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Bandwidth Management in Router for DHCP Protocol, Review for the Best One

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ABSTRACT

Bandwidth Management with Static IP is much easier than DHCP Protocol. In DHCP, the IP changes when the main system is powered on every time and the Bandwidth associated with the previous IP also changes. This paper describes the problems and techniques and tries to solve the Bandwidth distribution process during the system is in DHCP and justify the two articles "BANDWIDTH MANAGEMENT IN ROUTER FOR DHCP PROTOCOL" and "ALLOCATION OF BANDWIDTH IN DHCP PROTOCOL".

Keywords

Bandwidth, DHCP, IP, Router, Switch, Wi-Fi, Management, Network.

Introduction

The terms "bandwidth" and "data rate" are frequently used interchangeably in the field of telecommunications, which can make things somewhat unclear at times. Every connection to a network has a *data rate*, which is the speed at which bits are sent from one node to another, and a *bandwidth,* which is the maximum amount of bits that a link may send or receive in one second. Both of these rates are measured in bits per second [1]. In a easier way Bandwidth is represented in the number of bits, kilobits, megabits, or gigabits that can be transmitted in one second [2]. Network management is a broad range of functions including activities, procedures, and the use of tools to administrate and reliably maintain computer network systems [3]. Strictly speaking, network Management does not include terminal equipment (PCs, workstations, printers, etc.). Rather, it concerns the reliability, efficiency, and capacity of data transfer channels [4].

Now we are taking a look at Bandwidth management in various Routers to PC ports in network management and solve the way in which they can go to solve the technological allegation to a non-Wi-Fi Router about their functional limitations in DHCP Protocol. In computer networks where IPs are assigned in a Static (IPV4) way, in there bandwidth management can be done in a good way but IP conflict arises when two pc have the same IP. But to avoid IP conflict when the network is in DHCP protocol where IP is assigned to hosts in a random way, then Bandwidth for a specific IP cannot be done properly [5]. This Paper will try to solve this kind of problem in a way that is required to be implemented technically in lab first and then needs to go ahead for future developments about this technique.

Management of Bandwidth

Consequently, as stated earlier the term Bandwidth is often incorrectly used to describe the amount of data within a prescribed period of time transferred or from the website or server. Bandwidth consumption is accumulated over a month and is measured in gigabytes [6]. For this meaning, the more accurate phrase used for a maximum amount of data transfer each month or given period is monthly data transfer [7,8]. Bandwidth management is done in present days only for IP to IP or for a block of IPs where bandwidth is divided by the same amount limit to all IPs (Figure 1).

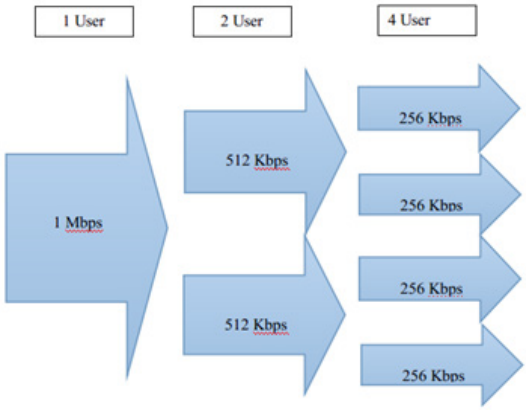


Figure 1: Bandwidth is distributed equally to all IPs or hosts normally.

Limitations of Bandwidth distribution: But when one server needs more bandwidth than the given limit, then it takes more bandwidth, and the equal distribution of bandwidth technique fails and some servers get less amount of bandwidth than the given allocated limit [9].

Bandwidth Management in Wired Router

Through the internet data sent, such as a web page or email, is in the form of data packets. Two or more data lines from different networks is connected by a router. When a data packet comes in on one of the lines, in the router reads the network address information in the packet to determine the ultimate destination of packet. Then using the information it directs the packet to the next network on its journey by using its routing table or routing policy, (Figure 2) [10,11].

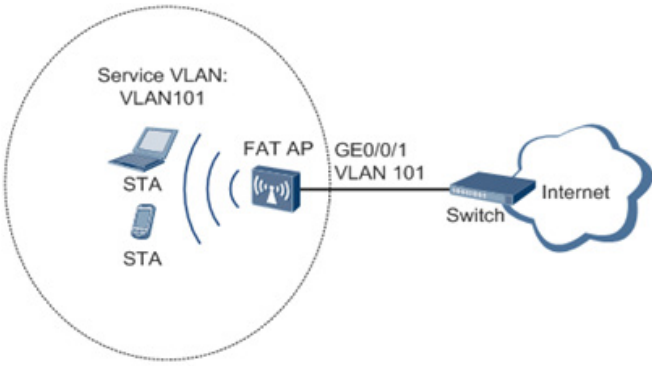


Figure 2: Bandwidth is distributed equally to all IPs or hosts normally by Wi-Fi router.

A. Non Wi-Fi Router or Wired Router may have interfaces for different types of physical layer connections, such as copper cables, optic fiber, etc. Each network interface is used to able data packets to be forwarded from one transmission system to another [12]. To connect two or more logical groups of computer devices known as subnets, routers may also be used for this, each with a different network prefix. Non-Wi-Fi routers may be used to provide connectivity within enterprises, between enterprises and the Internet, or between Internet service providers (ISPs') networks. In wired routers, all are managed Bandwidth by only Static IP [13,14].

B. If we use wired router to distribute Bandwidth we can also limit bandwidth to each MAC (Media Access control) address of servers, computers, storage etc. statically. But this paper not only discusses about to limit the bandwidth to each internet user's devices but also discusses the mechanism to hold the allocated bandwidth fixed to those devices.

Short Scenario of Router and Switch in a big Wired Network: Router used only with IP address. So router limits bandwidth by only IP addresses. MAC address is used with only by switch. So bandwidth limitation is done with only by MAC addresses [15,16]. When Bandwidth is troughed to a Router, it limits Bandwidth only on one IP address or a block of IP addresses separately which is connected to the Workstations via Hub or Switch (Figure 3), (Figure 4).

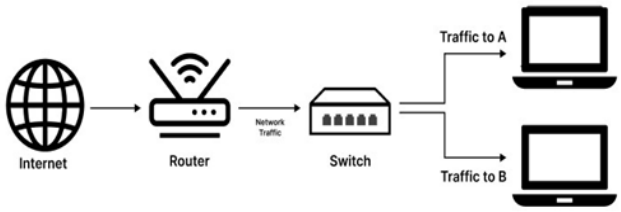


Figure 3: Position of Router and Switch in a Network.

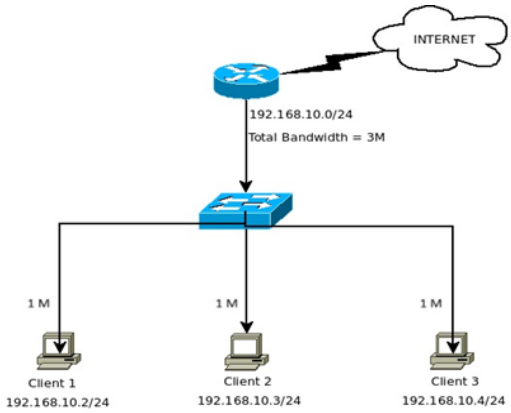


Figure 4: ISPs Bandwidth is distributed to all clients with the same limit.

Non Wi-Fi Microtic Router works on IPs & also in some cases on MAC Addresses, Non Wi-Fi Cisco Router limits Bandwidth from IP to IP & often limits Bandwidth for a block of IP addresses [17], Non Wi-Fi Juniper also does the same & able to limit Bandwidth for a block of IP addresses and this time uses Switches as using Multicast protocol [18], Non Wi-Fi Palo Alto does work same as Juniper [19,20]. Non Wi-Fi Fortinet is same as Palo Alto also. All are for Static IP addresses [21]. Here we find two designs, Bandwidth management for IP to IP (Figure 5), and Bandwidth management for same class block of IP addresses (Figure 6).

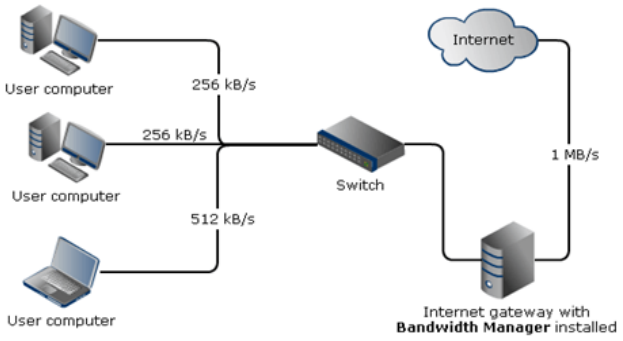


Figure 5: Bandwidth management for Router's IP to devices for the same class of IPs.

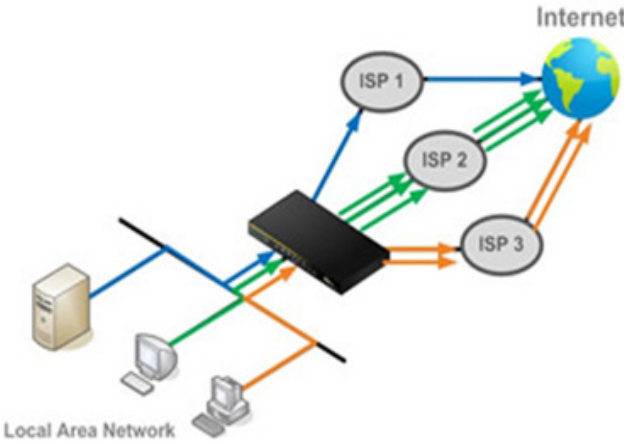


Figure 6: Bandwidth management for a block of same IP addresses equally by a Router.

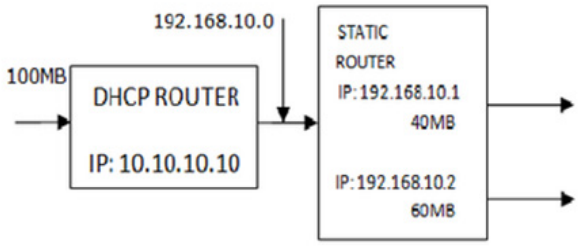
Limitation in DHCP Protocol

Client/Server protocol is a Dynamic Host Configuration Protocol (DHCP) that automatically provides an Internet Protocol (IP) to a host [22]. This means that a new computer can be added to a network without the hassle of manually assigning it a unique IP address or the existing network gets an IP address automatically when it is powered on. Many ISP use dynamic IP addressing for Internet subscribers. Bandwidth management Problem arises when IP distributions are on DHCP protocol where IP changes randomly when workstations are powered on every time and it changes bandwidth in the same way as IPs, in an unmanageable way [23]. In DHCP no Ip cannot retains allocated bandwidth as like as in the same way they were allocated firstly [24].

Solve

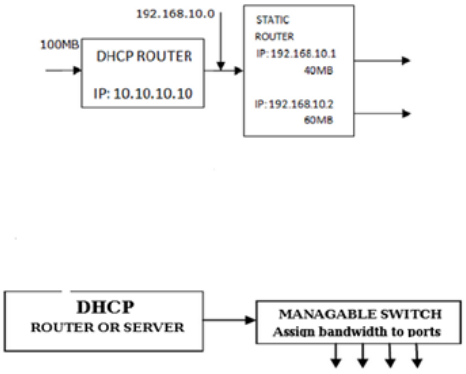
1. **In "Bandwidth management in router for DHCP protocol" paper:**

Here proposed two Routers, situated one after another, One DHCP router and another Static router. Consequently, the outcome of these two routers is nothing but similar to static IPs, where each Ip is bound with bandwidth. Look at the (Figure 7). Though Routers operate on Ips, so it seems logical, but costly and experimentally very hard to implement.



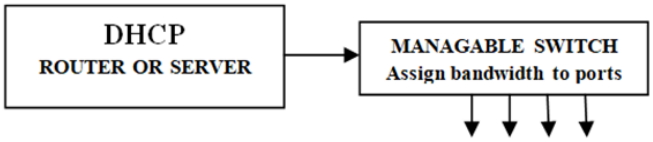
2. In "**Allocation of bandwidth in DHCP Protocol"** paper:

In this paper a new way to manage bandwidth is proposed (Figure 8) by keeping the previous one (Figure 7) both.



Now We Justify the Best One

Bandwidth management for **DHCP** Protocol- It needs a manageable Switch for binding MAC addresses with Bandwidth segments of each device on it ports.



In (Figure 9) 1st, DHCP Protocol Router takes all the real IPs and Bandwidth with it. Devices are connect to Switch ports. The Router gives different IPs to each time to each port when it powered on. The Switch binds device's MAC address with Bandwidth segments. So it seems if it changes IP of one port of Switch, it will come out from another port with the same Bandwidth and MAC address of the intended device. But really it cannot change port because each port is connected with the same device all time and connected with it's MAC address also. No matter if to change IP, bandwidth is binding with MAC address. This work is done in manageable Switch. Though we have discussed above that Router operates on IPs and Switch operates on MAC addresses. So the technique is absolutely justified.

Conclusion

In big business areas, DHCP protocol has much more difficulty for IP conflict issues but also has the advantage in adding devices

without giving it any IP. Bandwidth management in static Routers and in static switches is much easier than DHCP. However, we have to resolve the issue of bandwidth management in the DHCP protocol. In this regard, this paper justifies the distribution of Bandwidth management in routers in a concise and precise way as compared with the previously published two Papers.

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