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Assessment of Worldwide Interoperability for Microwave Access Technology (WiMAX) Quality of Services (QoS)

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Abstract- The increasing penetration of WiMAX users due to its many and various provided services necessitate addressing WiMAX QoS. This paper proposes six groups of telecommunication QoS and WiMAX QoS studies, groups are classified according to relevant objectives. Group A addresses telecommunication QoS highlights, group B is targeting values for telecommunication QoS parameters group C introduces the Non-utilization QoS of telecom services, group D focuses on evaluating WiMAX QoS parameters. group E conducts WiMAX Optimization usages while Group F is discussing the improvement of WiMAX performance. A number of WiMAX QoS studies conducted since 2009 are addressed in this paper and well studied.

Keywords: ETSI, ITU, WFQ

I. INTRODUCTION

Recently, broadband wireless communications considered as one of the most growing and developing technologies in the field of telecommunications. The broadband provides multimedia services for voice ,video, high definition tv(hdtv), and games with a certain level of quality of service (qos). For these services, a high data transmission is greatly needed. Worldwide interoperability for microwave access (wimax) network aims to provide this qos with high data rate throughput, consequently enhancing the degree of users satisfaction. Most of the important factors that promote wimax as an attractive technology are throughput, wide area coverage, and extensive support for qos and security.

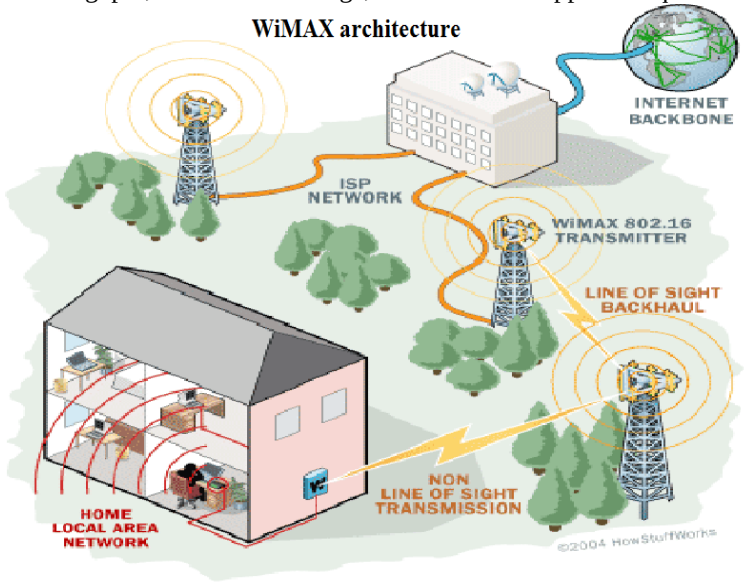

Fig.I-1 WiMAX Network Architecture

TABLE(I-1): TELECOMMUNICATION QOS FOR WIMAX STUDIES CLASSIFICATIONS

GROUP	NUMBER OF CONTRIBUTIONS	RELATIVE OBJECTIVE
GROUP A	4	TELECOMMUNICATION QOS HIGHLIGHTS
GROUP B	2	TARGETING VALUES FOR TELECOMMUNICATION QOS PARAMETERS.
GROUP C	3	NON-UTILIZATION QOS OF TELECOM SERVICES
GROUP D	4	EVALUATING WIMAX QOS PARAMETERS
GROUP E	2	WIMAX OPTIMIZATION USAGES
GROUP F	3	IMPROVEMENT OF WIMAX PERFORMANCE

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II. GROUP A: TELECOMMUNICATION QoS HIGHLIGHTS

This category deals with the Telecommunication QoS definitions, parameters and parameters computations, the group is composed of contribution of papers [1],[2],[3] and [4]. paper[1] Telecommunication QoS. A Frame work and Definition authored by ITU-T Telecommunication standardization sector of ITU. Provides a uniform approach to QoS across ITU-T and eliminates the confusion resulting from different frame-works and inconsistent definitions, the group defines telecommunication QoS from four points of views QoS offered by provider, Customer's QoS requirements, QoS achieved by provider and QoS perceived by customer. paper [2] QoS for wireless/fixed communication systems authored by ITU Abdalkerim Amara propose QoS parameters classifications as follows 1\ service independent QoS parameters. 2\ Direct services QoS parameters. 3\ Store and Forward services QoS parameters. As well as [2] and paper [4] Definition of QoS parameters and their computation authored by GSMA proposed QoS parameter model. European telecommunication Standardization Institute (ETSI) document is the main reference of [3] and [4]. In [4] all addressed QoS parameters and their values are based on field measurements, as mentioned earlier, this group pass a considerable attention for QoS parameters computations and measurements. However, the group is mainly concerned with QoS uses from customs point of view.

III. GROUP B: TARGETING VALUES FOR TELECOMMUNICATION QoS PARAMETERS

Papers [8] Telecommunications Quality of Service Contractual indicators for Developing Countries authored by Ali MahgoubGaafar†, Gamal Amin Elsayed†, Diaeldin AwadElgamel†, Salih Yassin Salih , Tarig Shawgi Abdelrahma†, Amin Babiker A. Mustafa†, and Ismail El-Azhary and [9] Customizing Non-Utilization Telecommunications QoS Parameters for Developing Countries Based on the ITU-T E.803 Recommendation authored by Ali MahgoubGaafar†, Gamal Amin Elsayed†, Diaeldin Awad Elgamel†, Salih Yassin Tarig Shawgi Abdelrahma†, Amin Babiker A. Mustafa†, and Ismail El-Azhary are concerned with setting targeted values of telecommunication QoS parameters. [8] is running after setting targeted values of parameters in order to achieve end user satisfaction, that identified eight distinct categories of telecommunication QoS ,which based on end-to-end user perception.

The categories (performance targets) provide indications of the upper and lower boundaries for applications to be perceived as essentially acceptable to the users and to determine whether a bearer channel is qualified to carry a given application's data or not. In study Paper [9] Customizing Non-Utilization Telecommunications QoS Parameters for Developing Countries Based on the ITU-T E.803 Recommendation authored by Ali Mahgoub Gaafar†, Gamal Amin Elsayed†,DiaeldinAwadElgamel,SalihYassinTarigShawgiAbdelrahma†, Amin Babiker A. Mustafa†, and Ismail El-Azhary, proposes different measurable levels for QoS parameters expressed in terms time concerns for many services classification of measurement environments and reference values of parameters relevant to time are specified for many services.

IV. GROUP C: NON-UTILIZATION QOS OF ICT SERVICES

The main reference of this category is the Recommendation ITU-T E 803. Paper [5] End-User Multimedia QoS categories authored by ITU-T Telecommunication standardization sector of ITU , Paper[6] Definition of typical measurement profiles authored by ETSI and Paper[7] Recommendation E.803 Quality of Service parameters for supporting service aspect. authored by ITU-T Telecommunication standardization sector focuses on the area of Non-Utilization telecommunications QoS. Paper[5] End-User Multimedia QoS categories authored by ITU-T Telecommunication standardization sector of ITU is focusing only on non- utilization stage of telecommunication QoS and lists 88 parameters over the product life cycle of ICT service. The study provides the better benefits :- 1\ Enable customers and users of ICT services to compare performance of service providers 2\ QoS performance on non-utilization stages enables customers, regulator, stakeholders and service providers to monitor performance levels for the benefit of the customer and ICT industry. [6] proposes a new and updated trend for the contractual behavior taking into consideration many factors, such as customer legal level of contractual understanding, customer awareness level, safety considerations and governmental restrictions. The Authors of [7] Customizing Non-Utilization Telecommunications QoS Parameters for Developing Countries Based on their contribution the ITU-T E.803 Recommendation.

V. GROUP D: EVALUATING WIMAX QoS PARAMETERS

Paper [10] Improving QoS of all IP-Generation of Pre- WiMAX Networks using Delay–Jitter Model authored by H.Dahmouni, H.El ghazi, D.Bonacci,B.Sans and A.Givord Paper [12] Location base performance for WiMAX Network for QoS with optimal Base station. authored by Rakesh Kumar Jha , Idrisz Bholebawa , U. Pena . D.Dalal. Paper [13] Performance analysis of VoIP Traffic in WiMAX using various Service Classes authored by Tarik Anouari Abdelkarim Haqiq and Paper [17] Performance Evaluation of WiFi and WiMax Using Opnet authored by Garima Malik , Ajit Singh focusing on managements of WiMAX QoS parameters. Analytical model, Opent simulation, NS-2 simulator and statistical models were used respectively for measuring QoS parameters. The parameters addressed by the papers of this groups are throughput, delay and jitter. WiMAX throughput is higher in heavier traffic situations and queue delay is smaller than that of WiFi.

VI. GROUP E: WiMAX OPTIMIZATION USAGES

Papers [14] and [18] deal with WiMAX optimization usages with respect to data this adopted as presented by paper[14] while the deployment of master base stations to improve QoS , increase of coverage area and number of users as presented by paper [18], this is based on master slave model.In paper [14] simulation methodology Qualnet 6.1 is employed to compare between three QoS classes are Ntps, nrtps and ertps with respect to mobility.

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VII. GROUP F: IMPROVEMENT OF WiMAX PERFORMANCE

Paper [11] introduced algorithm for reducing handover latency, by selecting ideal capacities for neighboring base stations this is coupled with strengthening the required signal. Paper [15] author improved QoS in PMP mode WiMAX networks by investigating the efficiency of WFQ and DWRR scheduling at base station using Opnet simulator. paper[16] applies some sort of statistical model to monitor the QoS of WiMAX parameters based on minimum number of samples to gain fast analysis and save memory space.

VII. CONCLUSION

According to the categorized groups, it's clear that considerable effects of exerted towards it's improvement leads to optimizations of WiMAX QoS parameters.

The area of WiMAX QoS research is now mature in telecommunication services and applications but still there is need for further improvements and monitoring. This is due to it's mandated needs.

Setting and updating targeted values for WiMAX QoS parameters is necessary for improving , measuring and monitoring WiMAX QoS.

The present WiMAX ISP,s attitude is trending towards connectivity rather than coverage due to the main service providers competition.

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