

BRX-XLR Calculator

BRX-XLR Calculator

Quick Start Guide

July 2016

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1 About the BRX-XLR

The Broadband Reach eXtender – eXtra Long Reach (BRX-XLR) can more than double the achievable ADSL2+ and ADSL bandwidth to subscribers located more than 10,000 feet (3.3 km) from the DSLAM serving them. The BRX-XLR is powered from the POTS signaling current and can be deployed with minimal planning and engineering activities.

2 Overview of the BRX-XLR Calculator Modes

This Calculator is used to provide estimates of the achievable bandwidth resulting from the insertion of the BRX-XLR in the Outside copper Plant (OSP).

The BRX-XLR Calculator can be used in a variety of ways to determine its optimal use. It can:

1. Calculate the achievable bandwidth based on the location of the BRX-XLR (from the DSLAM) and the distance to the subscriber CPE;
2. Calculate the optimal bandwidth for a specific total loop length and gauge of wire and recommend the location where the BRX-XLR should be installed (usually a range of distances from the DSLAM) to achieve the target bandwidth;
3. Calculate the best placement of a BRX-XLR cabinet to achieve a target bandwidth to multiple subscribers over a total loop length. This is useful to determine the Customer Serving Area (CSA) for a given access speed tier.

When considering the placement of the BRX-XLR, the Calculator uses the following notation:

1. **L1** is the distance between the DSLAM and the location where the BRX-XLR is installed;
2. **L2**: is the distance between the BRX-XLR and the subscriber CPE.



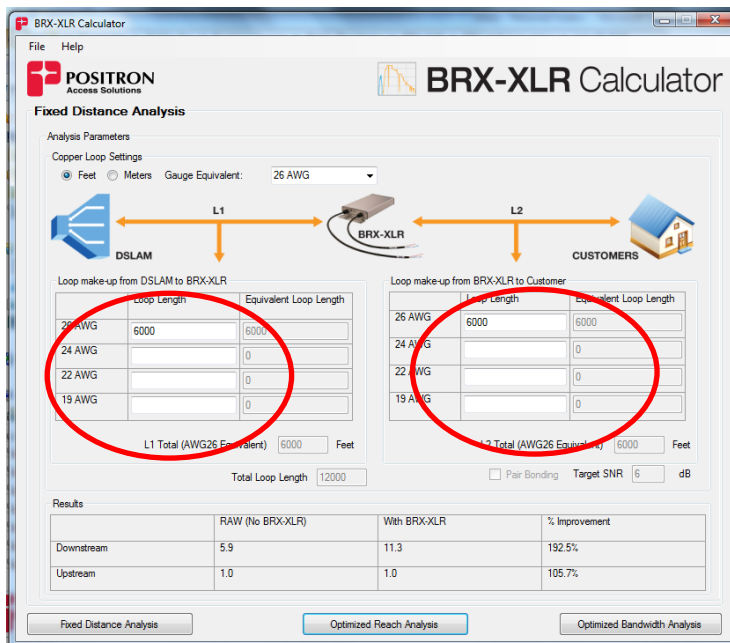
IMPORTANT NOTE: The BRX-XLR Calculator results are based on extensive testing by Positron Access Solutions on real copper binders. The testing took place over multiple loop lengths to achieve good granularity in the results. It is important to note that ALL of the figures are based on the presence of at least 6 subscriber CPEs in the binder to closely reflect real operating conditions in the OSP. When deploying the BRX-XLR to serve a customer on 1 or 2 pairs, the actual performance achieved will typically exceed the estimates from the Calculator.

3 Calculating the Resulting Bandwidth at a Specific Distance

This is the default BRX-XLR Calculator mode. The copper loop is specified for L1 (distance between the DSLAM and the BRX-XLR) and for L2 (distance between the BRX-XLR and the subscriber CPE). Each loop can be made up of sections of copper with different gauges.

The loop length can be entered in feet or meters. It is also possible to select the gauge that will be used as the Equivalent Wire Length (EWL) when reporting the Calculator results.

As soon as the L1 and L2 loop information is provided, the Calculator will provide the expected Downstream and Upstream bandwidth in raw mode (without the BRX-XLR) and then with the BRX-XLR installed at a distance of L1 from the DSLAM.



Specify the loop make-up for L1 and L2 by indicating the length of each segment of each loop based on the gauge of each segment.

You can enter the information in feet or meters. You can also select the gauge that will be used to report the total L1 and L2 loop length (Equivalent Wire Length – EWL).

NOTES:

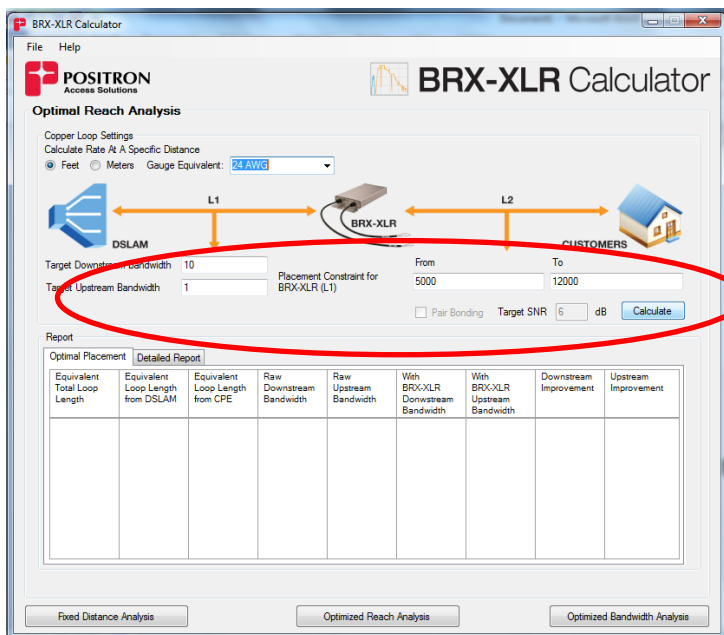
1. The default Signal to Noise Ratio (SNR) Target is currently set to 6 dB in the Calculator. A future version of the Calculator will support different target SNR values.
2. Although the BRX-XLR allows pair bonding, this will be supported in a future version of the Calculator. An easy workaround is to simply double the estimated bandwidth since the BRX-XLR typically delivers the same amplification (improvement) over each pair of equal distances.

4 Calculating the Optimal Reach for a Target Bandwidth

This mode is selected by clicking the **Optimal Reach Analysis** button on any of the Calculator pages. This is useful to determine how far a given target bandwidth level (downstream and upstream) can be delivered based on a range of location (distance from the DSLAM) where the BRX-XLR can be installed.

The range where the BRX-XLR can be installed can be specified in feet or meters. It is also possible to select the gauge that will be used as the Equivalent Wire Length (EWL) when reporting the Calculator results. As a “rule of thumb”, the BRX-XLR should be deployed near the middle of a copper pair but can easily be deployed anywhere beyond 6000 feet of 26 AWG copper (2km of 0.4mm) and up to 2/3 of the total copper loop and still be able to provide significant amplification of the ADSL2+/ADSL bandwidth in the downstream and upstream directions.

Once the target bandwidth is specified along with the allowable deployment range for the BRX-XLR, simply press the **calculate** button to obtain the recommended placement of the BRX-XLR that achieves the target bandwidth over the longest total loop distance. You will also be presented with other placement alternatives along with the maximum distance that delivers the target bandwidth for other L1 (distance from DSLAM to BRX-XLR) and L2 (distance from BRX-XLR and Subscriber CPE) combinations.

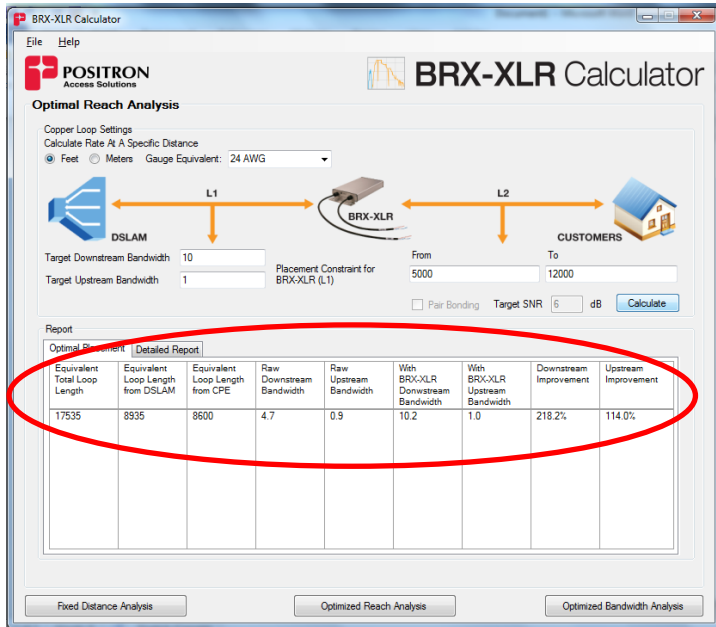


Specify the target downstream and upstream bandwidth and the allowable interval (distance from the DSLAM) where the BRX-XLR can be deployed.

NOTES:

1. The default SNR Target is currently set to 6 dB. A future version of the Calculator will support different target SNR values.
2. Pair bonding option will be supported in a future version of the Calculator. An easy workaround is to simply double the estimated bandwidth since the BRX-XLR typically delivers the same amplification (improvement) over each pair of equal distances. This means that when trying to determine how far a given target bandwidth can be delivered you should specify half of the target bandwidth if you intend to use pair bonding.

The Calculator will present the results in the report section below. The **Optimal Placement** tab provides information about the recommended placement of the BRX-XLR cabinet that delivers the target bandwidth over the longest overall total distance. This includes the resulting bandwidth improvement achieved in the downstream and upstream direction in comparison with the typical raw (no BRX-XLR) performance that should be experienced when there is no BRX-XLR installed on this loop.



BRX-XLR Calculator

Optimal Reach Analysis

Copper Loop Settings
Calculate Rate At A Specific Distance
 Feet Meters Gauge Equivalent: 24 AWG

DSLAM ← L1 → BRX-XLR ← L2 → CUSTOMERS

Target Downstream Bandwidth: 10
Target Upstream Bandwidth: 1
Placement Constraint for BRX-XLR (L1): From 5000 To 12000
 Pair Bonding Target SNR: 6 dB

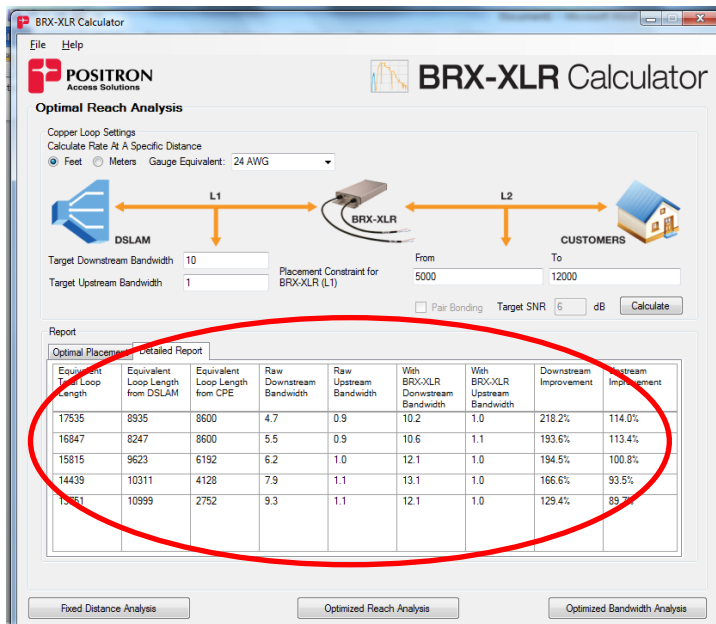
Report

Equivalent Total Loop Length	Equivalent Loop Length from DSLAM	Equivalent Loop Length from CPE	Raw Downstream Bandwidth	Raw Upstream Bandwidth	With BRX-XLR Downstream Bandwidth	With BRX-XLR Upstream Bandwidth	Downstream Improvement	Upstream Improvement
17535	8935	8600	4.7	0.9	10.2	1.0	218.2%	114.0%

Fixed Distance Analysis | **Optimized Reach Analysis** | Optimized Bandwidth Analysis

The optimal placement is determined by the highest downstream bandwidth resulting from the placement options of the BRX-XLR.

Since the recommended placement for the BRX-XLR may not always represent a good fit in the OSP. For this reason, the Calculator offers additional placement options to help determine the best location for the BRX-XLR based on the availability of splice points along the loop for the interval specified.



BRX-XLR Calculator

Optimal Reach Analysis

Copper Loop Settings
Calculate Rate At A Specific Distance
 Feet Meters Gauge Equivalent: 24 AWG

DSLAM ← L1 → BRX-XLR ← L2 → CUSTOMERS

Target Downstream Bandwidth: 10
Target Upstream Bandwidth: 1
Placement Constraint for BRX-XLR (L1): From 5000 To 12000
 Pair Bonding Target SNR: 6 dB

Report

Equivalent Total Loop Length	Equivalent Loop Length from DSLAM	Equivalent Loop Length from CPE	Raw Downstream Bandwidth	Raw Upstream Bandwidth	With BRX-XLR Downstream Bandwidth	With BRX-XLR Upstream Bandwidth	Downstream Improvement	Upstream Improvement
17535	8935	8600	4.7	0.9	10.2	1.0	218.2%	114.0%
16847	8247	8600	5.5	0.9	10.6	1.1	193.6%	113.4%
15815	9623	6192	6.2	1.0	12.1	1.0	194.5%	100.8%
14439	10311	4128	7.9	1.1	13.1	1.0	166.6%	93.5%
12751	10999	2752	9.3	1.1	12.1	1.0	129.4%	89.2%

Fixed Distance Analysis | **Optimized Reach Analysis** | Optimized Bandwidth Analysis

The detailed report tab provides ALL of the recommended locations for the installation of the BRX-XLR along with the resulting bandwidth achievable that meets the specified target bandwidth over the maximum overall distance from the DSLAM.

5 Calculating the Optimal Placement of BRX-XLR to Maximize the Achievable Bandwidth at a Target Distance

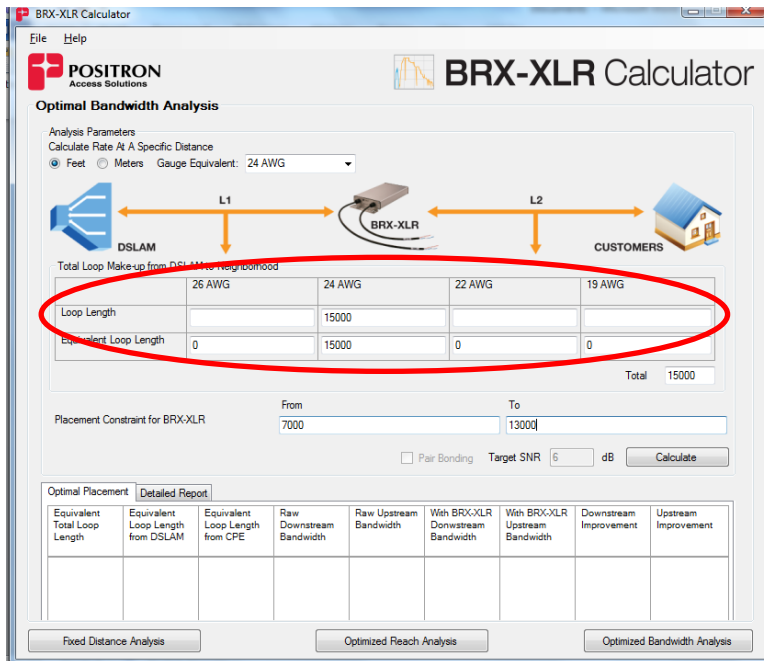
This mode is selected by clicking the **Optimal Bandwidth Analysis** button on any of the Calculator page.

The total length of the copper loop is specified (from the DSLAM to the subscriber CPE). The loop can be made up of sections of copper with different gauges.

The total loop length can be entered in feet or meters. It is also possible to select the gauge that will be used as the Equivalent Wire Length (EWL) when reporting the Calculator results.

You must provide a range of distances (from the DSLAM) specifying acceptable locations where the BRX-XLR can be installed. As a “rule of thumb”, the BRX-XLR should be deployed near the middle of a copper pair but can easily be deployed anywhere beyond 6000 feet of 26 AWG copper (2Km of 0.4mm) and up to 2/3 of the total copper loop and still be able to provide significant amplification of the ADSL2+/ADSL bandwidth in the downstream and upstream directions.

Once the loop definition is completed, simply press the **calculate** button to obtain the recommended placement of the BRX-XLR as well as the other placement alternatives along with the resulting bandwidth achievable for this loop.



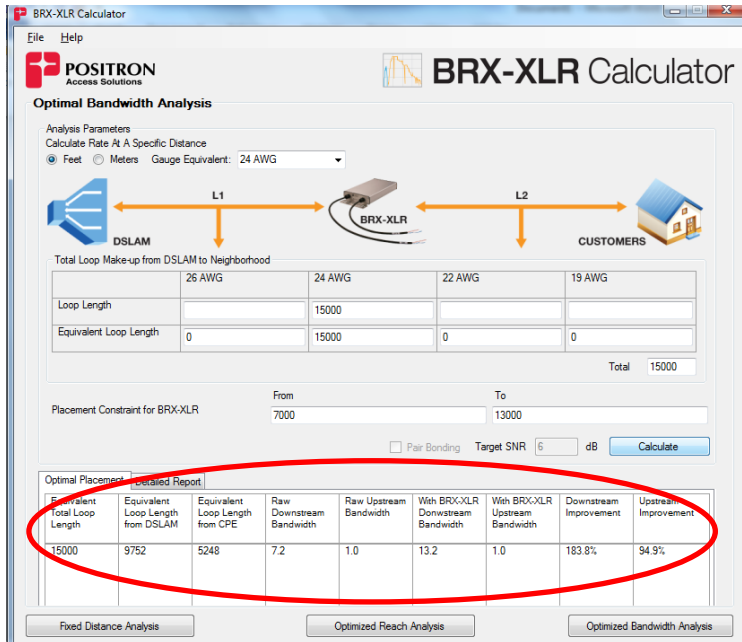
The screenshot shows the BRX-XLR Calculator interface. The 'Optimal Bandwidth Analysis' section is active. It includes a diagram of a DSLAM connected to a BRX-XLR device, which is then connected to customers. The diagram is divided into two segments, L1 and L2. Below the diagram is a table for 'Total Loop Make-up from DSLAM neighborhood' with columns for 26 AWG, 24 AWG, 22 AWG, and 19 AWG. The 'Loop Length' row shows 15000 for 24 AWG, and the 'Equivalent Loop Length' row shows 0 for all other gauges. A red oval highlights these rows. Below the table are fields for 'Placement Constraint for BRX-XLR' (From: 7000, To: 13000), 'Pair Bonding' (unchecked), and 'Target SNR' (6 dB). A 'Calculate' button is present. At the bottom, there are three analysis modes: 'Fixed Distance Analysis', 'Optimized Reach Analysis', and 'Optimized Bandwidth Analysis'.

Total Loop Make-up from DSLAM neighborhood				
	26 AWG	24 AWG	22 AWG	19 AWG
Loop Length		15000		
Equivalent Loop Length	0	15000	0	0
				Total 15000

Specify the loop make-up for the total loop between the DSLAM and the target customer serving area (CSA) by indicating the length of each segment of the loop based on the gauge of each segment.

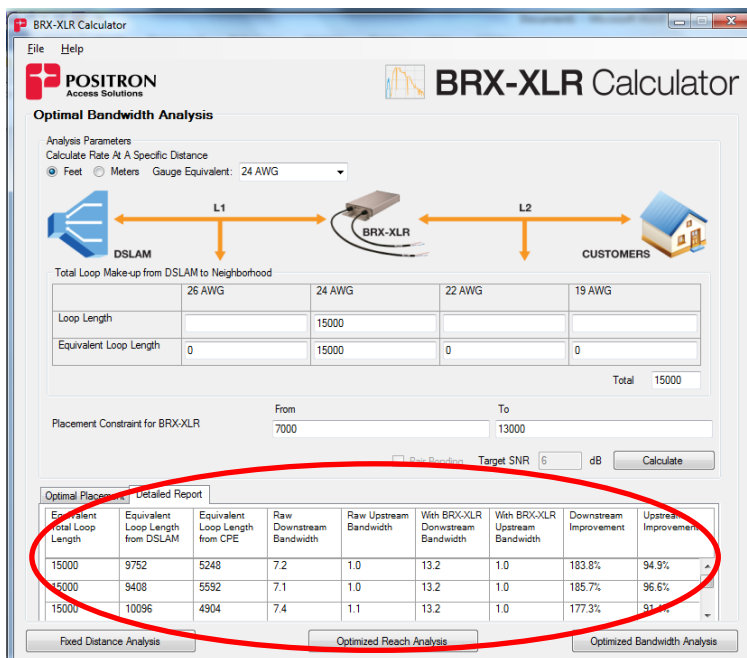
You can enter the information in feet or meters. You can also select the gauge that will be used to report the Equivalent Wire Length (EWL) for the recommended placement options of the BRX-XLR.

The Calculator will present the results in the report section below. The **Optimal Placement** tab provides information about the recommended placement of the BRX-XLR and the resulting bandwidth improvement achieved in the downstream and upstream direction in comparison with the typical raw (no BRX-XLR) performance that should be seen.



The optimal placement is determined by the highest downstream bandwidth resulting from the placement options of the BRX-XLR.

It is understood that the recommended placement for the BRX-XLR may not always represent a good fit in the OSP. For this reason, the Calculator offers additional placement options to help determine the best location for the BRX-XLR based on the availability of splice points along the loop for the interval specified.



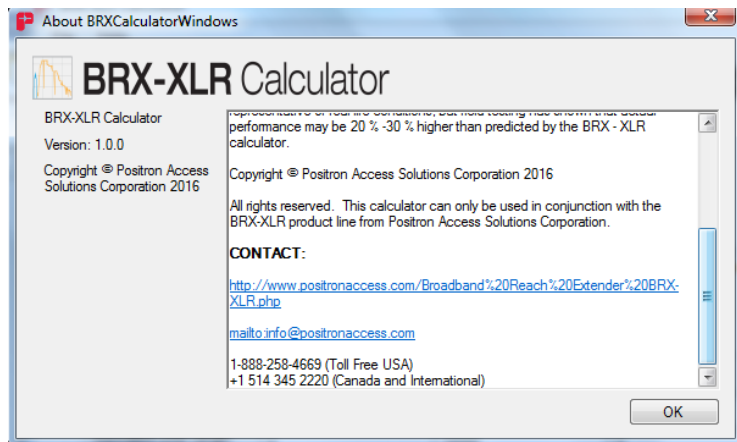
The detailed report tab provides ALL of the recommended locations for the installation of the BRX-XLR along with the resulting achievable bandwidth.

6 Help

The Help topic presents a quick summary of the capabilities of the BRX-XLR Calculator.

It includes a quick link to the BRX-XLR product page on the Positron Access Solutions web site for the latest information about the BRX-XLR.

You will also find a link to send a request email to Positron Access Solutions and contact information should you require technical assistance with the Calculator.



7 Technical Assistance Center Contact Information

You can reach the Positron Access Solutions Technical Assistance Center for more information.

USA Toll-Free: 1-888-258-4669

Canada / International: +1-514-345-2220

www.positronaccess.com

Customer Portal: <http://www.positronaccess.com/Portal.php>