Acterna HST-3000

Option for ISDN PRI Services

As a widely deployed service, ISDN is a key source of revenue for telecommunication service providers world-wide. This, coupled with today's reduced budgets and smaller workforces, make it more critical than ever to ensure the timely and successful turn up and maintenance of ISDN service – the first time out. Additionally, thorough ISDN testing can prove more complex than basic physical layer and BER testing for technicians who lack the necessary training. To meet these challenges, an easy-to-use, versatile test solution is required that helps reduce failures and repeat rates while enhancing efficiency and ensuring consistent test practices.

The Acterna HST-3000 is a powerful and versatile test instrument for testing ISDN PRI service. Hand-held, rugged and easy-to-use, the HST-3000 is ideal for field use. Its modular design provides a scalable, all-in-one solution for ISDN testing, as well as thorough testing of the facilities over which it is provided.

The HST-3000 ISDN PRI option enables testing of Primary Rate ISDN circuits at both the customer site and central office. It supports call placement, receipt, D-Channel Decode analysis for 23B+D, NFAS (Non-Facility Associated Signaling), 24B and back-up D channel switching. With the full range of T1 loopcodes and BERT patterns it can also test BER across any combination of channels to verify service before delivery to the customer.

Compact and rugged for field technicians, the HST-3000 can be used in all conditions, from an inside office environment to a noisy, wet outdoor span repeater. The HST-3000 also boasts automated setups and advanced features that ensure consistent adherence to service provider methods and procedures. Each HST-3000 is built to order and can easily be field-upgraded with new modules and software as application and technology needs change.

Highlights

- **Test call types including voice, 56K, 64K, Nx56K, Nx64K and H0 to verify correct switch translations for inbound and outbound calls**
- **Place and receive calls on T1 (primary or secondary) for NFAS configurations**
- **Switch in-service D-channel to stand by D-channel for verification of D-channel backup operation in NFAS configurations**
- **Call status results provide summary of calls**
- **D-channel monitoring of layer 2/layer 3 cause code messages**
- **Store and print full layer 3 (Q.931) decodes**

ACTERNA™
Communications Test and Management Solutions

Call Verification

The HST-3000 can place, receive and monitor ISDN PRI calls on a primary or secondary T1 interface. It has the ability to place and receive single or NFAS voice, 3.1 kHz audio, 56k data, 64k data, Nx56/64k data or H0 calls. In addition, dual transmit/receive interfaces, standard on each T1 Service Interface Module (SIM), allows the HST-3000 to be deployed to test in-service to standby D-channel switching. All major call controls are supported, including National, DMS and 5ESS.

For incoming calls, the HST-3000 can either prompt the user to accept or reject the call, automatically accept or reject the call, or accept and loop back the B channels. After a call has been accepted, the technician can drop the received B channel data to the speaker or headset or BERT the call. BER testing and a voice path via a handset is provided to qualify these data and voice calls, respectively. This allows technicians to access T1 physical link measurements and verify switch translations prior to delivering service.

Easy-to-read result menus allow technicians to view ISDN statistics, call status, BERT results, T1 results and D-channel decodes. Technicians can also view a summary screen that presents a rapid assessment of test performance and a summary of results for the physical layer, LAPD and Q.931 results.

D-Channel Decodes Analysis

D-Channel decodes help to verify that a call is successfully established, or determine why a call was not completed by examining the protocol cause values. The HST-3000 can monitor layer 2 (Q.921) and layer 3 (Q.931) cause code messages on the D-channel in both terminate and monitor modes. Layer 2 results give technicians the ability to check link and D-channel status, verify LAPD frames and check utilization rates. Following link establishment, layer 3 decodes allow technicians to verify such factors as call state, who made or dropped the call, why the call was dropped, where the call is being carried (Interface ID/B-Channel) and call types.

Troubleshooting

Non-intrusive, bi-directional monitoring of in-service D-channel signaling messages makes troubleshooting ISDN service easier. For ISDN PRI circuits, the technician can access live D-channel lines through monitor jacks on a DSX patch panel. If the problem can not be isolated, then sectionalization can be accomplished by emulating either the TE or the NT. This enables the technician to sequentially replace each piece of premise equipment to identify the source of errors – reducing the total time to trouble resolution. Results can be displayed on-screen or stored for later retrieval and output via RS-232, USB or Ethernet connectivity standard with each base unit.

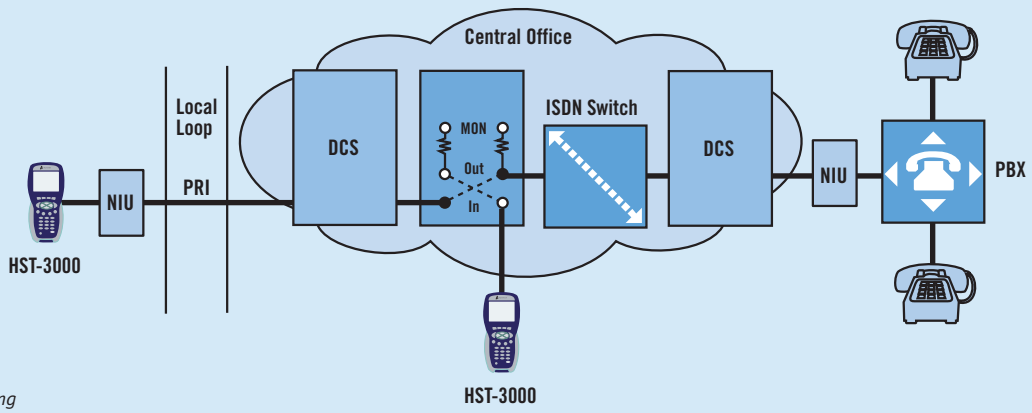


Figure 1: ISDN PRI testing

Flexible and Rugged Design

The HST's rugged, weather resistant design and long battery life are ideally suited for use in the field. Its modularity allows for field upgrades to support new testing requirements. 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 number of tests. The HST-3000 is easily upgradeable with technologies and advanced options that support the changing needs of service installers.

Test the Copper, Test the Service, Improve the Process

Equipped with the Copper Testing option and a copper Service Interface Module , the HST-3000 can quickly troubleshoot the local loop for line impairments that degrade or impair T1 performance. With the HST-3000, technicians can quickly identify and locate cable impairments: shorts, grounds, opens, crosses, bridged taps, wet sections and other high resistive faults. These impairments are easy to access with the HST-3000's advanced time domain reflectometer (TDR), precision digital volt/ohm meter (DVOM) and an accurate resistive fault locator (RFL) to pinpoint troubles prior to circuit installation. Copper test features are optimized for use anywhere on the local loop – at the NID, crossbox, pedestal, main distribution frame or anywhere a technician might gain access to the local loop to locate the source of trouble.

The T1 or HDSL facility that carries the ISDN PRI service can be qualified using a number of BERT patterns, such as QRSS, 1 in 8 and 3 in 24. The HST-3000 has an internal T1 clock signal and can also respond to in-band or out-of-band loopback commands, making it ideal for end-to-end or loopback BER testing.

After the physical layer has been tested, the actual ISDN service can be tested by placing and receiving calls, which verifies proper switch translations.

The HST-3000's pre-programmed tests and customized scripts ensure that all technicians, including novice users, follow the same procedures, eliminating mistakes caused by improper test configurations or incorrect procedures.

Acterna's TechComplete™ software (optional customized), allows the HST-3000 to improve turn-up and maintenance processes by operating with service provider's dispatch and closeout report systems to offload stored test results for later trend analysis and coaching reports. With these features, the HST-3000 can reduce repeat rates and failures and improve overall process efficiency.

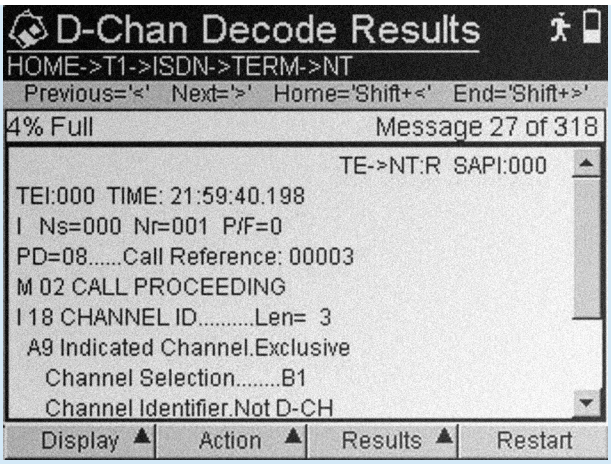


Fig. 2. D-Channel Decodes

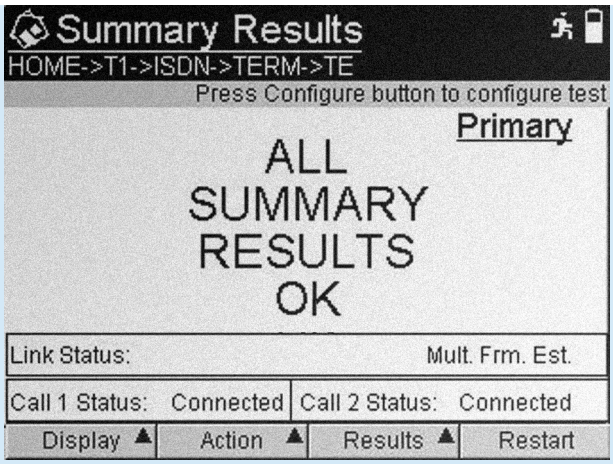


Fig. 3. ISDN PRI Summary Results

Interfaces

Dual Tx/Rx T1	Bantam jacks
10/100 BT Ethernet jack	8-pin modular
Serial port	DB9 female via cable (DCE)
USB Host	
USB Device	

T1 specifications

Operating Mode	Self test, T1 unframed,T1 D4,T1 ESF, FT1 D4 framed, FT1 ESF framed, T1 test Loopback, T1 line loopback
Input impedance	Bridge >1000 Ohms Term 100 Ohms +/- 5%
Receive level	DSX-DSX-MON 100 Ohms +/- 5% BRIDGE 0 to –20.0 dBdsx TERM +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 772 kHz
Line build out tolerance	+/- 1 dB at 772 kHz with LBO of 0 dB
Error insert	Bit Errors

ISDN PRI Specifications

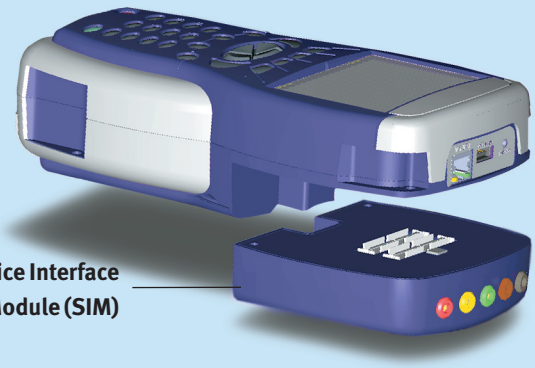
Operating modes	PRI Terminate PRI Monitor
Call controls	5ESS per 235-900-342 NTI-F per NT NIS-A211-1 NAT'L (National) per vendor documents and Bellcore SR-NWT-002120
Physical layer analysis	Layer 1 states Layer 2 (LAPD) states Layer 3 (call status) states Cause messages Loopbacks D-channel location select (PRI) D-channel backup testing (PRI) NFAS support (PRI) D-channel monitor D-channel message capture/LCD display/store
Voice capability	Layer 1 states Layer 2 (LAPD) states Layer 3 (call status) states Cause messages Loopbacks D-channel location select (PRI) D-channel backup testing (PRI) NFAS support (PRI) D-channel monitor D-channel message capture/LCD display/store
Data capability	10/100 BT Ethernet jack Serial port USB Host USB Device
ISDN testing	Call controls: National, AT&T and NTI custom Bit error rate test of B Channels NFAS/DCBU verification D Channel decode analysis Modes: Terminate, Monitor, PRI DS1: CRC/BPV/frame errors and errored seconds
Facilities testing	Bit Error Testing Timed tests Network loopbacks User configured loopbacks Line build-out (dB loss selection) T1 (511, 2047, 215–1, 220–1, 223-1, 1 in 8, 2 in 8, 3 in 24, zeros, ones, QRSS)

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 hrs. typical usage
Charging time	7 hours 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 transflective, 3.8-in diagonal (readable in direct sunlight)

General

Ruggedness	Survives 3-ft drop to concrete on all sides
Water-resistance	Splashproof: may be used in heavy rain
Language	English
Keypad	Typical 12-button keyboard



Flexible, modular platform makes technology upgrades or hardware changes easy

HST-3000 Handheld Services Tester
Actual Size: 9.5 x 4.5 x 2.75 in
Weight: 2.7 lb with battery

Ordering information

Base units

HST-3000C	HST-3000C base with copper testing Requires the purchase of a SIM – see separate listing for HST3000-CAR or HST3000-CU (Ethernet and serial ports included)
HST-3000	HST-3000 base without copper testing Requires the purchase of a SIM – see separate listing for HST-3000-CAR or HST-3000-AR (Ethernet and serial ports included)

SIMS (Modules)

HST-3000-T1	Dual Tx/Rx bantam T1 interface and T1 software option
HST-3000-CT1	Dual T/R/G interface for copper Testing and Dual Tx/Rx bantam T1 Interface and T1 software option
HST-3000-T1/T3	Dual Tx/Rx bantam T1 interface, and dual Rx, single Tx BNC DS3 interface and DS3 software option

Software options

HST3000-PRI	ISDN PRI software option
HST3000-TDR	TDR software option
HST3000-RFA	RFA/RFL software option
HST3000-WBTones	WB tones/TIMS software option
HST3000-VT100	VT100 option (Includes cable and software option)
HST3000-Script	Scripted testing software option
HST3000S-Web	Web browser software option
HST3000-PCMSIG	VF (PCM) signaling software option
HST3000-PCMTIMS	VF (PCM) TIMS software option
HST3000-T1DDS	T1 DDS 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
41084	T1 repeater power supply
43141	repeater power supply multiplexer
44116	HDSL doubler power supply
44527	HDSL remote access shelf
41157	Repeater extender

Acterna Advantage℠ – adding value with global services and solutions

From basic instrument support for your field technicians to management of complex, company-wide initiatives, Acterna's service professionals are committed to helping you maximize your return on investment. Whatever your needs – product support, system management, education services, or consulting and OSS (operations support systems) business planning – we offer programs that will give you the competitive edge. This is the foundation of Acterna Advantage.

Acterna is the world's largest provider of test and management solutions for optical transport, access, and cable networks, and the second largest communications test company overall. Focused entirely on providing equipment, software, systems, and services, Acterna helps customers develop; install; manufacture; and maintain optical transport, access, cable, data/IP, and wireless networks.

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