



SUNRISE TELECOM

... a step ahead



SunSet® SDH

Powerful SDH/PDH, Jitter/Wander, ATM, GSM,
V5.x, ISDN, Frame Relay, SS7 Test Set

The power of benchtop SDH/PDH and service testing
in the palm of your hand -

SunSet

A Single Solution for Transmission Testing and Protocol Analysis

As telecommunications networks expand to higher bandwidths and wider arrays of services, installation and maintenance become more challenging. A typical technician may be responsible for turning up and integrating many different services. This requires a vast array of skills, training, and equipment.

In addition, the modern access network combines many independent physical and protocol layers. A single voice or data connection may span the networks of several different companies: Telcos, Alternate Service Providers, and other private and public networks.

The SunSet SDH is the latest generation of access and metro network test sets from Sunrise Telecom, the industry leader in the design of handheld service verification equipment. A single package offers 2 Mbit/s to 2.5 Gbit/s testing with advanced applications for both SDH and SONET networks. Along with this complete set of transmission tests come all the tools needed to verify and troubleshoot ATM, GSM, GPRS, Frame Relay, ISDN, V.5x, and Voice.

The SunSet SDH increases efficiency, consolidates training, and saves money by testing all these rates and services. Among handheld sets, only the SunSet SDH has the feature set to ensure quality connections across the entire access network and verify that the quality of network synchronization meets ITU-T standards by performing Jitter and Wander measurements.

SDH

Now with Jitter and Wander testing capabilities!



- SDH testing: 52, 155, 622 Mbit/s and 2.5 Gbit/s
- PDH testing: 2, 34, and 139 Mbit/s
- T-carrier testing: 1.5 and 44 Mbit/s
- SDH/PDH Jitter/Wander testing and measurement per ITU-T 0.171 and 0.172
- 1.5M, 2M, 34M, and 45M Pulse Mask Analysis
- ATM testing

A Complete Kit of Powerful Protocol Analysis Tools— In One Handheld Unit

Weighing a mere 1.5 kg and with a long battery life, the SunSet SDH is the ideal tool for field engineers in the access and metro networks. Fitting perfectly in one hand, it is truly portable.

But you don't need to take it outside to appreciate the convenience of its size. Most importantly, the SunSet SDH includes powerful features you'd expect from a bench top instrument in a platform you can take anywhere. It incorporates the most popular and advanced features for testing PDH (2, 34, 139 Mbit/s), T-carrier (1.5 and 45 Mbit/s), and SDH networks (52, 155, 622 Mbit/s and 2.5 Gbit/s). Advanced protocol and service functions are available for IP, ATM, GSM, GPRS, V5.x, ISDN, SS7, Frame Relay, and Voice Frequency (VF).

Basic Testing Features

- SDH testing (optical/electrical)
- PDH testing
- T-carrier testing
- Full complement of test patterns
- Error injection and alarm generation
- Histogram analysis

Power to Grow

Over the years, the SunSet SDH has demonstrated its flexibility to keep pace as the network grows and evolves. If you only require SDH transmission testing today, you can add full PDH/T-carrier testing later with a simple software upgrade. Add features like ATM, GSM, or V5.x when you need them. A PCMCIA card provides instant software upgrades and access to new features.

Easy to Use

The SDH has a clear, backlit color display and well-organized measurement screens that allow for quick access to all test results. The dual-state LEDs give straightforward alarm and error information. The measurement screens display all important data at a glance; the summary screen provides an up-to-the-moment summary of all errors and alarms. Intuitive menus and function keys allow engineers to configure the test set quickly. The AUTO key greatly simplifies test setup.

Advanced Testing Tools

- Jitter generation and measurement
- Wander measurements
- SDH sections and path overhead monitoring
- SDH/SDH, SDH/PDH Mux/Demux testing
- G.783 pointer test sequences
- APS switching timing measurement
- VF/DSO and fractional E1/T1
- TCM
- Tributary Scan
- APS capture

Dual-color LEDs

Check your circuit's operation at a glance, making testing as simple as "green is good; red is bad." Signal status is displayed simultaneously for all rates.

155M E/139M Port

Tx and Rx connectors for STM-1 electrical or 139 Mbit/s testing.

Straightforward Results

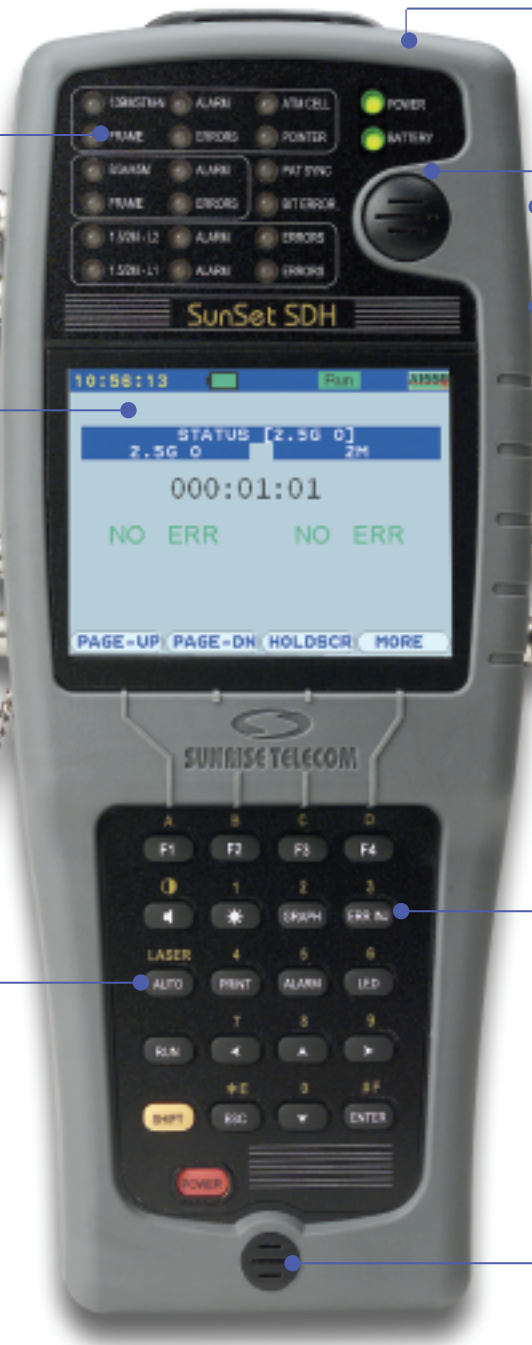
There is no need to decipher or dig through results. The SunSet SDH provides all results in an intuitive, convenient manner.

52M/155M/622M/2.5G Optical Ports

The SunSet SDH can be configured for FC or SC optical connectors, 1310 or 1550 nm single wavelength. It can also be configured for dual wavelength testing.

Auto Key

The AUTO key eases test configuration, letting you test more quickly, efficiently, and accurately.



I/O ports

Including RS-232 serial port and 10/100 BaseT network port, for remote control, printing, and downloading results.

Built-in Speaker

Listen to voice over 64 kbit/s, GSM Voice decoding, or Orderwire.

Dual 1.5M/2M Ports

Dual transceivers for transmission and protocol testing.

34/45/52 Mbit/s Ports

Test and monitor 34, 45 and 52 Mbit/s (STM-0) circuits.

External Clock

2 Mbit/s or 2 MHz. Reference clock for Wander measurements.

ERR INJ Key

Inject Errors at any rate to verify connectivity and response from network elements or to stress-test the network.

Built-in Microphone

Talk over 64 kbit/s or Orderwire using the convenient, hands-free microphone.



Dual Optical Wavelength

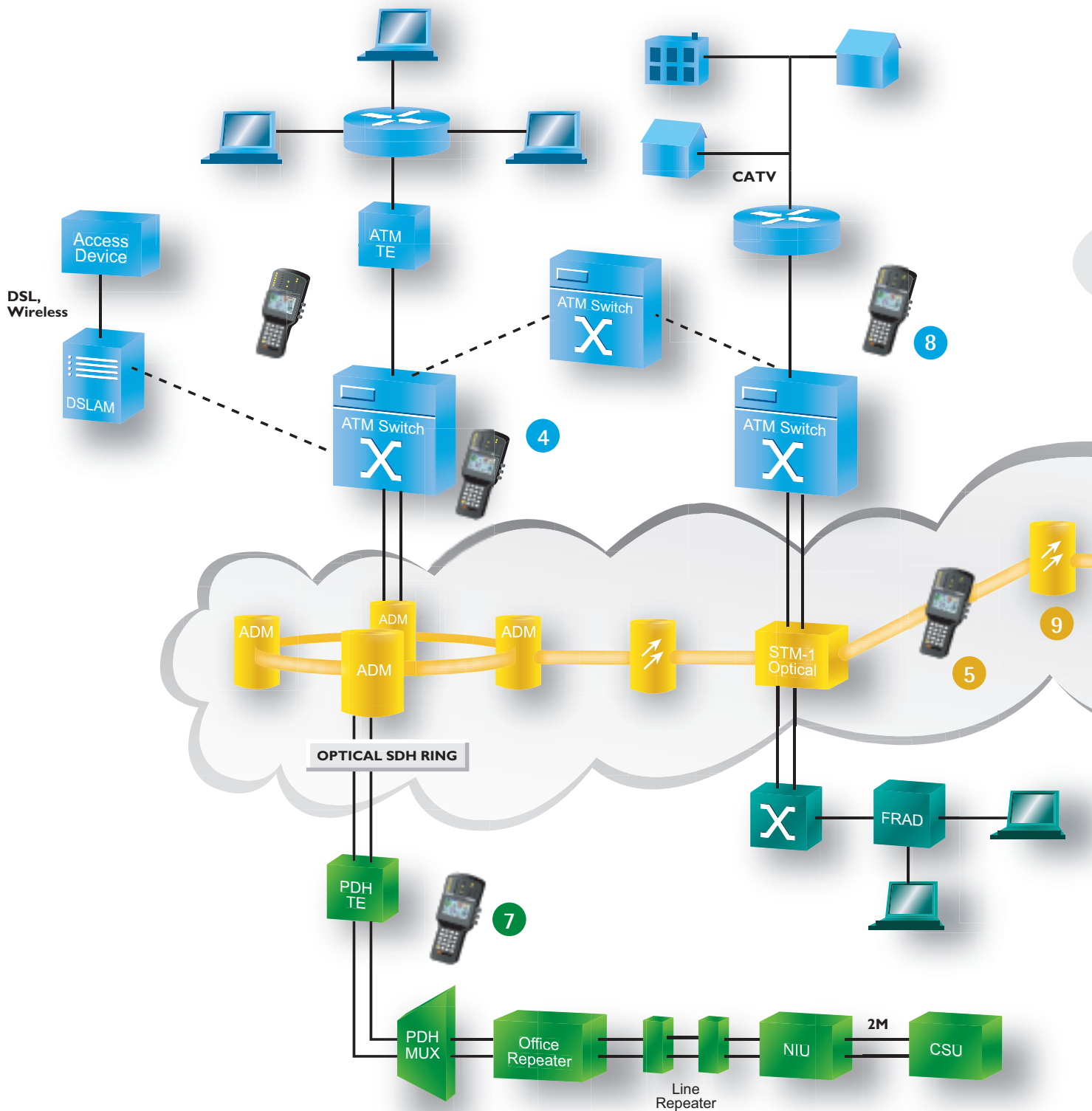
Dual wavelength transmitter can test 1310 and 1550 nm systems. Optical transmitters are available in FC or SC connectors.

SunSet SDH connector panels are available in multiple configurations. Please contact your sales representative for details.



Dual 1.5/2M Interfaces

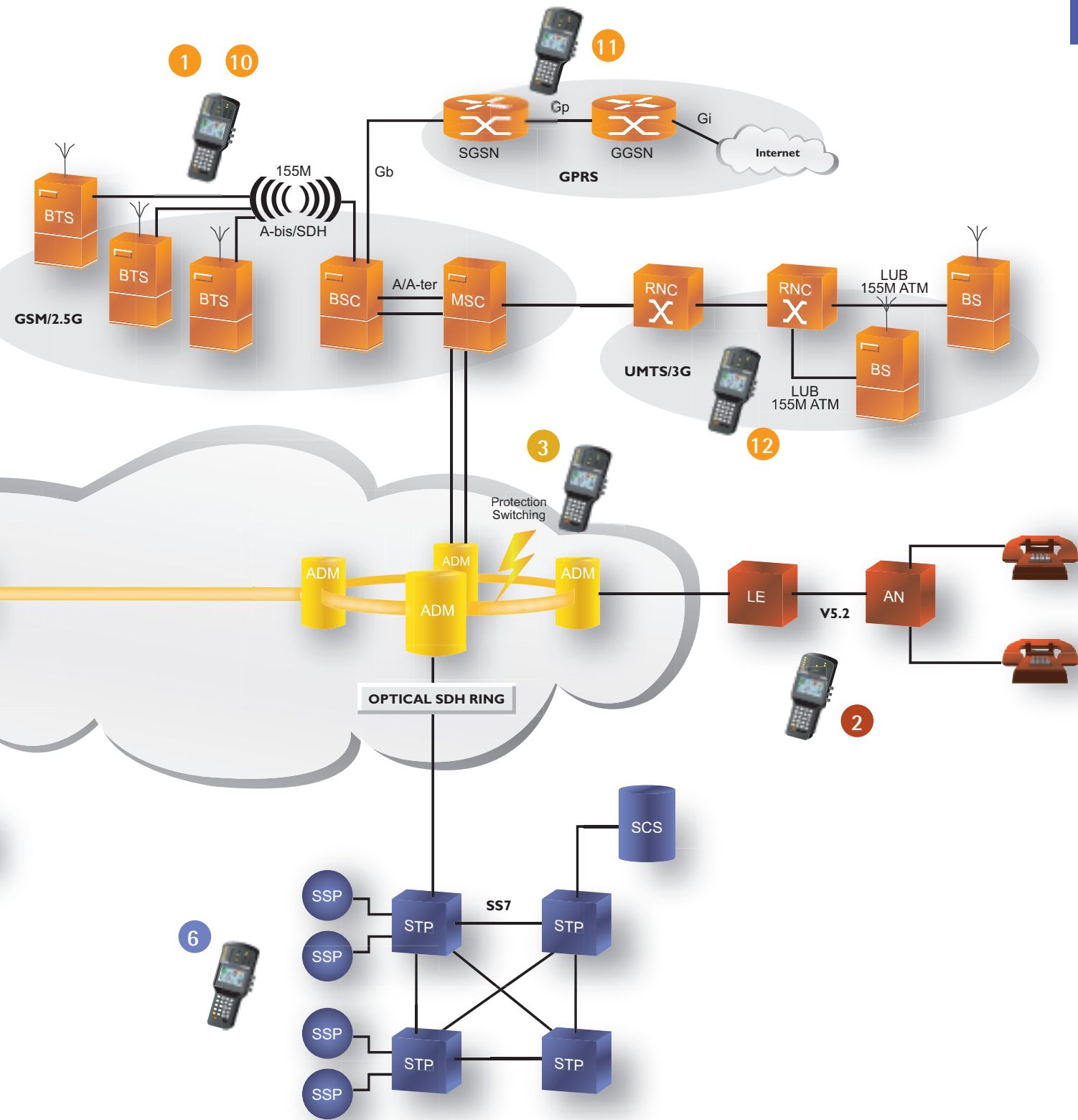
Dual 1.544/2.048 Mbit/s Balanced interfaces are available for dual BERT analysis and bidirectional protocol decoding. Choose either RJ45 or Bantam connectors.



Beyond Transmission Testing

The SunSet SDH can go anywhere your network takes you.

- 1 GSM A-bis monitoring and decoding; GSM Voice and TRAU access. Monitor 16 kbit/s GSM channels.
- 2 V5.x monitoring; 3c paths monitoring.
- 3 Test automatic protection switch timing.
- 4 Monitor VCCs, ATM QoS, OAM and BERT.
- 5 Establish & analyze SDH link to Network Elements. Loopback and BERT 2M channels.



6 Perform inexpensive first-pass analysis on SS7 signaling problems.

7 Bring PDH circuits into service.*

*In-service monitoring & error performance analysis per ITU-T G.826, M.2100.

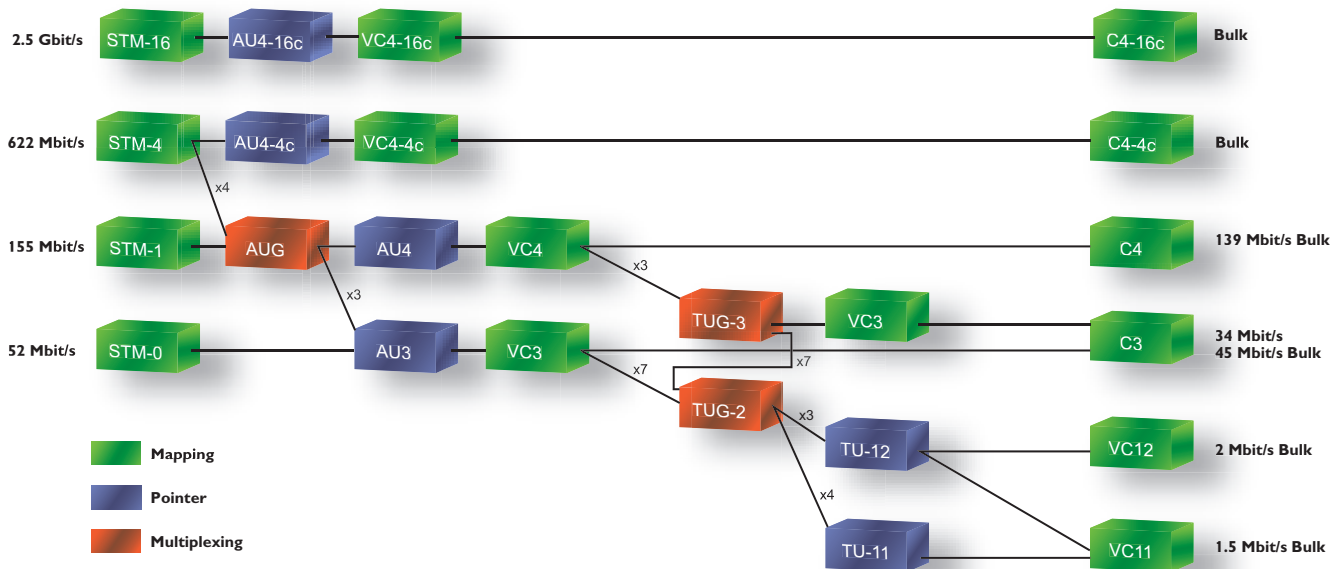
8 Ping the PC or ISP. Perform a Point-to-Point test on an ATM/VPI/VCI.

9 Set APS Signaling, Section/Path Trace, Synchronization Status bytes.

10 GPRS over GSM A-bis monitoring

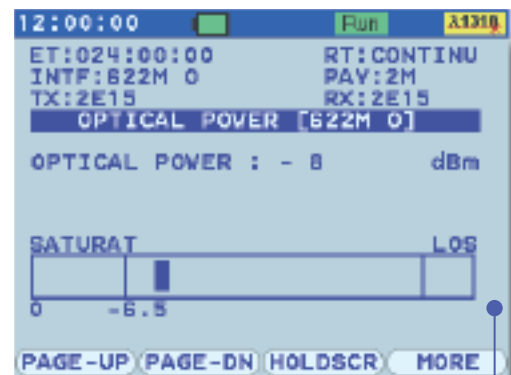
11 GPRS over Frame Relay

12 3G Network/ATM



SDH transmission testing and analysis up to 2.5 Gbit/s

Don't let the unit's small size fool you—the SunSet SDH offers extensive features for SDH testing and analysis. With the SunSet SDH, operators can access the SDH network at the optical or electrical interface, including STM-0/1 electrical and STM-1/4/16 optical. The SunSet SDH supports full ITU-T mapping for VC11, VC12, VC3, and VC4. Comprehensive analysis of SDH errors and alarms are conveniently sorted by near-end and far-end, regenerator section, multiplexer section, and high order and low order path, complying with ITU-T recommendations. Tests range from simple verification of optical power level and frequency to advanced features like overhead control/decode and multiplexer testing.



Field operators can quickly verify signal level with an easy to read power measurement.

SDH for the field

Lightweight, handheld, and ruggedized, the SunSet SDH is uniquely suited for field applications. It gives you long battery life and a color display that is easily readable under all lighting conditions, indoor and outdoor. The SunSet SDH has the power and features you would expect from a benchtop box in a platform you can take anywhere.



Advanced users can control/read SDH overhead bytes. The english decodes make overhead simple.

Applications for the field technician include:

- Verifying network continuity with BERT analysis
- Easily detecting SDH errors/alarms with LEDs and well-organized results screens
- Confirming proper frequency and power level
- Monitoring of pointer movement in the network and adjusting pointer values to stress network elements
- Identifying network synchronization problems by connecting the external clock input to the synchronization timing source of the network
- Checking the network's automatic protection switch (APS) function and measuring network switchover time

SDH Overhead Control

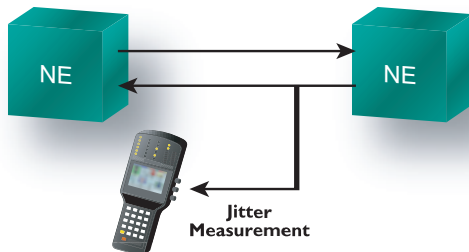
Even as a handheld instrument, the SunSet SDH provides advanced and comprehensive overhead testing capabilities including parity, protection switching, pointers, and network status. Overhead analysis displays both the hexadecimal and decodes of all overhead bytes, easily sorted by regenerator section, multiplexer, high and low order paths. You can also view network traces (J0, J1, J2), labels (C2, V5), and test communication channels (D1-D3, D4-D12) by performing BER tests on them. Tandem connections can also be monitored when traffic is carried across several network operators. The SunSet SDH enables you to control the transmitted overhead bytes and stress the network's response to various conditions. Order Wire testing is available through E1 and E2 bytes for talk/listen applications.

Advanced timing and synchronization capabilities

The SunSet SDH is proof that you don't need bulky benchtop equipment to deliver precise results for jitter and wander. The SunSet SDH offers jitter generation and analysis, as well as wander measurements, at an attractive price. Imagine the freedom and flexibility of performing advanced commissioning and acceptance tests with a handheld test set. Fully compatible with ITU-T 0.171 and 0.172 standards, the SunSet SDH effectively troubleshoots network synchronization problems and verifies network clock conformance.

Jitter generation and analysis

With its complete set of jitter measurements to verify proper conformance with ITU standards, the SunSet SDH ensures proper delivery of synchronized signals to the end user. You can stress the network element's jitter tolerance and measure bit error rate, measure the output jitter of terminal equipment, and verify the jitter transfer function of regenerators and optical amplifiers.

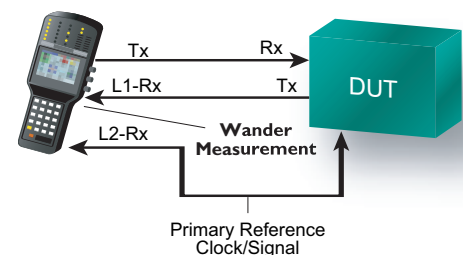


Jitter measurements

- Current & Maximum peak-peak jitter
- Current +peak and -peak
- Maximum +peak and -peak
- RMS & Maximum RMS
- Positive & negative phase hits

Wander analysis

Although wander is a naturally-occurring and inevitable phenomenon in networks, it is critical to minimize its effects in order to avoid bit errors, slips, and loss of data. Low quality synchronization signals will cause long-term variations that can result in a degraded signal with errors. The SunSet SDH offers important tools to measure the quality of synchronization signals in SDH and UMTS networks including TIE, MTIE, TDEV, and MRTIE measurements.



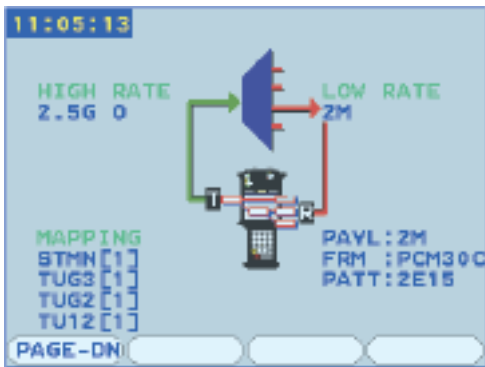
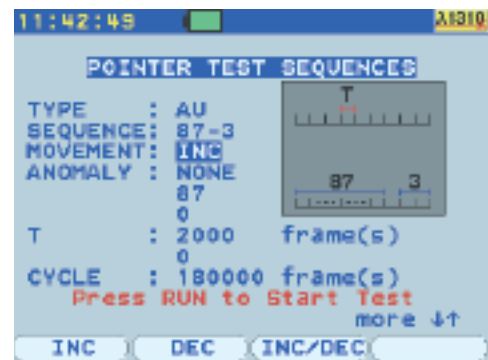
Advanced SDH Applications

APS

Automatic Protection Switching, a mission critical function in SDH networks, enables the network to respond quickly to failures, minimizing lost traffic. The SunSet SDH qualifies this vital system to ensure the network's protection mechanism is configured and operating properly. The SunSet SDH measures the amount of time for the network to complete an automatic protection switchover. Users can select the gate time limit, switch time limit, as well as the sensor criteria.

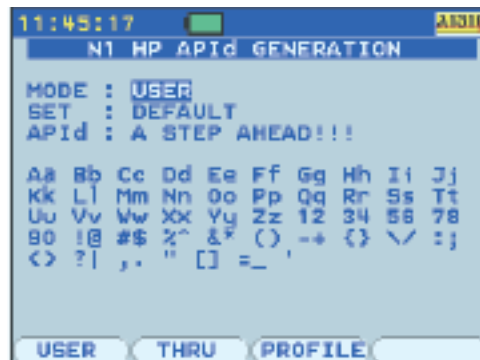
Pointer Testing

The SunSet SDH's ITU-T G.783 Pointer Test Sequences function ensures proper interconnection of PDH and SDH networks. In this test, the SunSet SDH stresses the network element on the SDH side and then measures the jitter level at the tributary output of the PDH physical interface.

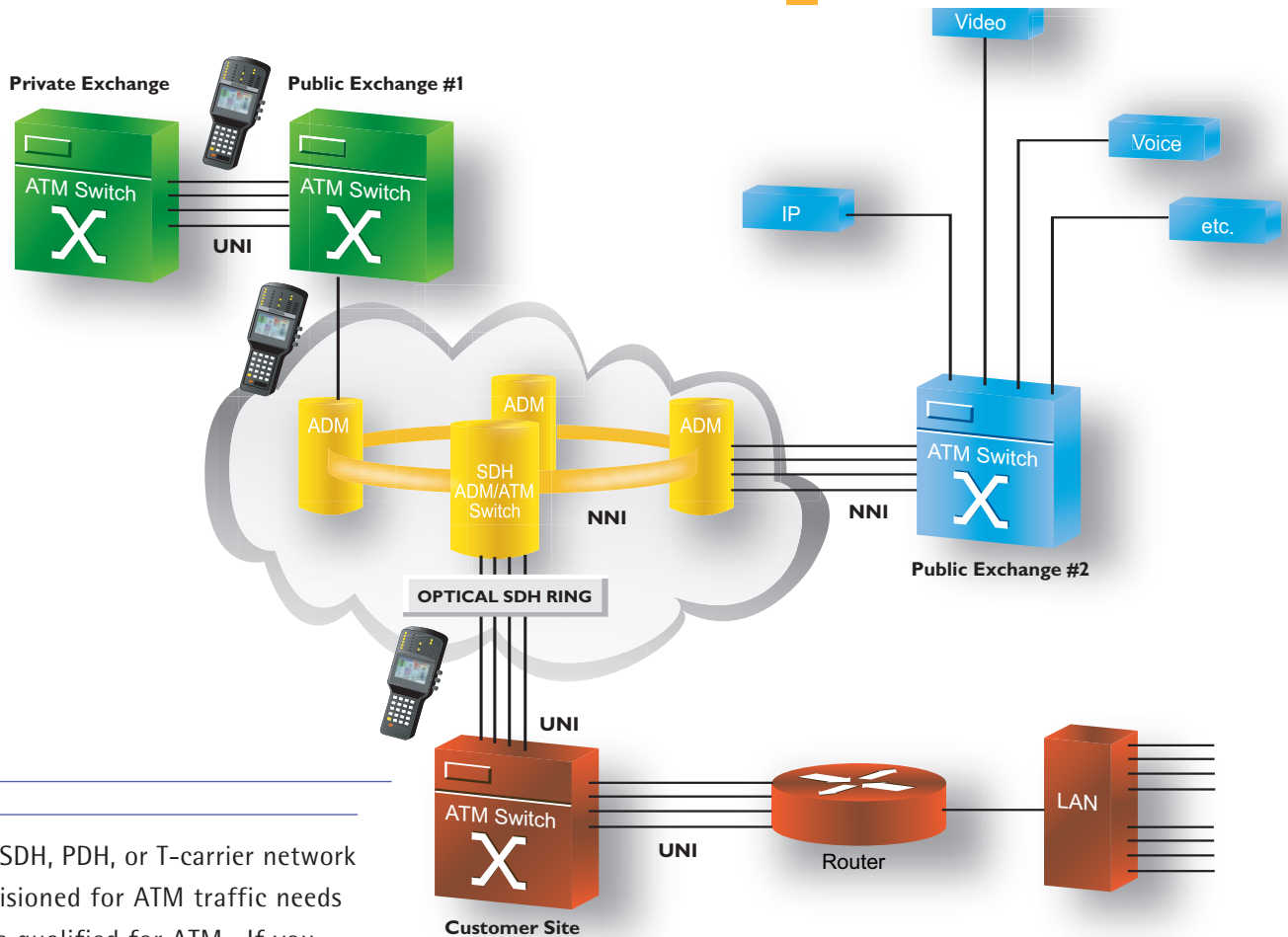


Tandem Connection testing

Resolve problems smoothly even when traffic is carried across multiple network operators with the SunSet SDH's Tandem Connection testing. It supports both in-service and out-of-service test applications.



Comprehensive ATM Diagnostics



Any SDH, PDH, or T-carrier network provisioned for ATM traffic needs to be qualified for ATM. If you lease your network to service providers using ATM, you need a tool to test, verify and troubleshoot the network and the traffic it is carrying. Conversely, if you are responsible for the ATM traffic, you must verify that the network is error free and functioning properly, especially when you do not own the network. When traffic is disrupted, you cannot waste valuable time and money pointing fingers.

The SunSet SDH is the single testing solution for both the physical layer and the ATM layer. With one test set, a single technician can verify network performance with and without ATM traffic. All applicable network rates, up to STM-16, are available in one chassis, eliminating the need for multiple ATM test units if the ATM network spans several subnetworks. The full-featured ATM testing capabilities of the SunSet SDH provide the power and flexibility to install and troubleshoot an ATM network from the ground up. The SunSet SDH can test and monitor between network elements (NNI) and the network and edge devices (UNI). It can verify network provisioning, perform stress tests, conduct BERT analysis, and monitor responses to alarms, errors, and OAM cells. The SunSet SDH allows you to non-intrusively monitor traffic across the network, gathering statistics on congestion, bandwidth, idle cells, OAM cells, and errors. Its ATM IP and INARP capabilities can verify connectivity between network devices, like a 3G Node B and RNC.

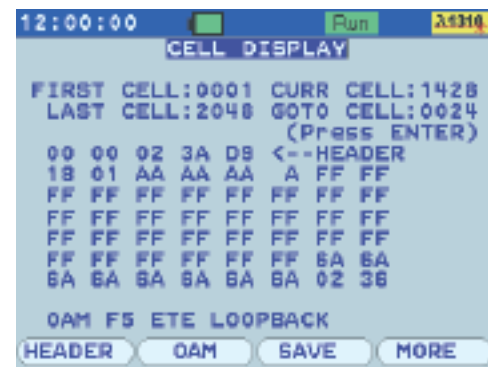


Traffic Generation:

- Generate one to eight independent VCCs. Perform up to eight separate traffic tests at once.
- Programmable traffic pattern: CBR, UBR, VBR, Sequential Cell with user or O.191 test cells.
- Insert OAM cells: F4/F5, Segment/End-to-End, FM cells. Verify the alarm and loopback response of ATM network elements.
- Inject errors: BIT, HEC, and NC-HEC errors.
- ATM Dual-ended BERT and Throughput testing with the SunSet xDSL and SunSet MTT.

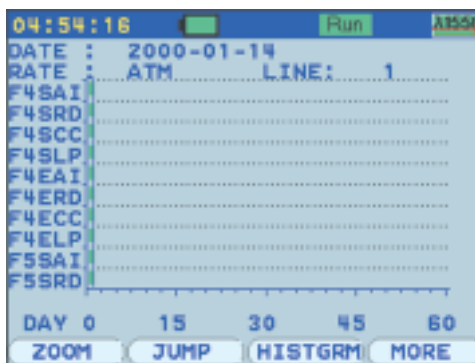
Cell Capture & Decode:

- Capture and store cells. Save user and/or OAM cells. View, decode, and analyze saved cells at any time.
- Header decode. The SunSet SDH displays the meaning of the header values, including general flow control (GFC), VPI/VCI, payload type indicator (PTI), and cell loss priority (CLP), plus any timestamps and sequence numbers.
- OAM cell decode. The SunSet SDH can decode all forms of OAM cells. Decipher the location IDs for AIS, RDI and loopback cells. Generate important PM statistics like total received cell count and block error results. Verify the activated PM block size.



Traffic Supervision:

- Scan 128 VCCs for header information. View the traffic moving across the network including the addresses and cell loss priority. Select suspicious streams to filter and analyze.
- Traffic Monitoring.
- BERT, Quality of Service (QoS), and OAM measurements. The SunSet SDH compiles vital network information following O.191. Comprehensive cell testing measures cell count, cell congestion, cell bandwidth, cell loss, cell error ratios, cell delay, and cell delay variation. Users can also view the number and total time of OAM events such as AIS and RDI alarms (also displayed in a histogram format).

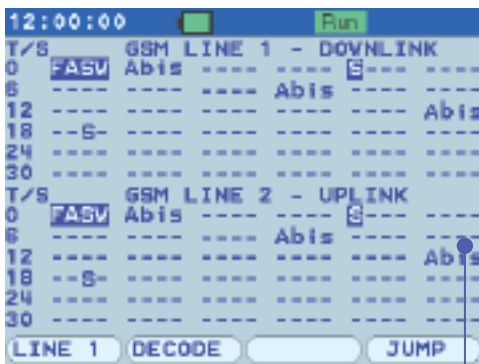


ATM IP Testing:

- Verify and measure an IP connection through the ATM network.
- Bridge and Route (per RFC 1483), PPPoA (per RFC 2364), PPPoE (per RFC 2516), Classical IP over ATM (per RFC 2225).
- PING and automated PING response. Specify number of PINGs and delay between PINGs. The SDH counts the number of successful PINGs, total lost PINGs, and response time.
- InARP, Verify far end device is active without knowing its specific IP address

A Portable Solution for Wireless Testing

The SunSet SDH provides the most convenient and cost-effective solution for installing and maintaining GSM links and ensuring proper transmission at higher rates. It offers the transmission testing needed to verify performance between the cellular network and the public switched network. Results include a complete status of the physical layer, along with voice quality, traffic statistics, and power level.



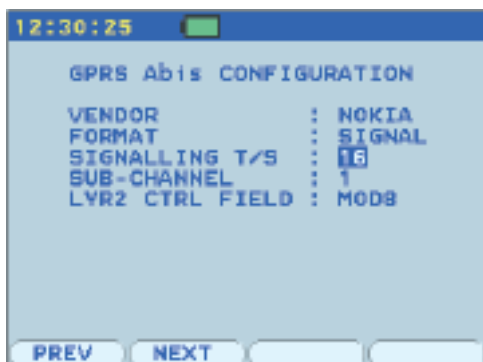
GSM bidirectional channel monitor

In-service monitoring

A single screen displays the usage of all traffic channels in both directions simultaneously, providing a clear picture of the network's traffic load. The SunSet SDH's speaker verifies speech quality for 13 kbit/s full rate, 13 kbit/s enhanced full rate (EFR), and 64 kbit/s A-law encoding types. Power level readings are displayed for speech transmission.

TRAU testing

The SunSet SDH can insert an artificial voice message into a GSM subchannel to check voice conversion in the TRAU units. Full-duplex testing means the SunSet SDH can insert a voice message or 16 kbit/s data pattern on one subchannel while the link is in-service. C-bit manipulation can stress test the network's response.



Protocol analysis

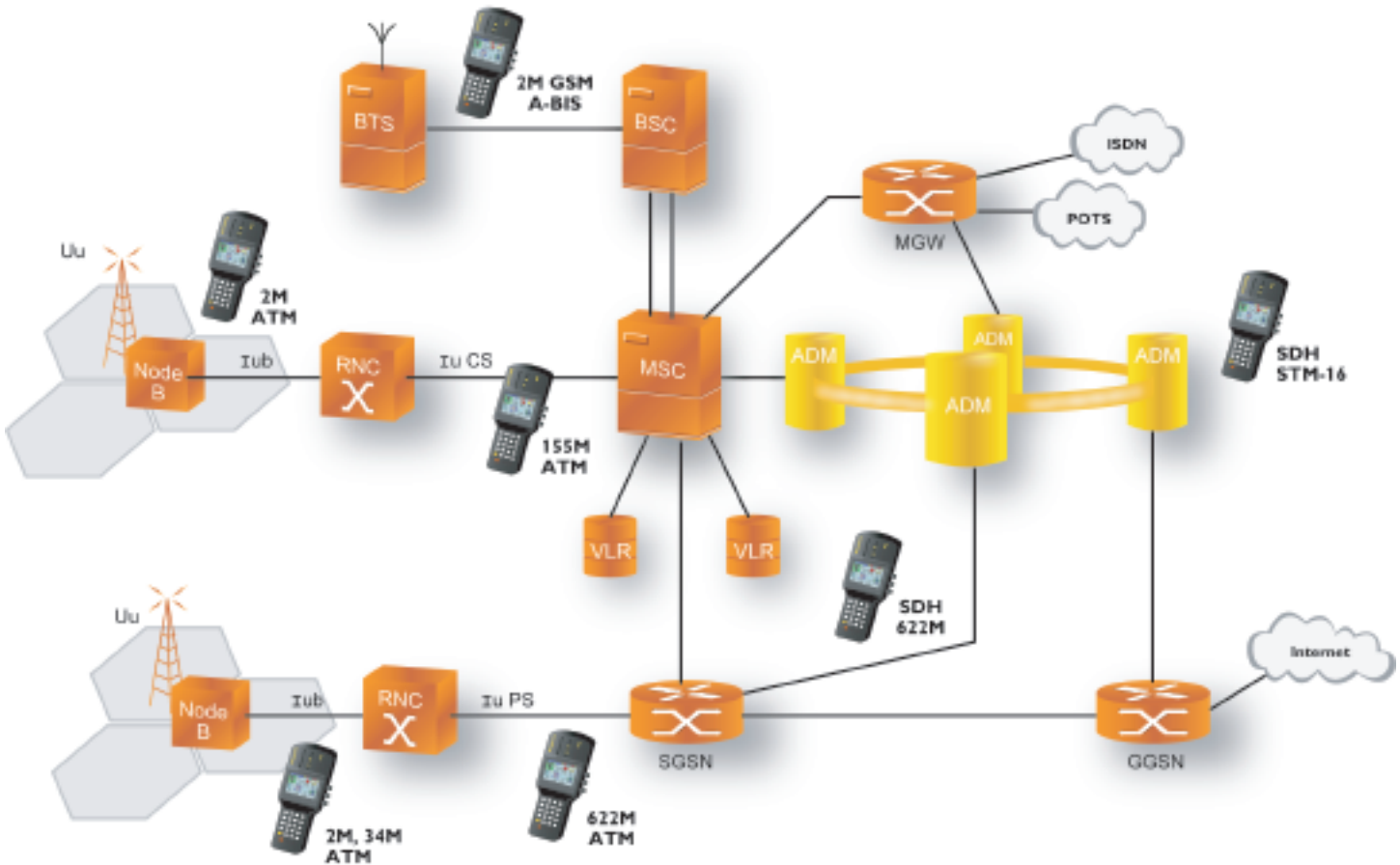
Bidirectional message tracing and full protocol decoding allow for easy troubleshooting at the A and Abis interfaces. An intuitive screen display makes even the most complex message contents easy to understand. A rich collection of filters enables you to identify trouble quickly by selectively capturing information.

GPRS

The SunSet SDH provides complete test capabilities for GPRS networks from the physical layer to upper layers, including frame relay. Comprehensive statistical analysis over GPRS Gb links verifies network performance and can identify where a GPRS network bottleneck may occur. Test features include layer detection pass/fail, network session counter, BSSGP message counter, and upper layer message counter over the Gb link between the BSC and SGSN. Over a Gb Frame Relay link, the SunSet SDH can ping to verify connectivity of IP equipment.

Testing in the 3G Network

Supporting optical and electrical interfaces for 2M to 2.5G, the SunSet SDH tests transmission quality at each point in the 3G network. Thorough ATM testing can verify ATM-layer performance and troubleshoot network provisioning problems. And its ATM InARP capability represents a foolproof way to check 3G network elements. Using InARP, the SunSet SDH can verify an active Node B or RNC. Most importantly, with InARP, there's no need to worry about tricky configuration parameters like the far-end IP address.



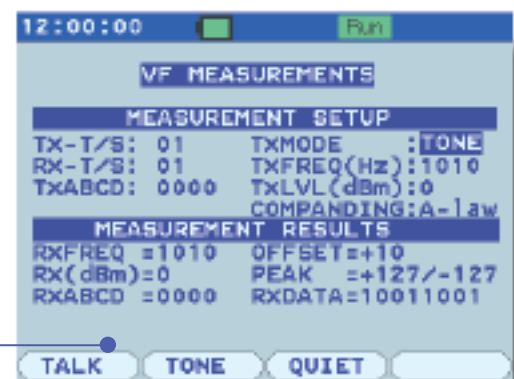
Advanced signaling capabilities for PCM systems

Statistic screens show traffic The SunSet SDH contains the complete diagnostic tools necessary to install and troubleshoot voice circuits. Its PCM signaling features support MFCR2, SS5, pulse, and DTMF digit analysis and call emulation. This allows you to test signaling in the public networks, as well as the interfaces between the public network and PABXs. Bidirectional monitoring can troubleshoot lines and register signaling problems between two exchanges. Call emulation can be used for installation testing and verification.

Voice Frequency Testing

The SunSet SDH tests digital to analog conversion by inserting and measuring tones (50 to 3950 Hz) on individual channels. You may talk/listen over a channel using the SunSet's integrated microphone and speaker.

VF Measurements



Signaling analysis and noise measurements

Test channel quality with signal-to-noise, C-notch, phosphometric, 3K-flat, and peak coder offset. In-service circuits can easily be tested for signaling errors. The SunSet SDH features digit and CAS analysis. A single screen simultaneously displays the CAS status of all 30 channels in both directions. You can also trigger on specific CAS events or user specified states. Line and register signaling can also be defined with variance from ITU Q.422 and Q.441 standards.

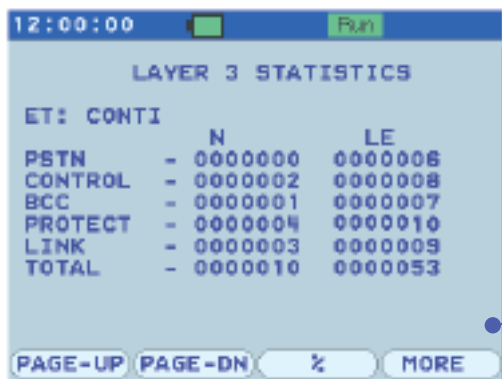
Call emulation

The SunSet SDH can place and receive voice calls to easily verify service and voice path when installing new trunks or PABX equipment. Whether it's DTMF, MFC-R2, SS5, or pulse, the SunSet SDH can support the wide variety of circuits you encounter. The integrated microphone and speaker (and headphone) check the voice path. A Call Emulator feature allows you to program expected call sequences. Full-duplex drop and insert testing means you can place a call or send a test tone on an in-service circuit.

Primary Rate ISDN emulation and monitoring

The SunSet SDH is the perfect tool for installing or maintaining ISDN PRA circuits. Compact and lightweight, it can easily be taken to the customer premise- providing full troubleshooting and diagnostic tools in the field and exchange. It operates in a multi-protocol environment supporting ETSI, DASS2, DPNSS, AUSSI, and Q.SIG.

You can use the SunSet SDH to install new PRA circuits and PBX equipment. Operating in both TE and NT modes, it can place and receive data and voice calls to verify correct provisioning. Talk/listen and BERT testing verify the B-channel. Protocol analysis allows the engineer to troubleshoot problems without a separate protocol analyzer. In-service monitoring can troubleshoot problems with a full channel decode, filters, and storage.



ET: CONTI	N	LE
PSTN	- 0000000	0000008
CONTROL	- 0000002	0000008
BCC	- 0000001	0000007
PROTECT	- 0000004	0000010
LINK	- 0000003	0000009
TOTAL	- 0000010	0000053

V5.x analysis

The SunSet SDH's V.5x analysis troubleshoots problems between the switch and remote terminal. It supports protocol analysis for V5.1 and V5.2 including 3 timeslot (3 C-paths). Powerful filter capability for each timeslot can pinpoint desired information.

V5.x

Frame relay

The frame relay option adds powerful frame relay testing to the SunSet SDH's thorough physical layer testing capabilities, providing the perfect solution for installing and maintaining frame relay networks. Complete physical layer testing, along with frame level simulation and analysis, is essential, since frame relay lacks its own error checking capabilities. The SunSet SDH's test provide the fastest method for verifying performance and maintaining quality of service in frame relay networks.

SS7

The SS7 option places powerful SS7 protocol analysis and monitoring in the hands of the field technician. Protocol decodes help technicians determine a preliminary diagnosis to SS7 network problems.

- Bidirectional SS7 protocol analysis at 1.5 Mbit/s or 2 Mbit/s
- Supports TUP, ISUP (ITU, Chinese, Italian, ANSI), BSSAP (MAP and DTAP), BTNUP, SSUTR2 (French TUPR2)

Related Products



SunSet OCx

Combining the power of a benchtop SONET set and protocol analyzer into a handheld platform, the SunSet OCx offers advanced testing for SONET and T-carrier networks and services. With electrical and optical interfaces, the SunSet OCx tests from DS0 to 2.5 Gbit/s (OC-48). Its light weight, durability, long battery life, and low cost make it the ideal tool for field technicians in the access and metropolitan networks.

- DS0 to 2.5 Gbit/s (OC-48)
- SONET and T-carrier transmission testing
- DS1, DS3 Jitter measurement
- Service verification: ATM (DS1 to OC-48c), Frame Relay, ISDN PRI, GR-303, SS7, GSM, voice
- Under 4 lbs (1.8 kg) and battery operated

SunSet 10G

The SunSet 10G is far more than a handheld test set for 10G. It's a compact, comprehensive test set that encompasses both optical and electrical interfaces and advanced test features from 1.5/2 Mbit/s through 10 Gbit/s. Its size, light weight, and low cost make it a convenient tool for metropolitan and core network field testing, without compromising testing capabilities, reliability, or accuracy.

- 1.5/2 Mbit/s to 10 Gbit/s (OC-192/STM-64)
- SDH/SONET transmission testing
- PDH/T-carrier transmission testing
- 5 lbs (2.2 kg) and battery-operated





Scalable Test Toolkit - STT

Complement your SunSet SDH metro testing with our Scalable Test Toolkit (STT) platform. The STT features a modular architecture allowing it to grow with your testing needs. Designed for next-generation optical network testing, the STT offers a flexible package for DWDM, SONET/SDH up to 10 Gbps, Ethernet, and Fiber testing. Test directly from a DWDM access point- load traffic onto a wavelength to check continuity or analyze a wavelength for signal quality.

- SONET-SDH testing from T1/E1 to 10 Gbps
- DWDM analysis
- Ethernet testing
- Fiber analysis (OTDR, OLTS, VPL, VOA)
- Multi-Service Analyzer (PSTN, VoIP, Mobile)
- Flexible, modular architecture
- Portable and battery operated for field testing
- Windows-based user interface with a large touch screen

Sunrise Telecom is a global leader in providing service verification equipment for a growing variety of telecommunications environments and technologies. Our products offer broad functionality and leading edge technology to test a variety of new DSL services, fiber optics, cable TV networks, and signaling networks. Sunrise products are designed to maximize the technician's effectiveness in the field and to provide realistic network simulations for equipment manufacturers to test their products.

Sunrise products have found broad acceptance in domestic and international markets. Our customers include incumbent local exchange carriers, competitive local exchange carriers, and other service providers, network infrastructure suppliers and installers throughout North America, Latin America, Europe, and the Asia/Pacific region. We distribute our products through a network of sales representatives, distributors, and a direct sales force throughout six continents.

Sunrise Telecom was incorporated on October 1, 1991 and became a public company July 2000, trading under the NASDAQ symbol SRTI.

Service & Support

Sunrise Telecom proudly gives its customers excellent service and support. Technical assistance is available from local representatives in over 70 countries, from factory experts, on the Internet, and via Sunrise's customer support line.

Contact Sunrise Telecom to find your local Sales Representative or Distributor and discover how the SunSet SDH can solve your testing needs.

Specifications

Detailed specifications are available for the features listed in this document. Inquire with your local representative.

Accessories

Several SunSet SDH accessories are available for specific testing requirements.

Ask your representative for ordering information and additional specifications.

Order Direct

toll-free order hotline 1 888 242 7077 (US/Canada only)

fax hotline 1 408 360 1958

order@sunrisetelecom.com

Customer Support

1 800 701 5208 (US/Canada only)

1 408 360 2200 (International)

e-mail

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