



# বাংলাদেশ টেলিযোগাযোগ নিয়ন্ত্রণ কমিশন

আইইবি ভবন, রমনা, ঢাকা-১০০০, বাংলাদেশ।


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২২ আগস্ট, ২০১৭ খ্রিঃ

## বিষয়ঃ Directives on Quality of Service (QoS) for Cellular Mobile Telecom Operators জারী করণ প্রসঙ্গে।

উপর্যুক্ত বিষয়ের প্রেক্ষিতে নির্দেশিত হয়ে জানানো যাচ্ছে যে, টেলিকম সেবার গুনগত মান বৃদ্ধি ও টেলিকম অপারেটরদের প্রদত্ত সেবাকে আরও জবাবদিহিতা মূলক ও গ্রাহককেন্দ্রিক করার লক্ষ্যে Directives on Quality of Service (QoS) for Cellular Mobile Telecom Operators জারী করা হলো, যা অনতিবিলম্বে কার্যকর করার জন্য সংশ্লিষ্ট সকলকে নির্দেশনা প্রদান করা হলো।

সংযুক্তিঃ বর্ণনামতে ১১ (এগার) পাতা।

  
22/8/2017

(মোঃ গোলাম রাজ্জাক)

পরিচালক

ইঞ্জিনিয়ারিং এন্ড অপারেশনস্ বিভাগ

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বিতরণঃ

চেয়ারম্যান/ব্যবস্থাপনা পরিচালক/প্রধান নির্বাহী কর্মকর্তা, সকল Cellular Mobile Telecom অপারেটর।

অনুলিপিঃ

১. মহাপরিচালক (সকল), বিটিআরসি।
২. পরিচালক, প্রশাসন, বিটিআরসি (ওয়েবসাইটে প্রকাশের ব্যবস্থা গ্রহণের জন্য)।
৩. চেয়ারম্যান মহোদয়ের একান্ত সচিব, বিটিআরসি (ইহা চেয়ারম্যান মহোদয়ের সদয় অবগতির জন্য)।
৪. ভাইস-চেয়ারম্যান ও কমিশনার মহোদয়গণের ব্যক্তিগত কর্মকর্তা, বিটিআরসি (ইহা মহোদয়গণের সদয় অবগতির জন্য)।
৫. অফিস কপি।



# Bangladesh Telecommunication Regulatory Commission

IEB Bhaban, Ramna, Dhaka-1000, Bangladesh.

## Directives on Quality of Service (QoS) for Cellular Mobile Telecom Operators

### 1. Introduction

- 1.1 In general terms, Quality of Service (QoS) refers to the ability of a network or service to satisfy the end user. QoS is defined in ITU-T Recommendation E.800 as “the collective effect of service performances, which determine the degree of satisfaction of a user of the service”. QoS therefore concerns aspects of services that users experience directly.
- 1.2 Growing concerns on various QoS parameters specially Call Drop, Call Quality and Data Throughput have been observed recently. With the increase of the subscriber base, customer's dissatisfaction is increasing and complains against the network are also increasing.
- 1.3 To ensure a level playing field along with a competitive environment and subscriber satisfaction, performance measurement with a common standard in regards to the QoS is a must. QoS parameters can be measured both from network monitoring terminals and field survey through Drive Test and Customers' opinion should also be taken into consideration in this regard.
- 1.4 Article 30 of the Bangladesh Telecommunication Regulation Act, 2001 (amended) addresses the specific functions and duties of the Commission related to service quality and consumer protection and directs the Commission:
  - a) To protect the interests of the local consumers in respect of the charges imposed on them, and their access to telecommunication services, and the quality and variety of such services.
  - b) To maintain and promote competition among the service providers in order to ensure high-quality telecommunication services.
- 1.5 The Bangladesh Telecommunication Act, 2001 (amended) grants the Commission the power to issue directives in any matter which the Commission deems necessary to implement the Telecommunication Act.

22 AUG 2017



## 2 Objectives

The objectives of these directives are:

- To create conditions for customer satisfaction by making known the quality of service which the Cellular Mobile Telecom Operator is required to provide and the user has a right to expect;
- To measure the Quality of Service provided by the Cellular Mobile Telecom Operators from time to time and to compare them with the benchmarks so as to assess the level of performance;
- To protect the interests of local consumers of Cellular Mobile Telecommunication Services; and
- To promote competition among the Cellular Mobile Telecom Operators in order to ensure high-quality telecommunication services.

NOW, the Commission doth hereby issue the instant DIRECTIVE, namely Directives on Quality of Service (QoS) for Cellular Mobile Telecom Operators.

## 3 Quality of Service (QoS) Standards

3.1 Every Cellular Mobile Telecom Operator shall meet and monitor the following Quality of Service benchmarks:

Table 1: QoS Parameters for Cellular Mobile Telecom Operators (2G Technology):

Sl. No	QoS Parameters	Benchmarks	Averaged over a period of
1	<b>CS KPI</b>		
1.1	Call setup success rate	$\geq 97\%$	One Month
1.2	Congestion due to SDCCH/Paging Channel(for CDMA)	$\leq 1\%$	One Month
1.3	Congestion due to TCH	$\leq 2\%$	One Month
1.4	Call drop rate	$\leq 2\%$	One Month
2	<b>PS KPI</b>		
2.1	EGPRS/CDMA 1X User Throughput (LLC layer)	DL $\geq 80$ Kbps UL $\geq 20$ Kbps	One Month
3	<b>SMS Service</b>		
3.1	Completion Rate for SMS service	$\geq 98\%$	One Month
4	<b>Operational KPI</b>		
4.1	Accumulated Down Time of BTSs	$\leq 1\%$	One Month

**Table 2: QoS Parameters for Cellular Mobile Telecom Operators (3G Technology):**

Sl. No	QoS Parameters	Benchmarks	Averaged over a period of
1	<b>CS KPI</b>		
1.1	CS RAB setup success rate	$\geq 97\%$	One Month
1.2	RRC Congestion (CS+PS Combined)	$\leq 1\%$	One Month
1.3	RAB Congestion (CS+PS Combined)	$\leq 2\%$	One Month
1.4	Circuit Switched Voice Drop Rate	$\leq 2\%$	One Month
2	<b>PS KPI</b>		
2.1	HSDPA Access Success Rate	$\geq 95\%$	One Month
2.2	HSPA User throughput	DL $\geq 512$ Kbps After 1 year : DL $\geq 768$ Kbps UL $\geq 50$ Kbps After 1 year : UL $\geq 70$ Kbps	One Month
3	<b>Operational KPI</b>		
3.1	Accumulated Down Time of Node Bs	$\leq 1\%$	One Month

**Table 3: QoS Parameters for Cellular Mobile Telecom Operators (Drive Test):**

Sl. No	QoS Parameters	Benchmarks
1	Service Coverage	For Out-door Coverage: All City Corporations $\geq -80$ dBm Rest area $\geq -90$ dBm
2	MOS	$\geq 3.5$
3	Call Setup Time	$\leq 7$ sec
4	CSSR	$\geq 97\%$
5	Call Drop Rate	$\leq 2\%$
6	Data Throughput (FTP)	DL (3G) $\geq 2$ Mbps; UL (3G) $\geq 128$ Kbps DL (2G) $\geq 160$ Kbps; UL (2G) $\geq 40$ Kbps

- 3.2 Every Cellular Mobile Telecom Operator shall meet the Quality of Service standard for entire service area and different sub-service area levels, namely Overall Network, Every individual City Corporation area level and rest of the licensed areas in Bangladesh separately in respect of each parameter specified in tables, namely Table 1 and Table 2.

  
22 AUG 2017





## Bangladesh Telecommunication Regulatory Commission

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- 3.3 BTRC may on random basis for any zone/area/sub-service area/node and according to complaint(s) regarding QoS issues on a specific zone/area/node, from time to time, through audit and Drive Test conducted either by its own officers or employees or through an agency appointed by it, verify and assess the performance by the Cellular Mobile Telecom Operator of the Quality of Service benchmarks of each parameter for the Cellular Mobile Telephone service specified in clause 3.1. Benchmarking modality and parameter definition shall be according to the definition specified in clause 11.
- 3.4 In respect of each parameter specified in table, namely Table 3, the service provider shall :
- Measure the parameters through drive tests of the Cellular Mobile Network at periodic intervals and take remedial action to address problems related to coverage, MOS, Call Setup Time, CSSR, Call drop, Data Throughput etc. revealed during such drive tests;
  - Submit compliance report to the Commission in every half-yearly period for the following areas:
    - All city corporation Areas, District and Upazilla headquarters of Bangladesh.
    - All main Roads connecting districts, major Railways and major River ways (defined by BIWTA) of Bangladesh.
    - All Public Universities, Major Hospitals, Airports, Land Ports, Sea ports and Cantonments of Bangladesh.
  - Submit compliance report for any area as may be specified by BTRC for QoS measurement from time to time.
  - The Commission may, through drive tests of the Cellular Mobile Network conducted either by its own officers or employees or through an agency appointed by it or through joint drive tests with the service provider, assess the quality of the service, and the service provider shall facilitate such drive tests. In respect of a drive test conducted by the Commission either by its own officers or employees or through an agency appointed by it, the service provider shall submit to the Commission :
    - Its action plan for removal of the shortcomings or deficiencies in any sub-service area, if the Commission notifies the service provider about such shortcomings or deficiencies.
    - Its final compliance report within such time limit as indicated in the action plan or such reduced time limit as may be indicated by the Commission in response to the action plan of the service provider.

  
22 AUG 2017

- 3.5 With specific order from Government or Ministry for implementing an imposition relating QoS, mobile network operators are bound to accommodate all necessary measures accordingly.
- 3.6 During any natural disaster, strikes, war, riots, power outage etc the fulfillment of QoS directives may be relaxed for the affected areas until the situation become normal.

## 4 Record Keeping

- 4.1 Every Cellular Mobile Telecom Operator shall preserve complete and accurate records required to find the value of each quality of service parameter specified in clause 3.1 for at least 01(one) year after submission of the report to the Commission.
- 4.2 For the Drive Test KPIs specified in Table-3 of clause 3.1, Drive Test log and MapInfo tab shall be stored and for the network KPIs specified in Table-1 and Table 2 of clause 3.1, original system generated file shall be stored without modification for the period specified in clause 4.1.
- 4.3 The Commission may, if required, direct any of its staff or an agency appointed by the Commission for the purpose, to inspect or to audit the records maintained by the Operators against each parameter under this directive or to get such records inspected or audited to ensure compliance of the provisions of these directives at any time.

## 5 Reporting

- 5.1 Every Cellular Mobile Telecom Operator shall submit to the Commission monthly reports on its compliance with each of the QoS standards specified in tables, namely Table-1 and Table 2 of clause 3.1 within the first 10 (ten) days at the end of each month in the format specified by the Commission.
- 5.2 In respect of each parameter specified in table, namely Table 3, the half-yearly reports shall be submitted to the commission respectively from 1st July, 1st January, but not later than 21 days counting from the specified dates. The Commission may review from time to time the periodicity and the format of such report.

## 6 Publication

- 6.1 The Commission may publish the following records, in such manner and format, as may be decided by the Commission from time to time:
- a. Compliance reports about benchmarks of each Quality of Service parameter reported to the Commission by the service providers in accordance with these directives.





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- b. Results of the audit and Drive Test undertaken by the Commission or its authorized agency.
- c. Results of the customer satisfaction surveys undertaken by the Commission through its website or through media for the information of the general public.

- 6.2 Every Mobile Operator shall publish, for the information of the consumers, its performance with respect to the benchmark of Quality of Service parameter specified in these directives in such a manner and in such format, as may be directed by the Commission from time to time.
- 6.3 BTRC may publish the ranking of the operators in terms of QoS from different evaluation processes such as Customer Survey, Results of the audit, Drive Test and the self-reporting of the operators through its website or media to raise public awareness and to push the operators for better quality.

## 7 Review

- 7.1 The Quality of Service parameters specified in these directives may be revised by the Commission from time to time.
- 7.2 The Commission, on reference from any affected party, and for good and sufficient reasons, may review and modify these directives.

## 8 Repealing

- 8.1 Interim Directives on Quality of Service for Mobile Operators, Reference no. BTRC/E&O/21-1/2013/115; dated 21-01-2014, is hereby repealed.
- 8.2 Nevertheless such repeal, anything done or any action taken under the said interim directives shall be deemed to have been done or taken under the corresponding provisions of these directives.

## 9 Interpretation

In case of any doubt regarding interpretation of any of the provisions of these directives, the clarification of the Commission shall be final and binding.

## 10 Legal Action

The Commission may impose appropriate legal action for the violation of any of the provisions of these directives.



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## 11. Definitions

### 11.1 2G CS KPI

Every Cellular Mobile Operator shall calculate the value of following 2G PS KPIs on PS NBH (Network Busy Hour) to meet benchmark specified in clause 3.1.

#### a. Call Set-up Success Rate

Call set up success rate = Total number of Established calls in Traffic Channel multiplied by 100 and divided by total number of call Attempted for Traffic Channel.

#### b. Congestion due to SDCCH

This parameter denotes congestion in the network due to non-availability of signaling channel known as Standalone Dedicated Control Channel (SDCCH) in respect of GSM network or paging channel in respect of CDMA network. This is defined as under:

SDCCH = Total number of all type of SDCCH Assignment Failure multiplied by 100 and divided by total number of all type of SDCCH Assignment Attempt.

#### c. Congestion due to Paging Channel

This parameter denotes congestion in the network due to non-availability of signaling channel known as paging channel in respect of CDMA network. This is defined as follows:

Paging Congestion = Total number of all type of Paging Assignment Failure multiplied by 100 and divided by total number of all type of Paging Assignment Attempt.

#### d. Congestion due to TCH

This parameter denotes congestion in the network due to non-availability of Traffic Channel (TCH). This is defined as follows

TCH Congestion = Total number of all type of TCH Assignment Failure multiplied by 100 and divided by total number of all type of TCH Assignment Attempt.



## e. Call drop rate

This parameter Call drop rate is determined by following equation:

Call Drop Rate = TCH Abnormal Release / (TCH Normal Release+ TCH Abnormal Release) multiplied by 100.

## 11.2 2G PS KPI

Cellular Mobile Operators shall calculate the value of following 2G PS KPIs on PS NBH to meet benchmark specified in clause 3.1.

### a. EGPRS User Throughput (LLC layer)

This measurement provides the TBF throughput of downlink EGPRS. The throughput is equal to the number of received/transmitted bytes divided by the received/transmission duration in EGPRS TBF for GSM cells.

## 11.3 Completion Rate for SMS service

Completion Rate of SMS = Number of successfully delivered SMS from SMSC multiplied by 100 and divided by the number of successfully submitted SMS to SMSC excluding subscriber Behavior.

Subscriber behavior related failures (absent subscriber, Exceeded Memory capacity, IMSI detachment, busy MS while receiving another SMS, Barred subscriber, Deregister in HLR, Error in MS, No credit and invalid destination numbers) shall be excluded from calculation as it is beyond the control of the service providers.

## 11.4 3G CS KPI

Cellular Mobile Operators shall calculate the value of following 3G CS KPIs on CS NBH to meet benchmark specified in clause 3.1.

### a. CS RAB setup success rate

Call Setup Success Rate is a ratio of Established Calls to Call Attempts.



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For establishing a call in 3G Networks, User Equipment (UE) accesses the Universal Terrestrial Radio Access Network (UTRAN) and establishes an RRC connection. Once RRC connection is established the Non Access Stratum (NAS) messages are exchanged between the UE and the Core Network (CN). The last step of the call setup is the establishment of a Radio Access Bearer (RAB) between the CN and the UE. For establishing a call in 3G Networks, call setup is the establishment of a Radio Access Bearer (RAB) between the CN (Core Network) and the UE (User Equipment) by total RAB attempts.

$$\text{RAB Setup Success Rate} = \text{RAB Assignment Success} / \text{RAB Assignment Request} \times 100\%$$

### b. RRC Congestion

This 3G parameter is same as signaling channel congestion in 2G Networks.

$$\text{RRC Congestion} = \text{Total number of all type of RRC Assignment Failure multiplied by 100 and divided by total number of all type of RRC Assignment Attempt.}$$

### c. RAB Congestion

This 3G parameter is same as Traffic Channel congestion in 2G Networks.

$$\text{RAB Congestion} = \text{Total number of all type of RAB Assignment Failure multiplied by 100 and divided by total number of all type of RAB Assignment Attempt.}$$

### d. Circuit Switched Voice Drop Rate

In 3G Networks, a normal disconnect is initiated from the Mobile Switching Centre (MSC) at completion of the call by a RAB Disconnect message. An abnormal RAB disconnect can be initiated by either UTRAN or CN and includes Radio Link Failures, Uplink (UL) or Downlink (DL) interference or any other reason. The Circuit Switched Voice Drop Rate (CSV Drop Rate) is given by the following equation:

$$\text{Circuit Switched Voice Drop Rate} = \text{CS RAB Abnormal Release} / (\text{CS RAB Normal Release} + \text{CS RAB Abnormal Release}) \text{ multiplied by 100.}$$

  
22 AUG 2017



## 11.5 3G PS KPI

Cellular Mobile Operators shall calculate the value of following 3G PS KPIs on PS NBH to meet benchmark specified in clause 3.1

### a. HSDPA Access Success Rate

DL HSPA Access Success Rate = Total number of successful DL HSPA establishment multiplied by 100 and divided by total number of DL HSPA establishment Attempt.

### b. HSPA User throughput

This parameter is intended for measuring user perceived DL/UL HSPA throughput.

## 11.6 Operational KPI

### a. Accumulated Down Time of BTSs

BTSs accumulated downtime (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation.

BTSs accumulated downtime (not available for service) = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month X 100/ (24 X No. of days in the month X No. of BTSs in the network in the licensed service area)

### c. Accumulated Down Time of Node Bs

Node Bs accumulated downtime (not available for service) shall basically measure the downtime of the Node Bs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation.

## 11.7 Drive Test KPI

The service provider shall measure the following KPs through drive tests of the Cellular Mobile Telecom Network at periodic intervals and take remedial action to address problems.

### a. Service Coverage

This parameter is intended for measuring the coverage in terms of the received signal strength in areas where the service provider has commissioned the service.



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### b. MOS

The degree of speech quality that a listener perceives at the terminal with a talker at the other end can be found from MOS value. Measurement will be based on PESQ or POLQA Algorithm (ITU-T P.862 or ITU-T P.863).

MOS	Excellent	Good	Fair	Poor	Bad
Score	5	4	3	2	1

### c. Call Setup Time

This parameter defines the time taken from pressing the send button of Mobile Set (MS) to getting the ring back tone.

### d. CSSR

CSSR (Call Setup Success Rate) is a ratio of Established Calls to Call Attempts.

### e. Call Drop Rate

Call Drop= Call Abnormal Release / (Call Normal Release+ Call Abnormal Release)

### f. Data Throughput

Data Throughput shall be measured using File Transfer Protocol by uploading and downloading specific file from monitoring terminal to FTP server installed at any external network.

## 12 Commencements

These directives shall come into force on the date of its signature.

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### Distribution:

1. Managing Director/Chief Executive Officer/Chief Technical Officer Cellular Mobile Operators (all).
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