SUNRISE TELECOM

...a step ahead

SunSet® E20c

**Powerful 2 Mbit/s, Datacom,
Cellular, Signalling, and Service Testing**

SunSet E20c

Each day brings new testing challenges. Therefore, you need a comprehensive testing tool that doesn't limit you to specific applications. The SunSet E20c delivers the broad range of test features that today's networks demand. It's portable, easy to operate, and more powerful than other test sets twice its size. Power, portability, and performance are all available in a single, handheld, 1.3 kg test set.

A unique combination of testing power and convenience

A test instrument's value comes from more than just powerful testing features. The efficiency it brings to network management is also a result of it's convenience and ease of use. And, its flexibility not only provides more solutions, but can extend the practical life of the unit.

Power You need powerful testing routines to solve complex problems, and the SunSet E20c provides complete testing. Both in-service monitoring and out-of-service testing routines are included for 2M and datacom. Detailed protocol analysis moves well beyond physical layer testing. And, the comprehensive list of supported protocols means power where you need it.

Convenience   Spend your time troubleshooting your circuit, not your test set. The SunSet E20c's intuitive menu structure, configuration graphics, LED display, and stored profiles mean your testing begins as soon as you arrive on site.
   Fitting comfortably in one hand and weighing only 1.3 kg, the SunSet E20c is completely portable. A rechargeable NiMH battery provides up to 3 hours of battery operation. Programmable software cartridges facilitate field upgrades; thus, the SunSet E20c evolves with your testing needs.

- 2M transmission
- Datacom
- Multiplexer testing
- ISDN PRA
- Q.SIG
- V5.1/5.2
- GSM
- Frame Relay
- X.25
- SS5
- SS7
- GPRS
- Voice Frequency testing
- Exchange Signalling
- X.50
- V.110
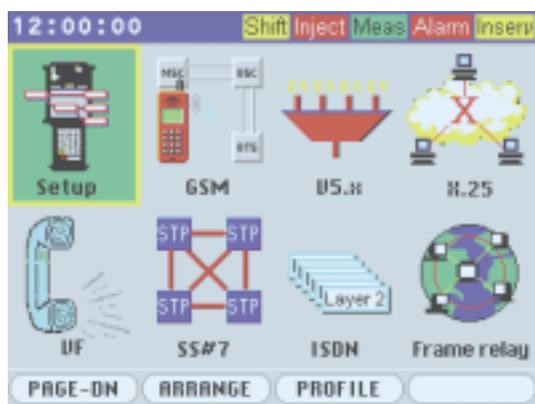
Flexibility   Your testing requirements and locations can change daily; your test equipment needs to be flexible. The SunSet E20c is equipped with two 75Ω unbalanced BNC receivers, two 120Ω balanced 3-pin banana receivers, two 75Ω BNC transmitters, and one 120Ω 3-pin banana transmitter. Optionally, it also can be equipped with 1.6/5.6 mm connectors (at 75Ω unbalanced). Most importantly, the SunSet E20c features a vast array of testing profiles, making it the most versatile test set you'll ever use.

Printing and Remote Control

A serial port allows for direct printing or connection to a computer for remote operation.

Dual-Color LEDs

Check your circuit's operation at a glance. Signal status is simultaneously displayed for both sides of the 2.048 Mbit/s circuit, or for the datacom signal.

Color Screen

Provides a graphic user interface and an icon-based menu for easy access to each application; can be read in direct sunlight.

Straightforward Results

There is no need to decipher or dig through results. The SunSet E20c provides all results in an intuitive, straightforward manner.

Key Provides Graphic Configuration

Avoid costly configuration mistakes. A single keystroke provides a picture graphic of the SunSet's configuration.

Integrated Microphone and Speaker

Allow the SunSet to function as a telephone when placing calls or monitoring voice quality. An additional headphone port is provided for noisy environments and bidirectional voice decoding.

Plug-in Software

Using programmable software cartridges, the SunSet E20c evolves with your testing needs. A second PCMCIA memory card is available for protocol traces and storage results.

3

Bringing solutions
to your network

1 GSM/GPRS field technicians

Here's a lightweight, battery operated test set that provides complete 2M transmission testing. Features include traffic analysis (both directions); TRAU and voice testing; in-depth protocol analysis at the A-bis interface, A interface, and MAP; and statistic analysis at Gb interface.

2 Private network data technicians

The SunSet E20c provides full transmission testing over 2.048 Mbit/s and V-series datacom interfaces. It verifies datacom circuits by monitoring the received data, control leads, and physical layer results. It also tests frame relay circuits (over both 2M and datacom) using LMI analysis, PING testing, stress testing, and statistics.

3 SS7 field technicians

Economical, first-pass SS7 protocol analysis is included in the SunSet E20c. Powerful filters operating in conjunction with protocol decodes help technicians diagnose SS7 network problems.
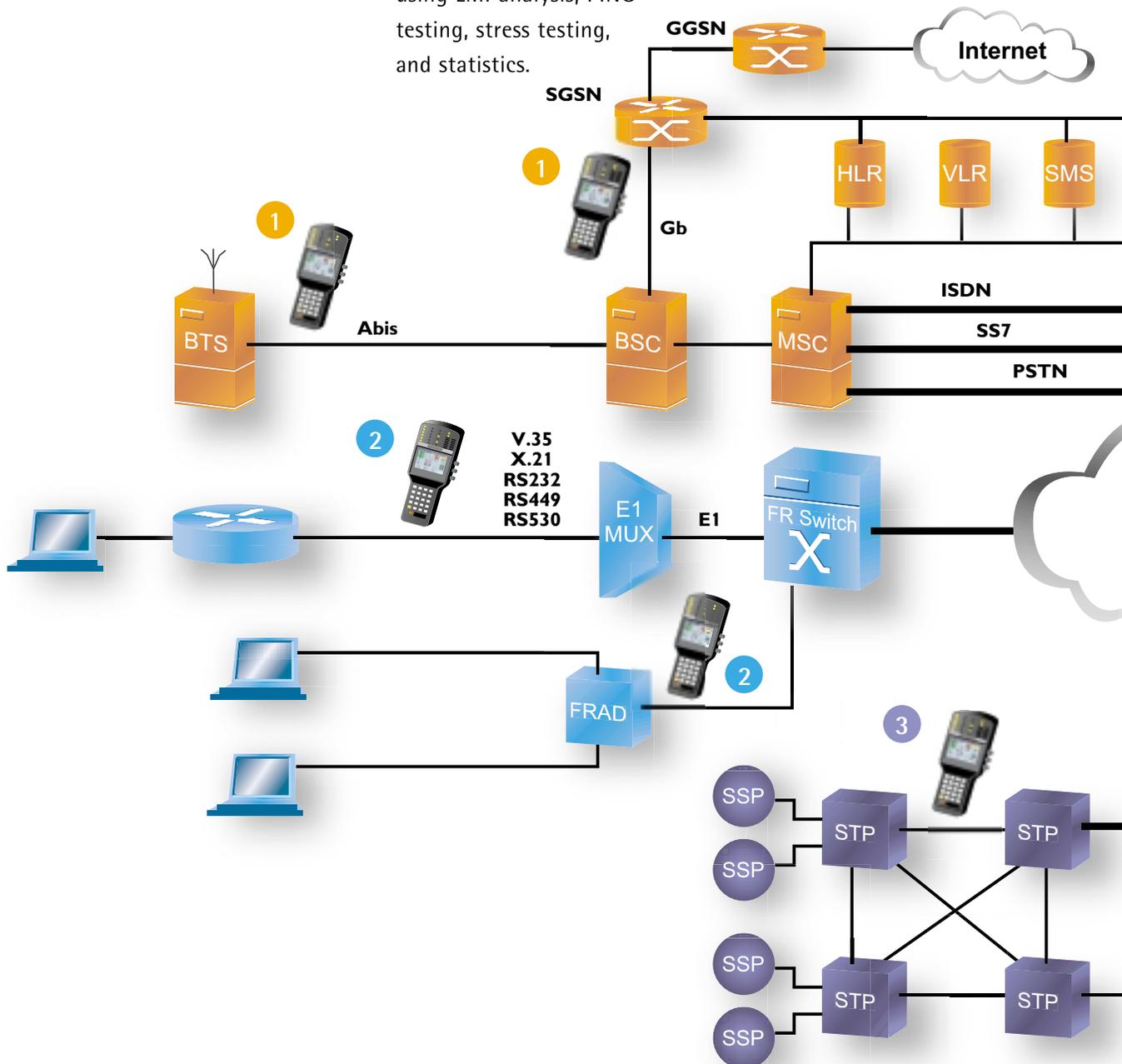
4 **ISDN Primary Rate Access (PRA) technicians**
You can verify PRA links by call emulation. Or, troubleshoot signalling problems with detailed protocol analysis. Supported protocols include ETSI, Aussi, DASS2/DPNSS, Q.SIG, and V5.1/V5.2.

5 **Exchange signalling technicians**
Whether using bidirectional monitoring, call emulation, or full-duplex drop & insert testing, the SunSet E20c verifies operation and troubleshoots line signalling and protocol issues. It provides a flexible and easy solution for MFC-R2, DTMF, SS5, ISDN, and pulse dialing systems.

6 **Private network telecommunications technicians**
Turning up new network locations, troubleshooting service problems, and verifying proper in-service operation are easier and faster with the SunSet E20c. It's completely portable without sacrificing test capabilities. Powerful test features address ISDN, Q.SIG, V5.1/5.2, MFC-R2, CAS, and similar applications.


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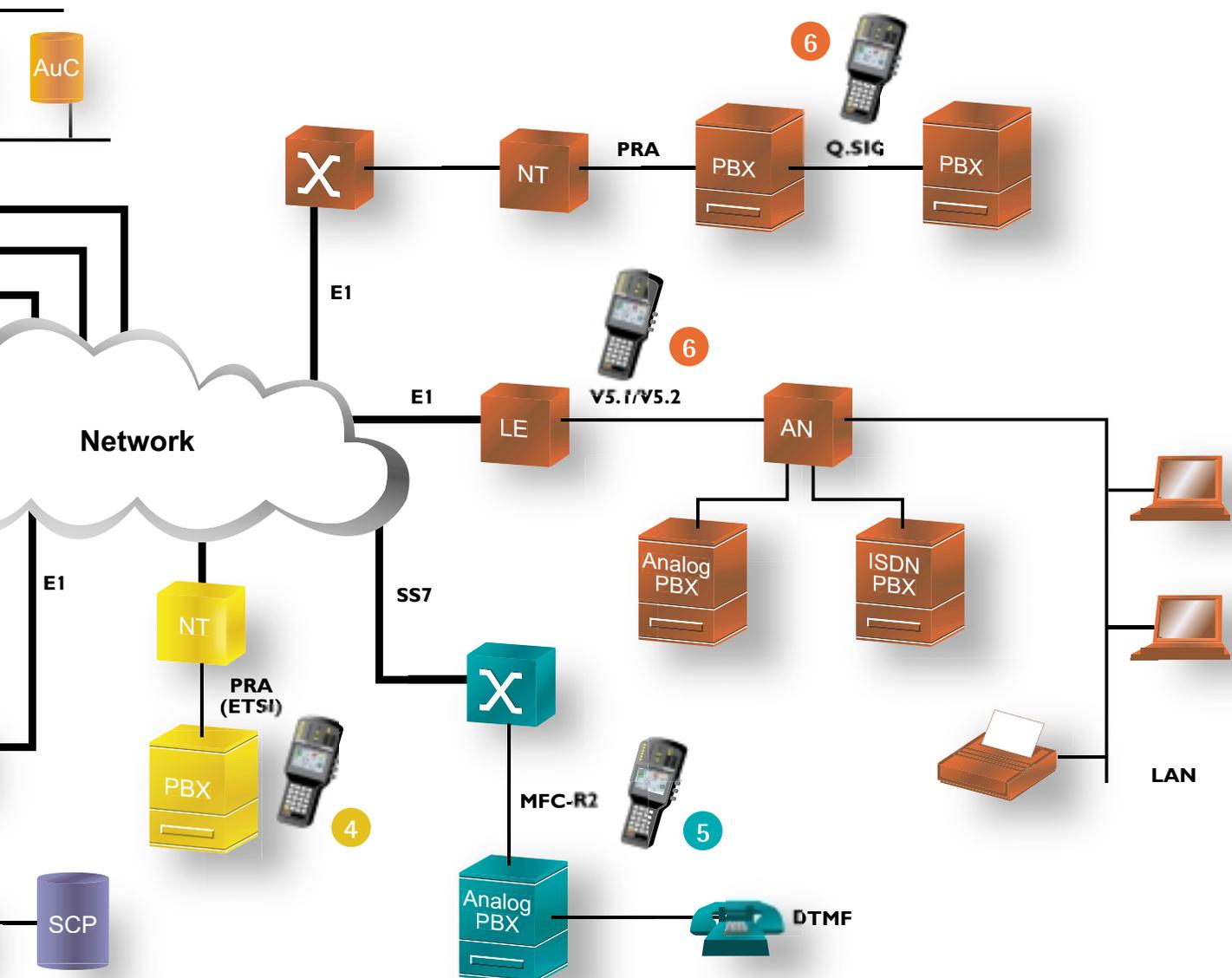
Complete 2.048 Mbit/s and
datacom transmission testing

In-service monitoring

In-service monitoring provides the most practical solution for maintaining, troubleshooting, and assessing service quality without disrupting service. Dual receivers enable bidirectional monitoring. Simply connect the SunSet E20c to any Protected Monitoring Point (PMP) and detect all critical alarms, code errors, CRC, E-bit errors, and FAS/MFAS errors. Since the LEDs instantly provide status information on both lines, there is no faster way to uncover faults. In-service monitoring can

With a Y-adapter cable, the SunSet E20c can perform bidirectional/non-intrusive datacom monitoring. The SunSet E20c displays the status of both the DCE and DTE. Results include data rate and control lead status (CTS, RTS, DTR, DCD, RL, or LL).

determine if a line section or service path conforms to ITU-T recommendations. The SunSet's results provide Pass/Fail indicators-taking the guesswork out of evaluation.

Exchange　　　　　　**Exchange**

PMP

PMP
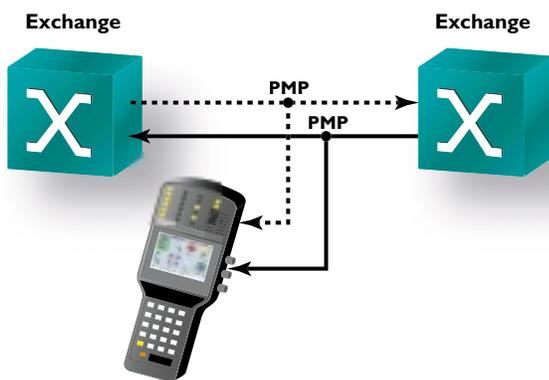
Long-term monitoring is simple with the SunSet E20c. Program a start and stop time, and the SunSet E20c takes care of the rest. The set may also be configured to print out every error or alarm condition, along with a date and timestamp. Histograms provide a graphical record of errors and alarms through time for easier correlation of repeating problems.
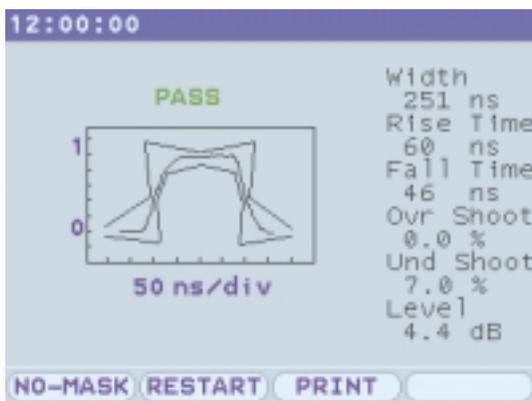
Out-of-service testing

The SunSet E20c can assess the performance of circuits and network equipment by Bit Error Rate (BER) testing. The SunSet contains a full complement of PRBS, fixed, and user-defined test patterns. Its full range of E1 measurements include: bit rate, signal level, clock and bit slips, bit error, code error, CRC-4 error, FAS error, MFAS error, E-bit error, loss of signal, loss of frame, AIS, FAS RAI, and MFAS RAI.

The SunSet E20c can emulate DTE or DCE equipment. A full complement of test patterns- including FOX, QRS, fixed, and user-defined- are available to stress test the line or modem. Measurements provide accurate information to analyze problems; these measurements include bit errors, block errors, data loss, pattern synchronization loss, slips, and line rate.

The SunSet's G.821 and G.826 analysis determine if the circuit and network equipment meet ITU-T's recommendations.

Alarm and error generation test the system's tolerance to faults and test the diagnostic capability built into network equipment. The transmit frequency offset feature stress tests the network timing. A propagation delay measurement indicates if the roundtrip delay is within the acceptable range. The SunSet E20c's pulse shape analysis provides an easy way to determine if the signal conforms to the required ITU-T G.703 standard.
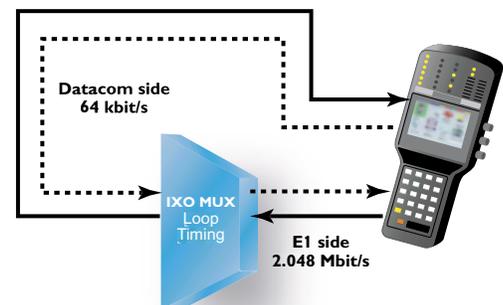
Comprehensive datacom testing

The SunSet E20c can test numerous devices in a data communications network through out-of-service BER analysis or non-intrusive monitoring. In addition, it can also emulate or test data multiplexers. It supports all common interfaces: G.703 codirectional, RS232/V.24, RS449/V.36, X.21/V.11, V.35, and RS530.

Multiplexer testing

The SunSet E20c provides added value with its ability to emulate or test a data multiplexer. Testing a multiplexer's operation includes verifying correct pattern transmission from the low speed datacom side to the multiplexed 2.048 Mbit/s side; also, from the 2.048 Mbit/s side to the low speed datacom side. In addition, the SunSet E20c can be configured as a one-channel multiplexer for testing the line prior to installation.


```
12:00:00

PASS                    Width
                         251 ns
                        Rise Time
                         60  ns
1                       Fall Time
                         46  ns
0                       Ovr Shoot
                         0.0 %
                        Und Shoot
   50 ns/div             7.0 %
                        Level
                         4.4 dB

NO-MASK  RESTART  PRINT
```


Datacom side
64 kbit/s

IXO MUX
Loop
Timing

E1 side
2.048 Mbit/s

Cellular

GSM

The SunSet E20c provides the most convenient and cost-effective solution for installing and maintaining GSM links. One handheld unit provides the signalling functions needed to isolate problematic signals and the transmission tests required to verify performance between the GSM circuits and the public switched networks. Results include a complete status of the physical line along with voice access status, traffic statistics, and power level. Also included is protocol analysis for A-bis, A and A-ter (BSSAP, SS7), and interfaces B to G (MAP, SS7).

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 E20c's built-in speaker verifies speech quality by accessing both the 13 kbit/s full rate and EFR GSM encoding, as well as the 64 kbit/s A-law speech encoding. An optional headphone allows you to distinguish uplink and downlink paths. Power level readings are displayed for speech transmission.

TRAU Testing: The SunSet E20c can insert an artificial voice message into a GSM subchannel to check voice conversion in the TRAU units. Full duplex testing means the SunSet E20c can insert a speech message or 16 kbit/s data pattern on an in-service link. C-bit manipulation can stress test the network's response.

Protocol analysis: Bidirectional message tracing and full protocol decode allow for easy trouble-shooting at the A and A-bis interfaces. The SunSet E20c decodes SS7 at the A and A-ter interface for the BSSAP (DTAP, BSSMAP), as well as SS7 (MAP) at the inter-MSC/database (VLR, HLR, AUC, EIR). It also decodes the full range of error messages. An intuitive screen display makes even the most complex message contents easy to understand. A rich collection of filters enables technicians to identify trouble quickly by selectively capturing information.

GPRS

The GPRS software option, in conjunction with the Frame Relay option, provides complete test capabilities from the physical layer to upper layers. Comprehensive statistical analysis over GPRS Gb links allows the user to verify GPRS network performance and 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 Gb link between BSC and SGSN node in the GPRS network. Over a Gb Frame Relay link, the SunSet E20c can ping to verify connectivity of IP equipment.

Advanced signalling capabilities for PCM systems

PCM signalling features support MFCR2, SS5, pulse, and DTMF digit analysis and call emulation. This allows the user to test signalling in the public networks, as well as the interfaces between the public network and PABXs. Bidirectional monitoring can troubleshoot lines and register signalling problems between two exchanges. Call emulation can be used for installation testing and verification.

VF Noise Measurements: Test voice channel quality with signal to noise, C-notch, phosphometric, 3K flat, and peak coder offset. In-service circuits can easily be tested for signalling errors. The SunSet E20c monitoring features include 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 signalling can also be defined by the user with variance from ITU Q.422 and Q.441 standards.

Call Emulation: Placing and receiving calls is a quick way to identify faults. The SunSet E20c has an integrated speaker/microphone (and headphone) for placing and receiving voice calls. A Call Emulator feature allows you to program an expected call sequence for MFC-R2, SS5, pulse, and DTMF. Full duplex drop and insert testing means you can place a call or send a test tone on an in-service circuit. The dual transmitters also enable you to busy out the far end.

Exchange   Exchange
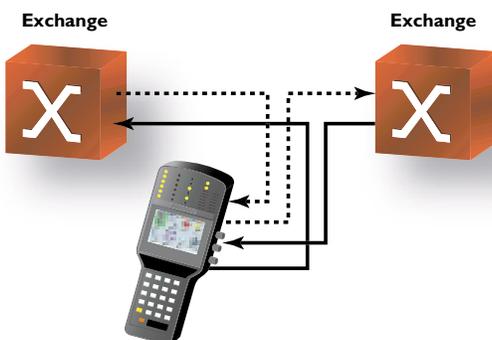
Primary rate ISDN, emulation, and monitoring

The SunSet E20c's Primary Rate option contains both emulation and monitoring modes. It operates in a multi-protocol environment, supporting ETSI, DASS2/DPNSS, AUSSI, Q.SIG, and V5.1/ V5.2 protocols.

The emulation mode is ideal for PRA installation and service verification. Operating in both TE and NT modes, it can place/receive data and voice calls to verify correct provisioning.

The protocol analysis feature allows the technician to use the E20c for troubleshooting problems without a separate protocol analyzer. Full E1 physical results, detailed protocol analysis, message filters, and a memory buffer make the E20c a simple, flexible, and convenient PRA test set.

V5.1/V5.2

This V5 concentration protocol between the local exchange and access network provides an economical solution for telecom services in remote areas. The SunSet E20c performs V5.1 and V5.2 bidirectional monitoring over dual E1 ports. With simultaneous 3-timeslot monitoring, the E20c offers a unique feature within the handheld market. Protocol analysis with powerful filter capability for each timeslot allows the user to pinpoint required information.

9

Convenient solutions for service verification

Frame Relay

The frame relay option adds powerful frame relay testing to the SunSet E20c's thorough physical layer testing capabilities, providing the perfect solution for installing and maintaining frame relay networks running over E1 or V-series interfaces. Complete physical layer testing, along with frame level simulation and analysis, is essential, since frame relay lacks its own error checking capabilities. The SunSet E20c's tests provide the fastest method for verifying performance and maintaining quality of service in frame relay networks.

In-service monitoring: In-service monitoring provides vital statistics on frame relay performance: utilization percentage, throughput (max, min, avg), and frame size. It also gives essential troubleshooting results for congestion, aborted frames, short frames, discarded frames, and FCS (frame check sequence) errors.

IP PING: The IP PING feature tests connectivity all the way to the user's IP LAN connection. Results include the number of errored or unreached PINGs and the round trip return time.

FOX Testing (Stress Testing): The SunSet E20c's load generation feature is capable of stress testing the network's various frame loads. This ability to generate traffic helps determine if the CIR (committed information rate) is achieved.

X.25

The SunSet E20c provides comprehensive testing for X.25 packet-switched networks. A user can perform statistical analysis and FOX testing (stress testing) for an X.25 link on E1, Nx64, or datacom interfaces. X.25 link performance, including utilization and throughput, can easily be verified using the X.25 Statistic Analysis feature. The FOX Test feature performs stress testing to see how X.25 performs under high load traffic.

Windows®-Based remote control and storage

Technicians can remotely operate the SunSet E20c from a PC simply by connecting to the SunSet E20c serial port using a standard printer cable and null modem adapter. Operations are performed using a Windows-based, graphic user interface that exactly duplicates the look and feel of the SunSet E20c.

E20 Monochrome

The SunSet E20 is a monochrome version of the SunSet E20c. It provides the same basic features and capabilities as the SunSet E20c.

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 internal 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. The company has continuously financed its growth internally through operations, which have been profitable since shipments began in October of 1992. Sunrise Telecom develops and manufactures superior quality test equipment at our corporate headquarters in San Jose, CA, USA.

Service & Support

Sunrise Telecom is proud to give 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 E20c 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 E20c accessories are
available for specific testing requirements.
Ask your representative for ordering
information and additional specifications.

Customer Support

1 800 701 5208 (US/Canada only)

1 408 360 2200 (International)

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