Overview of key concepts, terms and developments in Quality of Service
Kathmandu, Nepal
21 March, 2013

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What is Quality of Service (QoS)?

Quality of Service is defined as:

“The totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service.”

(E.800)
More details on QoS

Quality of service comprises requirements on all the aspects of a connection, such as service response time, loss, signal-to-noise ratio, cross-talk, echo, interrupts, frequency response, loudness levels, and so on.

A subset of telephony QoS is grade of service which comprises aspects of a connection relating to the capacity and coverage of a network - for example, guaranteed maximum blocking (of a call) and outage probability.

QoS also covers broadband and IP networks. QoS is the ability to provide different priority to different applications, users etc or to guarantee a certain level of performance to a data flow for example, a required bit rate, delay, jitter, packet dropping probability and/or bit error rate.
What is Quality of Service (QoS)?

Difference between Quality of Service & Quality of Experience

- Quality of Service and Quality of Experience related but distinct measurements of overall satisfaction users gain from a network service.

- **Quality of Service (QoS)** refers to the **performance of technical aspects of a network** which affect the ability of users to make use of the network.

- E.g. signal strength of a mobile network available to users and average levels of congestion found on a network.

- **Quality of Experience (QoE)** attempts to measure the **level of satisfaction a user is likely to enjoy** in using a network, including dealings with the network provider.
What is Quality of Service (QoS)?

Quality of Experience includes things such as:

- Satisfaction with dispute or fault resolution processes,
- Ease of access to billing mechanisms,
- Access to customer service personnel who are able to resolve customer issues,
- User friendly access guides,
- Network connection times, etc.

Main difference between the two is that **QoS refers to the technical performance of a network** while **QoE refers to the satisfaction a customer enjoys from a service**.

Because they are conceptually similar, regulators tend to regulate QoS and QoE together.
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How can QoS be measured?

Benchmarking service standards

Standard method for measuring QoS is by reference to benchmarks that are considered the minimum level of acceptable performance for a network.

Certain service parameters are often measured against a baseline value, e.g.:

- The signal available on mobile networks,
- The percentage of time in which network access is available,
- The likelihood of a network being congested,
- The percentage of calls on a network which are dropped or blocked, etc.

Many regulators specify standards for QoE measurements as well, such as:

- Maximum lengths of time for customer complaints to be resolved,
- Maximum number of customer complaints for a given number of customers,
- Maximum network outage/repair times.
How can QoS be measured?

Setting minimum service standards

There are two main methods for setting QoS and QoE standards for network operators:

- **First, a regulator specifies certain minimum standards for every operator over whom they have jurisdiction.** This allows certainty for operators as to what they must do.

- **Second, inclusion of standards in the individual licenses of operators.** This allows for more tailored requirements to be set for different operators.

- **Third, a combination of the above** (e.g. India), where there are universal minimum standards that can be modified through license conditions.
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Why is QoS important for mobile?

QoS is particularly important for mobile networks and mobile network operators.

- Significant part of the utility of mobile networks comes from their ability to be accessed at convenience of user. **QoS has direct and profound impact** on this ability.

- If a network has poor QoS characteristics it is unlikely that users will be satisfied with the service. Will be inclined to seek access to alternate network or discontinue using network completely.

- **QoS is extremely important for image or brand of network service provider.** If a network has poor QoS reputation (e.g. calls dropping out, customers not having sufficient network access) their customers will likely move to a competing provider.

- By ensuring networks operate at a minimum standard, QoS requirements ensure consumers are protected and receive services of an acceptable standard.
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Methods of enforcing QoS

There are two main methods for enforcement of QoS standards:

- Firstly, via **administrative penalties**, usually in the form of fines, administered by and paid to regulator. Designed to be punitive and to disincentivise non-compliance with QoS standards.

- Secondly, via **Service Level Agreements (SLAs)** contained within contracts made between service providers and consumers. Place providers in breach of contract for failure to supply relevant minimum standards. Provider can be held to account by consumers.

- Under SLAs, **service providers are required to compensate consumers for poor service quality**. Typically SLAs mandate that consumers will be reimbursed for a certain amount of their monthly fees, which increases as services remain unavailable or sub-standard.

Another way would be to assess the industry structure and see if further competition is warranted as a cosy monopoly or duopoly structure is unlikely to produce the best QoS. Likewise it may be necessary to assess other regulatory frameworks like infrastructure sharing to ensure that capex/opex is spent more on ensuring a higher QoS rather than building towers etc.
How should QoS be enforced?

Which method is best?

- **Regulator administered fines are currently the standard method** of enforcing QoS. However, fines deprive provider of funds that could be used to directly improve QoS. May provide no gain for consumers who suffer from poor QoS.

- In contrast, **SLAs ensure that operators are not stripped of funds**. By compensating customers they ensure those who experience poor service are the ones who receive something in return.
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Which agency should enforce QoS?

QoS standards may be enforced by:

- **Telecommunications regulators**, or
- **General consumer protection agencies or ombudsmen**.

Which enforcement method is better will depend on whether penalties for breach of QoS are in the form of **fines imposed by regulator** or **compensation paid to consumers**.

- In the case of fines it makes sense for the regulator to be in charge of monitoring and enforcing QoS for mobile service providers.
- If penalties are in the form of compensation to customers it makes sense for enforcement and monitoring to be administered by consumer protection agencies.
Who should enforce QoS?

Consumer protection bodies best placed to enforce QoS

- Administration by consumer protection agencies ensures consumers are represented and penalties are imposed in order to protect end users.

- Consumer protection agency ensures service providers aiming to meet QoS targets for benefit of their customers, rather than simply trying to avoid punishment by telecommunications regulator.

- Overall this option provides best outcomes for consumers and ensures that investment in network and service not impeded.
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QoS in Nepal: Challenges and the way forward

**Consumer Protection:** The purpose of Nepal’s current QoS regime is to protect the interests of consumers of telecommunication services by enforcing minimum standards for the quality of these services.

**The QoS parameters which are currently regulated in Nepal are:**
- service access delay;
- call set-up success rate;
- call drop ratio;
- point of interconnection Congestion;
- Response time to customer calls for assistance;
- percentage of calls answered by operators within 30 and 60 seconds;
- Promptness in attending to customer requests;
- Number of billing complaints per 1000 bills;
- Percentage of billing complaints cleared within a month; and
- Customer perception of the service


**Possible Gaps:** These include no broadband QoS provisions including for wireless broadband. Also There are no specific enforcement provisions listed in the NTA’s current QoS parameters.
Assessing the existing QoS regulations

The NTA has been unable to effectively track or monitor QoS: While the current regulations give it the power to test networks for QoS from time to time these powers have been ineffective in allowing the NTA to gain an accurate and comprehensive overview of mobile network QoS in Nepal.

Because it has not been able to monitor network QoS the NTA has not been able to effectively enforce the minimum standards it set in the 2007 parameters.

Power to obtain information: The current parameters mention the NTA periodically testing network QoS but otherwise give the NTA only limited ability to gather information regarding network QoS.

Need to assess possible broader issues impacting QoS in Nepal: Issues include

- Interconnection capacity/resources
- Handset SMS polling to China and India
- Cross-border interference
- Power situation – with even greater impacts in rural areas
- Others?
What can be done to improve the situation

**Incentives to maintain good QoS:** Service providers can be encouraged to maintain high standards of QoS by methods such as publishing reports on the performance of different providers.

This has the dual effect of rewarding those providers with good QoS ratings by publicly highlighting their success and of informing consumers as to which service provider will provide them with the best network QoS.

**Disincentives for poor QoS:** Publishing reports also has the added effect of disincentivising poor QoS, as provider will be publicly exposed for their poor practises.

Where this is not disincentive enough, compensation for customers, fines and other punishments could be considered by the NTA in order to mandate service providers to meet their QoS obligations.
Strategy for Regulating QoS in Nepal:

Some initial thoughts on the optimal strategy for regulating QoS in Nepal will involve:

- Giving the NTA the regulatory powers needed to monitor compliance with QoS standards such as access to service provider records for auditing purposes.

- Review of current parameters to be widened to include broadband/wireless broadband and maybe even roaming.

- Appropriate incentives and disincentives to encourage service providers to improve network QoS, for example at the worst case by levying fines or mandating providers to give compensation to customers affected by poor QoS. However, focus is on having a partnership to address such issues.

- Regular engagement by the NTA with both Service providers and consumers in order to ensure that QoS standards are being met and that incentives and disincentives are having the desired outcomes.
Thank You

I am happy to answer any questions...