

HAKOMetar - measurement tool for evaluating Quality of Internet Access Service

Bologna, 2015.

Reasons for developing tool:

- rising number of customer complaints on BB speed
- non transparent advertisement
- basic requirements for a usable access to internet

Operator's general business terms

- minimum broadband access speed specified - operators of fixed communications networks must specify and guarantee minimum broadband speed for the contracted communications services
 - ✓ minimum speed for packages with broadband access speed up to 10Mb/s - at least 50% of the maximum (advertised) broadband speed
 - ✓ minimum speed for the packages with broadband access speed above 10 Mb/s - at least 70% of the maximum (advertised) broadband speed

HAKOMETAR

- advertisement rules for fixed and mobile networks
- try and buy period for mobile broadband services (two days changed to five later)
- procedure for measuring the speed using tool developed by HAKOM
- using results of measurements in the process of resolving complaints (resolving complaints on the quality of services are much more easier)
- consumers have a possibility to downgrade to a package that is more appropriate for the actually achievable speed or terminating the contract free-of-charge

Measurements basics:

- ✓ Measure can be done during whole day
- ✓ three measurements in five days (7 of 10 in 2012.)
- ✓ User complaint can be sent from application



❖ In November 2012 HAKOM, in cooperation with CARNet (Croatian Academic and Research Network), launched certified software tool for measuring the speed of the broadband Internet access.

❖ Client application measurement

- The application is available on HAKOM's website and operators website
- Multiplatform app – Java based (run on most OS's)
- Detailed measurements
- Two ways of running application: a) WEB start java and b) standalone application
- Unique ID for each started measuring cycle

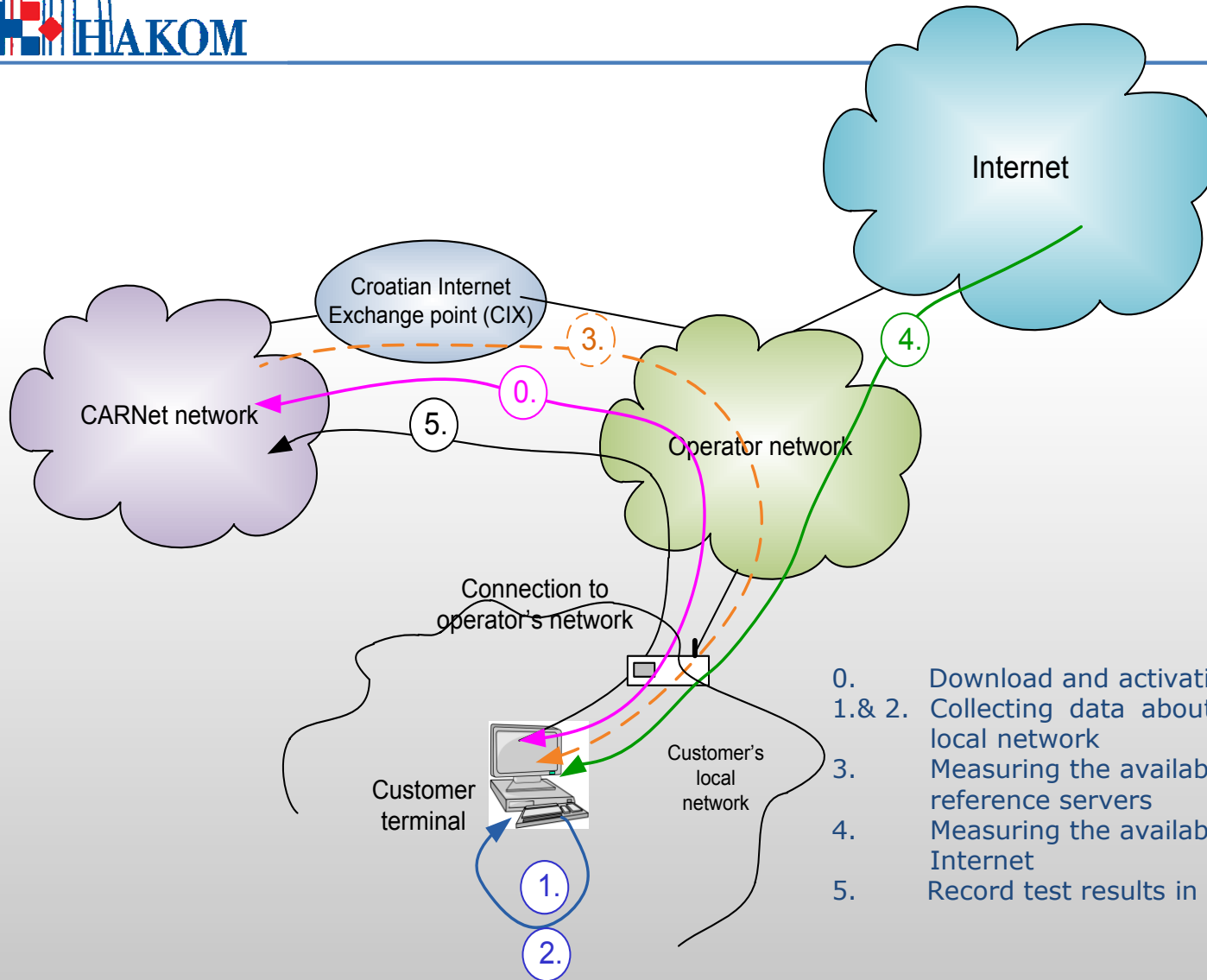
❖ For the correct use, the following conditions must be done:

- end user must connect his/her client device directly with the wired connection to the CPE set up as a terminating device by the ISP
- only this client device (and the CPE) should be present in the local area network of the end user
- end user must close all applications on his/her device apart from HAKOMETAR
- client device should have enough CPU, disc space and memory resources available

Functional levels:

- Collecting data about the user (identification), about the operator (IP address -> name of the operator) and about users computer and local network with/from which the measurements are performed
- Measuring the availability of data content at the reference servers; measuring the availability of data content on the Internet
- Measuring of other Internet access quality parameters: delay, jitter, packet loss
- Data Recording
- Sending complaint by e-mail to the operator (optional)

Measurements topology



0. Download and activation of HAKOMetar
- 1.& 2. Collecting data about the user, user's PC and local network
3. Measuring the availability of data content at the reference servers
4. Measuring the availability of data content on the Internet
5. Record test results in the database on a server

1. Collecting data about the user

Data collected from subscriber:

- Name and surname
- Address, postal code and city
- Phone number (fixed)
- Contact phone number
- User name to access the network (if there is one)
- Name of the operator with which the user/subscriber has contract
- The contracted access speed
- e-mail address



2. Collecting data about users local network



Data collected about local network:

- Computer network interface (IP and MAC address) – wire interface is mandatory
- Network interface load
- Active connection
- ARP table - reveals computers in the local network
- Routing table
- DNS server used by consumer computer
- CPU/Memory usage
- Operating system
-



3. Measuring the availability of data content at the reference servers

❖ Checking reference server load

❖ Measuring the download and upload transmission speeds

**❖ Availability of devices (ping) and traceroute to the server
(delay, path)**

❖ Useful for:

- assessing speed connection to / from CARNet
- shared services between CARNet and operators

❖ This measurement can be used only as a information!!!!



4. Measuring the availability of data content on the Internet

Parallel HTTP and FTP test

- establishment of a large number of simultaneously HTTP and FTP connections to the data content on the Internet -> stabilization
- checking CPU load and memory usage

Measurement objective: to obtain maximum speed between the user and the public internet

Possible limitations:

- user's PC is too weak to carry out measurements (indicated by measuring the performance of users PC)
- Operator blocks some protocols (operator has obligation to publish transparent any possible restrictions to the end user)
- Operator blocks some addresses (solution: alternative address is taken)

Results can be used as a proof in case of customer complaints which can be submitted to operator through HAKOMetar

5. Data Recording

❖ The data is recorded locally on the user's computer

- 8193_2012-11-13_not_valid.txt
- 8193_2012-11-13_valid.txt
- 8193_2012-11-13_11-29-34_key.txt

❖ Data is written to the server (HAKOM)

- Checking the validity of the information reported

Start

mjerjenja su završena

100%

download sa CARNET-ovog servera: 3.5456276 MB
upload do CARNET-ovog servera: 0.22615051 MB
download datoteke za upload: 0 MB
UKUPNO download-a: 13.043908 MB

Download brzina od CARNET-ovog servera: 2.3629642 Mbit/s
Download brzina - paralelni FTP: 3.2829387 Mbit/s
Download brzina - paralelni HTTP: 2.256366 Mbit/s

Download brzina vaseg linka: 3.2829387 Mbit/s

Executing server request

Zbog slijedecih upozorenja ovo mjerenje ne moze biti uvazeno !!!

upozorenje: Test nije valjan jer je izvršen izvan termina od 19 do 23 sata

FINISHED at: 2013-03-17 01:43:09

18. Slijedi zapisivanje output-a lokalno u C:\Users\vsvedek\HAKOMetar\19080_2013-03-17_not_valid.txt

UPOZORENJA:

Zbog slijedecih upozorenja ovo mjerenje ne moze biti uvazeno !!!

upozorenje: Test nije valjan jer je izvršen izvan termina od 19 do 23 sata

Status: finished**3,28
Mbit/s**

Ukupni download:

13,04 MB**HAKOMetar**

Conclusion

H **Transparency of contracts** - satisfied customers

H **Transparency of contracts** - protection for operators by providing legal certainty in the interpretation of the rights and obligations of the parties

H **HAKOMetar:**

- facilitated the resolving of complaints on the quality of services
- stimulated competition among service providers – in the end that leads to improvement in quality of service and less regulatory intervention
- in near future HAKOMetar will be upgraded for measuring speed in mobile networks
- other upgrades (blocking or throttling of traffic or any kind of traffic shaping on application level?)

