

# Quality of Service Parameters Evaluation for Real Time Traffic in Cellular Networks

Vandana Khare, M. Sudhakar

**Abstract:** Quality of Service (QoS) represents the quality measure in cellular service to users to provide an error free service with defined voice quality, minimum acceptable signal strength, limited call blocking and dropping probability even at high data transmission rates. RF Analysis and Optimization are important processes to attain Quality of Service, which are carried out by using Drive-test tool. RF performance parameters such as the received signal strength at user and Ratio of the necessary signal (data) to the interference present in the atmosphere are defined in this paper, for the efficient and effective functioning of the RF network of different service providers in a given service test area. We have also measured short-call and long-call control tests from the drive testing process to facilitate analysis of call success rate, blocked calls and dropped calls. Our analysis of the drive test results has helped us in identify problems like fewer throughputs, drop calls, handover failures in a service test area for different service providers.

**Keywords:** QoS, Call success rate, Call dropping rate, Call blocking rate, CQI

## I. INTRODUCTION

Quality of service (QoS) parameters in mobile gives tolerable check to the subscribers. The parameters of QoS is the combination of audio signal, low call blocking and dropping possibility, more data rates for multimedia signals and other uses. They show actual concert of mobile device, mostly as observed from the subscribers. QoS is normally calculated during signal transmission called KPIs that is connected to the subscriber's happiness whilst utilizing mobile services. They make easy mobile service providers to continue their services so that the subscriber's happiness is achieved. KPIs are calculated from dimensions of various mobile parameters. The KPIs used as principles in the estimation of QoS given by Mobile operators (MOs).

The opening of inexpensive elegant mobile devices with superior data achieve / send out rates, was mainly responsible for pleasing Nigeria addicted to the top four major African markets for the mobile communications. [Rao, 2011].

At present the basic mobile services such as creation / getting audio calls and SMS are no longer pricey. Mobile service providers allow Internet connectivity everywhere and at any of the time. This really gives speedy entrée to a number of services, Internet operators, educational environments, e-shopping, Internet browsing, TV screening, medium streaming etc [Presidential Committee on Broadband, 2012].

**Revised Manuscript Received on June 10, 2019.**

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From the user's side, there is a declaration of the effectiveness with admiration to the knowledge irrespective of the admission policy. However, in spite of the superior cell area and elevated technical restrictions, it is a common case that a user fails for occurrence of optimum performance due to the complexities connected with the mobile devices. The incapability to put up calls, unacceptable voice quality for the duration of calls, dropped calls, lost data packets or even reliable data network ease of use are some of the problems have to bear with and frequently period pay for.

## II. QOS PARAMATERS EVALUATION

Quality of service (QoS) refers to a network's performance to attain highest bandwidth and deal by new network performance similar to latency, error rate and throughput. Quality of service parameter are also responsible for managing network resources by fixing priorities for specific types of data (video, audio, files) in the network. QoS is totally applied to network traffic generated for video on demand, IPTV, VoIP, streaming media, videoconferencing and online gaming.

In packet-switched telecommunication services, quality of service refers to traffic prioritization and resource reservation control techniques rather than the achieved service quality. There are following QoS parameters are required to maintain high-quality of signal through transmission.

### 1. Call Setup Success Rate (CSSR):

The CSSR indicates the probability of successful calls initiated by the MS (Mobile Station). The CSSR is an important key performance indicator for evaluating the network performance. If it is low the subscribers are not likely to make calls successfully. The user experience is thus affected. CSSR can be calculated using the following formula

### 2. Drop Call Rate (DCR):

Drop Call Rate is defined as the number of calls dropped during a call process. RF drop mostly occurs due to poor dominance or interference. Poor coverage could lead to Inter System Handover although due to high interference the Handover can fail. This leads to Active Set update failure and the call is dropped eventually.

### 3. RSCP (Received signal code power):

It denotes the power measured by a receiver on a particular physical communication channel. It is used as an indication of signal strength.

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## 4. Ec/Io(Carrier to Interference Ratio):

It is the ratio of the received energy per chip to the in

## 5. BCR(Block Call Rate)

It is defined as the number of calls blocked due to non availability of the network resources.

## 6. CQI :

It represents the Radio network channel quality. It is an indicator carrying the information on how good/bad the communication channel quality is.

## III. QOS ANALYSIS

Drive test is a method of measuring and assessing the coverage, capacity and Quality of Service (QoS) of a mobile radio network. Drive Test is the procedure to perform a test while driving. Drive testing requires a mobile vehicle outfitted with drive testing measurement equipment.

The equipment are usually highly specialized electronic devices that interface to mobile handsets. This ensures measurements are realistic and comparable to actual user experiences.

### 3.1 Implementation Procedure

#### HARDWARE REQUIREMENTS-

2 Mobile Phones – For placing a short call and a long call with GPS – For finding the latitude and longitude of the location where the samples are being taken along with that one Laptop – To record the data into the software also one Data Card/ Modem – To TEST the downlink speeds as well as Dongle - Security Key , with all these one motor vehicle.

#### SOFTWARE USED

JDSU E6474A – It is the drive test software to record and analyze the samples for measuring various QoS parameters. Initially, we have to connect all the components to the laptop. Then, we have open the E6474A software and create a new project. Next, we have to add all the Hardware components in the sequencer. Then, we implement two test i) Call Control Test – For Long call and Short Call analysis ii) FTP Test – For data rates analysis. After that, we configure the properties of the test. Finally, we load the maps and data items into the workspace and run the drive test in Log mode.

## IV. RESULT

The theoretical results were obtained by using **Drive Test Analysis for QoS measurement in Cellular Network Bench Marks of TRAI**. Every leading network service provider in the market should follow the Benchmarks by the “TELECOM REGULATORY AUTHORITY OF INDIA”. A network is said to be good if it satisfies the benchmarks of TRAI. HerethefollowingParametersare obtained.

- TRAI Bench Marks for QOS PARAMETERS
- Call Setup Success Rate(CSSR) : > 95%
- Drop Call Rate (DCR) : < 3%
- Blocked Call Rate (BCR) : < 2%
- Received Signal Code Power(RSCP) : >-85dBm
- Signal to Interference Ratio(Ec/Io) : -7 to -10
- Latency : <250msec
- Handover Success Rate : > 98%

## MATHEMATICAL CALCULATIONS

### 1. CSSR(Call Setup Success Rate)-

- CSS(Call Setup Success Rate) is the ratio of the number of calls connected successfully to number of attempts to make a call.

$$CSSR = \frac{\text{No. of calls successful}}{\text{No. of calls established}} * 100$$

$$CSSR = \frac{8}{10} * 100 = 88.88 \%$$

### 2. Dropped Call Rate-

DCR(Dropped Call Rate): It is defined as number of calls dropped during a call process.

$$DCR = \frac{\text{No. of calls dropped}}{\text{No. of calls Established}} * 100$$

$$DCR = \frac{1}{9} * 100 = 11.11\%$$

### 3. Blocked Call Rate-

BCR(Blocked Call Rate): It is defined as number of calls blocked during a call process.

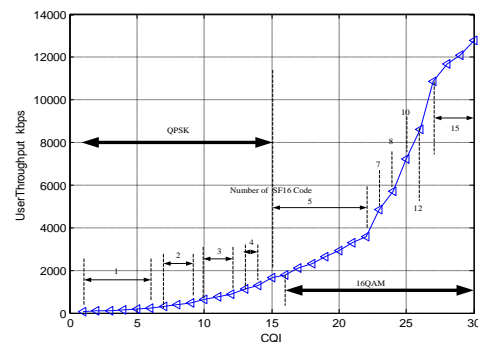
$$BCR = \frac{\text{No. of calls Blocked}}{\text{No. of calls Attempted}} * 100$$

$$BCR = \frac{8}{17} * 100 = 47.05\%$$

### 4. Channel Quality Indicator(CQI) –

The CQI value ranges from 0 ~ 30.

30 indicates the best channel quality and 0,1 indicates the poorest channel quality.



## COMPARATIVE RESULT-

S.No.	Parameters	BSNL	AIRTEL	IDEA
1.	No. Of calls attempted	12	17	15
2.	No. Of Good Calls	12	8	9
3.	No. Of Blocked Calls	0	8	4
4.	No. Of Dropped Calls	0	1	2
5.	Call Setup Success Rate(CSSR)	100%	88.88%	81.81%
6.	Dropped Call Rate(DCR)	0%	11.11%	18.18%
7.	Blocked Call Rate(BCR)	0%	47.05%	26.66%
8.	Call Duration	40 sec	60 sec	60 sec
9.	Inter Call Ideal Time	40 sec	40 sec	40 sec
10.	Latency	2177 msec	243 msec	111 msec



## V. CONCLUSION

Proposed technique focused on measuring QoS parameters with the help of drive tool test by user cell from beginning to end JDSU E6474A software. We know that success of any network depends on its three factors: coverage, capability and Quality of Service. In our proposed work these three factors are analyzed using the software tool JDSU E6474A by performing drive test. The main motive is to identify the difficulty in the set-up through measurement of different Quality of Service parameters for special mobile users and investigate the troubles in the Gachibowli area from the drive test outcome. Amongst all the BSNL service contributor is given that the best services to audio and Idea service supplier is given the best services for the audio, video and data services in the Gachibowli Area. Therefore by successfully performing the Drive Test, the QoS, consistency and accessibility of RF Coverage region will be extremely enhanced resulting in more customers and more income for the cellular service providers in upcoming days.

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