

A Survey on Dynamic Bandwidth Allocation Algorithm for Fiber Wireless Network

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ABSTRACT: Fiber Wireless (FiWi) gives an answer that joins gigabit latent optical system and Wi-Fi to give immense limit and additionally versatility support. To deal with the transmission capacity in FiWi, a dynamic transmission capacity distribution is proposed in this paper where it utilizes time division different access at the optical part also, Carrier Sense Multiple Access with Collision Avoidance at the remote part. Two strategies are utilized for the calculation, one utilizing status reporting and the other is utilizing non status reporting. It demonstrates that both calculations have their own preference and detriment. The distinctions were observed to be negligible however. For the status reporting, it has 4.6% higher data transfer capacity usage than non-status reporting and non-status reporting has 5.24% lower delay contrasted with status reporting.

KEYWORDS: Fiber Wireless, Carrier Sense Multiple Access, Collision Avoidance

I. INTRODUCTION

Wireless communication is the exchange of data or power between at least two focuses that are not associated by an electrical channel. The most widely recognized remote advancements utilize radio waves. With radio waves separations can be short, for example, a couple meters for television[clarification needed] or to the extent thousands or even a huge number of kilometers for profound space radio interchanges. It envelops different sorts of settled, versatile, and convenient applications, including two-way radios, cell phones, personal digital assistants (PDAs), and remote systems administration. Different cases of uses of radio remote innovation incorporate GPS units, carport entryway openers, remote PC mice, consoles and headsets, earphones, radio recipients, satellite TV, communicate TV and cordless phones. Passive optical networks (PONs) are presently being conveyed in extensive numbers worldwide and will assume an inexorably vital part in future broadband get to systems. PON was developed at British Telecom in the late 1980s. The first idea was to utilize time division multiplexing to isolate the accessible connection transmission capacity over numerous supporters. The fiber arrange between the focal office gear and the client's hardware would be completely inactive. This was firmly spurred at the time by the moderately high cost of lasers (costing admirably over US\$1000 around then) and the low rate of clients data transmission (communication was the primary application). For this reason, an extraordinary measure of research was started to study PONs. PONs has been viewed as an essential piece of numerous Fibers to the Home (FTTH) procedures. Basically, PONs is appealing on the grounds that they manage on filaments driving from the focal office out to serve the groups and lessen the quantity of optoelectronics at the focal office, bringing immediate and aberrant investment funds. Be that as it may, a long time has slipped by since the first advancement of PON until the substantial arrangements happening today. There are both specialized and monetary explanations behind this. Latent optical systems are monetarily alluring on the grounds that few clients can share basic assets. Regularly, upto 64 clients can share a PON port on an OLT.

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II. MOTIVATION

In past decade there is an immense improvement in the field of broadband get to network and advancements due to ceaselessly increment in number of clients towards web office which can gives a superior stage to clients to get to web in at whatever time anyplace adaptable way. The broadband administrations fundamentally require a higher data transmission, better adaptability with lower cost get to network to clients. As of late, Fi-Wi innovation itself is demonstrating a primary apparatus in the field of media transmission by its own particular merits over existing innovations. The current innovation like Passive Optical Organize (PON) offers better data transfer capacity and soundness however at high cost because of expensive optical gadgets. One more promising innovation is Wireless Mesh network (WMN) which gives administrations at lower cost with adaptability however having constrained data transmission because of channel interferences. So, Efforts are put to join the benefits of existing advancements propose new innovation named as "Fi-Wi" which giving better speed as we are drawing closer towards 4G and 5G correspondence level. Fi-Wi supports a lot of information rate (Up to the request of Gbps) so any sort of disappointment in system causes an immense measure of information misfortune i.e. Henceforth, survivability is significant worry in Fi-Wi organize on the grounds that it is characterized as capacity of system to proceed with its administrations after a disappointment. For the most part disappointment happens in back-end of the system i.e. in optical organize side more than the front end (remote system) in the system. Because wireless front end has the self healing property due to its mesh topology which helps it to reroute its traffic on a failure but optical back end has tree topology which having a more probability of getting failure.

III. OBJECTIVES

High utilization is one of the design goals for MPCP-based dynamic bandwidth allocation (DBA) algorithms in GiGabit passive optical networks (EPON). However, utilization is sacrificed in order to meet the delay limits of the applications in most DBA design schemes. This paper proposes a dynamic bandwidth allocation algorithm based on sorting report messages with additive-polling thresholds (AP-Sort DBA). This has the characteristics of high utilization and low delay during medium network loading. AP-Sort DBA is an extension of the adaptive dynamic bandwidth allocation algorithm with sorting report messages (Sort-DBA) and promotes utilization by reduction of unused slot remainders (USR) and distribution of excess bandwidth. For performance evaluation in terms of average delay, average queue size, loss rate and utilization, five DBA schemes are simulated, namely AP-Sort DBA, interleaved polling with adaptive cycle time (IPACT), dynamic bandwidth allocation. Our focus is how the wireless upstream traffic based on CluLoR going into the optical access network performs when conventional wired traffic is included in the optical network. We evaluate the delay performance for different practical scenarios and examine the underloading and overloading of the wireless and wired traffic respectively on FiWi networks. Our evaluations indicate that the performance impact of DBA algorithms depends on the source of the traffic and we provide comparisons in this project.

IV LITERATURE SURVEY

In literature, the problem and the previous techniques of Fiber Wireless is described

N. Kumar ET.AL Gigabit passive optical networks (GPON) give a limit supports in both the total bandwidth and bandwidth efficiency using bigger variable-length packets in Passive Optical Networks innovation. They have depicted an absolutely detached GPON perfect reach extender utilizing disseminated Raman enhancement and announced the enhanced examination through execution of a square root module by a separation of 60 km at information rate of 2.5 Gbps. An effective change in Q element is accomplished with square root module, which additionally helps in expanding the length of GPON.[1]

T. Tsagklaset.al [2] Proposes the brief description of the FIWI network. The system frameworks change the future applications of the system. With transmission capacity i.e. bandwidth request being expanded exponentially and with

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customers inquiring for consistent availability regardless of where they are it is clear that get to systems should be upgraded with colossal abilities that were not required before. Both optical and remote advances were developed all through the most recent decades as far as data transmission limit and QoS support of customers. Tens or even several Gb/s in expansive separations of a few Kilometers were accomplished with the utilization of optical filaments while broadband administrations have vanquished moreover the remote market space. However both advances exhibit inconveniences which dissuade them from being considered as the last answer for future system frameworks. Then again, FiWi systems involve another rising innovation that joins the upsides of both optical and remote systems. A few optical and remote innovations can be coordinated under different structures in request to give high broadband openness to both settled and versatile customers since the colossal limit of optical filaments can be joined with the adaptability that remote systems offer. One such approach is the idea of Radio-and-Fiber FiWi arranges in which optical and remote innovations, as PONs, AONs, WiMAX, and so forth are being coordinated either in equipment or programming prompting to new half breed arrange designs.[2]

The paper proposes the brief description of the gigabyte i.e. the scope of the GPON systems are characterized, in general, by an Optical Line Termination (OLT) system and an Optical Network Unit (ONU) or Optical Network Termination (ONT) with a passive Optical Distribution Network (ODN) interconnecting them. There is, in general, a one-to-many relationship between the OLT and the ONU/ONTs respectively.[3]

G. Kalfas et.al [4] They have presented the idea of medium transparency in MAC protocols for 60 GHz RoF systems showing a MT-MAC convention that is able to do progressively assigning both optical and remote limit and assets. Medium-straight forwardness depends on two parallel running dispute periods with settled dataframe structures requiring wavelength selectivity works just at the RAU site, permitting along these lines for similarity with totally detached system usage and for telecom administrator straightforward fiber-organize foundations. They have exhibited broad execution assessment comes about for transport and PON models of RoF system topologies, both for Poisson and for burst-mode activity at bit-rates up to 3 Gb/s, affirming in all cases the upgraded capability of our convention to effectively adjust to the system topology while giving broadband 60 GHz LAN usefulness.[4]

In this article, they introduce interestingly a Medium Transparent Access Control Protocol that arbitrates traffic channeled through both optical and remote media being fit for serving different RAUs and various remote clients dispensing just a predetermined number of wavelength assets. Our plan depends on a organize engineering that utilizes tun able wavelength filtering RAU designs and remote uplink and downlink channel era. They exhibit simulation based execution examination uncovering that our plan can give high throughput and little postpone values for numerous remote clients dispersed over the system notwithstanding when a predetermined number of wavelengths is accessible.[5]

In this review they discussed and evaluate the assess plan issues that must be managed in a PON get to arrange. In particular, to drive the cost of an get to arrange down, it is essential to have a proficient adaptable arrangement. They accept that a PON in view of surveying and with information epitomized in Ethernet outlines has exceptionally attractive qualities, for example, utilization of a solitary downstream what's more, a solitary upstream wavelength, and the capacity to arrangement a fragmentary wavelength ability to every client. They display a basic algorithm for element data transmission distribution in light of an interleaved surveying plan with a versatile process duration. They propose a novel approach for an in-band flagging that permits utilization of a solitary wavelength for both downstream information and Grant transmission. Likewise, they demonstrated this way to deal with be adaptable with the quantity of ONUs in the framework. Since each ONU utilizes the window measure required right now, the surveying process duration adjusts to the immediate line loads, driving to a versatile process duration. This is the essential thought behind the reasonable unused transmission capacity redistribution: lessened process duration prompts to an expansion in the measure of best-exertion transmission capacity accessible to occupied ONUs. This expansion is corresponding to their transmission capacity needs.[6][7]

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This paper gives the brief idea about the GPON and basic architecture of the GPON. GPON recognized the need to develop PON to Gigabit capable solution for transporting Ethernet and IP traffic. GPON is the most developed PON convention in the commercial center today. it offers far higher proficiency when contrast with ATM and Ethernet based PON advancements. GPON give the more drawn out transmission and higher transfer speed. GPON is indicate multipoint instrument and is one of the best decisions for the broadband get to organize. The GPON speed is more than other PON standards[8]

V. PROPOSED SYSTEM

In this paper, we simulate a network with a combination of wired and wireless traffic in FiWi Network, introduce a DBA space and qualitatively analyze it, which to the best of our knowledge, have not been extensively analyzed before in literature. An interesting practical application is the Cloud mobile host implementation, where we have multiple mobile hosts accessing data from Cloud servers. Cloud server are examples of heavily loaded wired networks, and mobile hosts are wireless nodes connected to the gateway at their average data rate. We also analyze the delay performance of different DBAs and propose the usefulness of each DBA for specific scenarios that are of practical importance we introduce dynamic bandwidth allocation (DBAs) for the fiber network and the importance of it when used with wireless network. We introduce a DBA space for the FiWi networks which combines different combination of grant transmission of the fiber network with that of the wireless network. The wired network follows the MPCP protocol (Multi-Point Control Protocol) in a time-sharing basis in the upstream direction and broadcast protocol in the downstream direction as used in IEEE 802.3ah.

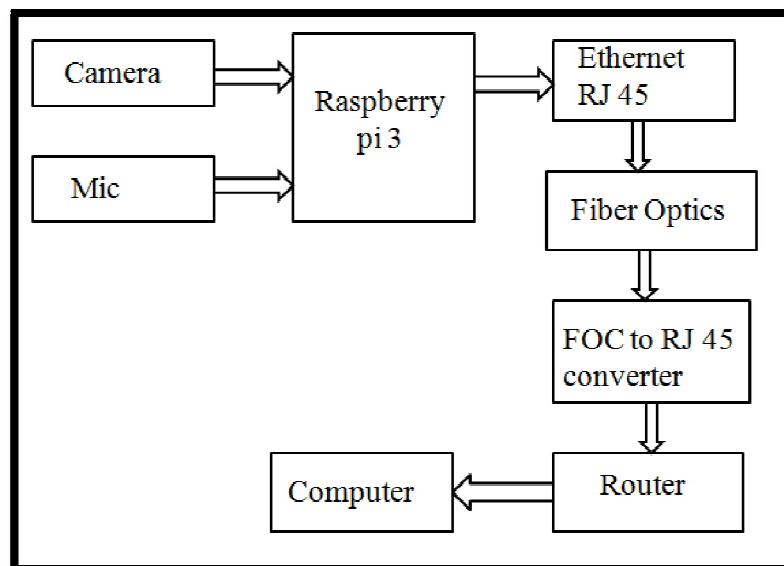


Fig: System Architecture

The MPCP protocol requires REPORT messages to be sent from the ONU to the OLT, with the information of the packets in the queue at the ONU, corresponding to which a GRANT message is sent to the ONU granting the necessary bandwidth to send the queued packets based on specific DBAs . The ONU and Gateway follow a point-to-point (P2P) protocol, and have a duplex mode transmission, thus upstream and downstream transmissions do not collide. The wireless network follows a two-head Cluster Head transmission. The Raspberry Pi is a series of small single-board computers. Which is used for the execute the programs on the board the camera and the mic is the input data given to the raspberry pie board the rj 45 ethernet is used RJ45 plugs highlight eight (8) pins to which the wire strands of a link

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interface electrically. Each plug has eight areas (positions), dispersed around 1mm separated, into which singular wires are embedded utilizing special cable crimping tools. The industry calls this sort of connector 8P8. Then the converter is used to convert the data FOC then the signal i.e. the output is displays on the computer

VI. CONCLUSION

In this paper, we proposed a multi-OLT PON structure for both FTTH terminals and WSN. A modified interleaved polling algorithm and scheduling algorithm of a control message were also proposed. From the computer simulation results, evaluating average packet delay, it is found that the proposed structure can reduce the end-to-end latency about 0.1ms up to the offered load of 0.6 while 0.2ms at offered load of 1.0 for both uniform and non-uniform traffic loads. Moreover, the multi-OLT PON can accommodate 5% more traffic load than the single-OLT PON without suffering from congestion. Therefore, it can be mentioned that the multi-OLT PON can effectively connects CHs of large WSN to make a converged network with FTTH terminals of a u-City with latency efficiency. The analysis performed in this study using the existing FS and LS bandwidth allocation schemes for both uniform and non-uniform traffic conditions proves the validity of the proposed multi-OLT PON structure. Moreover, the proposed multi-OLT PON structure with modified interleaved polling algorithm also outperforms other existing single-OLT polling algorithms in term of throughput for nonuniform traffic load with LS scheme. Furthermore, it is found that the convergence of FTTH and WSN in a multi-OLT PON is an efficient approach in that it provides cost effective solution than using two separate PONs, less packet delay, improved bandwidth Carriers can increase revenues by providing oversubscription, and can improve customer satisfaction by providing low latency PON. The quality of the DBA used is proportionately translated to increased carrier revenues. The only way to achieve both oversubscription and low latency PON is by implementing a DBA algorithm. A DBA algorithm minimizes latency, improves utilization and should respond quickly to the changing traffic patterns. The DBA algorithm should be SR-based, to make the best gains possible. When implementing SR-DBA in the GPON upstream channel, the operator can oversubscribe and provide 5 Gbps and beyond of allocated upstream bandwidth by leveraging the traffic burstiness. Through statistic multiplexing and ONT reports, latency is reduced by as much as 90%.

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