

TR-127
**Dynamic Testing of Splitters and In-Line Filters with xDSL
Transceivers**

Issue: 2 Corrigendum 1
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Issue History

Issue Number	Approval Date	Publication Date	Issue Editor	Changes
1	May 2009		Greg Gough, East by North	Original
1 Corrigendum 1	April 2010		Andre Holley Sparnex Instruments	Corrigenda items for TR-127 Issue 1
2	May 2011		Andre Holley Sparnex Instruments	ISDN Splitters added in Section 9 and support for the testing of ISDN Splitters added to other sections. Reporting Guidelines added as Appendix III
2 Corrigendum 1	12 November 2012	21 November 2012	Andre Holley, Sparnex Instruments	Corrigenda items for TR-127 Issue 2

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Executive Summary

TR-127 Issue 2 Corrigendum 1 contains corrections to TR-127 Issue 2

1 Purpose

The corrections specified in the following sections apply to TR-127 Issue 2.

2 Correction to Section 2.3 Definitions

Add the Baseline Splitter to Section 2.3 Definitions.

<u>Baseline Splitter</u>	<u>A splitter that is used to establish the reference data rate before adding the DUT</u>
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3 Addition to Section 5.1

Add the following new section 5.1.4

5.1.4 Requirements for the Baseline Splitters.

The Baseline Splitter SHALL meet or exceed the performance of the Device Under Test and SHALL meet or exceed the minimum requirements in the appropriate ATIS or ETSI standard. [7], [8], [9],[10] [12], [13].

4 Corrections to Section 5.8

- Update the introductory text as indicated below
- Add a new Section 5.8.1 (which includes a new Table 5-7.1) after Table 5-7.

5.8 Splitter and In-Line Filter Specifications

Table 5-5 through Table 5-~~8-7.1~~ SHALL be filled in with the requested information before starting any tests in order to have all the information for both the CO and the CPE ends of the SUT for the purposes of repeatability. Table 5-5 through Table 5-~~8-7.1~~ SHALL be included in the final test report.

5.8.1 Baseline Splitter

Table 5-7.1: Baseline Splitter Specifications

<u>Test Item</u>	<u>Specification</u>
<u>Baseline Splitter General Information</u>	
<u>Manufacturer</u>	
<u>Product Name</u>	
<u>Splitter Type (ADSL2plus or VDSL2)</u>	
<u>Splitter baseband service (POTS, ISDN, both)</u>	
<u>Splitter Classification (HSI or Triple Play)</u>	
<u>Secondary Protection Yes/No</u>	
<u>Serial Number</u>	
<u>DC Blocking Capacitors (Yes/No) (See Note in 6.2)</u>	

5 Corrections to Section 8.1.2

Update Section 8.1.2 as follows:

The general test setup reference model is shown in Section [06.2](#), Figure 6-5, i.e. with two xDSL transceivers, lines or line models, and two splitters.

6 Corrections to Table 8-12

Update **Table 8-12** as follows:

Table 8-12: Baseline Test Procedure

Test Configuration	Refer to Section 8.3.2
Method of Procedure	<p style="text-align: center;">Part A (measurement of delta-SNR):</p> <p>Configure the test setup as described in Section 8.3.2 with injection of –140 dBm/Hz AWGN at both ends.</p> <ol style="list-style-type: none"> 1. Configure the test setup as described in Section 8.3.2 with injection of –140 dBm/Hz AWGN at both ends. 2. Configure the CPE and DSLAM according to the interleaved profile as defined in Section 8.1.3. 3. Connect the CPE and DSLAM to the CPE and CO baseline splitters respectively, leaving the CPE and CO splitter POTS ports open. 4. Determine the average net data rate by performing the test procedure defined in Table 8-10 steps 3 to 7. 4.5. Connect the CPE and CO splitters with the first test loop defined in Section 8.1.2. 5.6. Force a new initialization and wait for modems to sync. If the net data rate is more than 5% below what was recorded for the same test loop in Section 8.2.3, re-initialize the line for a maximum of 6 attempts. Wait for 2 minutes after initialization for any bit-swaps to settle. 6.7. Collect and record the upstream and downstream noise margins, current CRC count, INP actual values, transmit power levels and net data rates. 7.8. Wait 2 minutes.

~~8.9.~~ Record the CRC Measurement Interval and the number of reported CRC. The amount of reported CRCs is the difference between the number recorded in this step ~~8~~ and the number recorded in step ~~75~~. Calculate Lambda according to the appropriate formula defined in Section 8.1.5. Record the CRC value specified in Table 8-7 for the calculated value.

~~9.10.~~ Repeat steps ~~54~~ through ~~98~~ for each test loop defined in Section 8.1.2.

~~10.11.~~ If applicable, repeat steps 2 through ~~109~~ with the CPE and DSLAM configured to the fast test profile as defined in Section 8.1.2.

Part B (measurement of on-hook case):

1. Configure the test setup as described in Section 8.3.2 with injection of -140 dBm/Hz AWGN at both ends.
2. Configure the CPE and DSLAM according to the interleaved profile as defined in Section 8.1.3.
3. Connect the CPE and DSLAM to the CPE and CO baseline splitters respectively.
4. Connect the POTS port of the CO splitter to the CO POTS model; see Section 7.1.1, (or equivalent Section 7.3.1.1 without ringing).
5. Connect the POTS ports of the CPE splitter to three on-hook CPE phone models; see Section 7.2.2 (or Section 7.3.2.1 with switch open).

[6. Determine the average net data rate by performing the test procedure defined in Table 8-10 steps 3 to 7](#)

~~6.7.~~ Connect the CPE and CO splitters with the first test loop defined in Section 8.1.2.

~~7.8.~~ Force a new initialization and wait for modems to sync. Wait for 2 minutes after initialization for any bit-swaps to settle.

~~8.9.~~ Collect and record the upstream and downstream noise margins, current CRC count, INP actual values, transmit power levels and net data rates.

~~9.10.~~ Wait 2 minutes.

~~10.11.~~ Record the CRC Measurement Interval and the number of reported CRCs. The amount of reported CRCs is the difference between the number recorded in this step ~~10~~ and the number recorded in step ~~98~~. Calculate Lambda according to the appropriate formula defined in Section 8.1.5. Record the CRC value specified in Table 8-7 for the calculated value.

~~11.12.~~ Repeat steps ~~76~~ through ~~1110~~ for each additional test loop defined in Section 8.1.2.

~~12.13.~~ If applicable, repeat steps 2 through ~~1211~~ with the CPE and DSLAM configured to the fast test profile as defined in Section 8.1.2.

Part C (measurement of off-hook case):

1. Configure the test setup as described in Section 8.3.2 with injection of -140 dBm/Hz AWGN at both ends.
2. Configure the CPE and DSLAM according to the interleaved profile as defined in Section 8.1.3.
3. Connect the CPE and DSLAM to the CPE and CO baseline splitters respectively.
4. Connect the POTS port of the CO splitter to the CO POTS model; see Section 7.1.1. (or equivalent Section 7.3.1.1 without ringing).
5. Connect the POTS port of the CPE splitter to two on-hook CPE phone models, see Section 7.2.2, (or Section 7.3.2.1 with switch open).and one off-hook CPE model, see Section 7.3.2.1 with switch closed.
6. Determine the average net data rate by performing the test procedure defined in Table 8-10 steps 3 to 7
- ~~6.7.~~ Connect the CPE and CO splitters with the first test loop defined in Section 8.1.2.
- ~~7.8.~~ Force a new initialization and wait for modems to sync. Wait for 2 minutes after initialization for any bit-swaps to settle.
- ~~8.9.~~ Collect and record the upstream and downstream noise margins,

	<p>current CRC count, INP actual values, transmit power levels and net data rates.</p> <p>9.10. Wait 120 seconds.</p> <p>10.11. _____ Record the CRC Measurement Interval and the number of reported CRCs. The amount of reported CRCs is the difference between the number recorded in this step 10 and the number recorded in step 9. Calculate Lambda according to the appropriate formula defined in Section 8.1.5.</p> <p>11.12. _____ Repeat steps 76 through 1110 for each additional test loop defined in Section 8.1.2.</p> <p>12.13. _____ If applicable, repeat steps 2 through 1211 with the CPE and DSLAM configured to the fast test profile as defined in Section 8.1.3.</p>
<p>Expected Result</p>	<p style="text-align: center;">Part A (measurement of delta-SNR):</p> <p>NOTE: If a test point fails to achieve any of these expected results, the remainder of the tests SHALL not be performed on that test point.</p> <p>It is expected that for <u>For</u> each loop tested, the xDSL transceivers SHALL:</p> <ol style="list-style-type: none"> 1. Establish a stable connection. 2. Achieve <u>an average</u> net data rate not more than 3% below what was recorded for the same test loop in Section 8.2.3. 3. Initialize with a minimum noise margin of at least 4 dB as collected in step 76. 4. Not exhibit continued coding violations or loss of synchronization. 5. Have the number of reported CRCs be less than or equal to the CRC value specified in Table 8-7 for the Lambda calculated under step 98. <p style="text-align: center;">Part B (measurement of on-hook case) and Part C (measurement of off-hook case):</p> <p>It is expected that for each loop tested, the xDSL transceivers SHALL:</p>

	<ol style="list-style-type: none"> 1. Establish a stable connection. 2. Achieve <u>an average</u> net data rate not more than 3% below what was recorded for the same test loop in Section 8.2.3. 3. Initialize with a minimum noise margin of at least 4 dB as collected in Step <u>98</u>. 4. Not exhibit continued coding violations or loss of synchronization. 5. Have the number of reported CRCs SHALL be less than or equal to the CRC value specified in Table 8-7 for the Lambda calculated under step <u>1140</u>.
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7 Corrections to Table 8-15

Update Table 8-15 as follows:

Table 8-15: Continuous ringing Test Procedure

Expected Result	<p>NOTE: If a test point fails to achieve any of these expected results, the remainder of the tests SHALL not <u>NOT</u> be performed on that test point.</p> <p>It is expected that for each loop tested, the CPE and DSLAM SHALL:</p> <ol style="list-style-type: none"> 1. Establish a stable connection. 2. Achieve a net data rate not more than 5% below what was recorded for the same test loop in Section 8.2.3. 3.2. Initialize with a noise margin of at least 4 dB as collected in step 10. 4.3. Do not exhibit continued coding violations, loss of synchronization, or inability to train. 5.4. Have the number of reported CRCs be less than or equal to the CRC value specified in Table 8-7 for the Lambda calculated under step 12.
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8 Corrections to Table 8-18

Update Table 8-18 as follows:

Table 8-18: Cadenced ringing Test Procedure

<p>Expected Result</p>	<p>It is expected that for each loop tested, the CPE and DSLAM SHALL:</p> <ol style="list-style-type: none"> 1. Establish a stable connection. 2. Achieve a net data rate not more than 3% below what was recorded for the same test loop in Section 8.2.3. 3.2. Initialize with a minimum noise margin of at least of 4 dB as collected in step 8. 4.3. Following the injection of the cadenced ringing, not exhibit continued coding violations when configured in interleaved mode. 5.4. Not undergo a loss of synchronization. 6.5. For Pass/Fail criteria values refer to Table 8-8.
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9 Corrections to Table 8-19

Update **Table 8-19** as follows:

Table 8-19: On/Off-Hook Test Procedure

<p>Expected Result</p>	<p>It is expected that for each loop tested, the CPE and DSLAM SHALL:</p> <ol style="list-style-type: none"> 1. Establish a stable connection. 2. Achieve a net data rate not more than 3% below what was recorded for the same test loop in Section 8.2.3. 3.2. Initialize with a minimum noise margin of 4 dB as collected in step 8. 4.3. Following the hook transitions, not exhibit continued coding violations when configured in interleaved mode. 5.4. Following (or during) the hook transitions, not undergo a loss of synchronization. 6.5. For Pass/Fail criteria values refer to Table 8-8.
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10 Corrections to Table 8-20

Update **Table 8-20** as follows:

Table 8-20: Ring Trip Test Procedure

<p>Expected Result</p>	<p>It is expected that for each loop tested, the CPE and DSLAM SHALL:</p> <ol style="list-style-type: none"> 1. Establish a stable connection. 2. Achieve a net data rate not more than 3% below what was recorded for the same test loop in Section 8.2.3. 3.2. Initialize with a minimum noise margin of 4 dB as collected in step 9. 4.3. Not exhibit a loss of synchronization as a result of the ringing signals and on/off hook transitions. 5.4. For Pass/Fail criteria values refer to Table 8-8.
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11 Corrections to Table 9-10

Update *Table 9-10* as follows:

Table 9-10: Baseline Test Procedure

Test Configuration	Refer to Section 9.6.2
Method of Procedure	<p>Part A (measurement with DC power, ISDN idle, no DC current):</p> <ol style="list-style-type: none"> 1. Configure the test setup as described in Section 9.6.2 with injection of -140 dBm/Hz AWGN at both ends. Connect the CO DC Source voltage. 2. Configure the CPE and DSLAM according to the interleaved profile as defined in Section 9.1.3. 3. Connect the CPE and DSLAM to the CPE and CO baseline splitters respectively, attaching the ISDN DC voltage supply at CO, and both ISDN transceivers, but with ISDN in the idle state and without DC voltage sink at CPE. <u>4.</u> Determine the average net data rate by performing the test procedure defined in Table 9-5 steps 3 to 7 4.5. Connect the CPE and CO splitters with the first test loop defined in Section 9.1.2. 5.6. Force a new initialization and wait for modems to sync. Wait for 2 minutes after initialization for any bit-swaps to settle. 6.7. Collect and record the upstream and downstream noise margins, current CRC count, INP actual values, transmit power levels and net data rates. 7.8. Wait for 2 minutes. 8.9. Record the CRC Measurement Interval and the number of reported CRCs. The amount of reported CRCs is the difference between the number recorded in this step 8 and the number recorded in step 7.6. Calculate Lambda according to the appropriate formula defined in Section 9.1.5. Record the CRC value specified in Table 9-2 for the calculated value. 9.10. Repeat steps 5.4 through 9.8 for each test loop defined in Section 9.1.2. 10.11. If applicable, repeat steps 2 through 10.9 with the CPE and DSLAM configured to the fast test profile as defined in Section

	<p>9.1.2.</p> <p>Part B (measurement with DC voltage, ISDN activated, no DC current):</p> <ol style="list-style-type: none"> 1. Configure the test setup as described in Section 9.6.2 with injection of -140 dBm/Hz AWGN at both ends. Connect the CO DC Source voltage. 2. Configure the CPE and DSLAM according to the interleaved profile as defined in Section 9.1.3. 3. Connect the CPE and DSLAM to the CPE and CO baseline splitters respectively. 4. Connect the ISDN port of the CO splitter to the CO ISDN transceiver including the DC voltage supply, see Section 7.5.2.1. 5. Connect the ISDN ports of the CPE splitter to the ISDN transceiver which is not consuming any DC current, see Section 7.5.3.1. 6. Determine the average net data rate by performing the test procedure defined in Table 9-5 steps 3 to 7 6.7. Connect the CPE and CO splitters with the first test loop defined in Section 9.1.2, to be incremented when this step is revisited. 7.8. Force a new initialization and wait for modems to sync. Wait for 2 minutes after initialization for any bit-swaps to settle. 8.9. Collect and record the upstream and downstream noise margins, current CRC count, INP actual values, transmit power levels and net data rates. 9.10. Activate the ISDN, wait for the ISDN to synchronize and wait for 2 minutes for the ISDN to stabilize. 10.11. Record the CRC Measurement Interval since the activation in Step 9 and the number of reported CRCs over that period. 11.12. Wait for 2 minutes. 12.13. Record the CRC Measurement Interval and the number of reported CRCs. The amount of reported CRCs is the difference between the number recorded in this step 12 and the number
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	<p>recorded in step 1140 Calculate Lambda according to the appropriate formula defined in Section 9.1.5. Record the CRC value specified in Table 9-2 for the calculated value.</p> <p>13.14. Repeat steps 76 through 1312 for each additional test loop defined in Section 9.1.2.</p> <p>14.15. If applicable, repeat steps 2 through 1413 with the CPE and DSLAM configured to the fast test profile as defined in Section 9.1.3.</p> <p style="text-align: center;">Part C (measurement with DC voltage, ISDN activated, and DC current):</p> <ol style="list-style-type: none"> 1. Configure the test setup as described in Section 9.6.2 with injection of -140 dBm/Hz AWGN at both ends. Connect the CO DC Source voltage and the CPE current load. 2. Configure the CPE and DSLAM according to the interleaved profile as defined in Section 9.1.3. 3. Connect the CPE and DSLAM to the CPE and CO baseline splitters respectively. 4. Connect the ISDN port of the CO splitter to the ISDN transceiver including the DC voltage supply, see Section 7.4 and 7.5. 5. Connect the ISDN port of the CPE splitter to the ISDN transceiver including the DC current sink, see Section 7.4 and 7.5. 6. Determine the average net data rate by performing the test procedure defined in Table 9-5 steps 3 to 7 6.7. Connect the CPE and CO splitters with the first test loop defined in Section 9.1.2, 7.8. Force a new initialization and wait for modems to sync. Wait for 2 minutes after initialization for any bit-swaps to settle. 8.9. Collect and record the upstream and downstream noise margins, current CRC count, INP actual values, transmit power levels and net data rates. 9.10. Activate the ISDN, wait for the ISDN to synchronize and wait
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	<p>for 2 minutes for the ISDN to stabilize.</p> <p>10.11. Record the CRC Measurement Interval since the activation in step 109 and the number of reported CRCs over that period.</p> <p>11.12. Wait for 2 minutes.</p> <p>12.13. Record the CRC Measurement Interval and the number of reported CRCs. The amount of reported CRCs is the difference between the number recorded in this step 12 and the number recorded in step 1140. Calculate Lambda according to the appropriate formula defined in Section 9.1.5. Record the CRC value specified in Table 9-2 for the calculated value.</p> <p>13.14. Repeat steps 76 through 1342 for each additional test loop defined in Section 9.1.2.</p> <p>14.15. If applicable, repeat steps 2 through 1443 with the CPE and DSLAM configured to the fast test profile as defined in Section 9.1.3.</p>
<p>Expected Result</p>	<p>NOTE: If a test point fails to achieve any of these expected results, the remainder of the tests SHALL notNOT be performed on that test point.</p> <p style="text-align: center;">Part A (measurement of delta-SNR, no ISDN signal with DC voltage, no current):</p> <p>It is expected that for each loop tested, the xDSL transceivers SHALL:</p> <ol style="list-style-type: none"> 1. Establish a stable connection. 2. Achieve an average net data rate not more than 3% below what was recorded for the same test loop in Section 9.2.3. 3. Initialize with a minimum noise margin of at least 4 dB as collected in Step 76. 4. Not exhibit continued coding violations or loss of synchronization. 5. Have Thethe number of reported CRCs be less than or equal to the CRC value specified in Table 9-2 for the Lambda calculated under Step 98.

**Part B (measurement with ISDN signal and DC voltage,
but no DC current)
and
Part C (measurement with ISDN signal and DC voltage
and current):**

It is expected that for each loop tested, the xDSL transceivers SHALL:

1. Establish a stable connection.
- ~~1.2.~~ Achieve an average net data rate not more than 3% below what was recorded for the same test loop in Section 9.2.3.
- ~~2.3.~~ Initialize with a minimum noise margin of at least 4 dB as collected in step 98.
- ~~3.4.~~ Not exhibit continued coding violations or loss of synchronization.
- ~~4.5.~~ Have the ~~The~~ number of reported CRC's in step 1110 ~~SHALL~~ be less than or equal to the CRC value specified in Table 9-2 for ISDN activation.
- ~~5.6.~~ Have the ~~The~~ number of reported CRC's ~~SHALL~~ be less than or equal to the CRC value specified in Table 9-2 for the Lambda calculated under step 1312.

12 Corrections to Section 9.1.2

The general test setup reference model is shown in Section [06.5](#), Table 6-9, i.e. with two xDSL transceivers, lines or line models, and two splitters.

End of Broadband Forum Technical Report TR-127