Nokia 1830 LX

Ultra-long reach un-repeatered optical amplification

- Ampification for long unrepeatered fiber spans
- Extend unrepeatered reach up to 500 km
- EDFA booster and Raman amplifiers
- Remote Optical Pumped Amplifiers (ROPA)
- Optical Service Channel (OSC) extension

The 1830 LinkXtender (LX) platform supports extended amplification in ultra-long optical span applications through two key enabling capabilities:

- **Optical amplifiers:** where intermediate in-line amplifier (ILA) sites are not feasible, the 1830 LX provides high-power booster Erbium-doped fiber amplifiers (EDFAs), Raman amplifiers and remote optically pumped amplifiers (ROPA) amplifiers to extend the distance between transponder sites on un-repeatered links up to 500km.
- **Supervisory channel wavelength conversion:** in applications where an optical service channel (OSC) from an optical transport platform such as 1830 GX or 1830 PSS needs to be transported across a long unrepeatered span, the 1830 LX OSC-WC converts the OSC into the amplification band used for other service wavelengths and on an ITU grid channel.

The Nokia 1830 LX extended reach amplification system enables optical transport over very long single unrepeatered optical fiber spans from 150 km to 500 km, and where intermediate inline amplifier (ILA) sites are not feasible or cost effective. The 1830 LX is ideal for enabling optical transport connectivity across remote wilderness, desert of other areas where road access is limited or unfeasible, and for un-repeatered subsea connections between islands, along coastal festoon links, maritime channel crossings, or to connect to remote stations out at sea, such as oil drilling terminals or wind farms.

As part of the Nokia 1830 PSS product family, the 1830 LX integrates with both the 1830 GX and 1830 PSS families of transport/WDM platforms, ensuring a seamless end-end WDM network, fully managed by the Nokia network management platforms.

Benefits

- Enables ultra-long un-repeatered optical spans for remote or undersea optical transport applications
- Reduces costs by eliminating intermediate ILA or repeater sites, where they are not feasible or practical
- Integrates with 1830 GX and 1830 PSS transport/WDM systems
- Operates in harsh environments; for example ROPA modules are passive devices designed for outside plant environments.
- Allows carriers to bring modern, high speed data services to remote locations
- Allows extended range transparent transport of optical supervisory channel from 1830 GX or PSS platforms

Applications

- Ultra-long span optical networking
  - across long span and remote terrestrial routes such as wilderness or deserts, terrestrial routes
  - long span un-repeatered undersea routes such as channel crossings or connections to ocean-based platforms
  - Island hopping and coastal festoon connections
- ROPA, remotely optical pumped amplifier applications
  - Temperature hardened environments

Product description

The 1830 LX product family consists of a series of modules providing boosted EDFA (up to 30dBm), Raman amplifiers (up to 5W), and ROPAs for use with the 1830 GX and 1830 PSS transport/WDM platforms, enabling optical transport over ultra long unrepeatered spans of up to 500 Km.

Figure 1 illustrates various 1830 LX configurations to address different distances. For mid-range distances, combinations of EDFA booster amplifiers and/or Raman amplifiers are used. Distances between terminals can be extended further using ROPAs, which operate by using a remote pump module located at the end terminals. The ROPA pump module supplies the pump power and energy required for optical amplification to the passive ROPA cassette located in-line along the fiber span.

Remote optically pumped amplifiers (ROPA) utilize a passive, remote amplifier cassette housing the ROPA amplifier elements at a midpoint along the span, which provides additional gain to boost the signal levels to achieve ultra-long spans without the need for any electronics or electrical power at the ROPA sites. The elimination of electronics and electrical power along the fiber span is a critical requirement in many remote wilderness or undersea island hopping applications.

Figure 1. Nokia 1830 LX extended reach configurations

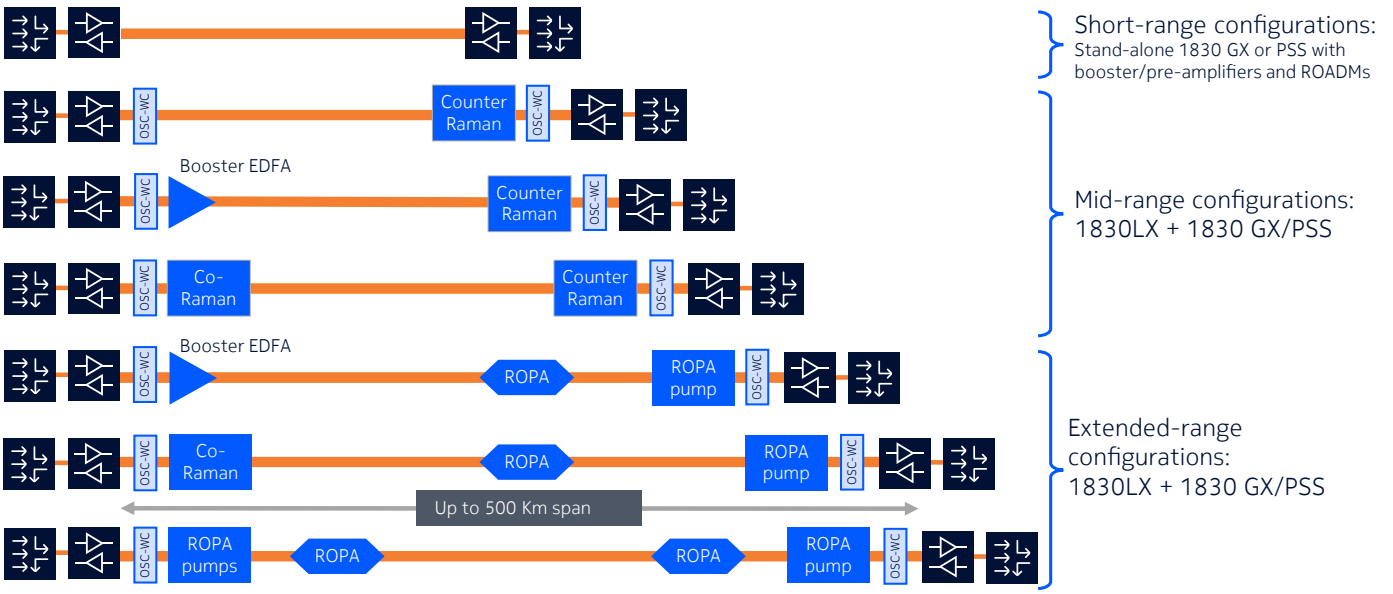
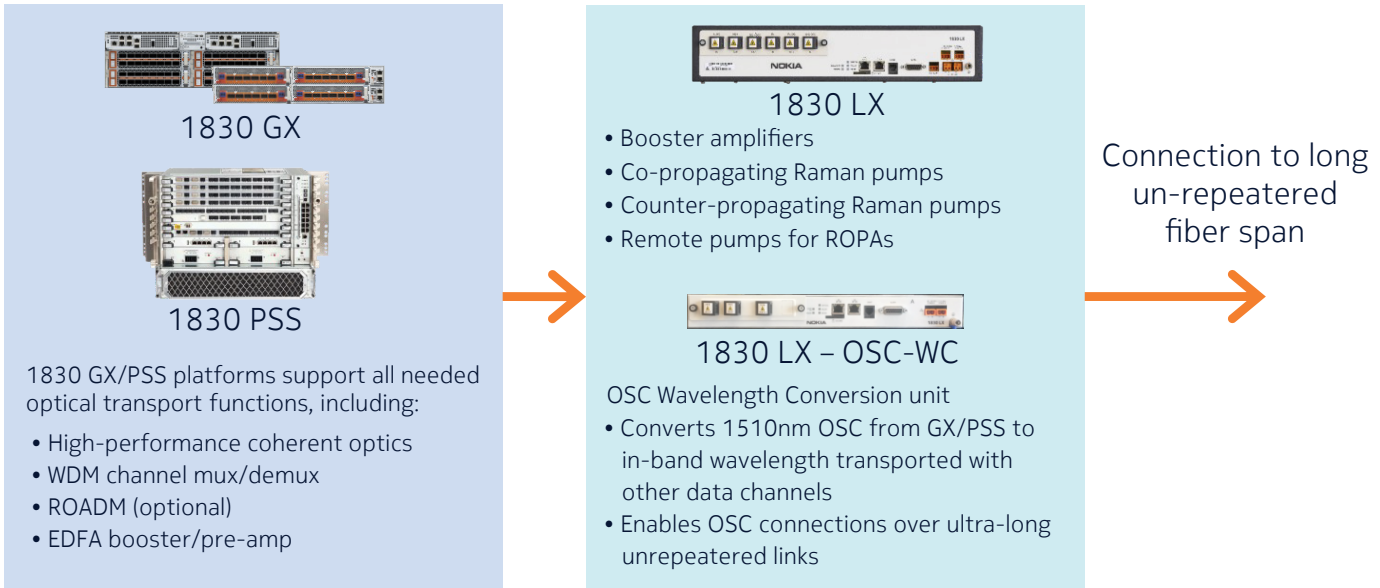


Figure 2. ROPA cassette in project specific outside plant enclosure designed for terrestrial applications

The ROPA amplifier cassette is a completely passive module that is temperature hardened and integrates into outside plant fiber splice enclosures. ROPA cassettes for terrestrial applications can be supplied by Nokia, and for subsea applications by working with the subsea fiber provider. An example of this enclosure for use in terrestrial applications is shown in figure 2.

The 1830 LX also includes an option for an optical supervisory channel wavelength conversion (OSC-WC) unit which allows for transparent transport of the 1510nm supervisory channel from Nokia 1830 GX or 1830 PSS platform across the ultra-long un-repeatered fiber spans that are enabled by the 1830 LX amplification options, as shown in Figure 3. The OSC-WC unit provides bi-directional translation of the OSC onto an ITU grid channel within the system amplification band, which can then be transported in parallel with other service channels originating from the GX/PSS optical transport systems.

Figure 3: The 1830 LX OSC wavelength conversion (OSC-WC) unit provides a complete solution for extending OSC connectivity across ultra-long optical spans enabled by 1830 LX



Nokia supported products

The 1830 LX is used in combination with 1830 GX, 1830 PSS and 1830 PSI optical transport systems.

1830 LX Modules

Unit	Part number(s)	Description
EDFA booster amplifiers		
P30F	3KC67036AA / BA	30 dBm EDFA amplifier, high power, 2RU
Raman amplifiers		
RP-15-O	3KC67011AA / BA	1.5W (1st order) Raman with Tx OSC, 2RU
SRP-30-C-O	3KC67015AA / BA	3W (3rd order) Super Raman, C band with TX OSC, 2RU
SRP-50-C	3KC67045AA / BA	5W (3rd order) Super Raman, C band, 2RU
Raman co-propagating amplifiers		
RCP-10	3KC67016AA / BA	1W (1st order) Raman Co-Pump, 2RU
RCPS-10	3KC67017AA / BA	1W (1st order) Raman Co-Pump Supplementary, 2RU
SRCP-30	3KC67018AA / BA	3W (3rd order) Super Raman Co-Pump, 2RU
ROPA pumps		
ROP-20	3KC67044AA / BA	2W (1st order) ROPA Pump, 2RU
EROP-20	3KC67051AA / BA	2W Dual Wavelength ROPA pump, 2RU
EROP-30	3KC67052AA / BA	3W Dual Wavelength ROPA pump, 2RU
EROP-50	3KC67053AA / BA	5W Dual Wavelength ROPA pump, 2RU
SROP-40	3KC67020AA / BA	4W 3rd-order Super ROPA Pump, 2RU
SROP-50	3KC67021AA / BA	5W 3rd-order Super ROPA Pump, 2RU
ROPA cassette		
Rx ROPA A	See description	ROPA cassette, project specific, contact Nokia for ordering code
OSC Wavelength Converter GEN1		
OSC-WC	3KC67046AA	OSC Wavelength Converter with external VOA connections CH15
OSC-WC-12	3KC67067AA	OSC Wavelength Converter with internal VOA and internal power monitor, CH12
OSC-WC-15	3KC67068AA	OSC Wavelength Converter with internal VOA and internal power monitor, CH15

All listed P/Ns are equipped with bare fiber terminations. For connectorized termination please contact your Nokia account representative to assess the applicability to the specific use case.

About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.

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