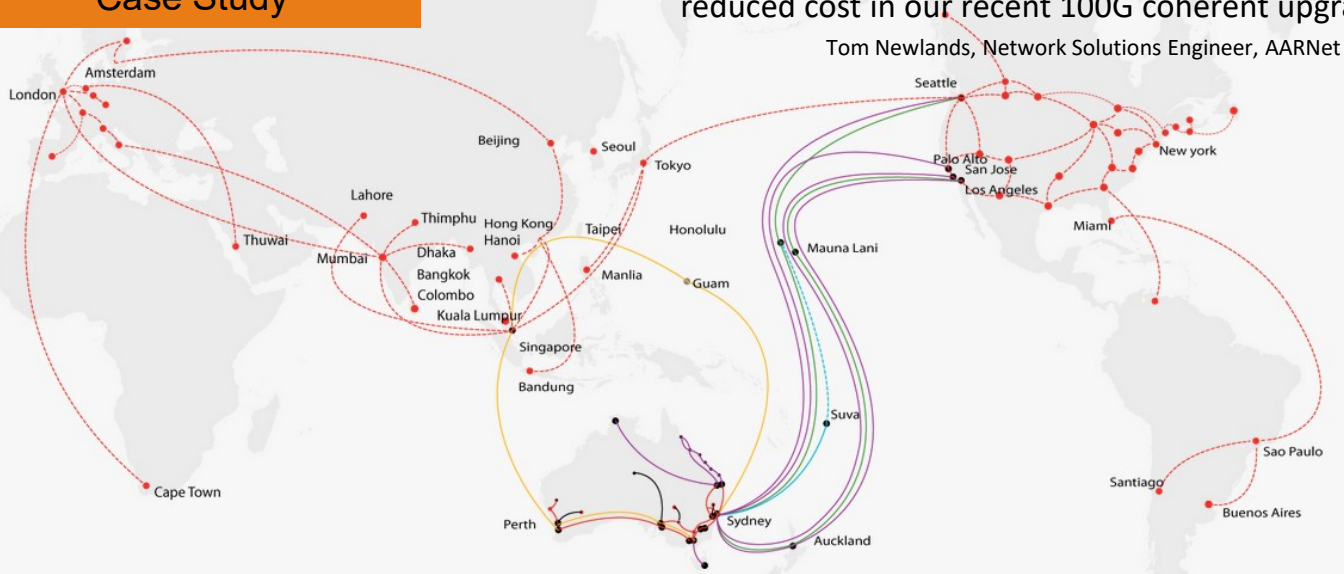
Case Study

”Proximion’s unique DCMs improved performance and reduced cost in our recent 100G coherent upgrade.”

Tom Newlands, Network Solutions Engineer, AARNet Pty Ltd



An upgrade of a 10G legacy dispersion compensated network to a mixed 100G coherent network

The Issue

AARNet Operates a 12,000 km DWDM network made up of Cisco 15454 hardware and has lit over 4Tb/s of capacity. In order to increase capacity AARNet decided to add a total of 1,850 km of its nationwide network with coherent transponders, and extend the legacy part with 230 km.

The four new links spanning 2,080 km connected: Sydney and Armidale, Narrabri and Armidale, Shepparton and Adelaide, and Keith and Mt Gambier. All new links used G.652 fiber, and the two longer spans contained multiple spans using RAMAN and EDFAs. However, when mixing with the legacy dispersion compensated G.655 network through Multi Degree ROADM’s, the coherent services did not work.

Signal transmission on the coherent channels was not possible due to severe distortion caused by non-linear effects.

Using conventional technology, three approaches was identified. The first, remove the legacy network. This would have been economically unfeasible since many 10G services were being used by customers unwilling to pay for coherent services.

The second alternative, regenerate the signals between the network segments. This would have been extremely expensive, both in terms of equipment cost and power consumption.

A third option, adding optical dispersion compensation. Using DCF would induce additional non–linear penalties but also changing the original design from single stage amplifiers to dual stage amplifiers, due to very high insertion loss from the DCF. This would have resulted in increased costs, reduced OSNR, increased power consumption, and higher latency.

THE COMPANY

aarnet
Australia’s Academic and Research Network

Australia’s Academic and Research Network (AARNet) provides unique information communications technology capabilities to enable Australian education and research institutions to collaborate with each other and their international peer communities.

AARNet is widely regarded as the founder of the Internet in Australia and renowned as the architect, builder and operator of world-class network infrastructure for research and education.

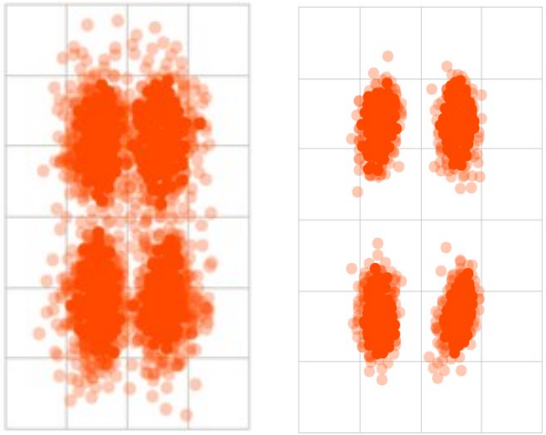
https://www.aarnet.edu.au/

Case Study

Proximion

An upgrade of a 10G legacy dispersion compensated network to a mixed 100G coherent network

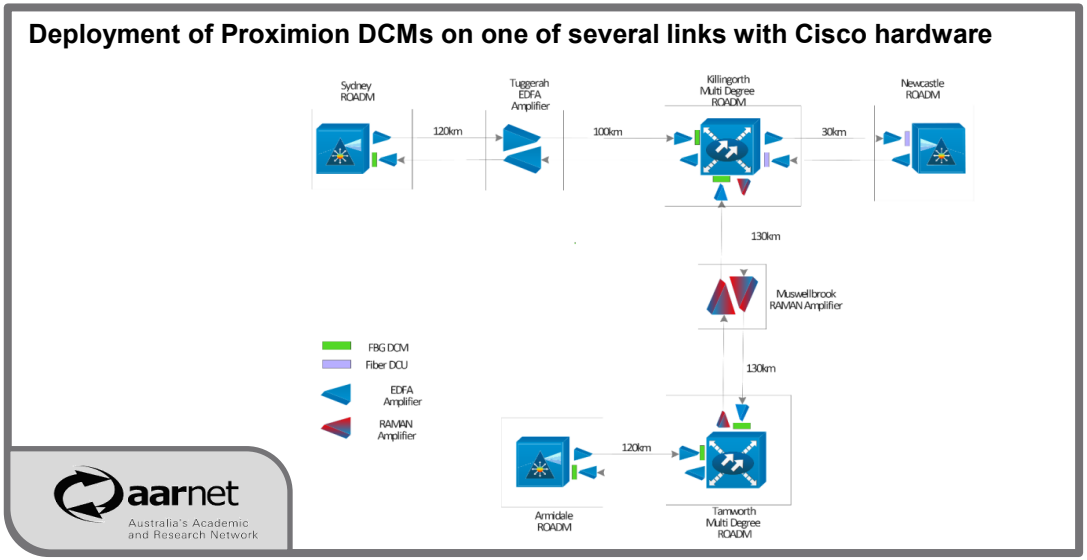
CONSTELLATION DIAGRAM



Coherent + DCF

Coherent + DCM

Deployment of Proximion DCMs on one of several links with Cisco hardware



The Solution

After an extensive search for a flexible and cost effective solution AARNet decided to cascade Proximion's FBG-DCMs at a few points, a design choice enabled by the much lower IL and insensitivity to non linear effects. Dispersion from a number of sites could be compensated without requiring any additional amplification. The solution allowed AARNet to deploy additional cheaper non-coherent 10G services to connect smaller customers.

A much more cost-effective solution since it did not require coherent transponders for every service. Unlike channelized FBG-DCMs Proximion's DCMs allowed AARNet to run both 100GHz and 50GHz DWDM systems, and will also support Flex Spectrum in future upgrades.

The Results

The 2,080 km connecting the Australian east coast was successfully upgraded using FBG-DCMs from Proximion. The issue with high NLE that severely distorted the new coherent channels was successfully mitigated with the DCMs and the IL turned out to be 3-5 times less than for equivalent DCFs, allowing a technically superior and cost effective amplification map. The technical performance of the DCMs substantially exceeded the expectations of the AARNet team.

The monitored residual dispersion was within 1% of AARNet's design. In addition it significantly improved the performance of the coherent signals on some of the spans. The Pre FEC BER improved by approximately 30%. This also allowed AARNet to connect smaller customers using much cheaper non-coherent 10G transponders – along services with much higher capacity needs.

Proximion AB
Skalholtsgatan 10, SE-164 40 Kista
Sweden

Phone: +46 8 750 48 88
info@proximion.com
www.proximion.com

January 2024
106397-A