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OPTICAL SAFETY AND CONNECTIONS VERIFICATION

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ABSTRACT

Techniques are described herein to verify and intercept any intra-node mis-cabling between cards. These techniques do not require any additional hardware, distributed protocol, or intelligence in the network manager or Software Defined Networking (SDN) tools.

DETAILED DESCRIPTION

In current Dense Wavelength Division Multiplexing (DWDM) optical platform architectures, the system leverages particular optical signals to satisfy the mandatory safety requirements related to amplifiers. Each of these signals has an assigned wavelength and is used between two adjacent nodes to create a closed loop referred to as an Optical Service Channel or an Optical Supervisory Channel (OSC). A procedure verifies the connectivity and the stability of a particular signal, closing the loop between the two adjacencies when the signal is stable.

Figure 1 below illustrates an example in which the OSC is one of those signals. An OSC loop is shown between two adjacency nodes. If a fiber cut is present between nodes A and B, the node B OSC receiver detects a loss of signal. The loss of signal is sent from the node B OSC transmitter to Node A. Node A then shuts off amplifier transmission to Node B.

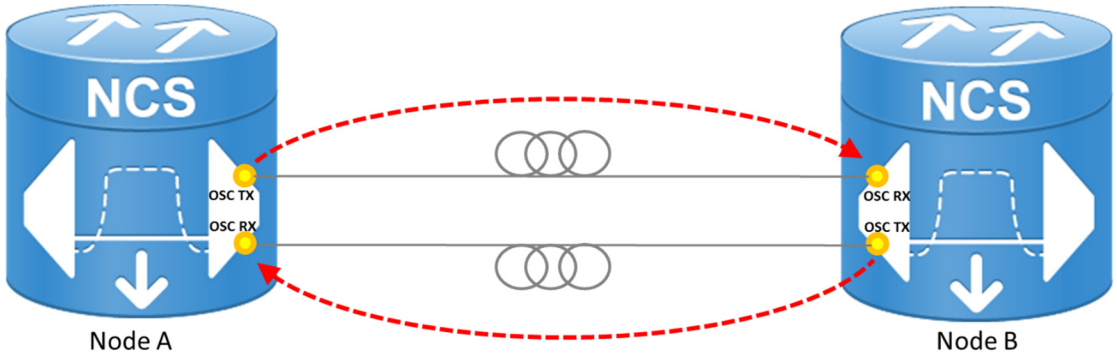

Figure 1

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Techniques are described herein to leverage those signals, and in particular during the initialization phase of those signals, for verification and discovery of intra-node connections between cards. A method may be performed based on the transmission and detection of optical signals transmitting at specific wavelengths. The node controller enables the lasers, orchestrates them, and monitors them through photodiodes equipped on the cards to determine which one is receiving the specific signal.

The optical spectrum may be properly partitioned to accommodate the C-Band and L-Band channels, in addition to OSC and Distributed Feedback (DFB) probe signals for Raman, Optical Time Domain Reflectometer (OTDR), and L-Band.

As shown in Figure 2 below, during the initialization phase, the node controller discovers the amplifier cards plugged into the chassis. With an order based on the card types recognized, the node controller begins enabling the optical signals, one after another, monitoring the photodiodes on the receiver sides of the other cards.

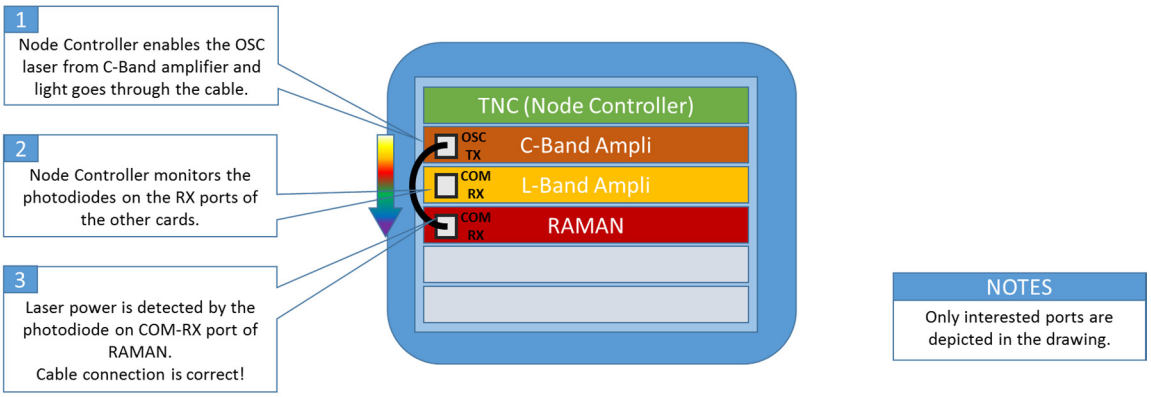

Figure 2

Figure 3 below illustrates an internal representation of an example system.

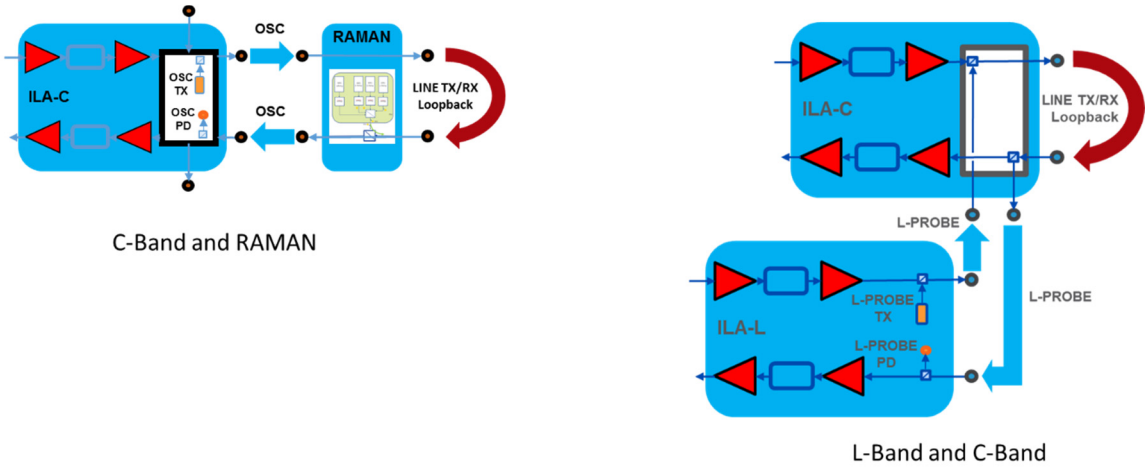

Figure 3

In summary, techniques are described herein to verify and intercept any intra-node mis-cabling between cards. These techniques do not require any additional hardware, distributed protocol, or intelligence in the network manager or Software Defined Networking (SDN) tools.