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Minimum Quality of Service Parameters
Internet and Mobile Services

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EXECUTIVE SUMMARY

• This presentation focuses on the quality of service measurement methodologies and minimum QoS parameters from the Regulatory point of view.

• It covers the following:
  – purposes of QoS regulations
  – QoS Monitoring Framework
  – Testing Methods
  – QoS Parameters of some services for mobile and internet
QUALITY OF SERVICE REGULATION (1)

• QoS is defined as the “Collective effect of service performance, which determines the degree of satisfaction of a user of the service” [ITU-T Recommendation E.800].

• QoS regulation is part of customer protection;

• But customer protection is broader than QoS regulation and

• QoS is not the same as network performance, which is more concerned with standards for the network, not user experience.
QUALITY OF SERVICE REGULATION (2)

- Main purposes of QoS regulation are [ITU-T Supp. 9 of E.800 Series]:
  - Helping customers be aware of the Quality of service provided by Internet Service Providers/Telecom through networks (mobile & fixed), so that to make their own choices;
  - Checking claims by operators;
  - Understanding the state of the market;
  - Maintaining/improving the QoS in presence of competition;
  - Maintaining/improving the QoS in absence of competition;
  - Helping operators to achieve fair competition; and
  - Making interconnected networks work well together.
DIFFERENT ASPECTS OF QoS

Four view points of QoS according to ITU-T E.802
## QOS OFFERED AND QOS DELIVERED

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<tr>
<th>Practices of ISPs in some countries</th>
<th>What should be the best practice</th>
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<tr>
<td>❖ Services are sold to customers without guarantee on minimum quality of service</td>
<td>Regulator should:</td>
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<td>❖ no guidance to customers on how the quoted service characteristics should be interpreted.</td>
<td>❖ set minimum QoS parameters of internet services</td>
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<td>❖ QoS figures quoted by various ISPs can not be compared</td>
<td>❖ Elaborate general mechanism to measure QoS parameters of internet services</td>
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<td>❖ Fix thresholds</td>
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QUALITY OF SERVICE MONITORING FRAMEWORK

- Generally at national level, the QoS Monitoring Framework is set by the Regulator in collaboration with Operators and/or without Customers.
- For QoS enforcement purposes, Regulators require to have legal and regulatory tools.
- Purpose of auditing the QoS:
  - Verify the QoS experienced by customers and
  - Compare the Results (from audit/testing exercise) against the licence obligations
- QoS expectations of customers vary from service to service (e.g.: voice, file transfer, ...).
- E.g: to measure the QoS experienced by internet customers, QoS parameters of each service have to be identified and measured separately.
TESTING METHODS: MOBILE NETWORKS (1)

• Methods to audit telecom operators’ mobile networks are, but not limited to:
  – Drive Test (performed on quarterly basis or any time required)
  – Consumer survey
  – Data submitted on monthly or quarterly basis by Mobile Telecom Operators
  – Etc.

• This presentation focuses on Drive Test Methodology
TESTING METHODS: MOBILE NETWORKS (2)

QoS Measurement Campaign prerequisites:

- Specify Locations (e.g.: City, sector)
- Prepare maps for those locations
- Calculate Samples (attempts) required for each location based on population: For more information, please refer to ITU-T Recommendation E.804.
- Calculate number of days/hours required
- Calculate number of hotspots (for measurement of data services) and locate those hotspots
- Prepare a script for each service (e.g: Voice, FTP, HTTP…)
- For Voice service measurement, specify the Mode (e.g: GSM, 3G or Dual mode)
TESTING METHODS: FIXED INTERNET (1)

Methods of testing the Internet provided by ISPs are:

- **Active Testing**:  
  - Performs analysis based on sending traffic (probing packets) between two destinations;  
  - Probing packets are injected in the network connection to measure the quality of service (QoS) of different services (web browsing, file transfer, VoIP, etc) over Internet connections.

- **Passive Testing**:  
  - Sniffs traffic (user data) as it is routed through a device;  
  - Performs analysis based on monitoring network traffic between two destinations.
TESTING METHODS: FIXED INTERNET (2)

Testing Scenarios for Active testing:

- **Scenario 1: National level:**
  - Test server located to the national Internet exchange point.
  - This scenario allows to benchmark/compare the QoS access of different ISPs to the local Internet exchange point.

- **Scenario 2: International level:**
  - Test server located to the Internet exchange point of another country, may another continent.
  - This allows the comparison between the connectivity of internet services inside and outside (different countries/continents)
TESTING METHODS: FIXED INTERNET (3)

Testing tools (from customer point of view):

- **Software-based:**
  - Installed on customers’ terminal equipment (e.g., Desktop, …)
  - Adv: Preferred due to lower costs, easier distribution & high coverage
  - Disadv: relies on end user equipment.

- **Hardware-based (probes):**
  - Located at end user premises, 
  - Limited number of probes are distributed
Sampling methodologies (for active testing):

How to select panelists:

- identify panelists (end user access points, where to install probes) based on statistical sampling
- identify internet packages for panelists, based on popularity, technologically delivery, geographically (urban, rural…) distributed and market
MINIMUM QUALITY OF SERVICE PARAMETERS (1)

Voice service (Mobile networks):
- Call Drop Rate
- Call Setup Success Rate
- Call Setup Time
- Speech Quality
- Service Coverage Area
MINIMUM QUALITY OF SERVICE PARAMETERS (2)

- **Download /Upload Speed:**
  - applied more for testing the QoS of browsing, file transfer (downloading file), steaming applications.
  - But the download speed QoS parameter is the most important for the said applications

- **Delay:**
  - applied more for VoIP, gaming, browsing, transactions

- **Delay variation:**
  - applied more for VoIP, gaming

- **Packet loss:**
  - applied more for browsing, file transfer, gaming
PUBLICATION

• For Consumer protection and Awareness purposes, the Quality of Service results from Audit Campaign should be published by Regulator / service provider, on website, or in magazine.
THANK YOU FOR YOUR ATTENTION!