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Quality of Service of Mobile Radio Network

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Abstract: ***The quality of services is the most important means of supporting the development of the telecommunications sectors, and given clear indications of the extent of matching networks of operators with the required specifications. To achieve the Quality of service you must gather accurate data and information on the reality of their services and quality of the underlying authority to issue and publish periodic reports on the quality of telecommunications service. as well as consumer awareness by these services through the establishment of the field campaigns to measure network performance and ensure compliance to the standard criteria. Radio network optimization is core to network operations today. TEMS Investigation captures the RF parameters in downlink and reports them in the customized format. These reports are used for optimizing the networks. In addition to traditional RF data, L2/L3 messages, and IP information collection and together with support for a wide range of services, makes TEMS Investigation the ideal choice for network operators. Measuring, testing and verification of QOS stated parameter by using the drive test method for a Certain areas of state of Khartoum.***

Keywords: wimax,,call,qos

1. Introduction

Drive Test Mobile System (DTMS): Is a technology used by telecom operators to measure, analyze and optimize their mobile networks It is considered as the basic tool to perform wireless network drive testing, benchmarking, monitoring, and analysis. Teams are the leading technology used by wireless operators to measure, analyze and optimize their mobile networks.

Radio network optimization is core to network operations today. TEMS Investigation captures the RF parameters in downlink and reports them in the customized format. These reports are used for optimizing the networks. In addition to traditional RF data, L2/L3 messages, and IP information collection and together with support for a wide range of services, makes TEMS Investigation the ideal choice for network operators.

Use TEMS Investigation to:
1) Tune and optimize networks.
2) Perform fault-tracing and wireless network troubleshooting.
3) Verify true terminal behavior with phone based measurements.
4) Verify cell coverage and capacity, as well as accessibility, retain ability, and integrity.

2. Methodology

The technique consists of using a motor vehicle containing mobile radio network air interface measurement equipment that can detect and record a wide variety of the physical and virtual parameters of mobile cellular service in a given geographical area. By measuring what a wireless network subscriber would experience in any specific area, wireless carriers can make directed changes to their networks that provide better coverage and service to their customers. Drive testing requires a mobile vehicle outfitted with drive testing measurement equipment. These equipment are usually highly specialized electronic devices that interface to OEM mobile handsets. This ensures measurements are realistic and comparable to actual user experiences. Drive test equipment typically collects data relating to the network itself, services running on the network such as voice or data services, radio frequency scanner information and GPS information to provide location logging.

The dataset collected during drive testing field measurements can include information such as:
a. Signal intensity.
b. Signal quality.
c. Interference.
d. Dropped calls.
e. Blocked calls.
f. Anomalous events.
g. Call statistics.
h. Service level statistics.
i. QoS information.
j. Handover information.
k. Neighboring cell information.
l. GPS location co-ordinates.

Drive testing can broadly be categorized into three distinct topics*:*

1. Network Benchmarking. 2. Optimization and Troubleshooting. 3. Service Quality Monitoring.

- **Drive test:** The NTC is committed to ensuring both quality and variety in telecommunication services throughout the Sudan. The NTC is also keep to ensure that the terms of licensees are well adhered. NTC has carried out a benchmarking survey of the GSM Mobile networks (2G) and services provided by mobile licensees (X, Y, and Z). The survey has covered OMDURMAN major roads in 4/7/14 June (12:00, 03:00) during working days. The NTC has performed about 150 voice test calls for each operators (2 minutes time duration) during the survey; Figures below illustrates the surveys drive test tools including (TEMS) Investigation Software , Maps Sony Ericsson W995 , GPS + Antenna , Laptop.

Figure 1: Devices used in drive test

3. Test

- **Service Coverage:** This is based on signal strength and refers to the network's ability in achieving a signal strength of -100 DB or higher (Rx Level is illustrated by figures for each Operator).

Table 1: The ranks of received signal values

Received signal in(db)	Rank
-10-70	**excellent**
-70-80	**Very good**
-80-90	**good**
-90-100	**fair**
-100-120	**poor**

- **Voice Quality:** The overall voice quality rate is equal to the average voice quality on the downlink and uplink which refers to the network's ability in achieving an acceptable level of voice quality using the Mean Opinion score (MOs) measure, note that a high Voice Quality Rate is desirable.

Table 2: **Desirable of Mean Opinion Score (MOS) measure**

Mos	Quality
5	**excellent**
4	**good**
3	**fair**
2	**poor**
1	**bad**

- **Call Setup Success Rate:** Call Setup success rate refers to the percentage of calls that are successfully set up and terminated as a percentage of the total call attempts. CSSR excludes dropped calls or calls that experience no network condition, low speech quality calls and calls with a long set up time.
- **Rx Quall:** Rx Quall is a value between 0 and 7, where each value corresponds to an estimated number of bit errors in a number of bursts.

Table 3: **Ranks for a number of bit errors**

Quality of received signal	***Bit error rate (BER)***	***Rank***
0	BER < 0.2%	Best
1	0.2% < BER < 0.4" i	|
2	0.4%<BER<0.8%	|
3	0.8% < BER <1.6%	|
4	1.6% < BER <3.2%	|
5	3.2% < BER <6.4%	|
6	6.4% < BER <12.8%	|
7	12.8% <BER	Worst

4. Results and Discussion

Table 4: Parameters result for operator x

Parameter	*No of event*	*Obtained value*	*References values*		
Call setup	131	99.25%	>98%	95-98%	<95%
Call drop rate	5	3.81%	<2%	2-10%	>10%
Handover success rate	281	98.57%	>96%	90-96%	<90%
Call block rate	1	0.75%	<2%	2-10%	>10%

Table 5: **Parameters result for operator y**

Parameter	*No of event*	*Obtained value*	*References values*		
Call setup	131	91.6%	>98%	95-98%	<95%
Call drop rate	7	5.34%	<2%	2-10%	>10%
Handover success rate	343	96.20%	>96%	90-96%	<90%
Call block rate	12	8.39%	<2%	2-10%	>10%

Table 6: **Parameters result for operator z**

Parameter	*No of event*	*Obtained value*	*References values*		
Call setup	140	92.57%	>98%	95-98%	<95%
Call drop rate	11	7.85%	<2%	2-10%	>10%
Handover success rate	486	96.9%	>96%	90-96%	<90%
Call block rate	11	7.43%	<2%	2-10%	>10%

5. Conclusion

We takes measures for quality of service and reads the networks of three operators in Khartoum Bahri Area using Drive test method and prove the below As per above 2G benchmarking in Khartoum Bahri city we have founded that QoS ranks . It has been leaded by X followed by Z and lasted by Y.

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