Directique

Quality of Mobile Services

Kingdom of Bahrain - 2011

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This study is published in accordance with Articles 3(b)(1), 3(c)(2), 3(c)(4) and Article 54 of the Telecommunications Law. The purpose of the study is to evaluate and benchmark Quality Levels offered by Mobile Network Operators, Batelco, Viva and Zain, in the Kingdom of Bahrain. The independent study was conducted with an objective End-user perspective by Cabinet Directique and does not represent any views of the Authority.

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1 READER'S ADVICE

For a proper understanding of this report, readers are advised to take into account the following key elements:

Quality of Mobile Services Audit is a snapshot of the observed quality and performance offered by Mobile Operators at the time of the measurements campaign.

Mobile Operators are continuously performing modifications and upgrades (including during the audit). Performance at the time of reading the report may be different.

TRA deliberately chose to assess quality from the end user perspective, which involve for example carrying out measurements with mobile devices which are available in Mobile Operator shops, behaving like the user on the field. Please read section 4 carefully for a full understanding of the test protocol and measurement conditions.

As with any quality audit or survey, the statistical accuracy is systematically presented in the results tables. Accuracy is the error margin to the actual values, so any comparison between results should take this confidence interval into account.

To be consistent with this level of accuracy, results have been rounded up or down to the nearest tenth of a unit. It is reminded that:

- the sum of two rounded results can be different from the rounding of their sum,
- Multiplying one rounded result by another is different than rounding the result of their multiplication.

Other statistical aggregates used in the report are:

- **Standard deviation** shows how much variation there is from the average. A low standard deviation indicates that the data points tend to be very close to the mean, whereas high standard deviation indicates that the data are spread out over a large range of values.

- **Min** and **Max** show the worse and best results (such as delay, throughput) obtained during successful measurements.

- **Average** is always the arithmetic mean of the referred sample.

2 EXECUTIVE SUMMARY

2.1 Introduction

Over the last two years the Authority has performed audits on the availability and the quality of Mobile telecommunications services in the Kingdom of Bahrain. The first audit in 2009 was not published. In 2010 two reports were released on Mobile network coverage and quality of Mobile services.

Throughout 2011, Mobile operators have continued to enhance their networks to support increasing consumer demand for bandwidth hungry services required for increasingly popular smartphones and wireless connected tablets.

In the current study covering 2011, the Authority put increased emphasis on evaluating and benchmarking the quality of data services offered by Mobile Network Operators in the Kingdom, Batelco, Viva and Zain using computers via dongle and smartphones.

In addition to Data services, the 2011 audit covers the quality of Voice service and Short Message Service (SMS) using regular handsets.

The Authority had selected Directique, an international consulting firm to conduct the assessment using a test method designed to qualitatively measure quality of service from an end users' point of view, avoiding assessing quality from a pure technical perspective as this is performed by Mobile Operators themselves on a recurrent basis.

This current audit was conducted from 17 November 2011 to 20 December 2011 inclusive, with a gap of 5 days during the Ashoora period at the request of Mobile Operators. It can be noted that (Voice) sample measurements performed during Ashoora did not indicate significant QoS degradation. Measurements were performed between 9:00 am and 10:00 pm every day except Saturdays.

The key highlights of this audit are that Mobile Operators have maintained or slightly increased quality of service for Voice and SMS compared to 2010. More significantly, dramatic network deployments have been undertaken with latest HSPA technology now available for 80% to 96% across all networks, allowing unprecedented data download speeds as shown in the report.

Mobile Operators will continue to perform network enhancements, in particular for the provision for LTE[1] . The result of the audit should therefore be read in the specific context of the time of the study. In order to continue capturing services evolution and enhancement, it is the Authority's intention to conduct a similar audit towards the end of 2012.

Finally, without Mobile Operators' cooperation during measurements preparation, review and validation, this report would not have been possible.

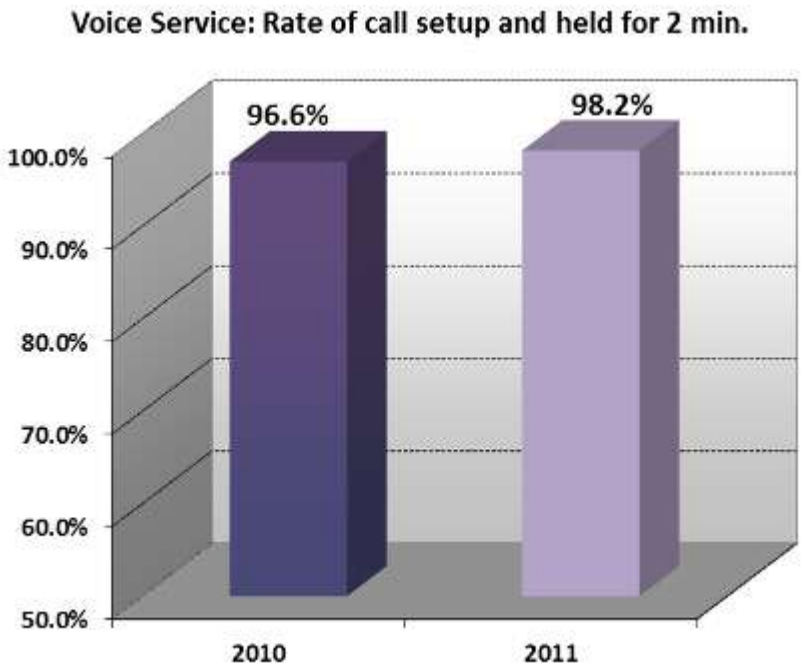
[1] LTE Long Term Evolution is a standard for wireless communication of high-speed data for mobile phones and data terminals developed by 3GPP and operated on specific wireless spectrum.

2.2 Industry results

The following tables show the average combined results achieved by the three Mobile Operators for all measurements. Detailed results for each Operator are available in section 5 of this report.

2.2.1 Voice service

Global Voice Service		**2011** **6 822 tests**	**2010** **7 059 tests**
Rate of calls set-up and held for 2 min		**98.2%**	**96.6%**
	Statistical accuracy	*± 0.3%*	*± 0.4%*
and marked	**4-perfect (PQR)**	**94.5%**	**94.1%**
	Statistical accuracy	*± 0.5%*	*± 0.5%*
	4-perfect or 3-fair (CQR)	**97.2%**	**95.7%**
	Statistical accuracy	*± 0.4%*	*± 0.5%*

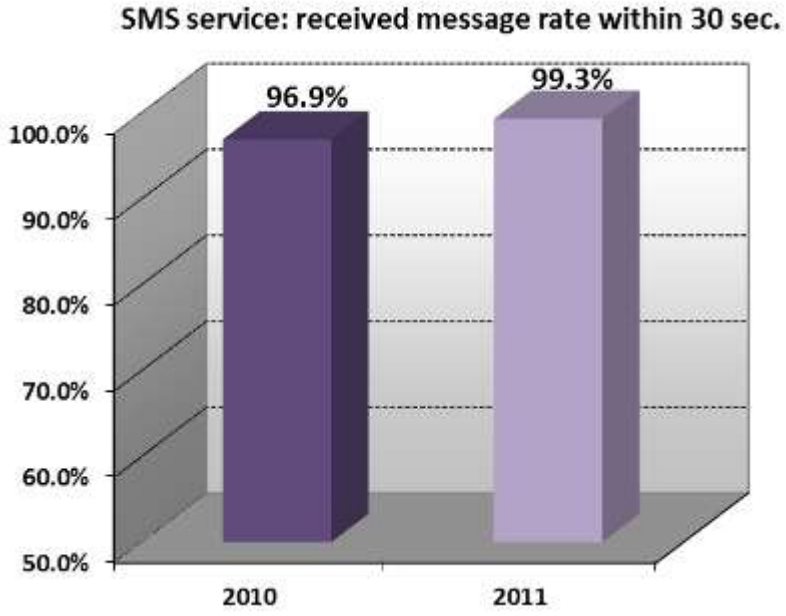


The average set up and held call rate of 98.2% offered by mobile operators in Bahrain is good and has progressed since last measurement campaign from 96.6% last year.

Similar positive evolution has been observed for the correct quality rate of 97.2% compared to 95.7% last year.

2.2.2 Messaging service

SMS Service	2011 3 096 tests	2010 1 569 tests
Rate of Received SMS within 2 min	**99.7%**	**99.2%**
Statistical accuracy	*± 0.2%*	*± 0.4%*
Rate of Received SMS within 30 sec	**99.3%**	**96.9%**
Statistical accuracy	*± 0.3%*	*± 0.9%*
Average time reception	**10.4 s**	**13.1 s**

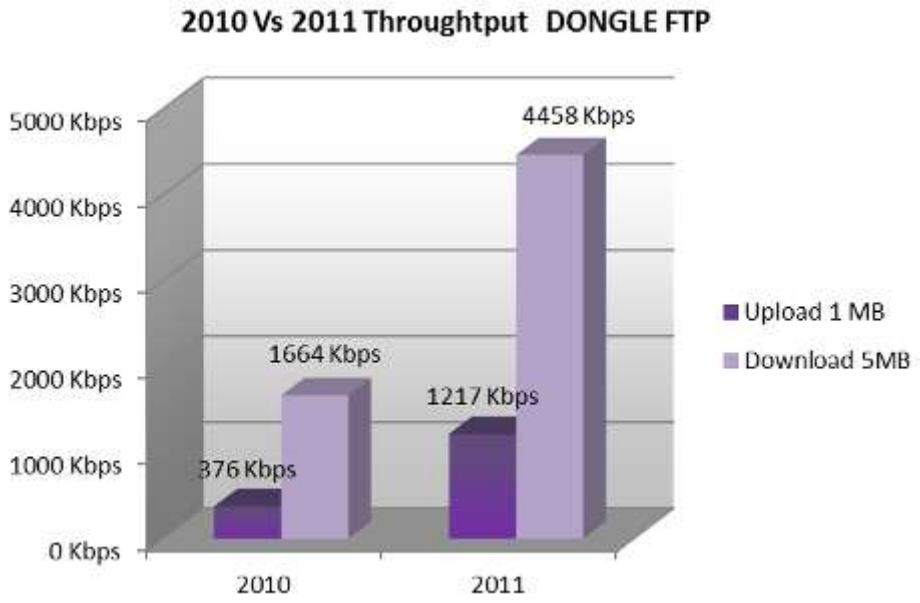


All networks offered a very good SMS service in receiving near 100% within 2 minutes. SMS received within 30 seconds rate of 99.3% progressed compared to 96.9% achieved last year.

2.2.3 Computer dongle services

DONGLE connection	2011 Hotspot 4 859 tests	2011 Random 1 774 tests	2010 Hotspot 4 152 tests	2010 Random 3 018 tests
Rate of successful radio connections to network	**99.8%**	**99.8%**	**98.8%**	**100.0%**
Statistical accuracy	*± 0.1%*	*± 0.2%*	*± 0.3%*	*± 0.0%*
Rate of successful radio connections within 10 sec	**99.7%**	**99.8%**	**98.7%**	**99.7%**
Statistical accuracy	*± 0.2%*	*± 0.2%*	*± 0.3%*	*± 0.1%*

FTP DONGLE	2011 Upload 1MB 1 007 tests	2011 Download 5MB 1 646 tests	2010 Upload 1MB 1 002 tests	2010 Download 5MB 2 016 tests
Rate of successful data transfers	**99.0%**	**99.6%**	**98.8%**	**98.8%**
Statistical accuracy	*± 0.6%*	*± 0.3%*	*± 0.7%*	*± 0.7%*
Average Throughput	**1217 Kbps**	**4458 Kbps**	**376 Kbps**	**1664 Kbps**



Dongle data services had seen a dramatic performance enhancement compared to last year in terms of data throughput, rate of successful data transfer remained stable.

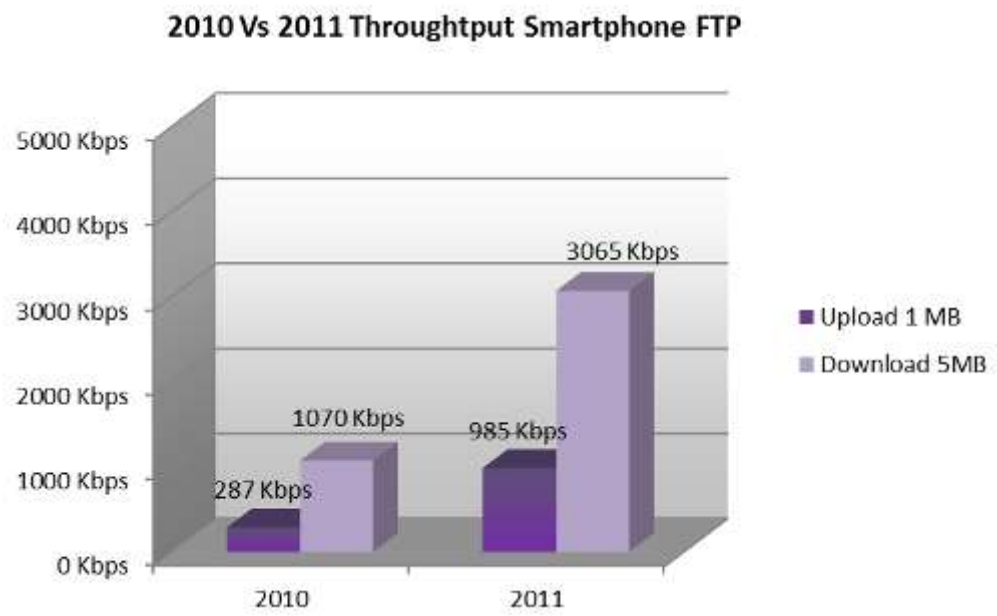
WEB Service	2011 2 155 tests	2010 3 219 tests
Rate of succesful data transfers	**98,1%**	**96,3%**
Statistical accuracy	*± 0,6%*	*± 1,2%*
Average download time once connected	**4,5 s**	**7,2 s**
Min download time once connected	**1,3 s**	**0,9 s**
Max download time once connected	**45,6 s**	**61,0 s**
Standard deviation download time once connected	**3,6 s**	**7,4 s**

SMTP-POP Service 100 Ko Mail	2011		2010	
	SMTP 448 tests	POP 449 tests	SMTP 492 tests	POP 492 tests
Rate of successful data transfers	**98.9%**	**97.5%**	**100.0%**	**100.0%**
Statistical accuracy	*± 1.0%*	*± 1.0%*	*± 0.0%*	*± 0.0%*

SMTP-POP Service 1 Mo Mail	2011		2010	
	SMTP 450 tests	POP 450 tests	SMTP 492 tests	POP 492 tests
Rate of successful data transfers	**98.0%**	**97.8%**	**99.5%**	**99.5%**
Statistical accuracy	*± 1.3%*	*± 1.4%*	*± 0.6%*	*± 0.6%*

2.2.4 SmartPhone Services

FTP SMARTPHONE	2011		2010	
	Upload 1MB 835 tests	Download 5MB 836 tests	Upload 1MB 724 tests	Download 5MB 1 160 tests
Rate of successful data transfers	**98.9%**	**99.5%**	**100.0%**	**100.0%**
Statistical accuracy	*± 1.3%*	*± 0.9%*	*± 0.0%*	*± 0.0%*
Average Throughput	**985 Kbps**	**3065 Kbps**	**287 Kbps**	**1070 Kbps**



Smartphone data services had seen a dramatic performance enhancement compared to last year in terms of data throughput, rate of successful data transfer decreased slightly.

HTTP SMARTPHONE	2011		2010	
	Upload 1MB 836 tests	Download 5MB 836 tests	Upload 1MB 1 352 tests	Download 5MB 1 334 tests
Rate of successful data transfers	**98.7%**	**98.3%**	**100.0%**	**100.0%**
Statistical accuracy	*± 1.5%*	*± 1.6%*	*± 0.0%*	*± 0.0%*
Average Throughput	**954 Kbps**	**1910 Kbps**	**285 Kbps**	**1245 Kbps**

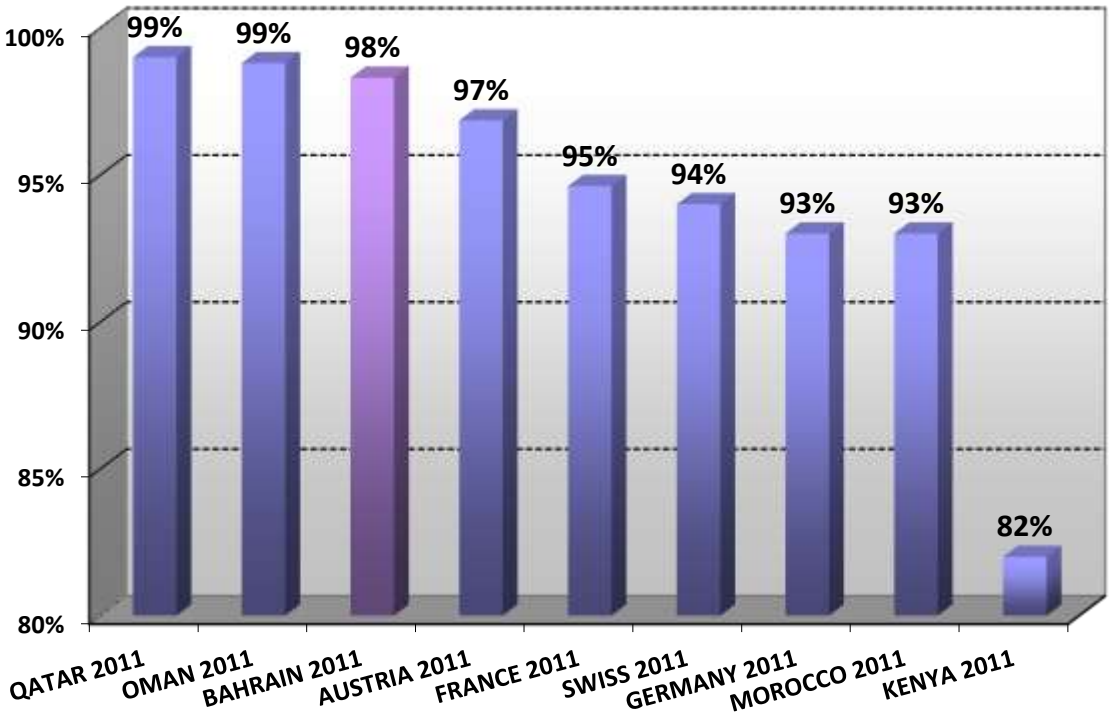
Smartphone WEB Service	2011 1 180 mes
Rate of successful data transfers	**99.7%**
Statistical accuracy	*± 0.5%*
Average download time once connected	**5.5 s**
Min download time once connected	**0.8 s**
Max download time once connected	**49.1 s**
Standard deviation download time once connected	**4.4 s**

3 BENCHMARK TO REFERENCE OPERATORS

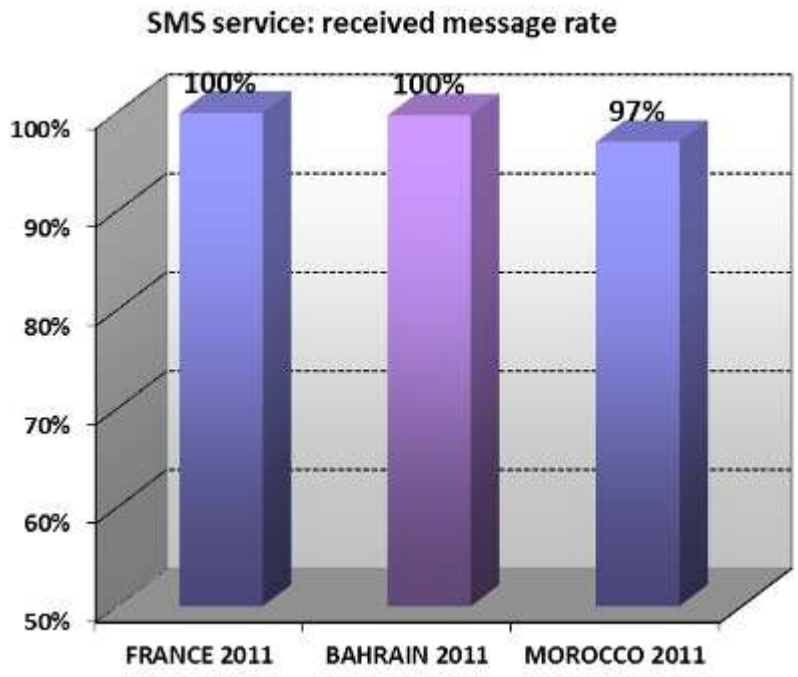
The following charts are comparing the average results achieved by the three Mobile Operators in the Kingdom of Bahrain, Batelco, Viva and Zain, with the average results obtained by National Mobile Operators in the respective benchmarked markets. Measurements are based on the same test procedures and for the same services.

The results shown for Bahrain are the average combined results achieved by the three Mobile Operators.

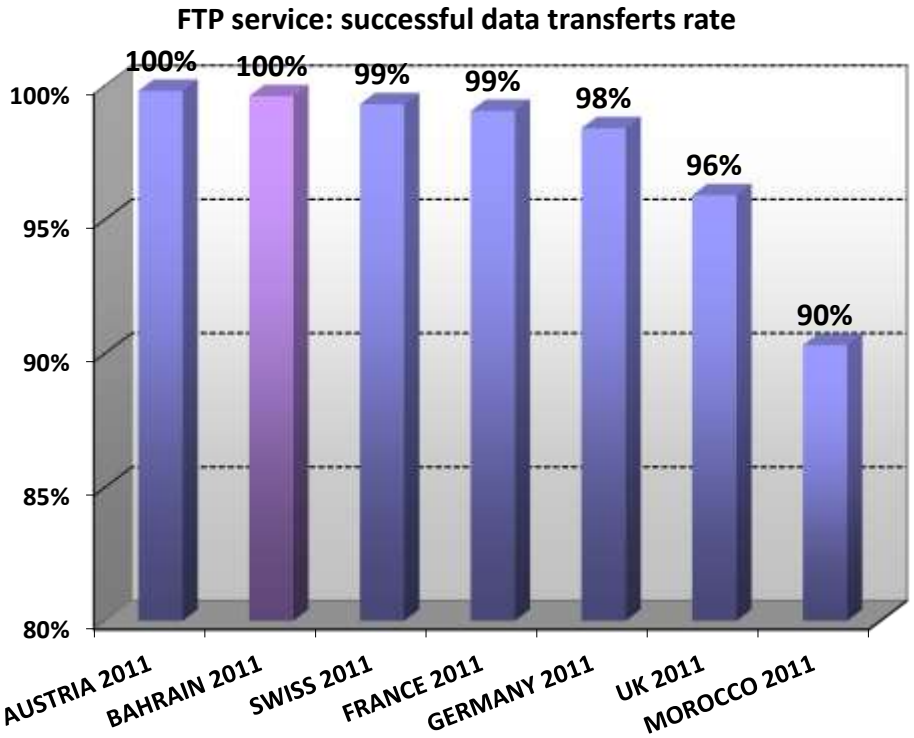
Incar cities and roads: Rate set-up and held for 2 min.



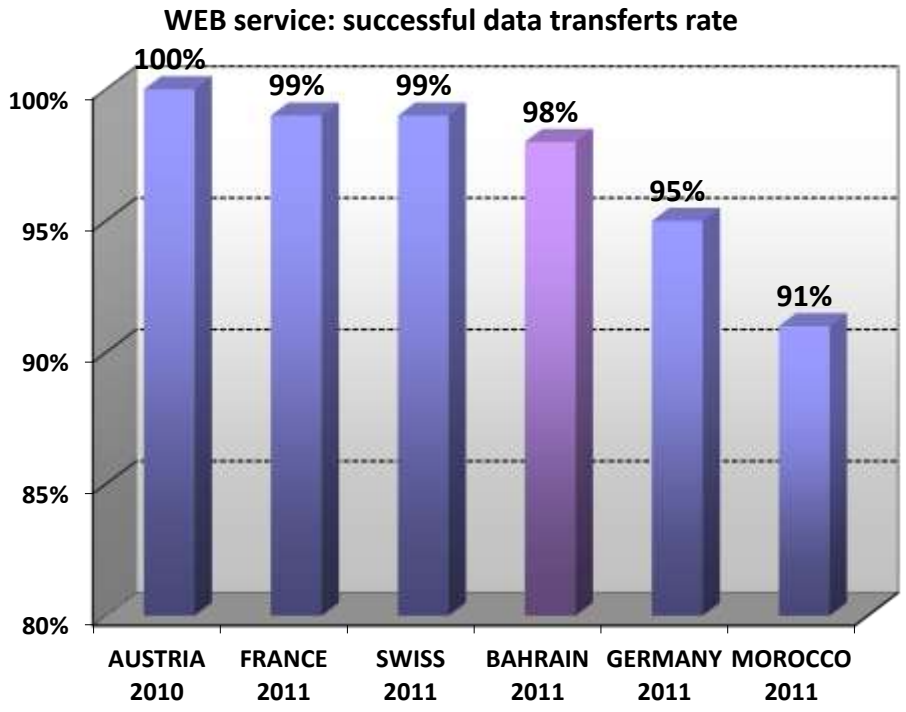
Batelco, Viva and Zain have achieved good performance for maintaining a 2 minutes call while driving in Towns and roads, performance better than France or Germany, but not as good as Oman or Qatar.



Bahrain's Mobile Operators offered a very good performance concerning the successful rate of received SMS message within 2 minutes.



Batelco, Viva and Zain have obtained very good successful rate for Data Transfer (FTP) performances similar to best benchmarked reference markets.



Bahrain's Operators offered good successful web data transfer performances.

4 MEASUREMENTS SPECIFICATION

4.1 Team and Equipment

4.1.1 Team

The project was managed by Directique Operations Director with the following project team on the ground:

- A dedicated project manager present in Al Manamah during audit launch phase.
- A field supervisor based in Al Manamah for the whole audit duration.
- Test team A performing voice and SMS measurements:
  - 2 engineers and a driver in the field,
  - 2 engineers in an office located in Seef area.
- Test team B performing data measurements:
  - 1 engineer in the field (tests were not carried out while driving),

4.1.2 Equipment

The following mobile devices have been selected, in agreement with Mobile Operators:

Network	Voice / SMS	Fixed Phone	FTP / WEB	Smartphone
BATELCO	Nokia 6120C	BATELCO	Huawei E1820	HTC Desire S
ZAIN			Huawei E173	
VIVA			Huawei E372	

Test handsets and data dongles

All devices were compatible with voice and SMS technologies and were recommended or sold by Mobile Operators for 2G and 3G technologies. Batelco land lines were equipped with a standard fixed phone.

During In car measurements, mobile phones were used without external antenna. For all voice measurements, a hands-free kit was used with mobile phones.

4.1.3 Sim cards

SIM cards were sourced locally.

SIM	Usage	BATELCO	ZAIN	VIVA
Prepaid SIM	Voice SMS	SImSim	Eezee	Viva prepaid
Postpaid Sim		Freetime	Hewar 990	Viva post-paid
Data post-paid Sim	FTP WEB Mail	Batelco Broadband	Zain Broadband	VIVA Broadband 40

Test Sim Cards (packages)

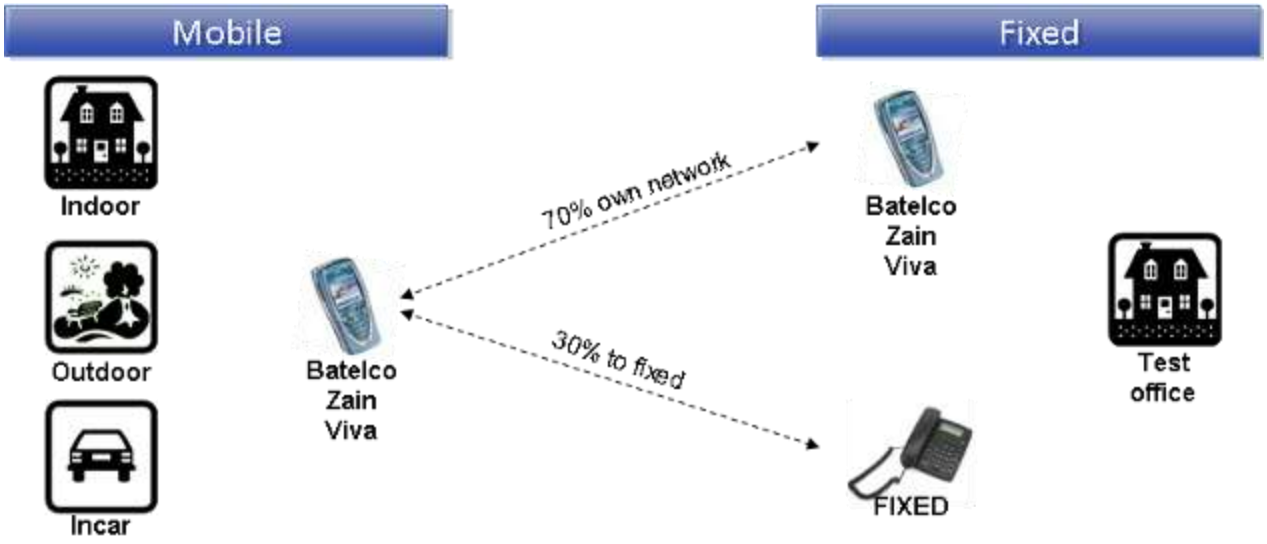
4.2 Voice service quality testing

4.2.1 Measurement

A voice measurement was a call attempt followed by a 2 minutes conversation. Calls were placed on all networks simultaneously from the same physical location. A measurement was therefore a set of three calls, one per Mobile Operator.

A field engineer was conversing over his mobile phone with an engineer in the Seef office. The engineer in the office was using either a fixed-line phone or a mobile phone.

Each field team had one phone for each mobile network. Either side could initiate the call following pre-defined call sample objectives.



- **Voice Service Levels**:

Voice measurements were performed in three configurations:

- Indoor : Pedestrian Indoor in public and private buildings
- Outdoor: Pedestrian Outdoor in the busiest outdoor places. 1/3 of the measurements were dynamic, walking from one point to another and 2/3 were static.
- In car: On road links (In car Road) and within Town borders (In car Town)

Calls included 70% Mobile to Mobile (MTM) own network and 30% Mobile to land line.

- **Audio Quality marking:**

Failed and dropped calls were registered in the database. Otherwise the audio quality was evaluated for established and 2 minutes maintained calls. Once a call was established, engineers followed a speech guideline, simulating an average conversation, and audio quality was marked on a scale of 1 to 4 as follow:

Level 4 : Perfect	Engineer doesn't notice any defect
Level 3 : Fair	One defect occurs while the conversation goes on uninterrupted
Level 2 : Poor	The natural flow of the conversation is altered and the engineer has to repeat himself
Level 1 : Bad	The defect is so strong that conversation cannot proceed.

As the call went on, each engineer took note of the identified defects such as: metallic noises, voice distortion, echo...At the end of the call the fixed located engineer collected both marks on a scale of 1 to 4, did input results in the database, along with standard description of specific defect(s), if any. In the case field and fixed-end engineers had different evaluation for the call, the worst mark was retained.

4.2.2 Testing Area and sample size

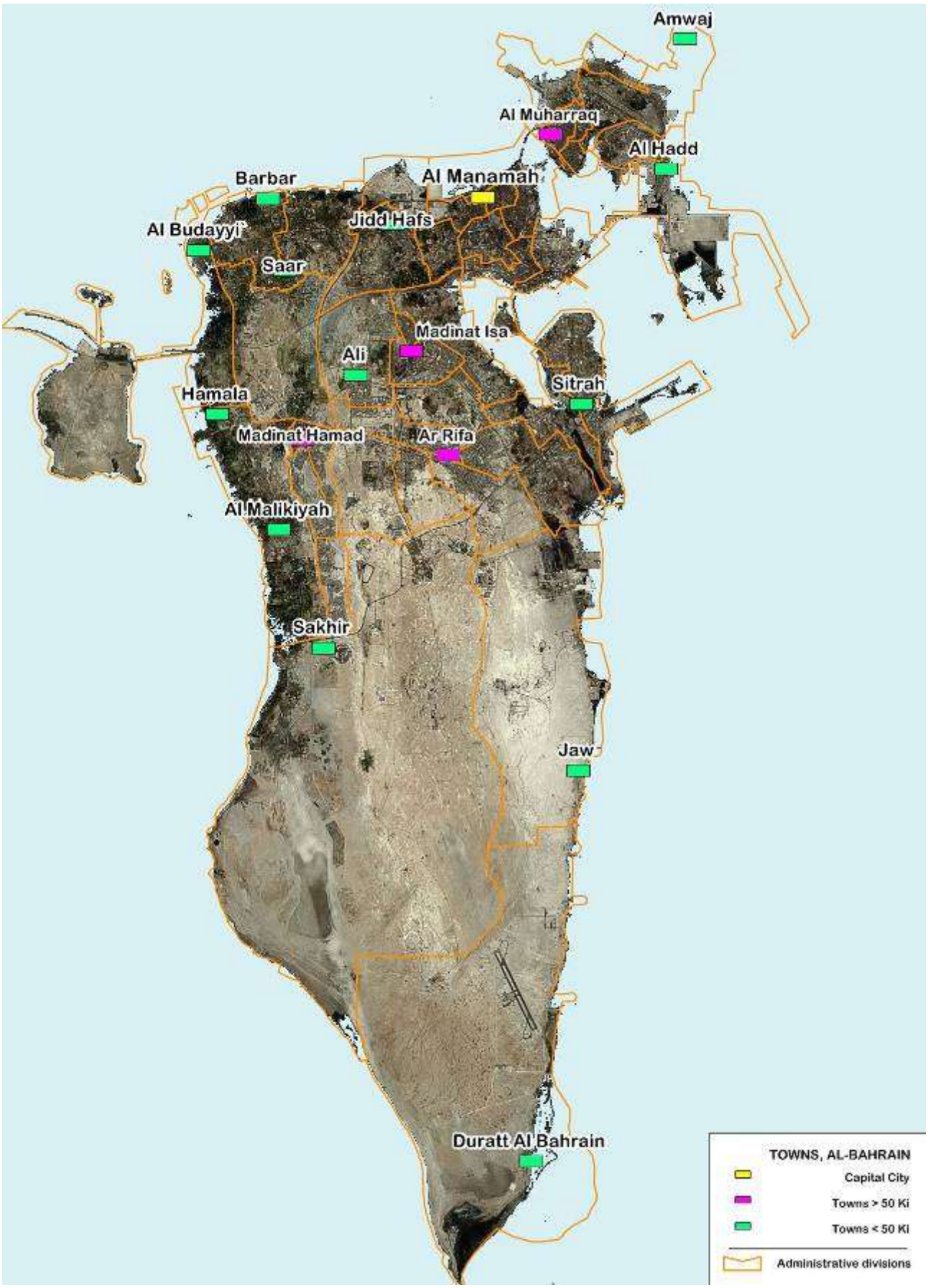
Sampling distribution between towns was based on population data and organised as follow:

Towns / Roads	In car town	Indoor	Outdoor	Total
Capital city	303	152	152	607
Towns > 50K inhabitants	311	154	151	616
Towns < 50K inhabitants	368	206	208	782
Road links				257
Total	**982**	**512**	**511**	**2274**

Test calls repartition

The total number of voice test calls performed was near 7,000

Tested Towns and roads



4.2.3 Measurements specifications - Towns

- ***In car measurements***

In Towns of more than 50,000 inhabitants, tested zone was divided into equal areas, and a number of calls were allocated to each of these areas. Field engineers did adapt their journey depending on external events (traffic, one way roads…), with the aim of covering the whole area as per test plan.

In smaller Towns (less than 50,000 inhabitants), measurements were performed on a paths that included major roads and constructed zones (Downtown, malls, stations, touristic places and business centres).

- ***Pedestrian measurements***

Pedestrian measurements were equally distributed over an area to ensure good test coverage.

Pedestrian outdoor measurements

1/3 of measurements were dynamic (from a point to another) and 2/3 were static. A single test was performed for each location, to always ensure best repartition over the tested zone. Locations were selected among high-attendance pedestrian places (buildings, parks, malls, ...).

Pedestrian indoor measurements

Calls were placed preferably on daylight indoor (less than 3 meters from a window) or on deep indoor. Any floor in a particular building was tested, except basement and above 12th floor.

Measurements were adapted by building type: 48% in the public places and 52% in offices and residential areas:

- Large places : 3 to 4 measurements were performed
- Small places : 1 to 2 measurements were performed

Cites	Own	Fixed	Total	Incar	Indoor	Outdoor
Al Budayyi`	68	32	100	50	25	25
Al Malikiyah	40	18	58	34	12	12
Al Manamah	424	183	607	303	152	152
Al Muharraq	127	54	181	90	47	44
Al-Hadd	31	13	44	22	11	11
Ali	74	33	107	55	26	26
Amwaj	31	13	44	22	11	11
Ar Rifa	120	49	169	85	42	42
Barbar	14	6	20	10	5	5
Duratt Al Bahrein	36	16	52	17	17	18
Hamala	14	6	20	10	5	5
Jaw	36	16	52	18	17	17
Jidd Hafs	72	28	100	50	25	25
Madinat Hamad	95	39	134	68	33	33
Madinat Isa	92	40	132	68	32	32
Saar	38	13	51	17	17	17
Sakhir	21	9	30	10	10	10
Sitrah	72	32	104	53	25	26
Total	**1405** 70%	**600** 30%	**2005**	**982**	**512**	**511**

Global voice distribution

4.2.4 Measurements specifications - Road links

Road links	Own	Fixed	Total
Al Budayyi` - Hamala	4	3	**7**
Al Malikiyah - Jidd Hafs	6	4	**10**
Al Malikiyah - Sakhir	9	3	**12**
Al Manamah - Al Malikiyah	10	4	**14**
Al Manamah - Al Muharraq	11	3	**14**
Al Manamah - Hamala	12	4	**16**
Al Manamah - Jidd Hafs	15	6	**21**
Al Manamah - Sitrah	7	4	**11**
Al Muharraq - Al Hadd	6	3	**9**
Al Muharraq - Amwaj	4	2	**6**
Ali - Madinat Hamad	7	2	**9**
Ar Rifa - Madinat Isa	3	3	**6**
Ar Rifa - Sakhir	5	2	**7**
Barbar - Al Budayyi`	7	1	**8**
Duratt Al Bahrain - Ar Rifa	16	6	**22**
Hamala - Al Malikiyah	5	2	**7**
Jaww - Duratt Al Bahrain	11	5	**16**
Jidd Hafs - Al Budayyi`	6	1	**7**
Jidd Hafs - Barbar	3	3	**6**
Madinat Hamad - Madinat Isa	6	3	**9**
Madinat Isa - Al Manamah	4	3	**7**
Madinat Isa - Sitrah	7	3	**10**
Sakhir - Ali	7	4	**11**
Sitrah - Jaww	15	9	**24**
Total	**186** **69%**	**83** **31%**	**269**

Road links sample distribution

4.2.5 Global Voice Measurements Distribution

Definition		Realized
Calls origins	MTM own	70%
	Fixed	30%
Hours	Busy hours	42%
Outdoor	Stationary	48%
	Moving	52%
Indoor	Daylight	51%
	Deep	49%
Type of Indoor	Private (Offices and Habitation)	52%
	Public	48%

4.2.6 Method

Test methodology followed ITU ref P.800 Mean Opinion Score for voice specification.

The corner stone of Directique test methodology is based on a training method performed on a specifically developed software **FormaTest** ©.This training method allows for a clear and faithful marking system of audio and video quality problems. Directique guarantee consistency across engineers, and a minimum standard deviation of the marks.

All tests were timed stamped and GPS tagged, in order to ensure full traceability of each measurement.

Test phones were verified on a daily basis, and when allocated for field testing, handsets were rotated between teams regularly to avoid bias due to potential to small differences between same model phones in radio frequency sensitivity and processor performance.

Measurements software assisted by **ChronoTest** ©, were started simultaneously by the mobile and the fixed operators to synchronize call start. The software provided engineers with all necessary information related to a test call, when a call had to be placed (either mobile originated or mobile terminated) and ended, in order to guarantee a strict adherence to test protocol. **ChronoTest** © was combined with a GPS receiver recording the location of the mobile team every second.

All information concerning test location and call marks were recorded by the engineer at the fixed-end location in a database who ran live coherence checks to guarantee error free recording.

Hands-free kits were used on mobile phones in order to minimizes ambient noise and provide a better environment to the field engineer to measure quality of the voice service.

Outdoor, the phone was either held by hand, or placed in a pocket in areas where discretion was required.

4.2.7 No default procedure

In order to guarantee the same level of assessment for all Mobile Operators, engineers were regularly switched from one operator to another.

In order to prevent a faulty phone polluting measurement samples, phones used for the test were tested prior the start of measurements campaign.

Any abnormal behaviour of a handset was recorded and the phone was removed from the test pool.

Every week, test results were computed in a way that singled out any problem that could be related to a test phone.

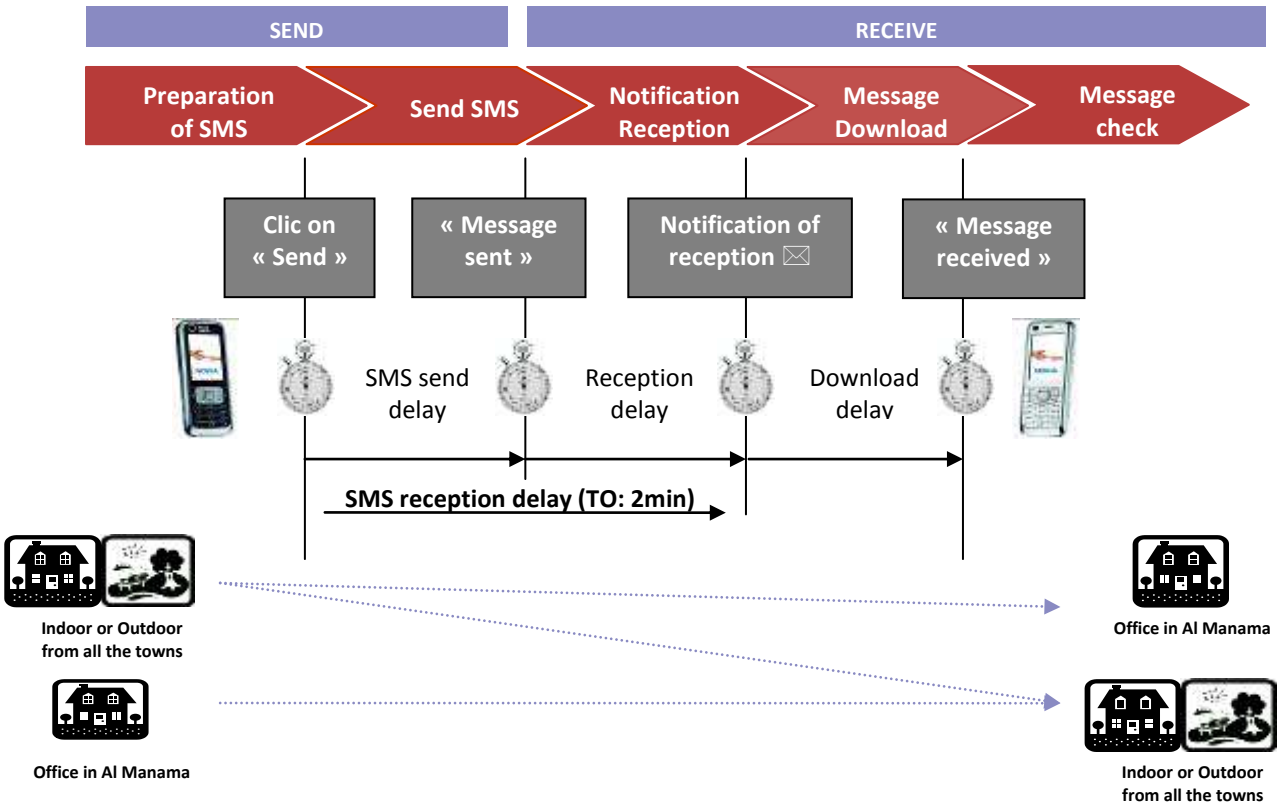
Test phones were rotated between Mobile Networks every half day.

4.3 SMS measurements

The mobile phones used to receive SMS were at a fixed location in an area served by a strong radio signal from the Mobile Operators. The mobile phones transmitting the SMS were in the field with the testing team. SMS were sent from indoor and outdoor locations used for voice testing or from the fixed location in Seef area. During a test both phones stayed still.

A measurement, made simultaneously on all Mobile Networks, consisted of:

- Sending a 26 characters message including an index, and recording time
- Observing on the phone when transmission was acknowledged and taking note of the time
- Observing reception of the message on the other phone and taking note of the time; a message not received after 2 minutes elapse time was marked as failed.
- Opening and checking integrity of the received message and index matching

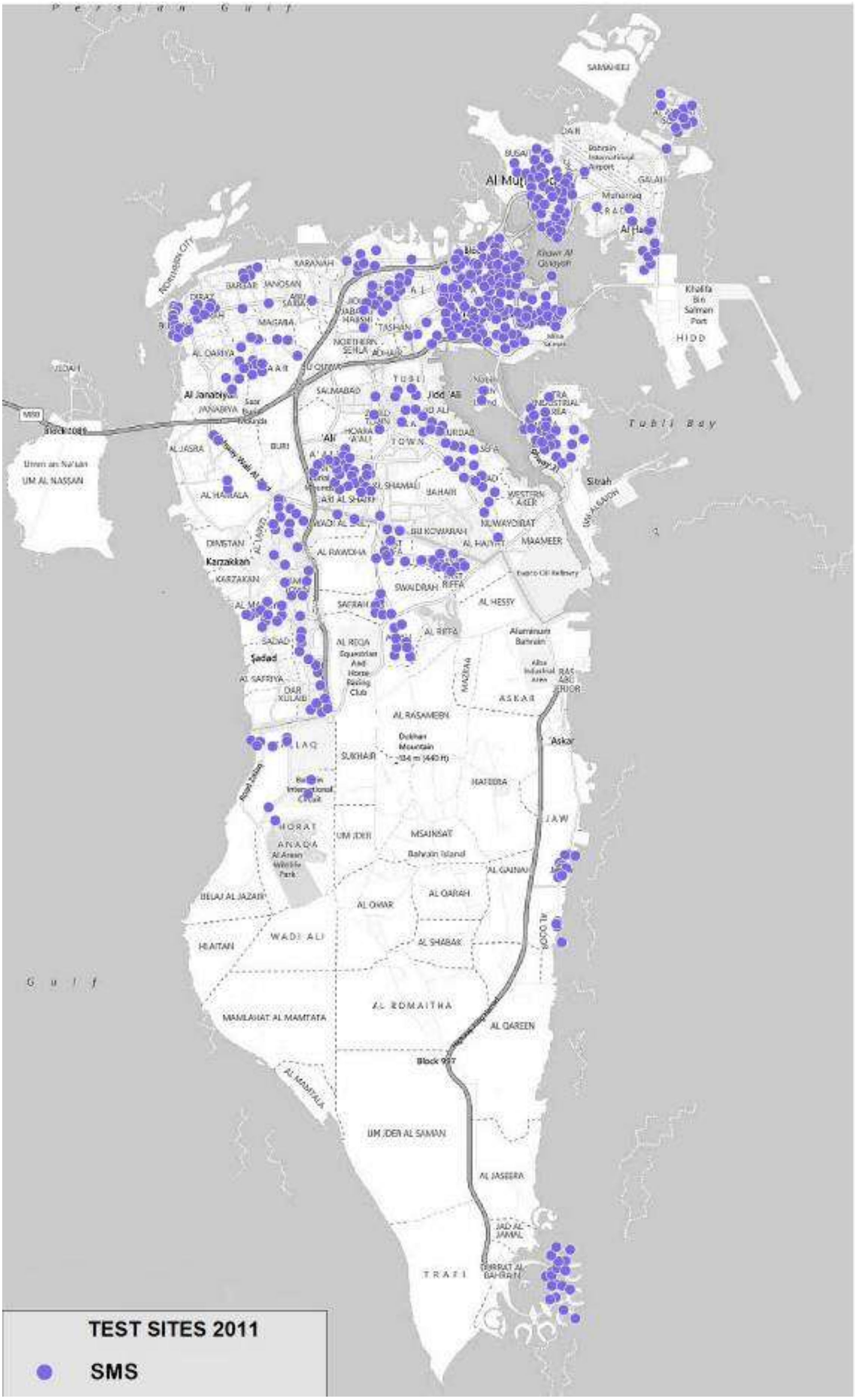


SMS test areas excluded road links, SMS testing schedule was the same as for voice testing.

The following table show the SMS test sample repartition:

Towns	Reception Al Manama	Emission Al Manamah	Emission and Reception in towns	Total
Al Malikiyah	8	8	8	**24**
Al Manamah	101	101	102	**304**
Al Muharraq	28	30	30	**88**
Ali	16	18	18	**52**
Amwaj	10	8	6	**24**
Ar Rifa	30	30	28	**88**
Barbar	4	4	2	**10**
Hamala	4	4	2	**10**
Jaw	12	10	12	**34**
Jidd Hafs	15	17	18	**50**
Madinat Hamad	22	20	24	**66**
Madinat Isa	22	24	22	**68**
Saar	10	14	10	**34**
Sakhir	8	6	6	**20**
Sitrah	16	18	18	**52**
Al-Hadd	8	6	8	**22**
Al Budayyi`	20	14	16	**50**
Duratt Al Bahrein	10	12	14	**36**
Total	**344**	**344**	**344**	**1032**

Map of SMS measurements



4.4 Data service testing

4.4.1 FTP measurements

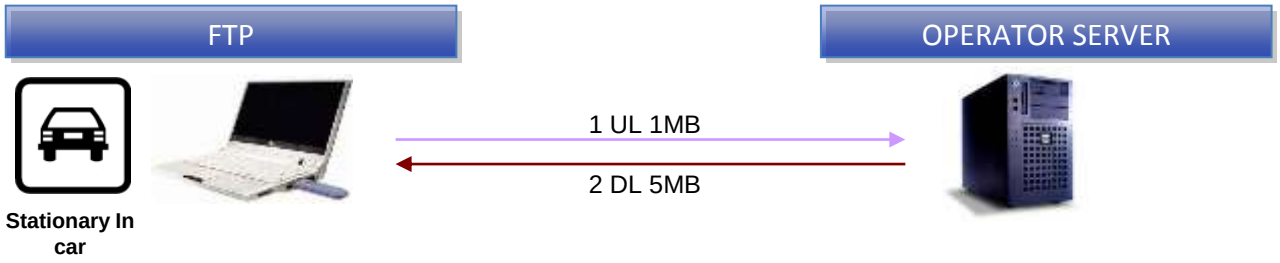
Data measurements were carried out automatically via **Mobi.Net** ©, Directique's software data test.

Test handset were connected to a laptop and **Mobi.Net** © was launched on each selected test point.

On each network, a measurement consisted of:

- Attempting to set up a radio connection before a 30 sec. timeout. Connection time was recorded.
- Downloading 1MB and 5MB file via FTP. Download time of the entire file was recorded (test of integrity)
- Uploading 1MB file via FTP. Uploading time of the entire file was recorded

In case of error, the software did record the error type based on pre-defined error codes such as: FTP server connection error, radio signal drop, data transfer timed out set at 10 minutes etc.



Quality of Service assessment offered by the access network with FTP Download and Upload tests was distributed over Capital City and Towns of more than 50,000 inhabitants for a part and from a fixed location with the best data coverage (Hotspot).

Towns	Connexion	FTP DL 5MB	FTP UL 1MB
Al Manamah	72	48	24
Al Muharraq	132	88	44
Al Riffa	132	88	44
Isa Town	132	88	44
Madinat Hamad	132	88	44
Total	**600**	**400**	**200**

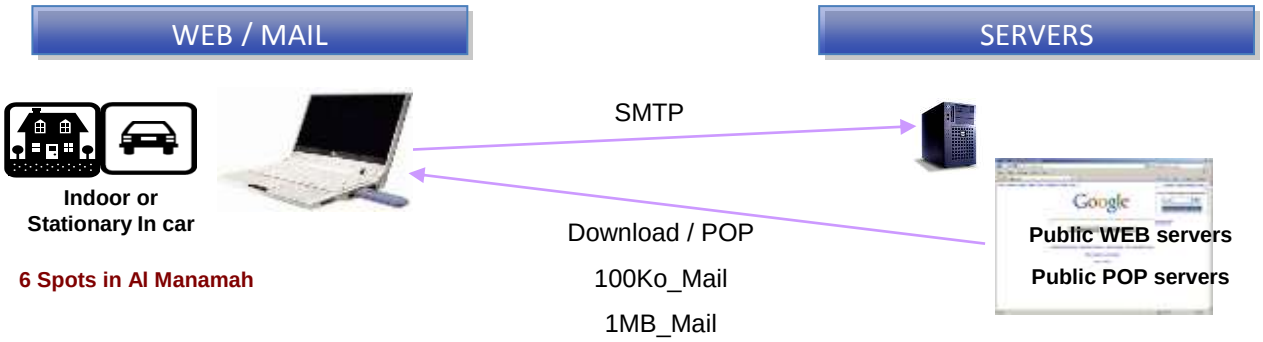
FTP test samples repartition for random locations

Hot Spots			Samples
Batelco	Zain	Viva	FTP
HOTSPOT 1 China Embassy Juffair Ave	HOTSPOT 1 Juffair Al Shabab Ave	HOTSPOT 1 Government Ave	50
HOTSPOT 2 Wipping Willow in Hoora Road No 1865	HOTSPOT 2 Adil Center Saqiyah Ave	HOTSPOT 2 Al Hadrami Ave	50
HOTSPOT 3 Friends Electronics Gudaibiya Abdul Rahman Al Dakhel Ave	HOTSPOT 3 Bahrain Pharmacy Sh Daij Ave	HOTSPOT 3 Exhibitions Ave	50
HOTSPOT 4 Dasman Center Zinj Qudaibiya Ave	HOTSPOT 4 New City Center Road No 2819	HOTSPOT 4 242 Exhibitions Ave	50
HOTSPOT 5 Mezquita Bahrain Road No 4219	HOTSPOT 5 Karbabad Ave	HOTSPOT 5 DIPLOMATIC AREA Road No 1704	50
HOTSPOT 6 Miraje Hotel Al Fatih Hwy	HOTSPOT 6 Near Petrol Pump Road no 2809	HOTSPOT 6 Sh Daij Ave	50

FTP test samples repartition for hotspot locations

4.4.2 Web and Mail measurement

Web and Mail measurements were carried out automatically with **Mobi.Net** © (introduced earlier).



The test 3G+ USB dongle was connected to a laptop and **Mobi.Net** © was launched on each selected test point.

On each network, a measurement consisted of:

- Attempting to set up a radio connection before timeout set to 30 sec. Record connection time.

- For Web : downloading one of the 10 most visited public homepages and the homepage of each operator, taking note of completion time, errors on page if any, with a 60 sec. timeout.

Dongle Web sites		
Batelco	**Zain**	**Viva**
http://www.batelco.com	http://www.bh.zain.com/portal/page/portal/home	http://www.viva.com.bh/static/CorporatePortal/English/Home/index.htm
http://www.google.com.bh/		
http://www.facebook.com/		
http://www.google.com/		
http://www.youtube.com/		
http://www.live.com		
http://www.yahoo.com		
http://www.wikipedia.org		
http://www.apple.com/		
http://arabia.msn.com/		
http://vuclip.com/		

HTTP tested webpages

- For Mail (SMTP/POP): sending and receiving an e-mail, with an attached document 100Ko or 1MB.

Sample Web and Mail

Test of the end to end usage from a fixed location with the best data coverage with web surfing and mail: 6 locations (Hot Spots) provided by each operator in Al Manamah.

Hotspot	Mail	Web
HOTSPOT 1	50	120
HOTSPOT 2	50	120
HOTSPOT 3	50	120
HOTSPOT 4	50	120
HOTSPOT 5	50	120
HOTSPOT 6	50	120
Total	**300**	**720**

Mail test samples repartition

4.4.3 Smartphone measurement

4.4.3.1 Performance measurement

The automatic smartphone data software **MobiSpeed** © was launched on each Random and hotspot test point,

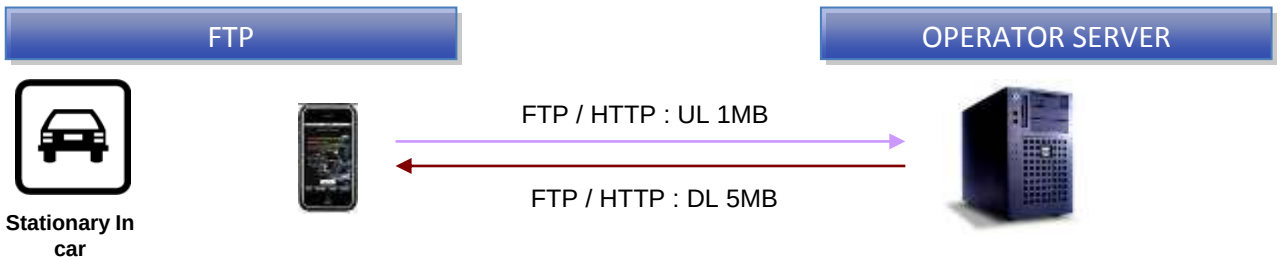
On each network, a measurement consisted of:

- Downloading and 5MB file via FTP. Download time of the entire file was recorded (test of integrity).
- Uploading 1MB file via FTP. Uploading time of the entire file was recorded
- Downloading and 5MB file via HTTP. Download time of the entire file was recorded (test of integrity).
- Uploading 1MB file via HTTP. Uploading time of the entire file was recorded
- For hotspot only, downloading one of the 10 most visited public homepages and the homepage of each operator, taking note of completion time, errors on page if any, with a 30 sec. timeout.

Smartphone Web sites		
BATELCO	**ZAIN**	**VIVA**
http://www.batelco.com/portal/cs/cs_contactus.asp	http://www.zain.com/muse/obj/portal.view/content/Foter/Contact-20us	http://www.viva.com.bh/static/CorporatePortal/English/HelpAndSupport/ContactUs/index.htm
http://www.google.com.bh/		
http://m.facebook.com/		
http://m.youtube.com/		
http://www.google.com/		
http://login.live.com/		
http://m.yahoo.com/		
http://m.arabia.msn.com/		
http://www.wikipedia.org/		
http://m.vuclip.com/		
http://www.apple.com/		

Smartphone HTTP tested webpages

In cases of error, the software did record the error type based on pre-defined error codes such as: FTP server connection error, radio signal drop, data transfer timed out set at 10 minutes etc

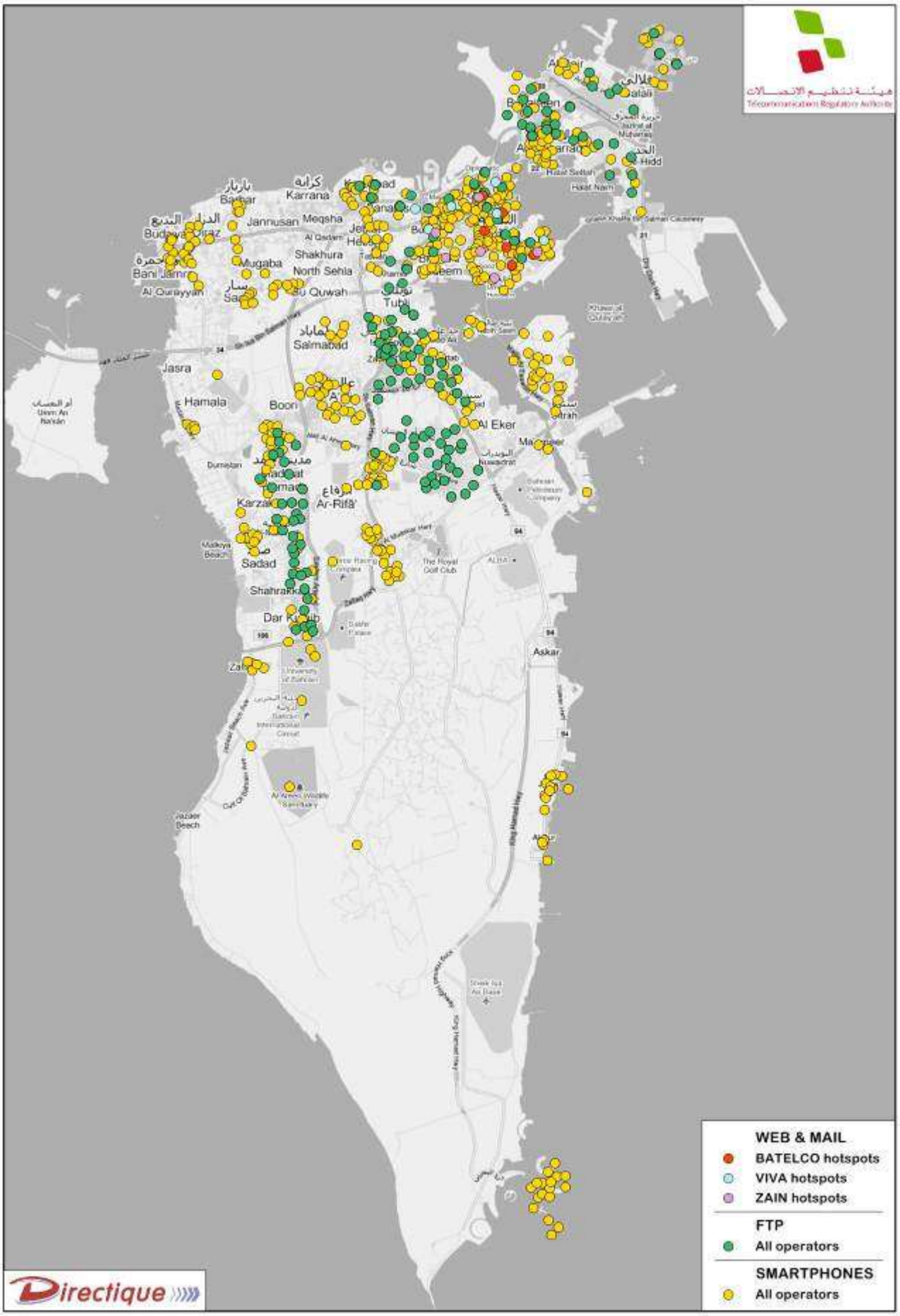


Smartphone testing area excluded road links, testing schedule was the same as for Dongle data testing.

Towns	FTP DL 5 MB	FTP UL 1 MB	HTTP DL 5 MB	HTTP UL 1 MB
Al Muharraq	44	44	44	44
Madinat Isa	44	44	44	44
Ar Rifa	44	44	44	44
Madinat Hamad	44	44	44	44
Al Manamah	24	24	24	24
Total	**200**	**200**	**200**	**200**
Hotspot	FTP DL 5 MB	FTP UL 1 MB	HTTP DL 5 MB	HTTP UL 1 MB
HOTSPOT 1	13	13	13	13
HOTSPOT 2	13	13	13	13
HOTSPOT 3	13	13	13	13
HOTSPOT 4	13	13	13	13
HOTSPOT 5	13	13	13	13
HOTSPOT 6	13	13	13	13
Total	**78**	**78**	**78**	**78**

Smartphone test sample repartition

Map of DATA measurements



5 AUDIT RESULTS

5.1 Key Performance Indicators

5.1.1 Voice KPIs

A voice measurement is a successful call attempt followed by a 2 minutes conversation, with an assessment of the audio voice quality for each operator service.

KPIs	Definition
SHC (Set-up and held for 2 min calls)	% of calls set-up and held for 2 min. Call set-up on first attempt and held for 2 min without drop. Rate is based on the total sample
PQR (Perfect quality rate)	% of calls set-up held for 2 min and marked 4. Calls excluded = failed on first attempt, dropped before 2 min, or been marked 3 or lower Rate is based on the total sample
CQR (Correct quality rate)	% of calls set-up held for 2 min and marked 3 or 4 Calls excluded = failed on first attempt, dropped before 2 min, or been marked 2 or lower Rate is based on the total sample

5.1.2 SMS KPIs

KPIs	Definition
RS2 **(% of received SMS within 2 minutes)**	SMS not refused when sent out and received within 2 minutes without being altered Rate is based on the total number of SMS send attempts.
RS30 **(% of SMS received SMS within 30 sec)**	SMS not refused when sent out and received within 30 seconds without being altered.
RS15 **(% of SMS received SMS within 15 sec)**	SMS not refused when sent out and received within 15 seconds without being altered.

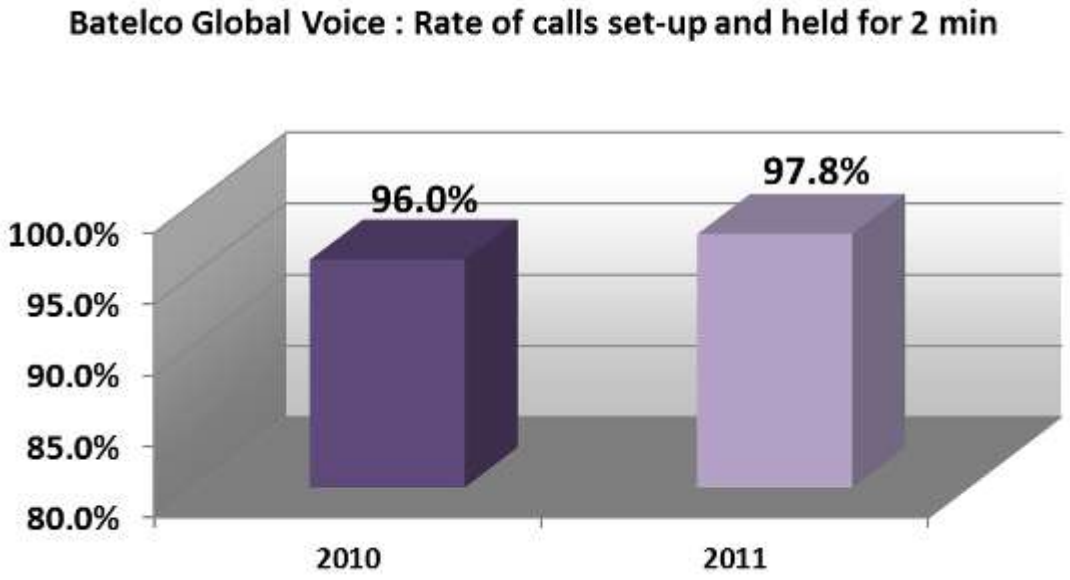
5.1.3 FTP, HTTP, Web and Mail KPIs

KPIs	Definition
% of successful radio connections within 1 minute	Connection within 1 minute timeframe. The indicator is based on the total number of connection attempts
% of successful radio connections within 10 seconds	Same as above but within 10 seconds timeframe
% of successful data transfers	Successful data file when received in full and without radio drop, within 10 minutes (FTP) or 2 minutes (Web & eMails) once connected. Indicator is based on the total number of connection attempts
Average download time once connected	Average download time once connected applied only to successful data transfers
Standard download time deviation	Standard download time deviation applied only to successful data transfers

5.2 Batelco results

5.2.1 Global voice results (Towns & Roads)

Global Voice Service		BATELCO 2 274 mes
Rate of calls set-up and held for 2 min		**97,8%**
	Statistical accuracy	*± 0,6%*
and marked	**4-perfect (PQR)**	**96,8%**
	Statistical accuracy	*± 0,7%*
	4-perfect or 3-fair (CQR)	**97,6%**
	Statistical accuracy	*± 0,6%*



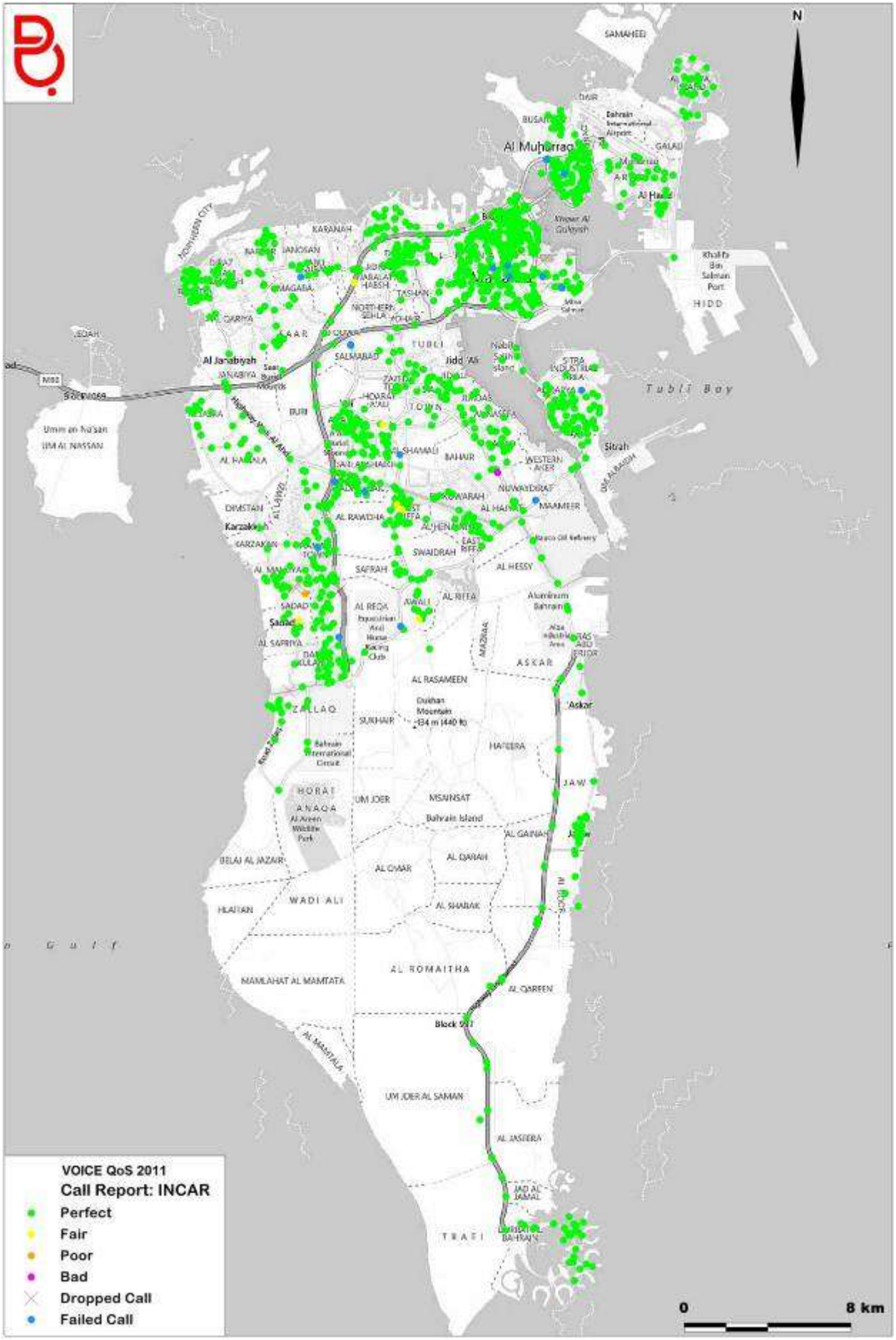
5.2.1.1 Towns voice results (In car-Indoor-Outdoor)

Towns Voice Service		**BATELCO 2 005 tests**
Rate of calls set-up and held for 2 min		**98,0%**
	Statistical accuracy	*± 0,6%*
and marked	**4-perfect (PQR)**	**97,0%**
	Statistical accuracy	*± 0,8%*
	4-perfect or 3-fair (CQR)	**97,8%**
	Statistical accuracy	*± 0,6%*
Difference between 2010 & 2011		**-1,0%**
	Statistical accuracy	*± 0,6%*

Towns Incar Voice Service		**BATELCO 982 tests**
Rate of calls set-up and held for 2 min		**98,1%**
	Statistical accuracy	*± 0,9%*
and marked	**4-perfect (PQR)**	**97,4%**
	Statistical accuracy	*± 1,0%*
	4-perfect or 3-fair (CQR)	**97,9%**
	Statistical accuracy	*± 0,9%*

5.2.1.2 Roads Links voice results

Road Links Voice Service		**BATELCO 269 mes**
Rate of calls set-up and held for 2 min		**96,3%**
	Statistical accuracy	*± 2,3%*
and marked	**4-perfect (PQR)**	**95,9%**
	Statistical accuracy	*± 2,4%*
	4-perfect or 3-fair (CQR)	**96,3%**
	Statistical accuracy	*± 2,3%*



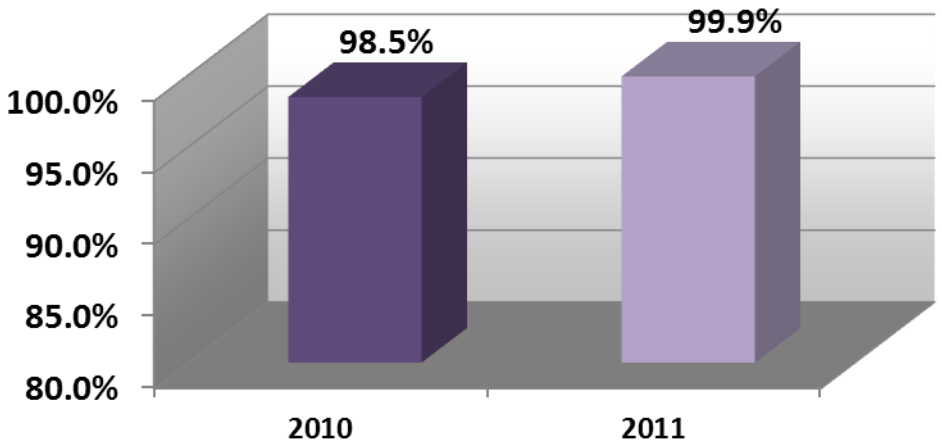
In car voice results

5.2.2 Data results

5.2.2.1 SMS results

SMS Service		BATELCO 1 032 tests
Rate of Received SMS within 2 min		**99,9%**
	Statistical accuracy	*± 0,2%*
Rate of Received SMS within 30 sec		**99,9%**
	Statistical accuracy	*± 0,2%*
Rate of Received SMS within 15 sec		**99,1%**
	Statistical accuracy	*± 0,6%*
Average time reception		**8,0 s** *

Batelco SMS Service : Rate of Received SMS within 2 min



5.2.2.2 Data accessibility results

Hotspot Dongle connection	BATELCO 1 619 mes
Rate of successful radio connections to network	99,96%
Statistical accuracy	*± 0,10%*
Rate of successful radio connections within 10 sec	99,75%
Statistical accuracy	*± 0,24%*

Random Dongle connection	BATELCO 586 mes
Rate of successful radio connections to network	99,3%
Statistical accuracy	*± 0,7%*
Rate of successful radio connections within 10 sec	99,3%
Statistical accuracy	*± 0,7%*

5.2.2.3 Mail results

SMTP-POP Service 100 Ko Mail	BATELCO SMTP 150 tests	BATELCO POP 150 tests
Rate of successful data transfers	98,7%	99,3%
Statistical accuracy	*± 1,8%*	*± 1,3%*
Average sending/receiving time once connected	14,8 s	13,8 s
Min sending/receiving time once connected	10,6 s	7,4 s
Max sending/receiving time once connected	31,7 s	28,9 s
Standard deviation sending/receiving time once	3,8 s	4,0 s
2010 Vs 2011 Rate of Sucessful data transfers	-1,3%	-0,7%

SMTP-POP Service 1 Mo Mail	BATELCO	
	SMTP	POP
	150 tests	150 tests
Rate of successful data transfers	98,0%	99,3%
Statistical accuracy	*± 2,2%*	*± 1,3%*
Average sending/receiving time once connected	54,6 s	18,8 s
Min sending/receiving time once connected	39,9 s	10,4 s
Max sending/receiving time once connected	182,3 s	90,9 s
Standard deviation sending/receiving time once	20,3 s	9,0 s
2010 Vs 2011 Rate of Sucessful data transfers	-0,4%	+0.9%

5.2.2.4 WEB service results

WEB Service	BATELCO
	719 tests
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average download time once connected	4,8 s
Min download time once connected	1,7 s
Max download time once connected	42,3 s
Standard deviation download time once connected	3,5 s

5.2.2.5 FTP results Hotspot

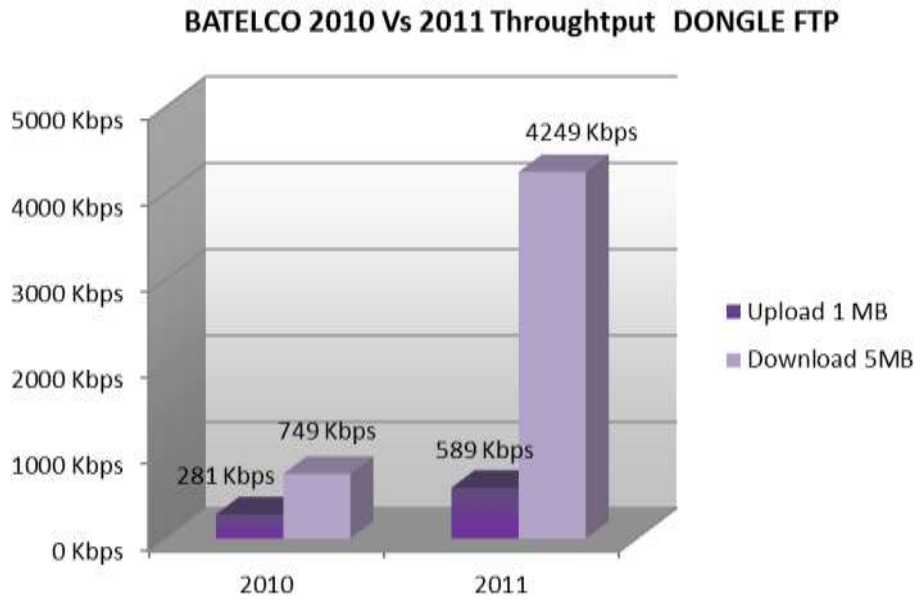
Hotspot Dongle FTP UPLOAD 1MB	**BATELCO 150 tests**
Rate of successful data transfers	**99,3%**
Statistical accuracy	*± 1,3%*
Average Throughput	**1274 kbps**
Min Throughput	**200 kbps**
Max Throughput	**2778 kbps**
Standard deviation Throughput	**771 kbps**

Hotspot Dongle FTP DOWNLOAD 5 MB	**BATELCO 150 tests**
Rate of successful data transfers	**100,0%**
Statistical accuracy	*± 0,0%*
Average Throughput	**5172 kbps**
Min Throughput	**1423 kbps**
Max Throughput	**9869 kbps**
Standard deviation Throughput	**2127 kbps**

5.2.2.6 FTP results Random

FTP UPLOAD 1MB	BATELCO 184 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	589 kbps
Min Throughput	129 kbps
Max Throughput	2697 kbps
Standard deviation Throughput	507 kbps

FTP DOWNLOAD 5MB	BATELCO 398 mes
Rate of successful data transfers	99,7%
Statistical accuracy	*± 0,5%*
Average Throughput	4249 kbps
Min Throughput	249 kbps
Max Throughput	9664 kbps
Standard deviation Throughput	1866 kbps



5.2.3 SmartPhone results

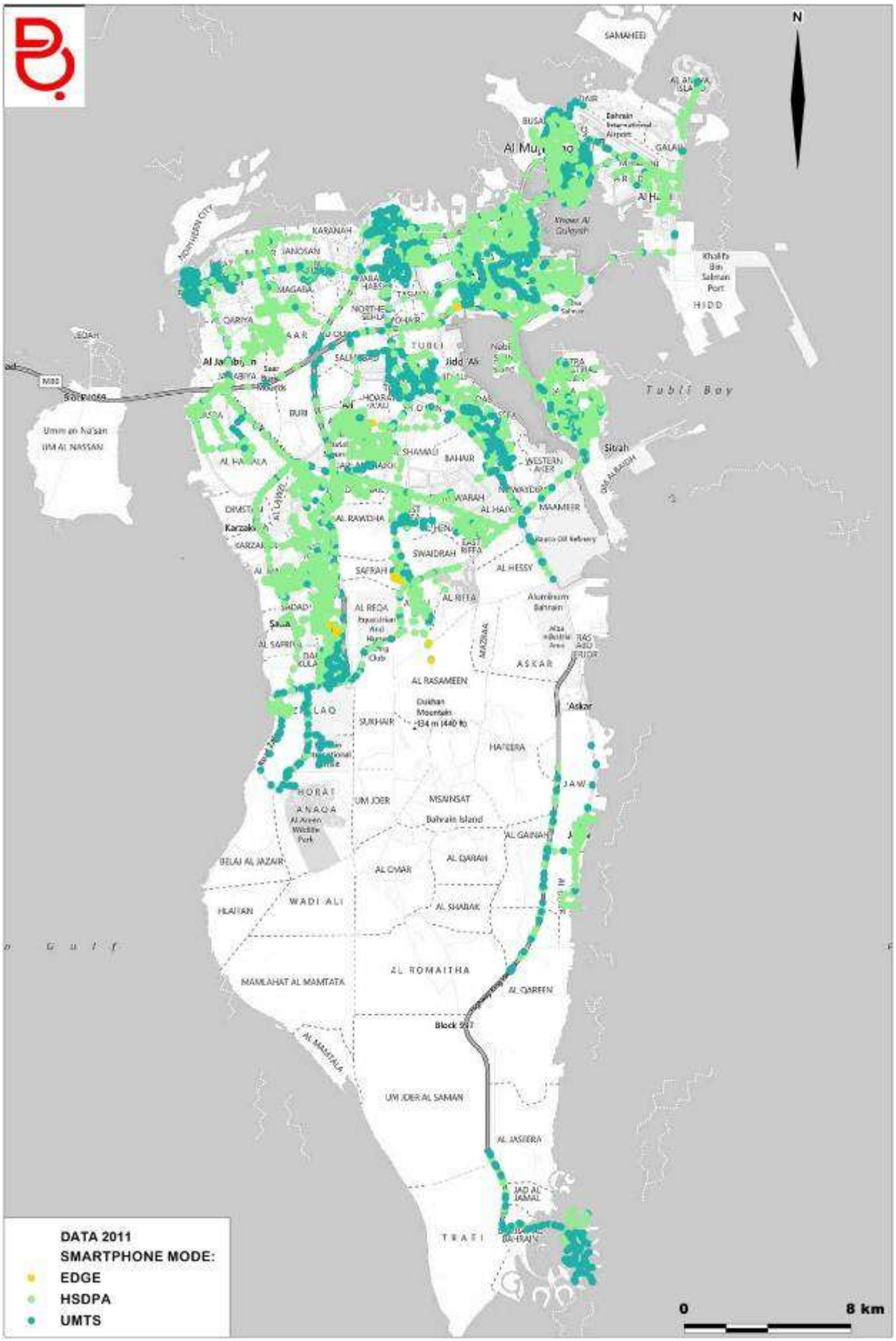
5.2.3.1 Data Coverage

Smartphone Data Coverage		BATELCO 33 210 mes
EDGE		**0.3%**
	Statistical accuracy	*± 0.1%*
UMTS		**20.4%**
	Statistical accuracy	*± 0.4%*
HSPA		**79.3%**
	Statistical accuracy	*± 0.4%*
2010 HSPA coverage		**27.0%**

This table provides the technology breakdown used by Mobile Operators as recorded during all measurements. Every minute, the mobile is recording the observed technology. These samples have been taken in towns and on road links. They are shown as contextual information at the time of the audit.

79.3% of the measurements for BATELCO were achieved using HSPA[1], versus 27% in 2010.

[1] HSPA High Speed Packet Access



Smartphone Service: Data Coverage

5.2.3.2 Web service results

WEB Service	BATELCO 388 tests
Rate of successful data transfers	99,7%
Statistical accuracy	*± 0,5%*
Average download time once connected	6,7 s
Min download time once connected	1,3 s
Max download time once connected	57,1 s
Standard deviation download time once connected	5,0 s

5.2.3.3 FTP results Hotspot

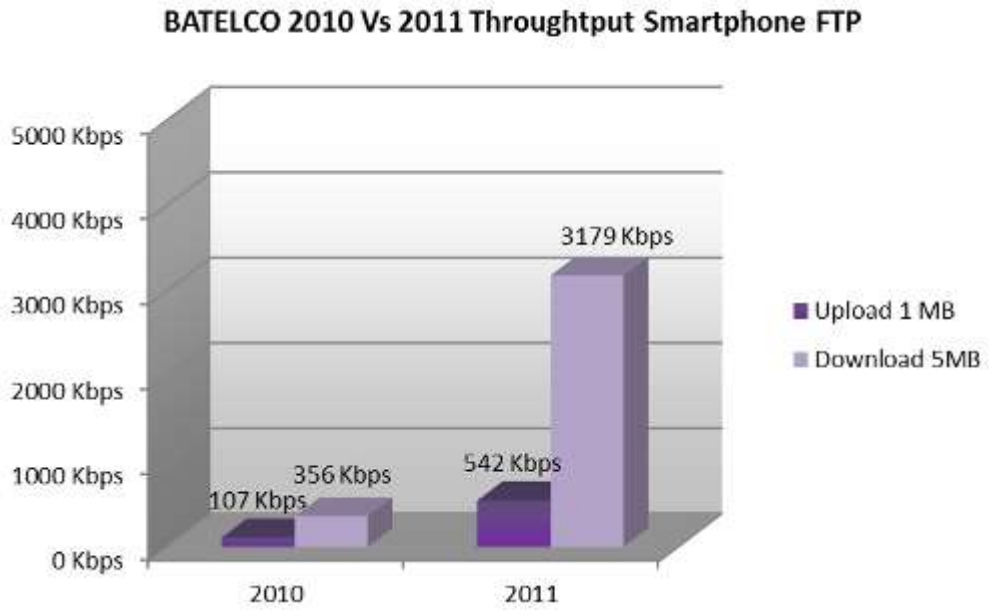
Hotspot Smartphone FTP UPLOAD 1MB	BATELCO 78 mes
Rate of successful data transfers	98,7%
Statistical accuracy	*± 2,5%*
Average Throughput	1011 kbps
Min Throughput	187 kbps
Max Throughput	2310 kbps
Standard deviation Throughput	572 kbps

Hotspot Smartphone FTP DOWNLOAD 5MB	BATELCO 78 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	3828 kbps
Min Throughput	1818 kbps
Max Throughput	7055 kbps
Standard deviation Throughput	1483 kbps

5.2.3.4 FTP results Random

Random Smartphone FTP UPLOAD 1MB	BATELCO 200 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	542 kbps
Min Throughput	90 kbps
Max Throughput	2574 kbps
Standard deviation Throughput	373 kbps

Random Smartphone FTP DOWNLOAD 5MB	BATELCO 200 mes
Rate of successful data transfers	99,5%
Statistical accuracy	*± 1,0%*
Average Throughput	3179 kbps
Min Throughput	320 kbps
Max Throughput	6840 kbps
Standard deviation Throughput	1543 kbps



5.2.3.5 HTTP results Hotspot

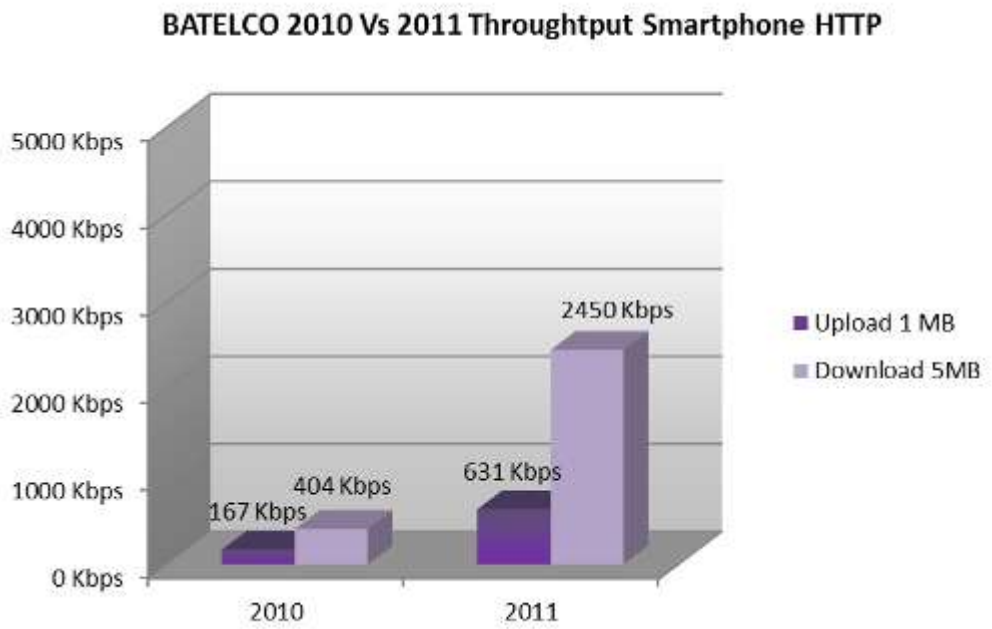
Hotspot Smartphone HTTP UPLOAD 1MB	BATELCO 78 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	981 kbps
Min Throughput	207 kbps
Max Throughput	2238 kbps
Standard deviation Throughput	590 kbps

Hotspot Smartphone HTTP DOWNLOAD 5MB	BATELCO 78 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	2736 kbps
Min Throughput	1268 kbps
Max Throughput	4569 kbps
Standard deviation Throughput	837 kbps

5.2.3.6 HTTP results Random

Random Smartphone HTTP UPLOAD 1MB	BATELCO 200 mes
Rate of successful data transfers	99,5%
Statistical accuracy	*± 1,0%*
Average Throughput	495 kbps
Min Throughput	98 kbps
Max Throughput	1884 kbps
Standard deviation Throughput	304 kbps

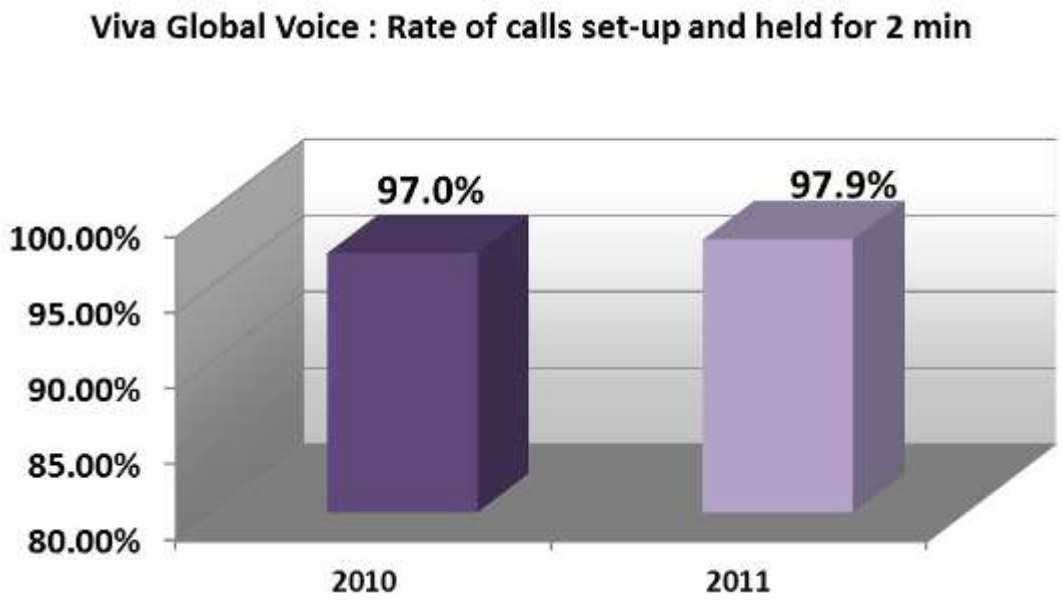
Random Smartphone HTTP DOWNLOAD 5MB	BATELCO 200 mes
Rate of successful data transfers	99,0%
Statistical accuracy	*± 1,4%*
Average Throughput	2338 kbps
Min Throughput	235 kbps
Max Throughput	5238 kbps
Standard deviation Throughput	1034 kbps



5.3 Viva results

5.3.1 Global voice results (Towns & Roads)

Global Voice Service		VIVA 2 274 mes
Rate of calls set-up and held for 2 min		**97,9%**
	Statistical accuracy	*± 0,6%*
and marked	**4-perfect (PQR)**	**95,2%**
	Statistical accuracy	*± 0,9%*
	4-perfect or 3-fair (CQR)	**97,2%**
	Statistical accuracy	*± 0,7%*

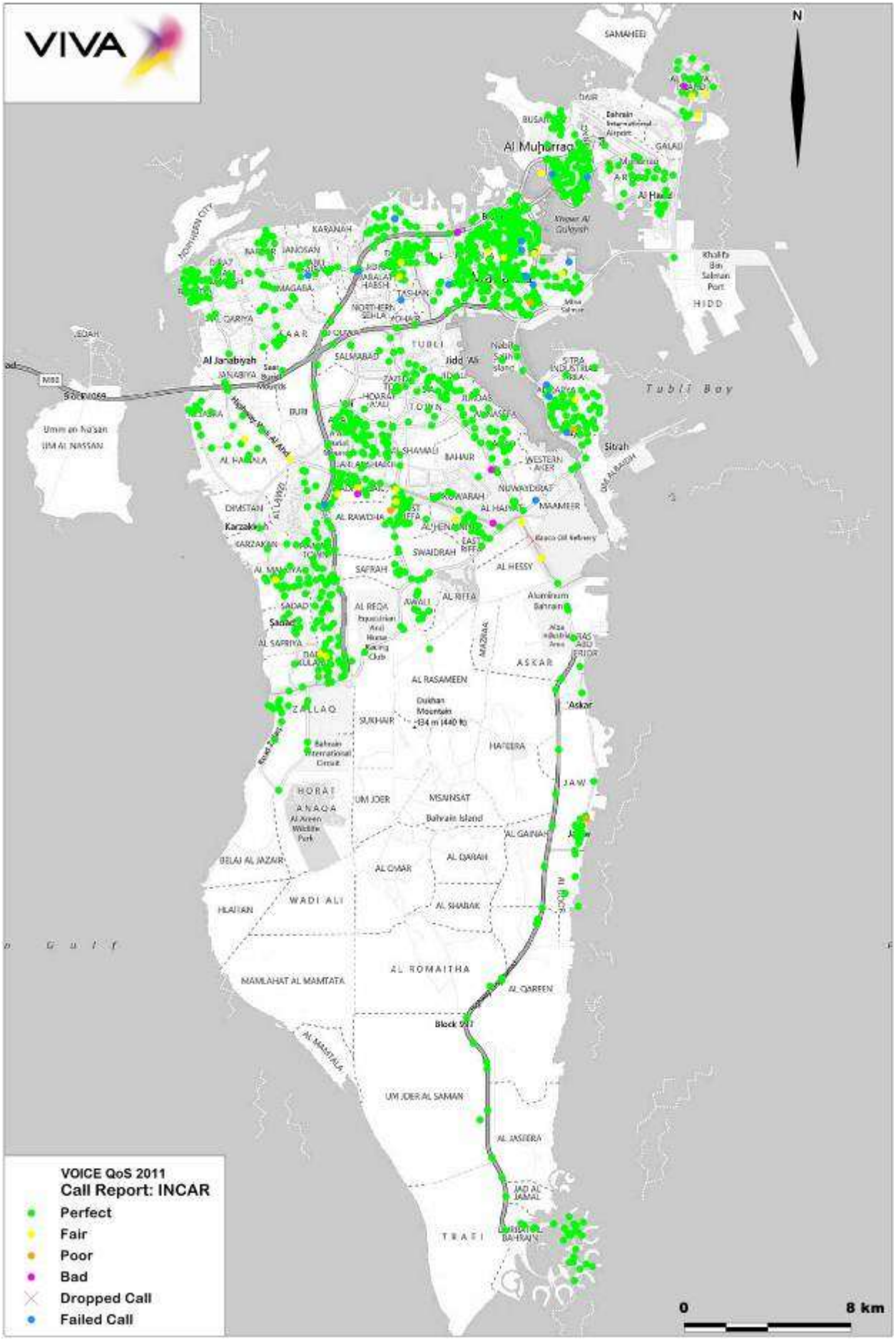


Towns Voice Service		**VIVA 2 005 tests**
Rate of calls set-up and held for 2 min		**98,1%**
	Statistical accuracy	*± 0,6%*
and marked	**4-perfect (PQR)**	**95,5%**
	Statistical accuracy	*± 0,9%*
	4-perfect or 3-fair (CQR)	**97,3%**
	Statistical accuracy	*± 0,7%*
Difference between 2010 & 2011		**1,4%**
	Statistical accuracy	*± 0,6%*

Towns Incar Voice Service		**VIVA 982 mes**
Rate of calls set-up and held for 2 min		**98,5%**
	Statistical accuracy	*± 0,8%*
and marked	**4-perfect (PQR)**	**96,0%**
	Statistical accuracy	*± 1,2%*
	4-perfect or 3-fair (CQR)	**97,7%**
	Statistical accuracy	*± 0,9%*

5.3.1.1 Roads Links voice results

Road Links Voice Service		**VIVA 269 mes**
Rate of calls set-up and held for 2 min		**96,7%**
	Statistical accuracy	*± 2,1%*
and marked	**4-perfect (PQR)**	**93,3%**
	Statistical accuracy	*± 3,0%*
	4-perfect or 3-fair (CQR)	**96,3%**
	Statistical accuracy	*± 2,3%*

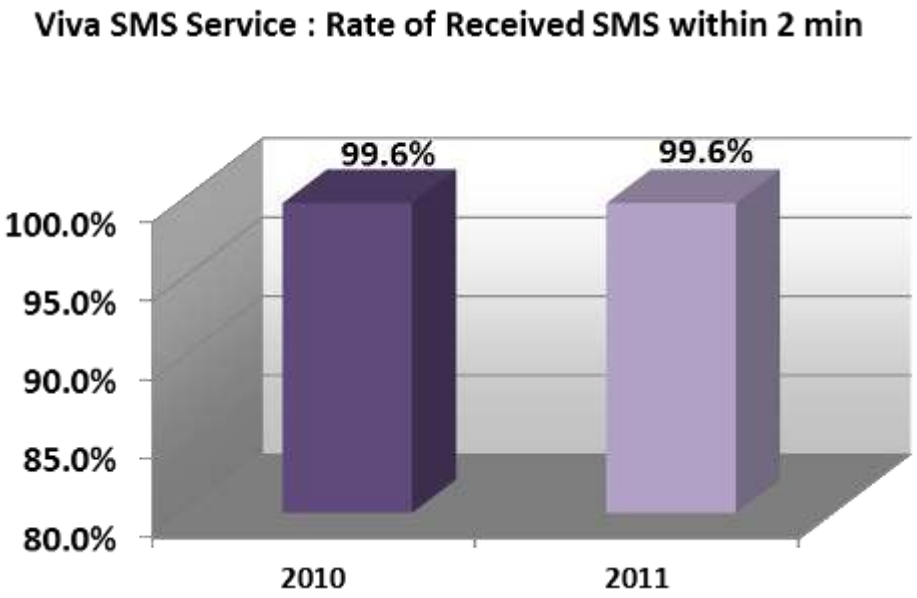


In car voice results

5.3.2 Data results

5.3.2.1 SMS results

SMS Service		VIVA 1 032 tests
Rate of Received SMS within 2 min		**99,6%**
	Statistical accuracy	*± 0,4%*
Rate of Received SMS within 30 sec		**99,2%**
	Statistical accuracy	*± 0,5%*
Rate of Received SMS within 15 sec		**97,5%**
	Statistical accuracy	*± 1,0%*
Average time reception		**8,2 s**



5.3.2.2 Data accessibility results

Hotspot Dongle connection	VIVA 1 620 mes
Rate of successful radio connections to network	99,51%
Statistical accuracy	*± 0,34%*
Rate of successful radio connections within 10 sec	99,51%
Statistical accuracy	*± 0,34%*

Random Dongle connection	VIVA 594 mes
Rate of successful radio connections to network	100,00%
Statistical accuracy	*± 0,00%*
Rate of successful radio connections within 10 sec	100,00%
Statistical accuracy	*± 0,00%*

5.3.2.3 Mail results

SMTP-POP Service 100 Ko Mail	VIVA	
	SMTP 148 tests	POP 149 tests
Rate of successful data transfers	98,6%	93,3%
Statistical accuracy	*± 1,9%*	*± 4,0%*
Average sending/receiving time once connected	9,4 s	7,1 s
Min sending/receiving time once connected	7,3 s	5,5 s
Max sending/receiving time once connected	26,9 s	23,6 s
Standard deviation sending/receiving time once	2,9 s	1,9 s
2010 Vs 2011 Rate of Sucessful data transfers	-1,4%	-6,7%

SMTP-POP Service 1 Mo Mail	VIVA	
	SMTP	POP
	150 tests	150 tests
Rate of successful data transfers	96,7%	96,7%
Statistical accuracy	*± 2,9%*	*± 2,9%*
Average sending/receiving time once connected	46,2 s	10,9 s
Min sending/receiving time once connected	33,0 s	7,4 s
Max sending/receiving time once connected	87,5 s	38,5 s
Standard deviation sending/receiving time once	8,1 s	3,4 s
2010 Vs 2011 Rate of Sucessful data transfers	-3,3%	-3,3%

5.3.2.4 WEB service results

WEB Service	VIVA
	716 tests
Rate of successful data transfers	94,8%
Statistical accuracy	*± 1,6%*
Average download time once connected	3,0 s
Min download time once connected	1,1 s
Max download time once connected	42,9 s
Standard deviation download time once connected	2,9 s

5.3.2.5 FTP results Hotspot

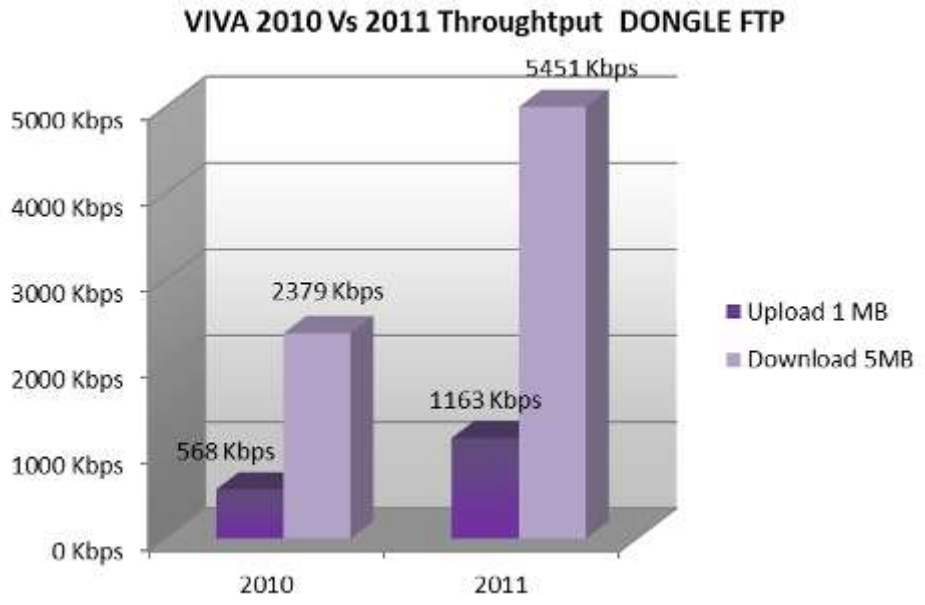
Hotspot Dongle FTP UPLOAD 1MB	**VIVA 148 tests**
Rate of successful data transfers	**99,3%**
Statistical accuracy	*± 1,3%*
Average Throughput	**1789 kbps**
Min Throughput	**1116 kbps**
Max Throughput	**2225 kbps**
Standard deviation Throughput	**232 kbps**

Hotspot Dongle FTP DOWNLOAD 5MB	**VIVA 150 tests**
Rate of successful data transfers	**100,0%**
Statistical accuracy	*± 0,0%*
Average Throughput	**8617 kbps**
Min Throughput	**3686 kbps**
Max Throughput	**13358 kbps**
Standard deviation Throughput	**2000 kbps**

5.3.2.6 FTP results Random

FTP UPLOAD 1MB	VIVA 182 mes
Rate of successful data transfers	96,2%
Statistical accuracy	*± 2,8%*
Average Throughput	1163 kbps
Min Throughput	79 kbps
Max Throughput	2225 kbps
Standard deviation Throughput	605 kbps

FTP DOWNLOAD 5MB	VIVA 398 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	5451 kbps
Min Throughput	213 kbps
Max Throughput	13231 kbps
Standard deviation Throughput	2665 kbps



5.3.3 SmartPhone results

5.3.3.1 Data Coverage

Smartphone Data Coverage		VIVA 30 375 mes
EDGE		**0.4%**
	Statistical accuracy	*± 0.1%*
UMTS		**0.0%**
	Statistical accuracy	*± 0.0%*
HSPA		**99.6%**
	Statistical accuracy	*± 0.1%*
2010 HSPA coverage		**97.2%**

This table provides the technology breakdown used by Mobile Operators as recorded during all measurements. Every minute, the mobile is recording the observed technology. These samples have been taken in towns and on road links. They are shown as contextual information at the time of the audit.

99.6% of the measurements for Viva were achieved using HSPA[1], versus 97.2% in 2010.

[1] HSPA High Speed Packet Access

Smartphone Service: Data Coverage

5.3.3.2 Web service results

WEB Service	VIVA 396 tests
Rate of successful data transfers	99,7%
Statistical accuracy	*± 0,5%*
Average download time once connected	3,1 s
Min download time once connected	0,7 s
Max download time once connected	40,4 s
Standard deviation download time once connected	2,4 s

5.3.3.3 FTP results Hotspot

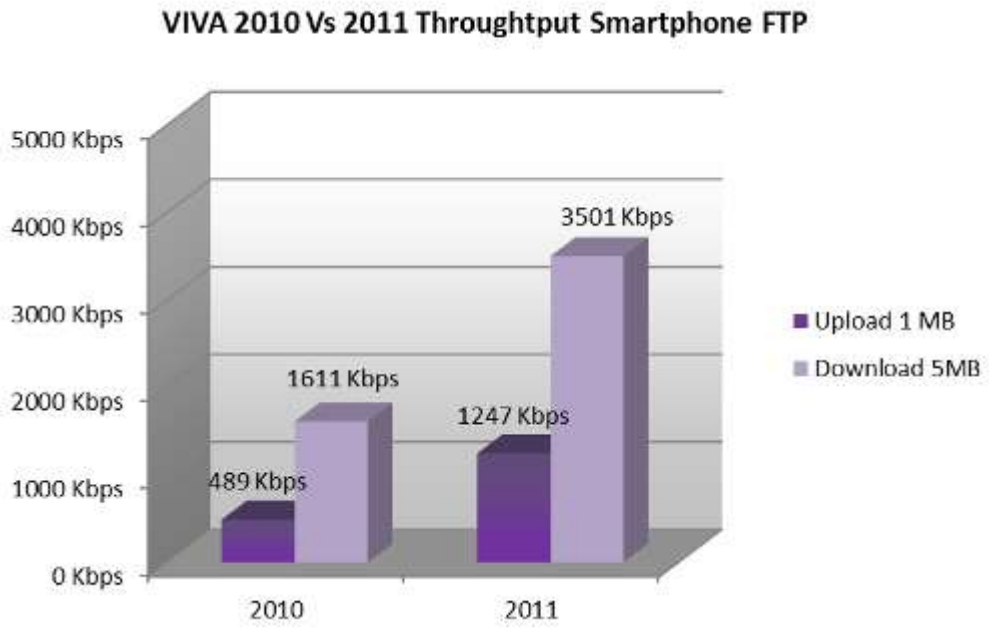
Hotspot Smartphone FTP UPLOAD 1MB	VIVA 78 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	1610 kBp/s
Min Throughput	923 kBp/s
Max Throughput	1999 kBp/s
Standard deviation Throughput	297 kBp/s

Hotspot Smartphone FTP DOWNLOAD 5MB	VIVA 79 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	4115 kbps
Min Throughput	511 kbps
Max Throughput	8279 kbps
Standard deviation Throughput	1776 kbps

5.3.3.4 FTP results Random

Random Smartphone FTP UPLOAD 1MB	VIVA 200 mes
Rate of successful data transfers	96,5%
Statistical accuracy	*± 2,6%*
Average Throughput	1247 kbps
Min Throughput	73 kbps
Max Throughput	2012 kbps
Standard deviation Throughput	452 kbps

Random Smartphone FTP DOWNLOAD 5MB	VIVA 200 mes
Rate of successful data transfers	99,5%
Statistical accuracy	*± 1,0%*
Average Throughput	3501 kbps
Min Throughput	568 kbps
Max Throughput	7422 kbps
Standard deviation Throughput	1633 kbps



5.3.3.5 HTTP results Hotspot

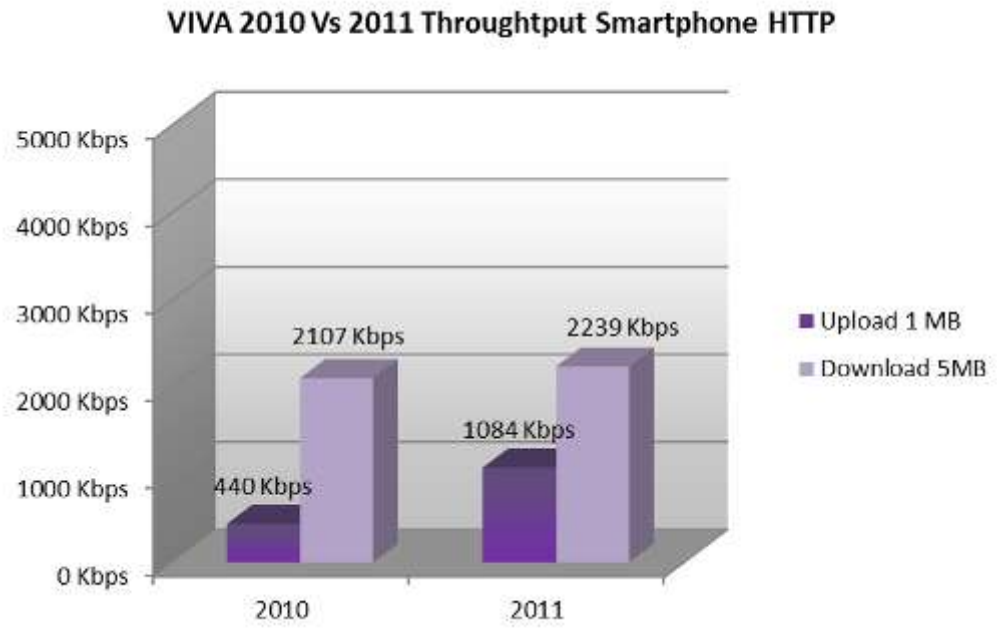
Hotspot Smartphone HTTP UPLOAD 1MB		VIVA 79 mes
Rate of successful data transfers		100,0%
	Statistical accuracy	*± 0,0%*
Average Throughput		1429 kbps
Min Throughput		815 kbps
Max Throughput		1741 kbps
Standard deviation Throughput		185 kbps

Hotspot Smartphone HTTP DOWNLOAD 5MB		VIVA 79 mes
Rate of successful data transfers		100,0%
	Statistical accuracy	*± 0,0%*
Average Throughput		2961 kbps
Min Throughput		944 kbps
Max Throughput		5232 kbps
Standard deviation Throughput		1004 kbps

5.3.3.6 HTTP results Random

Random Smartphone HTTP UPLOAD 1MB	VIVA 200 mes
Rate of successful data transfers	96,0%
Statistical accuracy	*± 2,7%*
Average Throughput	1084 kbps
Min Throughput	95 kbps
Max Throughput	1752 kbps
Standard deviation Throughput	404 kbps

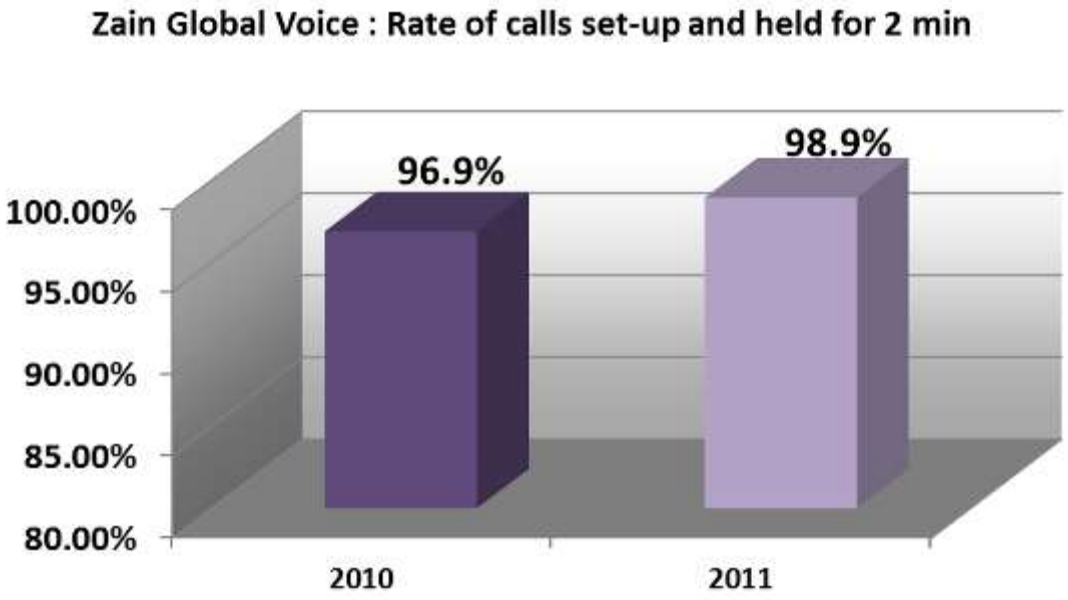
Random Smartphone HTTP DOWNLOAD 5MB	VIVA 200 mes
Rate of successful data transfers	99,5%
Statistical accuracy	*± 1,0%*
Average Throughput	2239 kbps
Min Throughput	165 kbps
Max Throughput	4889 kbps
Standard deviation Throughput	1067 kbps



5.4 Zain results

5.4.1 Global voice results (Towns & Roads)

Global Voice Service		ZAIN 2 274 mes
Rate of calls set-up and held for 2 min		**98,9%**
	Statistical accuracy	*± 0,4%*
and marked	**4-perfect (PQR)**	**91,4%**
	Statistical accuracy	*± 1,2%*
	4-perfect or 3-fair (CQR)	**96,9%**
	Statistical accuracy	*± 0,7%*



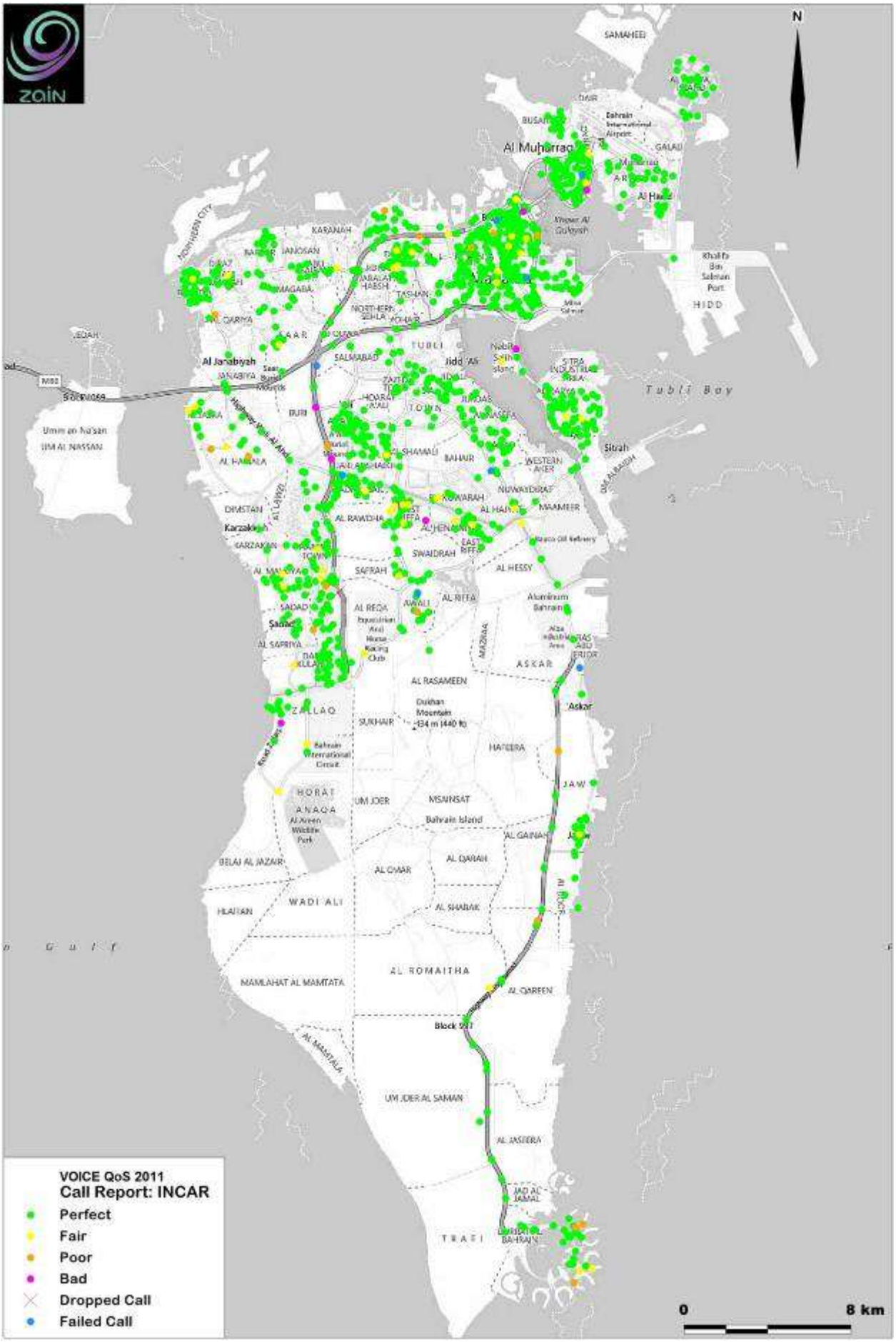
5.4.1.1 Towns voice results (In car-Indoor-Outdoor)

Towns Voice Service		**ZAIN 2 005 tests**
Rate of calls set-up and held for 2 min		**99,1%**
	Statistical accuracy	*± 0,4%*
and marked	**4-perfect (PQR)**	**91,8%**
	Statistical accuracy	*± 1,2%*
	4-perfect or 3-fair (CQR)	**97,4%**
	Statistical accuracy	*± 0,7%*
Difference between 2010 & 2011		**0,7%**
	Statistical accuracy	*± 0,4%*

Towns Incar Voice Service		**ZAIN 982 mes**
Rate of calls set-up and held for 2 min		**99,4%**
	Statistical accuracy	*± 0,5%*
and marked	**4-perfect (PQR)**	**94,0%**
	Statistical accuracy	*± 1,5%*
	4-perfect or 3-fair (CQR)	**98,0%**
	Statistical accuracy	*± 0,9%*

5.4.1.2 Roads Links voice results

Road Links Voice Service		**ZAIN 269 mes**
Rate of calls set-up and held for 2 min		**97,8%**
	Statistical accuracy	*± 1,8%*
and marked	**4-perfect (PQR)**	**88,8%**
	Statistical accuracy	*± 3,8%*
	4-perfect or 3-fair (CQR)	**93,3%**
	Statistical accuracy	*± 3,0%*

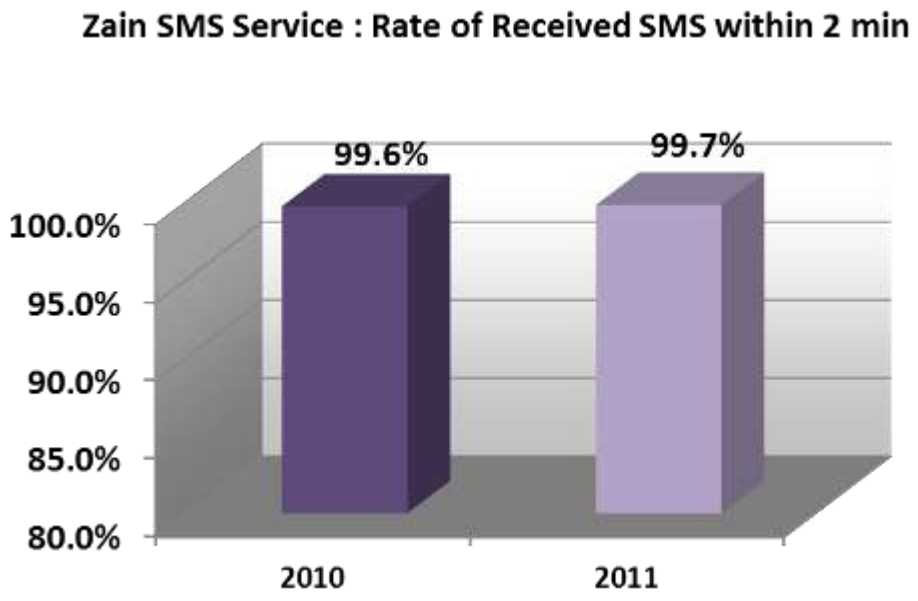


In car voice results

5.4.2 Data results

5.4.2.1 SMS results

SMS Service	ZAIN 1 032 tests
Rate of Received SMS within 2 min	**99.7%**
Statistical accuracy	*± 0.3%*
Rate of Received SMS within 30 sec	**98.7%**
Statistical accuracy	*± 0.7%*
Rate of Received SMS within 15 sec restricted to 516 tests	**95.9%**
Statistical accuracy	*± 1.7%*
Average time reception	**9.4 s**



5.4.2.2 Data accessibility results

Hotspot Dongle connection	ZAIN 1 620 mes
Rate of successful radio connections to network	99,94%
Statistical accuracy	*± 0,12%*
Rate of successful radio connections within 10 sec	99,88%
Statistical accuracy	*± 0,17%*

Random Dongle connection	ZAIN 594 mes
Rate of successful radio connections to network	100,00%
Statistical accuracy	*± 0,00%*
Rate of successful radio connections within 10 sec	100,00%
Statistical accuracy	*± 0,00%*

5.4.2.3 Mail results

SMTP-POP Service 100 Ko Mail	ZAIN SMTP 150 tests	ZAIN POP 150 tests
Rate of successful data transfers	99,3%	100,0%
Statistical accuracy	*± 1,3%*	*± 0,0%*
Average sending/receiving time once connected	10,0 s	7,5 s
Min sending/receiving time once connected	7,7 s	6,0 s
Max sending/receiving time once connected	32,8 s	14,0 s
Standard deviation sending/receiving time once	3,3 s	1,1 s
2010 Vs 2011 Rate of Sucessful data transfers	-0,7%	0,0%

SMTP-POP Service 1 Mo Mail	ZAIN	
	SMTP	POP
	150 tests	150 tests
Rate of successful data transfers	99,3%	97,3%
Statistical accuracy	*± 1,3%*	*± 2,6%*
Average sending/receiving time once connected	44,2 s	17,9 s
Min sending/receiving time once connected	34,4 s	10,2 s
Max sending/receiving time once connected	122,1 s	49,3 s
Standard deviation sending/receiving time once	12,0 s	7,2 s
2010 Vs 2011 Rate of Sucessful data transfers	-0,7%	-2,7%

5.4.2.4 WEB service results

WEB Service	ZAIN
	720 tests
Rate of successful data transfers	99,4%
Statistical accuracy	*± 0,5%*
Average download time once connected	5,6 s
Min download time once connected	1,3 s
Max download time once connected	51,7 s
Standard deviation download time once connected	4,4 s

5.4.2.5 FTP results Hotspot

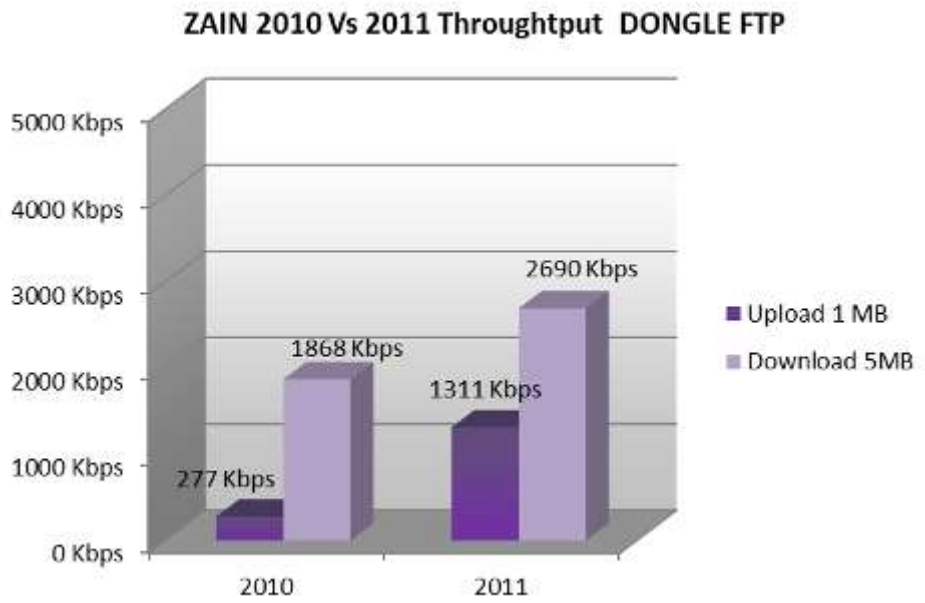
Hotspot Dongle FTP UPLOAD 1MB	**ZAIN 149 tests**
Rate of successful data transfers	**99,3%**
Statistical accuracy	*± 1,3%*
Average Throughput	**1321 kbps**
Min Throughput	**90 kbps**
Max Throughput	**1688 kbps**
Standard deviation Throughput	**393 kbps**

Hotspot Dongle FTP DOWNLOAD 5 MB	**ZAIN 150 tests**
Rate of successful data transfers	**99,3%**
Statistical accuracy	*± 1,3%*
Average Throughput	**2216 kbps**
Min Throughput	**260 kbps**
Max Throughput	**3755 kbps**
Standard deviation Throughput	**682 kbps**

5.4.2.6 FTP results Random

FTP UPLOAD 1MB	ZAIN 194 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	1303 kbps
Min Throughput	161 kbps
Max Throughput	1684 kbps
Standard deviation Throughput	414 kbps

FTP DOWNLOAD 5MB	ZAIN 400 mes
Rate of successful data transfers	99,5%
Statistical accuracy	*± 0,7%*
Average Throughput	2690 kbps
Min Throughput	165 kbps
Max Throughput	5497 kbps
Standard deviation Throughput	1157 kbps



5.4.3 SmartPhone results

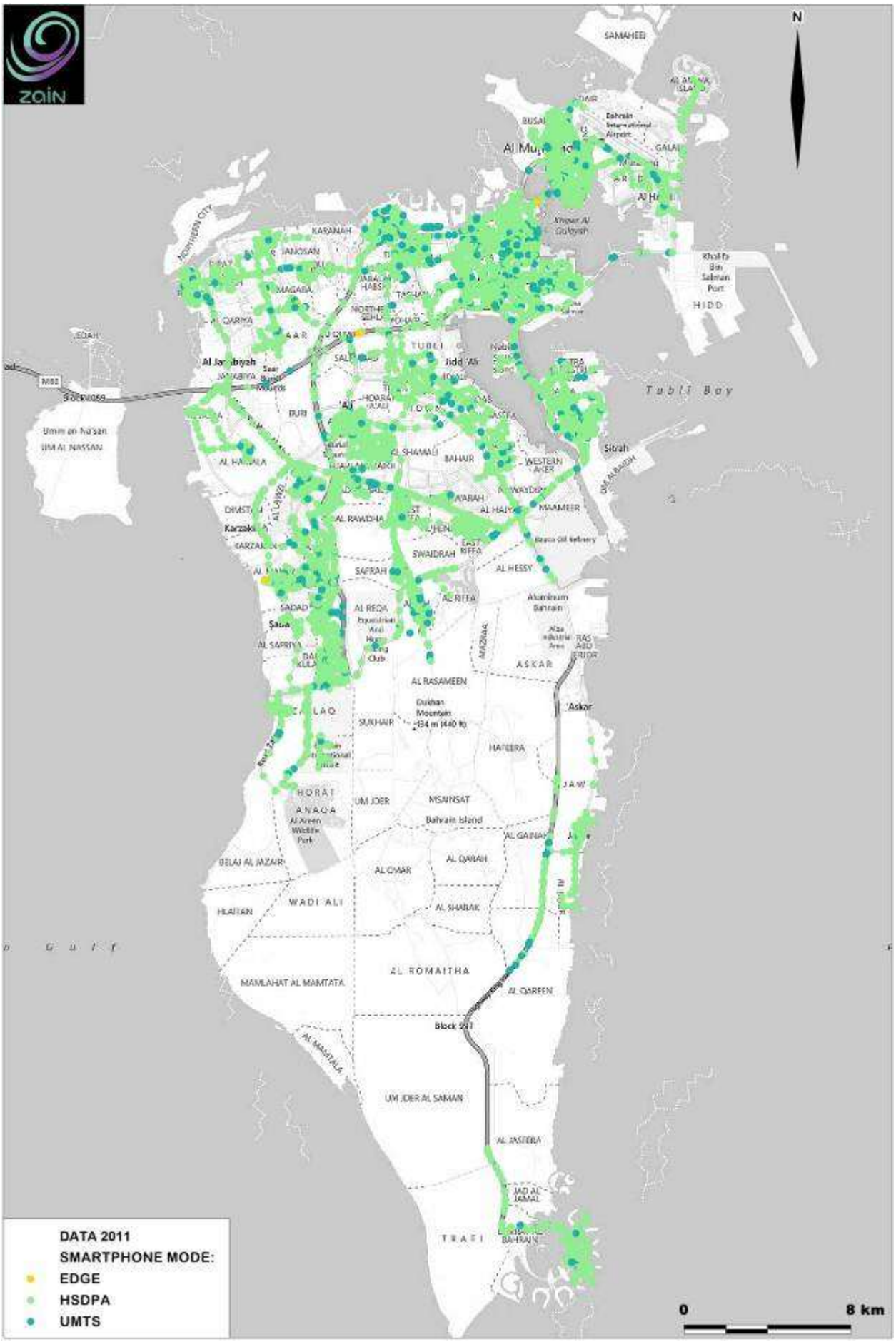
5.4.3.1 Data Coverage

Smartphone Data Coverage		ZAIN 29 890 mes
EDGE		0.1%
	Statistical accuracy	*± 0.0%*
UMTS		5.6%
	Statistical accuracy	*± 0.3%*
HSPA		94.4%
	Statistical accuracy	*± 0.3%*
2010 HSPA coverage		29.4%

This table provides the technology breakdown used by Mobile Operators as recorded during all measurements. Every minute, the mobile is recording the observed technology. These samples have been taken in towns and on road links. They are shown as contextual information at the time of the audit.

94.4% of the measurements for Zain were achieved using HSPA[1], versus 29.4% in 2010.

[1] HSPA High Speed Packet Access



Smartphone Service: Data Coverage

5.4.3.2 Web service results

WEB Service	ZAIN 396 tests
Rate of successful data transfers	99,5%
Statistical accuracy	*± 0,7%*
Average download time once connected	6,7 s
Min download time once connected	0,3 s
Max download time once connected	49,8 s
Standard deviation download time once connected	5,8 s

5.4.3.3 FTP results Hotspot

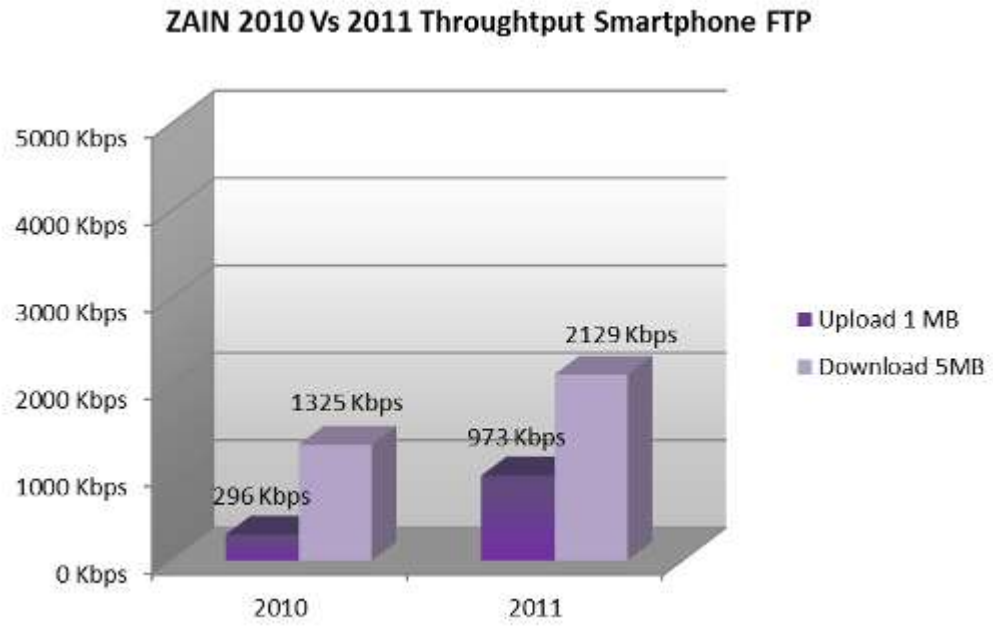
Hotspot Smartphone FTP UPLOAD 1MB	ZAIN 79 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	825 kbps
Min Throughput	202 kbps
Max Throughput	1147 kbps
Standard deviation Throughput	293 kbps

Hotspot Smartphone FTP DOWNLOAD 5MB	ZAIN 79 mes
Rate of successful data transfers	100,0%
Statistical accuracy	*± 0,0%*
Average Throughput	2237 kbps
Min Throughput	323 kbps
Max Throughput	2803 kbps
Standard deviation Throughput	631 kbps

5.4.3.4 FTP results Random

Random Smartphone FTP UPLOAD 1MB	ZAIN 200 mes
Rate of successful data transfers	99,5%
Statistical accuracy	*± 1,0%*
Average Throughput	973 kbps
Min Throughput	196 kbps
Max Throughput	1294 kbps
Standard deviation Throughput	275 kbps

Random Smartphone FTP DOWNLOAD 5MB	ZAIN 200 mes
Rate of successful data transfers	99,0%
Statistical accuracy	*± 1,4%*
Average Throughput	2129 kbps
Min Throughput	208 kbps
Max Throughput	2806 kbps
Standard deviation Throughput	718 kbps



5.4.3.5 HTTP results Hotspot

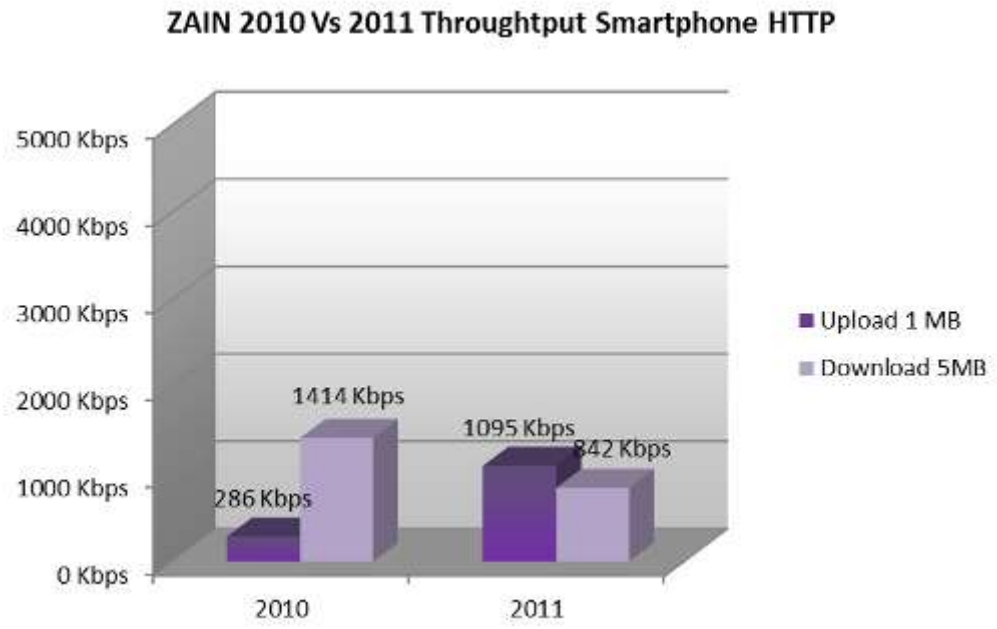
Hotspot Smartphone HTTP UPLOAD 1MB	**ZAIN 79 mes**
Rate of successful data transfers	**100,0%**
Statistical accuracy	*± 0,0%*
Average Throughput	**932 kbps**
Min Throughput	**117 kbps**
Max Throughput	**1457 kbps**
Standard deviation Throughput	**389 kbps**

Hotspot Smartphone HTTP DOWNLOAD 5MB	**ZAIN 79 mes**
Rate of successful data transfers	**98,7%**
Statistical accuracy	*± 2,5%*
Average Throughput	**825 kbps**
Min Throughput	**151 kbps**
Max Throughput	**1607 kbps**
Standard deviation Throughput	**273 kbps**

5.4.3.6 HTTP results Random

Random Smartphone HTTP UPLOAD 1MB	ZAIN 200 mes
Rate of successful data transfers	99,0%
Statistical accuracy	*± 1,4%*
Average Throughput	1095 kbps
Min Throughput	129 kbps
Max Throughput	1488 kbps
Standard deviation Throughput	348 kbps

Random Smartphone HTTP DOWNLOAD 5MB	ZAIN 200 mes
Rate of successful data transfers	95,0%
Statistical accuracy	*± 3,0%*
Average Throughput	842 kbps
Min Throughput	183 kbps
Max Throughput	1752 kbps
Standard deviation Throughput	324 kbps



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