

A reliable wavelength division multiplexing metro-access network realizing crosstalk-free transmission between uplink and downlink

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Abstract A novel wavelength division multiplexing metro-access network based on dual-fiber ring of remote nodes and star topology of optical network units is designed to realize the reliable network in case of either single or dual fiber failure. In the design, the survivability of the network is largely enhanced by three work modes. Simultaneously, this network structure can also avoid the crosstalk between uplink and downlink. The simulation results demonstrated with 2.5-Gb/s up/downstream signals show this approach could work very well.

Keywords Wavelength division multiplexing · Network structure · Ring topology · Reconfiguration · Survivability

1 Introduction

The passive optical networks (PON) have replaced traditional copper-based network becoming the ultimate solution in the fiber-to-the-home (FTTH) market (Lee et al. 2006). With the development of technology and the continuous integration of network traffic such as video on demand (VOD), HDTV and Cloud Computing, traditional PONs like EPON can't satisfy increasing bandwidth demand of subscriber. In addition, it still lacks the security due to its working methods. So the Wavelength Division Multiplexing (WDM) is proposed and studied all over the world to solve the problems of large communication capacity, high security and huge bandwidth. The WDM is considered as one of the best selections to the next generation access network (Park et al. 2004).

To most tree and star topologies, the number of subscribers is restricted by the structure. So, the ring topology is considered as a solution to the large-scale access, which can fulfill the combination of convergence network and the access network. Besides, to a huge-capacity

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