

CASE STUDY

AJC Restores Subsea Optical Network Services with Infinera Time-based Instant Bandwidth



CUSTOMER

Australia Japan Cable

CHALLENGE

AJC experienced a network outage on its subsea optical network between Japan and Guam.

AJC needed to quickly restore network services to its customers while undertaking subsea cable repairs.

SOLUTION

Infinera Intelligent Transport Networks enable unparalleled scalability, accelerated service innovation and simplified optical network operations.

Infinera Time-based Instant Bandwidth enables the activation of pre-deployed bandwidth for predefined time periods.

RESULTS

AJC activated more than 400G of bandwidth and restored network services in less than eight hours, avoiding an outage of days or weeks during deep-sea optical network repairs.

AJC restored network services on the DTN-X-based optical network and restored network services on another vendor's optical network by temporarily redirecting that traffic to the Infinera optical network.



Australia Japan Cable (AJC) is a multi-terabit subsea cable network operator connecting Sydney, Australia and Tokyo, Japan via Guam. In mid-2015, AJC experienced a major path failure on one of its two segments connecting to Japan following a fault at a depth between 7,000 to 8,000 meters. AJC needed to rapidly restore network services between Japan and Guam by activating over 400 gigabits per second (400G) of bandwidth on other segments of AJC's network. AJC faced a significant challenge since subsea fiber optic cable repair can take days or even weeks. Infinera Time-based Instant Bandwidth enabled AJC to restore network services internally and within eight hours of the network outage.

AJC is a private subsea optical fiber cable network operator co-owned by some of the world's leading service providers including Telstra, AT&T, NTT, Verizon and Softbank. AJC's 12,700 kilometer (km) fiber network connecting Sydney, Australia and Tokyo, Japan via Guam is installed at an average depth of 4,000-5,000 meters. The company's wavelength division multiplexing (WDM) optical transport network (optical network) is currently equipped to deliver 1 terabit per second (1T) of bandwidth, supporting high-bandwidth and low-unit-cost network services, and has the potential to deliver 5T with future upgrades. AJC's strategy is to offer connectivity and bandwidth through its highly reliable and resilient submarine cable system, enabling its customers a cost-effective and diverse method of supplying services to their customers.

Carriers, Internet service providers, mobile service providers and major cloud/



Australia Japan Cable's Subsea Cable Network
Connecting Australia and Japan via Guam

content providers rely on AJC's fiber-based, high-bandwidth 10 gigabit Ethernet (GbE), 40 GbE and 100 GbE transport services to extend their own optical networks and enhance the availability and performance of the services they provide to their customers.

The AJC optical network employs an optical fiber ring

"To meet the growing bandwidth needs of carrier, enterprise and ISP customers, AJC is significantly increasing the capacity of our network. We selected Infinera because it allowed us to scale capacity while simplifying operations."

—Philip Murphy
Head of Engineering
Australia Japan Cable

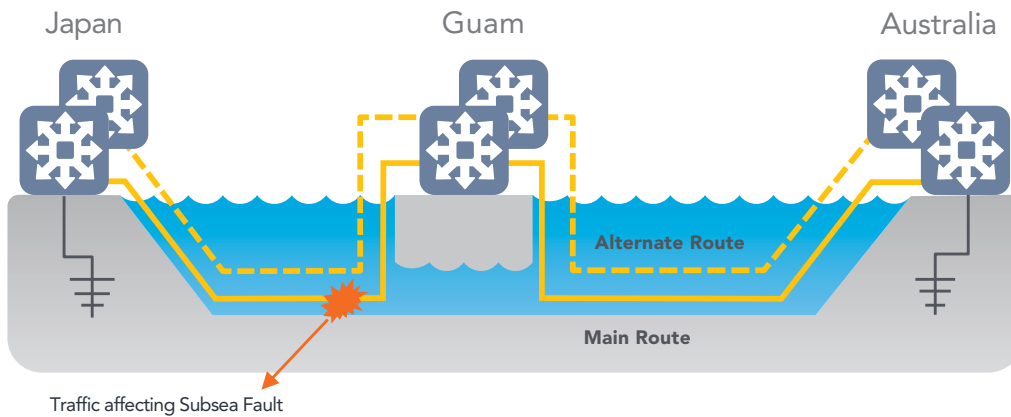


Figure 1: The AJC Optical Network Employs an Optical Fiber Ring Cable Configuration Connecting Australia, Guam and Japan

cable configuration connecting Australia, Guam and Japan, as seen in Figure 1. The configuration includes two interconnecting rings from Australia to Guam and Guam to Japan. Each location has two physically separate cable landing stations connected by optical fiber. With this configuration, AJC is able to maintain continuous network service delivery to its customers in the event that repairs are needed to one of the two landing stations due to a network fault.

AJC's Challenge

In the summer of 2015, AJC experienced a network outage on its optical network between Japan and Guam. While the redundant fiber path was still operational, the working bandwidth on that path was not sufficient to carry all of the network services that needed to be restored.

AJC recognized that the deep-sea cable fault location and restoration operation would take days, and perhaps weeks, due to a number of uncertainties:

- Confirmation of a fault location can take hours or days and may be imprecise depending on type and number of faults
- Challenges exist due to the movement of cables or the deterioration of insulation
- Fault repair delays are possible once the ship is on site due to bad weather or other uncontrollable factors
- Additional fault identification and repair delays may be identified once the ship is onsite, resulting from the testing of the cable
- Delays may be associated with obtaining permits as international and coastal state laws may differ in various jurisdictions

- Repair procedures may be complicated by other network cable crossings near the location of the fault
- The location of the fault at a depth between 7,000 and 8,000 meters may require replacement of a large section of cable

To avoid a prolonged service outage of highly uncertain duration, AJC needed an alternative approach to quickly restore network services to its customers.

Infinera Selected for AJC Network Restoration

After a competitive bid process, in July 2013 AJC selected the Infinera DTN-X XTC-10 Platform for its multi-terabit network upgrade, with deployment phases in late 2013 and early 2014.

The DTN-X-based optical network is designed to deliver AJC up to 12T of non-blocking packet-enabled OTN bandwidth with terabit super-channels. The high bandwidth super-channels are enabled by Infinera's unique photonic integrated circuits (PICs) and FlexCoherent® Processors. Infinera is the only supplier to date delivering commercially available 500G of transmission bandwidth from a single line-card.

One of the many features that the DTN-X provides AJC is Instant Bandwidth™. With DTN-X, AJC can pre-deploy bandwidth that is available when needed and use Instant Bandwidth to activate that bandwidth on demand.

Instant Bandwidth offers AJC a significant advantage in provisioning new services for its customers because it enables rapid one-click and same-day deployment of permanent line-side bandwidth in 100G increments. Instant Bandwidth solves AJC's access and operational complexity issues by allowing new bandwidth and new services to be provisioned remotely, without any need for onsite visits.

Because AJC had deployed an Intelligent Transport Network with DTN-X in its multi-terabit network upgrade completed in July 2014, AJC is able to use Time-based Instant Bandwidth in 2015 to accelerate the recovery of network services.

An expansion of the Instant Bandwidth technology deployed by AJC, Time-based Instant Bandwidth, offers AJC increased flexibility. Time-based Instant Bandwidth allows AJC to take advantage of incremental bandwidth for a defined duration, and then deactivate the bandwidth at the end of a predetermined time period when it is no longer needed.

With the DTN-X and Time-based Instant Bandwidth, AJC realizes several benefits:

Scale Network Bandwidth

- The Infinera DTN-X XTC-10 Platform enables the rapid deployment of 500G subsea WDM super-channels
- Infinera's unique large-scale photonic integrated circuits (PICs) enable 500G of subsea super-channel bandwidth to be deployed from a single line-card in the DTN-X XTC-10 Platform

Simplify Optical Network Operations

- Time-based Instant Bandwidth enables software activation of pre-deployed optical network bandwidth for a defined duration, with pay-as-you-grow on-demand increments of 100G
- Time-based Instant Bandwidth enables AJC to quickly restore network services in less than eight hours by activating more than 400G of pre-deployed bandwidth
- Digital Network Administrator (DNA) management software enables temporarily activation of new pre-deployed bandwidth within a few hours

Having already realized the many benefits of working with Infinera before the deep-sea fiber failure, it was a natural choice for AJC to select Time-based Instant Bandwidth to restore network services quickly.

AJC Network Restoration Within 8 Hours

Time-based Instant Bandwidth enabled AJC to quickly restore network services in less than eight hours by activating more than 400G of pre-deployed bandwidth. With Time-based Instant Bandwidth, AJC reduced the length of time of the impact to customers from the network service outage that could have extended many days or even weeks during an operationally complex deep-sea repair ship deployment.

AJC and the Infinera team rerouted over 400G of bandwidth from the impacted AJC path to alternate paths on the AJC optical network. By using the Infinera DNA management software, within a few hours AJC temporarily activated new pre-deployed bandwidth spread over several links on an alternate path. With

DTN-X XTC-10
Platform



"AJC's top priority is ensuring maximum availability of network services for our customers. Our partnership with Infinera underscores Infinera's incredibly rapid response but also highlights the value of operating a network based on PIC technology, the DTN-X and Infinera's unique Time-based Instant Bandwidth capability, which enabled us to deploy software-activated bandwidth incrementally in a very short period of time."

—David Crofts
CEO
Australia Japan Cable

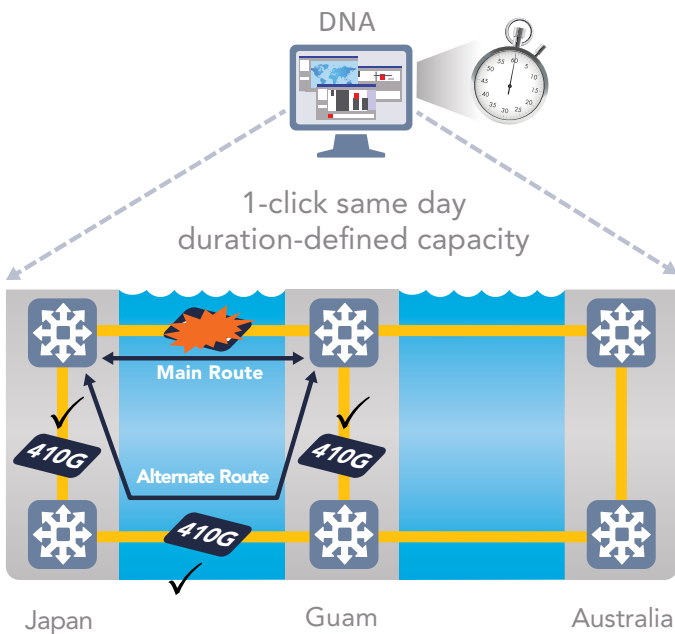


Figure 2: Time-Based Instant Bandwidth Enabled AJC to Quickly Restore Network Services in Less Than Eight Hours by Activating More Than 400G of Pre-Deployed Bandwidth

Time-based Instant Bandwidth
AJC was able to schedule the deactivation of the additional bandwidth at a time predefined by AJC.

AJC's highly resilient optical network architecture based on the Infinera DTN-X XTC-10

Platform was key in the network restoration. With Time-based Instant Bandwidth, AJC restored network services by activating pre-deployed bandwidth on the DTN-X-based optical network using Infinera's DNA software. In addition, AJC restored network services on another vendor's optical network by temporarily redirecting that traffic to the Infinera optical network.

The Infinera Intelligent Transport Network with Time-based Instant Bandwidth delivered the following results for AJC:

- By activating more than 400G of pre-deployed bandwidth in less than eight hours, AJC avoided an outage of days or weeks associated with a deep-sea repair operation
- AJC quickly restored network services by activating pre-deployed bandwidth over several links on an alternate AJC path on the DTN-X optical network, without any impact to existing network services on that path
- AJC restored network services on another vendor's optical network by temporarily redirecting those network services to the DTN-X-based optical network

For more information on how Intelligent Transport Networks can enable network operators to scale, accelerate service innovation and simplify network operations, contact us.

"We are pleased to continue our successful partnership with AJC. Customer satisfaction is of utmost importance to us, and we are committed to help in any way possible so they can, in turn, fully meet their customers' needs. Both the AJC and Infinera teams worked jointly with urgency to restore network services by activating predeployed network bandwidth, minimizing disruption to the AJC network and services."

—Lonny Orona
Executive Vice President
for Customer Support
Infinera