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**ITU Workshop on “Quality of Service and  
Quality of Experience of Multimedia Services in  
Emerging Networks”**

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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

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# QUALITY OF SERVICE REGULATION (1)

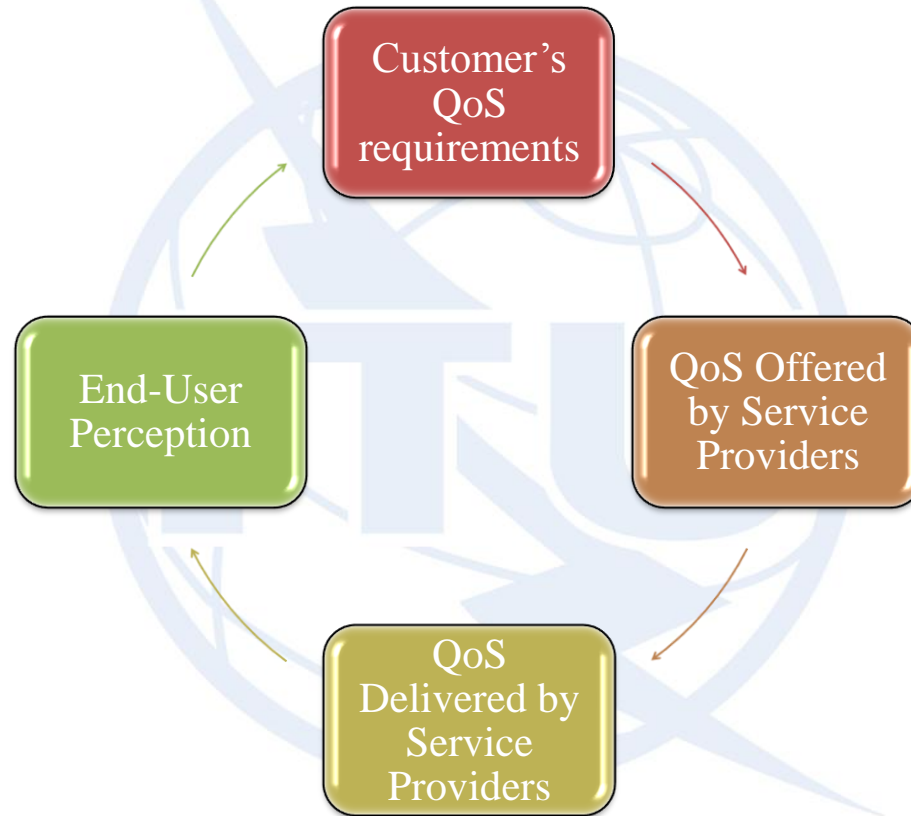
- QoS is defined as the “*Collective effect of service performance, which determines the degree of satisfaction of a user of the service*” [ITU-T Recommendation E.800].
- QoS regulation is part of customer protection;
- But customer protection is broader than QoS regulation and
- QoS is not the same as network performance, which is more concerned with standards for the network, not user experience.

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# 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

## Practices of ISPs in some countries

- ❖ Services are sold to customers without guarantee on minimum quality of service
- ❖ no guidance to customers on how the quoted service characteristics should be interpreted.
- ❖ QoS figures quoted by various ISPs can not be compared

## What should be the best practice

Regulator should:

- ❖ set minimum QoS parameters of internet services
- ❖ Elaborate general mechanism to measure QoS parameters of internet services
- ❖ Fix thresholds

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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.

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# 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



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# 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)

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# 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.

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# 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)

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# 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

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# TESTING METHODS: FIXED INTERNET (4)

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

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# 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

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# 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

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# 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



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**THANK YOU FOR YOUR  
ATTENTION!**