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Coriant Groove™ G30 Bidirectional Fiber Solution

Maximizing Fiber Utilization

The increasing demand for high speed connectivity to access cloud service providers and to interconnect data centers has escalated the need for fiber optic infrastructure and prompted the development of new methods to maximize the utilization of that infrastructure. When enterprises lease fiber optic infrastructure from third parties to access cloud service providers, the cost depends on the distance and the number of fiber strands to be leased. Enterprises typically require a small number of client ports and longer reach distances. A similar cost structure exists for interconnecting data centers. In this case, the requirements include a higher number of client ports and shorter metro reach interconnections.

To meet these evolving demands, Coriant has developed a cost-effective bidirectional fiber solution that helps to minimize the leasing cost while maximizing the utilization of fiber capacity. The solution, based on the Coriant Groove™ G30 Network Disaggregation Platform (NDP) and bidirectional CFP2-ACO DWDM line interfaces, supports diverse configurations for short or long optical reach and a low or high number of client ports. By maximizing the use of each strand of existing fiber, the Coriant bidirectional fiber solution helps to delay or avoid investment in new fiber cable installation.

HOW DOES A BIDIRECTIONAL FIBER SOLUTION WORK?

The implementation of a bidirectional fiber solution is based on the capacity of the fiber optic cable to guide light in both directions simultaneously and the flexibility of the optical CFP2-ACO modules to tune the emitting and receiving directions at different frequencies. Additionally, a passive filter to combine/separate the transmit and receive light frequencies (or s) is required to implement a bidirectional optical solution.

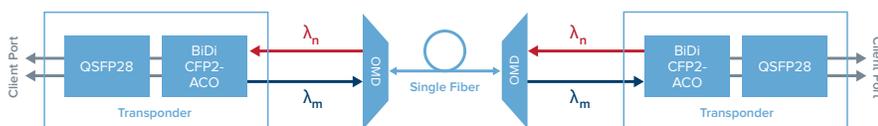


Figure 1: Bidirectional Passive Configuration

BENEFITS OF THE CORIANT GROOVE™ G30 BIDIRECTIONAL FIBER SOLUTION

- **Maximizes** fiber utilization with a bidirectional coherent line system, up to 200G per lambda
- **Reduces** operational costs when leasing fiber cable
- **Enhances** existing single fiber direct detect systems with 200G bidirectional coherent solutions without traffic interruption
- **Increases** reliability with a 50% reduction in the number of mechanical connections in the transmission fiber

In addition to passive configurations, amplified configurations are also supported using Pre-Amp/Booster-Amp (PABA) to extend the reach of the solution as shown in Figure 2.

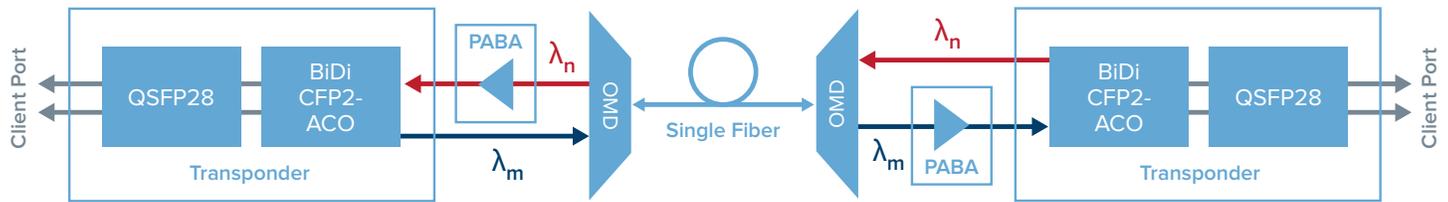


Figure 2: Bidirectional Amplified Configuration

For bidirectional amplified configurations, the reach or distance that can be supported by the solution will depend on the number of DWDM wavelengths and their data rates. For this application note, we assume that the Groove G30 NDP is configured with CHM1 muxponder modules and 100G client ports. Other client ports such as 10G/40G/FC8/FC16 can also be implemented with the Coriant bidirectional solution. In this case, a CHM2 muxponder module is required to host the bidirectional CFP2-ACO optical transceiver pluggable.

BIDIRECTIONAL FIBER SOLUTION APPLICATIONS

The Coriant bidirectional fiber solution uses diverse types of OMDs in passive and amplified configurations to provide cost-effective options for different requirements and applications. Table 1 provides a list of client ports and reach combinations. Depending on the number of client ports and the reach required, a specific configuration (either passive or amplified) is available.

Max Client Ports (100G)	Max Reach (km)	Type of Configuration	Application
2	115	100G – Amplified	Enterprise Cloud Connection
4	70	200G – Passive	Enterprise Cloud Connection
4	112	200G – Amplified	Enterprise Cloud Connection
8	115	100G – Amplified	Metro DCI
16	56	200G – Passive	Metro DCI
16	92	200G – Amplified	Metro DCI
16	109	100G – Amplified	Metro DCI
32	86	200G – Amplified	Metro DCI
32	120	100G – Amplified	Metro DCI
64	80	200G – Amplified	Metro DCI
96	20	200G – Passive	Intra-Data Center/Campus-DCI

Table 1: Bidirectional Fiber Solution Capacities, Configurations, and Applications

The Coriant bidirectional solution supports multiple applications including the following:

- Enterprise Cloud Connection
- Metro DCI
- Intra-Data Center/Campus-DCI

Enterprise Cloud Connection

Enterprises that are planning to expand or complement their IT environment with services in the cloud, either public or private, need to connect their on-premises environment to the new cloud platform. The reasons for expanding IT infrastructure to the cloud are typically to outsource their IT/business applications to a third party, to add remote storage and computing capacity, or to implement a disaster recovery environment. In the case of enterprise cloud connections, a few high speed, low latency connections would likely be enough to connect on-premises enterprise infrastructure to the cloud provider. For 2 x 100G client ports as shown in Figure 3, the Groove G30 NDP single fiber configuration provides a cost-effective solution by minimizing the number of leased fibers required while only adding the incremental cost of a two channel filter (minimum configuration) OMD2.

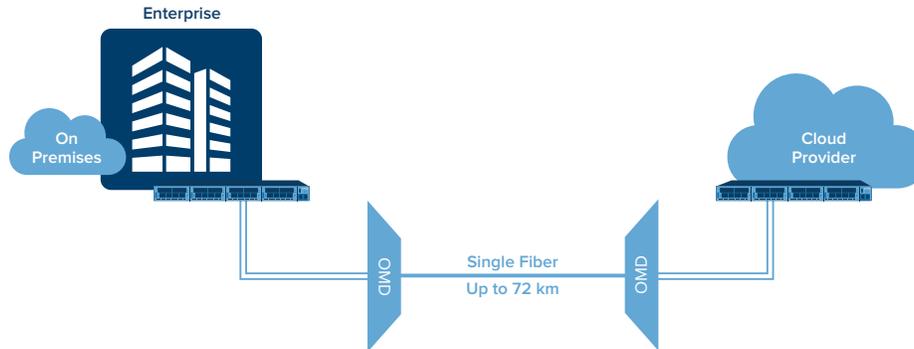


Figure 3: 2 x 100G Ports, Single Fiber Optic Configuration

An additional 2 x 100G client ports can be configured by adding a second CFP2-ACO to the Groove G30 NDP and a second OMD2 filter on each side. This new configuration will provide up to 4 x 100G client ports and a maximum reach of 70 km. If extended reach is needed, a PABA could be added to the solution on each side, thereby obtaining a maximum reach of 112 km for a 4 x 100G configuration or up to 115 km for a 2 x 100G configuration.

Metro DCI

For metro DCI applications, due to the diverse types of requirements, the Coriant bidirectional solution supports a variety of client ports and reach combinations through the use of different filters on passive and amplified configurations. A high-capacity and long reach metro DCI bidirectional configuration is offered for a maximum of 64 x 100G client ports and a maximum reach of 80 km. The same configuration can be set for 32 x 100G client ports and a maximum reach of 120 km. For 8 or 16 x 100G client ports, an amplified configuration provides maximum reaches of up to 115 km and 92 km respectively. An intermediate amplified configuration for 16 or 32 x 100G client ports is also available with reaches of 109 and 86 km respectively.

Intra-Data Center/Campus-DCI

Typical connectivity requirements within a data center involve a large number of client ports and short reach and are similar to the requirements for data centers located in short reach or within a campus area. For maximum fiber utilization, the Coriant single fiber solution can be configured with a 96 channel OMD, providing a total of 48 bidirectional connections. Each connection can carry a maximum capacity of 200G or 2 x 100G client ports. With this configuration, a maximum of 96 x 100G client ports can be supported. Because the distances within a data center or between data centers within a campus area are short, in most cases, amplification is not required.

CONCLUSION

The Coriant bidirectional fiber solution provides a cost-effective option for accessing cloud service providers, metro DCI, and intra-DC connectivity while minimizing the use of fiber strands and maximizing the number of client ports for each use case. The reduction in the use of fiber strands helps to minimize cost when leasing fiber infrastructure and delay or avoid new investment when fiber infrastructure is owned. Both passive and amplified bidirectional options are available to support a variety of client ports and reach requirements. While this application note provides requirements based on 100G client ports, other configurations are also available to provide lower speed client port options (10G/40G/FC8/FC16 interfaces) that utilize CHM2 modules in the Groove G30 NDP. The Coriant bidirectional fiber solution offers significant benefits to address the escalating demand for high speed connectivity and ensure network operators achieve the highest degree of fiber utilization at the lowest cost.

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