User Manual

Tektronix

**MTS200 Series MPEG Test System
Real-Time Analysis**

071-0076-03

www.tektronix.com

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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:

CAUTION
Refer to Manual

WARNING
High Voltage

Double
Insulated

Protective Ground
(Earth) Terminal

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 MTS200 Series MPEG Test System components:

- Expert Client

- Configuration Client

- Private Syntax Interpreter

If you purchased a Tektronix MTS200 Series MPEG Test System and are looking for hardware and software installation instructions, first-time operation procedures, or specifications, refer to the *MTS200 Series Hardware and Software Installation Technical Reference*, Tektronix part number, 071-0261-XX.

Manual Structure

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

Getting Started. This section provides brief overviews of the MTS200 and client applications, descriptions of the rear panel connectors, procedures for starting and logging onto the MTS200 system (including enabling/disabling Auto Logon), and procedures for shutting down the MTS200 system and applications.

Operating Basics. This section describes the MTS200 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 MTS200 client modules. It also provides a reference for all user-controlled analyses (called *probes*) enabled by the MTS200 system.

Appendix NO TAG: What to Do if an Application Locks Up. Appendix NO TAG describes how to recover if the MTS200 system locks up.

Appendix B:Networking. This appendix describes network requirements, basic TCP/IP and SNMP network installation procedures, and basic network trouble-shooting information for the Tektronix MTS200 Series MPEG Test System.

Appendix C: Private Syntax Interpreter. This appendix describes how to create and compile private syntax definitions for use with the MTS200 Series.

Appendix D: 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.

Appendix E: Software Repair. This appendix explains how to create and use an Emergency Repair Disk and how to reload the test system software if the installed copy becomes corrupt.

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 MTS200 MPEG Test System Hardware and Software Installation Technical Reference *manual* (Tektronix part number 071-0667-XX) *that is delivered with each MTS200 system for the following information:*

■ *Hardware installation procedures*

■ *Instrument option, accessory, and upgrade lists*

■ *First time operation and functional check procedures*

■ *MTS200 system specifications and compliances*

■ *Software 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. 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.

The following ARIB and ITU-R standards were used to develop the added ARIB enhancements to the MTS200 system:

■   ARIB STD-B10 (1.2), 1999, *Service Information for Digital Broadcasting System*

■   ARIB STD-B16 (1.1), 1999, *Digital Receiver Commonly Used for Digital Satellite Broadcasting Services Using Communication Satellite*

■ ARIB STD‑B20 (1.1), *Digital Broadcasting System and Related Operational Guidelines for Broadcasting Satellites*

■ ITU-R BO. 1408, *Transmission System for Advanced Multimedia Services Provided by Integrated Services Digital Broadcasting in A Broadcasting Satellite Channel*

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 RTA test system and applications.

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

Related Documents

The *MTS200 Series MPEG-2 DVB / ATSC ISDB‑S/ARIB System Analyzer User Manual*, Tektronix part number 071-0532-XX, contains information about using the Deferred-Time Analyzer and DVB Channel Coding and Decoding applications.

The *MTS200 Series Stream Creation Applications User Manual*, Tektronix part number 071-0534-XX, contains information about using the Multiplexer, DVB Table Editor, ATSC Table Editor, DVB Channel Coding and Decoding, Jitter Adder, Error Injector, and Open Mux Controller applications.

The *MTS200 Series Program Stream Analyzer User Manual*, Tektronix part number 071-0384-XX, contains information about using the deferred-time Program Stream Analyzer application.

The *MPEG Test System Dolby Digital Audio Stream Analyzer User Manual*, Tektronix part number 071-0535-XX, contains information about using the deferred-time AC-3 Audio Stream Analyzer application.

The *MTS200 Series MPEG Audio Stream Analyzer User Manual*, Tektronix part number 071-0192-XX, contains information about using the deferred-time MPEG Audio Stream Analyzer application.

The *MTS200 Series Video Stream Analyzer User Manual*, Tektronix part number 071-0249-XX, contains information about using the deferred-time MPEG Video Stream Analyzer application.

The *MTS200 Series Data Store Administrator User Manual*, Tektronix part number 071-0536-XX, contains information about using the Data Store (CARB) system that is part of MTS210 and MTS215 test systems.

Software Version

Table i lists the version numbers for the MTS200 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
Expert Client	2.06
Configuration Client	2.06
Private Syntax Interpreter	1.0

Related Applications

The real-time applications described in this manual are part of the suite of software and hardware components that comprise the Tektronix MTS200 Series MPEG Test System. Table ii shows the program icons for each 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 4.0 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 4.0.

Table ii: Tektronix MPEG Test System version 4.0 applications

Icon	Application title	Function	User document
Expert Client	Expert Client	Continuously monitor an input bitstream for compliance with the MPEG-2, DVB-SI, ARIB, and ATSC PSIP digital television standards.	MTS200 Series Real-Time Analyzer User Manual 071-0076-xx
Configuration Client	Configuration Client	Set, remove, and configure probes for MPEG-2, DVB, ATSC, and ISDB-S/ARIB inputs.	
Private Syntax Interpreter	Private Syntax Interpreter	Create table definitions used by the Real-Time Analyzer to interpret private syntax sections.	
Data Store Administrator	Data Store Administrator	Manage the data store (CARB) disks and control acquisition/generation of MPEG-2 transport streams.	MTS200 Series MPEG Test System Data Store Administrator User Manual 071-0536-xx

Table ii: Tektronix MPEG Test System version 4.0 applications (Cont.)

Icon	Application title	Function	User document
Deferred-Time Analyzer	MPEG-2 DVB/ATSC System Analyzer	Analyze transport streams and packetized elementary streams saved to system disk or data store (CARB) files.	MTS200 Series MPEG-2 DVB/ATSC System Analyzer User Manual 071-0532-xx
TMCC Deferred Ti...	TMCC Deferred-Time Client	Analyze ISDB-S/ARIB (TMCC) transport stream files saved to the system disk or data store (CARB) files.	
DVB Channel	DVB Channel Coding and Decoding	Code and decode transport stream files to DVB specifications.	MTS200 Series Stream Creation Applications User Manual 071-0534-xx (Information repeated in both manuals)
Program Strea...	Program Stream Analyzer	Analyze MPEG program stream files.	MTS200 Series Series Program Stream Analyzer User Manual 071-0384-xx
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.	MPEG Test System Video Stream Analyzer User Manual 071-0249-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.	MPEG Test System Audio Stream Analyzer User Manual 071-0192-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.	MTS200 Series Dolby Digital Audio Stream Analyzer User Manual 071-0535-xx
Multiplexer	MPEG-2 Transport Stream Multiplexer	Create transport stream files from PSI/SI/PSIP table files, elementary stream files, and data files.	MTS200 Series Stream Creation Applications User Manual 071-0534-xx
DVB Table Editor	DVB Table Editor	Create and edit PSI and DVB SAI table files for use with the transport stream multiplexer.	
ATSC Table Editor	ATSC Table Editor	Create and edit PSI ad ATSC PSIP table files for use with the transport stream multiplexer.	
ARIB Table Editor	ARIB Table Editor	Create and edit PSI and ARIB table files.	

Table ii: Tektronix MPEG Test System version 4.0 applications (Cont.)

Icon	Application title	Function	User document
TMCC Combiner	TMCC Combiner	Create transport stream files with TMCC information in the first eight bytes of the 16-byte Reed-Solomon area of 204-byte transport stream packets.	MTS200 Series Stream Creation Applications User Manual 071-0534-xx
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.	
Real-Time Multiplexer	Real-Time Multiplexer	Configure the real-time multiplexer application to remultiplex system and or elementary streams for immediate output.	
Open Mux Server	Open Mux Server	Remultiplex various MPEG inputs (system, MPEG-2, DVB, ATSC, and elementary streams) into a valid transport stream for immediate output. The user interface for this application is the Real-Time Multiplexer.	
License Manager	Tektronix Software Protection	Enter or reenter the general password to enable licensed applications.	Read This First, MTS200 Series Software V4.0 071-0537-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.	All MTS200 Series User Manuals

Other Information Sources

For information about the Windows NT operating system, refer to the Microsoft documentation that accompanied your system.

If you purchased a Tektronix MTS200 Series MPEG Test System, refer to the Compaq documentation that accompanied your test system for information about the Compaq server.

For the latest information about MTS200 Series Real-Time Analyzer features and bugs, refer to the *MTS200 Series Software Version 4.0 Read This First* document that accompanied your Tektronix MPEG Test System product.

Two sources of online information are provided with the MTS200 Series 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.

The following URLs access the websites for the standards organizations listed (the URLs listed were valid as of January, 2001):

■   MPEG-2 standards (International Organization for Standards)

   http://www.iso.ch/

■   DVB standards (European Technical Standards Institute)

   http://www.etsi.org/

■   ATSC standards (Advanced Television Systems Committee)

   http://www.atsc.org/

Contacting Tektronix

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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: techsupport@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 MTS200 MPEG Test System:

- Overviews of the MTS200 test system and client applications

- Procedures for starting and logging onto the MTS200 system

- Procedures for shutting down the MTS200 system and applications

NOTE. Refer to the MTS200 MPEG Test System Hardware and Software Installation Technical Reference *manual that is delivered with each MTS200 system for the following information:*

- *Hardware installation procedures*

- *Descriptions of the rear panel connectors*

- *Instrument option, accessory, and upgrade lists*

- *First time operation and functional check procedures*

- *MTS200 system specifications and compliances*

- *Software installation and recovery procedures*

MTS200 System Overview

The MTS200 test system is an MPEG-2 protocol monitor and analyzer used to monitor and analyze single and multiple program transport streams in MPEG-2, DVB, ATSC, and ISDB-S/ARIB environments.

When used with the MTS200 options, the MTS200 test system provides three primary capabilities to support the design and testing of MPEG, DVB, ATSC and ISDB-S/ARIB 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, ATSC, and ISDB-S/ARIB standards for detailed information about the syntax and semantics of each system.

The MTS200 system now uses a client/server architecture for real–time analysis of MPEG-2, DVB, ATSC, and ARIB structures consisting of an MPEG Analysis Server and the following client applications:

- Expert Client

- Configuration Client

Analysis Servers The Analysis Server is the process that actually analyzes transport stream inputs. The Analysis Server process interacts with the Expert Client to display analysis results, and with the Configuration Client to set the monitoring and analysis parameters for each MPEG Analysis Server process operating on the test system.

Expert Client The Expert Client application allows you to analyze a single MPEG 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.

Configuration Client   The Configuration Client allows you to perform the following tasks:

- Specify the standard to which you are testing: MPEG-2, DVB, ATSC, or ISDB.

- 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 Expert Client. You can configure each probe to report an error as Critical, Major, Minor, Warning, or as information only.

- Stop and restart an MPEG Analysis Server running on a MTS200 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.

Logging On to the MTS200 Series System

Perform the following steps to log on to your MTS200 Series system:

1. Switch the MTS200 Series power on to begin the Windows NT initialization process. Initialization can take up to two minutes. Under normal circumstances no action is required until the **Begin Logon** window appears.

2. When the **Begin Logon** window appears, press CTRL + ALT + DELETE (all three keys simultaneously) to open the **Logon Information** window.

3. Enter **MTS100** in the **User name** box, leave the password blank, and then press ENTER (these are the default values set at the factory). This is the login account you should use for most of your work. Refer to *Login User Names* and *Login Passwords* below for more information about those topics.

Login User Names   The "MTS100" user name is the login account you should use for most of your work. Two additional login user names are available. The first is "guest" with no password. The guest login level has only limited access to files and applications. The second is "administrator" with "MPEG2" as the password. The administrator login level has administrator privileges to files and applications.

NOTE. *You must use the "administrator" login when you perform any software upgrades.*

⚠️ **CAUTION.** *The "administrator" user has all the privileges of an administrator. If you are connected to a network, you may have more privileges than you realize within the network. It is recommended that you do not perform normal operations while logged in as an "administrator" user.*

Login Passwords   You can change the login passwords if necessary; refer to the Windows NT documentation for instructions. If you change any login password, be sure to create a new emergency repair disk.

Starting and Exiting the Expert and Configuration Client Applications

Once you have logged in to the MTS200 Series system, you can start the Expert and Configuration client applications using one of the following two methods:

■   Select the client name from the from the Windows NT Start | Programs | Tektronix MPEG Test System menu

■   Double-click the Expert or Configuration client icon from the **Tektronix MPEG Test System** window

You can exit the application using one of the following two methods:

■   Select **Exit** from the Session menu

■   Click the close button in the upper-right corner of the application window (shown below)

Close button

When you exit the application, the current configuration is preserved and used the next time you start the application. In the default configuration, information and error messages (up to 20 Mbytes) are automatically saved in the Windows NT Event Viewer. No other information is saved.

Shutting Down the MTS200 Series System

⚠ **CAUTION.** *Do not switch power off to your MTS200 Series system before the message "It is now safe to turn off your computer" appears. Doing so may result in lost data and difficulty in restarting Windows NT.*

Perform the following steps to shut down the MTS200 Series system:

1. To avoid loss of data and possible problems during subsequent Windows NT initialization, always shut down Windows NT before switching computer power off. To shut down Windows NT, select **Shut Down** from the Start menu (shown below).

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

3. After a few seconds, the **Shutdown Computer** window appears with the message that "It is now safe to turn off your computer." You can now power off the MTS200 Series system.

Real-Time Analysis Performance Factors

The Analysis Server analyzes the input stream as it is received and attempts to report errors as they are detected. When the Analysis Server cannot process and display errors in real time, the **Buffer filling** bar in the Expert Client becomes active. The Buffer filling bar (shown below) is located in the center of the Status bar on the bottom of the Expert client application window. As buffer filling increases, error and message displays are less timely.

Buffer filling: 6 %

The following factors determine the real-time performance of the test system:

■ The number and type of errors in the stream

■ The number and type of analyses that you have configured

■ The host computer processor speed

NOTE. *A test system running on a 120 MHz Compaq Prosignia platform is more likely to use the buffer than one that is based on a 200 MHz, 266 MHz, or 300 MHz Compaq Proliant platform.*

■ The memory (RAM) that is available on the host computer. The computer should have at least 32 Mbytes RAM; 64 Mbytes are standard on the Proliant 1600

If the input stream contains many errors, you can reduce buffer filling by limiting the number of analyses performed. Refer to *Analysis* starting on page 3–1 for more information.

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 and menu item descriptions of the MTS200 Series MPEG Test System Expert and Configuration client modules.

The rear-panel connectors are described in the *MTS200 Series Hardware and Software Installation Technical Reference*.

See the following sections for information about using the Expert and Configuration clients and descriptions of the analyses performed by the Analysis Servers.

- The *Expert Client Reference*   *page 3-9*

- The *Configuration Client Reference*   *page 3-61*

- The *Analyses Reference*   *page 3-1*

Expert Client Display Elements

Figure 2-1 shows the different elements of the Expert Client display.
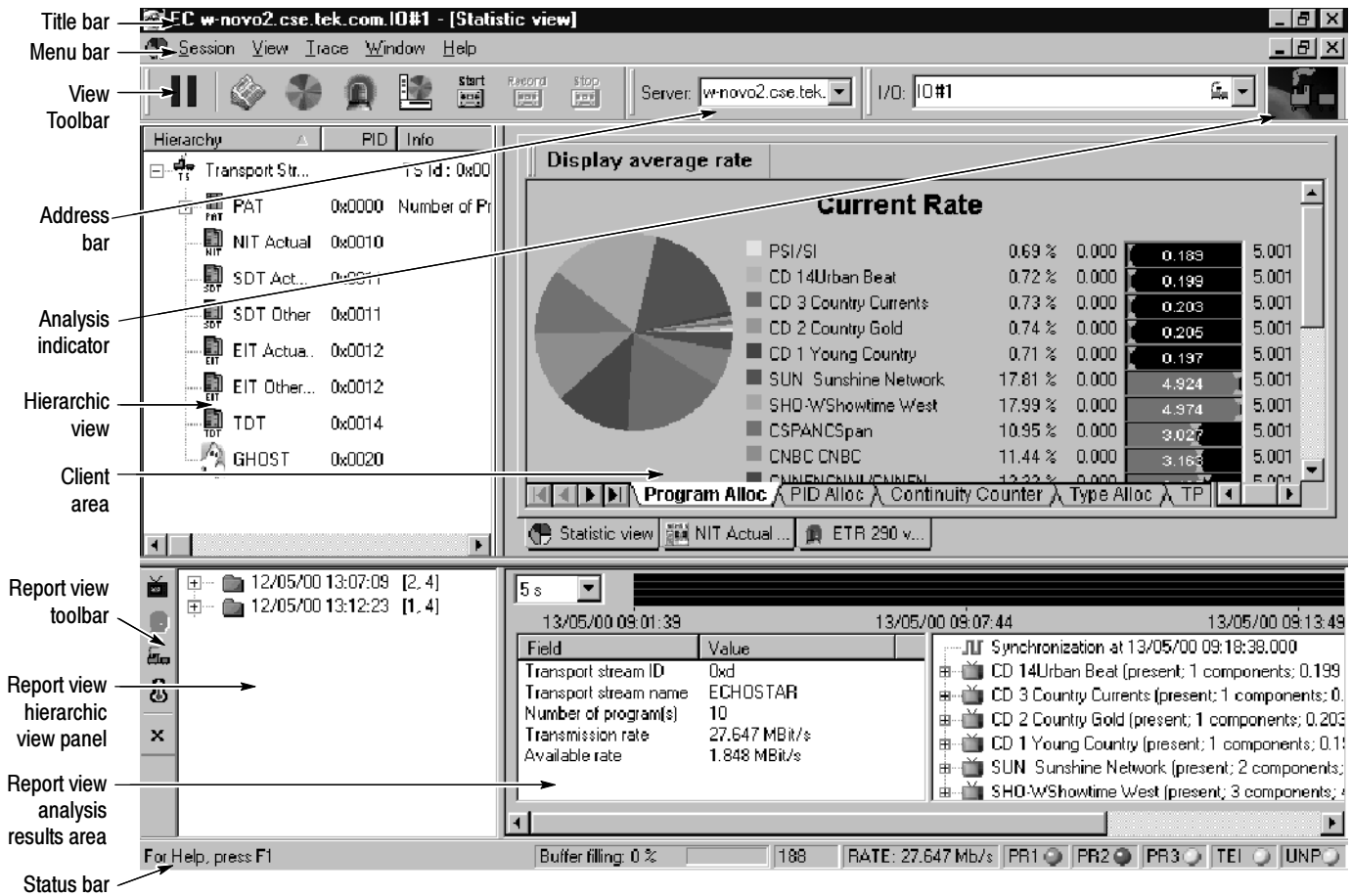
Figure 2-1: Expert Client display elements

Title Bar   The Title bar (see Figure 2-1) 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 2–8 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 3–10 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 (for test systems with multiple inputs).

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

- `<MTS system IP address>`

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

- `<MTS system name>`

  For example, enter `w-novo2.cse.tek.com` to analyze the signal from an MTS200 test 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 MTS200 test 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 2-1 lists the function of each icon in the View toolbar.

Table 2-1: 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 *Manually Capturing a Transport Stream* beginning on page 3-10).
	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 3-10 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 3‑12 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 2‑2 lists the functions of the toolbar buttons.

Table 2‑2: 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 2–1 on page 2–2, 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).
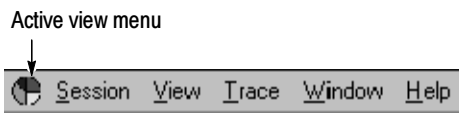
Active view menu

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 2–3 describes the menu selections available in the Active View menu.

Table 2‑3: 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 2-4 describes the menu selections available in the Session menu.

Table 2- 4: 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 *Configuring the Expert Client* on page 2-19 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 2-5 describes the menu selections available in the View menu.

Table 2-5: 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 3-10 for more information the Trace menu commands. Table 2-5 describes the menu selections available in the Trace menu.

Table 2-6: 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 2–7 describes the menu selections available in the Window menu.

Table 2‑7: 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 2–8 describes the menu selections available in the Help menu.

Table 2‑8: 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.

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.
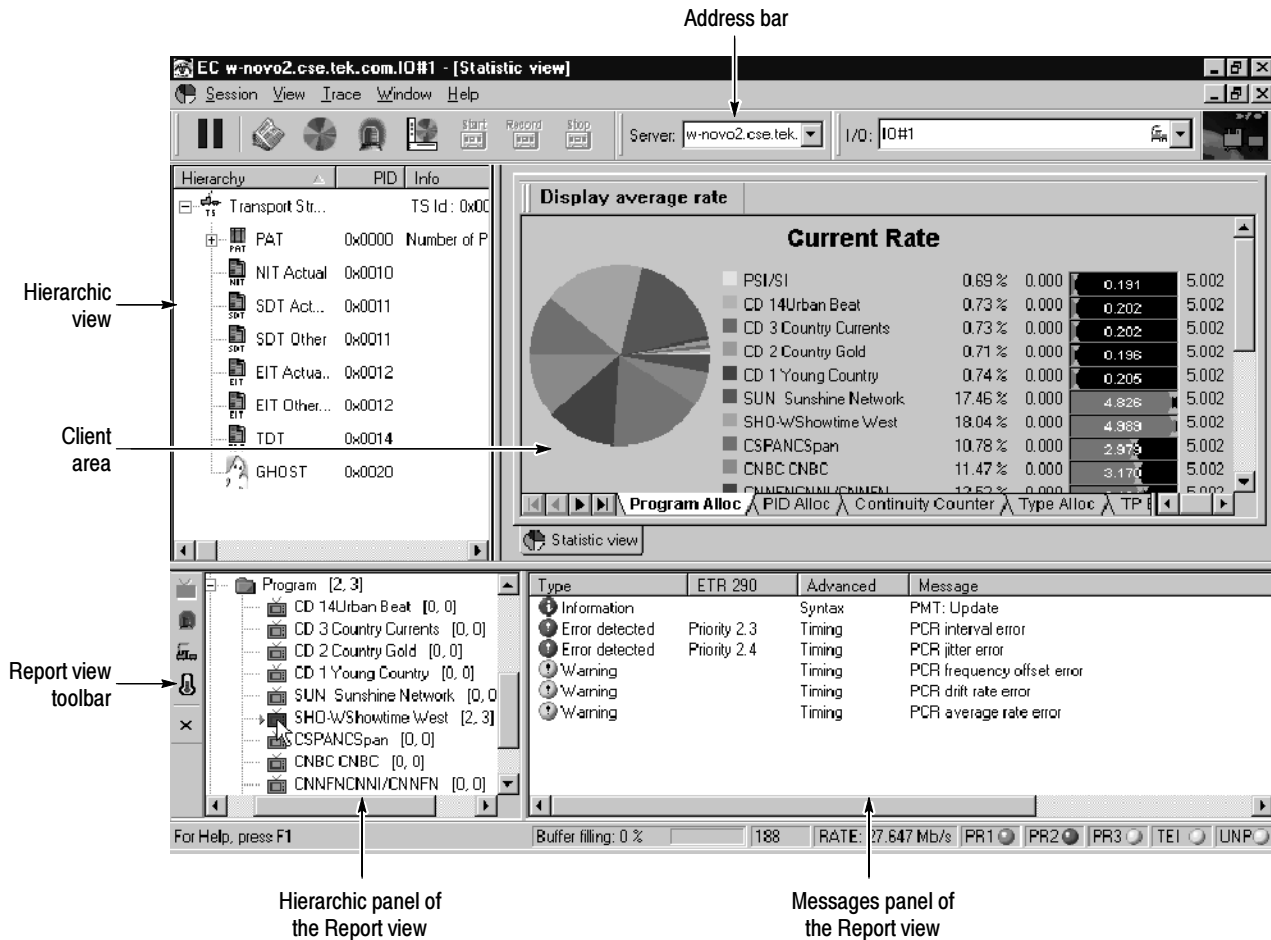
Figure 2- 2: The Expert client application window

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. You can select another Analysis Server on a remote machine by entering the machine name or IP address in the Server text box, and then selecting an I/O from the I/O list box.

- The Client area is displays the Program Allocation panel, which is one of the panel 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 Display Elements

Figure 2–3 shows the different elements of the Configuration Client display. The display elements are described on the following pages.
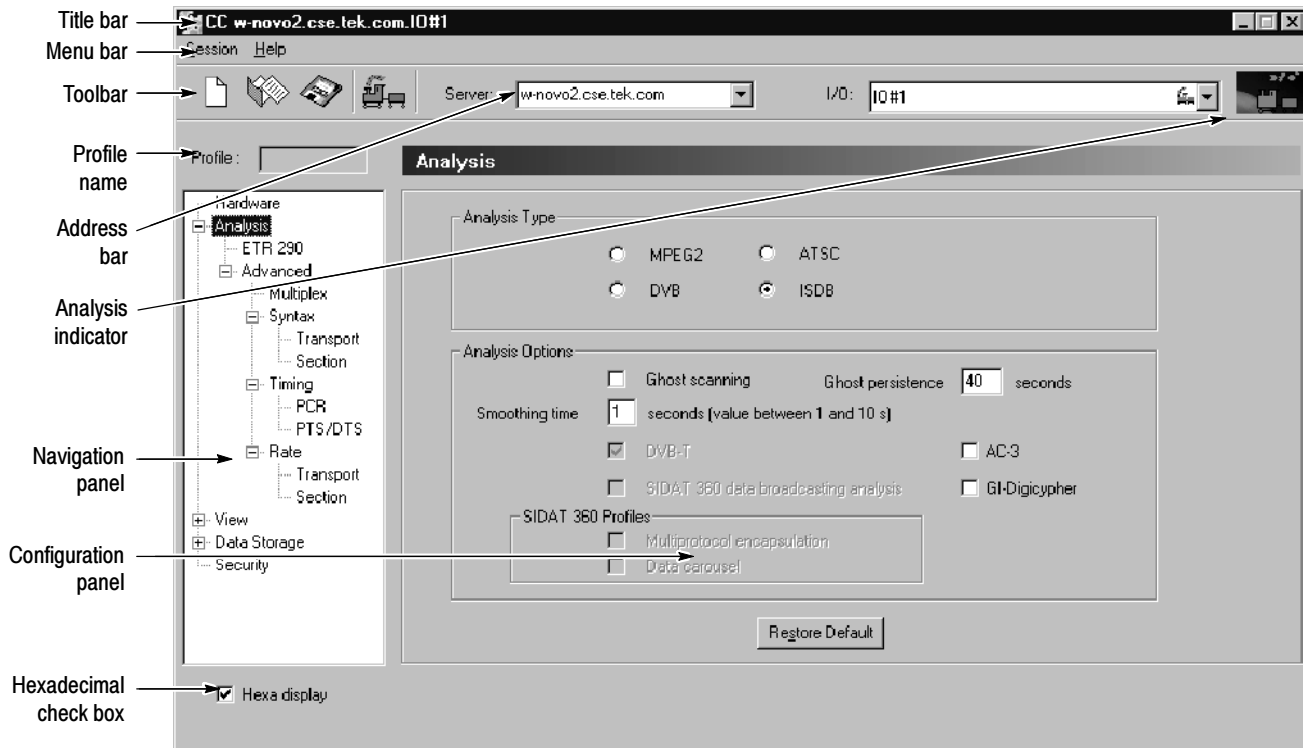
Figure 2-3: Configuration Client display elements

Title Bar   The Title bar displays the following information:

- Name of the application in the window (in Figure 2–3, CC is displayed for Configuration Client)

- Address and I/O port number of the signal source (in Figure 2–3, 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 2‑3) 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 2‑9 describes the menu selections available in the Session menu.

Table 2‑9: 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\Configu-ration 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 MTS200 system indicated in the address bar. See *Managing Remote Test Systems* on page 3-65. The shutdown.exe and shutgui.exe files need to be installed locally in the C:\MTS200\bin directory for this menu item to be active.
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 2-10 describes the menu selections available in the Help menu.

Table 2-10: 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 2-11 lists the function of each icon in the Toolbar.

Table 2-11: 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 (for test systems with multiple inputs) you want the Configuration Client to analyze.

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

- `<Test system IP address>`

  For example, enter `121.181.77.121` to analyze the signal on an MPEG test system with an IP address of 121.181.77.121.

- `<Test system name>`

  For example, enter `jam20.cse.tek.com` to analyze the signal from a test 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 MTS200 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 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 2-4.
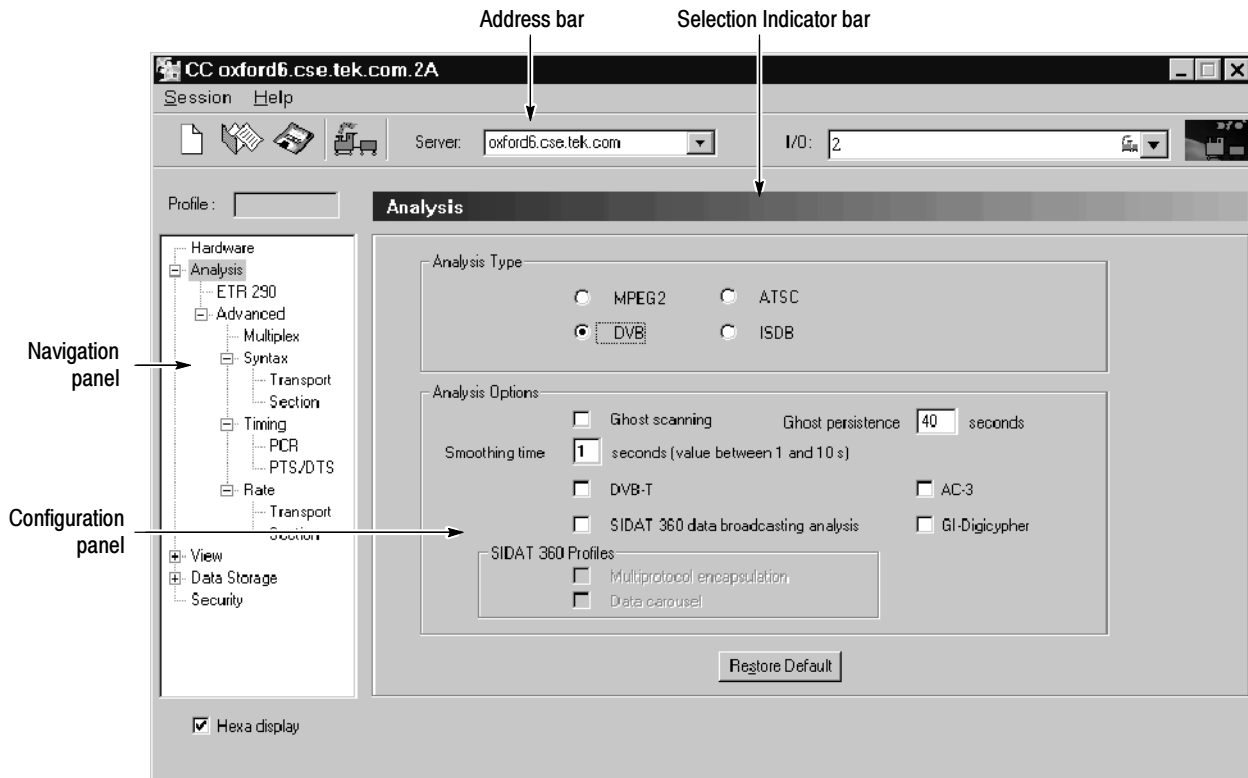
Figure 2- 4: The Configuration client application window

Note the following characteristics of the Configuration client window in Figure 2-4:

■   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 oxford6.

■   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.

Configuring the Expert Client Views

> *NOTE*. *The Expert Client displays the analyses of only one transport stream at a time.*

You can configure different aspects of the Expert Client display using the Settings configuration window. You access the Settings configuration window by selecting Settings from the Session menu. The Settings window contains the following 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 2–5). The View panel contains the following option:

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.

Report View Panel

Select View:Report in the Settings window hierarchy to open the Report View configuration panel (see Figure 2–6). Use this panel to limit the types of messages displayed in all report message views.
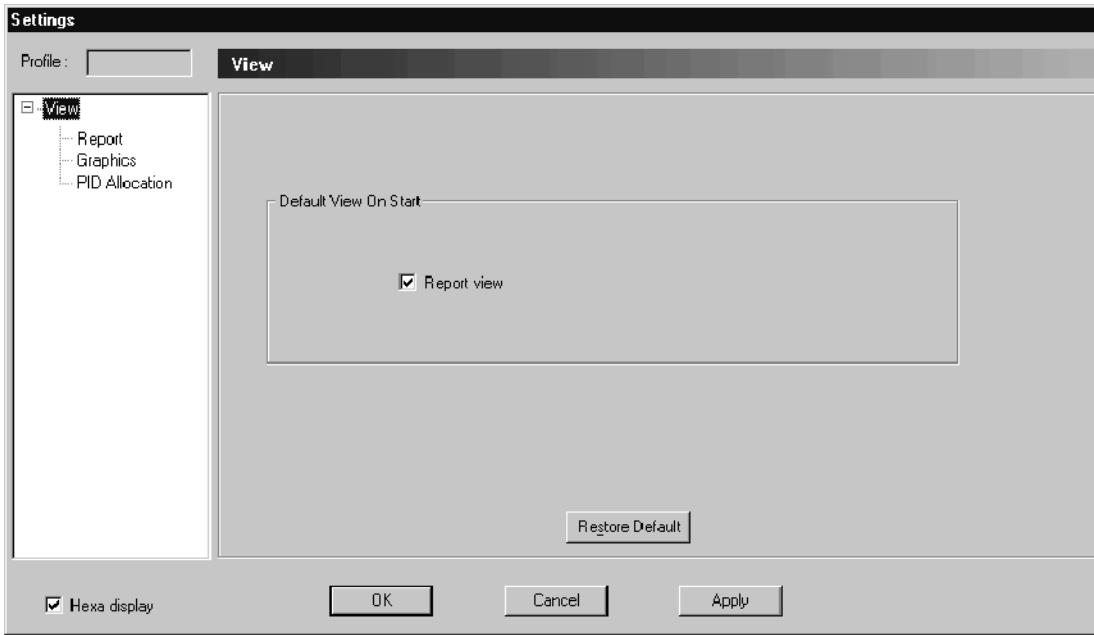
Figure 2‑5: View panel in the Settings window
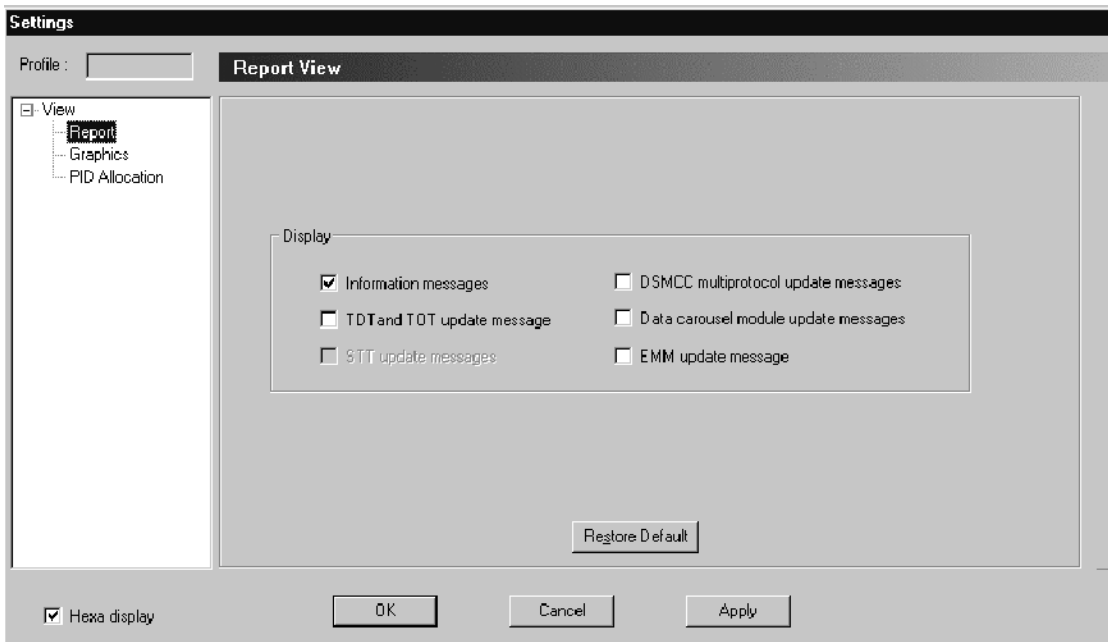
Figure 2‑6: Report View configuration window

The Report View panel (see Figure 2–6) 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 3–69).

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 3–69). 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 3–69). 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 2–7). 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.
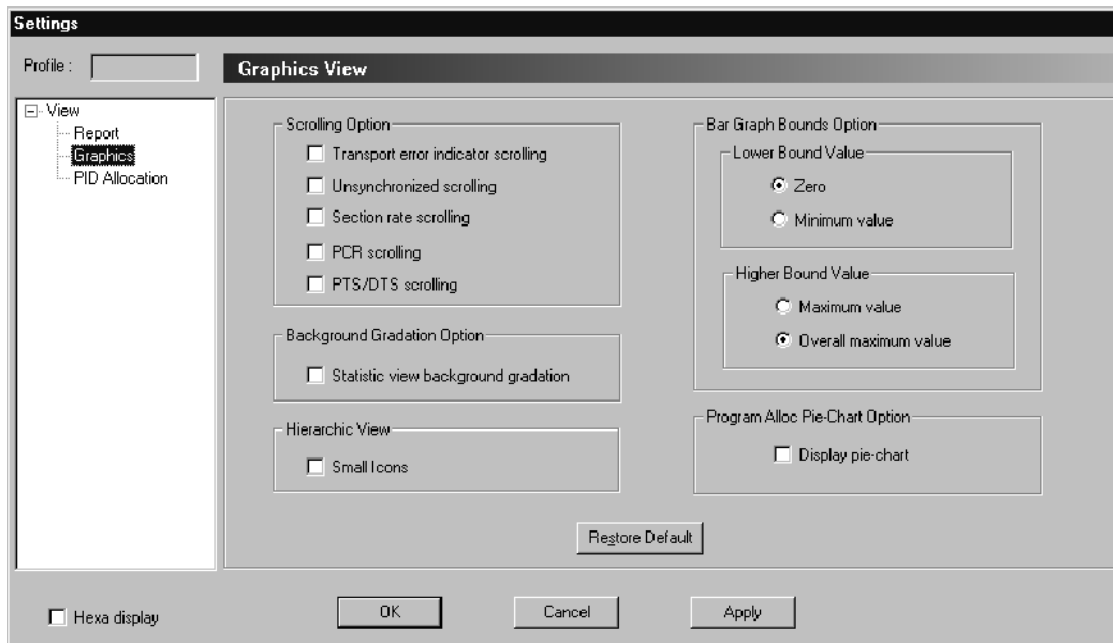
Figure 2‑7: Graphics View configuration window

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 2-8). 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.
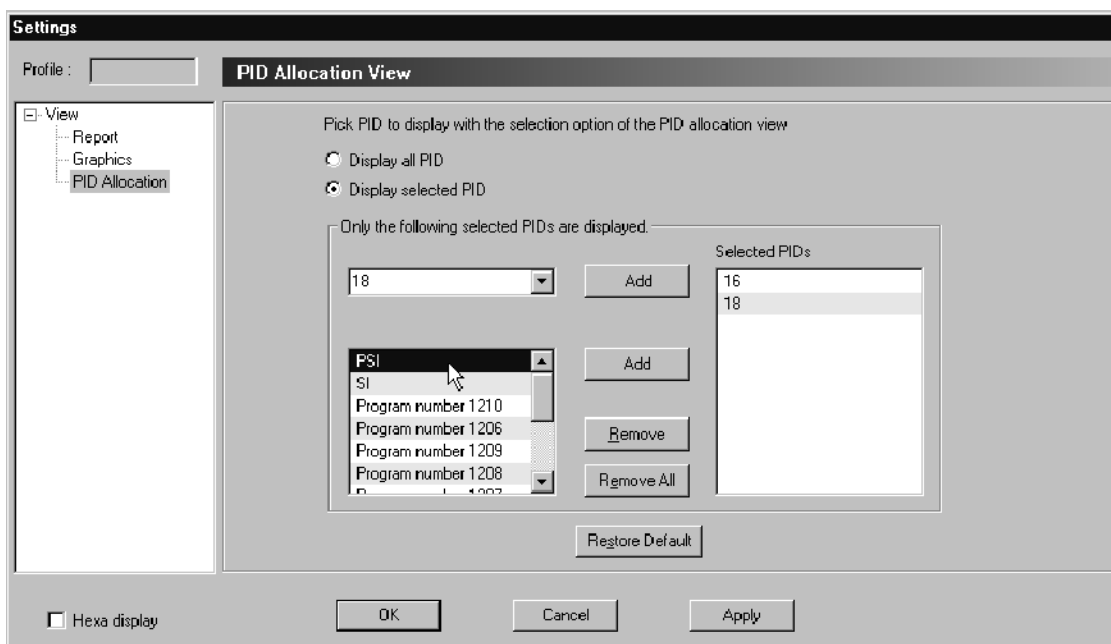
Figure 2- 8: PID Allocation View configuration window

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.

Reference

Reference

This section is a complete reference to the MTS200 Series Expert and Configuration client modules. Together, these two clients provide the same functionality as the MTS200 Series Version 3.0 Real-Time Analyzer, with additional ARIB table analysis capablities. 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, ATSC, and ISDB-S/ARIB. This section also explains client-server computing as it relates to the MTS200 system software modules and describes the two server modules enabled by the test system software.

- The *Expert Client Reference* (see page 3-9) 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 3-61) 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 *Analyses Reference* (see page 3-1) describes all of the MTS200 system analyses performed by the Analysis Servers. This section also provides procedures for setting, modifying, and removing the user-controlled analyses, called *probes*.

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

See *Appendix B: Networking* for information about installing MTS200 test systems in networked environments and basic network troubleshooting procedures.

Finally, see the *MTS200 Series 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 MTS200 Series.

MPEG Overviews

This section provides some brief overviews of MPEG monitoring and the types of transport streams monitored and analyzed by the MTS200 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 requirement of MPEG transmission systems. This functionality is provided by the Master Client, which is a component of the Tektronix MTS300 MPEG Test System and the Tektronix MTM300 and MTM301 MPEG Transport Monitors.

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, ATSC, and ISDB–S/ARIB 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, ATSC, and ISDB-S/ARIB 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, which is a component of the Tektronix MTS300 MPEG Test System and the Tektronix MTM300 and MTM301 MPEG Transport Monitors.

- 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. Three groups, the Digital Video Broadcasters (DVB), the Advanced Television Systems Committee (ATSC), and the Association of Radio Industries and Business (ARIB) have created MPEG-2 compliant standards that are used in DVB, ATSC, and ISDB-S/ARIB 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)

- Discontinuity Information Table (DIT)

- Selection Information Table (SIT)

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).

ARIB/ISDB Overview   ARIB stands for the Association of Radio Industries and Business. ARIB standards define elements (carried in table structures) for managing ARIB-compliant transport streams (these are the ARIB structures analyzed by the MTS200 system):

- Broadcaster Information Table

- Download Control Table

- Download Table

- Software Download Trigger Table

ISDB-S/ARIB transport streams are MPEG-2 compliant streams that conform to the ITU-R standard for ISDB-S (Integrated Service Digital Broadcasting, Satellite) multiplexing. An ISDB stream uses TMCC (Transmission and Multiplexing Configuration Control) data multiplexed in the first eight bytes of the 16 Reed-Solomon bytes of 204 byte MPEG-2 transport streams. TMCC information is used to manage the modulation parameters of the transponders in digital broadcast environments that include multiple broadcasters and types of services with different transmission requirements.

NOTE. The MTS200 MPEG Test System offers only limited ARIB table section analysis. To analyze Baisc and Data TMCC transport streams in real time, you need to upgrade your system to the Tektronix MTS300 MPEG Test System.

Client-Server Overview

This section briefly describes client-server software architecture and the Analysis Server enabled by the MTS200 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 back-ground (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 MTS200 system uses three servers (MPEG Analysis Server, TMCC Analysis Server, and Real-Time Multiplexer Server) to perform protocol analyses and generate transport stream output.

The MTS200 test system uses the following client modules to disiplay the results of and to configure the server functions:

- Expert Client

- Configuration Client

- TMCC Expert Client (deferred--time analysis only, installed when you purchase deferred--time analysis options or upgrades)

- TMCC Configuration Client (deferred--time analysis only, installed when you purchase deferred--time analysis options or upgrades)

- OpenMux (MTS205 or MTS215, Option OM only)

Combined, the client and server modules enable you to perform in-depth analyses of one transport stream input; configure the monitoring and reporting parameters of the monitored inputs; and to multiplex transport streams for output.

Analysis Servers

The Analysis Servers are the processes that perform the actual analyses on transport stream inputs.

Each Analysis Server interacts with the following entities as described:

- The Expert client displays the results of the Analysis Server.

- The Configuration client sets the monitoring and analysis parameters for inputs.

MTS 200 Series Real-Time Analyzer User Manual

Expert Client Reference

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

NOTE. *The Expert Client displays the analyses of only one transport stream at a time.*

The MTS200 Series Expert Client offers only limited ARIB table section analysis. If you want to analyze TMCC TS streams in real-time, you need to upgrade your system to the Tektronix MTS300 MPEG Test System.

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. However, you can connect more than one Expert Client to the same Analysis Server. (The Analysis Servers is the server component that performs analyses, the Expert Client is the client component that displays analysis results.)

This section describes the Expert Client in the following subsections:

Manually Capturing a Transport Stream

Using the Expert Client, you can manually capture a transport stream input. 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 3-61 for information about configuring the test system to trigger a data capture on 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 KB 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, and it will be written to the Single Shot partition on the Data Store disk (C:/CARB/MONO). Alternatively, enter the complete path (to a local directory) for the file you want to write in the text box. Remember to ensure that you have adequate disk space and that you have write permission in this location.

7. Use the **Before Event** and **After Event** boxes to set the amount of transport stream data captured before and/or after you initiate the capture event. For example, if you set the Before Event value to 1024 and the After Event Value to 2048, the captured file will include 1024 KB of data preceeding and 2048 KB of data following the moment you initiate 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.

Using the Hierarchic View

The Hierarchic view displays the contents of the transport stream as a hierarchical structure based on the PSI and SI, PSIP, and ARIB 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 3‑1.
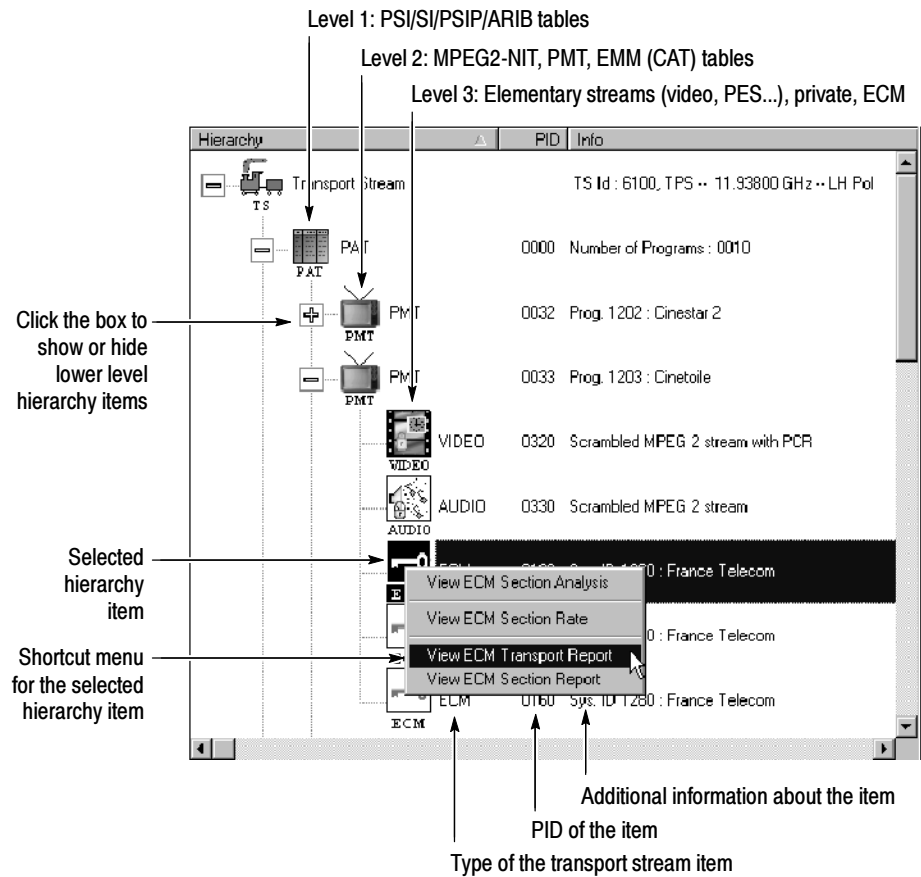
Figure 3‑1: Expert Client hierarchic display

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 3-2 describes the specific information displayed for the various transport stream item types.
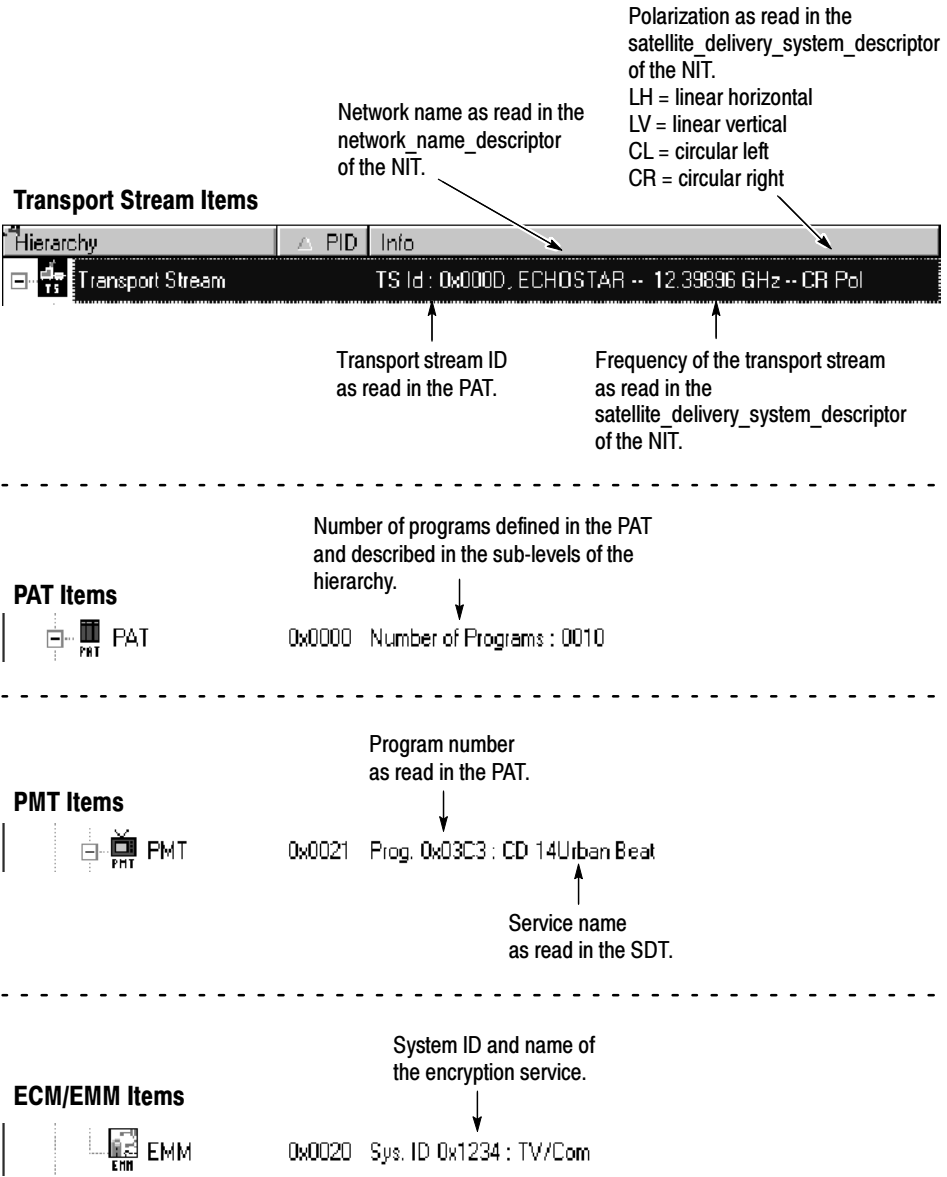
Figure 3-2: Specific information displayed for transport stream items

Setting the Appearance of the Hierarchic View

Table 3–1 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 3‑1: 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 *Hierarchic Icon Shortcut Menus* on page 3–17.
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 3-2 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 3-2: 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 or ISDB-S/ARIB).
	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 3-2: Hierarchic view icon identification (Cont.)

Icon	Hierarchy level	Element type
	4	For SIDAT 360 streams: DownloadInfoIndication tables for one-layer Data Carousels.
	4	For SIDAT 360 streams: DownloadServerInitiate tables for two-layer Data Carousels.
	4	For SIDAT 360 streams: Multiprotocol Encapsulation sections.
	4	DSM-CC generic stream (may carry several tables).
	4	Private table.
	5	ECM table for elementary stream.
	5	For SIDAT 360 streams: DownloadInfoIndication tables for two-layer Data Carousels.
	5	For SIDAT 360 streams: Data Carousel module (one-layer Data Carousels).
	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--3 describes the commands you will find in the shortcut menus.

Table 3- 3: Hierarchic view menu commands

Command	Description
View section analysis	Opens a section view window for the transport stream table selected in the hierarchic view. Refer to *Section Analysis View* on page 3--50.
	Section analysis will be performed only if a section probe is set from the Configuration Client.
View section rate	Opens a section rate view in the Client area for the transport stream table selected in the hierarchic view. Refer to *Section Rate View* on page 3--52.
	Section rate analysis will be performed only if a section rate probe is set from the Configuration Client.
View PCR analysis	Opens a PCR analysis view for the selected program in the Client area. Refer to *PCR Analysis View* on page 3--53.
	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.
View PTS/DTS analysis	Opens a PTS/DTS analysis view for the selected video or audio elementary stream in the Client area. Refer to *PTS/DTS Analysis View* on page 3--56.
	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.
View IP traffic	Opens an IP traffic monitor view for the selected item in the Client area. Refer to *IP Monitoring View* on page 3--60.
	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.
View transport or section report	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.
	This command is available for all stream items.

Using the Report View

The Report view (see Figure 3‑3) 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.
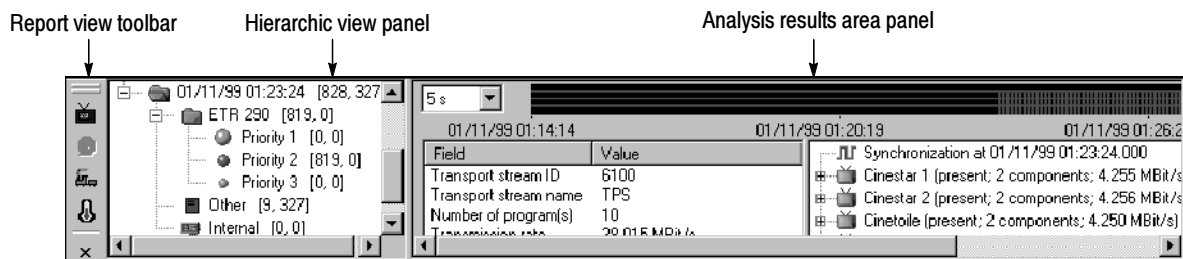
Figure 3‑3: Report view display

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).
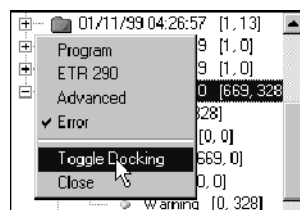
Report View Toolbar

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 3–4 lists the functions of the toolbar buttons.

Table 3- 4: 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 *Message Level Panel* on page 3–93.
	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 removes 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--4):

■ 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--93.

Program mode

□··· ☐ 10/12/99 11:30:00 [0, 13]
　　□··· ☐ Program [0, 3]
　　　　···· ☐ EWTN [0, 0]
　　　▶·· ☐ TVP [0, 0]
　　　　···· ☐ TVASA [0, 0]

ETR 290 mode

□··· ☐ 01/11/99 08:08:04 [181, 328
　　□··· ☐ ETR 290 [172, 0]
　　　　···· ● Priority 1 [0, 0]
　　　▶· ● Priority 2 [172, 0]
　　　　···· ● Priority 3 [0, 0]

Advanced mode

□··· ☐ 10/12/99 11:30:00 [0, 13]
　　□··· ☐ Advanced [0, 3]
　　　　▶·· ☐ Multiplex [0, 3]
　　　　···· ☐ Syntax [0, 0]

Error mode

□··· ☐ 10/12/99 11:30:00 [0, 13]
　　□··· ☐ Error [0, 13]
　　　　···· ● Critical [0, 0]
　　　　···· ● Major [0, 0]
　　　　···· ● Minor [0, 0]
　　　▶· ● Warning [0, 13]
　　···· ☐ Information [0, 0]
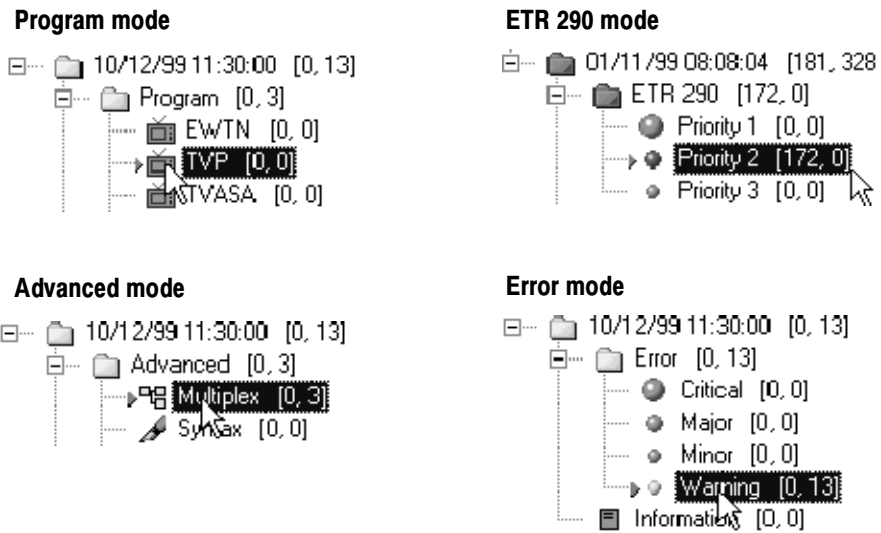
Figure 3‑4: Report view display modes

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 3–5 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 3‑5: Report view shortcut menu

Menu selection	Function
Acknowledge all mes-sages	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 configura-tions	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 3–5): 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.
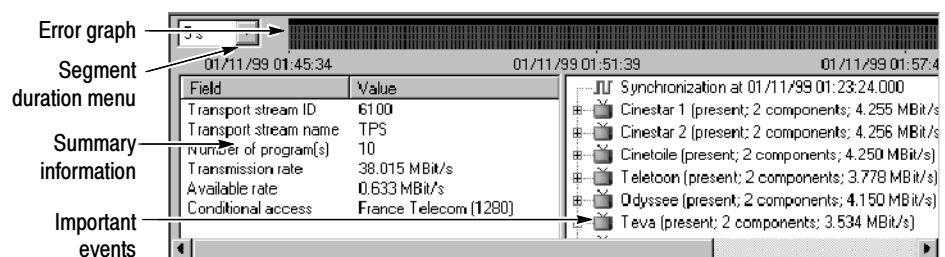
Figure 3-5: Analysis Results area of the Report view

As each measurement time period expires (as set by the Segment Duration menu), one of the five symbols shown in Table 3‑6 appears in the right-most graph segment:

Table 3‑6: 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 3‑5) 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 3‑5) 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 3‑6). 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 3‑6: Hierarchy levels in the Analysis Results area

Table 3‑7: 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 3–5 on page 3–23).

- 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 3–7) 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.
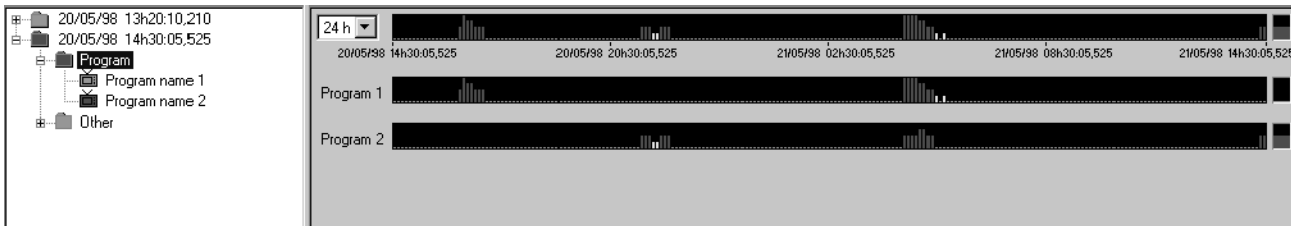
Figure 3‑7: Error Graph panel for the Program report mode

- When you select a third-level icon (program name), the Message panel is displayed in the Analysis Results area. The Message panel (see Figure 3–8) displays all errors that have occurred for the selected program. The Message panel is divided into five columns as listed in Table 3–8. 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.
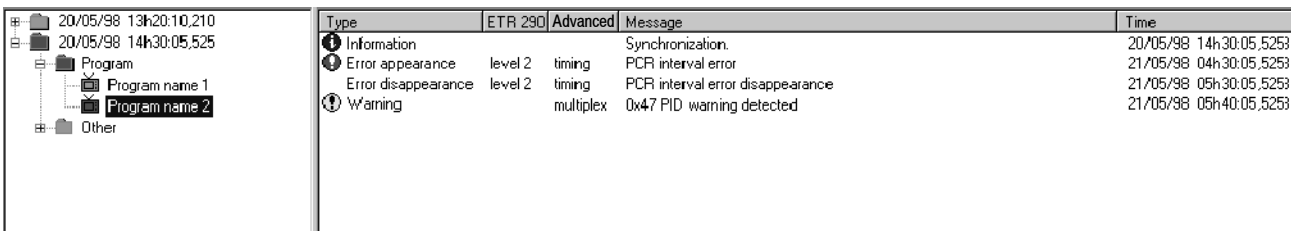
Figure 3‑8: Message panel for the Program report mode

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 3‑8: 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 3–5 on page 3–23).

■ 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 3–9) 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.
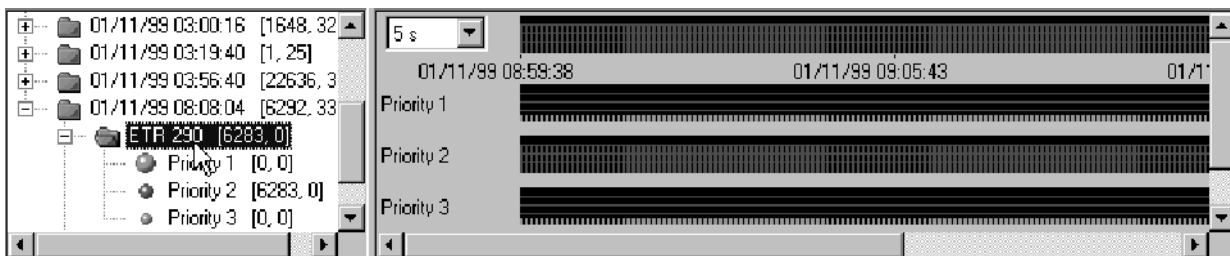
Figure 3‑9: Error Graph panel for the ETR 290 report mode

■ 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 3‑8) 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 3‑9. 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 3‑9: 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 3–5 on page 3–23).

■ 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 3–10) 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.
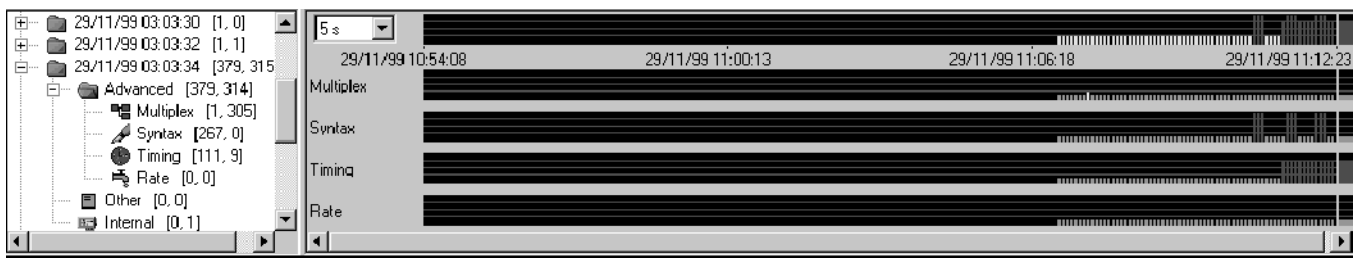
Figure 3-10: Error Graph panel for the Advanced report mode

■ 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 3–8 on page 3–26) displays all errors that have occurred for the selected analysis type. The Message panel is divided into five columns as listed in Table 3–10. 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 3‑10: 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 3‑93 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 3‑5 on page 3‑23).

- 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 3‑11) 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.
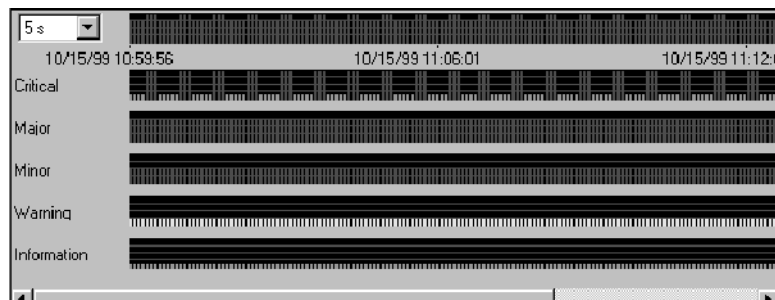
Figure 3‑11: Error Graph panel for the Error report mode

■ 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 3–8 on page 3–26) displays all errors that have occurred for the selected error severity. The Message panel is divided into six columns as listed in Table 3–11. 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 3‑11: 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).
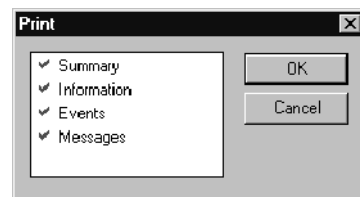
The Print window lists all the items you can print from the selected Configuration. All items preceded by a check mark will be printed when you click OK. Click a Print window item to select or deselect the item for printing.

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 3–91).

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.

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.
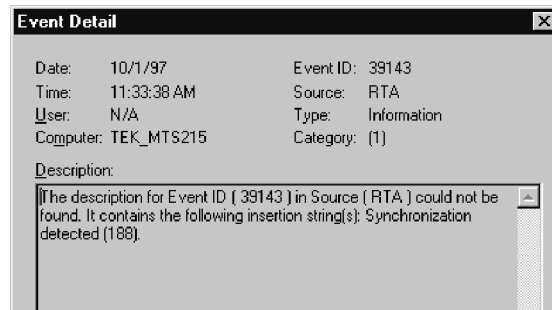
4. From the Event Viewer Application log window you can save the current contents of the Application Log to a file for later use, you can clear the log to make room for more entries, you can change the log size, and you can specify how the Event Viewer acts when the log is full. Refer to the Windows 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.*
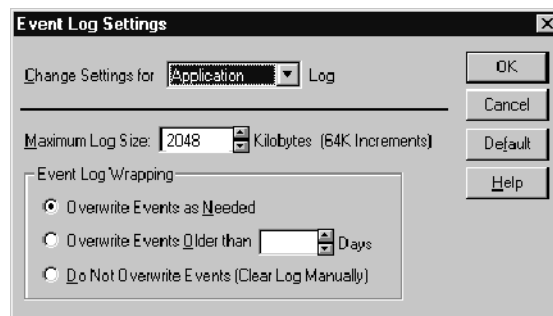
Using the Client Area

The Client area occupies the upper-right panel of the default Expert Client window (see Figure 2–1 on page 2–2). 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 3–36 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 3–12.

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.

Client area view panel tabs   Statistic view panel tabs
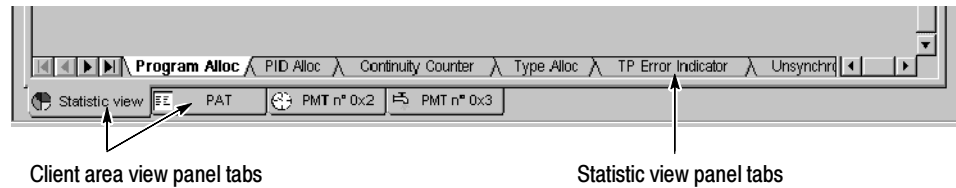
You can use the Window menu to change how multiple open views in the Client area are displayed, such as tiling or cascading the views. Refer to *Window Menu* on page 2–11 for more information.

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.

Expert Client control buttons

Client area control buttons

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--91.*

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 3-34).

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.
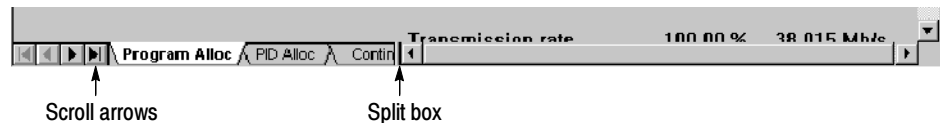
Bandwidth allocation tool tip displays. The Program Allocation, PID Allocation, and Type Allocation panels of the Statistic view provide different views of how the transport stream bandwidth is allocated. In each view, you can rest the mouse cursor anywhere in a transport stream item row, and a Tool Tip (shown below) is displayed. The information provided shows the minimum and maximum values taken by the element since the last synchronization.
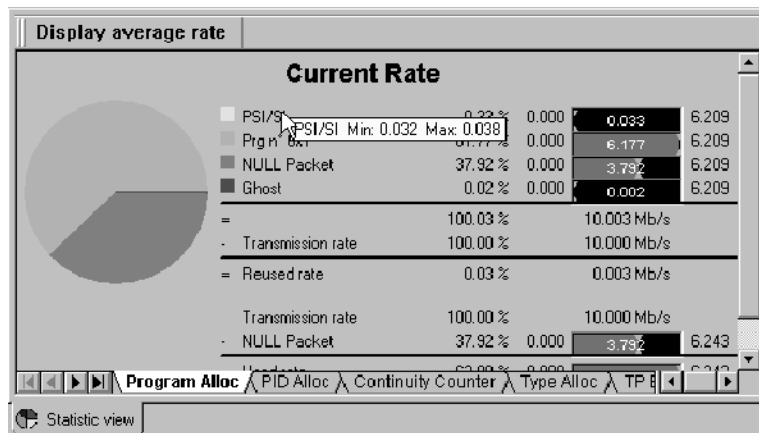
Program Allocation panel. The Program Allocation panel (see Figure 3–12) shows the bandwidth allocation of individual items in the input multiplex using a graphical pie chart. The yellow slice of the pie chart represents PSI/SI information; each remaining colored slice represents a program, null packets, 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.
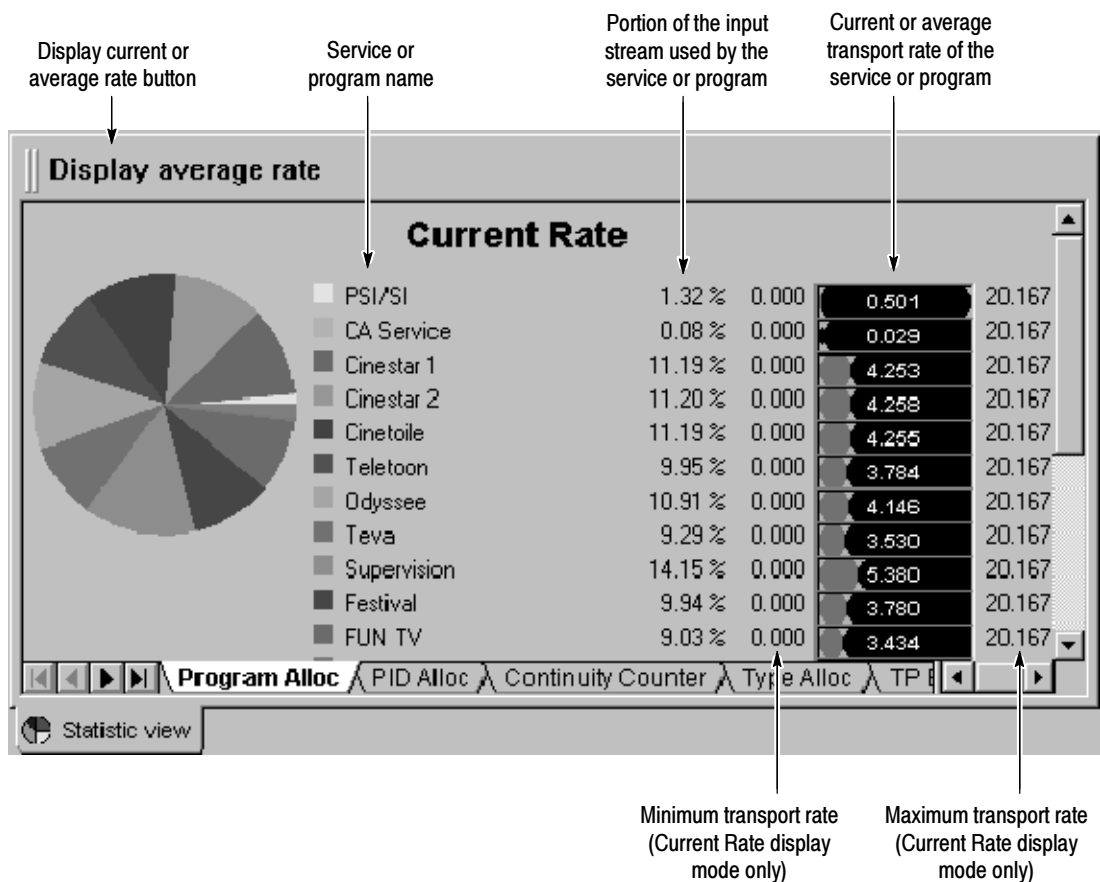
Figure 3-12: Program Allocation panel (Current Rate mode)

You can double-click a slice of the pie chart to switch to the PID Allocation panel (see Figure 3–12 on page 3–37) 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 3–87 for more information.

When you set user-defined limits on a stream item, the appearance of the graphic bar display changes. See Figure 3-13. In Figure 3-13, 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.
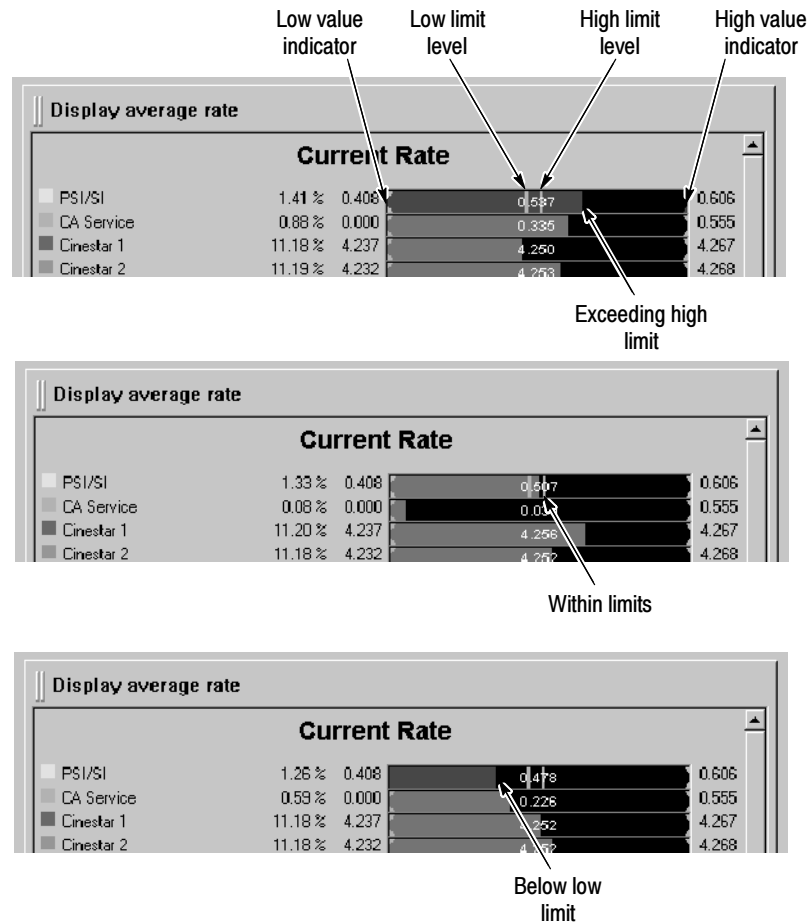
Figure 3-13: Reading the Program Allocation panel bar graphs

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 3-35 for more information.

PID Allocation panel. The PID Allocation panel (see Figure 3‑14) 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.
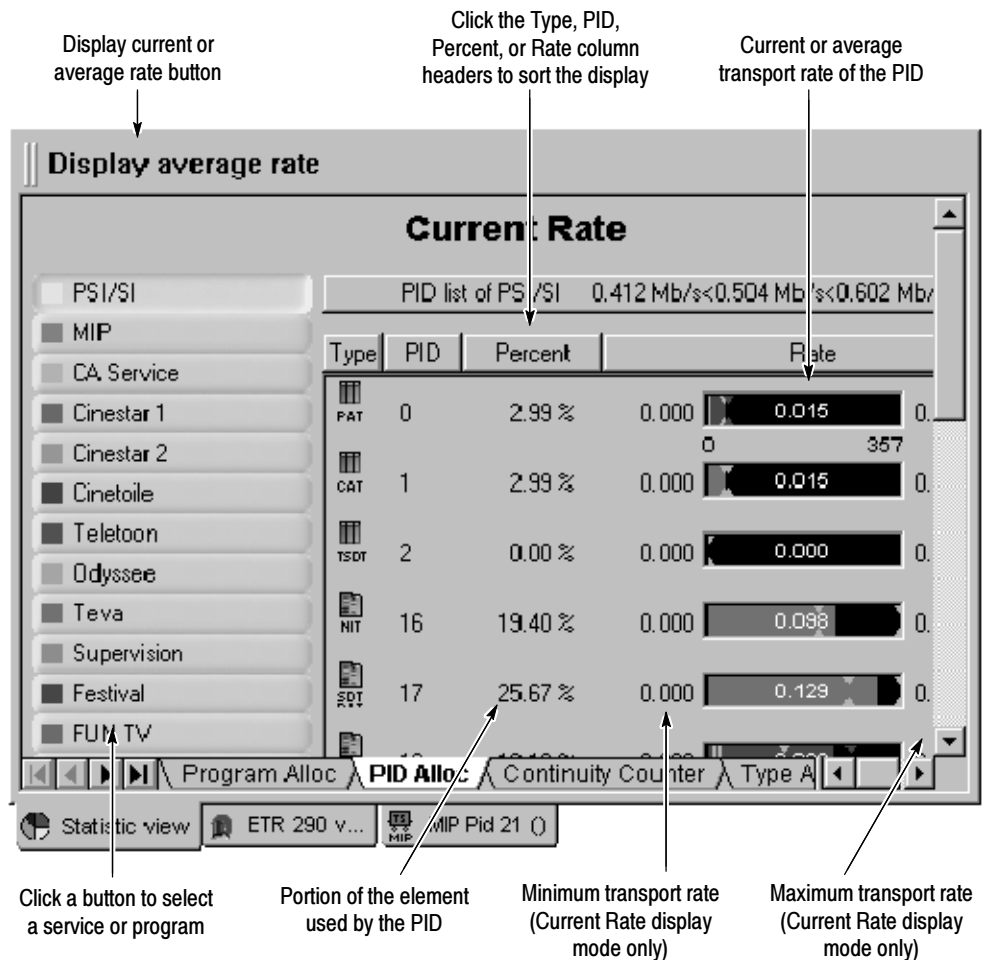
Figure 3‑14: PID Allocation panel (current rate mode)

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 2–23 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 3–14, PSI/SI has an instantaneous transport rate of 0.504 Mbits/s and the rate has been between 0.412 and 0.602 Mbits/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 3–87 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 3–35 for more information.
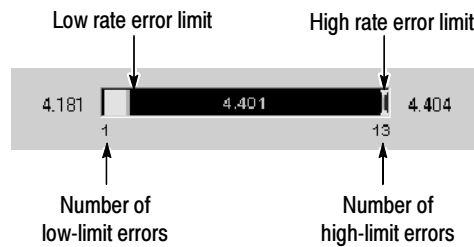
The number of low-limit errors detected (in this case, 1) appears immediately below the left end of the rate bar while the number of high-limit errors appears below the right end. The number of (low- or high-limit) errors reported is the number of 500 ms samples in which the actual transport rate has been below or above the specified limits.

Continuity Counter panel. The Continuity Counter panel (see Figure 3--15) 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--76 for more information.
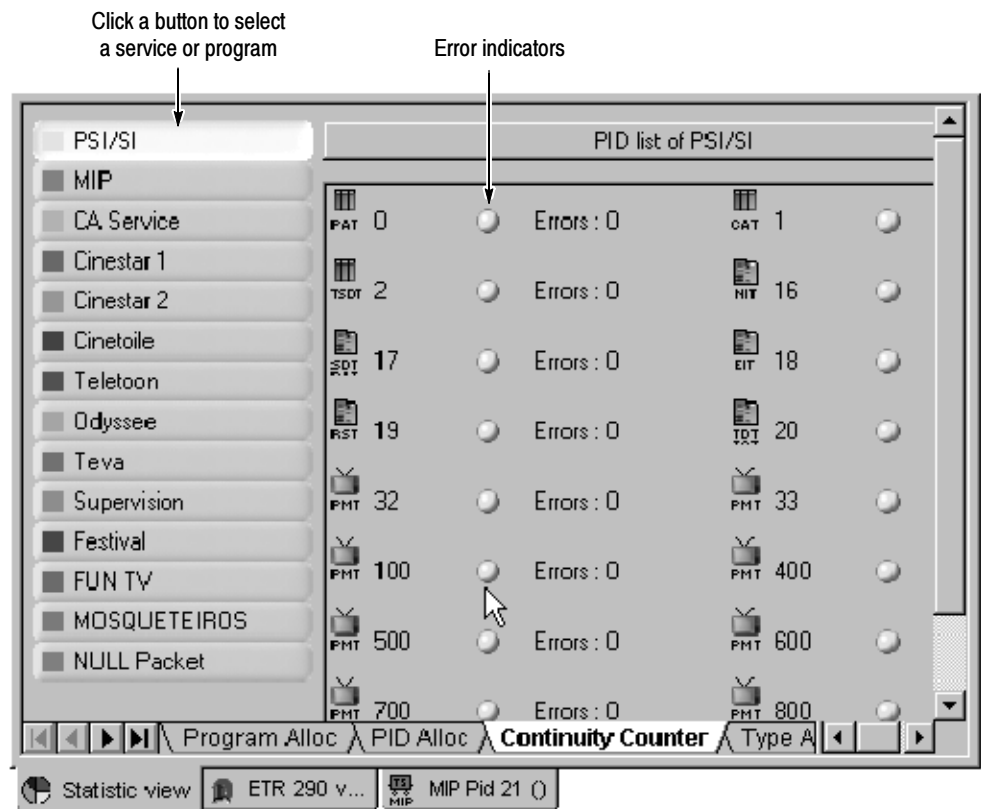
Figure 3--15: Continuity Counter panel

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--35 for more information.

Type Allocation panel. The Type Allocation panel (see Figure 3–16) 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.
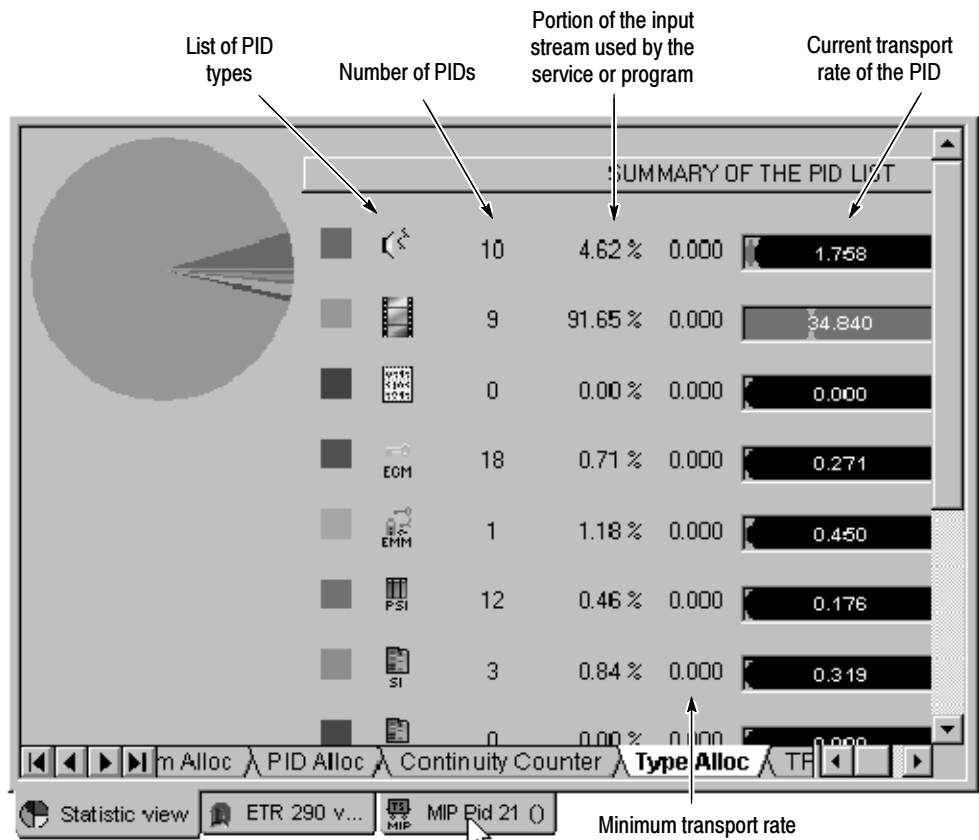
Figure 3- 16: Type Allocation panel

TP (Transport Packet) Error Indicator panel. The TP Error Indicator panel (see Figure 3‑17) 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 3‑76 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 3‑35 for more information.
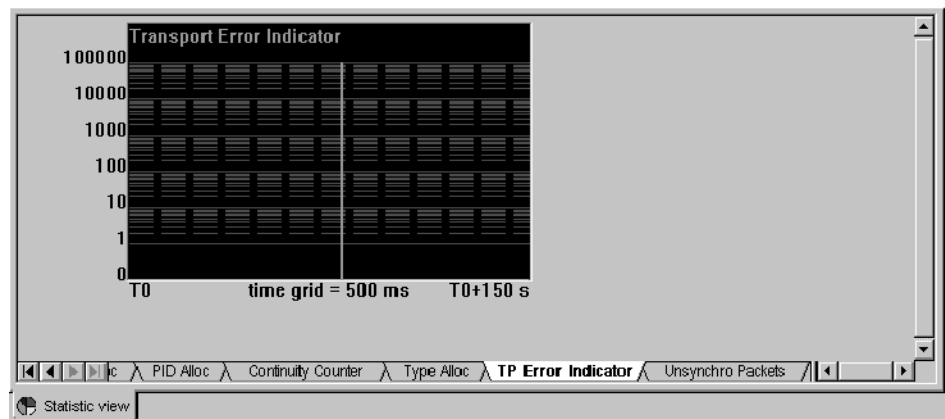
Figure 3‑17: TP (Transport Packet) Error Indicator panel

Unsynchronized Packets panel. The Unsynchronized Packets panel (see Figure 3‑18) 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 3‑72 for more information.

The UNP indicator in the status bar uses color conventions for error reporting. Refer to *Error Indicators* on page 3‑35 for more information.
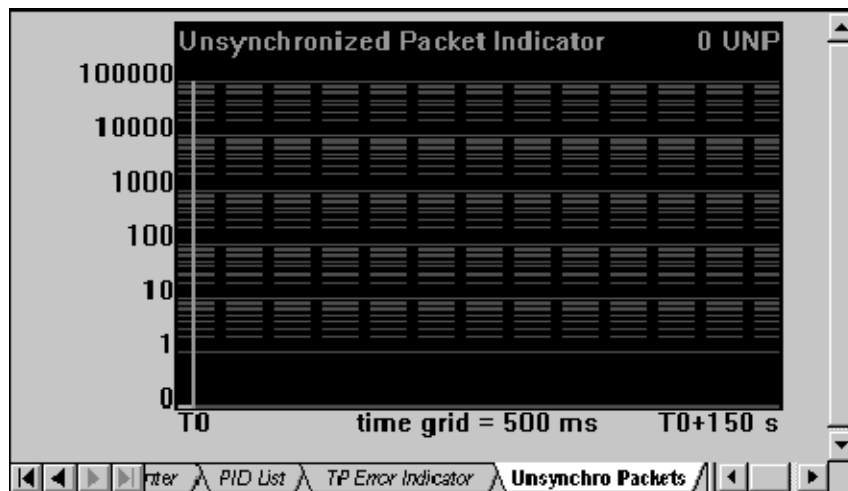
Figure 3‑18: Unsynchronized Packets panel

ASI/M2S Distribution panel. The ASI/M2S Distribution panel (see Figure 3–19) 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 3–19, 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.
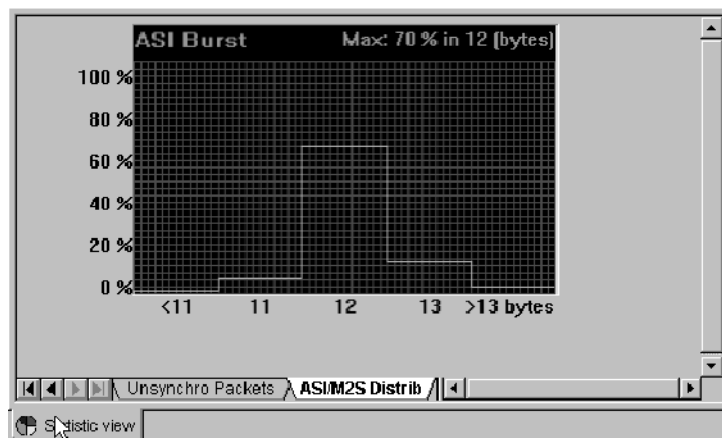
Figure 3‑19: ASI/M2S Distribution panel

ETR 290 View

The ETR 290 view (see Figure 3--20) provides a high-level report of all ETR 290[1] 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--35 for more information.
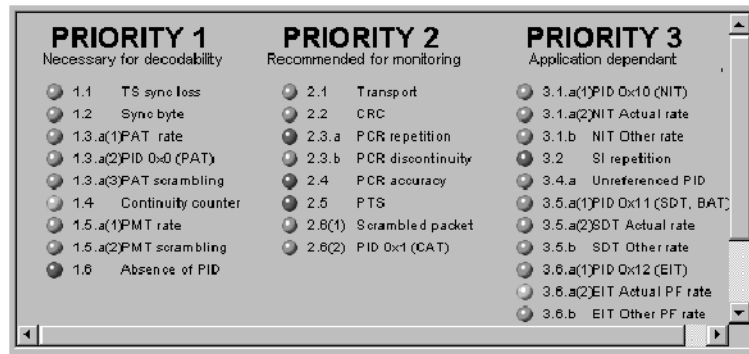
Figure 3--20: ETR 290 view (DVB mode)

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.

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[1]   **ETR 290 is the DVB consortium working group that recommends the measurements and controls performed on elements of a digital television chain. Refer to *ETR 290 Analysis* on page 3--112 for additional information about the ETR 290 recommendations, priority levels, and tests.**

Tests 1.3.a(1), 1.5.a(1), 3.1.a(2), 3.1.b, 3.5.a(2), 3.5.b, 3.6.a(2), 3.6.b, 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 3–88 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.a, 2.3.b, 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 3–21) is available for all tables carried in a transport stream, whether they are part of the system information tables (PSI, DVB–SI, ATSC/PSIP, ISDB/ARIB) or part of other transport stream data. Set section probes using the Configuration client.
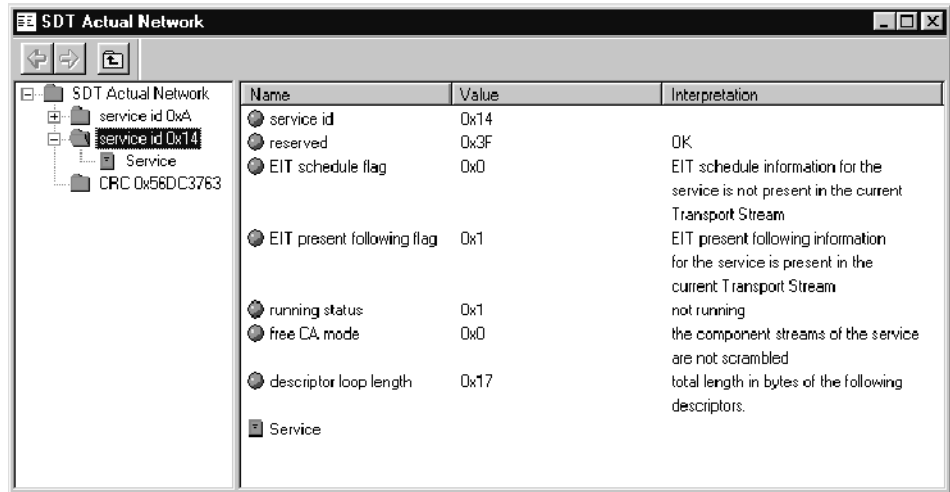
Figure 3‑21: Section Analysis view

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
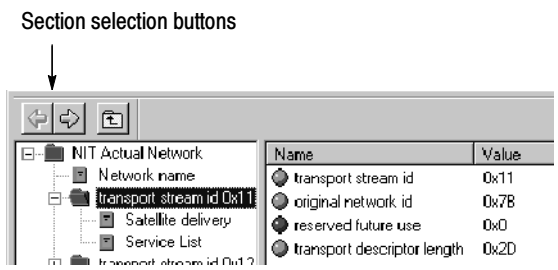
Although the normal numeric display is hexadecimal, it may be convenient in some instances to see the decimal value of one or more fields. Press the F2 function key to toggle between decimal and hexadecimal display.

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.
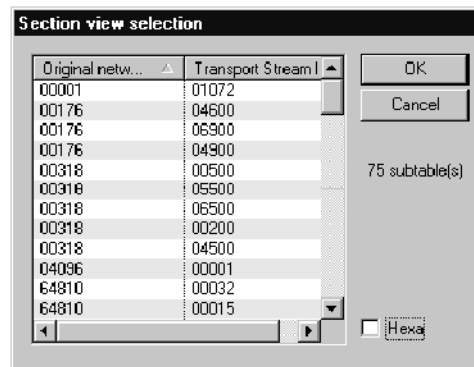
Printing a section analysis view. You can print a record of the current Section Analysis view by clicking inside the view to select the view, and then choosing Print from the View menu (or pressing CTRL+P).

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 3–22) 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.
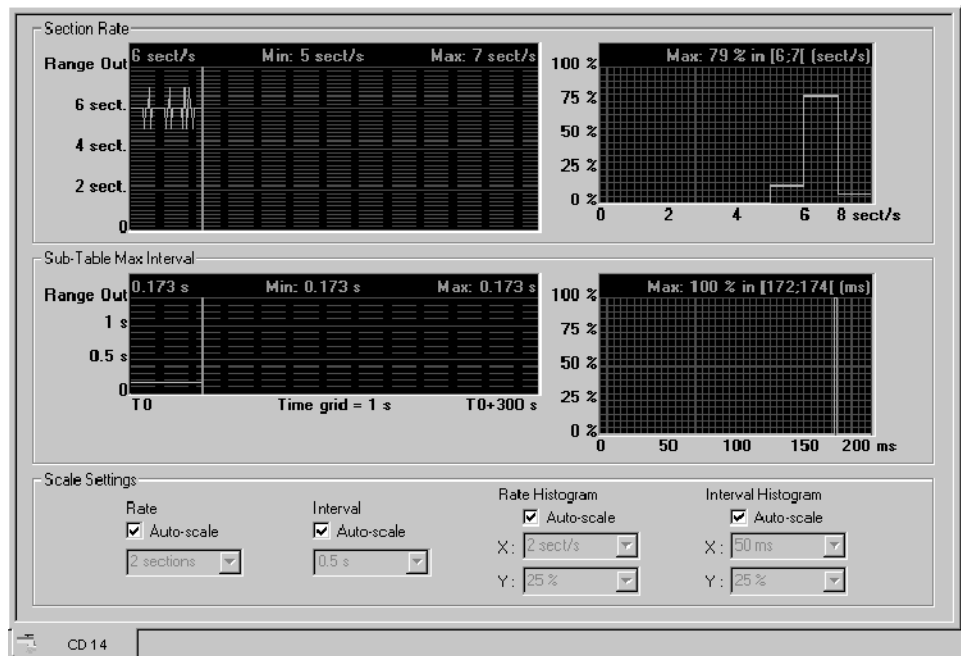
Figure 3‑22: Section Rate view

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 3–23) 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.
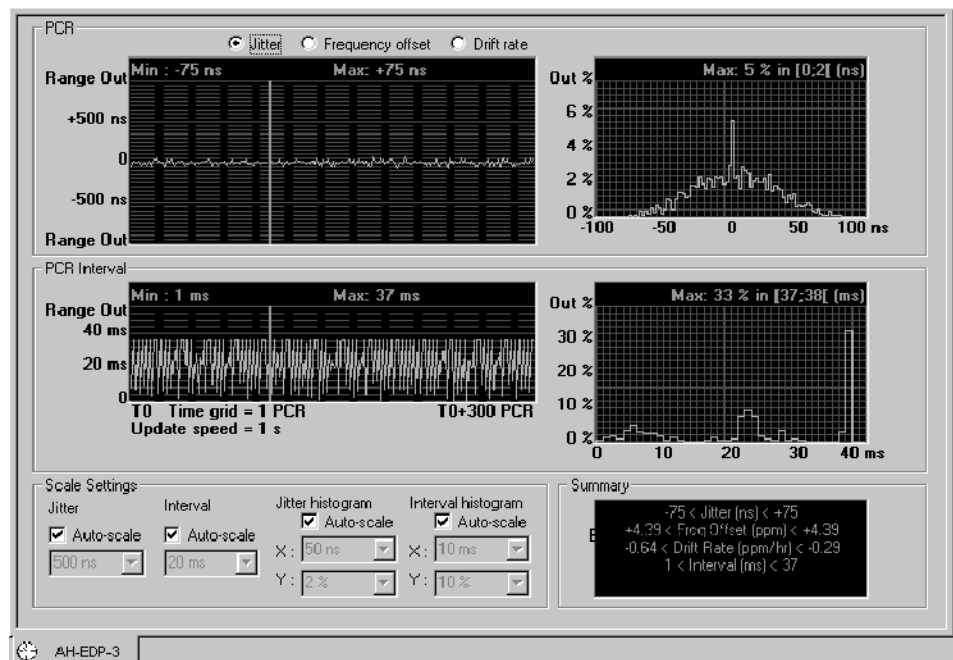
Figure 3‑23: PCR Analysis view

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 3–82 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 3–82 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 3–24) 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.
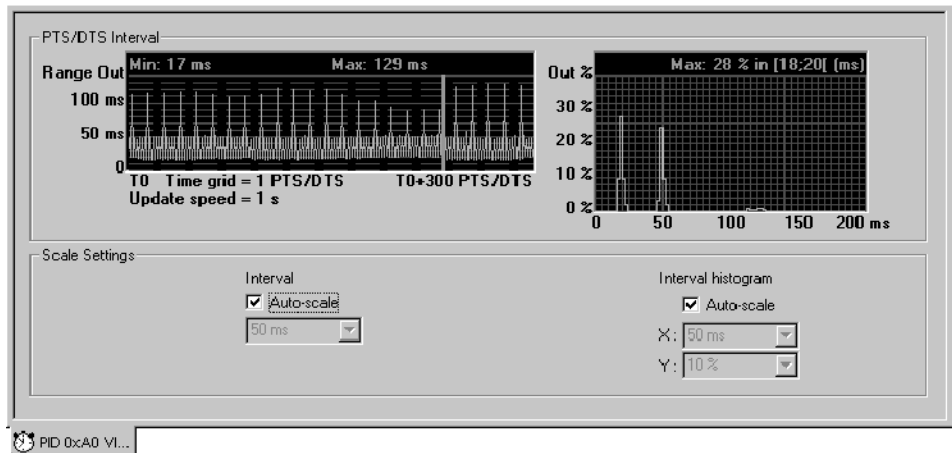
Figure 3‑24: PTS/DTS Analysis view

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 3–25) provides both a hierarchic and a field view of the selected MIP.
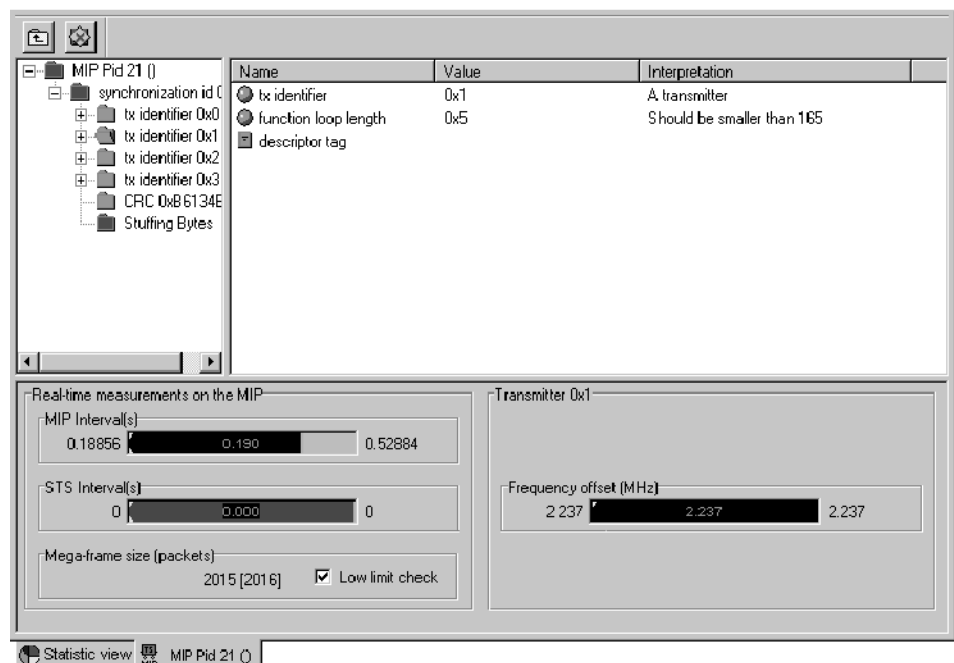
Figure 3‑25: MIP Packet Analysis view

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 synchro-nization 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 3–69 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--86) or use the Mega Frame Rate Analysis panel to set the MIP interval (refer to *Mega Frame Rate Analysis Panel* on page 3--90).

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--80).

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.
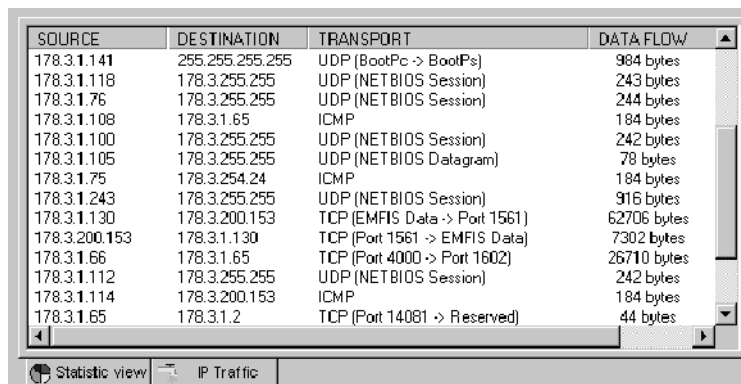
If the probed stream contains multiprotocol encapsulated datagrams, an interpretation of the IP (and TCP/UDP if present) headers is displayed, along with the sender and receiver addresses, and the total amount of data exchanged on that session. The Expert Client assumes that packets which have the same 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 3‑26), 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 3‑69 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 3‑26: 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 the Expert Client.

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, ATSC,and ARIB parameters.

- You can start, stop, and restart Analysis Servers using the Configuration Client; you can also restart a remote MT200 Series test 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 Configuration Client and explains each of the analysis settings.

See *Analysis Reference*, beginning on page 3-1, for details about the probes enabled by the test system and how to set, modify, and remove them.

See *Capturing a Transport Stream Event* on page 3-97 for information about capturing user-defined transport stream error events.

Changing Configurations

To change the current Analysis Server configuration, perform the following procedure:

1. Double-click the Configuration Client icon in the Tektronix MPEG Test System program group window.

2. Select Connection from the Session menu.

3. Select the IP address or host machine name of the test system running the Analysis Server you want to configure. You can enter an IP address or host machine name directly into this box, if the IP address or host name does not appear in the drop-down list.

4. Select the input from the I/O drop-down list box.

5. Click Connection, and the Configuration Client is displayed showing the current settings for the Analysis Server displayed in the address bar.

   All modifications made to this Analysis Server will be reflected in all of the Expert Clients connected to the Analysis Server.

6. Select the appropriate configuration category from the Configuration Client Navigation panel to open the associated configuration panel.

7. 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.

8. 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.

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 test 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 TestSystems

You can shut down and/or restart a remote test 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 test 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 test system indicated in the address bar.

   ■ Select the **Kill applications without saving data** option to close all applications on the MT200 system indicated in the address bar without saving changes.

   ■ Select the **Reboot after shutdown** option to restart the MT200 system indicated in the address bar after it has shut down.

   ■ Use the **Delay box** to specify a delay period before the MT200 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 MT200 system indicated in the address bar.

4. Click **OK** to close the Shutdown dialog box and send a message to the test 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 MT200 system being shut down.
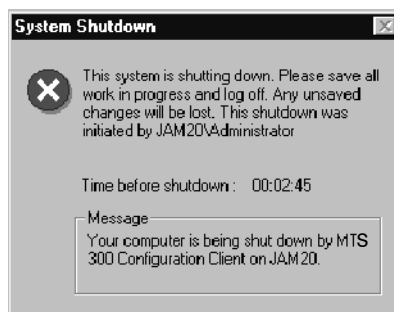
The System Shutdown message box shows the message and the name of the host machine that initiated the shutdown, an active clock showing the hours:minutes:seconds left until the machine shuts down, and the message you specified in the Shutdown dialog box.

Configuration 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 3–69.*

Hardware Panel   Select Hardware in the Navigation panel to display the Hardware configuration panel (see Figure 3‑27). Use the Hardware panel to configure the I/O port to which you are connected.
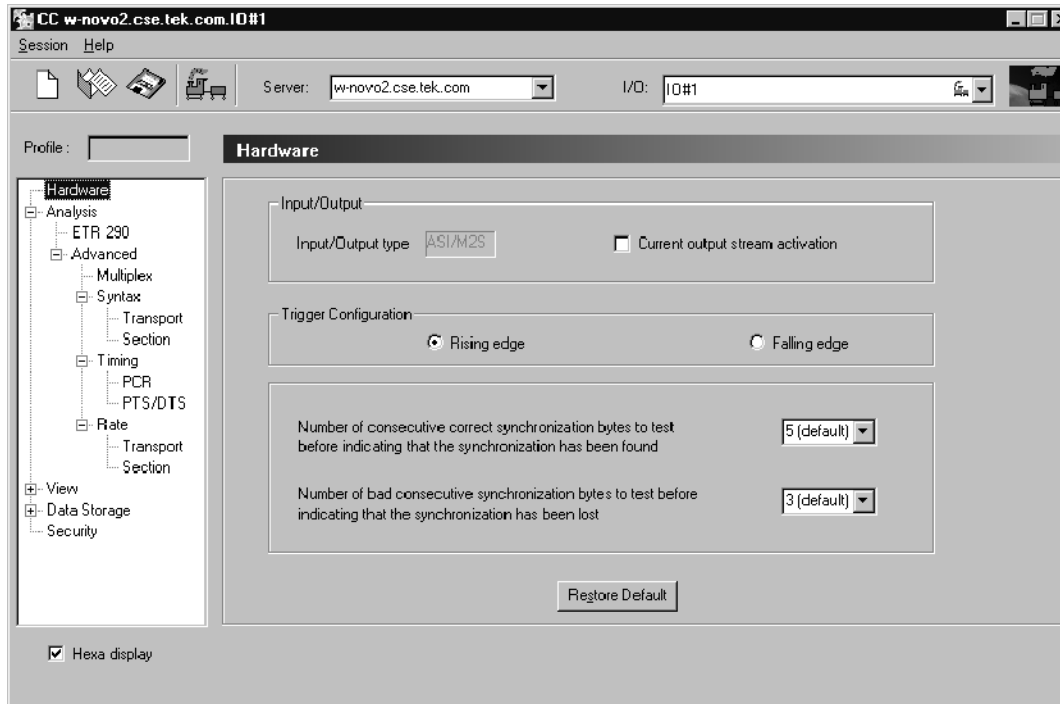
Figure 3‑27: Hardware configuration panel

The panel displays the current configuration of the test system Input/Output type.

You can select from the following options in the Hardware panel:

Output activation. Select this option to loop the input signal to the output connector.

Trigger configuration. You can configure the test system to use the rising or falling edge of a signal connected to the trigger input.

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 3–28).
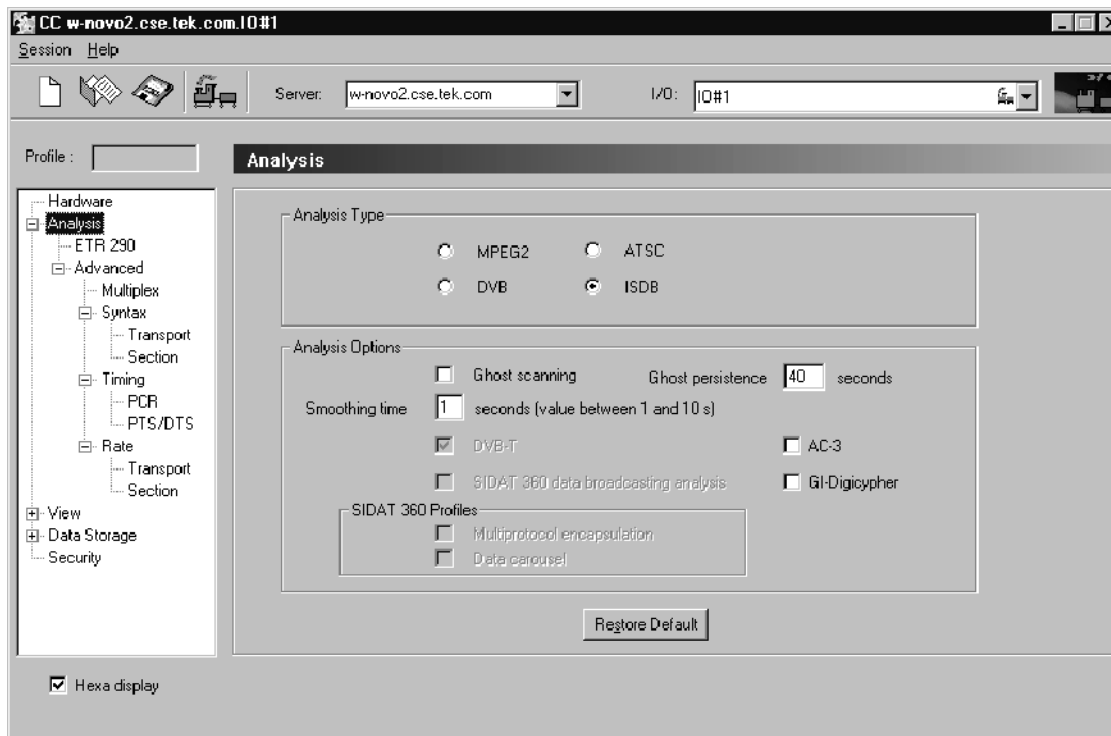
Figure 3- 28: Analysis configuration panel

The Analysis panel contains the following configuration options:

Analysis type. The Analysis Type setting determines which standard the test 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 to the ATSC standards.

- Select ISDB to analyze the stream to ISDB standards.

Analysis options. The first two analysis options are available for all three analysis types.

■ Select Ghost scanning to attempt to define all ghost packets[2] found in the stream. For example, if the test system identifies a ghost packet as a PMT, the test 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.
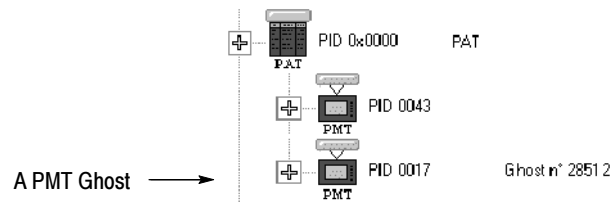
■ Select Smoothing time to adjust the period over which the system averages the transport rates reported in the Statistic view Program Allocation, PID Allocation, and Type Allocation panels. The default value is one second; you can enter any integer value from 1 to 10. Selecting a longer smoothing time 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 Digicipher 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 3-111 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.

[2]   **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 3‑29).

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.
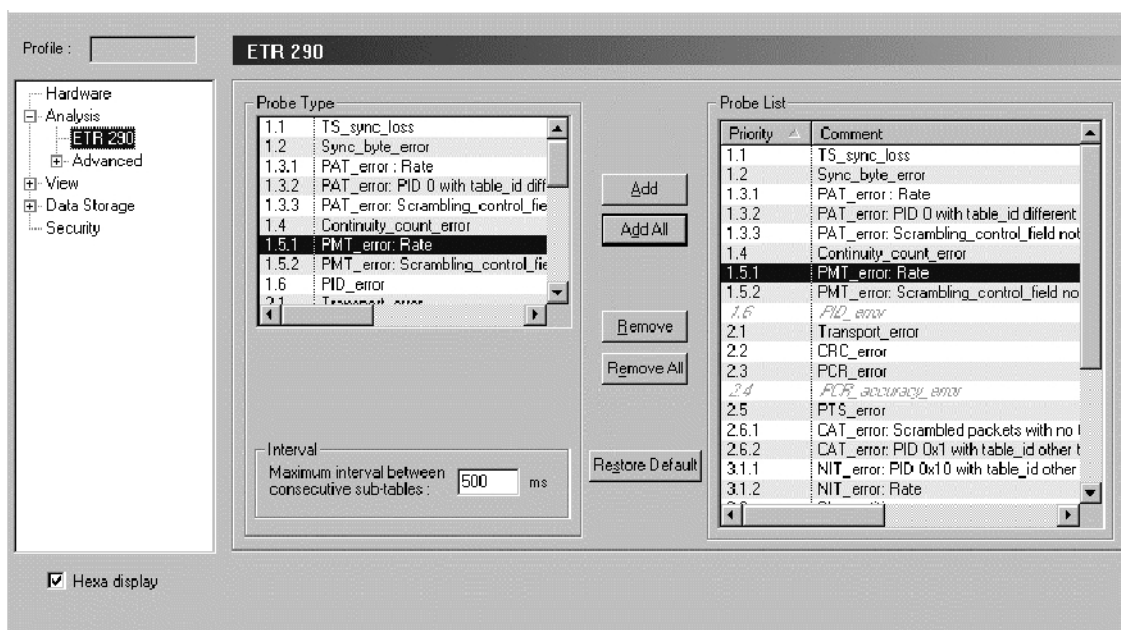
Figure 3‑29: ETR 290 configuration panel

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 3‑107 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 3‑107 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 3–30).

NOTE. *The Multiplex Analysis panel is one of several panels used for setting and
configuring test 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.*
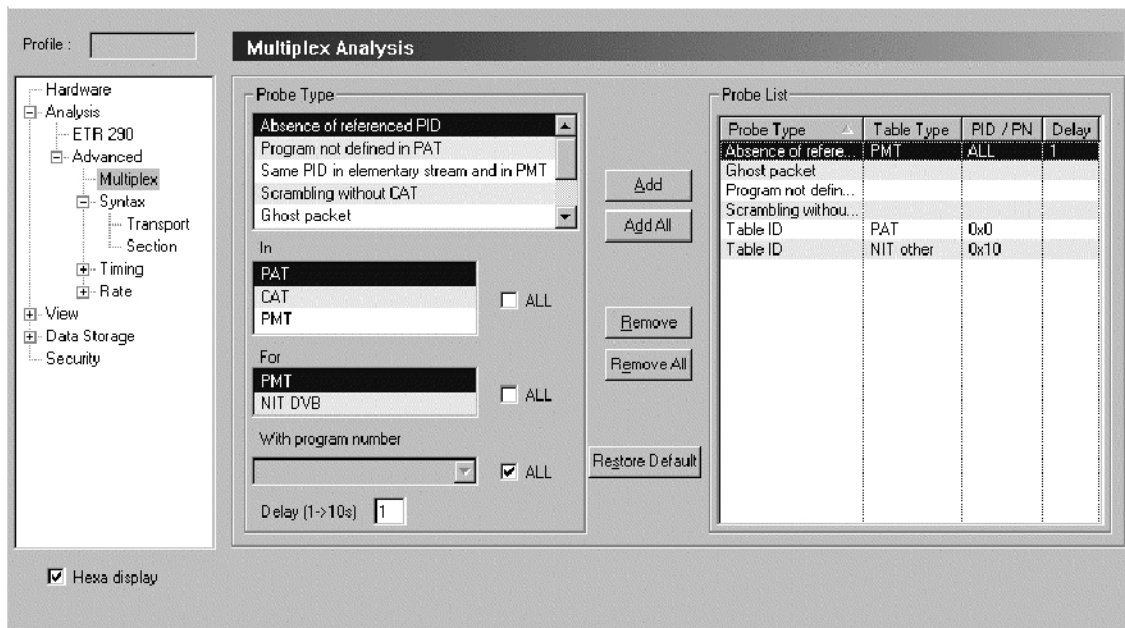
Figure 3- 30: Multiplex Analysis configuration panel

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 3–107 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 3–107 for instructions on setting,
changing, and removing probes.

Available multiplex probes. Table 3–12 lists all of the probes that you can control through the Multiplex Analysis panel. Some probes are only available for certain analysis types.

Table 3-12: 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 3–128 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 3‑31. The Syntactic Analysis panel contains options that affect private section interpretation and syntax error reporting.
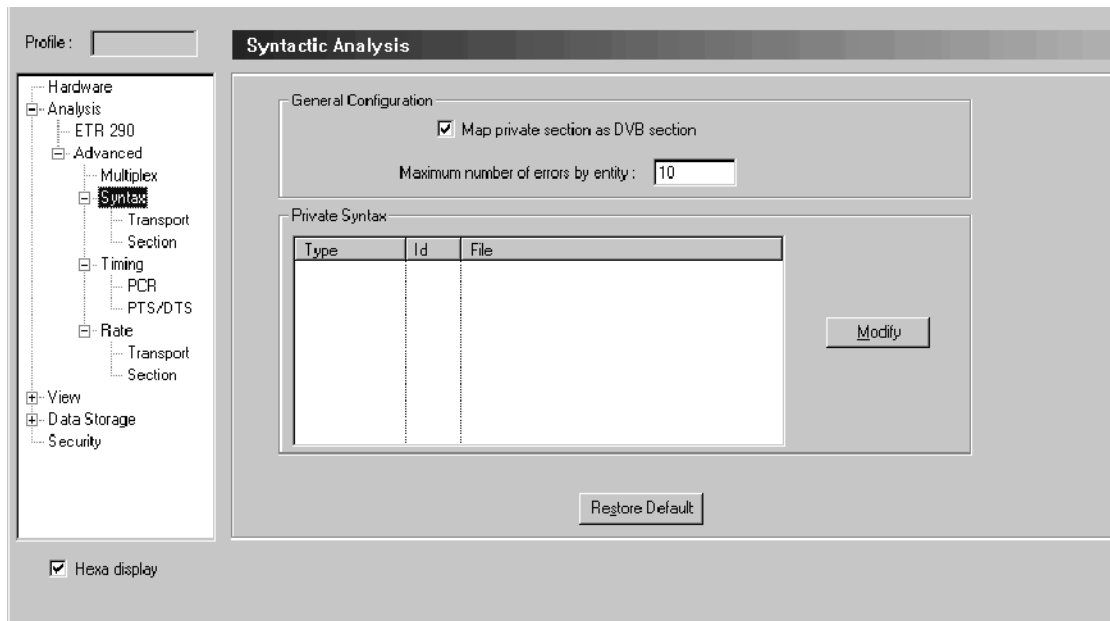
Figure 3‑31: Syntactic Analysis configuration panel

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 3‑69).

When you select Map private section as DVB section (a check appears in front of the option), the test 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 test system detects before stopping analysis for one entity. This limits the number of syntax errors reported by the test 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 test 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 C: 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 3-32. Use this configuration panel to set and configure transport syntax probes.
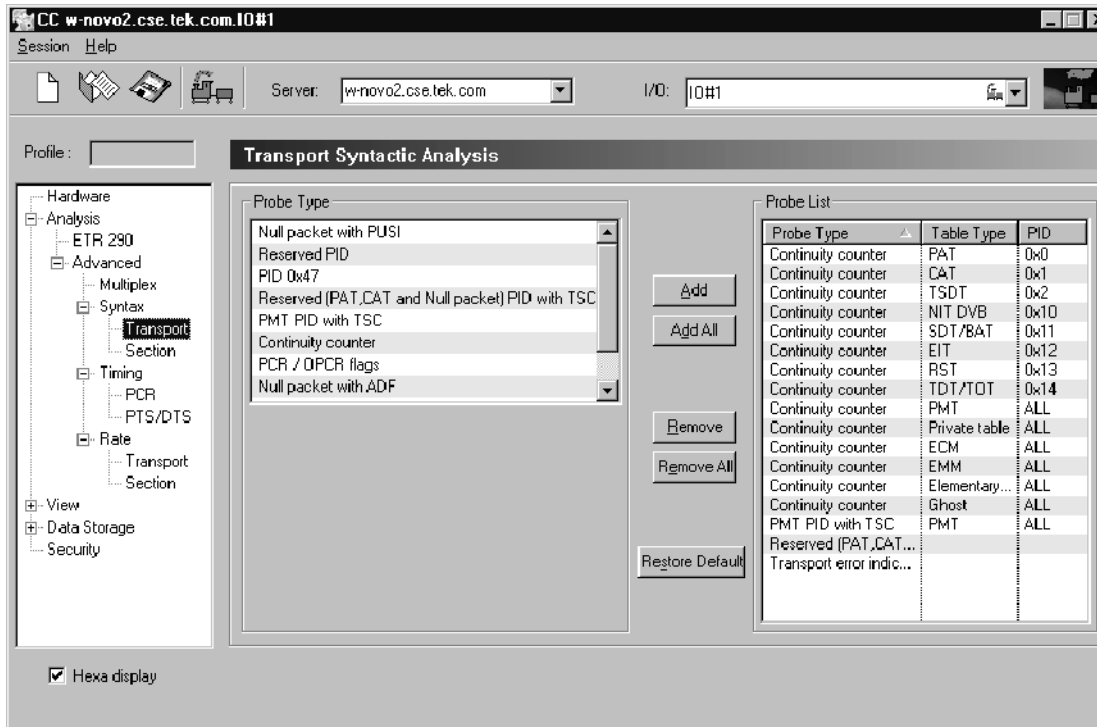
Figure 3- 32: Transport Syntactic Analysis configuration panel

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 3-107 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 3-107 for instructions on setting, changing, and removing probes.

Available transport syntax probes. Table 3-13 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 3-107 for instructions on setting, changing, and removing probes.

Table 3-13: 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 3-136 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.
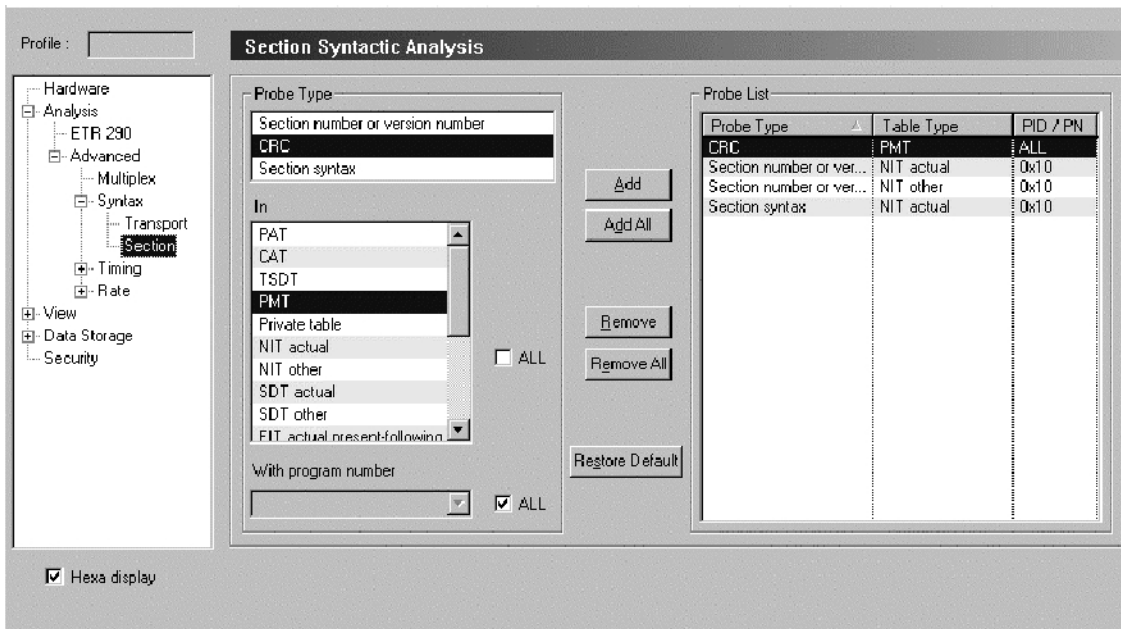
Figure 3‑33: Section Syntactic Analysis configuration panel

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 3‑107 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 3‑107 for instructions on setting,
changing, and removing probes.

Available section syntax probes. Table 3–14 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 3–107 and *Removing Probes* on page 3–109 for instructions on setting and removing probes.

Table 3‑14: 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 3–140 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 3-34. 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 3-69).*
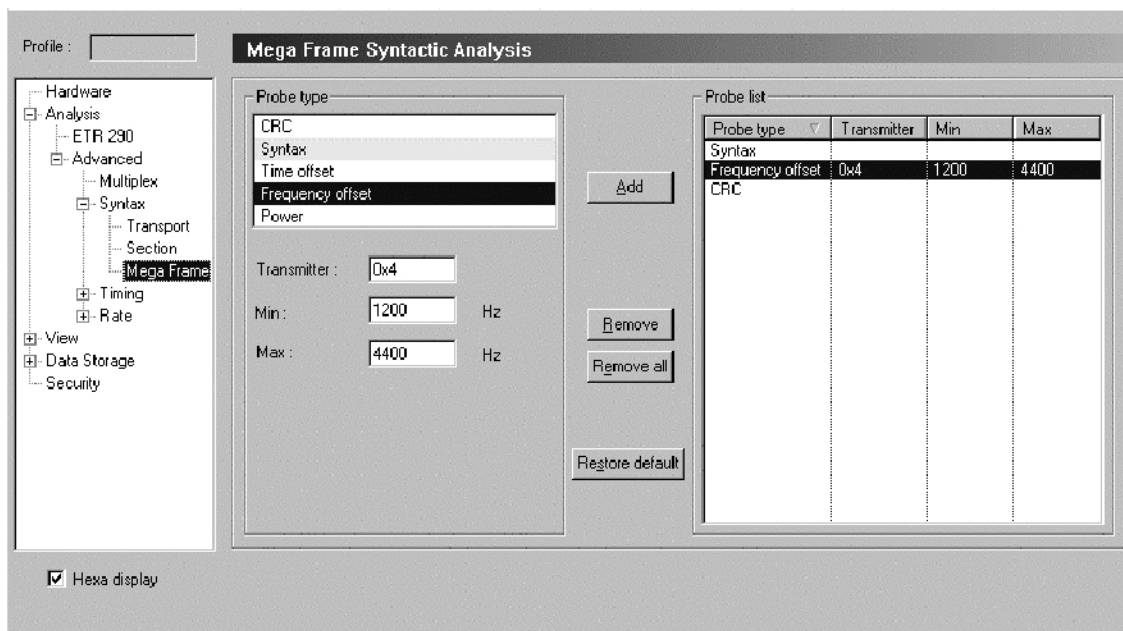
Figure 3-34: Mega Frame Syntactic Analysis configuration panel

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 3-107 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 3-107 for instructions on setting, changing, and removing probes.

Available mega frame syntax probes. Table 3–15 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 3–107 and *Removing Probes* on page 3–109 for instructions on setting and removing probes.

Table 3-15: 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 3–142 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 3-35. 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.
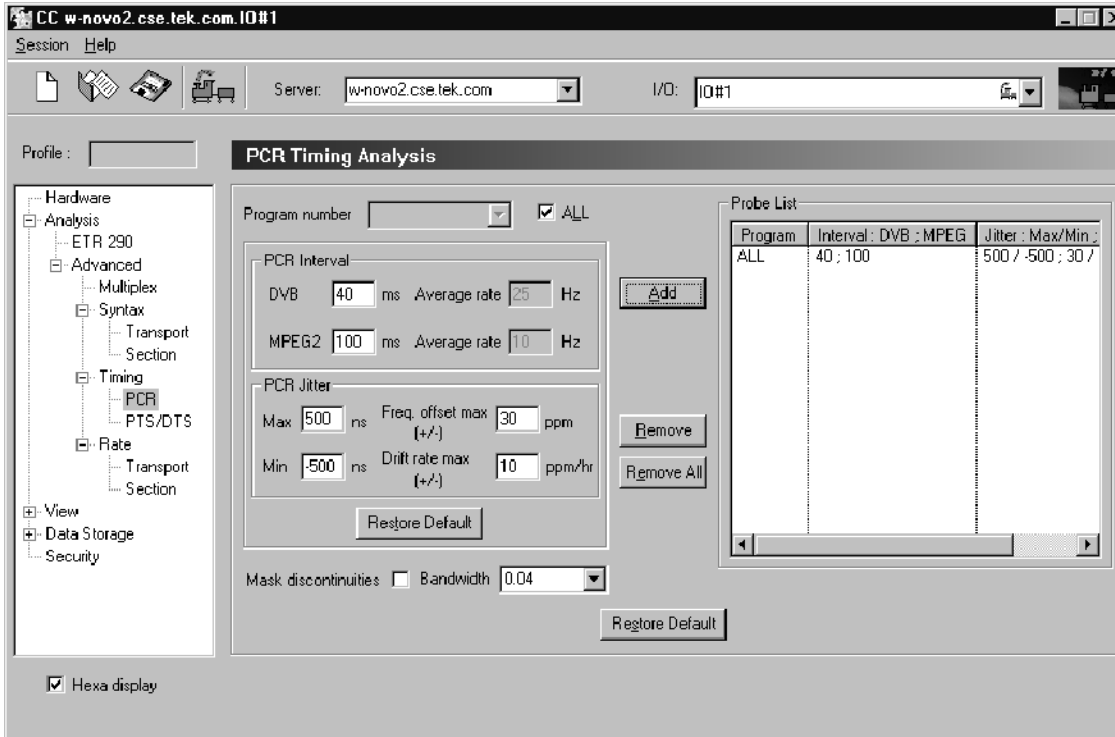
Figure 3- 35: PCR Timing Analysis configuration panel

NOTE. *The test 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 test 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 3-107 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--107 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 test 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 test 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 test 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--144 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--53.

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 3–36. 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.
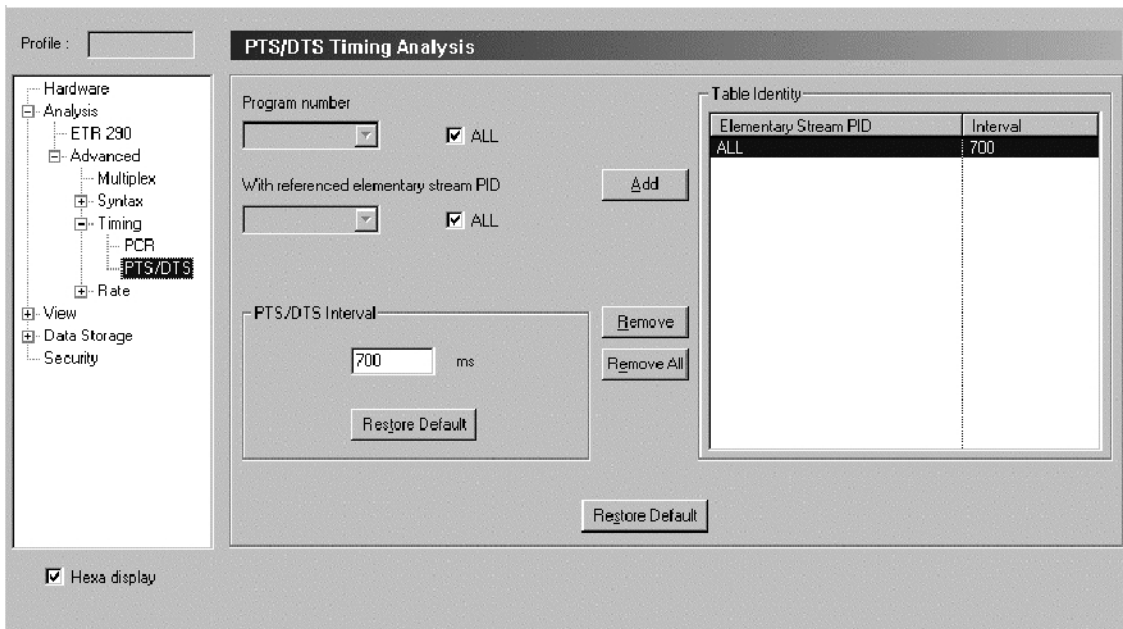

Figure 3- 36: PTS/DTS Timing Analysis configuration panel

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 3–107 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 3–107 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 3–37. Use this panel to set the STS interval probe. Refer to *Probe Operating Conventions* on page 3–107 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 3–69).*
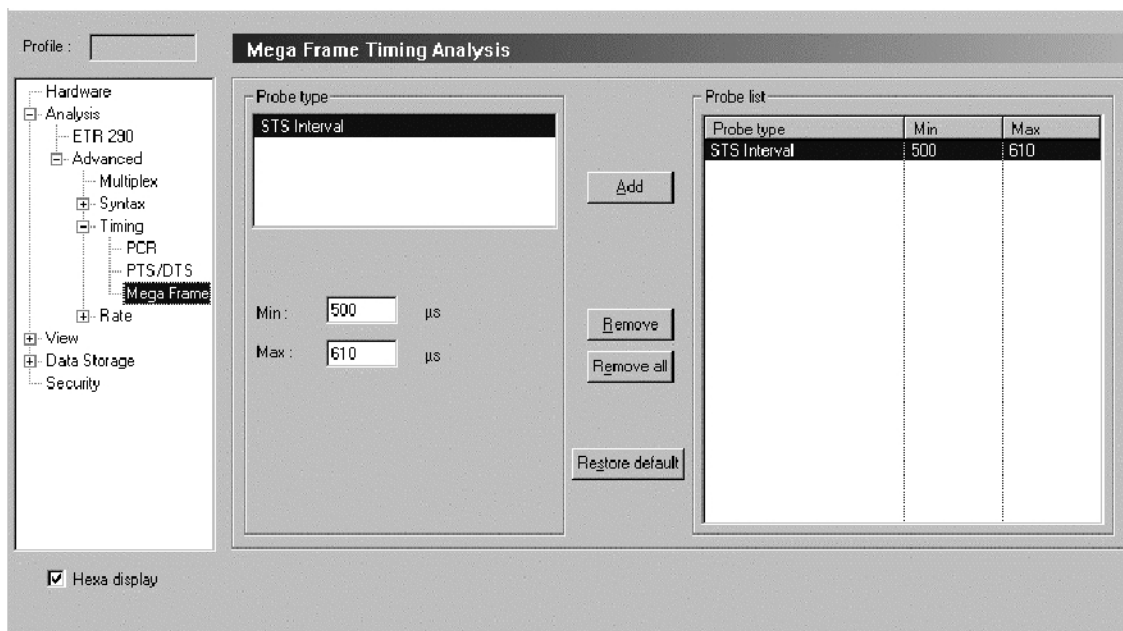
Figure 3- 37: Mega Frame Timing Analysis configuration panel

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 3-38. Refer to *Probe Operating Conventions* on page 3-107 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.
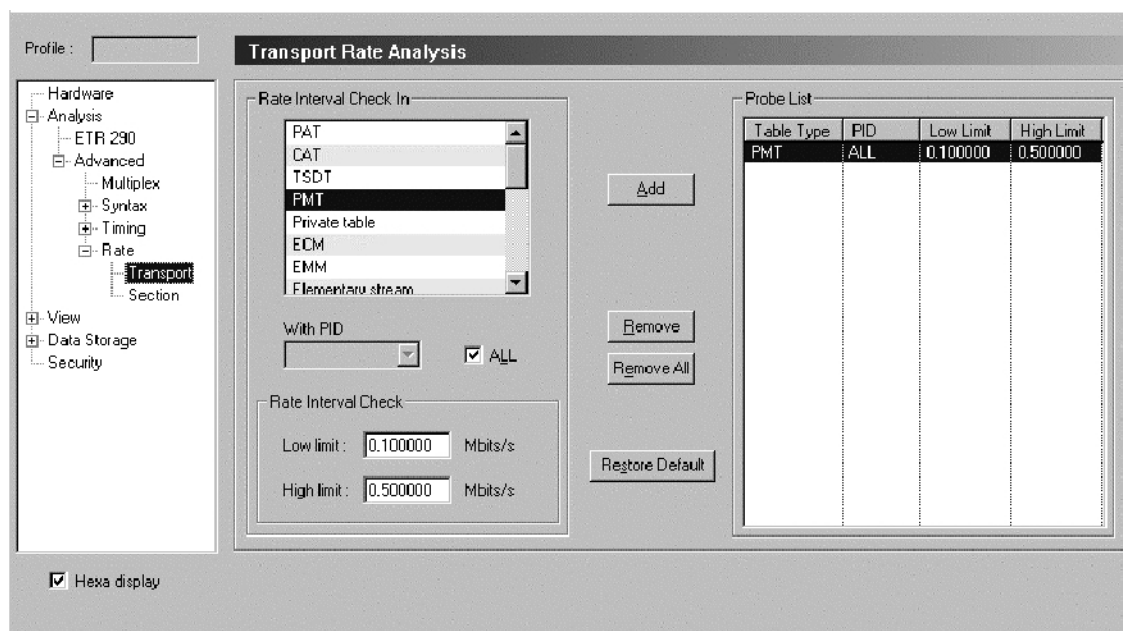
Figure 3-38: Transport Rate Analysis configuration panel

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--39. 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--71 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--69.*
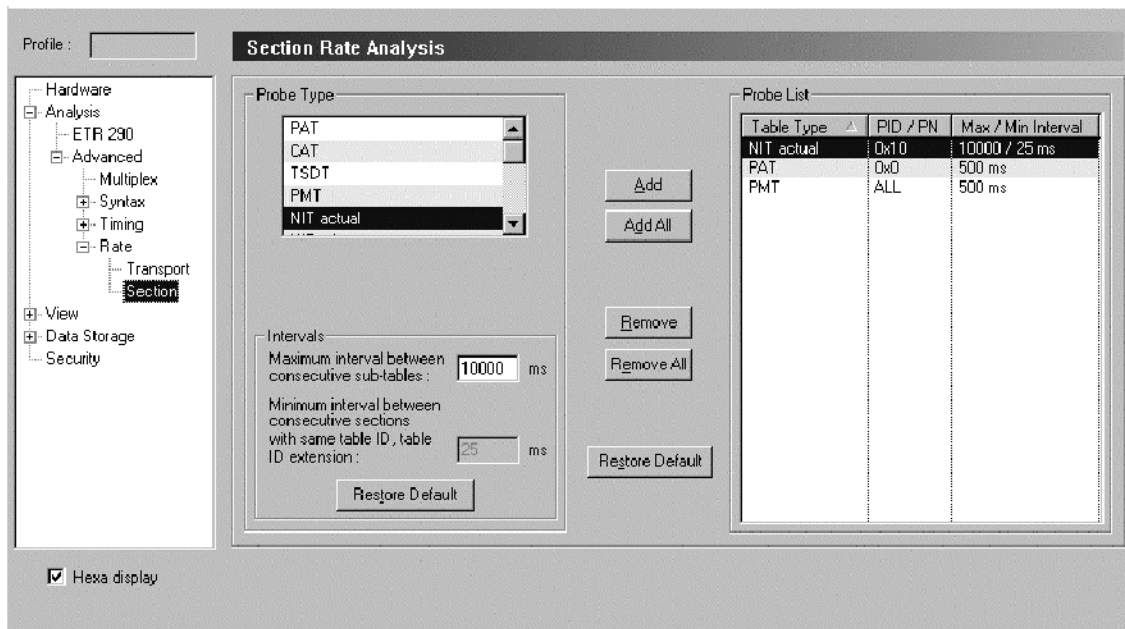
Figure 3--39: Section Rate Analysis configuration panel

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--107 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--107 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--40. 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--69).*
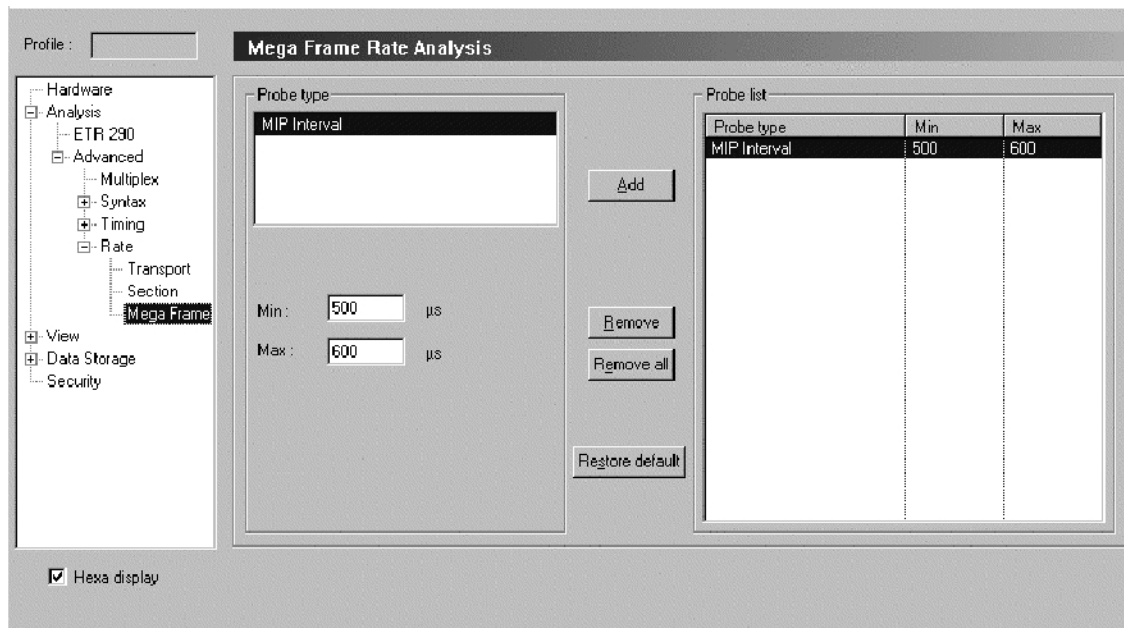
Figure 3- 40: Mega Frame Rate Analysis configuration panel

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--107 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 3-41. The Report panel allows you to set options for the way in which error messages are displayed in the Expert Client Report view.
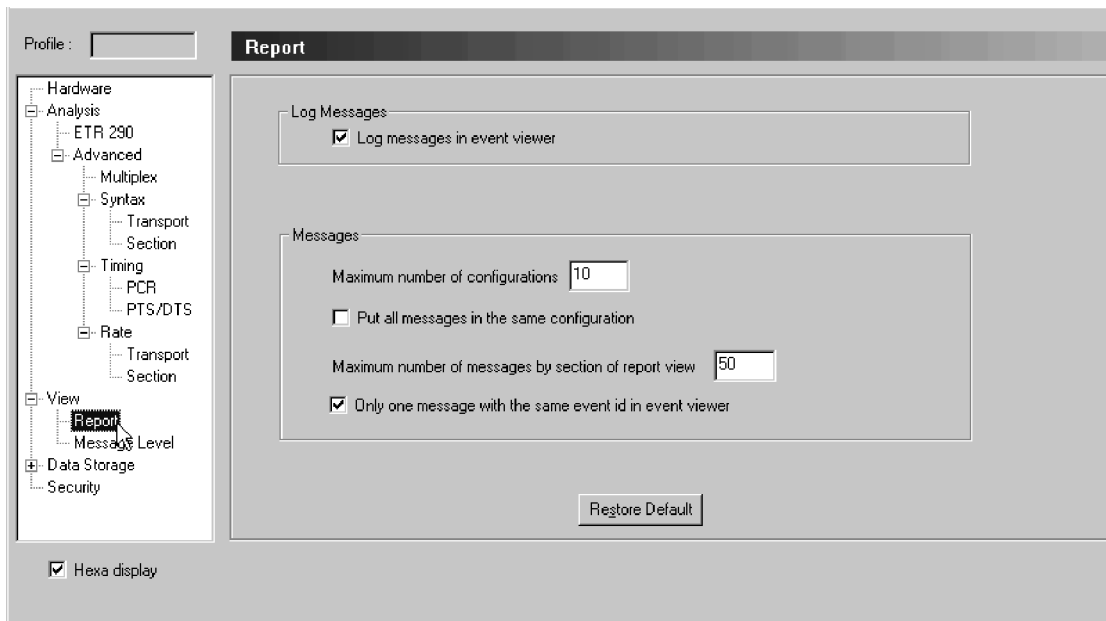
Figure 3-41: Report configuration panel

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 test system to the Windows NT Event Viewer. Clear the option to prevent RTA 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 3-32. 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 RTA 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 3-42.
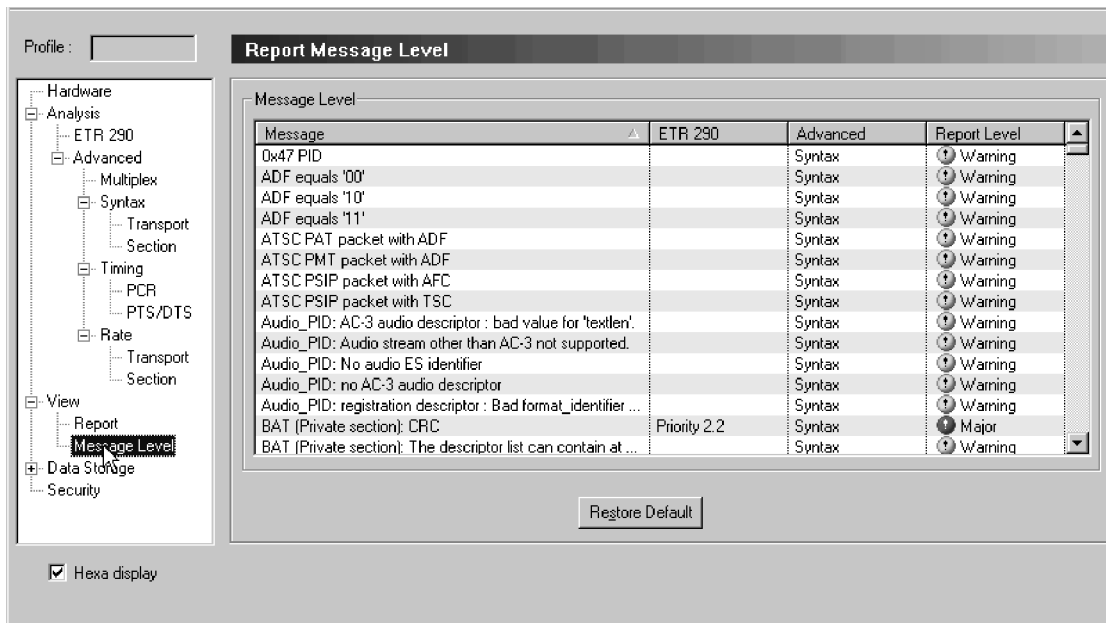
Figure 3‑42: Report Message Level configuration panel

The Report Message Level panel allows you to specify how the test system
reports each error in the Report View of the Expert Client:

- 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 MTS200 test 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 Client:

■ 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).
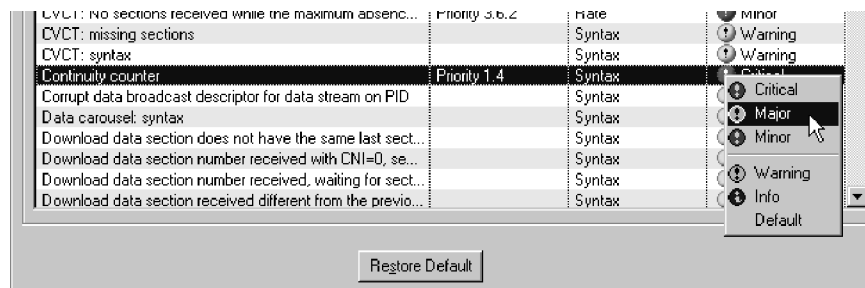
■ Left-click in the Report Level column of the test you want to modify to step through each error level in the list.

Restoring default error report levels. Use one of the following techniques to restore the default the error level reported in the Expert Client 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--43. 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.
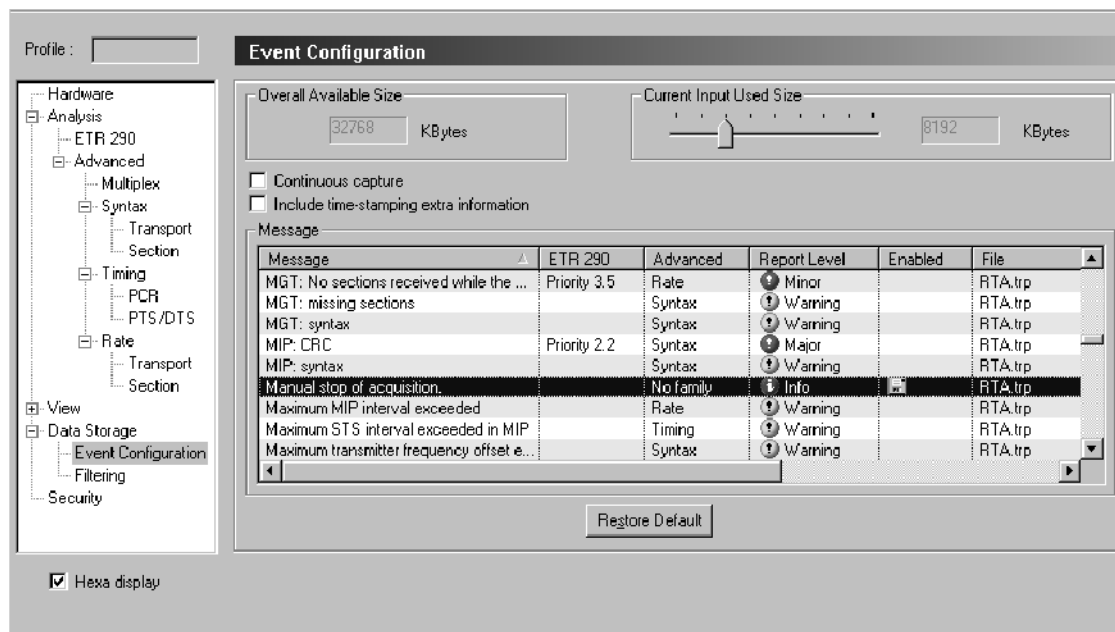
Figure 3--43: Event Configuration configuration panel

The capture file will be stored on the single shot partition of the Data Store disks (`C:\CARBO\MONO`).

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--97. The captured input file is saved as a *.TRP file, which you can later analyze using the optional MPEG-2 DVB/ATSC/ISDB-S/ARIB System Analyzer application.

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--43 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 MTS200 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 test 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 test 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 test system.

- ETR290. This column lists the ETR290 priority level for each ETR290 test performed by the test 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 a 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 MTS200 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 test 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 3–10.*

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 3–43.

To capture a user-defined transport stream event, perform the following steps:

1. Launch the Configuration Client and connect to the transport stream input you are monitoring.

    a. Double-click the Configuration client icon in the Tektronix MPEG Test System program group window, or select Configuration client from the Start menu.

    b. In the Server list box, select the IP address or host machine name of the analysis server analyzing the import stream from which you will capture input.

    c. If the host machine you are connecting to has multiple inputs, select the appropriate input from the I/O list box.

2. Open the Event Configuration panel of the Configuration Client.

3. Use the Current Input Used Size slide bar to set the size of the capture file in kilobytes. 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 KB to enable a capture.

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4. 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.
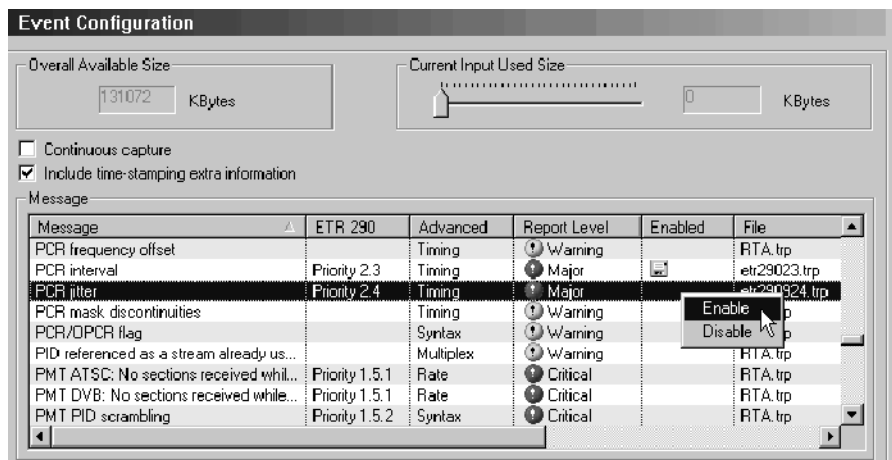
NOTE. An error condition must be detected by the Analysis Server to cause data to be captured. Always confirm that the related analysis or probe is enabled before enabling data acquisition. To confirm that a ETR 290 test is enabled, open the ETR 290 view and verify that the test indicator is colored green, orange, or red (not gray).

5. 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.
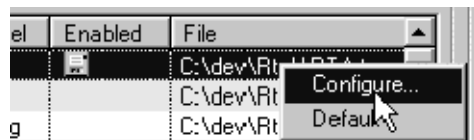
6. In the displayed Event Settings dialog box (see Figure 3–44), enter the name of the file you want to use when a portion of the stream is captured.

The captured file will be stored on the single shot partition of the Data Store disks (C:\Carb0\Mono), unless you specify an alternate location by entering the full path to the file in the Filename text box.
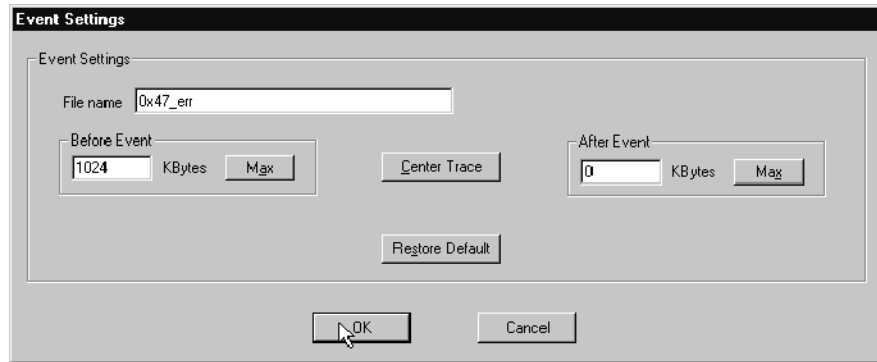
Figure 3‑44: Event Settings dialog box

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. 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.

Filtering Panel   Select Data Storage:Filtering in the Navigation panel to open the Filtering panel as shown in Figure 3-45. 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.
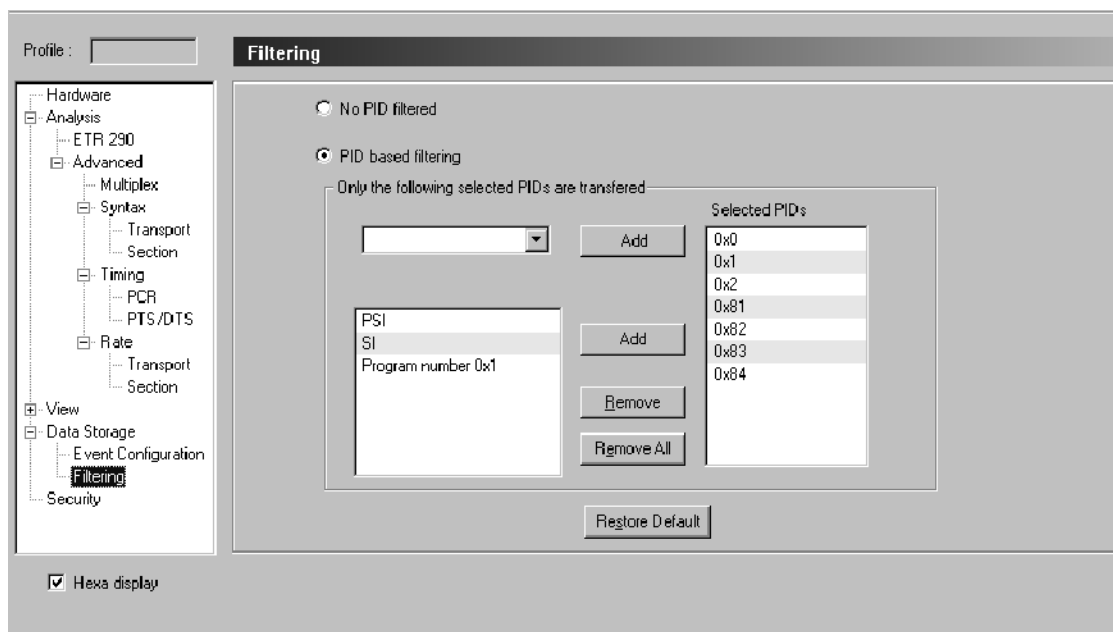
Figure 3-45: Filtering configuration panel

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 3–46). 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.
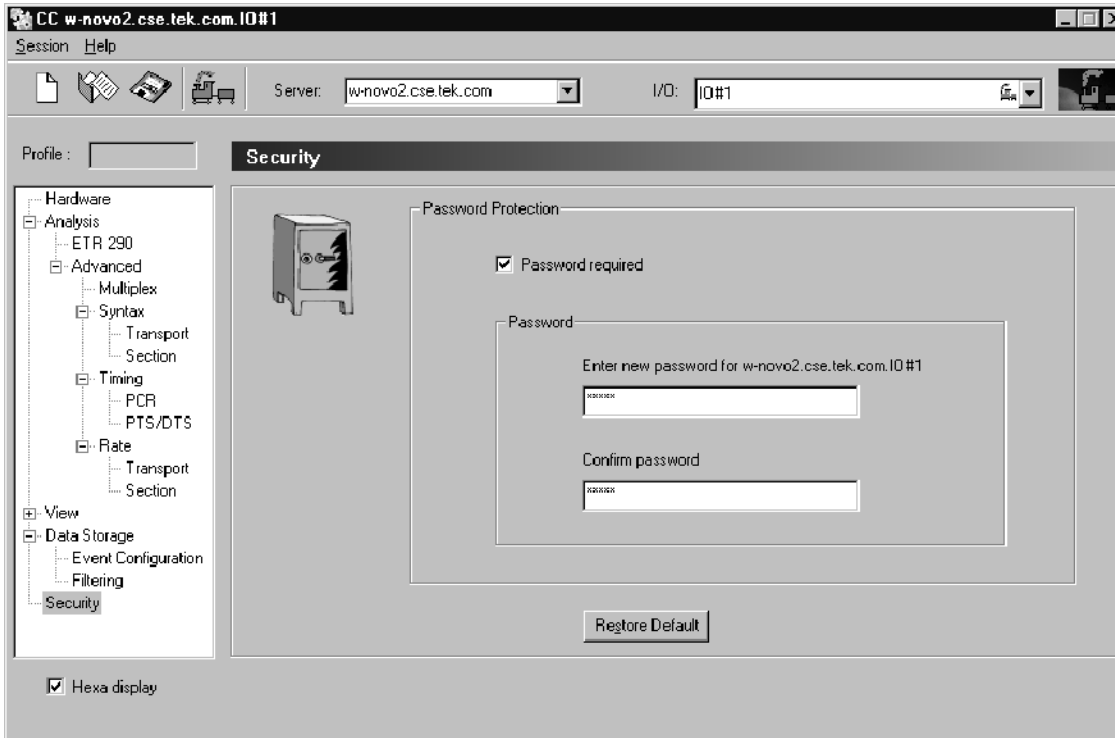
Figure 3‑ 46: Security configuration panel

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.
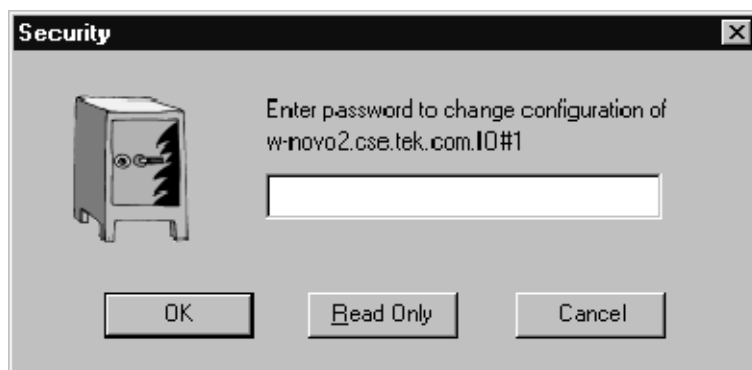
Analyses Reference

This section describes Analysis Servers and the default and user-controlled analyses performed by the MTS200 Series MPEG test 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

An Analysis Server is the process that performs the actual analyses on a transport stream input. The Analysis Server sends analysis results to the Expert client and is configured by the Configuration client.

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 3-106 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.

See the following sections for further information:

■ See *Configuration Client Reference* (beginning on page 3–61) for more information about the Configuration client.

■ See *Probe Operating Conventions* on page 3–107 for more information about using the Configuration client to set probes and probe limits.

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 3–147). Refer to *Transport Rate Analysis Panel* on page 3–87 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--61 for detailed descriptions of each panel.

This section describes basic procedures you will use to set, modify, and remove probes on the test 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 Configurations* on page 3--63 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 test 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 by double-clicking the icon the program group window.

2. Connect to the Analysis Server on your local test system by entering `localhost` in the Server text box (or to connect to a remote Analysis Server, select the host machine name or IP address on which the remote Analysis Server is running from the Server drop-down list box).

3. Select the appropriate input from the I/O drop down list box.

4. Select the desired probe in the Probe Type list of the Multiplex Analysis panel (see Figure 3-47).
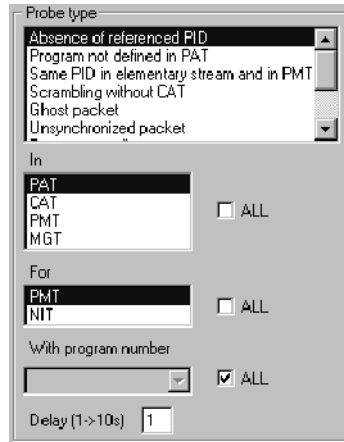
Figure 3-47: Multiplex Analysis panel, Probe Type list box

5. 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.

6. Click **Add** to add the probe to the Probe List.

7. 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.

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*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

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*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--69 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--69 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--69 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 Digicipher 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--60 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 3–71 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 3–16 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 optional MTS200 Series System Analyzer if you first capture part of the input stream to thedata store disk drives. Refer to the System Analyzer user manual for more information about performing T-STD analysis.

Table 3-16: 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 test 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	PID 0x0000 does not occur at least every 0.5 seconds A PID 0x0000 does not contain a table_id 0x00 (that is, a PAT) Scrambling_control_field is not 00 for PID 0x0000	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.a(1)	Maximum Interval Between Consecutive PAT Sections	Section Rate Analysis
1.3.a(2)	Table ID Error (PAT)	Section Syntactic Analysis
1.3.a(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 table_id 0x02 (that is, a PMT) do not occur at least every 0.5 sec on the PID, which is referred to in the PAT	ISO/IEC 13818-1: Sub clauses 2.4.3.3, 2.4.4.4, 2.4.4.8
	Scrambling_control_field is not 00 for all PIDs containing sections with table_id 0x02 (i.e. a PMT)	

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

ETR 290	Probe name	Configuration panel
1.5.a(1)	Maximum Interval Between Consecutive PMT Sections	Section Rate Analysis
1.5.a(2)	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 RTA 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 3–72).

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 Time interval between two consecutive PCR values more than 40 ms	ISO/IEC 13818-1: Sub clauses 2.4.3.4 / 2.4.3.5 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 RTA. 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.a	PCR Timing Analysis[1]	PCR Timing Analysis
2.3.b	PCR Discontinuity	

[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 3–17 on page 3–124 is an overview of the service information according to ETS 300 468. In the standard configuration, the RTAs 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 3–88). Do not change Maximum interval settings, however, if you plan to use ETR 290 tests to judge DVB compliance of the input stream.

Table 3-17: 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.a(1)	NIT Table ID Error	Section Syntactic Analysis
3.5.a(1)	SDT and BAT Table ID Error	Section Syntactic Analysis
3.6.a(1)	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.a(2)	NIT actual section rate probes	Section Rate Analysis
3.1.b	NIT other section rate probes	Section Rate Analysis
3.5.a(2)	SDT actual section rate probes	Section Rate Analysis
3.5.b	SDT other rate probes	Section Rate Analysis
3.6.a(2)	EIT actual section rate probes	Section Rate Analysis
3.6.b	EIT other 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 3-18 lists the values for service information (SI). The RTA 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 3-88). Do not change Maximum interval settings, however, if you plan to use ETR 290 tests to judge DVB compliance of the input stream.

Table 3-18: 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]

Table 3-18: SI repetition rates according to DVB (cont.)

Service information	Maximum interval (complete table)	Minimum interval (individual sections)
EIT	2 s[2]	25 ms
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, re-served_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 3-72 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 3-19 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 3-69).

Table 3-19: 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.a	All
Unsynchronized packet		1.2	All
Table ID	PAT	1.3.a(2)	All
	CAT	2.6(2)	All
	NIT	3.1.a(1)	All
	TSDT	—	All
	SDT	3.5.a(1)	DVB only
	EIT	3.6.a(1)	DVB only
	RST	3.7	DVB only
	TDT	3.8(2)	DVB only
	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

Absence of Referenced PID Probe

Error Condition: reports an error if the time interval between a PID reference in a PAT, CAT, PMT, or DCT and the appearance of that PID in the stream exceeds the period of delay (1 to 10 seconds) you specify.

Associated ETR 290 recommendation: PID_error, 1.6.

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.

Program Not Defined in PAT Probe

Error Condition: Reports an error if a PMT program number is not defined in the PAT.

Associated ETR 290 recommendation: None.

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

Same PID in Elementary Stream and in PMT Probe

Error Condition: Reports an error if a PMT and an elementary stream are identified with the same 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.

Scrambling without CAT Probe

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.

Associated ETR 290 recommendation: CAT_error, 2.6.1.

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.

Ghosts Packet Probe

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.

Associated ETR 290 recommendation: Unreferenced_PID, 3.4.

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.

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 Unsynchro 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 3‑20: Table ID analyses

Table ID analysis error	ETR 290
PAT error: PAT 0 with table_id different to 0x0	1.3.a(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.a(1)
SDT error: PID with 0x11 table_id other than 0x42, 0x46, 0x4A (BAT), or 0x72 (ST)	3.5.a(1)
EIT error: PID with 0x12 table_id other than 0x4E – 0x6F or 0x72 (ST)	3.6.a(1)
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 3‑69). Refer to the InterSI sections on page 3‑131 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 RTA checks the PMT, NIT, BAT, EIT and SDT for the presence of mandatory descriptors and checks all descriptors for compliance with DVB standards.

The RTA 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 3-69).

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 3-69).

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 3-69).

Error Condition: Reports an error if the Analysis Server detects problems of consistency with the method specified by the program paradigm. Refer to *Appendix D: 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 3-69).

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 3-69).

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 MTS200 Series MPEG test 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 3-135)

- Transport syntax analyses (beginning on page 3-136)

- Section syntax analyses (beginning on page 3-140)

- Mega Frame syntax analyses (DVB-T only) (beginning on page 3-142)

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

When the RTAs 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 3-50).

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 3-76 for information about using the Transport Syntactic Analysis panel.

- Refer to *Section Syntactic Analysis Panel* on page 3-78 for information about using the Section Syntactic Analysis panel.

- Refer to *Mega Frame Syntactic Analysis Panel* on page 3-80 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--105 and *Analysis Panel* on page 3--69).

  When you select Map private section as DVB section (a check appears in front of the option), the RTA 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 C: 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 3–21 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 3-69).

Table 3‑21: 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.a(3)	All
PMT PID with TSC	1.5.a(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

Error Condition: Reports an error if a packet with PID 0x47 is received.

*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.*

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).

Reserved (PAT, CAT, and Null Packet) PID with TSC Probe

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.

Associated ETR 290 recommendation: PAT_error, 1.3.3.

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.

PMT PID with TSC Probe

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.

Associated ETR 290 recommendation: PMT_error, 1.5.2.

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).

Continuity Counter Probe

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).

Associated ETR 290 recommendation: Continuity_count_error, 1.4.

NOTE. The Continuity Counter panel displays detected errors on a per-service basis. Refer to Continuity Counter panel on page 3–43 for more information about this panel.

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).

PCR/OPCR Flags Probe

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).

Associated ETR 290 recommendation: None.

How/where an error is reported in the Expert Client: An error message in the appropriate Message view(s).

Null Packet with ADF Probe

Error Condition: Reports an error if the Analysis Server detects a null packet that has an adaptation field.

Associated ETR 290 recommendation: None.

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

ADF Flags Probe

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:

- 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.

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).

Transport Error Indicator Probe

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.

Associated ETR 290 recommendation: Transport_error, 2.1.

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 *TP Error Indicator Panel* on page 3–45).

PAT PID with AFC & DI Probe (ATSC only)

This analysis probe appears only when the analysis type setting is set to ATSC (refer to *Analysis Panel* on page 3-69).

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.

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).

PMT PID with AFC & DI Probe (ATSC only)

This analysis probe appears only when the analysis type setting is set to ATSC (refer to *Analysis Panel* on page 3-69).

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.

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).

PSIP Tables PID with TSC Probe (ATSC only)

This analysis probe appears only when the analysis type setting is set to ATSC (refer to *Analysis Panel* on page 3-69).

Error Condition: Reports an error if the Analysis Server detects PSIP table packet PID with a transport_scrambling_control field that does not equal 00.

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).

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 3-69).

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 3-69).

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 3-22 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 3-69).

Table 3-22: Section syntax analyses

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

The RTA notes the presence and nature of each section syntax error in the section analysis view. Refer to *Section Syntactic View* on page 3-50 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, PSIP, ISDB-S/ARIB 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, ISDB-S/ARIB section 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 RTA also notes the presence and nature of each section syntax error in the section analysis view. Refer to *Section Analysis View* on page 3–50 for information about the section analysis view.

Mega Frame Syntax Probe Descriptions

Table 3‑23 lists the Mega Frame syntax analyses, the associated ETR 290 recommendation and the analysis type selected when the probe is available.

Table 3‑23: 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 3‑69 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 3‑80 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 3–144)

- PTS/DTS timing analyses (beginning on page 3–145)

- Mega Frame timing analysis (DVB-T only) (beginning on page 3–146)

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 RTA 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 3–82).*

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 3–82 for information about using the PCR Timing Analysis panel to set PCR probes.

NOTE. The test system 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 test system 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 3–84 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 3–56 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 3–84 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 RTA 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 3–80).

Transport Rate Probe Descriptions

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

The RTA calculates transport rates every 500 ms, but uses a smoothing period for transport rate averaging. In the default configuration, the RTA 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 3-69 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 RTA 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 3-37 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 3-40 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 3-44 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 3-87 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 3-88 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 3-52 for more information about using the Section Rate view.

Table 3-24 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 3-69).

Table 3-24: Section rate analyses

Analysis probe	ETR 290	Analysis type
Maximum interval between consecutive PAT sub-table sections	1.3.a(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.a(1)	All
Maximum interval between consecutive NIT sub-table sections. Two probes are available: NIT actual and NIT other.	3.1.a(2)	DVB and DVB-T
Maximum interval between consecutive SDT sub-table sections. Two probes are available: SDT actual and SDT other.	3.5.a(2)	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.a(2)	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 SIT sub-table sections	—	DVB and DVB-T
Maximum interval between consecutive DIT 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 BIT sub-table sections	—	ISDB only
Maximum interval between consecutive DCT sub-table sections	—	ISDB only
Maximum interval between consecutive DLT sub-table sections	—	ISDB only
Maximum interval between consecutive SDTT sub-table sections	—	ISDB only

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 3–24 for a list of section rate probes.

Associated ETR 290 recommendation: Refer to Table 3–24 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 3–90).

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: Networking

This appendix provides the following information:

- Network requirements for the Tektronix MTS200 Series 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 *MTS200 Series 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 MTS200 Series 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

Host machines 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 B-1.
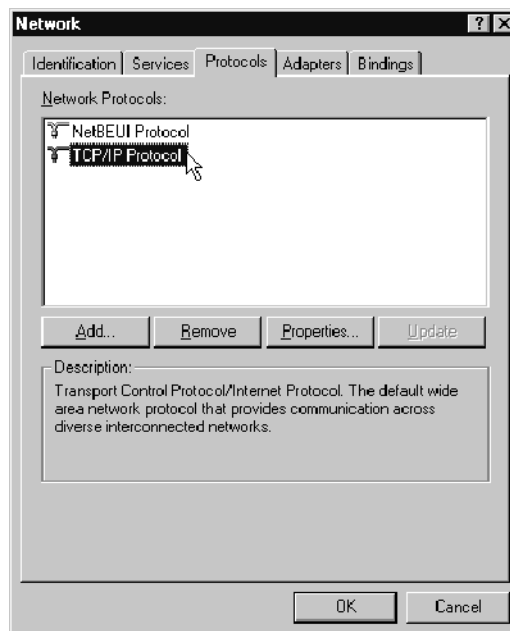
Figure B-1: Network dialog box showing TCP/IP Protocol item

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 B-2 on page B-4.

Set IP Address tab parameters.

5. Set the following IP Address tab parameters as shown in Figure B‑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.
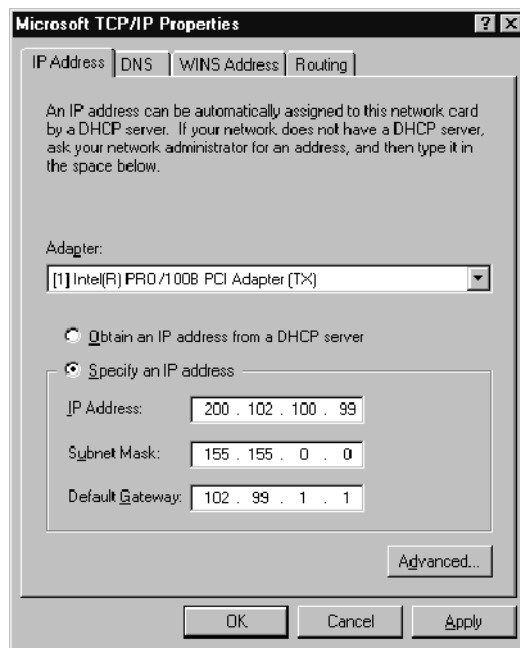
Figure B‑2: IP tab parameters

Incorrect values for any one of these parameters can make your test system behave unpredictably over a network. See *IP Parameters* beginning on page B‑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 B–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.
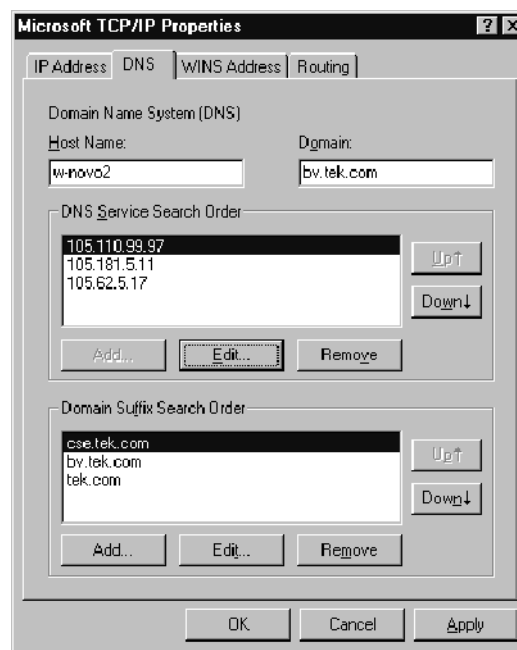
Figure B‑3: DNS tab parameters

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 MTS200 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 OpenMux (MTS205 and MTS215, 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 MTS200 Series for use on the network as described in *Network Requirements* on page B-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 B-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.
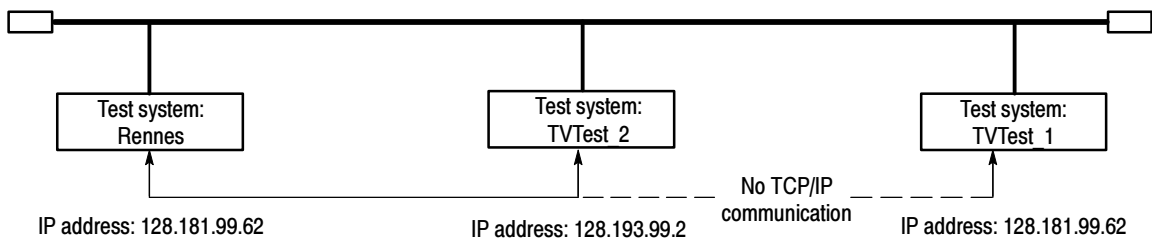
Figure B-4: Incorrect IP address

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 B-5 shows a simple (and fairly common) subnet mask problem.

In Figure B-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.

IP address: 128.181.96.201
Subnet mask: 255.255.255.0

Router

Test system:
Carnac

No TCP/IP
communication

Test system:
Rennes

Test system:
TVTest_2

Test system:
TVTest_1

IP address: 128.181.99.82
Subnet mask: 255.255.255.0

IP address: 128.181.99.72
Subnet mask: 255.255.255.0

IP address: 128.181.99.62
Subnet mask: 255.255.0.0
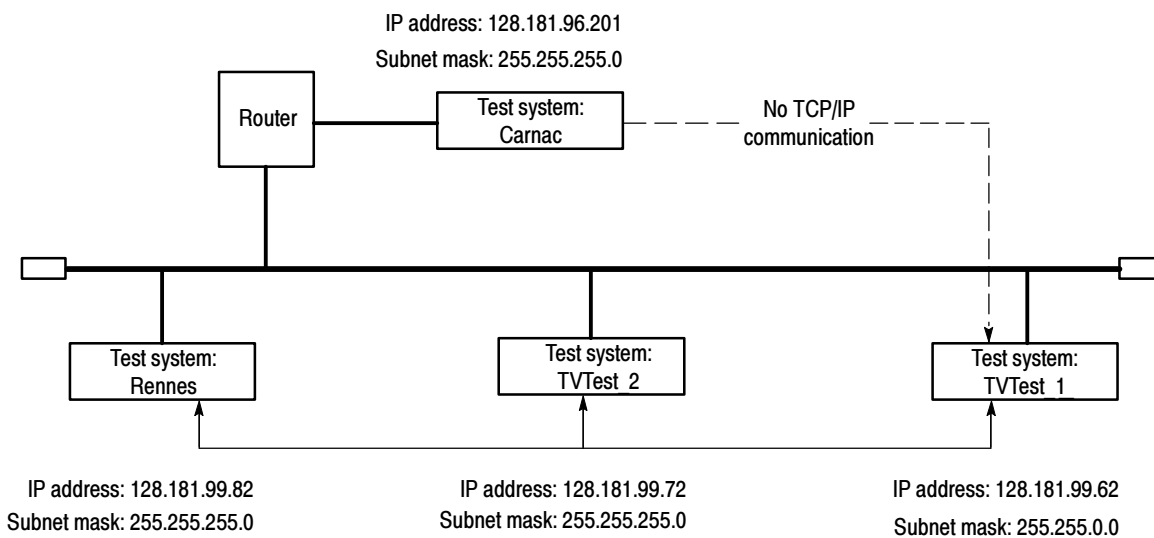
Figure B-5: Incorrect subnet mask

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).
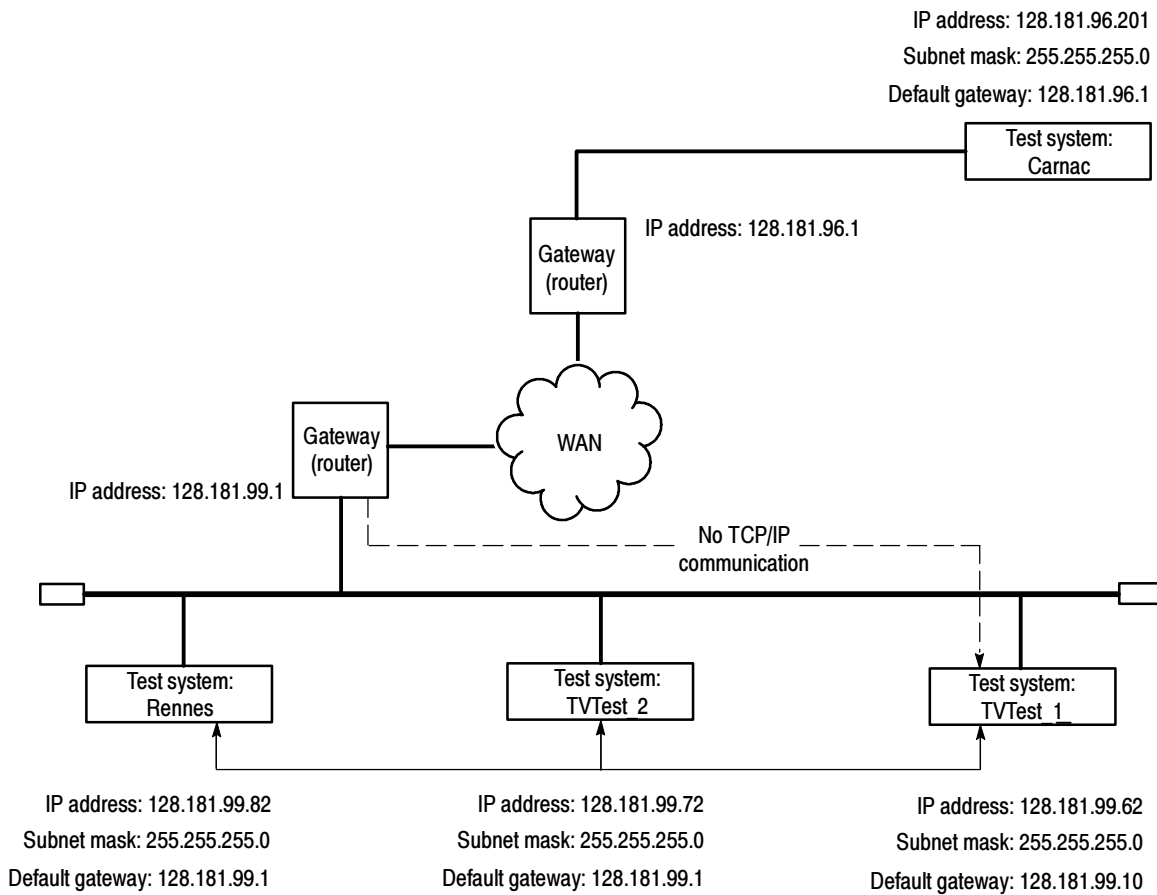
Figure B-6: Incorrect default gateway IP address

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 analysis 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.
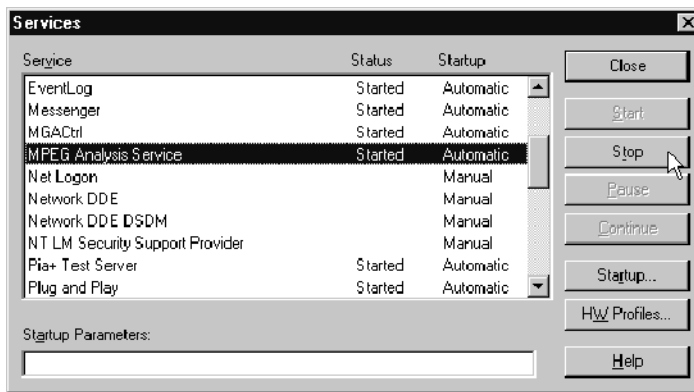
5. Click **Yes**, in the message box that appears. Notice the server icons in the system tray (the lower left of the standard test system desktop) disappearing.

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:
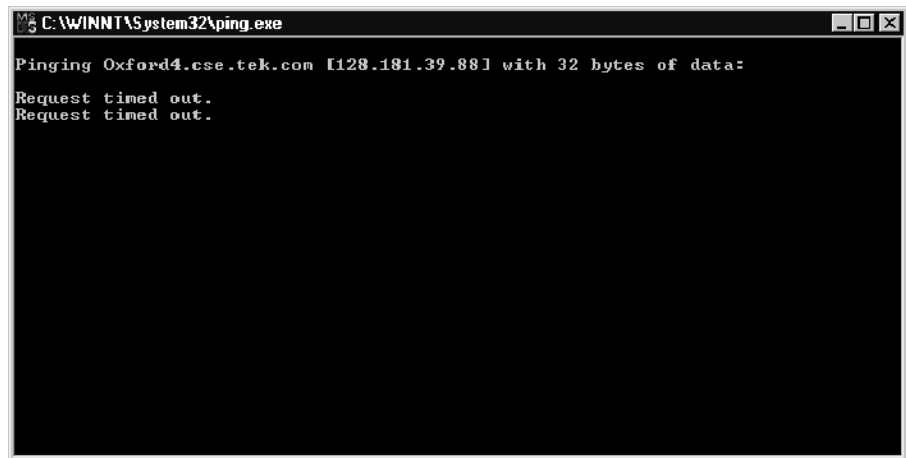
   `ping machineName`

   `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 B--7 the destination machine (Oxford4) is not responding.

Figure B-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 B-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:

  1    <10 ms    <10 ms    <10 ms   rs39aU106.ens.tek.com [128.181.240.2]
  2    <10 ms    <10 ms    <10 ms   r19a.ens.tek.com [128.181.1.2]
  3    <10 ms    <10 ms    <10 ms   r63a.ens.tek.com [192.65.3.6]
  4    <10 ms    <10 ms    <10 ms   rs63a.ens.tek.com [134.62.1.3]
  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 B-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 B-9.

Figure B-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 C: Using the Private Syntax Interpreter

You can use the Private Syntax Interpreter to create and compile private syntax definitions for use with the MTS200 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 3–74 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:

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 test 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.
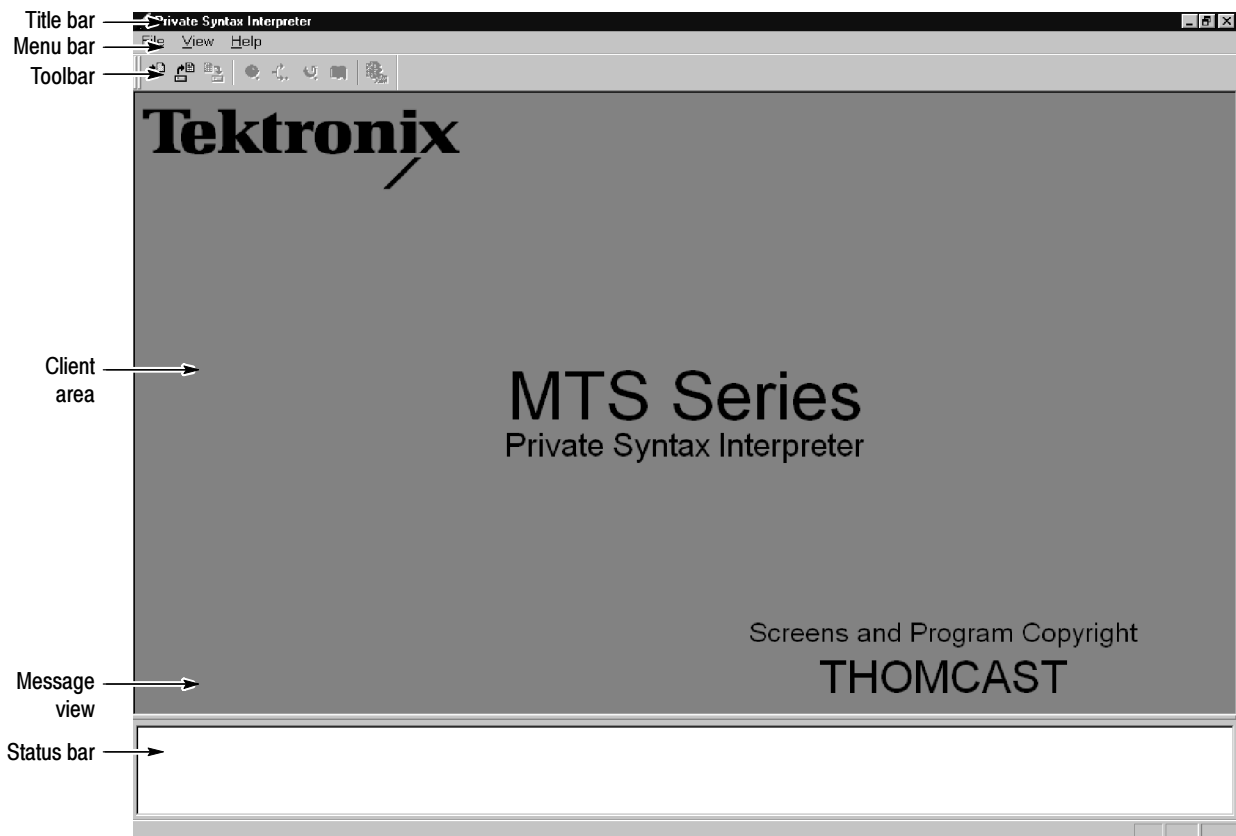
The Private Syntax Interpreter window contains the following elements:

■ 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 C–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 C–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 C‐1 describes the menu selections available in the File menu.

Table C‐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 C‐2 describes the menu selections available in the Edit menu.

Table C‐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 C–3 describes the menu selections available in the View menu.

Table C- 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 C–4 describes the menu selections available in the Window menu.

Table C- 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 C–5 describes the menu selections available in the Help menu.

Table C- 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 C-6 describes the functions available in the toolbar.

Table C-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.
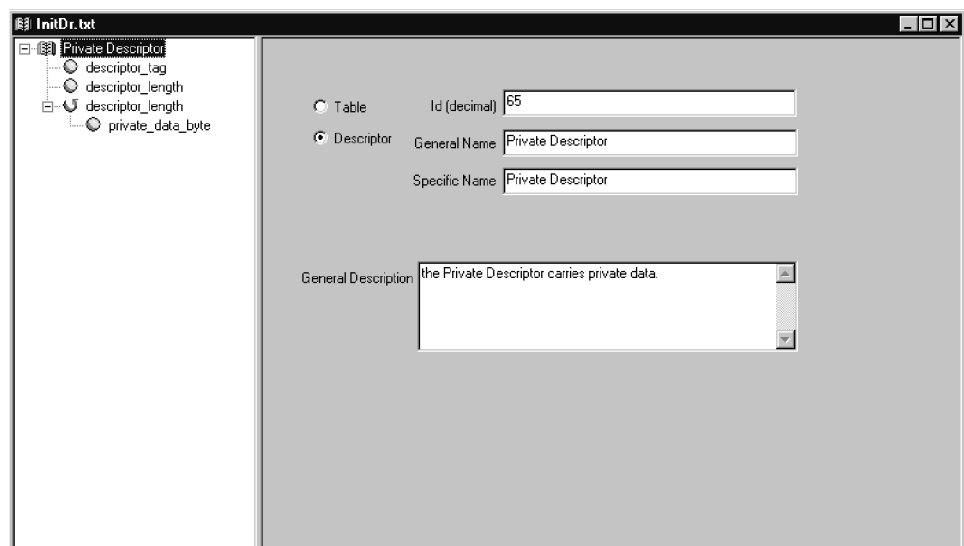
Hierarchic View. The Hierarchic view displays all the items related to making a table/descriptor pattern as well as the labels associated to each item. An item can be the root of the table/descriptor pattern, a field of the private syntax, a loop of items, a conditional branch of items, or a descriptor space reservation.
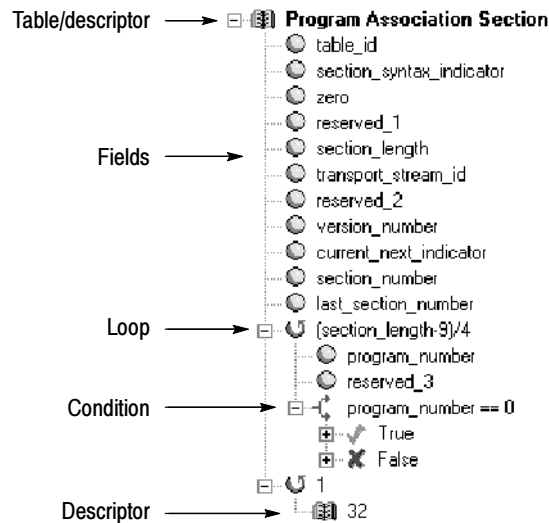
Table C-7 lists the icon types found in the Hierarchic view and the meaning of their associated labels.

Table C-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.
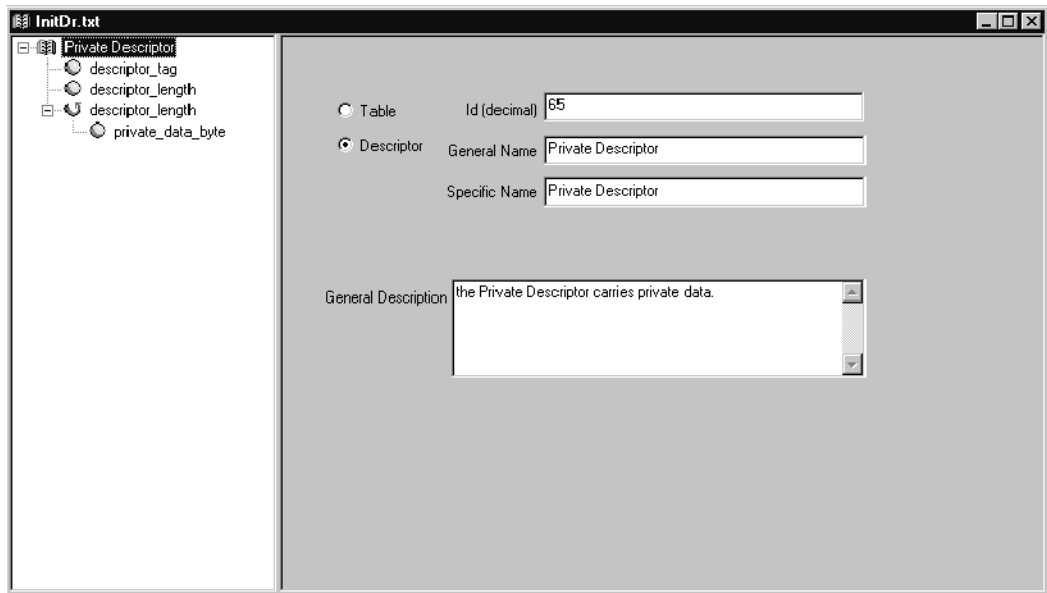
Field Panel. The Field panel (shown at the top of the following page) appears in the Characteristics view when you select a field icon in the Hierarchic view. This panel allows you to enter the unique **Field Id**. The panel provides the **Length** in bits of the field. In addition, the **Name** and **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 uimsbf).

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.
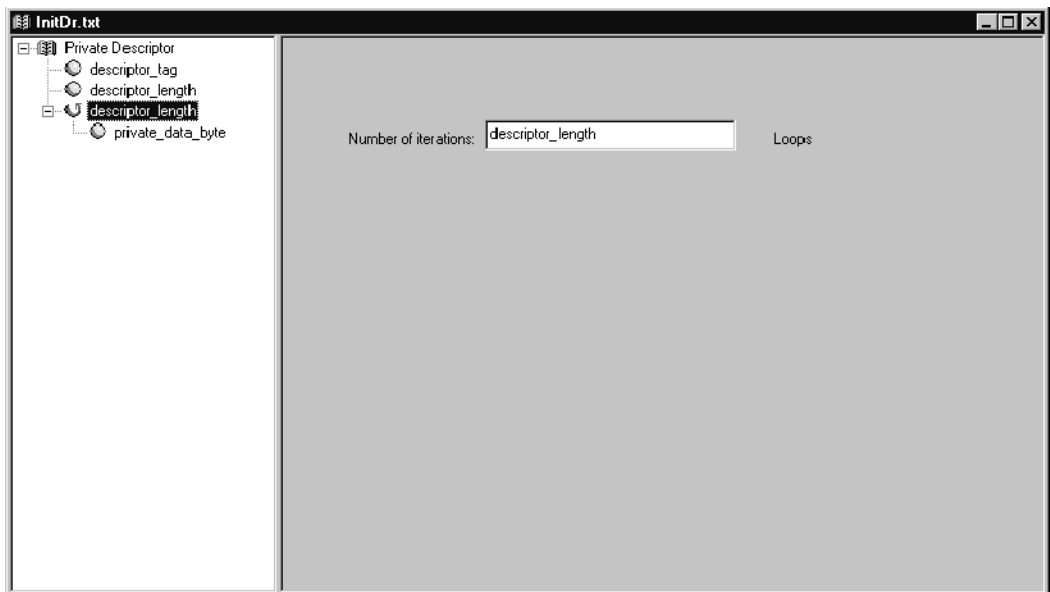
Message View   The Message view (as shown below) appears on the bottom of the application window when you compile the private syntax you are editing.

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.
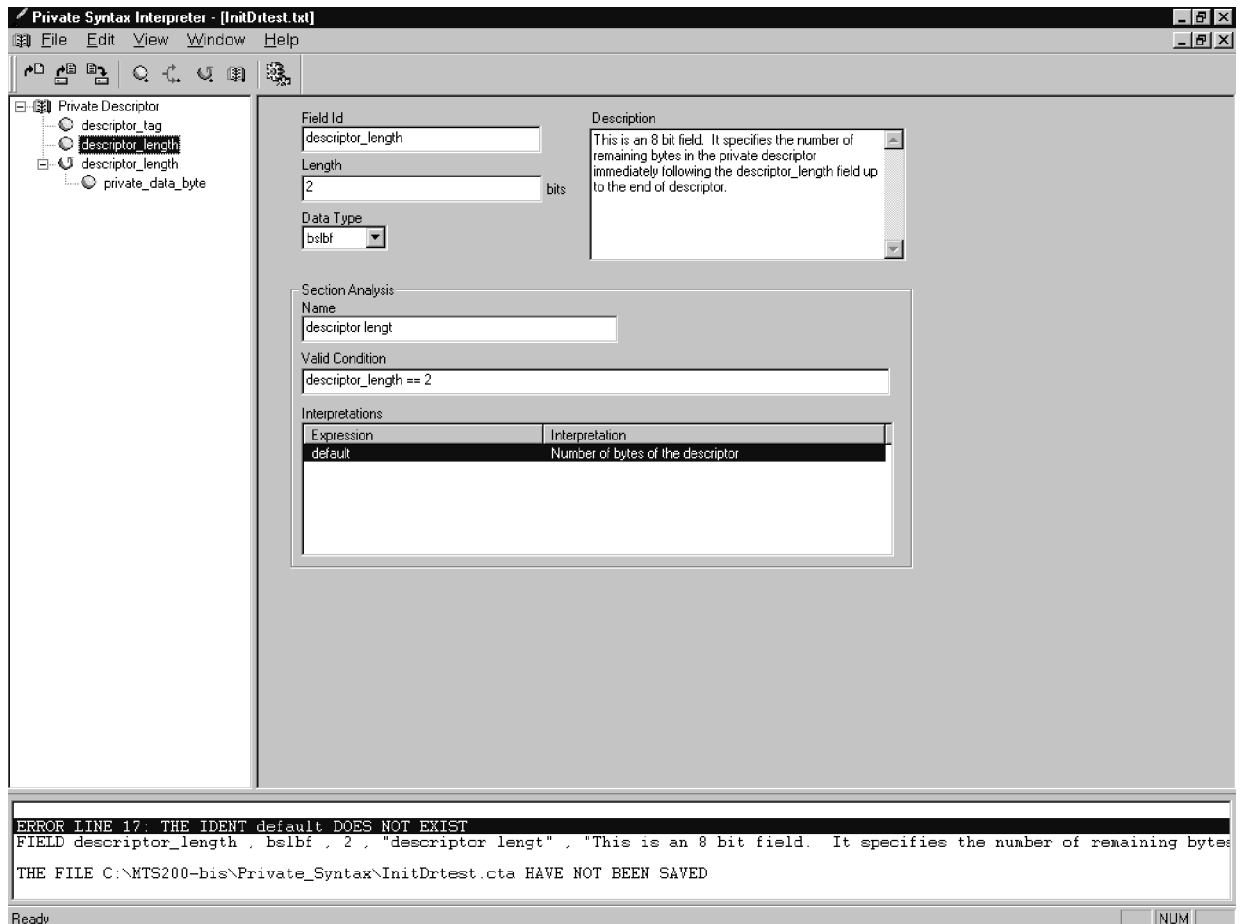
Editing Private Syntax Definitions

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 C-6). The following **New Table/Descriptor** dialog box appears.
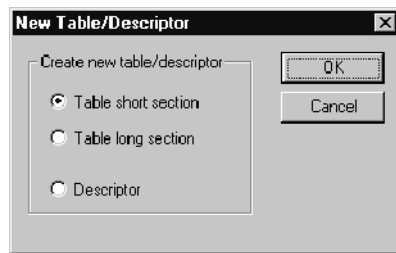
Select **Table short section** to define a new short private section syntax with the section_syntax_indicator field set to 0.

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 C-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 C-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.
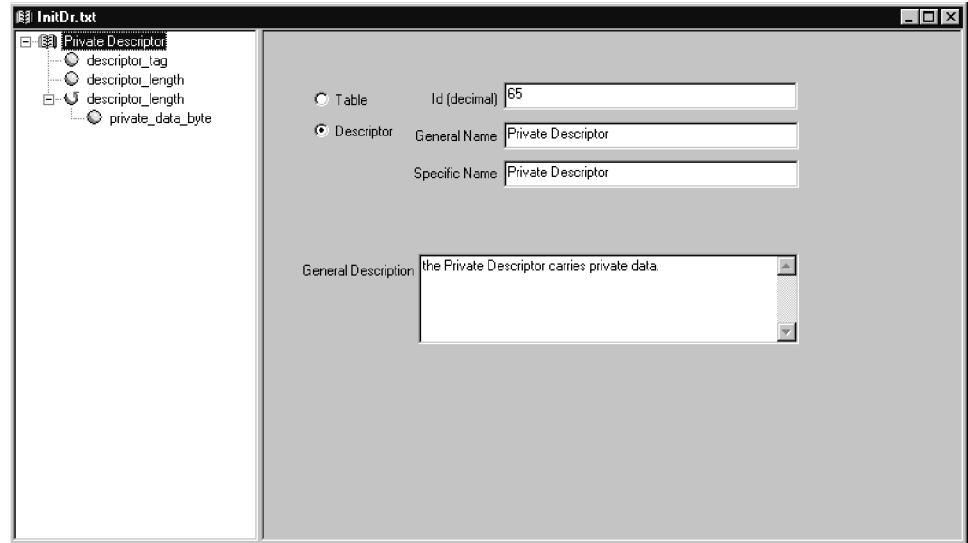
To completely expand the Hierarchic view, press the numeric keypad asterisk (*) key. To expand hierarchy items designated with a + symbol, click the symbol. The long private section, short private section, and descriptor template hierarchies expand as shown below.

The private syntax hierarchies are consistent with the ISO/IEC presentation of section syntax (refer to Table C–13 on page C–24). Use standard Windows NT mouse and cursor-key techniques to navigate within the hierarchies.

Table long section

- Private Section
  - table_id
  - section_syntax_indicator
  - private_indicator
  - reserved
  - private_section_length
  - table_id_extension
  - reserved_2
  - version_number
  - current_next_indicator
  - section_number
  - last_section_number
  - private_section_length - 9
    - private_data_byte
  - CRC_32

Table short section

- Private Section
  - table_id
  - section_syntax_indicator
  - private_indicator
  - reserved
  - private_section_length
  - private_section_length
    - private_data_byte

Descriptor

- Private Descriptor
  - descriptor_tag
  - descriptor_length
  - descriptor_length
    - private_data_byte

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.
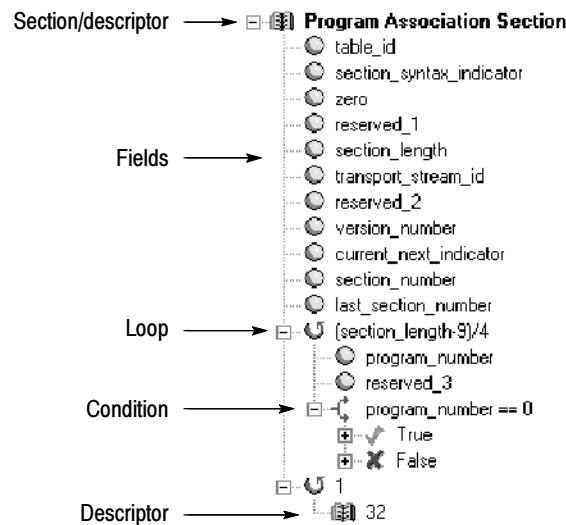
To add a new item to the section or descriptor, select (highlight) the hierarchy item that is to be the parent of the new item. Then choose **Add Field** from the Edit menu or click the **Add Field** toolbar button (refer to *Toolbar* on page C‑6). Table C‑8 lists the position in the hierarchy that added items appear.

Table C‑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.
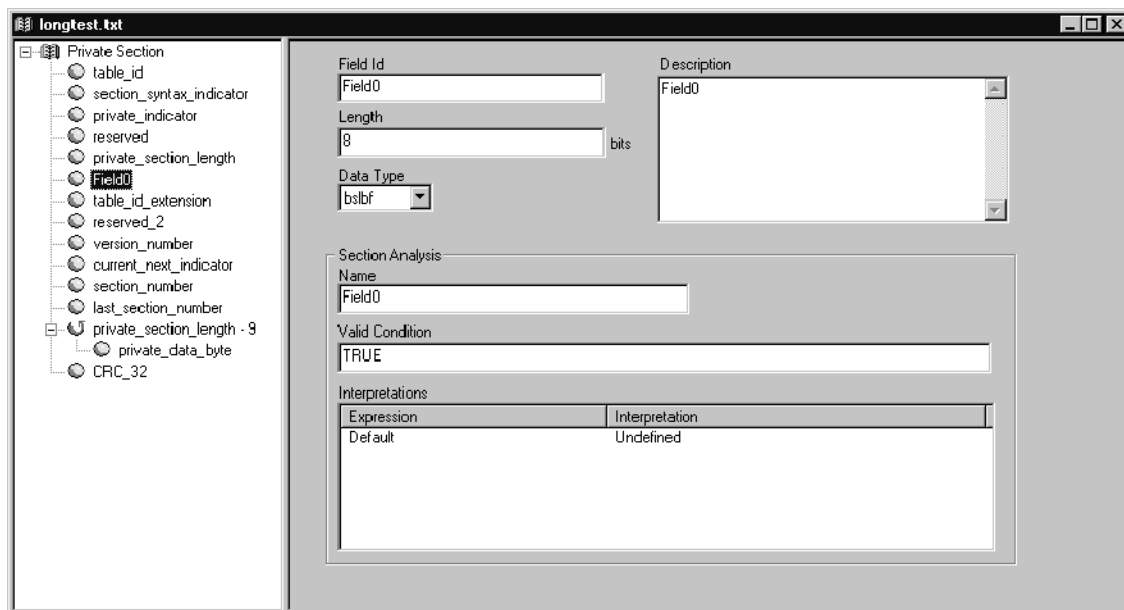
When you add a field hierarchy item, the Field panel appears in the Characteristics view as shown above. The default parameters for added field items are listed in Table C–9.

Table C‑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 C-10. These are the different data types supported by digital television standards and the application.

Table C-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 C-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 C-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 C-12 lists examples of interpretation expressions with their definitions.

Table C-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.
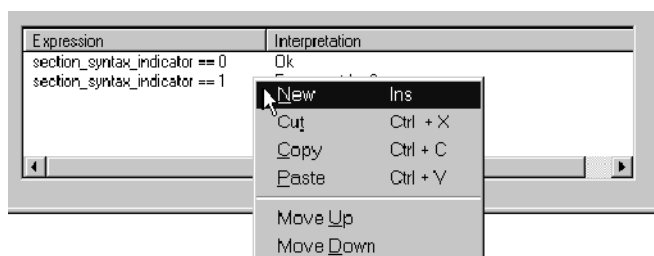
A new, default interpretation appears immediately after the selected item. Because the Analysis Server checks conditions in top-to-bottom order, you may want to move the new condition/interpretation pair below one or more of the existing entries.
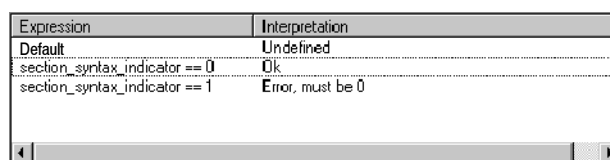
Changing Interpretation Order. To change the interpretation order within a field, right-click on the background of the list of interpretations box, and choose **Move Up** or **Move Down** from the menu**.**
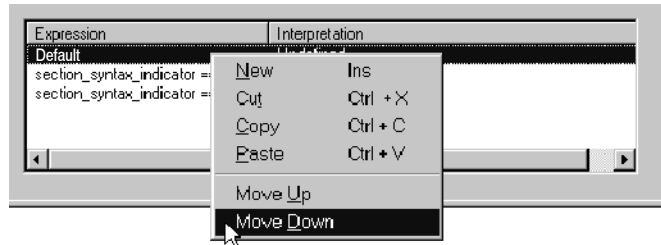
The selected condition/interpretation moves down one position as shown below. You can reselect the item and repeat the command to move the item to the bottom of the list.
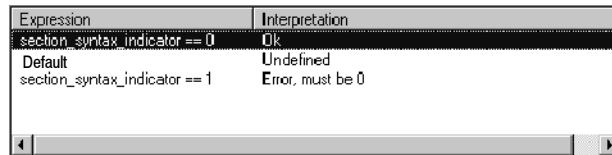
Editing an Expression/Interpretation. Click once on an expression/interpretation line to select it. Click on the expression or interpretation portion of the selected expression/interpretation to position the cursor at the end of the expression or interpretation and to enable text entry as shown below. You can then double-click a word to select it.
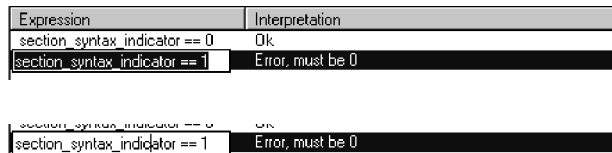
Once you have selected the expression or interpretation text to edit, you can right-click to open a shortcut menu. You can use the **Cut**, **Copy**, **Paste**, **Delete**, and **Select All** commands to edit the selected text. The **Undo** command lets you undo the previous text-editing action.

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 C-6). The default **Valid condition** is TRUE.
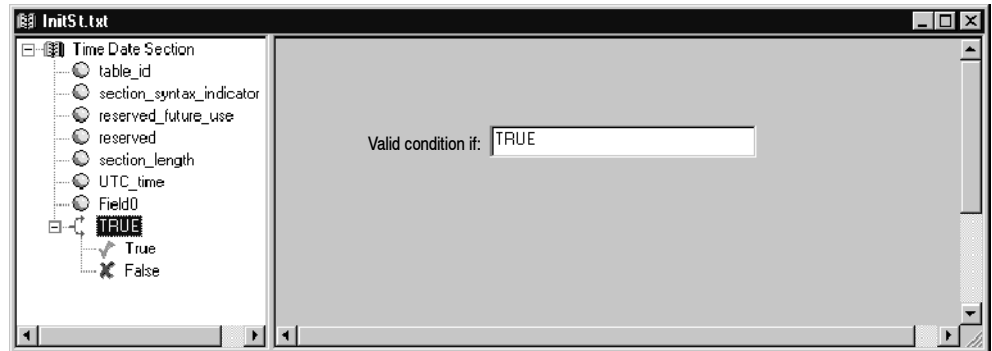
Adding a New Loop. To add a new loop, select **Add Loop** from the Edit menu or click the **Add Loop** toolbar button (refer to *Toolbar* on page C-6). The default **Number of iterations** is 1 loop.
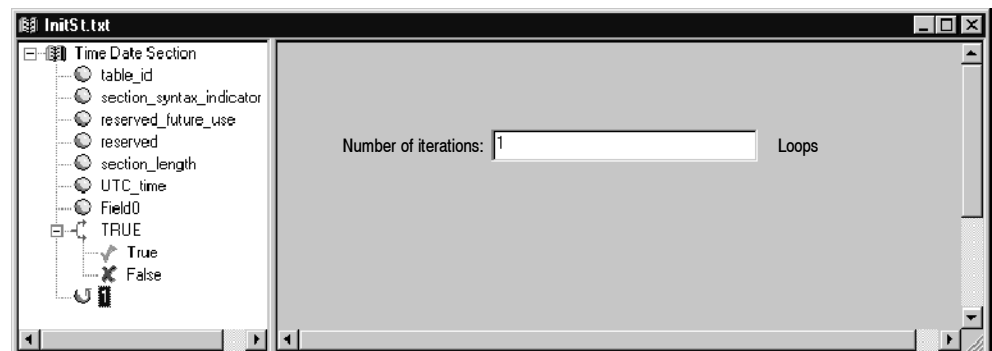
Adding a New Descriptor. To add a new descriptor, select **Add Descriptor** from the Edit menu or click the **Add Descriptor** button (refer to *Toolbar* on page C-6). The default **Descriptor Size** is 8 bytes.
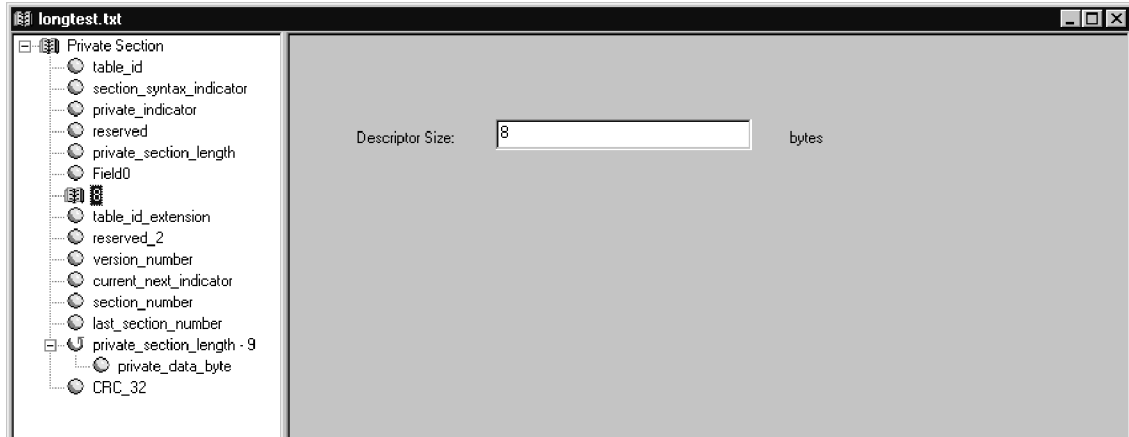
Changing the Hierarchy. Items or branches of the hierarchy can be moved within the hierarchy by selecting and dragging the associated icon.

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 C-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 C-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.

2. Select **Analysis:Advanced:Syntax** in the Navigation frame to open the Syntactic Analysis configuration panel (shown below).
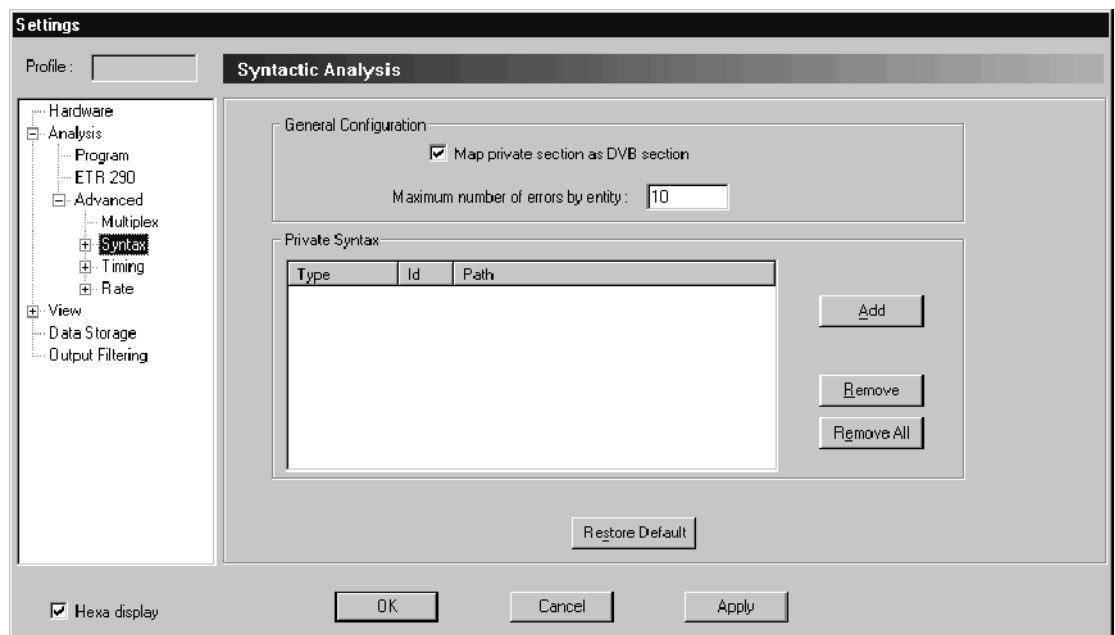
3. Click **Add**. A standard Windows **Open** window appears, with only .cta files displayed.

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.

8. Open a section analysis view of the appropriate table. Refer to *Section Analysis View* on page 3--50 for instructions.

Red folder icon and error indicator

Unique interpretation for item in Name column
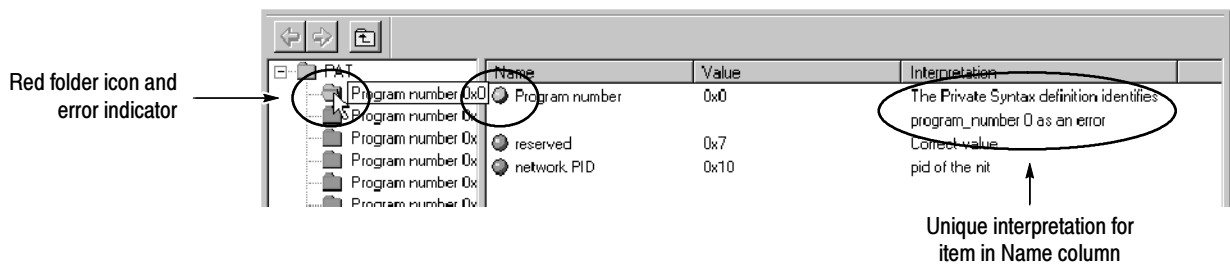
You can run the Private Syntax Interpreter and the Expert client applications simultaneously. You can therefore use the following technique to experiment with the effects of different private syntax definition parameters on known sections or descriptors:

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 C–13).

Table C‑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 C-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 C-14: Private descriptor

Syntax	No. of bits	Mnemonic
private_descriptor() {		
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 D: 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: base_PID = program number <<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 D--1.

The paradigm to identify the transport bit streams containing certain elements of the program is defined in Table D--1.

Table D--1: PID assignment for the elementary streams of a program

Name	PID definition	Description
PMT_PID	base_PID+0x0000	PID for the bit stream containing the program_map_table for the program.
Video_PID	base_PID+0x0001	PID for the bit stream containing the video for the program.
PCR_PID	base_PID+0x0001	Implies the video bit stream also carries the PCR values for the program.
Audio_PID	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	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 D-2 lists the program paradigm errors for programs adhering to the program paradigm $b_{12}=0$.

Table D-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

Appendix E: Software Repair

There are two parts to this appendix. The first part explains how to create and use an Emergency Repair Disk. The second part tells you how to reload the test system software if the installed copy becomes corrupted.

Creating and Using an Emergency Repair Disk

An emergency repair disk, specific to the system, is supplied with each Tektronix MPEG Test System. Whenever you upgrade the software or change your password, it is strongly recommended that you also create a new emergency repair disk. This will minimize the chances that you will need to completely reload the operating software for a minor problem.

Use the emergency repair disk to restore your system to its initial setup state if your system files become corrupt and you are unable to recover the previous start up configuration (Last Known Good — the Windows NT startup screen option). If you don't have the emergency repair disk, you will have to reinstall Windows NT. Please see the Windows NT System Guide, provided with your back-up copy of Windows NT, for the procedure required to restore your system.

You may also need the emergency repair disk to restore user passwords if they are forgotten. Be sure to update the emergency repair disk each time you add a user or change a password.

> ⚠ **CAUTION.** *The files on the Emergency Repair Disk are test system-specific; that is, the disk shipped with your test system is the only disk that will work with your system. Do not lose this disk. If you lose the Emergency Repair Disk provided with your test system, create a new one as described below.*

Creating an Emergency Repair Disk

To create an emergency repair disk, clearly mark a high density 3.5-inch floppy disk as the emergency repair disk for your test system, serial number <B0xxxxx> (be sure to write the serial number exactly as it appears on the rear panel); then perform the following steps.

NOTE. The emergency repair disk is test system specific. Make sure that the emergency repair disk is clearly marked with its serial number. The serial number of your Real-Time Analyzer appears on the original emergency repair disk and on the server rear panel, near the power input connector.

1. Choose Run from the Windows NT Start menu.

2. Type rdisk in the Run dialog box. The Repair Disk Utility dialog box opens.
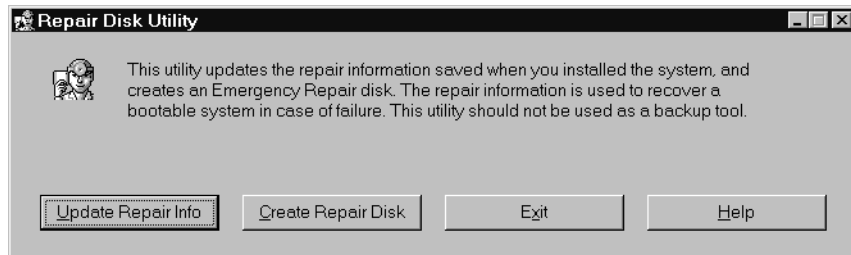
3. Click Update Repair Info to save your current configuration. A message appears to remind you that earlier repair information is overwritten. Click Yes to continue.

4. When the process is complete, a message appears to ask if you wish to create an Emergency Repair Disk. Click Yes. You are then prompted to insert a diskette into drive A.
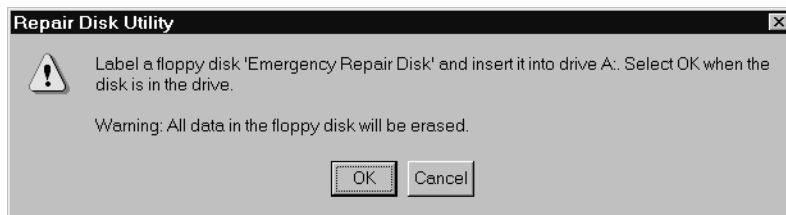
5. Insert a 3.5-inch disk in drive A and click OK. Rdisk formats the disk and copies the configuration files onto it.

6. When the operation is complete, click Exit in the Repair Disk Utility dialog box. Remove the disk from drive A and keep it in a safe place.

Using the Emergency Repair Disk

Always refer to the Windows NT documentation if you need more information.

1. Verify that you have a source of setup information available (the Windows NT back up software package).

2. Insert the Windows NT Setup disk.

3. Restart the Test System.

4. When the Windows NT Setup Screen appears, press R (repair).

5. When prompted, insert the emergency repair disk.

6. The emergency repair disk performs the following tasks:

   ■ Runs CHKDSK.EXE on the WINNT and SYSTEM partitions.

   ■ Verifies each file in the installation and replaces any that are missing or corrupt.

   ■ Replaces the System, Security, and Security Accounts Manager hives in the registry.

   ■ Reinstalls the Boot Loader (the boot sector, BOOT.INI, etc.).

Reinstalling the MTS200 Series Software

Use the procedures below to reinstall your test system software if it is accidently deleted or becomes corrupt. Software has been supplied on CD ROM.

NOTE. The following instructions are for reinstalling *MPEG Test System software on a machine running Windows NT Workstation 4.0 only; procedures for upgrading your software could be different. If you are installing a software upgrade, follow the instructions provided with the upgrade kit.*

Reinstalling software involves three procedures:

■ Uninstalling the software

■ Copying the program files

■ Entering passwords for your licensed applications

Uninstalling the Software   For best results, uninstall the software using unInstallShield application.

1. Restart Windows NT and log in as the administrator (Username = administrator; password = MPEG2). You must log in as the administrator to install the MTS200 Series applications.

2. Quit any applications that automatically started at login.

3. Double-click the Uninstall MTS V3.0 icon in the Tektronix MPEG Test System program group window (or whichever version is appropriate for your current software).

4. When the dialog box asks you to confirm file deletion, click Yes.

5. When uninstall is complete, Click OK to close the Remove Programs From Your Computer window.

Copying the Program Files   1. Double-click the My Computer icon on your Windows NT desktop and, in the resulting My Computer window, select the (C:) disk icon. Check the window status bar to verify that the system disk has at least 100 MB of free space. The program will not install if the system disk has less than 100 MB of free space.
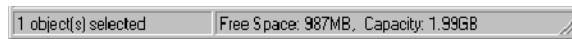
2. Place the MPEG Test System Version 4.0 Installation Software CD ROM into the CD ROM drive.

3. Select Run... from the Windows NT Start menu. Then enter d:\Setup.exe in the resulting window and click OK.

4. In a few seconds, the Tektronix MTS200 Series window appears on the computer screen.

5. Read the window text and then click Next to proceed to the Choose Destination Directory window.
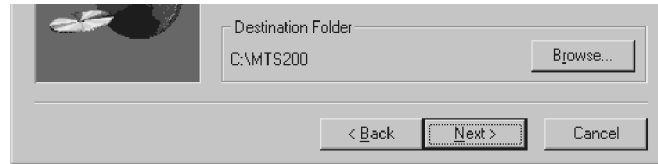
6. The default destination folder is C:\Mts200\. Click Next to accept the default folder. The applications may not function correctly if you specify another target folder.

NOTE. It is strongly recommended that you use the default destination folder.

---

7. The Setup Type window opens. If your test system has only real-time analysis hardware and software, select MTS205 System software with hardware; if your system also contains a Data Store (CARB) system, select MTS215 System software with hardware.
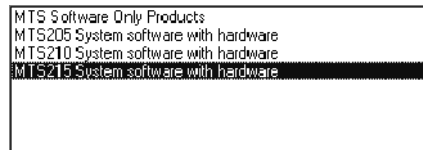
8. Click Next. The Select MTS2nn Platform window opens.

9. Select the option that applies to your test system and then click Next.

CAUTION. Selecting the wrong platform will prevent use of the Real-Time Analyzer and the Data Store system, if it is installed. Be sure to identify your computer platform and select the appropriate option.

---

10. The Select Program Folder window opens. Click Next to accept the default folder name (Tektronix MPEG Test System) and continue. The Selection Summary window opens.

11. Review the Destination Directory, System Product, and Start Menu Folder selections; if all are correct, click Next to proceed with installation.

The setup program begins installing the software. The activity and progress gauges appear to show that installation is progressing. Installation proceeds without your input (and sometimes with no apparent activity) for approximately 2 $1/2$ minutes, depending on your platform.
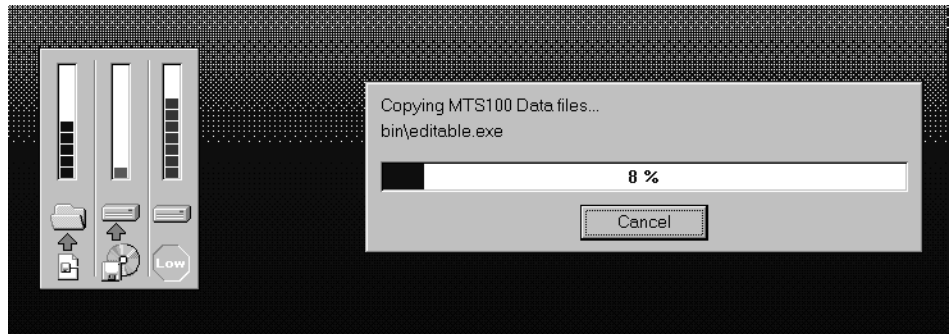
12. After the program group and submenu are set up, an information dialog box reminds you to verify that the Dongle (software key) is installed. Verify that the software key is installed on the parallel port; then click OK to continue.

13. The Setup Complete window opens; click Finish to continue.

14. A Notepad window opens to display the Readme file. Scan the text for important information, then select Exit from the File menu to close the window.

15. Another Setup Complete window opens. For best results, accept the "Yes, I want to restart my computer now" option, remove the MPEG Test System disc from the CD ROM drive, and click Finish to complete setup and reboot the system.

16. Log on as MTS100. No password is required.

17. Locate the Tektronix MPEG Test System folder on the Windows NT desktop and double-click the folder to open the program group window.

Entering the General License Password

Perform the remaining steps to reenter the general password that corresponds to the attached software key.

1. Double-click the License Manager icon in the Tektronix MPEG Test System window to start the application. The Tektronix Software Protection window appears.

2. Consult the list of passwords supplied with your most recent system upgrade and identify the General password. Use the original password supplied with your system only if you have not upgraded the system or added any options.

3. Enter the three 6-character Hexadecimal numbers of the password in the corresponding Tektronix Software Protection window entry fields (lowercase characters are acceptable) and then click OK. A License message window appears.

4. If the password is correct, click OK to acknowledge the message. If you made an error entering the password, click OK and return to step 1.

When you enter the correct password, software reinstallation is complete.

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. The Analysis Server sends analysis results to the Expert Client and is configured using the Configuration client.

ARIB (Association of Radio Industries and Business)

ARIB is a body of broadcasters, manufacturers, and communication carriers who are responsible for preparing standards on radio spectrum use in Japan.

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.

BIT (Broadcaster Information Table)

ARIB only.

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.

DCT (Download Control Table)

ARIB only.

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).

DIT (Discontinuity Information Table)
This DVB structure is only used with partial transport streams; it is never part of a transport stream used for broadcast.

DLT (Download Table)
ARIB only.

DSI (Download Server Initiate)
The DownlardServerInitiate 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.

Frame
    An ISDB-S/ARIB structure comprised of 48 slots. *See Slot* and *Super frame*.

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

M_TMCC
An ISDB-S/ARIB compliant multiplex with multiple transport streams. *See TMCC*.

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.

SDTT (Software Download Trigger Table)
>   ARIB only.

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.

SIT (Selection Information Table)
DVB–SI table. This DVB structure is only used with partial transport streams; it is never part of a transport stream used for broadcast.

Slot
An ISDB-S/ARIB structure corresponding to one, 204-byte error coded packet. *See Frame* and *Super frame*.

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.

S_TMCC
An ISDB-S/ARIB compliant multiplex with only one transport stream. *See TMCC*.

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.

Super frame
An ISDB-S/ARIB structure comprised of eight frames. *See Frame* and *Slot*.

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.

TMCC (Transmission and Multiplexing Configuration and Control)
TMCC information is used to control transmission parameters in ISDB-S environments where the multiplex includes transport streams from multiple broadcasters and the services encoded in the various transport streams require different modulation schemes. TMCC information is encoded in the first eight bytes of the 16-byte Reed-Solomon area of 204-byte packet transport streams. TMCC information includes modulation modes, slot assignments, and alarms.

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, ATSC, or ISDB-S/ARIB 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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