

قرار رقم ٢٠١١/٢٢

بإصدار الإرشادات الخاصة بتعريف وقياس مؤشرات جودة الخدمة

استنادا إلى قانون تنظيم الإتصالات الصادر بالمرسوم السلطاني رقم ٢٠٠٢/٣٠،
وإلى اللائحة التنفيذية لقانون تنظيم الإتصالات الصادرة بالقرار رقم ٢٠٠٨/١٤٤،
وإلى القرار رقم ٢٠١١/ ١٣ بإصدار ضوابط وقواعد متطلبات جودة الخدمة التي يلتزم
المرخص له بتقديمها،
وإلى موافقة الهيئة بجلستها المنعقدة في ١٥ يناير ٢٠١١،
وبناء على ما تقتضيه المصلحة العامة.

تقرر

المادة الأولى : يلتزم المرخص لهم في شأن العمل بضوابط وقواعد متطلبات جودة الخدمة
التي يلتزم المرخص له بتقديمها بالإرشادات المرفقة.

المادة الثانية : يعمل بهذا القرار اعتبارا من تاريخ صدوره.

صدر في: ٣ / ربيع الآخر / ١٤٣٢هـ
الموافق: ٨ / مارس / ٢٠١١م

محمد بن ناصر الخصيبي
رئيس هيئة تنظيم الإتصالات

الارشادات الخاصة بتعريف وقياس مؤشرات جودة الخدمة

المرفقة بالقرار رقم (٢٠١١/٢٢)

1. Percentage of Dropped Calls:

1.1 Description:

Dropped Calls are the Calls that cannot be completed due to a technical problem with the operator's network. The dropped call ratio is the proportion of incoming and outgoing calls which, once they have been assigned a traffic channel, are dropped or interrupted prior to their normal completion by the user, with the cause of the early termination being within the operator's network.

1.2 Measurement Method:

This quality indicator should be measured by analysis of real traffic taken from network equipment. When using the real traffic method, the measurement must be made via an automatic data collection system, based on the network counters which register the real traffic of the network. The network counters collect information for 24 hours a day, every day of the year. The number of dropped calls due to technical problems (such as signaling) should be recorded as a proportion of the total number of calls observed during the measurement period. Measurements should be conducted over a period long enough to ensure statistical significance and should accurately reflect traffic variations over the hours of a day, the days of the week and any particular call affecting events. In particular, specific problem period such as the busy hour must be represented in the measure: 30% of measures should be taken during the busy hour. The measurements of this key performance indicator should take the following into consideration:

a) Measurements should be based on the overall performance of all cell sites under each BSC/MSR/RNC (for 3G Network) separately. b) The report should provide both an overall measure and a measure for each BSC/MSR/RNC (for 3G Network) as applicable. c) It is further suggested that at least one set of measurements be carried out at BTS level each month though no threshold is being defined for the present and data be reported to TRA also.

This Quality Indicator should be reported on a Quarterly period basis.

2. Percentage of Blocked Calls:

2.1 Description:

Blocked Calls are the Calls that cannot be completed due to insufficient available capacity in the operator's network. The blocked call ratio is the proportion of outgoing calls that cannot be completed because the required network resources are not available when the call is made.

All operators should build a level of contention into their networks and blocking is an inevitable, but controllable consequence.

2.2 Measurement Method:

This quality indicator should be measured by analysis of real traffic taken from network equipment. When using the real traffic method, the measurement must be made via an automatic data collection system, based on the network counters which register the real traffic of the network. The network counters collect information for 24 hours a day, every day of the year. The number of blocked calls due to technical problems (such as signaling) should be recorded as a proportion of the total number of calls observed during the measurement period. Measurements should be conducted over a period long enough to ensure statistical significance and should accurately reflect traffic variations over the hours of a day, the days of the week and any particular call affecting events. In particular, specific problem period such as the busy hour must be represented in the measure: 30% of measures should be taken during the busy hour. The measurements of this key performance indicator should take the following into consideration:

- a) Measurements should be based on the overall performance of all cell sites under each BSC/MSC/ RNC (for 3G Network) separately.
- b) The report should provide both an overall measure and a measure for each BSC/MSC/ RNC (for 3G Network) as applicable.
- c) It is further suggested that at least one set of measurements be carried out at BTS level each month though no threshold is being defined for the present and data be reported to TRA also.

This Quality Indicator should be reported in a Quarterly period basis.

3. Handover Success Rate:

3.1 Description:

This Key Performance Indicators measure the successful handover of a mobile call from one cell to another. A successful call handover is one that allows a customer to continue his session without the need to re-establish a network connection. It is assumed that the handover of a call from one cell to another should be supported for speeds up to driving speed.

3.2 Measurement Method:

This quality indicator should be measured by analysis of real traffic taken from network equipment. The measurement should cover all kinds of Handovers (Cell – Cell), (BTS – BTS), (MSC – MSC) ...etc

The measurement must be made via an automatic data collection system, based on the network counters which register the real traffic of the network. The network counters

collect information for 24 hours a day, every day of the year the number of successful handovers should be recorded as a proportion of the total number of call handovers requests observed during the measurement period. Measurements should be conducted over a period long enough to ensure statistical significance and should reflect accurately traffic variations over the hours of a day, the days of the week and any particular call affecting events, such as poor radio coverage. In particular, specific problem period such as the busy hour must be represented in the measure: 30% of measures should be taken during the busy hour. This key performance indicator should be reported on a Quarterly basis.

4. Call Success Rate

4.1 Description:

A successful call is a call attempt that involves dialing a complete valid number that encounters no network problems. And results in an answer, ring back or busy tone if the called party does not answer or is busy, the call is still deemed successful.

4.2 Measurement Method:

The required statistics should be calculated from measurements on all real traffic Test measure must be scheduled evenly across the day. The ratio is calculated by dividing the number of successful calls by the total number of calls during the measurement period, which should be at least 24 hours. This key performance indicator should be reported on

Quarterly basis.

5.SMS Delivery Performance:

5.1 Description:

This key performance indicator measure the elapsed time between sending a text message from one mobile and the receipt of that message on the addressed mobile (which is assumed to be switched on and within coverage area).

5.2 Measurement Method:

This quality indicator should be measured by analysis of real traffic. Measurements should be conducted over a long enough period to ensure statistical significance and should reflect accurate traffic variations over the hours of a day, the days of the week and any particular call affecting events. The required statistic is the average end to end delivery time of a successful SMS, calculated for all the messages in the period, where the delivery time is the interval between sending and receiving the SMS. This quality indicator should be reported on Quarterly basis.

6.Mobile Number Portability:

6.1 Description:

The ratio of the number of orders for number portability where there is a deviation from the normal porting procedure agreed between the operators to the total number of supply orders for number portability.

6.2 Measurement Method:

The measure is defined as the number of supply orders with a deviation from the normal porting procedure in a given period divided by the total number of supply orders with number portability in that period. Any request for Mobile Number Portability registered by the Donor network should be validated within a maximum period of 48 hours. The measure applies to donor and recipient operators: A deviation from the normal porting procedure is deemed to have occurred when there is delay in the completion of service transfer for more than 2 hours.

7.Mobile Data Service Availability:

7.1 Description:

A mobile data service is available when the data bearer is active in the cell currently used by the customer and the customer can attach to the packet network and can access the internet.

7.2 Measurement Method:

This quality indicator should be measured by analysis of real traffic. Measurements should be conducted over a long enough period to ensure statistical significance and should reflect accurately traffic variations over the hours of a day, the days of the week and any particular call affecting events. The required statistic is the average of the number of successful attempts to access mobile data services divided by the total number of attempts. If a call attempt can access the packet network but cannot attach within 60 seconds, this is deemed a call failure.

7.3 Customer Orders for an access line to be completed within 5/10 days:

7.4 Description:

This quality indicator measures the total time that is taken for an operator to fulfill a customer order for an access line. There are several constituents of the total supply time. First is the initial response time, where a delivery date is given for an order, then there is the delivery time when the order gets completed.

7.5 Measurement Method:

The overall supply time should be recorded for each individual service and reported at geographic group levels (for the Governates of Muscat, Musandam, Dhofar as well as for the Regions of Ad Dakhiliyah, Batinah, Al Wusta, Ash Sharqiya, Ad Dhahirah and Alburimi. For each of the reporting areas, the average delivery time should be calculated along with the percentage of orders that are fulfilled within 5 working days and within 10 working days. Delivery Time will be recorded in days (working business) and hours. This quality indicator should be reported on quarterly basis.

8. Maximum Number of Faults per 100 lines per year:

8.1 Description:

This quality indicators measure the number of fault reports per fixed line. All reports of valid faults on fixed network access line. Faults in any equipment on the customer side of the network termination point are excluded. Network faults reported against either basic or primary rate access, or single or multi- access line , should be counted as one fault, regardless of the number of channels activated or affected. The count of the number of access lines should be one for basic or primary rate access regardless of the number of channels activated.

8.2 Measurement Method:

This statistic should be calculated by dividing the number of valid fault reports observed during the data collection period by the average number of access lines or service registrations in the network under consideration during the same data collection period. Fault reports should be assumed to be valid unless there is a specific reason to consider that they are invalid. Cases where a customer reports a fault that is found to be cleared when tested should be counted as a valid report unless the service provider has reason to believe that the fault did not occur. A report that concerns more than one access line between customers and the local exchange (or remote concentrator) should be counted in terms of the number of fault reports received rather than the number of lines affected. However, only one fault report should be included for each access line affected.

The following should not be included as fault reports:

- (a) Trouble with Customer Premise Equipment;
- (b) Cable/line cuts not due to service provider;
- (c) Faults due to another service provider;
- (d) Customer not knowing how to use the service.

This measure indicator should be reported on quarterly basis.

9. Percentage of Faults Cleared within 24 hours and 72 hours:

9.1 Description:

The time taken to clear a fault is the duration from the time a fault is reported to the time when the service element or service has been restored to normal working order. The duration of the fault (the Downtime) is the sum of all the time during the reporting period when a fault exists on the service. Downtime may exclude time outside the Service Cover Period, time within Scheduled Maintenance Period and any Lost Access Time.

9.2 Measurement Method:

The following statistics should be provided:

- The time by which the fastest 90 % of all other valid faults are repaired (expressed in clock hours); and
- The percentage of faults cleared any time stated as an objective by the service provider. This measure should be reported on a quarterly basis
- Mean values percentages produced daily or weekly may be aggregated into quarterly statistics

In order to account for downtime the service provider should provide advance information on the SCP, SMP and LAT. Fault repairs due to other interconnected networks where the service provider does not receive information on the clearing of the fault.

10. Percentage of Payphones in Working Order:

10.1 Description:

This performance indicator describes the percentage of public payphones from which it is possible to access and use the services that are provided at that facility.

10.2 Measurement Method:

The number of payphones in full working order on a given day divided by the sum total of payphones installed should be provided. A working payphone is a payphone that can be accessed and is capable of providing services. Statistics should be based on all cases or in case a representative sample is used, the sample size data should be provided.

11. Unsuccessful Call Ratio:

11.1 Description:

An unsuccessful call is a call attempt that is made to a valid number with all digits dialed following dial tone, where the called party busy, ring or answer state, is not recognized

by the calling user within 30 seconds after receiving the last digit of the destination subscriber number by the network.

11.2 Measurement Method:

Two measures should be provided separately: that is for the National and International calls. The required statistics should be calculated from measurements of all real traffic. The ratio is calculated by dividing the number of unsuccessful calls by the total number of calls during the measurement period, which should be at least 24 hours. This quality indicator should be reported on a quarterly basis.

12. Availability of Interconnection:

12.1 Description:

The availability of interconnection is determined by the proportion of calls that are successfully transferred from one operator to another at a point of interconnection. A successful call transfer is one that does not encounter congestion and does not encounter any failure due to a technical issues including signaling failure.

12.2 Measurement Method:

This quality indicator should be measured by analysis of real traffic sent to a point of interconnect. The total number of failed calls should be recorded as a proportion of the total number of calls observed during the measurement period. Measurements should be conducted over a period long enough to ensure statistical significance and should reflect accurately traffic variations over the hours of a day, the days of the week and any particular call affecting events. It is suggested that the measurements round the clock for 7 days at hourly intervals be carried out at least during the 2nd week of each month for reporting purposes. This measure should be reported on a quarterly basis. Figures should be broken down to show the call transfer rate for each point of interconnect. Operators should record the cause of failed calls (congestion, technical problems) in order to improve service.

13. Billing Complaints:

13.1 Description:

This quality indicator describes the number of complaints received by an operator that relate to an issued bill. The billing complaint is defined as follows:

“An expression of dissatisfaction or grievance by a customer, to which the customer expects a response from the service provider, about any aspect of the customer’s bill or the service providers’ billing services, but does not include a request for information”.

Some examples of Billing Complaints will include:

- ◆ Incorrect product scope of the bill.
- ◆ Incorrect tariff applied to the bill.

- ◆ Incorrect discounts applied to the bill.
- ◆ Incorrect address recorded on the bill.
- ◆ Timelines of billing delivery.
- ◆ Currency used in the bill.
- ◆ Duplication of billing.
- ◆ Service access problem

Any report of an issued bill that is subsequently found to be in error (i.e. that is found to be inaccurate). This applies to any type of service (fixed, mobile, internet etc).

The complaint is valid as soon as it is reported to the operator.

Billing complaints that do not relate to inaccuracy of charge (for instance, bills that are simply unclear) are not included here.

13.2 Measurement Method:

This statistic should be calculated by dividing the number of bill complaints received during the period by the total number of bill that are issued during the same period. Mean values percentages produced daily or weekly may be aggregated into monthly statistics. This performance indicator should be reported on quarterly basis.

14. Billing Complaints Resolved Rate:

14.1 Description:

This quality indicator describes the time taken for an operator to resolve a bill complaint is the duration from the moment a bill complaint is reported to the moment when the consumer agrees that the complaint has been resolved. The duration of the complaint is the time interval between reported time to time recorded by the operator for complaint being resolved.

14.2 Measurement Method:

This should be calculated by taking the number of bill complaints that are resolved within the target time(s) during a period and dividing by the total number of bill complaints that were received during that period.

15. Response to Operators Call Center Services:

15.1 Description:

This quality indicator measures The duration from the moment when the address information required for setting up a call is received by the network (e.g. recognized on the calling user's access line) to the moment the human operator or other voice-activated response system answers the calling user to provide the number information requested.

15.2 Measurement Method:

Statistics for this measure should either include all calls to operator assisted services in the data collection period or be based on a representative sample, in which case the number of observations should be provided. The required measure is the Mean time to answer and the percentage of calls answered within 20 seconds.

16. Login Time:

16.1 Description:

The login time is the period starting when the data connection between the Test-PC and the Test-Server has been established and finishing when the login process is successfully completed. An attempt to login is unsuccessful if the login process fails for any reason. If more than 5 consecutive attempts to login fail, an ISP outage is assumed.

16.2 Measurement method:

The statistics should be calculated from test calls made according to the measurement setup given in from draft ETSI recommendation EG 202 05757-4/ Annex B).

17. Bandwidth Utilization:

17.1 Description:

Throughput is the amount of data moved to and from the end-user to the nearest serving Internet Access Point (IAP) node successfully in a given time period.

17.2 Measurement Method:

The Service Provider (SP) shall install a test server to monitor, record and report. The standard end user equipment configuration is a personal computer with equivalent of at least a 1 GHz Pentium IV processor with 256 Mb memories running only a standard browser application. The test server shall be placed at the node or anywhere on the core network of the SP. A minimum sample size of any of the tests shall be at least 30 samples per user. A minimum of 10 user locations per node shall be tested for this purpose.

18. Packet Loss:

18.1 Description:

Packet loss is the percentage of packets lost between two designed routers within the local IAP nodes. Packet loss is the term used to indicate the loss of data packets during transmission over a telecommunication network. This may happen on account of high network latency or on account of overloading of switches or routers those are unable to process or route all the incoming data.

18.2 Measurement Methodology and Statistics

The measurement will be done by sending the Internet Control Message Protocol ICMP packets from one of the Core Servers to 10 different users in 10 different locations throughout the network. This will cover network core, backhaul and access part. Total 30 packets will be sent with each packet of the size of 32 Bytes. These 30 packets will be sent to each user location to calculate the Packet Loss for that location.

A process will be carried out which will send in total 30 packet samples from a Core Server to 10 user equipments in different locations. A packet loss for each location will be measured and will be averaged out.

This shall be calculated network wide (10 users/node) over a quarterly period

Packet Loss = $\sum n [(Packet\ Dropped / Total\ Number\ of\ Packet\ transmitted) * 100\%]/Total\ Number\ of\ user\ Equipments$

Where n = Total number of users

19. Percentage of Echo Cancellers at the central office (international voice services)

19.1 Description

Incorporating echo cancellers in each switched telephone calls, is mandatory, due to obvious reasons like mobile devices speaker and mike are so near that the speech while listening the call sneaks to mike and thus causes an echo to the talking parties and mismatch at the hybrid of the listeners. The echo criteria on international long distance calls, also exists due to return path delay. Any delay for more than 40 ms is perceptible to the human ear and thus causes the echo.

19.2 Measurement Methodology and Statistics

Inclusion of echo canceller devices at the originating and terminating switching devices is mandatory and is a part of switching signalling processes.

The measurement is achieved through the test calls originated from a test call generator and the reporting system provides echo, delay, packets loss and jitter values as measured and thus verifies the inclusion of echo cancellers.

Echo cancellers included with each switched calls and controlled by configuration commands. And this is applicable for the outgoing call from the exchange or incoming calls to the exchange to/from external networks.

Voice sample collected on test calls, are measured for presence of echo and reported through the reports.

20. International Voice Services - Resolution time of a Backbone Link Fault Impacting Traffic

20.1 Description

This is calculated based on traffic impacting event and the solution time by the operations team.

International link will consist of Transmission Backbone, transmission.

The starting time will be when the Backbone Transmission link fault occurs which cause IGW-Voice loses its connection to other international carrier(s) and impact to complete failure to establish normal calls to or through those carriers.

The resolution time will be when IGW-Voice re-establishes the connection to other international carrier(s) and the calls can be established successfully with an international test number after cease of NOC alarm to destination carriers.

20.2 Measurement Methodology and Statistics

Procedure	Backbone Transmission Front Office & Operation team reports time of 100% service impact. Backbone Transmission & Operation team reports time of 100% basic service restoration.
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Resolution time = reporting time of 100% basic service restoration - reporting time of 100% service impact

21. International Voice Services - Resolution time of International Gateway Fault Impacting Traffic

21.1 Description

This is calculated based on traffic impacting event and the solution time included in the reporting tool.

The starting time will be when the voice services are failing completely. I.e. no successful call attempt is registered by the system. The resolution time will be when the calls can be established successfully with an international test number.

21.2 Measurement Methodology and Statistics

The period for calculation is per month.

Procedure	IGW-NOC & Operation team reports time of 100% service impact. IGW-NOC & Operation team reports time of 100% basic service restoration.
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Resolution time = reporting time of 100% basic service restoration - reporting time of 100% service impact

22. International Voice Services-Speech Quality

22.1 Description

This refers to the ITU-T PESQ-LQ based MOS (Mean Opinion Score) measurement. The Speech Quality measurement tool uses the Perceptual Evaluation of Speech Quality (PESQ) listening-quality (LQ) test method based on the test calls simulated by Network Performance team.

22.2 Measurement Methodology and Statistics

Procedure	<p>PESQ</p> <p>The most widely accepted speech-quality test in the telephony industry is the Perceptual Evaluation of Speech Quality (PESQ) listening-quality (LQ) test. This test incorporates the standard International Telecommunications Union (ITU) T PESQ11 algorithm for measuring one-way, end-to-end speech quality of voice services over analog, VoIP, and wireless networks. It provides measurements that include a listening-quality mean opinion score (PESQ-LQ MOS) and quantify various analog and VoIP impairments, such as noise, jitter, delay, clipping, and frame muting.</p> <p>Although the PESQ-LQ MOS is expressed on a scale of 1 to 5, the maximum MOS obtainable is 4.5. Scores of 3.2 to 4.2 are generally considered good enough for "toll quality"—the quality normally experienced (and taken for granted) over the hybrid (IP and TDM) telephone transmission network.</p> <p>Test Calls should be performed on regular basis to measure the same.</p>
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The result of Mean opinion Score which give the indication about the international speech quality should be reported to the Authority on quarterly bases.