



Nortel extends 40G reach to dive deeper into the subsea market

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On 13 August, Nortel announced a significant breakthrough in undersea networking - 40G transport across an 8,000km submarine link - and a partnership with MPB Communications. Together these announcements signal Nortel's intent to pursue a bigger piece of the \$1.1 billion undersea communications market.

Nortel doubles the reach of its commercial 40G solution and extends its performance leadership

Carriers are in the process of upgrading their terrestrial transmission networks to 40Gbps, from 10Gbps, which has been the state of the art for WDM-based fiber networks for the past decade. Many vendors offer commercial 40G solutions and roadmaps to 100G. The modulation format used to achieve these capacities is a key technical strategy separating vendors, as each approach comes with cost, performance, and operational trade-offs. Nortel stormed the 40G market in 2008 with its coherent detection digital signaling processing and DP QPSK modulation format, which quickly proved superior to other approaches in terms of performance.

Piggybacking on earlier design efforts, Nortel has been able to double the reach of its 40G to around 9,000km with its introduction of Dual Polarization Binary Phase Shift Keying (DP BPSK). Nortel accomplished this using coherent optical FDM with two subcarriers spaced 20GHz apart in one 50GHz spectral slot combined with DP BPSK modulation format that supports 2 times 20G signals. DP BPSK's more robust method of signaling gives it a 3dB increase in reach and 6dB more resilience to phase distortion, which allows for higher launch power.

It took four years for Nortel to develop its initial 40G technology due to the complexity of designing the silicon-based ASICs and DSP (digital signal processing) required, but, through technology reuse, only one year to develop this second generation. While others are still rushing to develop their own 40G and 100G implementations using DP QPSK, Nortel is again pushing the envelope and keeping its technology edge in high-capacity transport. Nortel plans to make the ULH DP BPSK-based 40G commercially available in 1Q10.

Ultra-long reach makes 40G upgrades on trans-oceanic submarine links possible

Subsea cable operators are struggling to increase capacity to keep up with skyrocketing demand. Installing a new cable plant is both time consuming and expensive, so subsea cable operators have been looking to upgrade 10G channels to 40G. There are many large network builds under way around the world; for example, the Asia America Gateway cable, linking south-east Asia to the US, came online just last month. However, the business case for upgrading working 10G cables to the 40G line rate is much easier to make than building new links, especially with ship capacity as scarce as it has been for the last couple of years.

There is strong interest in cable upgrades in the Atlantic region (US-Europe) and around South & Central America. For select routes in Asia, upgrades are also under way; for instance, in 2Q09 Pacnet selected Xtera's NXT submarine line terminals to upgrade its EAC-C2C intra-Asia cable network. The NXT system offers yet another modulation format - differential phase shift keying (DPSK) - to support up to 20G line rates on short routes.

Ovum projects the market for undersea networking gear will more than double to \$2.2 billion by 2014 - an opportunity not lost on vendors



The top four submarine system suppliers (Alcatel-Lucent, Tyco, NEC, and Fujitsu) are facing increasing competition from non-traditional vendors, including Nortel, Xtera, Infinera and, most credibly to date, Huawei - which has become the number five player through its joint venture with Global Marine, Huawei Marine.

Nortel has won several contracts for capacity relief for unrepeaters submarine and festoon applications since it rolled out its 40G technology in 2Q08. Using specialized amplifiers provided by MPB Communications at link ends, operators can run 40G signals generated by Nortel through the system without the need to power the wet plant. These unrepeaters and festoon submarine applications increased the addressable market for 40G. The new, longer-reach DP BPSK will allow Nortel to provide upgrades to repeaters festoons and regional and trans-oceanic routes, further increasing its addressable 40G market and making it a stronger competitor for non-terrestrial applications.