

Chapter 11
QOS of Mobile Network

- 1. Overview of QoS(Quality of service):-** According to Peter Drucker quality in a service or product is not what you put into it. It is what the client or customer gets out of it.

As per the ITU , QoS is the collective effect of service performance which determines the degree of satisfaction of a user of the service

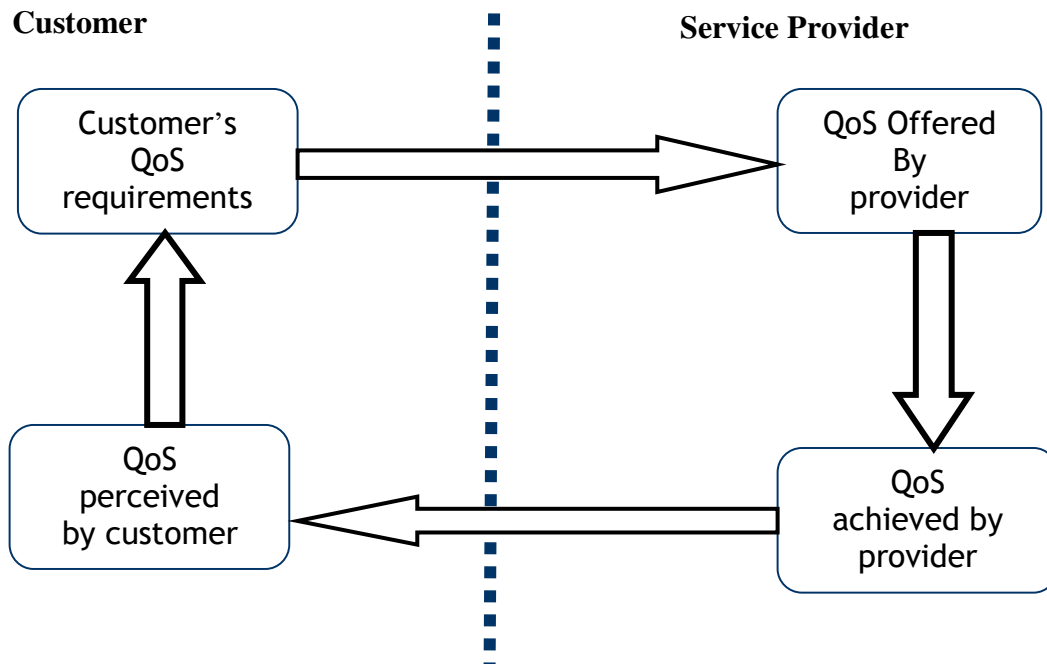


Figure-1
(Quality Criteria Perspective)

QoS to be truly useful and practical enough, it must be meaningful from 4 viewpoints as mentioned in Figure-1

- 2. QoS Monitoring :-** There are two methods of QoS monitoring , they are subjective assessment and subjective assessment.

In subjective assessment method personal as well as telephonic interview is carried out to assess customer perception.

In objective assessment audit of QoS parameter (bench marks) is carried out

In our country TRAI regulates QoS benchmarks for basic service, Cellular Mobile telephone Services , broadband service, VoIP based international long distance service etc. BSNL also have its own QoS benchmarks for various services.

QoS Regulation Parameters Benchmarks directed by TRAI are mentioned at TRAI's web site , www.traai.gov.in.

3. QoS Regulation Parameters: Benchmarks for Cellular Mobile Services:-

Sr.No	Qos Parameter	Benchmark
1	% of Billing Complaints resolved within 4 weeks	100%
2	Call set-up Success Rate (within licensees own network)	>95%
3	Service Access Delay	(< 15 sec)
4	Blocked Call Rate <ul style="list-style-type: none"> ➤ SDCCH/Paging Channel Congestion ➤ TCH Congestion 	<1 % <2%
5	Call Drop Rate	<3%
6	Percentage of connections with good voice quality	>95%
7	Service Coverage	Indoor > -75 dBm In Vehicle >-85 dBm Outdoor > -95 dBm
8	Point of Interconnect (POI) Congestion	< 0.5%)
9	Response Time to Customer for Assistance	within 60 Sec= 80% within 90 Sec = 95%
10	Billing complaints per 100 bills issued	<0.1%)
11	% of Billing Complaints resolved within 4 weeks	100%
12	Period of all refunds due to customers from the date of resolution of complaints	< 4 Weeks

Ratio of blocked attempts of SDCCH & total SDCCH seizure attempts (Sum of all Cells data) is will be taken as SDCCH Congestion .

Ratio of blocked attempts to Total TCH assignment requests is known as blocked call rate –TCH Congestion.

Ratio of TCH dropped after assignment to Total TCH successfully assigned is known as call drop rate.

POI Congestion is equal to $100 \times$ Ratio of number of attempts facing all circuits busy condition and total number of attempts on that POI .

4. Problems in the Network:- Low network availability, low network stability, RF Issues are main problems of network.

4.1 Low network availability :-Large number of BTS remain down due to power failure and low battery back up or non functioning of DG at the time of power failure or due to transmission media failure. This may cause coverage problem, hand over problem, large amount of radio capacity unavailability.

BTS interruptions (Blinks) may be cause of BCCH Failure very frequently or call drops and muting during conversation.

4.2 RF issues :- Overloaded BTS requires load balancing with adjacent BTS by tilting/lowering down/raising up BTS antennas.

Radio capacity loading in district head quarters & big Towns is around 90% or more but in rural area many of the BTS are under loaded because of not having required coverage. Such BTS needs immediate action to make them proper utilized.

5. Main causes of Call Drop:-

Call drops in GSM network can be caused by the following:

- i) Equipment: GSM radios/Combiners can be a cause of this, solution to this is replacement of the unit. A Mobile Station (phone) can also be a cause.
- ii) VSWR (voltage wave standing ratio): VSWR caused by poor connections on feeders, water penetration, fault on antenna etc
- iii) Transmission problem: If transmission is not perfect, high B.E.R (Bit error ratio) or other factors causing inaccuracy of transmission.
- iv) Interference: when there's frequency interfere (either co-channel or adjacent interference).
- v)Hand-over: if hand-over between two sectors is not well defined
- vi) Antenna down-tilts wrong (coverage shortfalls or interference)
- vii) Antenna on one sector pointing in different directions (Bad site performance and dropped calls)
- viii) Antenna support structure not rigid (dropped calls)

- ix) Antenna obstructed (poor performance and dropped calls)

Objective Questions related to QoS of Mobile Services

1. Subjective QoS assessment is carried out
 - (a) By Carry out personal / telephonic interview of customer
 - (b) On the basic of Key performance Indicators
 - (c) On the basic of OSS reports
 - (d) All of These
2. What should be the value of Call set-up Success Rate (within licensees own network) as per the QoS benchmark of TRAI
 - (a) >95% (b) >99% (c) >90% (d) 100%.
3. Billing complaints per 100 bills issued should be less then..... as per the QoS benchmark
 - (a)<0.1% (b) <1% (c) <5% (d) there should not be ant complaint
4. To achieve good QoS in GSM network it is recommended to keep SDCCH congestion below ..
 - (a) 1% (b) 5% (c) 3% (d) None of These
5. Objective QoS assessment is carried out on the basic of
 - (a) Key performance Indicators
 - (b) Customer feedback
 - (c) Market reach
 - (d) None of these
6. Which one is a cause of poor quality speech in GSM ?
 - (a) Fading
 - (b) Due to frequency interference
 - (c) Faulty Repeaters
 - (d) All of these
7. As per the QoS benchmark ,Service access delay should not be more then seconds
 - (a) 15 (b) 30 (c) 50 (d) There should not be any delay
8. As per the QoS bench mark , Call drop rate in GSM should not be more then

- (a) 3% (b) 1% (c) 5% (d) 0.1 %
9. Which one is a cause of call drop in GSM ?
- (a) Improper handover definitions
 - (b) High value of VSWR
 - (c) Transmission Problems
 - (d) All of these
10. As per the QoS benchmark ,out door service coverage in GSM should be at least
- (a) >-75 dBm (b) >-85 dBm (c)>-95 dBm (d) None of These

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