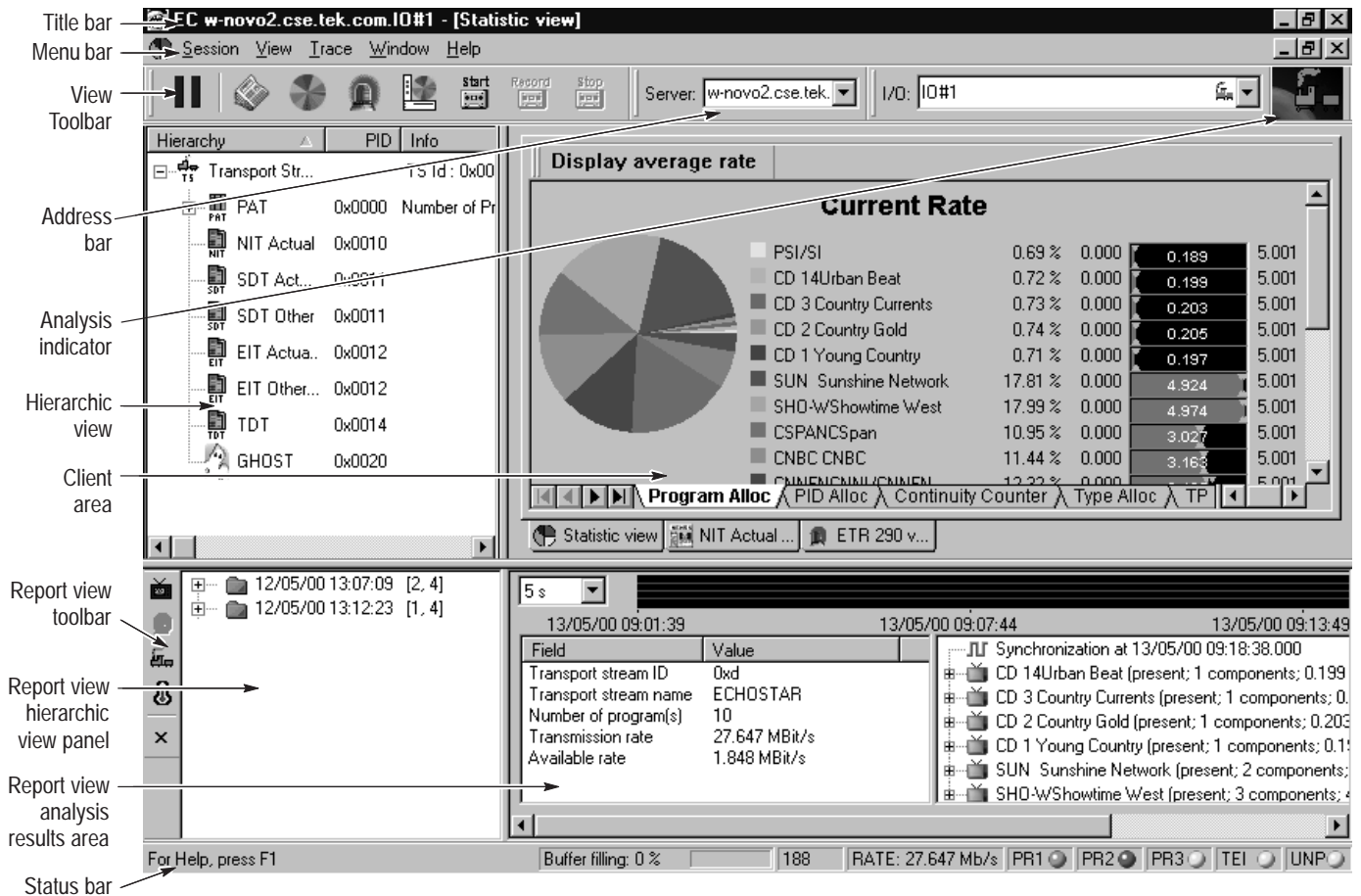


Figure 3–7: Expert Client display elements

- Title Bar** The Title bar (see Figure 3–7) displays the following information:
- Name of the application in the window (EC is displayed for Expert Client)
 - Address and I/O port number of the signal source (w-novo2.cse.tek.com is the address and IO#1 is the I/O port number)
 - Name of the view displayed in the Client area (in this example the Statistic view is currently displayed)

The Expert Client control buttons are located on the far right side of the Title bar.

- Menu Bar** The Menu bar provides access to the menus and contains the control buttons for the Client area of the Expert Client display. Refer to *Expert Client Menus* on page 3–90 for detailed descriptions of the menu functions available within the Menu bar. The menus contain commands grouped by their functions:
- The active view menu performs standard Windows NT window-management actions on the top (active) view in the Client area. You access this menu by clicking the icon at the far left of the Menu bar.
 - The Session menu lists commands that configure connection and display parameters for the Expert Client.
 - The View menu lists commands to manage and print the Expert Client views.
 - The Trace menu lists commands to control the manual capture of a transport stream input. Refer to *Manually Capturing a Transport Stream* on page 3–94 for more information.
 - The Window menu lists commands that control the appearance of open windows in the Client area.
 - The Help menu provides access to the online Help systems of the Expert Client and the Analysis Server. In addition, there is a command to access the version and copyright information for the Expert Client.

Address Bar The Address bar contains two address boxes that allow you to specify which Analysis Server and which I/O port you want the Expert Client to analyze. When you open the Expert Client from the Master Client, the address boxes automatically indicate the IP address or host machine name and I/O port number of the Analysis Server to which you are connected.

Enter the IP Address (or machine name) in the text box using one of the following two formats:

- <MTS300 system IP address>

For example, enter 121.181.77.121 to analyze the signal from an MTS300 system with an IP address of 121.181.77.121.









- <MTS300 system name>

For example, enter w-novo2.cse.tek.com to analyze the signal from an MTS300 system named w-novo2 on the cse.tek.com network.

The Server drop-down selection box lists the Analysis Servers you have successfully connected to in the past. You can select an MTS300 system name or IP address from the drop-down selection box.

View Toolbar The command buttons in the View toolbar provide direct access to the most-used menu commands for the Expert Client. Click a command button to perform the associated command. You can toggle the View toolbar on and off using the Toolbar command in the View menu. Table 3–23 lists the function of each icon in the View toolbar.

Table 3–23: Functions of the View Toolbar buttons

Button	Name	Function
	Freeze views (or pause)	Freezes (pauses) the updates to the current Expert Client display. The analyses occurring on the input are not stopped, and the history of the analyses is preserved while the views are frozen. This button is equivalent to the Freeze Views command in the View menu.
	Report view	Opens or selects the Report view located at the bottom of the Expert Client display. This button is equivalent to the Report View command in the View menu.
	Statistic view	Opens or selects the Statistic view in the Client area. This button is equivalent to the Statistic View command in the View menu.
	ETR 290 view	Opens or selects the ETR 290 Monitor view in the Client area. This button is equivalent to the ETR 290 View command in the View menu.
	Restore standard views	Restores the default Expert Client display, which consists of the Hierarchic, Statistic, and Report views. This button is equivalent to the Restore Standard command in the Window menu.
	Start trace	Starts moving transport stream data through the capture memory buffer. This button is disabled until you enable a manual capture of a transport stream (see <i>Manually Capturing a Transport Stream</i> beginning on page 3–94).
	Record trace	Starts the manual capture of the transport stream input. This button is disabled until you enable a manual capture of a transport stream.
	Stop trace	Stops the movement of transport stream data through the capture memory buffer. This button is disabled until you enable a manual capture of a transport stream and click the Record Trace button.

Refer to *Manually Capturing a Transport Stream* on page 3–94 for more information about using the Stop trace, Record trace, and Stop trace buttons.

Analysis Indicator The Analysis indicator (shown below) at the far right of the Address bar is animated when the Expert Client is actively analyzing the input stream. The indicator is motionless when analysis by the Expert Client is disconnected.








Hierarchic View The Hierarchic view area displays the hierarchy of the transport stream as indicated by the PSI/SI/PSIP tables. This view enables you to display specific analyses, using shortcut menus associated with each transport stream item (you access these menus by right-clicking the icons). Refer to *Using the Hierarchic View* on page 3–101 for more information.

Client Area The Client area contains various views of the current analyses. There are three basic views you can display in this area:

- The Statistic view is the default display for the Client area. There are six tabs at the bottom of the Statistic view that you can use to display different aspects of the transport stream analysis.
- The ETR 290 view shows the results of the ETR 290 analysis. You access the ETR 290 view using the ETR 290 button on the View toolbar.
- The Analysis, Rate, and Report views show the result of specific analyses being performed on the transport stream using various graphs. You open these views using the Hierarchic view shortcut menus.

Report View Toolbar The Report view toolbar buttons allow you to change the display mode of the Report view. Table 3–24 lists the functions of the toolbar buttons.

Table 3–24: Functions of the Report View Toolbar buttons

Button	Name	Function
	Program mode	Groups analysis results by program name in the Report view hierarchy.
	ETR 290 mode	Groups analysis results by ETR 290 priority level (priority 1, 2, 3 and Warning) in the Report view hierarchy.
	Advanced mode	Groups analysis results by error type (Multiplex, Syntax, Timing, and Rate) in the Report view hierarchy.
	Error mode	Groups analysis results by user-defined error severity (Critical, Major, Minor, and Warning) in the Report view hierarchy.
	Close report view	Closes the Report view.

Report View Hierarchic View Panel

The Report view displays the results of the analyses performed by the Analysis Server on the selected input. The Report view hierarchic display organizes the analysis results according to the mode you select from the Report view toolbar:

- Program mode groups analysis results by program name.
- ETR 290 mode groups analysis results by ETR 290 priority level (priority 1, 2, or 3).
- Advanced mode groups analysis results by error type (Multiplex, Syntax, Timing, or Rate).
- Error mode groups analysis results by user-defined error severity (Critical, Major, Minor, and Warning).

Report View Analysis Results Area

The Analysis Results area has three types of views. The type of view displayed depends on the type of icon selected in the Report view hierarchy:

- First level icon (a folder): Displays the Summary view (the default Report view) which displays various summary information about the transport stream being analyzed.
- Second level icon (a folder): Displays the Error Graph view which displays graphs showing the number errors occurring on the transport stream. The graphs are presented based on the mode of the Report view.
- Third level icon (changes depending on the mode): Displays the Message view (first, second, or third level icon) which displays the text of error messages. The error messages are presented based on the mode of the Report view.

The second- and third-level icon views display the results of the transport stream analysis organized based on the display mode selected from the Report view toolbar (Program, ETR 290, Advanced, or Error).

- Status Bar** The Status bar displays short Help and status messages and also contains several analysis indicators. The Status bar shows the following information:
- Help and status messages for menu and toolbar commands. In the Status bar in Figure 3–7 on page 3–84, the message “For Help, press F1” appears.
 - The status (percent usage) of the communication buffer. When the buffer reaches 100% usage, you may need to remove probes to ensure that complete measurements are made from the active probes.
 - The number of bytes (188, 204, or 208) in the input stream transport packets.
 - The global bit-rate of the input stream.
 - Presence of priority one (PR1), priority two (PR2), and priority three (PR3) ETR 290 errors. If no error is detected, a green LED icon is displayed; when an error occurs, the LED icon becomes red. If the error stops, the LED icon becomes orange to indicate that at least one error has been detected in the past.
 - Status of the TEI (Transport Error Indicator). The error indicator icon follows the same color conventions as the PR1, 2, and 3 indicators. The icon is gray when TEI analysis is disabled.
 - State of the UNP (Unsynchronized Packet). The error indicator icon follows the same color conventions as the MG1, 2, and 3 indicators. The icon is gray when UNP analysis is disabled.

Expert Client Menus

The menu bar (shown below) in the Expert Client display contains the command menus (Active View, Session, View, Window, and Help). The following pages describe the selections available within each of the menus.

Active View Menu

The Active View menu performs standard Windows NT window-management actions on the top view in the Client area. You can access this menu by clicking the icon at the far left of the Menu bar when the Client views are maximized (the example below shows the Statistic view icon).



The Menu bar icon representing the Active View menu changes to match the type of view currently displayed in the Client area. When the panels in the Client area are tiled, this menu can be accessed for each panel in the Client area. Table 3–25 describes the menu selections available in the Active View menu.

Table 3–25: Expert Client Active View menu commands

Command	Function
Restore	Changes all open Client area views to windows or icons within the Client area, depending on the last state of each window. The Active View menu icon disappears from the Menu bar when you select this command.
Move	Moves the selected view within the Client area.
Size	Resizes the selected view within the Client area.
Minimize	Minimizes all open Client area views to icons within the Client area. The Active View menu icon disappears from the Menu bar when you select this command.
Maximize	Maximizes all open Client area views. The Active View menu icon returns to the Menu bar when you select this command.
Close	Closes the active (top) Client area view.
Next	Selects the next Client area view. This command is equivalent to clicking the view tab to the right of the currently active view tab.

Session Menu The Session menu contains commands for configuring the Expert Client settings, for saving and loading analysis configurations, and for exiting the Expert Client. Table 3–26 describes the menu selections available in the Session menu.

Table 3–26: Expert Client Session menu commands

Command	Function
Connection	Opens the Connection dialog box where you can select an Analysis Server and input to begin Expert Client analysis. This command is only available when the Expert Client is not performing analysis.
Disconnection	Disconnects the Expert Client from the Analysis Server and stops analysis. You can still examine the displayed analysis results. When you select this command, the analysis indicator (train icon) at the far right of the toolbar becomes motionless.
Settings	Opens the Settings configuration window. Refer to <i>Configuring the Expert Client</i> on page 3–96 for information about using the Settings window.
Load	Restores a previously-saved analysis configuration.
Save as	Saves the current analysis configuration.
Restore standard	Restores the default settings for the Expert Client. This command is only available when analysis is stopped.
Exit	Stops analysis and exits the Expert Client.

View Menu Use the View menu commands to control the information displayed in the Expert Client. Table 3–27 describes the menu selections available in the View menu.

Table 3–27: Expert Client View menu commands

Command	Function
Freeze views	Suspends (freezes) window updates while analysis continues. Freezing the views allows you to examine or capture transitory information (that is likely to soon disappear from the display) and to find and examine error messages that have scrolled off the top of a message window.
Report view	Opens the Report view (if it is closed) or selects the Report view and places it in front of all other views in the Client area, if necessary.
Statistic view	Opens the Statistic view (if it is closed) or selects the Statistic view and places it in front of all other views in the Client area, if necessary.
ETR 290 view	Opens an ETR 290 view or selects the ETR 290 view and places it in front of all other views in the Client area, if necessary.
Toolbar	Toggle the presence of the View Toolbar (Command buttons) on and off. A check mark precedes the command when the Toolbar is present.
Status bar	Toggle the presence of the Status bar on and off. A check mark precedes the command when the Status bar is present.
Print	Prints the current window or window pane. In the Message view just the contents of the message view are printed.
Print Setup	Opens the Print Setup dialog box where you can configure the printer.

Trace Menu Use the Trace menu commands to control the manual capture of a transport stream input. Refer to *Manually Capturing a Transport Stream* on page 3–94 for more information the Trace menu commands. Table 3–28 describes the menu selections available in the Trace menu.

Table 3–28: Expert Client View menu commands

Command	Function
Start trace	Starts moving transport stream data through the capture memory buffer. This button is disabled until you enable a manual capture of a transport stream.
Record trace	Starts the manual capture of the transport stream input. This button is disabled until you enable a manual capture of a transport stream.
Stop trace	Stops the movement of transport stream data through the capture memory buffer. This button is disabled until you enable a manual capture of a transport stream and click the Record Trace button.

Window Menu

Use the Window menu commands to manage the various windows within the Client area display. Table 3–29 describes the menu selections available in the Window menu.

Table 3–29: Expert Client Window menu commands

Command	Function
Cascade	Arranges windows in the Client area in an overlapping upper-left to lower-right cascade. The active window is on the lower right.
Tile horizontally	Arranges Client area windows as non-overlapping tiles that stretch from left to right across the Client area.
Tile vertically	Arranges Client area windows as non-overlapping tiles that stretch from the top to bottom in the Client area.
Arrange icons	Arranges minimized-view icons along the bottom of the Client area.
Restore standard	Restores the default Expert Client window arrangement (will close all Client area views except for the Statistic view).
(List of open Client area windows)	Selects the Client area window to be shown in front of all other open windows.

Help Menu

Use the Help menu to access to online help and Expert Client version information. Table 3–30 describes the menu selections available in the Help menu.

Table 3–30: Expert Client Help menu commands

Command	Function
Expert Client help	Opens the Expert Client online help.
Analysis Server help	Opens the Analysis Server online help.
About Expert Client	Displays Expert Client version and copyright information.

Manually Capturing a Transport Stream

The MTS300 system allows you to manually capture a transport stream input using the Expert Client. Use the Event Configuration panel of the Configuration Client to enable a manual capture, and then use the Trace menu commands or toolbar buttons to control a manual capture from the Expert Client.

NOTE. *This procedure is for manually capturing transport stream input. Refer to Configuration Client Reference starting on page 3–151 for information about configuring the MTS300 system to capture user-defined transport stream events.*

Perform the following steps to manually capture a transport stream:

1. Launch the **Configuration Client** for the transport stream input you are monitoring.
2. Open the **Event Configuration panel** of the Configuration Client (expand the Data Storage item in the navigation panel of the Configuration Client).
3. Use the **Current Input Used Size slide bar** to set the size of the capture file in kBytes. You can set the capture size to a value up to the amount listed in the Overall Available Size box (determined by the available room on the SCSI drives).

NOTE. *You must set a capture size greater than 0 kBytes to enable a capture.*

4. Verify that the **Manual stop of acquisition event** is enabled in the Message list.
5. Right-click the **File** column of the **Manual stop of acquisition row**, and then click **Configure** from the shortcut menu to open the Event Settings dialog box.
6. In the Event Settings dialog box, use the **File name box** to enter the name of the capture file. The default file name is RTA.trp.

NOTE. *The captured file will be stored on the E: drive of the MTS300 system in a directory whose name matches the I/O port number being used to perform the capture. For example, if you are capturing a transport stream on I/O port 1 to a file named RTA.trp, the path to the file is: E:\IO#1\RTA.trp.*

7. Use the **Before Event** and **After Event** boxes to set the amount of transport stream data captured before and/or after you initiated the capture event. For example, if you set the Before Event value to 1024 and the After Event Value to 2048, the capture file will included 1024 kBytes of data from before you initiated the capture and 2048 kBytes of data from after you initiated the capture.
8. Click **Center Trace** if you want to save the same amount of data before and after the capture occurs. The size of the file will be the size you set in the Current Input Used Size selection box in the Event Configuration panel in step 3.
9. Click the appropriate **Max** button to save data up to the amount you set in the Current Input Used Size selection box in the Event Configuration panel in step 3, before or after the capture event occurs.
10. Click **OK** after you finish configuring the Event Settings dialog box.
11. If desired, open the **Filtering panel** of the Configuration Client to select specific PIDs to capture.
12. After you have completed the capture configuration, click the **Apply** toolbar button to enable the new Event Configuration settings.
13. Click **Restart now** to restart the Expert Client. The Start Trace shortcut button is now enabled (highlighted) in the Expert Client window.
14. Click **Start Trace** in the Expert Client window to begin moving transport stream data through the event–capture buffer.
15. Click **Record Trace** to initiate a transport stream capture, or click **Stop Trace** to stop the capture process without recording a file.

The capture point in a captured transport stream file will be based on your capture configuration as set up in the Event Configuration panel of the Configuration Client.

Configuring the Expert Client Views

You can configure different aspects of the Expert Client display using the Settings configuration window. Access the Settings configuration window by selecting Settings from the Session menu. The Settings window contains four configuration panels: View, Report View, Graphics View, and PID Allocation View.

Common Options

The following options appear on each of the Settings panels:

Hexa display. Use the Hexa display check box to set the PID and other values to be displayed in hexadecimal or decimal format in the Expert Client display and in the Settings panels. When cleared, values are displayed in decimal format.

Restore default. Click this button to restore the default configuration selections for the displayed panel.

View Panel

Select View in the Settings window hierarchy to open the View configuration panel (see Figure 3–8). The View panel contains the following options:

Default view on start. Use the Report view check box to select or deselect the Report view to be visible when the Expert Client is started. When cleared, this option causes only the Hierarchic view and the Client area to occupy the Expert Client window when you start the Expert Client.

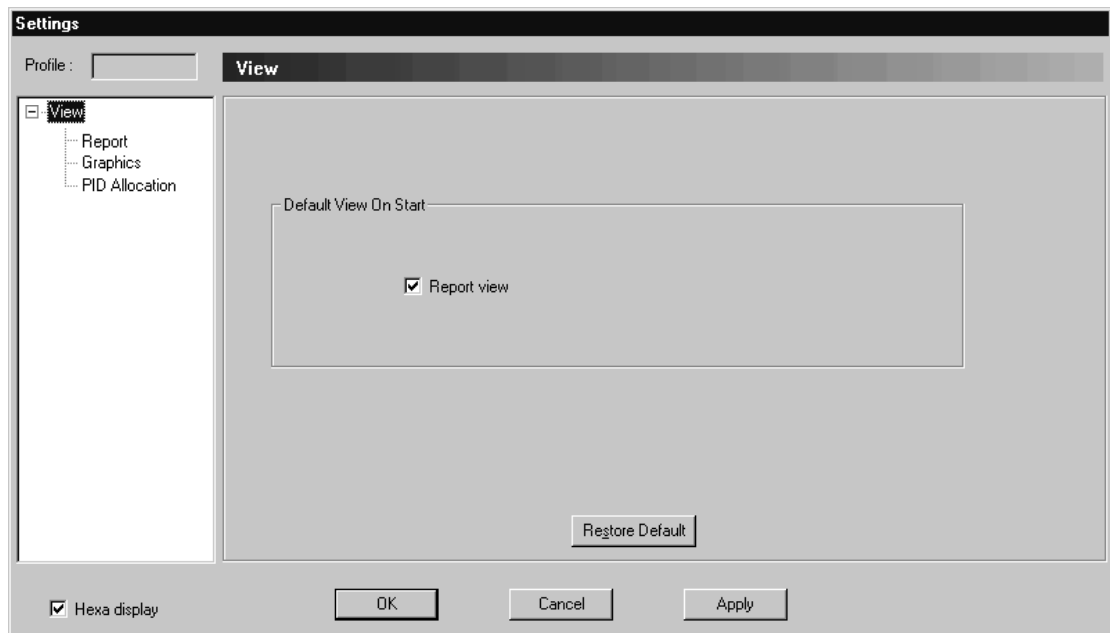


Figure 3–8: View panel in the Settings window

Report View Panel

Select View:Report in the Settings window hierarchy to open the Report View configuration panel (see Figure 3–9). Use this panel to limit the types of messages displayed in all report message views.

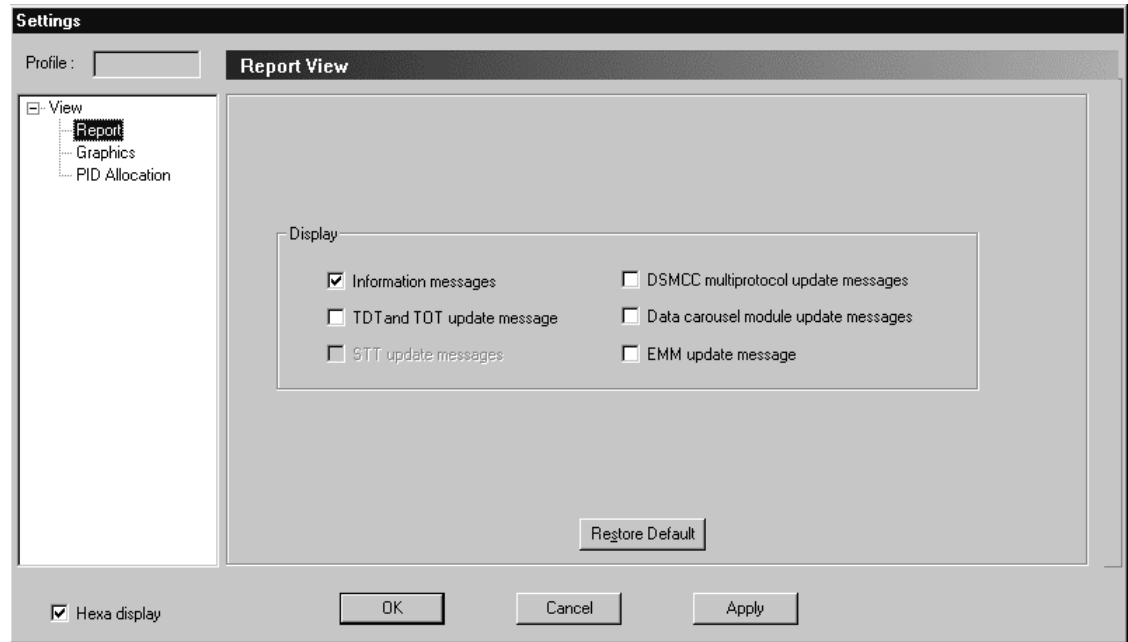


Figure 3–9: Report View configuration window

The Report View panel contains the following configuration options:

Information messages. Selected by default, this option alerts you to input stream events that are not considered errors, but may be important to your stream analysis. These events include as PSI and SI table updates, the presence of ghost (unreferenced) packets, and error disappearance. Clear the Information messages check box to prevent the display of these information events.

TDT and TOT update message. Not selected by default, this option lets you see information messages that report TDT (time and date table) and TOT (time offset table) updates.

STT update messages. This option is only valid when ATSC mode is selected in the Analysis configuration panel in the Configuration Client (refer to *Analysis Panel* on page 3–163).

DSMCC multiprotocol update messages. This option is only valid when SIDAT 360 data broadcasting analysis is selected in the Analysis configuration panel in the Configuration Client (refer to *Analysis Panel* on page 3–163). Select this option to inform you of errors and events detected in a SIDAT 360 stream. Clear this option when the message rate is too high.

Data carousel module update messages. This option is only valid when SIDAT 360 data broadcasting analysis is selected in the Analysis configuration panel in the Configuration Client (refer *Analysis Panel* on page 3–163). Select this option to inform you of errors and events detected in a SIDAT 360 stream. Clear this option when the message rate is too high.

EMM update message. Not selected by default, this option lets you see information messages that report EMM (Entitlement Management Message) updates.

Graphics View Panel

Select View:Graphics in the Settings window hierarchy to open the Graphics View configuration panel (see Figure 3–10). Use this panel to set options that determine how the Expert Client updates the various analysis graphs.

The Graphics View panel contains the following configuration options:

Scrolling option. In the standard configuration, scrolling is disabled for all graph types. You can enable (selected) or disable the scrolling mode for each of the listed views. The scrolling mode causes the data in the display to be updated from right to left without using a cursor.

Background gradation option. You can change the background color of the Statistic view by clicking the Statistic view background gradation check box.

Hierarchic view. Select this option to display the transport stream using small icons. By default, the stream components are displayed using large icons.

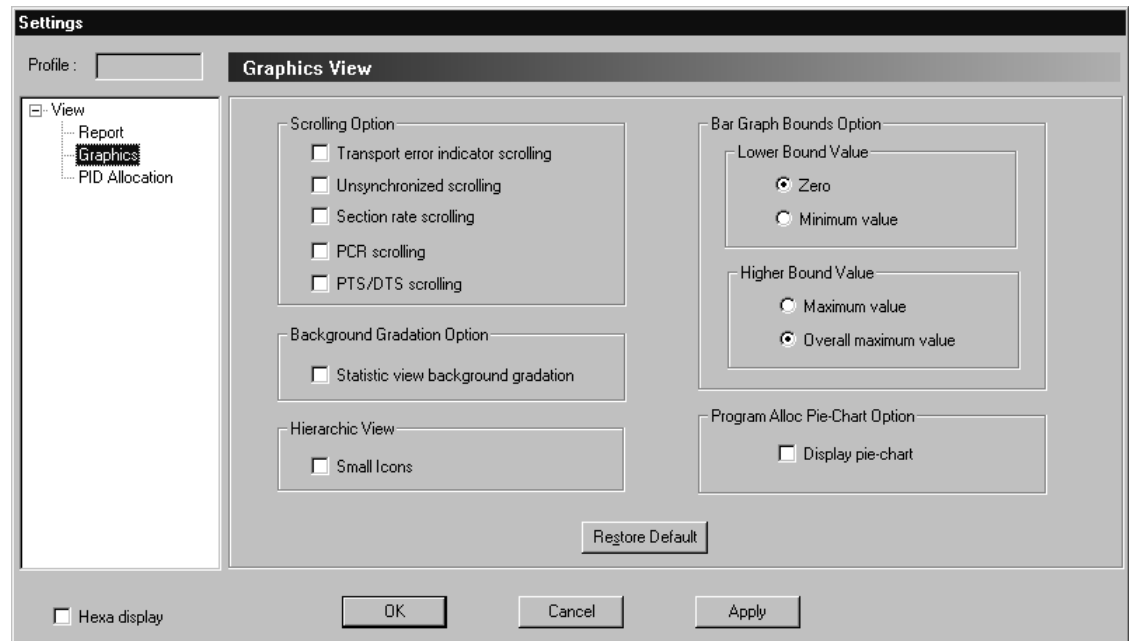


Figure 3–10: Graphics View configuration window

Bar graph bounds option. The bar graphs displayed in the Program Allocation view (first panel of the Statistics view) can be configured, specifically for the lower and higher bound values. You need to make these changes in order to draw an accurate comparison between all the bar charts displayed.

If you need to display the bar graphs as histograms, for example, to compare the values with each other, select Zero for the Lower Bound Value option (default selection), and select Overall maximum value for the Upper Bound Value option (default selection).

If you need to accurately assess the change of a value, select Minimum value for the Lower Bound Value option, and select Maximum value for the Upper Bound Value option.

Program alloc pie-chart option. Use this option to hide the pie-chart in the Program Allocation panel of the Statistic view by unchecking the box (in order to display the bar graphs as histograms, for instance).

PID Allocation View Panel

Select View:PID Allocation in the Settings window hierarchy to open the PID Allocation View configuration panel (see Figure 3–11). Use this panel to select which PIDs are displayed in the PID Allocation panel of the Statistic view in the Client area when you select the Selection button.

NOTE. When you add and remove PIDs directly from the PID Allocation panel by dragging and dropping stream icons between the Hierarchic view and the PID Allocation panel, the PID Allocation View panel automatically updates.

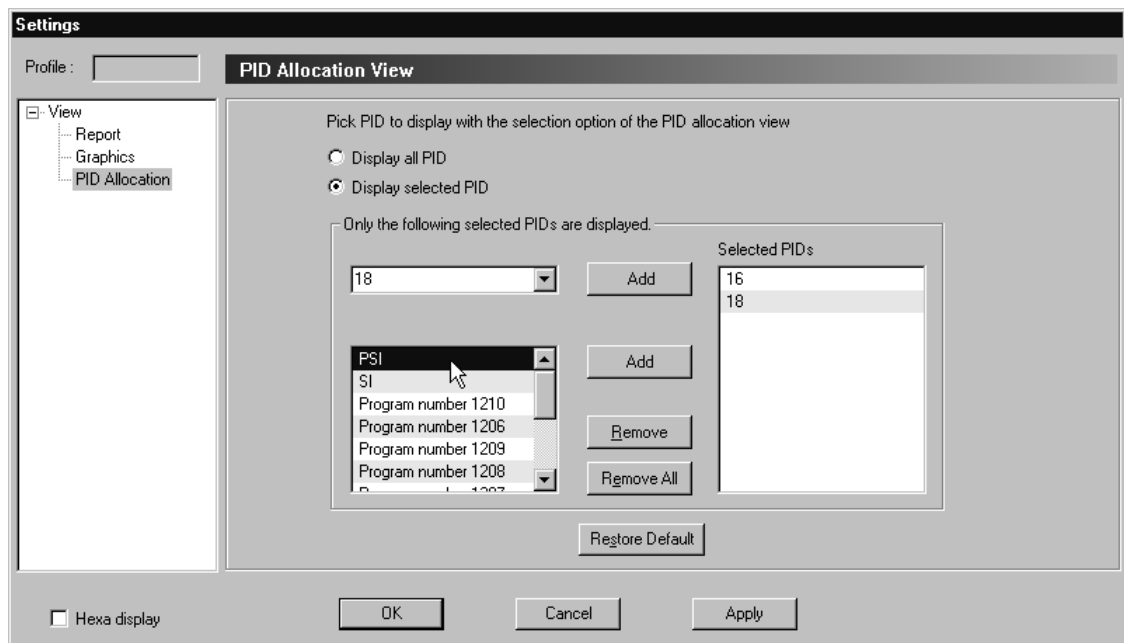


Figure 3–11: PID Allocation View configuration window

The PID Allocation View panel contains the following configuration options:

Display all PID. Select this option to display all PIDs in the transport stream.

Display selected PID. Select this option to display only the PIDs in the transport stream that you select in the PID Allocation View configuration panel. After you select Display selected PID, use the following methods to select PIDs to display:

- You can select a specific PID number from the top list box. Apply this choice by clicking the Add button.
- You can select a group of PID such as PSI, SI or a specific Program in the bottom list box. Apply this choice by clicking the Add button.

- You can remove a PID in the Selected PIDs list box by selecting the PID and clicking the Remove button or double-clicking the PID.
- You can remove all the PIDs in the Selected PIDs list box by clicking the Remove All button.

Using the Hierarchic View

The Hierarchic view displays the contents of the transport stream as a hierarchical structure based on the PSI and SI or PSIP tables. Each item in the transport stream is located in the hierarchy to show its relationship to other transport stream items. You can click the hierarchy boxes to show or hide lower-level hierarchy items. See Figure 3–12.

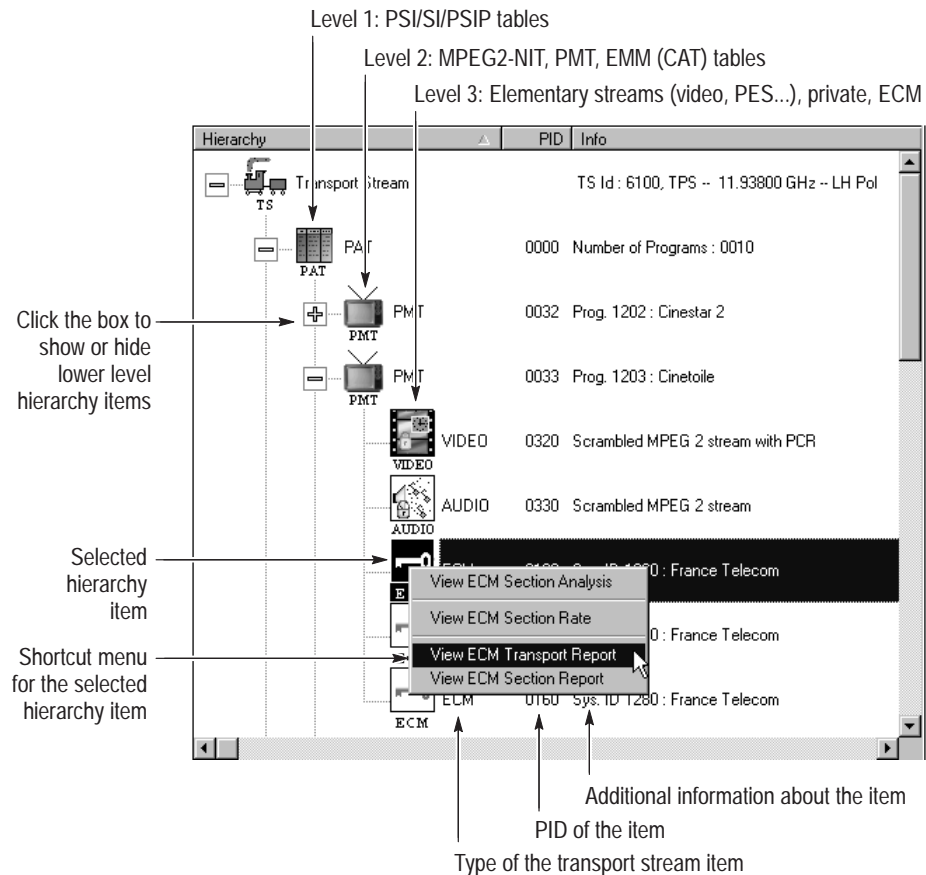


Figure 3–12: Expert Client hierarchic display

To the right of each hierarchy icon is text that shows the type of the transport stream item. The hierarchic display includes columns which display the PID of

the item and additional information about the item. The type of additional information that is listed depends on the type of the transport stream item. Figure 3–13 describes the specific information displayed for the various transport stream item types.

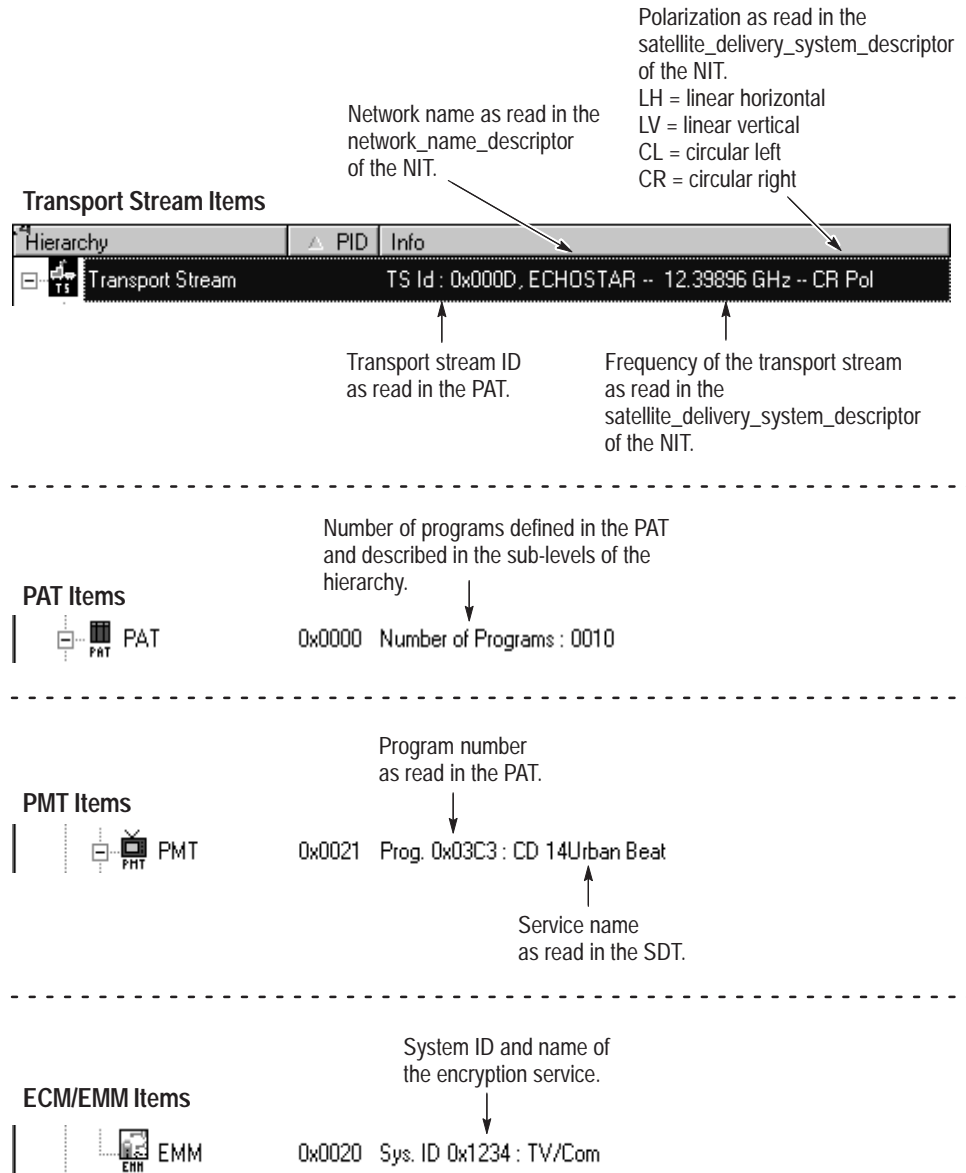


Figure 3–13: Specific information displayed for transport stream items

Setting the Appearance of the Hierarchic View

Table 3–31 summarizes the effects of mouse and keyboard actions that change the appearance of the Hierarchic view and show (or hide) additional information about the input stream.

Table 3–31: Mouse and keyboard actions in the Hierarchic view

Mouse action	Keyboard action	Effect on Hierarchic view
Left-click an icon		Selects the icon.
Right-click an icon		Displays a shortcut menu for the hierarchy item. Refer to <i>Hierarchic Icon Shortcut Menus</i> on page 3–106.
Double-click an icon		Opens an item Report view in the Client view.
Click the + box next to an icon	Press + on the numeric keypad	Displays one sub-level (if any) below the selected icon.
Click the – box next to an icon	Press – on the numeric keypad	Collapses the sub-level below the selected icon (will not override the F7 through F10 selections explained below).
	Press * on the numeric keypad	Opens all sub-levels below the selected icon.
	Press the up or down arrow key	Selects the icon immediately above or below the currently-selected icon.
	Press F1	Opens the Expert Client online Help.
	Press F2	Toggles the numeric display between hexadecimal and decimal (for example, 0x00C1 ↔ 193).
	Press F3	Freezes or unfreezes the updates to the displayed views (analysis does not stop when the views are frozen).
	Press F7	Expands or collapses the hierarchic view to only display the first-level icons.
	Press F8	Expands or collapses the hierarchic view to only display the first and second-level icons.
	Press F9	Expands or collapses the hierarchic view to only display the first, second, and third-level icons.
	Press F10	Expands or collapses the hierarchic view to display the first, second, third, and fourth-level icons.

Identifying Hierarchic Icons

The Expert Client uses a variety of icons to represent stream items. Each of the hierarchic icons has an associated menu that allows you to perform specific functions related to the stream item. Table 3–32 identifies the icons used in the Hierarchic view.

If an item is referenced in a table, but not found in the stream, the icon is grayed.

Table 3–32: Hierarchic view icon identification


























Icon	Hierarchy level	Element type
	1	Transport stream. This icon represents all (188/204/208-byte) transport packets that make up the stream. If you visualize the transport stream as a train, this icon represents every car in the train, regardless of its configuration or what it contains.
	2	PAT, CAT, or TSDT table.
	2	Any other table except ATSC PSIP tables (such as DVB-SI).
	2	ATSC-PSIP tables (such as CVCT, TVCT, MGT, STT, and RRT).
	2	A specific transport packet (such as MIP).
	2	GHOST. A ghost indicates one or more transport packets identified with a PID that is not referenced in an appropriate table.
	3	PMT table.
	3	MPEG-2 NIT table.
	3	For ATSC: EIT and/or ETT tables referenced by MGT.
	3	EMM table.
	4	Video stream.
	4	Audio stream.
	4	Data stream.
	4	ECM table for program.

Table 3–32: Hierarchic view icon identification (Cont.)

Icon	Hierarchy level	Element type
 DSMCC	4	For SIDAT 360 streams: DownloadInfoIndication tables for one-layer Data Carousels.
 DSMCC	4	For SIDAT 360 streams: DownloadServerInitiate tables for two-layer Data Carousels.
 DSMCC	4	For SIDAT 360 streams: Multiprotocol Encapsulation sections.
 DSMCC	4	DSM-CC generic stream (may carry several tables).
	4	Private table.
	5	ECM table for elementary stream.
 DSMCC	5	For SIDAT 360 streams: DownloadInfoIndication tables for two-layer Data Carousels.
 DSMCC	5	For SIDAT 360 streams: Data Carousel module (one-layer Data Carousels).
 DSMCC	6	For SIDAT 360 streams: Data Carousel module (two-layer Data Carousels).

PCR clock and scrambling symbols. A PCR clock () symbol is added to the upper-right corner of stream icons to indicate which stream in a program or service is carrying PCR clocks.

A padlock symbol () is added to the lower-left corner of stream icons to signify the streams that are scrambled.



Hierarchic Icon Shortcut Menus

Each active hierarchy item that is represented by an icon has a shortcut menu that enables you to learn more about the selected item. Right-click an icon to display the shortcut menu, and then select a menu command. Table 3–33 describes the commands you will find in the shortcut menus.

Table 3–33: Hierarchic view menu commands

Command	Description
View section analysis	<p>Opens a section view window for the transport stream table selected in the hierarchic view. Refer to <i>Section Analysis View</i> on page 3–139.</p> <p>Section analysis will be performed only if a section probe is set from the Configuration Client.</p>
View section rate	<p>Opens a section rate view in the Client area for the transport stream table selected in the hierarchic view. Refer to <i>Section Rate View</i> on page 3–141.</p> <p>Section rate analysis will be performed only if a section rate probe is set from the Configuration Client.</p>
View PCR analysis	<p>Opens a PCR analysis view for the selected program in the Client area. Refer to <i>PCR Analysis View</i> on page 3–142.</p> <p>This command is available for PMTs and independent PCRs only. The analysis will be performed only if a timing (PCR) probe is set from the Configuration Client.</p>
View PTS/DTS analysis	<p>Opens a PTS/DTS analysis view for the selected video or audio elementary stream in the Client area. Refer to <i>PTS/DTS Analysis View</i> on page 3–145.</p> <p>This command is available for video and audio streams only. The analysis will be performed only if a timing (PTS/DTS) probe is set from the Configuration Client.</p>
View IP traffic	<p>Opens an IP traffic monitor view for the selected item in the Client area. Refer to <i>IP Monitoring View</i> on page 3–149.</p> <p>This command is available for DSM-CC private sections and SIDAT 360 multiprotocol encapsulation streams only. The analysis will be performed only if a section probe is set on those streams from the Configuration Client.</p>
View transport or section report	<p>Opens an error message window for the selected stream item in the Client area, or brings an already-opened error message view to the front of the Client area views.</p> <p>This command is available for all stream items.</p>

Using the Report View

The Report view (see Figure 3–14) occupies the bottom of the default Expert Client application window. Using the Report view, you can display all analysis results or only selected results. You can set the Expert Client to display the Report view by default using the View panel of the Settings window.

The Report view consists of three primary elements: Report view toolbar, hierarchic view panel, and the analysis results area panel.

- **Report View Toolbar.** Click a Report view toolbar button to quickly change the display mode of the hierarchic view panel.
- **Hierarchic View Panel.** Use this panel to select which analysis results are displayed in the analysis results area, to select how the analysis results are displayed, and to acknowledge error messages.
- Depending on the item selected in the hierarchic view panel, the analysis results area can contain a summary view, a graph view, or a message view.

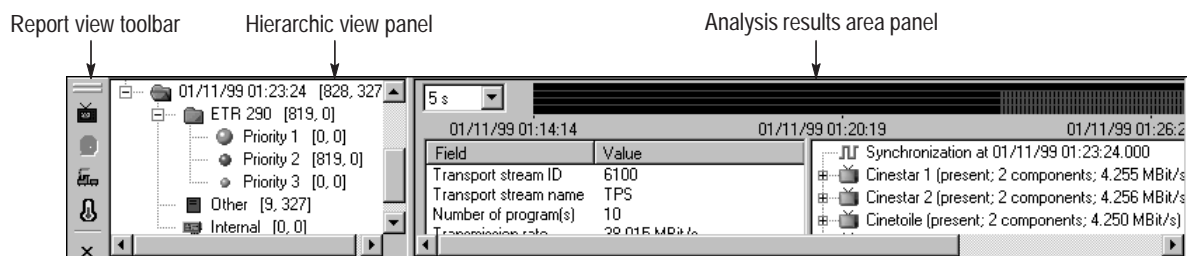
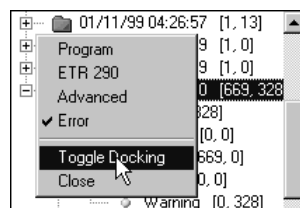


Figure 3–14: Report view display

Positioning the Report View

By default, the Report view occupies the bottom of the Expert Client display (this is called the “docked” state). You can toggle the location of the Report view to the Client area using the Toggle Docking command.






Right-click in the white space of the Report view Hierarchic panel and select Toggle Docking from the shortcut menu (repeating this step returns the Report view to the default position).



Report View Toolbar

The Report view toolbar buttons allow you to quickly change the display mode of the Report view. These buttons duplicate the commands in the shortcut menu of the hierarchic view panel in the Report view. Table 3–34 lists the functions of the toolbar buttons.

Table 3–34: Functions of the Report View Toolbar buttons

Button	Name	Function
	Program mode	Groups analysis results by program name in the Report view hierarchy.
	ETR 290 mode	Groups analysis results by ETR 290 priority levels (priority 1, 2, 3 and Warning) in the Report view hierarchy.
	Advanced mode	Groups analysis results by error type (Multiplex, Syntax, Timing, and Rate) in the Report view hierarchy.
	Error mode	Groups analysis results by user-defined error severity (Critical, Major, Minor, and Warning) in the Report view hierarchy. Set the severity level using the Message Level panel in the Configuration Client. Refer to <i>Message Level Panel</i> on page 3–187.
	Close report view	Closes the Report view.

Report View Hierarchic View Panel

The Report view displays the results of the analyses performed by the Analysis Server on the selected input. The hierarchic view panel gives you access to the following different views of the transport stream analysis:

- A summary of all the analysis results, which displays summary statistics of the transport stream.
- A graph of the errors that have occurred on the transport stream (current and past).
- A listing of the unacknowledged error messages for the selected item.

Hierarchy icons and levels. The hierarchic view panel in the Report view displays a hierarchic view of analysis results. The hierarchy display changes depending on the report display mode. The hierarchic view panel is a three-level display, and uses the Windows NT conventions for collapsing and expanding directory structures. The default display for the panel is to show the complete three level hierarchy.

Each hierarchic view, regardless of the display mode, has the following characteristics in common:

- **Top Level Icon (Folder).** The top level of the hierarchy displays a new folder each time a new synchronization event occurs. The top level folder represents a Configuration. A Configuration is a collection of all analysis results since the previous synchronization. Listed next to the top level icon is the time of the synchronization event and the running total of errors detected. When you select a first level icon, the Analysis Results area changes to display the default summary view.

When the Expert Client loses sync with the signal, the number of errors represents the total that occurred while the Expert Client was connected and synched to the input. The history of each input is maintained in the folders from previously synched sessions. You can delete all or some of these folders by right-clicking in the report view and making the appropriate selection from the shortcut menu.

NOTE. *The Expert Client creates a new Configuration every time synchronization is established. Therefore, if you stop and restart analysis, or if the Expert Client loses and regains synchronization for any reason (such as a momentary loss of the input signal), another Configuration icon appears in the hierarchic view.*

- **Second Level Icons (Folder, Other, and Internal).** The second level of the hierarchy displays a folder representing the organization (report mode) of the error messages you have chosen. When you select an icon at this level, the Analysis Results area to the right of the Report view updates to display graphs representing the average number of errors occurring on the transport stream.

The second level Other icon contains messages that are not related to the selected report mode.

The second level Internal icon contains the following messages when appropriate:

- **Hardware Input Overflow.** This message appears when the user has set too many probes for the corresponding Analysis Server input.
- **Extraction stopped for PID <n>.** This message appears when the requested measurements for PID <n> exceed system resources. The message indicates that incomplete measurements should be expected for PID <n> (for example, only some of the subtables of an SI table would be available for section analysis). When you see this message, you must remove probes from PID <n> in order to make complete measurements.
- **Third Level Icon.** The third level icons change depending on which report mode is selected (Program, ETR 290, Advanced, or Error).

The color of each report hierarchy icon signifies the presence or absence of errors and warnings within the corresponding item.

- A *green* icon indicates that no error or warning messages have been generated for the item or its hierarchic descendents.
- A *red* icon indicates that at least one unacknowledged error message has been generated for the item or its hierarchic descendents.
- A *yellow* icon indicates that at least one unacknowledged warning message has been generated for the item or its hierarchic descendents.

When the item (or its descendents) contains both errors and warnings, the errors take precedence, and the icon is red. The Expert Client displays the total number of error messages and the total number of warning messages in the item (or its descendents) in square brackets.

Report modes. The Report view hierarchic display organizes the analysis results using a user-selected graphical format. You can select a report mode using the Report view toolbar or the shortcut menu in the hierarchic view panel.

You can select between the following report modes (see Figure 3–15):

- The Program mode groups analysis results by program name (listed alphabetically).
- The ETR 290 mode groups analysis results by ETR 290 priority level (priority 1, 2, and 3).
- The Advanced mode groups analysis results by error type (Multiplex, Syntax, Timing, and Rate).
- The Error mode groups analysis results by user-defined error severity (Critical, Major, Minor, and Warning). Set the severity level using the Message Level panel in the Configuration Client. Refer to *Message Level Panel* on page 3–187.

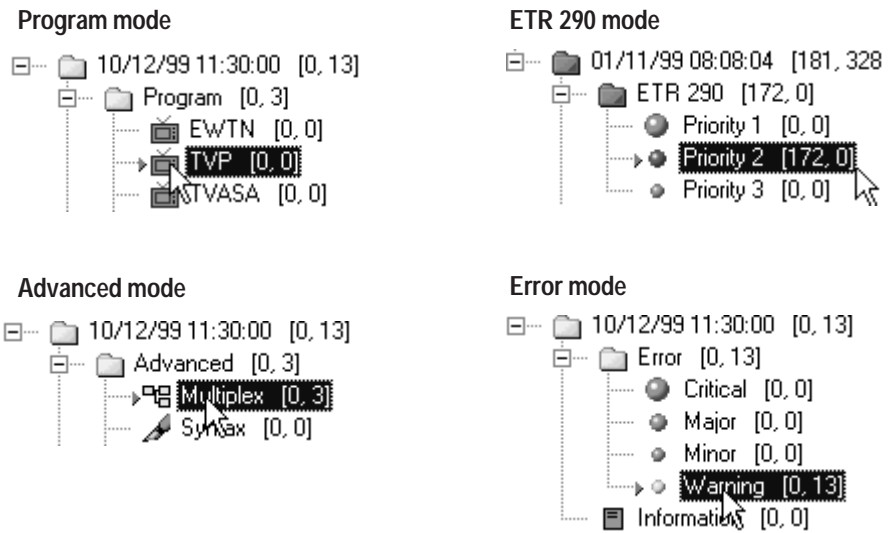


Figure 3-15: Report view display modes

Acknowledging error messages and deleting configurations. You can acknowledge error messages from the Report view and delete report configurations by right-clicking in the hierarchic view panel and selecting the appropriate item from the shortcut menu. Table 3-35 lists the commands in the shortcut menu.



CAUTION. You cannot undo the following menu commands. Acknowledged messages cannot be reset, and deleted messages or configurations cannot be recovered.

Table 3-35: Report view shortcut menu

Menu selection	Function
Acknowledge all messages	Acknowledges all of the Report view error messages for the selected configuration. Acknowledging all messages is equivalent to resetting past errors; the hierarchic icon becomes green (at least momentarily) as if no messages had been generated. A checkmark precedes all acknowledged messages.
Delete acknowledged messages	Deletes all acknowledged error messages from the selected configuration. Error messages that have not been acknowledged will not be deleted.
Delete all messages	Deletes all error messages (acknowledged or not) for the selected configuration.
Delete configuration	Deletes the selected configuration.
Delete all configurations	Deletes all but the most recent configuration.

Report View Analysis Results Area

The Analysis Results area has three types of views. The type of view displayed depends on the type of icon selected in the Report view hierarchy and the selected report mode (Program, ETR 290, Advanced, or Error):

- First level icon (a folder): Displays the Summary view (the default Report view) which displays various summary information about the transport stream being analyzed.
- Second level icon (a folder): Displays the Error Graph view which displays graphs showing the number errors occurring on the transport stream. The graphs are presented based on the mode of the Report view.
- Third level icon (changes depending on the mode): Displays the Message view (first, second, or third level icon) which displays the text of error messages. The error messages are presented based on the mode of the Report view.

The second- and third-level icon views display the results of the transport stream analysis organized based on the display mode selected in the Report view hierarchy (Program, ETR 290, Advanced, or Error).

Report view Summary (default) view. The Report view Summary view appears in the right section of the Report view whenever you select a Configuration icon (folder) in the Report view hierarchic view panel. The summary view presents a record of the input stream characteristics, contents, and errors.

The Summary view is divided into three regions (see Figure 3–16): the summary error graph, the general information panel, and the event panel.

- Error Graph. The error graph provides a high-level indicator of the frequency and severity of the errors measured during the current configuration, or monitoring session. The height of each segment in the graph indicates the most significant error level, if any, detected during the corresponding time period. The most recent segments appear at the right end of the graph, while the oldest segments scroll off the left end of the graph. The error level indicator for the current time period is indicated at the right of the error graph.

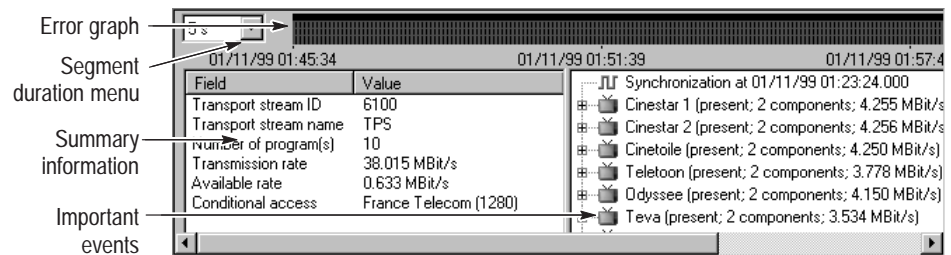


Figure 3–16: Analysis Results area of the Report view

As each measurement time period expires (as set by the Segment Duration menu), one of the five symbols shown in Table 3–36 appears in the right-most graph segment:

Table 3–36: Error graph symbols

Symbol	Description
Small green bar	Indicates that no error was detected during the measurement time period.
Short yellow bar	Indicates that at least one warning message was generated during the measurement time period.
Short red bar	Indicates at least one ETR 290 priority level three or other non-critical error was detected during the measurement time period.
Medium red bar	Indicates at least one ETR 290 priority level two or other critical error was detected during the measurement time period.
Tall red bar	Indicates at least one ETR 290 priority level one or other very critical error was detected during the measurement time period.

- The Segment Duration menu at the left end of the error graph controls the duration of each graph segment. The selections range from 5 s (five seconds) to 15 m (fifteen minutes). The time span of the error graph (from 18 minutes, 15 seconds to 54 hours, 45 minutes) depends on the settings in the segment duration menu.
- Summary Information. The summary information section (see Figure 3–16) displays a variety of information about the input stream. Displayed information includes the transport stream ID, the network name, the number of programs, the transmission rate, the available rate, and the conditional access for the transport stream being analyzed.
- Important Events. The important events section (see Figure 3–16) displays information about the stream and its contents as well as significant changes to the stream characteristics and content. Information is presented in a three-level hierarchic format. To expand the hierarchy at any point and reveal additional information about a stream item, either click the + box to the left of the item icon or double-click the icon itself.

Each level of the hierarchy displays the history of the transport stream at a different level of detail (see Table 3–17). First level icons displays information about the transport stream as a whole. Second level icons display information for each program in the stream. Third level icons display information about each program component.

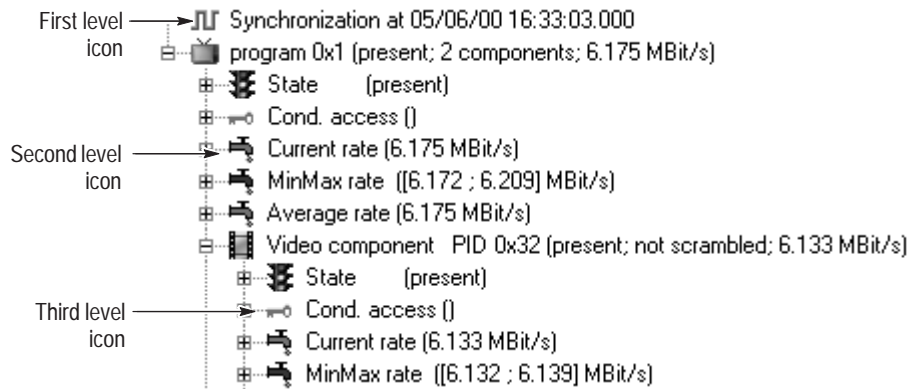


Figure 3–17: Hierarchy levels in the Analysis Results area

Table 3–37: Icons used in the Report view Analysis Results area

Icon	Level	Description
	1	Synchronization icons display the time of the last synchronization and consequently the beginning of a configuration.
	1	Program icons display the program name and its current state (presence, number of components, and rate).
	1	Lost Synchronization icons display the time of synchronization loss and, consequently, the end of a configuration.
	2	The program State icon indicates whether the program is “present” or “not present.” You can expand the State icon to reveal all program appearance and disappearance times.
	2	The program Cond. access icon displays all changes in the program conditional access.
	2	The program Rate icon displays the current bitrate for the program. Expand the rate item to reveal the time of all program rate changes.
	2	The Section, Audio, Video, or Data Component icons display the program component type, its PID, and its current state (presence, scrambling, and current rate). Expand each component to display the last level of important events.
	3	The component State icon indicates whether the component is “present” or “not present.” You can expand the State icon to reveal all component appearance and disappearance times.
	3	The component Cond. access icon displays all changes in the component conditional access.
	3	The component Rate icons show the current bitrate for the component. Expand the rate item to reveal all component rate changes.
	3	The component Scrambling icon displays the status and history of changes in the component scrambling state.

Report views using the Program report mode. The Program report mode displays information about the transport stream analysis and errors organized by program name. When you select the Program mode for the Report view, the information displayed in the Analysis Results area depends on the icon selected in the hierarchic view panel:

- When you select a first-level icon (configuration folder), the default Summary view is displayed (see Figure 3–16 on page 3–112).
- When you select a second-level icon (program folder), the Error Graph panel is displayed in the Analysis Results area. The Error Graph panel (see Figure 3–18) displays a graph of errors for each program in the transport stream. The summary graph of the errors for all components is displayed at the top of the Error Graph view.

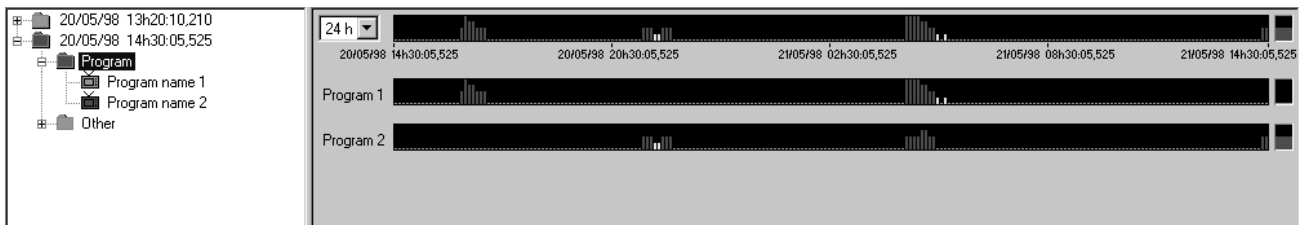


Figure 3–18: Error Graph panel for the Program report mode

- When you select a third-level icon (program name), the Message panel is displayed in the Analysis Results area. The Message panel (see Figure 3–19) displays all errors that have occurred for the selected program. The Message panel is divided into five columns as listed in Table 3–38. You can sort messages by clicking the column headers. Double-click an error message to display the details of the error in a dialog box.

Type	ETR 290	Advanced	Message	Time
Information			Synchronization.	20/05/98 14h30:05,525
Error appearance	level 2	timing	PCR interval error	21/05/98 04h30:05,525
Error disappearance	level 2	timing	PCR interval error disappearance	21/05/98 05h30:05,525
Warning		multiplex	0x47 PID warning detected	21/05/98 05h40:05,525

Figure 3–19: Message panel for the Program report mode

To change the width of a column in the message view, position the cursor over the divider to the right of the column heading; the cursor shape changes to indicate that you can change the width. Then click and drag the divider right or left to increase or decrease column width.

Table 3–38: Message view column descriptions (Program mode)

Column	Description
Type	Displays the type of error message: information, warning, error detected, or error disappearance.
ETR 290	Displays the ETR 290 priority level of the message (priority 1.1 to 3.8.2).
Family	Displays the family of the message (multiplex, syntax, timing, or rate).
Message	Displays the content of the message.
Time	Displays the time and date of the message.

Report views using the ETR 290 report mode. The ETR 290 report mode displays information about the transport stream analysis and errors organized by ETR 290 priority level (priority 1, 2, or 3). When you select the ETR 290 mode for the Report view, the information displayed in the Analysis Results area depends on the icon selected in the hierarchic view panel:

- When you select a first-level icon (configuration folder), the default Summary view is displayed (see Figure 3–16 on page 3–112).
- When you select a second-level icon (ETR 290 folder), the Error Graph panel is displayed in the Analysis Results area. The Error Graph panel (see Figure 3–20) displays a graph of errors for each ETR 290 priority level. The summary graph of the errors for all ETR 290 priority levels is displayed at the top of the Error Graph view.

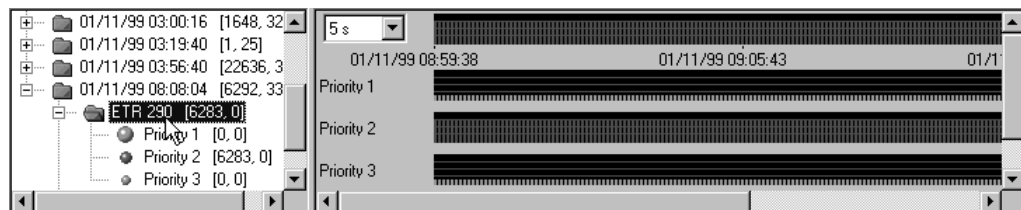


Figure 3–20: Error Graph panel for the ETR 290 report mode

- When you select a third-level icon (ETR 290 priority level), the Message panel is displayed in the Analysis Results area. The Message panel (similar to Figure 3–19) displays all errors that have occurred for the selected ETR 290 priority level. The Message panel is divided into six columns as listed in Table 3–39. You can sort messages by clicking the column headers. Double-click an error message to display the details of the error in a dialog box.

To change the width of a column in the message view, position the cursor over the divider to the right of the column heading; the cursor shape changes to indicate that you can change the width. Then click and drag the divider right or left to increase or decrease column width.

Table 3–39: Message view column descriptions (ETR 290 mode)

Column	Description
Type	Displays the type of error message: information, warning, error detected, or error disappearance.
Program	Displays the name of the program on which the error occurred.
ETR 290	Displays the ETR 290 priority level of the message (priority 1.1 to 3.8.2).
Advanced	Displays the type of error (multiplex, syntax, timing, or rate).
Message	Displays a statement briefly describing the error and the PID on which it occurred.
Time	Displays the time and date of the message.

Report views using the Advanced report mode. The Advanced report mode displays information about the transport stream analysis and errors organized by analysis type (Multiplex, Syntax, Timing, and Rate). When you select the Advanced mode for the Report view, the information displayed in the Analysis Results area depends on the icon selected in the hierarchic view panel:

- When you select a first-level icon (configuration folder), the default Summary view is displayed (see Figure 3–16 on page 3–112).
- When you select a second-level icon (Advanced folder), the Error Graph panel is displayed in the Analysis Results area. The Error Graph panel (see Figure 3–21) displays a graph of errors for each Advanced analysis type. The summary graph of the errors for all Advanced analysis types is displayed at the top of the Error Graph view.

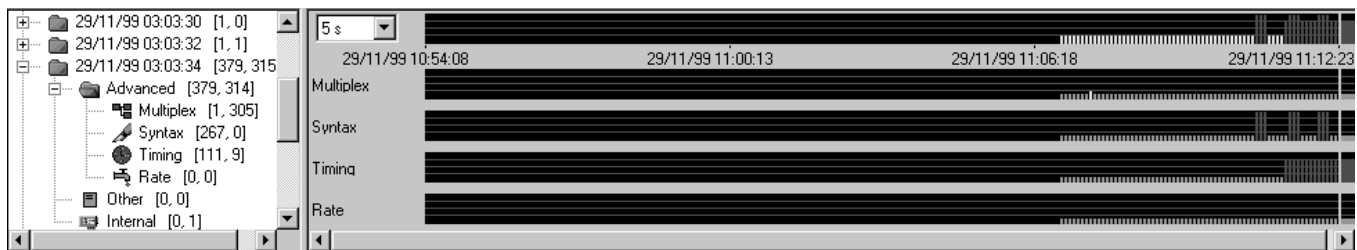


Figure 3–21: Error Graph panel for the Advanced report mode

- When you select a third-level icon (Advanced analysis type), the Message panel is displayed in the Analysis Results area. The Message panel (similar to Figure 3–19 on page 3–115) displays all errors that have occurred for the selected analysis type. The Message panel is divided into five columns as listed in Table 3–40. You can sort messages by clicking the column headers. Double-click an error message to display the details of the error in a dialog box.

To change the width of a column in the message view, position the cursor over the divider to the right of the column heading; the cursor shape changes to indicate that you can change the width. Then click and drag the divider right or left to increase or decrease column width.

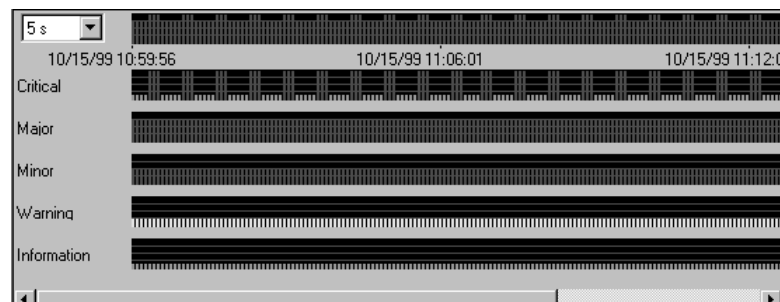
Table 3–40: Message view column descriptions (Advanced mode)

Column	Description
Type	Displays the type of error message: information, warning, error detected, or error disappearance.
Program	Displays the name of the program on which the error occurred.
ETR 290	Displays the ETR 290 priority level of the message (priority 1.1 to 3.8.2).
Message	Displays a statement briefly describing the error and the PID on which it occurred.
Time	Displays the time and date of the message.

Report views using the Error report mode. The Error report mode displays information about the transport stream analysis and errors organized by error severity (Critical, Major, Minor, and Warning). You can specify the severity for each test performed by the Analysis Server using the Message Level panel of the Configuration Client. Refer to *Message Level Panel* on page 3–187 for more information about setting error message levels.

When you select the Error mode for the Report view, the information displayed in the Analysis Results area depends on the icon selected in the hierarchic view panel:

- When you select a first-level icon (configuration folder), the default Summary view is displayed (see Figure 3–16 on page 3–112).
- When you select a second-level icon (Error folder), the Error Graph panel is displayed in the Analysis Results area. The Error Graph panel (see Figure 3–22) displays a graph of errors for each severity level. The summary graph of the errors for all error severities is displayed at the top of the Error Graph view.

**Figure 3–22: Error Graph panel for the Error report mode**

- When you select a third-level icon (error severity), the Message panel is displayed in the Analysis Results area. The Message panel (similar to Figure 3–19 on page 3–115) displays all errors that have occurred for the selected error severity. The Message panel is divided into six columns as listed in Table 3–41. You can sort messages by clicking the column headers. Double-click an error message to display the details of the error in a dialog box.

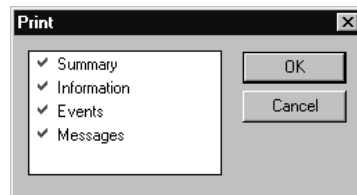
To change the width of a column in the message view, position the cursor over the divider to the right of the column heading; the cursor shape changes to indicate that you can change the width. Then click and drag the divider right or left to increase or decrease column width.

Table 3–41: Message view column descriptions (Error mode)

Column	Description
Type	Displays the type of error message: information, warning, error detected, or error disappearance.
Program	Displays the name of the program on which the error occurred.
ETR 290	Displays the ETR 290 priority level of the message (priority 1.1 to 3.8.2).
Advanced	Displays the type of error (multiplex, syntax, timing, or rate).
Message	Displays a statement briefly describing the error and the PID on which it occurred.
Time	Displays the time and date of the message.

Printing Reports and Messages

To print some or all of the data for a Report view Configuration, select the Configuration icon (first-level folder icon) and then select Print from the View menu or press CTRL+P to open the Print window (shown below).



The Print window lists all the items you can print from the selected Configuration. All items preceded by a check mark will be printed when you click OK. Click a Print window item to select or deselect the item for printing.

NOTE. A full report printout can be quite lengthy, depending on the complexity of the input stream, the duration of the analysis, and the number of events and errors encountered.

To print only the messages for one program, a single ETR 290 priority level, one advanced analysis type, or one error type, select the corresponding report hierarchy icon so the messages are displayed in the right report view section. Then select Print from the View menu (or press CTRL+P).

Messages and the Windows NT Event Viewer

The Analysis Server can save error message details in the Windows NT Event Viewer Application log. This gives you the opportunity to save a permanent record of analysis events, which would otherwise be lost when you pause window updates (Freeze views in the View menu) or exit the application.

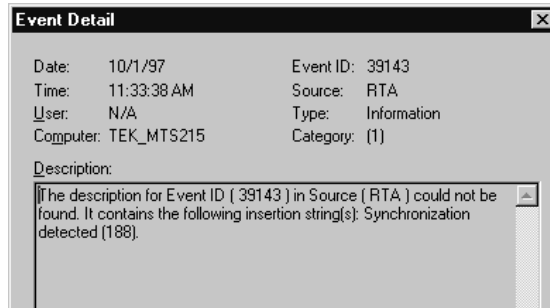
Turn Event Viewer logging on or off using the Report configuration panel of the Configuration Client (refer to *Report Panel* on page 3–185).

When you open an Event viewer messages window from within a Message view, you are accessing the Event Viewer Application log. To access the log directly, perform the following steps:

1. Start the Event Viewer application from the Windows NT Start menu by pointing to **Programs, Administrative Tools (Common)**, and then selecting **Event Viewer**.
2. When the **Event Viewer** window opens, select **Application** from the Log menu.

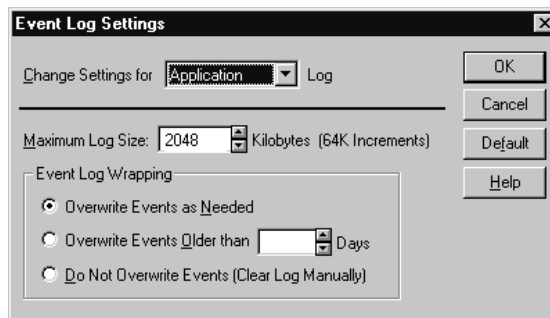
Date	Time	Source	Category	Event	User	Computer
10/1/97	11:33:38 AM	RTA	(1)	39152	N/A	TEK_MTS215
10/1/97	11:33:38 AM	RTA	(2)	39151	N/A	TEK_MTS215
10/1/97	11:33:38 AM	RTA	(2)	39150	N/A	TEK_MTS215
10/1/97	11:33:38 AM	RTA	(2)	39149	N/A	TEK_MTS215
10/1/97	11:33:38 AM	RTA	(2)	39148	N/A	TEK_MTS215
10/1/97	11:33:38 AM	RTA	(1)	39147	N/A	TEK_MTS215
10/1/97	11:33:38 AM	RTA	(1)	39146	N/A	TEK_MTS215
10/1/97	11:33:38 AM	RTA	(1)	39145	N/A	TEK_MTS215
10/1/97	11:33:38 AM	RTA	(1)	39144	N/A	TEK_MTS215
10/1/97	11:33:38 AM	RTA	(1)	39143	N/A	TEK_MTS215

3. The Application Log can contain hundreds of entries. Use the vertical scroll bar and arrows to see entries that will not fit in the window. As long as the Analysis Server is running, the log is continuously updated. To open an **Event Detail** window, double-click a log entry.



4. From the Event Viewer Application log window you can save the current contents of the Application Log to a file for later use, you can clear the log to make room for more entries, you can change the log size, and you can specify how the Event Viewer acts when the log is full. Refer to the Windows NT documentation (or the Event Viewer online help) for more information.

NOTE. For best results, do not select any Event Viewer Log Wrapping setting other than **Overwrite Events as Needed**. The Expert Client may freeze if the application event log fills to capacity during stream analysis. Choose **Log Settings** from the Log menu of the Event Viewer to verify the current log wrapping option and to change the size of the application event log, if necessary.



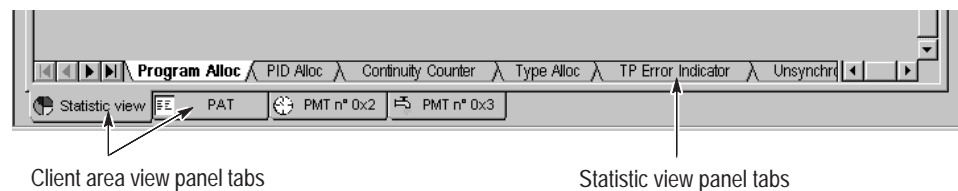
Using the Client Area

The Client area occupies the upper-right panel of the default Expert Client window (see Figure 3–7 on page 3–84). The Client area can display several different views which represent various aspects of the analysis of the input stream.

By default, the Client area displays the Statistic view whenever you start analysis. The Statistic view contains several panels, which display data about the input stream and the programs carried in the stream. Refer to *Statistic View* on page 3–125 for more information. The Client area can contain numerous other analysis panels that you can access through the Hierarchic view icons. Refer to *Using the Hierarchic View* on page 3–101.

Positioning and Sizing the Client Area Views

By default, the individual Client area views are maximized. That means that each view occupies the entire Client view. If more than one view is open at a time in the Client view, you can switch among them by clicking the appropriate Client area view tab as shown below.




You can use the Window menu to change how multiple open views in the Client area are displayed, such as tiling or cascading the views. Refer to *Window Menu* on page 3–93 for more information.

To simultaneously maximize the Statistic view and close other Client area views, click the **Restore standard views** toolbar button.

The Client area control buttons appear at the right end of the Menu bar when the Client area views are maximized as shown below.



Click the Minimize button (☐) to reduce the top Client area view to an icon within the Client area and change all other Client area views to windows or icons within the Client area, depending on their previous size. Each window and icon then has its own control buttons.

Click the Tile button () to reduce all Client area views to windows or icons within the Client area, depending on their previous status, if any. The sizing buttons disappear from the menu bar because each icon and window has its own sizing buttons.

Click the Close button () to close the top (currently selected) view.

NOTE. *Closing a Client area view clears all existing information. Unless you are logging messages to the Event Viewer, all information in a Client area view is lost when you close the view. Use the Report panel in the Configuration Client to enable Event Viewer logging. Refer to Report Panel on page 3–185.*

Error Indicators

The Client area views use the following colors for error indicators:

- *Gray* signifies that no test is currently running.

A test is not performed for one of three reasons: the user probe is not set, the test is disabled, or the input stream does not contain the applicable table. (For example, MPEG-2 streams, do not contain SI tables; therefore, ETR 290 tests 3.2 through 3.8 cannot be performed on non-DVB streams.)

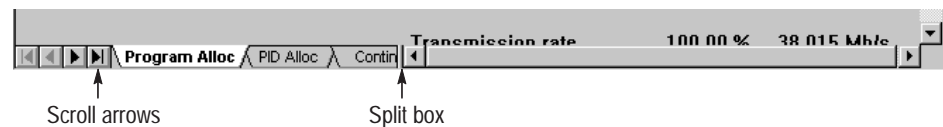
- *Green* signifies that a probe is set and that the measurement has remained within the user-specified limits.
- *Red* signifies that an error is occurring.
- *Orange* signifies that the monitored parameter is currently within the limits you defined but that an error has occurred since monitoring began.

Statistic View

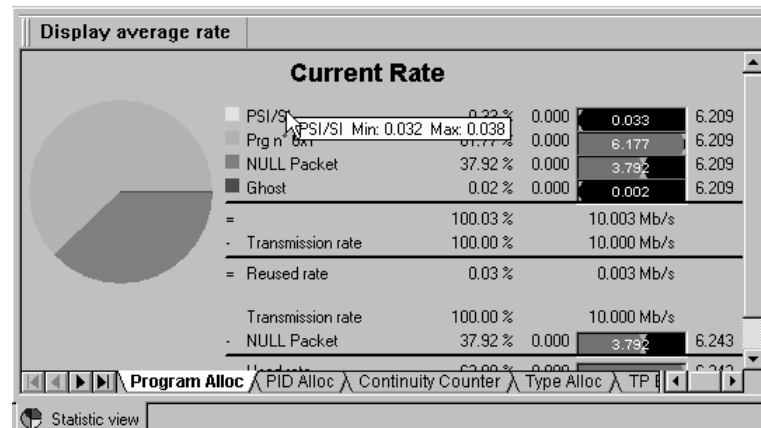
The Statistic view is a collection of different tabbed panels that display data about the input stream and the programs carried in the stream. You can display only one Statistic view panel at a time.

By default, the Program Allocation panel of the Statistic view appears in the Client area after you begin analysis on the input stream. You can view a different panel by clicking the corresponding tab on the bottom of the Statistic view panel (see illustration on page 3–123).

When the Statistic view first opens, some of the panel tabs are hidden by the horizontal scroll bar. You can click the scroll arrows to reveal the remaining tabs, or you can click the thin split box and drag to the right to shorten the scroll bar.



Bandwidth allocation tool tip displays. The Program Allocation, PID Allocation, and Type Allocation panels of the Statistic view provide different views of how the transport stream bandwidth is allocated. In each view, you can rest the mouse cursor anywhere in a transport stream item row, and a Tool Tip (shown below) is displayed. The information provided shows the minimum and maximum values taken by the element since the last synchronization.



Program Allocation panel. The Program Allocation panel (see Figure 3–23) shows the bandwidth allocation of individual items in the input multiplex using a graphical pie chart. The yellow slice of the pie chart represents PSI/SI information; each remaining colored slice represents a program, null packets, or unreferenced (ghost) packets. The accompanying color-coded list of programs (matches the pie-chart colors) provides a numeric report of bandwidth usage. A graphic bar displaying the current or average transport rate for each program or service in the multiplex is displayed on the right.

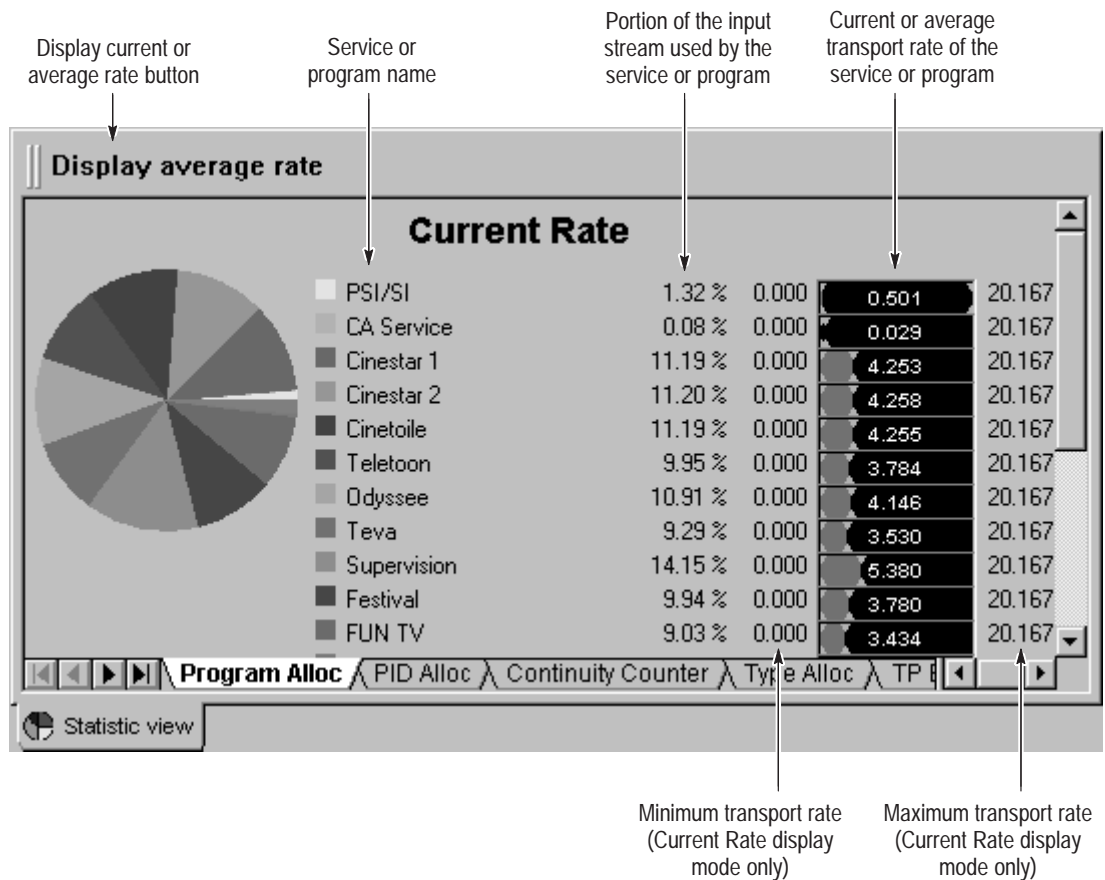


Figure 3–23: Program Allocation panel (Current Rate mode)

You can double-click a slice of the pie chart to switch to the PID Allocation panel (see Figure 3–23 on page 3–126) with the corresponding program or service already selected. You can turn off the pie-chart display using the Graphics View panel of the Settings window (select Settings from the Session menu).

The Reused rate is the rate of shared items (that is, PIDs shared between programs). The Used rate is the transmission rate less the Null Packet rate.

You can set the Program Allocation and PID Allocation panels to display current or average transport rates for the current configuration.

- Select **Display current rate** to display current transport rates. In this mode the minimum and maximum transport rates for the current configuration are displayed as well as the current transport rate. Current Rate is displayed on both the Program Allocation and PID Allocation panels when this mode is selected.
- Select **Display average rate** to display average transport rates. In this mode the transport rates for the current configuration are averaged and only the average rates are displayed. Average Rate is displayed on both the Program Allocation and PID Allocation panels when this mode is selected.

You can set user-defined upper and/or lower transport rate error limits for individual stream items so that the Analysis Server can alert you when the transport rate is outside of the desired range. Use the Transport Rate Analysis panel of the Configuration Client to set user-defined measurement limits. Refer to *Transport Rate Analysis Panel* on page 3–181 for more information.

When you set user-defined limits on a stream item, the appearance of the graphic bar display changes. See Figure 3–24. In Figure 3–24, the low and limit levels for PSI/SI have been set (using the Configuration Client) to 0.50 and 0.51 Mbps respectively. The two blue bars represent these limits.

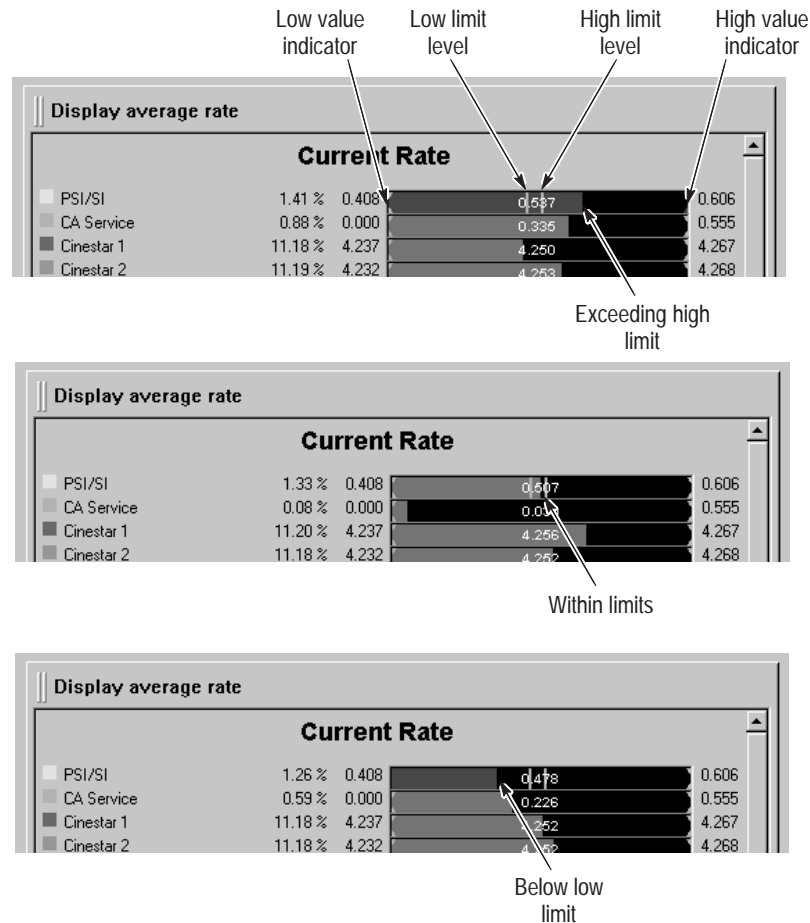


Figure 3–24: Reading the Program Allocation panel bar graphs

When you set measurement limits inside the range of the measured minimal and/or maximal rates, the graphic bar is green. When a limit has been violated, the bar becomes red. When the rate returns to within limits, the bar becomes green again, but the maximum and/or minimum value indicators become orange, indicating that the respective limit was surpassed. Refer to *Error Indicators* on page 3–124 for more information.

PID Allocation panel. The PID Allocation panel (see Figure 3–25) gives a more detailed, program-level view of input stream bandwidth allocation. Instantaneous, previous maximum, and previous minimum multiplex rates are shown by PID for the selected program. Each PID icon corresponds to the stream item type shown in the Hierarchic view.

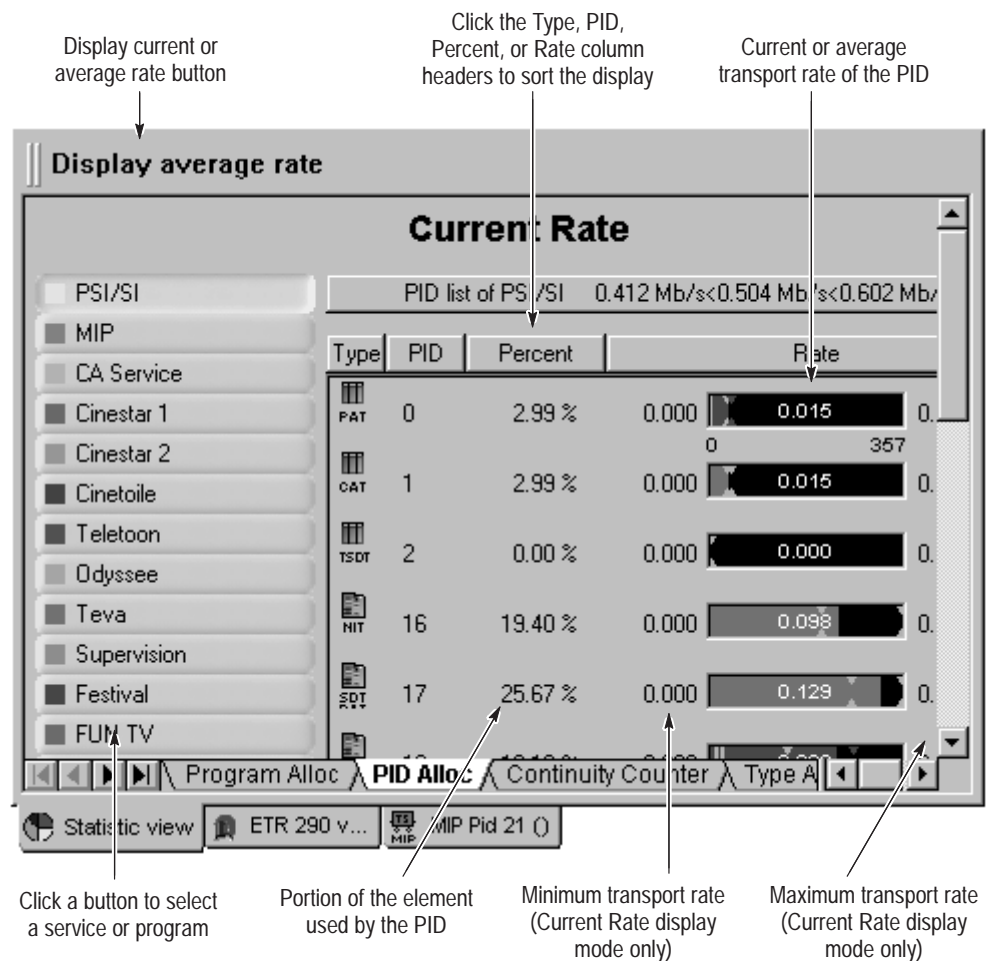


Figure 3–25: PID Allocation panel (current rate mode)

You can select a program to view in the PID Allocation panel using one of the following methods:

- Double-click the program slice in the Program Allocation panel to open the PID Allocation panel for that program.
- Click the corresponding program or transport stream item button in the PID Allocation panel.

Additionally, you can view selected PIDs only by clicking the Selection button. When you click the Selection button, the PIDs you referenced using the PID Allocation View panel of the Settings window are displayed. Refer to *PID Allocation View Panel* on page 3–100 for more information.

NOTE. You can add and remove PIDs directly from the PID Allocation panel by dragging and dropping stream icons between the Hierarchic view and the PID Allocation panel in the Client area. Doing so will automatically update the PID Allocation View panel of the Settings window.

The banner over the displayed PIDs in the PID Allocation panel contains information about the selected program or service. In the PID Allocation panel shown in Figure 3–25, PSI/SI has an instantaneous transport rate of 0.504 Mb/s and the rate has been between 0.412 and 0.602 Mb/s for the current configuration.

The area below the banner lists each PID in the program or service and, with graphics and text, reveals additional information about the stream item identified with that PID. If the program or service contains more than a few PIDs, you may have to use the vertical scroll bar to view the information for every PID.

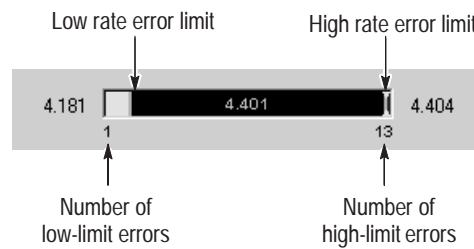
NOTE. You can sort the PID Allocation display by clicking the Type, PID, Percent, or Rate column headers.

You can set the Program Allocation and PID Allocation panels to display current or average transport rates for the current configuration.

- Select Display current rate to display current transport rates. In this mode the minimum and maximum transport rates for the current configuration are displayed as well as the current transport rate. Current Rate is displayed on both the Program Allocation and PID Allocation panels when this mode is selected.
- Select Display average rate to display average transport rates. In this mode the transport rates for the current configuration are averaged and only the average rates are displayed. Average Rate is displayed on both the Program Allocation and PID Allocation panels when this mode is selected.

You can set user-defined upper and/or lower transport rate error limits for individual stream PIDs so that the Analysis Server can alert you when the transport rate is outside of the desired range. Use the Transport Rate Analysis panel of the Configuration Client to set user-defined measurement limits. Refer to *Transport Rate Analysis Panel* on page 3–181 for more information.

When you set user-defined limits on a PID, the appearance of the graphic bar display changes (shown below). When you set measurement limits inside the range of the measured minimal and/or maximal rates, the graphic bar displays the standard colors to indicate error conditions (the corresponding PID selection button color will match the error condition). The display will show the current rate in red when it violates either limit. When a limit has been violated, the region of the bar between the limit and the actual min or max value becomes red; when the rate returns to the preferred range, the region becomes orange. Refer to *Error Indicators* on page 3–124 for more information.



The number of low-limit errors detected (in this case, 1) appears immediately below the left end of the rate bar while the number of high-limit errors appears below the right end. The number of (low- or high-limit) errors reported is the number of 500 ms samples in which the actual transport rate has been below or above the specified limits.

Continuity Counter panel. The Continuity Counter panel (see Figure 3–26) shows the results of continuity counter monitoring for each PID in the selected program or service. The data are displayed PID-by-PID, similar to the PID Allocation view. If a continuity error is detected, a message is displayed in the Report view.

The Transport Syntactic Analysis panel of the Configuration Client controls which PIDs are shown in this view. Refer to *Transport Syntactic Analysis Panel* on page 3–170 for more information.

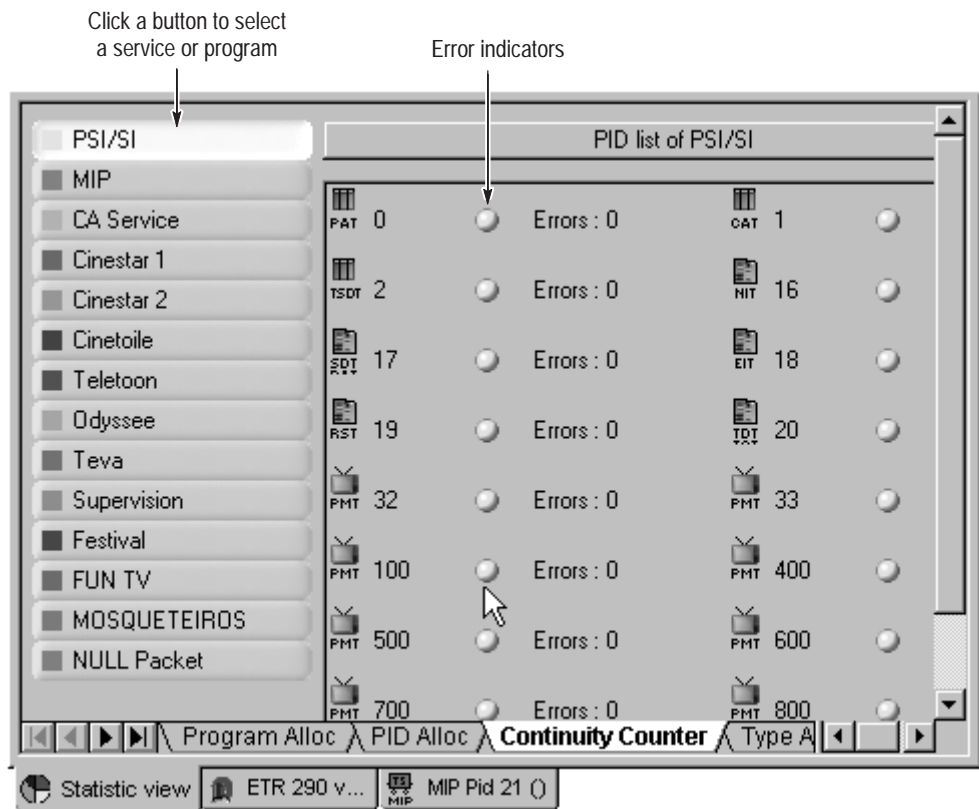


Figure 3–26: Continuity Counter panel

Select a program by clicking the corresponding button on the left edge of the panel. Each program button can change color to indicate the presence or absence of continuity counter errors in that program. The right portion of the panel shows the error status and number of errors for each individual PID in the program. The error indicators use colors to indicate error conditions. Refer to *Error Indicators* on page 3–124 for more information.

Type Allocation panel. The Type Allocation panel (see Figure 3–27) shows the bandwidth allocation of each PID type in a pie-chart display. Each slice of the pie chart represents a PID type (such as audio, video, or data).

The accompanying color-coded list of PIDs (matches the pie-chart colors) provides a numeric report of bandwidth usage. A graphic bar displaying the current transport rate for each PID in the multiplex is displayed on the right, along with the minimum and maximum rates.

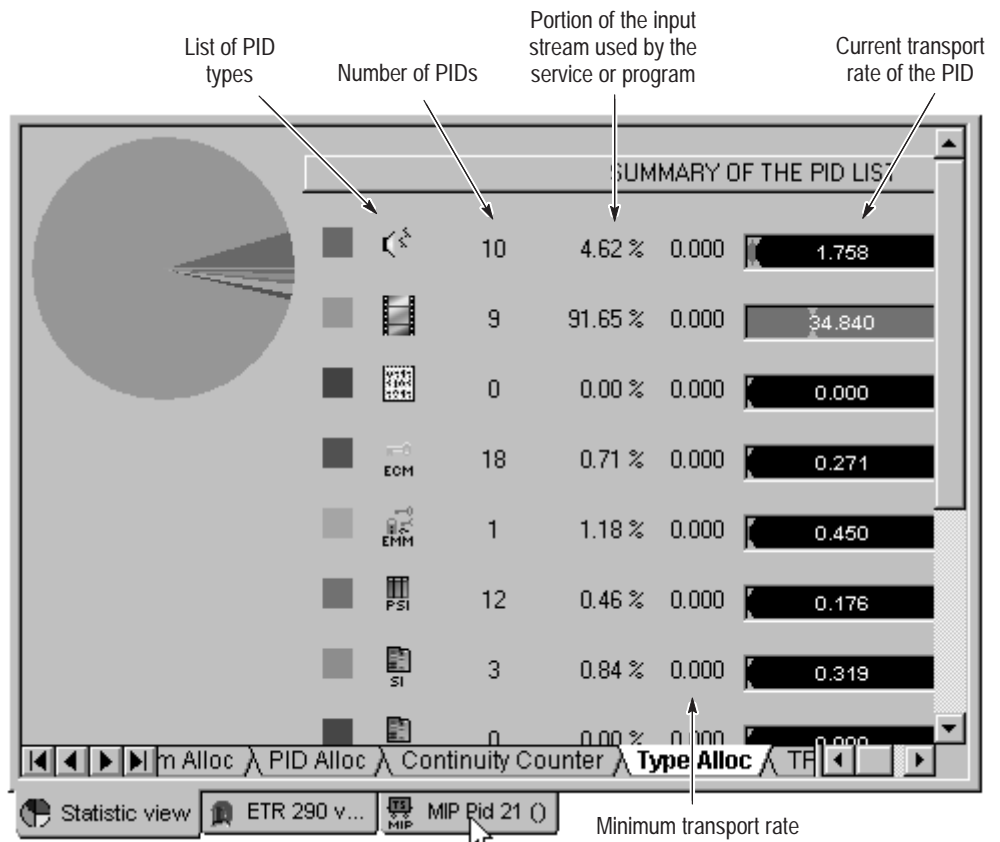


Figure 3–27: Type Allocation panel

TP (Transport Packet) Error Indicator panel. The TP Error Indicator panel (see Figure 3–28) reports the results of transport error indicator (TEI) monitoring per ETR 290. The `transport_error_indicator` field of every transport packet header is checked and the number of packets is counted with this bit-field set to 1 every 500 ms. The TP Error Indicator panel displays the last 150 seconds of the results in graphical form.

The Transport Syntactic Analysis panel of the Configuration Client controls this view. Refer to *Transport Syntactic Analysis Panel* on page 3–170 for more information about activating the transport error indicator probe. You can also add this probe using the 2.1 Transport error probe from the ETR290 panel of the Configuration Client.

The horizontal (time) scale of the graph is linear. The vertical (errors/500 ms) scale is logarithmic to show both very low and very high error rates.

The TEI indicator in the status bar uses color conventions for error reporting. Refer to *Error Indicators* on page 3–124 for more information.

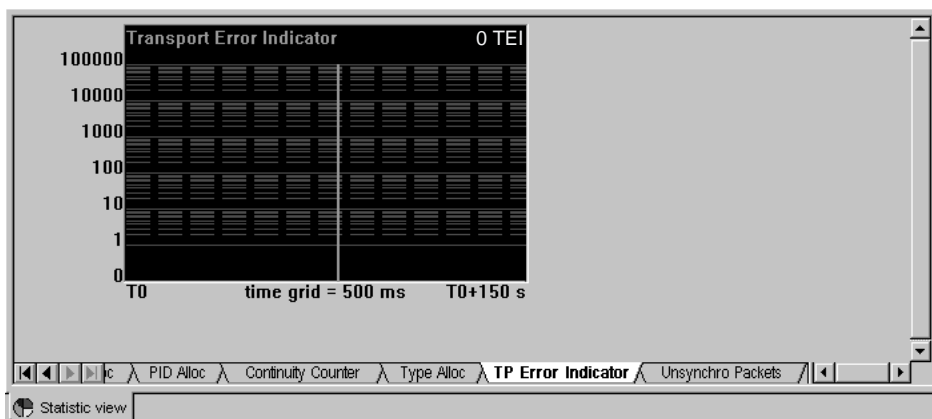


Figure 3–28: TP (Transport Packet) Error Indicator panel

Unsynchronized Packets panel. The Unsynchronized Packets panel (see Figure 3–29) reports the results of sync byte monitoring. The sync_byte field of every transport packet header is checked and the number of packets without the 0x47 sync_byte is counted every 500 ms. The number of packets with sync bytes are plotted on a graph with a logarithmic vertical scale to display both very low and very high rates of error. The vertical units are UNP per 500 ms.

You must set the unsynchronized packet probe using the Multiplex Analysis panel of the Configuration Client to perform sync byte monitoring. Refer to *Multiplex Analysis Panel* on page 3–166 for more information.

The UNP indicator in the status bar uses color conventions for error reporting. Refer to *Error Indicators* on page 3–124 for more information.

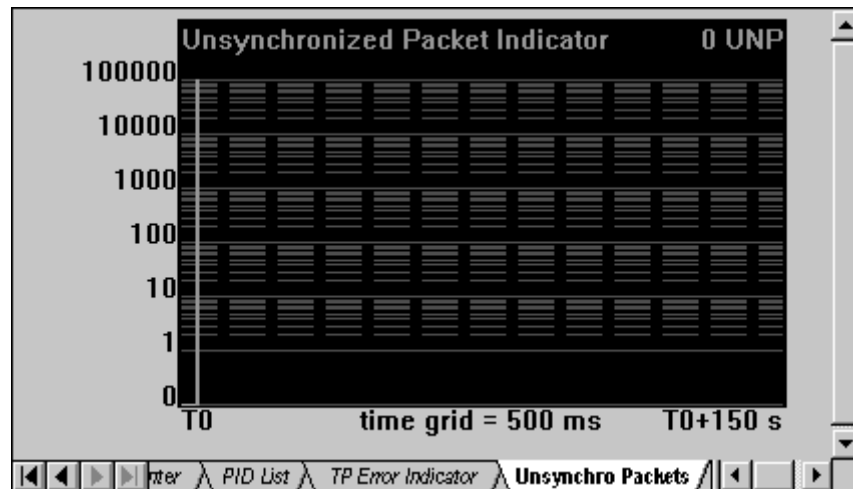


Figure 3–29: Unsynchronized Packets panel

ASI/M2S Distribution panel. The ASI/M2S Distribution panel (see Figure 3–30) shows the statistical distribution of the gaps between consecutive data bytes. The vertical axis represents the percentage of gaps in useful data (bytes) and the horizontal axis represents number of NULL (dummy) bytes between data bytes. In the Figure 3–30, over 70 percent of the packets in the transport stream being analyzed have twelve NULL bytes between them.

By default, the display is auto-scaled. If you clear the Auto-scale check box, you can select scales of 1%, 2%, 5%, 10%, or 20%.

The input transport stream mode can be one of two types (this mode is automatically detected):

- Burst mode which provides single bytes separated with dummy bytes.
- Packet mode which provides continuous transmission of bytes separated with continuous dummy bytes.

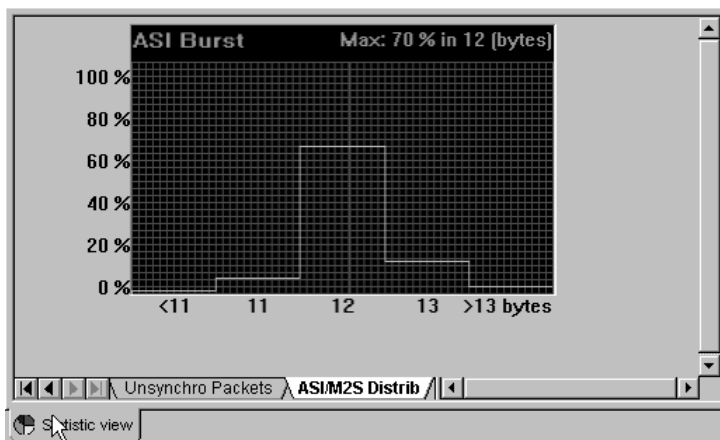


Figure 3–30: ASI/M2S Distribution panel

ETR 290 View

The ETR 290 view (see Figure 3–31) provides a high-level report of all ETR 290³ recommended tests performed by the Expert Client. To open an ETR 290 view, either select ETR 290 View from the View menu or click the ETR 290 View toolbar button. The status bar includes indicators (PR1, PR2, and PR3) to indicate the status of ETR 290 priority errors.

NOTE. *ETR 290 priority 3 checks DVB-SI tables. In ATSC analysis mode, these checks do not apply except for 3.4 Unreferenced_PID. When the ATSC analysis mode is selected, the Expert Client uses six tests specific to ATSC/PSIP tables based on the model of ETR 290 Priority 3 tests. Also, when MPEG-2 analysis mode is selected, there are no Priority 3 tests..*

In the ETR 290 view, test numbers are those used in the DVB measurement guidelines, ETR 290, except for the priority 3 checks which apply only to the DVB mode. In MPEG-2 mode, the priority 3 column does not appear and in ATSC mode the column is customized for that mode. Colored indicator lights show the status of each test. The error indicators follow color conventions for error reporting. Refer to *Error Indicators* on page 3–124 for more information.

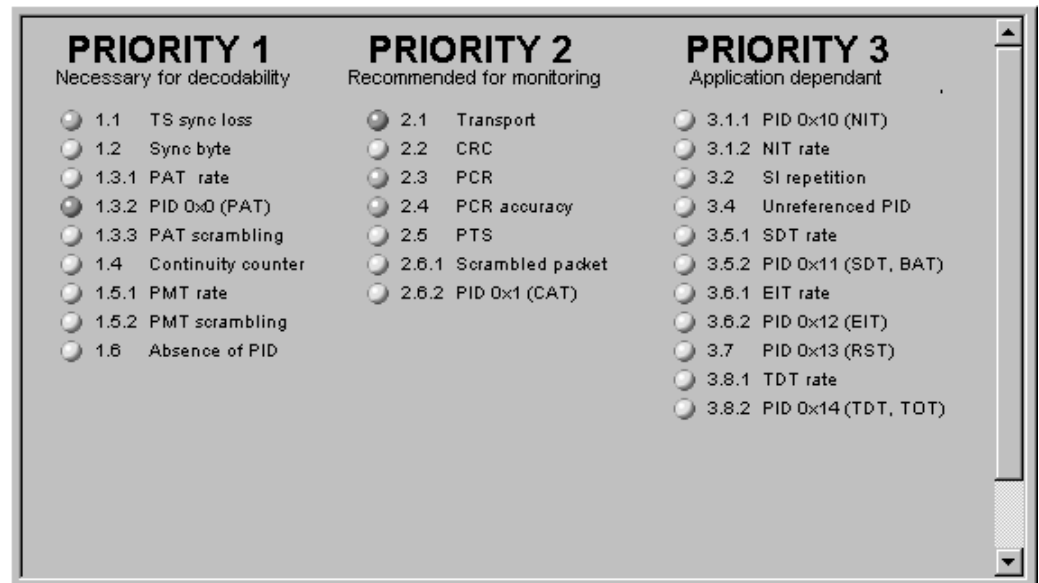
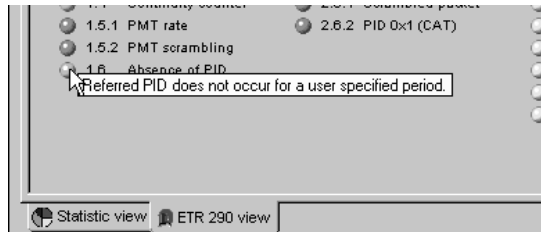


Figure 3–31: ETR 290 view (DVB mode)

³ ETR 290 is the DVB consortium working group that is responsible for recommending measurements and controls to be performed on all the elements of a digital television chain. Refer to *ETR 290 Analysis* on page 3–44 for additional information about the ETR 290 recommendations, priority levels, and tests.

Positioning your pointer over the test name or LED displays a Tool Tip (as shown below) describing the Analysis Server test or tests represented by that ETR 290 priority LED. You can double-click an error indicator to open a Message view in the Client area that displays the error messages pertaining to that particular ETR 290 error condition.



Tests 1.3.1, 1.5.1, 3.1.2, 3.5.1, 3.6.1, and 3.8.1 use error criteria that can be changed on the Section Rate Analysis panel of the Configuration Client. Refer to *Section Rate Analysis Panel* on page 3–182 for more information. The values you set in the Section Rate Analysis panel are displayed in the Tool Tips when you position your pointer over the test name or LED.

Tests 2.3, 2.4, and 2.5 (PCR and PTS/DTS probes) are performed only on PMTs and elementary streams that you specify using the Configuration Client timing analysis panels. The ETR 290 view shows how many of the PMTs and elementary streams (ES) in the input stream have been selected for monitoring.

Section Analysis View

The Section Analysis view (see Figure 3–32) is available for all tables carried in a transport stream, whether they are part of the system information tables (PSI, DVB–SI, ATSC/PSIP) or part of other transport stream data. Set section probes using the Configuration Client.

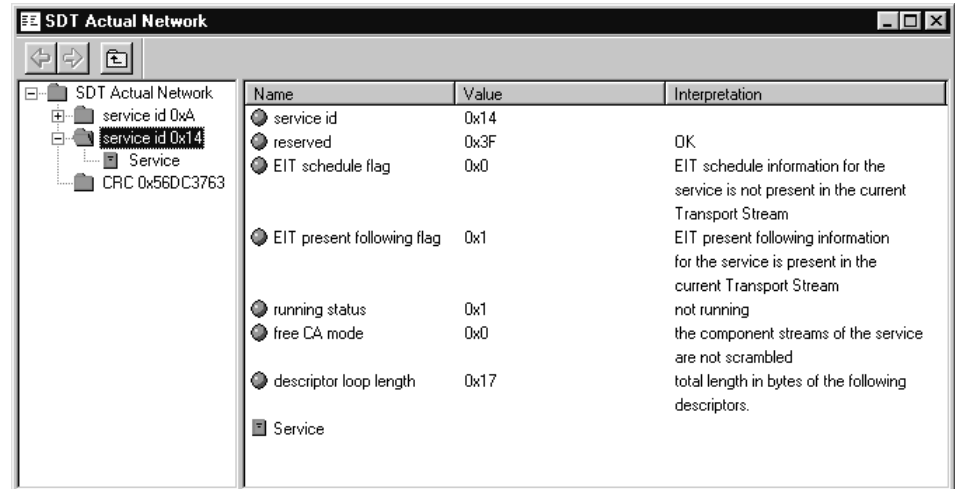

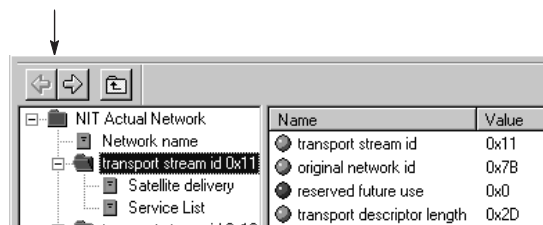


Figure 3–32: Section Analysis view

The Section Analysis view provides both a hierarchic and field view of the selected table section. In the Section Analysis view hierarchy, related fields are grouped and shown as folders and other icons. With some table types you can expand and collapse the hierarchy as you would a Windows NT Explorer directory hierarchy. Click a hierarchy icon to show the contents of the represented item in the right sub-view as shown below. You can also double-click the same folder icon in the right sub-view to show the same information.

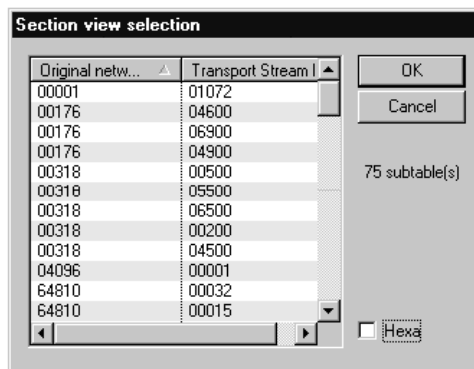
Click the Close Folder button () to close an open folder in the hierarchy. When more than one section of the selected sub-table exists, use the section selection buttons to scroll among the sections.

Section selection buttons



Although the normal numeric display is hexadecimal, it may be convenient in some instances to see the decimal value of one or more fields. Press the F2 function key to toggle between decimal and hexadecimal display.

Opening a section analysis view. To display the results of a section analysis, select View Section Analysis from the Hierarchic view shortcut menu. If an item in the Hierarchic view represents several sub-tables (such as an NIT, SDT, or EIT), an intermediate dialog box enables you to select one particular sub-table to analyze. For an SDT, for instance, a dialog box (shown below) enables you to choose the original_network_id and the transport_stream_id of the SDT sub-table. Double-click the sub-table you need to display or highlight the sub-table and click OK. You can click the column headers to reorder the listed sub-tables.



Printing a section analysis view. You can print a record of the current Section Analysis view by clicking inside the view to select the view, and then choosing Print from the View menu (or pressing CTRL+P).

NOTE. Before printing a view, check the Expert Client title bar to confirm that the desired view is selected.

Section Rate View

The Section Rate view (see Figure 3–33) contains graphs that show the section rate and time interval between sections of the selected table. Before you can open a Section Rate view of a table, you must first set a rate probe on the desired table using the Configuration Client. After the probe is set, select the corresponding Hierarchic view icon, right-click to open the shortcut menu, and then select View Section Rate. An intermediate dialog box lets you select a sub-table if necessary.

If a section rate error is detected the graph trace is red. The error indicator corresponding to the error is displayed in red in the ETR 290 view if the rate error is classified in the ETR 290 reference (for example, ETR 290 1.3.1 is a PAT rate condition). To see which error occurred, double-click the Hierarchic view icon corresponding to the Section Rate view or choose the View Report command in the shortcut menu to open the associated report view.

The lower Sub-Table Max Interval graph displays interval errors in red when a maximum section interval probe is set for the particular table type.

You can use the Graphics View panel of the Settings window (select Settings from the Session menu) to set the scrolling mode for the graphs.

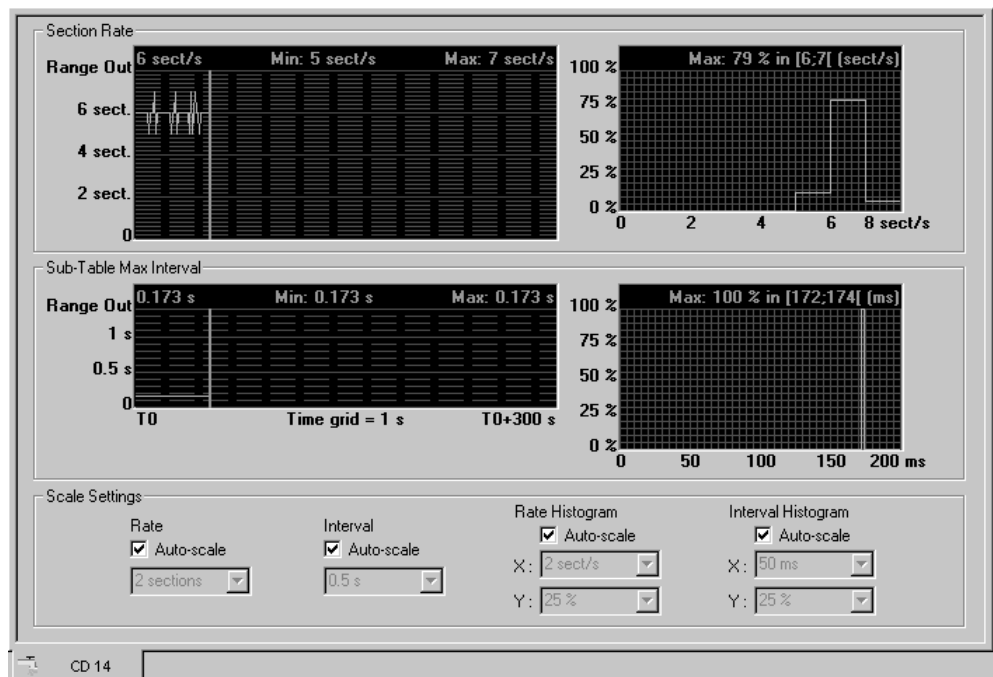


Figure 3–33: Section Rate view

Setting graph scales. All scales on the rate and interval graphs are linear and by default the Expert Client auto-scales the vertical scale on the graphs. To change the vertical scale on a graph, clear the corresponding Auto-scale check box and select an appropriate scale increment from the drop-down list box. The Section Rate vertical scale in the graph ranges from zero to four times the selected scale increment; the Sub-Table Max Interval scale ranges from zero to approximately three times the scale increment. Both vertical scales begin at zero regardless of the scale setting.

Histogram readout. The two section-analysis graphs on the right are histograms, which show the relative frequency of section rates and intervals. Histograms are a percentage value distribution since the beginning of the analysis. By default, the histogram readout lists the maximum rate or interval measured. If you position the cursor within a histogram, the cursor shape changes to resemble cross hairs and the histogram readout changes to display the rate or interval value at the cursor position.

PCR Analysis View

The PCR Analysis view (see Figure 3–34) is a graphical display of PCR precision and frequency. Before you can open a PCR Analysis view, you must first set a probe on the desired program using the Configuration Client.

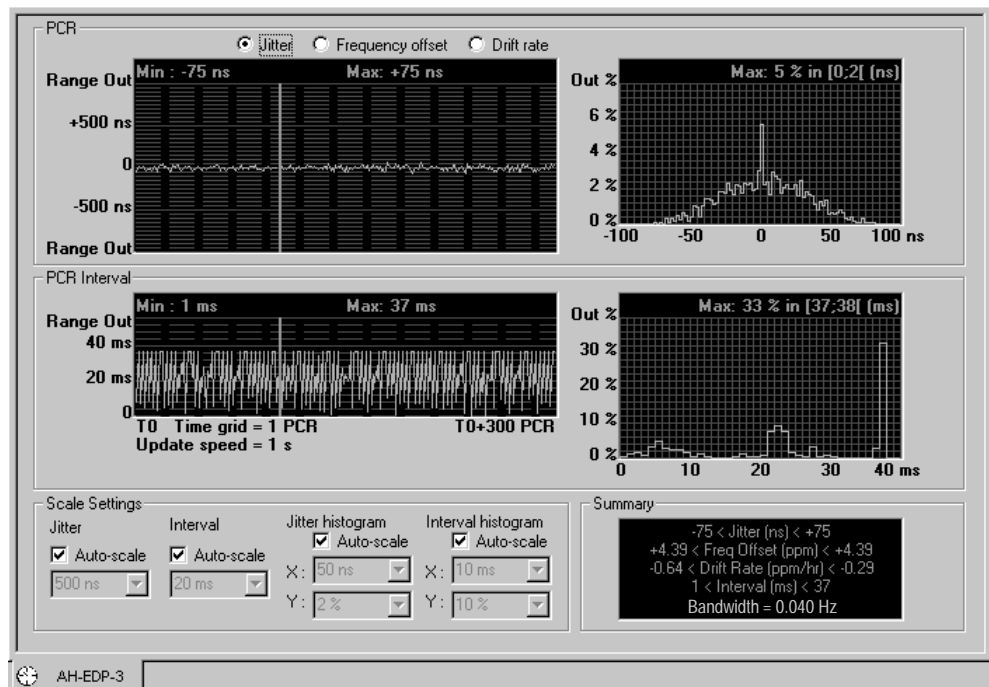


Figure 3–34: PCR Analysis view

The upper PCR graph plots your selection of either the Jitter, Frequency offset, or Drift rate of each clock reference of the selected program. The Jitter graph displays two kinds of information: jitter (a high-frequency component) and wander (a low-frequency component). Low-pass and high-pass filters are used to isolate these frequency components. The Frequency Offset graph displays the frequency error of the program clock reference (PCR). The Drift Rate graph displays the rate of change of the first two low frequency effects extracted from the signal.

The lower PCR Interval graph plots the time interval between consecutive PCR references used by the program. Each graph contains numeric readouts of the minimum and maximum values measured in the last 300 clock references. The graphs on the right are histograms, which show the relative frequency of the PCR data in the graphs on the left.

Red colored portions of the graphs and red Min or Max readouts indicate that the data exceeds the PCR error limits. The default interval error limit is 100 ms in MPEG-2 and ATSC mode and 40 ms in DVB mode. Any interval between consecutive clock references that exceeds these values is reported as an error. The default jitter error limit is ± 500 ns for all three modes. You can view or change PCR error limits using the PCR Timing Analysis panel of the Settings window. Refer to *PCR Timing Analysis Panel* on page 3–176 for more information.

You can use the Graphics View panel of the Settings window (select Settings from the Session menu) to set the scrolling mode for the graphs.

Settling filter. The Expert Client uses an internal Settling Filter to improve the accuracy of PCR jitter analysis. The Settling Filter requires time to acquire a minimum amount of data before the Expert Client can detect and report PCR jitter errors. The amount of time required for the Settling Filter depends on the Bandwidth setting in the PCR Timing Analysis panel of the Configuration Client. Refer to *PCR Timing Analysis Panel* on page 3–176 for more information.

When you first set a PCR probe and open a PCR Analysis view, a message appears in the upper histogram displaying how many seconds remain before the Settling Filter completes its operation.

Opening a PCR analysis view. Before you can open a PCR Analysis view, you must first set a probe on the desired program using the Configuration Client. After the probe is set, select the appropriate Hierarchic view PMT icon, right-click to open the shortcut menu, and then click View PCR Analysis. If you set Mask Discontinuities when you enabled the PCR probe with the Configuration Client, each PCR discontinuity with a magnitude greater than 1 ms (millisecond) is ignored. If no discontinuity mask is set, the discontinuity is taken into account and the model needs a delay to resettle.

NOTE. *The PCR interval and PCR jitter settings determine the thresholds for errors reported on the ETR 290 view. The default settings are consistent with ETR 290 recommendations. Do not change these settings if you plan to use ETR 290 tests to judge DVB compliance of the input stream.*

Setting graph scales. The scales on the PCR Analysis view graphs are linear and by default the Expert Client auto-scales the vertical scale on the graphs. To change the vertical scale on a graph, clear the corresponding Auto-scale check box and select an appropriate scale increment from the drop-down list box. The range of the Precision graph is approximately twice the selected increment; the range of the Interval graph is from zero to approximately three times the selected interval.

Histogram readout. The graphs on the right of the PCR Analysis view are histograms, which show the relative frequency of the PCR data in the graphs on the left. Histograms are a percentage value distribution since the beginning of the analysis. The histogram readout lists the maximum measured result. If you position the cursor within the histogram, the cursor shape changes to resemble cross hairs and the histogram readout changes to display the interval value at the cursor position. The histogram scales range from zero to approximately four times the selected increment.

PTS/DTS Analysis View

The PTS/DTS Analysis view (see Figure 3–35) graphs the interval between consecutive time stamps in the selected video or audio elementary stream. The minimum and maximum intervals between any two of the last 300 time stamps are also shown.

The PTS/DTS Interval graph displays each second of the PTS/DTS interval analysis. The interval is computed with two real time of successive PES that have PTS/DTS flags values other than zero. If the time between those two packets is higher than 700 ms, an error is reported.

You can use the Graphics View panel of the Settings window (select Settings from the Session menu) to set the scrolling mode for the graphs.

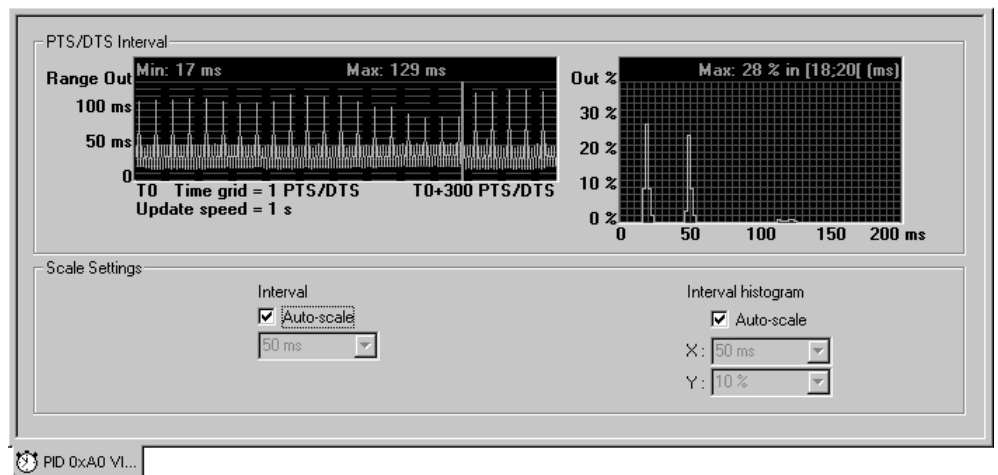


Figure 3–35: PTS/DTS Analysis view

Opening a PTS/DTS analysis view. Before you can open a PTS/DTS Analysis view, you must first set a probe on the desired elementary stream using the Configuration Client. To open a PTS/DTS Analysis view of a video or audio elementary stream, select the corresponding Hierarchic view icon, right-click to open the shortcut menu, and then select View PTS/DTS Analysis.

NOTE. The PTS/DTS Interval setting determines the threshold for errors reported on the ETR 290 view. The default setting is consistent with ETR 290 recommendations. Do not change this setting if you plan to use ETR 290 tests to judge DVB compliance of the input stream.

The Expert Client cannot display a PTS/DTS Analysis view for a scrambled elementary stream.

Setting graph scales. The scales on the PTS/DTS Analysis view graphs are linear and by default the Expert Client auto-scales the vertical scale on the graphs. To change the vertical scale on a graph, clear the corresponding Auto-scale check box and select an appropriate scale increment from the drop-down list box. The PTS/DTS Interval vertical scale ranges from zero to approximately three times the scale increment. The vertical scale begin at zero regardless of the scale setting.

Histogram readout. The right graph is a histogram, which shows the relative frequency of PTS/DTS intervals. Histograms are a percentage value distribution since the beginning of the analysis. The histogram readout lists the maximum interval measured. If you position the cursor within the histogram, the cursor shape changes to resemble cross hairs and the histogram readout changes to display the interval value at the cursor position.

**MIP Packet Analysis View
(DVB-T Only)**

The MIP Packet Analysis view (see Figure 3–36) provides both a hierarchic and a field view of the selected MIP.

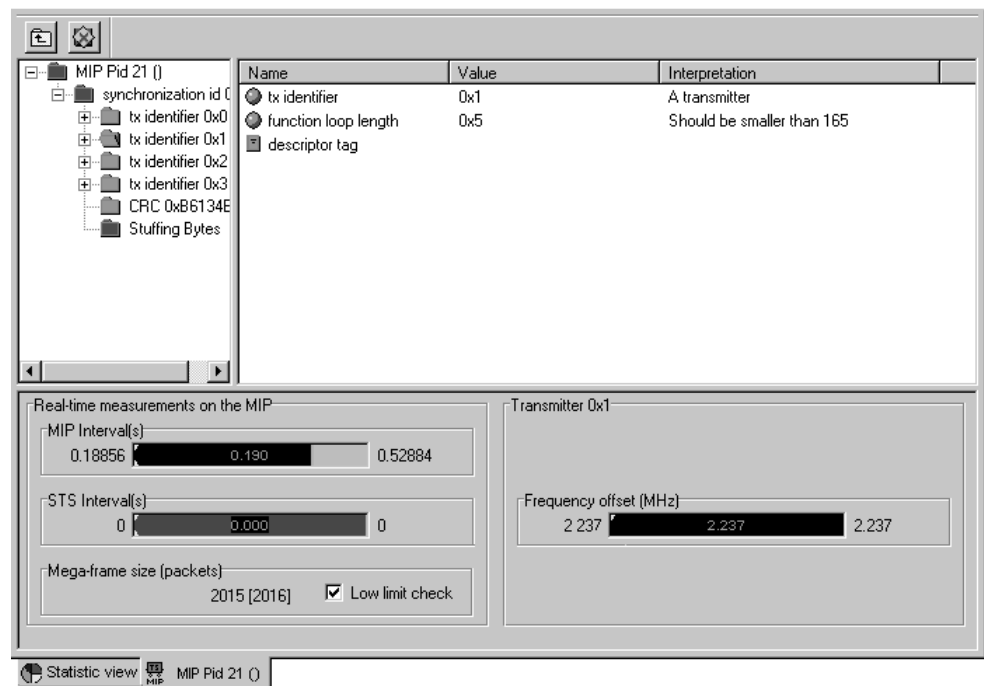



Figure 3–36: MIP Packet Analysis view

In the MIP Packet Analysis view hierarchy, related fields are grouped and shown as folders and other icons. With some table types you can expand and collapse the hierarchy as you would a Windows NT Explorer directory hierarchy. Click a hierarchy icon to show the contents of the represented item in the right sub-view as shown below. You can also double-click the same folder icon in the right sub-view to show the same information.

Click the Close Folder button () to close an open folder in the hierarchy.

Below the hierarchy view (which displays the MIP syntax) and the list view (which displays the name, values, and interpretation for each item of the analyzed MIP structure), the MIP Packet Analysis view displays the most important values associated with the MIP.

The bar graphs on the left side report the intervals between MIPs and synchronization time-stamps. Those measurements can be controlled by adding allowed variation intervals using the Configuration Client.

Also displayed are the emitted mega-frame size (between brackets) and the measured mega-frame size. If the measured mega-frame size differs from the emitted size, it means that an error occurred between the emission point and the reception point.

The bar graphs on the right side display the current values of the transmitter functions; they appear only when the corresponding transmitter is selected. Those bar graphs can be given allowed variation intervals (those intervals can also be defined from the mega-frame syntax settings box in the Configuration Client).

Opening an MIP packet analysis view. To open a MIP Packet Analysis view, select the appropriate Hierarchic view MIP icon, right-click to open the shortcut menu, and then select View MIP Packet Analysis.

NOTE. Before the Expert Client can recognize an MIP, DVB-T must be selected in the Analysis panel of the Configuration Client. Refer to Analysis Panel on page 3–163 for more information.

Setting user-defined intervals. On the bottom-left side of the view there are bar graphs, which report the intervals between MIPs and synchronization time-stamps. You can control these measurements by adding user-defined intervals.

You can set user-defined intervals using the Mega Frame Timing Analysis panel to set the STS interval (refer to *Analysis:Advanced:Timing:Mega Frame Panel* on page 3–180) or use the Mega Frame Rate Analysis panel to set the MIP interval (refer to *Mega Frame Rate Analysis Panel* on page 3–184).

On the bottom-right side of the view there are bar graphs that display the current values of the transmitter functions. These bar graphs appear only when the corresponding transmitter is selected. You can control these measurements by adding user-defined intervals.

You can set user-defined intervals for the transmitters using the Mega Frame Syntactic Analysis panel to set the interval (refer to *Mega Frame Syntactic Analysis Panel* on page 3–174).

IP (Internet Protocol) Monitoring View (SIDAT 360 Only)

Depending on the type of protocol in use, the Analysis Server can monitor the data transfer between two Internet or MAC addresses. This is done only on Multiprotocol Encapsulation sections, which are the only sections in which IP headers can be detected and read properly.

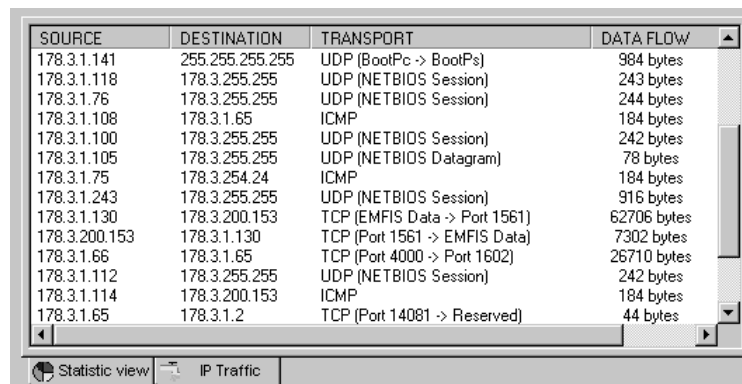
If the probed stream contains multiprotocol encapsulated datagrams, an interpretation of the IP (and TCP/UDP if present) headers is displayed, along with the sender and receiver addresses, and the total amount of data exchanged on that session. The Expert Client assumes that packets which have the same IP source/destination couple and the same TCP/UDP ports belong to the same session. A session line may disappear from the view when no corresponding packets are sent for a certain period of time (40 seconds usually).

Opening an IP monitoring view. Before you can open an IP Monitoring view, you must first set a probe on the desired DSM-CC stream using the Configuration Client. To open an IP Monitoring view (see Figure 3–37), select the appropriate Hierarchic view DSM-CC icon, right-click to open the shortcut menu, and then click IP Traffic.

NOTE. Before the Analysis Server can recognize a multiprotocol encapsulation section, SIDAT 360 data broadcasting analysis must be selected in the Analysis panel of the Configuration Client. Refer to Analysis Panel on page 3–163 for more information.

There is only one IP Monitoring view for the Expert Client. Therefore, if you add a probe on another stream, the results will be added to the same view.

IP monitoring can be tremendously bandwidth- and CPU-consuming. The section rate of such streams is usually very high.



SOURCE	DESTINATION	TRANSPORT	DATA FLOW
178.3.1.141	255.255.255.255	UDP (BootPc -> BootPs)	984 bytes
178.3.1.118	178.3.255.255	UDP (NETBIOS Session)	243 bytes
178.3.1.76	178.3.255.255	UDP (NETBIOS Session)	244 bytes
178.3.1.108	178.3.1.65	ICMP	184 bytes
178.3.1.100	178.3.255.255	UDP (NETBIOS Session)	242 bytes
178.3.1.105	178.3.255.255	UDP (NETBIOS Datagram)	78 bytes
178.3.1.75	178.3.254.24	ICMP	184 bytes
178.3.1.243	178.3.255.255	UDP (NETBIOS Session)	916 bytes
178.3.1.130	178.3.200.153	TCP (EMFIS Data -> Port 1561)	62706 bytes
178.3.200.153	178.3.1.130	TCP (Port 1561 -> EMFIS Data)	7302 bytes
178.3.1.66	178.3.1.65	TCP (Port 4000 -> Port 1602)	26710 bytes
178.3.1.112	178.3.255.255	UDP (NETBIOS Session)	242 bytes
178.3.1.114	178.3.200.153	ICMP	184 bytes
178.3.1.65	178.3.1.2	TCP (Port 14081 -> Reserved)	44 bytes

Statistic view IP Traffic

Figure 3–37: IP Monitoring view

Configuration Client Reference

The Configuration Client is used to configure the analyses performed by the Analysis Server. The results of the analyses are displayed in both the Master and Expert Clients.

The Configuration Client has the following characteristics:

- Multiple configuration panels (at the right side of the Configuration Client window) are used to group related probes.
- A hierarchic navigation panel (at the left side of the Configuration Client window) is used to display the Configuration Client panels.
- The Report Message Level panel allows you to define the level of more than 300 monitored MPEG-2, DVB, and ATSC parameters.
- You can start, stop, and restart Analysis Servers using the Configuration Client; you can also restart a remote MTS300 system using the Configuration Client.

NOTE. *Only one Configuration Client at a time can set parameters on an Analysis Server. If a Configuration Client is already connected to an Analysis Server, you can view the current settings, but you cannot change them. Also, Analysis Servers can be password protected so that your configuration settings cannot be changed without first supplying a password.*

This section describes the use of the Configuration Client and explains each of the analysis settings in detail.

- *Changing Configurations* page 3–152
- *Saving and Restoring Configurations* page 3–153
- *Managing Remote MTS300 Systems* page 3–155
- *Configuration Client Display Elements* page 3–157
- *Configuration Settings* page 3–161

See *Analysis Reference*, beginning on page 3–37, for more details about the probes enabled by the MTS300 system and how to set, modify, and remove them.

See *Capturing a Transport Stream Event* on page 3–191 for information about capturing user-defined transport stream error events.

Changing Configurations

To change the current Analysis Server configuration, perform the following procedure:

1. Select one of the Analysis Server icons in the Port Manager panel of the Master Client.
2. Right-click on the **Analysis Server icon** and select **Launch Configuration Client** from the shortcut menu.

The Configuration Client is displayed for the selected Analysis Server. All modifications made to this Analysis Server will be reflected in both the Expert and Master Clients connected to the Analysis Server.

3. Select the appropriate configuration category from the Configuration Client Navigation panel to open the associated configuration panel.
4. Change configuration settings using standard Windows techniques such as the following:
 - Click the appropriate option button to select among options
 - Select or clear a check box
 - Select from a list of several alternatives
 - Enter a new value in a text box

NOTE. Most of the configuration panels have a *Restore Default* button that you can click to return all settings on the displayed panel back to the factory-default settings.

5. When you have changed all the appropriate settings on one or more configuration panels, click the **Apply** toolbar button or select **Apply** from the Session menu to confirm and apply all configuration changes.

NOTE. Configuration settings are saved to the Windows NT registry and automatically persist from session to session, even if you exit the application and power down the instrument.

Saving and Restoring Configurations

Through the Configuration menu, you can perform the following functions:

- Save all of the current Analysis Server configuration settings as a named profile in the Windows NT registry
- Load a registry profile to restore a previously saved configuration
- Restore the standard, factory-default analysis configuration

Saving the Current Configuration

To save the current Analysis Server configuration in the Windows NT registry, perform the following procedure:

1. Select **Save Configuration as** from the Session menu to open the **Save Configuration As** window (shown below).



2. Save the current configuration using one of the following methods:
 - Enter a unique name in the **Profile name** box and click **Save** to create a new configuration profile.
 - Highlight a name on the **List of existing profiles** and click **Save** to overwrite an existing named profile with the current Analysis Server settings displayed in the Configuration Client.

Restoring the Default Configuration

To restore the default Analysis Server configuration, select **New Configuration** from the Session menu and click **Apply**. All settings will now be restored to the default state (no probes set, and MPEG-2 analysis type).

Loading a Saved Configuration

To restore an Analysis Server configuration that has been saved in the Windows NT registry, perform the following procedure:

1. Select **Load Configuration** from the Configuration menu to open the **Load Configuration** window.
2. Highlight the name of the profile that you want to restore (by clicking on the name in the **Profiles** list) and then click **Load**.
3. Click the **Apply** toolbar button or select Apply from the Session menu.

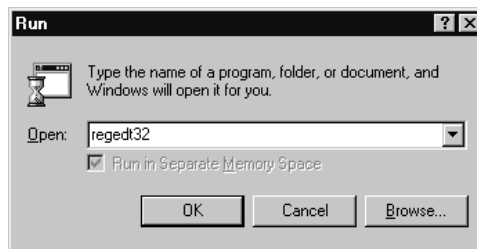
***NOTE.** You must click the Apply toolbar button or select Apply from the Session menu before your configuration changes will be applied to the Analysis Server input.*

Some configuration changes require that you restart the Analysis Server before the configuration changes can be applied. A message box that allows you to restart the Analysis Server appears when applicable.

Deleting a Saved Configuration

To delete a saved Analysis Server configuration, you must use the Registry Editor program, Regedt32.exe. Perform the following procedure to delete an existing configuration profile:

1. Open the Windows NT Start menu and select **Run**. The Run window (shown below) opens.



2. Type **regedt32** in the **Open** text box and click **OK** to open the Registry Editor window.

3. Select the **HKEY_LOCAL_MACHINE on Local Machine** window and double-click the folder icons to open the path to the MTS300 system profiles. The profiles are in the following directory path:

```
HKEY_LOCAL_MACHINE\Software\Tektronix\MTS\Configuration
Client\1.0\Profiles
```

4. Highlight the name of the configuration profile to delete and press **DEL** (or select **Delete** from the Registry Editor Edit menu). A warning message appears; click **Yes** to confirm the deletion.
5. Exit the Registry Editor.

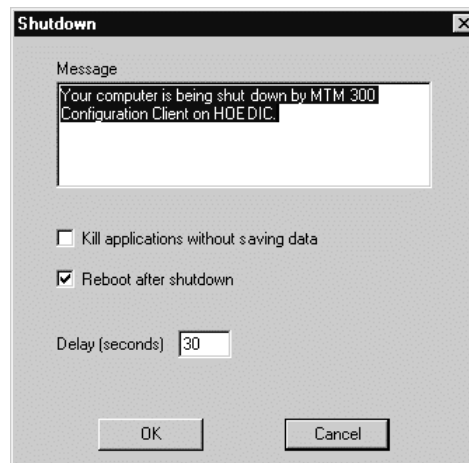
Managing Remote MTS300 Systems

You can shut down and/or restart a remote MTS300 system from the Configuration Client using the following procedure:

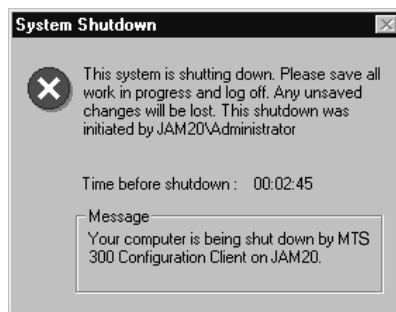


CAUTION. To avoid potential loss of data, use the *Shut Down Server* option only when necessary.

1. If not already connected, connect to an Analysis Server running on the MTS300 system you want to shut down or restart.
2. From the Session menu, select **Shut Down Server**. The Shutdown dialog box appears (shown below).



3. Make changes to the Shutdown dialog box using the option information provided in the following list:
 - The Message box contains a default shutdown message that you can edit. This message will appear in the System Shutdown message displayed on the MTS300 system indicated in the address bar.
 - Select the **Kill applications without saving data** option to close all applications on the MTS300 system indicated in the address bar without saving changes.
 - Select the **Reboot after shutdown** option to restart the MTS300 system indicated in the address bar after it has shut down.
 - Use the **Delay box** to specify a delay period before the MTS300 system indicated in the address bar shuts down. You can specify a delay period from 0 to 600 seconds. This number will appear in the System Shutdown message displayed on the MTS300 system indicated in the address bar.
4. Click **OK** to close the Shutdown dialog box and send a message to the MTS300 system indicated in the address bar, alerting the user of that device that it will be shut down within a specified period. The following illustration shows an example of the message that is displayed on the MTS300 system being shut down.



The System Shutdown message box shows the message and the name of the host machine that initiated the shutdown, an active clock showing the hours:minutes:seconds left until the machine shuts down, and the message you specified in the Shutdown dialog box.

Configuration Client Display Elements

Figure 3–38 shows the different elements of the Configuration Client display. The display elements are described on the following pages.

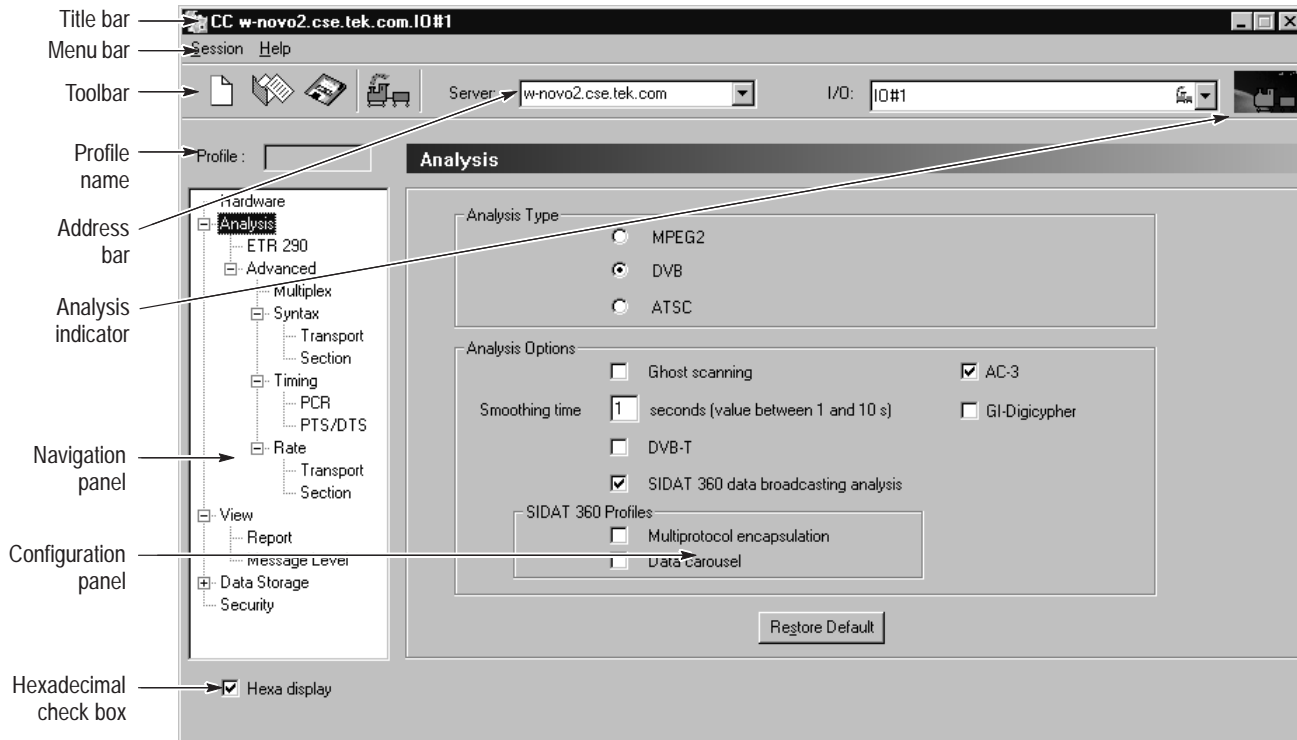


Figure 3–38: Configuration Client display elements

Title Bar The Title bar displays the following information:

- Name of the application in the window (in Figure 3–38, CC is displayed for Configuration Client)
- Address and I/O port number of the signal source (in Figure 3–38, 128.181.99.193 is the address and IO#1 is the channel number)

The standard Windows NT window-sizing control boxes for the Configuration Client are located on the far right side of the Title bar.

Menu Bar The Menu bar (see Figure 3–38) provides access to the Session and Help menus.

Session menu. The Session menu contains commands for connecting or disconnecting the Configuration Client, for saving and loading analysis configurations, for starting and stopping the Analysis Server, and for exiting the Configuration Client. Table 3–42 describes the menu selections available in the Session menu.

Table 3–42: Configuration Client Session menu commands

Command	Function
Connection	Opens the Connection dialog box from which you select the Analysis Server that you will connect to.
Disconnection	Disconnects the Configuration Client from the Analysis Server indicated in the address bar. When you select this command, the indicator (train icon) at the far right of the toolbar becomes motionless.
New configuration	Loads the default analysis configuration in the Configuration Client (MPEG-2 analysis type, with no probes set). You must use the Apply toolbar button or menu command to apply the setting changes to the Analysis Server indicated in the address bar.
Load configuration	Displays a dialog box from which you select saved configurations. You must use the Apply toolbar button or menu command to apply the setting changes to the Analysis Server.
Save configuration as	Saves the current analysis configuration to the Windows NT registry. A dialog box appears where you can enter a profile name. Configurations are saved in the following directory in the registry: HKEY_LOCAL_MACHINE\Software\Tektronix\MTS\Configuration Client\1.0\Profiles.
Apply	Applies the current Configuration Client parameters to the Analysis Server that you are connected to.
Restart analysis server	Stop and restarts the Analysis Server indicated in the address bar (the one you are currently connected to).
Stop analysis server	Stops the Analysis Server of the Analysis Server indicated in the address bar (the one you are currently connected to).
Start analysis server	Starts the Analysis Server indicated in the address bar.
Shut down server	Displays the Shutdown dialog box. Using this dialog box, you can restart or shut down the MTS300 system indicated in the address bar. See <i>Managing Remote MTS300 Systems</i> on page 3–155.
Exit	Exits the Configuration Client.

Help menu. The Help menu provides access to the online Help systems of the Configuration Client and the Analysis Server. In addition, there is a command to access the version and copyright information for the Configuration Client.

Table 3–43 describes the menu selections available in the Help menu.





Table 3–43: Configuration Client Help menu commands

Command	Function
Configuration Client help	Opens the Configuration Client online help.
Analysis Server help	Opens the Analysis Server online help.
About Configuration Client	Displays Expert Client version and copyright information.

Toolbar

The command buttons in the Toolbar provide direct access to the most-used menu commands for the Configuration Client. Click on a command button to perform the associated command. Table 3–44 lists the function of each icon in the Toolbar.

Table 3–44: Functions of the Configuration Client Toolbar buttons

Button	Name	Function
	New configuration (CTRL+N)	Loads the default analysis configuration in the Configuration Client (MPEG-2 analysis type, with no probes set). You must use the Apply toolbar button or menu command to apply the setting changes to the Analysis Server indicated in the address bar.
	Load configuration (CTRL+L)	Displays a dialog box from which you select saved configurations. You must use the Apply toolbar button or menu command to apply the setting changes to the Analysis Server.
	Save configuration as (CTRL+S)	Saves the current analysis configuration to the Windows NT registry. A dialog box appears where you can enter a profile name. Configurations are saved in the following directory in the registry: HKEY_LOCAL_MACHINE\Software\Tektronix\MTS\Configuration Client\1.0\Profiles.
	Apply (CTRL+A)	Applies the current Configuration Client parameters to the Analysis Server you are connected to.

Profile Name

If you have loaded a saved analysis configuration, this box will list the name of the saved configuration. Otherwise the box will be blank.

Address Bar The Address bar contains two address boxes that allow you to specify which Analysis Server and which I/O port you want the Configuration Client to analyze. If you open the Configuration Client from the Master Client, the address boxes automatically indicate the IP address or host machine name and I/O port number of the Analysis Server to which you are connected.

Server list box. Enter the IP Address (or machine name) in the Server text box using one of the following two formats:

- <MTS300 system IP address>

For example, enter 121.181.77.121 to analyze the signal from an MTS300 system with an IP address of 121.181.77.121.

- <MTS300 system name>

For example, enter jam20.cse.tek.com to analyze the signal from an MTS300 system named jam20 on the cse.tek.com network.

The Configuration Client saves machine names and IP addresses that you have successfully connected to in the past. You can select an MTS300 system name or IP address from the drop-down selection box.

I/O list box. Use the I/O list box to select the I/O port to which you want to connect. You can only connect to I/O ports that have been assigned to an Analysis Server. The I/O drop-down selection box uses icons to indicate which application is assigned to each I/O port.

Analysis Indicator The Analysis indicator (shown below) at the far right of the Address bar is animated when the Expert Client is actively analyzing the input stream. The indicator is motionless when analysis by the Expert Client is disconnected.



Navigation Panel Use the Navigation panel to select which configuration panel to open. Use standard Windows NT hierarchy navigation techniques to move through the available panels.

Configuration Panel Displays the configuration panel selected in the Navigation panel. Each configuration panel displays analysis options related to different aspects of the transport stream.

Hexadecimal Check Box Select the Hexa Display option to display all appropriate values in the Configuration Client in hexadecimal base. Clear the check box to display decimal values. This option appears on each configuration panel and affects all configuration panel displays.

Configuration Settings

This section describes and explains each of the analysis settings on the various configuration panels. Each hierarchy item in the Navigation panel opens a different configuration panel. Shown below is a fully expanded hierarchy with page numbers listed where the associated configuration panel is described.

Each configuration panel contains a Restore Default button. Click this button to restore the settings for the displayed panel back to their default settings.

NOTE. *DVB-T analysis mode must be selected from the Analysis configuration panel before the Mega Frame Syntactic, Timing, or Rate panels become available. Refer to Analysis Panel on page 3–163.*

Hardware	Page 3–162
[-] Analysis	Page 3–163
ETR 290	Page 3–165
[-] Advanced	
Multiplex	Page 3–166
[-] Syntax	Page 3–168
Transport	Page 3–170
Section	Page 3–172
Mega Frame	Page 3–174
[-] Timing	
PCR	Page 3–176
PTS/DTS	Page 3–178
Mega Frame	Page 3–180
[-] Rate	
Transport	Page 3–181
Section	Page 3–182
Mega Frame	Page 3–184
[-] View	
Report	Page 3–185
Message Level	Page 3–187
[-] Data Storage	
Event Configuration	Page 3–189
Filtering	Page 3–195
Security	Page 3–196

Hardware Panel Select Hardware in the Navigation panel to display the Hardware configuration panel (see Figure 3–39). Use the Hardware panel to configure the I/O port to which you are connected.

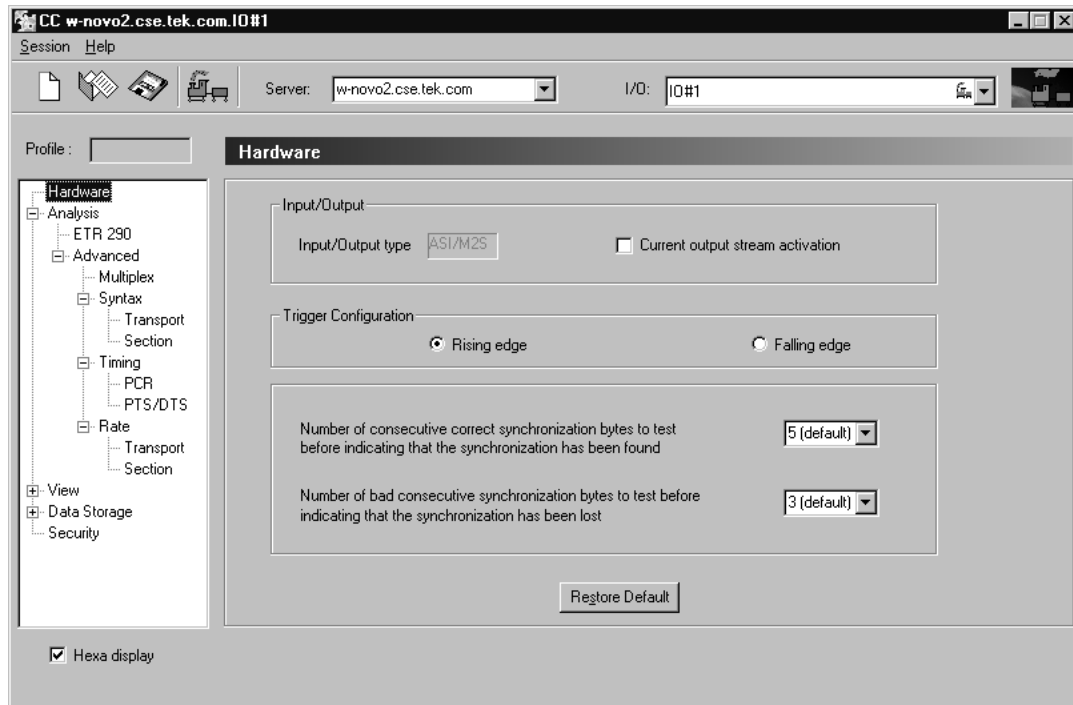


Figure 3–39: Hardware configuration panel

The panel displays the current configuration of the MTS300 system Input/Output type. ASI/M2S is the standard I/O type. SPI (MTS300, upgrade option MTS3FLV) and DHEI (MTS300, upgrade option MTS3FDE) may also be listed if the optional I/O boards are installed in the MTS300 system.

You can select from the following options in the Hardware panel:

Output activation. Select this option to loop the input signal on the I/O port you are monitoring to the output connector on the same I/O port.

Trigger configuration. You can configure the MTS300 system to use the rising or falling edge of a signal connected to the trigger input of the I/O port.

Number of consecutive correct synchronization bytes to test. Select the number of consecutive correct synchronization bytes to test before indicating the Analysis Server is synchronized to the input (3, 5, 7 or 9 correct synchronization bytes).

Number of bad consecutive synchronization bytes to test. Select the number of consecutive bad synchronization bytes to test before indicating that synchronization has been lost (1, 3, 5 or 7 bad synchronization bytes).

Analysis Panel Select Analysis in the Navigation panel to open the Analysis configuration panel (see Figure 3–40).

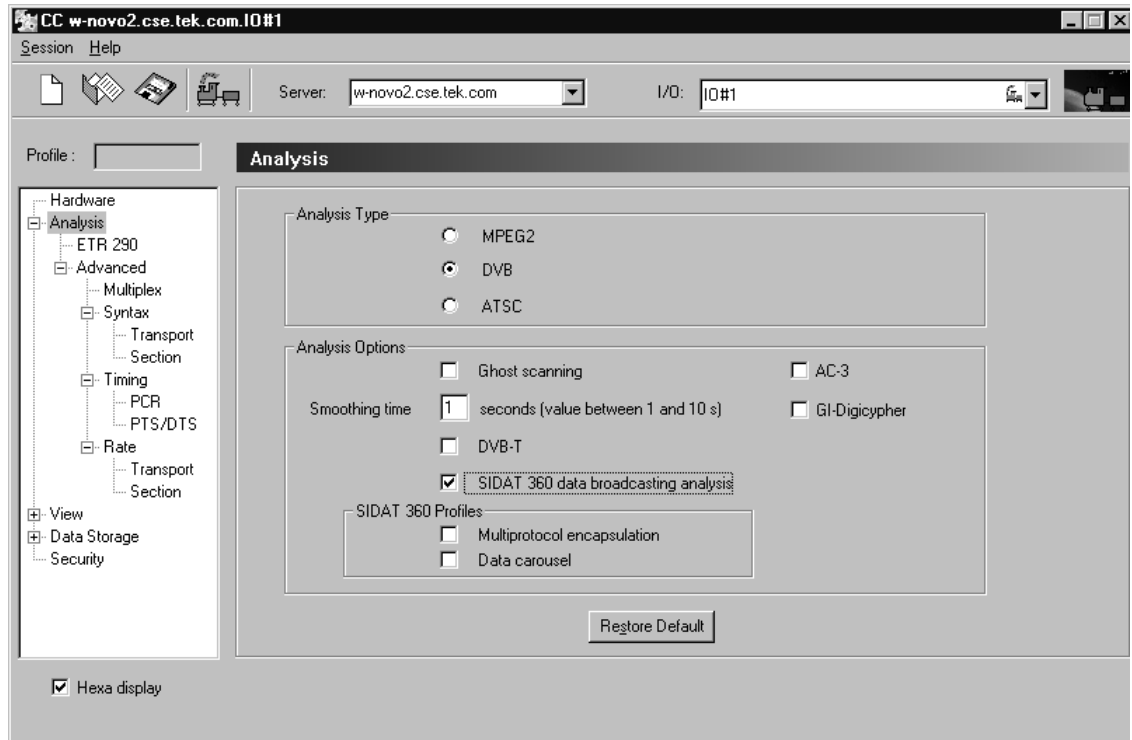


Figure 3–40: Analysis configuration panel

The Analysis panel contains the following configuration options:

Analysis type. The Analysis Type setting determines which standard the MTS300 system uses to monitor the input stream.

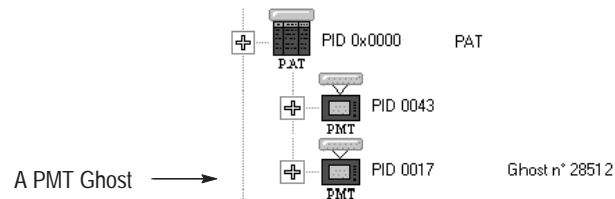
- Select MPEG-2 (the default) if the stream you are analyzing complies with the MPEG standard.
- Select DVB to analyze stream compliance with DVB standards.

Two of the Analysis Options settings, DVB-T and SIDAT 360, are available only when you select the DVB analysis type. Three of the configuration panels (Mega Frame Syntax, Mega Frame Timing, and Mega Frame Rate) are available only when you select the DVB analysis type and the DVB-T analysis option.

- Select ATSC to analyze the stream with regard to the ATSC standards.

Analysis options. The first two analysis options are available for all three analysis types.

- Select Ghost scanning to attempt to define all ghost packets⁴ found in the stream. For example, if the MTS300 system identifies a ghost packet as a PMT, the MTS300 system positions the icon under the PAT as shown in the following illustration. You can then perform on the ghost sections all the analyses allowed on PMT sections, such as Section syntax analysis and PCR analysis.



- Select Smoothing time to adjust the period over which the MTS300 system averages the transport rates reported in the Statistic view Program Allocation, PID Allocation, and Type Allocation panels. The default value is one second; you can enter any integer value from 1 to 10. Selecting a longer smoothing time reduces the range over which reported transport rates vary.
- Select AC-3 to perform analysis on Dolby AC-3 audio parameters when you are monitoring MPEG-2 or DVB streams containing embedded AC-3 audio.
- Select GI-Digicypher to interpret Digicypher II video streams as MPEG video elementary streams (instead of private data), and to perform PCR and PTS analyses on these streams.

The following analysis options are available only when you select DVB analysis (in the Analysis type portion of this configuration panel).

- Select DVB-T to enable Mega Frame analysis. Three of the configuration panels (Mega Frame Syntax, Mega Frame Timing, and Mega Frame Rate) are available only when you select the DVB-T analysis option.
- Select SIDAT 360 data broadcasting analysis to enable SIDAT analysis and the two SIDAT 360 Profiles options. You can enable both options simultaneously. Refer to *SIDAT 360 Analyses* on page 3-43 for more information.
 - Select Multiprotocol Encapsulation to enable protocol encapsulation testing for SIDAT 360 analysis.
 - Select Data Carousel to enable monitoring of data carousel presence.

⁴ One or more packets found in the transport stream but not referenced in any appropriate table.

ETR 290 Panel Select Analysis:ETR 290 in the Navigation panel to open the ETR 290 configuration panel (see Figure 3–41).

NOTE. *ETR 290 probes in the Probes List box can appear in italics on this panel. If an ETR 290 probe is listed in italics in the Probe List, then at least one probe of the corresponding ETR 290 recommendation is not set. This can happen if you have already set specific probes for the ETR 290 recommendation using the Advanced configuration panels in the Navigation panel.*

Use this panel to activate all probes for a selected ETR 290 recommendation.

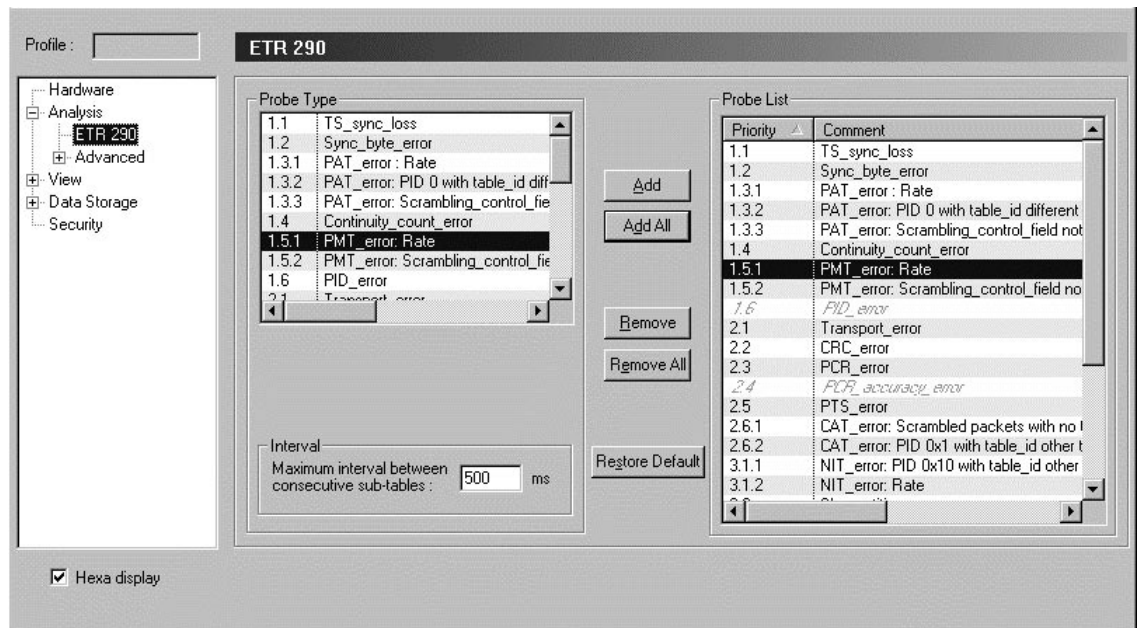


Figure 3–41: ETR 290 configuration panel

The ETR 290 panel contains the following configuration options:

Probe Type. The Probe Type box contains a list of the available ETR 290 probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Probes List. The Probes List box contains a list of the selected ETR 290 probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Multiplex Analysis Panel

Select Analysis:Advanced:Multiplex in the Navigation panel to open the Multiplex Analysis configuration panel (see Figure 3–42).

NOTE. The Multiplex Analysis panel is one of several panels used for setting and configuring MTS300 system probes. The probes available on this panel apply to the entire input stream multiplex and are appropriate for the current Analysis configuration panel selections.

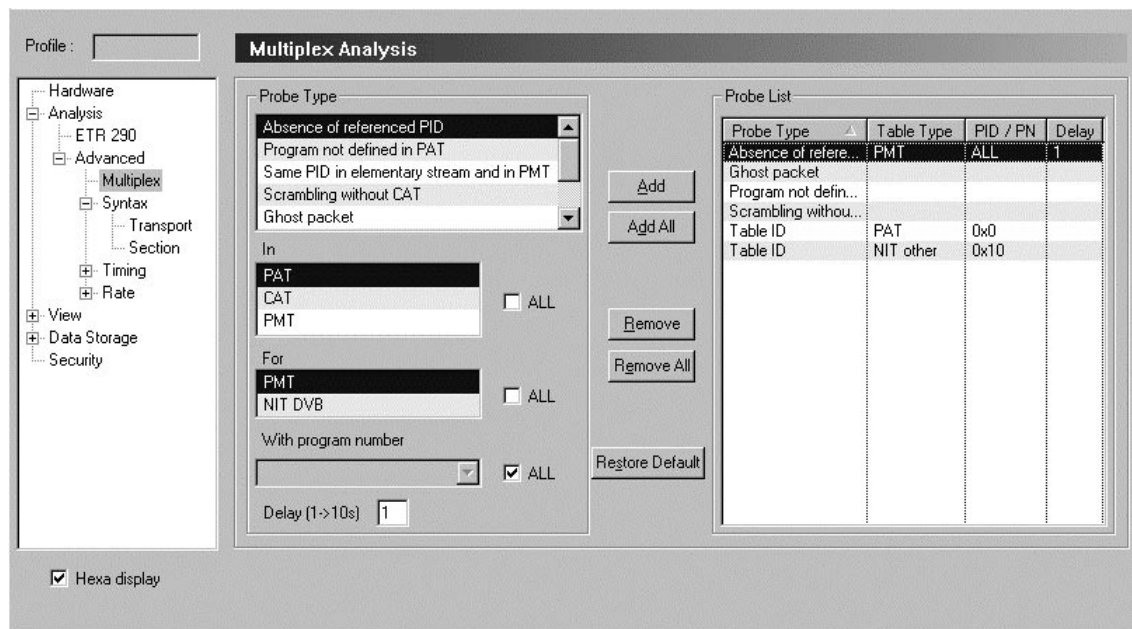


Figure 3–42: Multiplex Analysis configuration panel

The Multiplex Analysis panel contains the following configuration options:

Probe type. The Probe Type box contains a list of the available multiplex probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Probes list. The Probes List box contains a list of the selected multiplex probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Available multiplex probes. Table 3–45 lists all of the probes that you can control through the Multiplex Analysis panel. Some probes are only available for certain analysis types.

Table 3–45: Multiplex analysis probes

Probe title		Analysis type	ETR 290 level
Absence of referenced PID		All	1.6
Program not defined in PAT		All	—
Same PID in elementary stream and in PMT		All	—
Scrambling without CAT		All	2.6.1
Ghost packet		All	3.4
Unsynchronized packet		All	1.2
Table ID	PAT	All	1.3.2
	CAT	All	2.6.2
	NIT	All	3.1.1
	TSDT	All	—
	SDT	DVB only	3.5.2
	EIT	DVB only	3.6.2
	RST	DVB only	3.7
	TDT	DVB only	3.8.2
	TOT	DVB only	—
	MGT	ATSC only	—
	TVCT	ATSC only	—
	CVCT	ATSC only	—
	STT	ATSC only	—
	RRT	ATSC only	—
Inter SI consistency		DVB and DVB-T	—
Mega Frame Size		DVB-T only	—
Terrestrial descriptor consistency		DVB-T only	—
Program paradigm		ATSC only	—
Scrambled ES without CA descriptor		ATSC only	—
Absence of mandatory EIT		ATSC only	—

Refer to *Multiplex Probe Descriptions* beginning on page 3–60 for detailed information about the Multiplex Analysis probes.

Syntactic Analysis Panel

Select Analysis:Advanced:Syntax in the Navigation panel to open the Syntactic Analysis panel as shown in Figure 3–43. The Syntactic Analysis panel contains options that affect private section interpretation and syntax error reporting.

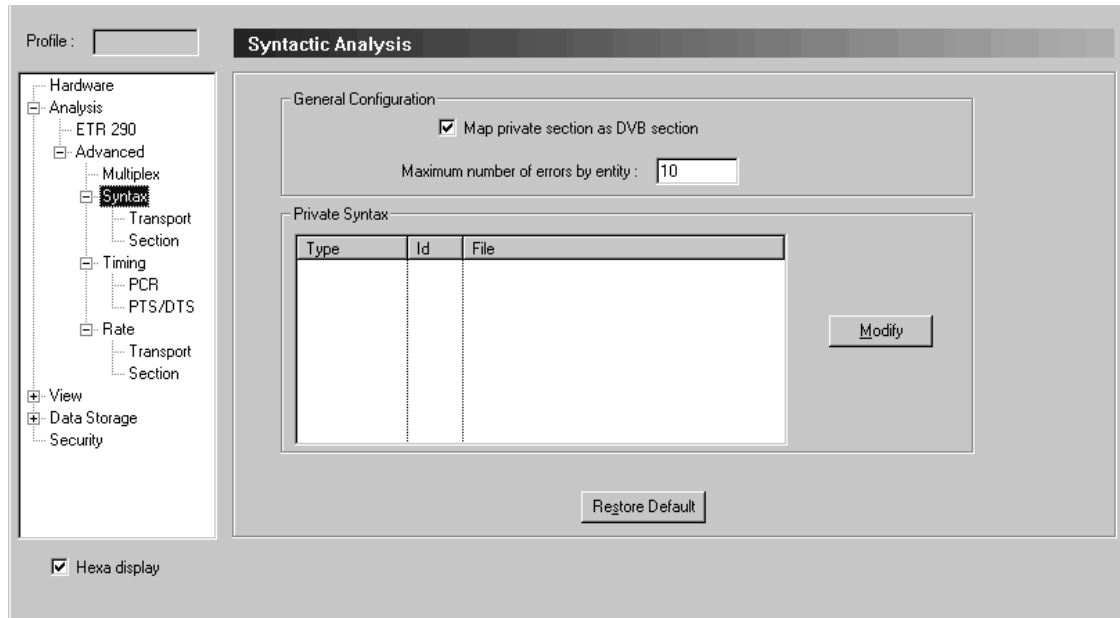


Figure 3–43: Syntactic Analysis configuration panel

The Syntactic Analysis panel contains the following configuration options:

General configuration. There are two possible general configuration settings:

- The Map private section as DVB section option appears only when you have set the analysis type to DVB through the Analysis panel (refer to *Analysis Panel* on page 3–163).

When you select Map private section as DVB section (a check appears in front of the option), the MTS300 system interprets all private sections encountered in the stream as DVB SI sections. The option is not present in the standard MPEG-2 configuration.

- The Maximum number of errors by entity setting allows you to set the maximum number of errors the MTS300 system detects before stopping analysis for one entity. This limits the number of syntax errors reported by the MTS300 system for each entity. This option is convenient when you are analyzing non-compliant streams that contain many errors.

NOTE. *The Map private section as DVB section option is cleared when you first specify DVB monitoring on the Analysis panel; select this option if necessary to force the MTS300 system to interpret PIDs 0x10 through 0x14 as SI. The Map private section as DVB section option must be cleared before you can load private syntax files.*

Private syntax. You can load private syntax definition (.cta) files through the Private Syntax portion of the panel. These files, generated with the Private Syntax Interpreter application, make it possible to analyze proprietary or non-standard tables and descriptors contained in the input stream. Use the following procedure:

1. Click **Modify** in the Private Syntax group. The Syntax Selection dialog box is displayed.
2. From the List of available syntax, highlight a definition file you want to add and click **Add**, or you can add all of the definition files by selecting **Add All**.
3. When you have added (or removed) all of the private syntax files, click **OK** to close the dialog box and return to the Configuration Client.
4. Click the **Apply** button to include the private syntax files into the Analysis Server indicated in the address bar.

Refer to *Appendix D: Using the Private Syntax Interpreter* for more information about using the Private Syntax Interpreter and generating user-defined private syntax definition files.

Transport Syntactic Analysis Panel

Select Analysis:Advanced:Syntax:Transport in the Navigation panel to open the Transport Syntactic Analysis configuration panel as shown in Figure 3–44. Use this configuration panel to set and configure transport syntax probes.

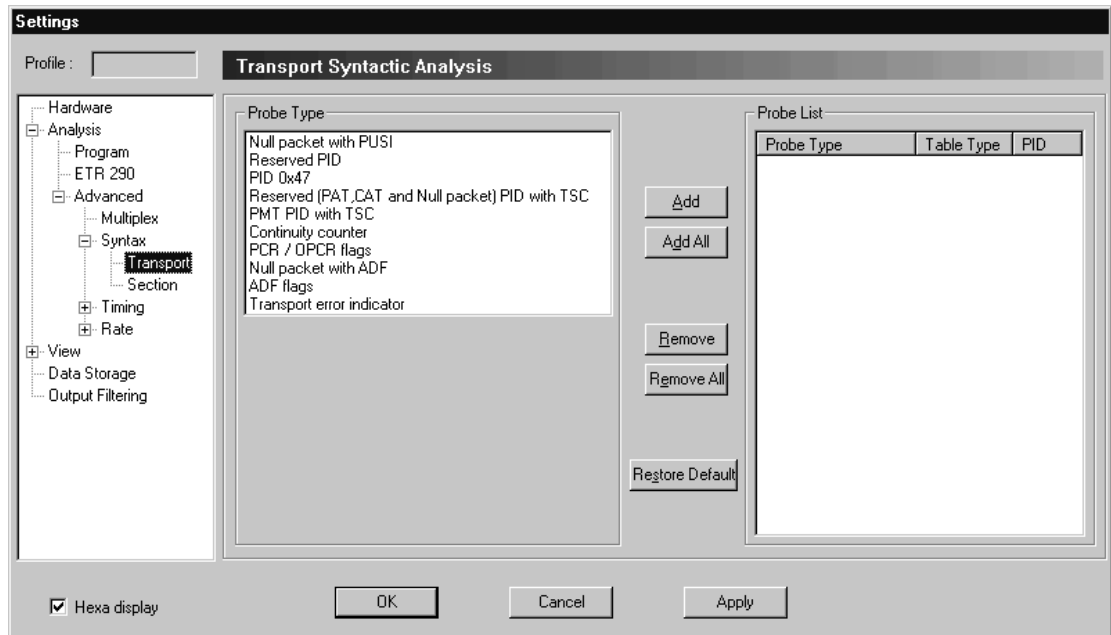


Figure 3–44: Transport Syntactic Analysis configuration panel

The Transport Syntactic Analysis panel contains the following configuration options:

Probe type. The Probe Type box contains a list of the available probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Probe list. The Probe List box contains a list of the selected probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Available transport syntax probes. Table 3–46 lists all of the probes that you can control through the Transport Syntactic Analysis panel. Some probes are only available for certain analysis types. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Table 3–46: Transport syntax probes

Probe title	Analysis type	ETR 290 level
Null packet with PUSI	All	—
Reserved PID	All	—
PID 0x47	All	—
Reserved (PAT, CAT, and Null packet) PID with TSC	All	1.3.3
PMT PID with TSC	All	1.5.2
Continuity counter indicator	All	1.4
PCR/OPCR flags	All	—
Null packet with ADF	All	—
ADF flags	All	—
Transport error indicator	All	2.1
PAT PID with AFC & DI	ATSC only	—
PMT PID with AFC & DI	ATSC only	—
PSIP tables PID with TSC	ATSC only	—
PSIP tables PID with ADF	ATSC only	—
MGT PID with PUSI & pointer field	ATSC only	—

Refer to *Transport Syntax Probe Descriptions* beginning on page 3–68 for detailed information about any of the transport syntax probes.

Section Syntactic Analysis Panel

Select Analysis:Advanced:Syntax:Section in the Navigation panel to open the Section Syntactic Analysis configuration panel (shown below). Use this configuration panel to set and configure syntax probes for private, PSI, SI, and PSIP tables.

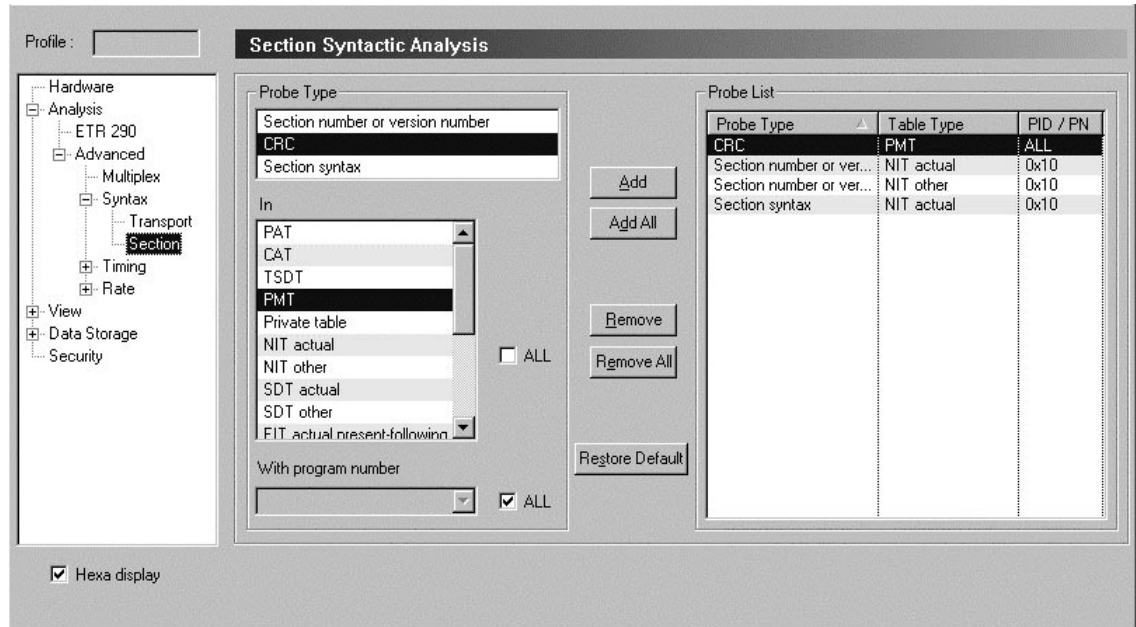


Figure 3–45: Section Syntactic Analysis configuration panel

The Section Syntactic Analysis panel contains the following configuration options:

Probe type. The Probe Type box contains a list of the available probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Probe list. The Probe List box contains a list of the selected probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Available section syntax probes. Table 3–47 lists all of the probes that you can control through the Section Syntactic Analysis panel. Some probes are only available for certain analysis types. Refer to *Setting Probes* on page 3–39 and *Removing Probes* on page 3–41 for instructions on setting and removing probes.

Table 3–47: Section syntax probes

Probe title	Analysis type	ETR 290 level
Section number or version number	All	—
CRC	All	2.2
Section syntax	All	—

Refer to *Section Syntax Probe Descriptions* beginning on page 3–72 for detailed information about any of the section syntax probes.

Mega Frame Syntactic Analysis Panel

Select Analysis:Advanced:Syntax:Mega Frame in the Navigation panel to open the Mega Frame Syntactic Analysis configuration panel as shown in Figure 3–46. Use this configuration panel to set and configure mega frame syntax probes.

NOTE. The Mega Frame Syntactic Analysis panel is available only when you have specified DVB-T analysis from the Analysis panel (refer to Analysis Panel on page 3–163).

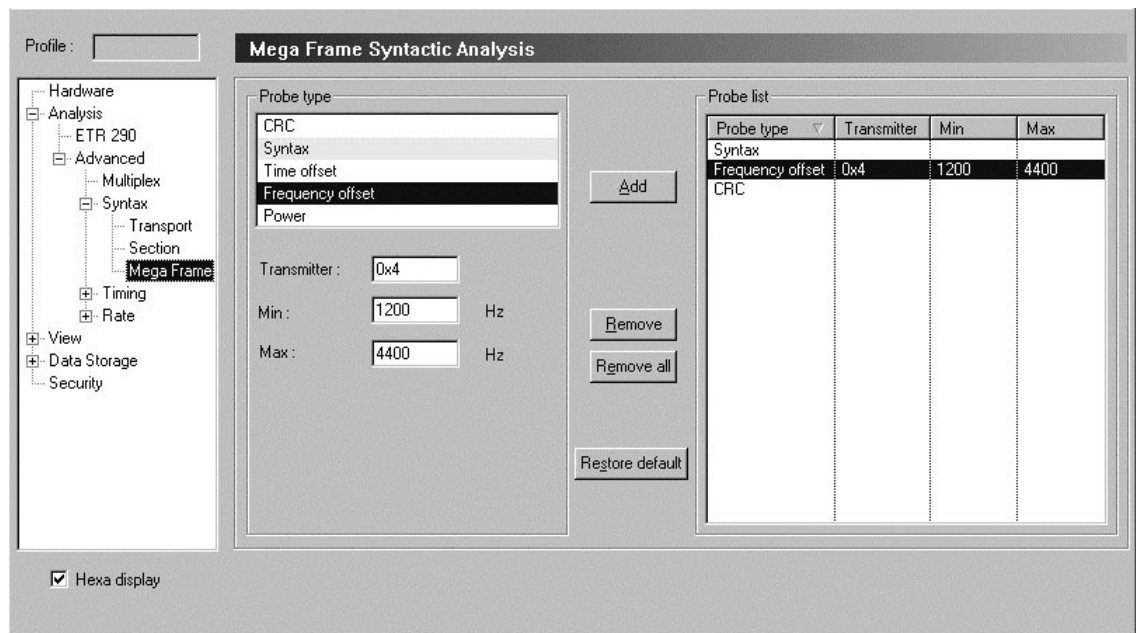


Figure 3–46: Mega Frame Syntactic Analysis configuration panel

This panel contains the following configuration options:

Probe type. The Probe Type box contains a list of the available probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Probe list. The Probe List box contains a list of the selected probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Available mega frame syntax probes. Table 3–48 lists all of the probes that you can control through the Mega Frame Syntactic Analysis panel. Some probes are only available for certain analysis types. Refer to *Setting Probes* on page 3–39 and *Removing Probes* on page 3–41 for instructions on setting and removing probes.

Table 3–48: Mega Frame syntax probes

Probe title	Analysis type	ETR 290 level
CRC	DVB-T only	—
Syntax	DVB-T only	—
Time offset	DVB-T only	—
Frequency offset	DVB-T only	—
Power	DVB-T only	—

Refer to *Mega Frame Syntax Probe Descriptions* beginning on page 3–74 for information about any of the Mega Frame syntax probes.

PCR Timing Analysis Panel

Select Analysis:Advanced:Timing:PCR in the Navigation panel to open the PCR Timing Analysis configuration panel as shown in Figure 3–47. Use the PCR Timing Analysis panel to configure and set PCR probes one program at a time and, if desired, use unique error limits for each individual program. You can also set probes on all stream programs at once, but you must then use the same measurement error limits for all programs.

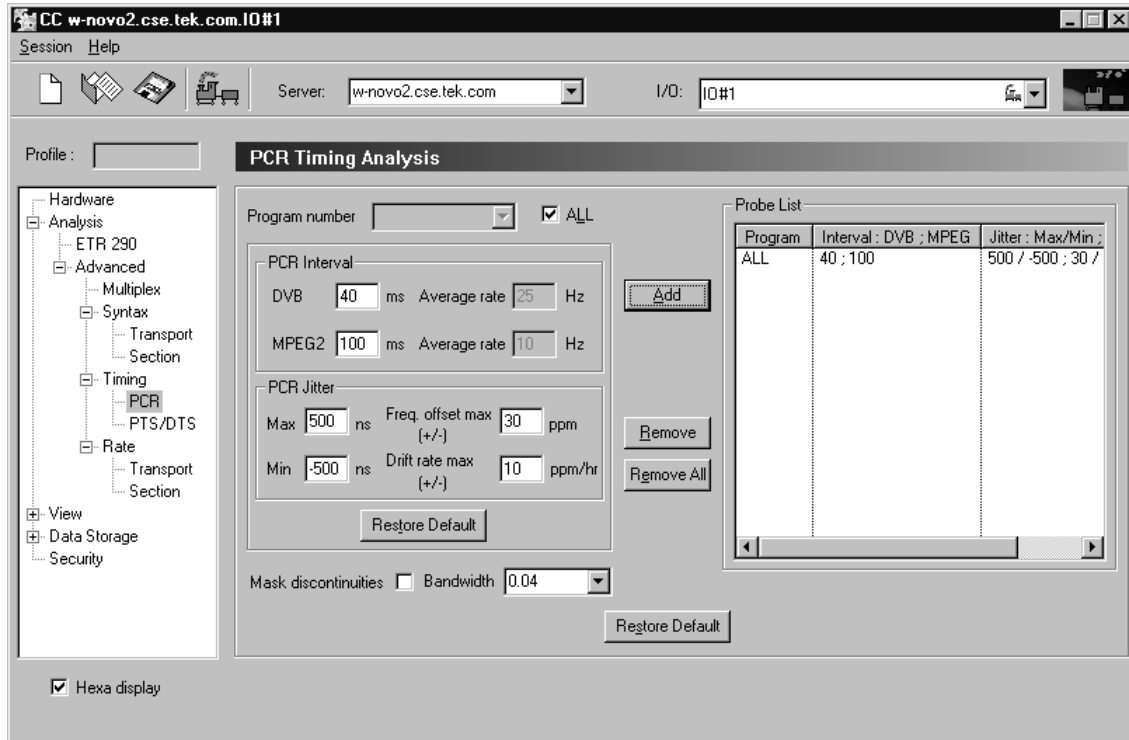


Figure 3–47: PCR Timing Analysis configuration panel

NOTE. The MTS300 system uses an internal Settling Filter to improve the accuracy of PCR jitter analysis. The Settling Filter must acquire at least 60 seconds of data before the MTS300 system can detect and report PCR jitter errors. Wait 60 seconds after setting a PCR probe to judge the PCR jitter performance or compliance.

The PCR Timing Analysis panel contains the following configuration options:

Program number. Use the Program Number box to select individual programs or all programs to probe. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Table identity. The Table Identity box contains a list of the selected programs. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

NOTE. *The PCR Interval and the PCR Jitter Max and Min settings determine thresholds for errors reported on the ETR 290 view. The default settings are consistent with ETR 290 recommendations. Do not change these settings if you plan to use ETR 290 tests to judge DVB compliance of the input stream.*

PCR interval. These settings specify the maximum permissible interval between consecutive PCRs. When a PCR probe is active, the MTS300 system reports an error when the interval between two consecutive PCRs for the monitored program exceeds the applicable (DVB or MPEG-2) value. The default for DVB mode is 40 ms; the default for MPEG-2 is 100 ms.

PCR jitter. The Max and Min settings specify the maximum permissible deviation from the expected PCR value. When a PCR probe is active, the MTS300 system reports an error when the deviation falls outside of the Max and Min values. The default for all analysis modes is +500 ns/–500 ns.

The Frequency offset setting determines the threshold for frequency offset errors. The default for all analysis modes is 30 ppm.

The Drift rate max setting determines the threshold for frequency drift rate errors. The default for all analysis modes is 10 ppm/hr.

Mask discontinuities. Under normal circumstances, the MTS300 system uses every PCR value in the stream to build the accuracy model that is used to judge the jitter of each newly decoded PCR. Occasional discontinuities (large PCR errors due to looped input, for example) can prevent creation of a valid model and hinder PCR analysis. Select Mask discontinuities to ignore very inaccurate PCRs, both for error reporting and for calculating the PCR jitter model.

Refer to *Timing Probe Descriptions* on page 3–76 for more information about PCR analysis and PCR probes.

Bandwidth. The Bandwidth setting controls the PCR Jitter measurement bandwidth used in the PCR analysis display. Refer to *PCR Analysis View* on page 3–142.

The default value is 0.04 Hz and you can enter values between 0.01 and 1 Hz. Use the drop-down selection box to select one of the defined values from the ETR 290 standard: 0.01 (MGf1), 0.1 (MGf2), or 1 (MGf3) Hz.

NOTE. *Setting lower bandwidth values will increase the time required for the Settling Filter of the Expert Client to compute PCR Jitter measurements.*

PTS/DTS Timing Analysis Panel

Select Analysis:Advanced:Timing:PTS/DTS in the Navigation panel to open the PTS/DTS Timing Analysis configuration panel as shown in Figure 3–48. Use this panel to set and configure PTS/DTS probes on one or more of the unscrambled video and audio elementary streams in the multiplex.

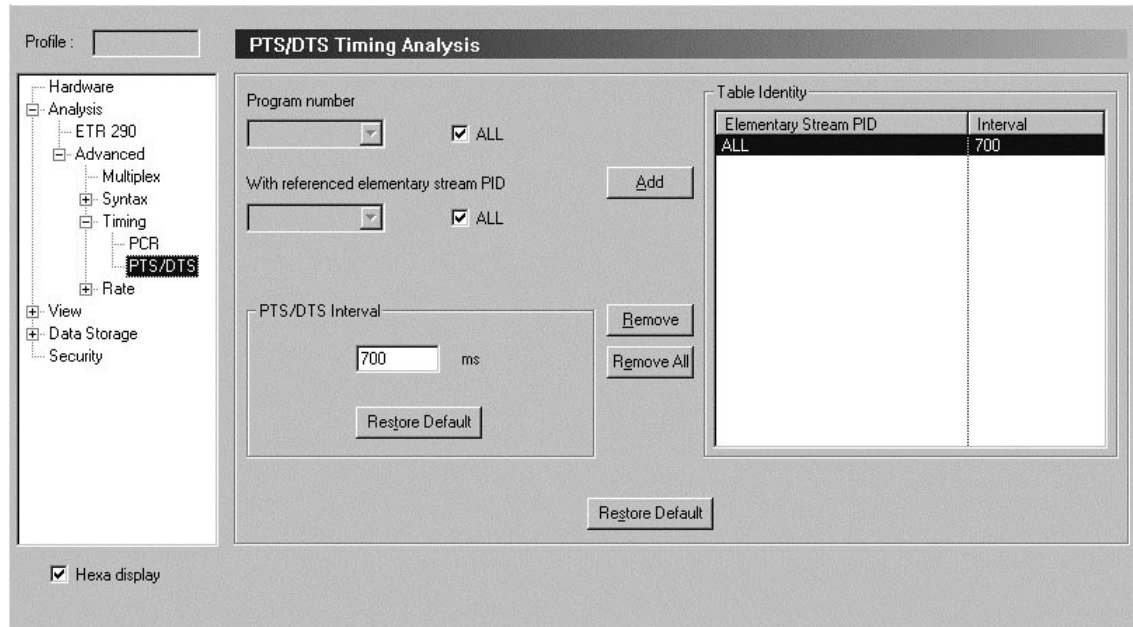


Figure 3–48: PTS/DTS Timing Analysis configuration panel

The PTS/DTS Timing Analysis panel contains the following configuration options:

Program number. Use the Program Number box to select individual programs or all programs to probe. Selecting a program number activates the With referenced elementary stream PID box. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Table identity. The Table Identity box contains a list of the selected programs. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

With referenced elementary stream PID. This box is activated when you select a program in the Program number box. Use this box to select elementary stream PIDs to reference with the selected program.

***NOTE.** The PTS/DTS Interval setting determines thresholds for errors reported on the ETR 290 view. The default settings are consistent with ETR 290 recommendations. Do not change these settings if you plan to use ETR 290 tests to judge DVB compliance of the input stream.*

PTS/DTS interval. This box allows you to change the PTS/DTS interval if necessary. The default value is 700 ms.

Mega Frame Timing Analysis Panel

Select Analysis:Advanced:Timing:Mega Frame in the Navigation panel to open the Mega Frame Timing Analysis configuration panel as shown in Figure 3–49. Use this panel to set the STS interval probe. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

NOTE. The Mega Frame Timing Analysis panel is available only when you have specified DVB-T analysis type from the Analysis panel (refer to Analysis Panel on page 3–163).

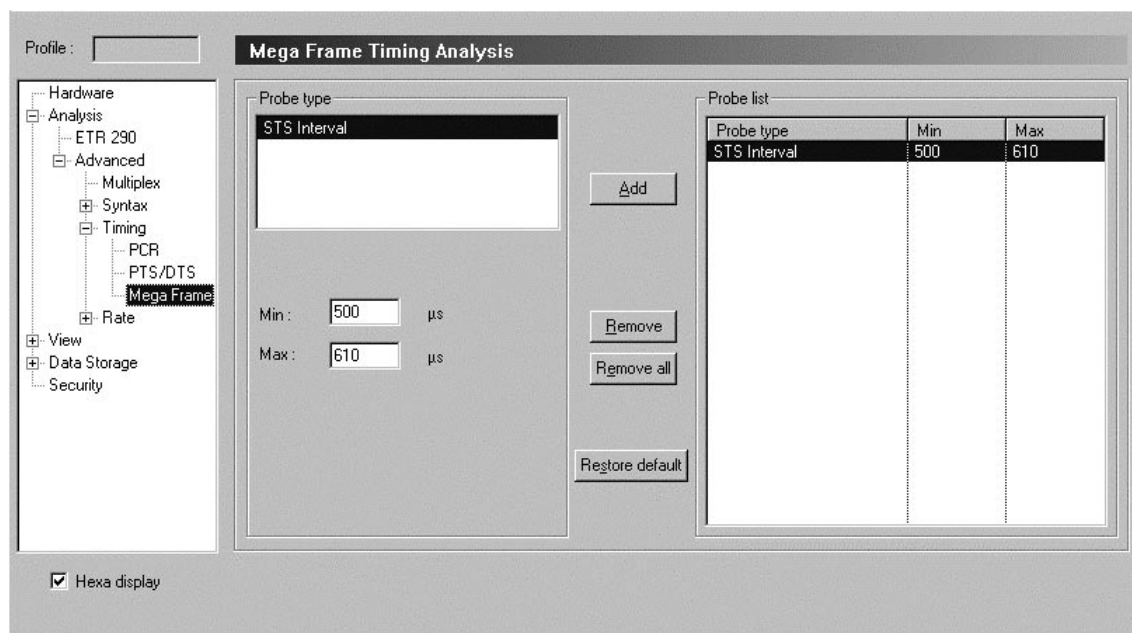


Figure 3–49: Mega Frame Timing Analysis configuration panel

The STS interval probe is used to check that the difference between two consecutive Synchronization Time Stamps carried in the MIP remains within an interval you define, and to report warnings every time the limits are exceeded.

The STS interval probe has two parameters: the Min and Max values allowed (expressed in 100 nanosecond units). Typically the STS interval should remain within the (0.5, 0.61) seconds interval.

You must enter a Min and/or Max value to add the STS interval probe.

Transport Rate Analysis Panel

Select Analysis:Advanced:Rate:Transport in the Navigation panel to open the Transport Rate Analysis configuration panel as shown in Figure 3–50. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

NOTE. The Analysis Servers automatically perform transport rate analysis whenever you analyze an input stream. These analyses appear in the Program Allocation, PID Allocation, and Type Allocation panels of the Statistic view.

Use this Transport Rate Analysis panel to set probes on selected stream items for transport rates that fall below or exceed limits that you define. You must enter a limit value to add a probe.

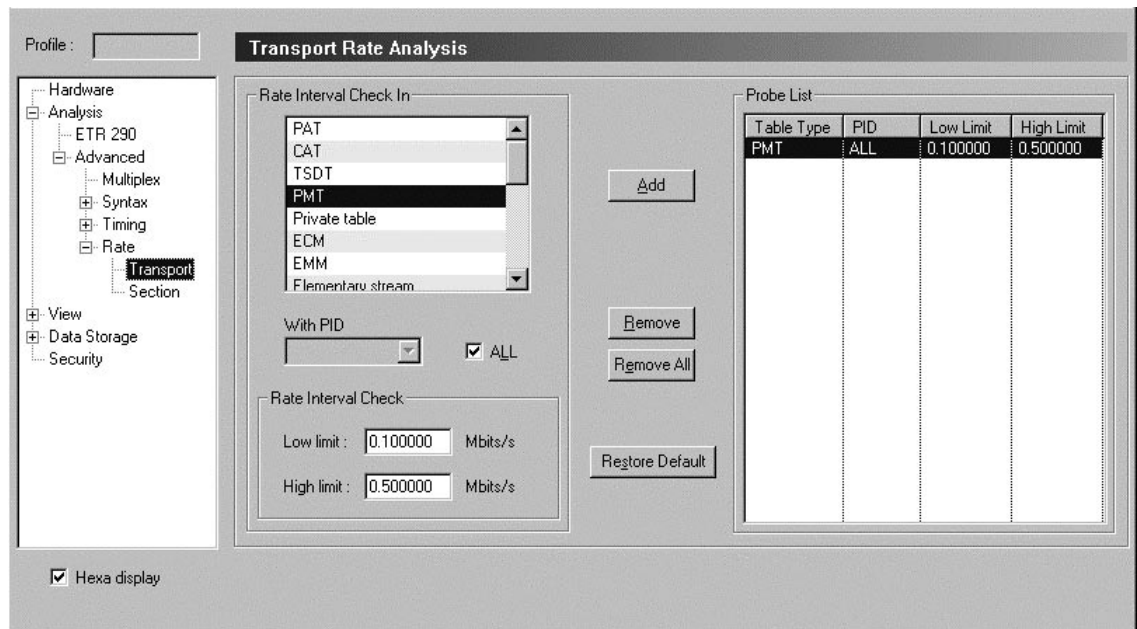


Figure 3–50: Transport Rate Analysis configuration panel

The Transport Rate Analysis panel contains the following configuration options:

Rate interval check in. This box contains the list of transport stream items available for you to probe.

Probe list. This box contains the list of transport rate probes that are set (or that will be set when you apply your changes).

Rate interval check. Use the Low limit and High limit boxes to set user-defined transport rate interval values. You must enter a limit value to add a probe.

Section Rate Analysis Panel

Select Analysis:Advanced:Rate:Section in the Navigation panel to open the Section Rate Analysis configuration panel as shown in Figure 3–51. Use this panel to specify the maximum acceptable interval between consecutive sub-table sections of each table type and the minimum interval between consecutive sections. User-defined intervals appear on the ETR 290 Detailed view. Refer to *ETR 290 Panel* on page 3–165 for more information.

NOTE. The Analysis Type setting in the Analysis configuration panel controls which stream items appear in the Probe Type list. Refer to Analysis Panel on page 3–163.

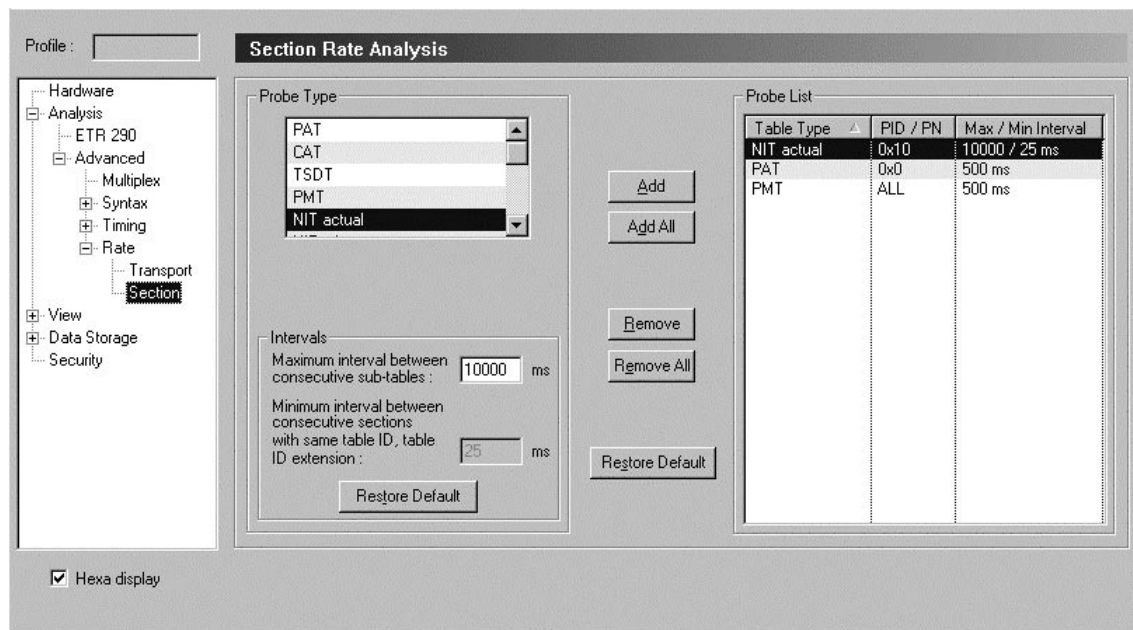


Figure 3–51: Section Rate Analysis configuration panel

The Section Rate Analysis panel contains the following configuration options:

Probe type. This box contains the list of available section rate probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Probe list. This box contains the list of user-defined section rate probes. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

NOTE. *The two Intervals settings determine the threshold for errors reported on the ETR 290 view. The default settings are consistent with ETR 290 recommendations. Do not change these settings if you plan to use ETR 290 tests to judge DVB compliance of the input stream.*

Intervals. The Intervals box contains the following two available options:

- When you select a section rate probe from the Probe Type list, the ETR 290 recommended value for the Maximum interval between consecutive sub-tables is displayed. You can enter an alternative value if necessary.
- The Minimum interval between consecutive sections with the same table ID, table ID extension box shows that 25 ms is the minimum permissible interval between consecutive sections. You cannot change this interval.

Mega Frame Rate Analysis Panel

Select Analysis:Advanced:Rate:Mega Frame in the Navigation panel to open the Mega Frame Rate Analysis configuration panel shown in Figure 3–52. Use this panel to set the MIP interval probe.

NOTE. The Mega Frame Rate Analysis panel is available only when you have specified DVB-T analysis type on the Analysis panel (refer to Analysis Panel on page 3–163).

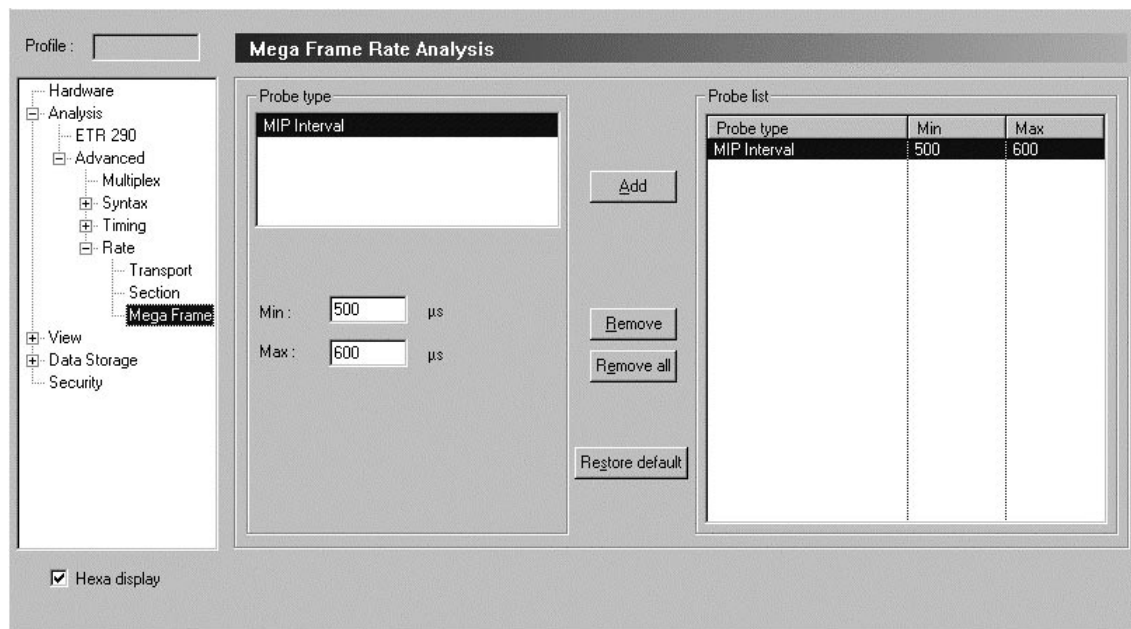


Figure 3–52: Mega Frame Rate Analysis configuration panel

Use the MIP interval probe to check that the difference between the Analysis board time stamps (the arrival time of the packets) of two consecutive MIPs remains within a user-defined interval, and to report warnings every time the limits are exceeded.

The MIP interval probe has two parameters: the Min and Max values allowed (expressed in 100 nanosecond units). Typically the MIP interval should remain within the (0.5, 0.61) seconds interval.

You must enter a Min and/or Max value to add the MIP interval probe. Refer to *Probe Operating Conventions* on page 3–39 for instructions on setting, changing, and removing probes.

Report Panel Select View:Report in the Navigation panel to open the Report configuration panel as shown in Figure 3–1. The Report panel allows you to set options for the way in which error messages are displayed in the Expert Client Report view.

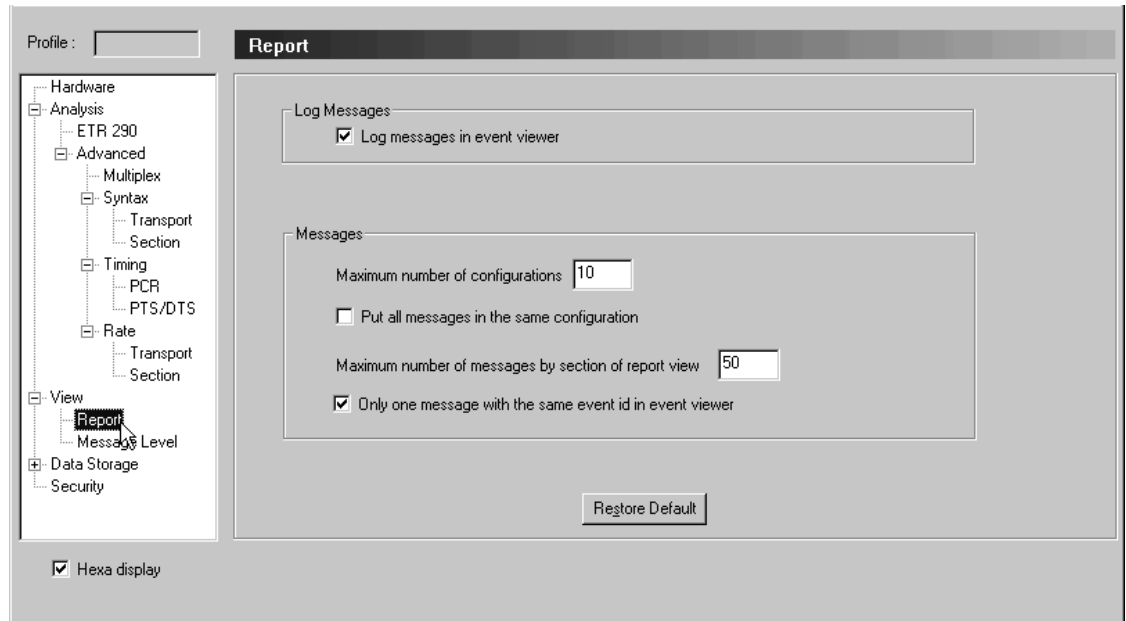


Figure 3–53: Report configuration panel

The Report View panel contains the following configuration options:

Log messages. Select the Log messages in event viewer option to log all events detected by the MTS300 system to the Windows NT Event Viewer. Clear the option to prevent MTS300 system error and message logging. Event Viewer is selected in the default configuration.

For further information about the Event Viewer, refer to *Messages and the Event Viewer* on page 3–121. Also consult the Windows NT online Help and the Event Viewer online Help.

Messages. The Messages portion of the panel contains display and logging options that affect all messages.

- The Maximum number of configurations option sets the maximum number of configurations the Report window displays. The default number of configurations is 10. Select Put all messages in the same configuration to limit the number of Report window configurations to one.
- The Maximum number of messages by sub-part of the report view option allows you to limit the number of messages that any Message view can contain. The maximum includes those messages that have scrolled off the top of the current message window or window pane; use the vertical scroll bar to see the messages that will not fit in the display window (you may have to press F3 to pause updates when monitoring a stream with many errors). When a Message view reaches the specified maximum, the oldest message is discarded as each new message appears. The default maximum is 50 messages.

This setting does not affect the capacity of the Windows NT Event Viewer application log.

- Select Only one message with the same event id in Event Viewer to limit the amount of message detail logged to the Event Viewer.

The MTS300 system posts only one general message for each event ID in the Message views. In reality, a Message view entry can represent many error or information messages. In the standard configuration, all information or error detail represented by the general message is logged to the Event Viewer.

Double-clicking an error message in the Expert Client Message view opens a window that provides event details. If the Only one message with the same event id in Event Viewer option is selected, only one message would appear in the Event viewer messages window for each event ID.

NOTE. When you monitor a stream that contains many items with many errors, logging all details can delay the appearance of messages in the Message views and quickly fill the Event Viewer application log. To log only general messages in the Event viewer, select the Only one message with the same event id in Event Viewer option.

Message Level Panel Select View:Message Level in the Navigation panel to open the Report Message Level configuration panel as shown in Figure 3–1.

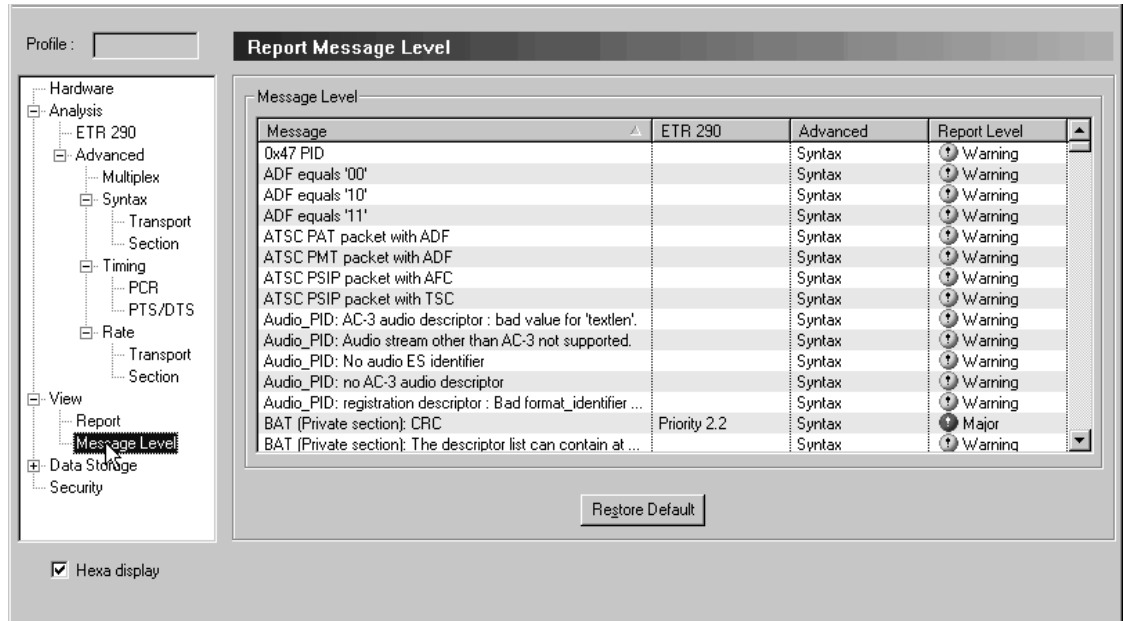


Figure 3–54: Report Message Level configuration panel

The Report Message Level panel allows you to specify how the MTS 300 system reports each error in both the Expert and Master Clients:

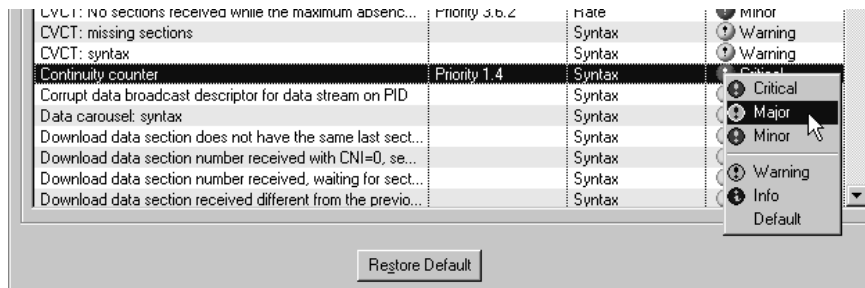
- Critical
- Major
- Minor
- Warning
- Information (Info)

The Report Message Level panel provides the following information (you can sort this information by clicking the column headers):

- Message. This column lists each test performed by the MTS300 system.
- ETR290. This column lists the priority level of each ETR290 test performed by the Analysis Servers.
- Advanced. This column lists the type of error that each failed test reports.
- Report Level. This column lists the level of error that each failed test reports.

Setting error message report levels. Use one of the following techniques to set the error level reported in the Expert and Master Clients:

- Right click the Report Level column of the test you want to modify, and then select the reporting level you want to use from the shortcut menu (shown below).



- Left-click in the Report Level column of the test you want to modify to step through each error level in the list.

Restoring default error report levels. Use one of the following techniques to restore the default the error level reported in the Expert and Master Clients for one or all error messages:

- Click Restore Default to restore the default error reporting level for all tests.
- Choose Default from the shortcut menu selection to restore the default value for an individual test.

Event Configuration Panel

Select Data Storage:Event Configuration in the Navigation panel to open the Event Configuration panel as shown in Figure 3–55. The Event Configuration panel allows you select the method of initiating data storage, the conditions that will stop data storage, and how much of the input stream is to be captured. You will use the Event Configuration panel in conjunction with the Filtering panel to configure the capture of a transport stream event.

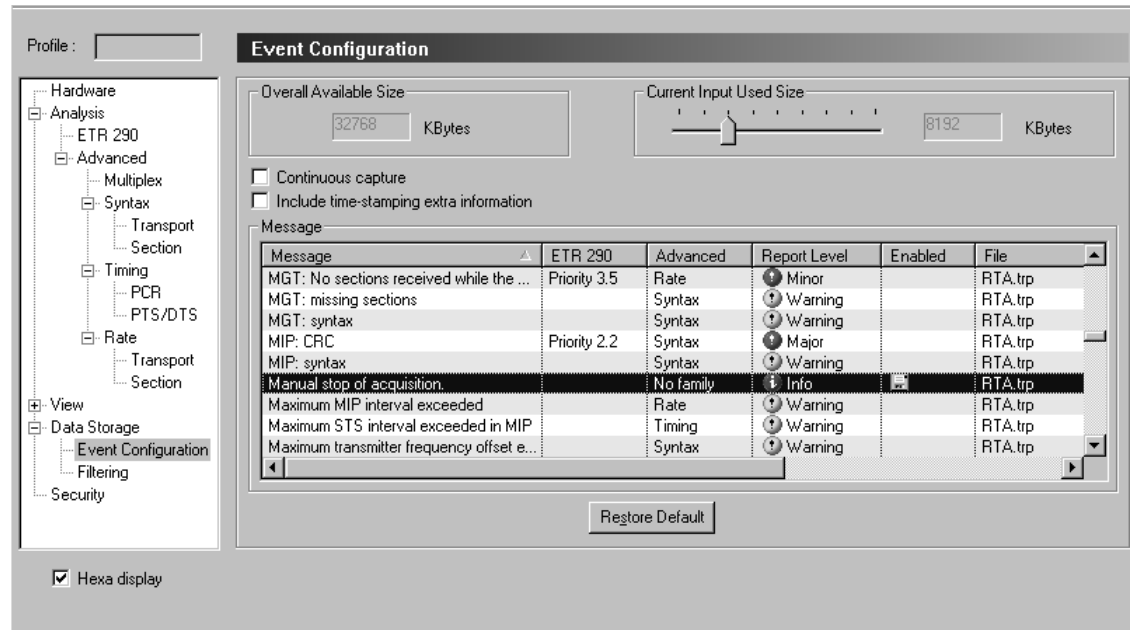


Figure 3–55: Event Configuration configuration panel

The capture file will be stored on the E: drive of the MTS300 system in a directory whose name matches the I/O port number being used to perform the capture. For example, if you are capturing an event on I/O port 1 to a file named RTA.trp, the directory path to the file is: E:\IO#1\RTA.trp.

You specify the file name and the size of the captured input file using the procedure described in *Capturing a Transport Stream Event*, beginning on page 3–191. The captured input file is saved as a *.TRP file, which you can later analyze using the MPEG-2 DVB/ATSC System Analyzer application (MTS300, Option DT).

NOTE. To enable a manual transport stream capture using the Expert Client, you must enable the Manual stop of acquisition event in the Message list as shown in Figure 3–55 and ensure that the Current Input Used Size value is not zero (but less than the Overall Available Size value).

The Event Configuration panel displays the current settings used to capture transport stream input. This panel has the following options:

Overall available size. This indicates the amount of disk space (in kilobytes) available to create an event trace file. Each Analysis board has one memory board. The disk space available is shared among the number of inputs installed on each analysis board. You specify how much disk space can be used for each input using the Current input used size option described below.

Current input size used. This is the amount of disk space (in kilobytes) reserved for the one or more event traces taken from the input of the MTS300 system to which you are connected. You must enter an amount greater than 0 KBytes to enable data storage.

Set the file size using the slider bar (the size is updated in the text box to the right). You need to apply your changes and restart the Analysis Server on the connected input for the changes to take effect.

Continuous capture. This option determines whether the MTS300 system will perform multiple input stream captures on the selected input, or whether only one event is saved.

If this option is selected, each enabled event will trigger an new input transport stream capture. Each new captured input file increments the number 'n' in the file name. If the first captured input file is `fileName.trp`, the second file name will be `fileName_1.trp`.

If this option is not selected, only the first enabled event will trigger an input stream capture. To reset event capturing after some input has been captured, return to this panel, disable and re-enable the event, and then press the Apply button.

Include time stamping extra information. This option allows you to add extra time stamp information to captured data. When this option is selected, each captured packet header includes a time stamp from the MTS300 system.

Message. This area lists the following information (you can sort the information in this area by clicking the column headers):

- **Message.** This column lists all of the tests performed by the MTS300 system.
- **ETR290.** This column lists the ETR290 priority level for each ETR290 test performed by the MTS300 system.
- **Advanced.** This column lists the test type for the test indicated in the row. For instance, the ATSC PSIP packet with AFC test is a test on the Syntax of the transport stream.
- **Report Level.** This column lists the error level you have specified for the test indicated in the row. You set the error level using the Report Message Level panel.
- **Enabled.** This column indicates whether the indicated error will generate an input stream capture. If an input fails the test, the error will trigger an input stream capture. Enabled is displayed with a disk icon.
- **File.** This column indicates the file name for the captured input based on the error that triggered the capture.

Capturing a Transport Stream Event. The MTS300 system allows you to capture a user-defined transport stream event. The Event Configuration panel of the Configuration Client controls the selection of transport stream events on which the MTS300 system can trigger a capture.

NOTE. *You can manually capture transport streams using the Expert Client. Refer to Manually Capturing a Transport Stream on page 3–94.*

To enable a manual transport stream capture using the Expert Client, you must enable the Manual stop of acquisition event in the Message list as shown in Figure 3–55.

To capture a user-defined transport stream event, perform the following steps:

1. Launch the Configuration Client for the transport stream input you are monitoring.
2. Open the Event Configuration panel of the Configuration Client.

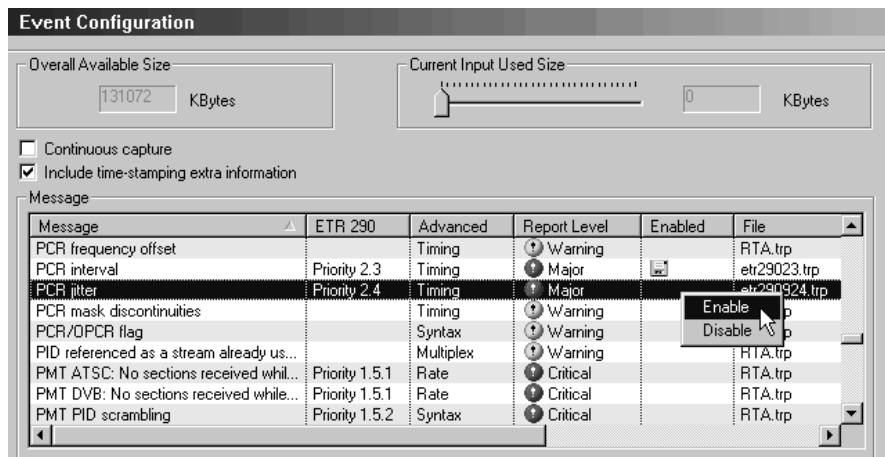
- Use the Current Input Used Size slide bar to set the size of the capture file in kBytes. You can set the capture size to a value up to the amount listed in the Overall Available Size box (determined by the available room on the SCSI drives).

NOTE. You must set a capture size greater than 0 kBytes to enable a capture.

- Use the Message list to select the transport stream event(s) you want to trigger the capture.

From the Event Configuration panel, click the event row in the Enable column to enable the error condition to trigger data capture. A disk icon in the Enabled column indicates that the selected error will trigger input data capture.

Left-clicking in the Enabled column toggles the test between enabled and disabled states. You can also right-click and select **Enabled** from the shortcut menu as shown below.



NOTE. An error condition must be detected by the Analysis Server to cause data to be captured. Always confirm that the related analysis or probe is enabled before enabling data acquisition. To confirm that a ETR 290 test is enabled, open the ETR 290 view and verify that the test indicator is colored green, orange, or red (not gray).

- To specify the filename and other parameters of the capture, right-click the filename column for the test you are enabling, and then select **Configure** from the shortcut menu.



- In the displayed Event Settings dialog box (see Figure 3–56), enter the name of the file you want to use when a portion of the stream is captured.

The capture file will be stored on the E: drive of the MTS300 system in a directory whose name matches the I/O port number being used to perform the capture. For example, if you are capturing an event on I/O port 1 to a file named RTA.trp, the directory path to the file is: e:\IO#1\RTA.trp.

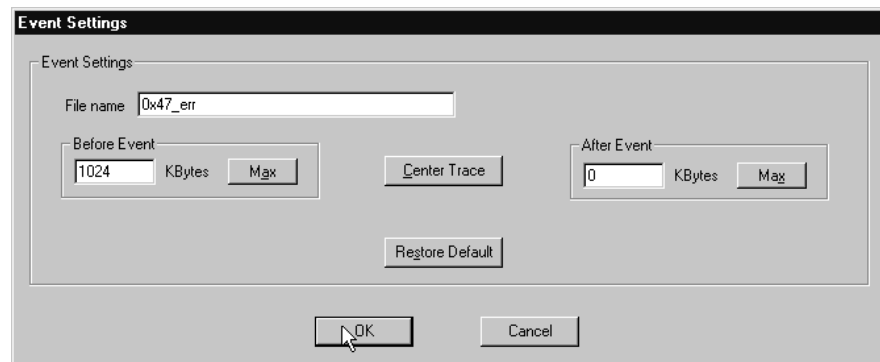


Figure 3–56: Event Settings dialog box

- Use the **Before Event** and **After Event** boxes to set the amount of transport stream data captured before and/or after you initiated the capture event. For example, if you set the Before Event value to 1024 and the After Event Value to 2048, the capture file will included 1024 kBytes of data from before you initiated the capture and 2048 kBytes of data from after you initiated the capture.
- Click **Center Trace** if you want to save the same amount of data before and after the capture occurs. The size of the file will be the size you set in the Current Input Used Size selection box in the Event Configuration panel in step 3.

9. Click the appropriate Max button to save data up to the amount you set in the Current Input Used Size selection box in the Event Configuration panel in step 3, before or after the capture event occurs.
10. Click **OK** after you finish configuring the Event Settings dialog box.
11. Open the **Filtering panel** of the Configuration Client to select which PIDs to capture.
12. Click **Apply** before exiting the Configuration Client to enable the new Event Configuration settings.
13. Click **Restart now** to restart the Expert Client.

The transport stream data will continue to move through the capture buffer until a transport stream event occurs (one you selected in the Event Configuration panel) that triggers a capture.

The capture point in a captured transport stream file will be based on your capture configuration as set up in the Event Configuration panel of the Configuration Client.

Filtering Panel Select Data Storage:Filtering in the Navigation panel to open the Filtering panel as shown in Figure 3–57. You will use the Event Configuration panel in conjunction with the Filtering panel to configure the capture of a transport stream event. The Filtering panel allows you to specify which PIDs of the input stream you want to be captured.

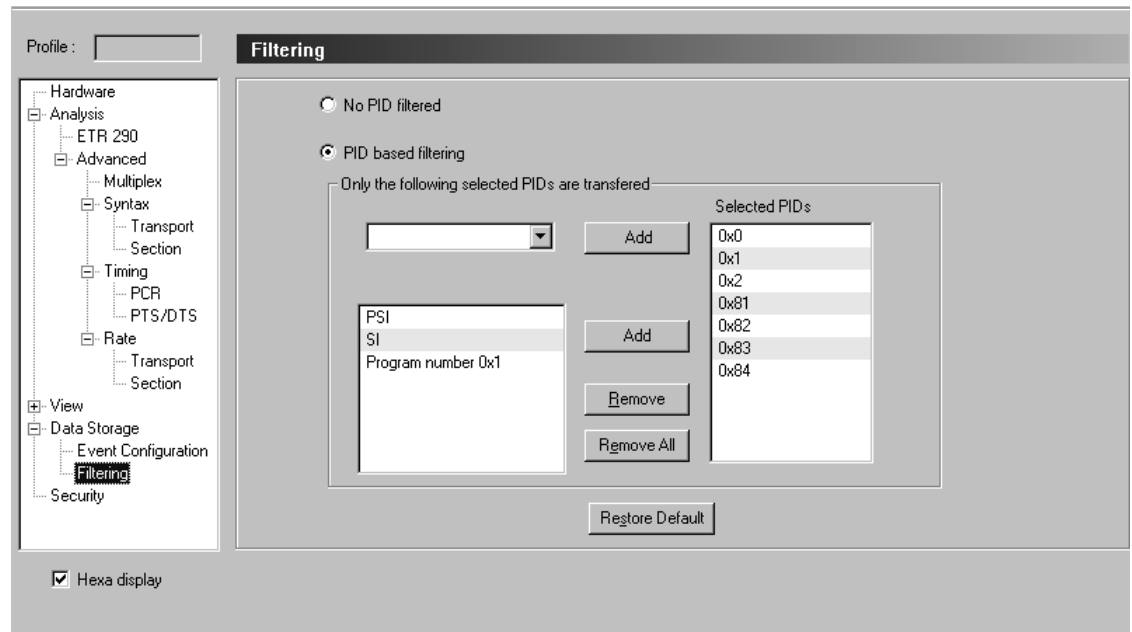


Figure 3–57: Filtering configuration panel

The Filtering panel contains the following configuration options:

No PID filtered. Select No PID filtered to capture the entire contents of the transport stream.

PID based filtering. Select PID based filtering to capture selected PIDs of the stream. After you select the PID based filtering option, you can select specific PID numbers from the upper list box or you can select groups of PIDs such as PSI, SI, PSIP or specific programs from the lower list box to add to the Selected PIDs list. Click the associated Add button to add items from either list box to the Selected PIDs list.

Security Panel Select Security in the Navigation panel to display the Security panel (see Figure 3–58). The Security panel allows you to set a password for an Analysis Server configuration that protects your current settings from being changed. This password applies only to the input indicated in the Address bar.

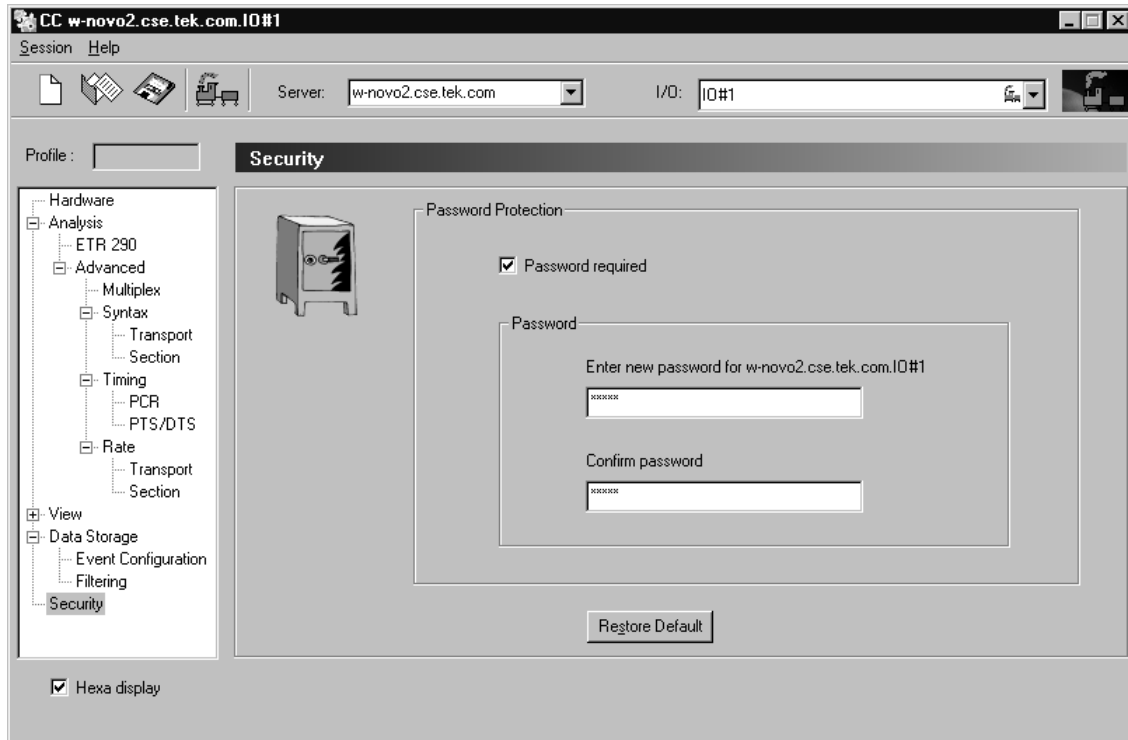


Figure 3–58: Security configuration panel

To set a password on an Analysis Server to which you are connected, use the following procedure:

1. Select the **Password required** option (it is not selected by default).
2. Enter the password and confirm it using the text boxes provided. The password is case sensitive.
3. Click the **Apply** button.

After setting a password, any Configuration Client that tries to connect to the Analysis Server will see the following Password dialog box. If you do not know the password, you can still open the Configuration Client for the indicated Analysis Server by clicking Read Only. However, you will be unable to apply changes to any settings.



Stream Recorder Reference

The Stream Recorder application allows you to record an MPEG transport stream onto the hard drive of the MTS300 system using a VTR-like interface. You can specify the duration, file name, and location of the recorded file.

This section describes the Expert Client in the following subsections:

- *Stream Recorder System Limits* page 3–199
- *Starting the Stream Recorder* page 3–200
- *Stream Recorder Display* page 3–200
- *Recording a Transport Stream* page 3–203

Stream Recorder System Limits

The Stream Recorder is governed by the following MTS300 system limits:

- Only one Stream Recorder can be launched at a time on each MTS300 system.
- The Stream Recorder can only record transport stream files with data rates between 1 Mbps and 140 Mbps and can store them only on the hard drive of the MTS300 system on which the application was launched. You cannot record transport stream files to a remote MTS300 system or use a remote Stream Recorder to record to a local MTS300 system.

NOTE. *It is recommended that you store transport stream files on the SCSI hard drives (E: drive) of the MTS300 system. The response time of the C: drive on the MTS300 system is limited and may affect the performance of the Stream Recorder and Stream Player applications when you try to record or play back streams with bitrates greater than 30 Mbps.*

- If the SCSI hard drives (E:) are 90% or more full, it is recommended that you use a defrag utility to defragment the SCSI drives. You can use any defrag utility that is compatible with the Microsoft Windows NT 4.0 operating system.
- The MTS300 system is limited to an aggregate data rate of 140 Mbps between all operating applications. You may have to shut down other MTS300 applications if you need to record a transport stream with high data rates.

Starting the Stream Recorder

Perform the following steps to start the Stream Recorder application:

1. Select an I/O port in the Port Manager panel of the Master Client.
2. If the I/O port is already assigned to an Analysis Server or application, you must first stop whatever process is occurring on the port and then “free” the port.
3. If the I/O port is labeled Free, select **Assign Server | Stream Recorder** from the shortcut menu. The Free icon will change to the Stream Recorder icon.
4. Select the Stream Recorder icon, and then select **Launch Stream Recorder Client** from the shortcut menu.

The Stream Recorder is displayed showing the Server Manager (MTS300 system) and I/O port number to which the Stream Recorder is connected.

Stream Recorder Display

The Stream Recorder application provides a VTR-like display (see Figure 3–59) that allows you to control the recording of a transport stream input.

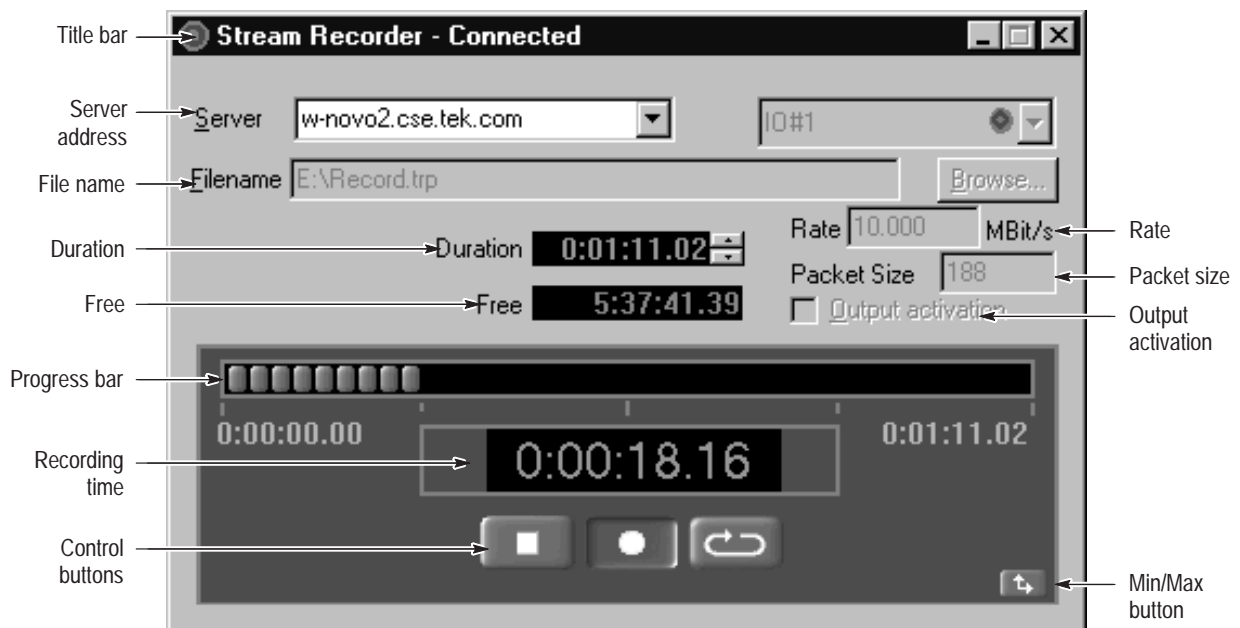
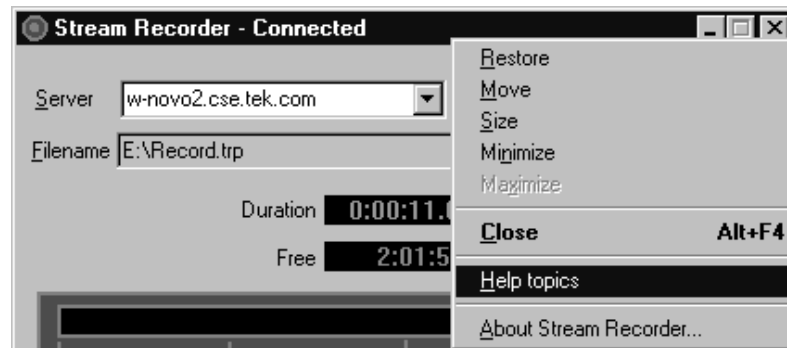


Figure 3–59: Stream Recorder display elements

Title Bar The Title bar contains the name of the application and the window control buttons. If you right-click in the Title bar, a shortcut menu appears as shown below. You access the Stream Recorder online Help from this menu.



Server Address If you launch the Stream Recorder from the Master Client, the Server address boxes contain the name or IP address of the server and the I/O port number to which the Stream Recorder is connected. You can use the text boxes to connect to a different MTS300 system or to a different I/O port number.

File Name The Filename box lists the directory path and filename of the file you will capture with the Stream Recorder. Click the Browse button to select the directory path and filename.

NOTE. It is recommended that you store transport stream files on the E: drive of the MTS300 system. The response time of the MTS300 system C: drive is limited and may affect the performance of the Stream Recorder and Stream Player applications when you try to capture or playback streams with bitrates greater than 30 Mbs.

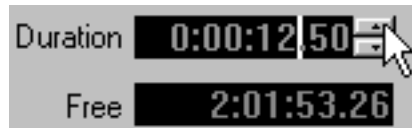
Free The Free box displays the amount of memory available (hours, minutes, seconds, and hundredths of a second) to record a transport stream file on the hard drive you selected in the Filename box.

Duration Use the Duration box to set the size of the transport stream file you are capturing. You can set the duration time (hours, minutes, seconds, and hundredths of a second) to any value not exceeding the available time listed in the Free box.

Perform the following steps to set the recording duration time:

1. Click in the Duration box to position the cursor on the right side of the digit you want to change.
2. Change the value of the digit by either entering a value using the keyboard and then pressing the Enter key, or clicking the desired Up or Down arrow.

In the example below, clicking the Up arrow will change the duration from 12.50 seconds to 13.50 seconds.



Rate and Packet Size The bitstream rate and the packet size of the input transport stream are displayed in these boxes. You cannot edit these values since they are measured from the input stream. The Rate box will display NOT SYNC when there is no input signal connected to the I/O port to which the Stream Recorder is assigned.

Output Activation When you select the Output Activation option, the transport stream on the I/O port input to which the Stream Recorder is connected is looped through to the output connector of that same I/O port.

Progress Bar The Progress bar displays the progress of an active recording process. The display elements in the Progress bar light up from left to right to indicate how far the capture process of the Stream Recorder has proceeded. The Progress bar in Figure 3–59 on page 3–200 shows a recording in process.

Recording Time When a stream capture is in progress, the Stream Recorder displays the beginning time (0:00:00.00), the ending time as set in the Duration box (0:01:11.02 in Figure 3–59), and the current time (0:00:18.16 in Figure 3–59) of the recording in progress.

Control Buttons The three Control buttons (from left to right: Stop, Record, and Loop Record) allow you to control the stream recording. Click a Control button to perform the desired task.

Minimize/Maximize Button


Click the Minimize/Maximize button  to remove or add the setup portion of the Stream Recorder display. When you minimize the Stream Recorder setup display, the Stream Recorder appears as shown in Figure 3–60.



Figure 3–60: Minimized Stream Recorder display

Recording a Transport Stream

Perform the following steps to record an input transport stream to a file on your MTS300 system:

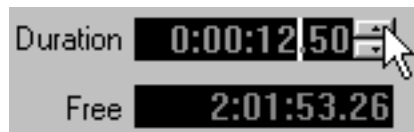
1. Connect a transport stream signal to one of the I/O port inputs on the MTS300 system.
2. Launch the Master Client application from the Tektronix MPEG Test system program group and connect to the local Server Manager.
3. In the Port Manager panel of the Master Client, assign the Stream Recorder to the I/O port to which you connected the transport stream input.
4. Launch the Stream Recorder client.
5. In the Stream Recorder window, use the **Filename** box to enter a path and filename for the transport stream file you are going to record.

NOTE. It is recommended that you store transport stream files on the E: drive of the MTS300 system. The response time of the C: drive on the MTS300 system is limited and may affect the performance of the Stream Recorder and Stream Player applications when you try to capture or playback streams with bitrates greater than 30 Mbs.

The MTS300 system is limited to an aggregate data rate of 1Mbs to 140 Mbs between all operating applications. You may have to shut down other MTS300 application to record a transport stream with a high data rate.

6. Enter a value into the Duration box that does not exceed the value displayed in the Free box.
 - a. Click in the **Duration box** to position the cursor on the right side of the digit you want to change.
 - b. Change the value of the digit by either entering a value using the keyboard and then pressing the Enter key, or clicking the desired Up or Down arrow.

In the example below, clicking the Up arrow will change the duration from 12.50 seconds to 13.50 seconds.



7. Click the **Output activation box** if you want to loop the input transport stream to the output connector of the I/O port to which the Stream Recorder is connected.
8. To record the input transport stream, perform one of the following steps:
 - a. Click the **Record button** to record the next portion of the transport stream up to the amount entered in the Duration box.

You can click the **Stop button** to stop the recording prior to reaching the Duration limit.

- b. Click the **Loop Record button** to start the recording process. The Stream Recorder will continue to capture transport stream input until you click the Stop button.

When you click the Stop button, the capture file will contain the preceding portion of the transport stream (prior to your clicking the Stop button) up to the amount entered in the Duration box.

Stream Player Reference

The Stream Player application allows you to play back transport streams saved on the hard disk of the MTS300 system using a VTR-like interface. You can specify which portion of the transport stream to play back, the rate of the transport stream (you can also apply an external clock to set the rate), the format (ASI or M2S) of the transport stream, and the playback mode (single play or loop play).

This section describes the Expert Client in the following subsections:

- *Stream Player System Limits* page 3–205
- *Starting the Stream Player* page 3–206
- *Stream Player Display* page 3–206
- *Playing Back a Transport Stream File* page 3–210

Stream Player System Limits

The Stream Player is governed by the following MTS300 system limits:

- Only one Stream Player can be launched at a time on each MTS300 system.
- The Stream Player can only play back transport stream files with data rates between 1 Mbs and 140 Mbs stored on the hard drive of the MTS300 system on which the application was launched. You cannot play back remote transport stream files or use a remote Stream Player to play back a local transport stream file.

NOTE. *It is recommended that you store transport stream files on the SCSI hard drives (E: drive) of the MTS300 system. The response time of the C: drive on the MTS300 system is limited and may affect the performance of the Stream Recorder and Stream Player applications when you try to capture or play back streams with bitrates greater than 30 Mbs.*

- If the SCSI hard drives (E:) are 90% or more full, it is recommended that you use a defrag utility to defragment the SCSI drives. You can use any defrag utility that is compatible with the Microsoft Windows NT 4.0 operating system.
- The MTS300 system is limited to an aggregate data rate of 140 Mbs between all operating applications. You may have to shut down other MTS300 applications if you need to play back a transport stream with high data rates.

Starting the Stream Player

Perform the following steps to start the Stream Recorder application:

1. Select an I/O port in the Port Manager panel of the Master Client.
2. If the I/O port is already assigned to an Analysis Server or application, you must first “free” the port. Select **Free I/O** from the shortcut menu.
3. If the I/O port is labeled Free, select **Assign Server | Stream Player** from the shortcut menu. The Free icon will change to the Stream Player icon.
4. Select the Stream Player icon, and then select **Launch Stream Player Client** from the shortcut menu.

The Stream Player is displayed showing the Server Manager (MTS300 system) and I/O port number to which the Stream Player is connected.

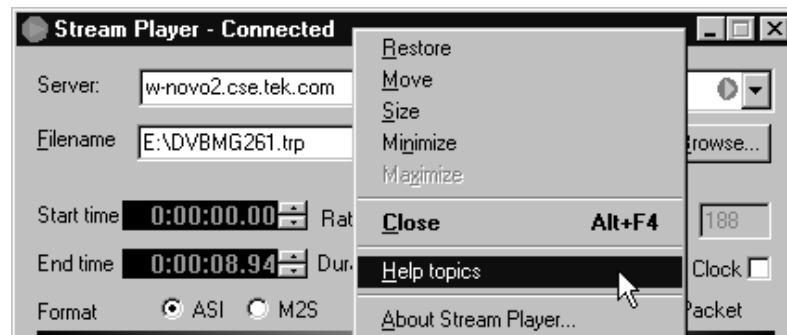
Stream Player Display

The Stream Player application provides a VTR-like display (see Figure 3–61) that allows you to control the play back of a transport stream file.



Figure 3–61: Stream Player display elements

Title Bar The Title bar contains the name of the application and the window control buttons. If you right-click in the Title bar, a shortcut menu appears as shown below. You access the Stream Player online Help from this menu.



Server Address When you launch the Stream Player from the Master Client, the Server address boxes contain the name or IP address of the server and the I/O port number to which the Stream Player is connected. You can use the text boxes to connect to a different MTS300 system or to a different I/O port number.

File Name The Filename box lists the directory path and filename of the file you will playback with the Stream Player. Click the Browse button to select the directory path and filename.

NOTE. It is recommended that you store transport stream files on the E: drive of the MTS300 system. The response time of the MTS300 system's C: drive is limited and may affect the performance of the Stream Recorder and Stream Player applications when you try to capture or playback streams with bitrates greater than 30 Mbs.

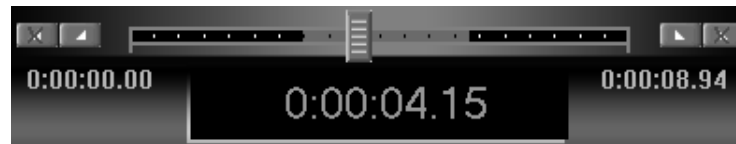
Start Time and End Time When you initially select a transport stream file in the Filename box, the Start time is set to all zeros (beginning of the file), and the End time is set to the value in the Duration box (end of the file).

Use the Start time and End time boxes to play back only a portion of the transport stream file. Refer to *Playing Back a Transport Stream File* on page 3–210 for instructions.

Duration The Duration box lists the size of the transport stream file (hours, minutes, seconds, and hundredths of a second) you selected in the Filename box. You cannot edit this value since it is measured from the selected file.

- Rate** When you initially select a transport stream file in the Filename box, the bitstream rate of the selected file is displayed in this box. When you use the Rate box to enter a custom rate, the Stream Player will output the transport stream file using that rate. The Rate box displays EXT CLK when you enable the External Clock option.
- Packet Size** The Packet Size box lists the packet size used in the selected transport stream. You cannot edit this value since it is measured from the transport stream file.
- External Clock** When you click the External Clock box, the Stream Player will use your external clock signal (connected to the same I/O port as the Stream Player) to set the output rate of the transport stream. The Rate box will display EXT CLK when you select this option.
- Format and Mode** Select ASI or M2S to set the output format of the transport stream. When you set the output format to ASI, you can set the output mode to Byte or Packet. Which mode you set, Byte or Packet, is determined by the requirements of the instrument receiving the signal from the MTS300 system.
- In Byte mode, each section of the transport stream data is sent with all of the data packets first, followed by all ASI null packets. In Packet mode, the transport stream data packets are distributed throughout the section and appear in small bursts that are separated by ASI null packets.
- Slide Bar and Selector Buttons** The full width of the Slide bar represents the full length of the selected transport stream file, with the beginning of the file on the left and the end on the right. When the Stream Player is actively outputting a transport stream, the Slide bar moves left to right to show relative progress through the file.
- You can use the Selector buttons on either side of the Slide bar in conjunction with the Slide bar to play back only a portion of the transport stream. Use the two inside Selector buttons to set custom start and end times and use the two outside Selector buttons to reset the start and end times back to their default values. Refer to *Playing Back a Transport Stream File* on page 3–210 for instructions.

When you set custom start and end times to play back only a portion of the transport stream, the Slide bar display indicates the portion of the stream that will be played back. In the example shown below, the green (non-black) section in the middle of the Slide bar represents the relatively small portion (middle one-third) of the transport stream that is being played back.



Playback Time

When a stream output is in progress, the Stream Player displays the current position in time (hours, minutes, seconds, and hundredths of a second) of the output in progress. In the example above, the playback time is 4.15 seconds.

Control Buttons

The three Control buttons (from left to right: Stop, Play, and Loop Play) allow you to control the stream output. Click on a Control button to perform the desired task.

The Play button plays the selected transport stream one time. When you select Loop Play, the Stream Player continues to play the same transport stream file until you stop the output.

Minimize/Maximize Button


Click the Minimize/Maximize button  to remove or add the setup portion of the Stream Player display. When you minimize the Stream Player setup display, the Stream Player appears as shown in Figure 3–62.



Figure 3–62: Minimized Stream Player display

Playing Back a Transport Stream File

Perform the following steps to play back a transport stream file located on your MTS300 system:

1. Launch the Master Client application from the Tektronix MPEG Test system program group, and connect to the local Server Manager.
2. In the Port Manager panel of the Master Client, assign the Stream Player to the I/O port from which you want to output the transport stream signal.
3. Launch the Stream Player client.
4. In the Stream Player window, use the Filename box to enter the path and filename for the stored transport stream file you want to playback.

NOTE. It is recommended that you store transport stream files on the E: drive of the MTS300 system. The response time of the MTS300 system's C: drive is limited and may affect the performance of the Stream Recorder and Stream Player applications when you try to capture or playback streams with bitrates greater than 30 Mbs.

5. Enter custom values in the Start time and End time boxes if you want to play back only a portion of the transport stream file. There are two methods you can use to change the start time and end time values:
 - a. Enter values directly in the Start time and End time boxes. Click in the appropriate box to position the cursor on the right side of the digit you want to change. Change the value of the digit by either entering a value using the keyboard and then pressing the Enter key, or clicking the appropriate Up or Down arrow.

In the example below, clicking the Up arrow will change the start time from 3.16 seconds to 4.16 seconds.



- b. Enter values using the Slide bar in conjunction with the Selector buttons. Use the mouse cursor to drag the Slide bar to the desired position in the stream file. When you drag the Slide bar, the output time display indicates the position in the file in hours, minutes, seconds, and hundredths of a second.

In the example below, the Slide bar has been dragged to 1.69 seconds.



- c. Click either the Start time or End time selector button (the two inside buttons) to set the desired custom start and/or end time.
 - d. You can click either Reset selector button (the two outside buttons) to reset the start and end times back to the default values (beginning and end of file).
6. Enter a custom value in the Rate box if you want the Stream Player to play back the transport stream at a rate different than the default rate of the transport stream file.
 7. Click the External Clock box if you want to set the playback rate using a clock signal connected to the clock input of I/O port being used by the stream player.
 8. Select the output Format (ASI or M2S) and Mode (Byte or Packet; ASI format only) by clicking the desired box.
 9. After you finish the Stream Player setup, play back the selected transport stream file by performing one of the following steps:
 - Click the Play button to play back the selected transport stream file one time. The Slide bar and output readout indicate the progress through the file. You can click the Stop button to stop the playback prior to reaching the specified end time.
 - Click the Loop Play button to play back the selected transport stream file in loop mode. Until you click the Stop button, the Stream Player will continue to output the selected transport stream.



Appendices

Appendix A: What to Do if an Application Locks Up

In the event an application locks up or freezes, perform the following steps to close the application.

1. Press **CTRL+ALT+DEL** to open the Windows NT Security dialog box.
2. Click **Task Manager** to open the Windows NT Task Manager.
3. Click the **Applications** tab, and then highlight the locked-up application (usually the status of the application will indicate *Not responding*).
4. Click **End Task**.
5. In some circumstances, a window opens prompting you to wait, end the task, or cancel your “end task” instruction. Follow the window instructions; if you click **End Task**, the application should close immediately.
6. If the above procedure fails to close the application, press **CTRL+ALT+DEL** again to return to the Windows NT Security dialog box.
7. Click **Shut Down**. This opens the Shutdown Computer dialog box.
8. Select **Shutdown and Restart**; then click **OK**.



CAUTION. *To avoid data loss, do not power off the computer without first exiting Windows NT. Only use the manual reset if the computer does not respond.*

If the above procedures do not close the application or restart the computer, manually power off the computer, and then proceed with a normal power on. To ensure that all parameters are reset, perform a complete power cycle following an application lock up.

Appendix B: Cleaning and Maintenance

This appendix describes general care and service procedures for the MTS300 MPEG Test System.

- *Preventative Maintenance* provides cleaning instructions.
- *In Case There is a Problem* provides some hints for troubleshooting startup errors. Service troubleshooting procedures are located in the *MTS300 MPEG Test System Service Manual* (refer to the *Preface* for a list of manuals).
- *Repacking for Shipment* gives instructions for packing and shipping the program monitor for reshipment.

General Care

Protect the instrument from adverse weather conditions. The instrument is not waterproof.



CAUTION. *To avoid damage to the instrument, do not expose it to sprays, liquids, or solvents.*

Do not use chemical cleaning agents; they may damage the instrument. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.

Preventive Maintenance

Check the electrical performance and the instrument accuracy certified (calibrated) once a year.

Preventive maintenance mainly consists of periodic cleaning. Periodic cleaning reduces instrument breakdown and increases reliability. You should clean the instrument as needed, based on the operating environment. Dirty conditions may require more frequent cleaning than computer room conditions.

Cleaning the Exterior

Clean the exterior surfaces of the instrument with a dry, lint-free cloth or a soft-bristle brush. If dirt remains, use a cloth or swab dampened with a 75% isopropyl alcohol solution. A swab is useful for cleaning in narrow spaces around the controls and connectors. Do not use abrasive compounds on any part of the instrument.



CAUTION. Avoid getting moisture inside the instrument during external cleaning and use only enough solution to dampen the cloth or swab. Use a 75% isopropyl alcohol solution as a cleanser and rinse with deionized water.

Do not wash the front-panel On/Standby switch. Cover the switch while cleaning the instrument.

Cleaning the Compact Disc Drive

The compact disc drive requires routine maintenance to operate at maximum efficiency. The compact discs can be damaged if dirt and dust accumulate on the surface of the discs. Store any discs in their protective containers to keep them from being exposed to dust or dirt.



CAUTION. Electrostatic discharge (ESD) can damage components in the CD ROM drive. Do not touch lens or exposed metallic parts on the platter, with the exception of the center hub.

Clean the face of the CD-ROM drive monthly with a cloth dampened with deionized water.



CAUTION. Do not allow moisture to enter the disc drive. When power is applied, the internal components may be damaged.

Cleaning the Keyboard and Mouse

Clean the exterior surfaces of the keyboard and mouse (part of Option VK) with a dry, lint-free cloth or a soft-bristle brush. A swab is useful for cleaning in narrow spaces around the controls and connectors. Do not use abrasive compounds on any part of the instrument.



CAUTION. Avoid getting moisture inside the keyboard and mouse during external cleaning and use only enough solution to dampen the cloth or swab. Use a 75% isopropyl alcohol solution as a cleanser and rinse with deionized water.

Cleaning the Optional SVGA Monitor

Clean the monitor CRT using a soft cloth dampened with deionized water to remove accumulated dust or fingerprints. Refer to the monitor service manual for any additional cleaning procedures and preventative maintenance servicing.

In Case of Problems

This section addresses problems that you may encounter while using the test system. This section does not identify specific problems related to performance verification or adjustments. The diagnostic procedures for the MTS300 MPEG Test System provided in this section can help you isolate problems to a specific module. For detailed performance verification, adjustment, or remove and replace procedures, refer to the *MTS 300 MPEG Test System Service Manual*, available as an optional accessory.

Power-on Diagnostics

Power-on diagnostics run when you first power on the instrument to start the test system application. These diagnostics check the operating system and hardware for correct operation. If error messages occur during the power-on diagnostics, there may be a system error that prevents the MTS 300 software modules from starting.

Table B–1 lists some of the symptoms of hardware problems (related to the operating system and peripheral devices) and possible solutions.

Table B–1: Troubleshooting power-on failures

Symptom	Possible causes and recommended actions
Instrument does not power on	Verify that the power cord is connected to the instrument and to the power source. Check that the instrument receives power when you press the On/Standby switch; check that fans start. Check that power is available at the power source. Contact your local Tektronix service center.
Instrument powers on but does not complete the power-on sequence	Check for and remove any disk in the floppy disk drive; make sure instrument boots from the hard disk drive.
Power-on diagnostics fail	Isolate problem to faulty platform or to faulty module (see <i>Test System Hardware Diagnostics</i>). Contact your local Tektronix service center.
Instrument does not recognize accessories such as monitor, printer, or keyboard	Check that accessories are properly connected or installed. Contact your local Tektronix service center.
Instrument will not power off with On/Standby switch	If the test system has a monitor, keyboard, and mouse connected, try powering off the instrument using the Windows NT shutdown procedure. If the instrument still does not power off, use the task manager to close down tasks. Finally, try the hard shutdown procedure; push and hold the On/Standby switch for five seconds to power off the instrument.

Software Problems

Your MTS300 MPEG Test System comes with software already installed. For any suspected software problems, try to isolate the problem to the test system application software or to other installed software.

Many software problems are due to corrupted or missing software files. In most cases the easiest way to solve software problems is to reinstall the software. See the *MTS300 MPEG Test System Hardware and Software Installation Technical Reference* that came with your test system.

If you suspect networking problems, see *Network Troubleshooting* beginning on page C–8.

Test System Hardware Diagnostics

Hardware problems can have several causes. Review the installation instructions in this manual to verify that you have properly installed the instrument. If you are certain that you have installed the instrument correctly, run the Hardware Diagnostics application to identify problems with the test system components. See the *MTS300 MPEG Test System Hardware and Software Installation Technical Reference* that came with your test system.

Repackaging for Shipment

The MTS300 MPEG Test System is shipped in cartons designed to provide it with the maximum protection. If you ship the instrument subsequently, you will need to use these cartons, the spacer pads, the protective bag, and the instrument support inserts to provide adequate protection. When an instrument is shipped to a Tektronix field office for repair, attach a tag to the instrument showing the following:

- Owner's name and address
- Serial number
- Description of the problem(s) encountered and/or service required.



CAUTION. To prevent the loss of your instrument's warranties, Tektronix strongly recommends that you use an actual MTS300 MPEG Test System shipping carton (that is in good condition) when you ship your instrument to another location or when you return the instrument to a Tektronix service center for repair.

Tektronix cannot honor the instrument's warranties if the test system arrives at the service center damaged and it was not shipped in its original carton or in a replacement carton (and its supporting packaging material) purchased from Tektronix. If you lose your original packaging material, contact your Tektronix representative to obtain replacement packaging. Table B–2 lists the part numbers to use when ordering replacement parts.

Replacement Packaging

New packaging material is available from Tektronix. The part numbers are in Table B-2. Packaging components are shown in Figure B-1 on page B-6. Each component has an index number, which also appears in Table B-2. To obtain these items, contact your nearest Tektronix office or representative.

Table B-2: Packaging material

Item	Tektronix part number	Figure B-1 Index number
Complete shipping carton (contains all subparts)	710-9423-00	
Top tray (cardboard insert)	004-4912-00	1
Instrument support inserts (2); top and bottom	004-4913-00	2
Inner shipping box (without internal subparts)	004-4926-00	3
Outer shipping box (without internal subparts)	004-4914-01	4
Spacer pad (makes two pads for inner shipping box)	004-4925-01	See Figure B-2
Accessory tray	004-4851-00	Not shown
Accessory tray	004-4852-01	Not shown
Protective bag	006-8164-00	Not shown

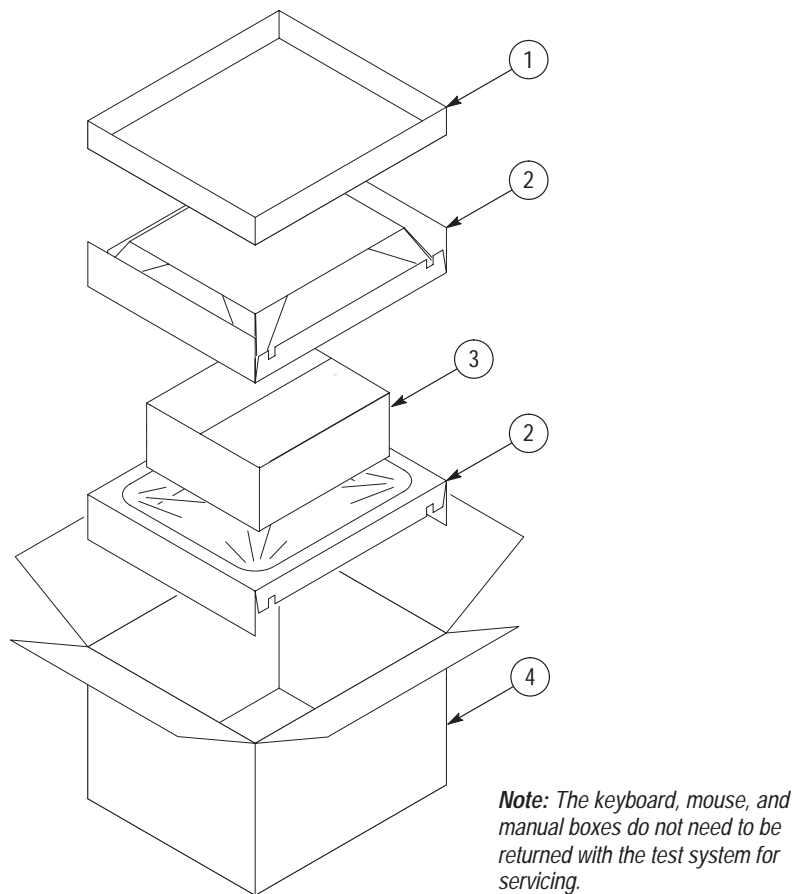


Figure B-1: Repackaging the test system

Repackaging Instructions

When the test system is shipped, it is important to provide it with the maximum protection. Figure B-2 on page B-7 shows how to repackage the MTS300 system for shipment. As the figure shows, it is not necessary to have the accessories received with the test system in the package for reshipment to repair. If you are shipping to another site for reinstallation, the accessories are packed last in accessory trays at the top of the box.

The inner shipping box, pads, and protective bag provide the necessary protection to allow the shipping materials of the outer shipping box to correctly support the product for shipment. Pack the inner shipping box as follows:

1. If you have the original packaging material, start by placing one of the spacer pads in the bottom of the inner box. Position the side of the pad with the smaller, square holes against the side of the box as shown in Figure B-2.
2. Place the protective front cover on the front of the test system.

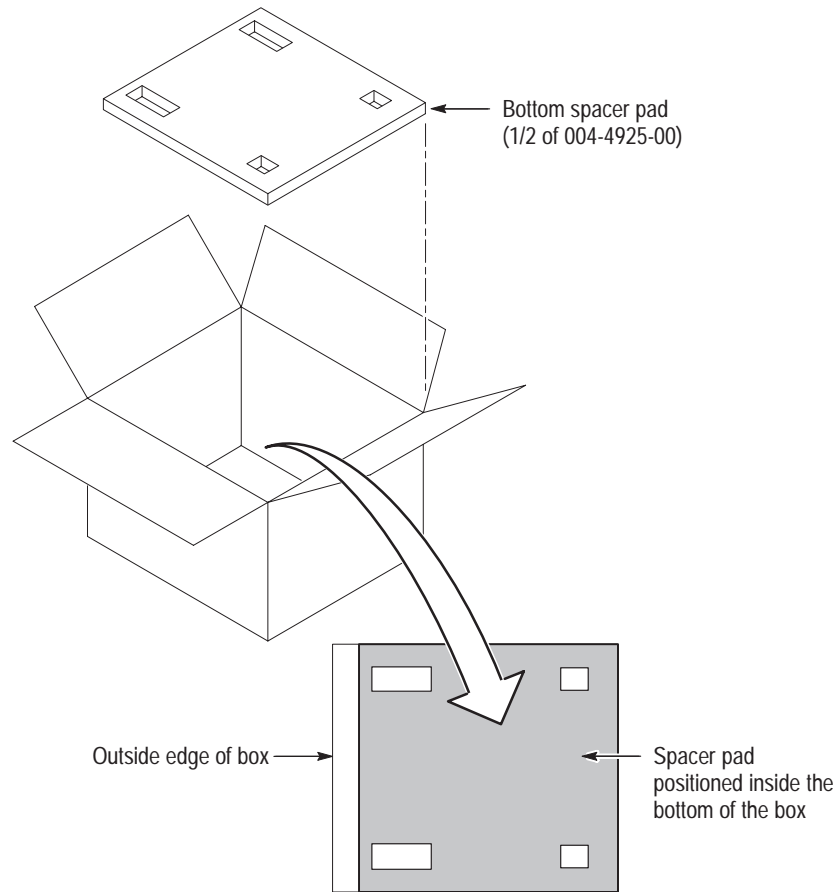


Figure B-2: Placement of bottom spacer pad in inner shipping box

3. Place the test system in the protective bag. The bag prevents dust, moisture, or other small packaging debris from entering the cabinet.
4. Fold the top of the bag neatly over the top of the test system to make it as flat as possible and seal with packing tape.
5. Place the bagged test system in the inner shipping box. The small feet on the bottom of the cabinet go in the square holes in the spacing pad and the larger feet near the front of the test system go in the larger rectangular holes. The bezel end of the cabinet fits over the edge of the spacer pad.
6. Place the other spacer pad on top of the test system. Place the side with the small square holes against the side of the box. The protective front cover on the bezel of the test system is not covered by the top spacer pad.
7. Close and tape the inner shipping box.
8. Place one of the support inserts in the bottom of the outer shipping box, film side up as shown in Figure B-1.

9. Place the sealed inner shipping box in the center of the bottom support insert in the outer shipping box.
10. Put the second support insert over the inner shipping box, film side down.

NOTE. *If you are using new packing material purchased from Tektronix, pre-stretch the film in the support inserts by pushing down firmly several times on the top support insert.*

11. Place the top tray in the box. If you are not shipping accessories with the MTS300 system, close and tape the outer shipping box.
12. When shipping the accessories, place the two accessory trays in the top tray, arrange the accessories in the trays, and then close and tape the outer shipping box.
13. Attach the appropriate shipping documents needed to ship the test system to its destination (either to Tektronix for repair or to another location).

Appendix C: Networking

This appendix provides the following information:

- Network requirements for the Tektronix MTS300 MPEG Test System
- Network installation procedures for configuring the TCP/IP and SNMP parameters of your test system
- Network troubleshooting techniques for solving basic networking issues common to many network installations

See the *MTS300 MPEG Test System Hardware and Software Installation Technical Reference* that came with your test system for procedures on reinstalling the application software.

Network Requirements

The Transmission Control Protocol/Internet Protocol (TCP/IP) protocol stack is pre-loaded on Tektronix MTS300 MPEG Test Systems. The open nature of TCP/IP allows you to create networks using various protocols and signaling techniques. This section lists the physical and network requirements for using test systems over a network.

Physical Requirements

The following list describes the physical requirements for networking test systems:

- Ethernet network or subnetwork to the test system
- 10Base-T / 100Base-T network drop to your local test system
- Network interface card (NIC) and driver

NOTE. *The Intel EtherExpress Pro/100B Adapter NIC and E100BT.sys adapter driver are pre-loaded on all test systems; this combination of NIC and adapter driver is the only one supported by the test system.*

Network management stations do not have requirements beyond basic connectivity between two points; the network adapter at a network management station can be of any type that allows it to communicate over a TCP/IP network. The routers installed in the network convert data to the appropriate format for the protocols used in your network.

Minimum Network Requirements

To use the test system over a network, you must install it in a TCP/IP network. TCP/IP networks have specific addressing and routing requirements that your network administrator will typically have already configured. Use this section as a checklist for the TCP/IP parameters that your network administrator assigns to your test system.

- Unique IP address
- Unique host name
- Subnet mask (if you are installing the test system in a network with multiple subnets)
- Default gateway IP address (if your environment uses multiple networks or subnets)
- DNS server IP address(es) (if you use the DNS service to resolve Internet addresses; some networks use multiple DNS servers)
- WINS server IP address(es) (if your system uses WINS to resolve computer names to IP addresses; some networks use multiple WINS servers)

NOTE. *In order to use test systems over a network, your network administrator needs to assign your host machine an IP address: you cannot use the test system with Dynamic Host Configuration Protocol (DHCP).*

Network Installation

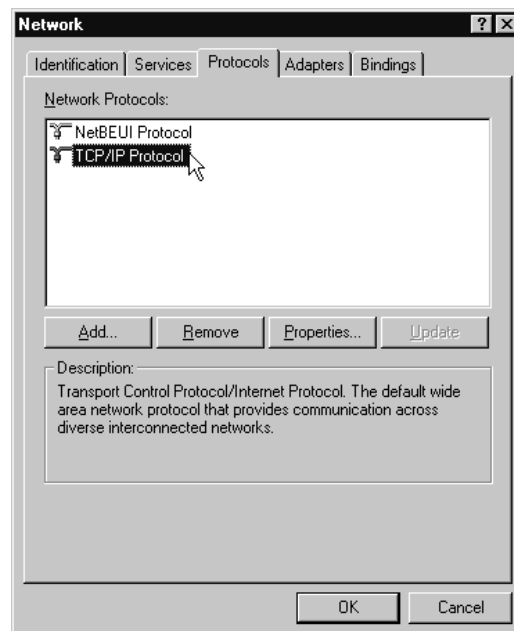
This section describes how to set the parameters listed in *Minimum Network Requirements*, and how to configure test systems to be managed in an SNMP-based network management environment. The information in this section will not replace the value added by networking professionals and describes only basic network installation procedures.

Setting TCP/IP Parameters

Each network uses specific values for such parameters as IP addresses and default gateways, so the parameter values used in the examples for this section are for illustrative purposes only unless otherwise specified. You can configure test systems as stand-alone instruments which need only minimal network parameters set, or you can configure them to be installed into a LAN or WAN (local or wide area network, respectively).

Display the Microsoft TCP/IP Properties dialog box.

1. Click the **Start** button on the taskbar, point to **Settings** and then **Control Panel**. (Alternatively, right-click the **Network Neighborhood** icon and select **Properties** from the shortcut menu. Skip to step 3.)
2. Double-click the **Network** icon.
3. Select the **Protocols** tab from the Network dialog box as shown in Figure C-1.

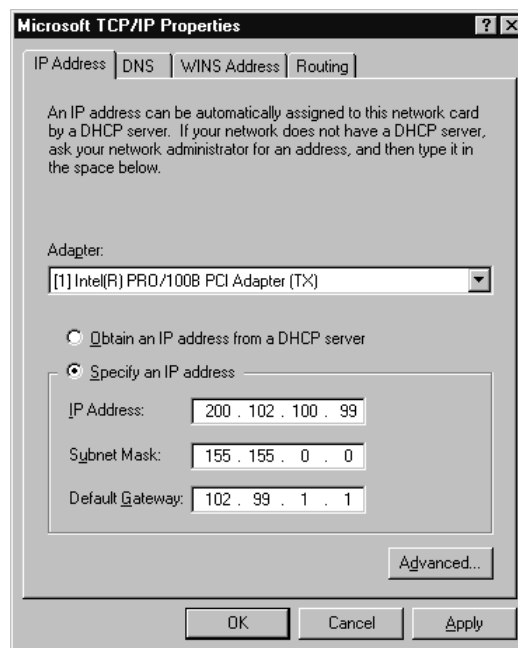
**Figure C-1: Network dialog box showing TCP/IP Protocol item**

4. Highlight **TCP/IP Protocol** from the Network Protocol selection box, and then click **Properties**.

The TCP/IP Properties dialog box is displayed showing the IP Address tab. See Figure C-2 on page C-4.

Set IP Address tab parameters.

5. Set the following IP Address tab parameters as shown in Figure C–2 and described below:
 - a. Select the Intel EtherExpress Pro Adapter (it should be the only option available for test systems).
 - b. Select **Specify an IP Address**.
 - c. Enter the IP address for your test system. If not already specified, obtain the IP address from your network administrator. IP addresses must be unique.
 - d. If necessary, enter the subnet mask value and default gateway, both of which, you obtain from your network administrator.

**Figure C–2: IP tab parameters**

Incorrect values for any one of these parameters can make your test system behave unpredictably over a network. See *IP Parameters* beginning on page C–9 for more information about these values.

6. Click Apply, and then click the DNS tab.

Set DNS tab parameters.

7. Set the following DNS values as indicated in Figure C–3:

NOTE. Do not set DNS parameters unless your network uses the DNS service. Setting these parameters when your network does not use this service will make your host machine run very slowly when trying to resolve network addresses.

- a. Enter your host machine name provided by your network administrator into the Host name text box. Host/domain name pairs must be unique.
- b. Enter the name of the domain of which your test system is a member in the Domain text box as directed by your network administrator.
- c. Click **Add** in the DNS Service Search Order group, and then enter the IP address of the Domain Name System server in the TCP/IP DNS Server dialog box.
- d. Click **Add** to accept your changes and dismiss the TCP/IP DNS Server dialog box.

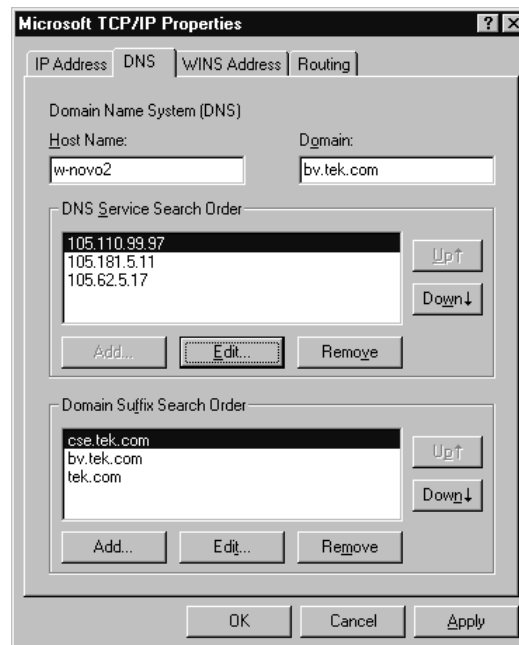


Figure C–3: DNS tab parameters

It should not be necessary to configure the parameters on the WINS Address or the Routing tabs.

8. Click **OK** when you are finished configuring the IP Address and DNS tab parameters and are certain that all of the values correct.
9. Restart your test system or network management station for the TCP/IP changes to take effect.

SNMP Network Management

SNMP is a communication protocol built on the top of UDP/IP. It implements a set of commands consisting of operations and variables. Equipment or applications (such as the MTS300 test system) that support SNMP present a set of variables that you can modify or consult as well as a set of notifications. All of these parameters are grouped into a Management Information Base (MIB).

MIBs are specifications containing definitions of management information so that network systems can be remotely monitored, configured, and controlled.

Accessing the MIB files. The Tektronix MIB is a textual description of the Analysis Server objects (functions and parameters) that can be monitored and controlled via SNMP. The MIB text files are installed at the following location:

```
C:\Mib\
```

The MIB files are used by the real-time analysis applications and the Stream Player, Stream Recorder, and OpenMux (MTS300, Option OM only) applications.

The MIB file pairs for each application, for example, the RTAv1.mib and RTAv2.mib files, are used for SNMPv1 and SNMPv2 systems respectively.

The operations in SNMP are limited to retrieving the value of management information, modifying the value of management information, and reporting an event.

Retrieval. The most common type of retrieval operation requires that the identities are those that exactly match the identity of returned variables. This retrieval operation is called GET.

For instance, from a DOS prompt window you can run the following command to check that the Analysis Server is running on the first input:

```
getone -v2c <machineName> rta0 rtaStartStop.0
```

Where <machineName> is the network name of the test system for which you are trying to determine the Analysis Server status.

Modification. There is one modification operation, which is called SET. The operand for SET is a list of pairs. Each pair consists of the identity of a variable and its desired value. Use this operation to configure and control a managed system.

For instance, from a DOS prompt window you can run the following command (all on one line) to stop analysis on the first input of a named test system:

```
setany -v2c <machineName> rta0 rtaStartStop.0  
-i stop
```

Where <machineName> is the network name of the test system for which you are trying to start the Analysis Server.

To restart the Analysis Server, use the same syntax, but change the -i switch parameter to start.

```
setany -v2c <machineName> rta0 rtaStartStop.0  
-i start
```

Event Reporting. The SNMP event reporting operation is called TRAP. It specifies an event and a list of pairs. A *pair* consists of the identity of a variable and its value or values. This operation reports the occurrence of events on a managed system to a list of managers configured to receive events.

Network Troubleshooting

Networks are based on standards; however, there are many unique characteristics of each network (LAN or WAN) that make it difficult to troubleshoot without a thorough knowledge of the specific network. Consequently, in-depth network troubleshooting should be performed by an expert who knows your network characteristics.

This section provides some basic procedures that can eliminate some of the more common sources of network errors. The information in this section is organized as indicated in the following list:

- *Basic Requirements*
- *IP Parameters*
- *Common Troubleshooting Procedures*
- *Sources of Information*

If you cannot resolve problems using the procedures described in this section, see your network administrator.

Basic Requirements

Fulfill the following requirements before troubleshooting your host machines:

- Configure your MTS300 MPEG Test System for use on the network as described in *Network Requirements* on page C-1.
- Ensure that any applications that you may have loaded on your test system since receiving it are not using the ports assigned to the test system components.

IP Parameters

The illustrations in this section depict how each IP parameter (IP address, subnet mask, and default gateway) can negatively impact network connectivity.

Incorrect IP address. If the IP address for your test system is incorrect (not unique), then you may, or may not be able to communicate over the network. In Figure C-4, TVTest_1 uses the same IP address as Rennes. If Rennes is started first, TVTest_1 will recognize the IP address conflict and will not load TCP/IP; consequently, the test system will not be reachable over the network.

If your IP address is incorrect, and the IP address does not exist on your subnet, you may be able to communicate from the device (test system or monitoring station), but you may not be able to communicate with the device.

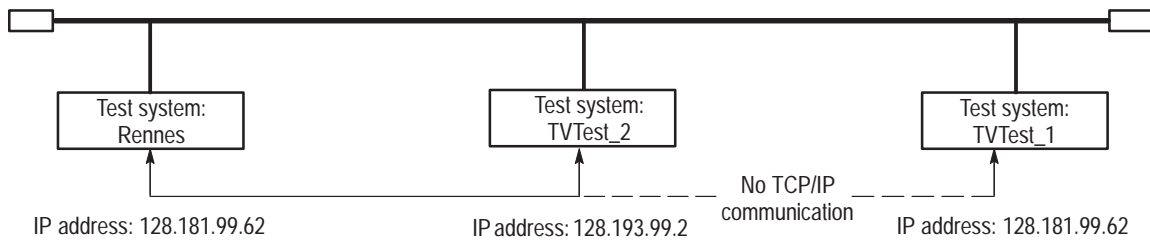


Figure C-4: Incorrect IP address

Incorrect subnet mask. Subnets and subnetting networks is complex and requires a thorough understanding of IP addressing. Call your network administrator if you think your networking problem involves subnets. Figure C–5 shows a simple (and fairly common) subnet mask problem.

In Figure C–5, the subnet mask for TVTest_1 indicates that the network address is contained in the first two bytes of the IP address. In dotted decimal notation, the network address is 128.181. This information allows the device to communicate with any other device with the same network address without being routed through a default gateway.

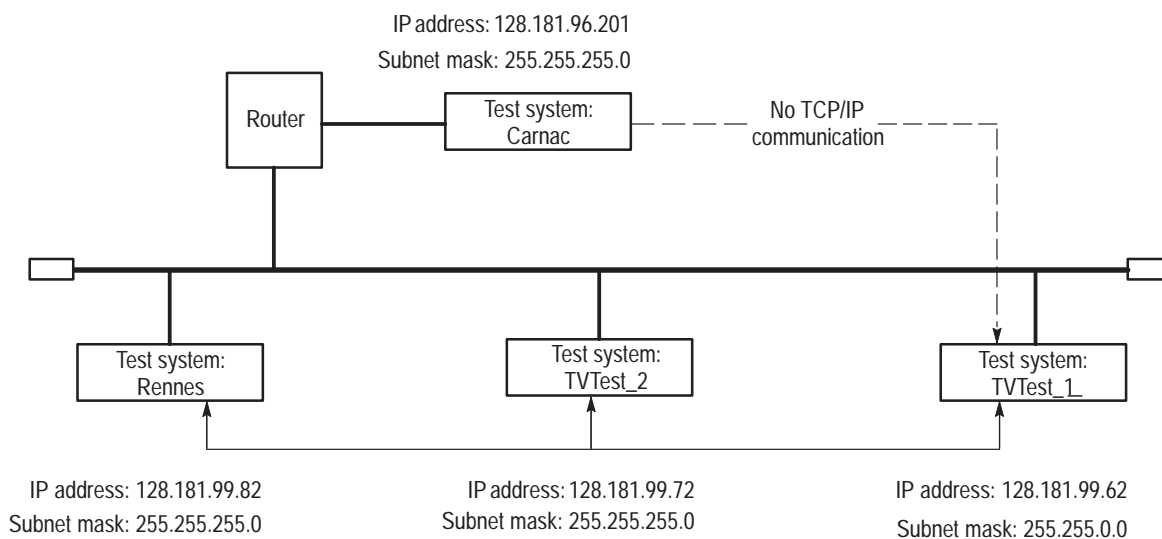


Figure C–5: Incorrect subnet mask

TVTest_1 cannot communicate with Carnac, because, according to the subnet mask on TVTest_1, Carnac and TVTest_1 are logically on the same network. Consequently, messages sent from TVTest_1 to Carnac are never routed. Because these two devices do not share a medium, TVTest_1 will never find the correct address for the network card on Carnac and will not be able to reach Carnac.

TVTest_1 can communicate with TVTest_2 and Rennes because these three devices share a medium, so messages from TVTest_1 do not need to be routed. TVTest_1 is therefore able to find the correct addresses for TVTest_2 and Rennes in spite of having an incorrect subnet mask.

Incorrect default gateway IP address. The default gateway you have specified in the TCP/IP Properties dialog box is the device that “knows about” your subnetwork and others on your network. When you send messages (for instance traps from your test system) to a device on another subnet, the default gateway is able to route the message to the appropriate subnet. If the IP address specified in the TCP/IP Properties dialog box is incorrect, messages to devices on other subnets will not reach their destination (because they never made it to the default gateway).

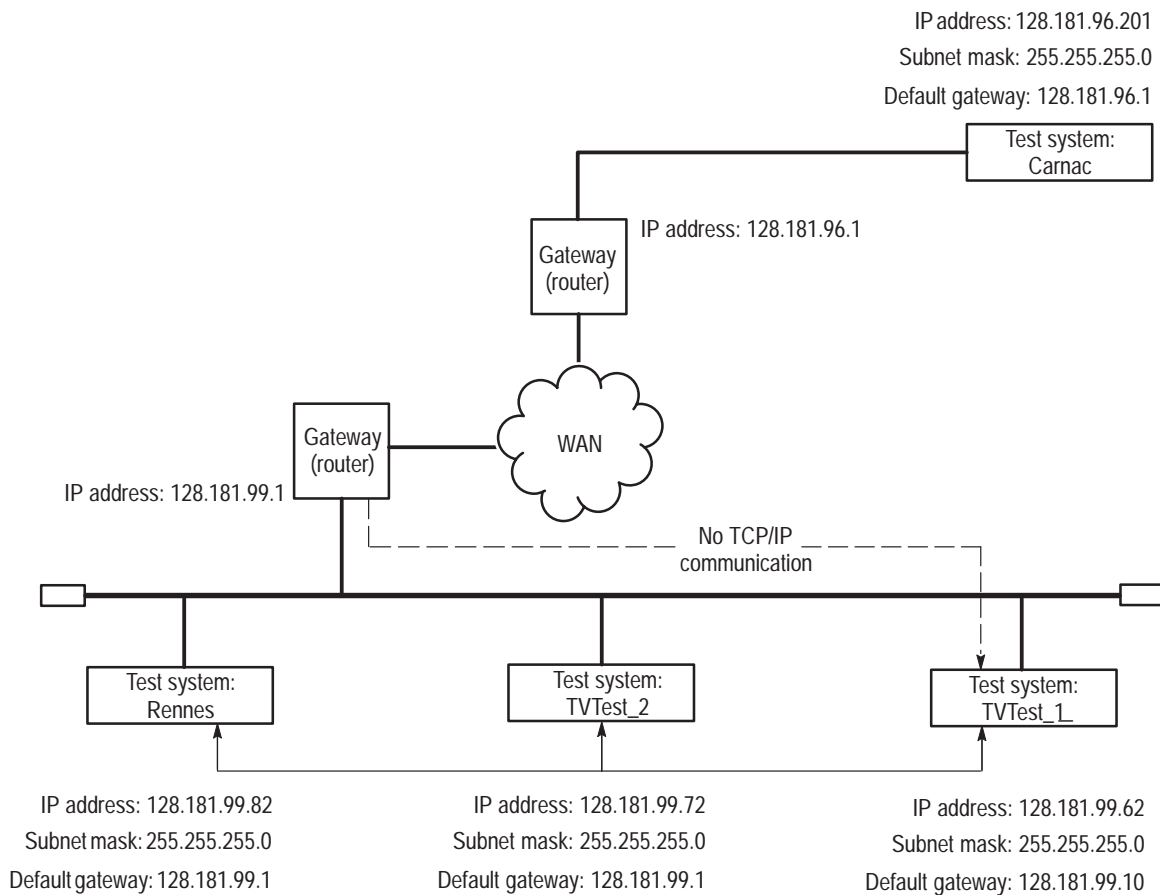


Figure C-6: Incorrect default gateway IP address

Common Troubleshooting Procedures

Many of the procedures performed in the following sections are common tasks. Use these procedures when called for in the following sections.

Stopping and restarting the MPEG Analysis Services. Usually the MPEG servers start automatically when the test system starts. However, sometimes what may at first seem to be a network problem can be cleared simply by stopping and restarting the MPEG Analysis Service.

Use the following procedure to perform this task:

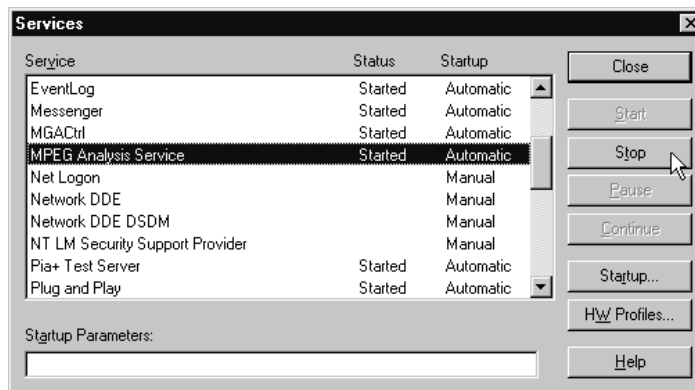
1. From the NT desktop, point to **Start**, click **Settings**, and then select **Control Panel** from the submenu.



2. Double-click the Services icon. The Services Dialog box is displayed.

3. Scroll down in the list box until you can see MPEG Analysis Service.

4. Highlight this item, and then click the Stop button.



5. Click **Yes**, in the message box that appears. Notice the server icons in the system tray (the lower left of the standard test system desktop) disappearing.



6. After the services are stopped, click **Start** to restart the server processes. The Server Manager icon and the Analysis Server icons for all of your inputs will reappear in the system tray.

Finally, you can restart your test system, which will automatically restart the Server Manager and Analysis Server processes.

Pinging a host machine. One of the utilities provided with all TCP/IP installations is `Ping.exe`. (Look in the `C:\winnt\system32\` directory.) This utility allows you to send communication packets to and record the response from an indicated host machine. This, in essence, determines whether or not your packets arrived at the destination. To run ping, use the following procedure:

1. Select Run from the Start menu. The Run dialog box appears.
2. Type one of the following into the Run text box:

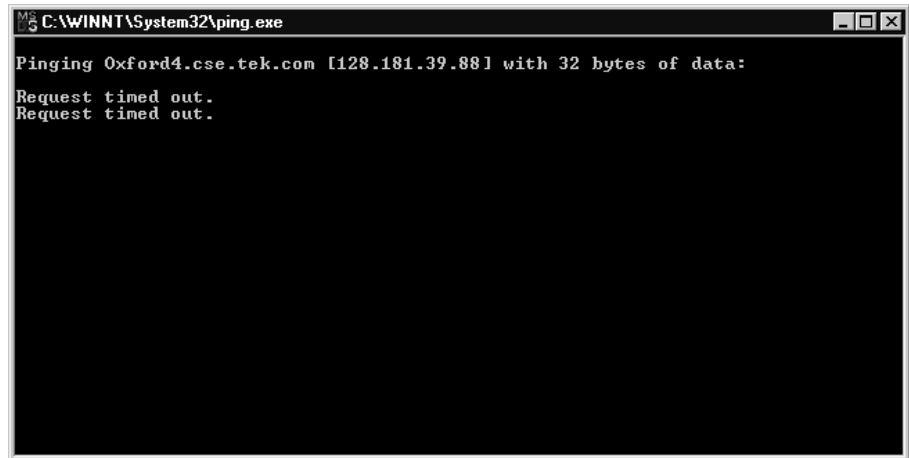
```
ping machineName
```

```
ping IPAddress
```

In the examples, `machineName` and `IPAddress` represent the host machine name and IP address, respectively, of the networked device you are trying to ping.

3. Click OK.

A DOS window appears indicating whether or not the destination is responding to the ping. In Figure C-7 the destination machine (`Oxford4`) is not responding.

A screenshot of a DOS command window titled "C:\WINNT\System32\ping.exe". The window displays the output of a ping command: "Pinging Oxford4.cse.tek.com [128.181.39.88] with 32 bytes of data: Request timed out. Request timed out." The text is white on a black background.

```
C:\WINNT\System32\ping.exe
Pinging Oxford4.cse.tek.com [128.181.39.88] with 32 bytes of data:
Request timed out.
Request timed out.
```

Figure C-7: Ping.exe command window

Ping only runs briefly, and the DOS window closes when the process is complete.

Tracing the route of TCP/IP packets. Sometimes it is helpful to know how far your packets made it on the way to a destination machine and which devices the packets pass through on the way. The utility that provides this functionality is `tracert.exe`. Tracert can also indicate a congested point in the network. To run `tracert`, use the following procedure:

1. Select Run from the Start menu. The Run dialog box appears.
2. Type one of the following into the Run text box:

```
tracert machineName
```

```
tracert IPAddress
```

In the examples, `machineName` and `IPAddress` represent the host machine name and IP address, respectively, of the networked device you are trying to reach.

3. Click OK.

A DOS window appears (see Figure C–8) indicating the progress of your packets. The far right column indicates the IP address of the nodes on the network that successfully pass your `tracert` packets. This information indicates the last good node on the path to the destination device.

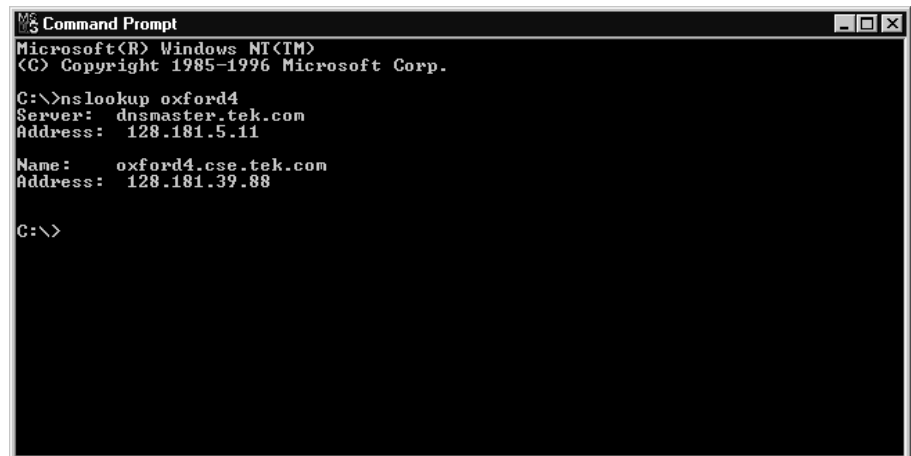
```
C:\WINNT\System32\tracert.exe
Tracing route to ibm.com [204.146.80.99]
over a maximum of 30 hops:
  0  <10 ms  <10 ms  <10 ms  rs39a0106.ens.tek.com [128.181.240.21]
  1  <10 ms  <10 ms  <10 ms  r19a.ens.tek.com [128.181.1.2]
  2  <10 ms  <10 ms  <10 ms  r63a.ens.tek.com [192.65.3.6]
  3  <10 ms  <10 ms  <10 ms  rs63a.ens.tek.com [134.62.1.3]
  4  * * * Request timed out.
  5  * * * Request timed out.
  6  * * * Request timed out.
  7  * * * Request timed out.
  8  * * * Request timed out.
  9  * * * Request timed out.
 10  * * * Request timed out.
 11  * * * Request timed out.
 12  * * * Request timed out.
 13  * * * Request timed out.
 14  * * * Request timed out.
 15  94 ms  93 ms  * 204.146.80.99
 16  * * 78 ms -
```

Figure C–8: Tracert.exe command window

Finding IP addresses for devices on your network. At times, you may need to find or confirm the IP address of a computer on your network (or, conversely, the network name if all you have is an IP address). You may want to find this information to ensure that IP addresses and network names you use in the Hosts file are correct. The utility that will display this information is `nslookup.exe`. Use `nslookup` as described below:

1. Point to the Start button and then select **MSDOS**. The command line interface appears.
2. Enter one of the the following and press **Enter**, where `machineName` or IP address is the network name or IP address, respectively, of the device you are trying to lookup.
 - `nslookup machineName`
 - `nslookup IP address`

The network name and IP address of the device you are trying to lookup is displayed. If your network uses DNS, the IP address and network name of the DNS server is also displayed. See Figure C-9.



```
Microsoft Windows [Version 4.00]
Copyright (c) 1996 Microsoft Corporation

C:\>nslookup oxford4
Server: dnmaster.tek.com
Address: 128.181.5.11

Name: oxford4.cse.tek.com
Address: 128.181.39.88

C:\>
```

Figure C-9: Command prompt with `nslookup` results

Sources of Information

If you need more information about network troubleshooting, some potential resources are listed below.

NOTE. *These resources may provide you with more information. Most of this information is supplied as is, with no warranty as to its fitness, written or implied. The best source of network troubleshooting help is your network administrator.*

- Cisco Systems, Inc. <http://www.cisco.com/>

This site is particularly useful for networks that use Cisco devices. (This URL was valid as of November, 1999.)
- Dulaney, E; Lawrence, S; Scrimger, R; Tilke, A; White, J; Williams, R; Wolford, K. *MCSE Training Guide: TCP/IP*. Indianapolis, IN. New Riders, 1998

This is a training guide for Microsoft Certified Systems Engineer certification, and covers TCP/IP and network troubleshooting.
- Taylor, E. *Network Troubleshooting Handbook*. New York, NY. McGraw-Hill, 1999

Appendix D: Using the Private Syntax Interpreter

You can use the Private Syntax Interpreter to create and compile private syntax definitions for use with the MTS300 MPEG Test System. When you load the compiled definition through the Syntactic Analysis panel of the Configuration client, the Analysis Server uses the definition to monitor and analyze the syntax of the corresponding private sections or private data descriptors that are contained in the input stream. Refer to *Syntactic Analysis Panel* on page 3–168 for more information.

Using the Private Syntax Interpreter, you can construct private syntax definitions of short private sections (`section_syntax_indicator = 0`), long private sections (`section_syntax_indicator = 1`), and private data descriptors.

These are the basic steps you use to construct and use private syntax definitions:

1. Open the desired private syntax template or existing file
2. Change parameters of existing syntax items (such as fields, loops, and if-then branches)
3. Add and edit syntax items in the template or existing file as necessary
4. Save the private syntax definition to a text file
5. Compile the text file to create a binary data file for use with the Analysis Server (the Analysis Server results are displayed in the Expert client)
6. Load the binary data file into the Analysis Server using the Syntactic Analysis panel of the Configuration client

This appendix contains the following information:

- | | |
|--|-----------|
| ■ <i>Private Syntax Interpreter Interface</i> | page D–2 |
| ■ <i>Editing Private Syntax Definitions</i> | page D–12 |
| ■ <i>Compiling Private Syntax Definitions</i> | page D–21 |
| ■ <i>Analyzing Private Syntax with the Expert Client</i> | page D–21 |
| ■ <i>Private Data Reference</i> | page D–23 |

Private Syntax Interpreter Interface

This section provides information describing how to start the Private Syntax Interpreter application and how to use the elements of the application display.

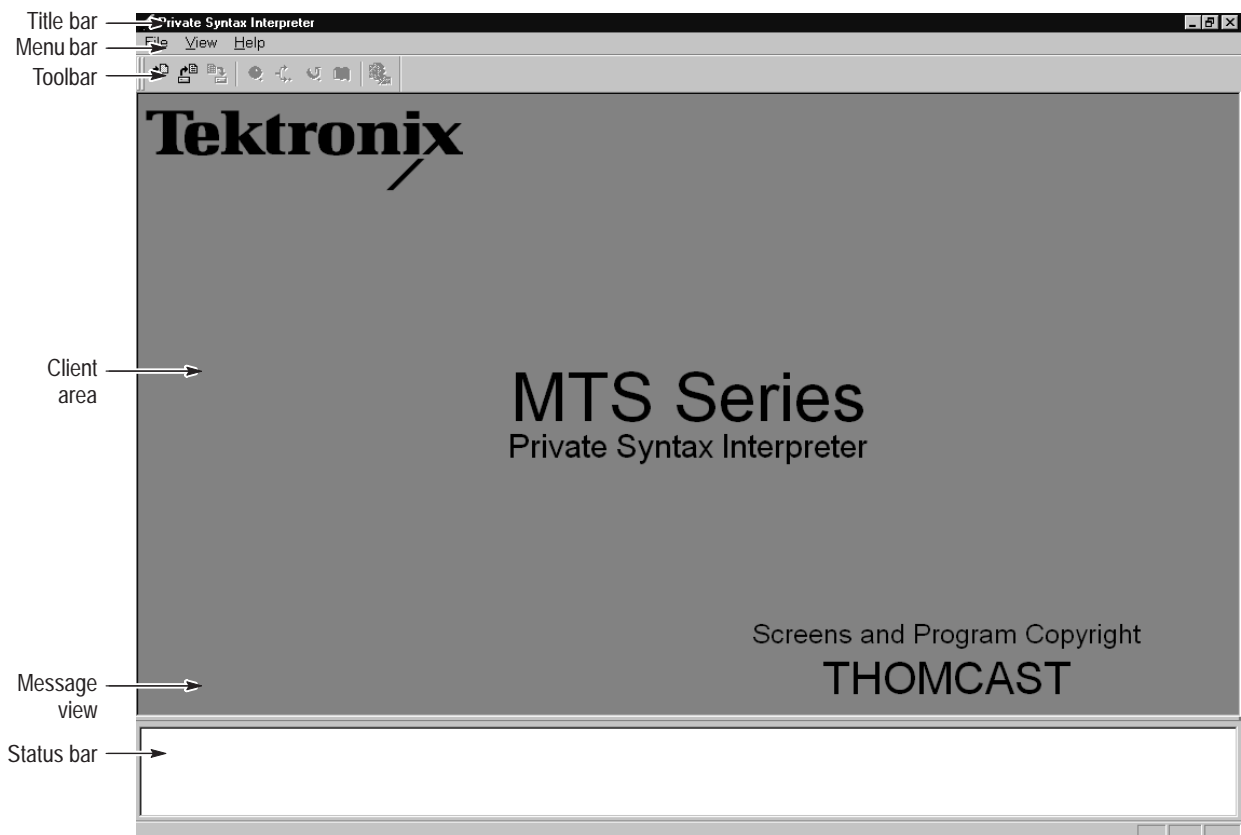
Starting the Application

Once you have logged in to the MTS300 system, you can start the Private Syntax Interpreter application using one of the following two methods:

- Select **Private Syntax Interpreter** from the Windows NT Start menu
- Double-click the **Private Syntax Interpreter** icon in the **Tektronix MPEG Test System** window

Elements of the Application Window

The Private Syntax Interpreter application window is shown below.



The Private Syntax Interpreter window contains the following elements:

- **Title Bar.** In addition to identifying the Private Syntax Interpreter application, the title bar indicates which private syntax text file is open, or if more than one text file is open, the title bar indicates which text file is currently selected.
- **Menu Bar.** The menu bar provides access to the various Private Syntax Interpreter command menus. Refer to *Menu Bar* on the following page for descriptions of the menu functions available within the menu bar.
- **Toolbar.** The toolbar contains graphical command buttons for many of the most-used menu commands. Refer to *Toolbar* on page D-6 for more information.
- **Client Area.** The Client area provides the workspace for creating and editing private syntax table or descriptor definitions.
- **Message View.** The Message view provides a place for operational messages to be displayed. This area is not displayed except when appropriate (refer to *Message View* on page D-11 for more information). You can manually display this area by selecting Messages from the View menu.
- **Status Bar.** The status bar displays first-level help messages about the Private Syntax Interpreter menus and icons pointed to by the mouse (as shown below).



Menu Bar. The menu bar contains the Private Syntax Interpreter menus. Listed below are the functions available in each of the menus.

- **File Menu.** The File menu contains standard Windows NT file management commands. Table D-1 describes the menu selections available in the File menu.

Table D-1: Menu bar File menu

Menu selection	Function
New	Create a new table/descriptor text file
Open	Open an existing table/descriptor text file
Close	Close the active table/descriptor text file
Close all	Close all table/descriptor text files
Save	Save the active table/descriptor text file
Save as	Save the active table/descriptor text file with a new name
Print	Print the active document
Print setup	Change the printer and printing options
Exit	Exit the application; will prompt to save documents

- **Edit Menu.** The Edit menu is present only when a private syntax editing window is open. This menu contains commands for editing the various syntax components and for compiling the syntax definition. Table D-2 describes the menu selections available in the Edit menu.

Table D-2: Menu bar Edit menu

Menu selection	Function
Undo	Undo the last action
Add field	Add a new field to the active table/descriptor text file
Add condition	Add a new condition to the active table/descriptor text file
Add loop	Add a new loop to the active table/descriptor text file
Add descriptor	Add a new descriptor to the active table/descriptor text file
Compile	Compile the active table/descriptor text file
Delete	Delete the selection
Copy	Copy the selection and put it on the Clipboard
Paste	Paste the Clipboard contents

- **View Menu.** The View menu contains commands for changing the appearance of the Private Syntax Interpreter application window. Table D–3 describes the menu selections available in the View menu.

Table D–3: Menu bar View menu

Menu selection	Function
Toolbar	Display or hide the toolbar
Status bar	Display or hide the status bar
Messages	Display or hide the message view

- **Window Menu.** The Window menu, present only when one or more syntax windows are open in the Client area, contains commands for managing the various syntax windows. Table D–4 describes the menu selections available in the Window menu.

Table D–4: Menu bar Window menu

Menu selection	Function
Cascade	Arrange the Client area windows so that they overlap
Tile	Arrange the Client area windows as non-overlapping tiles
Arrange icons	Arrange the icons at the bottom of the Client area if you have reduced the Client area windows to icons









- **Help Menu.** The Help menu provides access to Private Syntax Interpreter online help and version information. Table D–5 describes the menu selections available in the Help menu.

Table D–5: Menu bar Help menu

Menu selection	Function
Help topics	Open the Private Syntax Interpreter help window
About Private Syntax Interpreter	Display program information, version number, and copyright

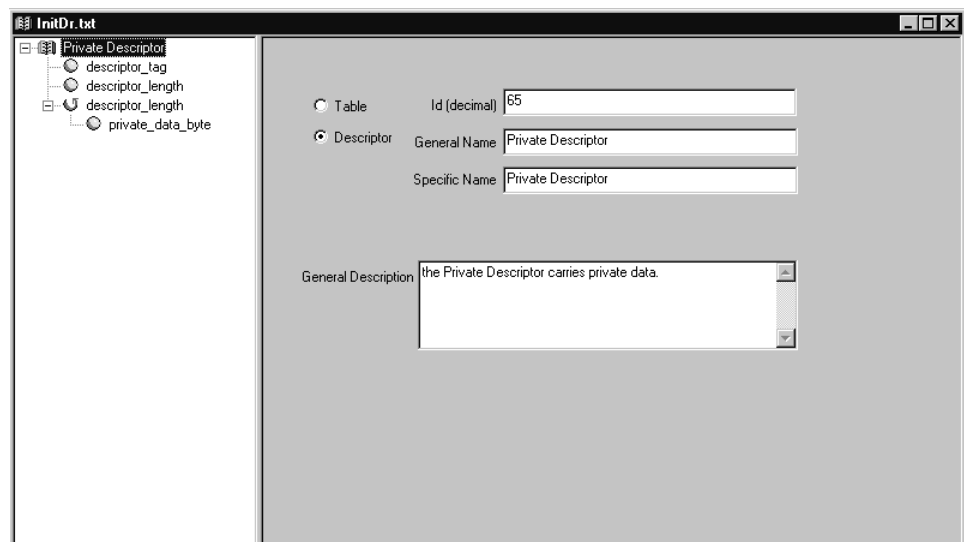
Toolbar. The toolbar command buttons are shortcuts to various menu commands. Table D–6 describes the functions available in the toolbar.

Table D–6: Private Syntax Interpreter toolbar buttons

Button	Equivalent menu command	Function
	File menu: New	Create a new table/descriptor text file
	File menu: Open	Open an existing table/descriptor text file
	File menu: Save	Save the active table/descriptor text file
	Edit menu: Add Field	Add a new field to the active table/descriptor text file
	Edit menu: Add Condition	Add a new condition to the active table/descriptor text file
	Edit menu: Add Loop	Add a new loop to the active table/descriptor text file
	Edit menu: Add Descriptor	Add a new descriptor to the active table/descriptor text file
	Edit menu: Compile	Compile the active table/descriptor text file

Table/Descriptor Window

The Table/Descriptor window (shown below) is used for assembling and editing tables or descriptors syntax. The window is divided into two portions: the Hierarchic view and the Characteristics view. The Characteristics view displays different panels depending on which Hierarchic view icon is selected.



Hierarchic View. The Hierarchic view displays all the items related to making a table/descriptor pattern as well as the labels associated to each item. An item can be the root of the table/descriptor pattern, a field of the private syntax, a loop of items, a conditional branch of items, or a descriptor space reservation.

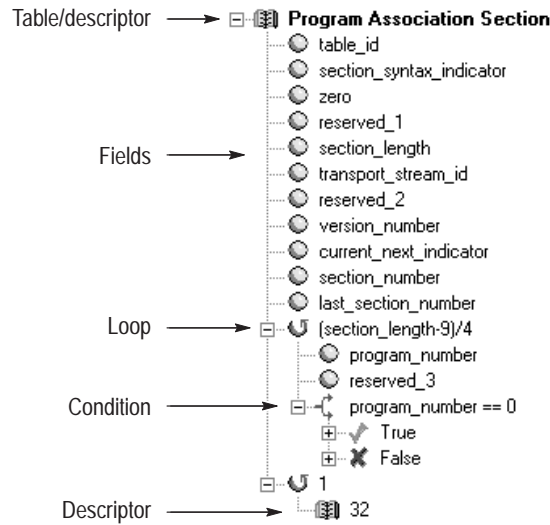


Table D–7 lists the icon types found in the Hierarchic view and the meaning of their associated labels.

Table D–7: Hierarchic view icons and label descriptions

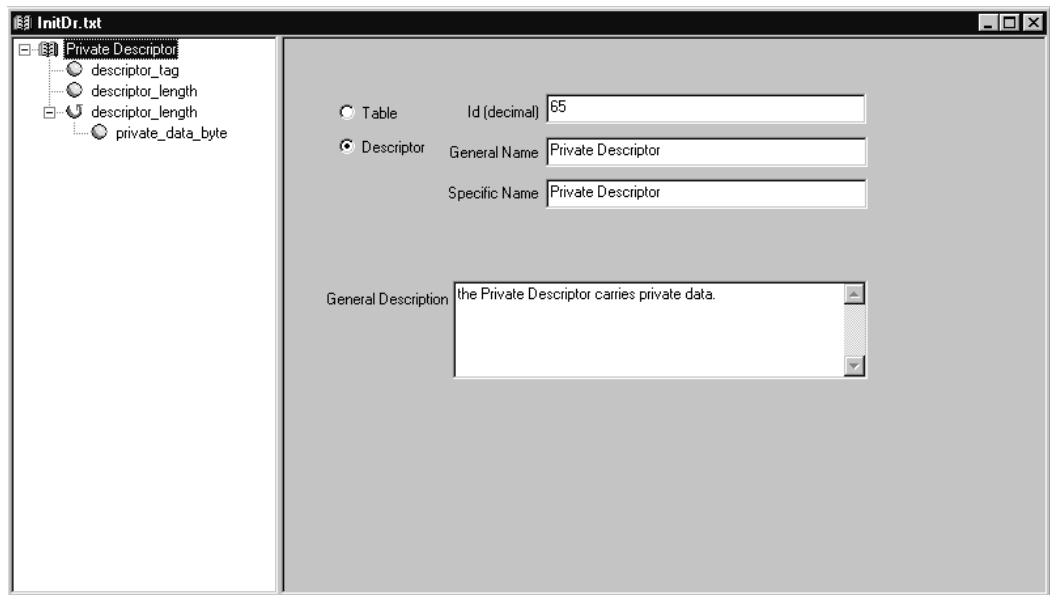
Icon type	Description
Table/descriptor	This icon gathers the characteristics of the table/descriptor when located at the top of the tree. The label is then the name of the table/descriptor. If not at the top of the tree, the descriptor icon represents a space reserved for a descriptor and the label indicates the length in bytes.
Field	The field icon labels are the unique field ID for the associated field.
Loop	The loop icon label indicates the number of iterations of this branch.
Condition	The condition icon label indicates the validity of the conditional branch.
True	The true icon indicates the conditional branch in case the previous condition expression is valid.
False	The false icon indicates the conditional branch in case the previous condition expression is valid.

Table Panel. The Table panel (shown below) appears in the Characteristics view when you select the root icon in the Hierarchic view.

After you have defined the type of private syntax by selecting **Table** or **Descriptor**, enter the **Id (decimal)** value (table ID or descriptor tag) of the private syntax you are editing.

NOTE. Table or descriptor ID decimal values cannot exceed 255. In addition, decimal values cannot be one of the following because they are reserved: 0 (PAT); 1 (CAT); 2 (TSDT); 66 and 70 (SDT); 200 and 201 (VCT).

The **General Name**, **Specific Name**, and **General Description** fields are optional fields to let you enter more information about the private syntax you are editing.

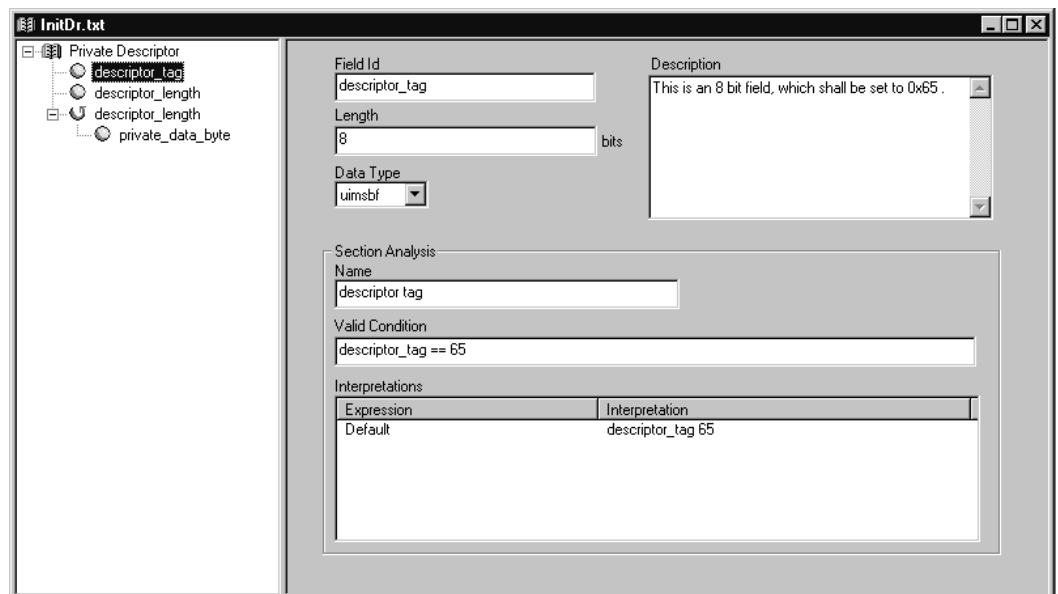


Field Panel. The Field panel (shown at the top of the following page) appears in the Characteristics view when you select a field icon in the Hierarchic view. This panel allows you to enter the unique **Field Id**. The panel provides the **Length** in bits of the field. In addition, the **Name** and **Description** fields give more information about the selected field icon.

The **Data Type** selection determines the interpretation of field data bits according to their type and order of transmission. Select the appropriate interpretation from the drop-down list (bslbf, rpchof, tbsv, or uimbsf).

The **Valid Condition** field declares the condition under which a field shall be considered valid or not.

At the bottom of the Field panel appears the list of **Interpretations**, which is a list of pairs (expression, interpretation). They are checked following the top-to-bottom order that they are listed. The interpretations indicate what descriptor will appear to the right of the item in the Section Analysis view of the Configuration client application.

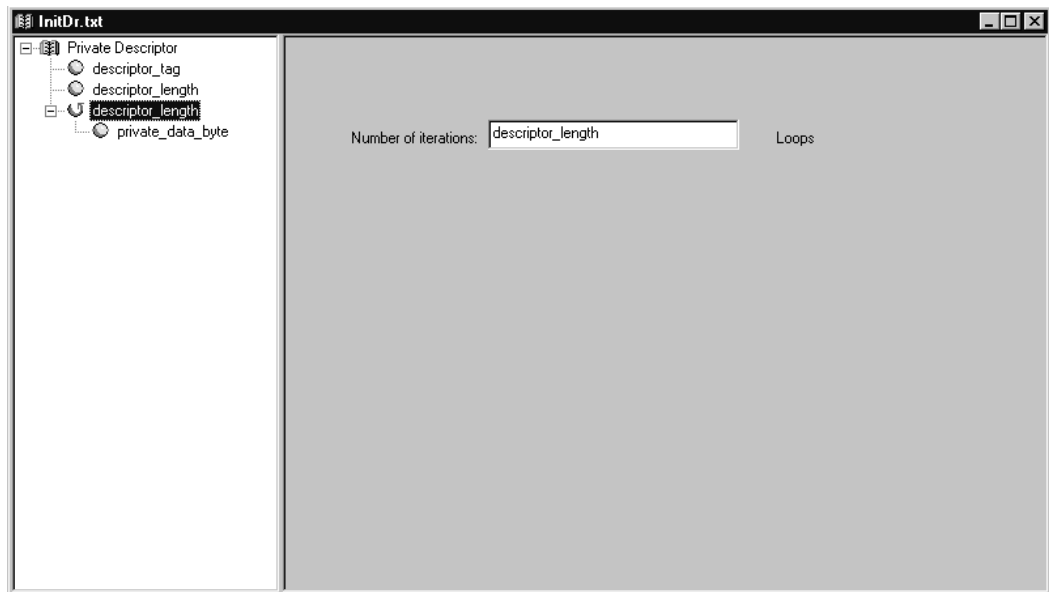


Expression Panel. The Expression panel (shown below) appears in the Characteristics view when you select a Condition, Loop, or Descriptor icon not located at the top of the Hierarchic view.

When you select a Condition icon in the Hierarchic view, the expression field is the test of the condition. The calculation of this field will determine whether the condition is true or false.

When you select a Loop icon in the Hierarchic view, the expression field indicates the number of iterations of the loop.

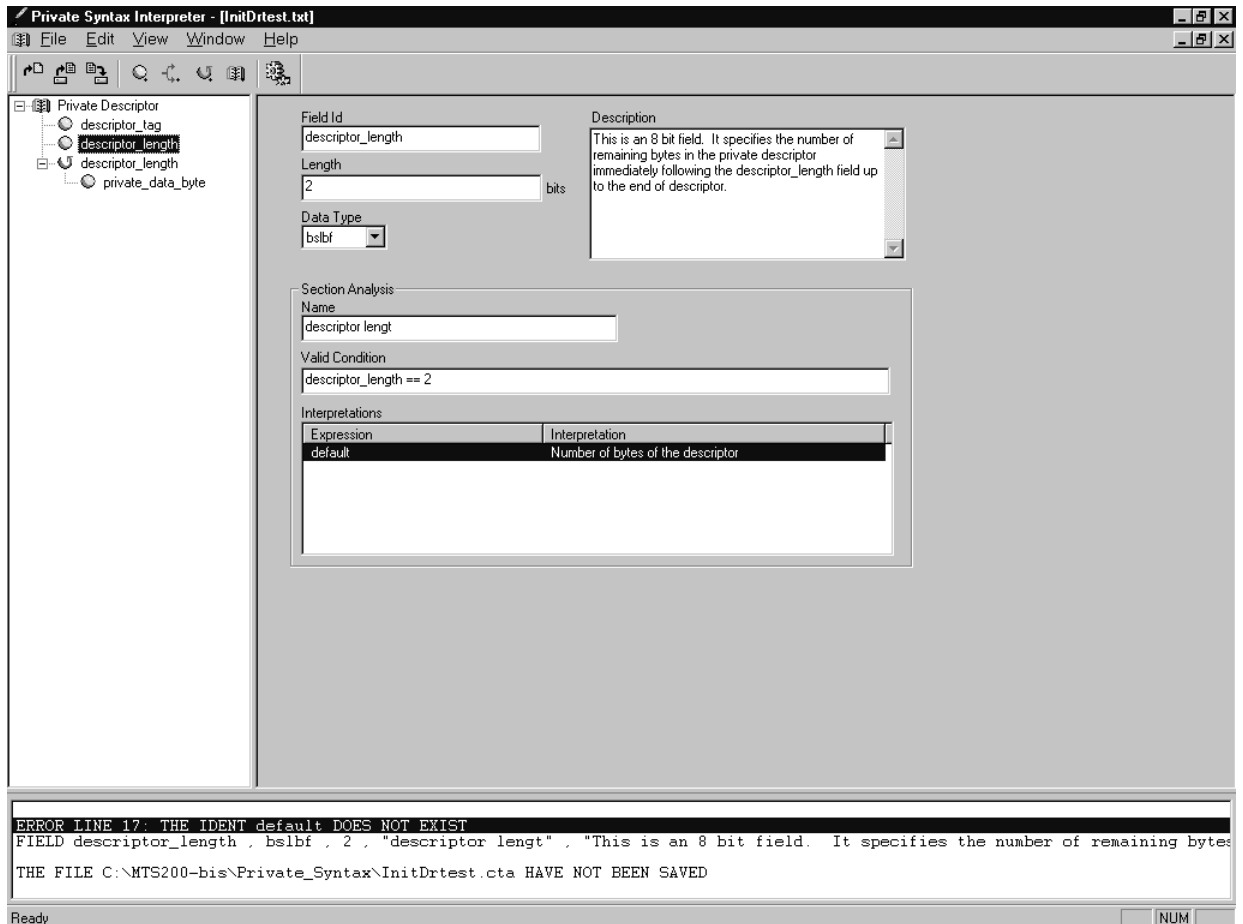
When you select a Descriptor icon in the Hierarchic view, the expression field indicates the space in bytes occupied by this item.



Message View

The Message view (as shown below) appears on the bottom of the application window when you compile the private syntax you are editing.

If any errors occur during compiling, the Message view displays appropriate error messages. If you double-click on an error message that contains the text: **ERROR LINE <number>**, the application highlights the erroneous item in the Hierarchic view.



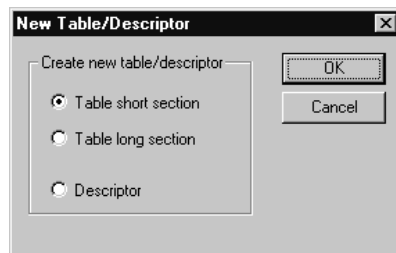
Editing Private Syntax Definitions

The editing of a private syntax definition consists of creating, modifying, and saving the pattern of a syntax definition. This pattern is made of syntax fields organized around loops, conditional branches, and space reservation for descriptors.

Private syntax definitions reside in text (.txt) files. The application uses standard Windows NT file management techniques to create, open, and save private syntax definition files.

Creating a New Private Syntax Definition File

To create a new private syntax definition, select **New** from the File menu or click the **New** toolbar button (refer to *Toolbar* on page D–6). The following **New Table/Descriptor** dialog box appears.



Select **Table short section** to define a new short private section syntax with the `section_syntax_indicator` field set to 0.

Select **Table long section** to define a new long private section syntax with the `section_syntax_indicator` field set to 1.

Select **Descriptor** to define a private syntax descriptor.

Click **OK** to open a section or descriptor template in the Private Syntax Interpreter. Client area.



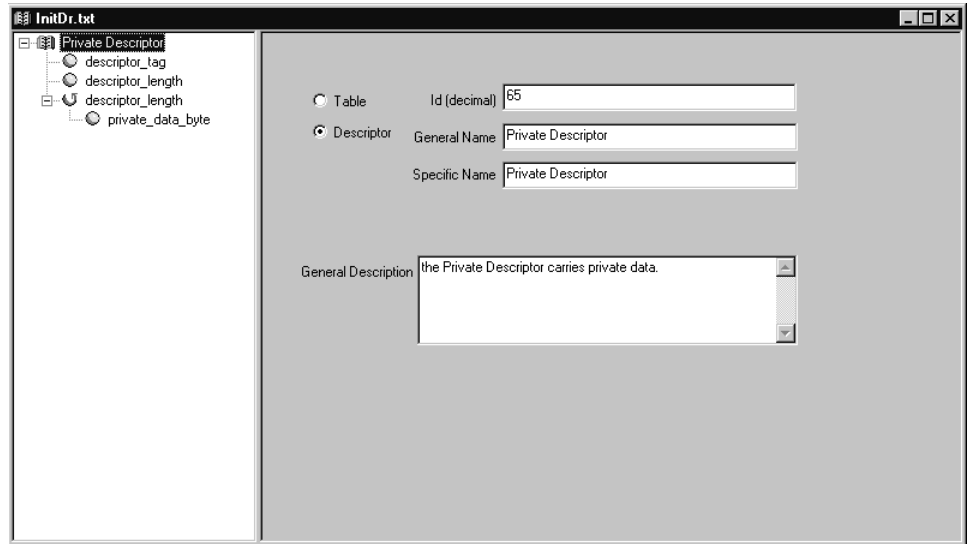
CAUTION. Always save new syntax definitions under a new, unique filename. It is possible to modify and replace the default template files (*InitDr*, *InitLg*, and *InitSt*). Do not do so without saving a backup of the original template. Refer to *Saving a Private Syntax File* on page D–20 for instructions.

Editing an Existing Private Syntax Definition File

To open an existing private syntax definition, select **Open** from the File menu or click the **Open** toolbar button (refer to *Toolbar* on page D–6). The standard Windows NT **Open** dialog box appears. Enter or select the file name and then click **OK** to open the private syntax definition window in the Client area.

Private Syntax Definition Window

When you create or open a private syntax definition, a Private Syntax Definition window appears within the application window. The Private Syntax Definition window is divided into two portions: the Hierarchic view and the Characteristics view. The Characteristics view contains the parameters that define the selected Hierarchic view icon. The Characteristics view displays different definition panels depending on which Hierarchic view icon is selected.



To completely expand the Hierarchic view, press the numeric keypad asterisk (*) key. To expand hierarchy items designated with a + symbol, click the symbol. The long private section, short private section, and descriptor template hierarchies expand as shown below.

The private syntax hierarchies are consistent with the ISO/IEC presentation of section syntax (refer to Table D–13 on page D–24). Use standard Windows NT mouse and cursor-key techniques to navigate within the hierarchies.

Table long section

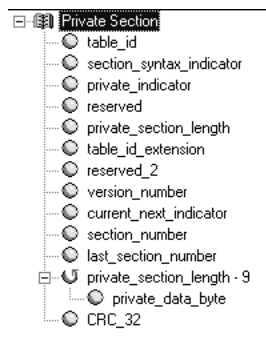
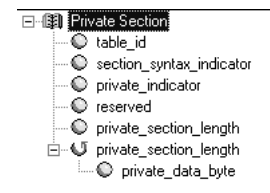


Table short section

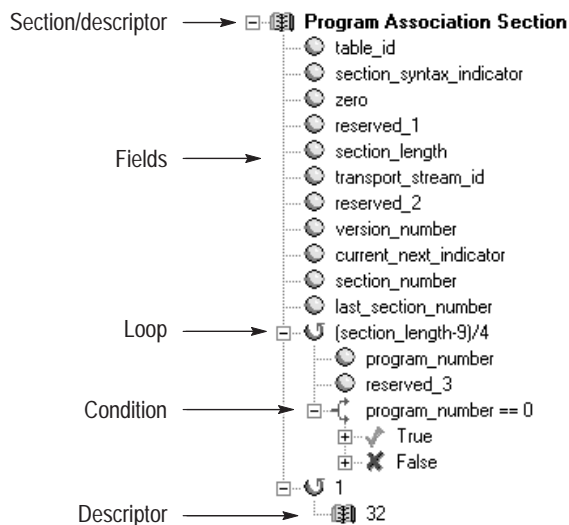


Descriptor



Adding and Editing Hierarchy Items

The hierarchy is a collection of syntax fields organized around loops and conditional branches as well as descriptors. The hierarchy root is a table item and is the only mandatory hierarchy item.

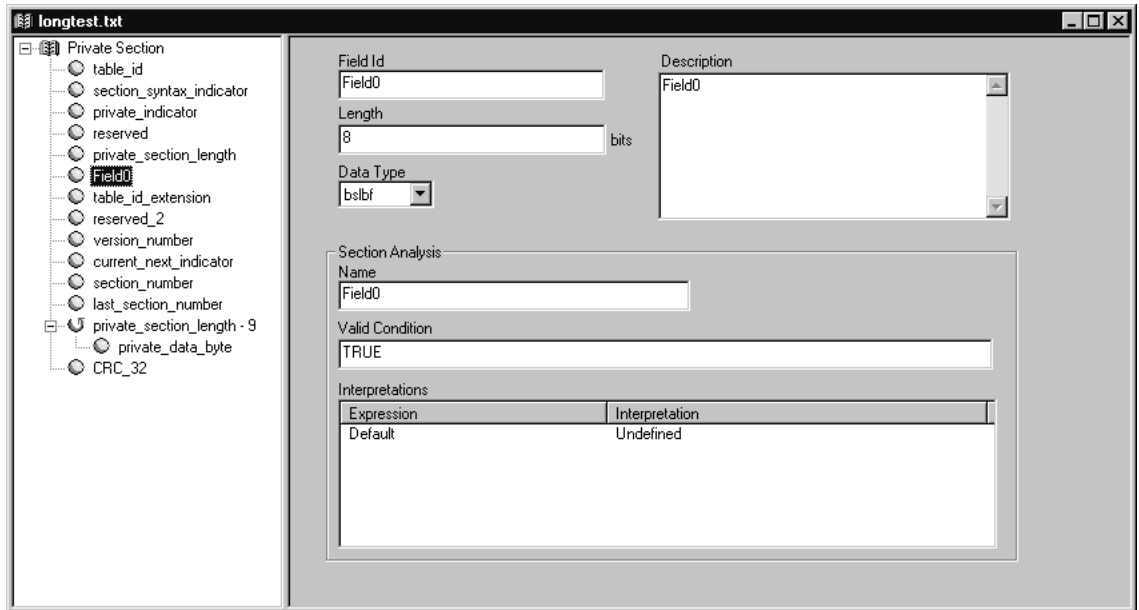


To add a new item to the section or descriptor, select (highlight) the hierarchy item that is to be the parent of the new item. Then choose **Add Field** from the Edit menu or click the **Add Field** toolbar button (refer to *Toolbar* on page D-6). Table D-8 lists the position in the hierarchy that added items appear.

Table D-8: Hierarchy position of added items

Selected item	Position of added item
Section/descriptor	Right after the selected item if it is a descriptor; at the end of the hierarchy if the table is a root item
Field	Immediately following the selected field
Condition	Immediately following the conditional branch
(Condition) True	Last item of the true conditional branch
(Condition) False	Last item of the false conditional branch
Loop	Last item of the loop branch

You can copy or delete existing hierarchy items using the Edit menu Delete, Copy, and Paste commands. You can also move existing hierarchy items by performing a drag-and-drop action on the item.



When you add a field hierarchy item, the Field panel appears in the Characteristics view as shown above. The default parameters for added field items are listed in Table D–9.

Table D–9: Default parameters for added private syntax fields

Field parameter	Default value
Field ID	Field <n> ¹
Length	8 bits
Data type	bslbf
Description	Field <n> ¹
Name	Field <n> ¹
Valid condition	True
Interpretations	
Expression	Default
Interpretation	Undefined

¹ The number <n> starts at 0 for the first added field and increments with each new field insertion.

Data Types. The four available data types are defined in Table D–10. These are the different data types supported by digital television standards and the application.

Table D–10: Private syntax data type definitions

Data type	Definition
bslbf	Bit string, left bit first
rpchof	Remainder polynomial coefficients, highest order first
tbsv	Text bit string value
uimsbf	Unsigned integer, most significant bit first

Expressions. An interpretation expression is a Boolean combination of operators and terminals. Table D–11 defines the operators you can use.

You can express conditional values in either hexadecimal or decimal base; that is, the following expressions are equivalent:

```

program_number == 422
program_number == 0x1A6
    
```

Table D–11: Private syntax expression operators and terminals

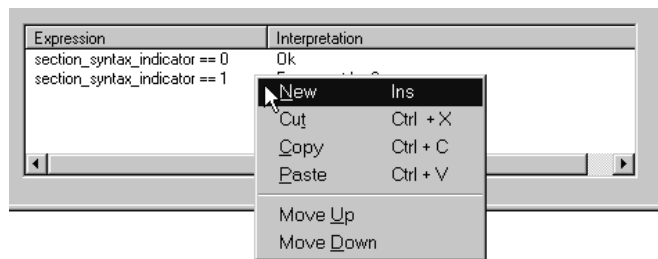
Type	Definition
Operators	
<	less than
>	greater than
<=	less than or equal
>=	greater than or equal
==	equal
!=	different
+	addition
-	subtraction
*	multiplication
/	division
	OR
&&	AND
!	NOT
Terminals	
integer	
field ID	Unique identifier of a field
TRUE	
FALSE	
API_COMPUTE_CRC_32	Computed value of the CRC32 for the section
API_GET_VALIDITY	True if CRC32 is OK
Default	For always applicable interpretation

Table D–12 lists examples of interpretation expressions with their definitions.

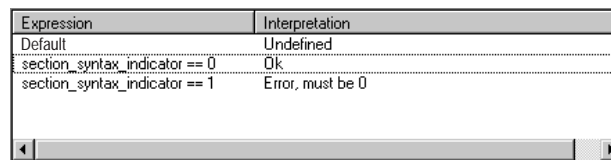
Table D–12: Private syntax example interpretation expressions

Expression	Definition
CRC_32==API_COMPUTE_CRC_32	Value of field CRC_32 is equal to the computed CRC32 value of the section
private_section_length<=4093	private_section_length field value is less than or equal to 4093
(section_length-9)/4	Number equal to the section_length field value minus 9, all divided by 4

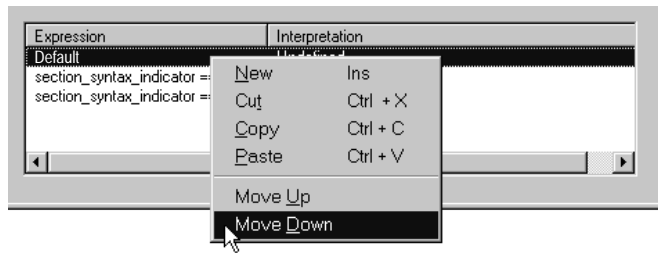
Adding Interpretations. The Analysis Servers check the conditions in this list to determine the interpretation text to display on the Expert client Section Analysis view. To add an entry to the interpretations list, right-click on the background of the interpretations box and then choose **New** from the resulting menu.



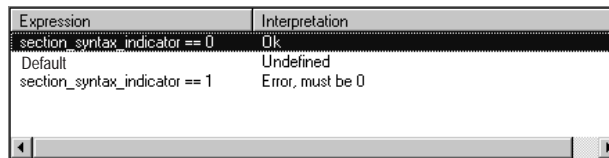
A new, default interpretation appears immediately after the selected item. Because the Analysis Server checks conditions in top-to-bottom order, you may want to move the new condition/interpretation pair below one or more of the existing entries.



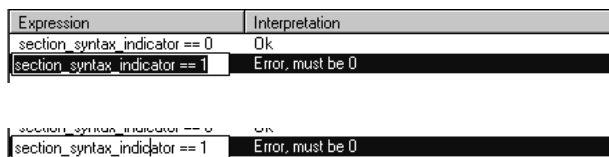
Changing Interpretation Order. To change the interpretation order within a field, right-click on the background of the list of interpretations box, and choose **Move Up** or **Move Down** from the menu.



The selected condition/interpretation moves down one position as shown below. You can reselect the item and repeat the command to move the item to the bottom of the list.

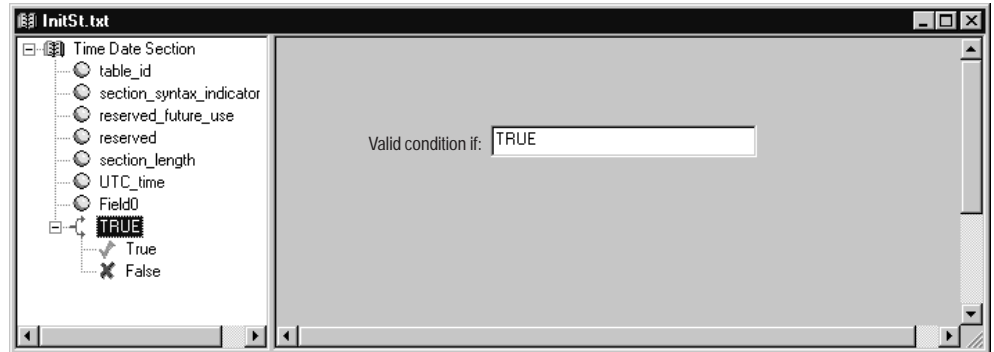


Editing an Expression/Interpretation. Click once on an expression/interpretation line to select it. Click on the expression or interpretation portion of the selected expression/interpretation to position the cursor at the end of the expression or interpretation and to enable text entry as shown below. You can then double-click a word to select it.

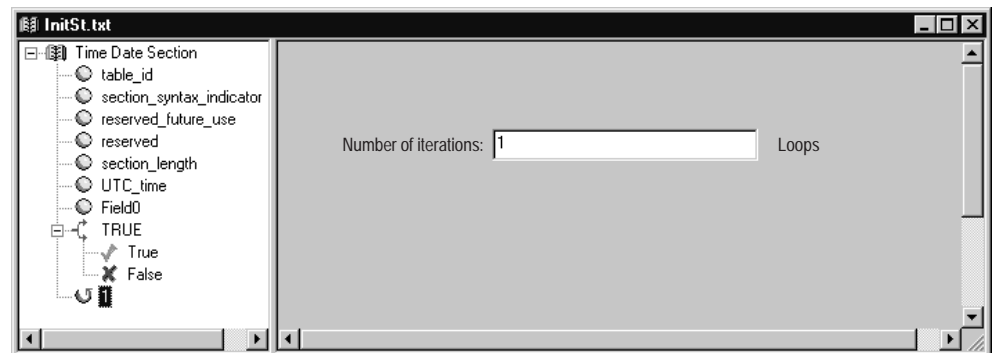


Once you have selected the expression or interpretation text to edit, you can right-click to open a shortcut menu. You can use the **Cut**, **Copy**, **Paste**, **Delete**, and **Select All** commands to edit the selected text. The **Undo** command lets you undo the previous text-editing action.

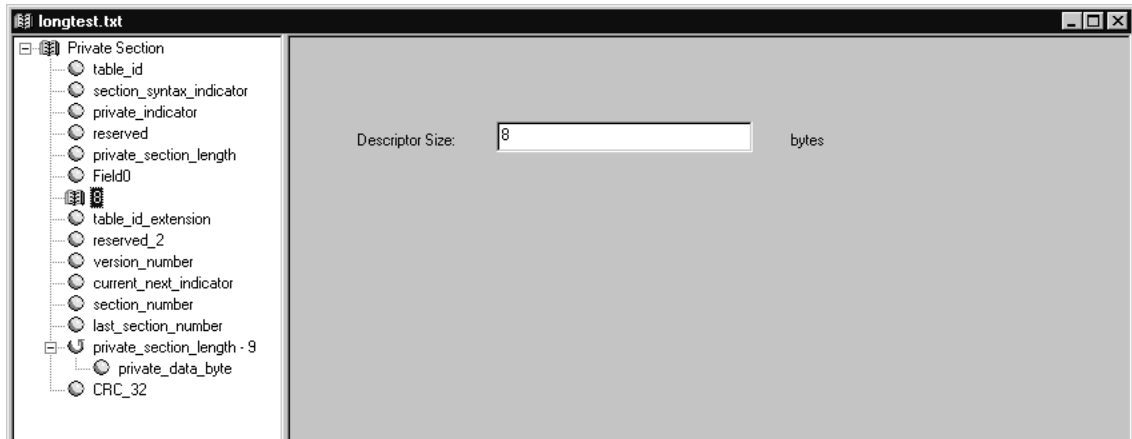
Adding a New Conditional Branch. To add a new conditional branch, select **Add Condition** from the Edit menu or click the **Add Condition** toolbar button (refer to *Toolbar* on page D–6). The default **Valid condition** is TRUE.



Adding a New Loop. To add a new loop, select **Add Loop** from the Edit menu or click the **Add Loop** toolbar button (refer to *Toolbar* on page D–6). The default **Number of iterations** is 1 loop.



Adding a New Descriptor. To add a new descriptor, select **Add Descriptor** from the Edit menu or click the **Add Descriptor** button (refer to *Toolbar* on page D–6). The default **Descriptor Size** is 8 bytes.



Changing the Hierarchy. Items or branches of the hierarchy can be moved within the hierarchy by selecting and dragging the associated icon.

Items or branches of the hierarchy can be copied from one position to another by holding the **CTRL** key down while dragging the selected icon.

To delete selected items or branches from the hierarchy, select **Delete** from the Edit menu or press the **DEL** button on your keyboard.

Saving a Private Syntax File

To save a private syntax definition in text file format, select **Save** from the File menu or click the **Save** toolbar button (refer to *Toolbar* on page D-6).

When you save a new syntax definition file, the standard Windows NT **Save As** dialog box appears. Enter a file name with a .txt extension and then click **OK**.

To save an existing syntax definition file under a new name, select **Save As** from the Edit menu.

NOTE. *If you are using an existing syntax definition as a template for a new definition, it is good practice to always select **Save As** to create the new file before you make any changes to the original definition.*

Compiling Private Syntax Definitions

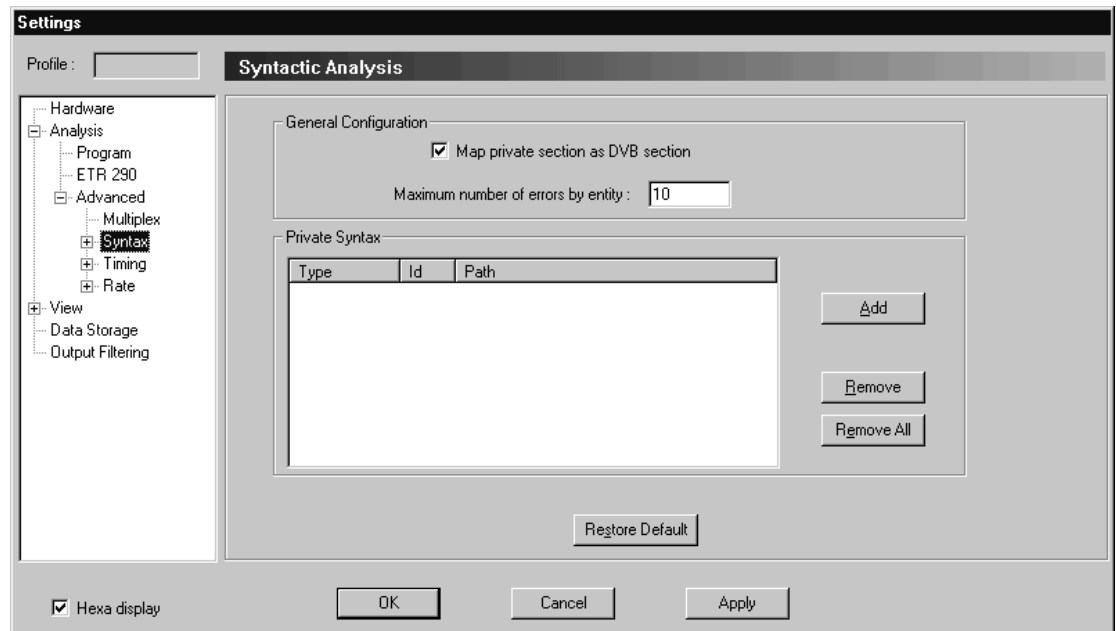
To compile a private syntax definition, select **Compile** from the Edit menu or click the **Compile** toolbar button (refer to *Toolbar* on page D–6).

The Message view opens at the bottom of the Private Syntax Interpreter window. If there is no compiling error, a file containing the private syntax table, with the extension .cta, is created in the same directory as the table file.

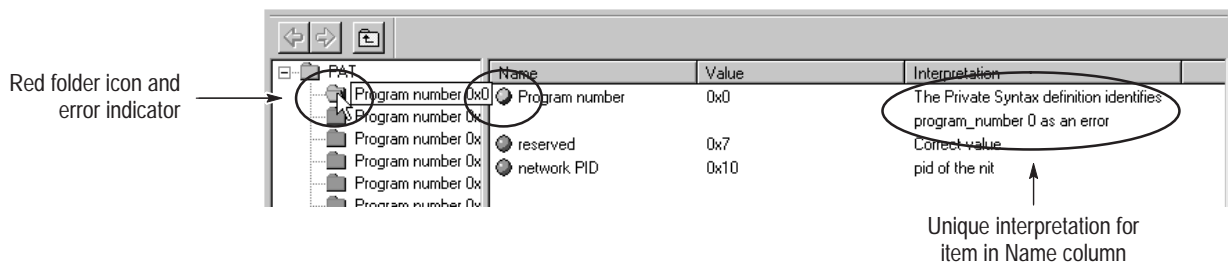
Analyzing Private Syntax with the Expert Client

Once you have created, saved, and compiled a private syntax definition, use the following procedure to monitor private data sections or descriptors in the input stream:

1. Open the Configuration client and connect to the input on which the private data sections you want to monitor are encoded: you can start the Configuration client from the Master client by right-clicking the appropriate multiplex icon and selecting Configuration client from the shortcut menu.
2. Select **Analysis:Advanced:Syntax** in the Navigation frame to open the Syntactic Analysis configuration panel (shown below).



3. Click **Add**. A standard Windows **Open** window appears, with only .cta files displayed.
4. Change the the appropriate directory, if necessary, and then select the desired binary syntax definition file (either double-click the file name or highlight the file name and click **Open**).
5. Repeat steps 3 and 4 for every private syntax definition you want to use.
6. Click **Apply** on the bottom of the Syntactic Analysis configuration panel to confirm your additions; click **OK** to confirm the additions and close the Settings window.
7. Start the Expert client and connect to the input you want to analyze: you can start the Expert client from the Master client by right-clicking the appropriate multiplex icon and selecting Expert client from the shortcut menu..
8. Open a section analysis view of the appropriate table. Refer to *Section Analysis View* on page 3–139 for instructions.



You can run the Private Syntax Interpreter and the Expert client applications simultaneously. You can therefore use the following technique to experiment with the effects of different private syntax definition parameters on known sections or descriptors:

1. Load the private syntax description in the Configuration client and begin analysis as described above. Open a section analysis window to see how the Analysis Server analyzes and reports the contents of the private section or descriptor.
2. Edit the private syntax text file as necessary.
3. Compile the syntax definition. The new definition overwrites the original definition.

4. Stop and then restart Analysis Server:
 - a. Right-click the Analysis Server icon for the input you are analyzing in the system tray and select **Stop** from the shortcut menu.
 - b. Wait for the green highlight to disappear, and then repeat the step, selecting **Start** from the shortcut menu.

When you restart analysis, the Analysis Server reads the new contents of the binary definition (.cta) file.

5. Open a section analysis window in the Expert client to see how the Analysis Server analyzes and reports the contents of the private section or descriptor.

Private Data Reference

The Private Syntax Interpreter application builds tables and descriptors as defined in *ISO/IEC 13818-1, Generic coding of moving pictures and associated audio information: Systems*, July 1996. Refer to the standard for additional parameter value information.

The following information is taken from ITU-T Rec. H.222.0 (ISO/IEC 13818-1).

Private Section Types

The `private_section` provides a further means to carry private data also in two forms. This type of elementary stream may be identified under `stream_type` as `private_data` in PSI sections. The short type of `private_section()` includes only the first five defined fields, and is followed by private data. For this structure the `section_syntax_indicator` shall be set to a value of 0. For the long type, the `section_syntax_indicator` shall be set to a value of 1 and the full syntax up to and including `last_section_number` shall be present, followed by `private_data_bytes` and ending with the `CRC_32`.

Syntax of the Private Section

When private data is sent in Transport Stream packets with a PID value designated as a Program Map Table PID in the Program Association Table, the `private_section` shall be used. The `private_section` allows data to be transmitted with a minimum of structure while enabling a decoder to parse the stream. The sections may be used in two ways: if the `section_syntax_indicator` is set to 1, then the whole structure common to all tables shall be used; if the indicator is set to 0, then only the fields `table_id` through `private_section_length` shall follow the common structure syntax and semantics and the rest of the `private_section` may take any form the user determines.

A private table may be made of several `private_sections`, all with the same `table_id` (see Table D–13).

Table D-13: Private section

Syntax	No. of bits	Mnemonic
private_section() {		
table_id	8	uimsbf
section_syntax_indicator	1	bslbf
private_indicator	1	bslbf
reserved	2	bslbf
private_section_length	12	uimsbf
if (section_syntax_indicator == 0) {		
for (i = 0; i < N; i++) {		
private_data_byte	8	bslbf
}		
}		
else {		
table_id_extension	16	uimsbf
reserved	2	bslbf
version_number	5	uimsbf
current_next_indicator	1	bslbf
section_number	8	uimsbf
last_section_number	8	uimsbf
for (i = 0; i < private_section_length-9; i++) {		
private_data_byte	8	bslbf
}		
CRC_32	32	rpchof
}		

Semantic Definition of Private Section Fields

The following paragraphs describe the various private section fields.

table_id - This 8-bit field, the value of which identifies the Private Table this section belongs to. Only values from 0x40 through 0xFE may be used.

section_syntax_indicator - This is a 1-bit indicator. When set to 1, it indicates that the private section follows the generic section syntax beyond the private_section_length field. When set to 0, it indicates that the private_data_bytes immediately follow the private_section_length field.

private_indicator - This is a 1-bit user definable flag that shall not be specified by ITU-T | ISO/IEC in the future.

private_section_length - A 12-bit field. It specifies the number of remaining bytes in the private section immediately following the private_section_length field up to the end of the private_section. The value in this field shall not exceed 4093 (0xFFD).

private_data_byte - The private_data_byte field is user definable and shall not be specified by ITU-T | ISO/IEC in the future.

table_id_extension - This is a 16-bit field. Its use and value are defined by the user.

version_number - This 5-bit field is the version number of the private_section. The version_number shall be incremented by 1 modulo 32 when a change in the information carried within the private_section occurs. When the current_next_indicator is set to 0, then the version_number shall be that of the next applicable private_section with the same table_id and section_number.

current_next_indicator - A 1-bit field, which when set to 1 indicates that the private_section sent is currently applicable. When the current_next_indicator is set to 1, then the version_number shall be that of the currently applicable private_section. When the bit is set to 0, it indicates that the private_section sent is not yet applicable and shall be the next private_section with the same section_number and table_id to become valid.

section_number - This 8-bit field gives the number of the private_section. The section_number of the first section in a private table shall be 0x00. The section_number shall be incremented by 1 with each additional section in this private table.

last_section_number - This 8-bit field specifies the number of the last section (that is, the section with the highest section_number) of the private table of which this section is a part.

CRC_32 - This is a 32-bit field that contains the CRC value that gives a zero output of the registers in the CRC decoder defined in ITU-T Rec. H.222.0 Annex A after processing the entire private section.

Private Descriptors

Descriptors exist within Program Streams and Transport Streams. A range of private descriptors may be defined by the user (see Table D–14). These descriptors shall commence with `descriptor_tag` and `descriptor_length` fields. For private descriptors, the value of `descriptor_tag` may take the values 64–255. These descriptors may be placed within a `program_stream_map()`, a `CA_section()`, a `TS_program_map_section()`, and in any private section(). Specifically `private_data_bytes` also appear in the `CA_descriptor()`.

Table D–14: Private descriptor

Syntax	No. of bits	Mnemonic
<code>private_descriptor() {</code>		
descriptor_tag	8	uimsbf
descriptor_length	8	uimsbf
for (i = 0; i < descriptor_length; i++) {		
private_data_byte	8	uimsbf
}		
}		

descriptor_tag - This 8-bit field identifies the private descriptor. Values from 64–255 (0x40 through 0xFF) may be used.

descriptor_length - An 8-bit field. It specifies the number of remaining bytes in the descriptor immediately following the `descriptor_length` field.

Appendix E: ATSC Program Paradigm

The ATSC program paradigm specifies the method to be used for allocating the values of the Packet Identifier (PID) field of the transport packet header in a systematic manner. Within one transport multiplex, television programs that follow the ATSC program paradigm are assigned a program number ranging from 1 to 255. The binary value of the program number is used to form b_{11} through b_4 of the PID. Programs adhering to the paradigm shall have b_{12} equal to '0'. Programs not adhering to the paradigm shall have b_{12} equal to '1'.

Additionally: $\text{base_PID} = \text{program number} \ll 4$, where the program number refers to each program within one transport multiplex and corresponds to the 16-bit `program_number` identified in the PAT and PMT. The b_0 through b_3 of the PID are assigned according to Table E-1.

The paradigm to identify the transport bit streams containing certain elements of the program is defined in Table E-1.

Table E-1: PID assignment for the elementary streams of a program

Name	PID definition	Description
PMT_PID	$\text{base_PID} + 0x0000$	PID for the bit stream containing the <code>program_map_table</code> for the program.
Video_PID	$\text{base_PID} + 0x0001$	PID for the bit stream containing the video for the program.
PCR_PID	$\text{base_PID} + 0x0001$	Implies the video bit stream also carries the PCR values for the program.
Audio_PID	$\text{base_PID} + 0x0004$	PID for the bit stream containing the primary audio for the program. The primary audio shall be a complete main audio service (CM) as defined by ATSC Standard A/52 and shall contain the complete primary audio of the program including all required voice-overs and emergency messages.
Data_PID	$\text{base_PID} + 0x000A$	PID for the bit stream containing the data for the program.

The `program_map_table` must be decoded to obtain the PIDs for services not defined by the paradigm but included within the program (such as a second data channel). According to the program paradigm, every 16th PID is a PMT_PID and may be assigned to a program. If a PMT_PID is assigned to a program by the program paradigm, the next 15 PIDs after that PMT_PID are reserved for elements of that program and shall not be otherwise assigned.

Table E–2 lists the program paradigm errors for programs adhering to the program paradigm $b_{12}=0$.

Table E–2: Program paradigm errors

Error	Requirement	A/53 Annex C Paragraph 5.3
Bad program number assignment	program_number shall be ranged from 1 to 255.	A_PSI_PRPA_001
Bad PMT_PID assignment	PMT_PID shall be equal to 'base_PID+0x0000.'	A_PSI_PRPA_002
Bad Video_PID assignment	If a program contains only one Video ES, this one shall be assigned to base_PID+0x0001. The PID of the other Video ES must be in the range [base_PID+0x0002; base_PID+0x000F], except the values (base_PID+0x0004, base_PID+0x000A).	A_PSI_PRPA_003
Bad PCR_PID assignment	If a program contains PCR data, this one shall be assigned to base_PID+0x0001.	A_PSI_PRPA_004
Bad Audio_PID assignment	If a program contains only one Audio ES, this one shall be assigned to base_PID+0x000f. The PID of the other Audio ES must be in the range [base_PID+0x0002; base_PID+0x000F], except the value base_PID+0x000f, base_PID+0x000A).	A_PSI_PRPA_005
Bad Data_PID assignment	If a program contains only one Data ES, this one shall be assigned to base_PID+0x000A. The PID of the other Data ES must be in the range [base_PID+0x0002; base_PID+0x000F], except the value (base_PID+0x0004, base_PID+0x000A).	A_PSI_PRPA_006
PID reserved by a program adhering to the program paradigm	The PID range from 0x0XX0 to 0x0XXF are reserved by programs adhering to the program paradigm with program_number = XX. These PIDs cannot be used elsewhere in the multiplex.	A_PSI_PRPA_007



Glossary

Glossary

AC-3

Audio coding scheme developed by Dolby Laboratories, Inc. and adopted by ATSC.

Analysis Server

The Analysis Server is the process that performs the actual analyses on transport stream inputs. Each MTS300 system can support up to two Analysis Server processes simultaneously. The Analysis Server sends analysis results to the Server Manager.

ATSC (Advanced Television Systems Committee)

The Advanced Television Systems Committee was formed to establish voluntary technical standards for advanced television systems, including digital high definition television (HDTV).

BAT (Bouquet Association Table: DVB SI)

Describes the bouquets (collections of services) carried by one or more transport streams.

Bouquet

A group of transport streams in which programs are identified by the network ID and PID pair of values.

CAT (Conditional Access Table: MPEG-2 PSI)

Associates one or more EMM (Entitlement Management Message) streams to specific PID values.

See also ECM.

Client/Server

The client / server software architectural model allows software to be developed into two or more modules:

- The server module performs CPU intensive operations, runs in the background (or remotely), and responds to “requests” from clients. Usually requests are due to some action you have taken.
- The client module is often a graphical user interface that allows you to configure or display the status of the server module.

Compression Layer

The compression layer is the compressed elementary stream and associated metadata that describes the elementary stream. Usually this layer is organized into variable length packets with headers and payloads of data, in which case the bitstream is called a packetized elementary stream, or PES.

See the appropriate MPEG-2, DVB, or ATSC standards for more information.

See also System Layer.

CRC (Cyclic Redundancy Check)

One of the fields described in the MPEG2 standard, used to check the accuracy of data in PSI and SI tables.

CVCT (Cable Virtual Channel Table)

One of the tables defined by ATSC PSIP; contains a list of attributes for virtual channels carried in the TS for a cable system.

Data Broadcast Descriptor

The key to data broadcasting protocols that fall within the scope of DVB SIDAT 360. The data_broadcast_descriptor that can be found in the SDT and DVB EIT. The data_broadcast_descriptor is the key to identifying data piping and synchronous/asynchronous data streaming.

DDB (Download Data Block)

The DownloadDataBlock table is a table that carries chunks of a module. DDBs are referenced by DSIs.

DII (Download Info Indication)

The DownloadInfoIndication table is a Data Carousel specific table that defines a group of modules. DIIs may be referenced either by the data_broadcast_descriptor of the Data Carousel (one-layer Data Carousels), or by the associate DSI (two-layer Data Carousels).

DSI (Download Server Initiate)

The DownloadServerInitiate table is a Data Carousel specific table that defines a super-group of modules. It is referenced by the data_broadcast_descriptor of the Data Carousel (2-layer).

DSM-CC (Digital Storage Media Command and Control)

The Digital Storage Media Command and Control specification is a set of protocols which provides the control functions and operations specific to managing ISO/IEC 11172 (MPEG-1) and ISO/IEC 13818 (MPEG-2) bit streams, although the concepts and protocols are considered to apply to more general use. DSM-CC is defined in ISO/IEC 13818-6. The strength of DSM-CC is that it enables a single DSM (in the server) to serve clients on these and other network topologies with one common protocol. DSM-CC messages are encapsulated in MPEG-2 sections whose format is compliant with the private section format defined in ISO/IEC 13818-1.

DTS (Decoding Time Stamp)

One of the fields described in the MPEG2 standard; may be present in a PES packet header that indicates the time that an access unit is decoded in the T-STD.

DVB (Digital Video Broadcast)

A project group of the European Broadcasting Union (EBU).

DVB IRD (Digital Video Broadcasting Integrated Receiver Decoder)

A receiving decoder that can automatically configure itself using the MPEG-2 Program Specific Information (PSI).

DVB-MG

Digital Video Broadcasting Measurement Guidelines

DVB-SI

Digital Video Broadcasting Service Information.

DVB-T

Digital Video Broadcasting Terrestrial.

ECM (Entitlement Control Message: MPEG-2 PSI)

The ECM is private conditional access information that specifies control words and possibly other, typically stream-specific, scrambling and/or control parameters.

See also EMM and CAT.

EIT (Event Information Table: DVB SI and ATSC PSIP)**DVB**

Provides information about the chronological order of events carried by the transport stream.

ATSC

Provides information about the programs (or data broadcasting sessions) defined for the virtual channels.

EMM (Entitlement Management Message: MPEG-2 PSI)

The EMM is private conditional access information that identifies the authorization levels or the services of specific decoders.

See also ECM and CAT.

Elementary Stream

An ordered series of bytes representing compressed audio, video, or data including associated control data. Elementary streams are described in the MPEG-2 standards.

EPG (Electronic Program Guide)

The EPG gives the content of the current program.

ETM (Extended Text Message)

An ETM is a multiple string data structure. Thus, it may represent a description of an event or channel in several different languages (each string corresponding to one language).

ETR (ETSI Technical Report)

One of the types of documents released by ETSI.

ETS (European Telecommunication Standard)

One of the types of documents released by ETSI.

ETSI

European Telecommunication Standards Institute

ETT (Extended Text Table: ATSC PSIP)

Provides detailed textual information about the virtual channels and events (programs) carried by the transport stream.

GPS

Global Positioning System

Input

See Multiplex.

IRD (Integrated Receiver/Decoder)

A receiving decoder that can automatically configure itself using the MPEG-2 Program Specific Information (PSI).

ISO (International Organization for Standardization)

Organization responsible for establishing standards at the world wide level.

Mega-Frame

A mega-frame is a set of OFDM frames, defined in such a way that the number of packets contained in a mega-frame does not depend on the transmission mode (2K or 8K).

MGT (Master Guide Table: ATSC PSIP)

Provides PID values for all PSIP tables carried in the transport stream (except for the STT).

MIP

Mega-frame Initialization Packet

MPEG

Moving Picture Experts Group

Multiplex (Input)

A Multiplex, as used in this online help system, is any single or multiple program transport stream. The terms Input and Multiplex are interchangeable when discussing a monitored bitstream.

NIT (Network Information Table: MPEG-2 PSI)

Describes the physical network over which the transport stream is carried. The DVB and ATSC standards extend the MPEG-2 definition of the NIT.

PAT (Program Association Table: MPEG-2 PSI)

Associates program numbers and PMT PIDs.

PCR (Program Clock Reference)

One of the fields defined in the MPEG2 standard, a time stamp in the TS from which the decoder timing is derived.

PES (Packetized Elementary Stream)

One of the structures defined by the MPEG2 standard, used to carry elementary stream data.

PIA (Processing Interface Adapter)

One of the boards designed by THOMCAST. The PIA+ board filters and analyzes the input transport stream for compliance to MPEG-2, DVB, and ATSC TS standards.

PID (Packet Identifier)

One of the fields described in the MPEG2 standard; a unique integer value used to identify elementary streams of a program in a single or multi-program TS.

PMT (Program Map Table: MPEG-2 SI)

Lists the PID values of program elements (for instance, elementary stream PID(s) and the PID of the clock references for the program elements).

Program

The following structures are elements of MPEG-2 programs (or services): PES packets, PMT, ECM. Program elements may, or may not, have a common time base.

Program paradigm

In ATSC environments, the program paradigm specifies the method that shall be used for systematically allocating PID values of transport packets.

PSI (Program Specific Information)

Program Specific Information is used to describe the structure of a transport stream encoded using the MPEG-2 standards. PSI is carried in the following MPEG-2 table structures: CAT, NIT, PAT, PMT, and TSDT.

PSIP (Program and System Information Protocol)

Program and System Information Protocol is used to describe the structure of a transport stream encoded using the ATSC standards. PSIP is carried in the following ATSC table structures: EIT, ETT, MGT, RRT, STT, and VCT

PTS (Presentation Time Stamp)

One of the fields described in the MPEG2 standard; it may be present in a PES packet header that indicates the time that a presentation unit is presented in the T-STD.

RRT (Rating Region Table: ATSC PSIP)

Provides rating information pertaining to a specified geographic region.

RST (Running Status Table: ATSC PSIP)

Allows quick updates to the timing information for the transport stream.

SDT (Service Description Table: DVB PSI)

Describes the services carried by the transport stream.

Service

A service, also called a program, is a collection of program elements that may, or may not have a common time base.

See also Program.

SFN (Single Frequency Network)

SFN is an extension of the DVB system in which all transmitted signals are identical; therefore, the MPEG-2 TS inputs to the various DVB-T modulators have to be bit identical.

SI (Service Information)

Service information is used to describe the structure of a transport stream encoded using the DVB standards. SI is carried in the following DVB table structures: BAT, EIT, NIT, RST, SDT, TDT, and TOT.

SID (Service ID)

The parameter used to uniquely identify a service within a transport stream.

SNMP (Simple Network Management Protocol)

SNMP is the most common protocol used in network management systems. SNMP is built on top of UDP/IP (User Datagram Protocol / Internet Protocol) and provides a common interface between all the various devices on a network and central network management stations. Network management stations use network software to monitor network traffic and respond to errors reported by devices on the network.

STS Interval

The STS interval measurement is obtained by calculating the difference between the STS of the current MIP and the STS of the previous MIP, modulo one second.

STT (System Time Table: ATSC PSIP)

Provides time and date information for the transport stream, as well as offset and daylight savings time data.

System Layer

The system layer is the transport stream with program data and associated metadata that describes the composition and organization of the transport stream.

MPEG-2 system layer information includes synchronization bytes, PID numbers, scrambling information, and other indicators, including the start of the transport packet payload. Transport packets can be PES packet, a PSI table, or other private data. ATSC and DVB transport streams are MPEG-2 compatible because the required ATSC and DVB system layer data are MPEG-2 private data structures.

See the appropriate MPEG-2, DVB, or ATSC standards for more information.

TDT (Time and Date Table: DVB SI)

Provides the time and date information (in UCT) for the transport stream.

TOT (Time Offset Table: DVB SI)

Provides time offset information for the transport stream.

Traps

Traps are SNMP messages generated by the Analysis Server. These messages are sent to one or more Server Managers (which you specify using the Router utility). Ultimately, the traps regarding errors on the transport stream are displayed as various error icons using the Master client.

Transport Stream

A transport stream is an ordered series of bytes representing valid MPEG-2, DVB, or ATSC elements used to deliver video, audio, or data. A transport stream may be composed of one or more elementary streams.

The following MPEG-2, DVB, and ATSC structures are transport stream elements: Program elements (including elementary streams and time stamps), and PSI, SI, and PSIP tables.

TS

See Transport Stream

TSC

Transport Scrambling Control

TSDT (Transport Stream Descriptor Table: MPEG-2 PSI)

The TSDT uses descriptors to provide information about the transport stream; for instance, information about the elementary streams, system clock, bit rate, and other parameters.

TSID (Transport Stream ID)

The parameter that uniquely identifies a transport stream within an original network.

TVCT

VCT for terrestrial broadcast environments.

T-STD (Transport Stream - System Target Decoder)

Described by the MPEG2 standard; a hypothetical reference model of a decoding process used to define the semantics of a TS.

VCT (Virtual Channel Table: ATSC PSIP)

There are two types of VCT: Terrestrial and Cable. Both describe attributes of the virtual channels defined for the transport stream including the transmission system and data about the services and programs for the network.



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