

Testing VDSL Remote (Customer) End Service Splitters

Application Note

AN/163

VDSL requires service-splitters at the network end as well as the remote customer end to separate the low-frequency telephone (POTS) and high-frequency data signals.

This Application Note outlines electrical tests of the Remote Customer End Splitter as covered in Annex E (pages 135-145) of ANSI Standard T1.424.2004.

The Remote End Service Splitter is shown in Fig.1. It consists of a pair of high-pass and low-pass filters in parallel with pass-band impedances and frequency ranges as shown.

The following is a list of test circuits and associated tables and test devices to facilitate the prescribed measurements:

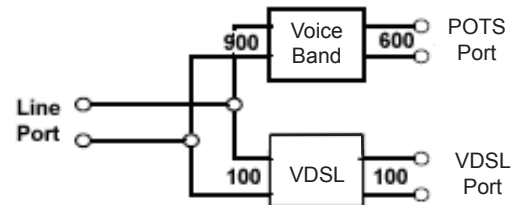


Fig. 1. Remote End Service Splitter

Test	ANSI Std. T1.424.2004 Requirement	Test Diagram	North Hills Device Key
Line to POTS 0.2-4kHz, 25kHz - 12MHz			
Insertion Loss ¹	Figure E.5 -- Table E.1	Figure 2	T1 = NH16186 & T2 = NH16185 or T1 = NH16189 & T2 = NH16188 ZHP _r = NH16274, MLP1=NH16410
Insertion Loss Ripple	Figure E.5 -- Table E.2		
Line Intermodulation Distortion	Figure E.5 -- Table E.4	Figure 2	T1= NH16186 T2= NH16185 ZHP _r = NH16274
Group Delay	Figure E.5 -- Table E.5		
Line to VDSL 25kHz - 12MHz			
Insertion Loss	Figure E.8 -- Table E.8	Figure 3	T3= NH16187 ZTR= NH16273
Insertion Loss Ripple	Figure E.8 -- Table E.9		
Return Loss 25kHz - 12MHz			
Return Loss	Figure E.9 -- Table E.10	Figure 4	RLB = 51100RLB ZTR = NH16273 ZTV = NH16409
POTS Longitudinal Balance 0.2 - 3kHz			
One Port Balance	Figure E.7 -- Table E.7	Figure 5	LBB1 = NH16392, ZTR = NH16272
Two Port Balance	Figure E.7 -- Table E.6	Figure 6	LBB1 = NH16392, CMI1 = NH16393

Note 1: Please refer to section on transmission in Application Note 160.

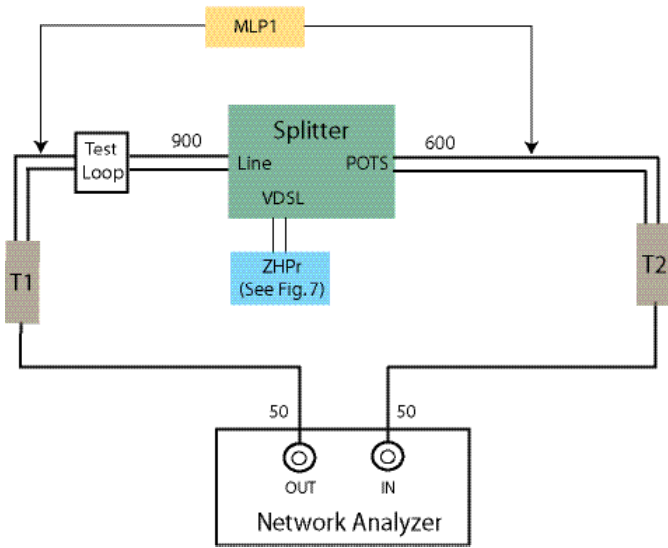


Fig. 2. Line to POTS Insertion Loss
0.2 - 4kHz, 25kHz - 12MHz

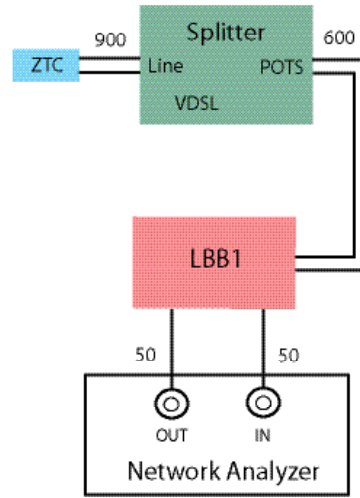


Fig. 5. One-Port POTS Longitudinal Balance
0.2 - 3kHz

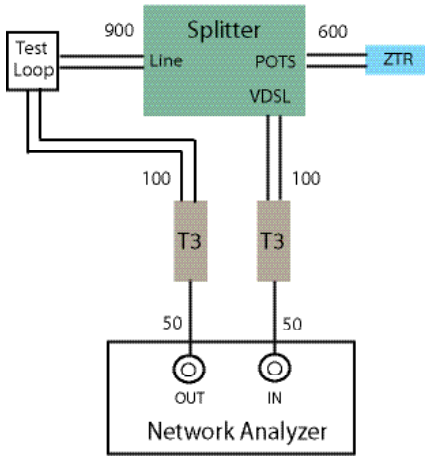


Fig. 3. Line to VDSL Insertion Loss
25kHz - 12MHz

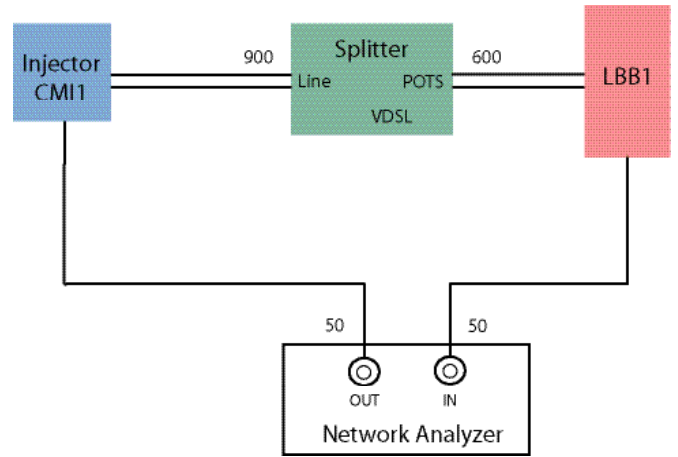


Fig. 6. Two-Port POTS Longitudinal Balance
0.2 - 3kHz

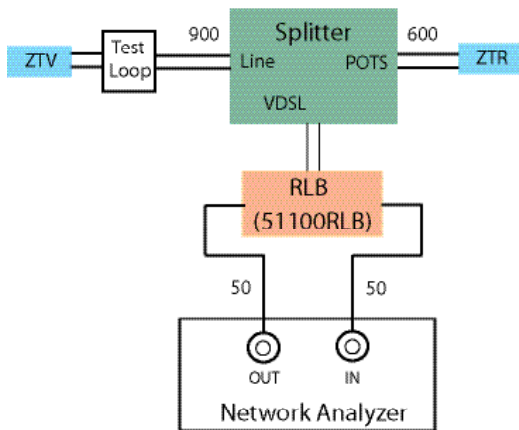


Fig. 4. VDSL Return Loss
25kHz - 12MHz

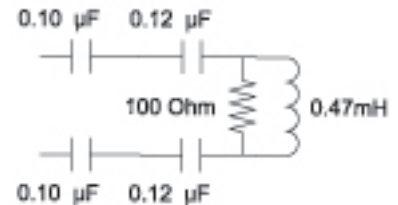


Fig. 7. ZHPr VDSL Port Termination Schematic

NORTH HILLS TEST DEVICE MODEL#	ANSI Std. T1.424.2004 Requirement	DESCRIPTION & FREQUENCY RANGE
Balun Transformers		
NH16185	T2 in Figure 2	50:600--Voice Band (200Hz-25kHz)
NH16186	T1 in Figure 2	50:900--Voice Band (200Hz-25kHz)
NH16187	T3 in Figure 3	50:100--VDSL (25kHz-30MHz)
NH16188	T2 in Figure 2	50:600--VDSL (25kHz-30MHz)
NH16189	T1 in Figure 2	50:900--VDSL (25kHz-30MHz)
Return Loss Bridges		
51100RLB	RLB in Figure 4	0.01-30MHz
Longitudinal Balance Bridges		
NH16403	LBB2 in Figures 5 & 6	50:900, 0.2-3kHz
Common Mode Injector Networks		
NH16404	CMI2 in Figure 6	Common Mode Injector
Termination Networks		
NH16408	ZHPc in Figures 2 & 7	VDSL Port Termination
NH16273	ZTR in Figure 5	600 ohm Terminator
NH16272	ZTC in Figures 3 & 4	900 ohm Terminator
NH16409	ZTV in Figure 4	100 ohm Terminator
NH16410	MLP1 in Figure 2	900/600 ohm Min. Loss Pad

Application Notes:

- 156. Measurement of Longitudinal Balance
- 157. Return Loss Bridges
- 160. Two-Port Balanced Network Measurements



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