

Toward Massive Transparency in Optical Networks

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Abstract

In optical transmission systems, transparency refers to the degree to which the network infrastructure can support signals independent of their physical characteristics, such as modulation format or wavelength. A level of transparency is usually achieved between the points at which optical signals are terminated. As we increase the optical transmission distances and bandwidth in the fiber, the transparency expands. Recent systems have been deployed that support transparent pass-through at add-drop nodes forming so-called optically transparent mesh networks. This migration is inevitable due to the ever increasing traffic demands within the global communication fabric. Electronic processing of communication signals is being pushed farther out to the edges of the network as the capacity demands in the core overwhelm the limited bandwidth and transmission capability of opaque network elements. At Bell Laboratories we are working on optical systems that will support massive transparency: 100's of wavelength division multiplexed (WDM) communication signals of different formats and bit rates traversing 100's of nodes and 1000's of kilometers. In this presentation I will describe a few of the physical layer technological challenges that arise in such systems and our experiments to understand and overcome those challenges.