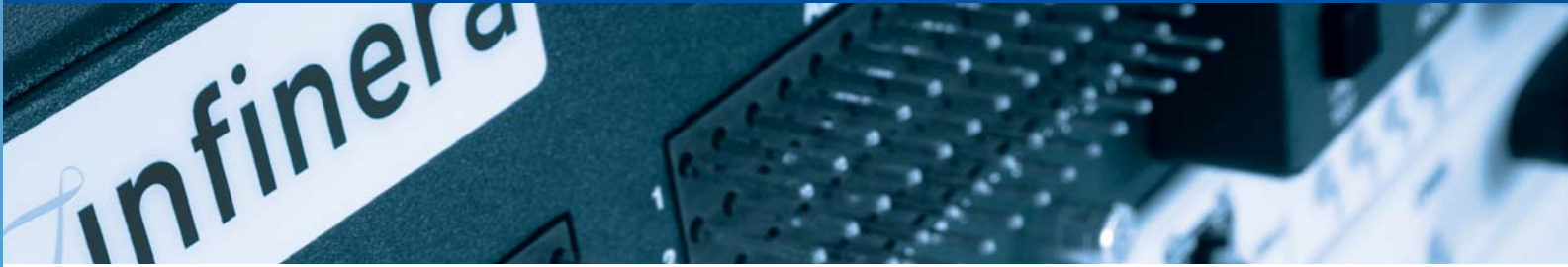


Infinera Case Study: Submarine Deployment in South America



Infinera Submarine Deployment in the Americas Delivers Capacity and Speed

Submarine links in the South America region can be especially demanding because of the large number of countries involved, the difficult terrain, and the rapidly growing traffic volume. With rapidly growing demand, service providers need to find solutions to increase the capacity of their networks without incurring the huge cost of building a new submarine line system and with minimal impact on existing customers' traffic. In this case study we examine how the Infinera DTN solution was deployed on such a link within the few hours available in a planned maintenance window.

The Infinera solution was deployed over an existing submarine network that runs around the coast of South America, and stretches up into North America. In the submarine part of this network there are 11 locations with a total cable distance of almost 28,000 route kilometers.

For many of these routes, all of the available fiber pairs were carrying production traffic, which meant a network migration to higher capacity equipment would involve downtime for existing customers. Traditional systems can require weeks or months of painstaking configuration for set-up and adjustment of dispersion compensation and amplifier power levels – during which time the route would not be available for production traffic.

What this service provider desperately needed was a higher capacity DWDM system in which individual routes could be fully commissioned within a typical operational maintenance window of a few hours.

So the requirements that Infinera had to satisfy were:

- Provide a submarine solution that would at least double the capacity of the network
- This upgrade would have to be able to operate on the existing undersea optical amplifiers
- The network cut over would have to take place within a planned maintenance window of a few hours
- The new network would need to be able to provision current and future services more quickly and efficiently than the current submarine network



Figure 1: Infinera enabled a doubling of capacity on this pan-American network, which extends for almost 28,000 route kilometers.

The Infinera Submarine Migration Plan

Following a successful demonstration of Infinera's submarine technology running over the existing undersea optical amplifiers, Infinera Professional Services put together a network migration plan for the customer that satisfied the demanding time constraints. The demonstration also confirmed that the Infinera equipment could be used with the existing undersea optical amplifiers.

The capacity issue would be solved with the Infinera submarine solution which uses 25 GHz grid spacing — effectively doubling the number of available channels from the initial design capacity of the system. Ongoing service turn-up times would be dramatically improved thanks to Infinera's industry-leading delivery times for both the 100Gb/s PIC-based submarine line modules (SLMs) and the client interfaces (TAMs).

Results of the Network Migration

The routes chosen for the first migration run from Panama to a landing station in the Caribbean and another on the Venezuelan coast. The amplifiers along this route are spaced at 60km intervals, and like most submarine amplifiers, do not operate over the whole of the C-band. Tests showed that the Infinera equipment could operate effectively over the existing third party amps. The final step was to disconnect the existing SLTE terminals from the fiber, connect the Infinera equipment, and perform the very precise dispersion management configuration that is so essential in all submarine systems.

The critical feature for this process was Infinera's unique, single-stage dispersion management solution based on the DCM3 module. This module requires only a fraction of the space that would be needed by a per-channel dispersion management solution (see Figure 2). More importantly, it allows the entire transmission band to be compensated in one step — a task that can be accomplished in minutes, rather than the

weeks that can be required by traditional SLTE dispersion compensation. All these tasks were completed successfully, and the Infinera equipment was fully commissioned only 12 hours into the 24 hour window allocated by the customer.

The newly deployed Infinera system has doubled the available channel count and has the ability to increase capacity even further up to 62 channels.

Digital Optical Network Meets Submarine

In the past, submarine networks have been obliged to trade capacity, speed, and flexibility for long reach and high reliability. Now that the Infinera DTN as SLTE has been introduced for the submarine market, submarine network operators are able to enjoy :

- Dramatically reduced equipment lead times. Days or weeks, rather than 6-12 months.
- Rapid deployment of new capacity. When the new equipment arrives, it can be deployed in days, rather than weeks.
- Fast, cost-effective cutovers using careful planning procedures. New capacity can be installed on production fibers, even during a narrow planned maintenance window.
- Up to a doubling of available capacity. The Infinera solution uses 25 GHz channel spacing to put more wavelengths into the spectrum available on the subsea network.

For more information, visit us at www.infinera.com, or contact an Infinera representative at the contact details below.



Figure 2: Traditional SLTE dispersion compensation can require up to 20 times the space of the Infinera DCM3 solution.



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