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Product Introduction

MP1590A

Network Performance Tester

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MP1590A
Network Performance Tester

Product Introduction

Anritsu Corporation

MBP-1SG040077

Measurement Business Center IP network Div.
Product Marketing Dept.

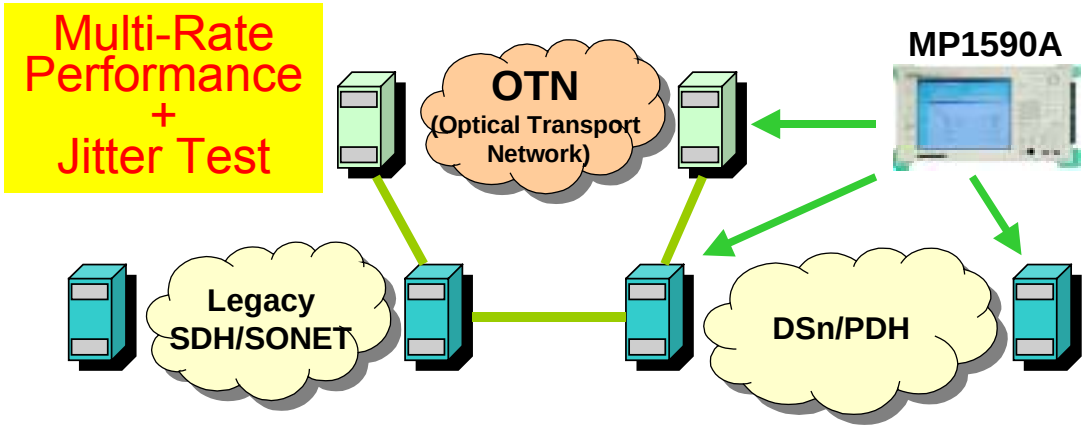
The following slides introduce the MP1590A Network Performance Tester.

MP1590A Network Performance Tester

What is the MP1590A?

Next-Generation SONET/SDH and OTN Systems

- Powerful multi-rate performance and jitter testing



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The MP1590A is a multi-rate tester capable of testing the performance and jitter of PDH/DSn, SDH/SONET, and OTN systems.

The MP1590A has been developed mainly for use in evaluating PDH/DSn, SDH/SONET, and OTN networks, and transmission equipment.

The MP1590A is an upgraded version of the MP1580A, and incorporates all the same features and performance. Conforming to ITU-T G.709 OTN (Optical Transport Network), the MP1590A can evaluate new networks and devices.

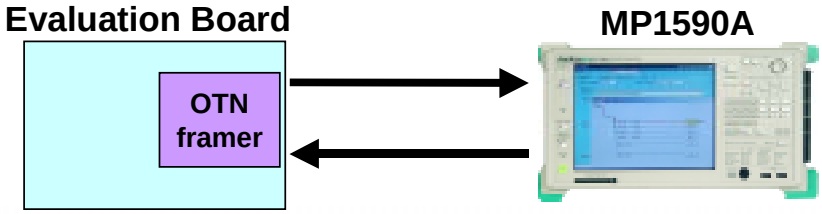
MP1590A Network Performance Tester

What is the MP1590A?

Module and Device Testing

- MP1590A supports electrical output and device testing
  - OTN
  - SONET, SDH

- For R&D and manufacturing test applications
  - Performance testing, Jitter testing



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The MP1590A provides numerous interfaces.

With its electrical I/O interfaces, the MP1590A can be used to evaluate both modules and devices.

MP1590A Network Performance Tester

Capabilities

Specifications

- Frame: PDH, DSn, SDH, SONET, OTN
- Frequency accuracy: ± 0.1 ppm
  - Offset range: ± 100 ppm in 0.1 ppm steps
- Optical output power: > 0dBm (10G/10.7G)
  >-1dBm (52M-2.5/2.6G)
- Wavelengths
  - Tx: 1310nm and 1550nm
  - Rx: 1260-1610nm (S/C/L bands)
- Clock source
  - Internal, External(1/1), Received, DCS Lock

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The MP1590A can handle OTN frames in addition to the frame formats of PDH, DSn, SDH, and SONET. A single MP1590A unit can test a wide range of bit rates.

The frequency accuracy of the internal standard clock is □0.1 ppm. Moreover, an offset range of □100 ppm is supported. (The MP1570A requires a jitter unit to offset the jitter with +/-0.1ppm accuracy. The MP1590A, however, does not require a jitter unit to offset jitter.)

The MP1590A provides a function to modulate external light (C/L bands) from a tunable laser source for output to a DUT. This function allows the tolerance of DUT wavelengths to be evaluated.

MP1590A Network Performance Tester

Capabilities

MP1590A Interfaces

Optical

- ✓OTU1(2.6G)/ OTU2 (10.7G)
- ✓STM-0/1/4/16/64
- ✓STS-1/3/12/48/192

Electrical

- ✓OTU2
- ✓STM-0/1/64
- ✓STS-1/3/192
- ✓E1, E2, E3, E4
- ✓DS1, DS3

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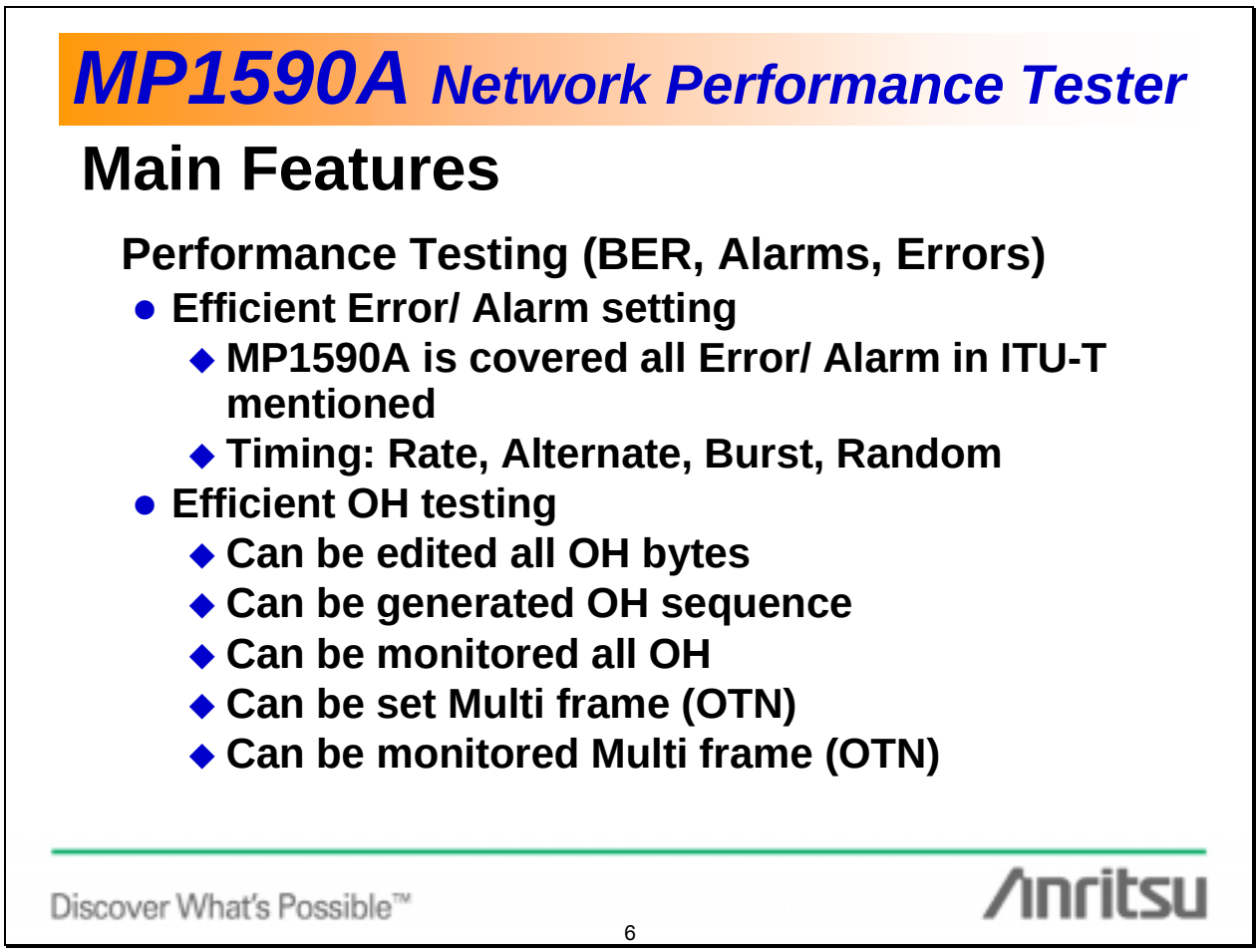
Data transmission interfaces
- Optical interfaces
  - STM-0, STM-1, STM-4, STM-16, STM-64
  - OC-1, OC-3, OC-12, OC-48, OC-192
  - OTU-1, OTU-2
- Electrical interfaces
  - E1, E2, E3, E4, DS1, DS3
  - STM-0, STM-1, STM-64, STS-1, STS-3, STS-192
  - OTU-2
- Standard clock input (BNC 75 Ω, Siemens 120 Ω Bantam 100 Ω)
  - Clock: 1/1 clock, 1.544 MHz, 2.048 MHz, 64 kHz + 8 kHz, 5 MHz, 10 MHz
  - Data: 1.544 Mbit/s (BITS), 2.048 Mbit/s
- Standard clock output (BNC 75 Ω, Siemens 120 Ω, Bantam 100 Ω)
  - Clock: 1.544 MHz, 2.048 MHz, 5 MHz, 10 MHz
  - Data: 1.544 Mbit/s (BITS), 2.048 Mbit/s
- Jitter/wander testing interface (Wander : 52 MHZ to 9953MGHz)
  - Clock I/O (52 MHZ to 10.7 GHz, SMA 50 Ω)
  - Standard clock output (52 MHz to 10.7 GHz, SMA 50 Ω)
  - Modulation signal output (BNC 50 Ω),
  - external modulation signal input BNC 50 Ω)
- Other
  - Trigger I/O (BNC 75 Ω),
  - DCC/GCC I/O (D-sub 9 pin)
  - Receive signal output (SMA 50 Ω),
  - Clock/Frame synchronous output (SMA 50 Ω)



Compared to the MP1570A, MP1590A error/alarm measurements have been upgraded. MP1590A supports all normalized items.

-The alternate timing error/normal settings each use 64000 frames. (Equivalent to eight seconds for the SDH/SONET frames)
-For Bit all error (at OTN bit rate) insertion, a random rate based on Poisson distribution can be inserted.
-For parity bytes, the error insertion location can be specified.
-When error/alarm measurement results are displayed in a split window, the tab indicating the layer where the error/alarm occurred is displayed in red for easier identification.
-For parity bytes, the error detection bit can be displayed.

All overheads (all bytes except parity and MFAS) can be edited. Moreover, an edit window is provided for editing OH bytes configured from multi-frames. Switching between mnemonic and hexadecimal input is supported.

All OH bytes can be monitored.
The continuity of multi-frames can easily be monitored using the monitor window of OH bytes configured from multi-frames.

MP1590A Network Performance Tester

Main Features

Jitter Testing

ITU-T Standard Jitter Testing

- Bit rate/Frequency
  - SONET/SDH
    - OC-1 to OC-192; STM-0 to STM-64
  - OTN
    - OTU1 -- 2.66 Gb/s, OTU2 -- 10.709 Gb/s
  - 10 Gb Ethernet (per ITU-T methods)
    - 10.3 GHz Clock
- Measurement item
  - Jitter Tolerance
  - Jitter Transfer
  - Manual Jitter Generation/ Measurement (Jitter generation, Output jitter)
  - Wander generation/ Measurement (P-P, +P, -P, TIE)

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A single MP1590A unit can test jitter/wander from 52 Mbit/s up to 10.7 Gbit/s.

(Wander testing is an option. Moreover, wander testing is supported only for SDH/SONET (52/156/622/2488/9953 Mbit/s).

Conventionally, jitter/wander was tested using the MP1570A (for up to 2488 Mbit/s) or the MP1570A and MP1580A (for 2488 or 9953 Mbit/s).

Operation has also been made easier by enabling the test points to be freely selected in the pattern master window provided for automatic measurements.

Jitter testing (ITU-T method) of a 10.3 GHz clock is also supported. (Option)

MP1590A Network Performance Tester

Main Features

DWDM Testing

DWDM Optical Test Features

- **External Laser Source input**
  - **Enables testing at user-selected C+L band wavelengths when using CW Tunable Laser Source (TLS)**
  - **MU150134A using LN modulator**
    Suitable for the Reference Optical source for Jitter testing

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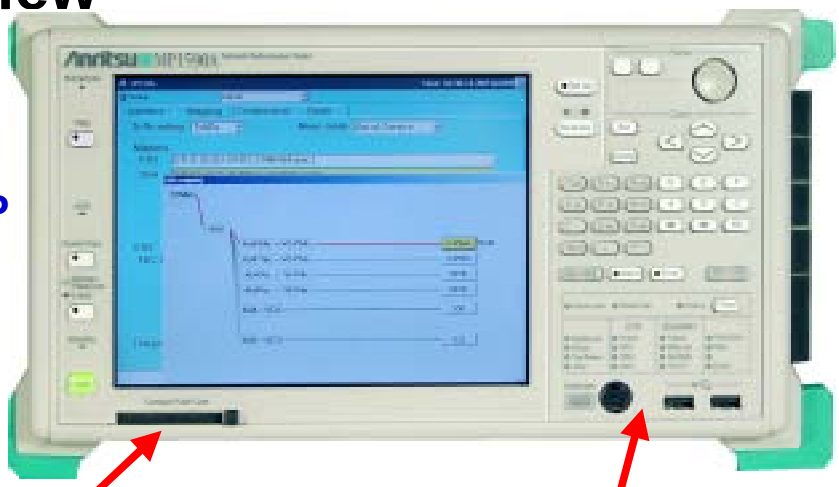
A MU150134A 10/10.7 G optical unit (Tx) is mounted to enable optical signal input from an external Tunable Laser Source (TLS). And MU150134A can transmit the 10/10.7G optical data depended on the wavelength from the TLS. This function enables the tolerance of DUT wavelengths to be evaluated.

Because optical signals output by the MU150134A have superior waveform quality and low jitter characteristics, the MU150134A is an ideal reference optical source for performing highly accurate jitter tests.

MP1590A Network Performance Tester

Front View



Windows® XP GUI

Windows® XP operating system

Compact Flash Memory
- **Saving results and configurations**
- **Software upgrades**

Keyboard and Dual USB Connectors

*Windows® is a registered trademark of Microsoft Corporation in the United States and other countries

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- 8.4-inch color TFT (800 x 600: SVGA) mounted

- GUI based on the Microsoft® Windows® XP Operating System utilized

- A compact flash (2 to 512 MB, conforming to CFA) can be used as an external storage medium.

- Two USB ports are mounted. Because Windows XP is used, peripheral devices can be easily connected (without any drivers required).

- By connecting an external printer to the MP1590A via the USB, screens can be printed (BMP, JPEG) and report (HTML, Making the Header format, It can be used the report.) files output (with printer drivers installed).

- Because the Plug & Play Device method is used, an optimum configuration for the customer's system and needs can be provided.

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MP1590A Network Performance Tester

Side View

Supports up to 6 interface modules based on industry standard compact PCI (cPCI) architecture

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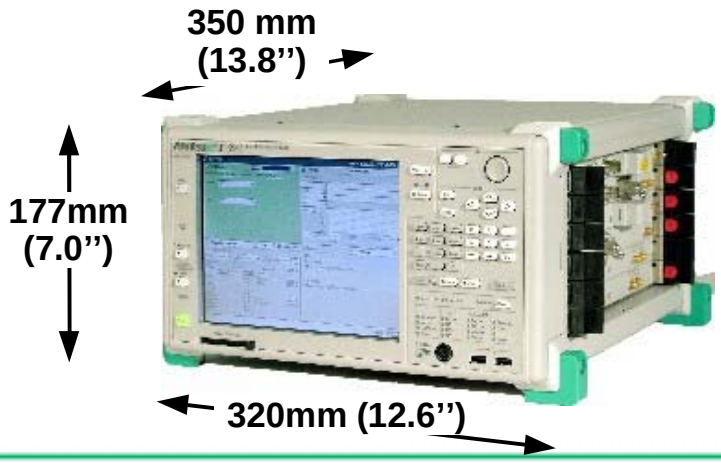
MP1590A Network Performance Tester

Physical Characteristics

Built-in TFT LCD (8.4'') and Compact body and Light weight Suitable for all location and all purpose

- **Maximum 17 kg (37pounds) with 10.7 Gb Jitter test**



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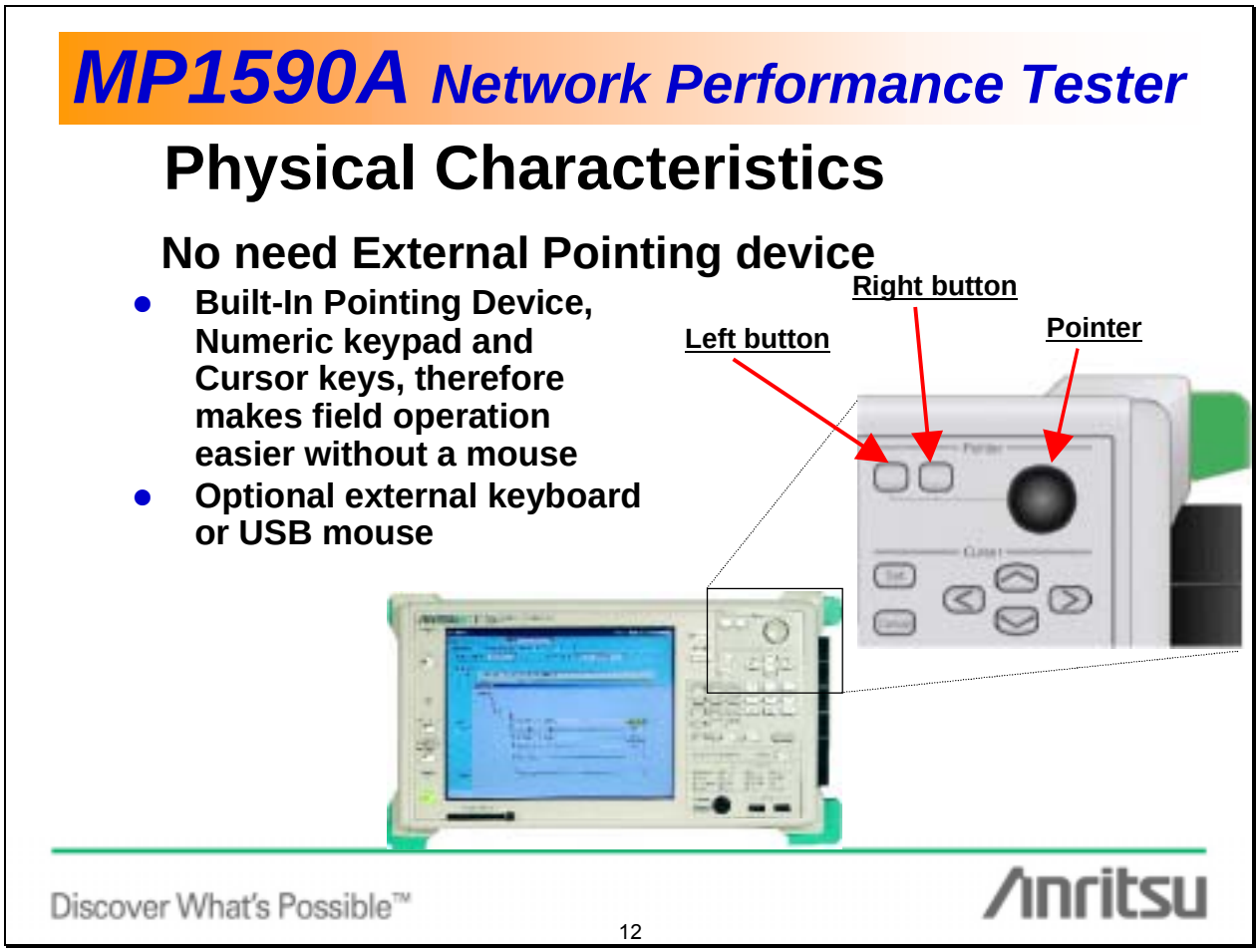
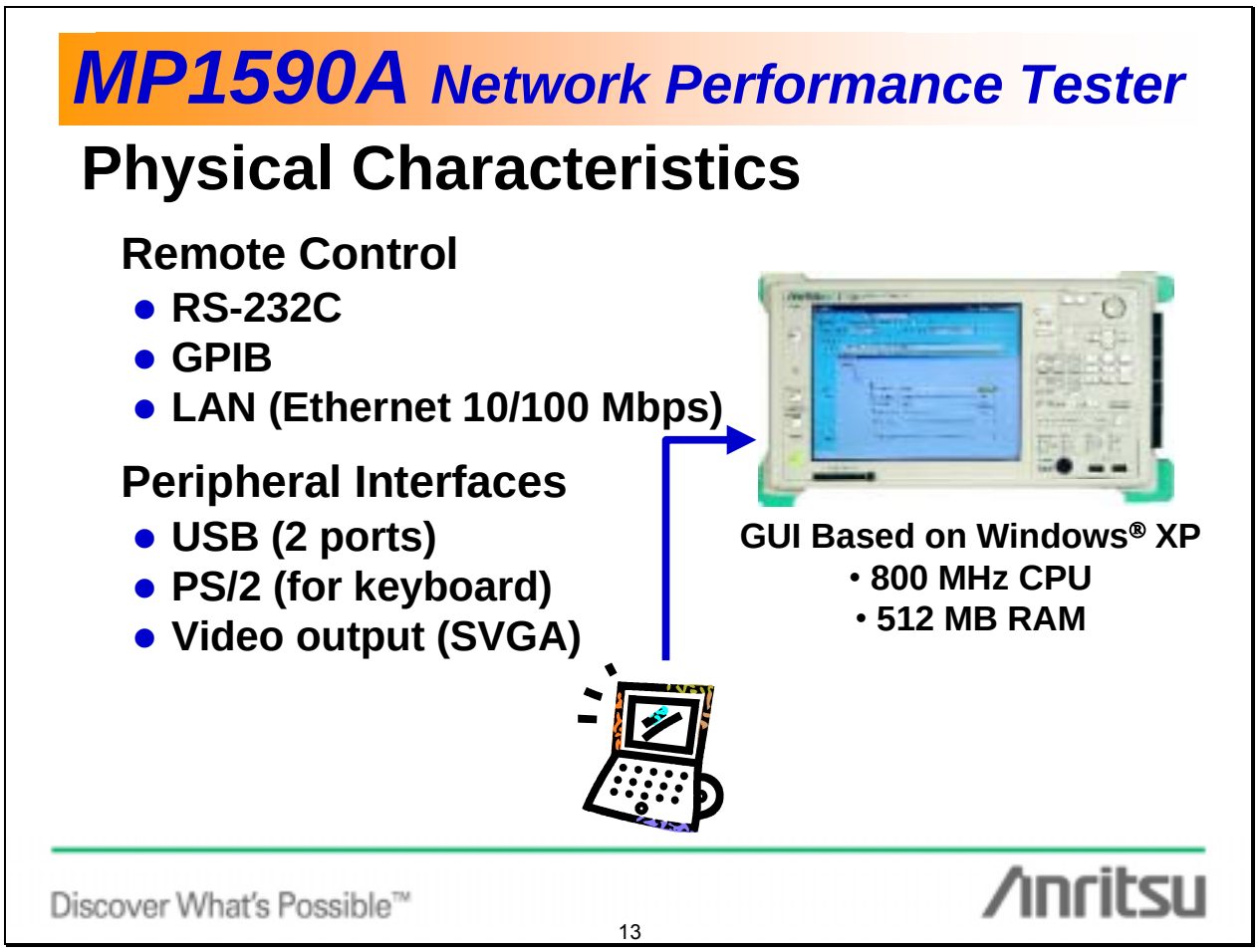
- The cabinet size is the same as that of the MP1570A. The screen size is the same as that of the MP1230A.
  320 (W) x 177 (H) x 350 (D) mm
- The maximum weight is 17 kg (10.7 Gbit/s jitter configuration).



By incorporating the basic operability of current models (MP1552A/B, MP1555A/B, and MP1570A), customers that use previous models can easily use the MP1590A without having to learn any new operations.

Moreover, thanks to the built-in pointing device and numeric keypad, customers can operate the MP1590A just like a PC.

By connecting an external keyboard or USB mouse, operability for the customer can be further enhanced. In environments where external devices cannot be used such as when conducting field tests, all MP1590A operations can be performed using the built-in pointing device mounted as standard.



External interfaces

The following interfaces are mounted for remote control:

RS-232C (option 01), GPIB (option 02)
Ethernet (10BASE-T/100BASE-TX, option 03)

The following interfaces are mounted for connecting peripheral devices:
USB port (2 ports), PS/2 (keyboard)
Video output (SVGA)

A compact flash (2 to 512 MB, conforming to CFA) can be used as an external storage medium. Flash memory connectable to the USB can also be used.

OTN Test Solutions

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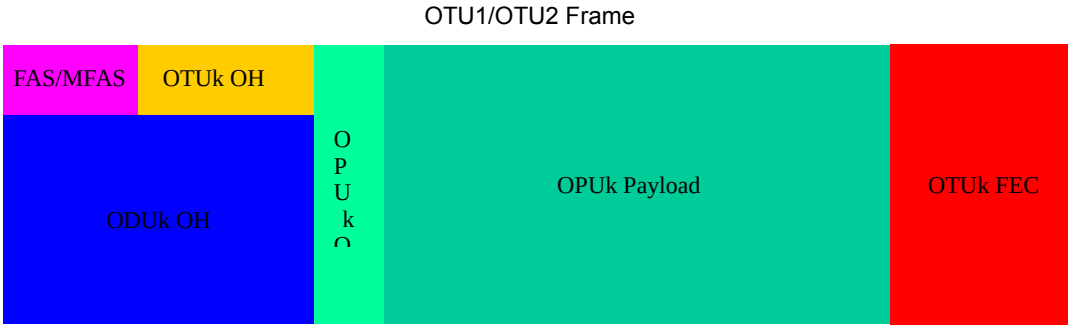
Here, we introduce the OTN (Optical Transport Network) test solutions of the MP1590A.

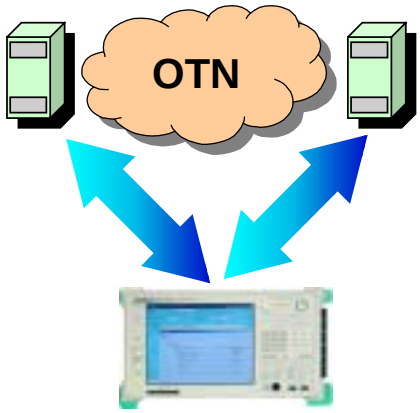


Bit rate: OTU2 10.709225 Gbit/s (transmission of about 81000 frames per second)
OTU1 2.666057 Gbit/s (transmission of about 42000 frames per second)

The OTN frame format is the same for each bit rate (with the same number of bits within each frame).

MP1590A Network Performance Tester

OTN Test Solutions



Standards

- Complies with ITU-T G.709,G.8251

Capabilities

- Mappings
  - SDH/SONET (Async. Sync.)
  - Null, PRBS
- Pointer editing, operating/ count
- OH editing/monitor/capture
- Error/Alarm generation/detection

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The MP1590A complies with ITU-T G709 (i.e., frame format, FEC) and G8251 (OTN jitter).

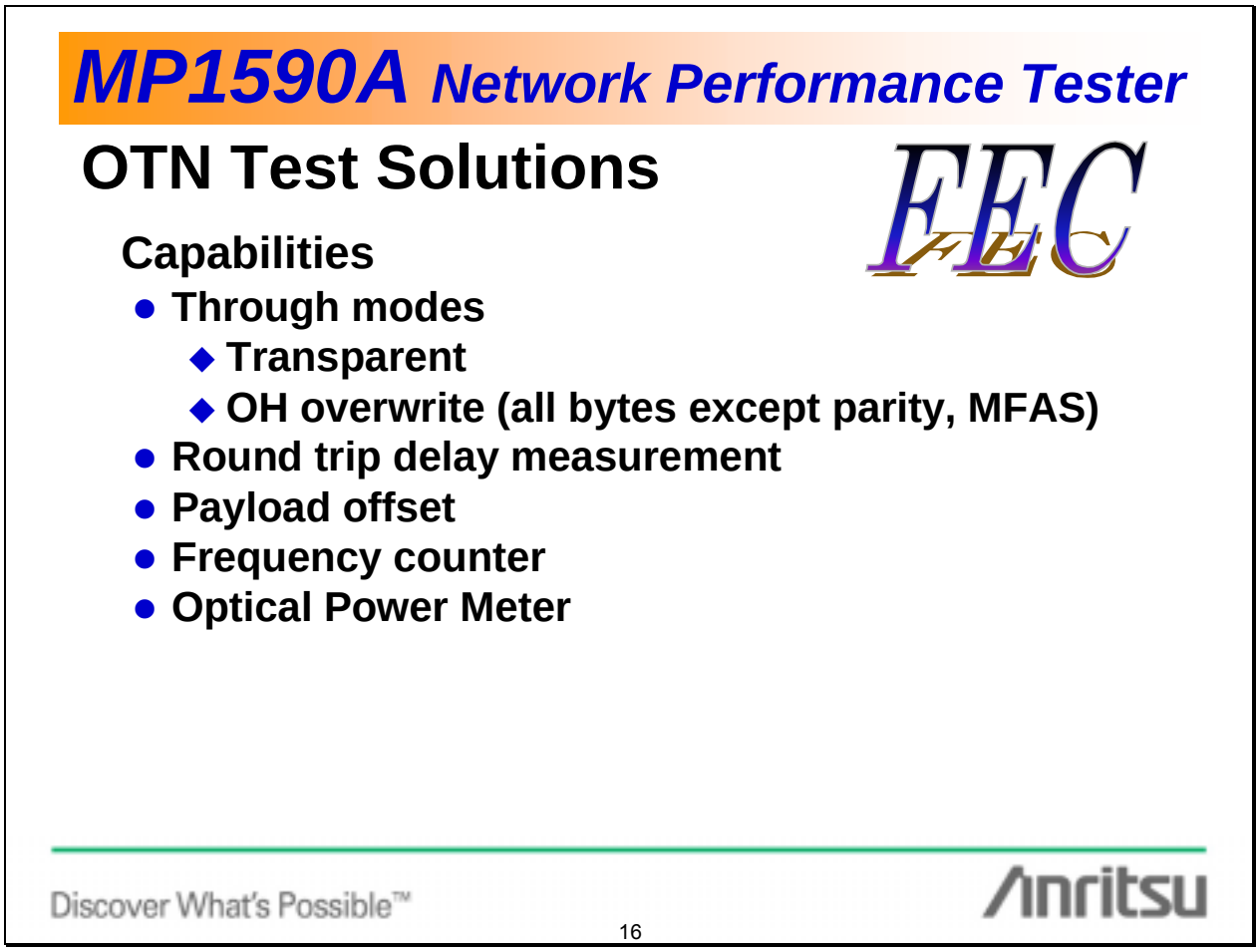
The MP1590A supports the following OTN mappings:

OTU2/OTU1 - SDH/SONET (Async./Sync.)
OTU2/OTU1 - NULL (The OPUk Payload area is all 0s.)
OTU2/OTU1 - PRBS

(Memo) To transmit a STM64/STS192 1 frame, about ten OTU2 frames are required.

All overheads (all bytes except parity, MFAS, and JC) can be edited. Moreover, the dedicated edit window can be used to edit overhead bytes configured from multi-frames. For the OTN signals received, the entire overhead area, TTI multi-frame display, FTFL multi-frame display, and payload area can be monitored. Monitoring of the payload area is displayed within an area consisting of 16 columns x 4 rows. Arbitrary locations within this area can be selected and monitored. For the APS/PCC bytes (4 bytes), the sequence capture function enables the sequence where the APS/PCC bytes were received to be identified.

The MP1590A supports OTN alarm generation/detection. Alarm detection can be turned on or off. The detection filter conditions can also be changed.



The MP1590A OTN signals have the following two types of through modes:

Transparent
Overhead overwrite

In transparent mode, the received signals are looped back and output as is while being monitored. In overhead overwrite mode, the selected OH is overwritten and output. The FEC can be calculated automatically and added.

During OTU2/OTU1-SDH/SONET (Async.) mapping, OTN justification can be used to offset the frequency of SDH/SONET signals mapped in the payload. The variable range is as follows:

OTU2: +/-65.9 ppm, OTU1: +/-65.6 ppm

MP1590A Network Performance Tester

OTN Test Solutions

Capabilities (continued)

- **FEC on/off control:**
  - **ON: complies with G.709 Reed-Solomon (RS255,239)**
  - **OFF: for use with other types of FEC**
- **Measurements when FEC enabled:**
  - **Corrected bit errors**
  - **Uncorrectable blocks**
- **Random Poisson distribution error generation capability (Error insertion capability)**
  - **When evaluating the FEC function of SUT, since all Errors will be corrected, in the usual Error inserted periodically, it is not realized as an examination. Evaluation more similar a real network is attained by using Error which made it generate in a Poisson distribution.**

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The MP1590A can perform error correction complying with ITU-T G709.

Supported FEC (Forward Error Correction) code: RS (255, 239) = Reed-Solomon symbols. Eight symbols within one code word can be corrected.
(1 code word = 255 bytes, 1 symbol = 8 bits)

For more details about error correction, see the attached explanation.

The MP1590A supports FEC encode/decode on/off control.

FEC OFF:
FEC OFF is set when an FEC code not compliant with G709 is inserted in the FEC parity area of the OTN frame for the DUT connected to the MP1590A. This prevents invalid error correction that may occur for the MP1590A and DUT.

At FEC ON, the FEC measurement items are as follows:
Corrected bit errors: Number of bits for which error correction was performed.
Uncorrectable blocks: Number of code words for which correction exceeding the correction capability was detected.

Moreover, the MP1590A can insert random errors based on Poisson distribution. Using random errors enables the error correction capability of the FEC decoder to be precisely evaluated. In the conventional error correction method whereby errors are inserted periodically, all errors are corrected. As a result, the FEC decoder cannot be precisely evaluated.

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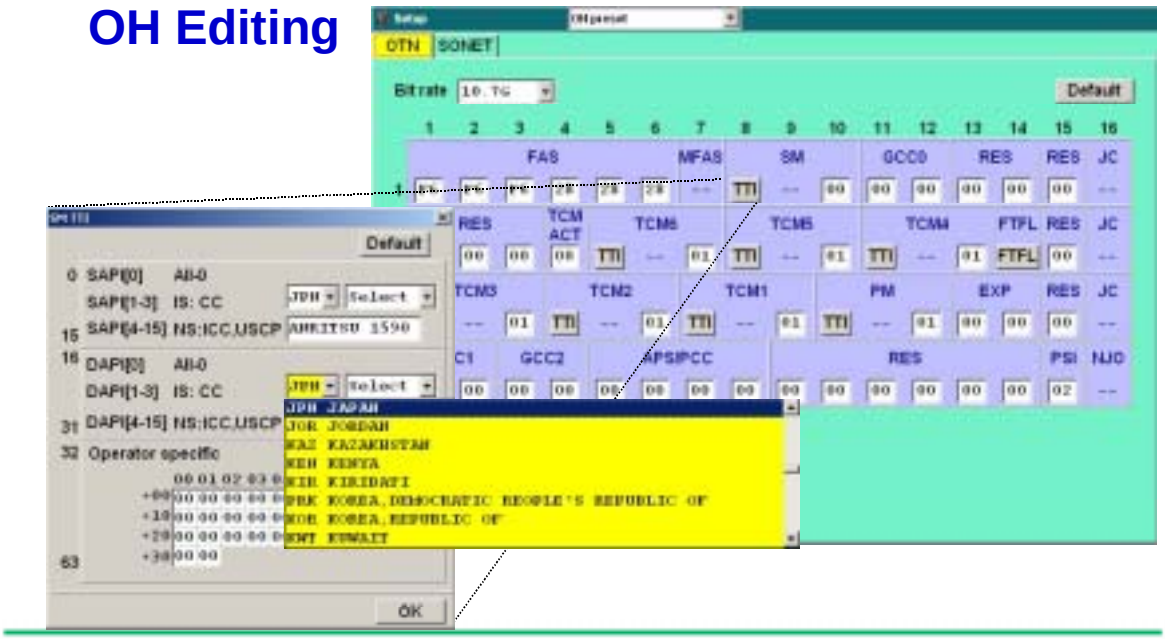
OTN Test Solutions

OH Editing



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The MP1590A can edit all overheads of the OTN frames (all bytes except parity, MFAS, and justification). Moreover, an edit window is provided to facilitate the editing of OH bytes (TTI and FTFL) configured from multi-frames. Switching between mnemonic and hexadecimal input is supported.

FAS: Frame Alignment Signal. Configured from the pattern indicating the beginning of the OTN frame.
MFAS: MultiFrame Alignment Signal. Indicates the sequence number (0 to 255) of the OTN multi-frame.
SM: Section Monitoring. Number of bytes of the Section monitor within the ODUk overhead.

PM: Path Monitoring. Number of bytes of the Path monitor within the ODUk overhead.
TCM*: Tandem Connection Monitoring. Number of bytes (1 to 6) of the tandem connection monitor within the ODUk overhead.
TCM/ACT: TCM ACTivation/deactivation (for further study)
FTFL: Fault Type and Fault Location. Within the ODUk overhead. Has a multi-frame configuration.
EXP: EXPerimental. Within the ODUk overhead.
GCC0-2: General Communication Channel. Within the OTU and ODU overhead.
APS/PCC: Automatic Protection Switching and Protection Communication Channel (for further study)
PSI: Payload Structure Identifier. Within the OPUk overhead. Has a multi-frame configuration and indicates mapping information within the OPUk payload.
JC: Justification Control. Within the OPUk overhead and indicates justification presence/absence information.
NJO: Negative Justification Opportunity. Within the OPUk overhead. Extended area at negative justification.
***-TTI: Trail Trace Identifier. Part of the SM, PM, and TCM* bytes. Has a multi-frame

configuration.

MP1590A Network Performance Tester

OTN Test Solutions

TTI Monitor

OH Monitor

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The MP1590A displays the entire OTN overhead in 4 rows x 16 columns. Moreover, the MP1590A displays the TTI and FTFL bytes that have a multi-frame configuration so that the operator can understand the structure at a single glance. The MP1590A also supports switching between mnemonic and hexadecimal display. Because the MP1590A uses a 4-row x 16-column frame, arbitrary locations within an OTN frame can be monitored.

Mnemonic display of the first byte PSI[0] (PT: Payload Type) of PSI bytes (multi-frame configuration) enables mapping information to be easily identified.

MP1590A Network Performance Tester

OTN Test Solutions

Error and Alarm Generation/Detection

	OTU2 / ODTU12					
	OTU	**ODU**	**TCM1 / 2**	**TCM3 / 4**	**TCM5 / 6**	**OH**
Alarms	LOF OOF LOM OOM AIS SM-TIM SM-BIAE SM-BDI SM-IAE	AIS OCI LCK PLM PM-TIM PM-BDI	TCM1-TIM TCM1-BIAE TCM1-BDI TCM1-IAE TCM1-LTC TCM2-TIM TCM2-BIAE TCM2-BDI TCM2-IAE TCM2-LTC	TCM3-TIM TCM3-BIAE TCM3-BDI TCM3-IAE TCM3-LTC TCM4-TIM TCM4-BIAE TCM4-BDI TCM4-IAE TCM4-LTC	TCM5-TIM TCM5-BIAE TCM5-BDI TCM5-IAE TCM5-LTC TCM6-TIM TCM6-BIAE TCM6-BDI TCM6-IAE TCM6-LTC	Sync.
Errors	SM-BIP8 SM-BEI Correct Uncorrect	PM-BIP8 PM-BEI	TCM1-BIP8 TCM1-BEI TCM2-BIP8 TCM2-BEI	TCM3-BIP8 TCM3-BEI TCM4-BIP8 TCM4-BEI	TCM5-BIP8 TCM5-BEI TCM6-BIP8 TCM6-BEI	Bit

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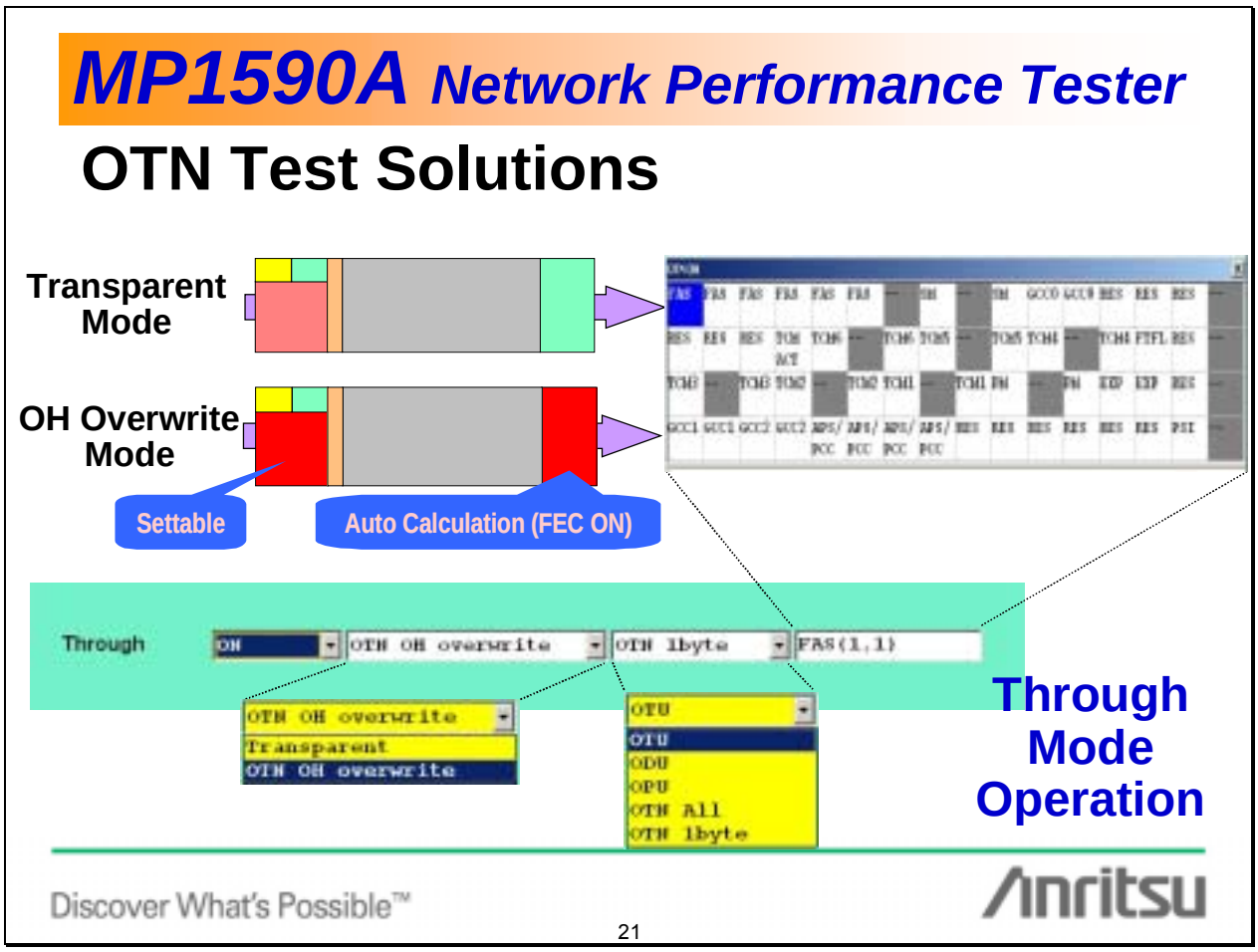
The MP1590A supports all OTN errors/alarms. The MP1590A can insert errors/alarms at Rate, Alternate, Single, or Burst timing. So DUT's tolerance test can be perform exactly.

The MP1590A shows alarms detected by frame or time unit.



The MP1590A OTN signals have the following two types of through modes:

Transparent
Overhead overwrite (all bytes except parity and MFAS)

Overhead overwrite includes the following:

OTUk OH only: Row 1 and columns 8 to 14 are overwritten.
ODUk OH only: Rows 2 to 4 and columns 1 to 14 are overwritten.
OPUk OH only: Rows 1 to 4 and columns 15 and 16 are overwritten.
Entire OTN OH: All bytes are overwritten.
Arbitrary byte of OTN OH: Only the selected byte is overwritten.

Both modes can be re-calculated FEC by setting FEC ON.

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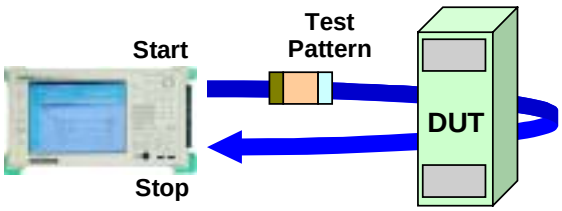
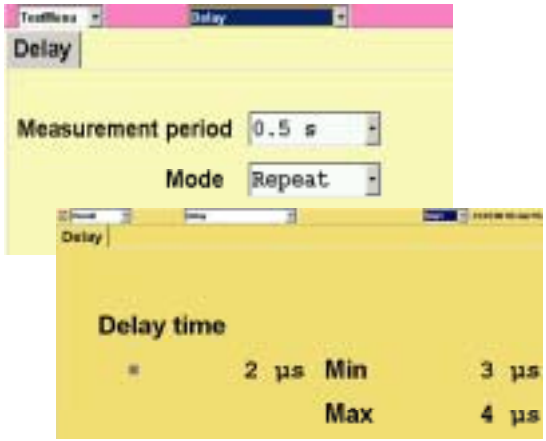
OTN Test Solutions

Delay Measurement

- Measuring round trip delay time is especially important for OTN equipment
  - FEC decode time usually adds increased delay more than SDH/SONET module





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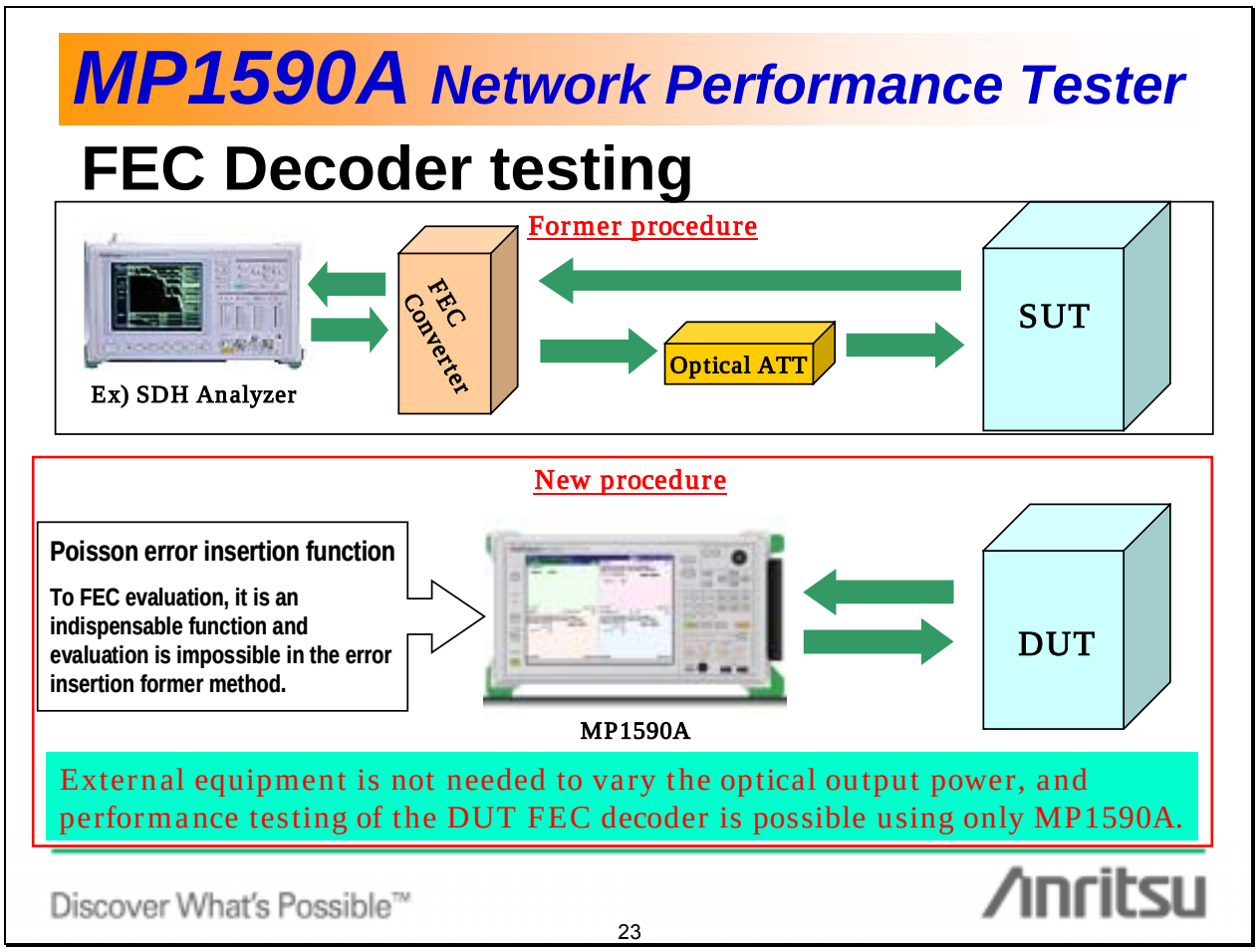
Compared with SDH/SONET modules, OTN equipment requires more processing time because FEC error correction is performed. As a result, measuring the delay time of OTN equipment is especially important.



When using the MP1570A to perform FEC testing, an FEC converter or variable optical attenuator had to be connected externally.

When using the MP1590A, however, a measuring system can be easily configured since the FEC converter and variable optical attenuator is built into the measuring instrument. Testing efficiency can also be improved.

Random errors can be inserted to create conditions approximating those of the physical circuit, thus enabling more accurate FEC testing.

SONET/SDH
Test Solutions

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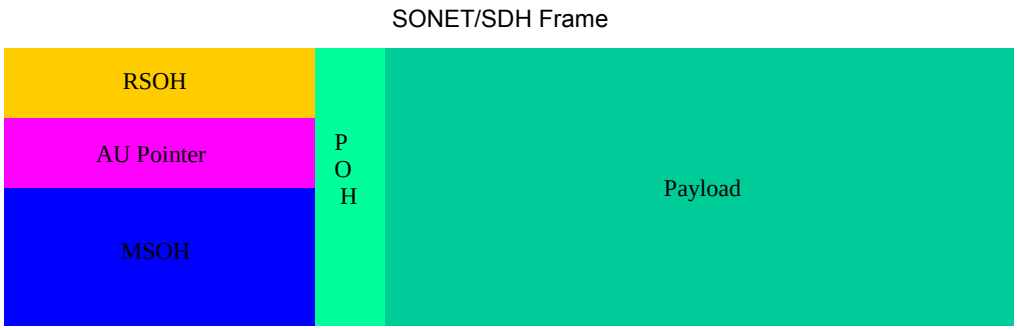
The following slides introduce the SONET/SDH test solutions of the MP1590A.



For SONET/SDH frames, one frame can be transmitted at 125 µsec regardless of the bit rate. Accordingly, the number bits within a frame depends on the bit rate.

For SONET/SDH frames, 8000 frames can be transmitted per second.

MP1590A Network Performance Tester

SONET/SDH & PDH/DSn Test Solutions

Standards

- Complies with G.703,G.707

Capabilities

- OH edit/monitor
- Pointer editing, operating/ count
- Error/Alarm generation/detection
- APS time measurement
- Arbitrary/ Contiguous concatenation mapping
  - VC4-Xc (X=2-16)
  - STS3-Xc (X=2-16)
- Round trip delay measurement

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The MP1590A has the same functions and features as the MP1570A, plus additional new functions for performing SONET/SDH tests.

The MP1570A supports the following concatenations:
VC4-c, VC4-4c, VC4-16c, VC4-64c
STS3cSPE, STS12cSPE, STS48cSPE, STS192cSPE

In addition to the above, the MP1590A also supports the following concatenations:
VC4-Xc (X = 2 to 16)
STS3xXcSPE (X = 2 to 16)

MP1590A Network Performance Tester

SONET/SDH & PDH/DSn Test Solutions

Capabilities

- Through mode operation
  - Transparent
  - OH overwrite
- Round trip delay measurement
- Mixed payload
  - TU/VT level are mixed
- Payload offset
- Frequency counter
- Optical power meter

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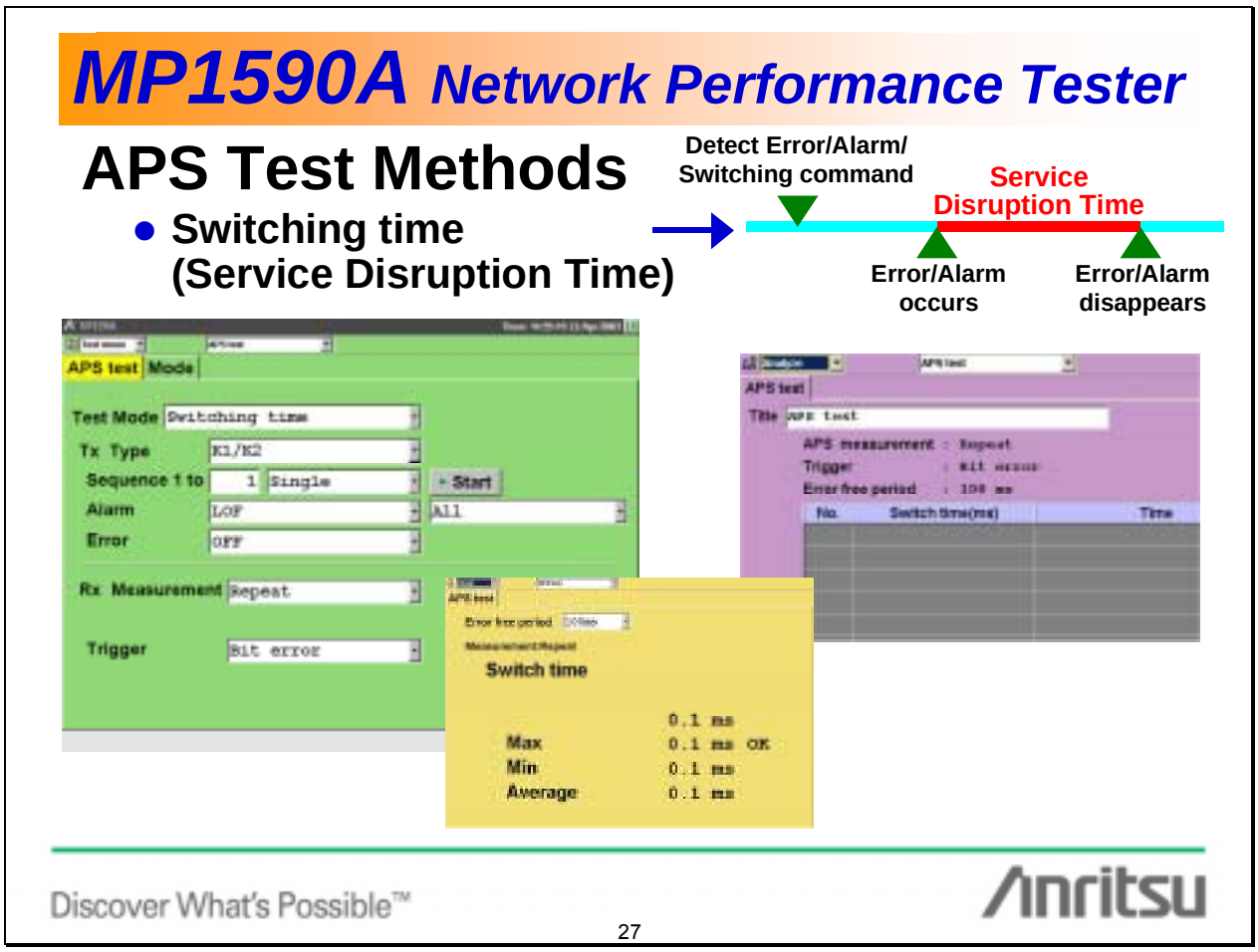
The MP1590A has an improved mix payload function that enables mixing at the TU/VT level.

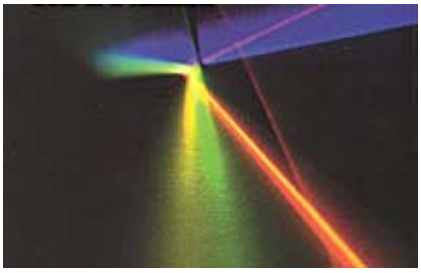


When performing APS Switching Time tests using the MP1570A, only one event could be measured per test. The MP1590A, however, enables continuous testing. The MP1590A can also display the results in more detail, as follows:

Absolute time of the Switching Time
Maximum, minimum, and average times of the Switching Time

And The MP1590A can capture MAX 3000 evens.

DWDM
Test Solutions



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The following slides introduce the DWDM test solutions when using an external tunable laser source.

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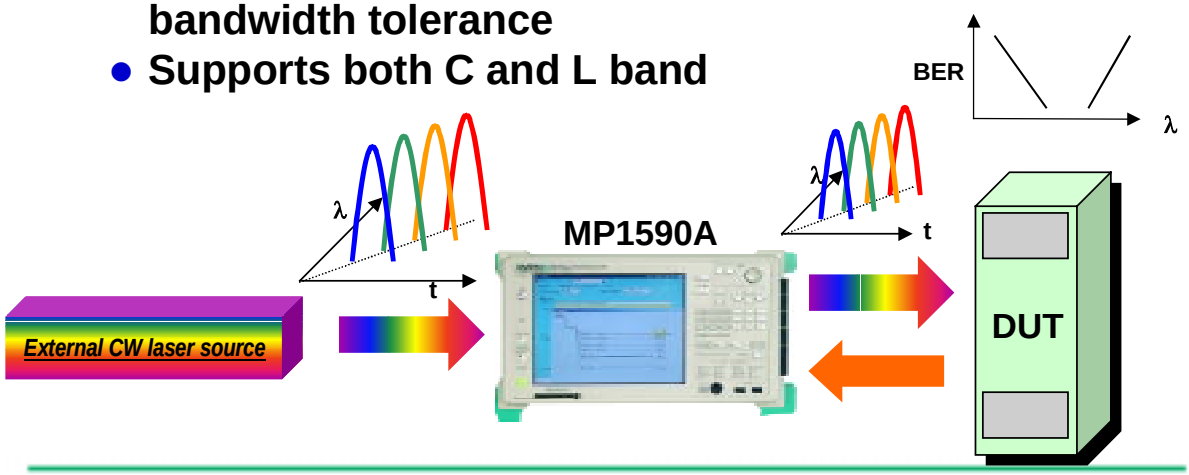
DWDM Test Solutions

External Optical (CW Laser Source) Input

- Modulates internal digital signal for output to DUT
- Enables evaluation of optical bandwidth tolerance
- Supports both C and L band



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One MU150134A 10/10.7 G transmission optical unit is mounted to enable optical signal input from an external Tunable Laser Source (TLS). The MP1590A modulates the optical signal from the external TLS and outputs it to the DUT, thus enabling the tolerance of DUT wavelengths to be evaluated.

Both C and L band (peak wavelengths) are supported.

Moreover, because the optical signals output by the MU150134A have superior waveform quality and low jitter characteristics, the MU150134A is an ideal reference optical source for performing highly accurate jitter tests.

ITU-T, Telcordia, ETSI and ANSI Standards Compliance

ANSI American National Standards Institute

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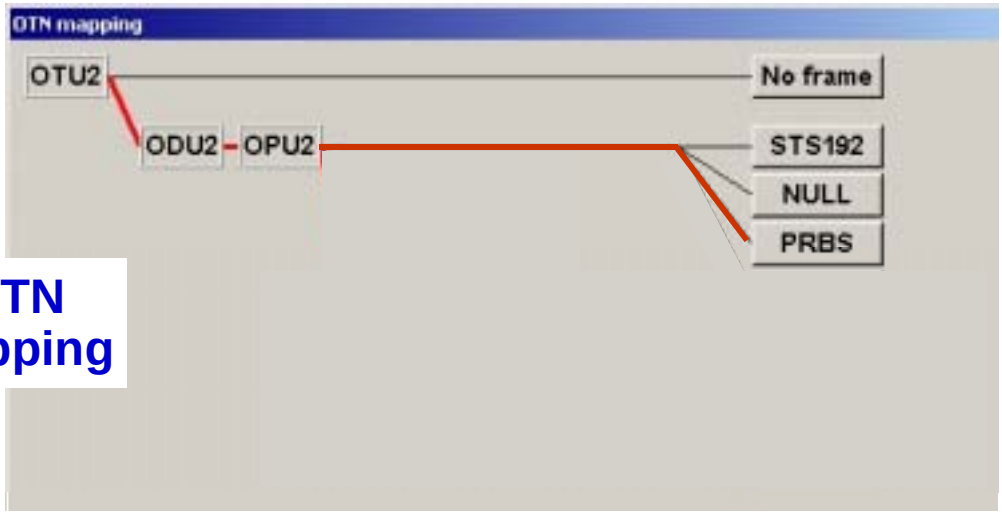
ITU-T, ANSI Standards Compliance



OTN Mapping

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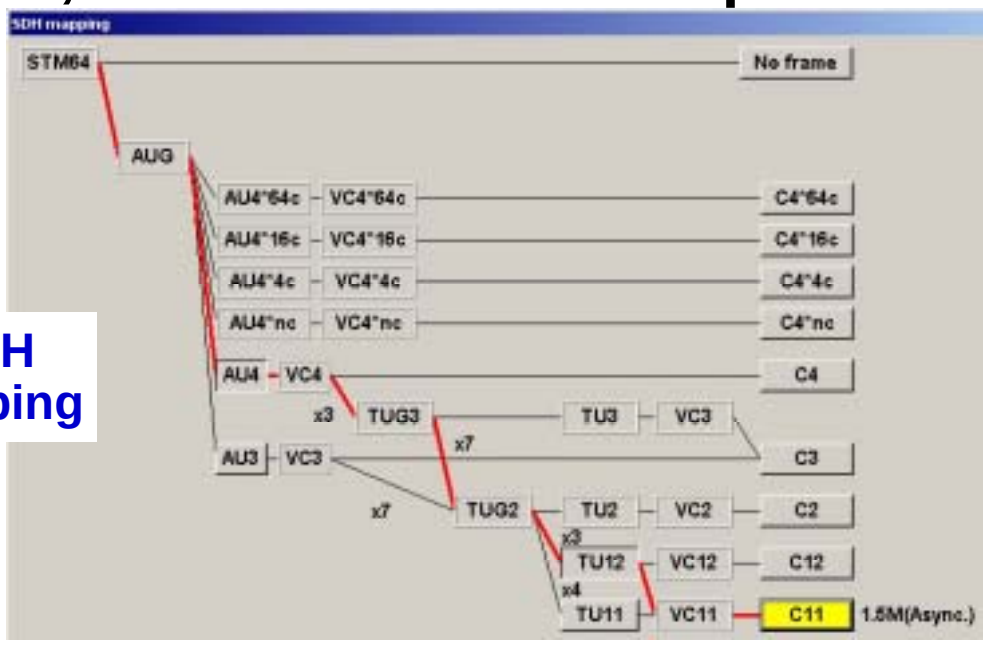
ITU-T, ANSI Standards Compliance

SDH Mapping



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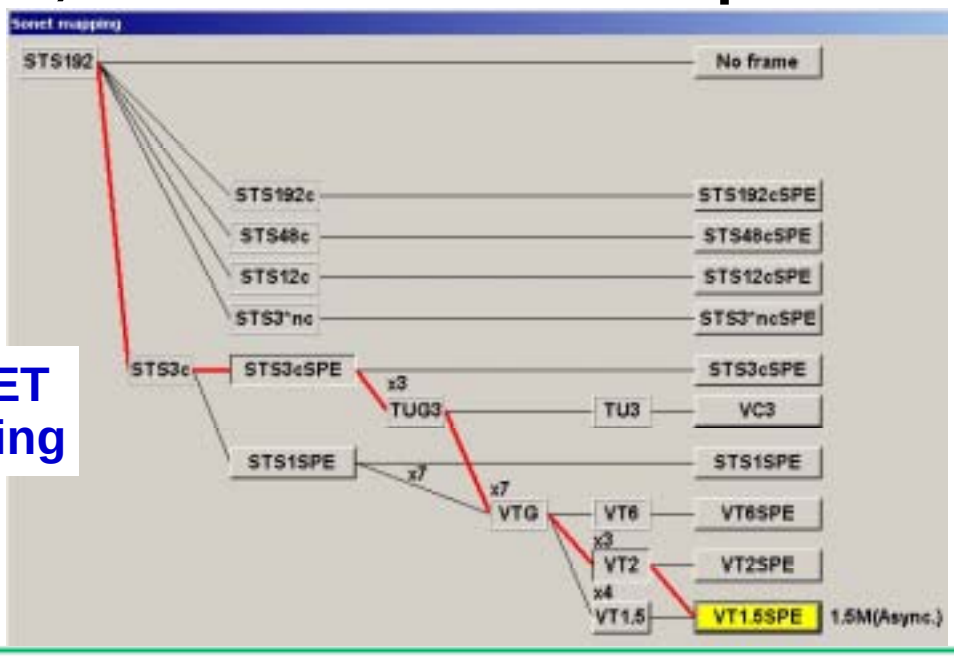
ITU-T, ANSI Standards Compliance

SONET Mapping



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Test Standards Compliance

Response/stress test: ITU-T G.783, G.806, G.798 Telcordia GR.253
Alarm alternate generation

APS test: ITU-T G.841 Telcordia GR253
Sequence generation & APS time measurement

Tandem connection: ITU-T G.707
Byte setting/monitor,Error/alarm measurement

Path trace: ITU-T G.707 Telcordia GR253
Byte setting, CRC check, Monitor

MP1590A Network Performance Tester

Frame Format Compliance

- **1.544Mbit/s: D4/ESF/Japan ESF**
- **2.048Mbit/s: 30, 31ch with/without CRC4**
- **8.448Mbit/s: ITU-T G.742**
- **34.368Mbit/s: ITU-T G.751**
- **44.736Mbit/s: M13/ C-bit**
- **139.264Mbit/s: ITU-T G.751**
- **51.84Mbit/s: SONET/SDH**
- **155.52Mbit/s: SONET/SDH**
- **622.08Mbit/s: SONET/SDH**
- **2488.32Mbit/s: SONET/SDH**
- **9953.28Mbit/s: SONET/SDH**
- **2666.057Mbit/s: OTN**
- **10709.225Mbit/s: OTN**

✓ **All bit rates are supported both Frame On and Off**

MP1590A Network Performance Tester

Jitter test Compliance

- Jitter tolerance
  - ITU-T G.783, G.825, G.813, G.8251
  - Telcordia GR-253, ANSI T1.105.03
  - ETSI EN 302 084
- Jitter transfer
  - ITU-T G.783, G.8251, ETSI EN 300 417-1-1
  - Telcordia GR-253, ANSI T1.105.03

Additional Function

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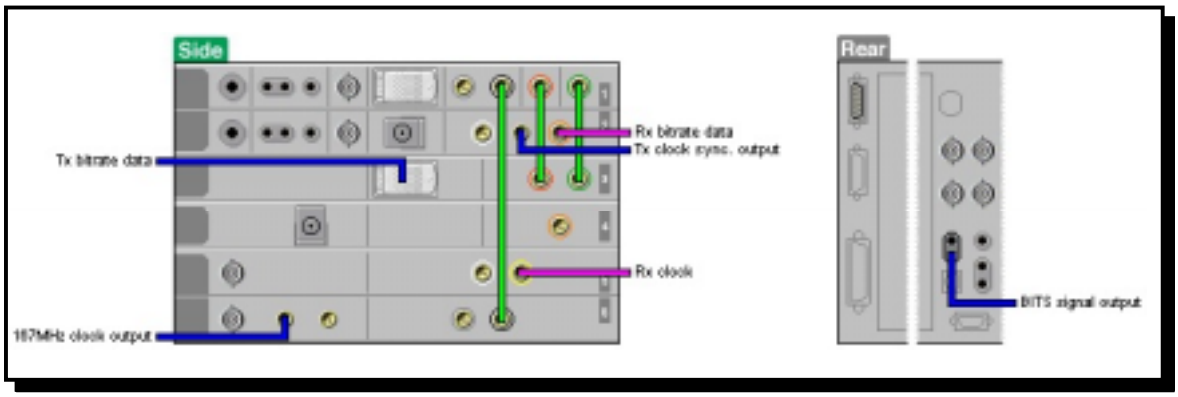
The MP1590A also offers other useful and effective functions. The following slides introduce these functions.

MP1590A Network Performance Tester

Additional Function

Built-In Smart User Manual

- **Unique on-screen display shows optical and electrical connections for the chosen configuration**



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The MP1590A has a built-in HELP function. The HELP key on the front of the unit can be used to display contents of the instruction manual. When the HELP key is pressed, the current cursor position is automatically recognized and the related page displayed. This function thus saves time in searching for the related HELP section.

The MP1590A also provides a Guidance function. This function displays a diagram for connecting the MP1590A as required by the customer based on the unit configuration, bit rate, and interface settings. This Guidance function also enables the bit rate and mapping settings to be checked.

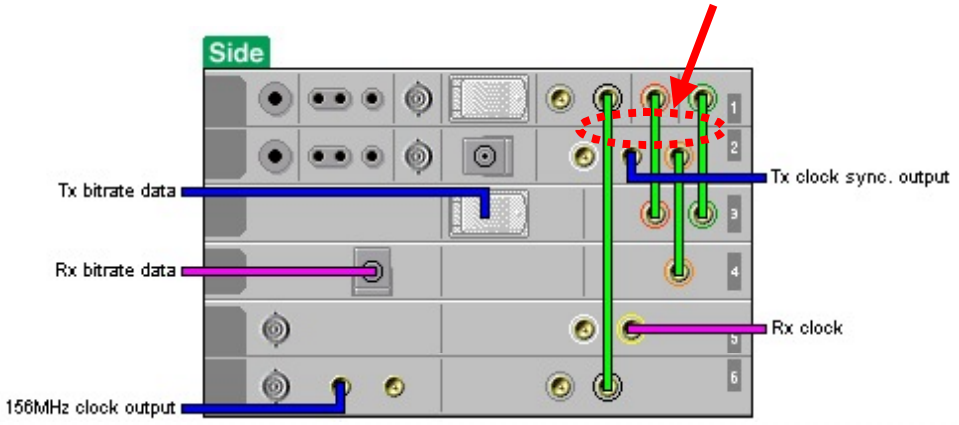
These functions help to reduce the possibility of incorrect connections and provide the customer with the means of performing smooth evaluations and tests.

MP1590A Network Performance Tester

Additional Function

Internally Switched High/Low Speed Circuitry

- No need to move semi-rigid cables when switching between 10G and 2.5G or lower speeds
- External cables remain in fixed locations



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The MP1570A required that connections between the units be changed whenever the bit rate or interface was switched.

The connection method of the MP1590A is much simpler.

- Optical interfaces of 52 Mbit/s to 2.6 Gbit/s and 9953M/10.7 Gbit/s are each provided for sending and receiving.

- The connection need not be changed the fiber or the cables when the wavelength is changed.

(The connectors, however, must be changed when switching between optical and electrical.)

MP1590A Network Performance Tester

Additional Function: Display Flexibility

Two Display Types

- 1/4 display helps present the whole test situation and facilitate screen copies for reporting

Standard 1/1 Display

1/4 Display

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The MP1590A uses the following screen configuration to set items required for evaluation and testing by the customer, and display the results:

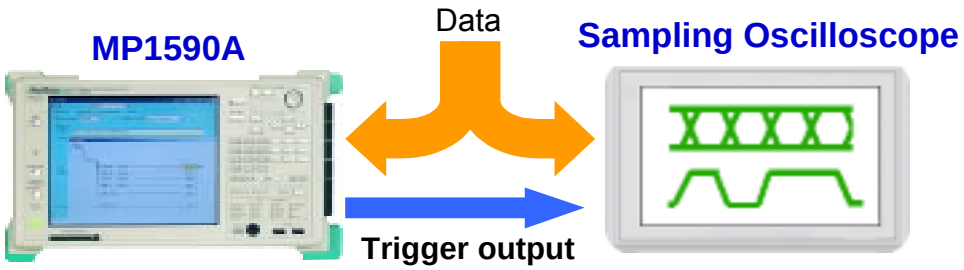
- Test Menu (1/4 display upper left)
  - Send section related settings (i.e., error/alarm, offset)
  - Jitter/wander settings (manual settings, tolerance, transfer)
  - Test related settings (i.e., test interval)
  - APS, OH TEST delay test settings, etc.
- Analyze (1/4 display upper right)
  - Graph displays (i.e., error/alarm, jitter)
  - Monitor displays (i.e., OH monitor, power meter, frequency monitor)
  - Capture result, etc.
- Result (1/4 display lower left)
  - Error/alarm count, delay test result, performance test
  - Jitter/wander test result, etc.
- Assist (1/4 display lower right)
  - Mapping display
  - Test channel setting

Each display can be expanded to fit the entire screen.

MP1590A Network Performance Tester

Additional Function：Trigger Output

- Eye pattern, Bit stream testing
  - Enables simultaneous evaluation of input signal waveform using external oscilloscope
- Error and alarm testing with trigger output



(1/16 Clock Sync. / Frame Sync. Output)

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The MP1590A outputs a 1/16-divided clock and frame signal synchronized with the signal sent or received. The waveform of DUT without a trigger can be observed by making this signal into a trigger.

The eye pattern can be observed when using the 1/16-divided clock as the trigger. This is useful for observing the signal level and phase relationship between the data and clock.

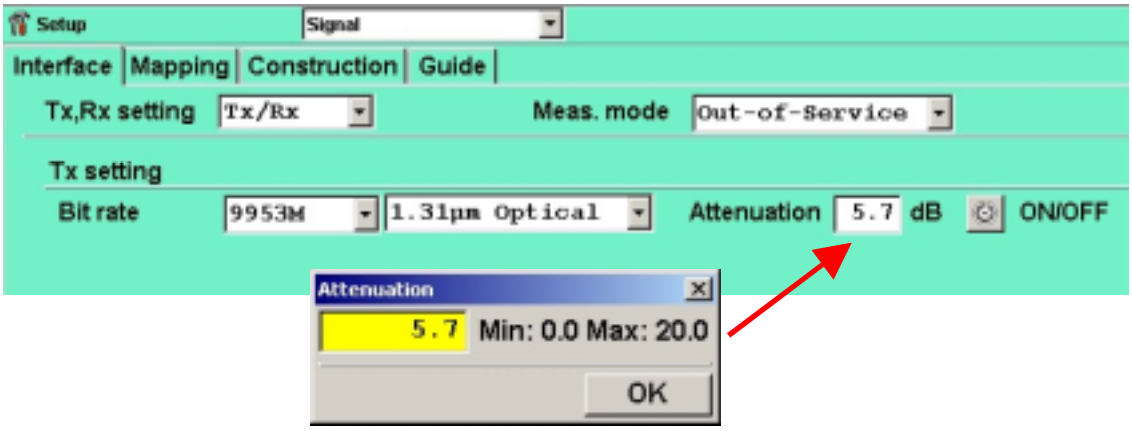
The bit stream of the signal can be observed when using the frame synchronous signal as the trigger.

MP1590A Network Performance Tester

Additional Function：Optical Attenuator

Built-in Optical Attenuator

- Adjusts output signal level
- 0-20 dB (10G/10.7G) 0-30dB (<2.66G)



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The MP1590A has a built-in optical attenuator for an optical transmission interface. (The MU150100A, MU1501210A, and MU150134A are options.)

Attenuation
10G/10.7 Gbit/s: 0 to 20 dB in 0.1 steps
52M to 2.6 Gbit/s: 0 to 30 dB in 0.1 steps

Varying the amount of attenuation is effective for evaluating the FEC decoder and tolerance of the input level of the DUT.

Configurations

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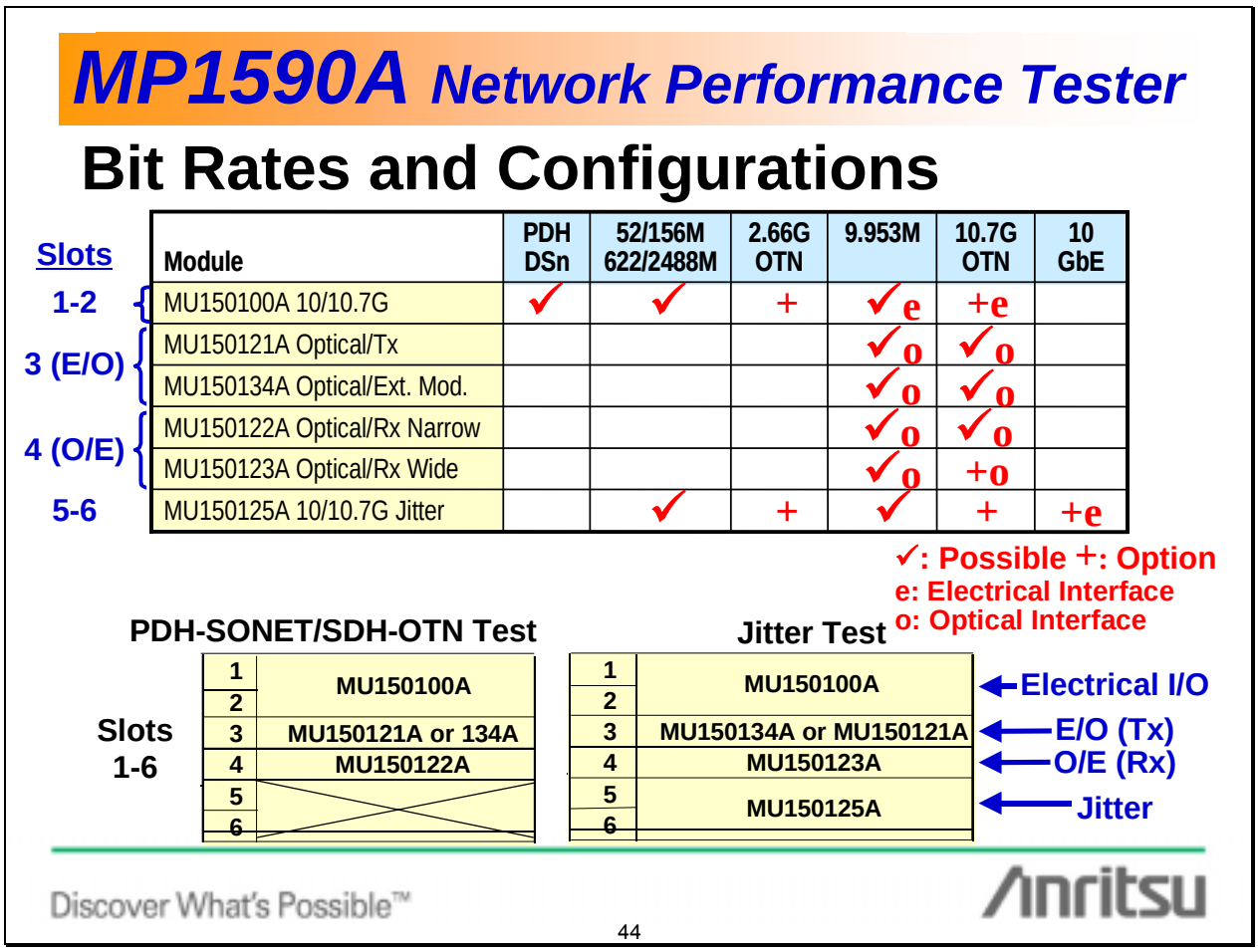

This table shows the correspondence between each module and bit rate.

The modules can be combined to provide the customer with optimum solutions for the customer's system and needs.

To perform jitter/wander tests at 10/10.7 Gbit/s, use the MU150123A because of its built-in clock recovery function. (It can not measure to use MU150122A)

Moreover, for 10/10.7 Gbit/s, use the MU150134A to input optical signals from an external tunable laser source, etc.
MU150134A has a internal laser source normally (fixed wavelength).

If only jitter/wander tests are necessary, just the MU150125A is installed. MP1590A built-in only MU150125A can be operate (Jitter Only Mode).

[Wander testing is an option and can only be performed for SDH/SONET (52, 156, 622, 2488, and 9953 Mbit/s).]

Thank You!

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We are proud to present the MP1590A as the ideal solution for the customer's system and needs.

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Specifications are subject to change without notice.

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