CWDM and DWDM Explained

The two key WDM technologies are coarse wavelength division multiplexing, CWDM and dense wavelength division multiplexing, DWDM. Which solution is best suited to a given environment depends on the network and user requirements.

CWDM supports up to 18 wavelength channels transmitted through a fiber at the same time. To achieve this, the different wavelengths of each channel are 20nm apart. DWDM, supports up to 80 simultaneous wavelength channels, with each of the channels only 0.8nm apart. CWDM technology offers a convenient and cost-efficient solution for shorter distances of up to 70 kilometers. For distances between 40 and 70 kilometers, CWDM tends to be limited to supporting eight channels. Unlike CWDM, DWDM connections can be amplified and can therefore be used for transmitting data much longer distances.

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The sweet spot for CWDM is up to 10 Gigabit Ethernet and 16G Fibre Channel. And it is quite unlikely capacities with increase beyond this in the future. DWDM however, is able to handle higher speed protocols up to 100Gbps per channel making it a more suitabletechnology for higher speed protocols.

Traditionally CWDM components have been lower in cost making it more popular than DWDM. Now the price for both solutions is comparable. With higher speeds, more channel capacity, longer distances and passive networking, DWDM is the technology of choice for green field installations.

Active or passive systems – what's the difference?

Both CWDM and DWDM solutions are available as active or passive systems. In a passive, unpowered solution the xWDM transceiver resides directly in the data switch. The output from the xWDM transceiver connects to an unpowered multiplexer that combines and redistributes, multiplexes and demultiplexes, the various signals. As the xWDM transceiver resides in the data switch, it means that all xWDM functionality is embedded in the data switch.

Active xWDM solutions are stand-alone AC or DC powered systems separated from the switch. The task of the stand-alone system is to take the short-range optical output signal of the fiber or IP switch and convert it to a long-range xWDM signal. This OEO, (optical to electrical to optical), conversion is handled by a transponder. The converted xWDM signal is then transmitted with the help of transceivers and multiplexers. Due to the separation of the xWDM transport solution from the actual switch, active systems also tend to be more complex than passive, embedded solutions.

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