

Design and Analysis of the Gateway Relocation and Admission Control Algorithm in Mobile Wimax Networks



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Abstract:

The WiMAX Forum bolsters different planning calculations to recognize and group the heterogeneous traffics. Yet, the planning calculation alone won't accomplish the better nature of administration in Mobile WiMAX IEEE 802.16e. The call affirmation control assumes a vital part particularly when consolidated with planning administration, as they are planned to oversee and ensure the QoS necessities. Subsequently we are proposing the Gateway Relocation Call Admission Control (GRAC) calculation, it just acknowledges or rejects the Mobile Stations and Priority based booking calculation separates the versatile stations with great channel conditions from poor channel conditions, and to separate constant traffics with the non-continuous traffics. Thus, the system delay diminished while the throughput of a system can be enhanced contrast with actualizing one of only them. Furthermore, our calculation execution additionally remembers decency, which reduces the starvation of nonreal-time traffics. Recreation result demonstrates the expansion the system execution as far as throughput; keep up the long haul reasonableness, and low parcel dropping and blocking proportions of constant traffics.

Keywords: Mobility management, resource management, admission control, WiMAX networks, statistics and stochastic process, and wireless networks.

Introduction:

WiMAX is short for Worldwide Interoperability for Microwave Access, and it additionally passes by the IEEE name 802.16. It can possibly do to remote broadband Internet access what PDAs have done to telephone access. WiMAX is planned to empower persevering, fast portable web access as scope range up to 50kilometers from the span of the Base Station with the information rate around 70Mbps. It doesn't requires Line-of-sight amongst client and base station and work with the authorized recurrence band 2 to 11 GHz. It additionally characterizes both the MAC and PHY layers and permits different PHY-layer particulars. WiMAX can bolster Quality of Service on the remote space and interfaces for ATM, IP furthermore it underpins a few broadband administrations like voice over IP (VoIP), video on interest and video gathering. The endorser stations (SS) which is gets to the WiMAX need to request an association with the base station (BS) past to transmit or get any information. The BS gets the solicitation then checks the accessibility of assets which are sufficient to convey the asked for administration select of debasing the QoS for other advancing associations. This procedure is administered by a technique known as the call



affirmation control.

Call Admission Control assumes a critical part in Mobile WiMAX which can likewise be characterized as the instrument to acknowledge or dismiss a stream taking into account the predefined parameter called stream particulars. A portion of the CAC calculations have been proposed in, for example, Weighted Fair Queuing, Earliest Deadline First (EDF), First In First Out (FIFO) none of the strategies accomplish better QoS and deferral. The Gateway Relocation Call Admission Control (GRAC) calculation joins the conventional Admission Control and ASN Gateway migration which lessens the postponement. The WiMAX Forum underpins different planning calculations to distinguish and arrange the heterogeneous traffics. The proposed Priority based booking calculation separates the versatile stations with great channel conditions from poor channel conditions, furthermore separates the continuous traffics with the non-constant traffics. Thus it diminishes the system defer and enhances the throughput. Principle goals of our calculation are to enhance the through put, of system to decrease the postponement limitations of continuous traffics, and to achieve reasonable asset dispersion amongst MSSs. In this chapter, we tend to square measure progressing to discuss concerning our project work description. Before that, we tend to square measure keeping introduction concerning necessary of project modules. WiMAX may be standards based mostly technology enabling the delivery of walk wireless broadband access as another to wired

broadband like cable and telephone circuit. WiMAX provides fastened, nomadic, and transportable and, soon, mobile wireless broadband property while not the requirement for direct line of sight with a base station. The planning of the WiMAX is good for challenges connected with earlier versions of wired and wireless access networks. At constant time the backhaul connects the WiMAX system to the network, it's not associate integrated a part of WiMAX system. Usually a WiMAX network consists of 2 components, a WiMAX Base Station (BS) and a WiMAX receiver conjointly referred as client Premise instrumentality (CPE). Backhaul is truly an affiliation system from the Access purpose (AP) back to the supplier and to the affiliation from the supplier to the network. A backhaul will commence any technology and media provided; it connects the system to the backbone. In most of the WiMAX deployments circumstances, it's conjointly doable to attach many base stations with each other by use of high speed backhaul microwave links. This is able to conjointly leave roaming by a WiMAX subscriber from one base station coverage space to a different, kind of like roaming enabled by telephone. The wide selection of the WiMAX technology depends on the peak of the antennas, if they're put in at the appropriate position from wherever there's no barrier between the transmitter and receiver, then we will get well vary and repair from it. Even if the frequency for operation of WiMAX isn't definite, the foremost possible band at three.5GHz is higher in

frequency than the 3G bands at around a pair of 1 GHz.

Range will, as a result, be lower, maybe somewhere between five hundredth and seventy fifth of the vary of 3G. WiMAX will thus support thirty to fifty kilometers distance with Line of Sight (LOS) links. As so much as Non line of sight (NLOS) links in involved American stateMAX will support the broad vary from three to ten kilometers victimization advanced modulation formula which will overcome several busy objects that WiFi systems cannot labor under. Wonderful Quality Of service management donates from type of WiMAX options. Even as on a LAN network, WiMAX users share information pipe and QoS will degrade as a lot of user's square measure extra to the network. Victimization the QoS options of WiMAX service suppliers will guarantee bound user's specific information measure amounts by limiting the information measure consumption of alternative users. Our final aim is to unravel the ASN GW relocation downside effectively and minimize relinquishing delay and packet loss. We tend to conjointly apply a straightforward admission management to the network so as to enhance our formula performance. Adopting a correct admission management formula to decrease network load may be a thanks to improve the formula performance. Quality is that the most vital feature of a wireless cellular communication system. Usually, continuous service is achieved by supporting football play (or handover) from

one cell to a different. Football play is that the method of adjusting the channel (frequency, time slot, spreading code, or combination of them) related to this affiliation whereas a decision is current. It's typically initiated either by crossing a cell boundary or by deterioration in quality of the signal within the current channel. Football play is split into 2 broad classes arduous and soft handoffs. They're conjointly characterized by "break before make" and "make before break." In arduous handoffs, current resources square measure discharged before new resources square measure used; in soft handoffs, each existing and new resources square measure used throughout the football play method. Poorly designed football play schemes tend to get terribly significant signal traffic and, thereby, a dramatic decrease in quality of service (QoS).

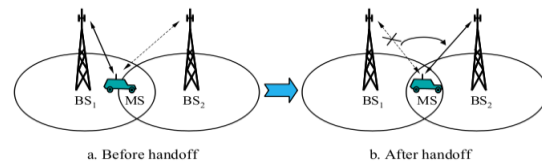


Figure 1: Handoff comparison

A hard football play happens once the previous affiliation is broken before a replacement affiliation is activated. The performance analysis of a tough football play is predicated on numerous initiation criteria. it's assumed that the signal is averaged over time, so speedy fluctuations thanks to the multipath nature of the radio surroundings will be eliminated. Various studies are done to see the form similarly because the length of the averaging window and

also the older measurements is also unreliable. Figure1 shows a MS moving from one BS (BS1) to a different (BS2). The mean signal strength of BS1 decreases because the MS moves removed from it. Similarly, the mean signal strength of BS2 will increase because the MS approaches it. This figure is employed to clarify numerous approaches delineated within the following segment.

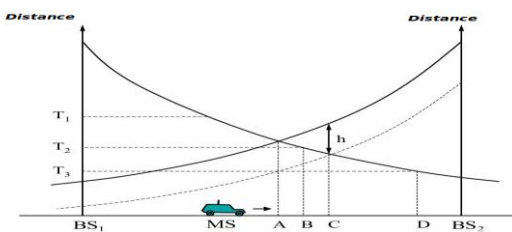


Figure 2: Distance travelling

WiMAX compliant instrumentality is allowed to work in each accredited and unauthorized bands. The minimum channel information measure for WiMAX usage is one.75 megacycle per channel, whereas ten megacycles is taken into account as AN optimum. Although 2.5 gig cycle and 5Hz none accredited bands square measure for the most part out there, their usage might be restricted to trials owing to the risks of interference preventing QoS commitments. The 2.5 and 3.5 gig cycle accredited bands are the foremost common bands for WiMAX applications. It ought to be noted that the five gig cycle band is additionally partly accredited in some countries. Most countries have already allotted accredited spectrum, typically to alternate operators. Nonetheless massive quantities of spectrum square measure still in method of allocation, and a few countries

haven't even outlined any WiMAX accredited bands nevertheless. WiMAX is intended to accommodate either Frequency Division Duplexing (FDD) that is additional suited to enterprise traffic, or Time Division.

Related Work:

In paper, author describe a framework for QoS support in such NGNs, Next Generation networks wherever multi interface terminals square measure given finish to finish QoS guarantees despite their purpose of attachment. The framework supports media freelance handovers, triggered either by the user or by the network, to optimize network resources distribution. This Framework not solely flows square measure given service guarantees seamlessly, however conjointly operators square measure given the flexibility to reconfigure the distribution of network resources to optimize performance. This framework will account for the challenges to be tackled in NGNs with a versatile and scalable resolution. In paper, author planned a psychological feature framework exploitation AN organic process formula, Swarm Intelligence, is planned. This framework uses a unique approach that utilizes a value operate that chooses the best parameters to produce AN adaptative quality of service (QoS) supported the user's wants. This approach ensures ability and quantifiability between totally different modulation techniques within the physical layer and enhances security against Denial of Service attacks cherish electronic jamming attacks and communication attack. Modulations cherish OFDM, WCDMA, to judge real time psychological feature network aren't incorporated in our gift work. In [3] paper, author planned a framework for quality of service provisioning over the air interfaces in future wireless networks, together with 3G improvement and psychological feature mobile networks. The framework relies on the paradigm

of service categories, whereby every category will exhibit a characteristic behavior in terms of resource allocation over the air interface. During this approach the user application will opt for the service category that most accurately fits its expectations in terms of QoS and price of access. However it should be necessary to limit the amount of categories of applications the user runs at the same time. In paper, author proposes the thought of developing a unique QoS optimization design that may decide the user necessities and knowing peak times of services utilization will save the bandwidth/cost factors. The planned design will be bespoke in step with the network usage priorities thus on significantly improve a network's QoS performance. The construct are refined by a field trial with real users once AN initial take a look at innovate controlled environments. In paper, author analyzed that a system combining extensions of 2 radio access technologies, IEEE 802.11 and IEEE 802.16 psychological feature necessities. globe use cases for such handovers embody responding to applications, operators, or users posing for higher information rates, lower prices, higher quality of service, or improved traffic management, similarly on changes in quality standing or coverage. Voice decision continuity (VCC) probably applies to 802.16m/802.11 VHT relinquishing. VCC will increase network quality. In [6] paper, author planned the QoS design and therefore the corresponding QoS communication protocols to be developed within the IST project Dandaloo. QoS management of the system conjointly represented through the Policy-based Management System and a true time Network observation system ready to aid in admission management with the results of active and passive measurements. Applicable to solely restricted set of accessible ways. In [7] paper, author proposes analyzed the implications of the "ABC" vision in an exceedingly UMTS/WLAN network context, and reveal necessary problems that arise. From a modeling purpose of read, our

bedrock system model provides express modeling support for necessary parameters that inarguably {affect have AN effect on} the computation of an bedrock resolution in an exceedingly UMTS/WLAN interworking context and on the far side. Unable to access network choice issues fully fledged psychological feature mobile environments that specialize in the result of rating models on the derivation of the optimum resolution. In [8] paper, author planned the rising necessities users square measure imposing upon the evolving world of heterogeneous psychological feature mobile/wireless networks through their perception of ultimate services. Above all the various ideas of adaptability/reconfigurability, and repair provision, which is able to respect users' aspirations and viewpoints, square measure thought of

Primary with given priority for QoS necessities upon the heterogeneous psychological feature networks. This model doesn't concerning|contemplate|take into account} about change this mapping as user centered situations and necessities, similarly as considering user perspective for the analysis integration. In paper, author addresses the matter of integration of those 2 categories of networks to supply such seamless property. Specifically, he describe 2 doable integration approaches specifically tight integration and loose integration and advocate the latter because the most well-liked approach. Integrated 802.11/3G wireless information services support seamless inters technology quality, Quality of Service (QoS) guarantees and multi supplier roaming agreements. The modifications to the planned design square measure required to support UMTS. In [10] paper, author planned security necessities and security design for psychological feature systems with the thought of trusty Computing (TC) for mobile instrumentation (ME). The protection framework supported trusty Mobile Platform (TMP) and PKI is planned to produce a substantial sturdy platform for user's access to

sensitive service and information within the situation of psychological feature systems. It offers advance security and conjointly satisfies the protection necessities of TMP category three. Thus it's additional appropriate on behalf of me and capable of being utilized to handle the protection problems in psychological feature networks. This technique has some slighter machine payloads.

Existing system and demerits:

The WiMAX Forum has defined a two tiered mobility management: ASN Anchored Mobility and CSN Anchored Mobility. Researchers design a dynamical HMIP scheme for MIP networks. Each MS dynamically determines the hierarchy of FAs according to the call to mobility ratio. The MIP registration update is only performed when a threshold is reached. Therefore, the signaling overhead incurred by MIP can be reduced significantly. And various priority based AC algorithms have been proposed. They cannot be applied to WiMAX networks directly, due to the specific mobility management techniques in WiMAX.

Proposed system:

In this paper, we have a tendency to propose entryway Relocation AC, which mixes ASN GW relocation and AC formula to maximise system capability. We have a tendency to conjointly propose a prediction formula supported Wiener method to request Anchored MSs to perform ASN GW relocation early. Thus, relinquishing MSs aren't born once the system load is full. The planned system will scale back average communication overhead and will increase average serving rate by determination the ASN GW relocation drawback. One of the foremost objectives of WiMAX Forum, thus, is to develop and standardize the WiMAX Forum specification that is evolving into net Protocol (IP)-based wireless network. The design is depicted; the Access Service Network provides wireless radio

access for WiMAX subscribers. It consists of 1 ASN entryway (ASN GW) and plenty of base stations (BSs). Every ASN is connected to property Service Network that provides IP property services.

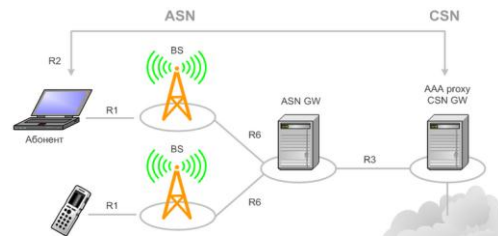


Figure 3: Signaling

A WiMAX receiver that is additionally referred as client Premise instrumentation (CPE) could have a separate antenna or might be a complete box or a PCMCIA card that inserted in a very portable computer or a PC. Access to a WiMAX base station is analogous to accessing a wireless access purpose (AP) in a very Wi-Fi network; however the coverage is a lot of. To this point one amongst the largest restrictions to the widespread acceptance of WiMAX has been the value of CPE. This can be not solely the value of CPE itself, however conjointly that of installation.

In the past, Broadband Wireless Access (BWA) is preponderantly Line Of Sight (LOS), requiring extremely experienced labor and a truck role to put in and supply a service to client . The conception of a self-installed CPE has been tough for BWA from the start; however with the arrival of WiMAX, this issue looks to be obtaining resolved Base Station (BS) A WiMAX base station contains of internal devices and a WiMAX tower. A base station will ordinarily covers the realm of regarding fifty kilometers or thirty miles radius; however

another and environmental problems sure the bounds of WiMAX vary to ten click or VI miles. Any wireless user among the coverage space would be ready to access the WiMAX services. The WiMAX base stations would use the media access management layer defines within the customary and would assign transmission and downlink information measure to subscribers in keeping with their necessities on real time basis

Call connection

In order to produce QoS secure services, the subscriber station (SS) is needed to order the required information measure from the bottom station (BS) before any knowledge transmissions. So as to serve variable bit rate (VBR) applications, that generate knowledge in variant rates and can't be sculpturesque accurately, the SS tends to stay the reserved information measure to confirm that the QoS secure services is provided. Thus, it's probably that the quantity of information to be transmitted is a smaller amount than the quantity of reserved information measure. The reserved information measure might not be totally utilized all the time. Though the quantity of reserved information measure is adjusted via creating information measure requests (BRs), the adjusted quantity of information measure is applied as early on successive returning frame. The unused information measure within the current frame has no probability to be utilized. Moreover, it's terribly difficult to regulate the quantity of reserved information measure exactly. The SS is also exposed to the danger of

degrading the QoS demand of applications because of the inadequate quantity of reserved information measure. It offers the advantage of getting higher management over network resource to produce QoS secure services If there are a unit three or four base stations and there are a unit nodes on the market in every base stations. Any node that is moving and are available in intersection space of 2 base station and if it wish to speak with different base station, at a similar time if that base station node wish to speak along with his base station, the priority with be to intersection node and therefore the base station node is enable to attend in queue.

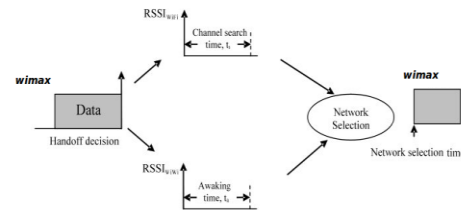


Figure 4: load reconciliation and cargo management mechanisms

In MIP, load reconciliation and cargo management mechanisms are planned. The concept is that in line with completely different criteria, MSs are equally served by HAs or quality Anchor Points (MAPs). However, if the approaches mentioned in are utilized in WiMAX, the hundreds of the anchored and serving ASN GWs are all affected.

The MSs may get to perform each ASN Anchored quality And CSN Anchored quality throughout an inter-ASN relinquishment. The long relinquishment latency and high packet loss

can degrade the service quality. On the opposite hand, in WiMAX, once playing ASN GW relocation, the load of the anchored ASN GW is reduced however the load of the serving ASN GW isn't affected. Though the same techniques will scale back the load of the recent serving ASN GW, the load of the new serving ASN GW is inflated. Therefore, solely the Anchored MS must perform ASN GW relocation to cut back the load of the Anchored ASN GW. The load of the Serving ASN GW is irrelevant. Admission management (AC) is one among the resource management techniques to limit most quantity of traffic within the network to ensure service quality for subscribers.

In wireless and mobile networks, the AC algorithms are rather more difficult thanks to the movement of MSs. AN MS served in current network could move to a different network. The affiliation of the MS could also be born if the desired resources within the target network can't be supported. it's typically united that keeping AN in progress affiliation un-broken is additional vital than admitting a replacement MS. Therefore, a relinquishment MS is given higher priority to access the network resources.

For this purpose, the general resources are partitioned off and a few resources are preserved for the relinquishment MSs solely. This can be known as priority-based AC. varied priority-based AC algorithms are planned here, we have a tendency to discuss 2 ordinarily used priority-based AC algorithmic programs: cutoff priority algorithmic program and new decision

bounding algorithm. If the resource in one ASN GW is over-provisioned, the ASN GW could become a performance bottleneck. Another approach is that the amount of BSs controlled by every ASN GW is scaled right down to forestall the resource overprovision. However, as a result of the amount of BSs controlled by every ASN GW is reduced, this may cause several inter-ASN handovers.

Winner method

The most vital part is that the workload-aware channel assignment module, that interacts with employment distribution module and outturn computation module, and avariciously assigns channels to the nodes. Noting that a node with higher employment is additional doubtless to be a bottleneck, as a result of the channel assignment depends on nodes' work- masses (generally nodes with higher workloads ought to be appointed with additional channels), and nodes' employment depends on the channel assignment, there's a circular dependency between channel assignment and nodes' workloads. to interrupt this roundness, we have a tendency to begin by distribution each node a default channel, and iteratively improve the outturn by avariciously distribution channels supported nodes' per appointed channel workloads then revoking under-utilized channels. The dispersion of a packet try before and when the packet try goes through a link of capability C_i forward that the link doesn't carry different traffic. If a link of capability C_0 connects the supply to the trail and therefore the

searching packets are of size L , the dispersion of the packet try at that initial link is $\Delta_{\text{zero}} = L/C$ zero. The acceptable relinquishment delay is way not up to the queuing delays of a replacement MS. forward that a relinquishment MS arrives and C is reached. If the relinquishment MS must look ahead to the ASN GW relocation of 1 Anchored MS, the relinquishment latency are going to be too high. Actually, if ASN GW relocation is performed simply once a relinquishment MS arrives, it's love playing each ASN Anchored quality and CSN Anchored quality. The relinquishment latency can't be reduced. On the opposite hand, one could perform ASN GW relocation abundant prior C is reached. However, this could force several Anchored MSs to perform ASN GW relocation, which can not be desirable as already mentioned earlier.

Thus, for relinquishment MSs, it's vital to perform ASN GW relocation at AN applicable time. Therefore, we have a tendency to propose a prediction algorithmic program supported Wiener method (WP) that provides a scientific thanks to verify once to request Anchored MSs to perform ASN GW relocation. If there are three or four base stations and every base stations are have three or four nodes. Hear, if any node whereas moving, are available in intersection space or in different base stations space and if that node send hand shake signal to base station at an equivalent time the bottom station node additionally send an equivalent signal, the moving node are going to be offer

priority on the bottom node and therefore the base node is unable to attend in queue, the moving node that have connected to a different base station, need to delete the link that is link to a different base station.

If we have a tendency to assume every MS never performs ASN GW relocation, it'll continually be served by 2 ASN GWs. for every ASN GW, the common service time of latest MSs is $1=c$. That is, the MSs can keep within the ASN GW for the period of whole affiliation holding time. it'll end in the best block likelihood for brand spanking new MSs and dropping likelihood for relinquishment MSs. Lower bound: If every MS continually performs ASN GW relocation now when every inter-ASN relinquishment, the common service time of latest MSs becomes $1=\delta c \rho n P$ for every ASN GW. Thus, we'll have rock bottom block likelihood for brand spanking new MSs and dropping likelihood for relinquishment MSs

MOBILE STATION

A mobile terminal (MT) searches for approachable wireless networks throughout the network discovery method. A multimode (equipped with multiple access network interfaces) MT should activate the interfaces to receive service advertisements broadcasted by completely different wireless technologies. A wireless network is approachable if its service advertisements is detected by the MT. the only thanks to discover approachable wireless networks is to continually keep all interfaces on.

The WiMAX Forum has outlined a two-tiered quality management: ASN Anchored quality and CSN Anchored quality: CSN Anchored quality ASN Anchored Mobility refers to the procedures related to the MS's movement between BSs, which can belong to an equivalent or completely different ASN GWs. In ASN Anchored quality, the context of the selected MS is transferred from the previous bachelor's degree to the new bachelor's degree. while not playing CSN Anchored quality, ASN Anchored quality will minimize relinquishment delay and packet loss.

As an instance, AN MS could perform intra-ASN relinquishment whereas still attaching to an equivalent ASN GW. additionally, AN MS could perform inter-ASN relinquishment wherever the ASN GW A is that the traffic anchor purpose and accountable for ASN- CSN tunneling. That is, traffic continues to be sent to ASN GW A, that then any tunnels traffic to ASN GW B. In Flow (1) and Flow (2), the MS is termed Serving MS of ASN GW A. In Flow (3), the MS is termed Anchored MS of ASN GW A and relinquishment MS of ASN GW B. In such case, the ASN GW A and ASN GW B are known as anchored ASN GW and Serving ASN GW, severally.

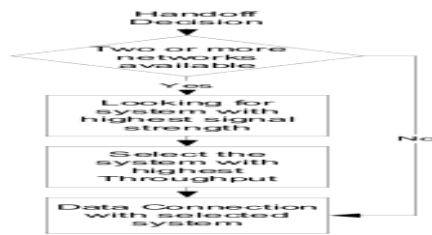
CSN Anchored quality refers to the method of adjusting the traffic anchor purpose and is freelance of the MS's link layer relinquishment. It's additionally known as ASN GW relocation. As an instance, if CSN Anchored quality isn't performed, once the MS roams from ASN GW

B to ASN GW C in Fig. 1, ASN GW A can tunnel traffic to ASN GW C. The MS continues to be served by 2 ASN GWs (ASN GW A and ASN GW C). As same discussion, the MS is termed Anchored MS of ASN GW A. Later on, the ASN GW A could request the MS to hold out CSN Anchored quality, i.e., ASN GW relocation. this could happen thanks to the serious load of the ASN GW A, to The ASN GW relocation could also be initiated at with different reasons. as an instance, as previous technique, AN MS could perform ASN Anchored Mobility while not playing CSN Anchored quality to cut back relinquishment latency. When the relinquishment is completed (i.e., the relinquishment delay has been reduced), the MS could perform ASN GW relocation now that the variety of Anchored MSs is unbroken little. However, it's going to not be an honest strategy continually to relocate AN Anchored MS therefore fast. as an instance, AN MS could move quick and keep dynamical its Serving ASN GW. During this example, it would be higher to stay the Anchored ASN GW unchanged. In another example, if the system load is light-weight, there's no aborting got to perform ASN GW relocation. This could happen thanks to the serious load of the ASN GW A, to cut back end-to-end latency, or for resource improvement functions. When playing ASN GW relocation, the traffic anchor purpose is modified to ASN GW C. The MS then isn't served by

ASN

GW

A.



Requirements and result:

We tested our protocol with single PC (20 GB Hard disc space and 1 GB RAM. And software's: Linux OS (Ubuntu 10.04), NS2.34, VMware. We got a result in two forms, one is Nam and another one is Xgraph.

Conclusion:

We additional develop associate analytical model to research the projected algorithmic rule. Simulations are conducted to gauge the performance of the projected algorithmic rule. The results show that the projected algorithmic rule will improve the performance considerably in terms of block likelihood, dropping likelihood, average serving rate, and average signal overhead.

Reference:

- 1) An End to End QoS Framework for cognitive Mobile Heterogeneous Environments > Miguel Almeida, Daniel Corujo, Susana Sargento, Vítor Jesus, Rui L. Aguiar
- 2) Increasing QoS and Security in cognitive Networks Using Cognitive Intelligence > Rajani Muraleedharan and Lisa Ann Osadciw.
- 3) Class Based Quality of Service over Air Interfaces in cognitive Mobile Networks > Yile

Guo and Hemant Chaskar, Nokia Research Center.

4) A Novel QoS Optimization Architecture for cognitive Networks > Aaqif Afzaal Abbasi, Javaid Iqbal, Akhtar Nawaz Malik

5) MOBILITY USING IEEE 802.21 IN A HETEROGENEOUS IEEE 802.16/802.11 BASED, IMT ADVANCED (cognitive) NETWORK > LES EASTWOOD, SCOTT MIGALDI, MOTOROLA QIAOBING XIE VIVEK GUPTA.

6) "End to end QoS Architecture for cognitive Scenarios" > Susana Sargento, Rui Prior

7) TOWARD A GENERIC "ALWAYS BEST CONNECTED" CAPABILITY IN INTEGRATED WLAN/UMTS CELLULAR MOBILE NETWORKS (AND BEYOND) > VANGELIS GAZIS, NANCY ALONISTIOTI and LAZAROS MERAKOS, UNIVERSITY OF ATHENS

8) User Centric Analysis of Perceived QoS in cognitive IP Mobile/Wireless Networks > F. Bader, C. Pinart, C. Christophi, E. Tsiakkouri, I. Ganchev.

9) Integration of 802.11 and Third Generation Wireless Data Networks > M. Buddhikot, G. Chandranmenon, S. Han, Y. W. Lee, S. Miller, L. Salgarelliev.