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FUZZY BASED QOS CENTRIC UMTS, WIFI INTEGRATION BY VERTICAL HANDOVER APPROACH

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Abstract

Applications of real-time operating in diverse net-works types have unique QoS criteria. The task of optimized integration of vertical handover with QoS is always a NP hard problem. Apart beginning the rotate strategies of vertical han-dover, the 802.21 frameworks is an effective strategy moderately, that is based on Media Independent Handover Functions. Though the design is constantly studied for meeting the QoS requirements of real time services, like VoIP, Video conferencing or Video web Streaming is known as a complicated problem. In this paper an extension to 802.21 frameworks is projected with the inclusion of QoS layer over the existing MIH layer. It enables the capability of quick decision making for enhanced interface selection based on given Quality of Service constraints. An assessment of the projected system compared with three other diverse networks of UMTS, Wi-Fi and WiMAX utilizing 802.21 framework post inclusion of Q-MIH layer.

Introduction

The growing mobile broadband visitors has overtaken accent and is expanding at a rapid pace. The development is going to stay, as global traffic figures are estimated to multiply two fold every year in the coming five years [1]. The phenomenal increase of traffic volume, fuelled by finest work and terminal abilities, is synchronous to user needs in terms of data rates on par with rates of fixed broadband.Long-Term Evolution (LTE) facilitates network service providers to have unique and better spectrum choice that enhances 3G networks with elevated information rates, inferior latency and a horizontal IP-based architecture [4]. For further increasing the broadband user involvement, 3GPP is redesigning the characteristics of the Advanced LTE standard. In sync with the trend, WLAN technology makes possible the wide availability of mobile Internet as companies World-wide make wireless services available in select locations (hot spots), such as airports or hotels.

The introduction of the new across the world Interoperability for Microwave Access IEEE 802.16 wireless MAN usual offers an air interface for secured, portable as well as broadband wireless entree´ networks that sustain mobile clients beyond the comprehensive protection area, with a network that is not entirely cellular based. WIMAX operates in the 2.5-3.5 GHz frequency band supporting autmost mobility of 100 km/h [3].The majority of the latest wireless technologies are able to provide these types of services. The 3G network offer wide-area protection and efficient flexibility service while WIMAX and WIFI networks are capable of considerably higher data rate and restricted mobility. Hence a combination of 3G and other IEEE standard networks enables the users to occurrence continuous and easy wireless connection in greater number of areas with enhanced support compared to a network dominated by a particular category. The distinct wireless technologies in combination form a heterogeneous network. The objective of heterogeneous networks is enhancing the spectral efficiency per unit area. The networks of cellular, WIMAX and WLAN as per varied strategies of radio access offer distinct advantages in circumstances of mobility managing, protection sustain, and QoS [4]. The procedure of vertical handoff amid various obtainable networks in the heterogeneous network happens to be the highest concern for the user. Hence the next-gen heterogeneous wireless systems face the main issue of providing consistent VHO.

To deal with this problem, the IEEE standard is researching on a basic IEEE 802.21 Media Independent Handover and a process of optimized mobility via different access technologies is projected. The objective of the standard known as Media Independent Handover Function (MIHF) is to sustain and better handovers based on an concept layer among Layer 3 and Layer 2 and beneath (MAC and PHY) [5]. This study primarily deals with the MIH framework and performance, projecting a VOH protocol dependent on Media Independent Handover performance in terminal and handover management.

Related Work

The consolidation of WiMAX, UMTS, WLAN to offer coherent movement with minimal hesitate and confluence these techniques to offer constant interaction as all are assorted features is extremely complicated issue. Generally there are two foremost kinds of handoff systems. Network-controlled, mobile aided handoff and Mobile regulated hand off. In (Nadine et al., 2007) consolidation architecture of UMTS, And Wi-Fi a center layer is presented which is named as

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Inter domain Management Module (IDM). This Inter domain
Management Module manages the vertical handoff concerning heterogeneous networks also in this architecture WiMAX is adjust as secondary network in any kind of case handoff to every alternative network fails subsequently Inter domain Management Module will handoff WiMAX to MS network. In (Jean-Marie et al., 2009) architecture Oblique as center layer is presented which associate with WiMAX,Wi-Fi and UMTS for consistent handoff also to offer multiple-interface control. In (Ylitalo et al., 2003) identifies an architecture that makes to choose determination and identify interface for each and every program flow also to stability the load of their traffic. In (Hasina, 2009) included a QoS Fuzzy Logic layer that obtain crisps principles from bottom and top layers and subsequently assess to choose procedures for handoff. This specific system is created within MIHF Layer. (Maaz et al., 2009) projected a VHOD. In this technique cross-layer circumstance has already accumulated and user-centric strategy is mostly regarded for this work. IEEE 802.21 is prepared for Handoff over heterogeneous networks. This par-ticular architecture offers consistent roaming with progressive session among Mobile User and Network using QoS assistance for multimedia services. The primary factor in this specific is that it is content independent. IEEE 802.21 design for mxml is offered by NIST for illustration. This model offers WiFi, UMTS, WiMAX, Handoff model for representation

QoS Based Vertical Handover Approach:

A. Vertical Handover (VHO)

The VHO is opposing to HHO. That it is the relocate of information procedure or a call during one accessibility innovation to an additional accessibility innovation, for illustration from WCDMA to GSM. VHO is generally utilized whenever the user is operating one accessibility innovation and throughout data session achieves the area of different access innovation. Based upon distinctive coupling circumstance in WIMAX-UMTS network, we possess distinctive vertical handover protocol that is utilized to correct multiple handover concerns, like as packet loss, extended handover latency and also false accelerated retransmit
The amounts of handover protocols (HOP) are obtainable to assist mobility control over VHO are Inter-RAT HOP Multi-RAT HOP Seamless HOP and PFMIPv6 with IQDE

However there are usually no absolutely characterized and documented HOPs for the mobile appliance to recognize the managing of handover among WIMAX and UMTS network effectively. This is the determination to recommend the achiev-able network architecture and Vertical Handover protocol concerning the mobile appliances providing the flexibility and facilities and continuation throughout handover among these two appearing reach techniques. However there are usually no absolutely characterized and documented HOPs for the mobile appliance to recognize the managing of han-dover among WIMAX and UMTS network effectively.

This is the determination to recommend the achievable network architecture and Vertical Handover protocol concerning the mobile appliances providing the flexibility and facilities and continuation throughout handover among these two appearing reach techniques.

B. System Architecture:

1)QoS Layer: The entire architecture is revealed in Fig 1. Providing QoS layer preceding the 802.21 MIH layer, this specific layer obtains data from distinctive layers and attain handover determination. Information assortment: Within the IEEE 802.21 [6] MIHF, present network linking among the terminal might simply accumulate the effective info of its adjacent networks by enrolling for media independent handover services. Maximum data are static (i.e., network ID, link type, provider types obtainable in a network), so present network might accumulate them once it detects the new adjacent network or most alternative time, and keep them in its individual database. Dissimilar the static ones, a few information is enthusiastic, modifying with time (i.e., obtain-able bandwidth, packet loss rate). Present network transfers the dynamic data consult to adjacent networks upon it locates out the link concerning itself and the terminal is proceeding down and the handover is proceeding to be induced. Exactly how to manage with the accumulated information to pick the finest new network for the critical to hand over is revealed in details just below.

2)Events Generations:: Events to choose from distinctive layers are produced will depend on distinctive circumstances. link down, Link up, link going down and associated, most of these are produced by media independent handover , functions associated to bandwidth is generated through application layer among the modification of program and user choices also arranged by user upon application layer. On the perspective of these occasions QoS layer is stimulated.

3)Fuzzy Inference System: : Fuzzy consultant system is made up of fuzzy inference engine, fuzzifier, fuzzy rule build and defuzzifier [11]. Following in this analysis, sing fuzzifier and also fuzzy rule base that are described even more in below.

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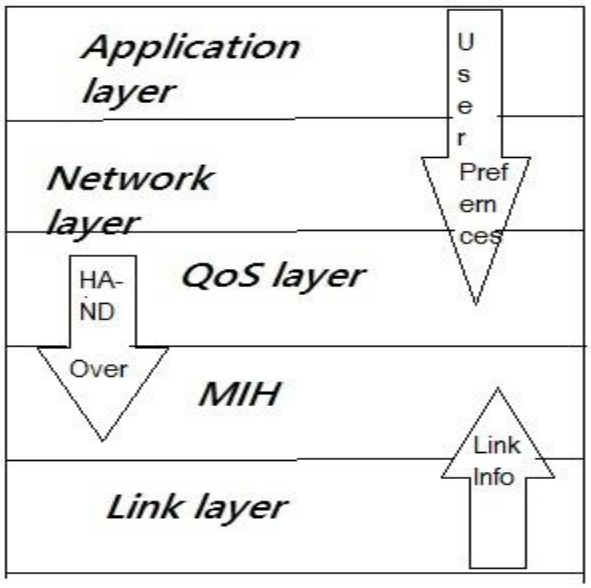

Figure 1. System Architecture

4)Fuzzification: : In fuzzification transforming the crisp standards into linguistic elements and then determining membership function for each and every variable. In the projected system for bandwidth, membership function is minimal and maximum, for user needs and transmission strength it is minimal, moderate and maximum. These membership functions are then utilized to assess rules.

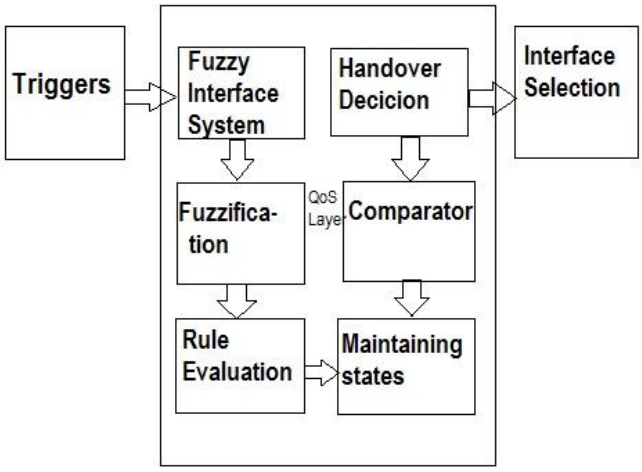

Figure 2. System Block Diagram

5)Rules Evaluation: : Rules are analyzed applying AND, OR Boolean logic. Concerning the fusion of three inputs, generally there are 18 achievable rules, for transmission ability and user needs, utilizing three (3) membership functions for bandwidth. 32 * 2 = 18

Furthermore output is considering by numbers starting 1 to 18 in desires of less to high. This result is accumulated in files for more control.

6)State Maintaining: In state maintaining, producing the state of the previous assessed interface in file, and subsequently evaluating with the previously analyzed, if this is more effective than preceding interface, choose this more continue in the equivalent network.

7)Comparator:: The job of comparator is to examine the claims of distinctive networks starting file and perhaps evaluate those among each and every other to obtain the finer one, regarding to the modified specifications.

8)Handover decision: : Handover decision might be situated on comparator result; this component will bring the feedback from comparator and point the circulation to preferred interface.

Implementation In Formation of Proposed Approach:

Representation Scenario: User is roaming amongst UMTS, WiMAX as well as Wi-Fi networks. In the beginning, MN accesses data in UMTS network. In the communication, ifit comes into a WiMAX protection field, or a Link Up is identified, changes to WiMAX networks, which is effective compared to UMTS in terms of bandwidth and expense. Next if a Wi-Fi network is found, the traffic is transferred to Wi-Fi network. The projected technique is executed with an mxml. The networks, Wi-Fi (802.11b), WiMAX (802.16), UMTS including Mobility model in NIST are implemented with simulation, with every MN comprised of three radio interfaces, one each for Wi-Fi, WiMAX and UMTS.

The MN implements the network change based on the projected intelligent vertical handover algorithm. The mobility scenarios are implemented by simulation, with the standard WiMAX network model for every MN used. The 802.11b system consists of 11 Mbps data rate, 11 Mbps basic rate and bandwidth of 11 Mbps. Orthogonal frequency division multiplexing (OFDM) is used as the default set up in WiMAX. Assuming a hassle free wireless communication, the MN has access to only one active flow of data at any particular time.

Sequence of Events:

The MIHF offers three types of solutions namely, Media Independent Event Service (MIES), Media Independent Command Service (MICS), and Media Independent Information Service (MIIS) that make possible data transfer between various wireless networks. First the QoS layer collects

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the details of link layer's variables, such as bandwidth available, signal strength as well as user requirements.

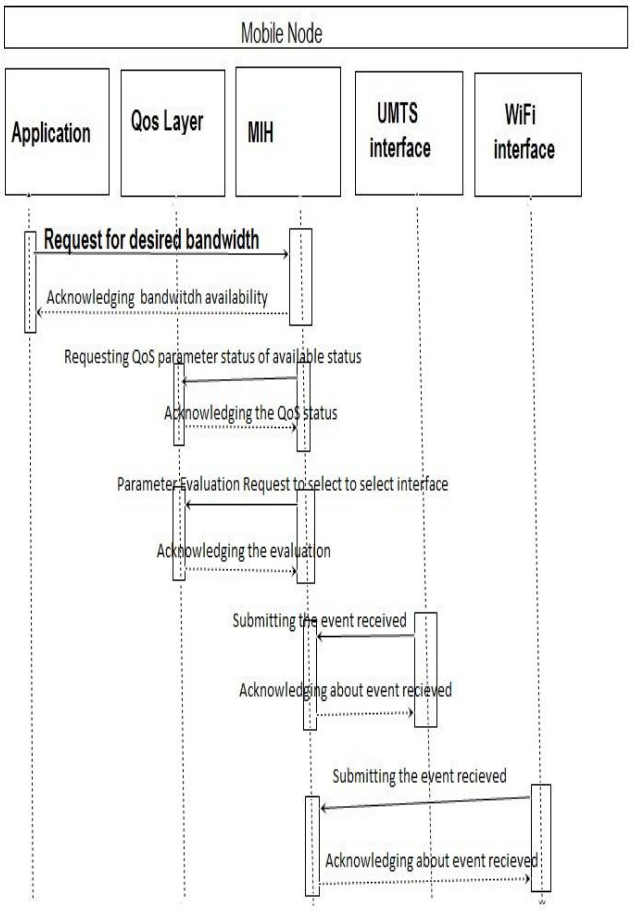

Figure 3. The sequence of events within mobile node

These details in the implementation version are collected from tcl. Next in the specified layer, the Fuzzification of the inputs describes membership functions (mf) for all variables. The bandwidth is based on solely low and high mf's whereas signal strength as well as user requirements are based on three mf, low, medium and high. Rules Evaluation: The guidelines are assessed based on the fuzzifier data as well as output value

Performance Evaluation And Analysis:

The simulations of scenario 1 are executed using mxml [13] and examined utilizing trace graph [14]. The MN is enabled to utilize several interfaces of UMTS as well as Wi-Fi. In the available networks MN goes mobile for about 200 sec. In the first stages of the simulation MN communicates in UMTS and in the later stages alters among CN with the help of UMTS

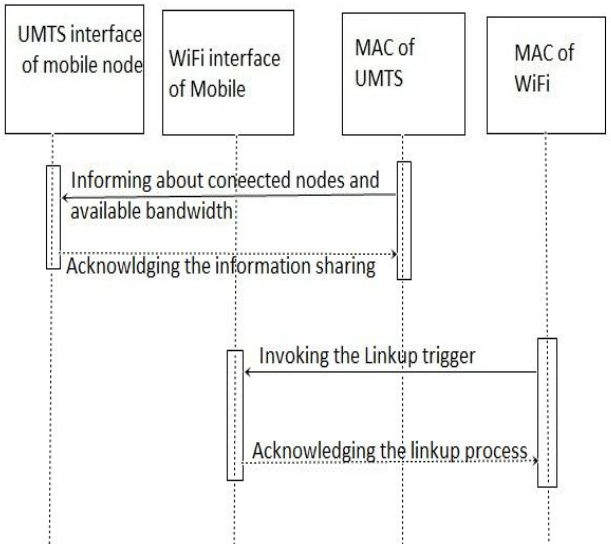

Figure 4. The sequence of events between mobile node, umts and wifi

network. After 4sec, MN changes to Wi-Fi where for 48 sec it remains in the network and later switches to WiMAX network.

Analysis: Evaluating the overall efficiency of the model we determine the projected model shows an enhanced performance compared to previous methodologies. Based on previous recommended viewpoint and simplified scenarios, similar parameters are applied and the results are contrasted with respect to throughput (see fig 3), latency(see fig 4) and jitter(see fig 5)without the QoS layer.

Throughput: In Fig 3 we possess throughput of obtained bits with admirable time and with transmission of varied traffic. Up to t=80 sec we transmit data program and from t=81 sec video program is transmitted. The nature of graph for both techniques is practically similar with respect to the program, however with the projected approach the throughput is enhanced in contrast to the basic strategy.

End-to-End Delay: Fig 4 demonstrates an end-to-end delay of packets through 200 seconds. The end-to-end delay of projected strategy is around 0.03 sec, and for the non QoS dependent strategy it is 0.05 seconds, for video program.

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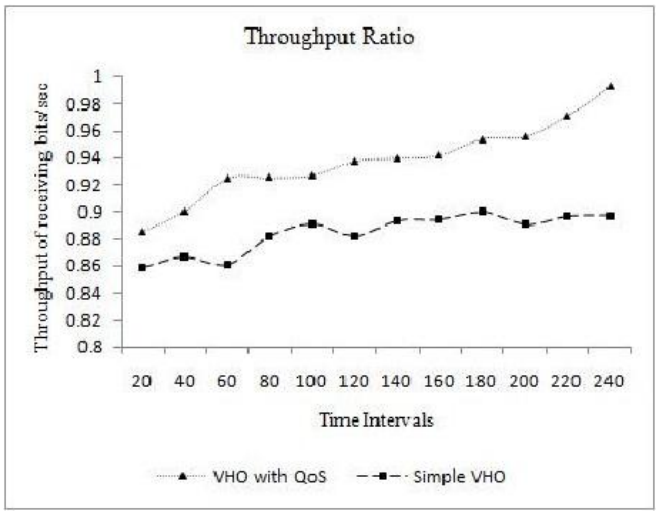

Figure 5. Exploration of the performance of QoS aware over simple VHO towards throughput

Jitter: Jitter of projected model is around 0.001 sec,very low compared to the basic strategy which has difference in jitter values i.e.start sat0.025 sec and then stay sat 0.003 seconds. When contrasted with projected system this jitter is

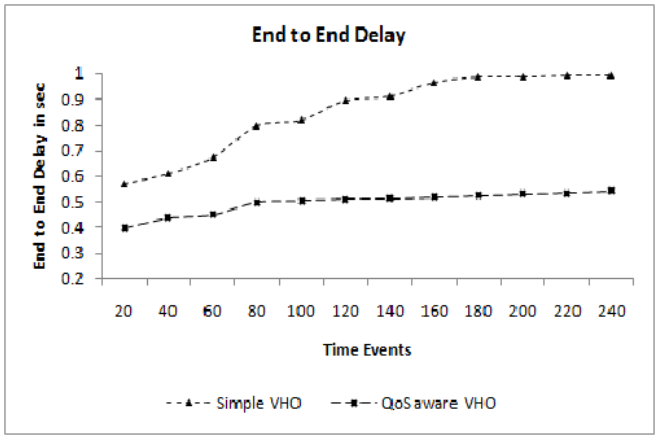

Figure 6. The sequence of events between mobile node, umts and Exploration of the performance of QoS aware over simple VHO towards latency

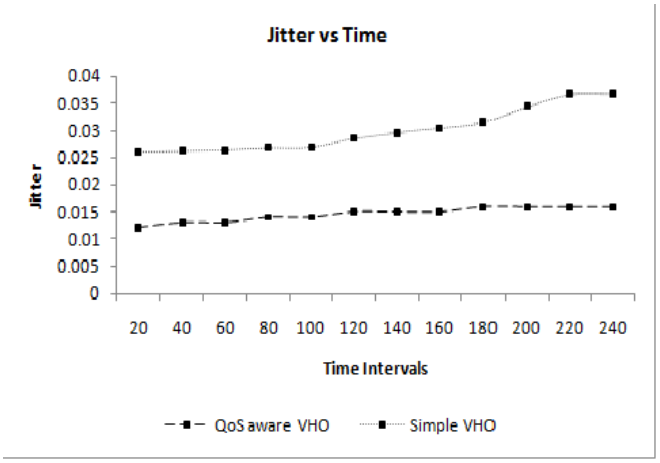

Figure 7. The sequence of events between mobile node, umts and Exploration of the performance of QoS aware over simple VHO towards jitter

not satisfactory and for video program the difference in jitter is unacceptable

CONCLUSION

In the process of selecting an efficient network based on factors discussed above, a system is projected. The handover is calculated by obtaining the neighbor discovery related information and link information from 802.21 MIHF and applied with fuzzy logic. The projected model is effective in choosing the foremost interface corresponding to traffic behavior and transmission strength while preserving the configuration of existing interface for future decision making.

The simulations outcomes show that projected approach performs efficiently with appreciable latency, jitter and through-put. Contrasted with basic approaches, the projected strategy shows a small enhancement in throughput, and diminishing of latency and jitter without considering the power expenditure of Mobile node.

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