

A STUDY OF ARCHITECTURE FOR TWDM PON USING SOFTWARE DEFINED PEER TO PEER FILE SHARING

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Abstract - Global bandwidth consumer use peer to peer file sharing application for sharing file such as audio/video with the nearer user, reducing the bandwidth could result in less burden in the feeder fiber thus could save work time and bandwidth for P2P file sharing application uses passive optical network (PON) which provides a excellent environment. In this paper we proposed the P2P file sharing for intra traffic architecture in TWDM PON with software defined network reduce inter & intra traffic in the PON and which ISP and thus improving the quality of service the control plane and data can be implementing SDN with open flow protocol ,which allows ISP to have a flexible and centralized control of the P2P intra traffic .The Proposed architecture could result in the improvement of quality of service in terms of packet delay and drops percentage for different traffic

Key Words: P2P, TWDM PON

1. INTRODUCTION

File sharing between nearby user is through peer to peer .The P2P system is classified as structured and unstructured .The Peers are randomly connected to some subset in unstructured while the peer are connected in an organized way in structured which result in efficient file sharing. The large file can be accessed only through file sharing in the distributed system. There are two types of file sharing which are centralized file sharing and P2P file sharing.

The centralized file sharing uses file transfer protocol and file sync, while P2p file sharing uses napster, gnutella, and bit torrent. For a gigantic bandwidth in a single line fiber it uses optical network. Optical network are based on point to multi point fiber and passive network uses an optical splitter to facilitate a single fiber to serve multiple premises .Standard PON consists of a centralized optical line terminal, multiple optical network and one optical splitter. Optical line terminal connects multiple ONU's via Optical splitter .For downstream OLT will broadcast the datum packets to all ONU's. For upstream ONU will transmit the datum packets one by one based on time division multiple access, wavelength division multiple access. In TDM OLT will calculate the bandwidth and decide the slot time for each ONU to transmit the datum /Packets.

To decrease amount of the inter ISPs traffic by localizing the intra ISP traffic .it can be reduced by ONU mechanism includes patching and caching which could result in reduce resource consumption and add extra downstream

bandwidth at the OLT. In downstream intra ISP traffic is not necessary to be buffered. Software defined networking (SDN) increased agility enhanced security automation and lower capital expenditure & operating expenditure.SDN focus on separation of the control plane and data plane function of the network. The function of the control will make the decision how the data packet should flow through the network, maintain, control and program the data plane from central plan. The purpose of SDN is to have a centralized programming model in the network. Open flow protocol is used to adapt SDN mechanism into network which is based on an Ethernet switch, with internal flow tables and standardization interface to add and remove flow entries.

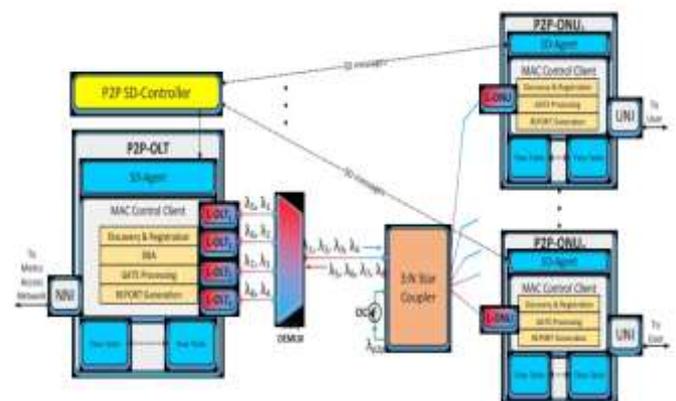


Fig -1: Software-defined P2P File Sharing for TWDM-PON system architecture.

2. REVIEW ON PROPOSED ARCHITECTURE

In the proposed architecture is based on TWDM PON which is P2P -OLT, P2PONUs, P2P SD controllers and 3: N star coupler. To save more bandwidth and less delay an P2P intra traffic communication is used between ONUs .The open flow tables controlled by the SD controller for secure communication.P2P SD controller sends a SD message to P2P-ONU's.P2P - OLT consists of the SD-agent flow table and MAC control client which contains the discovery & registration process, dynamic bandwidth allocation, gate processing and report generation.

2.1 SYSTEM ARCHITECTURE

P2P-OLT consists of the SD-agent, flow tables and MAC control client which contain the discovery & registration process, dynamic bandwidth allocation (DBA), gate

processing and report generation. Each P2P –ONU has the SD agent flow table and Mac control client. P2P SD controller manages the routing of the P2P intra traffic, 3: N star coupler consist of an optical of an optical circulator (OC) that broadcast the P2P traffic tuned at the wave length.

ONU’s architecture consist of the SD agent, flow table, routing table, user to network interface (UNI), queues for different traffic, transceiver and receiver.

2.1.1 SD Agent:

The SD agent is controlled by P2P SD controller, Which is communicated over a secure channel using the open flow protocol It is a originally defined communication protocol in SDN environment that enables the SDN controller to directly interact with the forwarding planes of network devices Therefore the function of SD agent is to manage flow table by adding or removing the flow entries.

2.1.2 FLOW TABLE:

The function of flow table is to classify and separate the packet based on the transmission control protocol(TCP)user datagram protocol (UDP) source port, expedited forwarding (EF)traffic, assured forwarding(AF) traffic,P2P traffic and best effort (BE)traffic, each flow table entry contains of header fields, counters and actions.

to SD-agent, then the SD-agent will respond by sending back the OFPT_FEATURES_REPLY message. Furthermore, the SD-controller configures the SD-agent by using OFPT_SET_CONFIG_REQUEST message and SD-agent will reply OFPT_SET_CONFIG_REPLY message. Lastly, the SD-controller sends OFPT_FLOW_MOD message to SD-agent to modify flow tables.

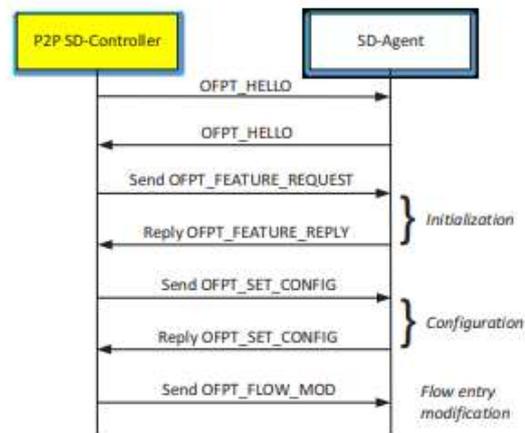


Fig – 2.2 : P2P SD-Controller operation

2.2 SYSTEM OPERATION

User network interface receives a request from user. Flow table separate the packet based on TOS inside the table controlled by the P2P SD-controller. The packet then will be separated in EF/AF/BE P2P queues. The DBA inside OLT will give an order to ONU's to send the EF/AF/BE packets every cycle and P2P packet will be sent one out of 10 cycles. Before P2P packet is sent the P2P SD controller will determine whether this packet destination is the same ONU or not, if in the same ONU then the packet will directly redirect back in same ONU, but if the destination in other ONU's P2P SD controller will order the ONU's and destination ONU to change the wavelength into λ_{p2p} .

3. CONCLUSION

In recent years, Peer-to-peer (P2P) application has gained so much popularity that gave so much force for Internet Service Provider (ISPs) and internet backbone. This paper has proposed a new architecture and new resource allocation scheme to guarantee the quality of services (QoS) in intra-PON traffic. Our proposed DBA and SDN-Controller can handle and enhance the required bandwidth for P2P service. We try to raise the system performance of the P2P file-sharing application without consuming more resources. Moreover, our proposed architectures can be further implemented to handle other P2P applications, such as P2P VoD, P2P IPTV, P2P Live-Streaming, for our future works.

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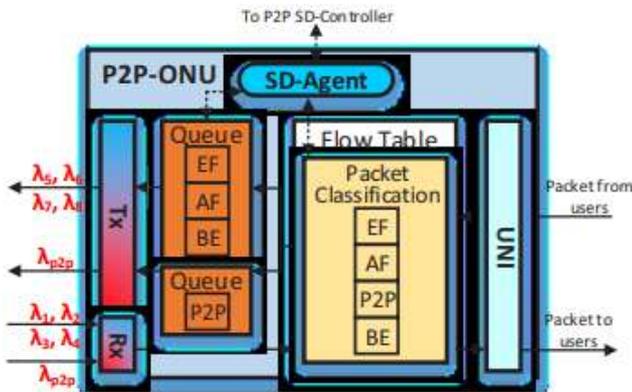


Fig - 2: Detailed P2P-ONU structure

2.1.3 Communication operation between SD-controller and SD-agent:

The secure channel is the interface for communication between the P2P SD-controller and SD-agent in ONU's. Through this interface, the P2P SD-controller can manage the SD-agent, receives and sends the SD-message to modify, adds or removes the flow tables. The detail communication operation after the first connection is established, both of P2P SD-controller and SD-agent should send an OFPT_HELLO message to each other; next for the initialization between controller and agent is that the SD-controller will send the OFPT_FEATURES_REQUEST message

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