AUTORITÀ PER LE GARANZIE NELLE COMUNICAZIONI
AGCOM
DIREZIONE TUTELA DEI CONSUMATORI

Consumer's Protection Office

MisuraIntenetMobile.it

The Agcom project for Mobile Broadband QoS evaluation

October 2013

Project Target

Drive Test periodic measurement campaigns plan, over several years, according to Resolution n. 154/12/CONS, in order to provide:

Evaluation of performances of the mobile networks operating in Italy, in front of mobile broadband QoS.

Publication of result statistics, to be available to consumers and service subscribers, in order to assure trasparency of the performances really provided compared with the features offered from the operators.

Drive Test main features

Tested the 4 mobile access networks available in Italy, provided from H3G, Telecom Italia, Vodafone and Wind operators.

More than 1000 test suites, per campaign, performed. Each test suite is executed, at the same time over the 4 networks, within a test pixel (elementary area of 500 m x 500 m) selected among the most populated ones (> 1,800 inhabitant per km²) of the visited cities.

Test suite duration: about 22 minutes.

One campaign per half-year planned.

For year 2013, 20 big cities selected, covering all geographic regions of the Country.

About 6,000 km covered during each campaign.

16 weeks spent for each campaign.

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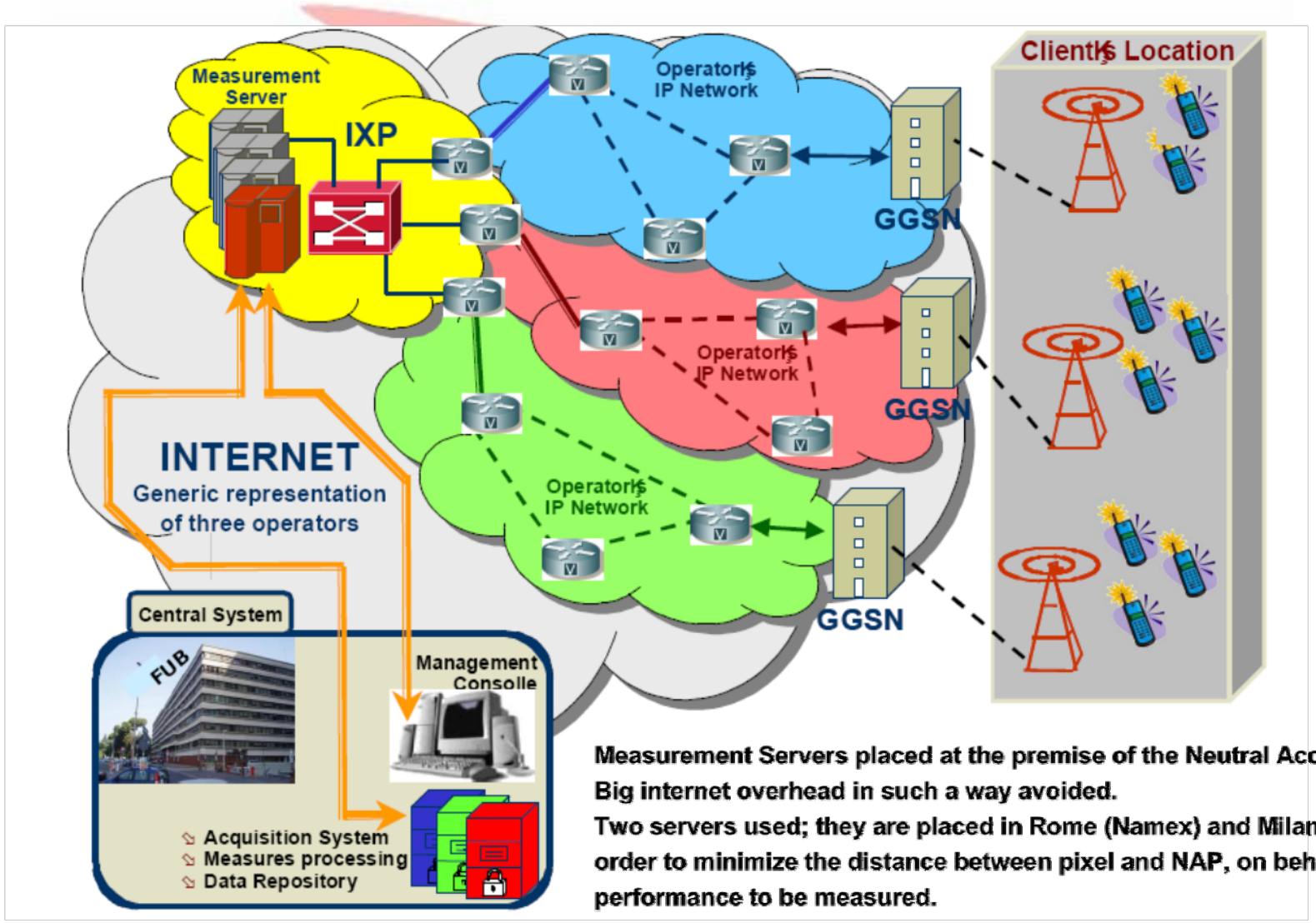
Drive test campaign for 2013: visited cities and number of pixel

REGIONE	Popolazione nelle 20 regioni (%)
LAZIO	9.4%
LOMBARDIA	16.4%
CAMPANIA	9.6%
PIEMONTE	7.4%
SICILIA	8.3%
LIGURIA	2.7%
EMILIA-ROMAGNA	7.3%
TOSCANA	6.2%
PUGLIA	6.7%
VENETO	8.1%
FRIULI-VENEZIA GIULIA	2.0%
CALABRIA	3.3%
UMBRIA	1.5%
SARDEGNA	2.8%
ABRUZZO	2.2%
TRENTINO-ALTO ADIGE	1.7%
MARCHE	2.6%
BASILICATA	1.0%
MOLISE	0.5%
VALLE D'AOSTA	0.2%
	100.0%

COMUNE	Superficie territoriale totale (%)	Popolazione nelle 20 città (%)	Numero pixel comuni	Numero pixel SUBSET (30%; Dens media > 1875)	Numero pixel 1 (20% - min. 10)	Numero pixel 2 (popolazione regionale - min. 10)	Numero pixel SELEZIONE
ROMA	31.7%	28.3%	5,154	1,504	301	94	198
MILANO	4.4%	13.6%	728	515	103	164	134
NAPOLI	2.8%	9.8%	497	340	68	96	82
TORINO	3.2%	9.3%	518	360	72	74	73
PALERMO	3.8%	6.7%	646	382	76	83	80
GENOVA	5.9%	6.2%	996	299	60	27	44
BOLOGNA	3.4%	3.9%	567	198	40	73	57
FIRENZE	2.5%	3.8%	410	198	40	62	51
BARI	2.8%	3.3%	478	220	44	67	56
VERONA	5.0%	2.7%	799	184	37	81	59
TRIESTE	2.0%	2.1%	368	132	26	20	23
REGGIO DI CALABRIA	5.7%	1.9%	985	108	22	33	28
PERUGIA	10.9%	1.7%	1,786	110	22	15	19
CAGLIARI	2.1%	1.6%	354	91	18	28	23
PESCARA	0.8%	1.3%	138	79	16	22	19
TRENTO	3.8%	1.2%	628	97	19	17	18
ANCONA	3.0%	1.1%	504	59	12	26	19
POTENZA	4.2%	0.7%	698	42	10	10	10
CAMPOBASSO	1.3%	0.5%	223	27	10	10	10
AOSTA	0.5%	0.4%	85	24	10	10	10
TOTALE	100.0%	100.0%	16,562	4,969	1,006	1,012	1,013

Measurement System Architecture



Measurement Servers placed at the premise of the Neutral Access Point. Big internet overhead in such a way avoided.
Two servers used; they are placed in Rome (Namex) and Milan (Mix) NAP in order to minimize the distance between pixel and NAP, on behalf of the performance to be measured.

Drive Test operating conditions

Test suites provided in static and outdoor conditions (nomadic approach) ➔ measurement results published.

Moreover dinamic tests are experimented during the moving from a city to the next and, within the city, from a pixel to the next ➔ measurement results for Agcom internal use only.

Test terminal device selected for year 2013: USB connect card for PC (evolution to smartphone planned starting from 2014).

Best technology approach selected for the type of the USB key to be used: presently category 24 device in downlink (42.2 Mbps) and category 6 in uplink (5.76 Mbps) selected.

USB key hardware type presently selected for year 2013: Huawey K4605 / E372.

Test instrumention: SwissQual Diversity Benchmarker.

Indicators measured

According to ETSI TS-102-250 & TS-202-057 some KPI have been chosen for evaluation of network performance and quality of mobile broadband service, in terms of:

- **Data transmission throughput**
- **Data transmission unsuccesful rate**
- **Packet delay**
- **Packet loss**
- **Jitter**

Test cycle atomic tests

During every test suite, a test cycle composed of atomic tests is running, providing measurement of following KPI:

- **FTP upload data transmission and fault rate**
- **HTTP download data transmission and fault rate**
- **HTTP download WEB page browsing time and fault rate**
- **Data transmission delay (round trip time)**
- **Packet loss rate**
- **Jitter**

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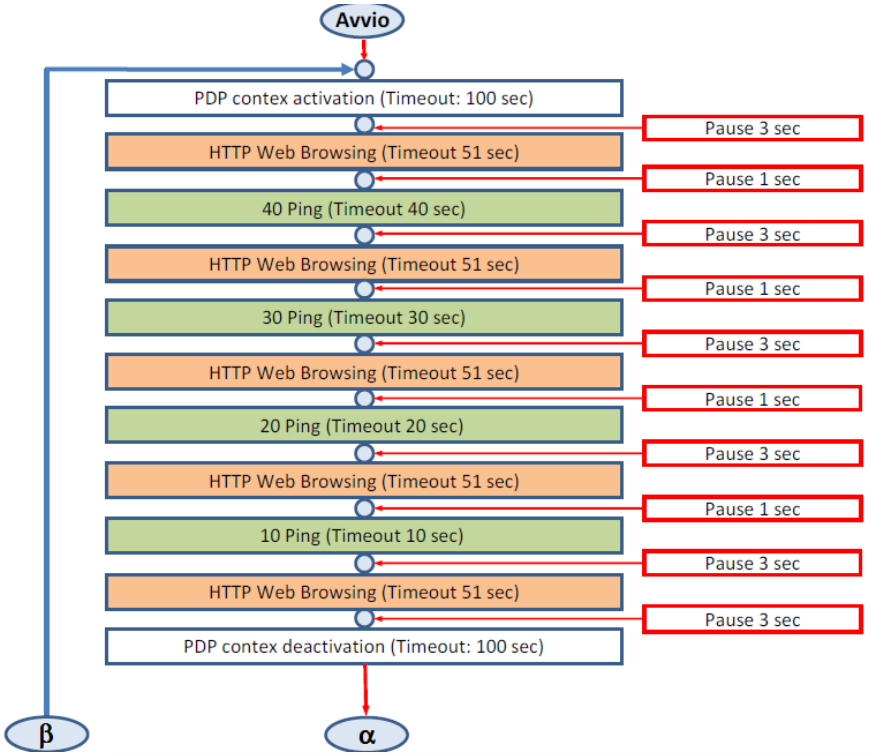
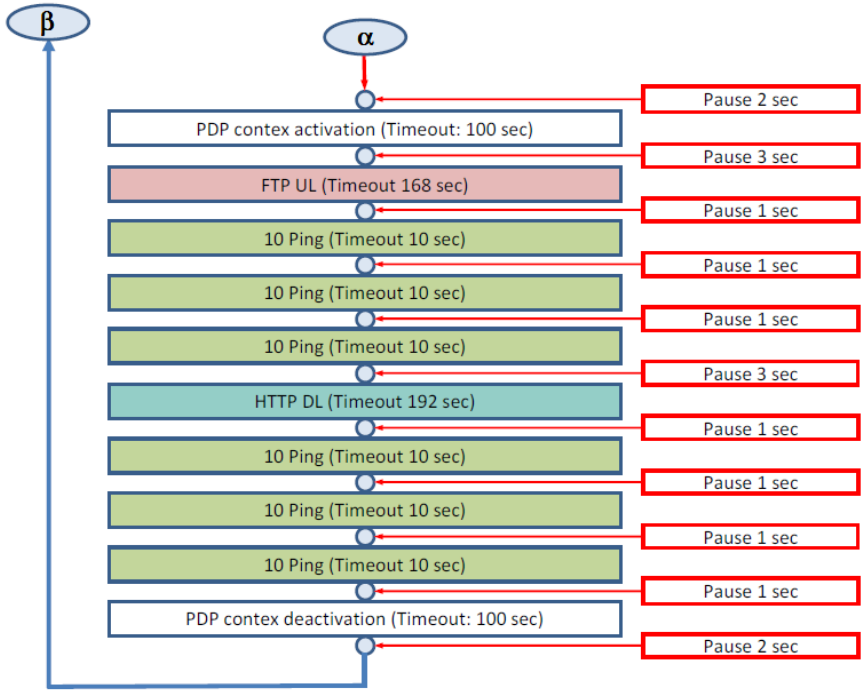
Test cycle flow diagram





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Status of drive test program

- **A preliminary campaign executed from June till October 2012.**
- **Measurement and statistics are available, but Agcom is not allowed to publish them, being the preliminary campaign a field trial. Only some general purpose figures are shown hereafter.**
- **The first official campaign executed in the timeframe January-May 2013.**
- **Results of first campaign available and published by end of October 2013.**
- **The second campaign of the year 2013 planned to start by early November 2013.**

Throughput overall results from field-trial

Performance figures over all networks

KPI*	Throughput [Kbps]	Duration [s]
FTP Upload	1393	
HTTP Download	5043	
HTTP Browsing (Keplero)		5.66

* On overall raw data

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Throughput overall results from first campaign 2013

Performance figures over all networks

KPI	Throughput [Kbps]	Duration [s]
FTP Upload	1573	
HTTP Download	6268	
HTTP Browsing (Keplero)		3.58

* On overall raw data

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Throughput overall results:

First trial (2012) vs First Campaign (2013)

KPI *	First Trial results	First official campaign	Percentage of upgrade
FTP Upload – throughput (Kbps)	**1393**	**1573**	**+12,92%**
HTTP Download – throughput (Kbps)	**5043**	**6268**	**+24,29%**
HTTP Browsing – Keplero page download time (sec)	**5.66**	**3.58**	**+36,75%**

*** On overall raw data**

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First campaign 2013: KPI overall mean values measured over all pixel of all cities.

KPI	Type of measurement	H3G	Telecom Italia	Vodafone	Wind	Overall
FTP Upload transmission rate (Mbps)	Measured value within the vaild tests	1469	1835	1823	1166	1573
	Fault rate (retainability test)	1.47%	0.46%	2.37%	4.45%	2.19%
HTTP Download transmission rate (Mbps)	Measured value within the vaild tests	6696	6451	7260	4691	6268
	Fault rate (retainabiilty test)	0.37%	0.42%	1.07%	1.04%	0.72%
HTTP browsing time (sec)	Measured value within the vaild tests	N.A.*	3.38	3.23	4.35	3.58
	Fault rate (retainabiilty test)	N.A.*	0.76%	2.07%	2.59%	1.78%
Packet Delay- Round Trip Time (ms)		54.92	48.24	51.32	63.57	54.51
Packet Loss		0.76%	0.11%	0.71%	0.82%	0.60%
Jitter (ms)		6.39	5.16	5.83	6.12	5.88

* **Not Available**: unvalid data, due to a wrong operation performed from H3G operator in the configuration of the USIM used for the test.