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Performance Evaluation of Broadband in Sudan

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ABSTRACT

Broadband speed has emerged as the single most commonly cited metric for characterizing the quality of broadband offerings. However, speed measurements for the same service can vary significantly. These differences arise from a complex set of factors including different test methodologies and test conditions. For any testing methodology, teasing apart the end-to-end tests and attributing performance bottlenecks to constituent parts is technically challenging. While the broadband access network can be the bottleneck, significant bottlenecks arise in home networks, end users' computers, and server-side systems and networks. Consequently, inferences regarding how ISP delivered speeds compare with their advertised speeds need to be undertaken with careful attention to the testing methodologies employed. Many testing methodologies are inappropriate for the purposes of assessing the quality of a broadband network.

Keywords:- **Throughput, Evaluation, Broadband, Quality of Service.**

I. INTRODUCTION

The quality of service is considered as one of the most important means to support the development of the telecommunications sector, which gives clear indications for the extent of matching network operators with the required specifications while providing the possibility to take advantage of these networks in the techniques and future systems. Broadband Combines connection capacity (Bandwidth) and transmission capacity that is faster than primary rate, or to be more precise, integrated services digital network (ISDN) at 1.5 or 2.0 megabits per second [1].

This paper focuses on the quality of service standards and sets parameters for broadband quality of service, which is considered highly important to ensure acceptable and competitive service delivery.

The current situation for Broadband in Sudan An active complex system for quality of services is already in place with dedicated parameters for measurements and monitoring with regards to most of the offered services which lack broadband service. In addition, there are indicators to measure the quality of services and data short message services. Having said that, there is an absence of Broadband service measurements and monitoring.
Therefore, there is a strong need for broadband quality of service standards such as Key Performance Indicators (KPIs) and parameters, in addition to measuring and monitoring techniques.
There is a challenge for supportive standard indicators, which measure broadband services in order to be approved, applied by service providers and consequently confirmed by the regulator to meet customer satisfaction.
The proposed solution is to set broadband quality of service parameters with targeted values in addition to applying adequate measuring and monitoring techniques [3]. This paper is organized as follows a brief information about the whole research paper Section II is about the adopted methodology. Section III is the results and discussion of what has been done. Section IV represents the Conclusion, which was derived from the results that have been observed and provide recommendations.

II. METHODOLOGY

The methodology used in this paper to determine Key Performance Indicators (KPIs) and parameters for broadband is achieved by reviewing similar international experience of different countries for broadband quality of service, market indicators level of competition and regulatory aspects (For the relevant data visit the International Communication Union's website.) A filtering process will be applied to select countries that have similar indicators to Sudan. The average values of the quality of services and indicators for broadband will be extracted these will be the expected values for Sudan. Practical parameters evaluation will be

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handled throughout drive testing for the different operators under different situations.

Note: We named the service providers ZAIN, MTN and SUDANI with unordered A B and C for confidential requirements at the request of the national telecommunication corporation.

Quality of service measurement is a crucial aspect of this paper. Thus, it has to be emphasized that the tools being used for quality of service measurement and analyses are TEMS Investigation 13.0.1 and TEMS symphony.

Finally, all the result are compared to the international telecommunication union standards.

III. RESULT AND DISCUSSION

Table.1 File Transfer Protocol (FTP) Throughput For Three Service Provider

	Service Provider A		**Service Provider B**		**Service Provider C**	
	Ftp Data Transfer Success	Ftp Data Transfer Fail	Ftp Data Transfer Success	Ftp Data Transfer Fail	Ftp Data Transfer Success	Ftp Data Transfer Fail
1st Day	85	3	62	2	78	2
2nd Day	47	1	16	1	24	1
3rd Day	23	0	30	4	35	2

The packet loss of the three providers in two days shows that these providers have poor in their quality of service compare to the international telecommunication union database

Table.2 Average values of parameters from countries similar to Sudan

Indicator	**Average Targeted Value**
Latency	Data 250 ms Video 150 ms Audio 100 ms
Throughput	80.14 % of the subscribed speed
Download Speed	3.6 Mbps >> Steady State all 24 h
Upload Speed	1.8 Mbps >> Steady State all 24 h
Service Availability	96 %
Packet Loss	< 3 %

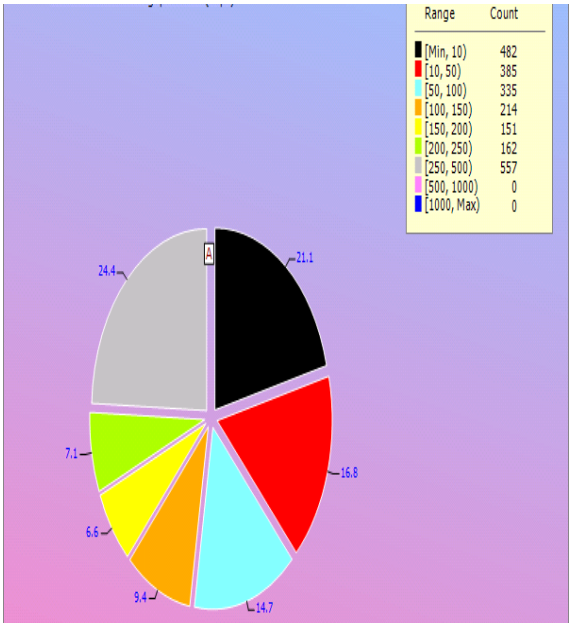

Figure. 1, data service File transfer protocol download throughput mean (Kbps) on the first day for Service provider A

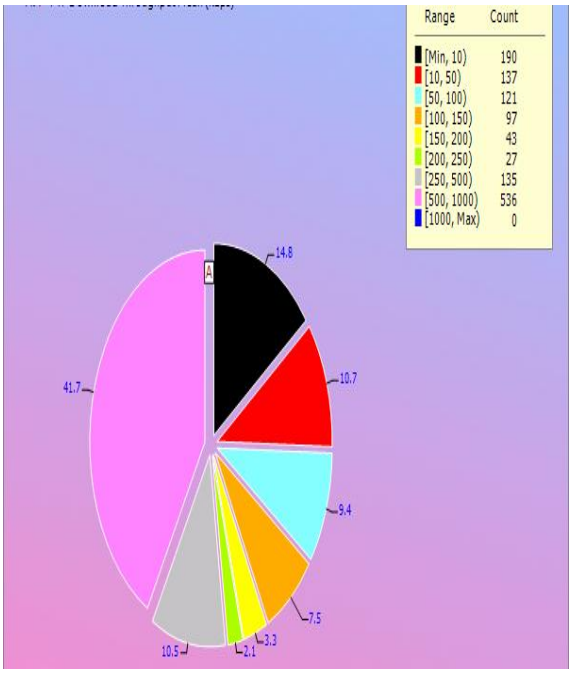

Figure. 2 data service File transfer protocol download throughput mean (Kbps) in the second day for Service provider A

The figures above show the system operating at low and medium speed, which indicates low performance and utilization of the system by provider A on both days of the test, compared to the expected figures gathered from the international telecommunication union database.

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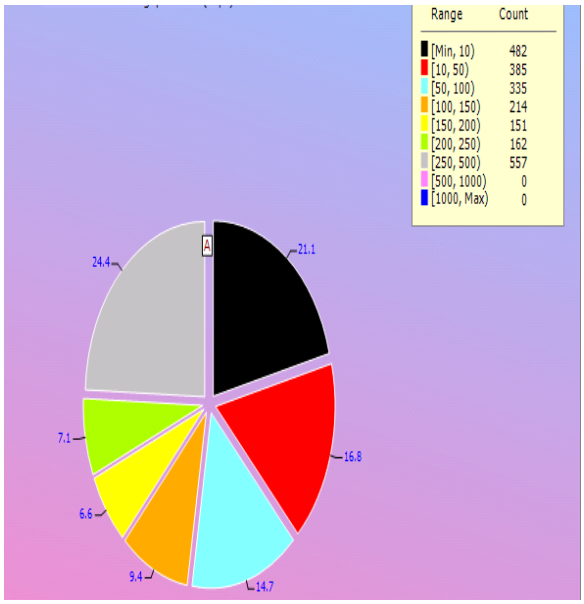

Figure. 3, data service File transfer protocol download throughput mean (Kbps) on the first day for Service provider B

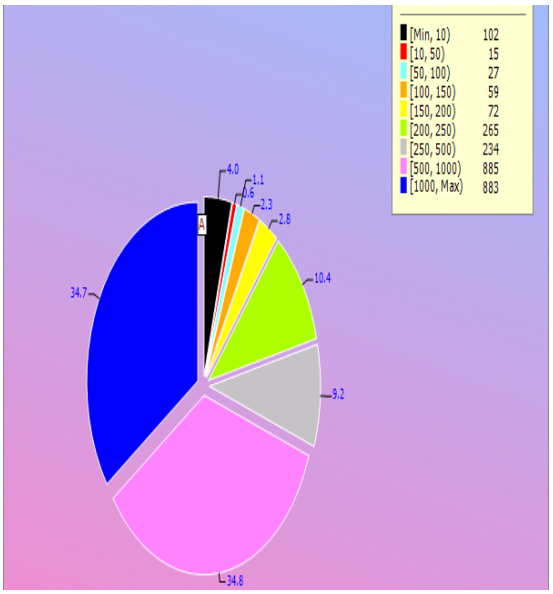

Figure. 5 File transfer protocol download throughput mean (Kbps) on the first day for Service provider C

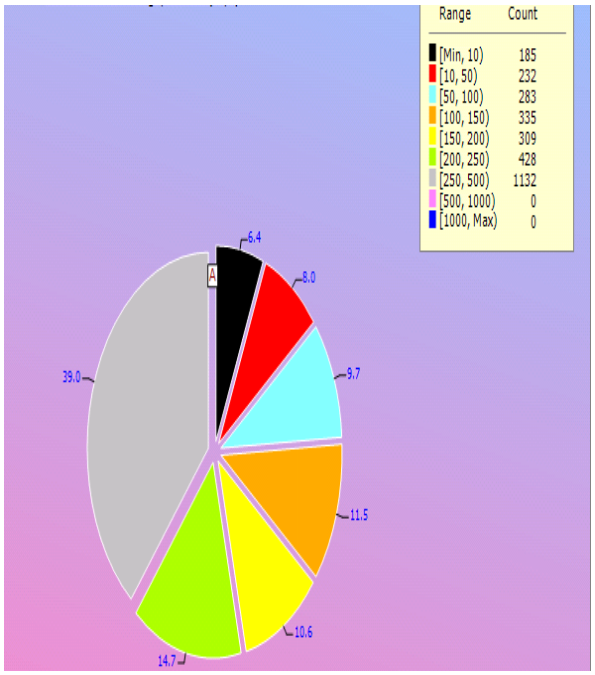

Figure. 4, data service File transfer protocol download throughput mean (Kbps) in the second day for Service provider B.

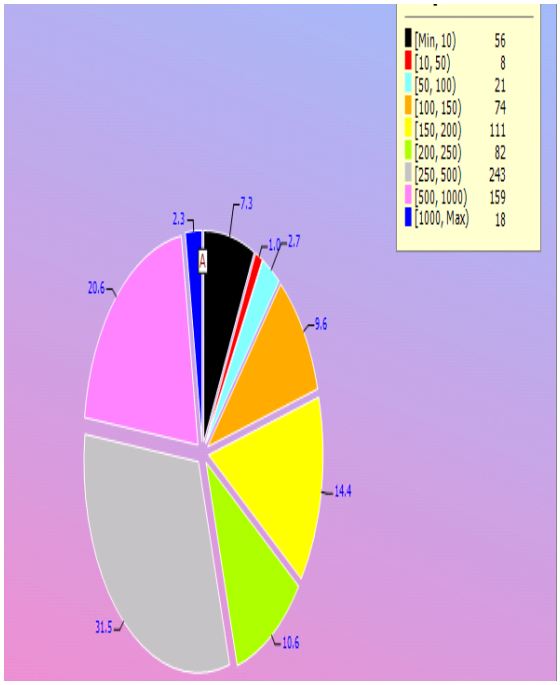

Figure. 6, data service File transfer protocol download throughput mean (Kbps) in the second day for Service provider C.

Similarly to provider A, the figures relating to provider B above make it clear, that the system which is operating at low and medium speed displays low performance and utilization of the system.

Service provider C shows some growth in the performance of its system, which is low and medium speed has respectively a higher performance and utilization of the system than provider A and B. However, compared to the data extracted from the international telecommunication union database, it is still performing worse than expected.

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IV. CONCLUSION

As a recommendation, the proposed broadband quality of service parameters is recommended to be approved by the regulatory authority. The drafted quality of service parameters should be applied and comforted with the performance of the operator's networks. The customized broadband parameters must be regularly assessed and adopted. The recommended broadband parameters should continually evolve with future techniques and systems. The existing quality of service measuring and monitoring techniques should be upgraded to fit proposed broadband parameters. The International Telecommunication Union's Key Performance Indicators (KPIs) weighing and filtering mechanism is recommended to be customized for similar required topics. Issuance of an updated reporting system for the broadband quality of service measurements is recommended. Deliverables of measurements should be benchmarked with those of the operators on a quality base. The comparative report on the broadband quality of service for the operators should be declared and published. The new parameters which came as a result of this paper and was based on the international KPIs should be raised and adopted by the relevant international organizations, such as ITU, IEEE, and ETSI in order to be evaluated and assessed.

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