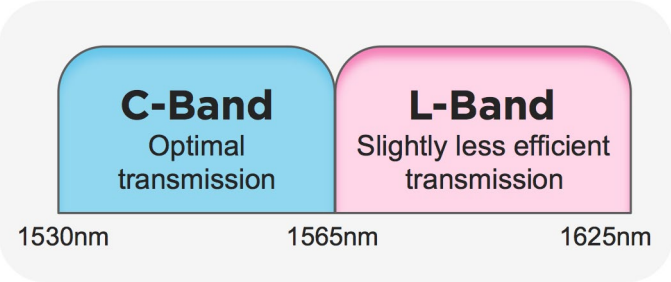
Apollo Integrated C+L Band

Apollo's C+L band solution expands fiber capacity from the C-band to the L-band efficiently and affordably, without service interruption. Furthermore, it offers two approaches to mitigate the performance impacts of the SRS effect: dynamic SRS compensation and noise loading.

When to Use C+L Band

The C-band offers optimal transmission on optical fibers, with widely available and cost-optimized transceivers, amplifiers, and ROADMs. When the C-band is fully utilized on one fiber, capacity is typically increased by lighting the C-band on another unused fiber in the cable.



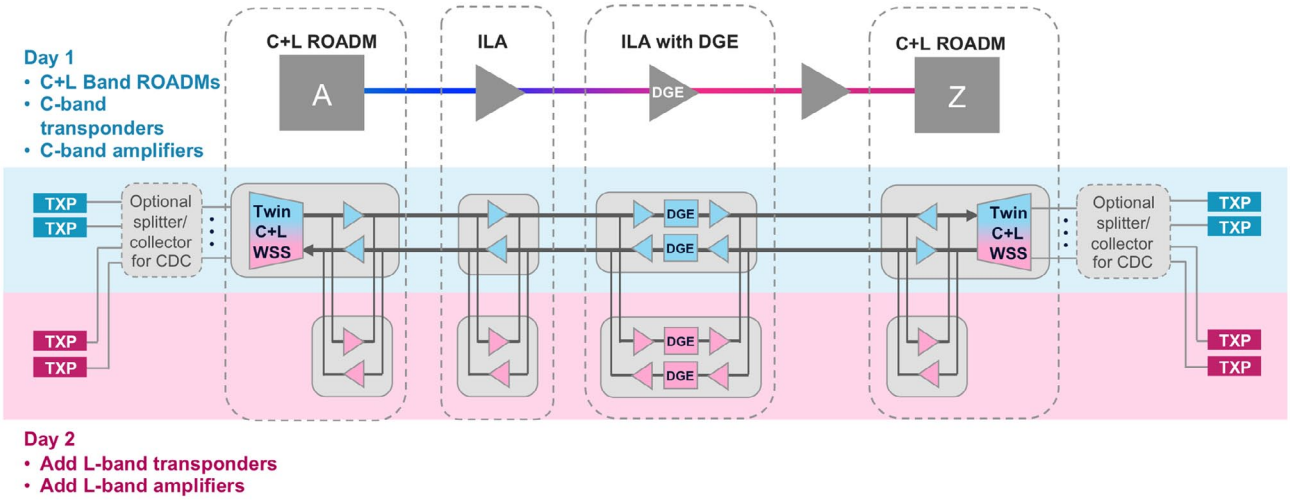
On certain routes, however, extra fibers may not be available. In such cases, the L-band spectrum – though slightly less efficient – can be used on current fibers alongside the C-band. However, L-band components tend to be costlier due to limited usage. With a thorough understanding of this situation, Apollo provides a highly efficient and cost-effective solution for supporting C+L band on optical fibers where required.

Apollo C+L Band Solution Overview

The Apollo solution centers around an advanced C+L band ROADM with built-in C-band booster amplifiers. Its core technology is an innovative twin C+L band WSS with a shared switching fabric for both bands, making the ROADM only slightly more costly than a C-band-only version.

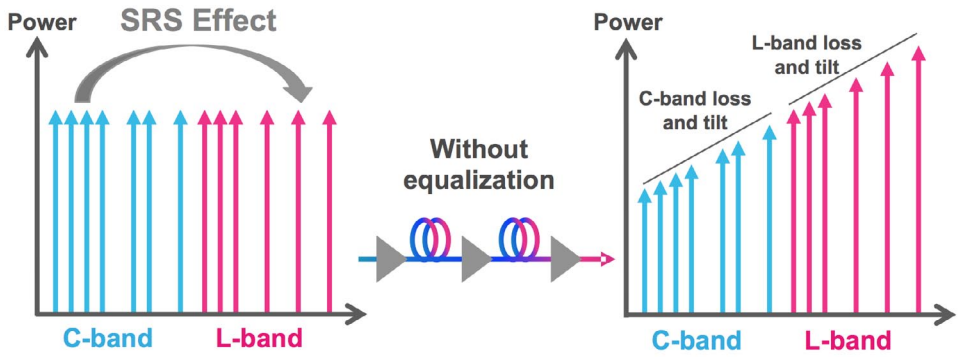
Day 1 uses only the C-band. In addition to the C+L band ROADM, this setup includes standard C-band transponders/ muxponders and amplifier components, resulting in a configuration similar to a typical C-band system.

On day 2, when L-band capacity is required, L-band transmission and amplifier components are added without affecting C-band services. This approach is more efficient and cost-effective than deploying a separate L-band solution with individual C-band and L-band ROADMs.



Mitigating the SRS Effect

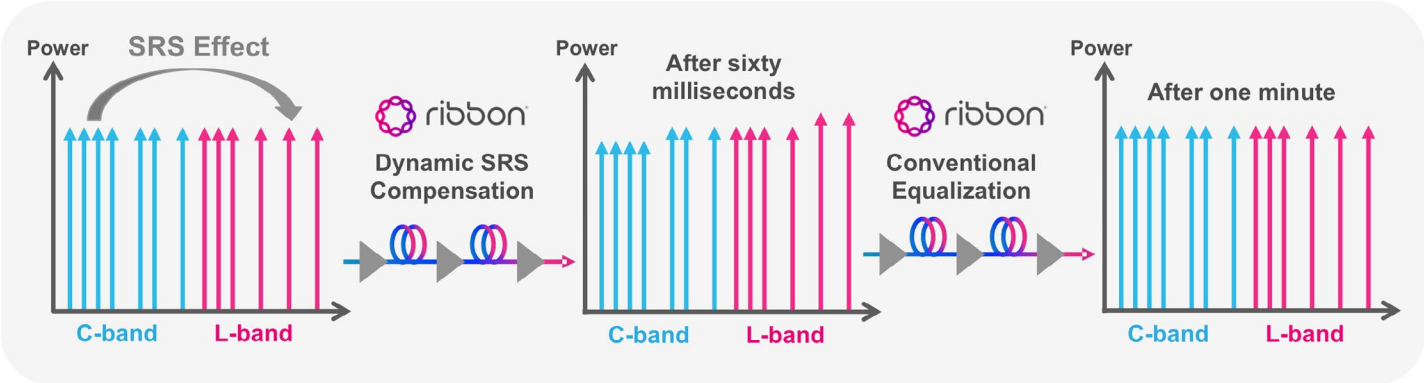
The SRS (Stimulated Raman Scattering) effect shifts optical power from the C-band to the L-band when channels are added or dropped, resulting in a power tilt of 5dB or higher. This causes service-affecting performance degradations that conventional equalization cannot compensate for quickly enough. Apollo offers two methods to address this issue.

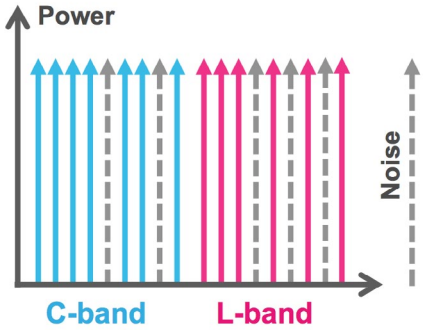


Dynamic SRS Compensation (default)

This Ribbon-patented method uses instantaneous power measurements and feedback loops to equalize power to within about 1dB of the target equalization in less than 60 milliseconds, ensuring that services are not affected. This is followed by complete smooth equalization for optimal C+L band transmission.

An advantage of this approach is that it does not require any additional equipment. However, when WSON restoration is applied to many wavelengths, these must be processed in batches, sometimes resulting in longer restoration times.





Noise Loading (optional)

This method injects noise into unused channels, making SRS tilt a static value and enabling continuous, smooth equalization. It is highly predictable and supports short WSON restoration times even with multiple wavelengths. However, this technique requires a dual noise loader for the C and L bands, resulting in increased space, power, and cost.

Some Key Apollo C+L Solution Line Cards

All Apollo C+L band line cards can be deployed in any Apollo 9600 platform. Some key line cards are summarized below.

Apollo ROADMI_20CL

Highly integrated 20-degree C+L Band ROADM

- Twin 20-degree C+L band WSS for route & select architecture with low insertion loss
- Integrated C-band high power booster, with pluggable CFP2 high power pre-amps
- Integrated C+L OCM
- Integrated OSC and OTDR filters

Apollo MCS_8x12CDCF

CDC Flex-Grid collector based on a dual 8x6 multi-cast switch for C+L band networks.

Does not require an external EDFA array.

Enables low-cost termination in a ROADM site for up to 8 degrees, with up to 12 coherent transceivers.

Apollo OTDR1625M_8S

OTDR module with a 1625nm laser and a 1 x 8 optical switch that enables rotating among eight fibers connected to the card.

Testing can be performed in-service and does not interfere with C and L-band services.

Dynamic range of 35dB is ideal for metro applications.

Contact Us Contact Ribbon to learn how Apollo C+L Band can Expand Fiber Capacity