# QoS Issues in Implications of Voice over Venerable Networks

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**Abstract: -**The wireless based networking technology is an efficient way to disseminate data across the globe without physical connectivity between sender and receiver. Various type of wireless networking technologies viz. Ethernet, Wi-Fi and other IEEE 802 standard technologies have been deployed successfully for such data transmission over airing last two decades and have proved a huge success. Today, due to rapid proliferation in technology on hardware and software front both client demand pattern and data need change drastically. Now we need to deliver very large size data containing audio / video contents and other real time control applications simultaneously with time bar on delivery. Nevertheless, the above-mentioned wireless technologies lack integrated approach to deliver this entire thing simultaneously with standard quality and quantity. This lack in integrated approach and demand of huge data delivery within time motivated the networking community to design IEEE 802 standard for "time sensitive networks". Such network provides vast number of connectivity applications but still have challenge on Quality of Service (QoS) in data delivery hence are more venerable in comparisons to previous networks. In this paper, we have discussed the issue of delivering voice data over such network and how to measure the Quality of Service (QoS) of voice over these networks.

**Keywords-**time sensitive networks, venerable networks, wireless technology, QoS of voice in wireless network.

## I. Introduction

Wireless technology came in existence for the military applications that uses wireless data to connect the nodes in the region where cabling is not possible. Subsequently wireless network has twisted a network that covenants with the data transmission at radio frequencies. Wireless network entail of peer-to-peer networks where each computer openly interconnect with the other without wire. With the proliferation of cell phones, laptop and computers etc. demand of wireless network has grown up day by day. At inception, the wireless technology was slow, expensive and reserved for unreceptive environment where cabling is difficult but now a complete range of IEEE 802 standard protocols is available and convenient in communicating audio, video and voice data that needs to interconnect within the assortment of the wireless network.

Video and voice are real time applications and with the augmentation of the internet more and more voice data sent over the wireless networks like voice over internet network, voice over ATM, voice over frame relay and voice over Ethernet. For all such real time applications, time is very important. Even the millisecond delay in information may cause huge catastrophe and information may lose its significance. Hence, the wireless network for real time application must be time sensitive. Time Sensitive Network for real time media is control stream that are used to automotive or industrial facilities. The main issues of the Time Sensitive network viz. firstly to identify the characteristics of the traffic of data, secondly to identify the hardware and software configuration details with their limitations and large network is scrabbling down into the small assessment facing many critical time synchronization issues. In real time systems, the information is processed within the specified time.

Real time system can broadly categorized in to two categories viz. *hard and soft real time systems*. Hard real time system must be completed within the time. The deadline imposed with the applications, so that any failure cannot be associated with the processed applications. Likewise soft real time system still functions where deadline not met. We have many protocols that are used in real time application but these protocol have some drawbacks that's why these protocols are not used in every field of real time application. So demand of huge data delivery in voice communication we to design IEEE 802 standards for Time Sensitive Networks. In order to make a wireless network time sensitive M.J. Taneer [1] has suggested three important additions to IEEE 802 architecture:

(i) Time awareness of network by universal time synchronization.

(ii) Time sensitive queuing of data with guaranteed timely forwarding and delivery of data.

(iii) Bandwidth and latency reservation of wireless channel to provide dedicated path for time sensitive data.

In the primarily stage the time sensitive network will work from the identification of traffic characteristics so that time synchronization of devices routers and switches on the network. Large network consist of small test it will leads to the dropped packets in voice i.e. measured by the bandwidth that is reserved for the time sensitive queues. The rest of this paper organized as follows: section II gives details of the work done by various technocrats and scientists in the field of time sensitivity in wireless networks. Section III gives problem definition of the time sensitive network. Section IV gives of QoS issues in time sensitive applications. Section V consists of implication of voice in data networks. Section VI follows how to measure the QoS of voice in networks and VII follows conclusion and future work.

## II. RELATED WORK

S. Soulhi [2] in his paper titled "Telephony over wireless networks" has analyzed and compares both traditional and packet based cellular telephone services. He established that traditional telephone services are based on circuit switching and a dedicated path is established that is reserved to the caller. Its major weakness is pulse code modulation (PCM) voice But packet based data networks improved profitability and productivity in business communication by simultaneously transmitting voice and data packets on same channel. Despite that the many issues still left to consider like quality of service routing and security issues. J. Kim et al [3] studied characteristics of voice quality on the internet protocol network as per voice over internet protocols services. They provide a method to measure the quality of network not only with the internet protocol network but also with the gateway and gatekeeper also and concludes that continuous development in the wireless network need efficient measurement and performance of a network. L.Angrisani [4]measured the IPDV values and performance matrices, perceiving the quality at application layer by the user and applications of voice over internet protocols. Voice quality is measured at application layer of the ISO/OSI model.C. Mancas and M. Mocanu [5]considered performance of traffic types queuing and resource reservation protocol and issues in Quality of service (QoS) affected by delaying packets due to the parameters like latency, bandwidth, jitter, packet loss and echo.

They found that when guaranteedbandwidth is not provided, it will leads to the congestion resulting in problem for the system. T. J. Kostas et al [6] provides architecture and technical viability of real time voice over packet switched networks. They examine the architecture for voice over internet protocol that measuring internet delay and loss characteristics of the data. Z. Han et al [7] gives a user satisfaction factor (USF) that provide quality of service (QoS) on type of services such as audio voice data and multimedia data. High system performance for different data, modifying scheduling schemes also measured delay of sensitive application. They have also designed further generalized terms for the future wireless time sensitive network.Siddiqui [8] provides qualities of service mechanism to infrastructural solution that are implemented through Soft Phones in the interconnected campus through quality of service mechanism. B. Kim et al. [9] give the concepts, how packet loss and delay would be minimized in the internet network.

## III. PROBLEM DEFINITION

As envisage from above section, in order to ensure timely delivery of data over wireless network not a lot of work has been done and only a rare work is done on voice and QoS issues in Time Sensitive Networks (TSN). Since TSN are venerable in the sense that they are highly in demand for precise and time critical applications.Since manynetworks exist for real time applications but only those applications, which have implications related to voice over the Venerable networks, are critical and can be solved by the time sensitive network based on its advances. In the predominantly stage the time sensitive network works from the identification of traffic characteristics so that time synchronization of devices routers and switches on the network. Large network entail of small test it will leads to the dropped packets in voice i.e. measured by the bandwidth, which is reserved for the time sensitive queues.

Keeping all these factors in mind, this paper will try to calibrate these issues and measure QoS problems for them so that an inclusive plan to mitigate them can be designed.

## IV. ISSUES FOR TIME SENSITIVE APPLICATIONS

Quality of Service (QoS) is a major issue for time sensitive applications.The QoS issues may arise due to various factors like frame relay, internet protocol etc. Also many wireless

networks lack integrated approach to deliver the data with standard quality are other relevant issues. So to get the standard quality of the data the improvement in the QoS is needed. It would be the major issue for this paper also. Firstly we will understand how the voice signals deteriorate when the voice is passes through the signal. It is a time sensitive issue that has to be considered in the wireless network. As per network application delay in voice data is very sensitive. When voice is delayed due to any reason it will degrade the quality of a network. Quality of service routing would be also considered as issue for a time sensitive application.

When the data is routed sometimes an echo occurs which cause reflection of own voice and calls coming from the other places. It is a genuine problem; it leads to the disturbance for the users. Authentication is required to get the original data (voice), so security would be an issue for time sensitive applications. A critical issue is real time communication where provide service guarantees in the network. Loss of packets over the wireless network would be an issue for the time sensitive applications.

## V. IMPLICATIONS OF VOICE IN DATA NETWORKS

Over the decade huge amount of data is communicated over the internet. This data can be audio, video, voice, pictures, messages etc. But our main aim of this paper is to describe the implications of voice in data networks like frame relay, internet protocol, ATM, public switched telephone network, Ethernet etc. Now question arises, why voice is more important because voice provides effective communication medium for everyone so anyone can understand and take actions accordingly.If voice suffered with implications, so it becomes a genuine problem in time sensitive environment. This has created a motivation to design a "Time Sensitive network" to solve implications of voice.

Frame relay, Internet protocol and ATM are known cell switching technologies. Bandwidth is allocated dynamically when network needs to transmission.Public Switched Telephone Networks used dedicated path, hence inefficient use of bandwidth.Frame Relay and Internet Protocol delayed the voice transmission due to network congestion. So, dropped packets are increased and may leads to deteriorate the integrity of voice transmission. In frame relay to overcome the problem of dropped packets priorities are set for traffic. When priorities are set data packets are divided into the small fragments, so it increase the overhead and bandwidth efficiency reduced.

When data is in queue it varies the arrival time of packets called jitter in Frame Relay Networks.Echo cancellation is also more important in voice over Internet Protocol, which suffers delays in the network.ATM services are costly and yet not universally available.AAL1 (ATM Adaptation Layer 1) and VOATM (Voice over ATM) produce waste bandwidth and voice transmission overhead increased.Frame Relay Access (FRA) not giving good voice quality because usually it uses data rates 56/64 kbps and used algorithms ITUG.723.1 and G.729A. But using RAD algorithm it increases high quality of voice. RAD is an internetworking strategy between Frame Relay and Internet Protocol.

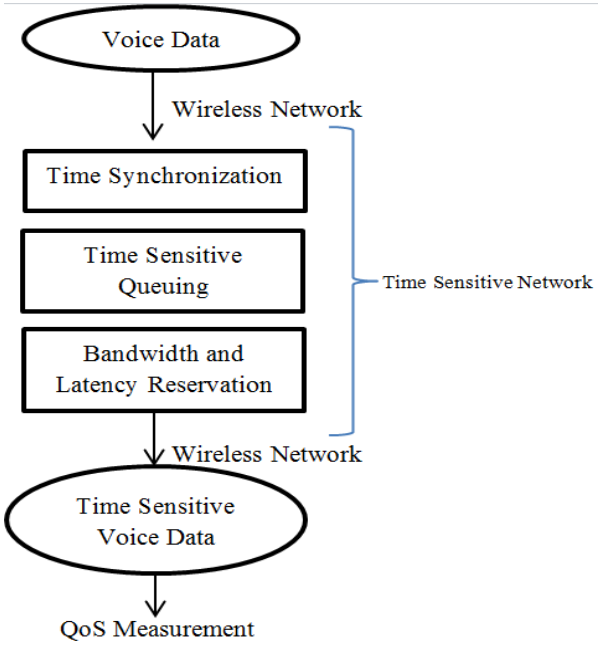


Figure 1: Block Diagram for Measuring QoS

Figure1 shows how QoS can be measured using voice data in the wireless network. Currently the problem would be solved using time sensitive synchronization, time sensitive queuing and bandwidth/latency reservation. So the time sensitive voice data would be come from the time sensitive network. Finally measure the Quality of services (QoS) of voice by the network.

## VI. MEASUREMENT OF QoS OF VOICE BY THE NETWORK

Thoroughly, we about the Quality of Service (QoS) and this section discuss how to measure the QoS by the network. Quality measurement of voice over internet usesPSTN, ISO/OSI

model and mean opinion score.Functions and levels are used to systematically measurement of the Quality of service (QoS).To improve the quality of network it mustinclude integrity, objectivity, and feasibility to design a measuring process. Integrity means data should be correct and accurate, objectivity means data should be in the either form and feasibility means analysis and evaluation of the proposed work.

To measure the QoS Catalina and Mithai have devisd four parameters viz. bandwidth, latency, packet loss and jitter. Bandwidth means the amount of data carried out from one point to the other point in a given period of time, latency means delay how much time it take for a packet to get one designated point to another, packet loss means when data is travelled through the network but some of the packets would not reach to the destination and jitter means variations in the time interval between the arrival of package due to congestion and packet loss. Packet delay is minimized by suing the mechanism clock synchronization. Voice quality affected by packet loss rather mouth-to-ear delay over the wireless access network.

## VII. CONCLUSION AND FUTURE WORK

We conclude that this paper gives list of Implications of voice in Venerable Network that is used in time critical applications. Networks are prevailing for time critical applications, but some issues are over there, these issues measure the QoS of voice by the network. Future work will be elucidation of real time applications and how these problems can be solved, where time sensitive network can be used. Also simulation study of data transmission over TSN and identification of proper simulation plate form will provide a practical support to research in the field.

## REFERENCES

[1] M. J. Teener, "Time Sensitive Networking: When "Best Effort" isn't Enough". Visitors Seminar at Electrical Engineering Department, UCLA, Barkley, Feb. 2012.

[2] S. Soulhi, "Telephony over packet networks", IEEE Canadian review, pp. 4-8, Winter/Hiver 1999.

[3] J. Kim et al, "VOIP QoS Design of Measurement Management Process Model", IEEE International Conference on Information Science and Applications, pp. 1-6, Apr. 2010.

[4] L. Angrisani et al, "Quality Assessment of VOIP services: a proposal based on the measurement of the IP Packet Delay Variation", Proceedings of the IEEE International Conference on Measurement and Networking, pp 111-116, Oct. 2013.

[5] C. Mancas and M. Mocanu, "QoS Optimization in Congested Multimedia Networks", 36thIEEE International Conference on Telecommunications and Signal Processing, pp. 38-42, Jul. 2013.

[6] T. J. Kostas et al, "Real Time Voice Over Packet Switched Networks", IEEE Network, vol. 12, no. 1, pp. 18-27, 1998.

[7] Z. Han et al, "Delay Sensitive Scheduling Schemes for Heterogeneous QoS over Wireless Networks", IEEE Transactions on Wireless Communications, vol. 6, no. 2, pp. 423-428, 2007.

[8] S. A. Siddiqui, "Analysis of Basic Quality of Service Mechanism for Voice over IP In Hamdard University Network Campus", International Journal of Recent Advances in Engineering & Technology, vol. 2, no. 1, pp. 8-13, 2014.

[9] B. Kim et al, "Enhancing QoS of Voice Over WLANs", IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks, pp. 1-9, Jun. 2012.

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