International Journal of Business
Management & Research (IJBMR)
ISSN (P): 2249–6920; ISSN (E): 2249–8036
Vol. 10, Issue 1, Feb 2020, 21–28

TRANS STELLAR
•Journal Publications •Research Consultancy

Original Article

AN ANALYSIS ON DEPLOYMENT OF UNIFIED COMMUNICATION IN ENTERPRISES WITH QOS ATTAINMENT USING CLOUD SERVICES

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ABSTRACT

In the present world, the Enterprises are completely relying on Unified Communication for their core business. The expectation of ubiquitous delivery of the communication will be high as more connected devices they use. There is increase in number of applications, devices and human users who are getting connected whether to Internet or to their own network, connectivity with enhanced QoS is mandatory to have uninterrupted functionality of the day to day business. The successful deployment of the various products depends upon the QoS metrics achieved during the communication. In this paper, we propose a workload balancing and synchronization mechanism between Enterprises and Cloud services to enhance QoS. Although we focus on the QoS parameters like Jitter, CODECs, available Bandwidth etc., also state that our mapping mechanism can be easily used in monitoring the Unified Products communication and also propose a tool called Network Traffic Monitoring System architecture that can be used to monitor various services offered by Enterprises using Unified Communication Products.

KEYWORDS: Unified Communication, QoS, Jitter, Time Delay, NTMS & Cloud

Received: Oct 21, 2019; **Accepted:** Nov 11, 2019; **Published:** Jan 22, 2020; **Paper Id.:** IJBMRFEB20204

INTRODUCTION

In the present scenario, effective communications play a vital role in business development. But, enterprises face challenges in using appropriate technologies to sustenance effective communications. Unified Communications is a notion that incorporates heterogeneous technologies, which can function together and while human does the communication process, technology can enhance and advance it. The progression and propagation of recent unified communication technologies have transformed the functionality and communication methodology of the people. In the end of 2018, the expected data traffic over mobile networks is estimated as 15.9 Exabytes per month, with video streaming would comprise of 69 percent. The no of Mobile-connected devices would reach up to 10 billion by the end of 2018[1]. Unified Communications products support Enterprise business to flourish by using shared conversational workspaces in having meetings more prolific, fast-tracking how work gets done by embedding communications into workflows and all-time connection with employees whether in they are in the office or remote location. Successfulness of engaging unified communication lies on the QoS metrics achieved during network communication. Essentials of network performance with relevance to QOS scope include availability, bandwidth, latency and error bit rate. Apart from these factors, bandwidth provisioning and management of network traffic influences the enhancement of QoS. The network traffic categories are given in Figure 1.

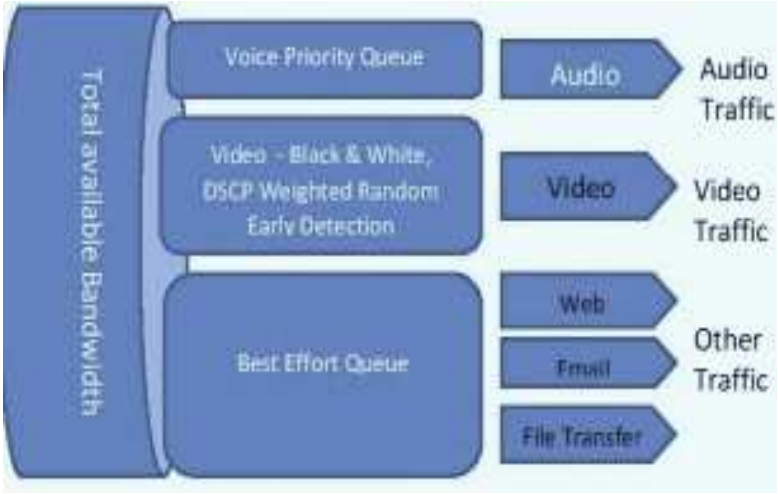

Figure 1

Since QoS is concerned with the prioritization of traffic within a network, it can be aimed at a network interface, a server/router's performance or in terms of specific applications. The highest QOS will be attained for a service by giving the user greatest satisfied communication service. In order to satisfy a user, we must, first of all, know how much he/she is comfortable quantitatively using the service. Since primary factors which affect user satisfaction depend on a service, we have to calculate the user satisfaction from various points of views. Though commonly many factors are available, proper monitoring and management of resources including bandwidth is to be considered as primary.

Impact of QoS

QoS is an intangible term since there is no determinate meaning for it. Depending on where, how and why it is meant for, people and professionals in different fields look it from diverse perspectives and have dissimilar understandings of it. QoS therefore, being a concept massively used in the field of computer networking and other packet switched telecommunication networks and techniques used to provide a degree of guarantees on the capability of a network to deliver predictable results. QoS technologies are intended to handle abnormal and changeable techniques to give guaranteed timely delivery of specific application data or resources to a particular destination or destinations which is not ensured by normal bandwidth or data-compression techniques. The key goal of enhanced QoS is to provide deserved priority to different applications including dedicated bandwidth, measured jitter and latency and enhanced lossless features. It also ensures that the priority decision to more than one user communication does not distract the rest in the queue. To be precise, QoS is defined as overall performance of Unified Communication Products across networks as stated in Figure 2.

To handle this mounting range of devices and the drastic rise in traffic, the networks are switching over to an all-heterogeneous architecture of diverse communication technologies.

Figure 2

These technologies have variety of bandwidths, coverage area, and operating frequencies. Same way their QoS characteristics, such as delay, throughput, and packet loss, as well as usage and implementation costs also differ from each other. Requirement of QoS with respect to type of Communication is given below table 1.

Table 1

QoS Class Type	Communication Type
QoS class 0	Real-time, jitter sensitive and high interactive applications includes Voice over IP (VoIP) and Video conferences
QoS class 1	Real-time, jitter sensitive and high interactive applications like VoIP and Video conferences, but with less constrained delay requirements
QoS class 2	Transaction data comprises of highly interactive traffic
QoS class 3	Transaction data comprises of interactive data
QoS class 4	Low loss applications like short transactions, bulk data, non-real-time buffered video streaming
QoS class 5	Traditional applications of default IP network leaving any QoS demands
QoS classes 6 & 7	Designed for applications like applications in QoS class 0 or 1, but with high demands for the packet loss rate

The consequence of using heterogeneous network-based architecture for different applications, especially multimedia applications incurs extensive challenges [2]. Out of these challenges, the QoS-related issues such as effective QoS evaluation, management, and monitoring stay top in the list [3]. The challenging task is managing QoS for video or voice applications over heterogeneous networks. A research from Nemertes reveals that the companies spend a reasonable amount of their budget to accomplish VoIP applications over these network architectures. Small Enterprises incurs an annual cost ranging from $25,000, and for global Enterprises it is around $2 million. Therefore, the Enterprises need to

spend lot of their effort to guarantee service quality at every level of the network. System slowdown is another challenge for businesses, which is expected due to improper network management and monitoring. According to Gartner research, for large Enterprises the hourly cost of system slowdown was $42,000 and for an average enterprise business, 87 hours of slowdown per year is anticipated. As the consequence, unified communication networks QOS of an Enterprise should be observed, managed, and assessed on an enduring basis.

LITERATURE SURVEY

Since long time, Enterprises deploy two communication channels by investing considerable cost in which one is used for voice carrying network such as telephony, voicemail and video conferencing while the other is used for data carrying network such as e-mails, data, instant messaging etc. Though, it has become mandatory to implement an integrated technology such as UC with enhanced QoS mechanisms [4]. In order to achieve satisfied QoS, the impact of network impairments can be effectively done by end-to-end enquiries and track the changes of crucial performance parameters, such as network delay and loss [5]. The versatileness and heterogeneity of the applications, services, protocols and network traffic along with their QoS requirements is a challenging problem when it comes to scheduling their traffic through the same network paths. Accommodating the QoS requirements of such a combined network and/or application's traffic which might be sharing the same network path or even the same session is a multifaceted problem which is to be handled from different perspectives to approach optimality. The usage of versatile communication technologies and applications types in a heterogeneous network makes the calculation of its QoS metrics at the Enterprise level a challenging task. To manage such challenges, unified metric measurement functions are highlighted [6]. These unified metric measurement functions provide solution only when the data about the network traffic is effectively produced. The management of the network traffic data is a cumbersome task for the network administrator when the UC grows in double fold in Enterprises. The augmentation of QoS for typical IPTV services given by various authors is built on specifications provided by the standardization bodies ITU-T and European Telecommunications Standards Institute (ETSI). The most common facilities and features defined are audio and Video as streaming application and also download applications like Electronic Programming Guide feature of data download. Several IPTV services with its unique real-time communication characteristics claim different QoS resources. Hence it can be narrated as the IPTV services are related to network QoS classes, defined by 3GPP and ITU-T. [7]

Problem Derived

Satisfaction of QOS is at the moderate level and it is directly connected to technology got used, which cost us investing more. The design of fundamental networking technologies like the Ethernet were not able to get aligned with prioritized traffic or guaranteed performance levels, and it becomes difficult to implement QoS enhancement measures across the Internet. Hence, QoS becomes mandatory for forthcoming internet applications of such as VoIP and video-on-demand. Adding to this, the fact that UC is a technology, mainly work on IP communications and as it adheres with crucial time pattern of RT traffic, the need for the blend of QoS and UC cannot be overstated.

Solution Proposed

To ensure the optimization of network performance to a perceived level, Network Traffic Monitoring System (NTMS) at the Enterprise level along with Unified Communications as a Service (UCaaS) from Cloud can be best solution in load balancing task for the network administrator. Cloud services can be deployed via a private cloud,

community cloud, public cloud or hybrid cloud. For the Enterprises, based on the cost they can choose public or hybrid cloud for their access. A common Cloud services architecture is given in Figure 3. The Self-Provisioning service can be utilized under the awareness that the Enterprises will be having control over the services opted. Cloud-based UC known as UCaaS, encompass the features available in premises-based IP telephony, presence, mobility, integrated audio and web conferencing, video solutions, collaboration and business application integration features. This leads to switch over of the cost from capital expense to a probable operating expense. Thus, the Enterprise will be able to to maintain and manage the UC based network services within the minimum cost

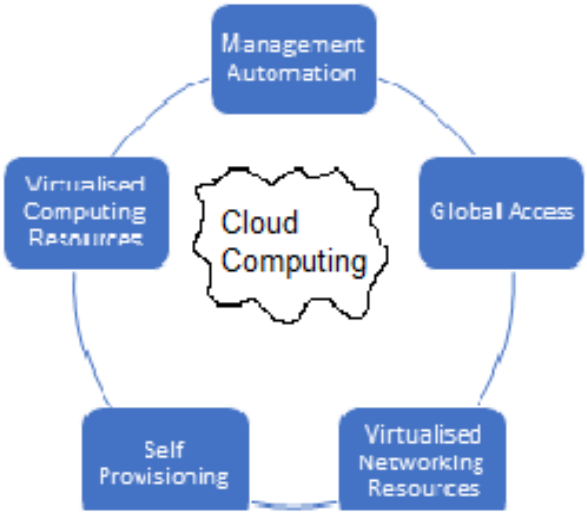

Figure 3

The UCaaS quick updating feature facilities the Enterprise to choose and deploy the latest and required applications along with upgradation where ever required and this gives the IT team of the Enterprise a greater flexibility with their Unified Communication System. The users can have the access to applications which lead them to instantly chat, arrange for on-the-fly conferences and meetings that includes both voice and video, document sharing and interchanging and involve customer in real-time conversation which leads to greater customer satisfaction.

The Enterprise can deploy the UC and through Cloud. The software tools and technologies available in Cloud can be used for monitoring and operating services, applications and as well as the data of the Enterprise can be stored and managed by Cloud services. The functions of the Enterprises which are to handled includes resource usage, data storage, backup and recovery, analytics, aggregation, security, cost, optimization, performance monitoring, control and compliance etc. Except cost analysis, rest all the services can be optimally utilized with the periodical report obtained from Cloud by the network administrator of the Enterprise.

CONCLUSIONS

In the current scenario, UC is a technology related with IP communications and the time-critical nature of RT traffic consideration, the core objective is to deploy UC with enhanced and sustained QoS. As Cloud computing is now growing like never before, with Enterprises of all sizes acclimating to this new technology. Cloud Computing services ranging from data storage to analysis are now offered instantly, commitment-free and on-demand. While cloud computing is

undoubtedly beneficial for mid-size to large Enterprises, a no of threats like data breaches, credential and access management, Account hijacking, Denial of service etc., security measures are to be strengthened. In this paper, an attempt is made to identify the techniques for enhancing QoS with the use of Cloud Services along with Enterprises level software tool. The goal of the model is to attain the QoS marks related to the service time and rejection rate of requests and consumption of available resources.

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