MTS4000
MPEG Test Systems
Specifications and Performance Verification

Technical Reference

Tektronix

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Contacting Tektronix

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Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

To safely perform service on this product, additional information is provided at the end of this section. (See page vi, *Service safety summary*.)

General safety summary

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

Before use, always check the product with a known source to be sure it is operating correctly.

This product is not intended for detection of hazardous voltages.

Use personal protective equipment to prevent shock and arc blast injury where hazardous live conductors are exposed.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.

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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. Do not use the provided power cord for other products.

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, make sure that the product is properly grounded. Do not disable the power cord grounding connection.

Power disconnect. The power switch disconnects the product from the power source. See instructions for the location. Do not position the equipment so that it is difficult to disconnect the power switch; it must remain accessible to the user at all times to allow for quick disconnection if needed.

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.

The measuring terminals on this product are not rated for connection to mains or Category II, III, or IV circuits.

Do not operate without covers. Do not operate this product with covers or panels removed, or with the case open. Hazardous voltage exposure is possible.

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

Do not operate with suspected failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power cord. Clearly mark the product to prevent its further operation.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use only specified replacement parts.

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

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

Do not operate in wet/damp conditions. Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry. Remove the input signals before you clean the product.

Provide proper ventilation. Refer to the installation instructions in the manual for details on installing the product so it has proper ventilation.

Slots and openings are provided for ventilation and should never be covered or otherwise obstructed. Do not push objects into any of the openings.

Provide a safe working environment. Always place the product in a location convenient for viewing the display and indicators.

Avoid improper or prolonged use of keyboards, pointers, and button pads. Improper or prolonged keyboard or pointer use may result in serious injury.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use care when lifting and carrying the product. This product is provided with handles for lifting and carrying.

Service safety summary

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

To avoid electric shock. Do not touch exposed connections.

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 product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.

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.

Verify safety after repair. Always recheck ground continuity and mains dielectric strength after performing a repair.

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.*

Symbols and 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.

⚠️ When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbol(s) may appear on the product:

CAUTION Refer to Manual | Protective Ground (Earth) Terminal | Mains Disconnected OFF (Power) | Mains Connected ON (Power) | Standby

Preface

This manual lists the electrical, mechanical, and environmental specifications, and the certification and compliance statements for the Tektronix MTS4000 MPEG Test System. Also provided are procedures for verifying the performance of the test system.

NOTE. Text in this manual about the MPEG Player refers to the MPEG player application installed in the MTS4000 system.

Product documentation

The following table lists the documentation available for your MTS4000 or MTS4SAV3 product:

Document (Tektronix part number)	Purpose	Location
MTS4000 and MTS4SAV3 Quick Start User Manual (071-2970-xx English, 077-0665-xx Simplified Chinese, 077-0666-xx Japanese, 077-0657-xx Russian)	Describes how to install and get started using the test systems.	
MTS4000 and MTS4SAV3 Analyzer Applications User Manual (077-0622-xx)	Describes the operation of the following analyzer applications: TSCA, PES Analyzer, T-STD Buffer Analyzer, and ES Analyzer.	
MTS4000 and MTS4SAV3 Generator Applications User Manual (077-0623-xx)	Describes the operation of the following generator applications: Multiplexer, MPEG Player, TS Editor, ISDB-T Remux, Make Seamless Wizard, Transport Stream Cutter, and Script Pad.	
MTS4000 and MTS4SAV3 Carousel Applications User Manual (077-0624-xx)	Optional manual supporting module-level servicing of the instrument.	
MTS4000 and MTS4SAV3 Release Notes (077-0627-xx)	Describes known issues with the test systems.	
MTS4EAV7 HEVC / AVC Video and Compressed Audio Analyzer User Manual (071-3228-xx)	Describes the operation of the MTS4EAV7 application software.	
MTS4CC Elementary Stream Compliance Checker User Manual (071-2075-xx)	Describes the operation of the MTS4CC application software.	
PQA600B and PQASW Picture Quality Analyzer User Manual (071-3280-xx)	Describes the operation of the PQA application software.	
VQS1000 Video Quality Software Quick Start User Manual (077-0489-xx)	Describes the operation of the VQS1000 application software.	

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Specifications

This chapter contains specifications for the MTS4000 MPEG Test Systems.

All specifications are guaranteed unless labeled "typical." Typical specifications are provided for your convenience but are not guaranteed.

To meet specifications, the following conditions must be met:

- The system must be kept within the environmental limits specified in this document.

- The system must be powered from a source maintaining voltage and frequency within the limits described in this document.

- The system must have been operating continuously for at least 20 minutes within the specified operating temperature range.

Any conditions that are unique to a particular characteristic are expressly stated as part of that characteristic.

Table 1: Platform specifications

Characteristic		Description
Operating system		Microsoft Windows 7 Ultimate, 64 bit
Processor		Intel i7 860 Quad core
Disk space		
	Operating system and software applications	500 GB SATA hard drive
	File storage	500 GB SATA hard drive
RAM		4 GB
CD-ROM drive		CD-R/W, DVD-R/RW, DVD+R/RW
Display		LCD, 1280 X 1024, 17 inch
Ethernet		
	10/100/1000 (GigE)	Two 10/100/1000Base-T; RJ45 connector
		Supported protocol: Ethernet/IP/UDP/ MPEG-TS and VLAN
		When used in MPEG-TS analysis and record, the minimum and maximum link bit rates are typically 250 kbps and 100 Mbps respectively
		IP playout bit rate is typically up to 190 Mbps
Keyboard/mouse		Integrated keyboard/mouse
External audio ports		External audio jacks for microphone input and line output
External VGA Output		
USB ports		Six USB 2.0 device connectors, two on front, four on side

Table 2: ASI card electrical characteristics

Characteristic	Description
ASI card	Quad ASI adapter for PCI Express bus, x4 Gen 1.
Connector type	BNC 75 Ω (4x). Each port can be independently configured as input or output.
Tx or Rx Bit Rate, typical	Up to 214 Mbps max
Physical layer	DVB-ASI (coax) EN50083-9
Return Loss, typical	> 15 dB, typical
ASI Output (Demodulated RF Output)	
Signal amplitude	1.0 V_{p-p} max, 600 mV_{p-p} min, into a 75 Ω load.
Return loss	10 dB min at 270 MHz

Table 3: DVB-S2 card characteristics

Characteristic	Description
Input frequency range	950 MHz to 2150 MHz with 1 MHz step size
Input signal amplitude range, typical	–60 dBm to –30 dBm for a CBER of <$1e-6$
	Use high quality shielded cables and higher input level to prevent ingress of interfering signals. This is particularly important at the tuned frequency where the input circuitry is by design most sensitive.
Modulation format	QPSK in accordance with DVB-S (ETSI EN 300 421)
	QPSK, 8PSK, 16APSK and 32APSK in accordance with DVB-S2 (ETSI EN 302 307) including Constant, Adaptive and Variable Coding and Modulation (CCM, ACM and VCM)
Modulation baud rate	1 MBaud min, 60 MBaud max
	Maximum symbol rate: 60 MBaud in QPSK, 45 MBaud in 8PSK, 39 MBaud in 16APSK, and 32 MBaud in 32APSK.
Code rate	DVB-S: 1/2, 2/3, 3/4, 5/6, 6/7, 7/8
	DVB-S2: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
FEC modes	Viterbi and Reed-solomon in accordance with DVB-S
	LDPC and BCH in accordance with DVB-S2
	Short and Normal FEC blocks in accordance with DVB-S2
Roll off	0.2, 0.25, 0.35
Connector type	F type
Input termination impedance	75 Ω nominal
Input return loss, typical	>6 dB, 950 MHz to 2150 MHz
LNB supply voltage	selectable; 13.0 V ±1.5 V or 18.0 V ±1.5 V, with 100 Ω, 5 watt resistor load
LNB supply maximum current	200 mA
LNB 22 kHz signalling frequency	22 kHz ±20%
LNB 22 kHz signalling amplitude	800 mV_{p-p} with 100 Ω load
LNB mode	DiSEqC 2

Table 4: DVB-S2 measurements

Measurement	Description
RF lock	RF lock is indicated by LED and Status
Input level (signal strength), typical	Range: –60 dBm to –30 dBm Resolution: 1 dB Accuracy: ±5 dB
EVM (Error Vector Magnitude), typical	Display Range: ≤4.0% to ≥30.0% RMS Resolution: 0.1% Accuracy: ±20% or reading
MER (Modulation Error Ratio) with equalizer, typical	Display Range: 10 dB to 30 dB with equalizer Resolution: 1 dB Accuracy: ±2 dB for range from 10 to 28 dB
C/N (Carrier to Noise ratio), typical	Display Range: 10 dB to 30 dB Resolution: 1 dB Accuracy: ±2 dB for range from 10 to 28 dB
Phase noise, typical	Display Range: 5 to 45 Degrees RMS Resolution: 1 Degree
Pre-Viterbi BER	Pre-Viterbi BER is displayed
Pre-Reed Solomon (RS) BER	Pre-RS BER is displayed
Pre-LDPC BER	Pre-LDPC BER is displayed
Pre-BCH BER	Pre-BCH BER is displayed
Post RS BER and TEF (Transport Error Flag)	Post Reed Solomon BER (TEF ratio), TEF rate, and number of Transport Error Flags (TEF count) is displayed
Transmission parameter	All coding and modulation parameters are indicated to the user
Constellation	The RF constellation is displayed

Table 5: 8VSB card characteristics

Characteristic	Description
Input frequency range	54 MHz to 860 MHz, VHF/UHF channels 2 to 69 (to include low VHF frequencies)
Input signal level	–72 dBm to –6 dBm (–23 dBmV to +43 dBmV) Use high quality shielded cables and higher input level to prevent ingress of interfering signals. This is particularly important at the tuned frequency where the input circuitry is by design most sensitive.
Modulation format	8VSB in accordance with ATSC A/53B
Receiver bandwidth	6 MHz
Input termination impedance	75 Ω nominal
Connector type	F-type
Input return loss, typical	5 dB minimum

Table 6: 8VSB measurements

Measurements	Description
RF Lock	RF lock is indicated by LED and Status
Input level (signal strength), typical	Display Range: –72 dBm to –2 dBm relative to 75 Ω (–23 dBmV to +47 dBmV)
	Resolution: 1 dB
	Accuracy: ±3 dB
EVM (Error Vector Magnitude), typical	Display Range: ≤3.0% to ≥12.5% rms
	Resolution: 0.1%
	Accuracy: ±20% of reading
Equivalent MER (Modulation Error Ratio) with Equalizer, typical	Display Range: 17 dB to 31 dB with Equalizer
	Resolution: 0.1 dB
	Accuracy: ±1 dB for MER >25 dB; ±3 dB for MER 25 dB to 31 dB
	(Measured at –30 dBm input. For best MER accuracy, maintain the input signal level between –50 dBm and –15 dBm.)
SNR (Signal to Noise Ratio), typical	Display Range: 15 dB to 35 dB
	Resolution: 1 dB
	Accuracy: ±1 dB for SNR < 25 dB; ±3 dB for SNR 25 dB to 35 dB
BER	Pre-RS BER, SER 1 second and 10 seconds windows values are displayed
TEF (Transport Error Flag)	Transport Error Flags (uncorrectable error count) in a 1 second window and 10 second window are displayed
Constellation diagram	The 8VSB constellation diagram is a display of I-data history with histograms (the IQ constellation is not available). This is displayed as Symbol Distribution in the user interface
Echo profile, typical	Equalizer filter tap information is displayed.
	Display Echo Level range: Normalized real tap values over the range of –1 to 1
	Display Delay range: –6.7 µs to 45.5 µs

Table 7: QAM Annex B card characteristics

Characteristic	Description
Input frequency range	88 MHz to 858 MHz
Input signal level, typical	–64 dBm to –19 dBm (45 dBuV to 90 dBuV relative to 75 Ω)
	With either a 64 or 256 QAM input, there are five or fewer Transport Error Flags in 11 seconds, which corresponds to a post FEC rate of $1e^{-8}$
	≥ –30 dBm when operated in an electromagnetic field of 3 V/m or more
Modulation format	64QAM, 256QAM (compliant with ITU J-83 Annex B)
Interleaving mode	Level 1 and Level 2 interleaving support compliant with all ITU J-83 Annex B, excluding I, J = (128,7) and (128,8), and in 256 QAM excluding (8, 16) and (16, 8)
Modulation baud rate	64 QAM: 5.056941 Mbaud/s
	256 QAM: 5.360537 Mbaud/s
Spectrum polarity	Demodulates both Normal and Inverted IF Spectrum
Receiver bandwidth, QAM B	6 MHz nominal
Connector type	F type

Table 7: QAM Annex B card characteristics (cont.)

Characteristic	Description
Input termination impedance	75 Ω nominal
Input return loss, typical	5 dB minimum
Ultimate Modulation Error Ratio with equalizer, typical	≥37 dB with an equalizer

Table 8: QAM Annex B measurements

Measurement	Description
RF lock	RF lock is indicated by LED and Status
Input level (signal strength), typical	
Range	–64 dBm to –19 dBm (45 dBuV to 90 dBuV relative to 75 Ω)
Resolution	1 dB
Accuracy	±3 dB
EVM (Error Vector Magnitude), typical	
Display Range	
64 QAM	≤1% to ≥5% rms
256 QAM	≤1% to ≥2.5% rms
Resolution	0.1%
Accuracy	±1%
MER (Modulation Error Ratio) with Equalizer, typical	
Display Range	
64 QAM	22 dB to 37 dB
256 QAM	28 dB to 37 dB
Resolution	0.1 dB
Accuracy	±1 dB for MER < 25 dB; ±3 db for MER 25 dB to 34 dB (measured at –30 dBm input)
SNR (Signal to Noise Ratio), typical	
Display Range	
64 QAM	22 dB to 37 dB
256 QAM	28 dB to 37 dB
Resolution	Resolution: 1 dB
Accuracy	Accuracy: ±1 dB for SNR < 25 dB; ±3 db for SNR 25 dB to 34 dB
BER (Bit Error Ratio)	Pre-RS BER is displayed
TEF (Transport Error Flag)	Transport Error Flags (uncorrectable error count) in a 1 second window and 10 second window are displayed
Constellation	The RF constellation is displayed

Table 9: Video over IP card

Characteristic	Description
General description	
Ethernet ports	The interface supports full duplex operation only. Half duplex is not supported.
ASI input	One ASI input for loop-through of ASI input
ASI output	One ASI output for video over IP to ASI output or for ASI/SMPTE310M loop-through of input signal selectable via SW control.
Transport stream rate over IP	250 Kbps to 155 Mbps max
ASI output (TS from video over IP)	
Connector	BNC
Impedance	75 Ω nominal, transformer coupled.
Transport stream rate, typical	250 Kbps min and up to 155 Mbps max.
Signal amplitude	600 mV$_{p-p}$ min, 1.0 V$_{p-p}$ max into a 75 Ω load.
Return loss	10 dB min at 270 MHz
Ethernet optical port – General characteristics	
Optical operating mode	Single mode or Multimode
Connector type	Duplex data link MSA compliant SFP connector
Standard	1000 BASE-X
Data format	NRZ
Ethernet optical transmitter – Single mode 1550 nm using Tektronix supplied SFP module	
Output power, typical	–2 dBm to +4 dBm
Center wavelength - 1550 nm, typical	1530 nm Min, 1550 nm typical, 1570 nm max
Total jitter (peak-to-peak)	<170 ps
Extinction ratio	≥9.0 dBm
Ethernet optical receiver – Single mode 1550 nm using Tektronix supplied SFP module	
Optical input power, typical	–26 dBm to –3 dBm, BER ≤ 1 X 10^{-12}
Input wavelength	1270 nm ≤ λ ≤ 1610 nm
Jitter tolerance	IEEE 802.3z and ANSI X3T11
Ethernet optical transmitter – Single mode 1310 nm using Tektronix supplied SFP module	
Output power, typical	–11 dBm to –3 dBm
Center wavelength - 1310 nm, typical	1270 nm min, 1310 nm typical, 1355 nm max

Table 9: Video over IP card (cont.)

Ethernet optical transmitter – Single mode 1310 nm using Tektronix supplied SFP module	
Total jitter (peak-to-peak)	<170 ps
Extinction ratio	≥9.0 dBm
Ethernet optical receiver – Single mode 1310 nm using Tektronix supplied SFP module	
Optical input power, typical	–19 dBm to –3 dBm, BER ≤ 1 X 10^{-12}
Input wavelength	1270 nm ≤ λ ≤ 1610 nm
Jitter tolerance	IEEE 802.3z and ANSI X3T11
Ethernet optical transmitter – Multimode 850 nm using Tektronix supplied SFP module	
Output power, typical	–9.5 dBm to –2 dBm
Center wavelength - 850 nm, typical	830 nm min, 850 nm typical, 860 nm max
Total jitter (peak-to-peak)	<170 ps
Extinction ratio	≥9.0 dBm
Ethernet optical receiver – Multimode 850 nm using Tektronix supplied SFP module	
Optical input power, typical	–17 dBm to 0 dBm, BER ≤ 1 X 10^{-12}
Input wavelength	770 nm ≤ λ ≤ 860 nm
Jitter tolerance	IEEE 802.3z and ANSI X3T11
Ethernet Electrical Port	
Standard	10/100/1000BASE-T IEEE 802.3
Connector type	RJ-45
Data format 10/100 Base T	NRZ
Data format 1000 Base T	Trellis encoded, PAM5 symbols full-duplex on 4-pair Cat-5 UTP per IEEE 802.3ab

Table 10: 10G Ethernet card

Characteristic	Description
General description	
Ethernet ports	Dual 10 Gigabit SFP+ Ethernet connections supporting 10GBASE-SR
Transport stream rate over IP, typical	700 Mbps throughput
Ethernet optical port	
Optical operating mode	Multi mode SR
Connector type	SFP+
Standard	IEEE 802.3
Physical layer interface	10GBASE-SR (E10G41BFSR, E10G42BFSR)

Table 11: AC power source electrical characteristics

Characteristic	Description
Source voltage	100 to 240 VAC. Fluctuations must not exceed 10% of the nominal rated voltage.
Frequency range	50/60 Hz

Table 11: AC power source electrical characteristics (cont.)

Characteristic	Description
Power consumption	220 W maximum, 100 - 240 V, 50/60 Hz.
Mains fuse	Not operator replaceable.

Table 12: Mechanical characteristics

Characteristic	Description
Classification	Bench top instrument.
Cooling airflow	Intake is from the side of the instrument, and exhaust is to the rear of the instrument.
	For proper cooling, at least two inches (51 mm) of clearance is needed on the sides and rear of the instrument cabinet
Overall dimensions	Height: 346.0 mm (13.62 in)
	Width: 434.5 mm (17.01 in)
	Depth: 243.0 mm (9.57 in)
Weight	17.0 kg (37.48 lb)
Shipping weight	20.2 kg (44.53 lb)

Table 13: Environmental characteristics

Characteristic	Description
Atmospherics	
Temperature	
Operating	+5 °C to +40 °C, 30 °C per hour maximum gradient; temperature of the intake air at the front and sides of the instrument
Non-operating	−20 °C to +60 °C, 30 °C per hour maximum gradient
Humidity	Max wet bulb temperature: +29 °C (derates relative humidity to ~22% at 50 °C).
Operating	20% to 80% relative humidity, non-condensing.
Non-operating	10% to 80% relative humidity, non-condensing.
Altitude	
Operating	0 to 3000 m (9800 ft).
Non-operating	0 to 12,000 m (40,000 ft).
Dynamics	
Random vibration	
Operating	0.27 g_{rms} total from 5 to 500 Hz.
Non-operating	2.28 g_{rms} total from 5 to 500 Hz.
Sine vibration, operating	0.013 inch peak-to-peak displacement from 5 Hz to 55 Hz
Functional shock, non-operating	30 g, 11 ms half-sine

Performance verification

The procedures in this section allow you to verify the performance of the following MTS4000 MPEG Test System components:

- ASI Interface
- 10 G Interface
- MTS4000 Platform and System Software

Preparation

Before you begin the Performance Verification procedures, review the following information:

- Ensure that the procedures are performed only by qualified service personnel who have read the General Safety Summary at the front of this manual.
- Ensure that the service personnel are familiar with system operation (refer to the MTS4000 MPEG Test System Quick Start User Manual).

Required equipment

You will need the following equipment to perform the verification procedures:

- 75 Ω BNC-to-BNC cable (quantity of one) Tektronix part number 174-4954-00.
- RJ45 network cable.
- 850 nm fiber cable.
- A copy of the "sym1.mpg" transport stream file.

NOTE. The "sym1.mpg" transport stream file is supplied with every instrument in the following directory: C:\Test Streams.

You can also obtain this file from the MTS4000 Documentation Browser CD or from the Tclips MPEG Test Stream Software DVD.

Prepare the instrument

Perform the following steps to prepare the instrument to be tested:

1. Make sure the dongle is securely installed on a USB port.

2. Make the following cable connections on the instrument.

   - Connect the 75 Ω BNC-to-BNC cable between the ASI 3 and ASI 4 ports on the ASI card.

   - Connect the RJ45 network cable between the two network connectors on the instrument side panel.

   - Connect the 850 nm fiber cable between the ports on the 10G card (if installed).
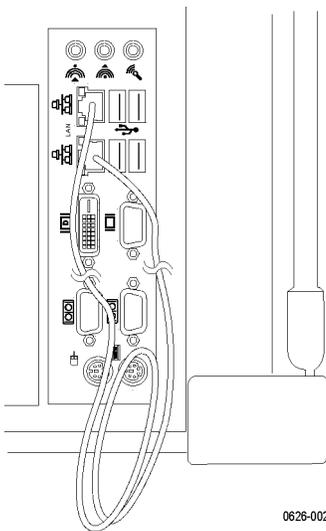
Standard 1G network loopback connection
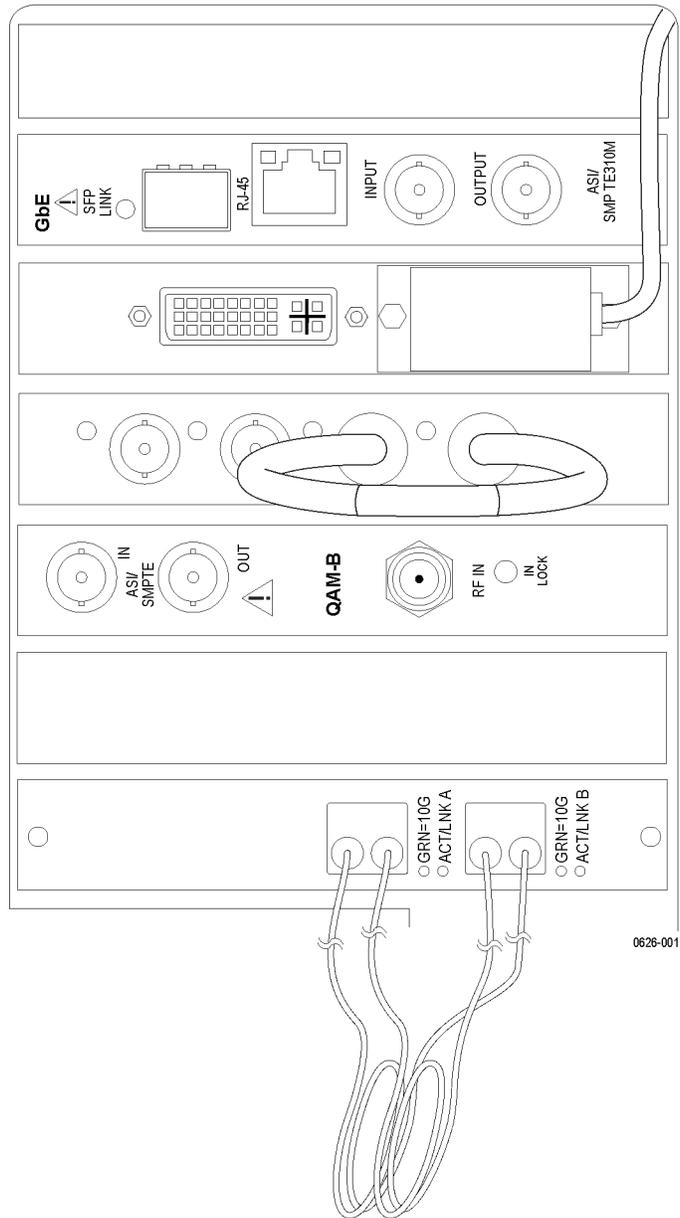
ASI loopback connection and 10G optical loopback connection

3. Connect the power cord to the side-panel power input connector.

4. Power on the MTS4000 system.

MPEG Player initial setup. The verification procedures use the MPEG player to play out a test stream file. Prepare the MPEG Player using the following steps.

1. Start the MPEG Player by double-clicking the icon on the desktop.

NOTE. If the Recommended Settings dialog box displays, dismiss the box by selecting OK.

2. Open the sym1.mpg transport stream file.

    a. Click File > Open and locate the file sym1.mpg (C:\TestStreams).

    b. Select the file and click Open.

3. In the Play menu, set the following:

NOTE. In the MPEG Player menus, a check mark appears next to the selected setting for some menu parameters.

    a. Packet Size: 188.

    b. Clock: Select Default in the dialog box to display the Default Clock dialog box. Select OK in the Default Clock dialog box.
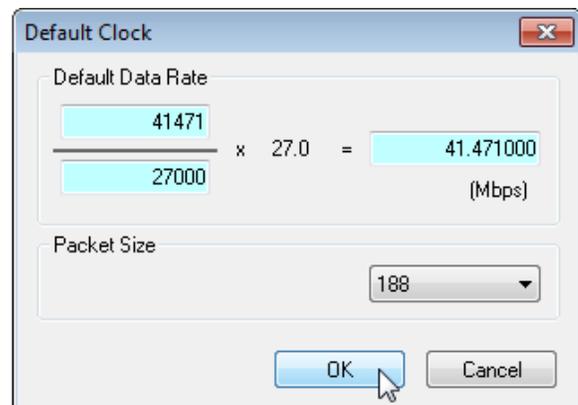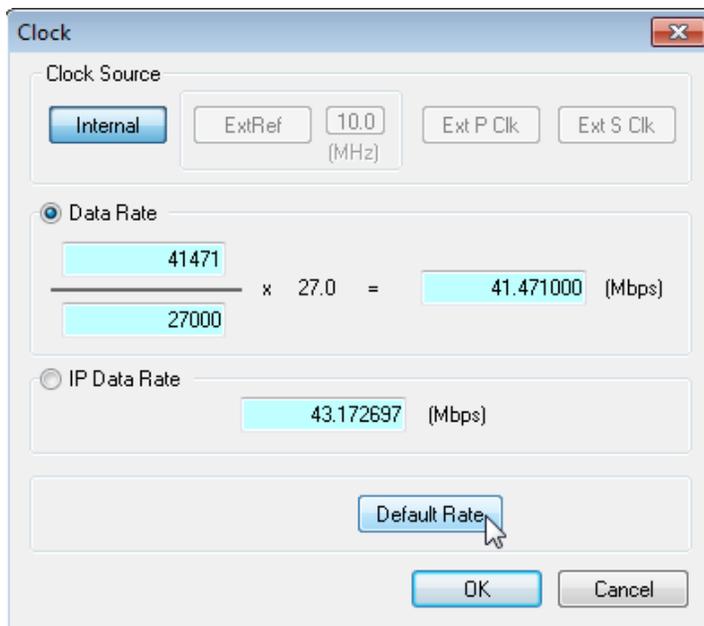
    c. Update: On.

d. PCR Initial Value: Set Base Value and Extension Value to 0 in the dialog box.
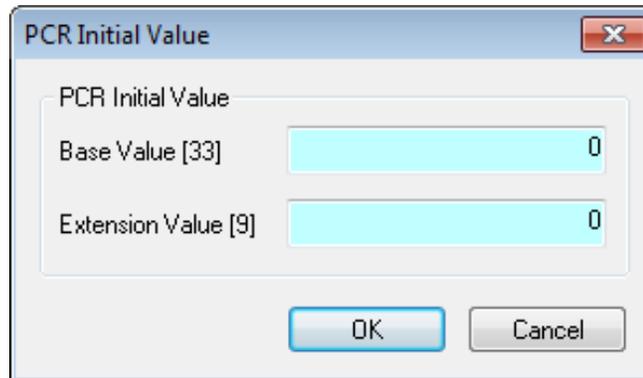
e. Source: Disk.

f. Loop: On.

g. Other: Set the Standard to DVB. The select Update.

Select the Continuity Counter check box.

Select the PCR/PTS/DTS check box.

Select the TDS/TOT/STT check box.

Clear the NPT check box.
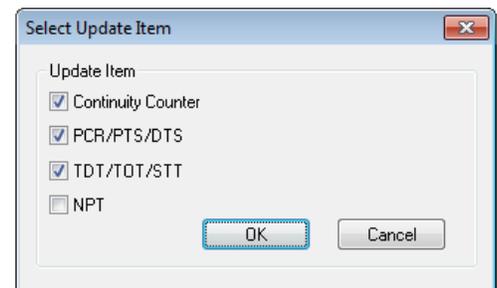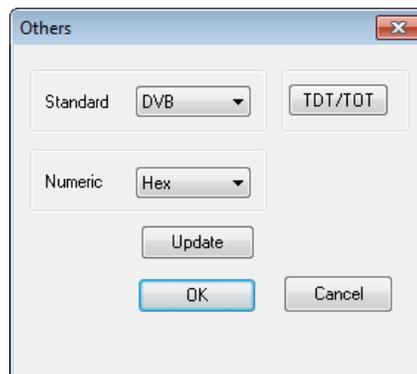
Do not close the MPEG Player application.

Verification procedures

Perform the following steps to verify that the MTS4000 system is operating properly. The steps are written with the assumption that you are performing all of the steps in order. If you start the procedures in the middle, you will have to review previous steps for instrument setup.

ASI loopback test

1. In the MPEG Player, set the following:

   a. Select Play > Interface > ASI.
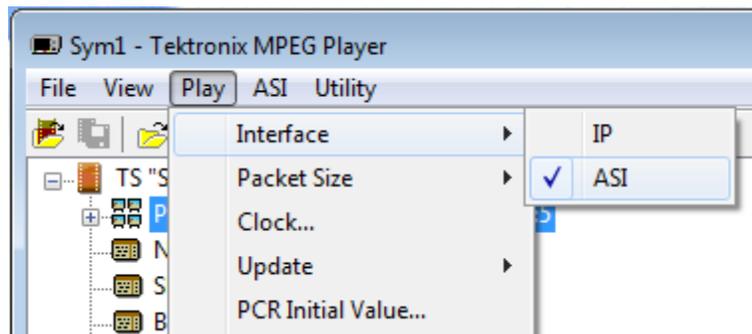
   b. Select ASI > ASI Out > ASI-3.
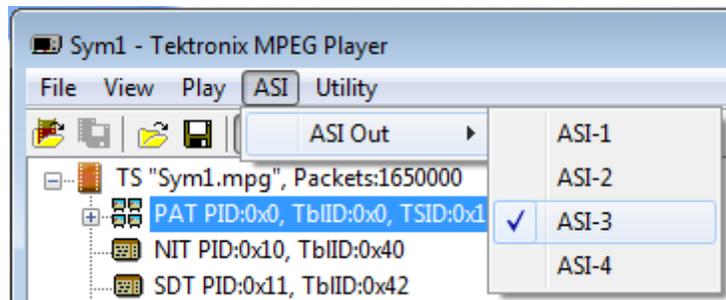
   c. In the MPEG Player toolbar, click the green Play arrow to start playing the transport stream file.

2. Start the TS Compliance Analyser by double-clicking the icon on the desktop.

3. Set the Real-time Interface to ASI-4.
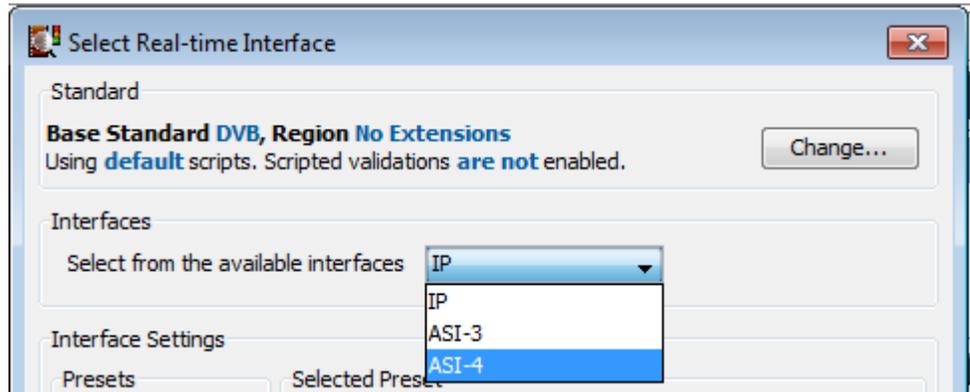
4. Click OK to accept the changes and close the Select Real-time Interface dialog box.

After a few seconds, the TSCA window opens with the analysis results of the ASI transport stream. Some EIT errors are acceptable.
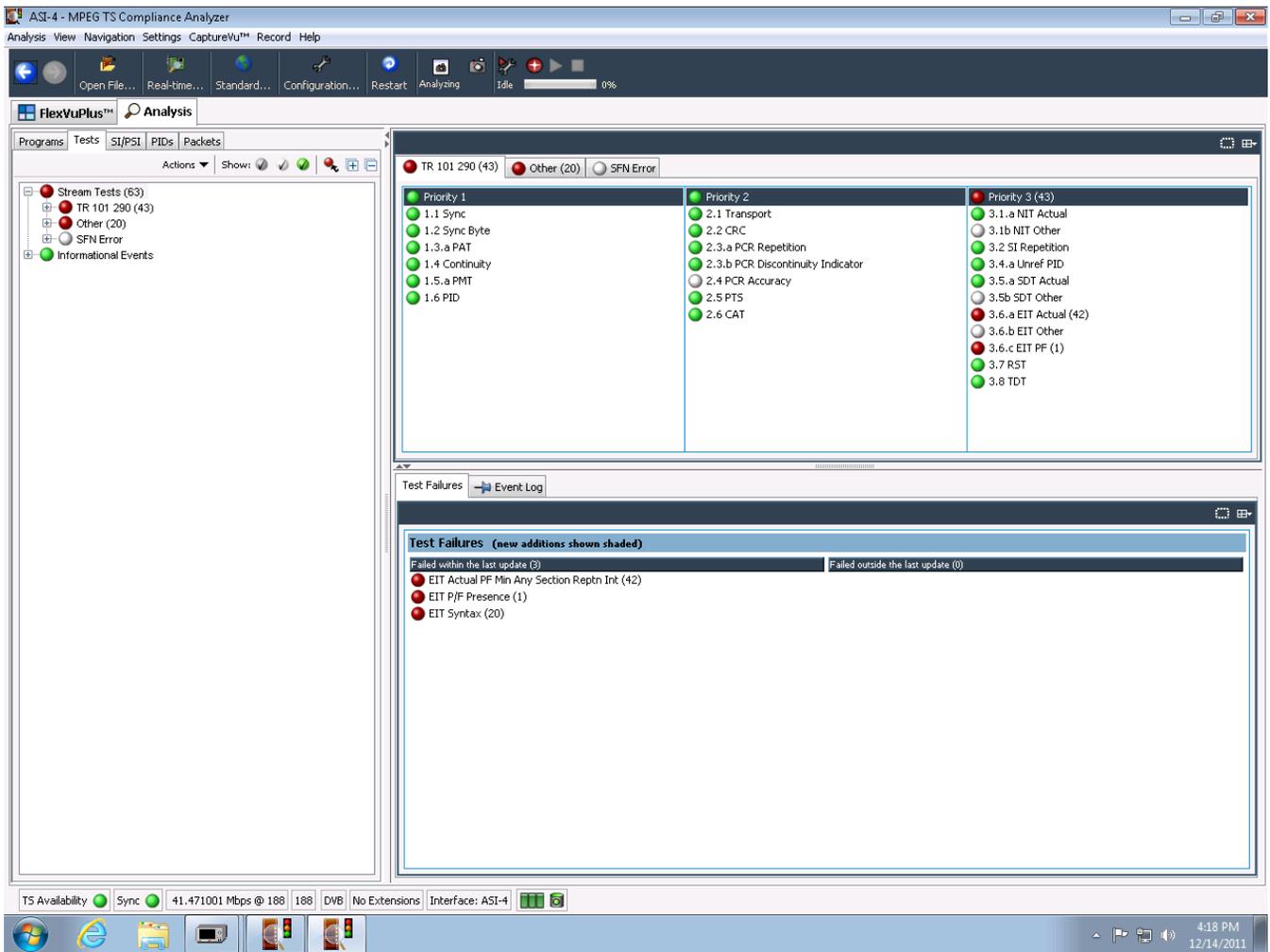
1G Ethernet loopback test
10G loopback test

The steps in this procedure can be used to perform a loopback test on the standard 1G Ethernet ports and the optional 10G optical interface card ports.

The example screen shots display the names and connections for the 1G Ethernet ports. The 10G optical ports have identical screens, but different adapter names.

NOTE. Do not attempt to perform the two loopback test simultaneously. First test the 1G Ethernet ports, then if installed, test the 10G optical ports.

1. Verify that the ports are active.

   a. 1G Standard Ethernet ports: With a loopback cable connected, verify that the LEDs on the Ethernet ports are on or blinking. Check the RJ45 cable connections if the LEDs are off.

   b. 10G Optical Interface ports: With a loopback cable connected, verify that the LEDs on the optical ports are on or blinking. Check the fiber cable connections if the LEDs are off.

NOTE. For ease of identifying the ports, if you need to verify both the 1G Standard Ethernet ports and the 10G Optical ports, do not have both loopback cables connected at the same time.

2. Open the Network and Sharing Center in the Windows Control Panel.

   You should see two local area connections displayed.

MTS4000 Specifications and Performance Verification
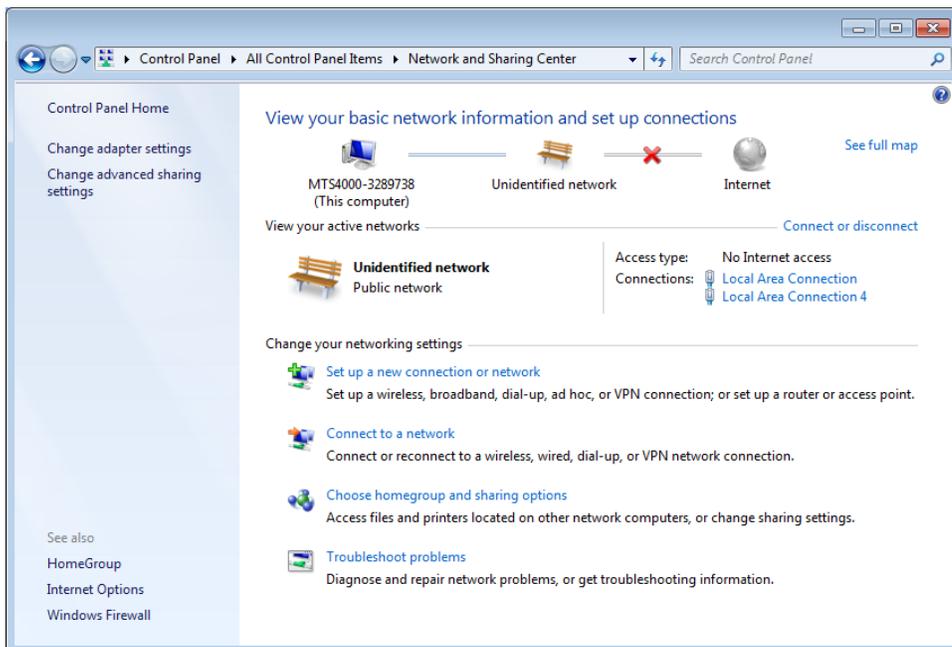
4. Configure the two ports as static IP addresses 192.168.1.100 and 192.168.1.200 on the MTS4000.

   a. Select the first Local Area Connection and then click Properties in the dialog screen. Configure it to 192.168.1.100 IP address. (This will be used for the MPEG Player.)
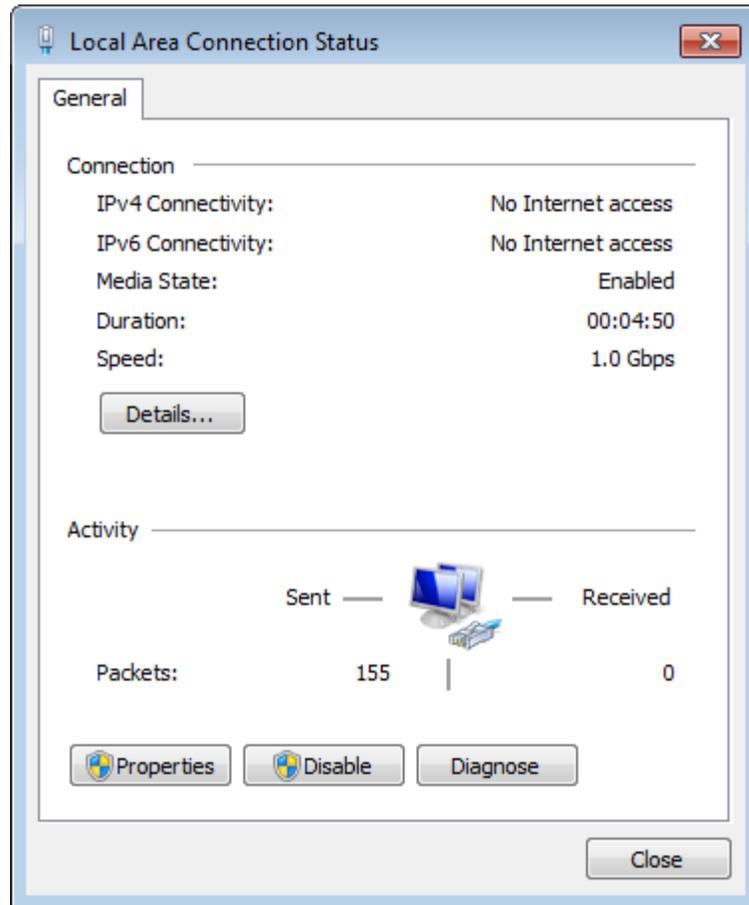
**b.** Highlight Internet Protocol Version 4 (TCP/IPv4) and select Properties.
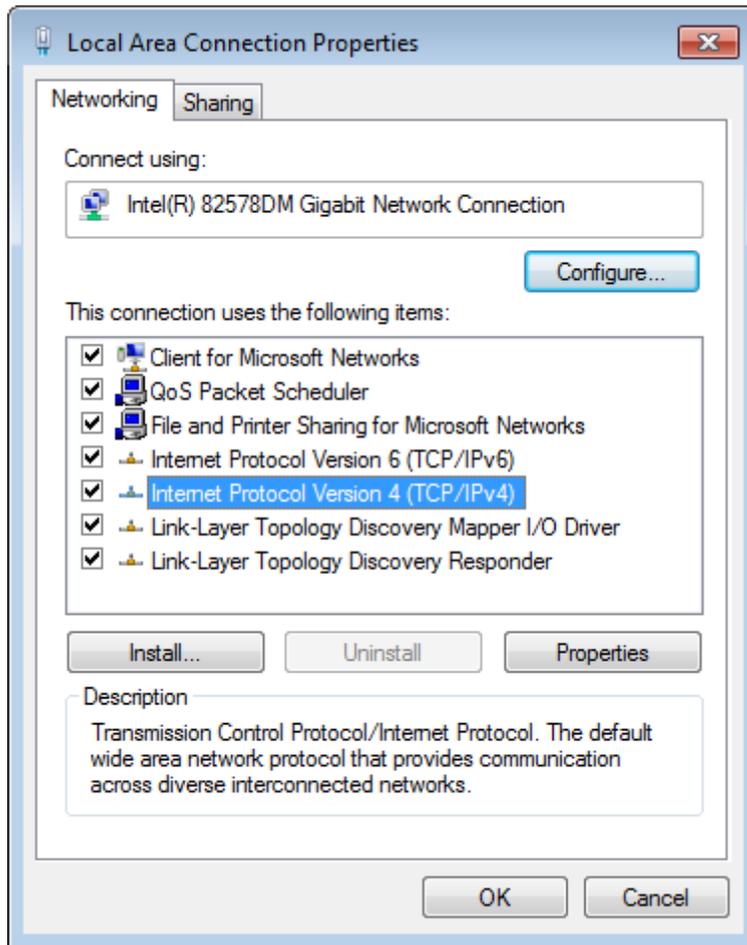
    c. Select Use the following IP address: and enter the value 192.168.1.100.
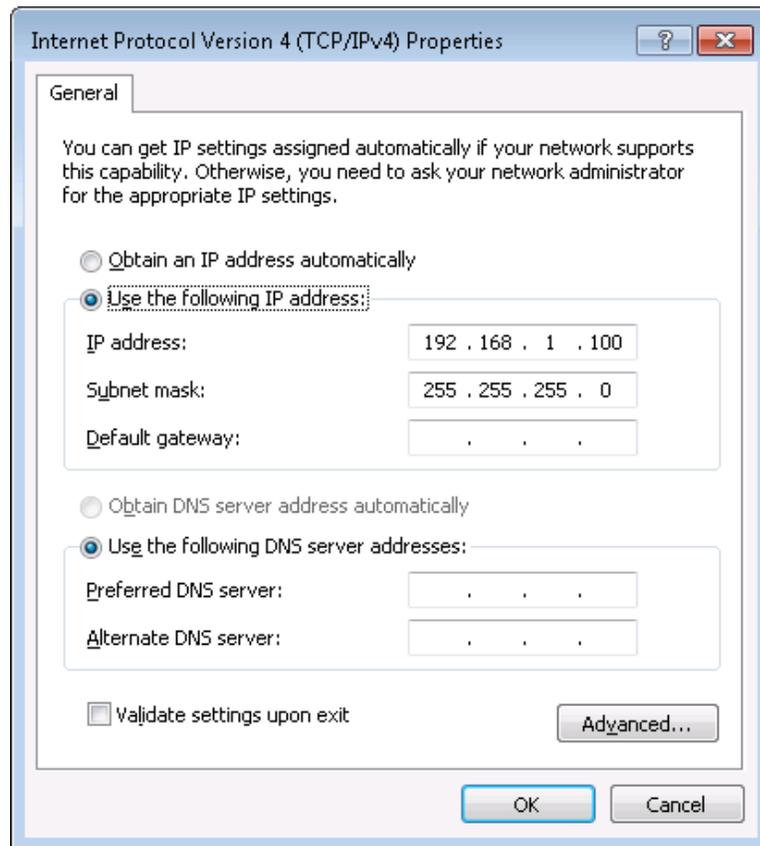

    d. Select the second Local Area Connection and set the IP address to 192.168.1.200. Use the same method as described for setting the first Local Area Connection. (This will be used for TSCA input.)

5. Start the MPEG player and open the Sym1.mpg file.

6. In the MPEG player toolbar, select Play > Interface > IP.

If the following pop-up displays, select OK. Do not use Auto Configure.
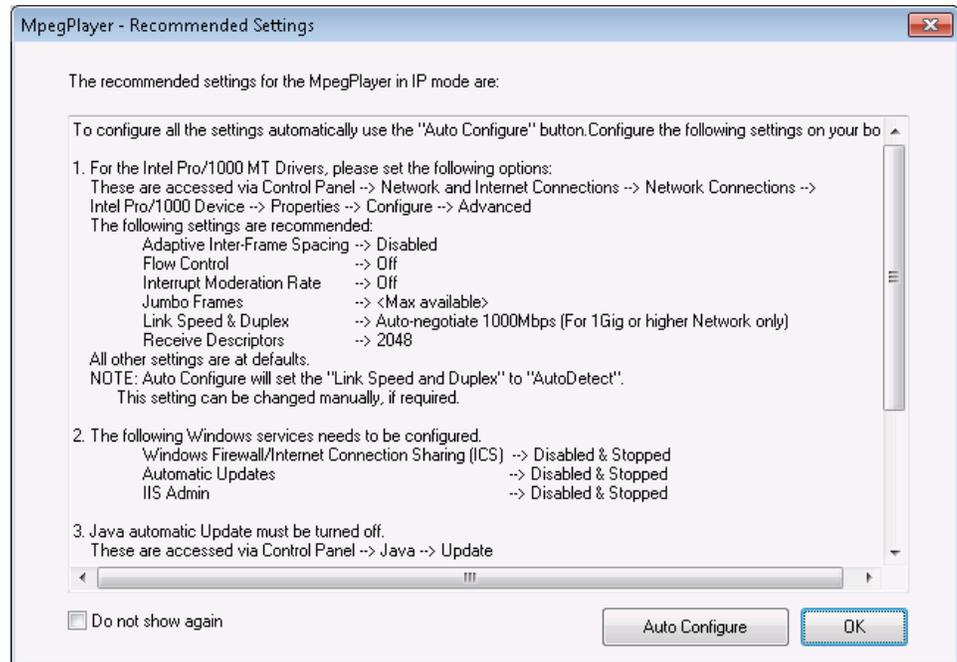
7. In the MPEG player toolbar, select IP > Configure.
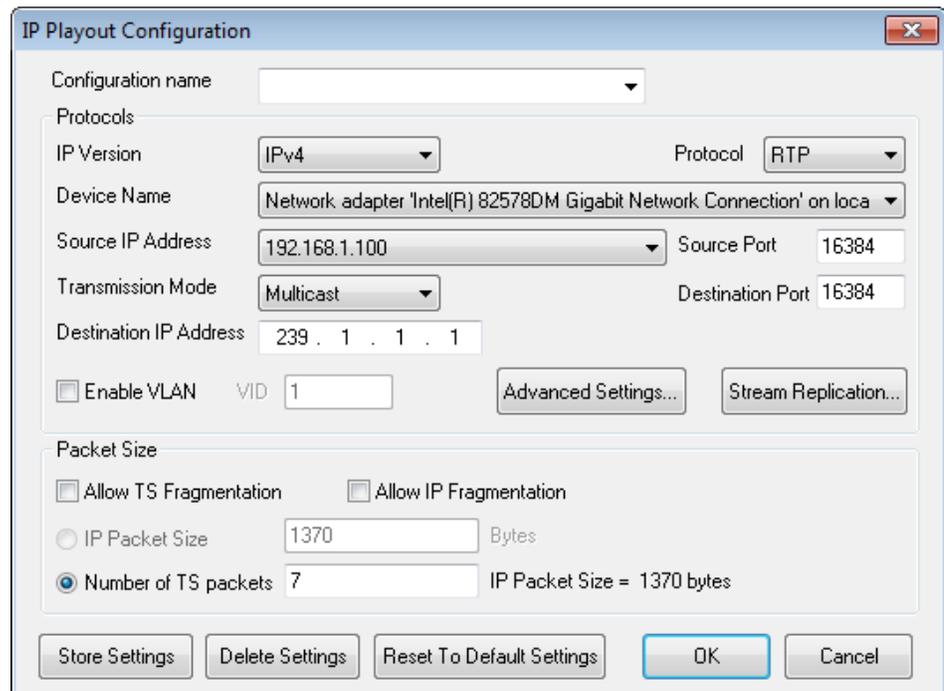
8. Configure the IP interface.

    a. Use the Device Name pull-down list and select the adapter that you set the IP address to 192.168.1.100. This is to be used for playout.

    b. Click Stream Replication and enter 0 (no stream replication).

9. In the MPEG Player toolbar, click the green Play arrow to start playing the transport stream file.

**10.** Start the TS Compliance Analyzer and choose IP interface.

If this is the first time the IP interface has been selected, double click the red area in preset or click the "+" button once
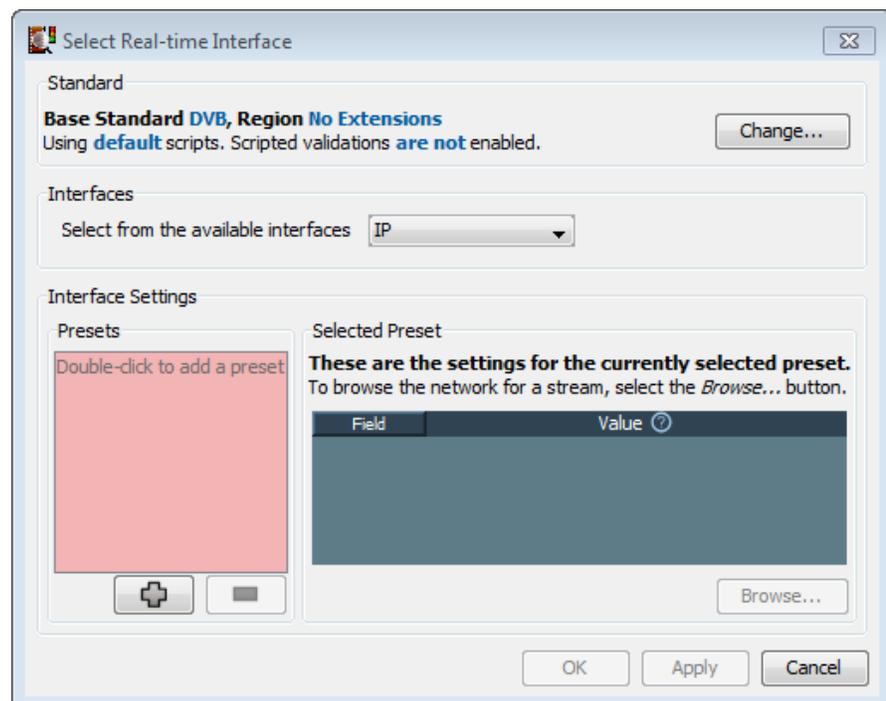
11. Browse to the stream coming to 192.168.1.200 port. In this example, it is the Intel(R) 82583V Gigabit Network Connection.
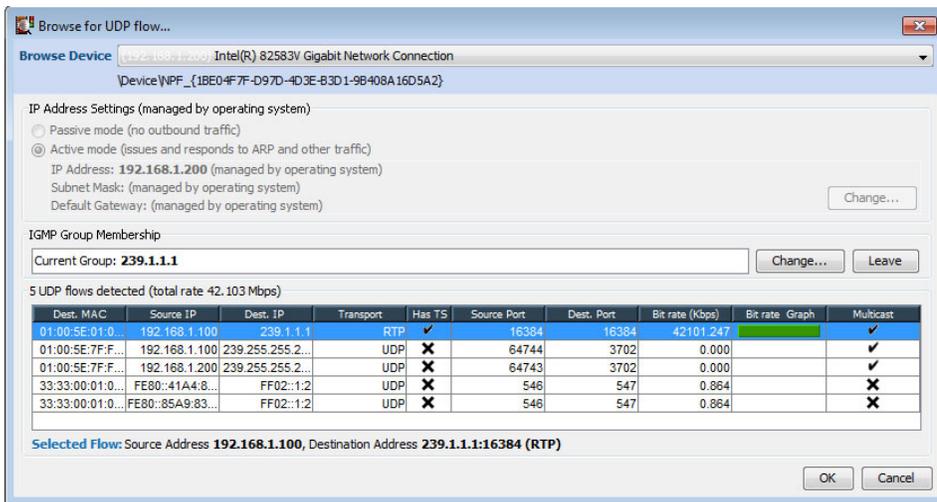
12. Click on the "green" stream on the list for analysis where source IP is 192.168.1.100 (this is from MPEG Player) and select OK.

13. Close all remaining configuration screens, and the analysis will start.

14. Some EIT errors are acceptable, see below:
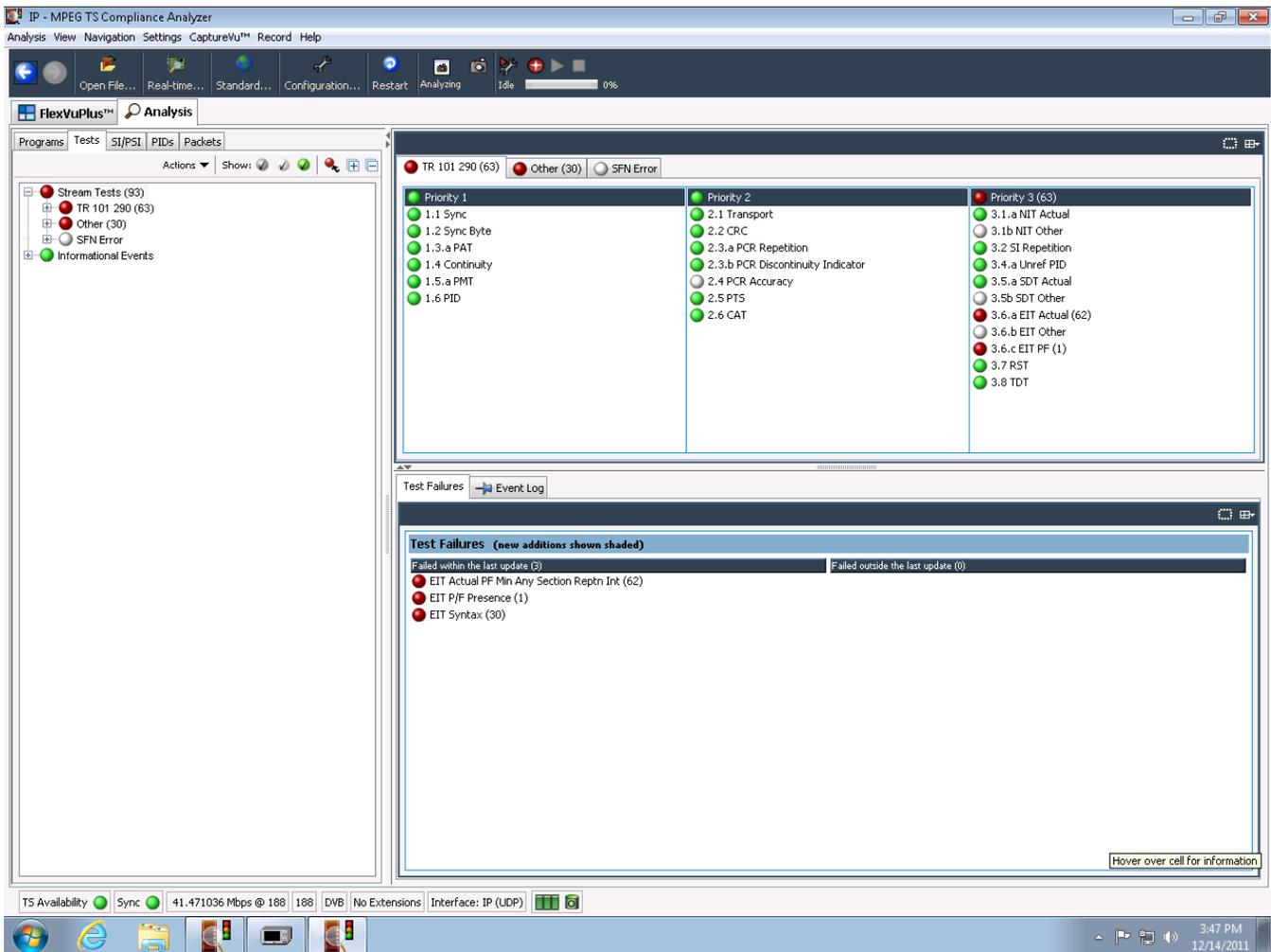
Shut down the instrument   The Performance Verification procedure is complete.

Power off the instrument and disconnect the signal cables.