



SUNRISE TELECOM

... a step ahead



SunSet® SDH



Introducing the world's smallest STM-4
optical network test set—the powerful

SunSet

The Challenge— Comprehensive Access Network Testing

As telecommunications networks expand to higher bandwidths and wider arrays of services, installation and maintenance becomes more and more difficult. 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.

A Single Solution for Protocol Analysis and Physical Layer Troubleshooting— The SunSet SDH

The SunSet SDH is the latest generation of access network test sets from Sunrise Telecom, the industry leader in the design and manufacture of handheld telecommunications service verification equipment. The SunSet SDH offers 2.048 Mbit/s to 622 Mbit/s testing, along with all the service verification tools you need: ATM, GSM voice and TRAU, A-bis, GPRS over A-bis, V5.1/V5.2, and SS7. Other protocols are also available for 1.544 Mbit/s. Technicians can increase efficiency, consolidate training, and save time and money by testing all these rates and services with a single handheld unit. Among handheld sets, only the SunSet SDH has the feature set to ensure quality connections across the entire access network.

SDH



- SDH testing: 52, 155, and 622 Mbit/s
- PDH testing: 2, 34, and 139 Mbit/s
- T-carrier testing: 1.544 and 44.736 Mbit/s
- ATM testing
- Comprehensive service verification protocols

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

The fully-loaded SunSet SDH incorporates the most popular and powerful features for testing PDH (2, 34, 139 Mbit/s), T-carrier (1.5 and 45 Mbit/s), and SDH networks (52, 155 and 622 Mbit/s). The SunSet SDH also offers protocol analyzer functions with Internet Protocol (IP), Asynchronous Transfer Mode (ATM), GSM Voice and TRAU Access, GSM A-bis protocol, V5.x, GPRS over GSM A-bis, and SS7. Traditional voice frequency (VF) and trunk conditioning functions are also included.

The SunSet SDH is battery powered and field upgradeable. Its light weight, rugged durability, long battery life, and low cost make it the ideal tool for field technicians in the Access Network. The comprehensive feature set also makes it well suited for local exchange and laboratory environments.

Basic Testing Features

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

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 unambiguous 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 technicians to configure the test set quickly. The AUTO key greatly simplifies test setup.

Power to Grow

The SunSet SDH has the flexibility to grow as your network grows. 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 (2.048 Mbit/s service verification), or V5.x when you need them. Upgrade your existing software to the latest version at no cost throughout an optional 3-year warranty period.

Advanced Testing Tools

- SDH sections and path overhead monitoring
- SDH/PDH Mux/Demux testing
- G.783 Pointer Test sequences
- APS switching timing measurement
- VF/DSO and fractional E1/T1
- TCM
- Tributary Scan (E1)

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.

155M/622M 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.



Serial Port

Print your results or store them on your PC for later review.

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 2MHz.

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 Order Wire using the convenient, hands-free microphone.



Dual Optical Wavelength

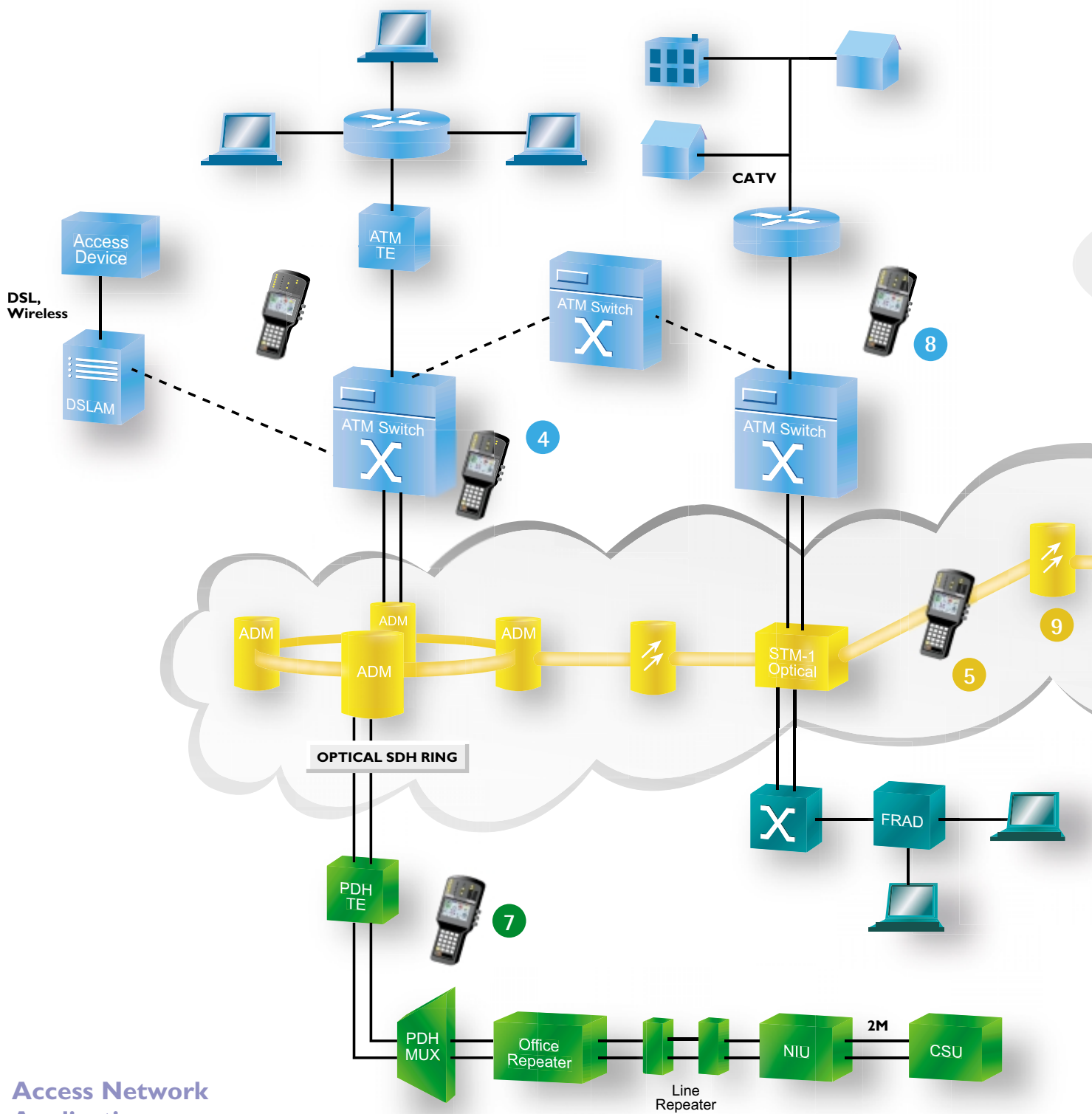
Dual wavelength transmitter can test 1310 and 1550 nm systems. Optical transmitters are available in FC or SC connectors.

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



Dual 1.5/2M Interfaces

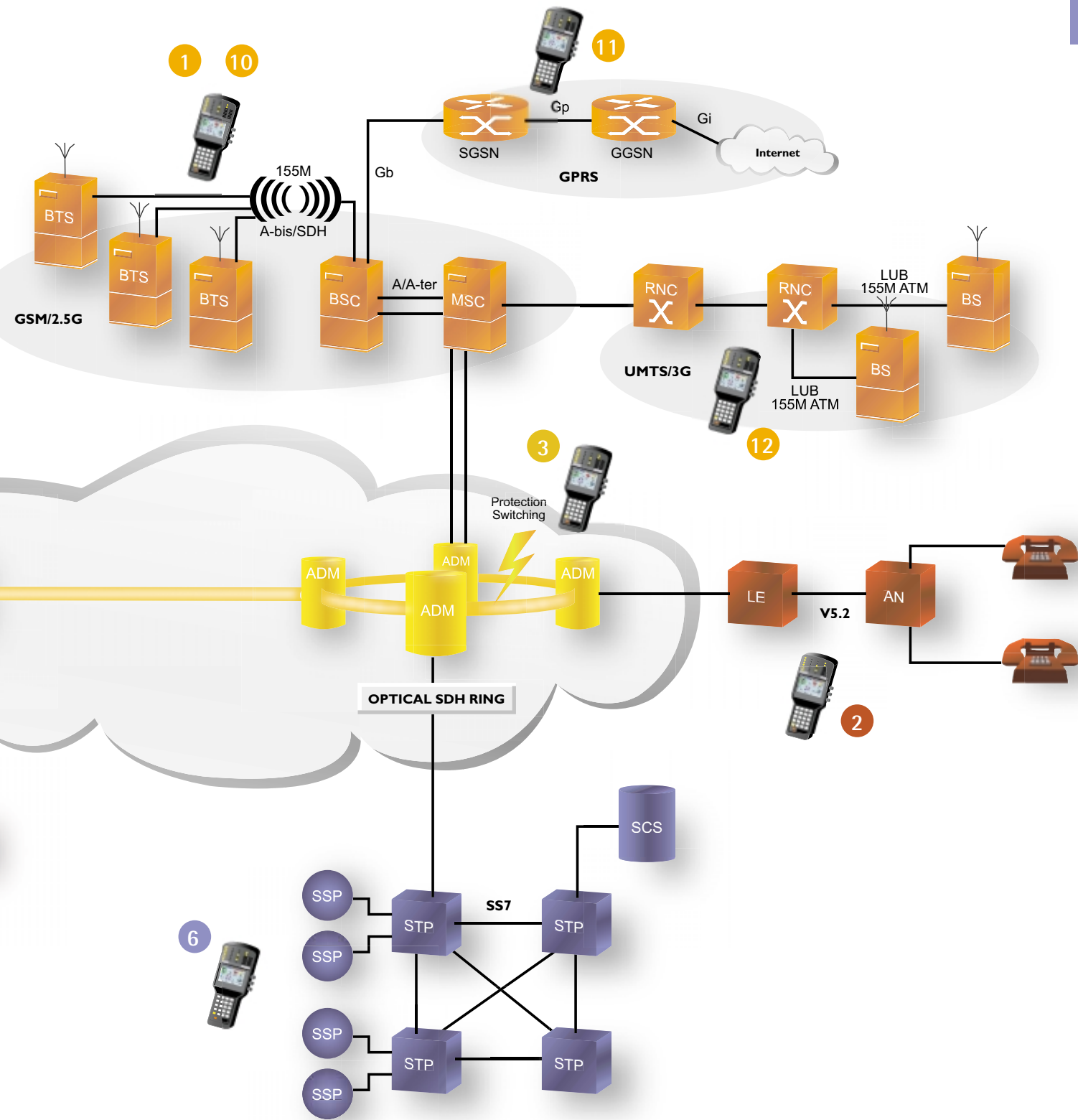
Dual 1.544/2.048 Mbit/s Balanced interfaces are available for dual BERT analysis and full protocol decoding. Choose either RJ45 or Bantam connectors.



Access Network Applications

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.

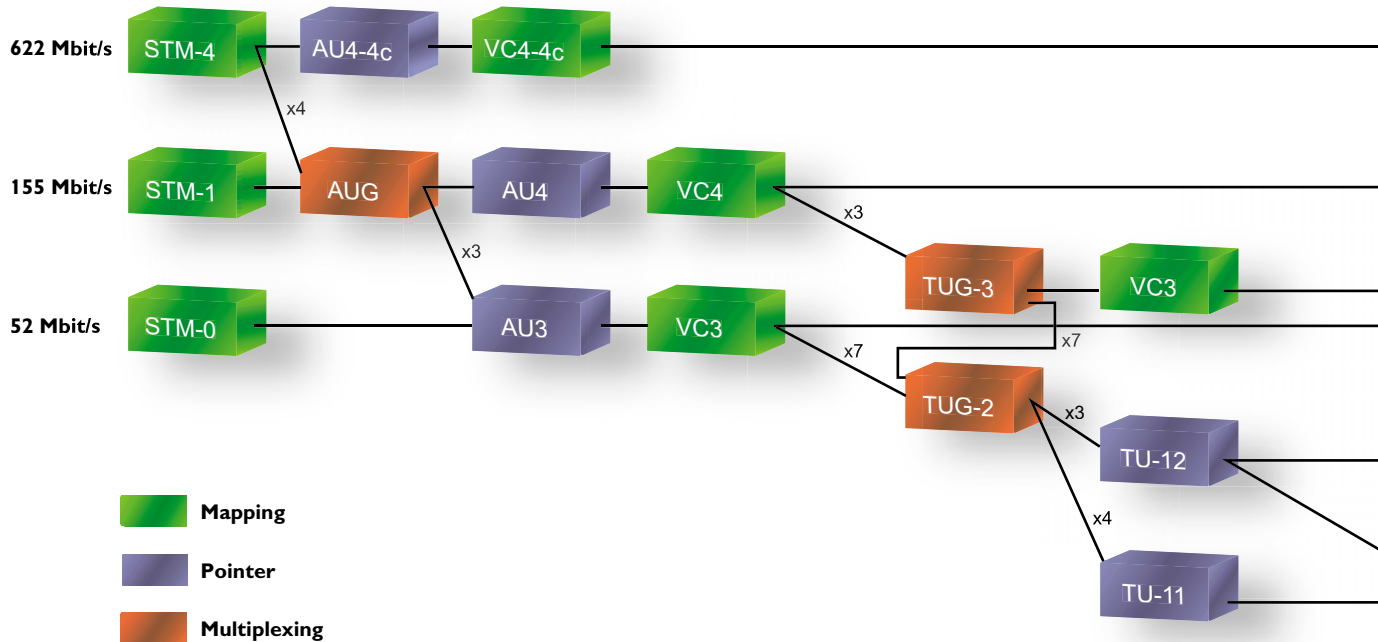
8 Ping the PC or ISP. Perform a Point-to-Point test on an ATM/VPI/CI.

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

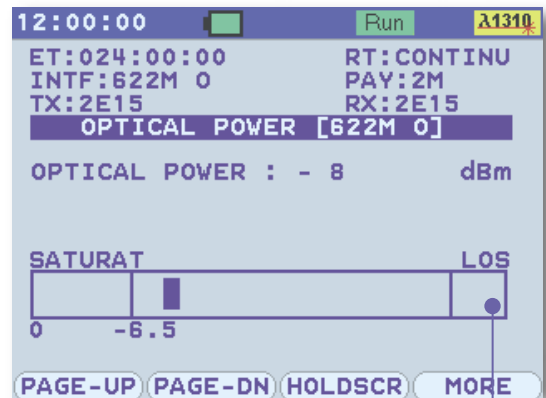


Advanced SDH transmission testing & analysis—in a handheld unit

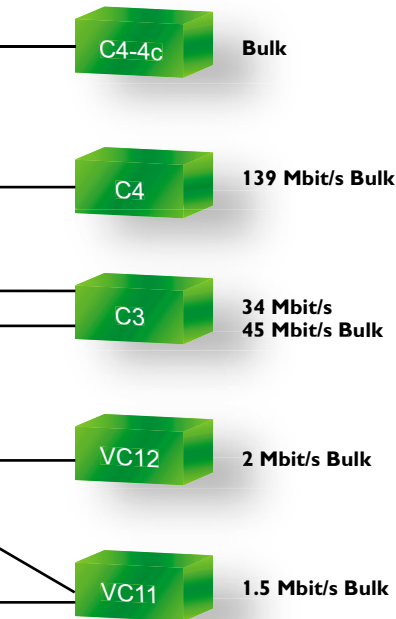
Don't let the unit's small size fool you—the SunSet SDH offers extensive features for SDH testing and analysis. With the SunSet SDH, operators can access the SDH network at the optical or electrical interface, including STM-0/1 electrical and STM-1/4 optical. The SunSet SDH supports full ITU-T mapping for VC11, VC12, VC3, and VC4. Comprehensive 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.

SDH for the field

The SunSet SDH is uniquely suited for field applications. No other SDH analyzer weighs less than 1.5 kilograms and runs for hours on a single battery charge.



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



```

12:00:00 Run 1310
SEND K1,K2 BYTES

K1 BYTE
BITS1-4 REQUEST
0000 No request
BITS5-8 CHANNEL
0000 Null Channel

K2 BYTE
BITS1-4 CHANNEL
0000 Null Channel
BIT5 ARCHITECT
0 1+1
BITS6-8 ALARM
000 Reserved

BIT=0 BIT=1 SEND

```

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

Applications for the field technician include:

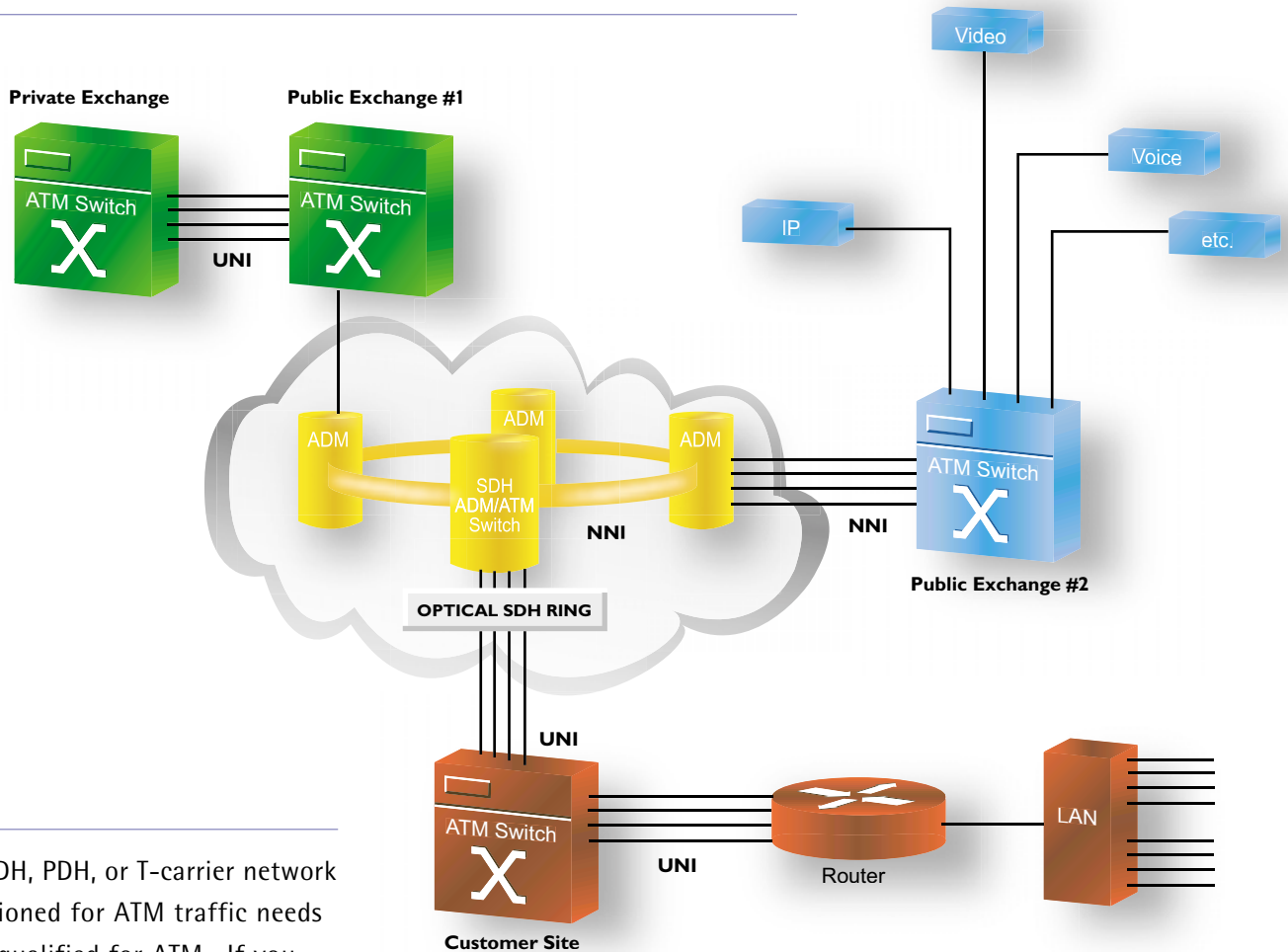
- Verifying network continuity with BERT analysis
- Easily detecting SDH errors/alarms with LEDs and well-organized results screens
- Confirming proper frequency and power level
- Monitoring of pointer movement in the network and adjusting pointer values to stress network elements
- Identifying network 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
- TCM
- Trouble scan
- Sequential test

SDH Overhead Control

The SunSet SDH allows the user to easily access the entire regenerator section, multiplexer section, and high and low order path overhead to monitor and test the SDH network. Important network properties such as parity (B1, B2, B3, and BIP-2), protection switching (K1, K2), pointers (H1-H2), and network status and alarms (M1, S1, G1) are readily available. The user can also view network traces (J0, J1, J2), labels (C2, V5), communications channels (D1-D3, D4-D12), and user-defined messaging (F1, F2). Order Wire testing is available through E1 and E2 bytes for talk/listen applications.

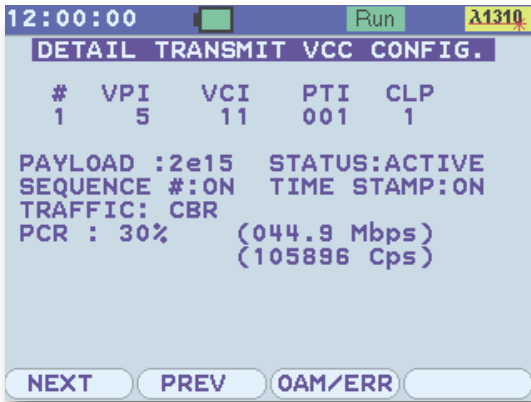


Comprehensive ATM Diagnostics



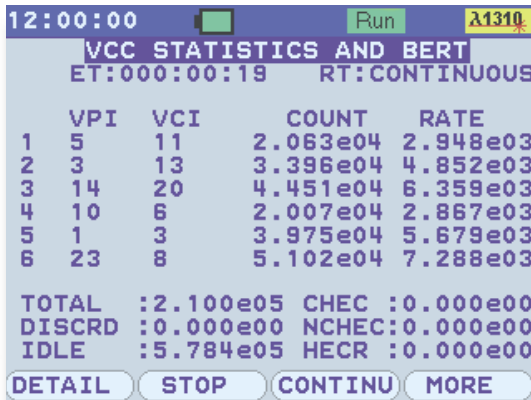
Any SDH, PDH, or T-carrier network provisioned for ATM traffic needs to be qualified for ATM. If you lease your network to service providers using ATM, you need a tool to test, verify and troubleshoot the network and the traffic it is carrying. Conversely, if you are responsible for the ATM traffic, 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 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 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.



Traffic Generation:

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

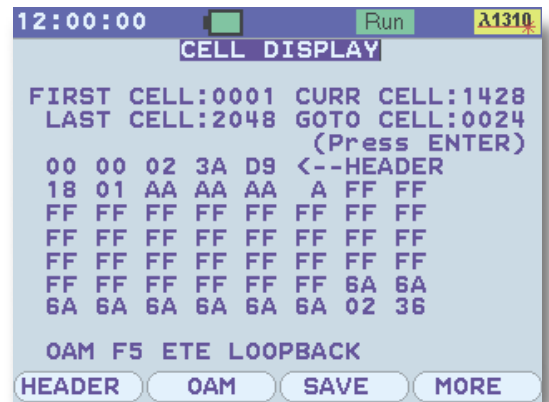


Traffic Supervision:

- Scan 32 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 0.191. 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.

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 SDH displays the meaning of the header values, including general flow control (GFC), VPI/VCI, and payload type indicator (PTI), plus any timestamps and sequence numbers.
- OAM cell decode. The 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.



ATM IP Testing:

- Verify and measure an IP connection through the ATM network.
- Bridge and Route (per RFC 1483), PPP, and DHCP.
- 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.

Powerful signaling and protocol analysis in your hand

12:00:00 Run

T/S	FASW	GSM LINE 1 - DOWNLINK	Abis	S
0	FASW	Abis	Abis	S
6			Abis	
12				Abis
18	--S-			
24				
30				

T/S	FASW	GSM LINE 2 - UPLINK	Abis	S
0	FASW	Abis	Abis	S
6			Abis	
12				Abis
18	--S-			
24				
30				

LINE 1 DECODE JUMP

GSM

GSM

The SunSet SDH provides the most convenient and cost-effective solution for installing and maintaining GSM links and ensuring proper transmission at higher rates. This comprehensive, handheld unit provides the signaling functions needed to isolate problematic signals. It also features the transmission tests required to verify performance between the GSM circuits and the public switched networks. Comprehensive results assist in analyzing physical signaling, voice access, and traffic management. Protocol analysis for A-bis interface can be performed later with stored data. In-service monitoring helps to analyze both channel traffic and voice quality.

TRAU Testing

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

V5.x

12:00:00 Run

LAYER 3 STATISTICS

ET: CONTI

	N	LE
PSTN	- 0000000	0000006
CONTROL	- 0000002	0000008
BCC	- 0000001	0000007
PROTECT	- 0000004	0000010
LINK	- 0000003	0000009
TOTAL	- 0000010	0000053

PAGE-UP PAGE-DN % MORE

V5.1/V5.2

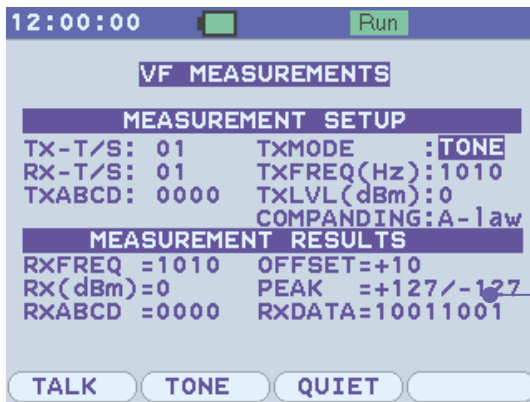
The SunSet SDH also supports V5.x protocol analysis for the access network, including 3 Time Slot (3 C-paths) monitoring for V5.2 protocol. Detailed protocol analysis for in-service testing with message filters and a memory buffer make the SunSet SDH a very powerful test unit for the access network.

GPRS

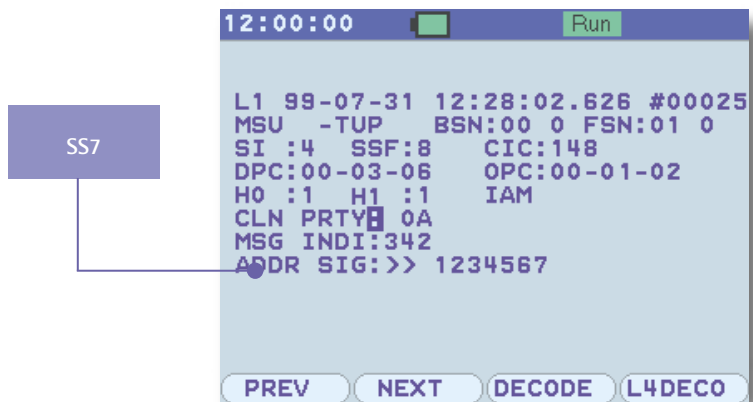
The SunSet SDH provides GPRS monitoring over A-bis interface, conforming to ETSI recommendations for GSM. GPRS statistics include layer detection, pass/fail report, and session count. A-bis statistics include RLL Management, D Management, CC Management, and TRX Management.

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



SS7

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. Statistic screens show traffic utilization, frame types, and retransmission. Powerful filters aid in quick troubleshooting by focusing on a specific customer, message type, OPC/DPC, etc.

PDH/T-carrier
Testing

```
12:00:00 Run
TEST CONFIGURATION
TEST MODE      :SINGLE
TEST INTERFACE :45M
TEST PAYLOAD   :2M
45M           2M
FRAME:M13     FRAME :PCM30C
RXLVL:HIGH    RXCHN  :1
TXLVL:HIGH    TXCHN  :1
TXCLK:INTERN  TXSRC  :TESTPAT
OTHERCH: AIS
```

SINGLE MUXTEST

Powerful PDH Testing

Full testing of PDH legacy networks can be done with the SunSet SDH. Framed, unframed and structured modes are available for in-service and out-of-service tests for different types of tributaries. Fractional E1(Nx64) or T1 (Nx64, Nx56) with selectable time slot setting is also available on this powerful test set.

Comprehensive T-Carrier Testing

Just because the SunSet SDH is designed for high speed optical rates and data-centric protocols like ATM does not mean that you need to sacrifice the traditional T-carrier applications. The SunSet SDH offers all the transmission testing applications for 1.5 and 45 Mbit/s circuits.

Windows®-Based Remote Control and Storage

Technicians can remotely operate the SunSet SDH from a PC simply by connecting to the SDH serial port using a standard printer cable and null modem adapter. A graphic user interface that exactly duplicates the look and feel of the SDH is available for Windows®-based PCs.



Related Products



SunSet OCx

Service Verification and Analysis

- ATM/IP
- GR-303, SS7, ISDN PRI, VF/DSO, Frame Relay

Broadband Testing

- OC-48/48c to STS-1
- DS3 (45 Mb)
- Dual DS1 (1.5 Mb)

Advanced Tools

- Remote control
- Pulse mask DS3, DS1
- Overhead & Loopback control

SunSet 10G

- First true handheld test set at 10 Gbit/s
- Complete BERT & Performance Monitoring in compliance with ANSI, Telcordia, & ITU-T standards
- Overhead analysis
- Pointer stress testing
- Large, easy-to-see color display
- SONET and SDH in the same test set
- Economical for wide deployment
- Core Network payloads from STS-192c/STM-64c to STS-1/VC3 Bulk



Sunrise Telecom is a global leader in providing service verification equipment for a growing variety of telecommunications environments and technologies. We are constantly advancing industry standards in handheld telecom test equipment with leading edge innovations to our SunSet products: renowned easy-to-use graphical interface for viewing circuit status information, innovative software cartridges that instantly expand our already impressive feature set, and elegant internal design with state-of-the-art circuitry to enable next generation products.

Sunrise products have found broad acceptance in domestic and international markets, with a customer base that includes local exchange carriers, cellular exchange operators, private network operators, and telecom equipment manufacturers. Telephone companies on six continents have standardized on our products, which are distributed by a network of sales and service representatives in more than 70 countries.

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)

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