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T-BERD®/MTS-5800 Specifications

5811P/5822P

Ethernet

Test Interfaces/Bit Rates	
10/100/1000 Mbps electrical	Dual-port capable
100 Mbps Ethernet optical	Dual-port capable
Gigabit Ethernet (Optical)	Dual-port capable
10 GE WAN Phy (9.9 Gbps)	Dual-port capable
10 GE LAN Phy (10.3 Gbps)	Dual-port capable

Interface Type
RJ45
SFP
SFP+
SFP+ Tunable

General
Line-rate traffic Tx and Rx for all interfaces
Single-stream generation/analysis
10-stream generation/analysis per stream
Auto-discovery of test sets

Modes of Operation
Terminate
Monitor
Through (intrusive)
Loopback
Half duplex
Full duplex

Timing
Recovered from Rx
Internal (Stratum 3)
Recovered from external (bits/set)
Frequency offset Tx/Rx

Ethernet Features
Layer 1 (unframed) Bit Error Testing Patterns
High-frequency test pattern
Low-frequency test pattern
Mixed-frequency test pattern
Random data pattern (RPAT)
Jitter-tolerance test pattern (JTPAT)
Supply-noise test sequence (SPAT)
Layer 2 (framed) Bit Error Testing Patterns
Compliant random-data pattern (CRPAT)
Compliant jitter-tolerance pattern (CJPAT)
Compliant supply-noise pattern (CSPAT)
Framed Pattern Test
PRBS (2^11-1, 2^15-1, 2^20-1, 2^23-1, 2^31-1 and inverse)
All 1s, all 0s
1:3, 1:7, 3:1, 7:1, 2 in 8
User-defined
MAC Frame Payload
PRBS pattern
Editable digital word
Flow Control
Emulation on/off
Pause Frames
Tx insert
Pause quanta - Definable
Pause frame analysis (for example, counts)

Ethernet Generator
Frame Type
802.3
DIX
VPLS with inner and outer MAC
MAC in MAC 802.1ah
EtherType field-editable
MAC Addressing
Destination MAC address - Unicast
Destination MAC address - Broadcast
Destination MAC address - Multicast
Source MAC address - User-defined
Source MAC address - Auto-increment
MAC Frame Size
64, 128, 256, 512, 1024, 1280, 1518, user-defined, jumbo (to 10 k)
User-defined
Jumbo (to 10 k)
EMIX
Random

VLAN

VLAN tagging 802.1q

VLAN tag-editable fields
- Priority
- VID

VLAN scan

VLAN Stacking (Q-in-Q)

SVLAN tag-editable fields

SVLAN ID

SVLAN priority

SVLAN DEI

SVLAN TPID

CVLAN ID

CVLAN priority

Supports up to 8 stacked VLAN tags

VPLS

VPLS parameters - MAC addresses

VPLS parameters - Frame type

VPLS parameters - Ethertype

VPLS tunnel and VC label - Label, CoS, TTL

VPLS control word - Reserved bits, sequence number

MAC in MAC/PBT/PBB 802.1ah

Parameters - MAC address

B-Tag - TPI, VID, priority, DEI

I-Tag - TPI, SID, priority, DEI, NCA, Res1, Res2

MPLS

Single-label support

Stacked-label support - Up to 2

Editable parameters/results - Label

Editable parameters/results - CoS

Editable parameters/results - TTL

MPLS-TP

MPLS-TP label support (tunnel and VC)

VLAN tag support

Line-rate traffic generation

Traffic analysis

Editable parameters/results - Label

Editable parameters/results - Priority

Editable parameters/results - TTL

Rx filters

GAL (Label 13) + ACH from ITU-T G.8113.1
- Common header label - PW, LSP, section
- CCM generation and analysis
- LBM/LBR generation and analysis
- AIS generation and analysis
- OAM alert label (Label 14) from ITU-T G.8114
- Common header label - PW, LSP, section
- CCM generation and analysis
- LBM/LBR generation and analysis
- AIS generation and analysis

OAM alert label (Label 14) from ITU-T Y.1711
- Common header label - PW, LSP, section
- CCM generation and analysis
- FFD generation and analysis
- BDI generation and analysis
- FDI generation and analysis

Simultaneous OAM and background-traffic generation

Ethernet OAM

Y.1731 Service OAM and 802.1ag CFM
- CCM messages
- Programmable CCM rate
- CCM type - Unicast, multicast
- MEG ID end point
- Maintenance domain level
- AIS Tx/Rx
- RDI Tx/Rx
- LBR/LBM (Ping) - Unicast, multicast
- LTM/LTR (Trace)
- MEP discovery

802.3ah Link OAM
- Mode - Passive/active
- Vendor OUI
- Vendor-specific info
- Max PDU size
- Unidirectional links
- Remote loopback
- Link events
- Variable retrieval
- Dying gasp
- Link fault
- Critical event
- Errored symbol period event
- Errored frame event
- Errored frame period event
- Errored frame second summary event

IP Packet Generator

IP

IPv4 frame format

IPv6 frame format

TCP port number

UDP port number

IP Addressing

Destination IP address - User-defined

Source IP address - User-defined

IPv4-Editable Fields

ToS

DSCP

Flags

Protocol

TTL

IPv6-Editable Fields

Traffic class

Flow label

Next header

Hop limit

IP Ping

Fast Ping

IP Traceroute

Traffic Generator

Number of traffic engines

Bandwidth contolled

Bandwidth specification in Mbps or kbps

Bandwidth granularity

Bandwidth specification in %

Bandwidth utilization accuracy - 0.1%

Burst mode - Burst size - 1 to 2 Mbps frames

Bandwidth specified - Definable

Continuous Tx

Once Tx - Definable frames/burst

Traffic generation in LBM frames at line rate

Analysis of LBR frames at line rate

Traffic Profiles

Constant bandwidth

Ramp bandwidth

Bursty bandwidth

Flood bandwidth

Traffic generation in Mbps or kbps and % utilization

Bandwidth-configurable based on L1 or L2

TCP Throughput

10/100/1000 Mbps line rate stateful emulation

1 GE line rate stateful emulation

10 GE line rate stateful emulation

Configurable source and destination IP address

Packet length

TCP/UDP traffic modes

Source port

Destination port

Listen port

Configurable TCP window size

Measures TCP efficiency
Measures buffer delay
TCP client emulation
TCP server emulation
Up to 64 simultaneous TCP stateful sessions
Supports 4 background streams
Compatible with iPerf
RFC 2544
Asymmetric testing
Symmetric testing
Throughput
Frame loss
Out-of-sequence frames
Delay
Back to back
Committed burst size (CBS)
Policer test
Jitter
Master/slave
Pass/fail thresholds per MEF 23.1
Connectivity QuickCheck
Parallel testing
Optional testing with line rate LBM frames
Definable frame size
LAG support · Sequential MAC addresses · Suppression of OOS frames
Report formats
Graphical results
Total-test-time display
ITU-T Y.1564
10 Traffic streams
Service Configuration test
Service Performance test
Committed information rate (CIR)
Extended IR (EIR)
Maximum IR (MIR)
Frame loss rate (FLR)
Frame delay (FD)
Frame delay variation
Commited burst size (CBS)
Policer test
Round-trip testing
Concurrent bidirectional testing
Configurable VLAN, priority, addressing, and pass/fail thresholds

Programmable pass/fail thresholds
Graphical results
Screenshot support
Auto-negotiation check
Saved reports
Saved test profiles
Configurable DEI, TPID, TOS/DSCP
Inclusive of L2 Ethernet, IPv4, and IPv6
Integrated TrueSpeed TCP traffic stream with background streams
Optional testing with line rate LBM frames
Asymmetric testing
One-way delay with CDMA or GPS receiver
LAG support · Sequential MAC addresses · Suppression of OOS frames
IETF RFC 6349
Automated TCP-Throughput test per RFC 6349
Supported on 10/100/1000 Mbps electrical and 1/10 G optical interfaces
Path MTU Detection test
Round-Trip Time test
Walk-the-Window test
TCP-Throughput test
Traffic-Shaping test
TCP-Efficiency metric
Buffer-Delay metric
Up to 64 simultaneous TCP stateful sessions
Graphical results and report generation
1 KB TCP window-size granularity
Jumbo frame support
Configurable file and window sizes
Total-test-time display
Configurable saturation window test
Compatible with the following endpoints: · T-BERD/MTS instruments · QT-600 Ethernet probes · TrueSpeed VNF server
Layer 2 Transparency Testing (J-Proof)
Encapsulation supported · VLAN · Q-in-Q · Spanning Tree · Cisco protocols (Discovery, etc.) · GARP · STP

Send/receive Ethernet control-plane traffic · Spanning Tree frames Tx/Rx · Cisco discovery protocol · LDP frames Tx/Rx · Link aggregation LACP · Cisco UDLD, ISL, PagP, DTP, PVST-PVST+ · MAC bridging 802.1d · VLAN-BRDGSTP · Custom frame builder	
Synchronous Ethernet ITU G.826x	
10 GE Tx/Rx	
1000/100/10 Mbps Electrical Tx/Rx	
100/1000 Mbps Optical Tx/Rx	
G.826x-compliant	
Frequency offsets ± 100 ppm in 1 or 10 ppm increments	
Recovered interface timing	
4.6 ppm frequency accuracy	
SSM message decode	
ESMC message capture	
Quality message transmit and decode	
Definable SSM PDU rate (pps)	
Background data plane traffic generation	
IEEE 1588v2 PTP	
1 GE Tx/Rx	
1588v2 master PRC emulation	
1588v2 slave emulation	
Encapsulations supported	none, VLAN, and Q-in-Q
Packet delay variation measurements on control-plane traffic	
Generate up to 4 streams of background data plane traffic	
Frame/packet capture and decode via Wireshark	
Layer 2 1588v2 messaging	
Layer 4 1588v2 messaging	
Message rates multicast: fastest 2/16/64/64 (DelayResponse/Announce/Sync/DelayRequest); slowest one message every 16 seconds	
Message rates unicast: fastest 2/16/16/16 (DelayResponse/Announce/Sync/DelayRequest); slowest one message every 16 seconds	
Support for unicast and multicast address mode	
Support for forwardable and non-forwardable address	

Static unicast message negotation: ON or OFF

Thresholds for delay, PDV, and time error

Single- and dual-step operation in slave mode (single step in master mode)

Master-mode clock classes supported
- Primary
- Primary holdover
- Arbitrary
- Arbitrary holdover
- Primary A
- Arbitrary A

1588v2 delay measurements (master/slave, requires GPS receiver or TEM module)

One-way (master-to-slave and slave-to-master) delay (requires GPS receiver or TEM module)

Differential delay and delay asymmetry measurements

Time error measurements

Loopback

Manual (LLB)

Automatic

Local

Far end

Delay

Round-trip delay

Acterna Test Protocol Version 3 (default)
10GE High Precision - low delay
- This is for high accuracy RTD measurements (±80 ns with a hard loopback)
- Maximum distance 47,000 km x 2 (enough to go around the earth)

GE Optical High Precision - low delay
- This is for high accuracy RTD measurements (±135 ns or better accuracy with a hard loopback)
- Maximum distance 94,500 km x 2 (enough to go around the earth)

Acterna Test Protocol Version 2 with Fill byte
High Precision - low delay
- For short to medium distances to be compatible with older JDSU implementations (around ±4 µs accuracy)
- Maximum distance 37,750 km x2 for 10GE and 377,500 km x 2 for GE

Lower Precision - high delay
- For very long distances to be compatible with older JDSU implementations

One-way delay

Delay measurement accuracy

CAT-5 Testing

Link speed

Link status

Cable status

Crossover/straight (MDI/MDIX)

Distance to fault

Pin mapping

Pair length

Polarity

Skew

Capture/Decode

Wirespeed capture up to 10 Gbps

Wirespeed capture up to 1000/100/10 Mbps

Integrated Wireshark on the test set

256 MB capture buffer per port

Triggers

Tx and Rx capture

Frame slicing

Expert Decode/Analysis

Decode/analysis capture files

Detect half-duflex ports

Detect ICMP layer issues

Identify top talkers

TCP layer diagnosis - ex. retransmissions

Traffic Profiling

Detect and display up to 128 streams of live traffic

Specify filters for stream detection

Stream classification

Network Discovery

Automatically detect networks, domains, devices, and hosts

Traffic Filtering

Ethernet (Layer 2) Traffic Filtering

MAC source and destination address

Frame type/length

VLAN ID

VLAN priority

VLAN discovery

VLAN (Layer 2.5) Tags - 802.1q

TPI

Priority

CFI/DEI

VID

VLAN (Layer 2.5) Tags - Q-in-Q, 802.1ah

SVLAN ID

SVLAN priority

SVLAN TPI

CVLAN ID

CVLAN priority

IP (Layer 3) Traffic Filtering

Source and destination IP address

Subnet mask

IPv6 traffic class

TOS/DSCP fields

TCP/UDP (Layer 4) Traffic Filtering

ATP listen port

Protocol Analysis

CDP and LLDP Frame Discovery and Decode

CDP Analysis
- Device identifier
- Port identifier
- VLAN ID
- Source MAC address
- IP Subnet addresses

LLDP Analysis
- Chassis identifier
- Port identifier
- Time to live
- Source MAC address and optional VLAN ID
- Management IP address
- MAU Type information

Errors Tx/Rx

Code error Tx/Rx

FCS error Tx/Rx

IP checksum Tx/Rx

Bit error Tx/Rx

Insertion profile - Once

Insertion profile - Rate

Insertion profile - Burst

Alarms Tx/Rx

Local fault Tx/Rx

Remote fault Tx/Rx

Ethernet Results

Custom Results

Histogram and Graphical Results Script

Link Status

Loss of signal

Link active

Frame detected

Sync obtained

VLAN-tagged frame detected

Auto-Negotiation Status

Link configuration ack

Link advertisement status

Pause capable

Remote fault
Destination MAC address when using ARP
Link Counts/Statistics
Bandwidth utilization
Frame rate
Tx Mbps
Rx Mbps
Round-trip delay
Service-disruption time
Received frames
Transmitted frames
Received packets
Transmitted packets
Pause frames
Lost frames
Out-of-sequence frames
Out-of-sequence packets
VLAN frames
CVLAN ID
SVLAN ID
CVLAN priority
SVLAN priority
Unicast frames
Unicast packets
Multicast frames
Multicast packets
Broadcast frames
Broadcast packets
Frame length
Packet length
Packet jitter, avg
Packet jitter, max
Errored Counts
Symbol errors
Code violation
FCS-errored frames
Runts
Jabbers
Oversized frames
Undersized frames
Out-of-sequence frames
Lost frames
IP checksum errors
IP packet-length errors
Packet payload errors

Bit error
Bit-error rate
QoS Measurements
Throughput
Frame loss
Packet jitter
Delay
Out of sequence
Frame/packet size binning
MAC throughput Rx
IP throughput Rx
TCP/UDP throughput Rx
Payload throughput Rx
Service disruption measurements · Definable threshold time
Round-trip delay measurements
One-way delay measurements
Rx bytes
Rx Mbits
Rx frames
Rx frames per second
Utilization %
Current Rx results
Min Rx results
Average Rx results
Max/peak Rx results
Ratio Rx results
Seconds Rx results
Event Log
Event, date, start time, stop time, duration, value
Real-Time Histogram
Seconds, minutes, hours, days
Time
Current date, current time, test-elapsed time
Graphical Displays
Errors versus time
Frame loss versus time
Packet jitter versus time
Latency versus time
Throughput versus time
Application-Layer Testing
Walk the Window
FTP Throughput
HTTP Throughput

SONET/SDH

Test Interfaces/Bit Rates
STS-1 (e)
STM-1 (e)
STM-1 (o)
OC-3
OC-12
STM-4
OC-48
STM-16
OC-192
STM-64
Laser Type
SFP
SFP+
SFP+ Tunable
Modes of Operation
Terminate
Monitor
Through (intrusive)
Tributary scan
Drop and insert
Timing
Recovered from Rx
Internal (Stratum 3)
Recovered from external (bits/set)
Recovered from 10 MHz clock
SONET/SDH Features
SONET/SDH framing
Overhead manipulation/analysis
Optical/electrical power level
PRBS generation
PM/SM TTI messages Tx/Rx
Overhead byte viewing/manipultion
Service disruption measurements · SD separation/debounce time setting · SD threshold time settings
Signal label generation/display
Frequency offset Tx/Rx
Round-Trip Delay Measurement
RTD measurement accuracy
PRBS Pattern
2^15-1, 2^15-1 inverse
2^20-1, 2^20-1 inverse
2^23-1, 2^23-1 inverse
2^31-1, 2^31-1 inverse

Programmable - 32 bit
ANSI and ITU implementations
Anomoly/Error Generation
Bit/TSE
Frame word
B1
B2
B3
HP-REI
MS-REI, LP-BIP
LP-REI
Insert - Single
Insert - Rate
Multiple
Defects/Alarms Generation/Analysis
LOS
LOF
RS-TIM
MS-AIS
MS-RDI
AU-LOP
AU-AIS
HP-UNEQ
HP-RDI
HP-TIM
HP-PLM
TU-LOP
TU-AIS
TU-LOM
LP-UNEQ
LP-RDI
LP-TIM
LP-PLM
LP-RFI
SDH Mappings
VC4 Bulk, AU-4-4c, AU-4-16c, AU-4-64c
VC12
VC4
VC3
E4
DS3
E3
E1
SONET Mappings
STS-1, STS-3c, STS-12c, STS-48c, STS-192c

VT1.5	
DS3	
DS1	
E1	
Results	
Signal Category	
Signal present	
Signal-loss count	
Signal-loss seconds	
Rx frequency	
Rx-frequency deviation	
Rx-frequency maximum deviation	
Tx frequency	
Electrical input level · STS-1 · STM-1e	dBdsx, dBm, volts dBnom only
BPV count (STS-1 only)	
BPV-error rate (STS-1 only)	
Regenerator/Section OH Category	
FAS/frame word-error count	
FAS/frame word-error rate	
LOF count	
OOF count	
B1-BIP-error count	
B1-BIP-error rate	
Severely errored seconds	
OOF seconds	
Section trace mismatch	TIM
J0-Regenerator trace	
Multiplexer/Line OH Category	
APS message count	
APS bridge-request code	Ring
APS destination node	Ring
APS source node	Ring
APS path code	Ring
APS status	Ring
APS request code	Linear
APS K1 channel number	Linear
APS K2 channel number	Linear
APS MSP architecture	Linear
APS status	Linear
B2-BIP-error count	

B2-BIP-error rate
SES
Unavailable seconds
AIS seconds
REI count
REI rate
S1 Synchronization message
Z1 Byte value
High-Path (AU, VC3/4) OH Category
Pointer-justification count
Pointer-increment count
Pointer-decrement count
Pointer-NDF count
Pointer value
Pointer size
LOP count
B3-BIP-error count
B3-BIP-error rate
B3-BIP-errored seconds
REI count
VC-3/4 REI rate
POH SES
POH unavailable seconds
Signal label
J1 trace message
Path status
Low-Path (VC3/12, TU3/12, VT1.5) Category
Pointer transmitted
Pointer received
Pointer-justification count
Pointer-increment count
Pointer-decrease count
Pointer-NDF count
LOP count
LOP seconds
B3/V5 BIP count
B3/V5 BIP-error rate
REI count
Pointer transmitted
Pointer received
Signal label
Signal label mismatch
J2 Lower-order trace message
J2 Lower-order TIM

Logic Category
Pattern-loss count
Bit-error/TSE count
Bit-error/TSE rate
Pattern-slip count
Pattern-slip seconds
Pattern-loss count
Pattern-synchronization-loss seconds
Pattern-synchronization status
Alarms
Signal-Loss Status
Frame-synchronization-loss status
Pattern-synchronization-loss status
MS/Line-AIS
AIS (HP)
AIS (LP)
LOP (HP)
LOP (LP)
LOS
OOF
LOF
MS/Line RDI
LP RDI
HP RDI
MS/Line-REI
Regenerator trace identifier mismatch
High-path trace identifier mismatch
HP-UNEQ/UNEQ-P
Low-path trace identifier mismatch
Loss of multiframe
Overhead-Byte Manipulation/Viewing – High Path
A1, A2, J0, J1, D1, D2, D3, C2, H1, H2, H3, G1, B2, K1, K2, F2, D4, D5, D6, H4, D7, D8, D9, H4, D7, D8, D9, Z3/F3, D10, D11, D12, Z4/K3, S1, Z1, M1/Z2, E2, Z5/N1
SDH Low-Order View (AU/VT)
V5, S2, N6, K4
SOH and POH Evaluation
Text decode of S and C bytes for the trace identifier. J0 display of 16-byte ASCII sequence. J1, J2 display of 16- or 64-byte ASCII sequence.
Tandem Connection Monitoring (TCM)
Analysis of the N1 and N2 bytes, monitoring/display of: AIS, ODI, RDI, OEI, REI, APId, incoming B3/computed BIP comparison, IEC, TC-UNEQ

Performance Measures
G.826
G.828
G.829
M.2101
T1.231
T1.514
K1/K2 Event Log
Date, time, K1 value, code, channel, K2, bridge, MSP, status
Event Log
Event, date, start time, stop time, duration, value
Real-Time Histogram
Seconds, minutes, hours, days
Time
Current date, current time, elapsed test time

OTN G.709

Test Interfaces/Bit Rates
OTU1
OTU2
OTU1e
OTU2e
Laser Type
SFP
SFP+
SFP+ tunable
Modes of Operation
Terminate
Monitor
OTN Layer
OTN/ODU framing
ODU1 in ODU2 multiplexing
ODU0 multiplexing · ODU-0 bulk BERT from an OTU-2 · ODU-0 1 GE Layer 2 and IPv4 traffic from an OTU-2 · ODU-0 bulk BERT from an OTU-1 · ODU-0 1 GE Layer 2 and IPv4 traffic from an OTU-1 · ODUflex bulk BERT from an OTU-2 · ODUflex 1 GE Layer 2 from an OTU-2 · Generic mapping procedure (GMP) supported · GFP-T encapsulation of Ethernet 8B/10B PCS

GFP-T · CID · UPI
Overhead manipulation/analysis
Power level
PM/SM TTI messages Tx/Rx
Overhead manipulation/analysis
Service-disruption measurements · SD separation/debounce time setting · SD threshold time settings
Payload type (PT) label generation/display
Transfer delay
Frequency offset Tx/Rx
PRBS Patterns
2^20-1, 2^20-1 inverse
2^23-1, 2^23-1 inverse
2^31-1, 2^31-1 inverse
Programmable - 32 bit
ANSI and ITU implementations
Error-Insertion Capability
Single, rate
OTU Error Tx/Rx
FAS
MFAS
SM-BIP/BEI
PM-BIP/BEI
FEC uncorrectable
FEC correctable
TCM1-6 BIP
TCM1-6 BEI
Bit error
Codeword errors (correct/incorrect)
OTU Alarm Tx/Rx
LOF
OOF
LOM
OOF
OOM
SM-IAE
SM-TIM
SM-BDI
SM-BIAE
PM-TIM
PM-BDI
FTFL Fwd signal fail
FTFL Fwd signal degraded

FTFL Bwd signal fail
FTFL Bwd signal degraded
TCM1-6 IAE
TCM1-6 TIM
TCM 1-6 BDI
TCM1-6 BIAE
ODU Errors Tx/Rx
FAS
MFAS
PM BIP/BEI
TCM BIP/BEI
Bit error
ODU Alarms Tx/Rx
LOF
OOF
LOM
OOM
AIS
OCI
LCK
PM-TIM
PM-BDI
FTFL
FTFL Fwd signal fail
FTFL Fwd signal degraded
FTFL Bwd signal fail
FTFL Bwd signal degraded
TCM1-6 IAE
TCM1-6 TIM
TCM 1-6 BDI
TCM1-6 BIAE
OPU Errors/Alarms Tx/Rx
PT label mismatch
Client loss
Bit error
ODU Mappings
Bulk
ODU0
ODU1
ODU2
SDH Mappings
VC4 bulk, AU-4-4c, AU-4-16c, AU-4-64c
VC4
VC3

SONET Mappings
STS-1, STS-3c, STS-12c, STS-48c, STS-192c
Ethernet Mappings
10 GE
1 GE
Results
LEDS
Signal present
Frame sync
Pattern sync
LOS
LOF
LSS
Interface
Invalid Rx signal seconds
LOS count
Optical Rx level (dBm)
Reference frequency
Round-trip delay
Rx-frequency maximum deviation (ppm)
Rx-frequency (Hz)
Rx-frequency deviation (ppm)
Signal-loss count
Tx clock source
Tx-frequency maximum deviation (ppm)
Tx-frequency (Hz)
Tx-frequency deviation (ppm)
FEC
Uncorrected word errors
Uncorrected word-error rate
Corrected word errors
Correctable word errors
Corrected word-error rate
Correctable word-error rate
Corrected bit errors
Corrected bit-error rate
Correctable bit errors
Correctable bit-error rate
Framing
Frame-sync-loss seconds
Frame-sync losses
OOF-seconds count
FAS errors
FAS-error rate
LOF

LOF seconds
Multiframe-sync-loss seconds
OOM-seconds count
MFAS errors
MFAS-error rate
OTU
OTU-AIS
OTU AIS seconds
SM-IAE
SM-IAE seconds
SM-BIP-error counts
SM-BIP-error rate
SM-BDI seconds
SM-BDI count
SM-BIAE seconds
SM-BIAE count
SM-BEI count
SM-BEI-error rate
SM-TIM count
SM-TIM seconds
SM-SAPI
SM-DAPI
SM-operator specific
GCC BERT bits
GCC BERT bit errors
GCC BERT bit error rate
ODU
ODU
ODU-AIS
ODU-AIS seconds
ODU-LCK
ODU-LCK seconds
ODU-OCI
ODU-OCI seconds
PM-BIP count
PM BIP-error rate
PM-BDI seconds
PM-BDI count
PM-BEI count
PM-BEI-error rate
PM-TIM seconds
PM-TIM count
PM-SAPI
PM-DAPI
PM-operator specific

PM round-tip delay recent
PM round-trip delay last
FTFL
Forward-fault type
Forward-SF seconds
Forward-operator specific
Forward-operator identifier
Backward fault type
Backward SF-seconds count
Backward SD-seconds count
Backward-operator identifier
Backward-operator specific
TCM 1-6
IAE seconds
BIP errors
BIP-error rate
BDI seconds
BIAE seconds
BEI errors
BEI-error rate
TIM seconds
SAPI
DAPI
Operator-specific
GCC BERT bits
GCC BERT bit errors
GCC BERT bit error rate
OPU
Payload type mismatch seconds
Payload type
Payload
Pattern-sync-loss seconds
Pattern-sync losses
TSE/bit errors
TSE/bit-error rate
Ethernet Client
As per Ethernet results
RFC 2544 on 10 GE client
SONET/SDH Client
As per SONET/SDH results
OTN Check
Automated workflow is available at all OTN rates for OTN bulk
Set test duration based on bit error rate theory or actual time
Bit error rate theory parameters for test duration · Data rate (for example, OTU4) · BER threshold · Confidence level (% value, statistical degree of certainty)
Key Automated Tests
Payload BERT · PRBS pattern selection · Pass/fail BER threshold
Round trip delay · Selection of applicable OH fields: PM, TCM1-6 · Measurement frequency · Pass/fail threshold (ms)
GCC transparency · Selection of applicable OH field: GCC0, GCC1 or GCC2 · Pass/fail BER threshold
Report generation and formats

Fibre Channel

Laser Type
SFP
SFP+
Modes of Operation
Terminate
Monitor
Thru
Test Interfaces/Bit Rates (dual-port capable)
1.0625
2.125 Gbps
4.25 Gbps
8.5 Gbps
10.519 Gbps
14.025 Gbs
Fibre Channel Features
General
Flow control
Login
Buffer credits
Fibre Channel Login
at "F-port"
at "N-port"
Layer 1 (unframed) Bit Error Testing Patterns
High frequency test pattern per IEEE 802.3, 2000 edition, Annex 36A
Low frequency test pattern per IEEE 802.3, 2000 edition, Annex 36A
Mixed frequency test pattern per IEEE 802.3, 2000 edition, Annex 36A
Random data pattern (RPAT) per NCITS TF-25-1999
Jitter tolerance test pattern (JTPAT) per NCITS TF-25-1999
Supply noise test sequence (SPAT) per NCITS TF-25-1999
Layer 2 (framed) Bit Error Testing Patterns
Compliant random data pattern (CRPAT)
Compliant jitter tolerance pattern (CJPAT)
Compliant supply noise pattern (CSPAT)
Framed Pattern Test
PRBS (2^23-1, 2^31-1 and inverse)
All 1s
All 0s
User defined
Fibre Channel Traffic Generation
Transmit traffic profiles
Constant
Ramp
Bursty
Traffic generation in Mbps and % utilization
Configurable source and destination ID
Sequence ID
Originator ID
Responder ID
Frame length
User-defined
Packet payload
Granularity
Fibre Channel Traffic Filtering
Routing control
Destination identifier
Source identifier
Data structure type
Sequence count
Fibre Channel Error Insertion
Bit error
CRC
Framed bit
Code violation
Insertion type - Single, rate, burst

Enhanced Fibre Channel Test (RFC-2544-like)
Selectable configuration template
Throughput
Latency
Frame loss
Back-to-back
Buffer credits
Buffer credit throughput
Selectable flow control login type
Definable frame length
Pass/fail thresholds
Report generation
Screen capture support
Graphical results
8 G Fibre Channel Specific
Scrambling in FC-1/MAC layer, on total FC frame
Supported IDLE and FILL WORD patterns include IDLE on Link INIT and as FILL WORD; IDLE on INIT and ARBFF on FILL WORD; ARBFF on INIT and as FILL WORD
Results
Interface
Signal losses
Signal loss seconds
Sync loss seconds
Optical Rx overload
Optical Rx level (dBm)
Login Status
Far-end buffer-to-buffer credits
Login status
Tx/Rx ELP accept
Tx/Rx ELP Ack1
Tx/Rx ELP reject
Tx/Rx ELP request
L2 Link Statistics
Total utilization %
Frame rate
Frame size
Rx Mbps
Tx Mbps
Round trip delay (us)
Service disruption (us)
L2 Link Counts
Rx frames
Tx frames
Rx frame bytes
Tx frame bytes
Class F frames
Class 1 frames
Class 2 frames
Class 3 frames
BERT Stats
Pattern losses
Pattern loss seconds
Bit error rate
Bit errors
Bit errored seconds
Bit error-free seconds
Bit error-free seconds (%)
Error Stats
Symbol errors
CRC errored frames
Fiber runts
Fiber jabbers
Undersized frames
Code violations
Code violation rate
Code violation seconds

PDH

Test Interfaces
E4
DS3
E3
E1 balanced
E1 unbalanced
T1
Interface Type
BNC
Bantam
RJ48
E4
Modes of Operation
Terminate
Monitor
Thru (intrusive)
Timing
Recovered from Rx
Internal (Stratum 3)
Recoverd from external (bits/sets)

Framing
Framed
Unframed
Test Patterns
2^15-1* inverse
2^20-1* inverse
2^23-1* inverse
User-programmable
Round-trip delay
ANSI and ITU
Mappings
E3
E1
64 k
Anomaly/Error Insert/Analysis
Frame errors
TSE/bit error
Single
Rate
Defect/Alarm Insert/Analysis
AIS
RDI/FAS distant
General
Frequency offset ±100 ppm
National bit support
Performance Measures

G.821	OOS
G.826	ISM/OOS
M.2100	ISM/OOS

Results
Signal Category
Rx frequency
Rx-frequency deviation
Rx-frequency maximum deviation
Tx frequency
Round-trip delay
Frame Category
FAS TSE count
FAS TSE rate
FAS word-error count
FAS word-error rate
Frame-synchronization-loss count
Frame-synchronization-loss seconds
Logic Category
TSE/bit-error count

TSE/bit-error rate
Pattern slips
Pattern-slip seconds
Pattern-synchronization-loss count
Pattern-synchronization-loss seconds
DS3
Modes of Operation
Terminate
Monitor
Through (intrusive)
Timing
Recovered from Rx
Internal (Stratum 3)
Recovered from external (bits/set)
Framing
M13
C-bit
Unframed
Test Patterns
All 1s
All 0s
2^15-1* inverse
2^20-1* inverse
2^23-1* inverse
Round-trip delay
User-progammable (3...32 bits)
User byte
100
1100 (aka idle)
1010 (aka blue)
ANSI and ITU
Mappings
E1
T1
64 k
Anomaly/Error/Insert/Analysis
BPV/code error
Frame
Parity
C-bit parity
TSE/bit error
Single
Rate
Multiple

Defect/Alarm Insert/Analysis	
AIS	
RDI/FAS distant	
REBE	
TS-16 AIS	
TS-16 RDI/MFAC distant	
General	
Frequency offset ±100 ppm	
Loop codes Tx NIU, CSU, line	
Rx compensation - High - 0 ft	
Rx compensation - Low - 450 ft	
Rx compensation - Low - 900 ft	
Service disruption	
Performance Measures	
G.826	ISM/OOS
G.821	
M.2100	
M.2101	
T1.231	
T1.510	
Results	
Signal Category	
Receive frequency	
Receive-frequency deviation	
Receive-frequency maximum deviation	
Transmit frequency	
BPV/code rate	
BPV/code count	
Electrical input level	
Round-trip delay (ms)	
Frame Category	
Frame-error count	
Frame-error rate	
Frame-error seconds	
Frame-synchronization-loss count	
Near-end out-of-frame seconds	
Far-end out-of-frame seconds	
C-bit format	
Rx X-bits	
FEAC word	
Parity-error count	
Parity-error rate	
Parity-error seconds	
C-bit parity-error count	

C-bit parity-error rate
C-bit error seconds
FEBEs
DS2 frame-synchronization-loss count
Logic Category
Bit-error/TSE count
Bit-error/TSE rate
Pattern slips
Pattern-slip seconds
Pattern-synchronization-loss count
Pattern-synchronization-loss seconds
Pattern-synchronization status
E3
Modes of Operation
Terminate
Monitor
Through (intrusive)
Timing
Recovered from Rx
Internal (Stratum 3)
Recovered from external (bits/set)
Framing
Framed
Unframed
Test Patterns
All 1s
All 0s
2047
2^11-1* inverse
2^15-1* inverse
2^20-1* inverse
2^23-1* inverse
User-progammable (3...32 bits)
User byte
Round-trip delay
1:1
1:3
1:4
1:7
ANSI and ITU
Mappings
E1
64 k

Anomaly/Error/Insert/Analysis
Code error
FAS error
TSE/bit error
Single
Rate
Defect/Alarm/Insert/Analysis
AIS
RDI/FAS distant
General
Frequency offset Tx ±100 ppm
Tx LBO - 0 dB loss
Tx LBO - 6 dB loss
National bit support - On/off
Service disruption
Performance Measures
G.826
G.821
M.2100
Results
Signal Category
Tx frequency
Rx frequency
Rx-frequency maximum deviation
Electrical-input level
Code-error count
Code-error rate
Round-trip delay (ms)
APS switch time (ms)
Frame Category
FAS bit-error count
FAS bit-error rate
FAS word-error count
FAS word-error rate
Frame-synchronization-loss count
8M FAS word-error rate
8M FAS bit-error count
8M FAS bit-error rate
8M FAS word-error count
8M FAS word-error rate
Logic Category
TSE/bit-error count
TSE/bit-error rate
Pattern slips
Pattern-slip seconds
Pattern-synchronization-loss count
Pattern-synchronization-loss seconds
Pattern-synchronization status
E1
Modes of Operation
Terminate
Monitor
Through (intrusive)
Timing
Recovered from Rx
Internal (Stratum 3)
Recovered from external (bits/set)
Framing
Unframed
PCM30
PCM30C
PCM31
PCM31C
Test Patterns
All 1s
All 0s
2^15-1* inverse
2^20-1* inverse
2^23-1* inverse
QRSS
User-progammable (32 bits)
Round-trip delay
1:1
1:3
1:4
1:7
ANSI and ITU
Mappings
64k
Anomaly/Error/Insert/Analysis
Code error
FAS error
MFAS error
TSE/bit error
Single
Multiple
Rate
Defect/Alarm/Insert/Analysis
AIS
REBE
TS-16 AIS
TS-16 RDI/MFAS distant
General
Frequency offset Tx ±100 ppm
Service disruption
Performance Measures
G.826
G.821
G.829
M.2100
Results
Signal Category
2 Mbps receive frequency
2 Mbps reference frequency
2 Mbps receive-frequency deviation
2 Mbps receive-frequency maximum deviation
2 Mbps transmit frequency
Electrical-input level
Code-error count
Code-error rate
Round-trip delay (ms)
Timing slips
Frame slips
APS switch time
Logic Category
TSE/bit-error count
TSE/bit-error rate
Pattern slips
Pattern-slip seconds
Pattern-synchronization-loss count
Pattern-synchronization status
Alarm Category
FAS/frame synchronization
MFAS synchronization
CRC synchronization
AIS
RDI
Power-loss count
2 Mbps alarm

Frame Category
FAS bit-error count
FAS bit-error rate
FAS word-error count
FAS word-error rate
Nonframe-alignment word
MFAS word-error count
MFAS word-error rate
Time-slot Rx byte
CRC-error count
CRC-error rate
CRC-synchronization-loss count
FAS-synchronization-loss count
MFAS-synchronization-loss count
Remote-end block error (REBE)
T1
Modes of Operation
Terminate
Monitor
Through (intrusive)
Timing
Recovered from Rx
Internal (Stratum 3)
Recovered from external (bits/set)
Framing
Unframed
SF
ESF
SLC-96
Test Patterns
63
511
511 QRSS
2047 QRSS
2047
All 1s
All 0s
2^15-1* inverse
2^20-1* inverse
2^23-1* inverse
QRSS
User-progammable (3...32 bits)
User byte
Bridged tap
MultiPat

Round-trip delay
1:1
1:3
1:4
1:7
2 in 8
3 in 24
MIN/MAX
T1 DALY
55 OCTET
T1-2/96
T1-3/54
T1-4/120
T1-5/53
Mappings
64 k
56 k
Anomaly/Error/Insert/Analysis
Frame errors
BPV errors
TSE/bit error
Single
Rate
Multiple
Defect/Alarm/Insert/Analysis
AIS
REBE
General
Frequency offset Tx ±100 ppm
Performance Measures
G.826
G.828
G.829
M.2100
T1.231
Tx LBO
Service disruption
Loop Codes
Loop-code Tx
Loop-code emulation
Loop code Tx repeater
HDSL loop-code Tx · CO-to-customer direction · Customer-to-CO direction
User-defined loop-code support

DS1 Dual HDLC Monitor and PPP Ping
Modes of Operation
Bridge
Terminate
DSX monitor
Line Code
B8ZS
AMI
Clock Source (PPP ping only)
Internal
Recovered
External
Selectable clock offset
Transmit LBO (PPP ping only)
0 dB
–7.5 dB
–15.0 dB
–22.5 dB
Framing
Unframed
ESF
D4 (SF)
SLC-96
Payload
Bulk
Fractional rate
HDLC
Normal or inverted HDLC mode
CRC16 or CRC32
PPP (PPP ping only)
PPP mode (client or server)
IP mode (static or auto)
Optional authentication
IP (PPP ping only)
IPv4 frame format
Local IP
Remote IP
Destination IP address — user defined
Subnet mask
Preferred and alternate DNS server
IPv4 Editable Fields
ToS
DSCP
TTL

IP Ping

Editable packet length (46 – 1500 bytes)

Single

Multiple

Continuous

Fast

Alarms/Errors Generation and Analysis (PPP ping only)

LOS

LOF

AIS

RAI

BPV

Frame

Results

Interface

Signal losses

Signal loss seconds

Rx level (Vpp)

Rx level (dBsx)

Rx/Tx frequency (Hz)

Rx/Tx frequency deviation (ppm)

Rx/Tx frequency max deviation (ppm)

Bi-polar violations (BPVs)

BPV rate

Excess zeros state count

Ones density state count

DS1

Frame sync losses

Frame sync loss seconds

AIS alarms

AIS seconds

T1 alarm seconds

Frame errors

Frame error rate

Frame error seconds

Excess zeros

Maximim consecuitive zeros

HDLC

Rx/Tx frame count

Rx/Tx octet count

Frame aborts

Short frames

FCS errored frames

Percent utilization (average, current, maximum)

Throughput (average, current, maximum)

Average fame rate (frames/s)

Average frame size (octets)

PPP (PPP ping only)

PPP status

Local IP

IP subnet mask

Remote IP

Preferred and alternate DNS server

Destination IP address

Resolved host name

Ping (PPP ping only)

Ping requests Tx

Ping replies Rx

Lost pings

Lost ping %

Delay (ms)

Ping requests Rx

Ping replies Tx

Capture/Decode

Wirespeed capture

Integrated Wireshark on the test set

256 MB capture buffer

Triggers

Frame slicing

DS3 HDLC Dual Monitor

Modes of operation

DSX-MON

Terminate

Framing

Unframed

M13

C-Bit

HDLC

Normal or inverted HDLC mode

CRC16 or CRC32

Interface

Signal losses

Signal loss seconds

Rx level (Vpeak)

Rx level (dBdsx)

Rx frequency (Hz)

Rx frequency deviation (ppm)

Rx frequency max deviation (ppm)

Bipolar violations (BPVs)

BPV rate

BPV error seconds

Excess zeros count

Excess zeros seconds

DS3

Frame sync losses

Frame sync loss seconds

Near end OOF seconds

Far end OOF seconds

AIS seconds

RAI seconds

FEAC word

Frame errors

Frame error rate

Parity errors

Parity error bit rate

C-Bit errors

C-Bit error rate

C-Bit error seconds

C-Bit frame mismatch seconds

C-Bit sync loss seconds

FEBEs

FEBE rate

FEBE seconds

Rx X-Bits

HDLC

Rx frame count

Rx octet count

Frame aborts

Short frames

FCS errored frames

Percent utilization (average, current, maximum)

Throughput (average, current, maximum)

Average fame rate (frames/s)

Average frame size (octets)

CPRI

Test Interfaces/Bit Rates	
614 Mbps optical	Dual-port capable
1.2 Gbps optical	Dual-port capable
2.4 Gbps optical	Dual-port capable
3.1 Gbps optical	Dual-port capable
4.9 Gbps optical	Dual-port capable
6.1 Gbps optical	Dual-port capable
9.8 Gbps optical	Dual-port capable
10.137 Gbps optical	Dual-port capable
Laser Type	
SFP	
SFP+	
SFP+ Tunable	
Modes of Operation	
Terminate	
Monitor/Through	
Timing	
Recovered from Rx (slave)	
Internal (Stratum 3) (master)	
Recovered from external (bits/sets) (master)	
Recovered from 10 MHz clock (master)	
CPRI Features	
Optical/electrical power level	
Frequency offset Tx/Rx	
CPRI startup sequence - normal or bypass	
PRBS Generation and Monitoring	
Unframed	
L1 - Pattern inserted in hyperframe structure	
L2 - Pattern inserted in CPRI basic frame	
Interface Type	
Master	
Slave	
Selectable CPRI protocol Version	
Control and Management (C&M) Channel	
Ethernet	
HDLC	
Selectable C&M channel rate	
Service Disruption Measurements	
SD Seperation/Debounce time setting	
SD Threshold time setting	
Round-Trip Delay Measurement	
RTD measurement accuracy	

PRBS Patterns
2^15-1, 2^15-1 inverse
2^20-1, 2^20-1 inverse
2^23-1, 2^23-1 inverse
2^31-1, 2^31-1 inverse
Delay
Live
Digital word
ANSI and ITU implementations
Anomaly/Errors Generation
Bit/TSE
Code
K30.7
Running disparity
Insert - Single
Insert - Rate
Defects/Alarms Generation/Analysis
LOS
LOF
SDI
RAI
Results
Signal Category
Signal losses
Sync-loss seconds
Optical Rx overload
Optical Rx level (dBm)
Rx frequency
Rx-frequency deviation
Rx-frequency maximum deviation
Tx frequency
Tx-frequency deviation (Hz)
Tx-frequency deviation (ppm)
Tx-frequency maximum deviation (ppm)
CPRI Inband Protocol
Tx/Rx protocol version
Tx/Rx C&M HDLC rate
Tx/Rx C&M Etherent subchannel number
Port type (master/slave)
Start-up state
CPRI Counts
Word sync loss events
Word sync loss seconds
Code word count Tx/Rx
Frame count Tx/Rx

Error Stats
Code violations
Code violation rate
Code violation seconds
K30.7 words
Frame-sync loss events
Frame-sync loss seconds
Pattern-sync losses
Pattern-sync-loss seconds
Bit-error rate
Bit errors
Errored seconds
Error-free seconds
Error-free seconds, %
Total bits received
Round-trip delay current (ms)
Round-trip delay average (ms)
Round-trip delay minimum (ms)
Round-trip delay maximum (ms)
Remote LOS seconds
Remote LOS
Remote LOF seconds
Remote LOF
RAI
RAI seconds
SDI seconds
SDI
Running disparity errors
Running disparity error rate
RRH Testing (available for ALU RRH)
RRH SW version
RRH serial number
RRH SFP information

OBSAI

Test Interfaces/Bit Rates
768 Mbps optical
1.5 Gbps optical
3.1 Gbps optical
6.1 Gbps optical
Laser Type
SFP
SPF+
SFP+ Tunable

Modes of Operation
Terminate
Monitor/Through
Timing
Recovered from Rx (slave)
Internal (Stratum 3) (master)
Recovered from external (bits/sets) (master)
Recovered from 10 MHz clock (master)
OBSAI Features
Optical/electrical power level
Frequency offset Tx/Rx
PRBS Generation and Monitoring
Unframed
L1 - Pattern inserted in frame structure
L2 - Pattern inserted in OBSAI message
Interface Type
Master
Slave
Selectable number of message groups in master frame
Selectable number of message slots in message group
Selectable number of idle bytes after message group
FCB message generation
Round-Trip Delay Measurement
RTD measurement accuracy
PRBS Patterns
D6.6 D25.6
2^15-1, 2^15-1 inverse
2^20-1, 2^20-1 inverse
2^23-1, 2^23-1 inverse
2^31-1, 2^31-1 inverse
Live
Digital Word
Delay
Anomaly/Errors Generation
Bit
Code
Insert - Single
Insert - Rate

Results
Signal Category
Signal losses
Sync-loss seconds
Optical Rx overload
Optical Rx level (dBm)
Rx frequency
Rx-frequency deviation
Rx-frequency maximum deviation
Tx frequency
Tx-frequency deviation (Hz)
Tx-frequency deviation (ppm)
Tx-frequency maximum deviation (ppm)
OBSAI Counts
Code word count Tx/Rx
Frame count Tx/Rx
Message group counts Tx/Rx
Receive message counts: control, measurement, WCDMA/FDD, WCDMA/TDD, GSM/EDGE, TETRA, CDMA2000, WLAN, loopback, frame clock burst, Ethernet, RTT, WiMAX, virtual HW reset, LTE, generic packet, multihop RTT
Error Stats
Word sync loss events
Word sync loss seconds
Code violations
Code violation rate
Code violation seconds
K30.7 words
Frame sync losses
Frame sync loss seconds
Pattern sync losses
Pattern sync loss seconds
Bit error rate
Bit errors
Errored seconds
Error-free seconds
Error-free seconds, %
Total bits received
Round-trip delay current (ms)
Round-trip delay average (ms)
Round-trip delay minimum (ms)
Round-trip delay maximum (ms)
Tx/Rx OBSAI state

Jitter O.172

General Features	
Generate and measure jitter on electrical interfaces	DS1, E1, DS3, E3, E4, STM1e
Automatic measurement sequences · Maximum tolerable jitter (MTJ) · Measure intrinsic jitter · Jitter transfer function (JTF)	
Support different measurement bands · High band · Wide band · Extended band · Set user-definable band	
Select common jitter mask	
Create user-definable masks	
Results	
Jitter results per measurement band	
Current peak-to-peak jitter [UI] · Peak-to-peak jitter [UI] · Positive peak jitter [UI] · Negative peak jitter [UI]	
Maximum peak-to-peak jitter [UI] · Peak peak jitter [UI] · Positive peak jitter [UI] · Negative peak jitter [UI]	
Phase hits	
Percentage of mask	
RMS jitter [UI]	
Jitter graphs	

Wander

General Features	
Measure wander on 1 PPS signal (use Ext Clk input and multiaccess timing adapter 22035030)	
Measure wander on 1 G optical Ethernet interface	
Measure wander on T1, E1, and unframed 2.048 MHz signals	
Measure wander on 10 MHz signal	
Selectable peak-time offset threshold	
Resolution	1 ns
Sample rate	1, 30, 60 samples per second
Internal data storage	256 M
External data storage on USB stick	
Start/Stop via key	

Results	
Time-interval error (TIE) · Current TIE(s) · Maximum TIE(s) · Minimum TIE(s)	
Maximum peak-to-peak TIE (MTIE)(s)	
Offset between test signal and reference · Current offset (µs) · Minimum offset (µs) · Maximum offset (µs)	
Pass/fail result	
TIE graph	
Time deviation (TDEV)	
Reference clock for 1 pps wander	1 pps reference signal (use Ext Clk input and multiaccess timing adapter 22035030)
Reference clock for GigE optical, T1, E1, 2 MHz, and 10 MHz wander	2 MHz or 10 MHz reference signal (use Ext Clk input and multiaccess timing adapter 22035030)
Cables for 1 pps wander	
Wander Analysis Tool	
Offline analysis of captured/imported TIE measurements	
Maximum peak-to-peak TIE (MTIE) [s]	
Frequency offset (ppm)	
Drift rate (ppm/s)	
Masks	
ANSI · SMC holdover (T1.105.109)	
ETSI · SEC (ETS 300 462-5-1) · SEC network IF (ETS 300 462-3-1) · SSU (ETS 300 462-4-1) · SSU network IF (ETS 300 462-3-1)	
GR253 · SMC transient	

ITU · G.8261 · SEC network IF (G.832, G.825) · SEC option 1 (G.813) · SEC option 2 (G.813) · SEC holdover option 2 (G.813) · SEC trans. option 2 (G.813) · SSU network IF (G.823, G.825) · SSU Type I (G.812) · SSU Type II, III (G.812) · SSU Type IV (G.812) · PRC (G.811) EEC-1 noise generation (G.8262 constant temperature) · EEC-1 noise generation (G.8262 constant temperature) · EEC-1 noise generation (G.8262 with temperature effects) · EEC-2 noise generation (G.8262 constant temperature) · EEC-1 noise tolerance (G.8261) · EEC-1 noise tolerance (G.8262)

Services

VoIP Testing
10/100/1000 Mbps electrical Ethernet interfaces
1 GE optical Ethernet interface
10 GE optical Ethernet interface
SIP, Cisco SCCP, and H.323 fast connect
SIP Parameters
Dial by phone/URL/e-mail
Nortel and Huawei SIP emulation
Proxy login and proxyless operation
SCCP Parameters
Selectable Cisco phone emulation supporting at least 15 models
Configurable device name
H.323 Parameters
H.323 ID
Bearer capability including unrestricted digital, speech, and
3.1 K audio
Configurable calling and called-party number plans and number types
Static, auto-discoverable, and no-gatekeeper operation

Configurable local and gatekeeper RAS port and call control port
Configurable time zone
Configurable RTP port range
General Parameters
Auto answer on/off
Codecs: · G.711 A Law · G.711 U Law · G.723 5.3 K · G.723 6.3 K · G.729A · G.726 · G.722
Configurable call manager port
Selectable silence supression
Configurable jitter buffer and speech-per-frame parameters
ACR or G.107 MOS scoring
Configurable jitter, loss, delay, and content thresholds pass/fail
Mean Opinion Score results (MOS)
Graphical summary results including Ethernet, transport and content
Transaction log including call log and protocol signaling
Content: · Phone book of last 10 numbers and IP addresses called · DTMF digits
Triple-Play Automated Test Script
10/100/1000 Mbps electrical Ethernet interfaces
1 GE optical Ethernet interface
10 GE optical Ethernet interface · More than 11,000 simulated calls with configurable codec and sampling rate · Configurable voice call or tone with configurable silence supression, sampling rate, and jitter buffer · Up to 250 simulated SDTV channels with configurable frame size and MPEG-2/4 compression · Up to 52 simulated HDTV channels with configurable frame size and MPEG-2/4 compression · Two configurable data streams with individual constant or ramp traffic and configurable frame sizes including random frames

IPTV
10/100/1000 Mbps electrical Ethernet interfaces
1 GE optical Ethernet interface
10 GE optical Ethernet interface · Single- and multiple-program transport stream (SPTS/MPTS) formats · Video explorer capable of detecting 512 SPTSs and 32 MPTSs and a video analyzer that supports 16 SPTSs and 1 MPTS · Supported measurements include bandwidth utilization, packet loss, packet jitter, PCR jitter, continuity-error bit and error-bit indicator · TR 101 290 priority 1 errors, such as program identification (PID), program association table (PAT), and program map table (PMT) · Loss-distance and period errors per RFC 3357, results pertransport stream and per PID · Measure ICC latency and R-UDP latency · Microsoft Television (MSTV) Support · Internet Group Management Protocol (IGMP) support

Primary Rate ISDN	
Test access	T1
TE emulation	
NT emulation	
D-channel signaling decodes	
Call control	National 5ESS NI-1
D-Channel rate	64 k 56 k
Call type	Data Voice 3.1 k audio
Channel number	1 to 24
D-channel rate	56 k

Signaling—Place/Receive Call	
Test access	T1
E&M signaling	
Loop-start signaling	
Ground-start signaling	
Audio drop/insert	
Signaling bits	
Place call	
Receive call	
MF digits	
DTMF digits	
Event log	
VF tone insertion	

Fractional T1/E1	
Test access	T1
Fractional T1	n x 64 k
Fractional T1	n x 56 k
Contiguous channels	
Noncontiguous channels	
V.54 Loop-code support	

Voice Frequency	
Test access	T1
Listed to an audio call	
Insert VF tones	404, 1004, 1804, 2713, and 2804 Hz
User frequency	
Quiet tone	
Holding tone	
Three tone	
Frequency sweep	
Impulse noise	
Rx frequency	
Level (dBm)	
DC offset mV	

OTDR

The T-BERD/MTS-5800 is compatible with the 4100 Series OTDR MA, LA, MP, quad, and CWDM.

See the OTDR module specifications for details.

OSA

The T-BERD/MTS-5800 is compatible with the COSA-4055 module. See the COSA-455 module specification for details.

Specifications

Physical	
Dimension	**5811PL and 5822P**
Height	17.78 cm (7 in)
Width	24.13 cm (9.5 in)
Depth	7.62 cm (3 in)
Weight	1.9 kg (4.2 lb)

Power*	
Parameter	
Operating time	Between 2 and 5 hr (depending on type of test)
Charging time	Approximately 7 hr from empty
Unit power input	12 VDC, 60 W maximum
Power supply input	100 to 240 VAC, 50/60 Hz, autosensing
Power supply output	12 VDC, 5 AMP maximum
Environmental	
Operating temperature	0 to 50°C
Operating humidity	10–90% RH noncondensing
Storage temperature	–20 to 60°C
Storage humidity	10–95% RH noncondensing
Shock/Drop/Vibe	
Shock	Per IEC 68-2-27 and 68-2-29 Ed. 2.0
Drop	Per IEC 721-3-7 2nd Ed. /IEC 61010-1
Vibration	Per IEC 68-2-6 and MIL-PRF-28800F (Class 2)
General	
Touch screen	7-inch LCD resolution 1200 x 600 high visibility
Internal memory	Minimum of 1 G (thousands of reports)
Ports	USB 2.0 (2), RJ45 Ethernet, serial RS-232, Bluetooth (Bluetooth headset support for VoIP and PRI calls and tethering to iOS devices for file transfers), WiFi, analog headset jack
Remote access	SmartAccess Anywhere