

Connecting the Positron Access Solutions BRX-XLR Bandwidth Amplifier

The following procedure will take you through the basic steps to qualify a copper loop BEFORE and AFTER the installation of the BRX-XLR-2 in order to assess the performance gain resulting from the insertion of the BRX-XLR-2 on the subscriber pair.

This procedure will require the use of the Positron BRX-XLR calculator. It is recommended that you download a copy of the calculator using the instructions at the end of this document. Note that registration is required.

Step 1: BRX-XLR Placement Determination

To start you must have the actual cable makeup (cable gauges and lengths) for the loop to the customer. Drop distance and gauge should also be included.

Step 1.1

Select the “Optimized Bandwidth Analysis” button in the lower right corner of the calculator. In the Analysis Parameters in the top left, select between Feet (default) and Meters and select the Gauge Equivalent corresponding to the cable gauge you typically use to report loops in your management system.

Step 1.2

Enter the loop details in the appropriate Loop Length fields in the calculator.

Step 1.3

Enter the Target SNR configured in the DSLAM (default value: 6).

Click the Calculate button and the results will appear instantly in the table at the bottom.

The Optimal Placement tab results provide an equivalent loop length location (columns 2 & 3) that will optimize the bandwidth for the speed shown in the “With BRX-XLR” column. The Detailed Report tab shows bandwidth projections for other amplifier locations.

Use the equivalent loop length as the starting point to look for likely installation locations. The results will show the lengths in the selected gauge equivalent.

Step 1.3a

If planning one location for two customers, repeat steps 2 and 3 for the second loop (longer or shorter). Look for a location that is between the long and the short loop result.

Step 1.4

Based on the results from step 1.3 and/or 1.3a, find a likely location along the route where it will be relatively easy to install the BRX-XLR. For example, load points, splices, and gauge change locations where pairs are relatively available (so to speak) are likely spots to install the BRX-XLR.

Step 1.5

Using the actual BRX-XLR location determined from step 1.4, perform the “Fixed Distance Analysis” (lower left button) in the Calculator. Select the Gauge Equivalent in the Analysis Parameters. Top left.

Enter the L1 loop make up information from the DSLAM to the selected BRX-XLR location in the left fields,

Enter the L2 loop make up information from the selected BRX-XLR location to the customer in the right fields. You can enter multiple numbers if there are several cable types. For example, the drop wire is often a larger gauge size. The calculator performs the analysis as the values are being entered; ignore any red alert text until you have finished entering both sides of the loop.

The results of this step in the “With BRX-XLR” column (3) is the bandwidth that the customer can expect with the BRX-XLR in that location.

Step 2: Measure each pair to be used for the presence of a sealing DC Voltage (-40 VDC to -63 VDC).

Important Note: The BRX-XLR-2 unit is powered from the Sealing Current found on a standard POTS pair. The BRX-XLR-2 will not work on a dry pair (line with no sealing current). Each pair of the BRX-XLR-2 is powered independently with each pair requiring the presence of the sealing DC Voltage for proper operation.

Step 3: Before inserting the BRX-XLR-2 on the copper pair, you should access the DSLAM/MSAN Performance Statistics page and record the following performance information between the DSLAM/ MSAN and the subscriber CPE:

| | |
|--|--|
| Downstream Training Rate | |
| Upstream Training Rate | |
| Downstream Maximum Attainable Bit Rate | |
| Upstream Maximum Attainable Bit Rate | |
| Downstream Maximum Transmit Rate | |
| Downstream Minimum Transmit Rate | |
| Upstream Maximum Transmit Rate | |
| Upstream Minimum Transmit Rate | |
| Downstream SNR Margin | |
| Upstream SNR Margin | |

Step 4: Insert the BRX-XLR-2 at the desired location, making sure to connect the grounding lug of the unit to a proper ground (less than 25 ohms). You will usually find a proper ground point at the location where the BRX-XLR-2 is to be installed.

Step 5: Connect one of the BRX-XLR-2 CO-side pairs to the corresponding pair from the DSLAM/MSAN. If you are using the BRX-XLR-2 to serve two (2) different subscribers or if you use two (2) bonded pairs to serve a single customer, you will have to connect each pair. The CO-side pairs are color-coded as follows:

- CO Line 1 Blue / White
- CO Line 2 Orange / White

Step 6: Connect the corresponding BRX-XLR-2 CPE-side pair(s) to the pair(s) going to the subscriber home.

- CPE Line 1 Blue / White
- CPE Line 2 Orange / White

Important Note: Please make sure to match the corresponding CO-side pair number to the corresponding CPE-side pair number.

Once this step is completed, the DSLAM and the CPE will retrain the circuit and bring up the ADSL2+ / ADSL link with the higher bandwidth.

Step 7: Access the DSLAM/ MSAN Performance Statistics and record the improved results:

| | |
|--|--|
| Downstream Training Rate | |
| Upstream Training Rate | |
| Downstream Maximum Attainable Bit Rate | |
| Upstream Maximum Attainable Bit Rate | |
| Downstream Maximum Transmit Rate | |
| Downstream Minimum Transmit Rate | |
| Upstream Maximum Transmit Rate | |
| Upstream Minimum Transmit Rate | |
| Downstream SNR Margin | |
| Upstream SNR Margin | |

If the DSLAM/ MSAN is set to a specific **Maximum Transmit** rate for the Downstream and Upstream direction that is lower than the **Maximum Attainable** Downstream and Upstream rate, you should increase the DSLAM/ MSAN settings to the **Maximum Attainable** Downstream and Upstream rates in order to fully benefit from the additional bandwidth resulting from the insertion of the BRX-XLR-2 on the subscriber pair.

End of BRX-XLR installation procedure

Additional Deployment Considerations

Bonded Pairs

For convenience, the BRX-XLR Calculator does include an option (checkbox) for pair bonding. Essentially, this feature simply assumes that the two loops are essentially identical and therefore doubles the resulting bandwidth for both downstream and upstream. In reality, bonded pairs are often not the same length. It is recommended to enter the longest loop in the calculator in order to optimize placement for this loop. Since the other loop is shorter, the resulting bandwidth resulting from the bonded pairs should be slightly better than what the Calculator will predict.

Actual Raw Throughput May be Different From Predicted Values

There will be times when actual raw throughput will be significantly different (>10%) from predicted values. This may be caused by a number of factors. One of the most likely reason is that the Target SNR default value in the BRX Calculator (set to 6dB), is not the same as the one provisioned in the DSLAM. If that is the case, simply change the value in the Target SNR box to match the DSLAM setting. If this does not resolve the issue, then it may be because you are faced with “less than ideal” line conditions where the bandwidth is negatively impacted by bridge taps, influence from power lines and/or disturbances from other pairs or the use of other protocols in the same binder such as T1/E1, HDSL, and G.SHDSL. Our field experience has shown that the BRX-XLR provides even better Improvement Ratios (i.e. Bandwidth Enhancement) when such conditions are present. As a result, it is difficult to predict what the expected bandwidth will be but we recommend that you still follow the optimal placement recommended in this tab before moving on to step 1.4.

NOTE: In order to predict the expected bandwidth as accurately as possible, it is recommended to increase the loop length (in step 1.2) and press Calculate. Adjust the loop length (and recalculate) until the Raw downstream bandwidth in column 4 is equal to what you are measuring. Once that is achieved, you can use the “With BRX-XLR Downstream Bandwidth” indicated in column 6 as a good enough estimate of what you can obtain. The placement of the BRX-XLR should be the one obtained in step 1.4 above.

Minimum and Maximum Loop Length Values for the BRX-XLR

To facilitate the planning process, the BRX-XLR Calculator will provide a warning in red whenever a number is entered that does not meet a minimum value that would ensure proper and useful performance. These criteria, for 26AWG (0.40 mm) cables, are:

- 1) Minimum Loop Length from DSLAM to BRX-XLR (L1) should be no less than: 5,000 feet (1.5 km).
- 2) Minimum Loop Length from CPE to BRX-XLR (L2) should be no less than: 500 feet (150 m).

In addition, a red warning will pop up if the Total Loop Length is more than 18,000 feet (5.5 km). It is important to note that the product is still operational and useful beyond this point if a bandwidth below 4 Mbps is acceptable, for instance:

- 3) Maximum distance for a 2.5 Mbps service (or 5 Mbps with pair bonding): 19,000 feet (5.8 km)
- 4) Maximum distance for a 1.0 Mbps service (or 2 Mbps with pair bonding): 20,000 feet (6.1 km)

Downloading the BRX-XLR Bandwidth Calculator

Below is the procedure to request access to the Positron Access Portal and to download the **BRX-XLR Calculator**.

- Go to www.positronaccess.com/Portal.php
- Complete the “**Sign Up**” form to request a username & password
- You will then receive an email from Positron with your username & password

After you receive the email from Positron

- Go to www.positronaccess.com/Portal.php to access the “**Portal**”
- Enter your username & password under the “**Login**” section and click on **Login**
- Once in the Portal:
 - Click on “**Software/Firmware**” on right menu
 - Click on **BRX-XLR** folder on the top menu
 - Click on **Download** next to BRX-XLR Calculator
 - Download the BRX-XLR Calculator application and install on your computer