IP Optical Traffic Technology for Integrated Traffic Control of IP and Optical Networks

As broadband access spreads along with the diversification of network services, communication networks will become more important as one of the social infrastructures and if unexpected new services appear in the future, dynamic traffic fluctuations will occur. Therefore, servers that control such traffic need to respond flexibly to unexpected changes in traffic demand and restore operations quickly in the event of system failures and natural disasters.

The network architecture, which consists of IP networks and optical networks, based on commercially available technology can only manage IP (IP: Internet protocol) routers in IP networks and optical cross connects (OXCs) in optical networks separately. To enable the network to adapt to dynamic traffic changes, it is necessary to configure both IP and optical networks, but management of IP networks is not automatically coordinated with that of optical networks. Manual operation to configure both IP and optical networks takes time and is not efficient. That is, existing technology cannot deal effectively with dynamic changes in traffic. Consequently, it will be necessary for the network topology to be controlled by an integrated management scheme for both IP routers and OXCs.

NTT Network Service Systems Laboratories has developed an IP optical traffic engineering (TE) server for managing IP routers and OXCs in an IP optical backbone network and controlling traffic and has successfully conducted testbed trials of dynamic network control in an IP optical backbone network configured with IP routers and OXCs. This TE technology has two main features. One is an IP optical traffic control technology. The IP optical TE server computes optimal paths between these layers and can also reconfigure the network topology using a newly designed traffic control algorithm, dealing quickly and flexibly with fluctuations in traffic demand and sudden changes in network status due to system failure. In addition, it can also provide stable and reliable network services. The second feature is the separation of traffic control functions. This IP optical control algorithm is implemented in the IP optical TE server separate from node equipment, so it enables a carrier to apply traffic control policies considering quality of service, reliability, and efficiency. This allows the carrier to differentiate network operations from other operations, achieving both a flexible and reliable backbone network.

To ensure that future traffic changes can be handled, NTT is promoting international standardization of the interfaces of the IP optical TE server in the Internet Engineering Task Force and plans to conduct interoperability trials with vendors and add functions in accordance with operation and control scenarios in actual networks.

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