

CMA 5000 - UTA

SPECIFICATIONS

Universal Transport Analysis Module / SDH/SONET Application



Content

- The perfect tool for testing SDH & SONET core networks up to 10 Gbps
- Testing APS switch time reaction of the network with 125 μ s resolution
- Auto-discovery of the signal structure
- Field exchangeable XFP and SFP
- Fast and professional reports

The perfect tool for testing SDH & SONET core networks up to 10 Gbps

SDH and SONET technologies are firmly established in the core and metropolitan networks. STM-64 and OC-192 are widely deployed in today's networks. While great care is devoted to warrant a very high quality of transport, in the real world of day-to-day installation, commissioning and maintenance activities things are not always running smooth. To this effect, several important tests are always carried out in order to assess the good behaviour of these networks before turn-up. Similarly, when the network has been turned on, it is paramount to keep monitoring the network health at physical level and beyond.

The SDH/SONET application of the UTA module provides a complete set of test functions for testing SDH/SONET networks up to 10 Gbps, among which we find the checking & monitoring of the optical levels, alarm, error & frequency stressing, tributary mapping checking, routing, connectivity and pointer tests on the synchronous payloads, round trip delay measurement, BER tests, automatic protection scheme switching time and more.

As a part of the UTA applications family, the SDH/SONET application is just one test solution among many others. The UTA module has been designed to support almost all the transport standards of modern networks (ex: 10 GigE, G.709, ...) and represents a new class of tester for the field engineers. One tool is all you need!

Key Features	Key Applications
<ul style="list-style-type: none"> • SDH/SONET interfaces up to 10 Gbps • Pluggable XFP & SFP – 1310 nm / 1550 nm • Generates and analyzes SONET/SDH frames down to the tributary level (DS1/E1) • Automatic Protection Switching time measurement <ul style="list-style-type: none"> ○ 125 μs measurement accuracy • Quality assessment as per G.82X and M.21XX recommendations • Round Trip Delay measurement <ul style="list-style-type: none"> ○ 100 ns of resolution • Valuable Functions and Options: <ul style="list-style-type: none"> ○ Trouble scan, APS, RTD, Concatenation, Tandem Connection Monitoring, ATM, NGN monitoring ... • NGN Monitoring option: <ul style="list-style-type: none"> ○ Monitor several VCAT groups simultaneously ○ VCAT, LCAS, Differential Delay monitoring • User-programmable thresholds for visual pass/fail indicators • Automatic test report in PDF format 	<ul style="list-style-type: none"> • Installation, commissioning and troubleshooting tests • Check the switch time reaction of the network after failure – should not exceed 50 ms • Verify QoS with objective performance tests in compliance with ITU-T and Telcordia standards • Verify that transport delay through the network is acceptable for the service that is carried • Quickly identify network impairments through easy-to-interpret user interface

Testing APS switch time reaction of the network with 125 μ s resolution

Due to the large amount of information being transferred over Synchronous Optical Network (SONET/SDH), it is extremely important to ensure that the transport services are as readily available as possible.

APS -Automatic Protection Switching- is the protection mechanism that has been implemented in SDH/SONET networks in order to guarantee the availability of the network in case of problems. The protection process involves switch actions between working fibers and backup fibers. This process is completed when the equipments at both ends of the network have completed these actions within the same 50 ms completion time. The result of this operation is the disappearance of the defaults because the traffic is then transmitted on the backup channel.

The UTA-SDH/SONET application is able to detect defaults that may appear during a protection switch and displays their duration with 125 μ s resolution. With the "Event Analysis" function of UTA, you have access to all the information from a single window: total switch duration, details of all the events, partial duration for each event...

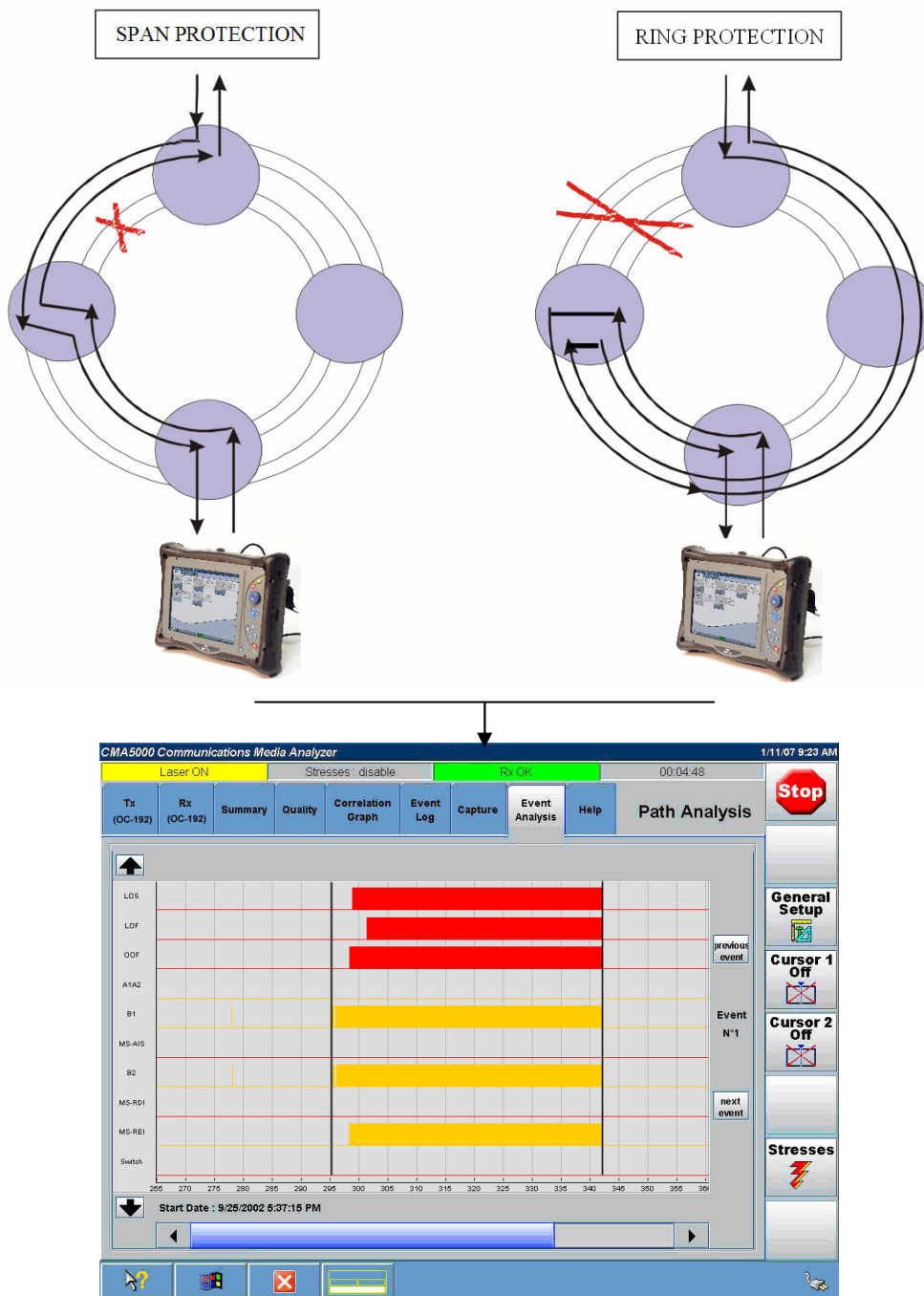


Fig.1: With the "Event Analysis" window, see all the defaults during the protection switch with 125 μ s resolution.

Auto-discovery of the signal structure

When performing tests in the field, it is sometimes difficult to configure the test equipment as the signal to be analyzed is not always known: is the signal concatenated, what the frame mapping structure is, are the containers of the frame all equipped or partially equipped? In such a situation, configuring the test equipment can be very painful and time consuming.

The “Structure Scan” function of the UTA application brings a smart solution to this type of problem.

“Structure Scan” automatically analyzes the signal and displays its frame structure in a graph for fast and easy interpretation.

The “Structure Scan” graph can give a complete overview of the frame down to the tributary and allows the automatic configuration of the UTA application.

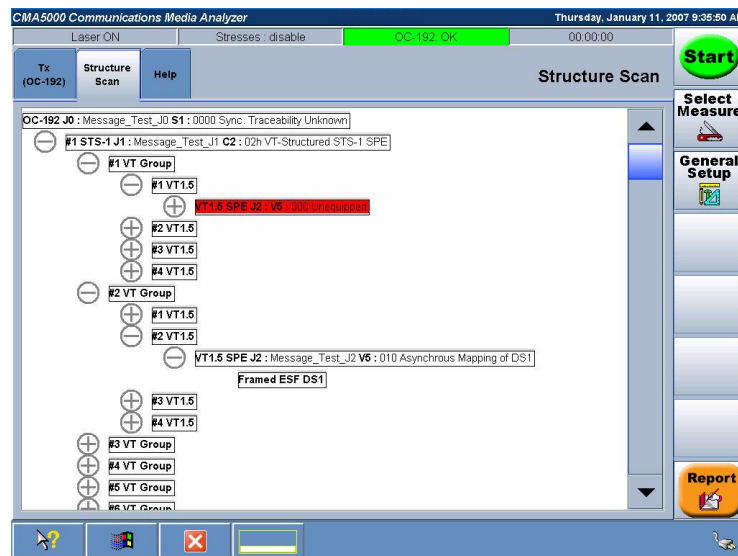


Fig.2: Discovering the frame structure of an unknown signal is easy with the “Structure Scan” function. Mix-payloads are also supported.

Field exchangeable XFP/SFP transceivers

The UTA module supports hot pluggable XFP/SFP transceivers. This feature brings a lot of configurability to the module. In the field, the user just has to replace the XFP/SFP by another to change the optical interface characteristics. Whatever the SDH/SONET link or equipment to test, the field engineer has the insurance to be able to equip his UTA module with the right optical interface.



Fig.3: Change the optical interface of your module in the field via XFP/SFP transceiver

Fast and professional reports

Creating professional report has never been so easy with the UTA application. After stopping a measurement, the report is just one click away: produce, save, print reports directly from the application. Select the set of results you want to produce, fill in the header information associated with the measurement and the UTA application will generate professionally presented reports in PDF format.

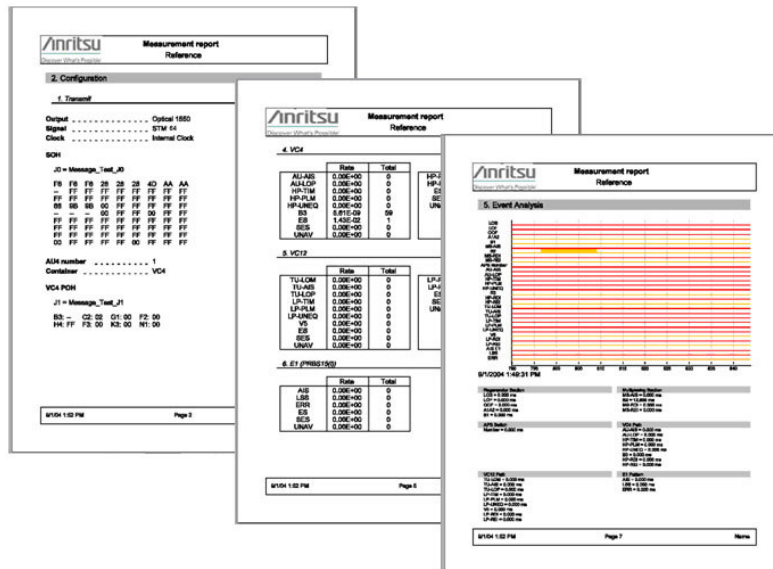


Fig.4: Generate automatic test report in PDF format with just one click

Specifications

Interfaces and Signal Specifications		
Signal	Port/Connector	Format
STM-64 / OC-192	One XFP port ¹	- SDH: as per ITU-T G.707 - SONET: as per Telcordia GR-253-Core
STM-1 / STM-4 / STM-16 (option) OC-3 / OC-12 / OC-48 (option)	One SFP port ¹	- SDH: as per ITU-T G.707 - SONET: as per Telcordia GR-253-Core
Clock Input	Bantam 100 Ohms	E1 (2.048 Mb/s) / DS1 (1.544Mb/s)
	BNC 75 Ohms	2.048MHz/1.544MHz/10MHz
Clock Output	BNC 75 Ohms	2.048MHz/1.544MHz
	SMA 50 Ohms	622.08 MHz (with STM-4/16/64) 155.52 MHz (with STM-1)
Data Communication Channel	DB-15 connector	D1-D3: 192 Kb/s channel D4-D12: 576 Kb/s channel

Optical Interfaces ^{1,2}							
	Ref.	Interfaces	Wavelength	Output Power	Reach	Overload	Sensitivity
XFP	5610-141-UTA	SR-1 / I-64-1	1290 – 1330 nm	-6 to -1 dBm	10 km	-1 dBm	-11 dBm
	5610-150-UTA	SR-1 / I-64.1	1290 – 1330 nm	-6 to -1dBm	10km	-1dBm	-11dBm
	5610-142-UTA	IR-2 / S-64.2b	1530 – 1565 nm	-1 to +2 dBm	40km	-1dBm	-14dBm
	5610-143-UTA	LR-2/L-64.2	1530 – 1565 nm	0 to +4 dBm	80 km	-7 dBm	-24 dBm
SFP	5610-144-UTA	LR-1 / L-16.1	1280 – 1335 nm	-2 to +3 dBm	40 km	-9 dBm	-27 dBm
	5610-145-UTA	LR-2 / L-16.2	1500 – 1580 nm	-2 to +3 dBm	80 km	-9 dBm	-28 dBm

Clock Synchronization	
Clock Reference	<ul style="list-style-type: none"> • Internal stratum 3 clock generation • External 2.048 MHz reference clock • Timed from 2.048 Mbit/s received signal • External 1.544 MHz reference clock • Timed from 1.544 Mbit/s received signal • External 10 MHz reference clock • Timed from SDH/SONET received signal

Notes

¹ The XFP/SFP interfaces of the UTA module meet the requirements stated in the MSA standard

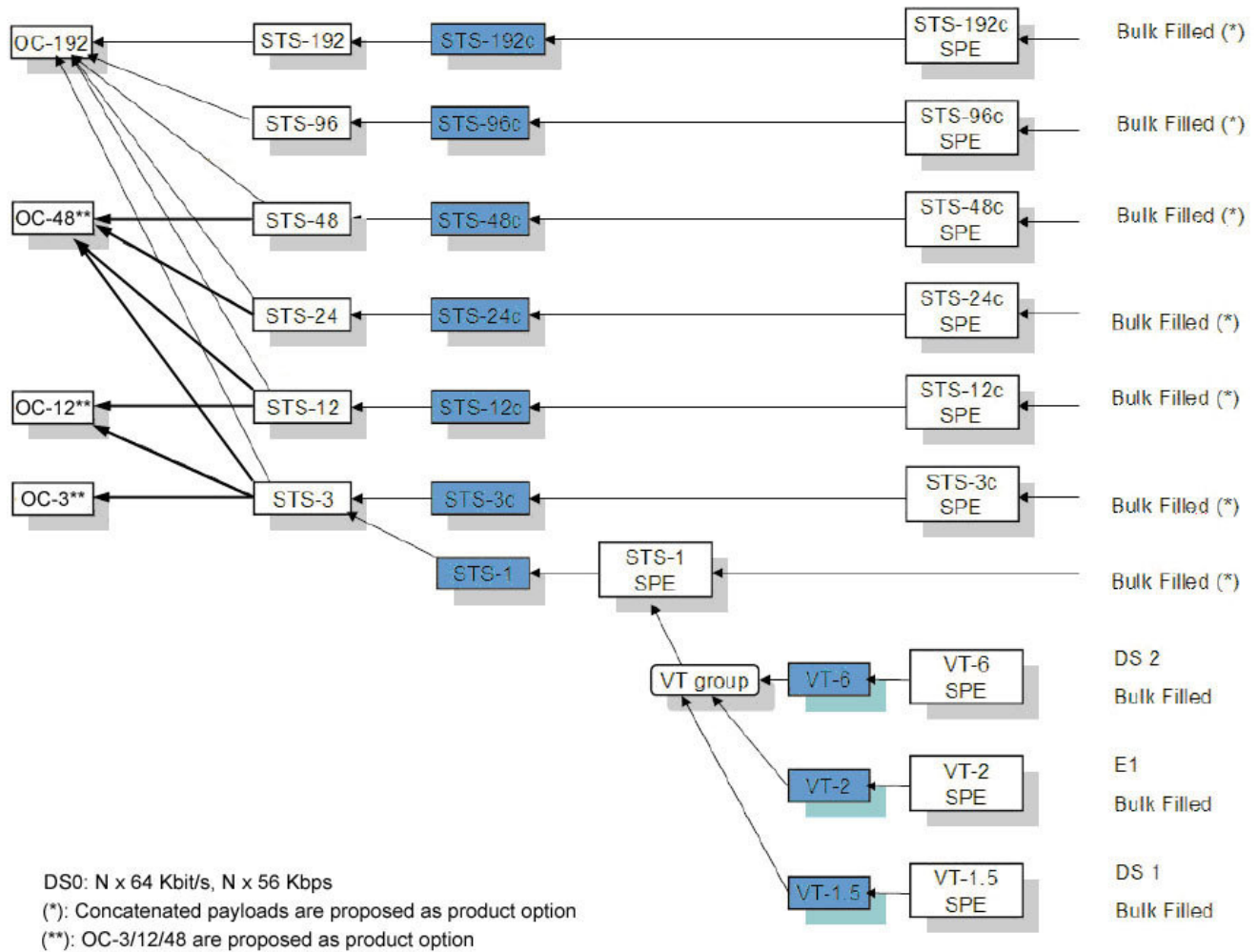
² Requires XFP/SFP that must be ordered separately (see the ordering guide)

DCC Signals

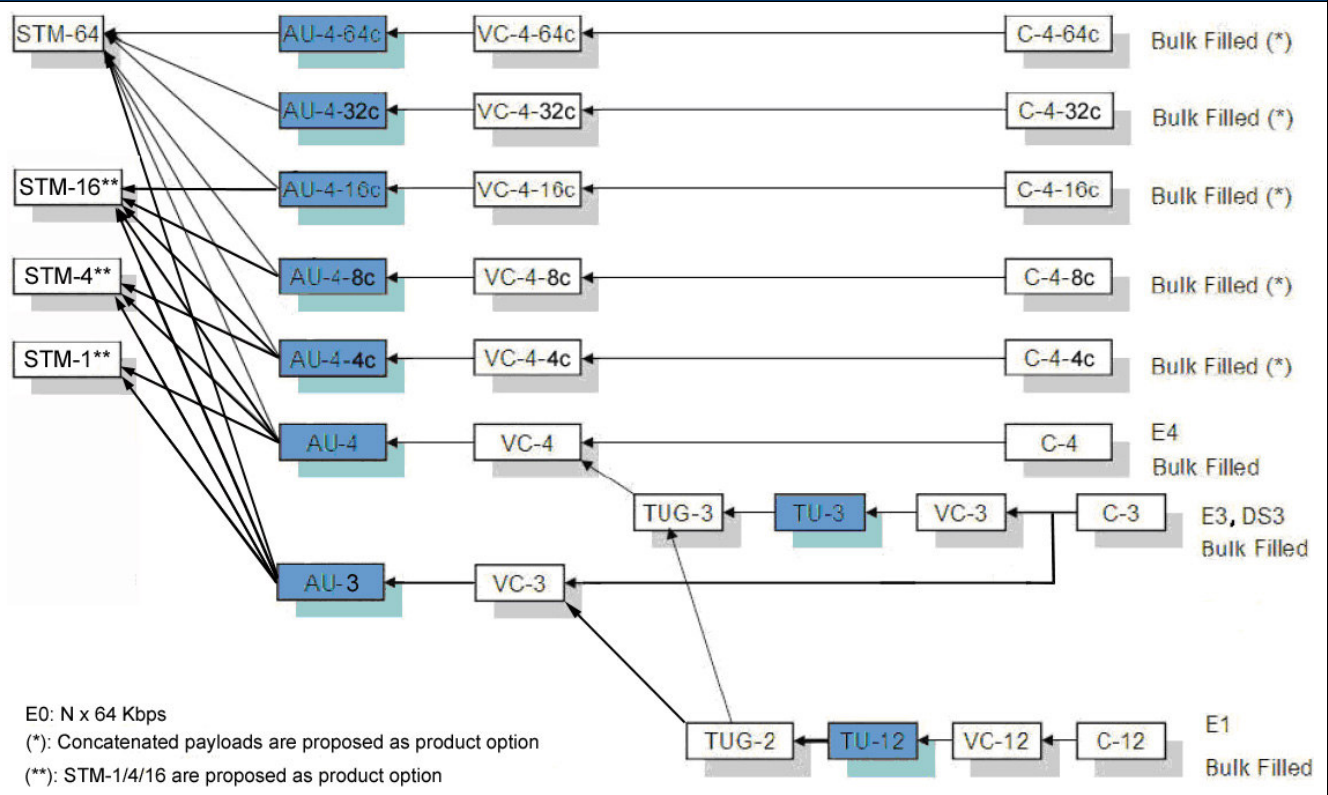
The UTA-SDH/SONET application supports the drop and insert of DCC channels from SONET/SDH

- D1-D3: 192 Kb/s
- D4-D12: 576 Kb/s

SONET Mappings



SDH Mappings



Test Pattern

PRBS Patterns	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> All "1" pattern, all "0" pattern, alternative "01" pattern, "1000" pattern, "1010" pattern, user-defined 2 bytes word pattern, 1 in 8, 2 in 8, 3 in 24, T1 Daly

SONET/SDH Overhead Editors	
SONET	
TOH Editor	<ul style="list-style-type: none"> All bytes of TOH (STS-1/STS-3) are programmable except B1/B2, H1/H2/H3 and Z0 J0 (Trace Identifier): <ul style="list-style-type: none"> programmable 62 bytes ASCII sequence, CRLF added or programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable byte
POH Editor (STS)	<ul style="list-style-type: none"> C2, G1, F2, H4, Z3, Z4, N1 J1 (Trace Identifier): <ul style="list-style-type: none"> programmable 62 bytes ASCII sequence, CRLF added or programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable byte
POH Editor (VT)	<ul style="list-style-type: none"> V5, Z6, Z7 J2 (Trace Identifier): <ul style="list-style-type: none"> programmable 62 bytes ASCII sequence, CRLF added or programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable byte
SDH	
SOH Editor	<ul style="list-style-type: none"> All bytes of SOH (STM-1) are programmable except B1/B2 and H3 J0 (Trace Identifier): <ul style="list-style-type: none"> programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable 62 bytes ASCII sequence, CRLF added or programmable byte
POH Editor (VC-4 and VC-3)	<ul style="list-style-type: none"> C2, G1, F2, H4, F3, K3, N1 J1 (Trace Identifier): <ul style="list-style-type: none"> programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable 62 bytes ASCII sequence, CRLF added or programmable byte
POH Editor (VC-12)	<ul style="list-style-type: none"> V5, N2, K4 J2 (Trace Identifier): <ul style="list-style-type: none"> programmable 15 bytes ASCII sequence, CRC (E.164) added or programmable 62 bytes ASCII sequence, CRLF added or programmable byte

Error Addition	
SONET/DSn	<ul style="list-style-type: none"> A1/A2, B1, B2, REI-L, B3, REI-P, V5, REI-V, FAW (FAS), SFAW, FPS, MAW, Parity P, Parity CP, F-bit, M-bit, FEBE, CRC-6, PRBS, Word, transmission errors
SDH/PDH	<ul style="list-style-type: none"> A1/A2, B1, B2, MS-REI, B3, LP-B3, HP-REI, V5, LP-REI, FAW (FAS), CRC-4, REI (E-bit or REBE), PRBS, Word, transmission errors
Error Control	<ul style="list-style-type: none"> Programmable number or rate

Alarm Addition	
SONET/DSn	<ul style="list-style-type: none"> 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, LOMF, LSF, OOF, RAI, IDLE, LSS, LPS, AIS
SDH/PDH	<ul style="list-style-type: none"> 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, AIS, RDI, LOMF, LSS, LPS
Alarm Control	<ul style="list-style-type: none"> On steady-state or programmable number of frames

Voice Add/Drop (Option)	
SONET	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> NA

Stress Function	
Pointer Movement	<ul style="list-style-type: none"> 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) : <ul style="list-style-type: none"> SDH: <ul style="list-style-type: none"> Single Alternating Regular + Double Regular + Missing Double Alternating Periodic 87.3 Periodic 87.3 with Add Periodic 87.3 with Cancel SONET: <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Programmable frequency offset: <ul style="list-style-type: none"> -100 ppm to +100 ppm in 0.1 ppm steps SONET/SDH
APS (K1/K2)	<ul style="list-style-type: none"> Automatic Protection Switch messages (K1/K2) are user-programmable MSP Linear (ITU-T G.783) and MSP-Ring (ITU-T G.841) are supported
SDH Through Mode	<ul style="list-style-type: none"> SOH overwrite: J0, A1, A2, K1, K2, S1, M0, M1 Error addition: A1A2, B1, B2, MS-REI, Transmission errors Alarm addition: LOS, LOF, OOF, MS-AIS, MS-RDI
SONET Through Mode	<ul style="list-style-type: none"> TOH overwrite: J0, A1, A2, K1, K2, S1, M0, M1 Error addition: A1A2, B1, B2, REI-L, Transmission errors Alarm addition: LOS, LOF, SEF, AIS-L, RDI-L
DS1 Loop Codes	<ul style="list-style-type: none"> DS1 SF: Loop Up, Loop Down (GSU / 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 (In-Band, Out-of-Band)

Path Analysis	
Signal Qualification	<ul style="list-style-type: none"> Power meter Frequency meter
Errors Analysis	<ul style="list-style-type: none"> SONET/DSn A1/A2, B1, B2, REI-L, B3, REI-P, V5, REI-V, FAW (FAS), SFAW, FPS, MAW, Parity P, Parity CP, F-bit, M-bit, FEBE, CRC-6, PRBS, Word, ERR SDH/PDH A1/A2, B1, B2, MS-REI, B3, LP-B3, HP-REI, V5, LP-REI, FAW (FAS), CRC-4, REI (E-bit or REBE), PRBS, Word, ERR
Alarms Analysis	<ul style="list-style-type: none"> 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, OOF, LSF, LOMF, RAI, IDLE, LSS, LPS, AIS 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, AIS, RDI, LOMF, LSS, LPS
Pointer Movement Analysis	<ul style="list-style-type: none"> Pointer value Number of positive and negative pointer movements Number of pointer movement with NDF
Quality Analysis	<ul style="list-style-type: none"> SONET Transmission quality is calculated each second as per GR-253 SDH/PDH Transmission quality is calculated each second in accordance with recommendations G.826, G.828, M.2100, M2101.1, M.2101, M.2110 for performance
Overhead Analysis	<ul style="list-style-type: none"> J0, J1 and J2 Path Trace messages (ASCII sequence) S1 (synchronization status) C2/V5 (signal label) Complete display of SOH/TOH and POH of the analyzed path channel Capture capacity: 64 consecutive frames
Event Analysis	<ul style="list-style-type: none"> Alarms and errors event analysis in temporal graphical display with 125 μs resolution

Round Trip Delay
<ul style="list-style-type: none"> Measurement possible at each path level Resolution: 100 ns Range: 0 to 2 sec (depending on path level) Result: Maximum RTD, minimum RTD, Average RTD and errors/alarms detection

Automatic Protection Switching Measurement
<ul style="list-style-type: none"> 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 recommendations, such as M.2100, M.2101.1 and M.2101
- Automatic calculation of Performance Objectives according to ITU-T recommendations such as G.826, G.828

Structure Scan

- Complete signal mapping auto discovery (including Mix Payload)

Trouble Scan

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

Ordering Information

Ordering Information	
5610-000-UTA	UTA base module *Applications must be ordered separately
5610-201-UTA	10 Gig SONET/SDH application (XFP not included)
Options	
5610-211-UTA	Concatenation option for 10 Gig SONET/SDH application
5610-212-UTA	Voice add/drop option for 10 Gig SONET/SDH application (only available for SONET)
5610-213-UTA	Tandem Connection Monitoring option for 10 Gig SONET/SDH application
5610-214-UTA	ATM option 10 Gig SONET/SDH application
5610-215-UTA	Virtual Concatenation Monitoring option (VCAT, LCAS, Diff.Delay) for High Order for 10 Gig SONET/SDH application
5610-216-UTA	"STM-1/4/16 and OC-3/12/48" option for 10 Gig SDH/SONET application (SFP not included)
5610-239-UTA	Remote Command for SDH/SONET application (via Ethernet) <i>Remark: Voice Add/Drop / ATM / VCAT Monitoring options are not supported by remote commands</i>
Accessories	
5610-141-UTA	1310 nm XFP (10 km) transceiver (LC connector) <i>*Multi-rates XFP supporting STM-64/OC-192/10 GigE</i>
5610-150-UTA	1310 nm XFP (10 km) transceiver (LC connector) <i>*Multi-rates XFP supporting STM-64/OC-192/10 GigE/OTU-2</i>
5610-142-UTA	1550 nm XFP transceiver (40 km) (LC connector) <i>*Multi-rates XFP supporting STM-64/OC-192/10 GigE/OTU-2</i>
5610-143-UTA	1550 nm XFP transceiver (80 km) (LC connector) <i>*Multi-rates XFP supporting STM-64/OC-192/10 GigE/OTU-2</i>
5610-144-UTA	1310 nm SFP transceiver (40 km) (LC connector) <i>* Multi-rates SFP supporting STM-1/4/16 & OC-3/12/48 & OTU-1</i>
5610-145-UTA	1550 nm SFP transceiver (80 km) (LC connector) <i>* Multi-rates SFP supporting STM-1/4/16 & OC-3/12/48 & OTU-1</i>
Upgrades	
5610-261-UTA	UTA module upgrade with "Concatenation" option
5610-262-UTA	UTA module upgrade with "Voice add/Drop" option
5610-263-UTA	UTA module upgrade with "Tandem Connection Monitoring" option
5610-264-UTA	UTA module upgrade with "ATM" option
5610-265-UTA	UTA module upgrade with "VCAT Monitoring" option
5610-266-UTA	UTA module upgrade with "STM-1/4/16 and OC-3/12/48 option (SFP not included)

Note 1: For best performance, the CMA5000 platform must have 512M RAM when using UTA with more than one application.

Note 2: All the 10G/11G applications are field upgradeable.

For upgrades with reference 5610-266-UTA, customers must call their Anritsu contact with module Serial Number as hardware upgrade might be required.

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