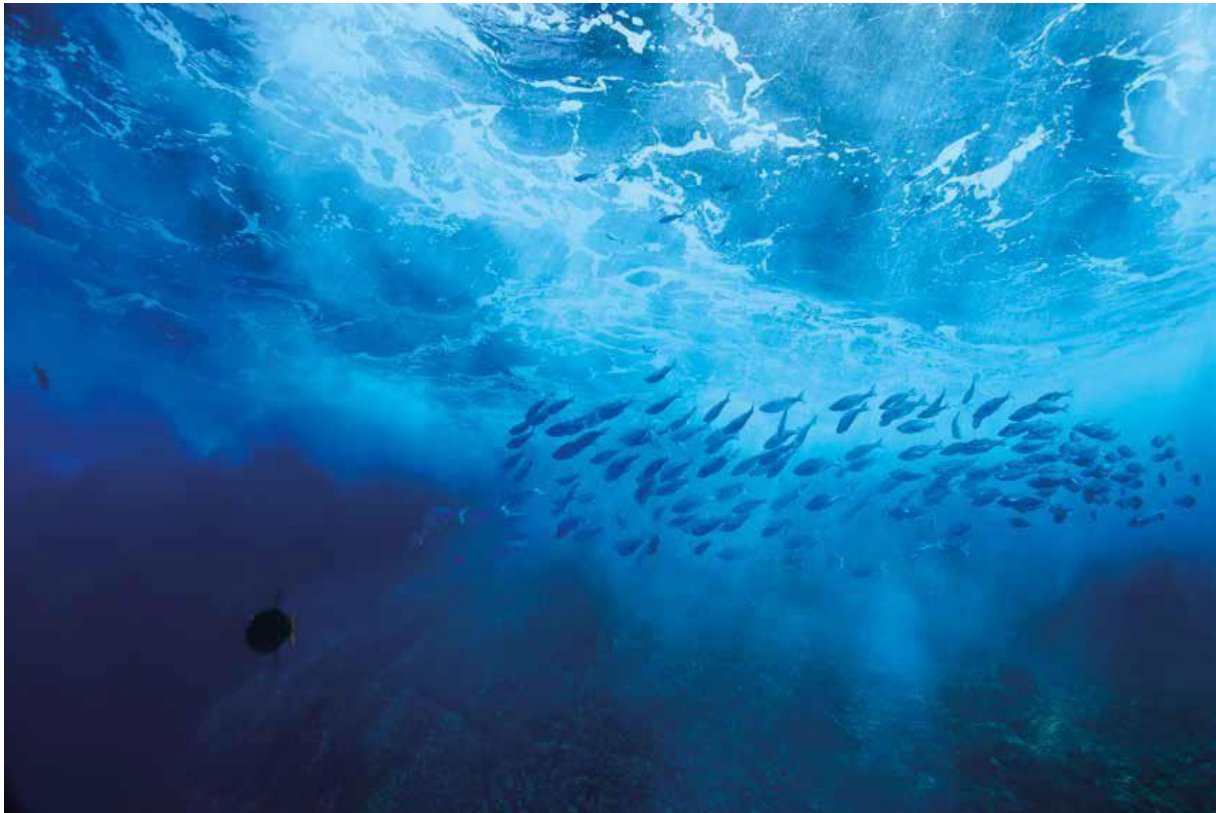

Delivering

- > Agility
- > Innovation
- > Performance



Nu-Wave Optima™ Platform Description

This document provides outline details of Xtera's Nu-Wave Optima™ Platform.

Please note that product specifications are liable to change and this description does not represent a contractual commitment.

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The Nu-Wave Optima™ is an optical DWDM transport offering industry-leading capacity and ultra-long-reach capabilities.

Nu-Wave Optima™ can be configured to support all optical networking applications, ranging from Submarine to Terrestrial Long Haul/Ultra-Long Haul. Using a single platform to address multiple applications lowers both CapEx and OpEx for communication providers, for example, by reducing sparing and training.

Its highly-scalable architecture makes it ideal for communication providers in the regional, long-haul, and ultra-long-haul markets. It is also well-suited for service providers that will start out with lower capacities, but ultimately require the high capacity needed by future bandwidth-intensive applications adnn to support their business growth.

Nu-Wave Optima™ terminals incorporate the latest transmission technologies such as SD-FEC and Coherent transmission, thus supporting new systems using only D+ fibre, or to add capacity to earlier generation repeatered systems, such as those using NZ-DSF and LEAF/LCF fibres, as it also incorporates measures to minimise penalties due to non-linear effects.

The modularity of the optical line system allows Xtera to customize a solution to cost-effectively address various distance requirements (including one or a few ultra-long spans), capacities ranging from modest to very high, or a combination of distance and capacities.

One of the key elements of the line system which allows Nu-Wave Optima™ to address various applications is its optical amplifiers which include EDFA, hybrid EDFA/Raman, and all-Raman amplifiers. The latest Reconfigurable Optical Add Drop Multiplexing (ROADM) technologies are also implemented as needed to support directionless and/or colorless transmission over multi-degree nodes.

The Nu-Wave Optima™ platform is supported by a fully featured and highly intuitive Management System, supporting all Optima™ NEs from a single application as well as, in Submarine applications, Repeater, BU and PFE equipment. For additional robustness a redundant NMS server configuration can be deployed, which operates in parallel with the first, with both machines having complete autonomy, thus avoiding the need for switchover. Optionally a Northbound interface from the NMS can be specified for connection to an OSS.



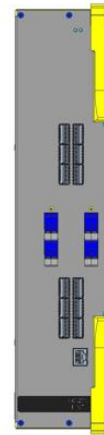
Nu-Wave Optima™ Features and Benefits

- Industry-leading [Capacity x Reach] metric for both unrepeated and repeated networks
- Compact equipment: up to **18** Tb/s per rack
- Amplifier/ROADM toolkit to efficiently address different spans, capacities, connectivity and availability requirements, during life of network
- Spares, training and NMS common to unrepeated, backbone and regional repeated submarine applications





- FlexRate Shelf. The latest addition to the Nu-Wave Optima™ platform supports a new generation of line cards with capacity for up to **6 Tbps** in a single shelf.
- Each card provides **four** wavelengths, each with QPSK/8QAM/16QAM software selectable modulation schemes **and baud-rates** which enables up to **1.2 Tbs** per Line card .
- Each card provides up to 12 OTU4/100 GbE clients with QSFP 28 interfaces
- There is also a Client combo card with 2x100Gbps + 20x10Gbps software programmable client ports.



1.1. Key parameters

| | |
|---|---|
| Terminal: | |
| Client Interfaces Available | GbE, OC-48/STM-16 10 GbE LAN & WAN PHY STM-64/OTU2/2e 100GbE/OTU4 |
| Line Interfaces Available | 100 -400 Gbit/s per wave. Software-defined modulation formats and Baud rates |
| Wavelength Range | Flexible Line Unit, Gridless tuneable across the entire bandwidth |
| Other Network Elements: | |
| ROADM / Multi-degree node | <10 FIT per amplifier pair 2 to 8 degrees, Colorless, directionless |
| Intermediate Line Amplifiers (ILA) | EDFA, hybrid EDFA/Raman, and all-Raman amplifiers |
| Performance: | |
| FEC | High gain Soft-Decision FEC, <5.2 dB Q limit |
| Protection | EDFA based Amplifier with redundant controllers and pumps for increased reliability. 1+1 and N+1 optical channel protection options |
| Management: | |
| NMS | Fully featured Management System, supporting all Optima NEs, Repeater, BU and PFE management from a single application. |
| Northbound Interface | REST-API Netcool SNMP SOAP-XML |
| Craft Interfaces | Java-based GUI with both local and remote access |
| Physical: | |
| Rack dimensions | 600mm (W) x 300mm (D) x 2200mm (H) ETSI rack |
| Footprint | Up to 18Tb/s of capacity in one rack, power consumption < 6000W, weight < 300kg |
| Compliance: | |
| | GR-63-CORE (NEBS), Zone 4 seismic, ETS 3 0-019-1, RoHS |
| EMI/EMC | FCC Part 15, Class A, EN50082-1, EN61000-4 |
| Optical safety | 21CFR1040.10, 21CFR1040.11, IEC60825-1, IEC60825-2 |