ITU REGIONAL STANDARDIZATION FORUM FOR AFRICA

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Tools and Methods for Testing the QoS of Internet services

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EXECUTIVE SUMMARY

- This presentation focuses on the quality of service testing tools and methodologies of internet services.
- It covers the following:
  - QoS Offered and QoS Achieved
  - Four view points of QoS according to ITU-T E.800
  - Testing Methods
  - Testing Tools
  - Sampling Methodology

- Why is it needed to test the QoS of Internet services offered by ISPs?
- What are the measurement methodologies and tools that can be adopted in order to evaluate the QoS of Internet delivered by ISPs to the customers versus the offered/promised?

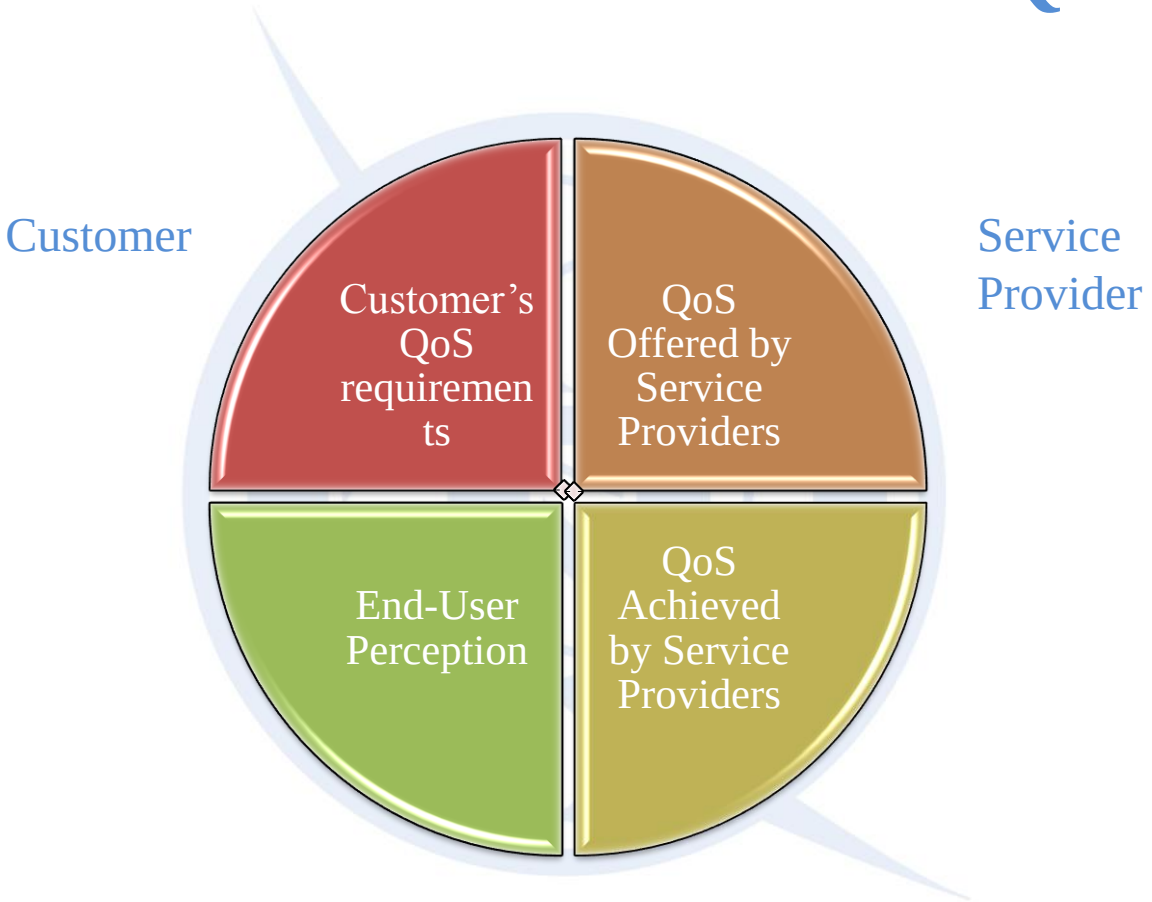
QOS OFFERED AND QOS ACHIEVED

The QoS of Internet offered (advertised) by ISPs is tested:

- by ISPs for optimization purposes or

- by Regulators because sometimes the QoS promised (in advertisements) is totally different with the QoS Delivered/achieved by ISPs.

DIFFERENT ASPECTS OF QOS



Four view points of QoS according to ITU-T E.800

TESTING METHODS

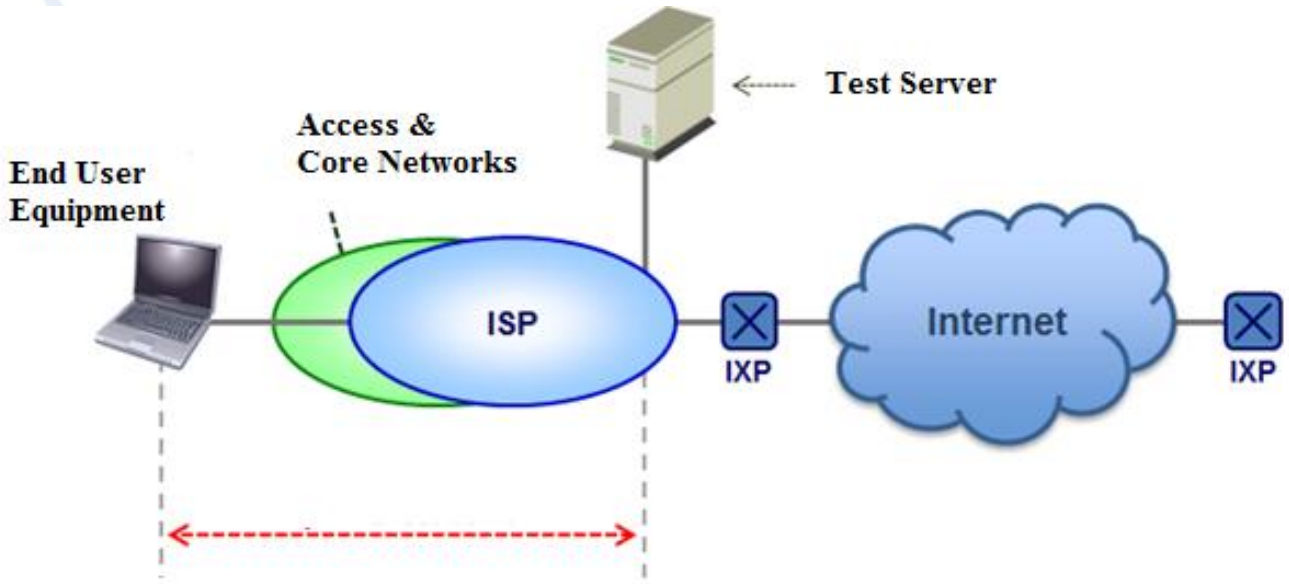
- Method 1:Measurements/testing using injected traffic
- Method 2: Measurements/testing using user traffic
- This presentation focuses on method 1

METHOD 1: TESTING USING INJECTED TRAFFIC

- 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.
- There are three scenarios for method 1:
  - Test at the ISP level,
  - Test at the National level (at Local IXP) and
  - Test at International level (at International IXP)

1ST SCENARIO: TEST AT ISP LEVEL

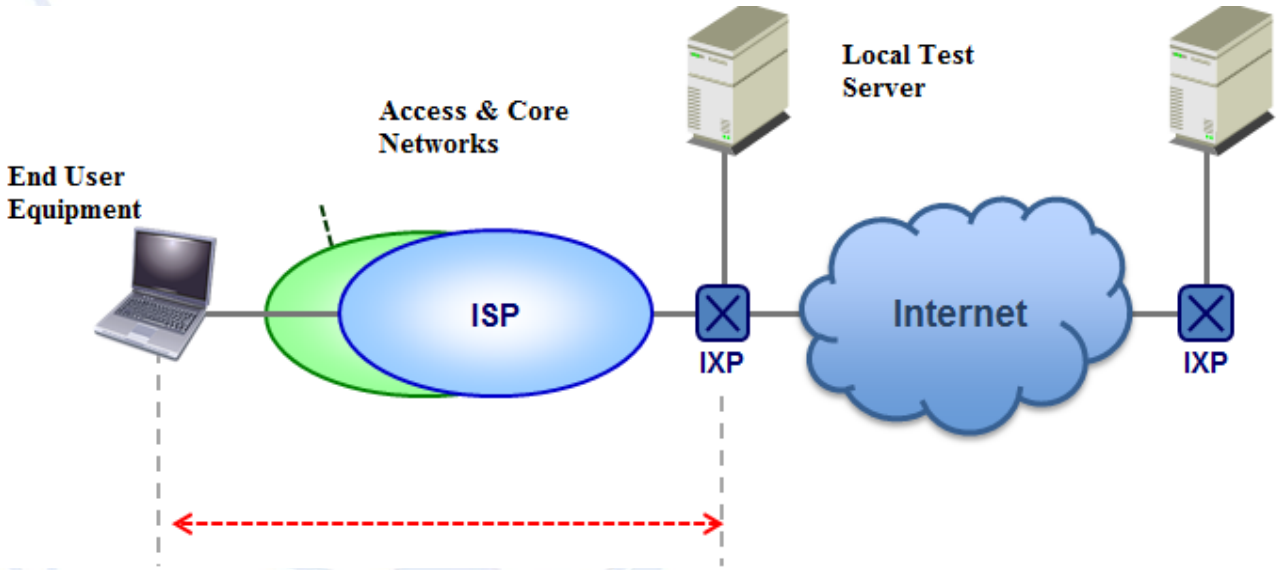
- Test server is located to the edge of the network (peering router)
- More used to evaluate internet bottlenecks inside ISP's network
- Relevant to the ISPs



- This approach can not be used to know the customer experience when accessing the internet because the information measured refers to the ISP network

2ND SCENARIO: TEST AT NATIONAL LEVEL

- Test server is located a the local Internet exchange point
- Can be carried on with or without involvement of ISPs by Regulators
- Measurement path includes a complete Internet connection from customer to test server located at the local IXP
- This scenario allows the benchmarking of the QoS access of different ISPs to the local Internet exchange point.



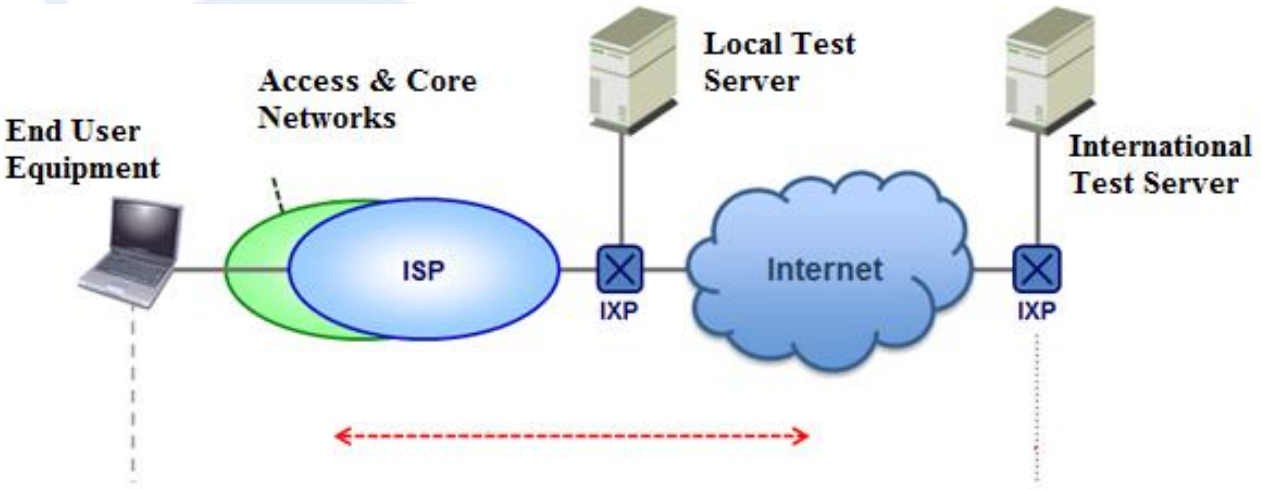
- Applied when testing local download/upload speed, latency
- The benchmarking/comparability of the ISPs can be reached in the best way, in case all ISPs are connected in a similar way to that local IXP (or any central measuring point)

2ND SCENARIO: TEST AT NATIONAL LEVEL (Cont…)

- In the case of web browsing download speed at national level, the measurements are done on the selected web pages stored on servers located inside the country.

3RD SCENARIO: TEST AT INTERNATIONAL LEVEL

- Test server located to International Internet exchange point (IXP of another country, may be another continent)
- Usually, the Internet connection that ISPs provide to customers is to the entire internet.
- Therefore, the more bandwidth capacity in the ISPs' connections , the more better the quality of Internet connection provided by ISPs.



- Applied when testing international download/upload speed
- This allows the comparison between the connectivity of internet services inside the country and outside (different countries/ continents)

3RD SCENARIO: TEST AT INTERNATIONAL LEVEL (Cont…)

- In the case of web browsing download speed internationally, the measurements are done on the selected web pages stored on servers located outside the country.

TESTING TOOLS

- Hardware-based Tools (Probes) and
- Software-based Tools

HARDWARE BASED TOOLS

There are two options of implementation:

- The probe completely replaces the end user's equipment.
  - No other equipment can be connected to the Internet access while the probe is performing measurements.
  - This is applicable also in the case of mobile Internet access.
- The probe shares the Internet access with ordinary traffic
  - For example by connecting a probe to a customer's residential gateway.

SOFTWARE BASED TOOLS

There are two kind of software based tools :

- A web-based tool: where the download and execution of the measurement software is initiated via the end user's web browser by accessing a specific web page.
- A dedicated software client: where the measurement software is permanently installed on the end user's terminal equipment.
  - In this case, different versions of the software are needed to support different operating systems and terminal equipment.

SAMPLING METHODOLOGY

- Selection of panelists (end user access points, where to install probes) should take into consideration various factors such as technologies, Internet speed packages (depending on popularity), locations and so on.
- identification of panelists based on statistical sampling:
  - With statistical sampling theory, we need to identify the dependent variable (e.g: download/upload speed/throughput)
  - Then, you look at other influencing factors (explanatory variables) to the dependent variable.
  - For example the primary explanatory variable in case of a country could be location while the secondary explanatory variable could be the distance between the probe and the test server location.

THANK YOU FOR YOUR ATTENTION!