Give you a feel®

Loss Monitoring of Individual Branch Fiber in PONs

Neural Optical Fiber Scope

NEW

ERA-BOTDA *NBX-N9000 Series*

End Reflection Assisted – Brillouin Optical Time Domain Analysis

The frequency-swept pump pulse technology for PONs loss measurement

- **Spatial resolution: 1m ~ 40m**
- **Sampling resolution: 0.5m ~ 20m**
- **Maximum branch number: 32**
- **Measure mode: OTDR / ERA-BOTDA**

NEUBREX®

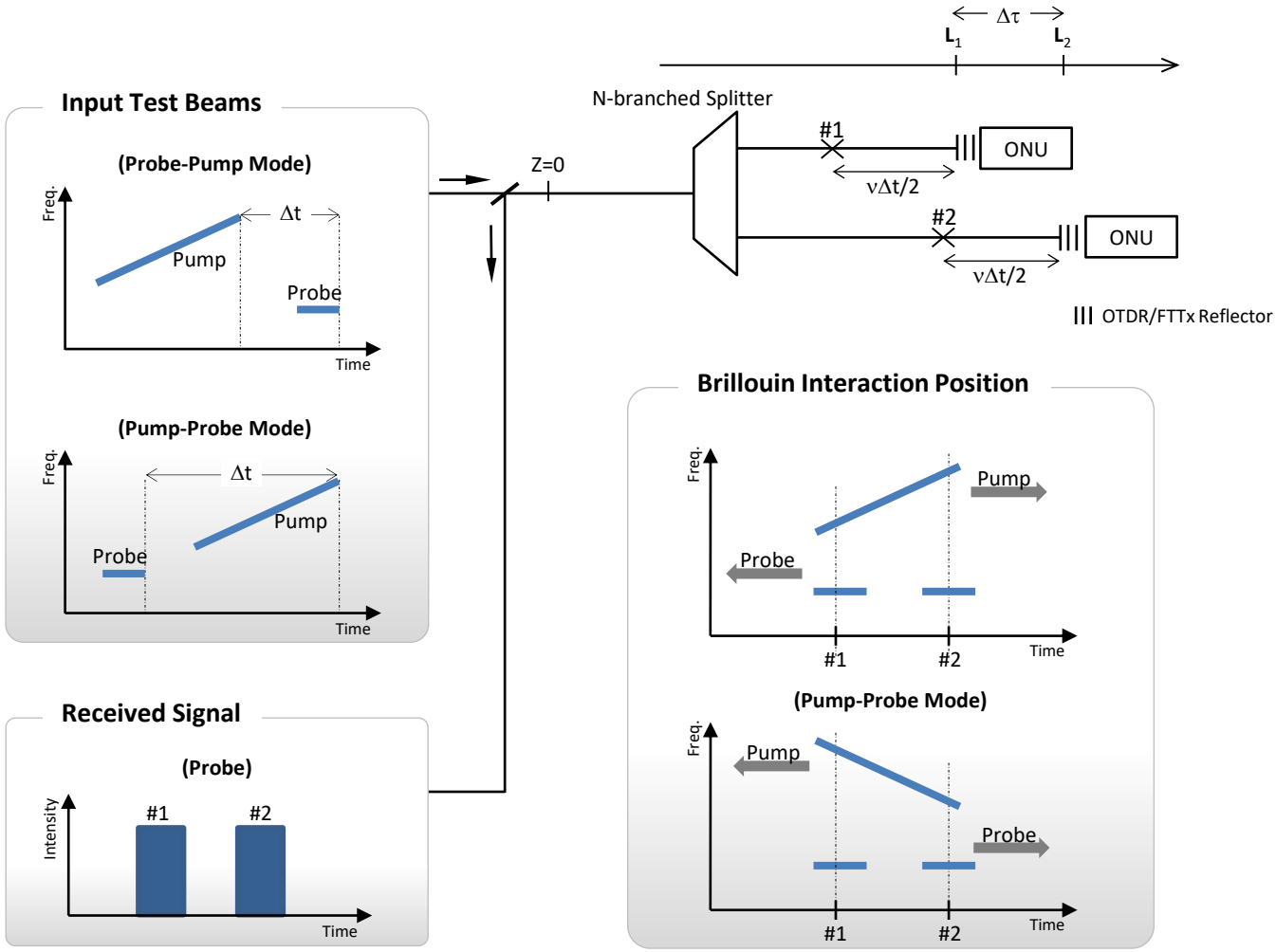
Key Features

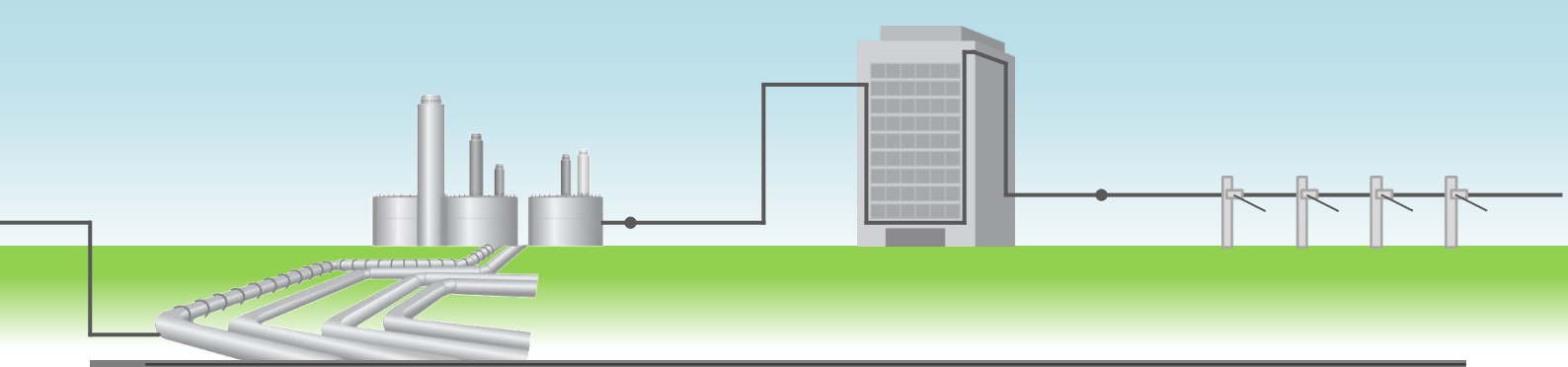
- The first-ever Brillouin Gain sensing technology for PONs.
- Measure the link loss of each individual branch path.
- Test and identify the fault path after splitter from Central Office.
- At the 1m Resolution of Reflective Probe, the best dead-zone is 0.5m.
- Maximum measuring branch is 32 channels.

Principles of ERA-BOTDA

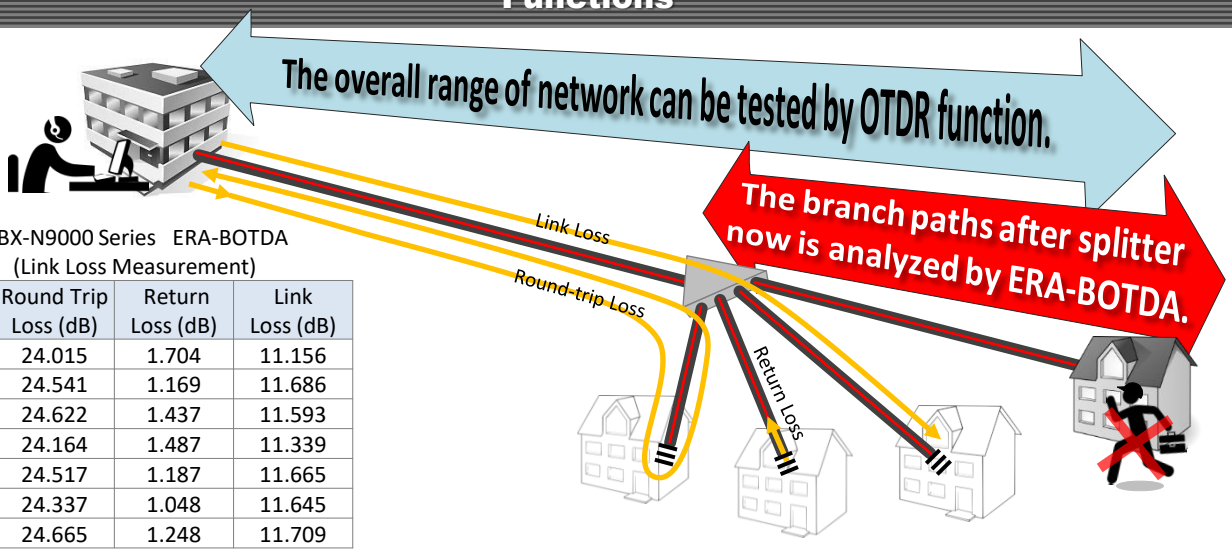
The NBX-N9000 Series ERA-BOTDA is a novel Brillouin backscattering-based Interrogator for the network loss measurement of Passive Optical Networks (PONs). With its unique designs of Brillouin frequency sweeping and the End Reflection Assisted time domain analyzing technology, the link loss and link profile of each individual branch after splitter can be measured and monitoring.

The figure below shows the concepts of the NBX-N9000 Series ERA-BOTDA. The test beams are configured in Probe and Pump that will be injected into a branching fiberoptic network. Due the interaction of beam Pump and Probe in the certain position of the fiber, the Brillouin shifted gain and frequency that against to the time domain will be detected. By computing and analysis of these signals, the intensity and position of signal of each branching paths can be profiled.





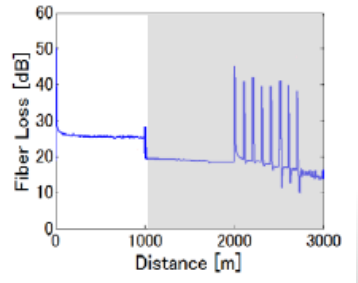
Functions



NBX-N9000 Series ERA-BOTDA
(Link Loss Measurement)

Branch	Round Trip Loss (dB)	Return Loss (dB)	Link Loss (dB)
#1	24.015	1.704	11.156
#2	24.541	1.169	11.686
#3	24.622	1.437	11.593
#4	24.164	1.487	11.339
#5	24.517	1.187	11.665
#6	24.337	1.048	11.645
#7	24.665	1.248	11.709

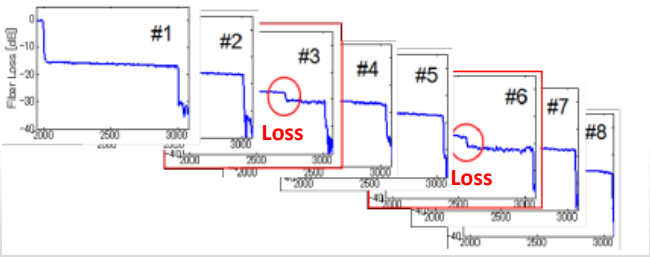
by NBX-N9000 Series OTDR



The OTDR offers the measurement of trunk and reflection peaks of branch paths.

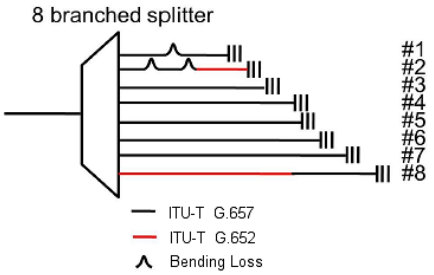
by NBX-N9000 Series ERA-BOTDA

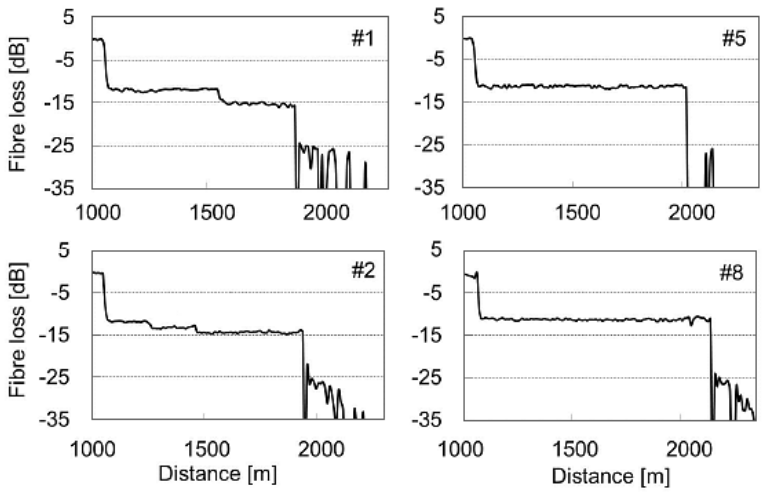
The ERA-BOTDA offers the measurement of Loss waveform of each individual branch.



Measures the Distributed Loss on 8 branch fibers of the PONs.

The test configuration of 1x8 access network is shown in as below. The bending loss is set in the designated path. Meanwhile, two types of fiber are using at #2 and #8, that are representing the mix using of different fibers in the real environment. The loss profile of each branch path shows the loss event can be identified clearly, and the mix using of fibers is not taking any interference of the measurement.





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Specifications NBX-N9000 Series

Function		*ERA-BOTDA*					*OTDR*			
Laser Wavelength	NBX-N9010	1650 ± 1 nm					1650 ± 1 nm			
	NBX-N9020	1625 ± 1 nm					1625 ± 1 nm			
Measurement Type		Pulsed probe pump Brillouin Analysis					OTDR			
Main Features		Link Loss, Branch Loss					Loss			
Distance Range		1km ~ 20km(1km/step)								
Measurement Frequency Range		8 ~ 12 GHz					-			
Range of Frequency Swept		100MHz ~ 600MHz					-			
Frequency-Swept Speed of Pump Pulse		0.1MHz/ns ~ 2MHz/ns					-			
Sampling Points		100,000 (default)								
Sampling Interval		0.5m, 1m, 2m, 5m, 10m, 20m								
Resolution of Reflective Probe		1m, 2m, 5m, 10m, 20m								
Average Count Settings		2^5 ~ 2^{23} times								
Pump Pulse Width		50ns, 100ns, 200ns, 400ns, 800ns, 1000ns					10ns, 20ns, 50ns, 100ns, 200ns			
Spatial Resolution *1		2m	5m	10m	20m	40m	1m	2m	5m	10m
Dynamic Range of ERA-BOTDA *2		14 dB	16 dB	20 dB	22 dB	24 dB	-			
Dynamic Range of OTDR (Back Scattering) *3		-					5 dB	8 dB	15 dB	18 dB
Measurement Accuracy *4		0.5dB					1dB			
Repeatability *4		0.2dB					0.5dB			
Measurement Time *5		3 minutes					30 seconds			
Applicable Fiber		Single-mode Fiber								
Connector Type		SC-UPC (Factory option)								
Interface		USB 3.0 x4, LAN (RJ-45) x2, RGB x1								
Power Supply		AC100 ~ 240V, 50/60Hz, 250VA								
Laser Safety Class		Class 1 (IEC60825-1 : 2001)								
Dimensions / Weight		approx. 456 (W) × 485 (D) × 286 (H) mm / 30 kg								
Operating Temperature		10～40 °C, Humidity below 85% (no dew condensation)								
Storage Temperature		0 ~ 50 °C								
Place of Production		Japan								

*1. Based on calculation result of Frequency-Swept Speed of Pump Pulse.
*2. Based on 2^16 average cycles. The Total Loss = Link Loss + Return Loss of FTTx (or OTDR) Reflector.
*3. Based on 2^16 average cycles. The Total Loss = Link Loss
*4. The maximum standard deviation of measurement value in 5 consecutive measurements for 100 consecutive points.
*5. The settings of 10k m distance range, 2^14 count settings, 100 sampling points not excluding the time for Pulse Adjustment.

* The specifications above and accessories layout are subject to change without notice. (20180521, A4)

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