UNH-IOL
DSL Consortium
DSL Forum TR-100
(TR100) Report Revision 1.0

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14 April 2009

Mr. Mike Vendor
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Mr. Vendor,

Enclosed are the results from the Broadband Forum TR-100 Test Suite performed on the DSL Modem Model A. The testing was performed according to Version 1 of the Broadband Forum TR-100, which may be downloaded from the following address:

http://www.broadband-forum.org/technical/download/TR-100.pdf

If you have any questions about the test procedures or results, please contact me via email at joe@iol.unh.edu, or by phone at +1-603-862-2911.

Sincerely,

Joe Tester

Joe Tester

Report reviewed by

Jane Tester

Jane Tester

UNH-IOL
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Result Key

Result	Interpretation
PASS / P	The device under test (DUT) exhibited conformant behavior.
FAIL / F	The DUT exhibited non-conformant behavior.
PSP	Performance sum pass. The DUT passed according to the performance sum metrics defined in TR-100.
RTC	(Refer-to-Comments) – From the observations a valid pass or fail could not be determined. Additional information explaining the situation is included.
NA	(Not Applicable) – The DUT does not support the technology required to perform this test.
NT	(Not Tested) – This test was not performed. Please refer to comments for a detailed explanation.

Test Summary

Test Number	Test Name	Results
SECTION 7 – PHYSICAL LAYER TEST CASES		
7.1	Bitswap Performance Test	**NT**
SECTION 8 – HIGHER LAYER TEST CASES		
8.1.1	Packet Throughput Test	**NT**
ANNEX A – NORTH AMERICAN TEST SET		
Loop tests with ports set for rate adaptive automode operation		
A.1.4.1	12 ADSL2plus self NEXT and FEXT Noise Impairment	**PASS**
A.1.4.2.1	26AWG Loop with Test Profile AU_RA_L_30000k	**PASS**
A.1.4.2.2	26AWG Loop with Test Profile AU_RA_I_30000k	**FAIL**
A.1.4.2.3	26AWG Loop with 24AWG Bridge Taps and Test Profile AU_RA_L_30000k	**PASS**
A.1.4.3	24 HDSL NEXT Impairment	**PASS**
A.1.4.4	5 T1 Adjacent Binder Impairment	**FAIL**
Loop tests with ports set for rate adaptive single mode operation		
A.1.5.1	12 Self NEXT and FEXT Noise Impairment	**PASS**
A.1.5.2	AWGN -140dBm/Hz Noise Impairment	**PASS**
A.1.5.3	24 HDSL NEXT Impairment	**PASS**
A.1.5.4	5 T1 NEXT Adjacent Binder Impairment	**PASS**

Equipment List

1. CPE: DSL Modem Model A (IOL ID: 0001)
   - Chipset make: DSL Consortium
   - Chipset model: DC1
   - Chipset firmware version: 1.2.3
   - System software version: 1.2.3
   - The Model A was set to train in automode (refer to DSL Forum TR-100).
2. DSLAM: DSL Modem
   - Line-card: Model A; port 1 (IOL ID: 1234)
   - Chipset make: DSL Consortium
   - Chipset model: DC1
   - Chipset firmware version: 1.2.3
   - System software version: 1.2.3
   - Maximum upstream data rate 2048 kbps, maximum downstream data rate 32000 kbps
   - Minimum upstream and downstream data rate 32 kbps
   - Net data rates were taken from the ATU-C serial configuration interface
3. Loop simulator: Company X Model X1.
   - Loop simulator serial #: 001122334455.
4. Impairment generator: Company Y Model Y2.
   - White_noise_file.xtk.
5. Coupling Circuit: Company Z Model Z3.
6. Testing station 6 with LASI (Lasi Automation with Standard Interfaces) version 2007.01.01.
7. Splitter Information: No CPE splitter installed.
8. Splitter Information: No CO splitter installed.
9. ATM Traffic Generator/Analyzer: NA.
10. Router / broadband access server: NA.

Test Detail

Test Number and Label	Result
A.1.4.1 – 12 ADSL2plus self NEXT and FEXT Noise Impairment (IOL Test ID: 12345)	PASSED

Purpose: The purpose of this test is to measure the rate vs. reach capabilities of the DUT with -140 dBm/Hz AWGN and 12 ADSL2plus self NEXT and FEXT impairment using a high latency profile. All test metrics must be passed. See Annex A of this document for more information.

Results

Loop Length 26 AWG (kft)	Bridge Tap Length 24 AWG (ft)	Noise Applied on CO Side	Noise Applied on Remote Side	Test Profile AU_RA_I_30000k								
				Upstream				Downstream				
				Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Reported Operating Mode
				Expected	Measured	Pass/Fail		Expected	Measured	Pass/Fail		
1	0	12 ADSL2plus Up FEXT, -140 dBm/Hz AWGN	-140 dBm/Hz AWGN	900	945	P	16.5	NA	21219	P	11.1	A2+
1	0	-140 dBm/Hz AWGN	12 ADSL2plus Dn FEXT, -140 dBm/Hz AWGN	NA	945	P	16.5	13700	17065	P	6	A2+
3	0	12 ADSL2plus Up FEXT, -140 dBm/Hz AWGN	-140 dBm/Hz AWGN	900	945	P	15.7	NA	20549	P	10.5	A2+
3	0	-140 dBm/Hz AWGN	12 ADSL2plus Dn FEXT, -140 dBm/Hz AWGN	NA	945	P	17.7	12254	14763	P	6	A2+
5	0	12 ADSL2plus Up FEXT + Dn NEXT, -140 dBm/Hz AWGN	12 ADSL2plus Up NEXT + Dn FEXT, -140 dBm/Hz AWGN	900	945	P	14	11001	13025	P	6.1	A2+
7	0	Same as previous	Same as previous	900	945	P	12.6	9284	10018	P	6	A2+
9	0	Same as previous	Same as previous	888	945	P	10	6969	7378	P	6	A2+
10	0	Same as previous	Same as previous	800	945	P	7.8	5712	6250	P	6.2	A2
12	0	Same as previous	Same as previous	800	848	P	6.1	3576	4157	P	6.2	A2+
5	50	Same as previous	Same as previous	913	945	P	14	10796	13049	P	6	A2+
5	100	Same as previous	Same as previous	900	945	P	12.8	10947	12394	P	6	A2+
5	150	Same as previous	Same as previous	900	945	P	13.5	11001	14039	P	6	A2+
5	200	Same as previous	Same as previous	900	945	P	14	10790	13942	P	6.1	A2+

Test Metrics

1. Data rate requirement: 20 of 22 tests must pass	22 test cases passed	**PASS**
2. Noise margin requirement: 0 reported margins < 4dB (upstream and downstream)	0 reported NM < 4dB	**PASS**
3. Noise margin requirement: 2 or less reported noise margins < 5dB (upstream and downstream)	0 reported NM < 5dB	**PASS**
4. Noise margin requirement: 3 or less reported noise margins < 6dB (downstream only)	0 reported DS NM < 6dB	**PASS**
5. Connectivity requirement: all 22 test cases must connect	0 test cases did not connect	**PASS**

Comments on Test Results

Test Number and Label	Result
A.1.4.2.1 – 26AWG Loop with Test Profile AU_RA_L_30000k (AWGN -140 dBm/Hz Noise Impairment) (IOL Test ID: 12345)	**PASSED**

Purpose: This test is designed to measure the rate vs. reach capabilities of the DUT with -140 dBm/Hz AWGN impairment using a low latency profile. All test metrics must be passed. See Annex A of this document for more information.

Results

Loop Length 26 AWG (kft)	Test Profile AU_RA_L_30000k								
	Upstream				Downstream				
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Reported Operating Mode
	Expected	Measured	Results		Expected	Measured	Results		
0.1	1000	1046	P	7.5	23412	26693	P	7.6	A2+
0.4	1000	1044	P	7.5	23768	26677	P	7.7	A2+
1	1000	1046	P	8	23616	26852	P	8.8	A2+
2	1000	1044	P	7.3	22740	26485	P	8.6	A2+
3	1000	1046	P	9.6	21551	25530	P	7.8	A2+
4	1000	1044	P	7	20287	23358	P	7.1	A2+
5	1000	1044	P	7.6	18186	20737	P	8	A2+
6	1000	1044	P	7.5	16456	17584	P	7.8	A2+
7	1000	1044	P	7.5	14368	14475	P	7.5	A2+
8	1000	1044	P	7.3	11236	11767	P	7.1	A2+
9	994	1046	P	7.1	9080	9585	P	6.6	A2+
10	976	1041	P	6.3	6734	7725	P	6.2	A2+
11	954	1047	P	7.6	5521	6118	P	6.1	A2+
12	900	1031	P	6	4167	4846	P	6.2	A2+
13	846	935	P	6	3264	3840	P	6.1	A2+
14	779	847	P	6	2717	3009	P	6.1	A2+
15	516	559	P	6.5	1952	2357	P	6.2	A2 L
16	430	515	P	6.2	1387	1809	P	6.2	A2 L
17	344	451	P	6.1	799	1371	P	6.1	A2 L
18	328	387	P	6.5	464	1006	P	6.2	A2 L
19	239	331	P	6.6	235	758	P	6.2	A2 L
20	150	259	P	6.8	212	445	P	6.2	A2 L

Test Metrics

1. Data rate requirement: 40 out of 44 test cases must pass	44 test cases passed	**PASS**
2. Noise margin requirement: 0 reported margins < 4dB (upstream and downstream)	0 reported NM < 4dB	**PASS**
3. Noise margin requirement: 4 or less reported noise margins < 5dB (upstream and downstream)	0 reported NM < 5dB	**PASS**
4. Noise margin requirement: 6 or less reported noise margins < 6dB (downstream only)	0 reported DS NM < 6dB	**PASS**
5. Connectivity requirement: all 44 test cases must connect	0 test cases did not connect	**PASS**

Comments on Test Results

Test Number and Label	Result
A.1.4.2.2 – 26AWG Loop with Test Profile AU_RA_I_30000k (AWGN -140 dBm/Hz Noise Impairment) (IOL Test ID: 12345)	**FAILED**

Purpose: This test is designed to measure the rate vs. reach capabilities of the DUT with -140 dBm/Hz AWGN impairment using a high latency profile. All test metrics must be passed. See Annex A of this document for more information.

Results

Loop Length 26 AWG (kft)	Test Profile AU_RA_L_30000k								
	Upstream				Downstream				
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Reported Operating Mode
	Expected	Measured	Results		Expected	Measured	Results		
0.1	900	945	P	16.8	18526	21188	P	9.7	A2+
0.4	900	945	P	16.5	18732	21185	P	9.6	A2+
1	900	945	P	17	18314	21219	P	11.1	A2+
2	900	945	P	17	18200	21032	P	10.7	A2+
3	900	945	P	17.5	17123	20549	P	10.5	A2+
4	900	945	P	17.8	16392	19564	P	8.3	A2+
5	900	945	P	18.3	15613	17816	P	8	A2+
6	900	945	P	16.5	14095	15717	P	7.6	A2+
7	900	945	P	17.1	13300	13391	P	7.6	A2+
8	900	NC	F	NC	11308	NC	F	NC	NC
9	850	945	P	15.1	9188	9185	F	6.5	A2+
10	800	945	P	13.5	6704	7645	P	6.5	A2
11	750	945	P	11.5	5364	5980	P	6	A2+
12	700	945	P	8.6	4496	4793	P	6.1	A2+
13	650	945	P	6.2	3496	3788	P	6.7	A2+
14	600	870	P	6	2292	2941	P	6.1	A2+
15	550	570	P	6.3	2022	2342	P	6.2	A2 L
16	500	520	P	6.1	1318	1853	P	6.2	A2 L
17	376	464	P	6.3	464	1402	P	6.2	A2 L
18	356	416	P	6.3	355	1022	P	6.3	A2 L
19	336	359	P	6.5	246	749	P	6.3	A2 L
20	227	287	P	7	178	466	P	6.2	A2 L

Test Metrics

1. Data rate requirement: 40 out of 44 test cases must pass	41 test cases passed	**PASS**
2. Noise margin requirement: 0 reported margins < 4dB (upstream and downstream)	0 reported NM < 4dB	**PASS**
3. Noise margin requirement: 4 or less reported noise margins < 5dB (upstream and downstream)	0 reported NM < 5dB	**PASS**
4. Noise margin requirement: 6 or less reported noise margins < 6dB (downstream only)	0 reported DS NM < 6dB	**PASS**
5. Connectivity requirement: all 44 test cases must connect	2 test cases did not connect	**FAIL**

Comments on Test Results

Test Number and Label	Result
A.1.4.2.3 – 26AWG Loop with Bridge Taps and Test Profile AU_RA_L_30000k (AWGN -140 dBm/Hz Noise Impairment) (IOL Test ID: 12345)	**PASSED**

Purpose: This test is designed to measure the rate vs. reach capabilities of the DUT with -140 dBm/Hz AWGN impairment using a low latency profile with bridge taps. All test metrics must be passed. See Annex A of this document for more information.

Results

Loop Length 26 AWG (kft)	Bridge Tap Length 24 AWG (ft)	Test Profile AU_RA_L_30000k								
		Upstream				Downstream				
		Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Reported Operating Mode
		Expected	Measured	Results		Expected	Measured	Results		
0.5	100	1000	1046	P	8.8	21971	25958	P	8.5	A2+
3	100	1000	1044	P	8	19423	23122	P	8	A2+
5	100	1000	1044	P	8.6	16631	18441	P	8	A2+
7	100	1000	1044	P	7.8	12862	13549	P	7.8	A2+
9	100	900	1046	P	7	8125	9503	P	6.7	A2+
11	100	900	1047	P	7.5	5270	6022	P	6.2	A2+
3	200	1000	1046	P	7.6	20932	25302	P	6.8	A2+
5	200	1000	1044	P	8	17812	20246	P	7.7	A2+
7	200	1000	1044	P	8.2	13156	13794	P	7.5	A2+
9	200	1000	1043	P	6.3	8221	8979	P	6.7	A2+
11	200	893	1047	P	7.7	4179	5673	P	6.2	A2+
12	250	803	1015	P	6	3293	4417	P	6.1	A2+
12	750	763	967	P	5.8	3842	4577	P	6.2	A2+
12	1500	492	895	P	5.8	3460	4687	P	6.2	A2+
15	400	516	551	P	6.3	1252	2041	P	6.2	A2 L
15	1000	491	523	P	6	1469	2176	P	6.2	A2 L
15	1500	336	483	P	6.1	1748	2247	P	6.3	A2 L
17.5	150	336	419	P	6.2	428	1185	P	6.2	A2 L
17.5	800	240	383	P	6.5	254	1013	P	6.2	A2 L
17.5	1500	24	327	P	6.3	508	1133	P	6.2	A2 L

Test Metrics

1. Data rate requirement: 36 out of 40 test cases must pass	40 test cases passed	**PASS**
2. Noise margin requirement: 0 reported margins < 4dB (upstream and downstream)	0 reported NM < 4dB	**PASS**
3. Noise margin requirement: 4 or less reported noise margins < 5dB (upstream and downstream)	0 reported NM < 5dB	**PASS**
4. Noise margin requirement: 5 or less reported noise margins < 6dB (downstream only)	2 reported DS NM < 6dB	**PASS**
5. Connectivity requirement: all 40 test cases must connect	0 test cases did not connect	**PASS**

Comments on Test Results

Test Number and Label	Result
A.1.4.3 – 26AWG Loop with Bridge Taps and Test Profile AU_RA_L_30000k (-140 dBm/Hz AWGN and 24 HDSL NEXT Noise Impairment) (IOL Test ID: 12345)	**PASSED**

Purpose: This test is designed to measure the rate vs. reach capabilities of the DUT with -140 dBm/Hz AWGN and 24 HDSL NEXT impairment using a low latency profile with bridge taps. All test metrics must be passed. See Annex A of this document for more information.

Results

Loop Length 26 AWG (kft)	Bridge Tap Length 24 AWG (ft)	Test Profile AU_RA_L_30000k								
		Upstream				Downstream				
		Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Reported Operating Mode
		Expected	Measured	Results		Expected	Measured	Results		
1	0	1000	1047	P	8.8	20000	26357	P	7.5	A2+
3	0	1000	1047	P	6.8	19484	24755	P	7.2	A2+
5	0	879	927	P	6	17506	19961	P	7	A2+
7	0	588	747	P	6	12988	13197	P	6.3	A2+
9	0	560	555	F	6	7184	7515	P	6	A2+
11	0	366	384	P	6	3619	3884	P	6	A2+
13	0	192	199	P	6.2	1624	1706	P	6.1	A2+
5	100	867	927	P	6	15443	17634	P	7.2	A2+
5	200	807	903	P	6.2	17173	19521	P	6.8	A2+
6	500	665	795	P	6	14443	16640	P	6.8	A2+

Test Metrics

1. Data rate requirement: 18 out of 20 test cases must pass	19 test cases passed	**PASS**
2. Noise margin requirement: 0 reported margins < 4dB (upstream and downstream)	0 reported NM < 4dB	**PASS**
3. Noise margin requirement: 2 or less reported noise margins < 5dB (upstream and downstream)	0 reported NM < 5dB	**PASS**
4. Noise margin requirement: 3 or less reported noise margins < 6dB (downstream only)	0 reported DS NM < 6dB	**PASS**
5. Connectivity requirement: all 20 test cases must connect	0 test cases did not connect	**PASS**

Comments on Test Results

Test Number and Label	Result
A.1.4.4 – 26AWG Loop with Bridge Taps and Test Profile AU_RA_L_30000k (-140 dBm/Hz AWGN and 5 T1 Adjacent Binder NEXT Noise Impairment) (IOL Test ID: 12345)	**FAILED**

Purpose: This test is designed to measure the rate vs. reach capabilities of the DUT with -140 dBm/Hz AWGN and 5 T1 adjacent binder NEXT impairment using a low latency profile with bridge taps. All test metrics must be passed. See Annex A of this document for more information.

Results

Loop Length 26 AWG (kft)	Bridge Tap Length 24 AWG (ft)	Test Profile AU_RA_L_30000k								
		Upstream				Downstream				
		Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Reported Operating Mode
		Expected	Measured	Results		Expected	Measured	Results		
1	0	1000	1046	P	7.5	20321	25507	P	7	A2+
3	0	1000	1044	P	8	16235	20530	P	6.5	A2+
5	0	1000	1044	P	8.8	9648	13347	P	6.2	A2+
7	0	1000	1044	P	7.2	4702	5460	P	6.1	A2+
9	0	994	1046	P	7.1	2626	3224	P	6.3	A2+
13	0	846	NC	F	NC	796	NC	F	NC	NC
14	0	620	NC	F	NC	515	NC	F	NC	NC
15	0	456	547	P	7	86	677	P	6.7	A2 L
5	100	1000	1044	P	8.2	8243	11363	P	6.2	A2+
5	200	1000	1044	P	7.5	10082	13174	P	6.2	A2+
6	500	1000	1044	P	7.5	7447	8801	P	6.2	A2+

Test Metrics

1. Data rate requirement: 20 out of 22 test cases must pass	18 test cases passed	**FAIL**
2. Noise margin requirement: 0 reported margins < 4dB (upstream and downstream)	0 reported NM < 4dB	**PASS**
3. Noise margin requirement: 2 or less reported noise margins < 5dB (upstream and downstream)	0 reported NM < 5dB	**PASS**
4. Noise margin requirement: 3 or less reported noise margins < 6dB (downstream only)	0 reported DS NM < 6dB	**PASS**
5. Connectivity requirement: all 22 test cases must connect	4 test cases did not connect	**FAIL**

Comments on Test Results

Test Number and Label	Result
A.1.5.1 – 26AWG Loop and Test Profile AU_RA_I_30000k (12 self NEXT and FEXT Noise Impairment) (IOL Test ID: 12345)	**PASSED**

Purpose: The purpose of this test is to measure the rate vs. reach capabilities of the DUT with -140 dBm/Hz AWGN and 12 Self NEXT and FEXT impairment using a high latency profile and single mode of operation. All test metrics must be passed. See Annex A of this document for more information.

Results

Loop Length 26 AWG (kft)	Noise Applied on CO Side	Noise Applied on Remote Side	Test Profile AU_RA_I_30000k								
			Upstream				Downstream				
			Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Operating Mode
			Expected	Measured	Pass/Fail		Expected	Measured	Pass/Fail		
1	12 ADSL2plus Up FEXT, -140 dBm/Hz AWGN	-140 dBm/Hz AWGN	900	945	P	15	NA	21210	P	11.1	A2+
1	-140 dBm/Hz AWGN	12 ADSL2plus Dn FEXT, -140 dBm/Hz AWGN	NA	945	P	17.5	13700	17055	P	6	A2+
5	12 ADSL2plus Up FEXT + Dn NEXT, -140 dBm/Hz AWGN	12 ADSL2plus Up NEXT + Dn FEXT, -140 dBm/Hz AWGN	900	945	P	14.2	11001	13018	P	6.1	A2+
12	12 ADSL2plus Up FEXT + Dn NEXT, -140 dBm/Hz AWGN	12 ADSL2plus Up NEXT + Dn FEXT, -140 dBm/Hz AWGN	800	852	P	6.1	3576	4164	P	6.1	A2
15	12 ADSL2 Annex-L Up FEXT + Dn NEXT, -140 dBm/Hz AWGN	12 ADSL2 Annex-L Up NEXT + Dn FEXT, -140 dBm/Hz AWGN	464	538	P	6.3	1348	2244	P	6.2	A2 L

Test Metrics

1. Data rate requirement: 7 of 8 tests must pass	8 test cases passed	**PASS**
2. Noise margin requirement: 0 reported margins < 4dB (upstream and downstream)	0 reported NM < 4dB	**PASS**
3. Noise margin requirement: 1 or less reported noise margins < 5dB (upstream and downstream)	0 reported NM < 5dB	**PASS**
4. Noise margin requirement: 1 or less reported noise margins < 6dB (downstream only)	0 reported DS NM < 6dB	**PASS**
5. Connectivity requirement: all 8 test cases must connect	0 test cases did not connect	**PASS**

Comments on Test Results

Test Number and Label	Result
A.1.5.2 – 26AWG Loop with Bridge Taps and Test Profile AU_RA_I/L_30000k (-140 dBm/Hz AWGN Noise Impairment) (IOL Test ID: 12345)	**PASSED**

Purpose: This test is designed to measure the rate vs. reach capabilities of the DUT with -140 dBm/Hz AWGN noise impairment using a high and low latency profiles and a single mode of operation with bridge taps. All test metrics must be passed. See Annex A of this document for more information.

Results

Loop Length 26 AWG (kft)	Bridge Tap Length 24 AWG (ft)	Test Profile AU_RA_L_30000k								
		Upstream				Downstream				
		Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Operating Mode
		Expected	Measured	Results		Expected	Measured	Results		
1	0	1000	1044	P	7.5	23616	26852	P	8.8	A2+
5	0	1000	1044	P	7.8	18186	20729	P	8.2	A2+
12	0	846	1023	P	6.1	4167	4880	P	6	A2
17.5	800	240	383	P	6.5	524	1017	P	6.2	A2 L

		Test Profile AU_RA_I_30000k								
		Upstream				Downstream				
		Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Operating Mode
		Expected	Measured	Expected		Expected	Measured	Results		
1	0	900	945	P	17.5	18314	21213	P	11.1	A2+
5	0	900	945	P	16	15613	17819	P	8.1	A2+
12	0	700	945	P	8.8	4496	4859	P	6.1	A2
18	0	356	412	P	6.6	355	1036	P	6.3	A2 L

Test Metrics

1. Data rate requirement: 14 out of 16 test cases must pass	16 test cases passed	**PASS**
2. Noise margin requirement: 0 reported margins < 4dB (upstream and downstream)	0 reported NM < 4dB	**PASS**
3. Noise margin requirement: 2 or less reported noise margins < 5dB (upstream and downstream)	0 reported NM < 5dB	**PASS**
4. Noise margin requirement: 2 or less reported noise margins < 6dB (downstream only)	0 reported DS NM < 6dB	**PASS**
5. Connectivity requirement: all 16 test cases must connect	0 test cases did not connect	**PASS**

Comments on Test Results

Test Number and Label	Result
A.1.5.3 – 26AWG Loop with Test Profile AU_RA_L_30000k (-140 dBm/Hz AWGN and 24 HDSL NEXT Noise Impairment) (IOL Test ID: 12345)	**PASSED**

Purpose: This test is designed to measure the rate vs. reach capabilities of the DUT with -140 dBm/Hz AWGN and 24 HDSL NEXT noise impairment using a low latency profile and a single mode of operation. All test metrics must be passed. See Annex A of this document for more information.

Results

Loop Length 26 AWG (kft)	Test Profile AU_RA_L_30000k								
	Upstream				Downstream				
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Operating Mode
	Expected	Measured	Results		Expected	Measured	Results		
1	1000	1046	**P**	6.8	20000	26341	**P**	7.5	A2+
5	879	927	**P**	6	17506	19973	**P**	7	A2+
13	192	195	**P**	6.1	1624	1725	**P**	6.1	A2

Test Metrics

1. Data rate requirement: 5 out of 6 test cases must pass	6 test cases passed	**PASS**
2. Noise margin requirement: 0 reported margins < 4dB (upstream and downstream)	0 reported NM < 4dB	**PASS**
3. Noise margin requirement: 1 or less reported noise margins < 5dB (upstream and downstream)	0 reported NM < 5dB	**PASS**
4. Noise margin requirement: 1 or less reported noise margins < 6dB (downstream only)	0 reported DS NM < 6dB	**PASS**
5. Connectivity requirement: all 6 test cases must connect	0 test cases did not connect	**PASS**

Comments on Test Results

Test Number and Label	Result
A.1.5.4 – 26AWG with Loop Test Profile AU_RA_L_30000k (-140 dBm/Hz AWGN and 5 T1 Adjacent Binder NEXT Noise Impairment) (IOL Test ID: 12345)	**PASSED**

Purpose: This test is designed to measure the rate vs. reach capabilities of the DUT with -140 dBm/Hz AWGN and 5 T1 adjacent Binder NEXT noise impairment using a low latency profile and a single mode of operation. All test metrics must be passed. See Annex A of this document for more information.

Results

Loop Length 26 AWG (kft)	Test Profile AU_RA_L_30000k								
	Upstream				Downstream				
	Sync Rate (kbps)			Noise Margin, Reported (dB)	Sync Rate (kbps)			Noise Margin, Reported (dB)	Operating Mode
	Expected	Measured	Results		Expected	Measured	Results		
1	1012	1046	**P**	7.5	20321	25534	**P**	6.2	A2+
8	922	1044	**P**	7.1	3953	4131	**P**	6.1	A2
15	456	551	**P**	7	86	677	**P**	6.7	A2 L

Test Metrics

1. Data rate requirement: 5 out of 6 test cases must pass	6 test cases passed	**PASS**
2. Noise margin requirement: 0 reported margins < 4dB (upstream and downstream)	0 reported NM < 4dB	**PASS**
3. Noise margin requirement: 1 or less reported noise margins < 5dB (upstream and downstream)	0 reported NM < 5dB	**PASS**
4. Noise margin requirement: 1 or less reported noise margins < 6dB (downstream only)	0 reported DS NM < 6dB	**PASS**
5. Connectivity requirement: all 6 test cases must connect	0 test cases did not connect	**PASS**

Comments on Test Results

Annex A: DSL Forum TR-100 Pass/Fail Criteria for Rate Adaptive Tests

Data rate pass/fail requirements: It is required that the modem trains in every loop reach test. A failure to train in any test will result in a failure of that section. This is required to eliminate the possibility of any modem with interoperability 'holes' from passing the requirements contained within this document (TR-100 Section 7 pg. 30). In addition the time limits shown in Table A.1 for achieving showtime and recording performance data must be met.

Mode	Maximum Train Time	Minimum Recording Delay
Single mode of operation	60 seconds	60 seconds following showtime
Automode	120 seconds	60 seconds following showtime

Table A.1: Train times and minimum performance data recording delays

In rate-adaptive testing (for both automode and single mode of operation), any test point that fails to meet the requirement in the downstream direction by 96 kbps or less or in the upstream direction by 32 kbps shall be re-tested 3 times. If a re-test is performed, then the maximum downstream value achieved during testing, along with the associated upstream rate, shall be recorded. If the SUT fails to sync within the allowed startup time, a result of zero will be recorded into the result for that test point and the whole section will be marked as a fail. If more than 10% of the data rates are less than the data rate requirements in a section, then the ATU-C/ATU-R pair fails the data rate requirements of that section (TR-100 Section 7 pg. 30).

For automode testing only, if a testpoint fails on the performance requirement for the following loops:

- Table A.1-14: Loops 13, 14, 15, 16, and 17kft
- Table A.1-15: Loops 13, 14, 15, 16, and 17kft
- Table A.1-16: 15kft Loop with 400ft, 1000ft, and 1500ft Bridged Tap
- Table A.1-17: 13kft Loop
- Table A.1-18: Loops 13, 14, and 15kft

An additional check is done on the sum of the measured upstream and downstream net data rates. If this sum is greater than or equal to the sum of the target upstream and downstream net data rates, the testpoint is considered a pass. This passing is indicated in the report as "Testpoint passed due to performance sum passing" (TR-100 Section A.1.4, pg. 57).

Noise margin pass/fail requirements: All measurements shall be from the DSLAM. Violation of any of the requirements in the noise margin chart (Table A.2) shall constitute a test section failure (TR-100 Section A.1.4 pg. 56). Table A.3 lists the allowable reported noise margin deviations according to the 10% and 25% limits per section (TR-100 Section A.1.4, pg. 57 and Section A.1.5, pg. 66).

Reported Noise Margin (dB)	Requirement
< 4	On no test point
>= 4 and < 5	On at most 10% of the test points
>= 5	On at least 90% of the test points
>= 6	On at least 75% of the downstream test points

Table A.2: Noise margin pass/rail requirement chart

Section Number	Number of test points in section	10 % limit	25% limit (applies to down-stream margins only)
A.1.4.1	22	2	3
A.1.4.2.1	44	4	6
A.1.4.2.2	44	4	6
A.1.4.2.3	40	4	5
A.1.4.3	20	2	3
A.1.4.4	22	2	3
A.1.5.1	8	1	1
A.1.5.2	16	2	2
A.1.5.3	8	1	1
A.1.5.4	8	1	1

Table A.3: Reported noise margin pass/fail limits, per test section

Overall pass/fail criteria for each adaptive rate test section is then as follows:

- If any reported noise margin is less than 4dB, then the ATU-C/ATU-R pair fails the noise margin requirements of that section.
- If more than 10% of the reported noise margins are less than 5dB in a section, then the ATUC/ATU-R pair fails the noise margin requirements of that section.
- If more than 25% of the reported downstream noise margins are less than 6dB in a section, then the ATU-C/ATU-R pair fails the noise margin requirements of that section.

If the ATU-C/ATU-R pair passes both the data rate and noise margin requirements, it passes the section; otherwise, it fails the section.

Annex B: Raw Results for Rate Adaptive Tests

Test A.1.4.1, 12 ADSL2plus self NEXT and FEXT Noise Impairment											
Main (kft)/Tap (ft)		1/0	1/0	3/0	3/0	5/0	7/0	9/0	10/0	12/0	5/50
Expected UBR		900	NA	900	NA	900	900	888	800	800	913
Expected DBR		NA	13700	NA	12254	11001	9284	6969	5712	3576	10796
Iteration 1	**UBR**	945	945	945	945	945	945	945	945	848	945
	DBR	21219	17065	20549	14763	13025	10018	7378	6250	4157	13049
	UNM	16.5	16.5	15.7	17.7	14	12.6	10	7.8	6.1	14
	DNM	11.1	6	10.5	6	6.1	6	6	6.2	6.2	6
	Time	24	24	24	24	30	48	48	48	48	48
	Mode	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2	A2+	A2+
Iteration 2	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Main (kft)/Tap (ft)		5/100	5/150	5/200	NA	NA	NA	NA	NA	NA	NA
Expected UBR		900	900	900	NA	NA	NA	NA	NA	NA	NA
Expected DBR		10947	11001	10790	NA	NA	NA	NA	NA	NA	NA
Iteration 1	**UBR**	945	945	945	NA	NA	NA	NA	NA	NA	NA
	DBR	12394	14039	13942	NA	NA	NA	NA	NA	NA	NA
	UNM	12.8	13.5	14	NA	NA	NA	NA	NA	NA	NA
	DNM	6	6	6.1	NA	NA	NA	NA	NA	NA	NA
	Time	24	30	48	NA	NA	NA	NA	NA	NA	NA
	Mode	A2+	A2+	A2+	NA	NA	NA	NA	NA	NA	NA
Iteration 2	**UBR**	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	DBR	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	UNM	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	DNM	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	Time	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	Mode	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
Iteration 3	**UBR**	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	DBR	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	UNM	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	DNM	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	Time	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	Mode	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
Iteration 4	**UBR**	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	DBR	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	UNM	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	DNM	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	Time	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA
	Mode	NT	NT	NT	NA	NA	NA	NA	NA	NA	NA

A.1.4.2.1 – 26AWG Loop with Test Profile AU_RA_L_30000k (AWGN -140 dBm/Hz Noise Impairment)												
Length (kft)		.1	.4	1	2	3	4	5	6	7	8	9
Expected UBR		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	994
Expected DBR		23412	23768	23616	22740	21551	20287	18186	16456	14368	11236	9080
Iteration 1	**UBR**	1046	1044	1046	1044	1046	1044	1044	1044	1044	1044	1046
	DBR	26693	26677	26852	26485	25530	23358	20737	17584	14475	11767	9585
	UNM	7.5	7.5	8	7.3	9.6	7	7.6	7.5	7.5	7.3	7.1
	DNM	7.6	7.7	8.8	8.6	7.8	7.1	8	7.8	7.5	7.1	6.6
	Time	24	24	24	24	24	24	-1736	24	48	48	48
	Mode	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+
Iteration 2	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Length (kft)		10	10	11	12	13	14	15	16	17	18	19
Expected UBR		976	976	954	900	846	779	516	430	344	328	239
Expected DBR		6734	6734	5521	4167	3264	2717	1952	1387	799	464	235
Iteration 1	**UBR**	1041	1047	1031	935	847	559	515	451	387	331	259
	DBR	7725	6118	4846	3840	3009	2357	1809	1371	1006	758	445
	UNM	6.3	7.6	6	6	6	6.5	6.2	6.1	6.5	6.6	6.8
	DNM	6.2	6.1	6.2	6.1	6.1	6.2	6.2	6.1	6.2	6.2	6.2
	Time	48	48	48	48	42	48	48	48	48	48	48
	Mode	A2+	A2+	A2+	A2+	A2+	A2 L	A2 L	A2 L	A2 L	A2 L	A2 L
Iteration 2	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

A.1.4.2.2 – 26AWG Loop with Test Profile AU_RA_I_30000k (AWGN -140 dBm/Hz Noise Impairment)												
Length (kft)		.1	.4	1	2	3	4	5	6	7	8	9
Expected UBR		900	900	900	900	900	900	900	900	900	900	850
Expected DBR		18526	18732	18314	18200	17123	16392	15613	14095	13300	11308	9188
Iteration 1	**UBR**	1046	1044	1046	1044	1046	1044	1044	1044	1044	1044	1046
	DBR	26693	26677	26852	26485	25530	23358	20737	17584	14475	11767	9585
	UNM	7.5	7.5	8	7.3	9.6	7	7.6	7.5	7.5	7.3	7.1
	DNM	7.6	7.7	8.8	8.6	7.8	7.1	8	7.8	7.5	7.1	6.6
	Time	24	24	24	24	24	24	-1736	24	48	48	48
	Mode	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+
Iteration 2	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Length (kft)		10	11	12	13	14	15	16	17	18	19	20
Expected UBR		800	750	700	650	600	550	500	376	356	336	227
Expected DBR		6704	5364	4496	3496	2292	2022	1318	464	355	246	178
Iteration 1	**UBR**	1041	1047	1031	935	847	559	515	451	387	331	259
	DBR	7725	6118	4846	3840	3009	2357	1809	1371	1006	758	445
	UNM	6.3	7.6	6	6	6	6.5	6.2	6.1	6.5	6.6	6.8
	DNM	6.2	6.1	6.2	6.1	6.1	6.2	6.2	6.1	6.2	6.2	6.2
	Time	48	48	48	48	42	48	48	48	48	48	48
	Mode	A2+	A2+	A2+	A2+	A2+	A2 L	A2 L	A2 L	A2 L	A2 L	A2 L
Iteration 2	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

A.1.4.2.3 – 26AWG Loop with Bridge Taps and Test Profile AU_RA_L_30000k (AWGN -140 dBm/Hz Noise Impairment)												
Main /Tap (ft)		.5/100	3/100	5/100	7/100	9/100	11/100	3/200	5/200	7/200	9/200	11/200
Expect. UBR		1000	1000	1000	1000	900	900	1000	1000	1000	1000	893
Expect. DBR		21791	19423	16631	12862	8125	5270	20932	17812	13156	8221	4179
Iteration 1	**UBR**	1046	1044	1046	1044	1046	1044	1044	1044	1044	1044	1046
	DBR	26693	26677	26852	26485	25530	23358	20737	17584	14475	11767	9585
	UNM	7.5	7.5	8	7.3	9.6	7	7.6	7.5	7.5	7.3	7.1
	DNM	7.6	7.7	8.8	8.6	7.8	7.1	8	7.8	7.5	7.1	6.6
	Time	24	24	24	24	24	24	-1736	24	48	48	48
	Mode	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+
Iteration 2	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Main/Tap (ft)		12/250	12/750	12/1500	15/400	15/1000	15/1500	17.5/150	17.5/800	17.5/1500	NA	NA
Expect. UBR		803	763	492	516	491	336	336	240	24	NA	NA
Expect. DBR		3293	3842	3460	1252	1469	1748	428	524	508	NA	NA
Iteration 1	**UBR**	1041	1047	1031	935	847	559	515	451	387	NA	NA
	DBR	7725	6118	4846	3840	3009	2357	1809	1371	1006	NA	NA
	UNM	6.3	7.6	6	6	6	6.5	6.2	6.1	6.5	NA	NA
	DNM	6.2	6.1	6.2	6.1	6.1	6.2	6.2	6.1	6.2	NA	NA
	Time	48	48	48	48	42	48	48	48	48	NA	NA
	Mode	A2+	A2+	A2+	A2+	A2+	A2 L	A2 L	A2 L	A2 L	NA	NA
Iteration 2	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
Iteration 3	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
Iteration 4	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NA	NA

A.1.4.3 – 26AWG Loop with Bridge Taps and Test Profile AU_RA_L_30000k (AWGN -140 dBm/Hz Noise Impairment and 24 HDSL NEXT Noise Impairment)											
Main /Tap (ft)		1/0	3/0	5/0	7/0	9/0	11/0	13/0	5/100	5/200	6/500
Expected UBR		1000	1000	879	588	560	366	192	867	867	665
Expected DBR		20000	19484	17506	12988	7184	3619	1624	15443	17173	14443
Iteration 1	**UBR**	1047	1047	927	747	555	384	199	927	903	795
	DBR	26357	24755	19961	13197	7500	3884	1706	17634	19521	16640
	UNM	8.8	6.8	6	6	6	6	6.2	6	6.2	6
	DNM	7.5	7.2	7	6.3	6	6	6.1	7.2	6.8	6.8
	Time	30	24	24	48	48	48	48	24	24	48
	Mode	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+	A2+
Iteration 2	**UBR**	NT	NT	NT	NT	555	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	7515	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	6	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	6	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	48	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	A2+	NT	NT	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT	NT	555	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	7504	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	6.2	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	6	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	48	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	A2+	NT	NT	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT	NT	555	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	7515	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	6	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	6	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	48	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	A2+	NT	NT	NT	NT	NT

A.1.4.4 – 26AWG Loop with Bridge Taps and Test Profile AU_RA_L_30000k (AWGN -140 dBm/Hz Noise Impairment and 5 T1 Adjacent Binder NEXT Noise Impairment)												
Main /Tap (ft)		1/0	3/0	5/0	7/0	9/0	13/0	14/0	15/0	5/100	5/200	6/500
Expected UBR		1000	1000	1000	1000	994	846	620	456	1000	1000	1000
Expected DBR		20321	16235	9648	4702	2626	796	515	86	8243	10082	7447
Iteration 1	**UBR**	1046	1044	1044	1044	1046	603	587	547	1044	1044	1044
	DBR	25507	20530	13347	5460	3224	1203	949	677	11363	13174	8801
	UNM	7.5	8	8.8	7.2	7.1	7.5	7	7	8.2	7.5	7.5
	DNM	7	6.5	6.2	6.1	6.3	6.6	6.5	6.7	6.2	6.2	6.2
	Time	24	24	24	48	48	48	48	48	48	48	48
	Mode	A2+	A2+	A2+	A2+	A2+	A2 L	A2 L	A2 L	A2+	A2+	A2+
Iteration 2	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

A.1.5.1 – 26AWG Loop and Test Profile AU_RA_I_30000k (12 self NEXT and FEXT Noise Impairment)						
Main (kft)		1	1	5	12	15
Expected UBR		900	NA	900	800	464
Expected DBR		NA	13700	11001	3576	1348
Iteration 1	**UBR**	945	945	945	852	538
	DBR	21210	17055	13018	4164	2244
	UNM	15	17.5	14.2	6.1	6.3
	DNM	11.1	6	6.1	6.1	6.2
	Time	24	24	24	48	54
	Mode	A2+	A2+	A2+	A2	A2 L
Iteration 2	**UBR**	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT

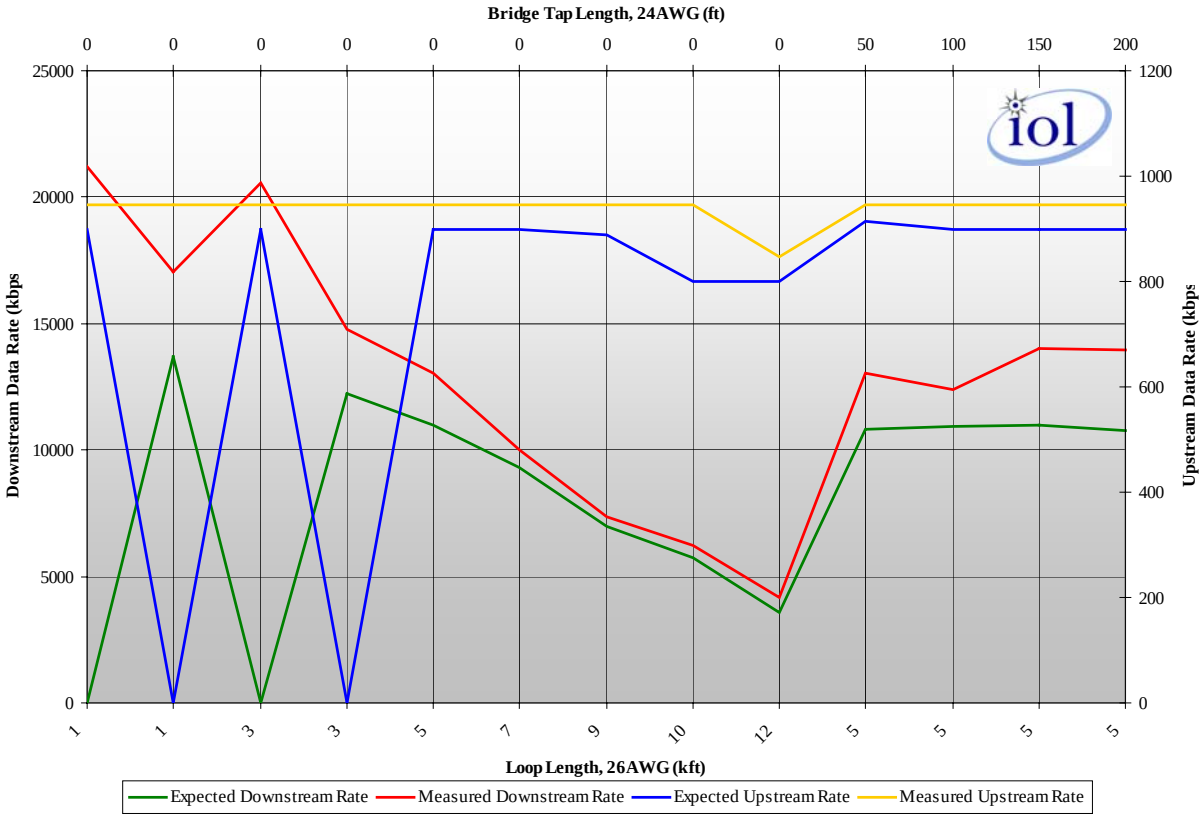
A.1.5.2 – 26AWG Loop with Bridge Taps and Test Profile AU_RA_I/L_30000k (-140 dBm/Hz AWGN Noise Impairment)									
		Test Profile AU_RA_RA_L_30000k				Test Profile AU_RA_RA_I_30000k			
Main /Tap (ft)		1/0	5/0	12/0	17.5/800	1/0	5/0	12/0	18/0
Expected UBR		1000	1000	846	240	900	900	700	356
Expected DBR		23616	18186	4167	524	18314	15613	4496	355
Iteration 1	UBR	1044	1044	1023	383	1044	1044	1023	383
	DBR	26852	20729	4880	1017	26852	20729	4880	1017
	UNM	7.5	7.8	6.1	6.5	7.5	7.8	6.1	6.5
	DNM	8.8	8.2	6	6.2	8.8	8.2	6	6.2
	Time	24	24	42	54	24	24	42	54
	Mode	A2+	A2+	A2	A2 L	A2+	A2+	A2	A2 L
Iteration 2	UBR	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 3	UBR	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT
Iteration 4	UBR	NT	NT	NT	NT	NT	NT	NT	NT
	DBR	NT	NT	NT	NT	NT	NT	NT	NT
	UNM	NT	NT	NT	NT	NT	NT	NT	NT
	DNM	NT	NT	NT	NT	NT	NT	NT	NT
	Time	NT	NT	NT	NT	NT	NT	NT	NT
	Mode	NT	NT	NT	NT	NT	NT	NT	NT

A.1.5.3 – 26AWG Loop with Test Profile AU_RA_L_30000k (-140 dBm/Hz AWGN and 24 HDSL Noise Impairment)				
Main (kft)		1	5	13
Expected UBR		1000	879	192
Expected DBR		20000	17506	1624
Iteration 1	**UBR**	1046	927	195
	DBR	26341	19973	1725
	UNM	6.8	6	6.1
	DNM	7.5	7	6.1
	Time	24	24	48
	Mode	A2+	A2+	A2
Iteration 2	**UBR**	NT	NT	NT
	DBR	NT	NT	NT
	UNM	NT	NT	NT
	DNM	NT	NT	NT
	Time	NT	NT	NT
	Mode	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT
	DBR	NT	NT	NT
	UNM	NT	NT	NT
	DNM	NT	NT	NT
	Time	NT	NT	NT
	Mode	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT
	DBR	NT	NT	NT
	UNM	NT	NT	NT
	DNM	NT	NT	NT
	Time	NT	NT	NT
	Mode	NT	NT	NT

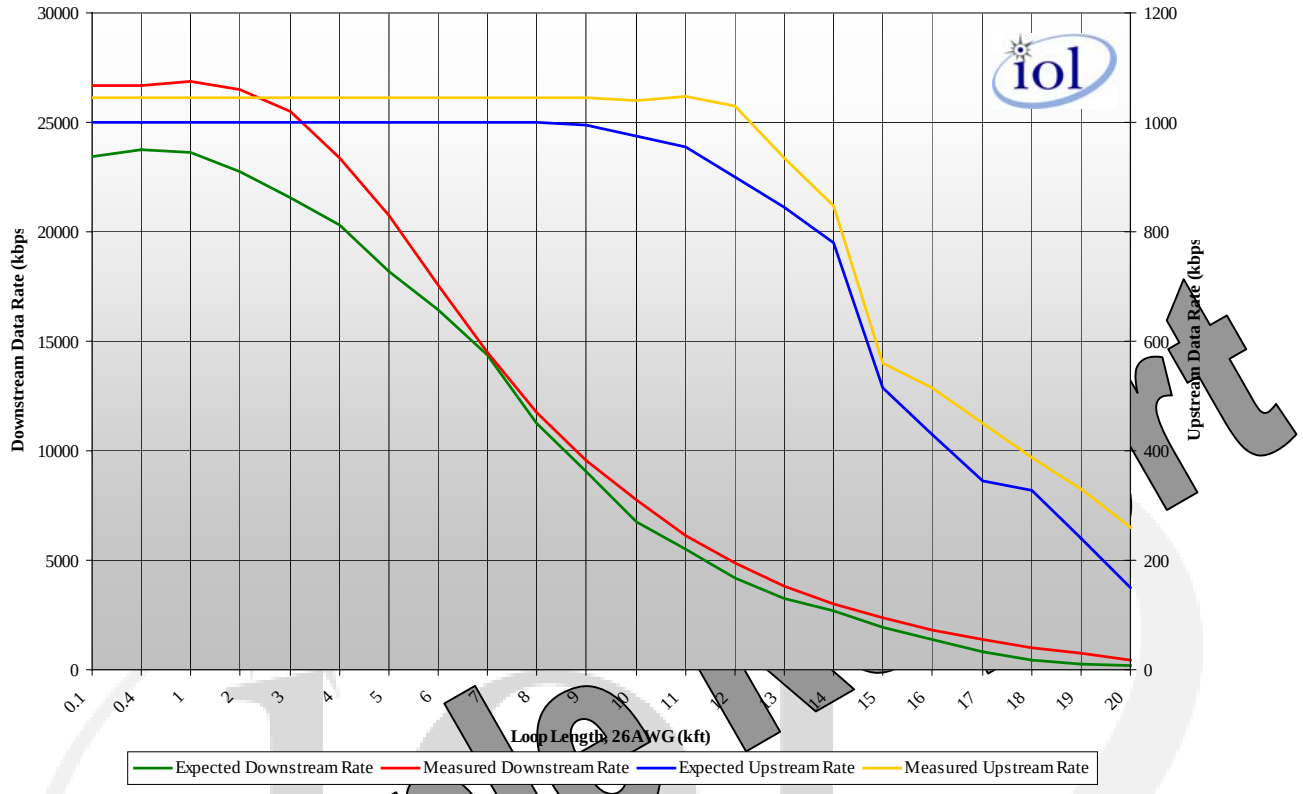
A.1.5.4 – 26AWG Loop with Test Profile AU_RA_L_30000k (-140 dBm/Hz AWGN and 5 T1 Adjacent binder NEXT Noise Impairment)				
Main (kft)		1	5	13
Expected UBR		1012	922	456
Expected DBR		20321	3953	86
Iteration 1	**UBR**	1046	1044	551
	DBR	25534	4131	677
	UNM	7.5	7.1	7
	DNM	6.2	6.1	6.7
	Time	24	42	54
	Mode	A2+	A2	A2 L
Iteration 2	**UBR**	NT	NT	NT
	DBR	NT	NT	NT
	UNM	NT	NT	NT
	DNM	NT	NT	NT
	Time	NT	NT	NT
	Mode	NT	NT	NT
Iteration 3	**UBR**	NT	NT	NT
	DBR	NT	NT	NT
	UNM	NT	NT	NT
	DNM	NT	NT	NT
	Time	NT	NT	NT
	Mode	NT	NT	NT
Iteration 4	**UBR**	NT	NT	NT
	DBR	NT	NT	NT
	UNM	NT	NT	NT
	DNM	NT	NT	NT
	Time	NT	NT	NT
	Mode	NT	NT	NT

Annex C: Data Charts

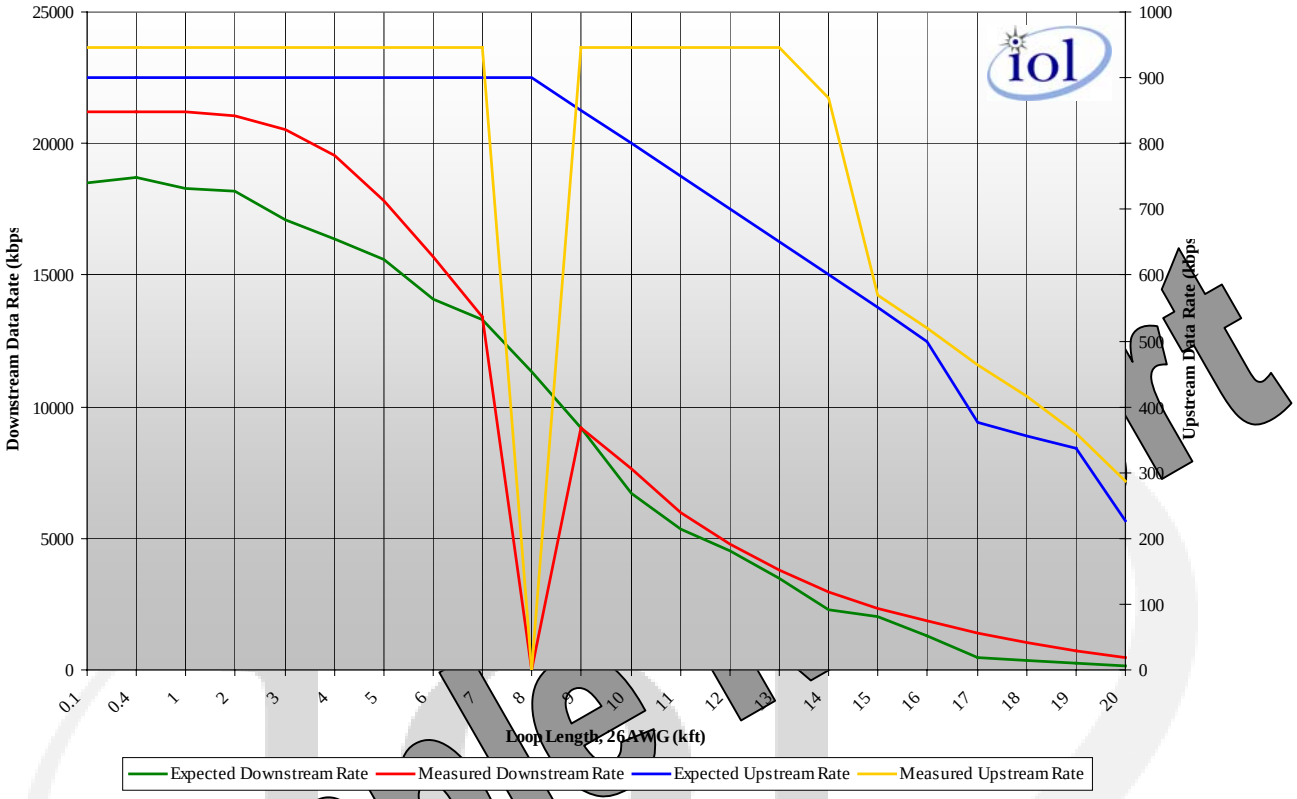
Section A.1.4.1 Test Results



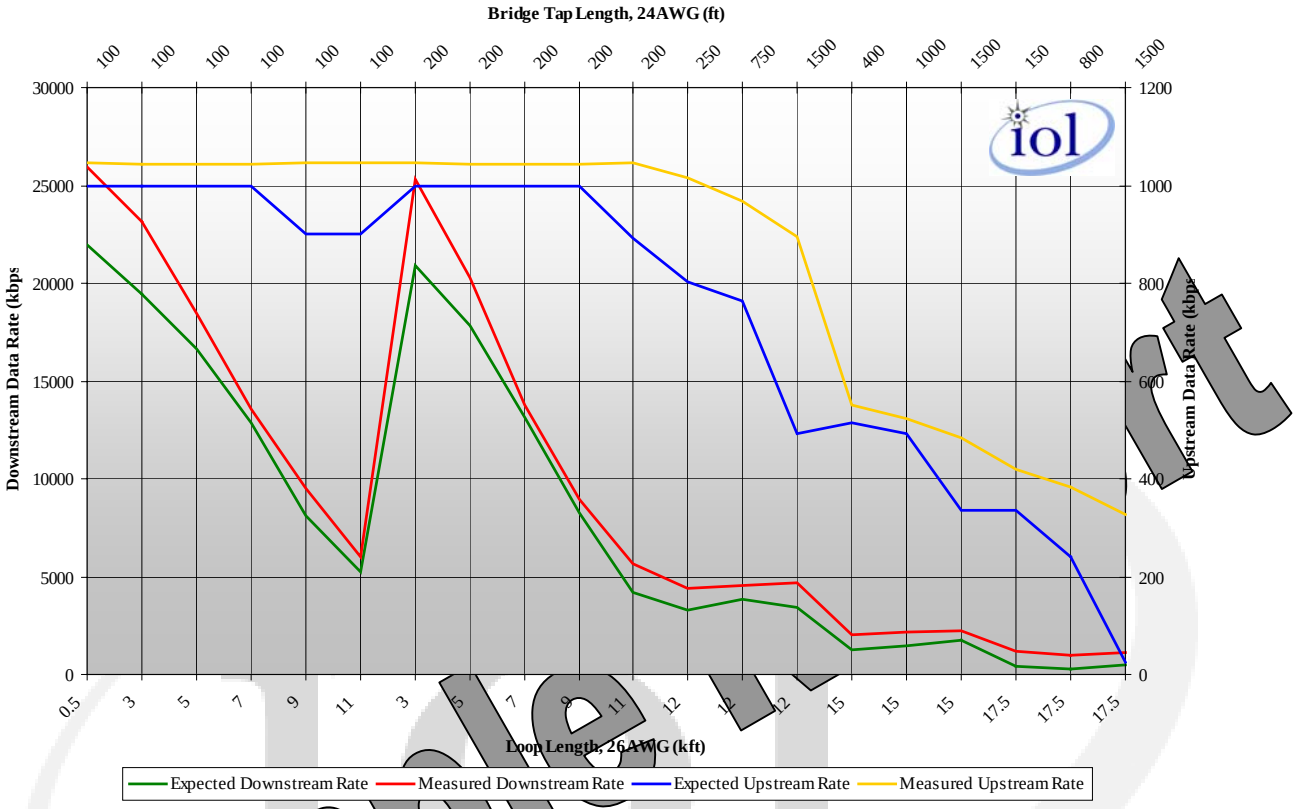
Section A.1.4.2.1 Test Results



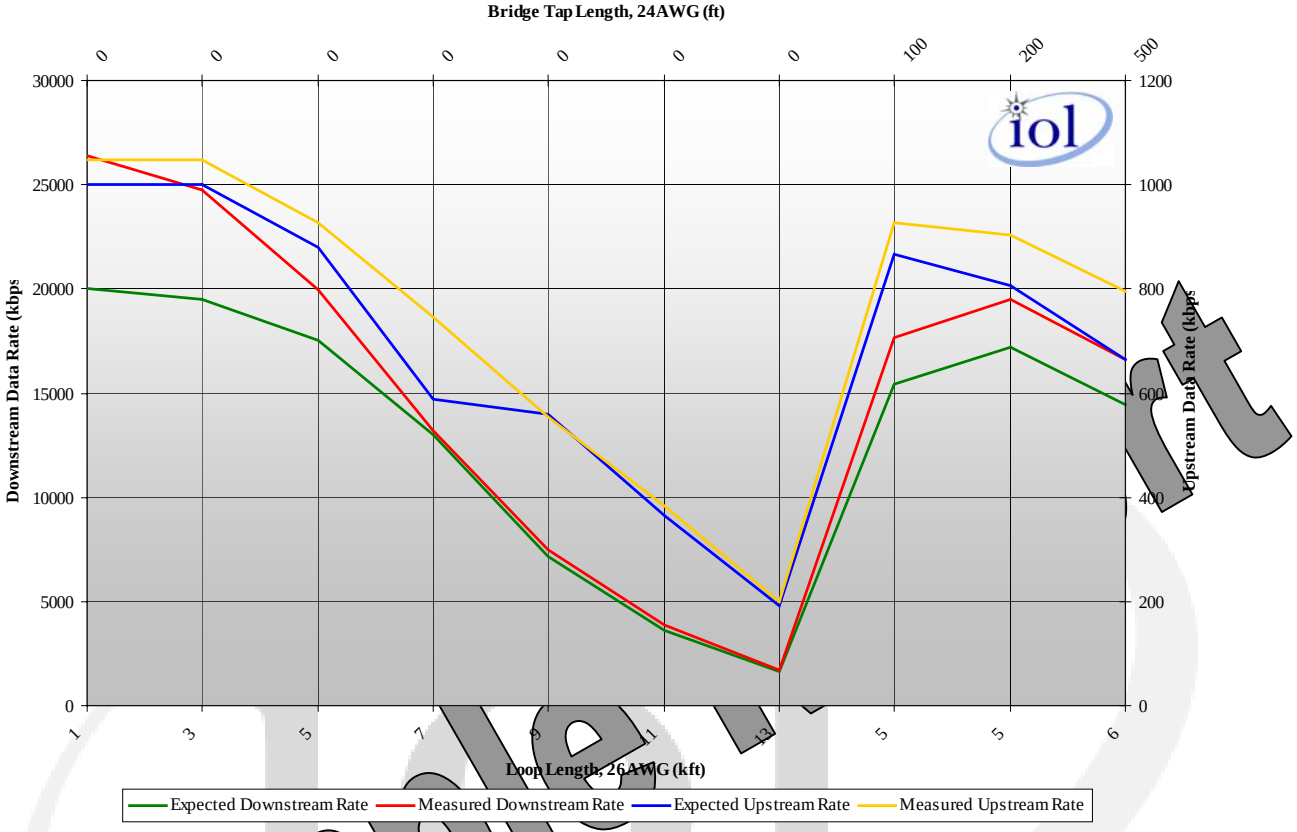
Section A.1.4.2.2 Test Results



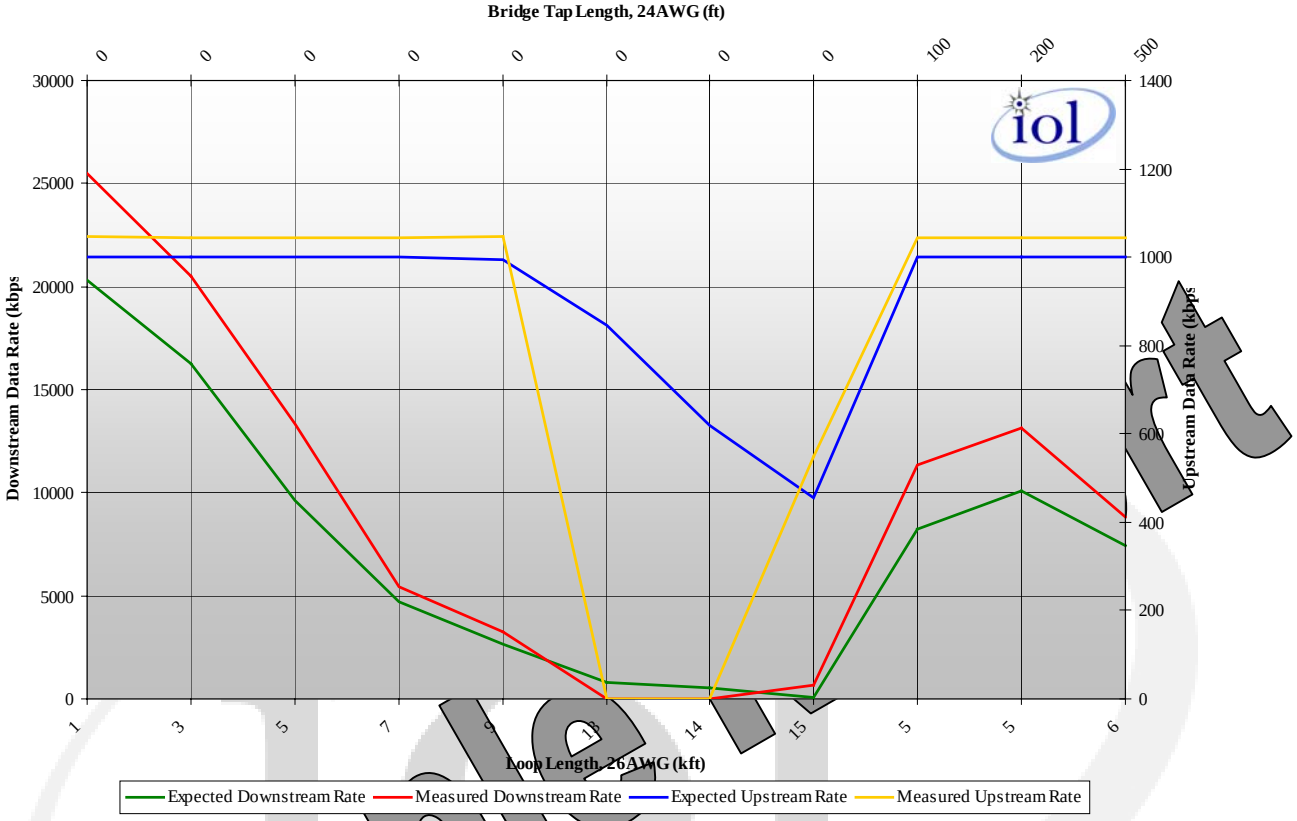
Section A.1.4.2.3 Test Results



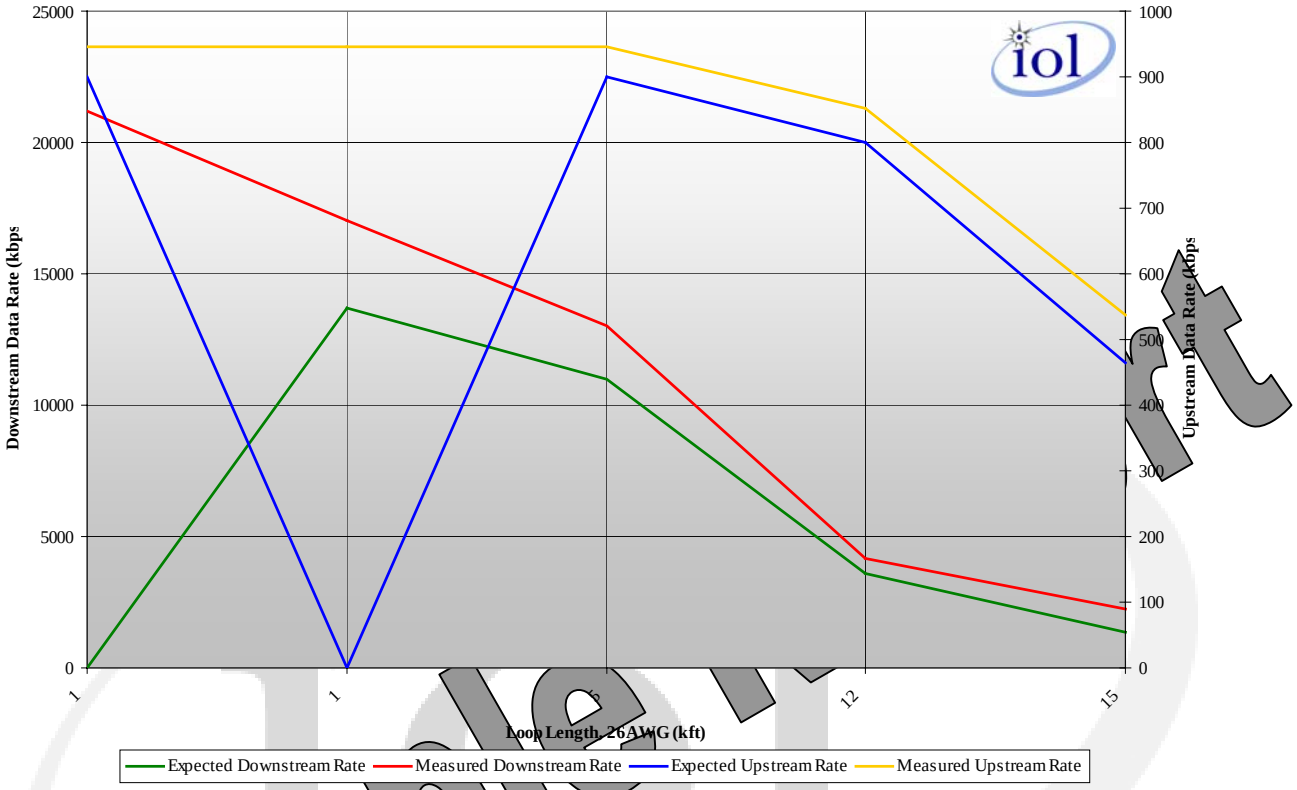
Section A.1.4.3 Test Results



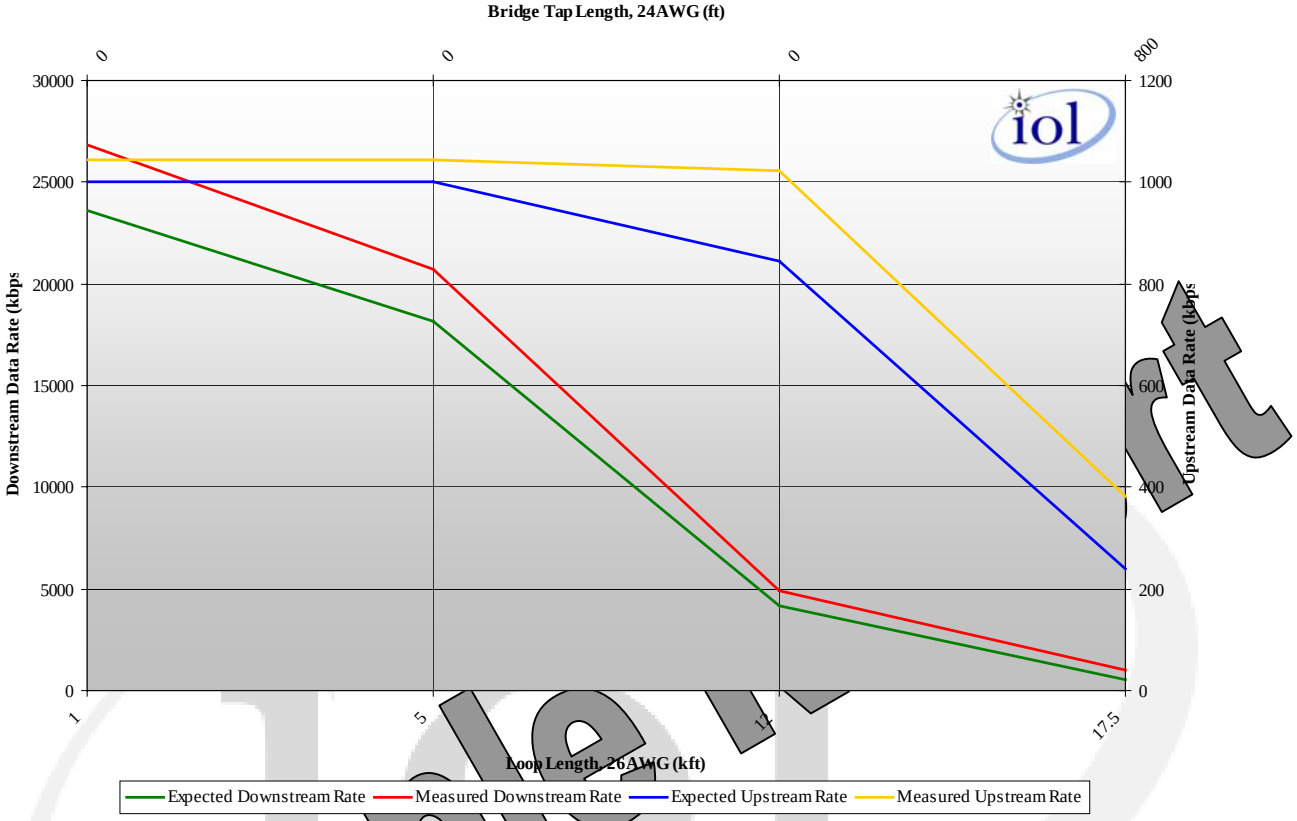
Section A.1.4.4 Test Results



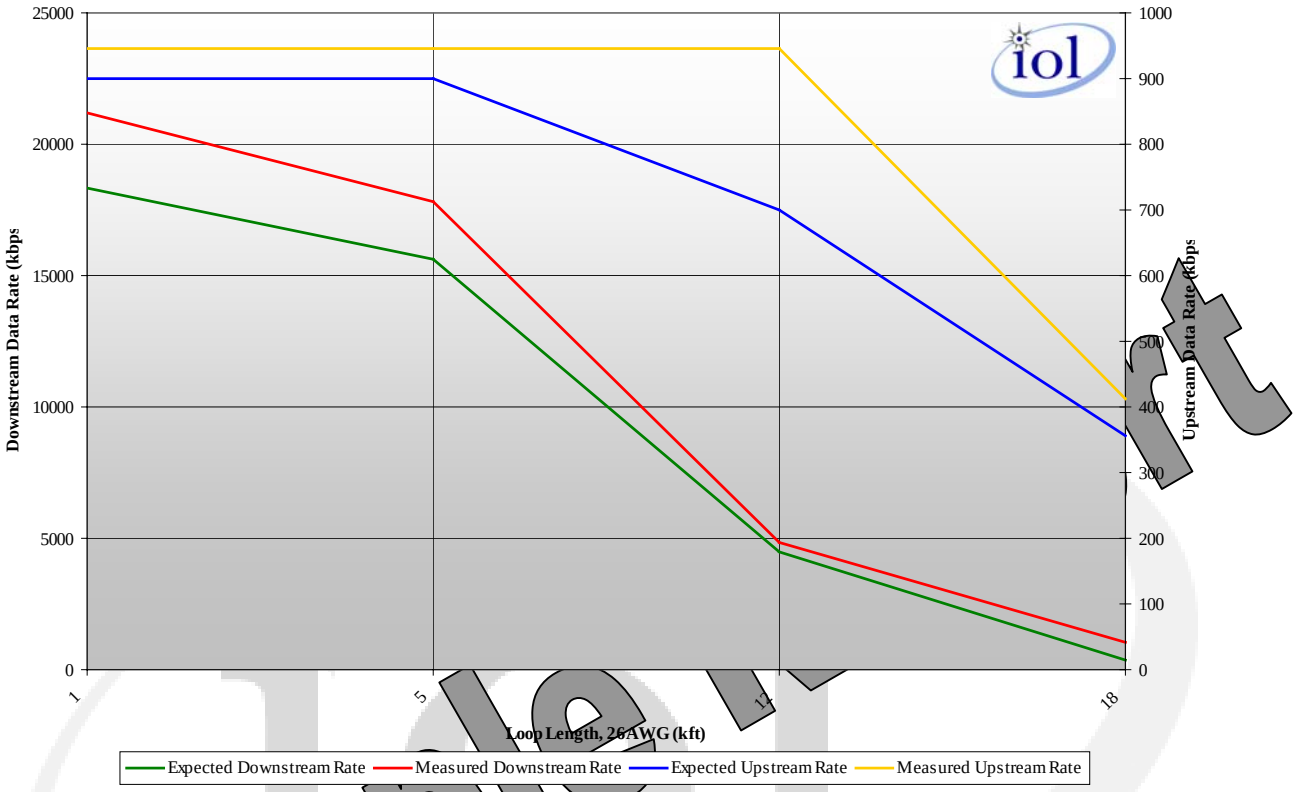
Section A.1.5.1 Test Results



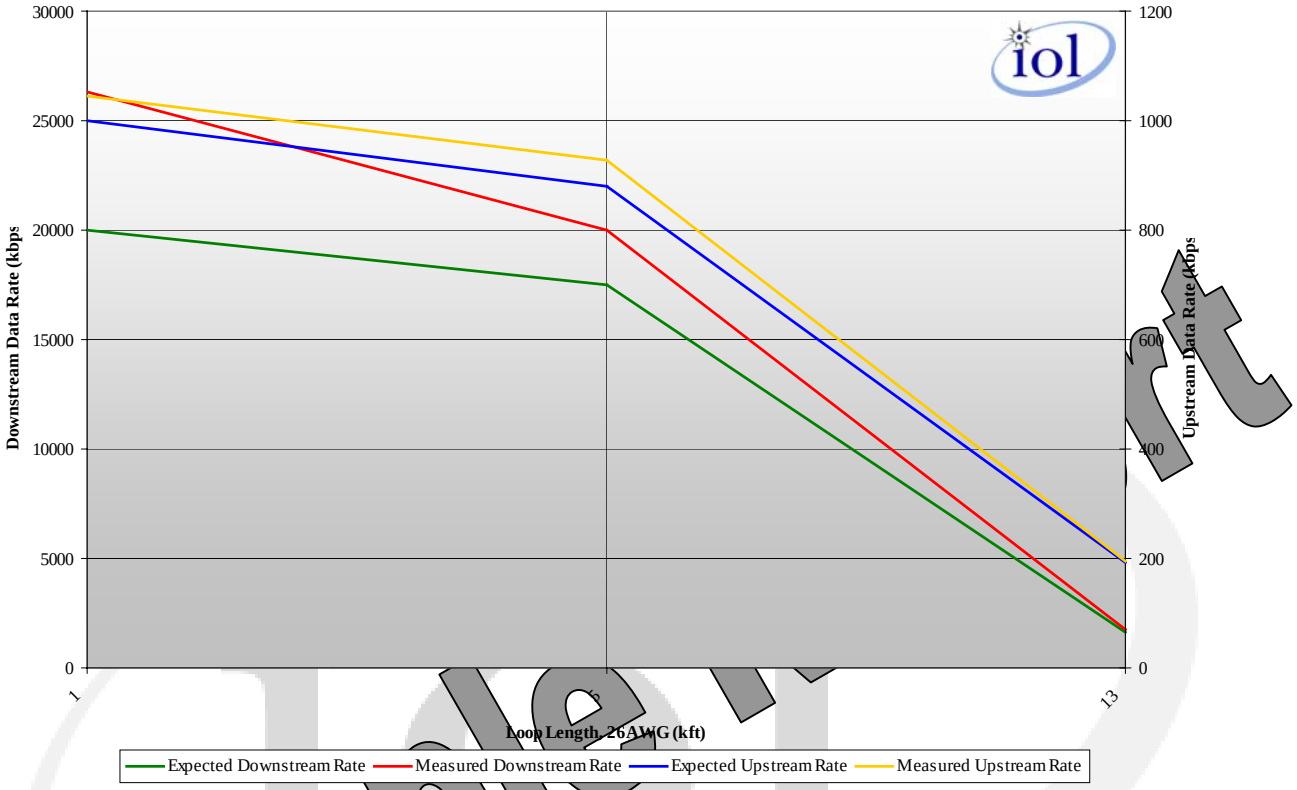
Section A.1.5.2a Test Results



Section A.1.5.2bTest Results



Section A.1.5.3 Test Results



Section A.1.5.4 Test Results