CMA 5000

eXtended Transport Analysis Application

CMA 5000

The Field Portable Solution for Installation, Commissioning and Maintenance of SONET/SDH Networks (ready for NGN)

The compact size of the XTA Application module conveniently fits into the CMA 5000 Multi-Layer Network Test Platform using a small bay adapter - thus reducing cost and overall weight.

Ideal Solution for Any Test Scenario

As a part of the CMA 5000 Multi-Layer Network Test Platform, the eXtended Transport Analysis (XTA) Application is just one way to accelerate the deployment of services while reducing the cost of measurement. With test and measurement options ranging from OTDR, connector inspection, chromatic and polarization mode dispersion to optical spectral analysis, bit error rate test, SONET/SDH analysis and Gigabit Ethernet, the CMA 5000 Multi-Layer Network Test Platform is the ideal single-solution for all your testing needs.

[1] Technical descriptions are available in the datasheet of each options

Today's competitive environment demands that networks offer exceptional performance and reliability with minimal downtime. When characterizing and documenting such stringent performance levels, the CMA 5000 eXtended Transport Analysis (XTA) Application is the ideal single-solution for transmission system analysis. The CMA 5000 XTA Application increases your competitiveness in installing, maintaining, commissioning and monitoring high-speed SONET, SDH and DWDM transmission systems via an innovative and comprehensive test solution.

Increase revenue through maximized network efficiency and QoS:

- Minimize network downtime with a comprehensive set of test functions and powerful graphical event correlation
- Reduce user errors with an intuitive, easy-to-interpret user interface and on-line help
- Verify QoS with objective performance tests in compliance with ITU-T and Telcordia standards

Optimize network performance:

- Achieve comprehensive testing of PDH/T-carriers and SONET/SDH networks up to 10 Gbps with only one instrument
- Produce APS measurement with 125 µs of resolution
- Obtain Round Trip Delay measurement with 100 ns of resolution
- Automatically detect network problems with Troublescan features

Reduce the cost of measurement:

- Generate professional test reports
- Reduce training and test time through targeted, user-friendly applications
- Protect your investment with a complete open architecture and future-proof technology

The CMA 5000 XTA Application enables installation and maintenance professionals to rely on one compact solution for testing DS1/E1 through OC-192/STM-64. An impressive list of options is also available[1]:

- Contiguous Concatenation
- Tandem Connection Monitoring
- Jitter and Wander generation/analysis from DS1/E1 up to OC-48/STM-16
- ATM over SONET/SDH
- Next Generation SONET/SDH (VCAT, LCAS, GFP, Eos)

All these possibilities of evolution protect your investment for the future.

Interfaces and Signal Specifications

SIGNALS				XTA MODULES			
SDH / PDH	SONET/ T-Carrier	Rate (Mb/s)	Interfaces	XTA 622	XTA 2.5	XTA 10-1310	XTA 10-1550
STM-64	OC-192	9953.280	Optical 1550 nm [1]	____	____	____	√
STM-16	OC-48	2488.320		____	√	√	√
STM-4	OC-12	622.080		√	√	√	√
STM-1	OC-3	155.520		√	√	√	√
STM-64	OC-192	9953.280	Optical 1310 nm [1]	____	____	√	____
STM-16	OC-48	2488.320		____	√	√	√
STM-4	OC-12	622.080		√	√	√	√
STM-1	OC-3	155.520		√	√	√	√
STM-1	STS-3	155.520	Electrical [2]	√	√	√	√
	STS-1	51.840		√	√	√	√
E4	____	139.264		√	√	√	√
E3	____	34.368		√	√	√	√
E1	____	2.048		√	√	√	√
____	DS3	44.736		√	√	√	√
____	DS1	1.544		√	√	√	√

Optical Transmitter	155.520 to 2488.320 Mb/s	9953.280 Mb/s
Wavelength		
1310 nm	1290-1330 nm	1290-1330 nm
1550 nm	1529-1570 nm	1530-1565 nm
Output Power		
1310 nm	-2 dBm to +2 dBm	+1 dBm to +5 dBm
1550 nm	-1 dBm to +2 dBm	-1 dBm to +2 dBm
Extinction Ratio	8.2 dB minimum	8.2 dB minimum (1550 nm) 6.0 dB minimum (1310 nm)

Optical Receiver	155.520 to 622.080 Mb/s	2488.320 Mb/s	9953.280 Mb/s
Wavelength	1270-1570 nm	1270-1570 nm	1527-1570 nm and 1290-1330 nm
Sensitivity (min)	-28 dBm (at 10^{-10} BER)	-28 dBm (at 10^{-10} BER)	-15 dBm (at 10^{-12} BER)
Saturation	-8 dBm	-8 dBm	-1 dBm

Clocks Synchronization	
Clock Reference	• Internal stratum 3 clock generation • External 2.048 MHz reference clock: 75 Ohms BNC connector, 0.5 to 4 Vpp signal amplitude • Timed from 2.048 Mbit/s received signal • External 1.544 MHz reference clock: 75 Ohms BNC connector, 0.5 to 4 Vpp signal amplitude • Timed from 1.544 Mbit/s received signal • External 10 MHz reference clock: 75 Ohms BNC connector, 0.5 to 4 Vpp signal amplitude • Timed from SDH/SONET received signal
Clock Output	• 155.520 MHz frequency signal synchronous with transmitted SDH/SONET signal, 50 Ohms connector, AC coupled, 600 mV amplitude

Key Features

- SDH/PDH and SONET/ T-Carrier testing in one smart box
- Independant Tx and Rx

Notes:

[1] SC/PC connectors

[2] BNC 75 Ohms connectors (except for DS1 Bantam 100 Ohms)

Interfaces and Signal Specifications (continued)

Key Features

- PDH/T-Carrier Drop &
- Concatenated payloads proposed as product o

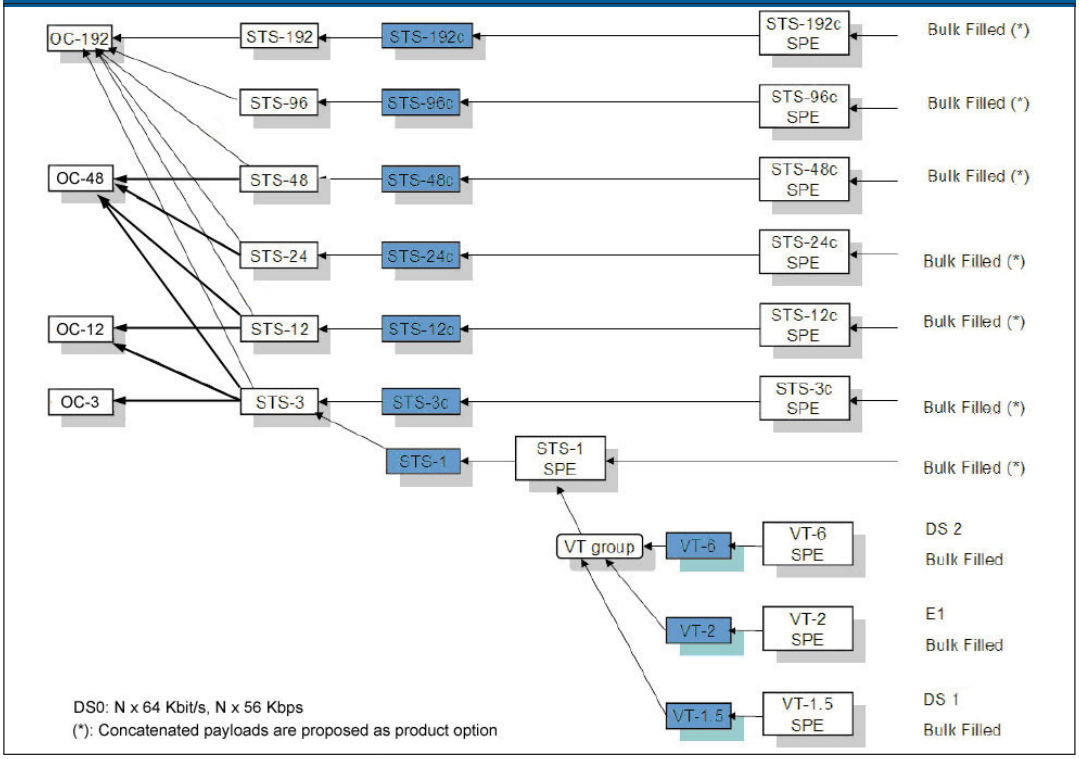
DCC Signals

The CMA 5000 XTA modules support the drop and insert of DCC channels from SONET/SDH.
Rates: D1-D3 DCC channels 192 Kb/s and D4-D12 DCC channels 576 Kb/s
Connector: DB 15

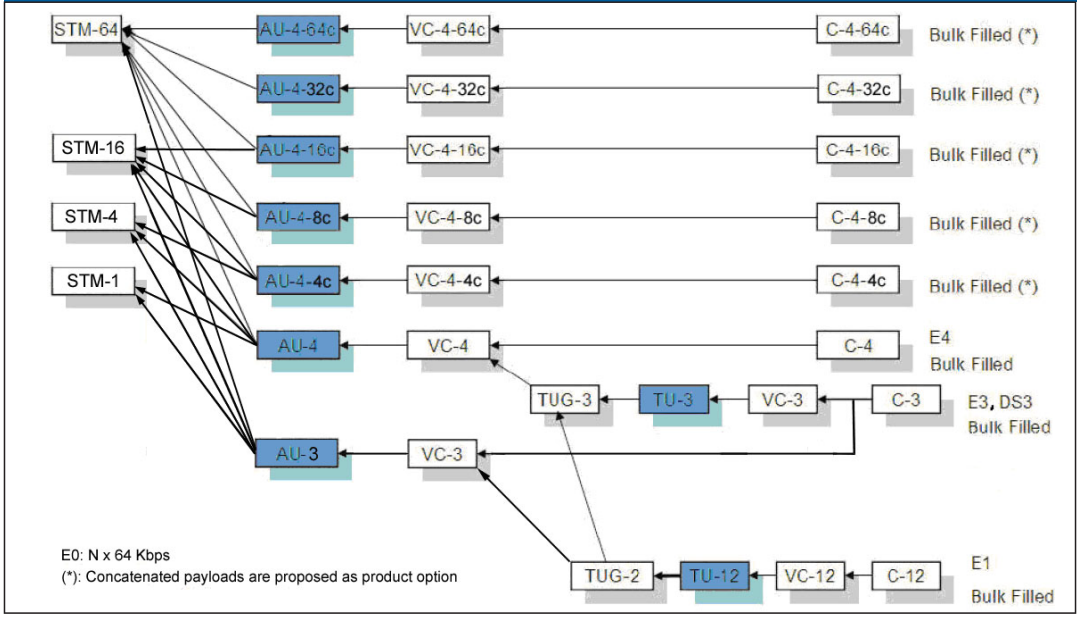
SONET/SDH Frame Formats and Mapping

SONET format	Telcordia GR-253
SDH format	ITU-T G.707

SONET Mappings



SDH Mappings



Interfaces and Signal Specifications (continued)

PDH/DSn Signal	Unframed Format	Framed Format
E1	PRBS	G.704 w/out CRC4 N x 64 Kbit/s
E3	PRBS	G.751
E4	PRBS	G.751
DS1	PRBS	ANSI T1.107 (SF and ESF) N x 64 Kbit/s, N x 56 Kbit/s
DS3	PRBS	ANSI T1.107 (C-bit and M-13)

T-Carrier MUX/DEMUX (Option)	
MUX/DEMUX	DS0 => DS1 => DS2 => DS3

Line Rate	Line Coding	Input Level	Output Level
E1 (2.048 Mbit/s)	HDB3 AMI	Short Haul: Terminate Monitor (-22 dB) Monitor (-26 dB) Monitor (-32 dB) High Z Long Haul: Terminate	G.703
E3 (34.368 Mbit/s)	HDB3	Terminate	G.703
E4 (139.264 Mbit/s)	CMI	Terminate/Monitor	G.703
DS1 (1.544 Mbit/s)	B8ZS AMI	Short Haul: Terminate Monitor (-22 dB) Monitor (-26 dB) Monitor (-32 dB) High Z Long Haul: Terminate	Short Haul: 0-133 feet 133-266 feet 266-399 feet 399-533 feet 533-655 feet Long Haul: 0 dB -7.5 dB -15 dB -22.5 dB
DS3 (44.736 Mbit/s)	B3ZS	Terminate Monitor	High DSX

Test Pattern	
PRBS Patterns	PRBS: 2^9-1, 2^{11}-1, 2^{15}-1, 2^{20}-1, QRSS, 2^{23}-1, 2^{29}-1, 2^{31}-1 inverted and non-inverted
Word Patterns	All “1” pattern, all “0” pattern, alternative “01” pattern, user-defined 2 bytes word pattern, 1 in 8, 2 in 8, 3 in 24, QRSS patterns for DS1 signal, T1 Daly

Key Features

- On-line help
- Automatic test

Network Emulation

Key Features

- Full range of I/O connectors
- Large color screen
- Almost unlimited storage capacity

SONET/SDH Overhead Editors	
SONET Frames:	
TOH Editor	All bytes of TOH (STS-1/STS-3) are programmable except B1/B2 and Z0 J0 (Trace Identifier): programmable 62 bytes ASCII sequence, CRLF added or programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable byte
POH Editor (STS)	C2, G1, F2, H4, Z3, Z4, N1 J1 (Trace Identifier): programmable 62 bytes ASCII sequence, CRLF added or programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable byte
POH Editor VT (POH)	V5, Z6, Z7 J2 (Trace Identifier): programmable 62 bytes ASCII sequence, CRLF added or programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable byte
SDH Frames:	
SOH Editor:	All bytes of SOH (STM-1) are programmable except B1/B2 J0 (Trace Identifier): programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable 62 bytes ASCII sequence, CRLF added or programmable byte
POH Editor	VC4 and VC3 POH: C2, G1, F2, H4, F3, K3, N1 J1 (Trace Identifier): programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable 62 bytes ASCII sequence, CRLF added or programmable byte VC12 POH: V5, N2, K4 J2 (Trace Identifier): programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable 62 bytes ASCII sequence, CRLF added or programmable byte

Error Addition	
SONET/DSn	A1/A2, B1, B2, REI-L, B3, REI-P, V5, REI-V, PRBS, Word, transmission errors, FAW (FAS), SFAW, FPS, CRC-6, MAW, Parity P, Parity CP, F-bit, M-bit, FEBE, Code Errors (BPV, EXZ)
SDH/PDH	A1/A2, B1, B2, MS-REI, B3, LP-B3, HP-REI, V5, LP-REI, PRBS, Word, transmission errors, FAW (FAS), CRC4, REI (E-bit or REBE), Code Errors (BPV, EXZ)
Error control	Programmable number or rate

Alarm Addition	
SONET/DSn	LOS, LOF, SEF, TIM-S, AIS-L, RDI-L, AIS-P, LOP-P, TIM-P, PLM-P, UNEQ-P, RDI-P, LOM-V, AIS-V, LOP-V, PLM-V, UNEQ-V, RDI-V, TIM-V, RFI-V, LSS, LPS, AIS, LOMF, LSF, OOF, RAI, IDLE
SDH/PDH	LOS, LOF, OOF, RS-TIM, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-PLM, HP-TIM, HP-UNEQ, HP-RDI, TU-LOM, TU-AIS, TU-LOP, LP-PLM, LP-UNEQ, LP-TIM, LP-RDI, LP-RFI, LSS, LPS, AIS, LOMF, RDI
Alarm Control	On steady-state or programmable number of frames

Network Emulation (continued)

Voice Add/Drop (Option)	
SONET/DSn	Supports adding and dropping of a selected 64/56 kb/s voice channel (carried in a DSn signal) to an external handset (µ-Law)
SDH/PDH	NA

Stress Function	
Pointer Movement	Pointer movement generation on SONET and SDH frames: • Pointer set to any value with or without NDF • Positive and negative movements • Pointer sequences (ITU-T G.783, Telcordia GR-253) **SDH** Single Alternating Regular + Double Regular + Missing Double Alternating Periodic 87.3 Periodic 87.3 with Add Periodic 87.3 with Cancel **SONET** Single Burst of 3 Periodic Periodic with Add Periodic with Cancel Periodic 87.3 Periodic 87.3 with Add Periodic 87.3 with Cancel Phase Transient
Frequency Shift	Programmable frequency offset: -100 ppm to +100 ppm in 0.1 ppm steps SONET/SDH -100 ppm to +100 ppm in 0.1 ppm steps for PDH/T-Carrier
APS (K1/K2)	Automatic Protection Switch messages (K1/K2) are user-programmable MSP Linear (ITU-T G783) and MSP-Ring (ITU-T G841) are supported
SDH Through Mode	SOH overwrite J0, A1, A2, K1, K2, S1, M0, M1 Error addition: A1 A2, B1, B2, MS-REI, Transmission errors Alarm addition: LOS, LOF, OOF, MS-AIS, MS-RDI
SONET Through Mode	TOH overwrite J0, A1, A2, K1, K2, S1, M0, M1 Error addition: A1 A2, B1, B2, REI-L, Transmission errors Alarm addition: LOS, LOF, SEF, AIS-L, RDI-L
DS1 Loop Codes	Loop Codes generation on DS1 frames: DS1 SF: Loop Up, Loop Down (CSU / NIU FAC1 /NIU FAC2) DS1 ESF: Line Loop Back Activate, Payload Loop Back Activate, Line Loop Back Deactivate, Payload Loop Back Deactivate, Universal Loop Back Deactivate Modes: In-Band, Out-of-Band Auto response to received loopback code

Key Features

- 64/56 Kb/s voice channel add/drop capability (option)
- Active Through Mode to simulate network problems
- Linear and Ring APS architectures supported

Key Features

- Summary, detailed and graphical results presentation
- Event Log for History Analysis
- Event Analysis with 125 µsec resolution

Measurement Capabilities

Path Analysis	
Signal Qualification	• Power meter • Frequency meter
Error Analysis	**SONET/DSn** A1/A2, B1, B2, REI-L, B3, REI-P, V5, REI-V, PRBS, Word, ERR, FAW (FAS), SFAW, FPS, CRC-6, MAW, Parity P, Parity CP, F-bit, M-bit, FEBE, Code Errors (BPV, EXZ) **SDH/PDH** A1/A2, B1, B2, MS-REI, B3, HP-REI, LP-B3, LP-REI, V5, PRBS, Word, ERR, FAW (FAS), CRC4, REI (E-bit or REBE), Code Errors (BPV, EXZ)
Alarms Analysis	**SONET/DSn** LOS, LOF, SEF, TIM-S, AIS-L, RDI-L, AIS-P, LOP-P, PLM-P, TIM-P, UNEQ-P, RDI-P, LOM-V, AIS-V, LOP-V, PLM-V, UNEQ-V, RDI-V, TIM-V, RFI-V, LSS, LPS, AIS, RAI, OOF, LSF, LOMF, IDLE **SDH/PDH** LOS, LOF, OOF, RS-TIM, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-PLM, HP-UNEQ, HP-TIM, HP-RDI, TU-LOM, TU-AIS, TU-LOP, LP-PLM, LP-UNEQ, LP-TIM, LP-RDI, LP-RFI, LSS, LPS, AIS, LOMF, RDI
Pointer Movement Analysis	XTA modules track all the SONET/SDH pointers movements information: • Pointer value • Number of positive and negative pointer movements • Number of pointer movement with NDF
Quality Analysis	**SONET/DSn** Transmission quality is calculated each second as per GR-253 **SDH/PDH** Transmission quality is calculated each second in accordance with recommendations G.821, G.826, G.828, M.2100, M2101.1, M.2101, M.2110 for performance
Overhead Analysis	Realtime display of the following information: • J0, J1 and J2 Path Trace messages (ASCII sequence) • S1 (synchronization status) • C2/V5 (signal label) SONET/SDH: • Display of SOH/TOH and POH of the analyzed path channel • Capture capacity: 64 consecutive frames
Event Analysis	Alarms and Errors event analysis in temporal graphical display with 125 µs resolution

Measurement Capabilities (continued)

Round Trip Delay

- Measurement possible at each path level
- Resolution: 100 ns
- Range: 0 to 2 sec (depending on path level)
- Result: Tmax, Tmin, Tavr, Tcurrent and Errors/Alarms detection

Automatic Protection Switching Measurement

- Number of switches
- Switch duration (with 125 µs resolution)
- K1/K2 capture and interpretation

Performance Analysis

- Direct graphical presentation of performance and availability conformance test result
- Automatic calculation of acceptance thresholds according to ITU-T recommandations, such as M.2100, M.2101.1 and M.2101
- Automatic calculation of Performance Objectives according to ITU-T recommendations such as G.821, G.826, G.828

Structure Scan

- Complete signal mapping auto discovery (including Mix Payload)

Troublescan

- Continuous VC-4/SPEs scanning for alarms and errors detection

General Information

- The XTA hardware is a double size plug-in module compatible with the CMA 5000 Multi-Layer Network Test Platform (small, medium or large bay adapters).
- AC power: 100 to 250 VAC via CMA 5000 platform

Environmental specifications:	Operating Temperature: 0°C to +40°C Storage Temperature: -20°C to +70°C Humidity: 10% to 80%
Safety:	Electrical: EN 61010-1 Optical: Class I (21 CFR 1040) / Class 1M (60825-1)
EMC:	EN 300386 V1.3.2

- Warranty: 1 year standard
- CMA 5000 platform features are detailed in the CMA 5000 platform specifications sheet.

Key Features

- Trouble Scan function
- Automatic configuration with Structure Scan function

Key Features

- Future-proof solution with a complete list of upgrades to adapt to your evolving network requirements (contact your NetTest or Anritsu Representative for details)
- XTA modules have to be plugged into a CMA 5000 platform

Notes:

[1] A 1310 nm configuration is also available under reference 5663-000-XTA

[2] Each module is shipped with:

- One optical patchcord with SC/PC connectors
- One BNC 75 Ohms cable
- One optical 10 dB attenuator SC/PC connectors

[3] Module number

CMA 5000 XTA 10G-1550 Module [2]

Order Number	Description
5665-000-XTA	**CMA 5000 XTA 10G-1550 module** [1] Test module for T-Carriers/PDH and SONET/SDH technologies up to 10 Gbit/s. It provides: • Optical interfaces at 1550 nm for OC-192 and STM-64 • Optical interfaces at 1310 nm and 1550 nm for OC-3/12/48 and STM-1/4/16 • Electrical interfaces for DS1, DS3, STS-1, STS-3 and E1, E3, E4, STM-1

CMA 5000 XTA 2.5G Module [2]

Order Number	Description
5616-000-XTA	**CMA 5000 XTA 2.5G module** Test module for T-Carriers/PDH and SONET/SDH technologies up to 2.5 Gbit/s. It provides: • Optical interfaces at 1310 nm and 1550 nm for OC-3/12/48 and STM-1/4/16 • Electrical interfaces for DS1, DS3, STS-1, STS-3 and E1, E3, E4, STM-1

CMA 5000 XTA 622 Module [2]

Order Number	Description
5604-000-XTA	**CMA 5000 XTA 622 module** Test module for T-Carriers/PDH and SONET/SDH technologies up to 622 Mbit/s. It provides: • Optical interfaces at 1310 nm and 1550 nm for OC-3/12 and STM-1/4 • Electrical interfaces for DS1, DS3, STS-1, STS-3 and E1, E3, E4, STM-1 • Concatenation • Tandem Connection Monitoring • Jitter & Wander

List of options for XTA modules

Order Number	Description
XXXX[3]-101-XTA	Concatenation option (Full package)
XXXX[3]-151-XTA	T-Carrier package (T-Carrier MUX/DEMUX and voice add/drop (µ-Law))
XXXX[3]-201-XTA	Tandem Connection Monitoring (TCM) option
XXXX[3]-239-XTA	Remote Commands for XTA module (via Ethernet) *Remark: T-Carrier Package / ATM / VCAT Monitoring / Next-Gen options are not supported by remote commands*
XXXX[3]-301-XTA	Jitter & Wander full package option (*only available on XTA 2.5G and XTA 622 modules*)
XXXX[3]-351-XTA	"Tx only" Jitter package option (*only available on XTA 2.5G and XTA 622 modules*)
XXXX[3]-401-XTA	ATM option
XXXX[3]-501-XTA	VCAT Monitoring option (VCAT, LCAS, Diff. Delay) for High Order Path
XXXX[3]-601-XTA	Next Generation SONET/SDH Tx & Rx for High Order paths: VCAT, LCAS, GFP-F (-T), EoS

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