

CMA 5000

Optical Transport Analysis Application



research
& design



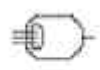
manufacturing



installation
& maintenance



network
monitoring



optical
components

CMA 5000

The Premier Solution for Installation, Commissioning and Maintenance of SONET/SDH Networks



The compact size of the OTA 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 Optical Transport Analysis (OTA) 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.

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 Optical Transport Analysis (OTA) Application is the ideal single-solution for transmission system analysis. The CMA 5000 OTA 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 μ s 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 OTA Application enables installation and maintenance professionals to rely on one compact solution for testing DS1/E1 through OC-192/STM64. It provides efficient, reliable testing of a multitude of parameters, including Alarms and Errors analysis, APS with 125 μ s resolution, Round Trip Delay measurement with 100 ns resolution, network availability and performance evaluation. In addition, the CMA 5000 OTA Application's innovative Troublescan feature automatically detects problems, allowing network impairments to be identified and rectified quickly to ensure the network meets the expectations of both you and your customers.

Interfaces and Signal Specifications

SIGNALS

OTA MODULES

SDH / PDH	SONET/ T-Carrier	Rate (Mb/s)	Interfaces	OTA 622	OTA 2.5	OTA 10-1310	OTA 10-1550
STM64	OC-192	9953.280	Optical 1550 nm ¹	—	—	—	✓
STM16	OC-48	2488.320		—	✓	✓	✓
STM4	OC-12	622.080		✓	✓	✓	✓
STM1	OC-3	155.520		✓	✓	✓	✓
STM64	OC-192	9953.280	Optical 1310 nm ¹	—	—	✓	—
STM16	OC-48	2488.320		—	✓	✓	✓
STM4	OC-12	622.080		✓	✓	✓	✓
STM1	OC-3	155.520		✓	✓	✓	✓
STM1	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		✓	✓	✓	✓

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 DS3 Bantam 100 Ohms)

Optical Transmitter	155.520 to 2488.320 Mb/s	9953.280 Mb/s
Wavelength		
1310 nm	1278-1357 nm	1290-1330 nm
1550 nm	1529-1570 nm	1530-1565 nm
Output Power		
1310 nm	-6 dBm to -3 dBm	1 dBm to 5 dBm
1550 nm	0 dBm to -2 dBm	-1 dBm to 2 dBm
Extinction Ratio	8.2 dB minimum	8.2 dB minimum

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)	-33 dBm (at 10 ⁻¹⁰ BER)	-30 dBm (at 10 ⁻¹⁰ BER)	-15 dBm (at 10 ⁻¹² BER)
Saturation	-8 dBm	-8 dBm	-1 dBm

Clock Synchronization	
Clock Reference	<ul style="list-style-type: none"> • Internal stratum 3 clock generation • External 2.048 MHz reference clock: 75 Ohms BNC connector, 0.05 to 2 Vpp signal amplitude • Timed from 2.048 Mbit/s received signal • External 1.544 MHz reference clock: 100 Ohms Bantam connector, 0.05 to 2 Vpp signal amplitude • Timed from 1.544 Mbit/s received signal • Timed from SDH/SONET received signal
Clock Output	<ul style="list-style-type: none"> • 155.520 MHz frequency signal synchronous with transmitted SDH/SONET signal, 50 Ohms connector, AC coupled, 600 mV amplitude

Interfaces and Signal Specifications (continued)

Key Features

- PDH/T-Carriers Drop & Insert
- Mux/Demux Testing
- Concatenated payloads are proposed as product option

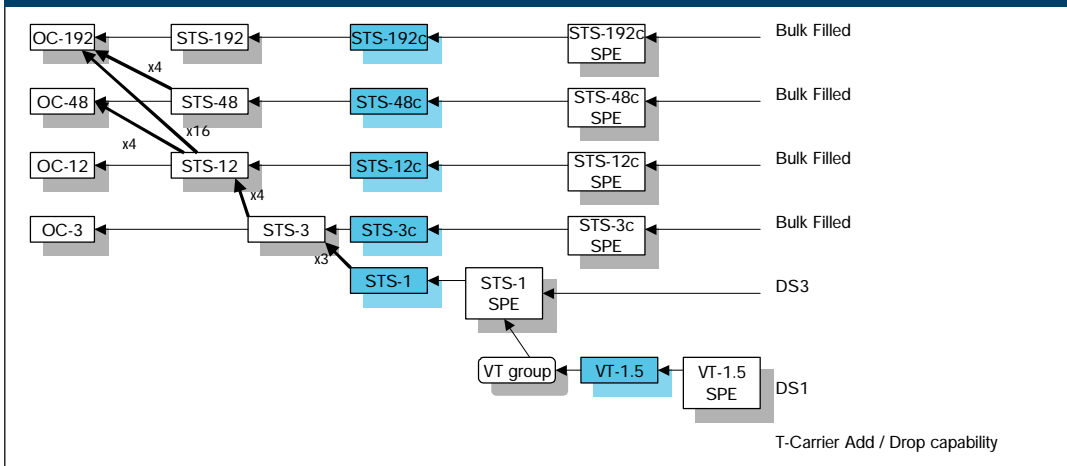
DCC Signals

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

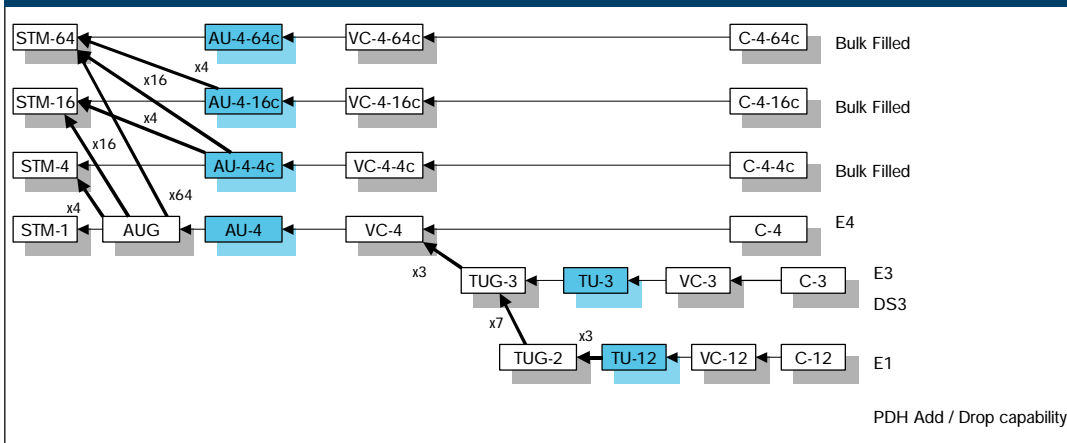
SONET/SDH Frame Formats and Mapping

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
E3	PRBS	G.751
E4	PRBS	G.751
DS1	PRBS	ANSI T1.107 (SF and ESF)
DS3	PRBS	ANSI T1.107 (C-bit and M-13)

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

Network Emulation

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
POH Editor (STS)	C2, G1, F2, H4, Z3, Z4, N1 J1: (Trace Identifier) programmable 62 bytes ASCII sequence, CRLF added
POH Editor VT (POH)	V5, Z6, Z7 J2: (Trace Identifier) programmable 62 bytes ASCII sequence, CRLF added
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
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 VC12 POH: V5, N2, K4 J2: (Trace Identifier) programmable 15 bytes ASCII sequence, CRC (E.164) added

Error Addition	
SONET/DSn	A1/A2, B1, B2, REI-L, B3, REI-P, V5, REI-V, PRBS, Word, transmission errors, FAW, SFAW, FPS, CRC-6, Parity P, Parity CP
SDH/PDH	A1/A2, B1, B2, MS-REI, B3, LP-B3, HP-REI, V5, LP-REI, PRBS, Word, transmission errors FAW, CRC4, REI
Error control	Programmable number or rate

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

Key Features

- On-line help
- Professional reports

Network Emulation (continued)

Key Features

Stress Function	
Pointer Movement	Pointer movement generation on SONET and SDH frames: <ul style="list-style-type: none"> • Pointer set to any value with or without NDF • Positive and negative movements • Pointer sequences (ITU-T G.783, Telcordia GR-253)
Frequency Shift	Programmable frequency offset: -100 ppm to +100 ppm in 1 ppm steps for SONET/SDH -100 ppm to +100 ppm in 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 K1, K2, S1, A1, A2, J0, M1 recalculated; error addition: B1, B2, MS-REI Transmission; alarm addition: LOF, MS-AIS, MS-RDI; APS simulation
SONET Through Mode	TOH overwrite K1, K2, S1, A1, A2, J0, M1 recalculated; error addition: B1, B2, REI-L transmission, alarm addition: LOF, AIS-L, RDI-L; APS simulation

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

Measurement Capabilities

Path Analysis	
Signal Qualification	<ul style="list-style-type: none"> • Power meter • Frequency meter
Error Analysis	<p>SONET/DSn A1/A2, B1, B2, REI-L, B3, REI-P, V5, REI-V, PRBS, Word, FAW, SFAW, FPS, CRC-6, MAW, Parity P, Parity CP</p> <p>SDH/PDH B1, A1/A2, B2, MS-REI, B3, HP-REI, LP-B3, LP-REI, V5, PRBS, Word, FAW, CRC4, BPV</p>
Alarms Analysis	<p>SONET/DSn LOS, LOF, OOF, AIS-L, RDI-L, AIS-P, LOP-P, SLM-P, UNEQ-P, RDI-P, LOM-V, AIS-V, LOP-V, SLM-V, UNEQ-V, RDI-V, TIM-V, LSS, LPS, AIS, RAI, LOMF</p> <p>SDH/PDH LOS, LOF, OOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-SLM, HP-UNEQ, HP-TIM, HP-RDI, TU-LOM, TU-AIS, TU-LOP, LP-SLM, LP-UNEQ, LP-TIM, LP-RDI, LSS, LPS, AIS, LOMF</p>
Pointer Movement Analysis	OTA modules track all the SONET/SDH pointers movements information: <ul style="list-style-type: none"> • Pointer value • Number of positive and negative pointer movements • Number of pointer movement with NDF
Quality Analysis	<p>SONET/DSn Transmission quality is calculated each second as per GR-253</p> <p>SDH/PDH Transmission quality is calculated each second in accordance with recommendations G.826, G.828, M.2100, M2.101.1, M.2101, M.2110 for performance</p>
Overhead Analysis	Realtime display of the following information: <ul style="list-style-type: none"> • J0, J1 and J2 Path Trace messages (ASCII sequence) • S1 (synchronization status) • C2/V5 (signal label) <p>SONET/SDH:</p> <ul style="list-style-type: none"> • Complete 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

Ordering Information

Key Features

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

Notes:

¹ A 1310 nm configuration is also available under reference 5613-000-OTA

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 OTA 10G-1550 Module ²	
Order Number	Description
5615-000-OTA	CMA 5000 OTA 10G-1550 module ¹ Test module for T-Carriers/PDH and SONET/SDH technologies up to 10 Gbit/s It provides: <ul style="list-style-type: none"> • Optical interfaces at 1550 nm for OC-192 and STM64 • Optical interfaces at 1310 nm and 1550 nm for OC-3/12/48 and STM1/4/16 • Electrical interfaces for DS1, DS3, STS1, STS3 and E1, E3, E4, STM1

CMA 5000 OTA 2.5G Module ²	
Order Number	Description
5625-000-OTA	CMA 5000 OTA 2.5G module Test module for T-Carriers/PDH and SONET/SDH technologies up to 2.5 Gbit/s It provides: <ul style="list-style-type: none"> • Optical interfaces at 1310 nm and 1550 nm for OC-3/12/48 and STM1/4/16 • Electrical interfaces for DS1, DS3, STS1, STS3 and E1, E3, E4, STM1

CMA 5000 OTA 622 Module ²	
Order Number	Description
5622-000-OTA	CMA 5000 OTA 622 module Test module for T-Carriers/PDH and SONET/SDH technologies up to 622 Mbit/s It provides: <ul style="list-style-type: none"> • Optical interfaces at 1310 nm and 1550 nm for OC-3/12 and STM1/4 • Electrical interfaces for DS1, DS3, STS1, STS3 and E1, E3, E4, STM1

List of options for OTA modules	
Order Number	Description
XXXX ³ -100-OTA	Concatenation option (Full package)
XXXX ³ -200-OTA	Tandem Connection Monitoring (TCM) option
XXXX ³ -300-OTA	Jitter & Wander full package option (only available on OTA 2.5G and OTA 622 modules)
XXXX ³ -350-OTA	"Tx only" Jitter package option (only available on OTA 2.5G and OTA 622 modules)
XXXX ³ -400-OTA	ATM option



NetTest A/S
Kirkebjerg Allé 90
DK-2605 Brøndby
Denmark

Tel: +45 72 11 23 00
Fax: +45 72 11 22 77
E-mail: nordic@nettest.com

NetTest Sales Offices

Brazil	+55 11 5505 6688	Italy	+39 02 95 12 621
China	+86 10 6467 9888	Singapore	+65 6220 9575
Denmark	+45 72 11 23 00	Spain	+34 91 372 92 27
France	+33 1 49 80 47 48	USA	+1 315 266 5000
Germany	+49 89 99 89 01 0		

NetTest, the pioneer in multi-layer network testing, is a global provider of test and measurement systems, instruments and components for all types of networks and all stages of network development and operation. Our solutions offer leaders in optical, wireless and fixed networking vital insights into network performance, enabling informed business decisions that drive profitability.