Service Aware Control Mechanisms for Light-trail WDM Networks

Ashwin Gumaste ¹, Janak Chandarana ¹, Nasir Ghani ² and Vishal Sharma ³

¹ Dept. of IT, Indian Institute of Technology, Bombay India.
² Tennessee Tech University
³ Dept. of EE, Indian Institute of Technology, Bombay India.

Email: ashwing@ieee.org, janak@it.iitb.ac.in, nghani@tntech.edu, v.sharma@ieee.org

Abstract: A light-trail is a generalized lightpath that enables multiple nodes to statistically share an optical communication path (wavelength bus). A light-trail is different from a lightpath on account of its unique node architecture – that enables formation of wavelength buses by supporting characteristics of optical drop-and-continue and optical passive-add. Apart from the node architecture, another differentiation between light-trails and lightpaths is the out-of-band control channel. The combined effect of a unique node architecture and out-of-band control channel enables light-trails to provide sub-wavelength grooming capability, dynamic provisioning and optical multicasting. These features offered by light-trails are critical for next generation emerging applications such as Video-on-demand (VoD), Triple-play and Pseudo-Wire Edge-to-Edge Emulation (PWE3).

The control channel requires engineering enhancement to provision dynamic and bandwidth efficient services over light-trails. We investigate into the control channel hierarchies of light-trail networks to provision these emerging services. Centralized, distributed, static, dynamic, and cooperative control mechanisms are discussed. Performance of light-trail control for providing next generation services such as pseudo-wires, VoD and triple play are considered through simulation.

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