SUNRISE TELECOM®
Productivity Rising™

STT 40G

43G OTN and 40G SDH/SONET Testing
Now with optional DPSK line coding
DATA SHEET

The versatile and powerful STT 40G takes Sunrise Telecom's Scalable Test Toolkit (STT®) platform to a new level as a test and measurement solution for high speed transport networks such as 43G OTN (OTU3) and 40G SDH/SONET (STM-256/OC-768). With payload structure down to VC12, VC11, VT1.5, and VT2, it offers service providers a complete test solution for today's and tomorrow's Metro, Core, and DWDM transport networks. In addition to it, STT 40G now offers 43G DPSK modulation with tunable transmitter for OTN Network Element client and line side field verification. Its small size and weight in stand alone mode makes the STT 40G the smallest and lightest test set in the world. This commanding set of features is available in a single, compact, easy to use, and cost effective unit. The STT 40G can be used independently or combined with other test modules to enhance its application, taking advantage of its bidirectional 10.7/10G drop and insert port. Like other STT modules the STT 40G offers the revolutionary and cost-effective stand-alone mode in remote or local environments, allowing test modules to operate at 100% of their capabilities and features, even when removed from the STT platform.

Key Features

- OTN, SDH, SONET in one instrument
- Optional DPSK modulation for OTN NE line side verification in the field
- 10/10.7G auxiliary port to interconnect STT 40G module with other 10G systems
- Fully independent or can be combined with other test modules to enhance application
- Internal SDH/SONET mapping down to VC12, VC11, VT1.5, VT2
- Complete performance tests and analysis for point to point links and DWDM networks
- Comprehensive SDH/SONET/OTN overhead control and decode
- Auto-configuration
- Stand-alone operation (no platform required) increases portability and flexibility
- Complies to ITU-T, Telcordia, and ANSI standards
- Intuitive user-friendly, yet powerful, Graphical User Interface

Benefits

- All-in-one transport networks test solution
- Cost-effective solution, as a stand-alone module, self-contained portable instrument, or as a 40/43G complement to existing STT ONE reducing CAPEX
- Eliminates the need for multiple platforms
- Same look and feel as other STT modules reduces the learning curve and operational expenditures
- Ideal for Network Element installation, verification and troubleshooting
- Increases availability of test gear as STT modules left behind can be used at 100% of their capabilities, while the test platform is being used in other application.
- Native Remote Control operation that can work on low bandwidth conditions, offering the most responsive system in the market.

The user-interface has been designed specifically for carrier, NEMs, and lab applications, maintaining the familiar look and feel of other STT products to reduce the learning curve and operational expenses. Auto configuration takes the guess-work out of configuring the instrument to the circuit being tested. Yet, experienced users will appreciate advanced features like overhead monitoring and control, APS timing measurement, pointer test sequences, and propagation delay measurement.

Test Features

With its comprehensive set of test and measurement features, the STT 40G allows the user to perform routine and advanced testing on high speed transport networks with a single platform.

All measurements conform to industry standards, and circuit impairments are displayed on a correlated graphical view, giving operators insight into the possible causes of circuit impairments. By combining the STT 40G with STT ONE, it offers a cost effective solution for testing all transport networks from 1.5 or 2 Mbit/s up to 40/43 Gbit/s, eliminating the need for multiple platforms.

Optical Transport Network (OTN)

STT 40G provides Forward Error Correction (FEC), verifies conformance to ITU-T G.709 and a wide range of network performance standards, including end-to-end connectivity at OTU3 bit rate, and complete synchronous/asynchronous mapping of SDH STM-256, SONET OC-768 client signals.

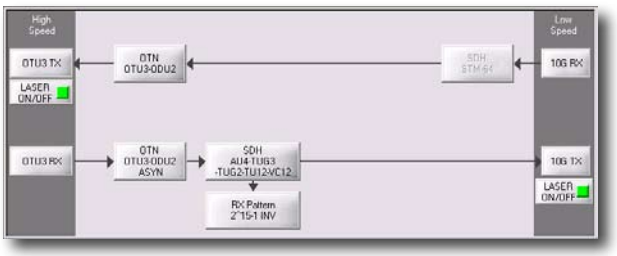
- OTU3 (43 Gbit/s) interface
- ODU Time Division Multiplexing (ODU2 into OPU3)
- Synchronous/asynchronous mapping of SDH/SONET signals
- OTN/SDH, OTN/SONET mux test and emulation
- Error performance analysis per ITU-T G.8201 and M.2401
- APS timing measurement
- Alarm Generation and Error Injection (including correctable and non-correctable FEC)
- OTN Tandem Connection Monitoring
- OTU, ODU, OPU error injection and alarm generation
- OTU, ODU, and OPU bytes control and decode
- Complies to ITU-T G.709

Traditional SDH/SONET

- Mapping/demapping of payloads from VC4-64c/ STS-192c down to VC11, VC12/V T1.5, VT2
- SDH/SONET errors/alarms detection and generation
- SDH/SONET overhead control and decode
- Pointer monitoring and adjustment
- APS timing measurement
- Alarm Generation and Error Injection
- Complies to ITU, Telcordia, and ANSI standards

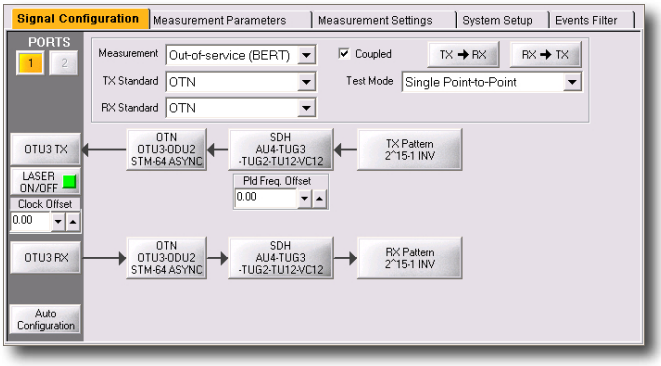
10/10.7G Auxiliary Port

- Field replaceable transceivers (XFP)
- OTU3 to OTU2 drop/insert
- OTU3 to STM-64 or OC-192 drop/insert
- STM-256 to STM-64 drop/inset
- OC-768 to OC-192 drop/insert



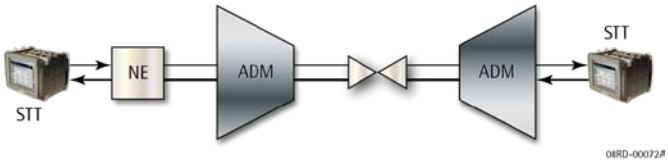
Applications

STT 40G allows the user to perform testing on high-speed transport networks. Offering both in-service and out-of-service configurations, the STT 40G covers installation, commissioning, maintenance and troubleshooting applications. Among other advance features, it supports a comprehensive set of test modes including point-to-point, through modes, mux-test and mux emulation. Its complete error insertion and alarm generation selection can be used to verify network performance monitoring systems. Application oriented graphical user interface shows the building blocks and flow of the test signals as user friendly set up guide.



Out-of-Service Testing

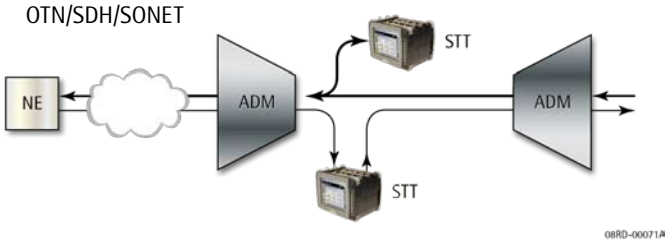
OTN/SDH/SONET



- Bring-into-service, stress testing, and maintenance
- Error performance analysis conforming to ITU-T and Telcordia recommendations
- End-to-end error free transmission verification
- SDH/SONET network routing verification

In-Service Testing

OTN/SDH/SONET



- Line and payload through mode monitoring
- In-service monitoring through protected monitoring points or optical splitters
- Overhead bytes monitoring and decoding
- Pointer monitoring

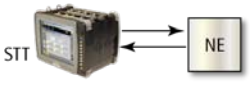
Mux Test

OTN

- OTN/SDH, OTN/SONET Mux/demux testing
- Asynchronous and synchronous mapping of SDH/SONET client signals into OTU3

Network Element Verification

OTN/SDH/SONET



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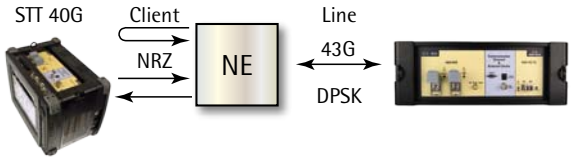
- Error injection, alarm generation to verify NE remote indication
- FEC error generation to verify NE Forward Error Correction capabilities
- SDH/SONET Pointer Test Sequences generation to test NE response to problems with sync
- Frequency offset to stress clock recovery of NE
- ODU Time Division Multiplexing test

DPSK NE Field Installation/Verification



- DPSK line coding verification
- Tunable DPSK transmitter for DWDM C-band verification
- End to loopback client-to-line or line-to-client verification
- Bi-directional client-to-line and line-to client verification with 2 test sets
- OTN protocol verification

About STT Platform

The Scalable Test Toolkit (STT) is an advanced, modular, and flexible testing solution that addresses Layer 1 through Layer 7 requirements, from fiber optics to Quality of Service. Designed to meet the challenges of designing, installing, maintaining, and troubleshooting core, metro, and access networks, the STT combines an innovative test platform with revolutionary test features, supporting a complete suite of capabilities and technologies for the converging global communications market.

All STT modules are equipped with a unique standalone feature that allows them to operate at 100% of their capabilities outside of the platform, maximizing test resources.

- STT ONE. OTN, EoS (Ethernet over SDH/SONET), NGN (VCAT, LCAS and GFP), legacy SDH/SONET and PDH/T-carrier testing. Transport testing from 1.5/2 Mbit/s up to 10/10.7 Gbit/s. Advanced next generation network testing, GigE frames drop/insert from SDH/SONET via GFP-T port, Packet Capture and export, In-service real time monitoring of SDH/SONET tributaries (Channel Master), APS testing. Legacy networks testing: VF, Pulse Mask.
- STT Metro. 10/100/1000M Ethernet testing. Throughput and Bit Error testing across Layers 1, 2, and 3. Stacked VLAN (Q-in-Q) and MPLS. RFC 2544 benchmark testing. GPS antenna port for one-way latency measurements. IP connectivity testing. Bidirectional monitoring of live networks. Packet capture with decoding up to Layer 7.
- STT 10G Ethernet. 10 GigE LAN/WAN Ethernet testing. Throughput and Bit Error testing across Layers 1, 2, and 3. Advanced test features Stacked VLAN (Q-in-Q) and MPLS. RFC 2544 benchmark testing and packet capture and decode up to Layer 7.

Specifications

TEST INTERFACES

SDH and SONET

43/40G Optical Test Port

Port/Connector
Universal interface with FC-PC and SC-PC adapters

40/43G NRZ (STT-8100/STT-8110)

Transmitter

Line coding: NRZ
Single Mode 1550 nm
Output power range
1550 nm, 2 km: 0 to +3 dBm
Laser Safety: Class 1, IEC 60825-1, FDA/CDRH, 21 CFR 1040.10 and 1040.11
Bit rates
43.018413 Gbit/s ±4.6 ppm (OTU3)
39.81312 Gbit/s ±4.6 ppm (STM-256, OC-768)
Clock source
Internal
Freq. offset: ± 50 ppm with 1, 0.1 ppm resolution
Received
Recovered from received signal
External
2.048 Mbit/s (MTS/SETS) or 2.048 MHz (SDH)
1.544 Mbit/s (BITS) or 1.544 MHz (SONET)
64K+8K co-directional
Complies to ITU-T G.709, G.693 VSR2000-3R2

Receiver

Frequency recovery range
43.018413 Gbit/s ±50 ppm (OTU3)
39.81312 Gbit/s ±50 ppm (STM-256, OC-768)
Jitter tolerance
ITU-T G.825, G.783
GR-253-CORE
Operational wavelength range
1290 to 1565 nm
Receiver sensitivity is specified and guaranteed at 1550 nm
Input power range
1550 nm Short Reach, PIN detector: -6 to +3 dBm
Damage level: +7 dBm (peak)
Complies to ITU-T G.709, G.693 VSR200-3R2, and G.8251

43G DPSK (STT-8120/STT-8130)

Transmitter

Line coding: NRZ-DPSK
Single Mode
Adjustable wavelength range
1528.77 – 1563.45 nm
Frequency grid:
50 GHz per ITU-T G.694.1
Output power
+3 dBm
Bit rates
43.018413 Gbit/s ±4.6 ppm (OTU3)
Clock source
Internal
Freq. offset: ± 50 ppm with 1, 0.1 ppm resolution
Received
Recovered from received signal
External
2.048 Mbit/s (MTS/SETS) or 2.048 MHz (SDH)
1.544 Mbit/s (BITS) or 1.544 MHz (SONET)
64K+8K co-directional
Complies to ITU-T G.709

Receiver

Frequency recovery range
43.018413 Gbit/s ±50 ppm (OTU3)
Operational wavelength range
1528.77 – 1563.45 nm
Receiver sensitivity is specified and guaranteed
Input power range
+2 to +10 dBm
Damage level: +13 dBm (peak)

10.7/10G Auxiliary Port (STT-8110 /8130 Only)

Uses field replaceable XFP transceiver modules
Port/Connector: LC-PC

Transmitter

Line coding: NRZ
Single Mode Optics
Bit rates
10.70923 Gbit/s ±4.6 ppm (OTU2)
9.96328 Gbit/s ±4.6 ppm (STM-64, OC-192)
Clock source
Internal
Recovered from 43/40G signal

Receiver

Frequency recovery range
10.70923 Gbit/s ±100 ppm (OTU2)
9.96328 Gbit/s ±100 ppm (STM-64, OC-192)
Complies to ITU-T G.709 and G.959.1

SA586-1550MR XFP: 10G Mulit-rate transceiver (optional)

Output power range
1550 nm: -1 to +2 dBm
Laser Safety: Class 1, IEC 60825-1, FDA/CDRH, 21 CFR 1040.10 and 1040.11
Input power range
Intermediate Reach, PIN detector: -14 to 0 dBm
Saturation level: -1 dBm
Operational wavelength range
1260 to 1565 nm

Communication Channel and Clocks

DCC/GCC
Micro D-sub 9-pin
DCC (D1-D3, D4-D12), GCC0, GCC1, or GCC2 Drop and Insert port
External Clock Inputs
BNC, 75 Ohms unbalanced
2 Mbit/s and 2 MHz
Bantam, 100 Ohms balanced
1.5 Mbit/s and 1.5Mhz
Bantam, 110 Ohms balanced
64 Kbits
Reference Clock Output
Connector: SMA, 50 Ohms unbalanced
Signal: 200~450mV
Frequency
43G: 2.7 GHz
40G: 2.5 GHz

TEST FEATURES

Application Modes

Standards

OTN, SDH, SONET, and Unframed (43/40G)
*Unframed mode supports PRBS test patterns only

Measurement Modes

Out-of-service (BERT) and In-service (Live)

Tx and Rx Configuration

Coupled: Tx and Rx are coupled together and have the same configuration
Independent: Tx and Rx may be configured independently

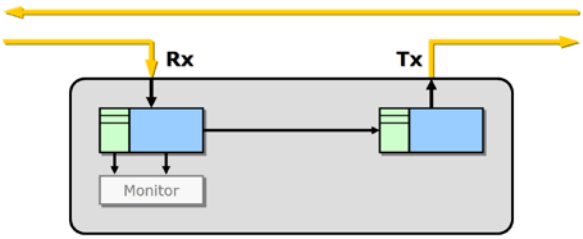
TEST MODES

Point-to-point

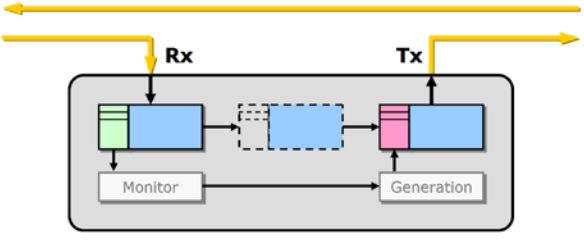
Tx and Rx are set to the same rate
Internal mapping and multiplexing down to 2 and 1.5 Mbit/s tributaries

Through Mode Operation

Line through
- Monitors the entire signal as it passes through the instrument with no manipulation of overhead, errors, or alarms
  - Overhead can be monitored
  - Alarms and errors are measured



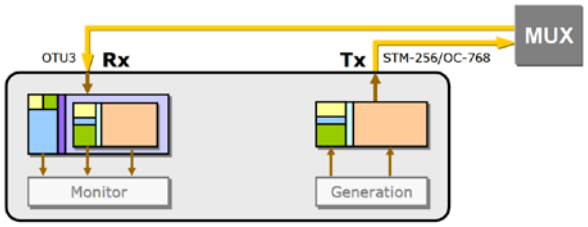
Payload through
- Passes the payload (including POH) through the instrument with overhead manipulation
  - SOH (SDH/SONET) and OTU/ODU (OTN) error insertion and alarm generation
  - SOH (SDH/SONET) and OTU/ODU (OTN) overhead control (except pointers)



Mux/Demux Test (40G/43G)

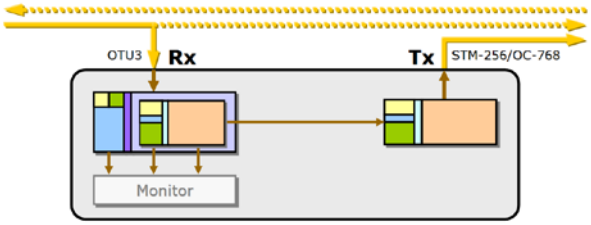
Mux test
- Test pattern is generated on 40G SDH/SONET Tx and the BER test is performed on the 43G OTN Rx

Demux test
- Test pattern is generated on 43G OTN Tx and the BER test is performed on the 40G SDH/SONET Rx



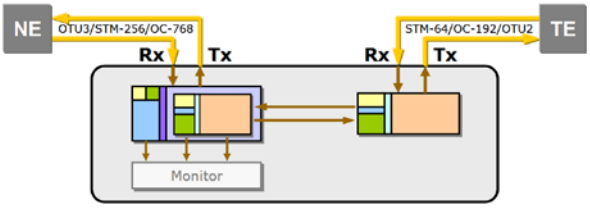
Mux/Demux Mode (40G/43G)

Drop or insert an external 40G SDH/SONET signal from/to 43G OTN Unidirectional



10/10.7G Drop and Insert (STT-8110 Only)

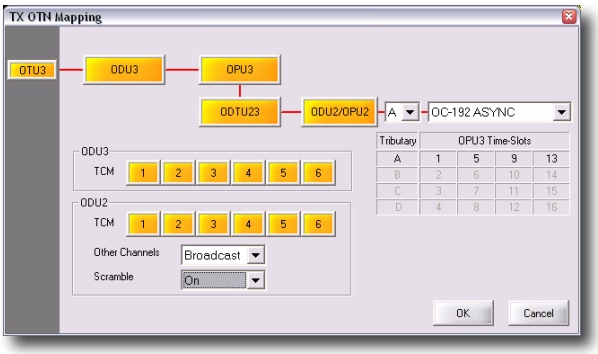
Uses the Auxiliary 10/10.7G port for bidirectional STM-64/OC-192 or OTU2 payload drop and insert from STM-256/OC-768 or OTU3 signals to an STT ONE or another external test equipment, analyzer, simulator, or network element.



OTN Tests and Measurements

Frame/Payloads

Frame and mapping structure conforms to ITU-T G.709
- Synchronous and asynchronous mapping of SDH/SONET payloads and PRBS test signals



OTU Time Division Multiplexing Mappings
- ODU2 into OPU3 (internal and external)
- Flexible channel numbering:
  - Standard (G.709)
  - User selectable OPU3 timeslots (4 out of 16)
- External mapping (drop/insert or digital wrapper emulation mode)
- Selectable measurement side (high or low)
- OPU2 payloads
  - STM-64 synchronous and asynchronous
  - OC-192 synchronous and asynchronous,
  - Bulk Mode.
- SONET/SDH payload mapping down to VC12, VC11 / VT1.5, VT2 bulk modes
- OPU2 payload scrambling
- Programmable payload frequency offset

Test Patterns

Framed mode
- PRBS: 2^{31}-1, 2^{23}-1, 2^{20}-1, 2^{15}-1
- Fixed: all 1s, all 0s, alt 1010, 1-4
- User: 10 programmable 16-bit user patterns. Pattern names up to 10 characters.

Unframed mode
- PRBS: 2^{31}-1, 2^{23}-1, 2^{20}-1, 2^{15}-1

Test pattern inversion

Error Injection

OTU: FAS (OA1, OA2), MFAS, SM-BIP-8, SM-BEI, correctable FEC errors, uncorrectable FEC errors
ODU: PM-BIP-8, PM-BEI
TCM1-6: BIP-8, BEI
Payload bit errors
Modes
- Single
- Burst: 1 to 8000
- Rate: $1x10^{-9}$ to $2x10^{-3}$
- (Options vary depending on configuration and error type)

Alarm Generation

OTU: LOS LOF, OOF, OOM, AIS, SM-TIM, SM-IAE, SM-BDI, SM-BIAE,
ODU: AIS, OCI, LCK, BDI, PM-TIM, PM-BDI
TCM1-6: OCI, AIS, LCK, TIM, BDI, IAE, LTC, SM-BDI, SM-BIAE
Modes
- Single
- Periodic (number of frames ON and OFF)
- Continuous
- (Options vary depending on configuration and alrm type)

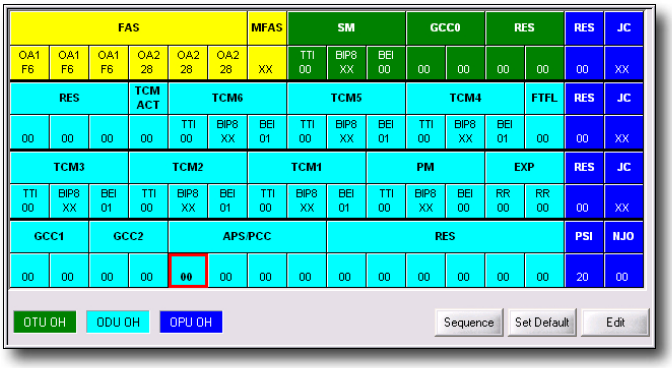
Measurements

Errors
- OTU: FAS (OA1, OA2), MFAS, SM-BIP-8, SM-BEI, SM-BDI, SM-BIAE, correctable FEC errors, uncorrectable FEC errors
- ODU: PM-BIP-8, PM-BEI
- TCM1-6: BIP-8, BEI
- Payload bit errors

Alarms
- OTU: LOS, LOF, OOF, OOM, AIS, SM-TIM, SM-IAE, SM-BDI, SM-BIAE
- ODU: AIS, OCI, LCK, BDI, PM-TIM, PM-BDI
- OPU: PLM
- TCM1-6: OCI, AIS, LCK, TIM, BDI, IAE, LTC, SM-BDI, SM-BIAE

Error performance analysis: ITU-T G.8201, M.2401

Overhead Features



Overhead Monitor
- Hex display of all bytes (OTU, ODU, and OPU)
- Text decode of all applicable bytes
- TTI [SM (OTU), PM (ODU), TCM1-6], FTFL, APS/PCC, PSI
- Conforms to ITU-T G.709

Overhead Programming
- Hex input for all bytes except framing (FAS and MFAS), parity (BIP8, BEI) and justification (JC)
- Trail Trace Identifier (TTI) Generation
  - SM (OTU), PM (ODU), TCM1-6: SAPI/DAPI 16 bytes E.164 ASCII sequence
  - Operation bytes: 32 bytes HEX or E.164 ASCII sequence

Automatic Protection Switching (APS)/Protection Communication Channel (PCC) bytes control & decode per ITU-T G.709 and G.873

Fault Type Fault Locator (FTFL) control and decode. Forward and backward field structure per ITU-T G.709

Payload Structure Identifier
- Payload type generation/decode: Hex mode or text mode
- Conforms to ITU-T G.709, PT decode requires locking to MF #1

Overhead Sequence Generation
- Bytes: TTI (SM, PM, TCM1-6), GCC0, GCC1, GCC2, APS/PCC, or any single overhead byte
- Generates up to 256 elements

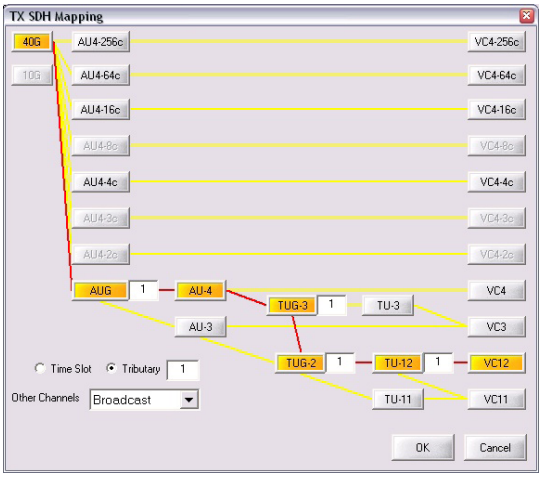
Overhead Sequence Capture
- OA1/OA2, TTI (SM, PM, TCM1-6), GCC0, GCC1, GCC2, APS/PCC, or any single overhead byte
- Captures up to 256 elements

Automatic Protection Switch Time Measurement
- Resolution: 1 ms
- Accuracy: ± 3.035 µs
- Sensors: LOS, LOF, LOM, OTU-AIS, OTU-IAE, OTU-BIAE, OTU-BDI, ODU-AIS, ODU-OCI, ODU-LCK, ODU-BDI, OPU-PLM
- Pass/Fail indication
- Programmable switch time and gate time

SDH

Payloads

VC4-256c Bulk, VC4-64c Bulk, VC4-16c Bulk, VC4-4c Bulk, VC4 Bulk, VC3 Bulk, VC12 Bulk, VC11 Bulk



Test Patterns

Framed mode
- PRBS: 2^{31}-1, 2^{23}-1, 2^{20}-1, 2^{15}-1, 2^{11}-1, 2^{9}-1
- Fixed: All 1s, All 0s, Alt 1010, 1-4
- User: 10 programmable 16-bit user patterns. Pattern names up to 10 characters.

Unframed mode
- PRBS: 2^{31}-1, 2^{23}-1, 2^{20}-1, 2^{15}-1

Test pattern inversion

Error Injection

Bit, FAS (Frame base), B1, B2, B3, LP-BIP, MS-REI, HP-REI, LP-REI

Modes
- Single
- Burst: 1 to 8000
- Rate: $1x10^{-9}$ to $2x10^{-3}$
- (Options vary depending on configuration and alarm type)

Alarm Generation

RS: LOS, LOF, RS-TIM
MS: MS-AIS, MS-RDI
AU: AU-LOP, AU-AIS
HP: HP-AIS, HP-UNEQ, HP-TIM, HP-RDI, HP-PLM, HP-ERDI (Payload, Server, Connectivity)
TU: TU-LOP, TU-AIS, TU-LOM
LP: LP-UNEQ, LP-TIM, LP-RDI, LP-PLM, LP-ERDI (Payload, Server, Connectivity)

Modes
- Single
- Periodic (number of frames ON and OFF)
- Continuous
- (Options vary depending on configuration and alarm type)

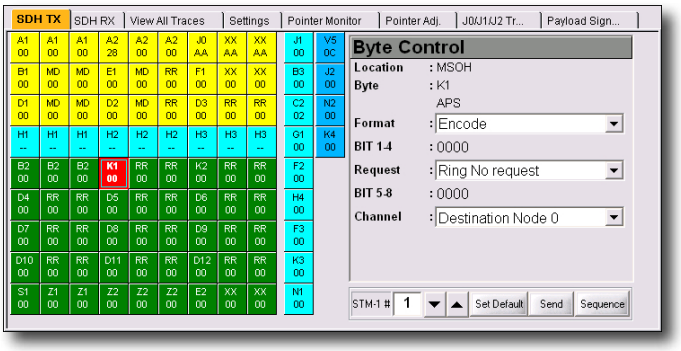
Measurements

Errors
- FAS (# of Frame errors per Frame), Bit, B1, B2, B3, BIP-2, MS REI, HP/LP REI

Alarms
- RS: LOS, LOF, OOF, RS-TIM
- MS: MS-AIS, MS-RDI
- AU: AU-AIS, AU-LOP
- HP: HP-AIS, HP-PLM, HP-ERDI (Payload, Server, Connectivity), HP-TIM, HP-UNEQ
- TU: TU-LOM, TU AIS, TU-LOP
- LP : LP-PLM, LP-ERDI (Payload, Server, Connectivity), LP-TIM, LP-UNEQ

Error performance analysis
- ITU-T G.821, G.826, G.828, G.829, M.2101, M.2110, M.2120

Overhead Features



Overhead Monitor
- Hex display of all bytes (RS, MS, HP, and LP)
- Text decode of all applicable bytes (K1/K2, S1, C2, etc.)

Overhead Programming
- Hex input for all bytes except parity (B1/B2/B3), pointers (H1-H3), and undefined bytes
- Text encoding of all applicable bytes (K1/K2, S1, C2, etc.)

Overhead Sequence Generation
- Bytes: J0/J1/J2, K1/K2, or any single overhead byte
- Generates up to 16 elements

Overhead Sequence Capture
- Capture: J0/J1/J2, K1/K2 (2 bytes), or any single overhead byte
- Each new value is captured with a timestamp (absolute or elapsed) and duration (in ms or frames)
- Trigger: Manual or user-defined value
- Resolution: 125 µs (1 frame)
- Captures up to 256 elements

Trace Generation
- J0 Section trace: 1 byte, 16 bytes, E.164/ASCII sequence + CRC-7 or 64 bytes E.164/ASCII sequence
- J1/J2 Path trace: 16 bytes E.164/ASCII sequence + CRC-7 or 64 bytes E.164/ASCII sequence
- Selection: Default, user, or through

Pointer Monitor
- AU/TU
- Instantaneous pointer value display
- Loss of pointer seconds
- Total justification count
- Positive justification count
- Negative justification count
- New Data Flag (NDF) seconds

Pointer Adjustment
- Programming of AU/TU pointer value, NDF, and SS bits
- Pointer increase or decrease

Pointer Test Sequences

Standard: ITU-T G.783
Sequences: Single, burst, phase transient burst, periodic, 87-3, 26-1, opposite, and custom
Movement: Increase, decrease, increase + decrease
Anomalies: Added, cancel, and none
Frequency offset: Positive, negative, and none
Sequence timing: Initialization, cool down, and measurement

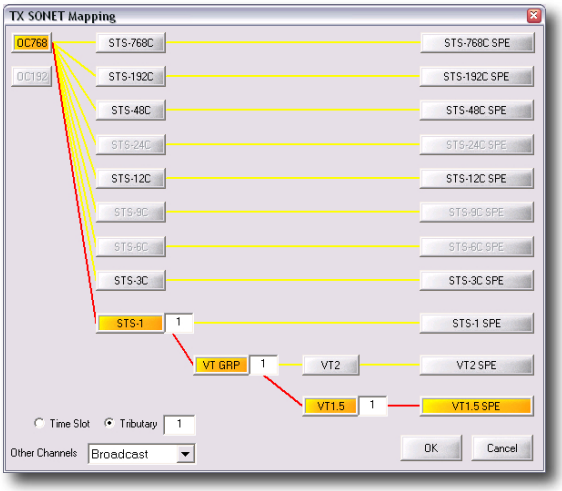
Automatic Protection Switch Time Measurement

Resolution: 1 ms
Accuracy: ±125 µs
Sensors: LOS, LOF, MS-AIS, MS-RDI, AU-AIS, HP-RDI, LP-RDI, TU-AIS, Pass/Fail indication
Programmable switch time and gate time

SONET

Payloads

STS-768c SPE, STS-192c SPE, STS-48c SPE, STS-12c SPE, STS-3c SPE, STS-1 SPE, VT2 Bulk, VT1.5 Bulk



Test Patterns

Framed mode
PRBS: 2^{31}-1, 2^{23}-1, 2^{20}-1, 2^{15}-1, 2^{11}-1, 2^{9}-1
Fixed: All 1s, All 0s, Alt 1010, 1-4
User: 10 programmable 16-bit user patterns. Pattern names up to 10 characters.
Unframed mode
PRBS: 2^{31}-1, 2^{23}-1, 2^{20}-1, 2^{15}-1
Test pattern inversion

Error Injection

Bit, FAS (# errors per frame), B1 (CV-S), B2 (CV-L), B3 (CV-P), BIP-V (CV-V), REI-V, REI-L, REI-P
Modes
Single
Burst: 1 to 8000
Rate: $1x10^{-9}$ to $2x10^{-3}$
(Options vary depending on configuration and error type)

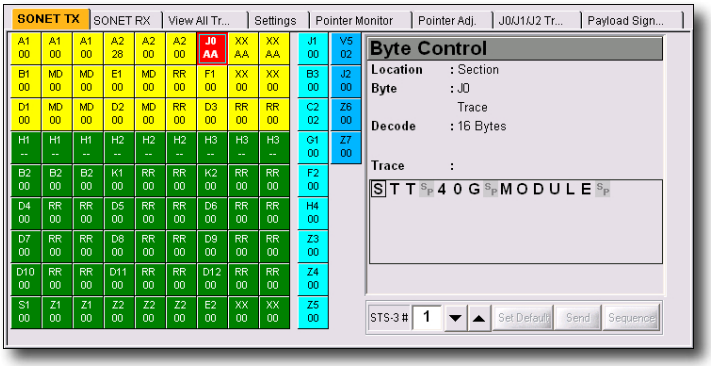
Alarm Generation

LOS, LOF, TIM-S/P, AIS-L/P, RDI-L/P, ERDI-P, LOP-P, PLM-P, UNEQ-P, RDI-V, LOM-V, UNEQ-V, AIS-V, LOP-V, TIM-V, RDI-V, ERDI-V, PLM-V
Modes
Single
Periodic (number of frames ON and OFF)
Continuous
(Options vary depending on configuration and alarm type)

Measurements

Errors
FAS (# errors per frame), B1 (CV-S), B2 (CV-L), B3 (CV-P), BIP-V (CV-V), REI-V, REI-L, REI-P
Alarms
LOS, LOF, TIM-S/P, AIS-L/P, RDI-L/P, ERDI-P, LOP-P, PLM-P, UNEQ-P, RDI-V, LOM-V, UNEQ-V, AIS-V, LOP-V, TIM-V, RDI-V, ERDI-V, PLM-V, TIM-P
Failure indications for all alarms
Error performance analysis
Telcordia GR-253-CORE
Section: SEFS-S, CV-S (B1), ES-S, SES-S
Line near end: CV-L (B2), ES-L, SES-L, UAS-L, FC-L
Line far end: CV-LFE (REI-L), ES-LFE, SES-LFE, UAS-LFE, FC-LFE
Path near end: CV-P (B3), ES-P, SES-P, UAS-P, FC-P
Path far end: CV-PFE (REI-P), ES-PFE, SES-PFE, UAS-PFE, FC-PFE, CV-P (BIP), ES-V, SES-V, UAS-V, FC-V, CV-PFE (REI-V), ES-VFE, SES-VFE, UAS-VFE, FC-VFE, CV-V (BIP), ES-V, SES-V, UAS-V, FC-V
Pointers: PPJC-P Det, NPJC-P Det, PPJC-P Gen, NPJC-P Gen, PJC Diff-P, PJCS-P Det, PJCS-P Gen, plus Pointer Value and NDF-P seconds; PPJC-V Det, NPJC-V Det, PPJC-V Gen, NPJC-V Gen, PJC Diff-V, PJCS-V Det, PJCS-V Gen, plus Pointer Value and NDF-V seconds

Overhead Features



Overhead Monitor
Hex display of all bytes
Text decode of all applicable bytes (K1/K2, S1, C2, etc.)
Overhead Programming
Hex input for all bytes except parity (B1/B2/B3), pointers (H1-H3), and undefined bytes
Text encoding of all applicable bytes (K1/K2, S1, C2, etc.)
Overhead Sequence Generation
Bytes: J0/J1/J2, K1/K2, or any single overhead byte
Generates up to 16 elements

Overhead Sequence Capture
- Capture: J0/J1/J2, K1/K2 (2 bytes), or any single overhead byte
- Each new value is captured with a timestamp (absolute or elapsed) and duration (in ms or frames)
- Trigger: Manual or user-defined value
- Resolution: 125 µs (1 frame)
- Captures up to 256 elements

Trace Generation
- J0 Section trace: 1 byte, 16 bytes, E.164/ASCII sequence + CRC-7 or 64 bytes E.164/ASCII sequence
- J1/J2 Path trace: 16 bytes E.164/ASCII sequence + CRC-7 or 64 bytes E.164/ASCII sequence
- Selection: Default, user, or through

Pointer Monitor
- Instantaneous pointer value display
- Loss of pointer seconds
- Total justification count
- Positive justification count
- Negative justification count
- New Data Flag (NDF) seconds

Pointer Adjustment
- Programming of STS and VT pointer values, NDF, and SS bits
- Pointer increase or decrease

Pointer Test Sequences

Standard: ANSI T1.105.03, Telcordia GR-253
Sequences: Single, burst, phase transient burst, periodic, 87-3, 26-1, opposite, and custom
Movement: Increase, decrease, increase + decrease
Anomalies: Added, cancel, and none
Frequency offset: Positive, negative, and none
Sequence timing: Initialization, cool down, and measurement

Automatic Protection Switch Time Measurement

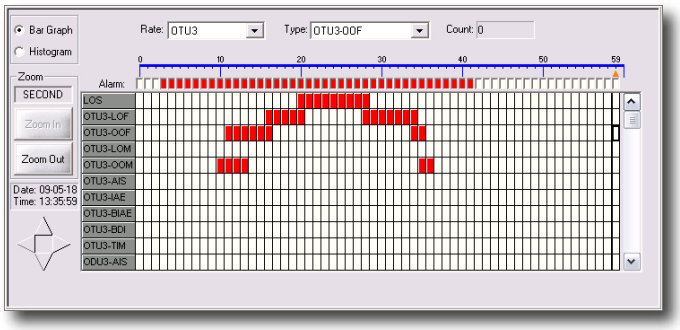
Resolution: 1 millisecond
Sensors: LOS, LOF, AIS-L, AIS-V, RDI-L, AIS-P, REI-L, RDI-P, RDI-V,
Pass/Fail indication
Programmable switch time and gate time

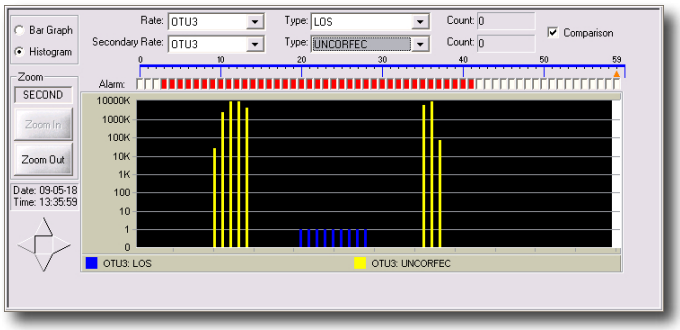
Common to OTN, SDH and SONET

Measurements

Optical power level measurement
- Accuracy: ± 3 dB
- Wavelength: 1550 nm
  - Receiver sensitivity and optical power measurement accuracy are specified and guaranteed at 1550 nm
- Optical saturation indication

Histogram analysis and bar graph correlation
- Errors/Alarms/Pointer/Clock graphic display in real time
- Stores current results with 1-second resolution for the last 12 hrs, 1-minute resolution for the last 72 hrs, and 15-minute resolution for the last 60 days
- Compare two parameters to visually detect correlation





Frequency
- Current, maximum, minimum frequency offset (ppm)

Events log with 100 ms time stamps
- Tracks individual events, sequence and severity count

Full screen status
- Detailed overview
- Large color coded Alarm/Error

Service disruption measurement
- Programmable error-free test window: 1-3000ms
- Minimum disruption time: 50 µs
- Minimum defect time: 50 µs
- Longest, shortest, last and total counters
- Available for PRBS only

Measurement Settings

Continuous measurement
Programmable start time and duration
Elapsed time, remaining time display
Auto-configuration (40/43G Only)
- Automatically determines rate framing, payload structure, and test pattern
- Configures Tx to match the received signal
- Save, view, and reload configuration profiles

Measurement Results Management

Open
- Opens previously saved or archived measurement results

Print
- Prints measurement results

Export
- Export measurement results reports file to comma separated values (which can be read by text editors, word processors, or spreadsheet program), XML or text formats
- Test records can be exported to hard drive or USB memory

Archive
- Moves test records to the hard drive in raw format
- Test records can be opened in other instruments or PCs to be analyzed in its native format (require the STT 40G software)
- Archive All option

Test records
- View
- Lock and Unlock
- Delete and Delete All
- Rename

STT Reporter
- Generates PDF reports with user-customizable headers, contact information, logo, case information, and comments

GENERAL

Instrument Mode
Self-contained portable instrument, using attached STT Controller and power supply

Stand-alone Mode
Remote or local operation using a networked PC or direct Ethernet connection
Requires SA427 stand-alone kit
Automatic discovery of all test modules in the same network
Multiple units within the same network can be controlled from one PC
Offers 100% of its capabilities

Software upgrades via USB memory or LAN (through STT Controller or PC)
TL1 commands for remote operation and test automation
Admin Serial Port
- Built-in DB-9 for service, diagnostics, and TL1

Ethernet Port
- Built-in RJ-45, 10/100BaseT for service, diagnostics, TL1, and remote operation

Power requirements
- Consumption: 110 watts (module only)

Power supplies
- Compatible with STT-1525 and SA427; 100~240Vac, 50~60Hz (check with manufacturer for other options available)
- Battery backup with STT-1525, for uninterrupted measurements

Environmental
- CE Mark: Conforms to the applicable sections of 98/63/EEC
- Operating temperature: 32 to 104°F (0 to 40°C)
- Storage temperature: -4 to 158°F (-20 to 70°C)
- Humidity: 5% to 85% non-condensing

Dimensions
- Size: 12.6 x 8.7 x 4.4 in (320 x 220 x 110 mm)
- Weight: 8.8 lbs (4.0 kg)

Ordering Information

Control Module

STT-1001 . . . . . STT Control Module
[STT Control and Display Module with Windows XP Professional OS. Includes STT Manager Software (STT-1000-SW1), STT User's Manual. (SA920), Qty 2 Stylus (SA142), STT bus bridge case (SA144), Small Accessory Storage case (SA149. Requires STT Power Module and Test Module(s)]

Power Modules

STT-1501 . . . . . Power Module, AC. 216 Watt maximum output

STT-1521 . . . . . Power Module, AC. 340 Watt maximum output

STT-1525 . . . . . Power Module, AC and Battery. 150 Watt maximum output

SA427 . . . . . STT Stand-Alone Accessory Package. 130 Watt maximum output
[Includes: SA170 130 Watt external AC/DC Power Adapter; SA265 100 Ohm, CAT 5, RJ45 (m) to RJ45 (m), Cross-over 6' cable; SA266 Cable; 100 Ohm, CAT 5, RJ45 (m) to RJ45 (m), Straight 6' cable; SA144 STT Bus Case; 4x Screw-on feet]

SA155-UK . . . . . 3-prong power cord for use in United Kingdom.

SA155-EU . . . . . 2-Prong power cord plus ground for use in Europe (Except UK)

SA155-NA . . . . 3-prong power cord for use in Latin America, North America, and Asia

SA155-SW. . . . . 3-prong power cord for use in Switzerland

SA155-SA . . . . . 3-prong power cord for use in South Africa/India

10/10.7G XFP Optics Options for STT-8110

SA586-1550MR . XFP: 10G Multi-rate Transceiver
[1550 nm Single-mode, 40km, 9.95Gb/s to 10.7Gb/s transceiver plug-in for 10GBASE-ER/EW and FEC, 10G Fibre Channel, OC-192/STM-64 IR, OTU2. LC Connector.]

STT 40G Test Module

STT-8100 . . . . . STT 40G Module
OTN/SDH/SONET 40/43G analysis at OTU3, STM-256, and OC-768. Offers 40/43G optical interface.
[*Includes*: 40/43G Single Wavelength, 1550 nm Short Reach Tx/Rx optical transceiver; Standard universal optical connector base with UPC termination; 2x SA527 FC adapter for Universal Optical connector; 2x SA528 SC adapter for Universal Optical connector; SA918 STT 40G Users' Manual CD-ROM, one-year standard warranty and Certificate of Calibration]

STT-8110 . . . . . STT 40G Module with 10/10.7G port
OTN/SDH/SONET 40/43G analysis at OTU3, STM-256, and OC-768. Offers 40/43G optical interface and 10/10.7G auxiliary XFP port for external drop/insert applications.
[*Includes*: 40/43G Single Wavelength, 1550 nm Short Reach Tx/Rx optical transceiver; Standard universal optical connector base with UPC termination; 2x SA527 FC adapter for Universal Optical connector; 2x SA528 SC adapter for Universal Optical connector; SA918 STT 40G Users' Manual CD-ROM, one-year standard warranty and Certificate of Calibration. Requires optional XFP optical transceiver modules for 10/10.7G]

STT-8120 . . . . . STT 40G Module 43G DPSK OTN 43G analysis at OTU3 with STM-256/OC-768 client signals. Offers 43G DPSK optical interface and tunable Tx.
[*Includes*: Standard universal optical connector base with UPC termination; 2x SA527 FC adapters for Universal Optical connector; 2x SA528 SC adapters for Universal Optical connector; SA919 STT 40G Users' Manual (SA919), one-year standard warranty and Certificate of Calibration]

STT-8130 . . . . . STT 40G Module 43G DPSK OTN 43G analysis at OTU3 with STM-256/OC-768 client signals. Offers 43G DPSK optical interface, tunable Tx and 10/10.7G auxilliary XFP socket for Drop/Insert.
[*Includes*: Standard universal optical connector base with UPC termination; 2x SA527 FC adapters for Universal Optical connector; 2x SA528 SC adapters for Universal Optical connector; SA919 STT 40G Users' Manual (SA919), one-year standard warranty and Certificate of Calibration]

Warranty

SSTT-8100-W1 . . . STT 40G Model OTN/SDH/SONET40/43G, Standard Warranty

STT-8100-EW1 . . . STT 40G, 1 Yr Extended Warranty

STT-8100-EW2 . . . STT 40G, 2 Yrs Extended Warranty

STT-8110-W1 . . . . STT 40G Model w/10/10.75G,Port, Standard Warranty

STT-8110-EW1 . . . STT 40G, 1 Yr Extended Warranty

STT-8110-EW2 . . . STT 40G, 2 Yrs Extended Warranty

STT-8120-W1 . . . STT 40G MODULE 43G DPSK, Standard Warranty

STT-8120-EW1 . . . STT 40G, 1 Yr Extended Warranty

STT-8120-EW2 . . . STT 40G, 2 Yrs Extended Warranty

STT-8130-W1 . . . . STT 40G MODULE 43G DPSK, with 10G PORT, Standard Warranty

STT-8130-EW1 . . . STT 40G, 1 Yr Extended Warranty

STT-8130-EW2 . . . STT 40G, 2 Yrs Extended Warranty

Universal Connector Adapters

SA527 . . . . . FC adapter for Universal Optical connector

SA528 . . . . . SC adapter for Universal Optical connector

SA529 . . . . . LC adapter for Universal Optical connector [Check with factory for availability and lead time]

SA530 . . . . . ST adapter for Universal Optical connector [Check with factory for availability and lead time]

SA532 . . . . . DIN adapter for Universal Optical connector [Check with factory for availability and lead time]

Other Accessories

SA620 . . . . . Semi-rigid Carrying Case with wheels and telescoping handle

SA622 . . . . . Hard Carrying Case with Wheels for STT

Replacement Parts

SA170 . . . . . STT Power Supply for stand-alone mode. 130 Watt maximum output

SA918 . . . . . STT 40G User's Manual CD-ROM

Important Notice:

This product may contain technologies regulated by U.S. export control law. In the case of the export of product(s) and/or technologies described in this document, please take the appropriate procedure in conforming to all regulations related to the export. ECCN 5B001.b.1 : Telecommunications & information security; test, inspection and production equipment.

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