

# HST-3000 Handheld Services Tester

## Broadcom® Bonded ADSL2+/VDSL2 SIM



### Key Benefits

- Saves money and reduces repeat faults with triple-play services testing capability
- One universal module covers VDSL2/ADSL2 single and bonded pair with vectoring
- Saves time—the same tip/A, ring/B leads test copper and xDSL
- Verifies critical correct pair-bonding and provisioning, letting users segment single-line performance issues for bonded groups
- Isolates faults stemming from bridged taps, noise, or poor pair balance using Hlog and QLN graphs and G.INP analysis
- Improves OpEx and field productivity when combined with StrataSync™, a cloud-based solution that displays assets, modules, versions, and locations; maintains accurate instrument configuration and setup; and provides visibility into instrument utilization and test data management



### Applications

- ADSL2+, VDSL2, ADSL2+/VDSL2 bonding and VDSL2 vectoring
- Triple-play services over ADSL2+, VDSL2, Ethernet, and WiFi (web, data throughput, IP video, VoIP)
- Advanced copper-circuit testing with precision fault location
- Optical power level testing (with MP-60 or MP-80 USB accessory)

Service providers face significant challenges when ramping up their networks to provide advanced triple-play services with the same or better quality than cable/multiple switch operators (MSOs). Key to their success is cost-effectively increasing bandwidth to subscribers for new IP video services over bonded asymmetric digital subscriber line 2+/very high-speed digital subscriber line 2 (ADSL2+/VDSL2). Internet Protocol television (IPTV) services require pristine xDSL service Layer 1 performance. Factors such as noise, crosstalk, pair imbalance, bridged taps, and other copper plant anomalies can be easily hidden when testing one pair at a time. Designed for the outside plant, the HST-3000 meets those challenges head-on.

Featuring the latest Broadcom Corporation chipset, the new service interface module (SIM) tests bonded-pair ADSL2+/VDSL2 by terminating both pairs of a bonded group. The Broadcom SIM also supports legacy ADSL1, ADSL2, ADSL2+, VDSL2, and vectored VDSL2 in the same module, so technicians can easily switch between testing bonded and non-bonded services without the need to swap modules. Further, the module lets technicians work smarter and faster to test copper and xDSL using the same dual tip/ring/ground interface leads for both service turn-up and copper fault isolation.

The lightweight, rugged, and battery-operated HST-3000 with the Broadcom SIM cost-effectively scales to provide an all-in-one solution for field installation, maintenance, and troubleshooting across a wide range of triple-play service test applications.

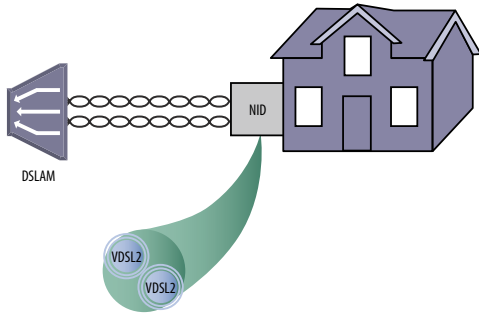


Figure 1. Bonded pair testing is mission critical

## Applications

### Why a Bonded Pair Test?

A relatively simple, single-pair sync test that checks one xDSL pair at a time is simply insufficient for bonded pair DSL service. Testing one pair at a time will not establish actual line rates, because it does not include the impact of crosstalk. Rates may give a false positive, because they may show higher bit rates without the effects of crosstalk noise. Testing one line at a time will not exercise the pair-bonding timer threshold settings nor will it validate that each line is wired to or configured for the same bonding group.

- Identifying when loops are not in the same bonding group *requires* dual modem testing
- Proper provisioning and bonded group metrics analysis require *both* interfaces to be active
- Crosstalk analysis is only possible when both pairs are active

### Full Compatibility Range

The new universal xDSL SIM for the HST-3000 tests ADSL1, ADSL2, ADSL2+, VDSL2, bonded ADSL, bonded VDSL, and vectored VDSL2 with just one module, making it compatible with a huge range of CPE and DSL access multiplexer (DSLAM) equipment. Service providers can minimize their investment cost in test equipment as well as in DSLAM ports, so they can continue to offer high-speed data services over single-pair ADSL2+, while turning up new IP video service tiers as they qualify new bonded service areas.

VDSL Summary - Group		
HOME->VDSL BOND->EMULATE		
Pair 1-Show Time, Pair 2-Show Time		17a,17a
	UP	DOWN
Group Rate	94875 K	160064 K
Max Group Rate	94072 K	246918 K
Group Capacity	100.0 %	64.8 %
Lapse Time	0 sec	
DSL Interface	RJ45	
Display ▲ SELT TERM Results ▲ DSL Stop		

Figure 2. Show Time for bonded pairs requires that both pairs of a bonded group are active

VDSL Summary - Pair 1		
HOME->VDSL BOND->EMULATE		
PTM 10101010 10101010	Est. Length 1.3k ft	Data Off V-FI,VDSL2 17a RJ45, VTU-R
V-Full/Show Time	UP	DOWN
Actual Rate	50628 K	80032 K
Max Rate	50341 K	122519 K
Capacity	100.0 %	65.3 %
Noise Margin	9.4 dB	14.1 dB
Line Attenuation	17.7 dB	11.0 dB
Signal Attenuation	17.2 dB	11.0 dB
Display ▲ SELT TERM Results ▲ DSL Stop		

Figure 3. View statistics simultaneously for both pairs of a bonded group

### BPT, Hlog, and QLN Graphs

Technicians can analyze poorly performing services with bits-per-tone (BPT), Hlog (insertion loss), and quiet line noise (QLN) graphs accessible within the xDSL application. Significant dips or notches in the BPT and Hlog graph may indicate the presence of a bridged tap or a corroded splice, showing the absorption of DSL signal energy. The QLN graph provides an indication of external noise interference. Spikes may show a high noise floor revealing noise interference issues. After identifying the trouble source, technicians can find and correct problems with the advanced copper measurement suite on the HST-3000, including the precision time domain reflectometer (TDR) or resistive fault locator (RFL) tools.

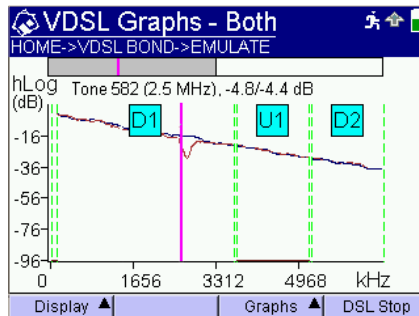


Figure 4. Dual-pair Hlog graph showing likely bridged tap on pair 1 at tone 582

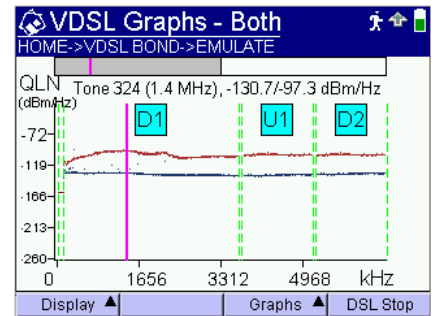
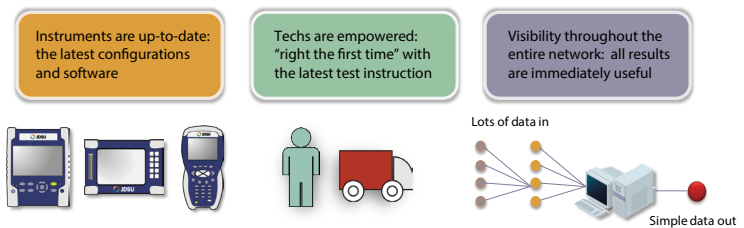


Figure 5. Dual-pair QLN graph showing noise on pair 1

### StrataSync Empowers Your Assets

StrataSync is a hosted, cloud-based solution that manages assets, configurations, and test data for JDSU instruments and ensures that all instruments are equipped with the latest software and installed options. StrataSync manages inventory, test results, and performance data from anywhere with browser-based ease for improved technician and instrument efficiency. StrataSync manages and tracks test instruments, collects and analyzes results from the entire network, and informs and trains the workforce.



Get all this without increasing headcount and while minimizing overall operating costs and truck rolls.

**Specifications**
**DSL Modem**
**Test Interface**

ADSL2+/VDSL2, RJ45 (single and bonded)

ADSL2+/VDSL2, 2 mm recessed banana tip/A, ring/B, (single and bonded)

**Modem Chipset**

Broadcom 63168

**VDSL Standard Compliance ITU-T G.993.2**
**VDSL2 Annex A, B**

ITU-T G.998.1 ATM bonding

ITU-T G.998.2 PTM bonding

ITU-T G.993.5 self-FEXT cancellation (vectoring)

Profiles: 8a/8b/8c/8d, 12a/12b, (17a for single only)

Band plan 997 and 998, U0 band

**ADSL Standard Compliance ITU-T G.992.1**
**Annex A (G.DMT)**

ITU-T G.992.3 Annex A, L (ADSL2)

ITU-T G.992.5 Annex A, M (ADSL2+)

ITU-T G.998.1 ATM bonding

ITU-T G.998.2 PTM bonding

ANSI T1.413-1998, Issue 2

ITU-T G.992.5 INP Amendment 3

**All Modes (single, bonded pair ADSL/VDSL2)**
**Graphs**

BPT

Combination BPT/SNR tone

VDSL band statistics

Hlog

QLN

**Miscellaneous results**

Synchronization (Show Time)

Failed synchronization

Number of syncs

Training time

Standard used

Estimated loop length

Modem firmware version

**Errors/Performance Local/Remote/Remote (total)**

Loss of signal

Forward error correction (FEC)

Cyclic redundancy check (CRC)

Loss of frame

Loss of margin

Far end loss of signal

Errored seconds

Severely errored seconds

Unavailable seconds

**Measurements (bonded pair ADSL/VDSL2)**
**G.INP Statistics (upstream/downstream)**

Status

Retransmitted DTUs

Corrected DTUs

Uncorrected DTUs

INP REIN

**Measurements (upstream/downstream)**

Modem state

Group rate

Max group rate

Group capacity

Lapse time

**Per Band Bonded VDSL2 Statistics**

Loop attenuation (LATN)

Signal attenuation (SATN)

SNR margin

Tx power

**Vectoring Status**

V-not configured, V-running, V-full, F-friendly

**Network**
**Network Modes**

Terminate,through

**Network Types**

ADSL1, ADSL2, ADSL2+, VDSL, bonded ADSL2+, bonded VDSL

IPoE, PPPoE, IPv6oE, multiple VLANs, data off

ADSL/ADSL2+

IPoE, PPPoE, IPv6oE, MVC Video, IPoA, PPPoA, multiple VLANs,

Network off

VPI/VCI

**Transport Types**

ATM, PTM

**IP Mode**

DHCP, static

**MAC Setting**

Factory default, user-defined

**Vendor ID**

Yes/No

**User Class**

Yes/No

**VLAN**

Tag on/off

ID selection 0–4095

Priority selection 0–7

**Additional Features**

Technology auto mode for single pair DSL standard

(Auto, ADSL, VDSL2)

Transport auto mode (ATM or PTM bonding)

PhyR settings upstream/downstream

NitroMode

Dual latency paths (VDSL2)

Four latency paths (ADSL2/2+)

**Cables**

CB-5CLIP-BON RJ to 5-clip lead cable

(bonded cable for Broadcom/Conexant®/Capri SIMs)

CB-5CLIP-RTC RJ to 5 clip lead cable with regular telco clips

(bonded cable for Broadcom/Conexant/Capri SIMs)

CB-BONDED RJ to dual RJ cable

(bonded cable for testing at the NID/NIU)

**Ordering Information**
**Base Unit**

HST3000-NG2-1 HST-3000 mainframe without copper (color)

HST3000C-NG2-1 HST-3000 copper mainframe (color)

**Available SIMS (modules)**

HST3000-BDCM-2 ADSL/VDSL with Broadcom chipset

HST3000-BDCM-WB2-2 ADSL/VDSL bonded and copper (up

to 30 MHz) with Broadcom chipset

HST3000-CUCE Copper only SIM, CE marked

HST3000-WB2 Wide band 2 (up to 30 MHz) copper test

HST3000-ETH 10/100/1000 Ethernet

HST3000-CT1 T1 and copper

HST3000-DC Datacom

HST3000-E1 E1

HST3000-E1-DC E1/datacom

HST3000-4WLL 4-wire local loop

HST3000-T1 Dual TX/RX Bantam T1 interface and T1

HST3000-T3 Dual TX/RX Bantam T1 interface,

and dual RX/single TX BNC DS3 interface/and DS3

HST-BRA ETSI (Euro) ISDN BRA

HST3000-BRI ISDN BRI

HST3000-CSH4 Copper, 4-wire G.SHDSL

(STU-R/C, Annex A/B)

HST3000-BLK Blank

**Software Options**

HST3000-BLUETOOTH Bluetooth wireless

HST3000-COS Class of service

HST3000-802.11 802.11 wireless

HST3000S-WEB Web browser

HST3000-REMOP Remote operation

HST3000-SCRIPT Scripted test

HST3000-DSL2 ADSL2 and ADSL2+

HST3000S-IP Advanced IP suite—PING and

through mode support

HST3000S-IP-Video IP video analysis

HST3000S-VMOS Video MOS analysis

HST3000-MSTV Microsoft IPTV video analysis

HST3000-VT100 VT100 emulation

HST3000S-VOIP VoIP software analysis

HST3000S-H.323 H.323 VoIP signaling

HST3000S-MGCP SCCP MGCP VoIP signaling

HST3000S-MOS VoIP mean opinion score

HST3000S-SCCP SCCP VoIP signaling

HST3000S-SIP SIP VoIP signaling

HST3000-UNISTIM VoIP signaling call controls for UNISTIM

HST3000-OPTETH Optical Ethernet

HST3000-IPV6 IPv6 option for Ethernet SIM

HST3000-MPLS MPLS

HST3000-MSTR Multiple streams

HST3000-TCPUDP TCP/UDP

HST3000-FTP FTP

HST3000-WBTONES WB TIMS

**Test & Measurement Regional Sales**

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