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IMPROVING THE REQUIREMENTS BASED BANDWIDTH ALLOCATION IN 5G POINT TO POINT NETWORKS

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Abstract

In General, the 5G is a fifth-generation technology that works at speeds of 4G to 100 times the network speed. The main objective of introducing modern information technologies is to facilitate and facilitate access to public services. The use of new technologies is a key factor in improving the overall structure of public administration and increasing its efficiency. In addition, it is important to improve the infrastructure of all types of communications. The telecom operators are often willing to invest more in infrastructure development. In this paper, a new model was proposed to enhance the bandwidth allocation and utilization. It is a requirements-based network that allows the users to increase the speed of wireless networks. This proposed method also increases the amount of data that can be transmitted over wireless networks.

Keywords:

5G, Telecom Operators, Bandwidth, Wireless Networks

1. INTRODUCTION

In recent years, Smartphone makers have been waiting to expand the market, telecommunications companies to attract customers, and governments to improve the security of cities, especially users of high-speed Internet speeds. 5G is the Internet technology based on the fifth-generation mobile phone [1]. It is assumed that it will have download and upload speeds many times faster than the previous fourth generation technology called 4G. Before we get into the internet speeds in 5G technology, let us know about the average 4G speeds [2]. Although specific bandwidth, quality, and average speeds are set for 4G technology worldwide, there are still significant differences in Internet speeds between each country [3].

In that sense, 4G LTE users in Singapore have the highest speed of 44 Mbps on average in the world and 9.31 Mbps in India on average, according to Open Signal, an international wireless internet speed research firm [4]. Technology advances from 1G to 4G have introduced many changes in our lives, from ordinary wireless voice calls to high-speed internet usage. In that sense, technologists believe that 5G technology will bring about unprecedented change not only in smart phone use but in all other fields [5].

For example, with the introduction of 5G technology in vehicles, all vehicles traveling on a particular road can exchange information with each other to avoid accidents and fuel wastage [6]. In addition, the Internet of Things uses technologies including artificial intelligence and machine learning to inject precision into a variety of topics, including urban security, energy conservation, environmental management, and disaster management [7]. In addition, it facilitates the use of sports and entertainment-based live shows, movies, and processors that focus on technologies such as virtual reality and augmented reality [8].

Network administrators can use bandwidth analyzers and monitors to diagnose and fix network performance issues. These tools can be used to assess reaction time and other characteristics, comprehend network device relationships, and monitor bandwidth performance and traffic on the network. With the help of these technologies, IT professionals can do a lot more than just be network resources for bandwidth hogs and personal apps and services.

Network performance can be displayed in real time using graphical user interfaces (GUIs), which are available for some of the most popular technologies. The ability to display network activity in real time is one of the most essential features of these systems and it is one of the most important features of these systems. This is important for network managers who need to be able to see changes in traffic patterns or network intrusions in real time. Most of these tools are built into Windows, and they can show how much CPU is being used at any given time.

Managers will be able to see the flow of the network and the changes that occur on a real-time basis as a result, allowing them to create dynamic techniques for increasing the network performance. With these kinds of systems [14], it is possible to see long-term trends or other variables such as device performance and status by utilising various types of alerts and reports.

Through close analysis of the network managers identify bandwidth, search for IP addresses, devices or applications that may use more than a fair share of bandwidth in the network. There are various ways to do this [15]. Administrators can use the features of a wireless router to see which devices and processes use the bandwidth. The firewall can also provide detailed information about the bandwidth usage in the network. In general, the best way to find bandwidth pigs is to explore real-time use with visual dashboards. The new third-party bandwidth monitoring tools provide these types of display dashboards, which make the IP address and device usage transparent, and show real-time view of the bandwidth application to administrators.

This makes it easier to locate bandwidth pigs and manage the network. The Net-flow Collector is a specific area of Net-Flow functionality that allows administrators to collect IP network traffic and see where the traffic is coming from when moving through the network configuration [16]. This collector is often connected to a net-flow exporter, which exports data in the direction of the collector data collection. Net-flow collectors are devices that network administrators can use to identify the source and destination of traffic in specific areas of a network by collecting data from it.

Analyzing network congestion or interruptions can be accomplished through the use of various approaches to learn more about certain types of network traffic, such as the service class or purpose of a single data transmission from a specific source. [17]. Administrators often use a Net-flow collector to look up information after the Net-flow exporter has collected it from a lot of different sources.

A number of approaches exist for network administrators to increase the performance of their servers. However, many of these solutions are incompatible with several fundamental principles about how servers operate on a network. The majority of the time, administrators check servers to determine how well they handle various types of information requests from users. To ensure that the tracking software is genuinely tracking the end users, it is necessary to carry out this procedure in a precise manner. Administrators can view in real time how long it takes a request to be completed, what results are returned to external users, and how the network handles load by identifying whether servers are running and responding to requests.

Administrators can determine how quickly servers respond by doing a simple ping test. User testing can be carried out in-depth in order to reproduce user inquiries, and they can also investigate numerous server ports at the same time. A customer-oriented context makes it possible for individual website users to determine whether they can access sites without receiving error messages from the database. In this section, we will look at some real-world instances of how server tracking can help networks deliver on their commitments to their users. Improving the important data of this paper is seen as important in this space to improve its various features considering the features such as classifying its functions.

2. LITERATURE REVIEW

Lagkas et al. [2] introduced a Spectral Resource Optimization technique for classified the primary and secondary user management in 5G communication network environment. In that the primary users of a network getting higher priority compare then the secondary users. Because the primary users have license to use the bandwidth band and the secondary users are utilize the bandwidth band in the random time manor. So the primary users are getting more priority level.

Yuan Ai et al. [3] provided a smart mechanism of Joint resource allocation. Here the radio resource of the network can allocate both the primary and secondary users without any connection lost. So, the user groups (both primary and secondary users) are unable to suffer the resource utilization problem. Then the authors include here an admission control technique to the user groups. This controls the secondary user occupancy of the bandwidth.

Khumalo et al. [4] proposed a Reinforcement Learning-based Computation Resource Allocation technique to separate the specific resources to the user group of a network. There the primary user attributes are registered, and the secondary user group attributes are not registered. So, the entry of primary users can register in a sequential manner and the entries of secondary users are in random manner.

Y. Wang et al [7] analysed the traffic issues between the user groups of the network. The conjugation occurs when the primary users and secondary users are tried to come the network at the same time. At that time, more emphasis will be placed on the primary users and they will be allowed to enter. Meanwhile, the secondary user will then have to wait. As the waiting time were increases, then the chances of exiting the network increase.

L.Huang et al [9] provided an energy efficient approach between the primary and secondary users. If the bandwidth allocation was increased, then the bandwidth utilization automatically increased. In a cut-off range, the number of secondary users utilized more energy of the network shows the inefficiency of the network. Because the primary users are utilize very low energy

Yang C et al. [10] Recommended improved bandwidth sharing methods. That is, the unused empty bandwidth is calculated first. And based on that calculation they are given that space on the primary basis which is on the waiting list of the secondary user.

Matinmikko M et al [12] calculated the disturbances in shared bandwidth systems. Based on that, they identified the primary users who have the appropriate license to use that bandwidth. After classifying them they were assured that bandwidth would be allocated to them by that license.

Jorswieck et al [13] calculated that distributed bandwidth applications would increase the usability and usability of that cellular network. Bandwidth allocation was calculated there based on these calculation methods.

N. Michelusi et al [14] classified a sensing method that helps to calculate vacancies in the bandwidth. Morning spots on that particular wavelength were calculated based on its analysis results. So while it was being calculated whether the primary user was constantly there or not, it was found that the series of interruptions of the second user could also is a nuisance to them.

Ai Z et al. [15] were constantly monitored Users' devices. They calculated and analyzed important data such as the power their devices consume when using the bandwidth. Based on these results it is easy to calculate how much power is required by which device is used. It was calculated the bandwidth leasing method. This means that the space will be temporarily reserved for the secondary user in the absence of the primary user. Secondary users will be charged for using it. Thus the benefit to companies is high. But this leasing method will vary depending on the inconvenience to the secondary user when the primary user enters and the extent to which they are prepared for changes in the switching mode. That is, the bandwidth is allocated to them based on the interaction of the primary user and the interaction of the secondary user. Priority will be given to the first comer here. Others may need to be on the waiting list. Priority is given to communication here.

3. PROPOSED METHOD

The proposed Bandwidth Allocation Algorithm (BAA) is built on the following five bases which shown in Fig.(1), the frequency for this technology is usually between 3Gzh - 6Gzh frequency. This frequency is used to increase the range of existing electronic devices such as laptops, mobiles and tablets. However, as traffic in this system increases, its accessibility decreases, so scientists

expect to increase its frequency from 6Gzh to 24Gzh - 300Gzh, also known as high band or millimeter wave.

In an effort to increase bandwidth usage we need to ensure that the currently proposed algorithm works better. First the various commands receive its various commands as input. These inputs basically do different jobs for processing different information.

MM Wave: The millimeter wave receives a lot of data at once, which is capable of converting 1GB of data in seconds.

Speed Sales: The second base of 5G technology, the speed base, compensates for problems in the millimeter wave range.

Bim-forming: Bim-forming is a technique that keeps a monitor on all sources and can immediately switch to another speed tower if a signal is interrupted.

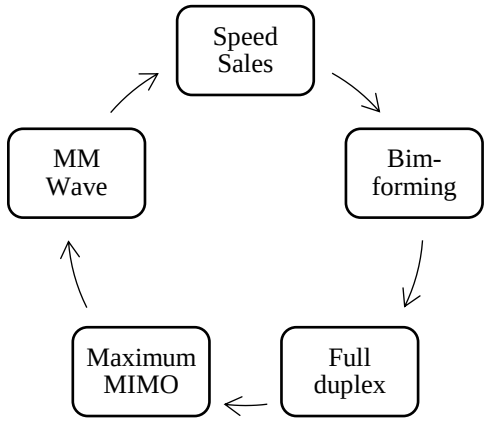

Fig.1. Proposed system design

Full duplex: The full duplex is capable of sending and receiving data simultaneously with the frequency band.

Maximum MIMO: Multiple input and multiple output is the fifth basis of this technology. With the help of this technology, it helps to maintain the speed capability of large cell towers by managing traffic.

Here bandwidth sense is done first. It then determines its needs by the diversified data that is in them based on its sensing data. Based on this resolution the required data is distributed to the various devices that are there. Once these things are done the remaining blocks are stored. This is basically the method below that works shown in Fig.2

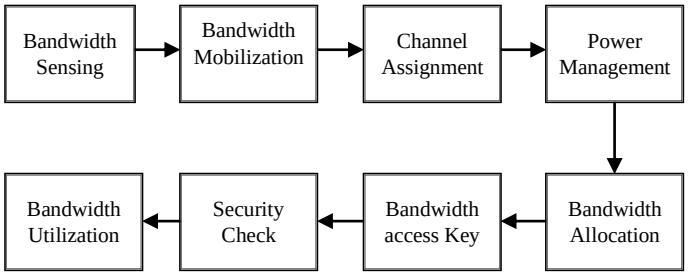

Fig.2. Bandwidth allocation block

The Bandwidth Analyzer, which is a piece of software, detects, collects, monitors, and analyses network bandwidth statistics and measurements, among other things. System administrators use this programme to keep track of how much bandwidth a certain network consumes on the Internet or on a larger network in order to determine how much bandwidth a particular network consumes. It is also referred to as a bandwidth monitor or an analyzer in some circles. The Bandwidth Analyzer is part of the network management software package.

Algorithm 1: Bandwidth Allocation Algorithm (BAA)

1. Start
2. Initialize bandwidth sensing module
3. Check the available bandwidth details
4. IF (bandwidth = available)
5. Then check if (bandwidth hole = available)
6. Then send the details to leasing unit
7. Wait for leasing request
8. Assign the bandwidth for utilization
9. Else
10. Then send the details to licensing unit
11. Waiting for licensing request from PU
12. Provide the license to PU
13. End

This programme, which is normally installed or operating on the network, keeps track of the entry and exit points on the network. When it comes to bandwidth analysis, the major goal is to determine the amount of data that is being downloaded or moved while also calculating the total amount of bandwidth consumed. Using a high-level band analyzer, it is feasible to look into the minutiae of each network pocket performance and security data. The source and destination IP addresses of each packet, as well as the peak usage period and other parameters, are included in the report. The network administrator can be notified when a bandwidth limit has been reached, and the network administrator can receive information on the specifics of bandwidth usage for each particular programme, user, and computer on the network.

A Bandwidth Assignment Protocol (BAP) is a data connection protocol that is used to replace connections in a data connection network. This protocol provides responsibility for bandwidth control to specific parties. This protocol is meant to be used in the implementation of the router. Because they are tied to BAP, links in point-to-point (PPP) multilingual bundles can be added or removed at any point in time. This was used in conjunction with the PAB band allocation control mechanism (PACP). Because of the widespread use of multiple lines, BAP provides a breakthrough approach for bandwidth control among peers. The PAB and PACP are dynamic control mechanisms for the PPP multilingual protocol, which are used to communicate with other PPP clients.

Call control packets, as defined by the BAP, are used to monitor and maintain the networks that carry out communications. Point-to-point protocols are data connection protocols that connect two terminals together using a series cable, a telephone connection, or another mode of communication. BAP allows and encourages two peers to collaborate in order to manage bandwidth. The protocol is used to make decisions on how much bandwidth to reduce or increase. The BAP also specifies the parameters, packets, and negotiation procedures that must be used when two parties are negotiating bandwidth connections. The norms guide peer-to-peer negotiation, which is conducted in a fair and professional manner. In BAP, a link-drop inquiry request is referred to as a formal process when one party advises that another

partner remove their link. In contrast, Pierre is free to refuse any request made by a third party.

4. RESULTS AND DISCUSSION

The proposed Bandwidth Allocation Algorithm (BAA) is compared with the existing algorithms in terms of different performance metrics like blocking connectivity, dropping connectivity, and bandwidth utilization of the network. Each performance metric of the proposed algorithm is verified for its efficacy with the existing techniques such as a smart collaborative charging algorithm (SCCA), Dynamic Bandwidth leasing and service selection (DSLSS), Cooperative Bandwidth sharing Algorithm (CSSA) and a contract-based Bandwidth trading scheme (CSTS). The Network Simulator (NS-2) used for the simulation with the following parameters. A network simulator is used here to make various measurements based on the currently proposed data. Various methods based on its data have been proposed to ensure its quality.

Table.1. Simulation parameters

Parameter	Value
Simulation duration	5500 frames
Preamble duration	20ms
Detection Connectivity	0.8
Frame duration	140ms
Online Primary Users (PU)	15
No of secondary users (SU)	10
Max. Interference Ratio	2.87
Permission Connectivity	1.25

4.1 BANDWIDTH JAMMING

The bandwidth jamming is nothing but the bandwidth reservation of the primary users.

$$\text{Bandwidth Jamming} = \sum_{b=1}^{a} Be \quad (1)$$

where, B_e is the total number of users

The Fig.3 presents the analysis of Bandwidth jamming between existing SCCA, DSLSS, CSSA, CSTS and proposed BAA.

The Fig.3 depicts the Bandwidth jamming evaluation. When compared, existing method the proposed method achieves high blocking connectivity because the un primary users need user license. The proposed bandwidth allocation algorithm achieves 97% bandwidth blocking. if the device not having user license and device license then it was send under security check with network administrator.

4.2 BANDWIDTH DROPPING

The dropping bandwidth is the ratio between the unusable or dropped spectrum bands under a particular time, when the non-blocked user asking to use the bandwidth. In that time the administrator was refuse the request from the secondary user.

$Dx(t)$= (dropped spectrum band under time (x,t))/(nonblocked user arrivalsundertime(x,t)) (2)

The Fig.4 presents the analysis of Bandwidth dropping between existing SCCA, DSLSS, CSSA, CSTS and proposed BAA.

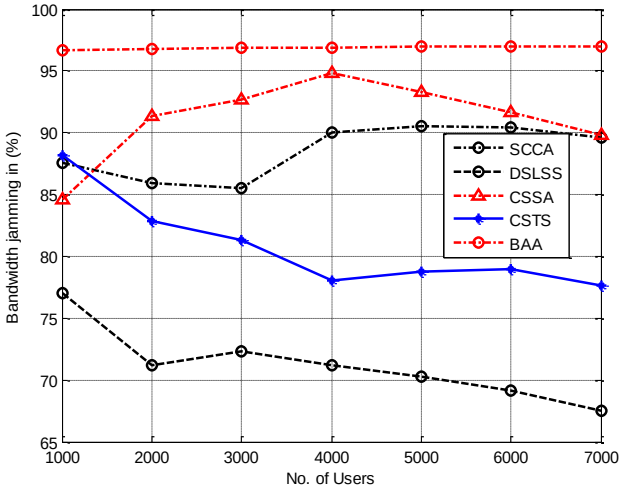

Fig.3. Analysis of Bandwidth Blocking

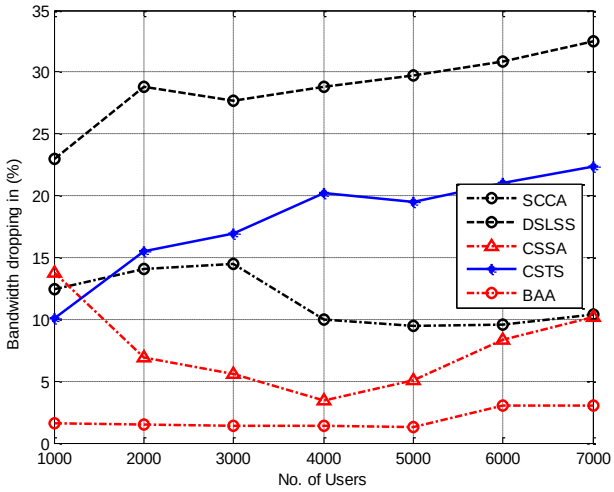

Fig.4. Analysis of Bandwidth Dropping

From Fig.4, if the device has both user license and device license then it was paired with the network. When compared, existing method the proposed method achieves less dropping connectivity. The proposed bandwidth allocation algorithm achieves 3% bandwidth dropping The primary users no need to get authentication from network admin.

4.3 BANDWIDTH UTILIZATION

At a given time, the highest quantity of data transferred over a user is referred the bandwidth. The percentage of consumed bandwidth off the total available bandwidth is called the bandwidth utilization.

BU (in %) = ((Total messages transmitted and received))/speed of transmission×100 (3)

The Fig.5 presents the analysis of bandwidth utilization between existing SCCA, DSLSS, CSSA, CSTS and proposed

BAA. The primary users did not require any authentication from admin. When compared, existing method the proposed method achieves more bandwidth utilization because all the slots occupied with the primary users. The proposed bandwidth allocation algorithm achieves 97% bandwidth utilization. The unused bandwidth allocated for other new devices while they are getting approved by admin.

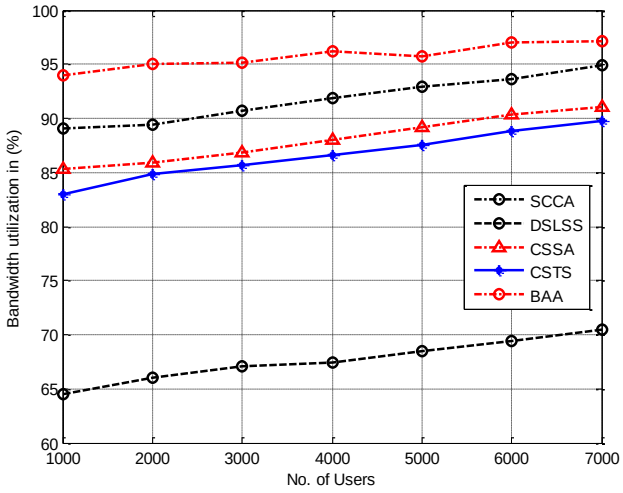

Fig.5. Analysis of Bandwidth utilization

5. CONCLUSION

Generally, unused, or excess bandwidth in a network is low and its usable capacity is low. And its usefulness will increase when it is handled properly. Thus, the number of users using it will continue to increase. Managing such efficient functions will further increase the number of users on the network. It also the process of providing the required speed to all users on the network. The proposed model achieves 97% bandwidth utilization. This shows the efficient bandwidth allocation done by the admin for all the primary and secondary users in the network. Hence, the proposed method was performed well in bandwidth management for the 5G networks. This shows all the user groups getting good connectivity and use the spectrum band without any interference. The further enhancements for this works focused on delay management and high throughput achievement. This is very important for the user groups to getting high speed communication from transmitter.

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