

CMA 3000, all-in-one field tester

SDH test options



KEY FEATURES

- Simultaneous bi-directional monitoring of SDH lines
- Powerful testing of SDH systems and embedded PDH systems
- Mapping and de-mapping
- Comprehensive error and alarm statistics
- Overhead byte testing and monitoring
- Trouble scan
- Pointer event generation and monitoring

Testing SDH networks has never been easier

CMA 3000 is NetTest's next-generation portable and futureproof field tester for the installation and maintenance of access and core networks.

The CMA 3000 field tester covers a wide range of applications, from fast first-aid troubleshooting to comprehensive, in-depth and all-layer analysis of transmission problems.

When equipped with the SDH test option, the CMA 3000 is a powerful and easy-to-use tool for testing SDH and PDH systems.

The SDH option has a very flexible configuration, with two electrical receivers and one electrical transmitter in its basic form. It can also be equipped with one or two optical modules.

With two optical modules, the instrument supports simultaneous bi-directional monitoring of SDH lines. This makes CMA 3000 the ideal instrument for both in- and out-of-service transmission-quality measurements.

The intuitive user interface, with a large color LCD display and easy-to-understand graphical symbols allows you to easily read and interpret important information from the SDH signal. For fast troubleshooting, the CMA 3000 displays alarms and transmission link status on LED indicators.

In addition, the trouble scan feature provides a fast approach to examining the SDH signal for major problems. CMA 3000 automatically configures to the received SDH signal, eliminating lengthy instrument setup.

The powerful 2 Mbps analysis capabilities of the basic CMA 3000 enables you to analyze a demultiplexed 2 Mbps signal embedded in an SDH signal. Additional CMA 3000 options let you carry out signaling analysis of GSM, GPRS/EDGE, SS7 and ISDN protocols.

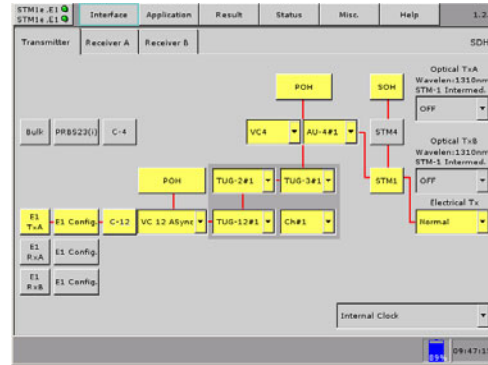


Figure 1 The intuitive user interface of CMA 3000 facilitates the SDH test setup.

KEY APPLICATIONS

- Comprehensive out-of-service testing for:
 - Installation
 - Provisioning
- Performance analysis
- Multiplex testing
- Physical line monitoring
- In-service monitoring for:
 - Fast troubleshooting
 - Overhead byte analysis
 - Traffic monitoring
 - In-service error performance measurement

Speeds troubleshooting

The CMA 3000 status monitor allows you to speed troubleshooting, as the status monitor is always active providing essential information on the monitored transmission system, including:

- Line alarms on LED indicators with a trap facility
- Display of current input frequency and deviation
- Indication of optical input level
- Display of overhead bytes
- Propagation time monitor
- Traffic channel usage in an embedded 2 Mbps signal
- Audio level in a traffic channel in an embedded 2 Mbps signal
- Listen-in on a traffic channel in an embedded 2 Mbps signal

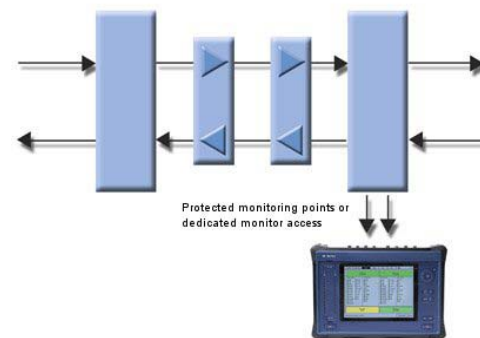


Figure 2 With the CMA 3000 you're able to perform bi-directional in-service monitoring of SDH lines.

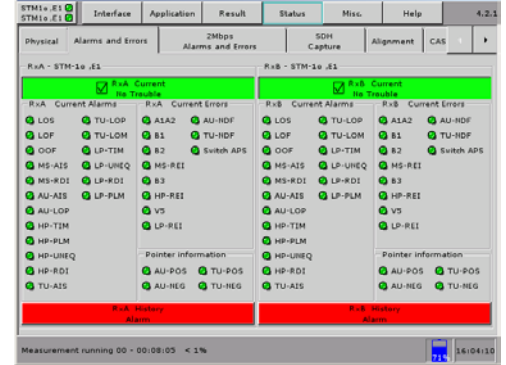


Figure 3 The CMA 3000 gives you a quick overview of errors and alarms of both sides of the SDH line.

Further troubleshooting can be done, using the CMA 3000 Trouble Scan feature. It allows you to examine the SDH signal for major problems and get the reports in an easy-to-understand display. In-depth trouble analysis can be done using the instrument event log or the pointer movement graph.



Figure 4 The trouble scan feature gives you a quick overview of the tributaries of the monitored line.

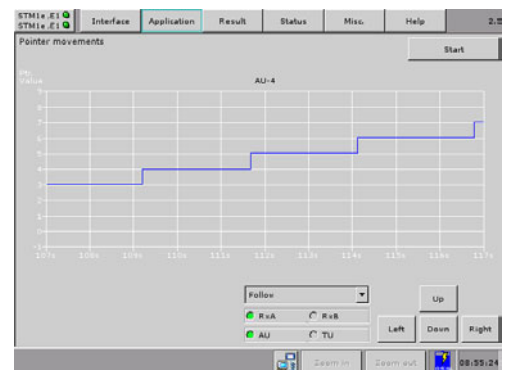


Figure 5 The pointer graph allows a detailed analysis of pointer movements in the monitored SDH signal.

For monitoring purposes you may connect the CMA 3000 using optical splitters or special test interfaces. If neither is available, you can use the CMA 3000 through-mode to access the signal.

Out-of-service or in-service statistics

For installing/commissioning and troubleshooting out-of-service lines the CMA 3000 provides powerful statistical measurements for Bit Error Rate (BER) testing.

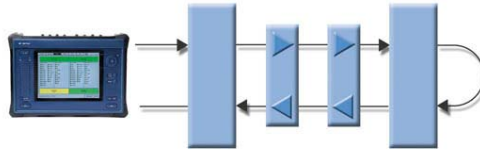


Figure 6 By looping back a test signal from the CMA 3000 at the far end, you can easily test the quality of SDH lines.

Statistics are also available for in-service analysis of the transmission-error performance of a line together with information on pointer operations. G.826, G.828, G.829 or M.2100 error-performance parameters are calculated for the measurement. The result is highlighted in easy-to-understand color indications.

Out-of-service tests

During installation/commissioning and stress testing of network elements you can control the signal transmitted by the CMA 3000.

When generating an SDH signal the instrument provides you with great flexibility for injecting errors, alarms, pointer operations and overhead byte changes into the transmitted signal.

In addition, you can deviate the frequency of the transmitted signal from nominal to test a

receiver's ability to handle signals that are out of specifications.

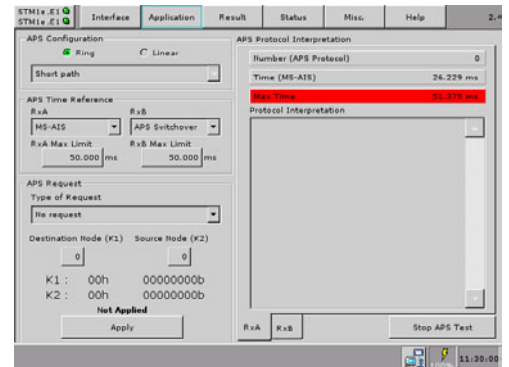


Figure 7 The dedicated APS test application makes it easy to find the maximum APS switchover time.

A special test feature provides easy testing of APS (Automatic Protective Switching) to allow identification of maximum switchover time during the test.

Should the result be above the user-defined threshold you will receive an indication of the problem.

Specifications

The specifications on the pages overleaf list the functionality for a basic CMA 3000 with SDH test module installed.

For more information on the functionality of the basic configuration please refer to the CMA 3000 basic instrument specifications sheet.

Specifications	
Electrical	<ul style="list-style-type: none"> Comply with ITU-T recommendation for electrical 155 Mbps interfaces Interfaces: STM-1 Line Code: CMI No. of transmitters (Tx): 1; No. of receivers (Rx): 2 Test configurations: Tx/Rx, Rx/Rx Connectors: BNC Impedance: 75 Ohms
Attenuation and impedance modes (electrical receivers)	<p><u>TERMINATE</u> Up to 12.7 dB cable attenuation, nominal impedance</p> <p><u>MONITOR</u> Attenuation in accordance with ITU-T recommendations Both modes automatically supported by the electrical receivers</p>
Optical	<p>Up to 2 optical modules can be installed Available modules (each with 1 transmitter and one receiver):</p> <ul style="list-style-type: none"> STM-1 1310 nm, short haul, LC connector STM-1/4 1310 nm, short haul, LC connector STM-1 1310 nm, long haul, LC connector STM-1 1550 nm, long haul, LC connector STM-1/4 1310 nm, long haul, LC connector STM-1/4 1550 nm, long haul, LC connector <p>Test configurations: Tx/Rx, with two optical modules also: Rx/Rx An optical level indicator for a received optical signal is provided</p>
Input offset range	± 50 ppm
Transmitter clocks	<ul style="list-style-type: none"> Internal accuracy: 4.6 ppm. Clock may be deviated up to 50 ppm from nominal Recovered from SDH input with same speed TTL level external 2 MHz clock Recovered from 2Mbps
Framing	According to ITU-T rec. G.707
Scrambling	According to ITU-T rec. G.707
SDH mappings	<p>Support of the following mappings in accordance with the ITU-T rec. G.707:</p> <p>C-12/2 Mbps structure:</p> <ul style="list-style-type: none"> STM-x -> AU4 -> VC4 -> TUG-3 -> TUG-2 -> TU-12 -> VC12 -> C12 -> 2 Mbps PDH (async. mapping) <p>C-4/Bulk test:</p> <ul style="list-style-type: none"> STM-x -> AU4 -> VC4 -> O.181 bulk test pattern <p>Planned mappings (planned additional interface or functionality options are required):</p> <p>C-3/34 Mbps structure:</p> <ul style="list-style-type: none"> STM-x -> AU4 -> VC4 -> TUG-3 -> TU-3 -> VC3 -> C3 -> 34 Mbps PDH <p>C-4/ATM structure:</p> <ul style="list-style-type: none"> STM-x -> AU4 -> VC4 -> ATM <p>C-4/140 Mbps structure:</p> <ul style="list-style-type: none"> STM-x -> AU4 -> VC4 -> C4 -> 140 Mbps PDH unframed (async. mapping) STM-x -> AU4 -> VC4 -> C4 -> 140Mbps/s -> 34 Mbps -> 8 Mbps -> 2 Mbps

FUTURE OPTIONS

- E4 interface testing¹
- Tandem connection monitoring¹
- Additional options are available or planned. Refer to the CMA 3000 Basic Instrument specifications sheet for further information

¹ Requires installation of the CMA 3000 SDH test module

Alarms	<p>Alarms can be detected or generated:</p> <ul style="list-style-type: none"> • 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>For 2 Mbps alarms supported please refer to the CMA 3000 basic instrument specifications sheet</p>
Errors	<p>Errors alarms can be detected or generated:</p> <ul style="list-style-type: none"> • B1, A1/A2, B2, MS-REI, B3, HP-REI, LP-B3, LP-REI, V5 <p>Error insertion:</p> <ul style="list-style-type: none"> • Manual: 1-8000 consecutive errors • Continuous 10^{-5}, 10^{-6}, 10^{-7}, 10^{-8}, 10^{-9}, 10^{-10} <p>For 2 Mbps errors supported please refer to the CMA 3000 basic instrument specifications sheet</p>
Error performance	<ul style="list-style-type: none"> • G.826/G.828/G.829/M.2100 analysis of the received signal based on detected errors and alarms: ES, SES, BBE (not M.2100), UAT, EFS, AT • Error performance evaluation for the total measurement: HR% allocation
BER test patterns	<p>Pattern generation and detection for O.181 bulk test pattern:</p> <ul style="list-style-type: none"> • Test patterns supported: PRBS 9, PRBS 11, PRBS 15, PRBS 20, PRBS 23, PRBS 29, PRBS 31. PRBS patterns can be inverted • All 0s, All 1s, Alternating 1/0, 1000 binary. User-defined 1 or 2 bytes • All patterns, except 'All 0', 'All 1' and 'Fox', can be inverted <p>For 2 Mbps test patterns supported please refer to the CMA 3000 basic instrument specifications sheet</p>
Pointers	<ul style="list-style-type: none"> • Support pointer events monitoring and generation • Pointer operations in accordance with G.783 • Events for graphical display of pointer movements (500 msec resolution)
Overhead	<ul style="list-style-type: none"> • Generation of section and path overhead bytes • Display of current section and path overhead bytes
Tributary signals	<p>For E1 signals (one per active receiver) embedded in a selected VC-12, CMA 3000 basic instrument E1 functionality is available</p>

Results	
Status	Current information on: <ul style="list-style-type: none"> Alarms and errors on the monitored line Input level indication Frequency deviation
Statistics	User-defined resolution: <ul style="list-style-type: none"> 1, 2, 5, 10, 15, 30s, 1, 5, 15, 30 min, 1, 2, 4, 6, 12 hours Information logged: <ul style="list-style-type: none"> Alarms Errors Pointer operations
Event log	Overhead byte events logged with 125 μ sec resolution time stamps
APS	APS (Automatic Protection Switching) test and analysis: <ul style="list-style-type: none"> APS switching time is measured. Switching time above a user defined threshold is highlighted <ul style="list-style-type: none"> Trigger events (user selectable): SDH alarms and errors; APS switchover Number of switchovers indicated by APS protocol K1/K2 bytes can be set and displayed



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