

Research on Control Routing Technology in Communication Network

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Abstract: In communication network, WDM optical backbone network has become the primary long-distance options. In this paper, the structure of WDM optical networks are analyzed, the add-drop system in the architecture of WDM optical networks is discussed. In order to improve network efficiency, we analyzed the characteristics of network routing, and proposed a new routing design method. In communication network, a good routing is very important for network operation. Routing technologies manage the flow of data between network segments in optical communication network. In addition, we also discussed the WDM optical network switching technology.

Keywords: Control, routing, communication network.

1 Introduction

With the huge information data growth in internet network service, how to increase the data transmission capacity for communication network is an important problem. Wavelength-Division Multiplexing (WDM) optical network can use the same fiber to support multiple optical channels, and can provide an ultra high-speed transmission. Such optical networks promise data transmission rates than the current high level of electronic networks [1-2]. So the WDM network is regarded as a long backbone transmission network. With the rapid development of the WDM technology, WDM optical communication network will be the future development direction of network construction [3]. To transmission network, most of the existing infrastructure network is still built in voice transmission, in accordance with the present technology, voice communications can be transmitted through the packet network and be able to carry multi-service circuit switched networks [4].

In the optical network, the optical signal is converted to the electrical signal, an electrical signal is converted to an optical signal at the entry point and then remains in the optical domain throughout the network until it is received at the far end and converted back to an electrical signal [5]. WDM optical networks offer huge transmission capacity. To ensure high-speed WDM network transmission capacity, there must be a good switching technology. In addition, a good routing technology, also is an important factor to ensure high-speed broadband WDM networks [6]. WDM can take advantage of the huge fiber bandwidth, so that transmission capacity than the single-wavelength transmission increased several times or more. Using WDM technology, originally used only a single wavelength of light as the carrier channel into several channels of different wavelengths of light while transmitting in the fiber, which fiber optic communications capacity doubled. WDM technology will help expand the network of new business to tap fiber optic bandwidth capacity, ultra high-speed communications and the expansion and

upgrade, and so has the very important, so it is as the best technology to improve transmission capacity and wide application. Routing stage in the connection request to establish a series of operations to carried out. The whole network is divided into information and based on local information in two ways. Routing selecting strategy is that the business arrive, the connection can select a physical route for optimization. Networks and connections in a given case to establish the demand, according to some algorithm or strategy to find connections source node and destination node of the connection path to ask the right, a good routing algorithm will significantly reduce the blocking rate, the connection requirements are met and to make full use of network resources.

2 Structure of WDM Network

WDM network model consists of the core optical network and connect to its IP routing on the composition, the dynamic establishment of IP routers through the exchange of optical IP routers connected with the other. WDM network constituted of multiple optical network, each optical network management by the different management entities, and each optical network and optical link through the Internet by a number of subnets composition. OXC in the network of these photons can also be full of light with OEO conversion. Subnets connected through compatible physical interfaces, can also be an appropriate use of photo-electron conversion, In this WDM model, two classes of logical interfaces, called User - Network Interface (UNI: User-Network Interface) and network - network interface (NNI: Network-Network Interface). Network structure based on business type and, UNI and NNI can be divided into public and private two types. Routing information (link state and topology information and other information) can interact with specific interfaces; and routing information in the public interface can not be passed, or by the type and amount of routing

information are clearly limited. The WDM optical network is shown in Fig. 2.1.

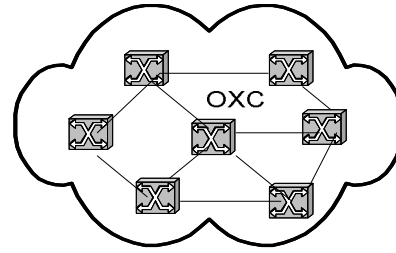


Figure 2.1: WDM network

According to the OSI seven layer protocol reference model, communication subnets involves only the network layer and the protocol layer, transport layer and above layers exist in the resource layer, so as a communication transmission network that needs only to consider the network layer, data link layer and physical layer protocols. In the physical layer, it is good to use optical fiber as transmission medium, high bandwidth, high-quality, ultra-high speed, low cost. So using optical network carrying multimedia communication services is the trend. In the network layer, using IP protocol, the variety of multimedia services (voice, video, data) are encapsulated in IP packets sent by the way, which is generally recognized.

3 The Add-Drop System for Network

ADM, is an multiplexing device that provides a network interface between different signals. General ADM node can be expressed with four-port models, including the three basic functions: the wavelength required under the road channel, multiplexed signal into the road, so that other wavelengths are not affected as much as possible through the channel. ADM specific work process is as follows: from the line to the WDM signal contains N-wavelength channels into the fiber end of the ADM, according to business needs, from the N wavelength channels, selectively output from the requirements under the Road side drop The wavelength channel, the corresponding input from the road-side add the

required wavelength channel. Other local independent wavelength channels directly through the ADM, and wavelength channel multiplex the road together, the line is output from the ADM of optical fiber end. A simple add-drop system for network can be seen in Fig. 3.1.

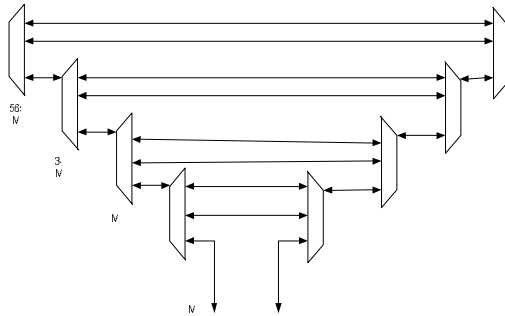


Figure 3.1: Add-drop system

In optical network nodes, there is an important device called switching matrix structure, also known as crossbar switch. Since the development of high-speed integrated circuits, this is easy to build high-speed network switching fabric and switching module. In optical networks, data switching is an important step. For an optical network, the network contains many nodes, each node has a switching function. In the switching of full matrix switch system, when the matrix structure is carried out, each module is connected to other modules to form a full mesh backplane. Each module has its own set of cable and thus do not have to set the central switching array. To an optical network, the structure of node for network can be seen in Fig.3.2.

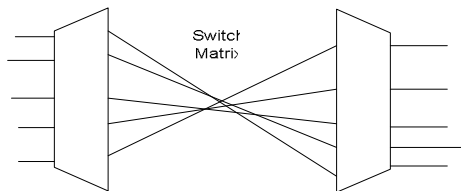


Figure. 3.2. The structure of node for network

4 New Routing Design Method

IP network routing is done by the routing device. Routers work through the implementation of certain

routing protocols. IP datagram is for the purpose of finding a host or network to reach the best route, and forward the datagram to achieve routing. Routing Protocol (Routing Protocol), such protocol is to use certain destination routing algorithm to find the best path to the host or network, such as RIP (Routing Information Protocol) and so on. IP protocol is to forward the data according to the route. Router routing in two ways: directly connected routes and non-directly connected routes. Routers are directly connected to the network interface between networks to communicate directly to connect routes. Directly connected routes configured the router in the network interface IP address automatically generated, so if no special restrictions on these interfaces, these interfaces are directly connected to the networks, and they can communicate directly. Interconnection by two or more routers use the network for communication between non-directly connected routes. Non-direct route is manually configured with static routes or dynamic routing protocols by running dynamic routing obtained.

Static routing is security more than dynamic routing. Static routing is that the network administrator needs manually to update the routing table. When the network topology changes or increases and decreases, and so on, the router, the network administrator needs to manually update the router's routing table, otherwise it will affect network communications. However, the static route compared with the dynamic routing, the biggest drawback is the need for network administrators to manually update the routing table, regardless of any corporate change in the network. This work is for network administrators, and it is a work of very large workload. Static routing works like this, when a host application needs in the different networks to send packets to the destination, the router receiving data from an interface.

Network layer will check the packet to determine the network is expected to send, and then

the router checks its routing table, and use the routing table information to determine the port is expected to be sent. Router again datagram encapsulated by certain rules, and then forwards the packet out of a port. Link-state data cannot be maintained on such destinations and/or networks just because they are outside the OSPF network as shown in Fig. 4.1. Therefore, they cannot appear as branches in the shortest-path tree. The number of areas an OSPF network can support is limited by the size of its Area ID field. Figure 4.1 illustrates a fairly simple OSPF network with just three areas, numbered 0, 1, and 2.

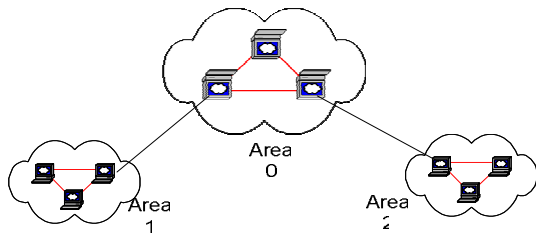


Figure 4.1. OSPF network with just three areas

5 Network Switching and Wavelength Converter

Circuit switching technology, and its basic features is the use of connection-oriented approach, the two sides to communicate, they need to communicate both with a fixed bandwidth allocation of a communication circuit. In network, the wavelength converter (WC) is very important for network functions. The network node with wavelength converter (WC) is shown in Fig. 5.1.

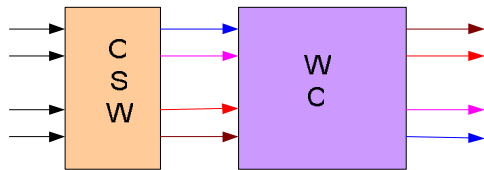


Figure. 5.1. Network node with WC

Packet switching technology is aimed at the characteristics of data traffic of a proposed exchange, and its basic feature is not connection-oriented approach using store and forward, it will need to transfer data in accordance with certain

length and it is divided into many small pieces of data. The WC will make the network be better performance. The components are configured into a network as shown in Fig. 5.2.

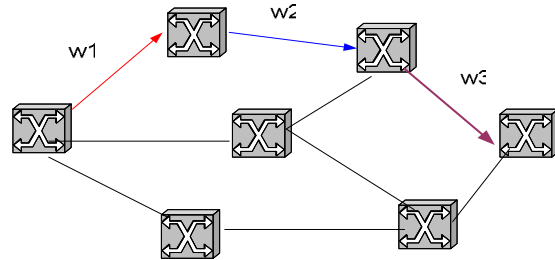


Figure. 5.2. Optical network with WC

6 Conclusion

In this paper, we analyzed WDM optical communication network structure, discussed the add-drop system and proposed a new routing selection method. Routing technology plays an important role in a optical communication network. We discussed the routing design and switching technology for WDM network in optical networks. Routing is the process of selecting paths in a network along which to send network traffic. A good routing selection method can make the network do better performance.

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