



Acterna HST-3000

Wireless Services Applications

The wireless market has become extremely competitive, making it crucial for providers to offer the best service and the broadest coverage area. The public relies heavily on their cellular devices for voice and new data applications, including text messaging, e-mail, the Internet, and digital photography. Often, customers will not tolerate noisy signals, dropped calls, or busy lines. There is a constant threat of losing customers; the pressure on the wireless provider to maintain an error-free and reliable network has become enormous.

Continued explosive growth in the demand for next generation wireless services is driving increased deployment of base stations and land lines. This growth has led to an increased requirement for accurate and reliable test solutions ensuring proper installation and maintenance of services. The ability to quickly and accurately diagnose and isolate network problems is key to a successful business.

The Acterna HST-3000 is a test solution that addresses the need to reduce failures, repeat rates, and kickbacks - especially for leased lines.

The HST-3000's ruggedness, versatility, and portability make it the ideal instrument for wireless technicians in the field to test T1/T3 with advanced stress patterns, T1 autotests, and VT100 emulation. Specifically designed for the outdoor field technician, the HST-3000 can be built to order and can quickly and easily be upgraded with new modules as application and technology needs change.

Wireless technicians use the HST-3000 to qualify and troubleshoot the circuit. They can also use the T1/T3 test features to bit error rate test (BERT) the line and to measure frequency and signal level on the circuit under test. Technicians can quickly qualify networks for accurate operation with dual transmitter and receiver T1 interfaces and with dual DS3 receivers. With advanced copper test capabilities, the HST-3000 can detect and identify copper loop problems, resolving finger-pointing issues on leased lines from the LEC.

Programmed with highly integrated applications for in-service and out-of-service testing, the HST-3000 examines both the pipeline and service levels to ensure that your network is performing properly.

Highlights

- Isolate and troubleshoot physical layer troubles from RF problems
- DS1 signal analysis and BER testing with standard and advanced stress patterns
- DS3 signal analysis and BER testing with patterns for both M13 and C-bit framing
- Dual DS1 receivers and transmitters for in-service monitoring as well as drop-and-insert and head-to-head testing
- Dual DS3 receivers for bi-directional monitoring
- Accurately measure frequency and signal level to ensure optimal T1 and T3 circuit performance
- Compact, lightweight, and scalable tool that is ideal for the needs of the wireless field technician
- Water resistant to withstand nature's elements
- Traditional T-BERD with innovative copper applications

DS1 Physical Layer Testing

The best way to test the network is to monitor the traffic at the T1 interface with an in-service test at the base transceiver station or cell tower, the base station controller, or the mobile switching center. The HST-3000 helps to ensure the proper performance of network connections to your base stations by performing signal, alarm, and timing tests together with BERT analysis.

The HST-3000's ability to monitor and perform BER testing in both directions of a circuit simultaneously streamlines the identification and isolation of circuit problems from faulty network equipment. Troubles within the network can be further sectionalized using standard or user-programmable loop codes to loopback network equipment and to locate faulty repeaters. Advanced timing analysis also helps technicians pinpoint signal delays, timing slips, and mismatches between switch and remote equipment.

Locating problems in your network is especially important if the lines are leased and finger-pointing issues need to be resolved. By verifying accurate transmission to the base transceiver station or cell tower, the technician can sectionalize troubles and pinpoint RF problems from your base station to mobile devices.

DS3 Physical Layer Testing

The HST-3000 provides a comprehensive DS3 testing capability to ensure that the circuit is functioning properly and to confirm that the line is clean. Evaluation of BER test results, frequency, and signal level helps identify potential sources of problems such as faulty or loose cable crimps, improper line build out, or miss-optional or faulty network equipment.

The HST-3000 allows you to qualify DS3 circuits with an array of BER testing patterns for both M13 and C-bit framing. It also supports the verification of frame synchronization on the circuit. For more comprehensive and flexible testing, you can insert test patterns or tones on single, multiple, or all DS1 channels within the DS3 circuit. The HST-3000's DS3 BER testing measurements include:

- DS3 FEAC loopback codes
- Advanced stress patterns
- Signal level and frequency
- Insertion of logic and frame errors

Easy-to-read result menus allow technicians to view physical layer measurements, BERT results, parity errors, FEBEs, and alarm conditions. Additionally, the summary screen provides a rapid assessment of overall test performance.

Straightaway Testing

Straightaway testing is useful in isolating problems between the base stations and the mobile switching center. A known test pattern can be simultaneously transmitted in each direction between the HST-3000 and network test equipment, providing for easier sectionalization of network and equipment troubles. Looping up a CSU, which only requires one test set, can also verify your T1/T3 circuit.

End-to-End Testing

If problems still exist after running straightaway or loopback testing, it is possible that errors were introduced by another provider's network. Testing through to the far end can determine if the problem is outside the immediate network. By using a pair of HST-3000's at either end of the line, end-to-end testing of the network using both straightaway and loopback tests will isolate the trouble.

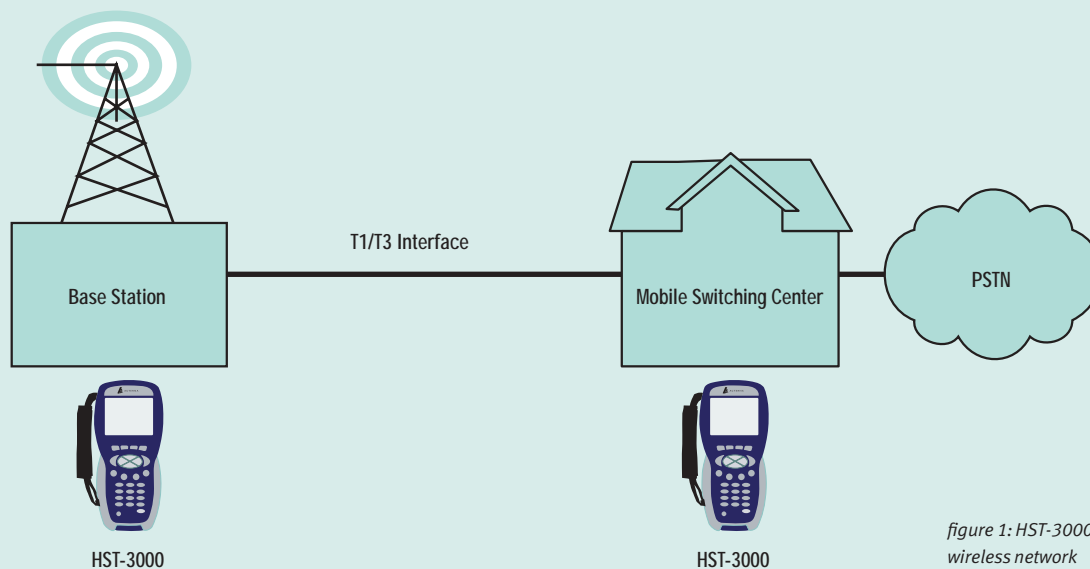


figure 1: HST-3000 Testing in the wireless network

VT100 Emulation

With the HST-3000's VT100 Emulation feature, technicians can access T1 and HDSL network equipment for configuration, performance data measurements, and loopback capabilities without having to carry a PC or laptop into the field.

T1 Autotest

The HST-3000's standard T1 Autotest allows technicians to select a series of BERT patterns and the time duration for each pattern. All standard and advanced T1 patterns are available to choose from, giving the user a lot of flexibility. Results are easily saved and can be associated with a work order ticket.

Saved Results

Hundreds of results can be saved on the HST-3000 and can then be exported directly to a printer or to a PC via serial or Ethernet connections. The results files can then be e-mailed, printed, or saved on a PC. The HST-3000's file manager also allows the technician to view previously saved test information on the test instrument.

Copper Plant Testing

The HST-3000 copper features enable wireless technicians to quickly troubleshoot their T1/T3 copper lines for faults and conditions that can degrade the service. This option can locate physical plant impairments proving to leased-line providers that problems exist on the cable. The HST-3000 has an advanced time domain reflectometer (TDR), precision digital volt/ohm meter (DVOM), and an accurate resistive fault locator (RFL) to pinpoint troubles.

Flexible and Rugged Design

The HST-3000's rugged, weather resistant design and long battery life are ideally suited for use in the field. Standard Ethernet, USB, and serial connections offer flexibility to easily download software and offload captured test data.

Easily configurable, the HST-3000 can be used by different technicians with different responsibilities to perform a wide variety of tests. The HST-3000 is based on a modular platform allowing for the addition of upgrades and options in the field. Other supported testing applications include: ADSL, G.SHDSL, DDS-LL, PCM Signaling and T1MS, BRI, and VoIP.

To accommodate the future and changing needs of wireless field technicians, the HST-3000 is an easily upgradeable platform that will allow for the support of new technologies and advanced options.



Interfaces

DS3 (Single Tx/Dual Rx) BNC
DS1 (Dual Tx/Rx) bantam jacks
10/100 BT ethernet jack 8-pin modular
Serial port DB9 female via cable (DCE)
USB host
USB device

T1 Specifications

Operating modes	Self test, T1 unframed, T1 D4, T1 ESF, FT1 D4 framed, FT1 ESF framed, T1 test loopback, T1 line loopback
Input impedance Bridge Term	>1000 Ohms 100 Ohms +/- 5%
DSX-MON	100 Ohms +/- 5%
Receive level Bridge Term	0 to -20.0 dBdsx +6 to -35.0 dBdsx
DSX-MON	+6 to -24.0 dBdsx
Transmitting timing sources	internal clock, recovered clock
Line codes	AMI, B8ZS
Line build out level	0, 7.5, 15.0, and 22.5 dB of cable loss at 722 kHz
Line build out tolerance	+/- 1 dB at 722 kHz with LBO of 0 dB
Error insert Logic, BPV, Frame	

DS3 Specifications

Operating modes	Terminate and Monitor
Receiver (input) specifications	
Frequency	44,736 Mbps + 300 ppm
Impedance	Nominal 75 Ohms at 22 MHz (unbalanced to ground)
Term	0 to 12 dB of cable loss at 22 MHz
DSX-MON	-20 dB loss plus 0 to 9 dB of cable loss from high signal 22 MHz
Transmitting timing sources	internal clock, recovered (from network) clock
Tests	BERT, Monitor, Framing Auto, Unframed, M13, C-bit
Line coding	B3ZS
Error/Alarm Types	Logic, BPV, Parity, Frame, AIS, RAI
FEAC loop codes	NIU, DS3 line, DS1 line

Physical Specifications

Size (H x W x D)	9.5 x 4.5 x 2.75 in
Weight	2.7 lb with battery
Operating temperature	22°F to 122°F
Storage temperature	-40°F to 150°F
Battery life	10 hour typical usage
Charging time	7 hour from full discharge to full charge
Operating humidity	10% to 80% relative humidity
Storage humidity	10% to 95% relative humidity
Display	1/4 VGA monochrome transreflective, 3.8-in diagonal (readable in direct sunlight)

General

Ruggedness	Survives 3-ft drop to concrete on all sides
Water-resistance	Splash proof; may be used in heavy rain
Keypad	Typical 12-button keyboard

Software Options

HST-3000-PRI	ISDN PRI software option
HST-3000-TDR	TDR software option
HST-3000-RFA	RFA/RFL software option
HST-3000-WBTones	WB tones/TIMS software option
HST-3000-VT100	VT100 option (includes cable and software option)
HST-3000-Script	Scripted testing software option
HST-3000-Web	Web browser software option
HST-3000-PCMSIG	VF (PCM) signaling software option
HST-3000-PCMTIMS	VF (PCM) TIMS software option
HST-3000-T1DDS	T1 DDS software option
HST3000S-VOIP	VOIP software option

Accessories

Test leads	POTS- 5 ft. banana plugs to alligator clips; T1- bantam to bantam, bantam to 310 Weco
Charger adapter	AC/DC battery charger/adapter; 120 VAC (50/60 Hz) input; 12 VDC (1 A) output
Soft cover	Form fitting nylon glove for test set and leads
Carrying case	Heavy-duty, nylon case for test set, extra SIMs, accessories and cables
Battery	Lithium ion

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