Investigating quality of service issues

Technology

CHAPTER TWO
2. 0 LITERATURE REVIEW

2. 1 Video QoS for Multimedia Consumer Terminals

Hentschel, Reinder, & Yiirgwei (2002) explores the potential of programmable platforms as against dedicated hardware, based on Scalable Video Algorithms (SVA) in the interests of flexibility, cost-effectiveness, product family modules, short product development cycles, upgradable products. While these technologies are costly and use much power, the conventional components are heavily limited in meeting future demands. This is not least because they are designed to meet particular target specifications and increased needs incur higher costs, besides the fact that dynamic resource control is impossible and that optimal performance is only possible is multiple applications are working an optimal rate. The SVA is dynamically adaptable, compatible with multiple platforms, manipulation of the output and best resource utilization, Center for Strategic and International Studies (2009). The SVA overall system architecture is developed collaboratively, and incorporates optimization strategies and resource management applications that admit, manage runtime budgets and schedule SVAs (QoS-RM).

The approach used by Hentschel, Reinder, & Yiirgwei (2002) uses separate and complementary applications to accomplish tasks, with quality levels being assured by applications, while resources are guaranteed by resource managers. The SVAs allow for system quality and cost effectiveness facilitated by applications that offer optimal resource utilization and reduced

system overheads. Users can initiate more applications through mode changes at which the system will be optimized, coupled with the resolution of temporary and structural overloads when applications interfere with the operation of each other. However, structural overloads must be initially detected before they are dynamically resolved. The systems are stable and can be reliably implemented. Hentschel, Reinder, & Yiirgwei (2002) presents potent evidence that SVAs and QoS-RMs can overcome the existent difficulties associated with programmable platforms used by consumer terminals. These applications are already operation in limited video technologies. Results by other researchers including Hentschel, Reinder, & Yiirgwei (2002) show less optimistic results about this technologies, especially because the internet/networking technology industry is driven more by practicality as against the best possible efficiency gains. The future prospects for such technologies are accroding to Dar & Latif (2010), enormous.

2. 2 Guaranteeing QoS for Video-on-Demand

Zamora, Jacobs, Eleftheriadis, Chang, & Anastassiou (2000) present an innovative and simple way to ensure end-to-end video QoS for Video-on-Demand (VoD) services. The need to avail great quality VoD over networks by mapping specific QoS in video client requirements to the QoS specifications for the network and video server. The model offers end-to-end QoS through by examining the network and video impediments affect quality. The VoD comprises of the video server founded on the video-pump architecture as well as an OS and network interface, video client and network. Network and video servers impairments have a massive impact on

the ultimate quality of the video, and the researchers lay emphasis on these aspects, identified in case studies in which these technologies have already been implemented, Foreman (2010).

The researchers isolate video server QoS, which are subsequently applied to experimental results from the Colombian case study that form the basis of mapping dideo server QoS to the video client QoS through the definition of the schedulable region. The researchers established the correlation between subjective QoS and the loss rate of the PDU at the client video. The GCRA performance was subsequently linked to the probability of PDU loss at the client video from which the schedulable region of the video server that models the video server capacity under the existent constraints of the video client QoS. The end-to-end QoS mapping used in VoD services is both innovative and simple and easily guarantees the quality of the video QoS, in which a particular QoS that is needed in a video client is translated into the QoS specification for a video server. This ensures efficiency in the utilization of resources. The technology employed in this paper is not very different from other technologies for ensuring end-to-end video quality. However, it is simple and the schedulable region that was derived for the video server helps in making sure that the end-to-end quality of service, with a specific QoS that is required in the client video that us translated into the video server QoS specifications, Zamora, Jacobs, Eleftheriadis, Chang, & Anastassiou (2000). The technology is founded on the generic voice on delivery model that comprises three elements including the video client, video server and network.

2. 3 Issues of Implementation of VoIP with QoS

Dar & Latif (2010) seeks to understand the aspects of VOIP implememtation to ensure quality audio quality over a packet network. The difficulty lies in the ability to carry instant audio on an IP network, not least the packetization and digitization of voice streams as well as a networking environment in which video, data and video transmissions are all integrated a unified and single system. This brings together telephone, call-processing intelligence and packet switching technologies, Stiller (2009). While VOIP is better that PSTN, it has faced multiple technical difficulties. Among them is the QoS VOIP requirements that necessitate quality that is similar to PSTN, protection of calls from network disturbances, ability to support multiple call set ups and latency, focussed overloads and handling of emergency calls as well security vulneralbilities. Secondly, the packet voice quality problem, which is dependent on voice encoding, packet loss, echo control abs network delays. The problems are easily noticeable and degrade the output quality. Thirdly the VoIP mechanisms of QoS, with existence of many such mechanisms.

These are also incuded in Jaffar, Hashim, & Hamzah (2009) include the *Resource Intervention Protocol, Differentiated Services, Integrated Services and MPLS Traffic Engineering (MTPL-TE).* Each of these protocols faces multiple technical difficulties that impede efficiency, and in many occasions they are combined in order to increase the efficiency of voice and video transmission over networks. While VoIP remains a good options as against the traditional live audio transmisions as well as PSTN, its deployment according to Dar & Latif (2010) remains marred with technical and practical difficulties. Quality and security problems remain the most challenging, but

by combing multiple protocols and solutions, it is possible to increase the efficiiency of VoIP and making it a viable alternative for both video and voice communication over the internet.

2. 4 QoS for Converged Data and VoIP Networks

The telecom and datacome industries revolution has seen the increasing relevance of QoS with regaard to VoIP and other internet technologies, and crucially, the convergence of data and voice network that is founded on ethernet and internet protocols. In common with Jaffar, Hashim, & Hamzah (2009) and Dar & Latif (2010), DeCusatis & Jacobowitz (2006) equally lays emphasis on the over-allocation of bandwidth for video traffic, which has relatively low cost implications with fibre optic technology, but potentially crippling for slower networks. The internet remains behind in embracing QoS technologies for VoIP comapared to telecom networks, largely because internet protocols are dissimilar to datacom and telecom protocols. The IETF efforts to standardize the Resource Researvation Protocol (RSVP) has failed due to poor scalability and the variety of needs in the market. DeCusatis & Jacobowitz (2006) explore two key open standards used in VoIP i. e. IP service type (ToS) and ethernet precedence. Ethernet precedence is a crucial technology in thevirtual LANS deployment and facilitates efficient traffic routing. It uses eight priority levels, and packet queing systems for swiutches that help in ensuring that resources are best utilized to avoid delays.

IP ToS is different from ethernet precedence that employs long standing message handling schemes used by the military. It employs six precedence levels that includes FLASH OVERIDE that is helpful in emergency handling and a priority level that is used for controlling network availability as well as

administrative domains stability. Recently, DiffServ has been proposed with regard to voice and video traffic handling to bolster QoS, which will make the deployment of both technologies more practical. There is also a danger of users changing their traffics just to get better quality services, a problem that does not exist with regard to best effort only networks. Converged networks and VoIP promise considerable operational cost and capital reductions for scalable networks. Bandwidth overprovisioning using QoS mechanisms must be considered in the use of advanced feature networking equipment includuding voice encoding algorithms, VLANs in dedicated ASIC hardwares and access controls within dedicated hardware, DeCusatis & Jacobowitz (2006).

Reductioon of noise and other quality distortions in VoIP environments necessitates a basic knowledge of the traditional voice signaling characteristics, processing as well as transmissions, besides necessitating knowledge of the IP network behaviour. DeCusatis & Jacobowitz (2006) has these elements in common with the vast majority of technical research into the implementation of VoIP. In addition, it is necessary to have knowledge of emerging VoIP interaction with the existent internet and telephone infrastructure. The reduction of noise is dependent on the making of implementation an design decisions that attain the desired wuality of voice, given the cost and network capacity constraints. The designand implementation of effective VoIP systems, coupled with network testing must be backed by targeted and specialized testing.

2. 5 QoS Video Traffic Management in Mobile Phones

The population is increasingly moving towards portable communication devices, which equally use, or need video and other quality communication technologies. IXIA (2011) points to the finite and expensive cell phone resources that are in themselves a convergence of varied technologies that have varied QoS needs. These are addressed by the charging and policy control, which is central to the evolved packet core, besides ensuring user QoE for specific service and subscription types. The rules are defined by service operators in the use of phone broadband, which ensures reduced congestion and quality, to the satisfaction of varied user needs. QoE policy management is however closely associated with the need to monetaze the services to benefit the most lucrative markets, which are likely to receive better quality as opposed to others.

In addition, policies are implemented in phases, but trends have tended towards standardization of policy mechanisms and QoS that allow subscriber differentiation according to the bearer model. This model has multiple parameters, including allocation and retention priority, QoS class indicator, maximum bit rate and the guaranteed bit rate. Other than the bear model, service data flows represents yet another crucial aspect in QoS policy management definition according to the service provider according to five parameters. These include the source IP and destination IP addresses, source port number, protocol identification and destination port number, Badard, Diascorn, Boulmier, Vicard, Renard, & Dimassi (2001). The quality also requires validation by modelling of subscribers. QoS and service control will become emphasized in regard to phone data and communication.

2. 6 Traffic Prioritization in Switched LANs

The IEEE 802. 1p introduced new bridge functionalities to include filtering services and expedited traffic capability, and Tobagi, Fraleigh, Karam, & Noureddine (2010) explores expedited calsses of traffic and prioritiization of time critical traffic. Data applications are usually unpredictable and hugely variable, neither are there specific latencny needs on networks despite the requirement for complete reliability. This report equally provides for classifications of traffic priority for multimedia traffic under the IEEE 802. 1p. The research work employes similar research design as in Jaffar, Hashim, & Hamzah (2009) and other works that used simulated traffic and vried QoS parameters to determine the quality of the transmission of vedo and other traffic over a network.

The results indicate that two major factors contribute to the deterioration of the video traffic quality and they include interferences between data and video traffic within shared buffes as well as in the switches of the network. Shared buffers equally treat video and other traffic, resulting in overshooting of the end-to-end delays. The second impediment comprises the competition of traffic from varied deveices on the same network, which is impossible to prioritize within the deveices and thus necessitating shared buffers. This helps avoid contentions on the ethernent. Switching hubs, full duplex links that connect stations to their ports and using dedicated ports is the only solution to eliminating both problems, Tobagi, Fraleigh, Karam, & Noureddine (2010).

2. 7 Video Prioritization over Ad Hoc Wireless Networks

Wireless networks are inherently unreliable, which hardly well for network traffic that is just as difficult to predict (Fiandrotti, Gallucci, Masala, & Magli, 2009). The IEEE 802. 11e amendment introduced Enhanced Distributed Channel Access that uses four different queues. The introduction of a scalable video standard of coding reduces the decoder task between the network abstraction and video coding layers that reduces packet losses. The prioritization algorithm on the other hand explores differentiation abilities of 802. 11e to prevent packet dissipation and schedules them for transmission. Packetization as well as scheduling according varied classes of traffics is crucial to the distribution of the traffic across the bandwidth according to the prioritization algorithm that will ultimately bolster QoS.

The report indicates that there is increased traffic differentiation by using these technologies, and with the higher differentiation, there is a reduced prospect of packet losses either because of jams, Ethernet contentions or other factors that slow down high-bandwidth traffic. Using algorithms envisioned in Hentschel, Reinder, & Yiirgwei (2002) increases flexibility, scalability and other factors that are available on a LAN network to work just as effcetively on wireless networks. Using SVA and SVC Codec also helps bolster the video quality, which with the benefit of versatile prioritization systems can be delivered to the user musch faster and in excellent quality (Fiandrotti, Gallucci, Masala, & Magli, 2009).

2. 8 The Impact of Security on VoIP Call Quality

Modern communication, involving multimedia requires extremely high security and security implementation have inevitable effects on the QoS,

which is measured in the form of jitter and latency or packet ratio. The attacks that can be targeted at VoIP infrastructure as well as the actual transmission and reception of the voice signal range, which have in turn resulted a lack of confidence in voice communication. Packet-switching renders VoIP vulnerable to possible information interception over public networks. Other threats include malicious interruptions of services attacks due to excessive traffic generated by attackers over the network that affects the legitimate services, Fiandrotti, Gallucci, Masala, & Magli (2009). In order to curb the challenges, data encryption and using VPN security measures protects the information and confidentiality of the people sending information. Encryption particularly makes information inaccessible to the non-target public, but the security algorithms simply make for for slower processing speeds and transmission speeds, Dar & Latif (2010). The security protocols used varied strategies that are mostly unhelpful to the QoS, and evidence from this research shows adverse effects on the loss of packet ratio, jitter and latency of the voice signal associated with the use of encryption algorithms, Radmand & Televski, Impact of Encryption on Qos in Voip (2010).

The laboratory results are multiply reduced in the real environment and the results in, Bless & Rohricht (2010) show that bandwidth limitation is the main reason for security threats, which in turn spawns myriads of other technical and security problems, and more investments in friendly security algorithms is necessary for the purposes of better QoS. The findings indicate encryption bandwidth increase lost packet ratio as well as packet latency, but overall, unprotected messages have far better quality.