

OPTICS CENTRAL

Adding CWDM to single wavelength Networks

This application note describes how to use a passive optic MUX/DEMUX to add CWDM wavelengths to 1310/1550nm single wavelength network rings.

Enterprises and service provider have traditionally been building their gigabit speed metro networks with 1310nm and 1550nm wavelengths. This network has consisted of a pair of fibers connected between two or more buildings with a SONET ADM (or Ethernet switch) at each building. Figure 1 shows a diagram of this application.

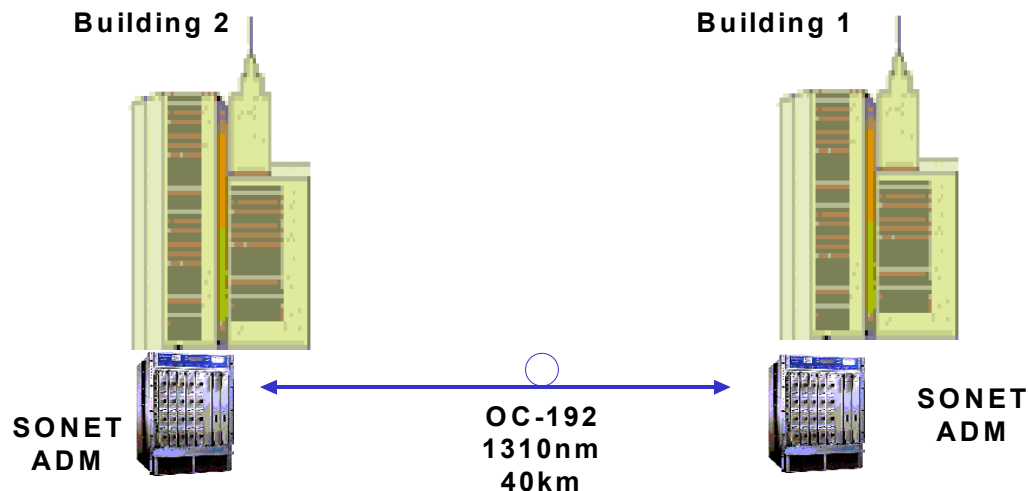


Figure 1. Single wavelength 1310nm link application

When additional bandwidth is needed between the two buildings the user adds either more fiber between the buildings or implements an expensive DWDM solution.

With the advent of CWDM transceivers and passive optics, a simple low cost solution is possible by adding a WDM MUX/DEMUX at each end with additional CWDM wavelengths. Figure 2 depicts an example of this solution. Note that with two additional CWDM wavelengths an Ethernet and Fibre Channel switch are deployed.

Adding CWDM to Single Wavelength Networks

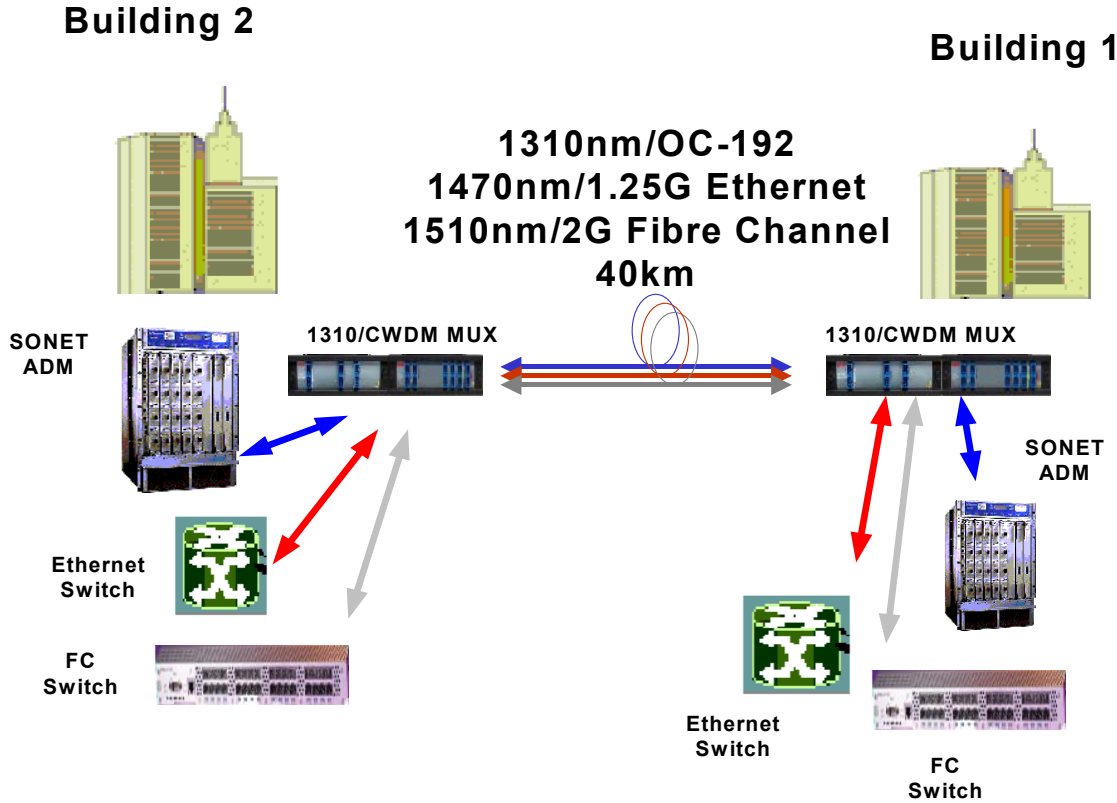


Figure 2. 1310nm link upgraded with additional CWDM Wavelengths.

Implementing the Solution

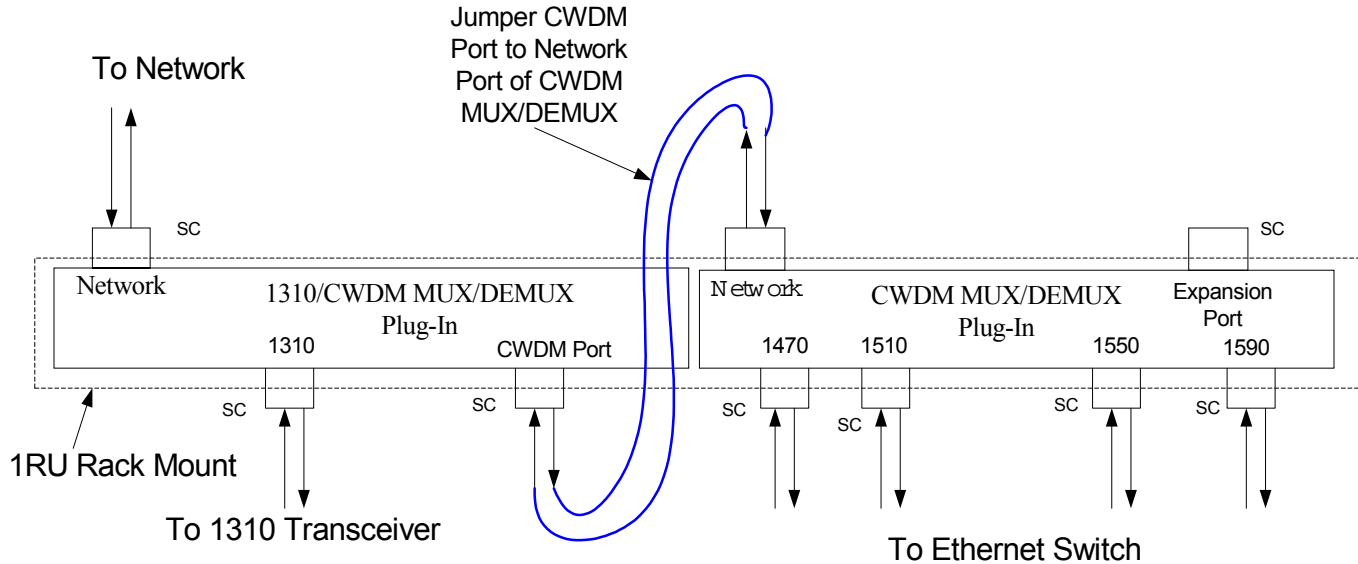
The upgrade solution is simple and cost effective. At each node in the network add a passive MUX/DEMUX with a single network side port and a 1310nm port with additional CWDM ports on the equipment side. The 1310nm wavelength is completely transparent to the added CWDM wavelengths. Up to 8 CWDM wavelengths can be added as the bandwidth requirements grow without interruption to the existing service.

The following block diagrams show how to upgrade a network using passive MUX/DEMUXs to insert and de-assert optical CWDM wavelengths from an existing single 1310 wavelength ring. Each step in the process of building the ring is shown below with an equipment view, node view and network view.

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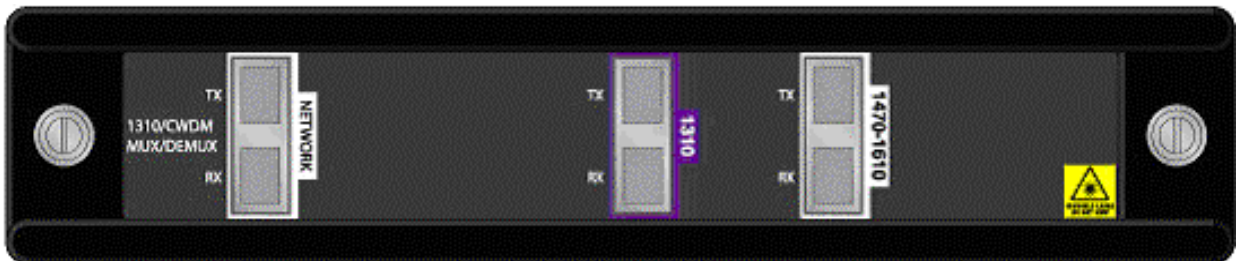
Equipment View

The equipment block diagram view, shown below, illustrates how to add/drop CWDM wavelengths to/from a 1310 wavelength ring network by connecting a 1310/CWDM MUX/DEMUX to a four channel CWDM MUX/DEMUX. The 1310/CWDM MUX/DEMUX connects to the network and splits the 1310nm wavelength from the CWDM group of wavelengths. After being connected to the 1310nm CWDM port, the CWDM MUX/DEMUX breaks out each of the individual CWDM wavelengths, which in turn go to an Ethernet switch.



Plug-In front panels views of the DEMUX/DEMUX equipment:

1310/CWDM MUX/DEMUX



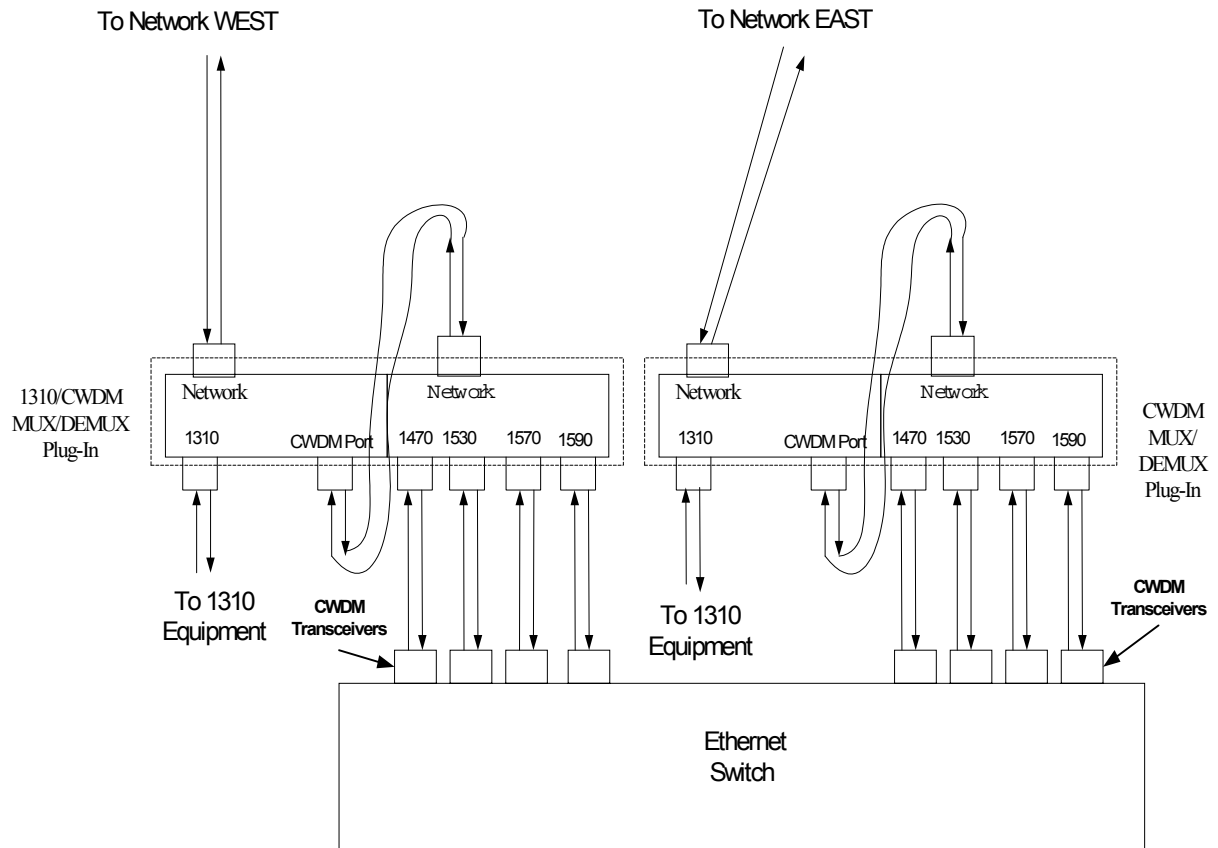
CWDM MUX/DEMUX-4-EX



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Node View

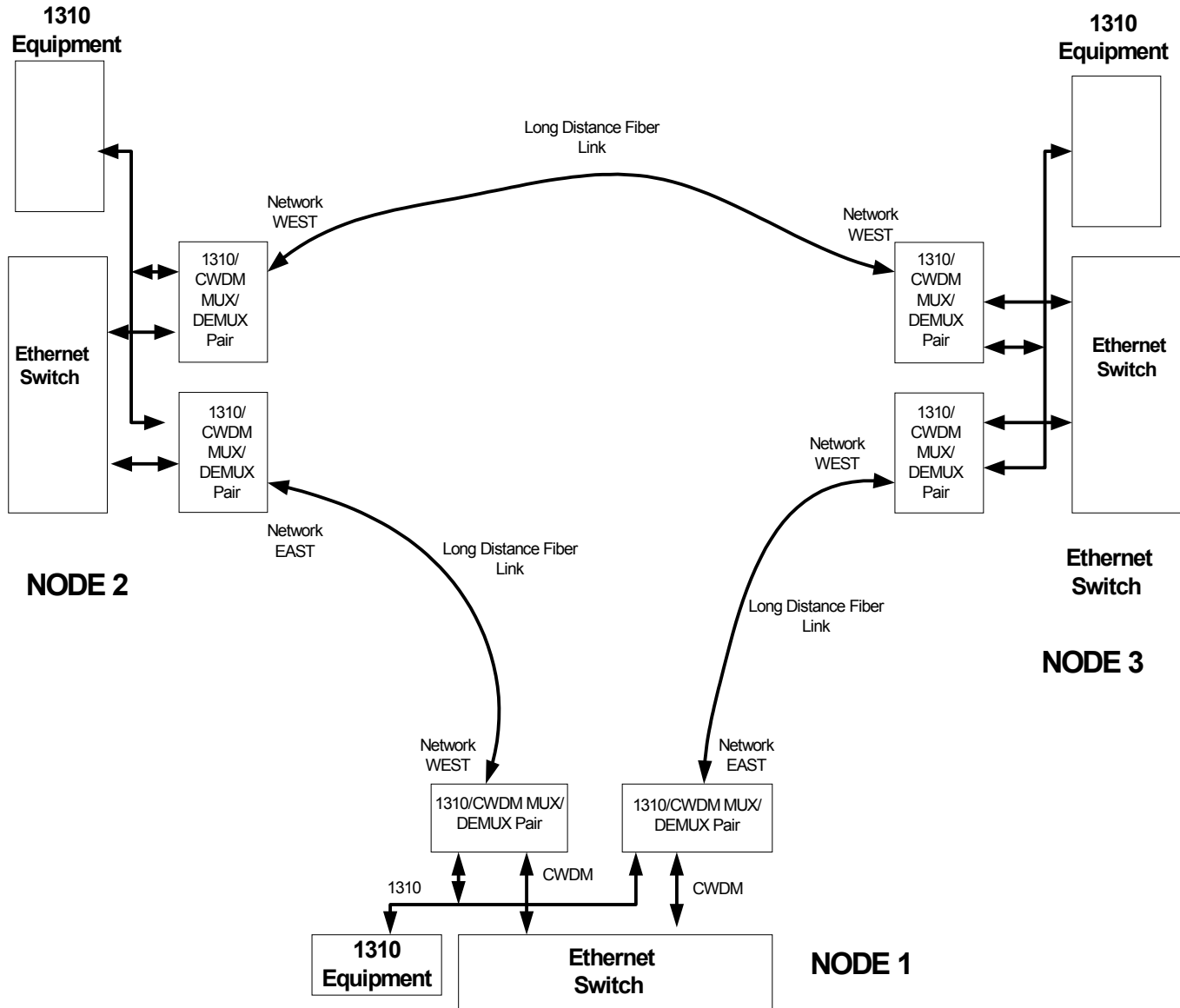
The node view, shown below, illustrates two sets of 1310/CWDM MUX/DEMUXs with CWDM MUX/DEMUXs connected to an Ethernet switch to make a protected node. The 1310 wavelengths are cabled separately to the 1310 network equipment.



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Network View

The network view, shown below, shows how to build a three node network with the protected node design shown above.



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Summary

The solution shown in this application note illustrates how to simply upgrade a 1310nm single wavelength network ring to a WDM network ring with four additional wavelengths. Further, the expansion need not be limited to four wavelengths. By adding a 8 channel CWDM MUX/DEMUX in place of the 4 channel CWDM MUX/DEMUX, 8 CWDM wavelengths become available on the network ring. For future bandwidth that is beyond the capability of 8 CWDM wavelengths, insert a DWDM MUX/DEMUX into the CWDM MUX/DEMUX for creating 45 more wavelengths with DWDM on CWDM (see Optics Central's app note for DWDM on CWDM).

Finally, this solution is also available to single wavelength networks deployed with 1550nm. In the above solution, substitute the 1310nm MUX/DEMUX with a 1550nm MUX/DEMUX that splits the 1550nm wavelength from the CWDM wavelengths.

For additional information see Optics Central app notes:

“The WDM Metro Access Solution”

“Implementing DWDM on CWDM”