

VDSL Autoconfiguration Plugtests Event 2008

Technical Information Document
Physical Layer
Version: 0.2
Date: 2008-03-06



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1 Introduction

This document gives an overview over the Auto Configuration Part of the VDSL-Autoconfig Plugtest 2008, hosted by ETSI Plugtests Services. It will give some information about the used infrastructure and the settings of the event. The purpose of this document is to allow the participants to prepare their equipment in advance.

**It is still possible, that something changed in this document until the
This document will be available in a final version as soon as the
registration application has been closed and the number of participating
companies is known.
Current version is 0.2**

2 General Information

2.1 Location and time

The Auto-Configuration Plugtest will be a part of the VDSL-Autoconfig Plugtest 2008. It will take place in Lannion France from May 12 through May 16.

Address and Contact of the place where the event will take place:

2.2 Contact

2.2.1 Technical Issues

CETECOM ICT Services
Martin Kirchner
Untertuerkheimer Str 6-10
66117 Saarbrücken
Tel: +49 681 598 8530
Mob: +49 173 878 0317
Mail: martin.kirchner@ict.cetecom.de
Web: <http://dsl.cetecom-ict.de>

2.2.2 Event Organising Issues

Generally:

ETSI Plugtests
Maya Ayache
CTI - Centre for Testing &
Interoperability
Plugtests TM Service
Tel: +33 (0)4 92 94 42 95
maya.ayache@etsi.org

3 Equipment Provisioning

3.1 What participants need to bring

- Power Cords (euro or shockproof plug)
- Power supplies and the devices must support 230V/50Hz
- PCs and own debug software
- Ethernet Cables to connect their equipment to the test network
- HUBs for tracing etc..

3.2 CPE Requirements

- The CPE has to be configurable during the event with respect to the IP settings, the kind of authentication, the ACS URL and the VPI/VCI settings.
- The CPE usernames must meet the requirements from TR-069 Chapter 3.4.4
- CPE vendors have to provide one firmware file which can be placed onto the file server
- It has to be possible to change the default ACS URL of the CPE
- The CPE should be prepared with the certificate distributed by CETECOM before the meeting
- The CPE has to be equipped with a power supply suitable for the German power mains network (230V/50Hz).

3.3 ACS Requirements

- The ACS has to be configurable during the event with respect to with respect to the IP settings, the authentication, the CPE address and the CPE Configuration parameter
- The ACS has to be prepared to use usernames and passwords as defined in TR-069 Chapter 3.4.4 for Digest authentication
- The ACS should be prepared with the certificate distributed and signed by CETECOM
- The CPE has to be equipped with a power supply suitable for the German power mains network (250V/50Hz).

3.4 Equipment provided by the organizer

- One central -48 VDC power supply
- One public PC with internet access
- Free WiFi access
- Tool Corner with soldering machine, screw drivers, etc.
- Some 10BT hubs for sniffing and debugging
- Workspace for every participating Company with 250V/50 Hz Power Connections, RJ-45 Sockets for DSL and Ethernet connection to the test network
- Some analogue phones
- SIP Server
- RADIUS Server
- HTTPS/HTTP and FTP Server
- DSLAM and test network (see chapter **Error! Reference source not found.**)

4 ADSL2/ADSL2plus Test Guide

4.1 Introduction

This document informs about specific tests which are recommended for the 3Play over broadband Plugtests event as long as ADSL2/ADSL2plus systems are subject for testing.

The document is based on the current DSL-Forum ADSL2/ADSL2plus interoperability test plans TR-100 (Version 1) and WT-105 (Version 6). This test guideline only refers to the tests in TR-100 and WT-105 without copying these into this document. Please refer to the respective documents for the relevant tests.

4.2 Test Guide

The Test Cases that are proposed in this document shall only be deemed as a proposal. The testing parties are free in performing further tests, if this is required to improve the interoperability of their systems. Furthermore, the participants DSL Plugtests Event are free in choosing the appropriate order of testing.

In the beginning of the interoperability test, the testing parties shall agree on the single test cases which shall be performed. However, the following test cases should be prepared in advance to allow a smooth and quick performance of the testing:

4.3 Reporting of Results

Only the pure results, collected in this document are feed back to the working groups of ETSI and maybe the DSL-FORUM. The page with firmware versions and other personal information are for your own use only. Please report only the results.

5 Proposed Tests

5.1 Noise Margin Verification

Before running performance tests, it is recommended to check the validity of the noise margin reporting provided by the units under test. As the Noise Margin Verification tests from TR-067 and TR-100, are too time-consuming to be used in the plugtests event (short time-slots) special Noise Margin Verification tests are proposed for this event.

- 1) Configure the loop simulator to 2000m (28,2dB) , ETS #1
- 2) Apply white noise at a level of -140dBm at both sides
- 3) Establish a DSL connection between DSLAM and CPE over the defined line in adaptive mode
- 4) Wait for 60 sec. after Showtime and report the Noise Margin and the CRC Errors of both sides
- 5) Increment the Noise Level at the ATU-R side in steps of 1 dB until CRC Errors are counted in the DOWNSTREAM
- 6) Report the UP and DOWNSTREAM Noise Margin
- 7) Disconnect the Modem
- 8) Re-configure the noise to -140 dBm/Hz on both sides
- 9) Establish a DSL connection between DSLAM and CPE over the defined line in adaptive mode
- 10) Wait for 60 sec. after Showtime and report the Noise Margin and the CRC Errors of both sides
- 11) Increment the Noise Level at the ATU-C side in steps of 1 dB until CRC Errors are counted in the UPSTREAM
- 12) Report the DOWN and UPSTREAM Noise Margin

5.2 WT-105 ADSL2/2+

5.2.1 Functional Tests from WT-105

ATU-R	ATU-C	Test
3.2.1	2.2.1	G.994.1 Handshake Procedure
3.2.5.2	2.2.5.2	Power management mode transition test
3.2.6	2.2.6	Loop Diagnostic Mode
3.2.7	2.2.7	Overhead Messaging Test
3.2.8.2	2.2.8.2	<p>Power Spectral Density (PSD) test. This test is possible independent from the Time slot at the CETECOM table for AnnexB devices.</p> <p><i>One Spectrum Analyzer will be centrally available at the event, if participants would like to verify the impact of their configuration to the electrical signal.</i></p> <p><i>We assume, that every participant has ensured in advance, that the PSD of his device is conform to the respective standard.</i></p>
8.1.8	8.1.8	ATU-R Register Reporting
8.1.9	8.1.9	Downstream Power Cutback

5.2.2 Layer1 Performance Tests from TR-100

ATU-R	ATU-C	Tests
A.2	A.2	<p>European Tests AnnexA</p> <p><i>Loop Simulators for ADSL, ADSL2 and ADSL2plus will be available during the 5th Joint DSL Plugtests Event. We will have one loop simulator for every test combinations placed close to the DSLAM Manufactures. Also we will have some movable noise generators</i></p> <p><i>All performance tests should be perform without noise or with the noise specified in the respective standard, please note this in the collection of the results</i></p> <p><u>Tests for ADSL2:</u></p> <p>A.2.5.1 Table A.2-15/TR-100 with the Profile A2_RA_F_16000k with White Noise Impairment</p> <p>A.2.5.2 Table A.2-18/TR-100 with Profile A2_RA_I1/2_16000k with FB Impairment</p> <p><u>Tests for ADSL2+:</u></p> <p>A.2.5.3 Table A.2-19/TR-100 with Profile A2P_RA_F_30000K with White Noise Impairment</p> <p>A.2.5.4 Table A.2-23/TR-100 with Profile A2P_RA_I_30000K with FB Impairment</p> <p><u>Tests for ADSL2+ CABINET:</u></p> <p>A.3 Table A.3-3/TR-100 with Profile A2P_RA_I_30000K, CAL=36 with FD over ADSL Impairment</p>

B.2	B.2	<p><u>European Tests AnnexB</u></p> <p><i>Loop Simulators for ADSL, ADSL2 and ADSL2plus will be available during the 5th Joint DSL Plugtests Event. We will have one loop simulator for every test combinations placed close to the DSLAM Manufactures. Also we will have some movable noise generators</i></p> <p><i>All performance tests should be perform without noise or with the noise specified in the respective standard, please note this in the collection of the results</i></p> <p><u>Tests for ADSL2:</u></p> <p>B.2.4.1 Table B.2-11/TR-100 with the Profile B2_RA_F_16000k with White Noise Impairment</p> <p>B.2.4.2 Table B.2-14/TR-100 with Profile B2_RA_I_16000k with FB Impairment</p> <p><u>Tests for ADSL2+:</u></p> <p>B.3.4.1 Table B.3-12/TR-100 with Profile B2P_RA_F_30000K with White Noise Impairment</p> <p>B.3.4.2 Table B.3-15/TR-100 with Profile B2P_RA_I_30000K with FB Impairment</p> <p><u>Tests for ADSL2+ CABINET:</u></p> <p>B.3.8 Table B.3-32/TR-100 with Profile A2P_RA_I_30000K, CAL=36 with FB Impairment</p>
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5.3 VDSL2

5.3.1 Functional Tests for VDSL2 adopted from WT-115

VTU-R	VTU-C	Test
5.1.1.1	5.1.1.1	Test of Capabilities, Profile and vendor ID
5.1.3	5.1.3	CRC Tests verify the CRC Error Reporting with micro interrupts of 10ms
5.2.6.7	5.2.6.7	Power management ; Transition from L0 to L2 and from L2 to L0 <ol style="list-style-type: none"> 1. Initial a stable Link between VTU-C and VTU-R 2. report the link data (rates and noise margin) 3. Start any higher layer transaction 4. Stop the Higher layer transaction and wait for the transition from to state L0 to L2 or force the transition to state L2 5. report the link data (rates and noise margin) 6. Initial a FTP or HTTP Up/Download 7. measure the time where the link need to transition in state L0 8. report the link data (rates and noise margin)
5.3.2.1	5.3.2.1	Bit Swapping <ol style="list-style-type: none"> 1. Initial a stable Link between VTU-C and VTU-R 2. report the link data (rates and noise margin) and the CRC Errors 3. Disturb one carrier in DOWN Stream direction 4. Report the link data (rates and noise margin), the CRC Errors and the bit loading of the disturbed carrier Disturb one carrier in UP Stream direction 5. Report the link data (rates and noise margin), the CRC Errors and the bit loading of the disturbed carrier
1.5	1.5	VTU-R Register Reporting Report the reported Register values by the DSLAM
5.4.3	5.4.3	In-band Spectral shaping (WT-115 Version 4)

5.3.2 Layer 1 Performance Tests for VDSL2 adopted from WT-114

VTU-R	VTU-C	Test
A.1.7.1	A.1.7.1	Loop Reach Tests with adaptive rate profiles for VDSL2 over POTS with FDM spectral mask.
B.3.1.1	B.3.1.1	Loop Reach Tests with adaptive rate profiles for VDSL2 over ISDN with Profile B_8x. And White Noise conditions
B.3.6.1	B.3.6.1	Loop Reach Tests with adaptive rate profiles for VDSL2 over ISDN with Profile B_30x. And White Noise conditions

6 Test Result collection

6.1 Test Information

Date of Test	
Timeslot:	
Used Loop Simulator:	
Used Noise Simulator	
Comment:	

Do not fill this field, if you like to report the results.

ATU-R	
Manufacturer:	
Typ / Name:	
Hardware Version:	
Firmware Version:	
Comment:	

Do not fill this field, if you like to report the results.

ATU-C	
Manufacturer:	
Typ / Name:	
DSL Typ	<input type="checkbox"/> ADSL2 AnnexA <input type="checkbox"/> ADSL2+AnnexA <input type="checkbox"/> ADSL2 AnnexB <input type="checkbox"/> ADSL2+AnnexB <input type="checkbox"/> VDSL2 Annex_
LT-Card	
Hardware Version:	
Firmware Version:	

6.2 TR-100/WT-105 ADSL2/ADSL2+

6.2.1 Functional Tests from WT-105

G.994.1 Handshake Procedure	
Achieved Shotime	<input type="checkbox"/> YES <input type="checkbox"/> NO
Comments	

Dynamic Behavior (Power Management mode transition test)		Comment (<i>needed time</i>)
Entry into L2 from L0	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	
Exit from L2 into L0	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	
L2 low power trim	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	

Functional Tests WT-105		Comment
Overhead Messaging Test	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	
Loop Diagnostic Mode	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	
Upstream PSD	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL	

Register Reporting		Comment
Upstream NM	<input type="checkbox"/> reported	
Donstream NM	<input type="checkbox"/> reported	
Upstream Loop Attenuation	<input type="checkbox"/> reported	
Downstr. Loop Attenuation	<input type="checkbox"/> reported	
ATU-R Vendor ID	<input type="checkbox"/> reported	
ATU-R version No.	<input type="checkbox"/> reported	
ATU-R Serial No.	<input type="checkbox"/> reported	

6.3 Layer 1 Performance Tests from TR-100

6.3.1 ADSL2 AnnexA

Table A.2-15/TR-100			
Noise:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
DSLAM:	<input type="checkbox"/> ADSL	<input type="checkbox"/> ADSL2	<input type="checkbox"/> ADSL2+ <input type="checkbox"/> ADSL <input type="checkbox"/> VDSL
	<input type="checkbox"/> AnnexA	<input type="checkbox"/> AnnexB	<input type="checkbox"/> Annex

Loop Length (m, ETSI loop #1)	A2 RA F 16000k							
	Upstream				Downstream			
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)
	Expected	Measured	Pass/Fail		Expected	Measured	Pass/Fail	
250	1048				12232			
1250	1048				12232			
1750	1048				11952			
2500	1048				9968			
3250	1004				6280			
4000	800				3292			
4750	576				1688			
5500	378				604			

Table A.2-18/TR-100			
Noise:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
DSLAM:	<input type="checkbox"/> ADSL	<input type="checkbox"/> ADSL2	<input type="checkbox"/> ADSL2+ <input type="checkbox"/> ADSL <input type="checkbox"/> VDSL
	<input type="checkbox"/> AnnexA	<input type="checkbox"/> AnnexB	<input type="checkbox"/> Annex

Loop Length (m, ETSI loop #1)	A2P RA II/2 16000k							
	Upstream				Downstream			
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)
	Expected	Measured	Pass/Fail		Expected	Measured	Pass/Fail	
250	1048				8052			
750	1048				9244			
1250	972				8348			
1750	836				6912			
2250	696				4616			
2750	536				2156			
3250	376				96			

6.3.2 ADSL2+ AnnexA

Table A.2-19/TR-100			
Noise:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
DSLAM:	<input type="checkbox"/> ADSL	<input type="checkbox"/> ADSL2	<input type="checkbox"/> ADSL2+ <input type="checkbox"/> ADSL <input type="checkbox"/> VDSL
	<input type="checkbox"/> AnnexA	<input type="checkbox"/> AnnexB	<input type="checkbox"/> Annex

Loop Length (m, ETSI loop #1)	A2P RA F 30000k							
	Upstream				Downstream			
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)
	Expected	Measured	Pass/Fail		Expected	Measured	Pass/Fail	
250	1048				23800			
1250	1048				22048			
1750	1048				17340			
2500	1048				10432			
3250	1004				6100			
4000	800				3292			
4750	576				1688			
5500	378				604			

Table A.2-23/TR-100			
Noise:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
DSLAM:	<input type="checkbox"/> ADSL	<input type="checkbox"/> ADSL2	<input type="checkbox"/> ADSL2+ <input type="checkbox"/> ADSL <input type="checkbox"/> VDSL
	<input type="checkbox"/> AnnexA	<input type="checkbox"/> AnnexB	<input type="checkbox"/> Annex

Loop Length (m, ETSI loop #1)	A2P RA I 30000k							
	Upstream				Downstream			
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)
	Expected	Measured	Pass/Fail		Expected	Measured	Pass/Fail	
100	944				14296			
250	944				14296			
750	944				13600			
1250	928				11800			
1750	804				9296			
2500	588				3330			
3250	348				200			

Table A.3-3/TR-100			
Noise:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
DSLAM:	<input type="checkbox"/> ADSL	<input type="checkbox"/> ADSL2	<input type="checkbox"/> ADSL2+ <input type="checkbox"/> ADSL <input type="checkbox"/> VDSL
	<input type="checkbox"/> AnnexA	<input type="checkbox"/> AnnexB	<input type="checkbox"/> Annex

Loop Length (m, ETSI loop #2)	A2P_RA_I_30000k CAL=36							
	Upstream				Downstream			
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)
	Expected	Measured	Pass/Fail		Expected	Measured	Pass/Fail	
1000	840				7250			
2000	860				6100			
2400	850				3960			

6.3.3 ADSL2 AnnexB

Table B.2-11/TR-100			
Noise:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
DSLAM:	<input type="checkbox"/> ADSL	<input type="checkbox"/> ADSL2	<input type="checkbox"/> ADSL2+ <input type="checkbox"/> ADSL <input type="checkbox"/> VDSL
	<input type="checkbox"/> AnnexA	<input type="checkbox"/> AnnexB	<input type="checkbox"/> Annex

Loop Length [m, loop#1]	B2_RA_F_16000							
	Upstream				Downstream			
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)
	Expected	Measured	Pass/Fail		Expected	Measured	Pass/Fail	
0	1096				10000			
500	1096				10000			
1000	1096				10000			
1500	1096				10000			
2000	1048				8656			
2500	960				6560			
3000	744				4064			
3500	544				2200			
4000	344				720			

Table B.3-14/TR-100			
Noise:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
DSLAM:	<input type="checkbox"/> ADSL	<input type="checkbox"/> ADSL2	<input type="checkbox"/> ADSL2+ <input type="checkbox"/> ADSL <input type="checkbox"/> VDSL
	<input type="checkbox"/> AnnexA	<input type="checkbox"/> AnnexB	<input type="checkbox"/> Annex

Loop Length [m, loop#1]	B2_RA_I_16000k							
	Upstream				Downstream			
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)
	Expected	Measured	Pass/Fail		Expected	Measured	Pass/Fail	
250	890				6434			
750	890				7508			
1250	825				7334			
1750	640				6165			
2250	434				4121			
2750	225				1861			
3000	96				640			

6.3.4 ADSL2+ AnnexB

Table B.3-12/TR-100			
Noise:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
DSLAM:	<input type="checkbox"/> ADSL	<input type="checkbox"/> ADSL2	<input type="checkbox"/> ADSL2+ <input type="checkbox"/> ADSL <input type="checkbox"/> VDSL
	<input type="checkbox"/> AnnexA	<input type="checkbox"/> AnnexB	<input type="checkbox"/> Annex

Loop Length [m, loop#1]	B2P_RA_F_30000k							
	Upstream				Downstream			
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)
	Expected	Measured	Pass/Fail		Expected	Measured	Pass/Fail	
0	1096				24000			
500	1096				24000			
1000	1096				22712			
1500	1096				18112			
2000	1048				12496			
2500	960				7472			
3000	744				4000			
3500	544				1648			
4000	344				504			

Table B.3-15/TR-100			
Noise:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
DSLAM:	<input type="checkbox"/> ADSL	<input type="checkbox"/> ADSL2	<input type="checkbox"/> ADSL2+ <input type="checkbox"/> ADSL <input type="checkbox"/> VDSL
	<input type="checkbox"/> AnnexA	<input type="checkbox"/> AnnexB	<input type="checkbox"/> Annex

Loop Length [m, loop#1]	B2P RA I 30000								
	Upstream				Downstream				
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)				Noise Margin, Reported (dB)
	Expected	Measured	Pass/Fail		Expected		Measured	Pass/Fail	
					Class A	Class B			
100	888				13000	7640			
250	888				13000	7640			
750	888				13000	7640			
1250	832				12136	7640			
1750	640				9088	7640			
2500	328				3408	3408			
3000	128				1056	1056			

Table B.3-8/TR-100			
Noise:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
DSLAM:	<input type="checkbox"/> ADSL	<input type="checkbox"/> ADSL2	<input type="checkbox"/> ADSL2+ <input type="checkbox"/> ADSL <input type="checkbox"/> VDSL
	<input type="checkbox"/> AnnexA	<input type="checkbox"/> AnnexB	<input type="checkbox"/> Annex

loop length [m, loop#1]	DS sync rate [kbps]		Downstream Noise Margin, Reported (dB)	Pass / Fail
	expected	measured		
100	5344			
250	5184			
750	4600			
1500	3520			
2250	1016			

6.4 VDSL2

6.4.1 Functional Tests for VDSL2

TPS-TC Parameters		Details
Power Management	<input type="checkbox"/> O.K.	
CRC Error verification	Counted errors over 10 ms	
Test of Capabilities	<input type="checkbox"/> O.K.	
Basic Functionality bitswap test	<input type="checkbox"/> O.K.	
Verification of CRC error reporting	<input type="checkbox"/> O.K.	
VTU-R Register Reporting (<i>WT-115 / 5.7</i>)	<input type="checkbox"/> O.K.	
In-band Spectral Shaping	<input type="checkbox"/> O.K.	

Loop Reach tests VDSL2Noise: YES NO

Loop length 26 AWG	Testprofile VDSL2 over POTS							Repor ted Oper ating Mode
	Upstream			Downstream				
	Sync Rate (kbps)		Noise Margi n, Repor ted (dB)	Sync Rate (kbps)		Noise Margi n, Repor ted (dB)		
	Expect ed	Measu red		Expect ed	Meas ured			
50m								
100 m								
150 m								
200 m								
250 m								
300 m								
350 m								
400 m								
450 m								
500 m								
550 m								
600 m								
650 m								
700 m								
750 m								
800 m								
850 m								
900 m								
950 m								
1000 m								
1200 m								
1400 m								
1600 m								
1800 m								
2000 m								
2200 m								
2400 m								
2500 m								

Loop Reach tests VDSL2Noise: YES NO

Loop length 26 AWG	Testprofile B_8x							Repor ted Oper ating Mode
	Upstream				Downstream			
	Sync Rate (kbps)		Noise Margi n, Repor ted (dB)	Sync Rate (kbps)		Noise Margi n, Repor ted (dB)		
	Expect ed	Measu red		Expect ed	Meas ured			
50m								
100 m								
150 m								
200 m								
250 m								
300 m								
350 m								
400 m								
450 m								
500 m								
550 m								
600 m								
650 m								
700 m								
750 m								
800 m								
850 m								
900 m								
950 m								
1000 m								
1200 m								
1400 m								
1600 m								
1800 m								
2000 m								
2200 m								
2400 m								
2500 m								

Loop Reach tests VDSL2Noise: YES NO

Loop length 26 AWG	Testprofile B_30x							Repor ted Oper ating Mode
	Upstream			Downstream				
	Sync Rate (kbps)		Noise Margi n, Repor ted (dB)	Sync Rate (kbps)		Noise Margi n, Repor ted (dB)		
	Expect ed	Measu red		Expect ed	Meas ured			
50m								
100 m								
150 m								
200 m								
250 m								
300 m								
350 m								
400 m								
450 m								
500 m								
550 m								
600 m								
650 m								
700 m								
750 m								
800 m								
850 m								
900 m								
950 m								
1000 m								
1200 m								
1400 m								
1600 m								
1800 m								
2000 m								
2200 m								
2400 m								
2500 m								