Anritsu Advancing beyond

Tema livre

Técnicas de troubleshooting para redes ópticas

Bruno Gama

Account Manager
Anritsu ACBR Sales

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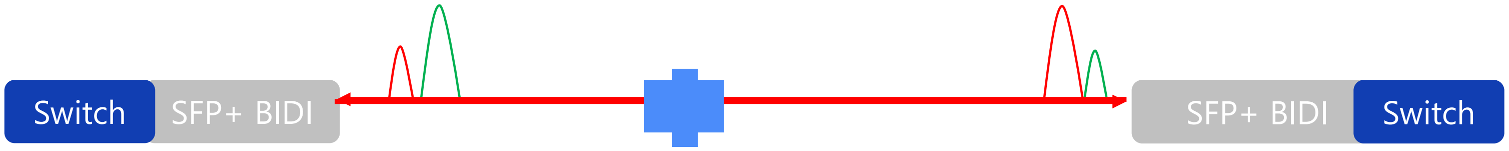
Introdução

1. Redes bidirecionais
2. Datacenters e conexões de até 600mts
3. Interfaces ópticas Plugáveis
4. Monitoração de redes
   - Uso dos pontos de monitoração
   - Problemas de diagnóstico avançado

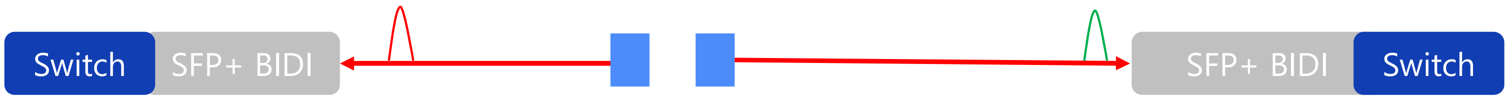
Sistemas Bidirecionais e Unidirecionais

Sistemas bidirecionais sofrem com a potência de retorno óptica (ORL). Esta característica deverá ser observada e analisada sempre que houver manutenção de fibras e/ou novas instalações.


Switch
SFP+ BIDI
SFP+ BIDI
Switch

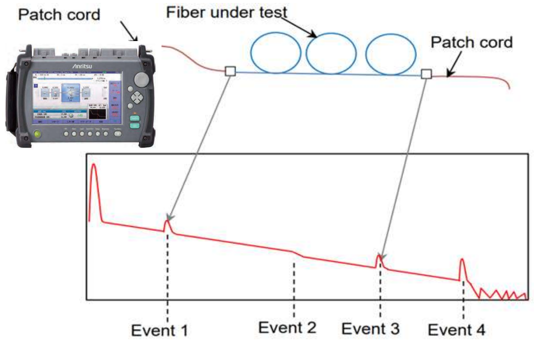
Sistema OK
Link UP
Potencia de RX presente
Tráfego OK

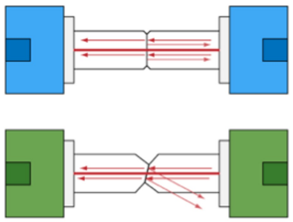
Conectores PC aberto


Switch
SFP+ BIDI
SFP+ BIDI
Switch

Sistema Parece OK
Link UP
Potencia de RX presente
Tráfego NOK

Exemplos ORL:


Patch cord
Fiber under test
Patch cord
Event 1
Event 2
Event 3
Event 4

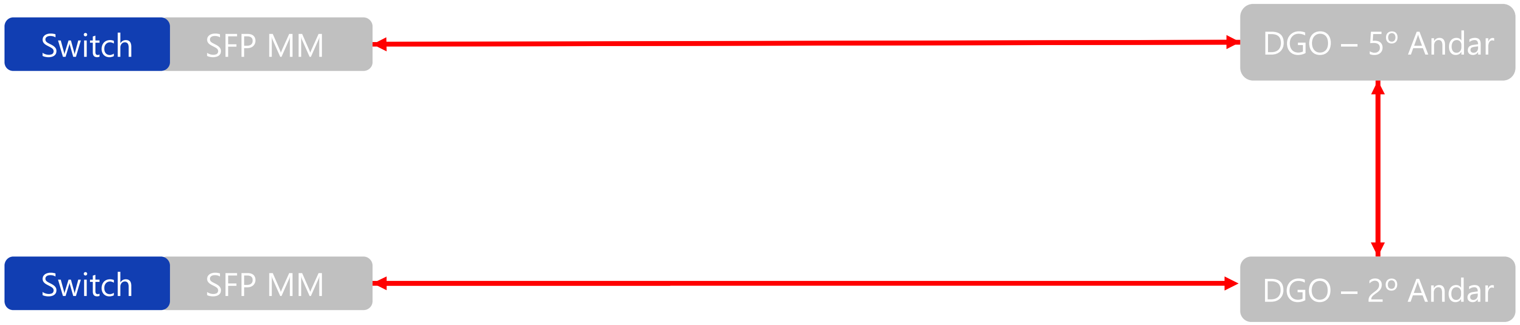


>40dB

>60dB

Conexões até 600 metros

Atenção aos modelos de fibras MM e seus transceivers:



Características	OM1	OM2	OM3	OM4	OM5
Diâmetro do Núcleo	62,5 µm	50 µm	50 µm	50 µm	50 µm
Fonte de Luz	LED	LED	VCSEL (Laser)	VCSEL (Laser)	VCSEL (Laser) + SWDM
Largura de Banda (850nm)	200 MHz·km	500 MHz·km	2000 MHz·km	4700 MHz·km	4700 MHz·km (850-953 nm)
1 Gbps (1000BASE-SX)	275 m	550 m	550 m	550 m	550 m
10 Gbps (10GBASE-SR)	33 m	82 m	300 m	550 m	550 m
40 Gbps (40GBASE-SR4)	Não recomendado	Não recomendado	100 m	150 m	150m
100 Gbps (100GBASE-SR4)	Não recomendado	Não recomendado	100 m	150 m	150m
Cor da Capa	Laranja	Laranja/Azul Água (Aqua)	Azul Água (Aqua)	Azul Água (Aqua) / Violeta	Verde Limão (Lime Green)

Interfaces ópticas Plugáveis - Confiabilidade e seus problemas em O&M

SFP/SFP+

XFP

Xenpak / X2 Converter

SFP28

QSFP+

CFP/CFP2/CFP4

QSFP28

1G	10G	25G	40G	100G

SFP+ Cable

Compact SFP

SFP+ Tunable

SFP/SFP+ Copper

QSFP+ Cable

X2 Converter

Testes para qualificar módulos ópticos

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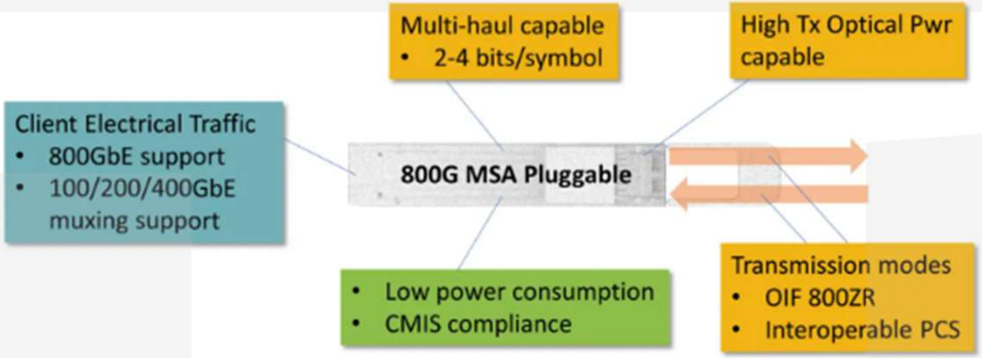
Aplicações
1G até 400G

800G
comprimento de
onda único/duplo

1.2T em comprimento de
onda único a 150 GHz



Multi-haul capable
- 2-4 bits/symbol

High Tx Optical Pwr capable

Client Electrical Traffic
- 800GbE support
- 100/200/400GbE muxing support

800G MSA Pluggable

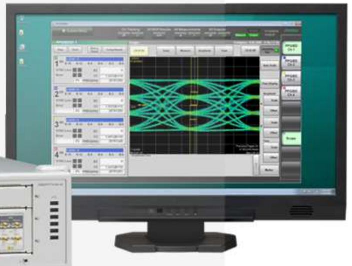
- Low power consumption
- CMIS compliance

Transmission modes
- OIF 800ZR
- Interoperable PCS

Acacia: Illustrating the key features needed for
800G MSA Pluggable modules.

MP1900A

MP2110A



MT1040A
MT1000A

MS9740B

Testes para qualificar cabos AOC e DAC

Cabos ópticos ativos, cabos de conexão direta

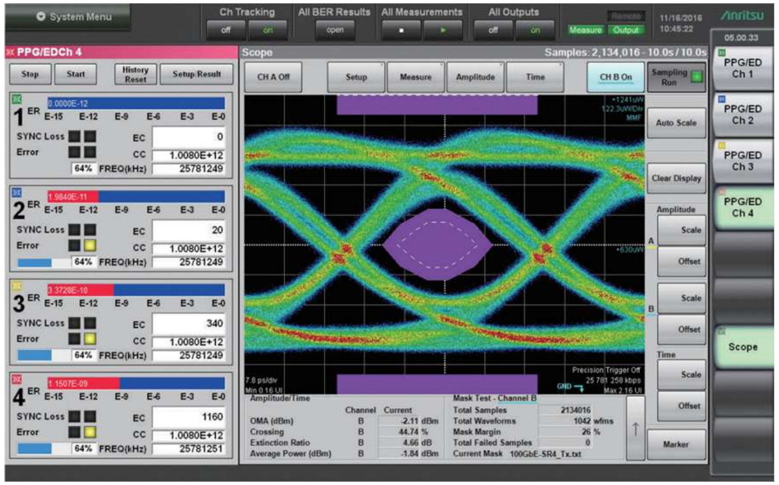
Medição simultânea de BER de 4 canais (teste de diafonia)
Análise de Padrão de Olho de Sinal Elétrico Diferencial
Análise de jitter de sinal elétrico diferencial

NRZ/PAM4 Avaliação de Sinal Elétrico Diferencial

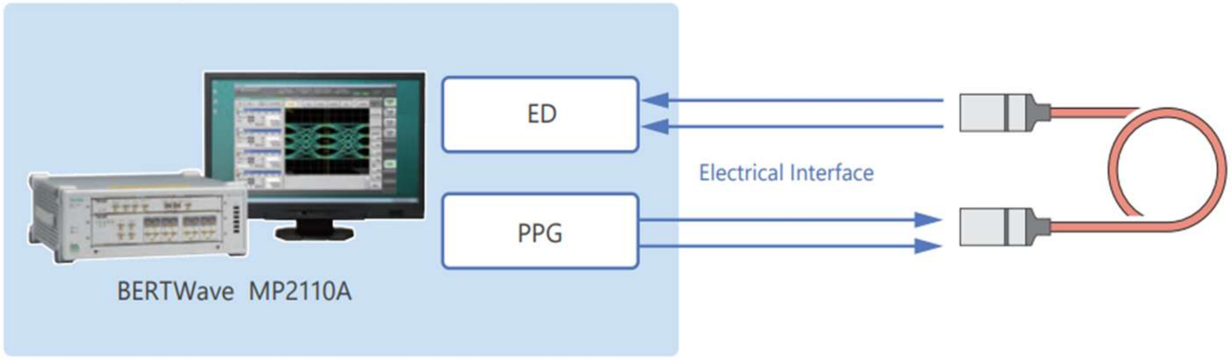
Um filtro de banda compatível com os padrões e CTLE

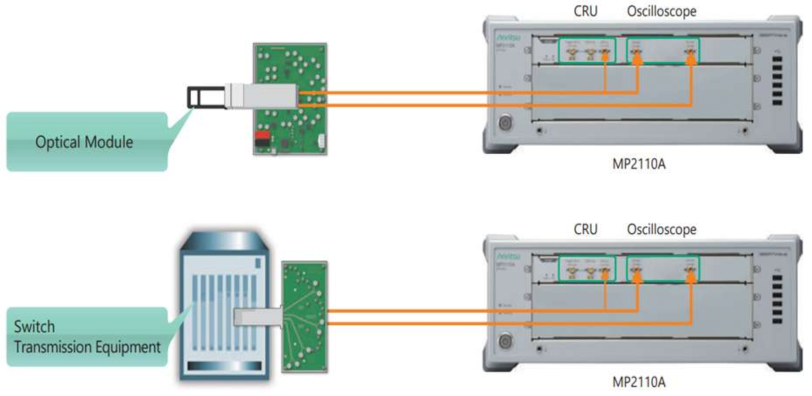
Função de calibração para isolar e extrair cabos ou perdas da placa de avaliação.

A Unidade de Recuperação de Relógio elimina a necessidade de fornecer um sinal de disparo

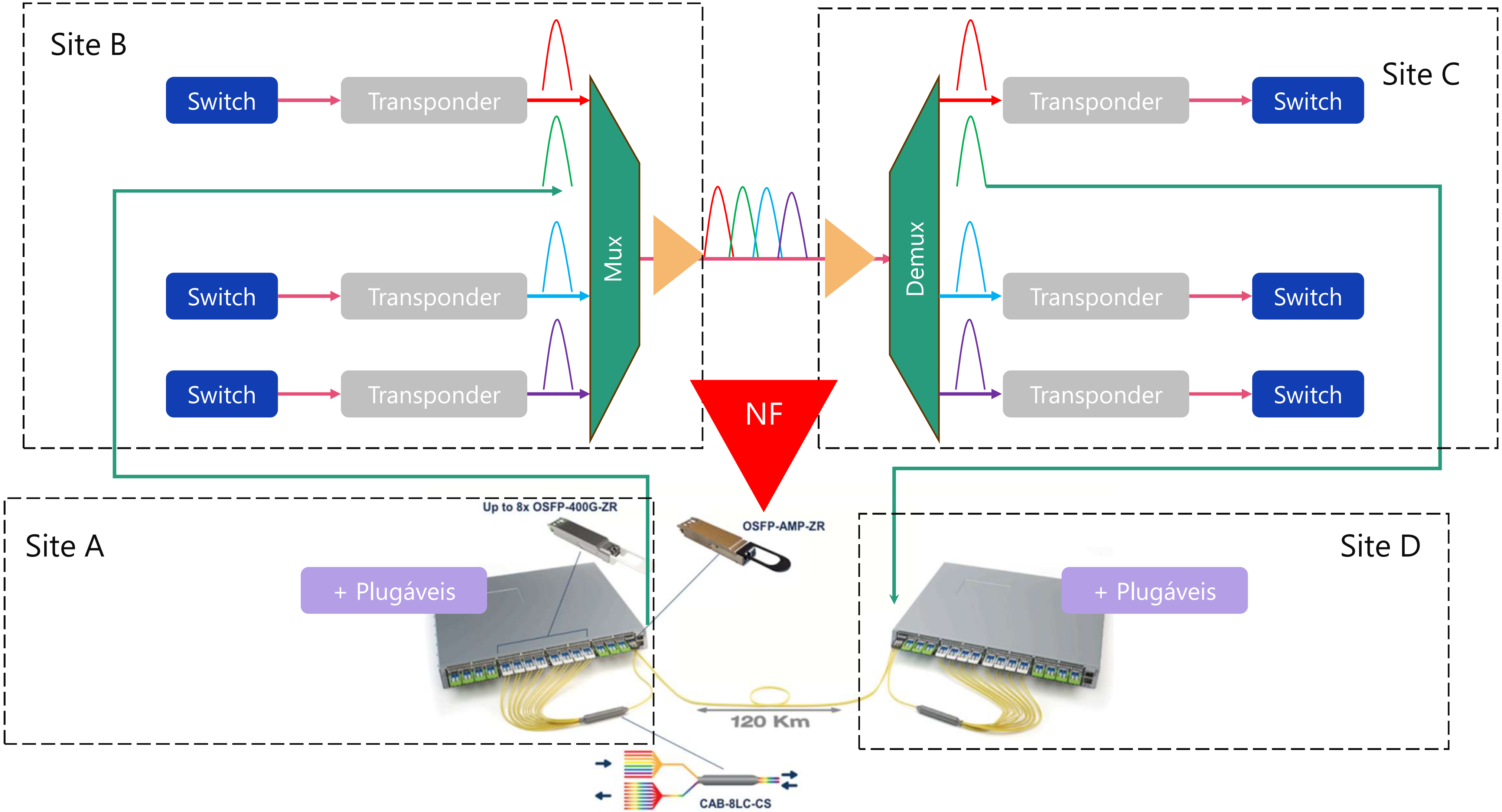

System Menu
Ch Tracking
All BER Results
All Measurements
All Outputs
PPG/ED Ch 4
Stop
Start
History Reset
Setup/Result
Scope
CH A Off
Setup
Measure
Amplitude
Time
CH B On
Sampling Run
PPG/ED Ch 1
PPG/ED Ch 2
PPG/ED Ch 3
PPG/ED Ch 4
Auto Scale
Clear Display
Scale
Offset
Marker
Scope
SYNC Loss
Error
EC
CC
FREQ(kHz)

Medição simultânea de BER e diagrama de olho

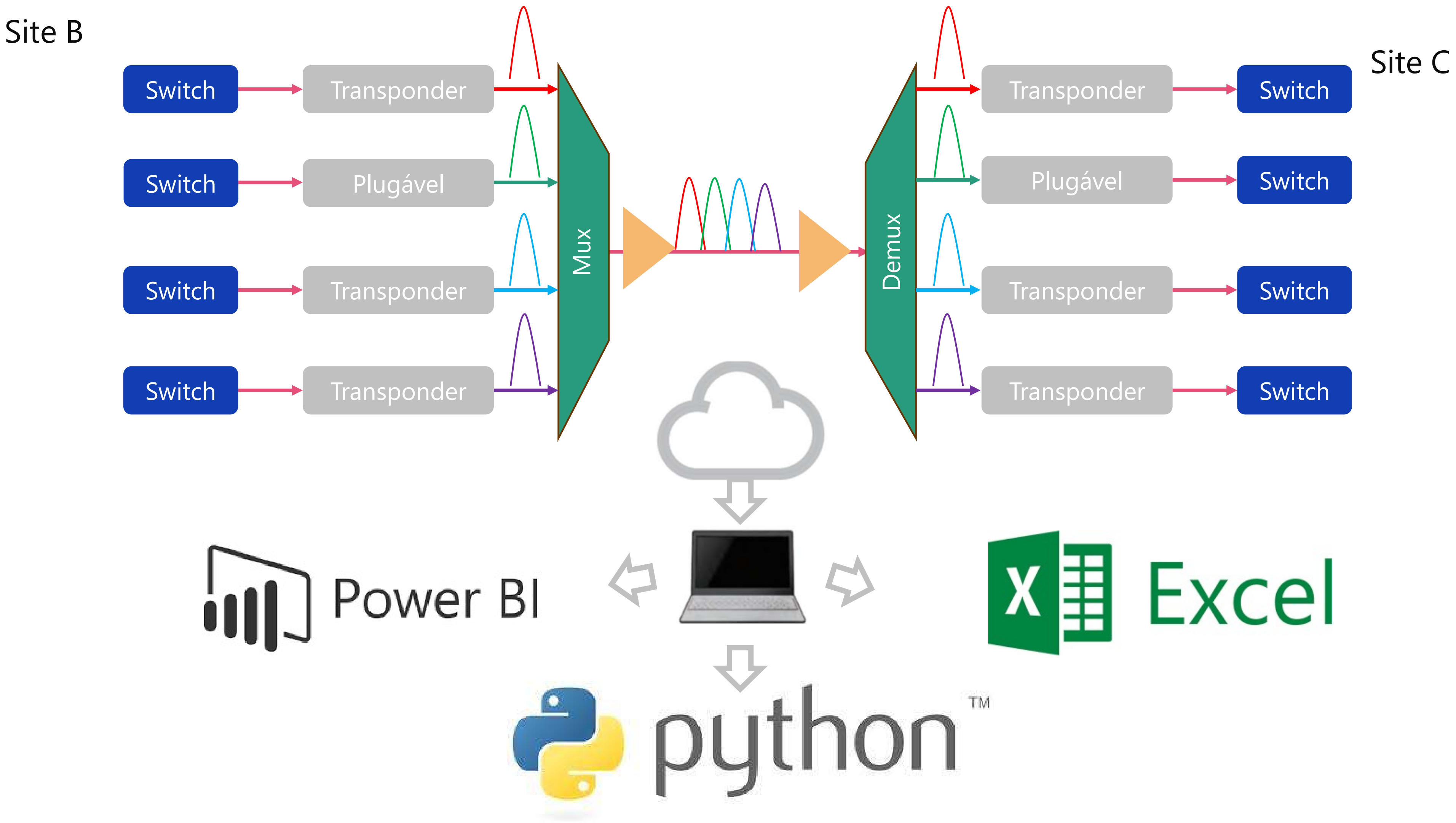

ED
PPG
Electrical Interface
BERTWave MP2110A


Optical Module
CRU
Oscilloscope
MP2110A
Switch
Transmission Equipment
CRU
Oscilloscope
MP2110A

Quais pontos monitorar e por quais razões?


Site B
Switch
Transponder
Switch
Transponder
Switch
Transponder
Mux
Site C
Transponder
Switch
Demux
Transponder
Switch
Transponder
Switch
NF
Site A
Up to 8x OSFP-400G-ZR
+ Plugáveis
OSFP-AMP-ZR
120 Km
Site D
+ Plugáveis
CAB-8LC-CS

Quais ferramentas utilizar?


Site B
Switch
Transponder
Switch
Plugável
Switch
Transponder
Switch
Transponder
Mux
Demux
Site C
Transponder
Switch
Plugável
Switch
Transponder
Switch
Transponder
Switch
Power BI
Excel
python™

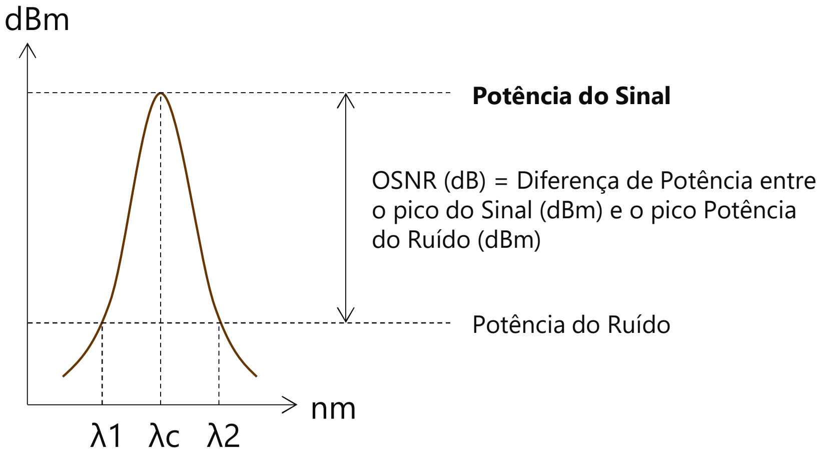
Quais equipamentos devo utilizar para medir ver e avaliar um λ ?

Estamos falando da Potência, da OSNR ou da largura espectral?

Se queremos saber a Potência?

Power Meter

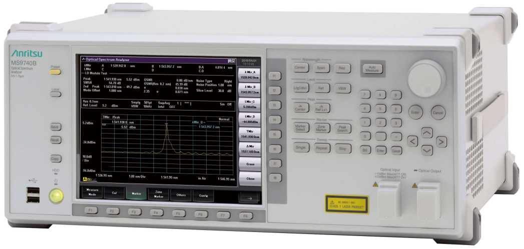
Se queremos saber a OSNR ou largura espectral?



Potência do Sinal

OSNR (dB) = Diferença de Potência entre o pico do Sinal (dBm) e o pico Potência do Ruído (dBm)

Potência do Ruído



OSA – Analisador de espectro óptico

A Relação Sinal-Ruído é um parâmetro que mede a qualidade de um sinal modulado, no caso da Relação Sinal-Ruído Óptico (OSNR - Optical Signal to Noise Ratio), podemos medir este parâmetro utilizando o seguinte critério:

Onde e por que aplicar as técnicas?

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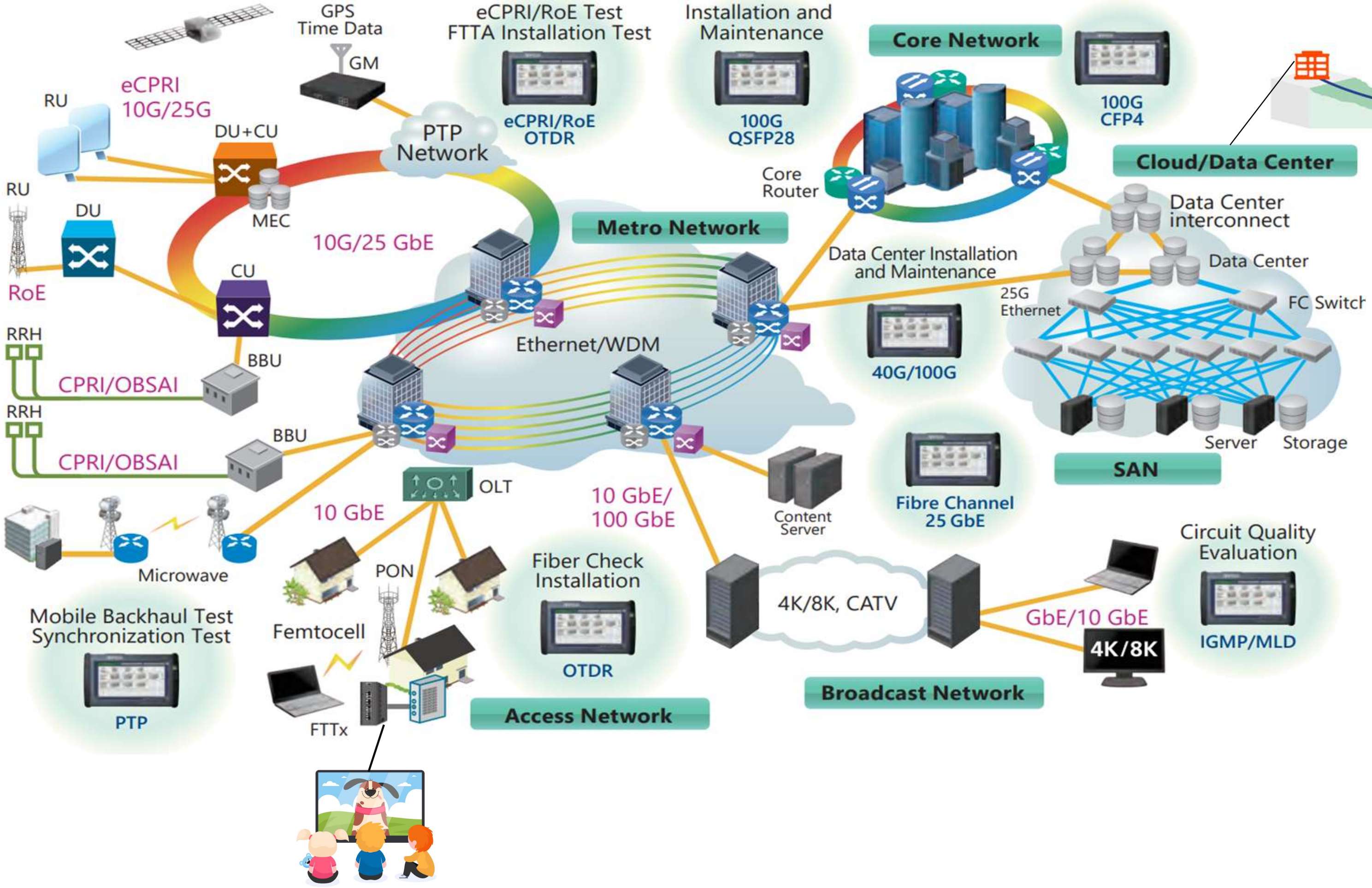
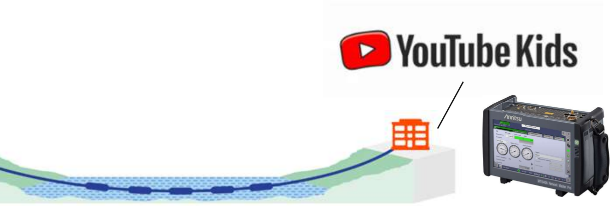

GPS
Time Data
GM
eCPRI/RoE Test
FTTA Installation Test
eCPRI/RoE
OTDR
Installation and
Maintenance
100G
QSFP28
Core Network
100G
CFP4
Cloud/Data Center
RU
eCPRI
10G/25G
DU+CU
PTP
Network
Core
Router
RU
DU
MEC
10G/25 GbE
Metro Network
Data Center
interconnect
Data Center Installation
and Maintenance
Data Center
CU
25G
Ethernet
FC Switch
RoE
RRH
Ethernet/WDM
40G/100G
BBU
CPRI/OBSAI
RRH
BBU
CPRI/OBSAI
Server
Storage
OLT
Content
Server
Fibre Channel
25 GbE
SAN
10 GbE
10 GbE/
100 GbE
Circuit Quality
Evaluation
Microwave
PON
Fiber Check
Installation
4K/8K, CATV
GbE/10 GbE
IGMP/MLD
Mobile Backhaul Test
Synchronization Test
Femtocell
4K/8K
OTDR
PTP
FTTx
Access Network
Broadcast Network


YouTube Kids

Coherent OTDR

Quais são os principais benefícios que essas técnicas trazem?

Otimização dos recursos, Estabilidade dos serviços e maior eficiência!

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Pesquisa rápida, Participe!

Bruno Gama

Account Manager
Anritsu ACBR

Digital & Optical Product Summary

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Network Master Pro

Mainframe MT1000A
10G Multirate Module MU100010A
100G Multirate Module MU100011A
High Performance GNSS Disciplined Oscillator MU100090B

All-in-One Transport Tester for Metro and Backhaul Network Installation and Maintenance

- Supports testing from 1.5 Mbps to 100 Gbps
- Remote operation & scripting
- Remote control over cloud and automated tests for standalone
- Compact, lightweight design for maximum field portability

The modular design of the Network Master Pro MT1000A platform makes it easy to support I&M for different network configurations. Combining it with the 10G Multirate Module MU100010A offers the necessary functions for I&M of networks at speeds from 1.5 Mbps to 10 Gbps. Combining with the 100G Multirate Module MU100011A, it supports more interface standards than any other handheld transport tester on the market such as CFP4/QSFP28, QSFP+, SFP28 (25GbE), SFP+/SFP and RJ45. MU100090B enables easy Pass/Fail evaluations when installing and commissioning time and phase synchronous networks.

Network Master Pro

Mainframe MT1040A
400G (QSFP-DD) Multirate Module MU104014A
400G (OSFP) Multirate Module MU104015A
100G Multirate Module MU104011A

One unit supporting 400G Ethernet I&M

- Supports network speeds from 10 Mbps to 400 Gbps
- Continuous and quantitative 400G FEC measurements
- Remote control over cloud and automated tests without external PC
- Compact and lightweight for easy portability

The MU104014A support QSFP-DD module and a dual-port interface for speeds from 10M to 100G for evaluating network equipment.
The MU104015A supports OSFP modules for evaluating 400G. The MU104011A has a dual-port interface for speeds of 100G or less.
In addition, by combining 2 measurement modules, MT1040A can test 2-port 400G Ethernet and also perform equipment evaluation tests.

ACCESS Master™

MT9085 series 850 nm/1300 nm (MM), 1310/1490/1550/1625/1650 nm (SM)

All-in-One Solution for Optical Fiber Construction and Maintenance of Core, Metro and Access Networks

- 8-inch LCD with easy visibility even in direct sunlight
- Better work efficiency with synergy of LCD touchscreen, rotary knob, and dedicated hard keys
- Easy-to-Use Fiber Visualizer function for simple fiber path analysis

The MT9085 series is a compact handheld all-in-one tester for performing optical pulse tests, optical loss/power measurements, and optical fiber end-face inspections. It has a wide variety of applications, ranging from installation and maintenance (I&M) of trunk fibers (Core, Metro, Mobile Fronthaul, Mobile Backhaul) to troubleshooting Access networks, such as breaks in drop cables.

Optical Spectrum Analyzer

MS9740B 600 nm to 1750 nm

Reduces Measurement Time and Improves Production Efficiency

- Wavelength sweeping time <0.35 s
- Dedicated applications for evaluating active optical devices
- Excellent cost performance
- Dynamic range performance ≤58 dB (0.4 nm from peak wavelength)
- 30 pm minimum resolution

The MS9740B reduce the measurement processing times by up to half compared to the earlier model while assuring high performance and complete test menus brings higher-efficiency inspection of active optical devices.

BERTWave™

MP2110A

For 10G to 800G Multi-channel Optical Module/Device R&D and Manufacturing

- Sampling oscilloscope and BERT for up to 4ch installed one unit
- Sampling oscilloscope supports analysis for both NRZ and PAM4 signals with high-speed, low-noise, and built-in CRU

The BERTWave MP2110A is an all-in-one instrument with built-in 4 channel Sampling Oscilloscope and BERT designed for manufacturing inspection of 10G/25G/100G/200G/400G/800G optical modules. The MP2110A will improve optical module production efficiency and reduce manufacturing costs.

Signal Quality Analyzer-R

MP1900A

Support 400 GbE/800 GbE and PCIe Gen4/5/6.
All-in-One Support for Evaluating Next-Generation NRZ/PAM4 Network Interfaces and High-Speed Serial Buses

- All-in-one support for both high-speed Ethernet and PCI Express interface tests
- Easily configured and easy-to-use all-in-one 64-GBaud PAM4 BER measurement system supporting FEC analysis
- Receiver tests are supported by the built-in Protocol Awareness PCIe Link Training and LTSSM analysis functions
- High-reproducibility measurements due to high waveform quality and high input sensitivity
- Supports true signal integrity analysis, such as bit error rate measurements, Jitter Tolerance tests, etc.

The MP1900A is a high-performance BERT with excellent expandability for supporting Physical layer evaluations of these high-speed interfaces. The all-in-one design is ideal for early stage R&D evaluations of all interfaces covering next-generation Ethernet networks to bus interconnects.

Network Master™

Mainframe MT9090A
µOTDR Module™ MU909014/MU909015
1310/1490/1550 nm plus filtered 1650 nm or 1625 nm

Field Optical Testing Redefined

- High-performance OTDR in a pocket-size package with unique battery operation
- Tri-wavelength OTDR for both installation and maintenance 1310/1490/1550 nm plus filtered 1650 nm or 1625 nm
- Built-in PON power meter, loss test set and light source function
- "Fiber Visualizer" mode simplifies operation, no OTDR knowledge needed
- *Bluetooth*, WLAN and Ethernet connectivity

The MU909014/15 series for the MT9090A from Anritsu finally addresses this need by providing all of the features and performance required for installation and maintenance of optical fibers in a compact.
The MT9090A represents an unmatched level of value and ease of use, while not compromising performance. Data sampling of five centimeters, dead zones of less than 0.8-meter and dynamic range up to 38 dB ensure accurate and complete fiber evaluation of any network type – premise to access, metro to core...including PON-based FTTx networks featuring up to a 1 × 64 split.

Optical Loss Tester/Light Source/Optical Power Meter

CMA5 series 850 nm/1300 nm (MM), 1310/1490/1550/1625 nm (SM)

For Optical Fiber Installation and Maintenance

- Built-in light source and power meter (Optical Loss Tester)
- Two wavelengths at one port (Light Source)
- Level measurement up to +23 dBm (Optical Power Meter)

The compact and durable design of the CMA5 series make these instruments the ideal combination of light source and optical power meter for measuring optical power when installing and servicing optical fiber cables.

Coherent OTDR

MW90010A

Measures Submarine Cables up to 12,000 km Long

- Fault detection with 10 m distance resolution
- Compact and lightweight all-in-one design for on-site portability 320 (W) × 177 (H) × 451 (D) mm, <17 kg
- Simple and easy touch-panel operation for easy first-time use by any operator
- Wide dynamic range supporting fault detection and troubleshooting of submarine cables with repeaters at 80 km or longer intervals

The MW90010A is a measuring instrument for detecting faults in ultra-long optical submarine cables of up to 12,000 km including multiple repeaters (EDFAs).