Optical Signal-to-Noise Ratio (OSNR) Measurement with MAP-300 Platform

VIAVI
VIAVI Solutions

The fiber optic MAP system from VIAVI Solutions is a powerful family of modules, software, and peripherals for characterizing fiber optic components, modules and systems.

- Full Capability OSNR Conditioning in a Single Platform
- Modular Reconfigurable and Scalable
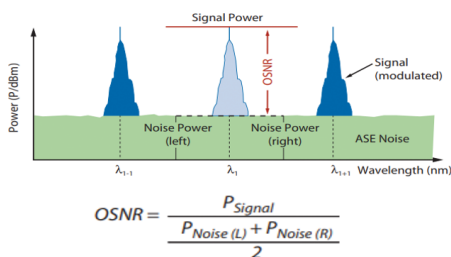- Low Cost of Ownership
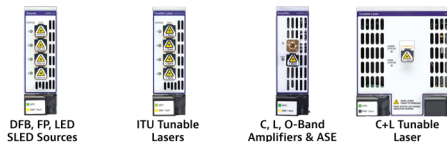- Flexible Calibration Paths

MAP300 Platform

Built on the award-winning VIAVI MAP-300 Optical Test platform, the MAP delivers a scalable test system that can be configured for R&D, production, or qualification test applications to optimize quality, productivity, and capital utilization.

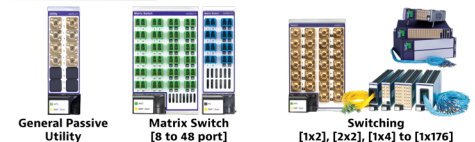## OSNR Measurement Waveform Illustration

$$OSNR = \frac{P_{Signal}}{\frac{P_{Noise\,(L)} + P_{Noise\,(R)}}{2}}$$

MAP LightDirect Portfolio

Sources & Amplifiers

DFB, FP, LED SLED Sources	ITU Tunable Lasers	C, L, O-Band Amplifiers & ASE	C+L Tunable Laser

Switching & Routing

General Passive Utility	Matrix Switch [8 to 48 port]	Switching [1x2], [2x2], [1x4] to [1x176]

Power, Loss & Spectral Measurement

C+L-Band Grating OSA	C-Band Coherent OSA	High-Performance Power Meters & Integrating Spheres

Signal Conditioning

| Metrology-grade Attenuators with Power Control	Variable Back-reflector	Polarization Controller Scrambler	C, L-Band Tunable Filter

OSNR Introduction

- OSNR is a key performance parameter in optical networks that predicts the bit error rate (BER) of the system
- Measuring the total Signal Power in the channel passband and the amplified spontaneous emission (ASE) noise in the gaps between the optical channels (normalized to a 0.1nm bandwidth)
- Noise power is average from the ASE noise, which is present to the left and to the right of the optical channel

Coherent Test Bed

Varying power levels of OSNR inside a DWDM channel
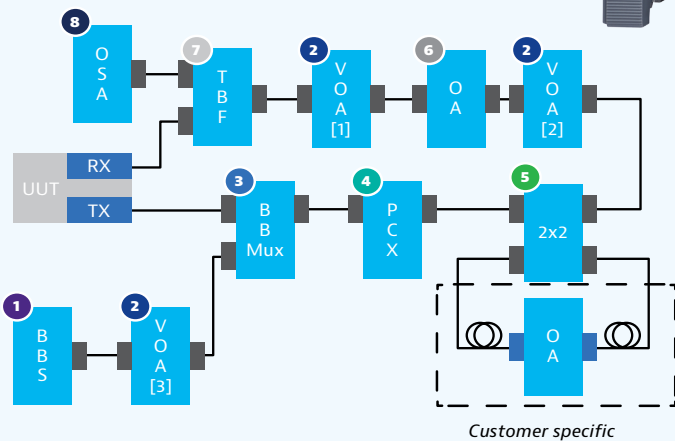
1 mBBS-C1 C-band noise source	**2** mVOA-C1 Quad VOA with output power monitor
3 mUTL-C1 Quad 50/50 coupler	**4** mPCX-C1 Pol Scrambler/ controller
5 mOSW-C1 2x2 cross bar switch	**6** mEDFA-C1 C-band amplifier with Gain and Power Control
7 mTFX-C2 C-band Tuneable Filter Switch	**8** mOSA-C1 CL-Band OSA

Block Function Description

Slot 1: C-band BBS for noise loading
Slot 2: Quad VOA
· D1: Control Final RX power
· D2: Manage power into final OA
· D3: Control ASE injection Level
Slot 3: Utility cassette with 50/50 coupler
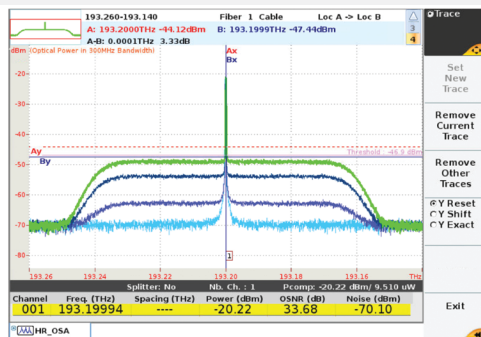Slot 4: Polarization scrambler (optional) for emulation of fiber SOP dynamics
Slot 5: 2x2 Switch for fiber span insertion
Slot 6: Optical amplifier
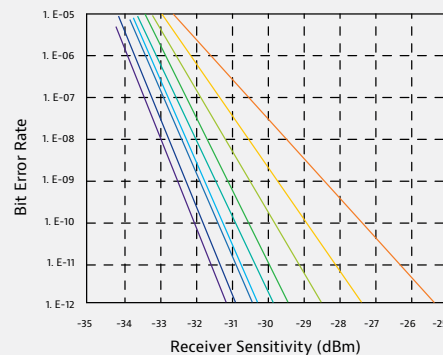Slot 7: DWDM/ROADM filter shape emulation and interated switch OSA

Customer specific

Coherent Signal Conditioning Types

i) OSNR Penalty
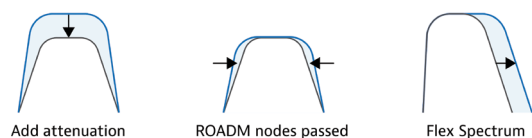

Varying power levels of OSNR inside a DWDM channel

ii) RX Sensitivity
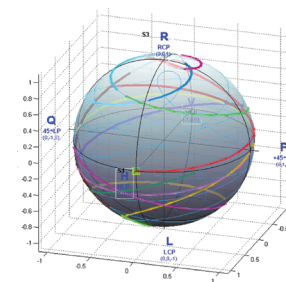

BER measured as a function of power delivered to the RX

iii) DWDM Filter Emulation

Channel Shape Management

Add attenuation   ROADM nodes passed   Flex Spectrum

Emulates the DWDM Network Filter & ensures only In-Band OSNR reaches the RX

iv) Dynamic SOP Emulation

Emulate changes to the state of the polarization as it interacts with small changes in the optical fiber