Directique

هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority

Mobile Networks Coverage Audit

Kingdom of Bahrain - 2010

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TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

Mobile Operators are under a coverage obligation as a condition of their mobile license, and it is the responsibility of TRA to verify and validate that each operator is meeting its obligation.

The license obligation requires operators to, using their own mobile telecommunications network, offer licensed services on or before a defined target date, with coverage of at least 95% of the population in the Kingdom of Bahrain.

The respective deadlines for operators to meet their coverage obligation were as follows:

Batelco	21 June 2003
Zain	31 December 2003
Viva	1 March 2010

The license obligation defines the minimum expected population coverage for each Mobile Operator's own telecommunications network. The coverage is independent of the technology deployed, however in order to determine coverage, measurements have been taken to validate for each operator the coverage of both 2G and 3G technologies.

The main highlight from the audit is that for all 3 Mobile Operators, outdoor coverage is almost perfect; being equal to or close to 100% of the population in all Governorates and this has been observed along the whole drive test routes, non depend on the population concentration. Even in Hawar islands a very good coverage has been observed.

Therefore outdoor areas with no service coverage, at all, are very limited and have only been observed in four 2G calls, and one 3G call on Viva's network, which is insignificant in regards to the number of successful measurements, 87,680 test calls in total.

The auditing contractor, Directique, confirms, as part of the scope of the audit, that all three Mobile Operators are compliant with their license obligation and, in fact exceed the obligation by offering 100% outdoor population coverage or very close to it within the tested geographical areas.

It is important to point out that several areas were not accessible to the test team, being either private land or reserved for government, which explains why the maps do not show any measurements in some area of the Kingdom. However those areas are not open to general public. With this in mind, results are very good and show that there is no significant coverage difference between operators.

Directique was also required to compare Mobile Operators coverage prediction maps with the actual coverage measured. The maps included in this report contain two layers: a first layer showing the coverage predictions provided by the operators themselves, on top of which, a second layer illustrating the results of the coverage measurements is superimposed. It is important to note that both the 2G and 3G observed coverage is very complete, and sometimes even better than the Mobile Operators' predictions.

2 INTRODUCTION

2.1 Background

The availability and quality of modern mobile telecommunications services are critical elements for the success of the Kingdom of Bahrain. Mobile services have seen a succession of different technologies which have enabled mobile services to evolve from basic voice and message services to more recently multimedia services including email, access to the internet and the conveyance of real time video. The common factor is the evolution of mobility towards higher data speeds, initially available only through fixed services.

Today's mobile telecommunications services allow many different economic and social sectors to benefit from enhanced applications and services. For the younger population, this translates to easy contact, music and inter-active games. Whilst in the business environment, the evolutions of mobile services meant that many company executives initially and now many employees have access to secured company email and data while on the move allowing for flexibility, continuity and maintenance of response times.

Whilst the evolution of technology has been an enabler of higher data rate services, competition has been an important driver. Batelco was deemed to be a licensee from 24 October 2002 per article 80(a) of the Telecommunications Law and was therefore allowed to continue operation from that date onward. Batelco's mobile license document was granted to it pursuant to the Telecommunications Law on 21 June 2003. Batelco had deployed a network based on 2G or GSM[1] standard, providing voice and short messaging services (SMS). MTC Vodaphone, now Zain Bahrain, was awarded a mobile license on 22 April 2003 and initially deployed the same GSM technology.

In a bid to win and maintain market share, Zain and Batelco respectively introduced 3G or UMTS[2] technology, 3G networks enabled higher data transfer rates than the existing 2G, thus enabling better access to the Internet and email services while on the move.

When STC Bahrain B.S.C. operating under the Viva brand became the Kingdom's third mobile licensee on 1 March 2009, Bahrain was already one of the most penetrated mobile markets in the world reaching 120% penetration rate. The Viva network deployment was based on a mixture of 3G and 2G technologies. The latest 3G evolution, HSPA[3], introduce elements allowing mobile value added services including Broadband, Video and Live TV.

Batelco and Zain networks have received significant upgrades during the course of 2010 to enhance the capability of their respective networks and improve their coverage. As a result each operator's network now includes a 2G and a 3G component.

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[1] GSM – Global System for Mobile Communications

[2] UMTS – Universal Mobile Telecommunications System

[3] HSPA – High Speed Packet Access

The need for the ongoing development of mobile networks in Bahrain is further driven by the sustained development of new zones, for business or residential purposes, and the large addition of multi storey building in already constructed areas.

This will not be the end and further evolution of mobile networks is being planned under the generic term LTE[4]. The mobile service licences granted to the existing Mobile Operators are technology neutral, enabling operators to implement the technology which is most suited to their business model and the needs of their subscribers.

The next generation of mobile networks could therefore be implemented in the existing frequency bands but if the full benefits of LTE are to be realised in the Kingdom (for example download speeds of 100Mb/s), then additional frequency bands will have to be made available to Mobile Operators. In order to make the frequency bands available, TRA is already leading discussions with stakeholders and the existing users of the required frequency bands in the Kingdom. TRA is also active at a Regional and Global level to develop common rules and standards for frequency allocation and thus to facilitate the earliest possible introduction of LTE services for the social and economic benefit of telecommunication users in the Kingdom of Bahrain.

2.1 Objective

The objective of this audit was to:

- Measure the outdoor coverage of the 3 Mobile Operators; Batelco, Viva and Zain,
- Establish for each operator a direct correlation between the number of households covered and the percentage of the population, resulting directly from such coverage
- Validate the coverage maps of each Mobile Operator against the outdoor coverage measured during the audit

[4] LTE – Long Term Evolution

3 METHODOLOGY

The audit was conducted between October 20th and December 1st 2010 and across the Kingdom's 5 Governorates.

Accessibility results have been weighted by the population percentage living in each Governorate. The tables presented in Annex show the detailed coverage as measured for each operator.

Measurements have been performed in two ways, a set of mobile equipment set in 2G only and a set of mobile equipment set in dual mode, meaning the equipment searches for the best signal between 2G and 3G.

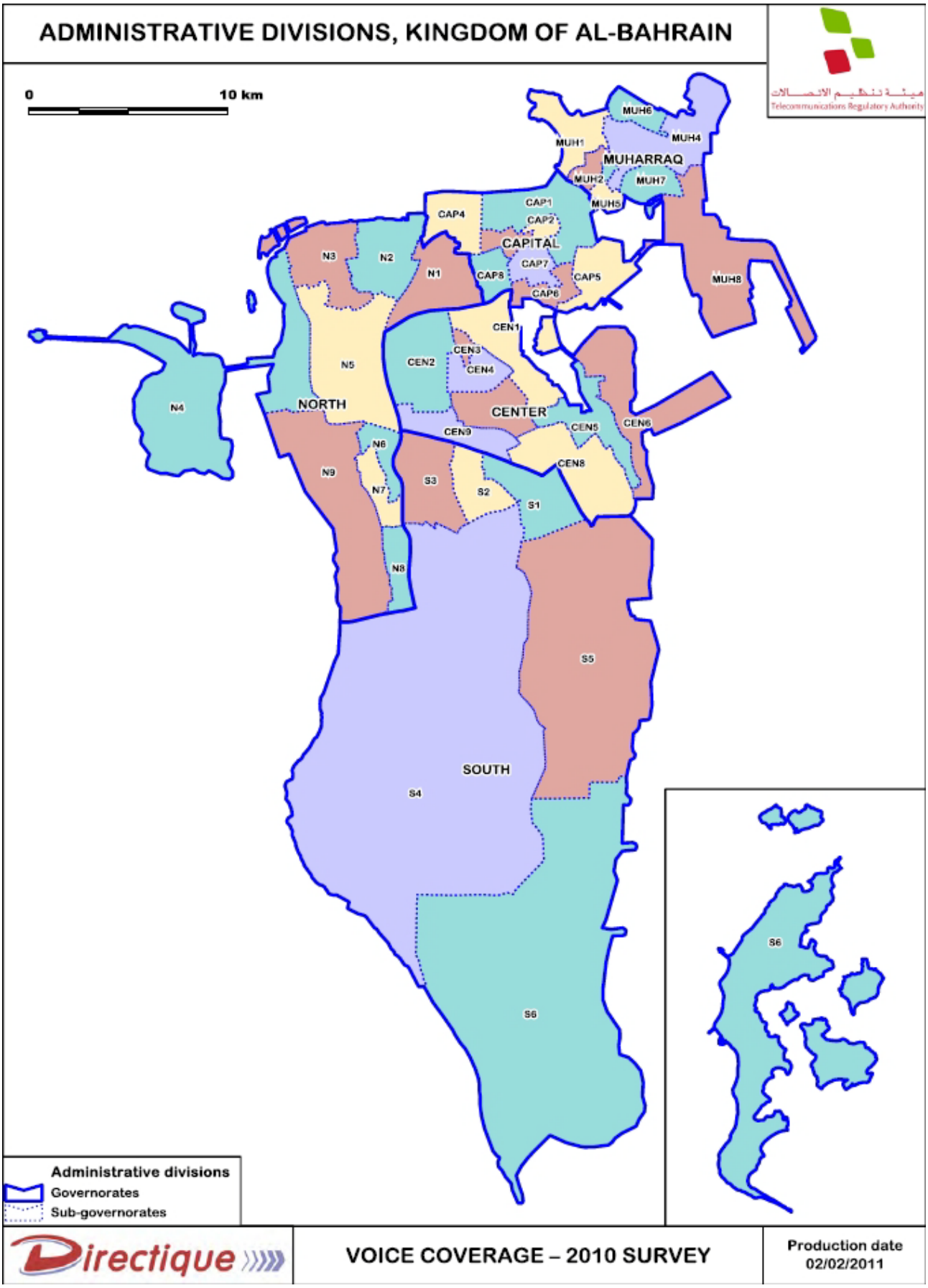
Coverage, from a end-user perspective, cannot be measured with a scanner or by tracing reception level. A scanner cannot discern the difference between the live cells and the other emitting cells and would give an over optimistic coverage measurement. Further, measuring reception levels would also not be appropriate as having a signal is not a guarantee that a call would be successful.

For example in the case of an unballanced cell between receive and transmit signal levels, it is possible for a mobile phone to receive a good signal but be unable to support a call due to the distance to the base station. Furthermore, such tools would measure reception levels in dB, and this cannot be interpreted or even understood by the end user.

It is for these reasons that the coverage has been audited using tools which are fully representative of how a subscriber would access a mobile service – the audit therefore if fully representive of the subscriber experience.

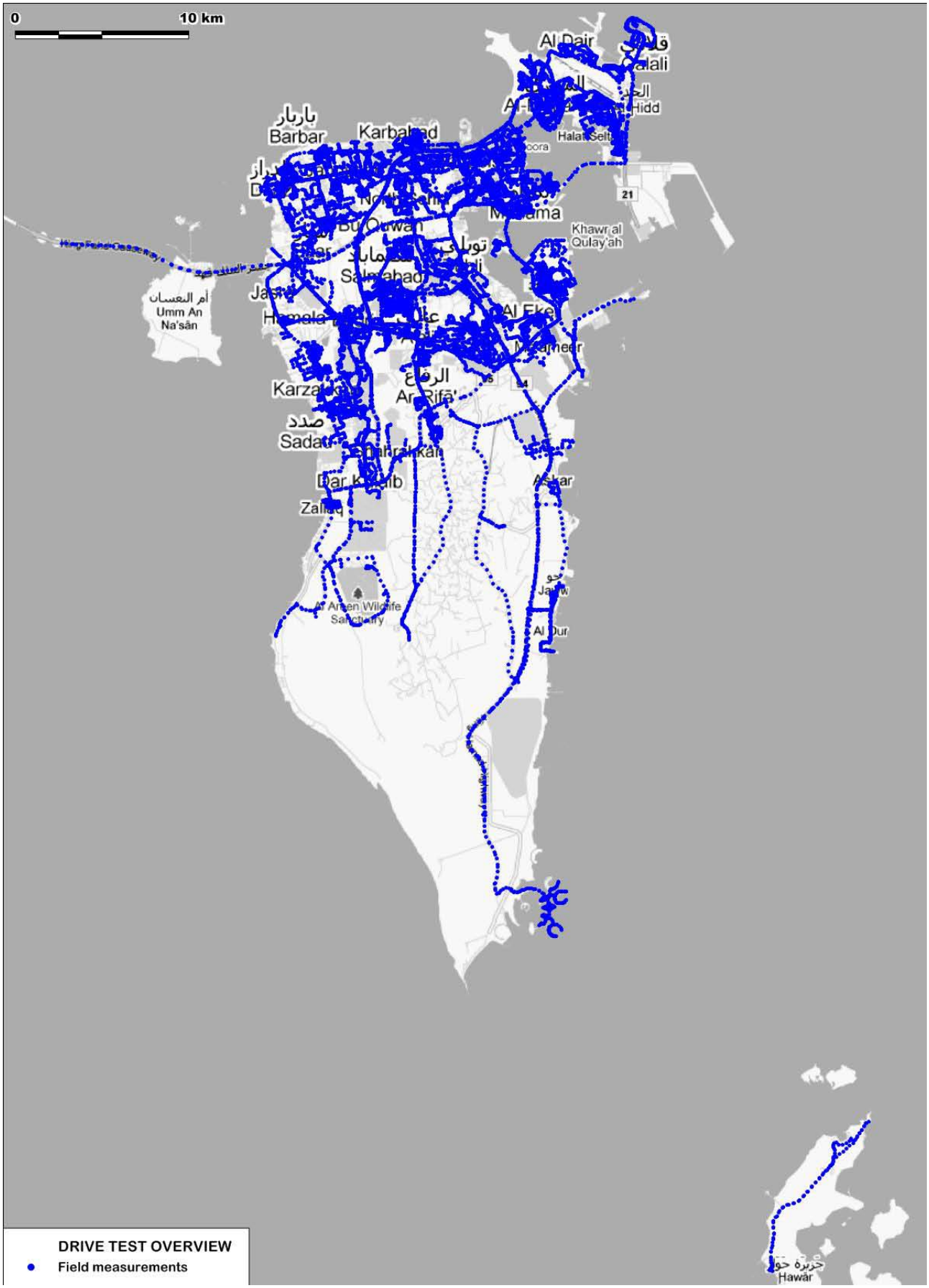
A vehicle equipped with standard mobile phones an placing calls following an automatic test script driven by a software called *MobiTrace***,** was used to drive along a predetermined route which was selected to ensure that it covered the 5 Governorates of the Kingdom. The software performed repeated call attempts to pre-defined numbers until a ringback tone or a specific audio recording (voicemail message) was received. The software also performed a measure of the field strength for every call. Such measurements are called **«** Accessibility **»** measurements.

3.1.1 Administrative divisions



3.1.2 Drive test

Routes followed by the vehicle performing measurements.



3.1.3 Equipment

Audit measurements were performed using standard mobile phones.

The make and model of the mobile phone used is Samsung 8300.

Two mobile phones were used per network, for this specific test one mobile phone locked in 2G mode and one mobile phone in dual mode allowing a dynamic selection between 2G and 3G for the operator – the phone was always selecting the 3G network when a 3G signal was available.

The same setup was repeated 3 times to cover all 3 networks, i.e. Batelco, Viva and Zain.

Rooftop box and mobile phones

For outdoor test conditions mobile phones were positioned in a plastic rooftop box. The rooftop box was tested in measuring using a reference signal, attenuation outside and then inside the rooftop box, to validate the absence of significant radio signal attenuation. Similarly the test platform was calibrated using a reference signal to identify and correct any significant difference between mobile phones sensibility.

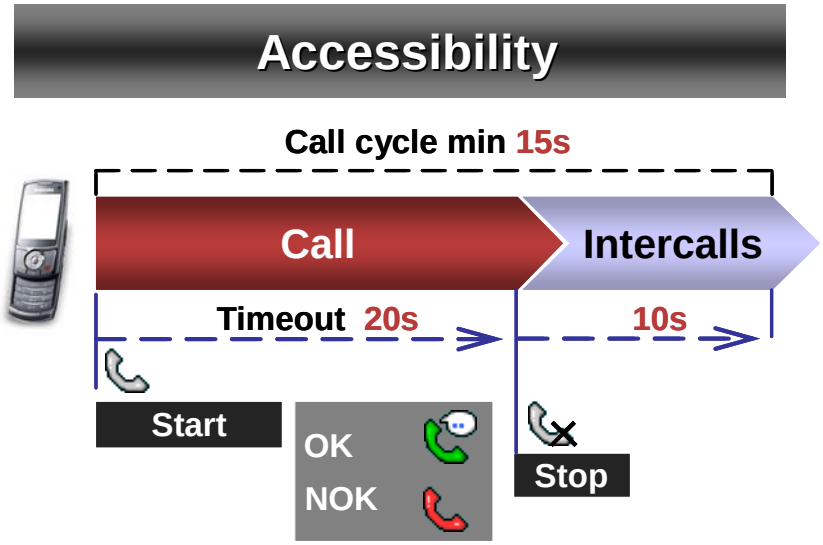
Inside the rooftop box, mobile phones were positioned vertically on a stable, specifically adapted base, to provide the best possible radio conditions. Electrical supply of each mobile phone was continuously guaranteed to ensure autonomy of the device and optimal radio conditions.

The platform was connected to computer based software running the automated test script and recording test results. The set-up was completed with a GPS receiver, one for each Mobile Operator, which recorded the exact location of each test.

3.1.4 Accessibility test scenario

The vehicle equiped with the on board test platform was following pre-defined routes across all 5 Governorates. The computer based software automaticaly initiated tests and recorded results following a pre-defined test cycle based on the following parameters:

- An individual test duration set to a minimum of 15 seconds and up to a maximum of 30 seconds - “Call cycle”
- A test window of up to 20 seconds - “Timeout”
- A minimum time before a new call takes place set to 10 seconds - “Intercall”



Accessibility test scenario

Coverage measurement for the 3 Mobile Operators’ networks was launched at exactly the same time, the software triggering the start of a call cycle for the 3 Operators simultaneously.

The timeout was set to 20 seconds to allow for different dial delay scenario.

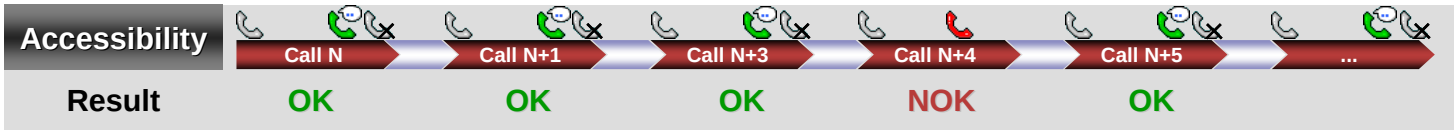
The Intercall time was set to 10 seconds to allow mobile phones in dual mode to select 3G if the signal was available.

During the entire test coverage over 30,000 test cycles were performed to gather results from 87,683 individual calls.

Calls failed due to genuine network problems as identified by mobile protocol and not related to network coverage, such as for example network congestion, were extracted and not taken into consideration in the final results.

3.1.5 Coverage rate

The geographical coverage rate is computed using the number of successful accessibility tests divided by the number of test attempts, after removal of congestion attempts, if any.



$$\text{Coverage rate} = \frac{\sum \text{OK}}{\sum \text{OK+NOK}}$$

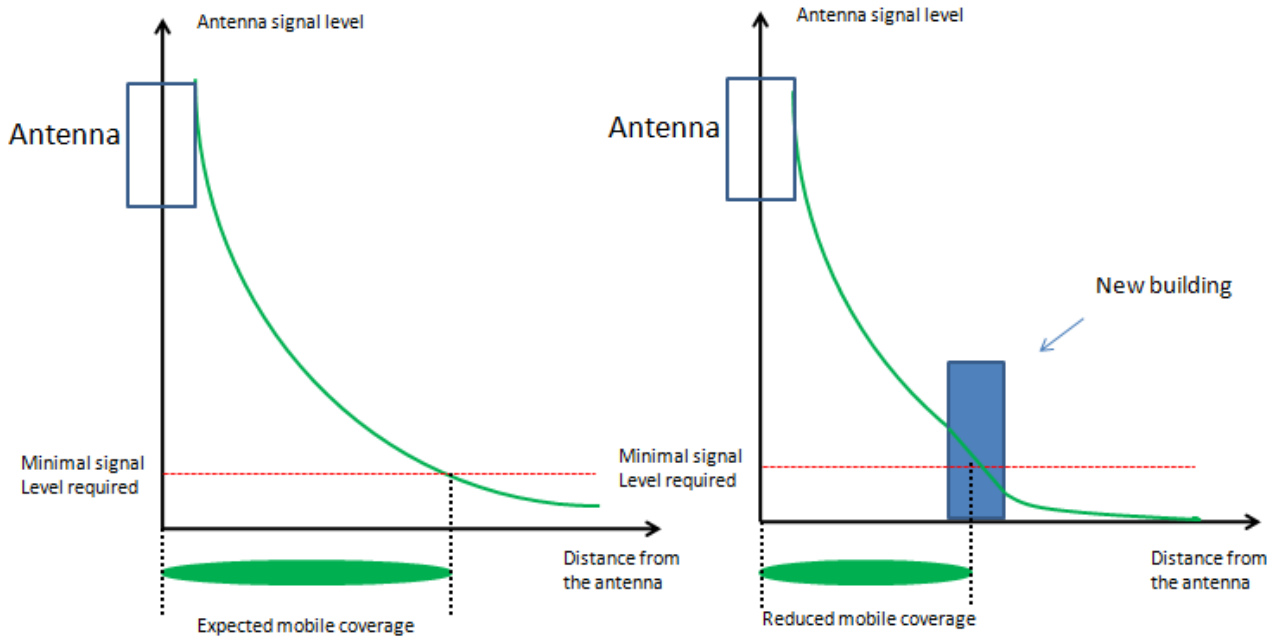
Population coverage is then calculated by weighting these results with the population percentage living in each Governorate, using latest available Central Informatics Organisation (CIO) census statistics for the Kingdom.

3.1.6 Additional elements

It is important to understand that outdoor coverage is usually better than indoor coverage, because the base station providing the mobile signal is usually located outside, typically on a building roof or a telecommunications mast.

The mobile signal is attenuated when it penetrates a building structure, affected by the thickness of concrete wall and metallic elements used in the construction, thus resulting in lower signal strength inside the building.

In some instances such as malls and large shopping centres, hotels and airports, Mobile Operators implement additional base stations to ensure adequate indoor coverage, however the assessment of indoor coverage was not in the scope of this audit.



Coverage evolution following a new construction

Readers shall understand that mobile coverage can also vary with the evolution of the landscape, the diagram above showing the impact of a new building in a previously fully covered area, and illustrate the need for Mobile Operators to continuously monitor the coverage of their mobile network and take action when necessary to maintain the appropriate coverage level.

4 RESULTS

4.1 Population coverage

4.1.1 Dual mode population coverage, total percentage achieved for each governorate, breakdown by operator and governorates population

			Dual Mode					
			Batelco		Viva		Zain	
Governorate	Code	% Pop	Nb	Coverage	Nb	Coverage	Nb	Coverage
Capital	CAP	27%	1806	100%	1850	100%	1611	100%
Central	CEN	27%	2636	100%	2790	100%	2287	100%
Muharraq	MUH	15%	977	100%	1026	100%	833	100%
Northern	N	23%	3909	100%	4032	100%	3311	100%
Southern	S	8%	2025	100%	2055	99.95%	1709	100%
Total		100%	11353	100%	11753	99.99%	9751	100%

4.1.2 2G population coverage, total percentage achieved for each governorate, breakdown by operator and governorates population

			2G					
			Batelco		Viva		Zain	
Governorate	Code	% Pop	Nb	Coverage	Nb	Coverage	Nb	Coverage
Capital	CAP	27%	3609	100%	3540	99.9%	3492	100%
Central	CEN	27%	4044	100%	4016	100%	4087	100%
Muharraq	MUH	15%	2089	100%	2096	100%	2097	100%
Northern	N	23%	6018	100%	5986	100%	5644	100%
Southern	S	8%	2701	100%	2675	100%	2732	100%
Total		100%	18461	100%	18313	99.98%	18052	100%

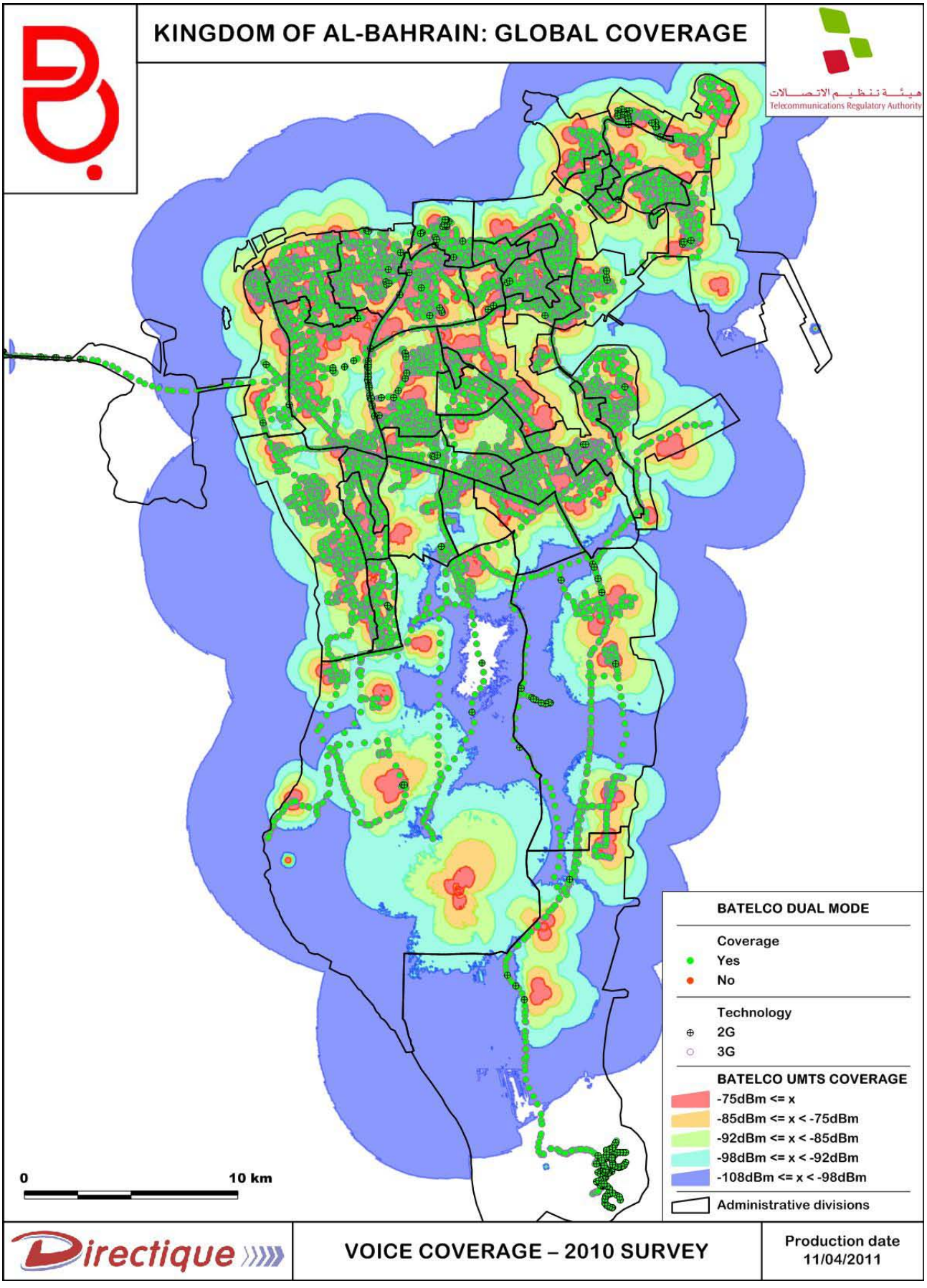
Legend:

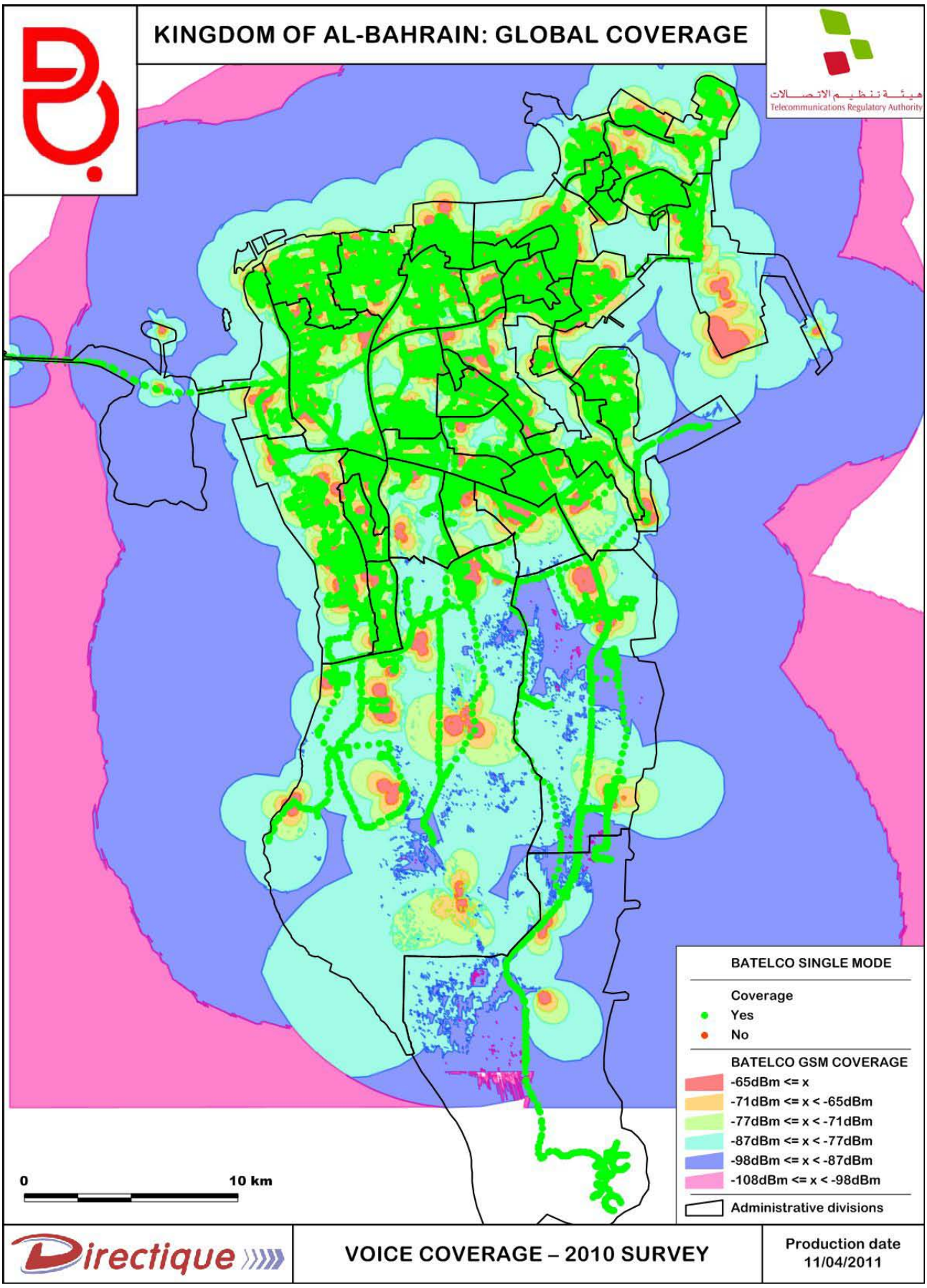
Governorate: Governorate name
Code: Governorate area as defined in administrative division map
% Pop: Population percentage in the specific area
Nb: Number of test calls performed
Coverage: Resulting computed population coverage in percent

4.2 Audit of Operators' Coverage Maps

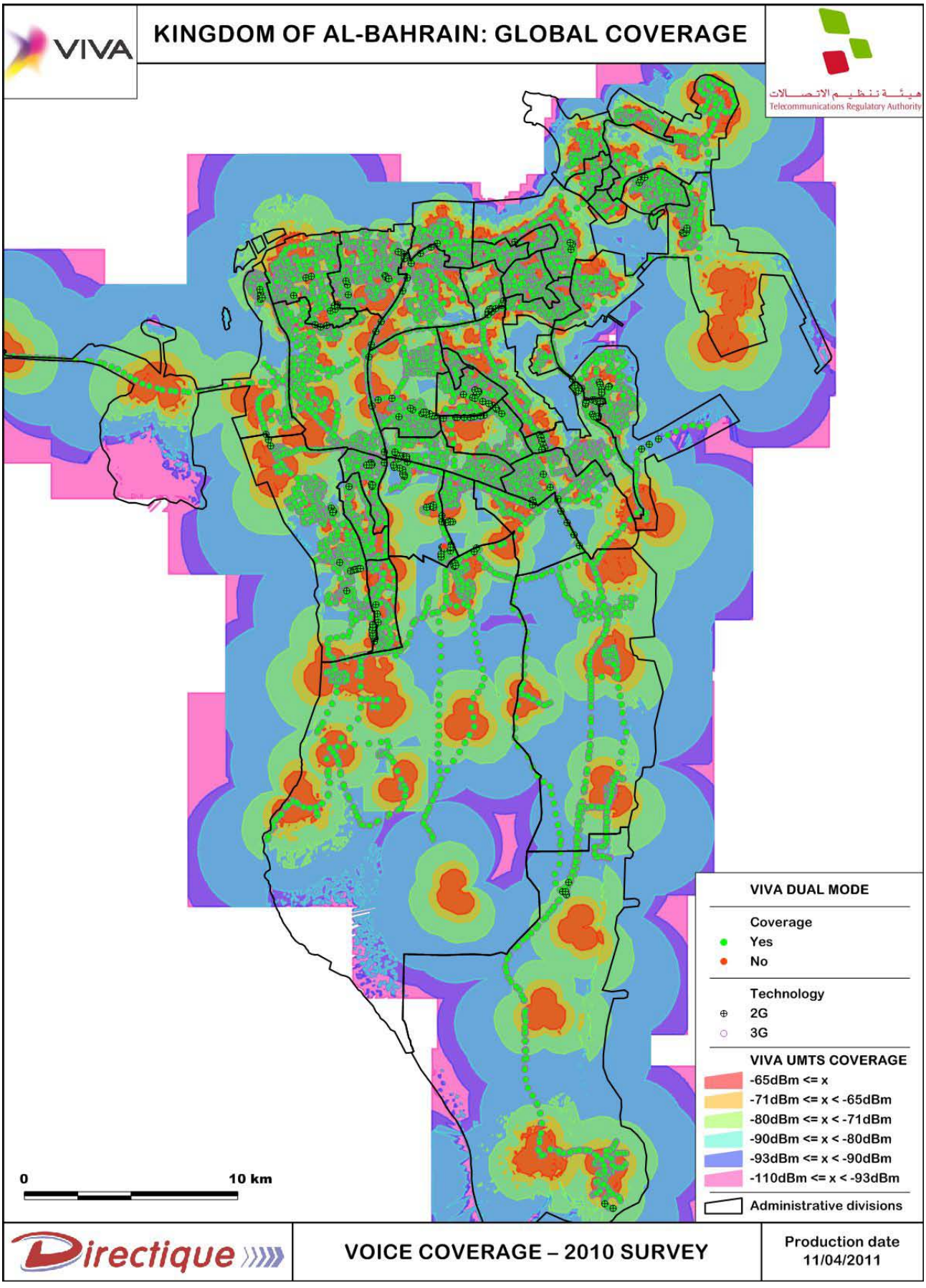
The documents presented hereafter show the coverage maps of each operator on which have been superimposed the coverage measurements realized by Directique during the audit. If for the large majority of the measurements both results are similar, it is interesting to note that in some cases, the observed audit results show a better coverage than the operators' predictions. Such examples are Durat in the case of Batelco, Sitra for Viva and the King Fahd Causeway in the case of Zain.

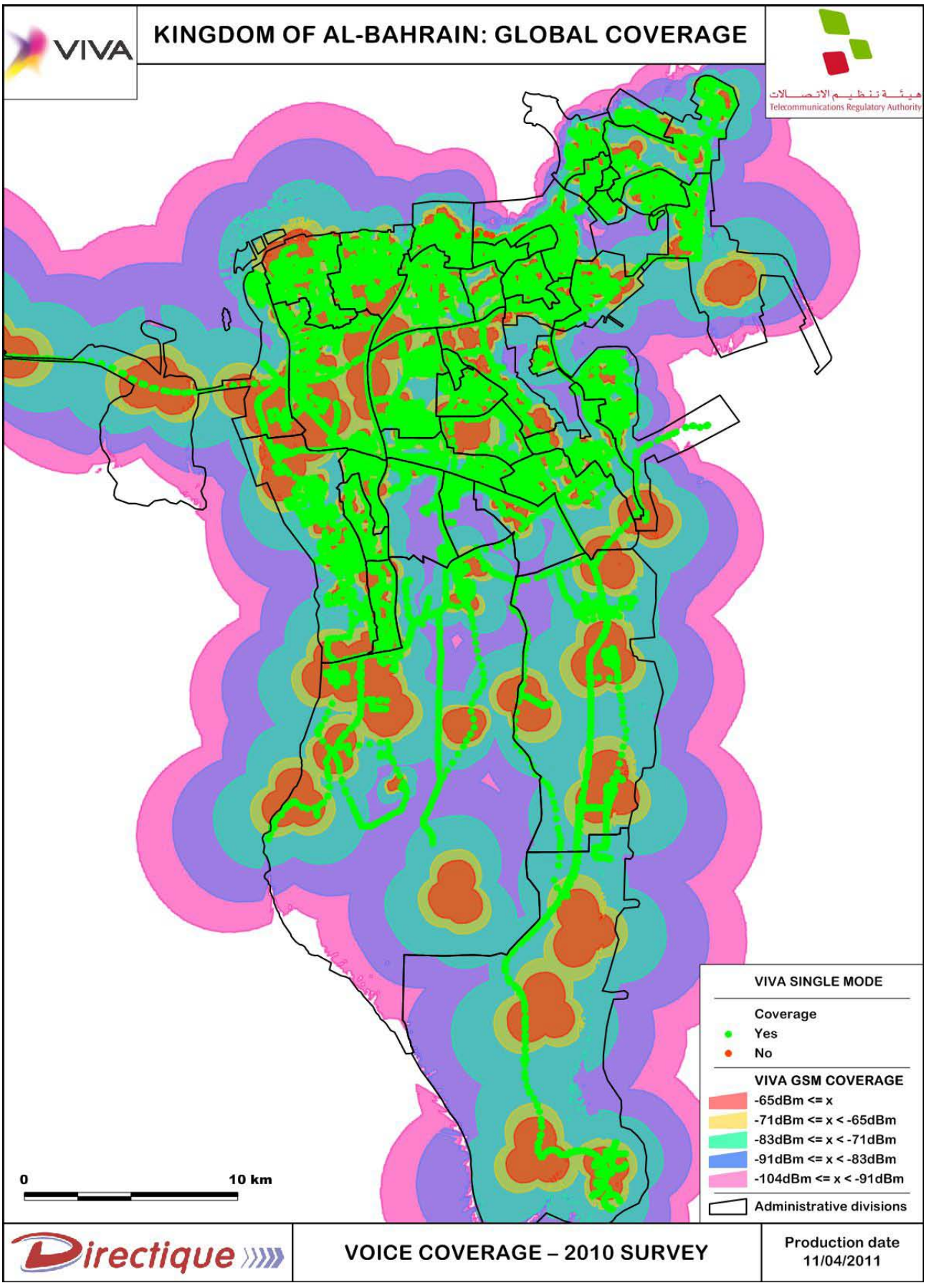
4.2.1 Batelco


KINGDOM OF AL-BAHRAIN: GLOBAL COVERAGE
هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority
BATELCO DUAL MODE
Coverage
Yes
No
Technology
2G
3G
BATELCO UMTS COVERAGE
-75dBm <= x
-85dBm <= x < -75dBm
-92dBm <= x < -85dBm
-98dBm <= x < -92dBm
-108dBm <= x < -98dBm
Administrative divisions
0
10 km
Directique
VOICE COVERAGE – 2010 SURVEY
Production date
11/04/2011

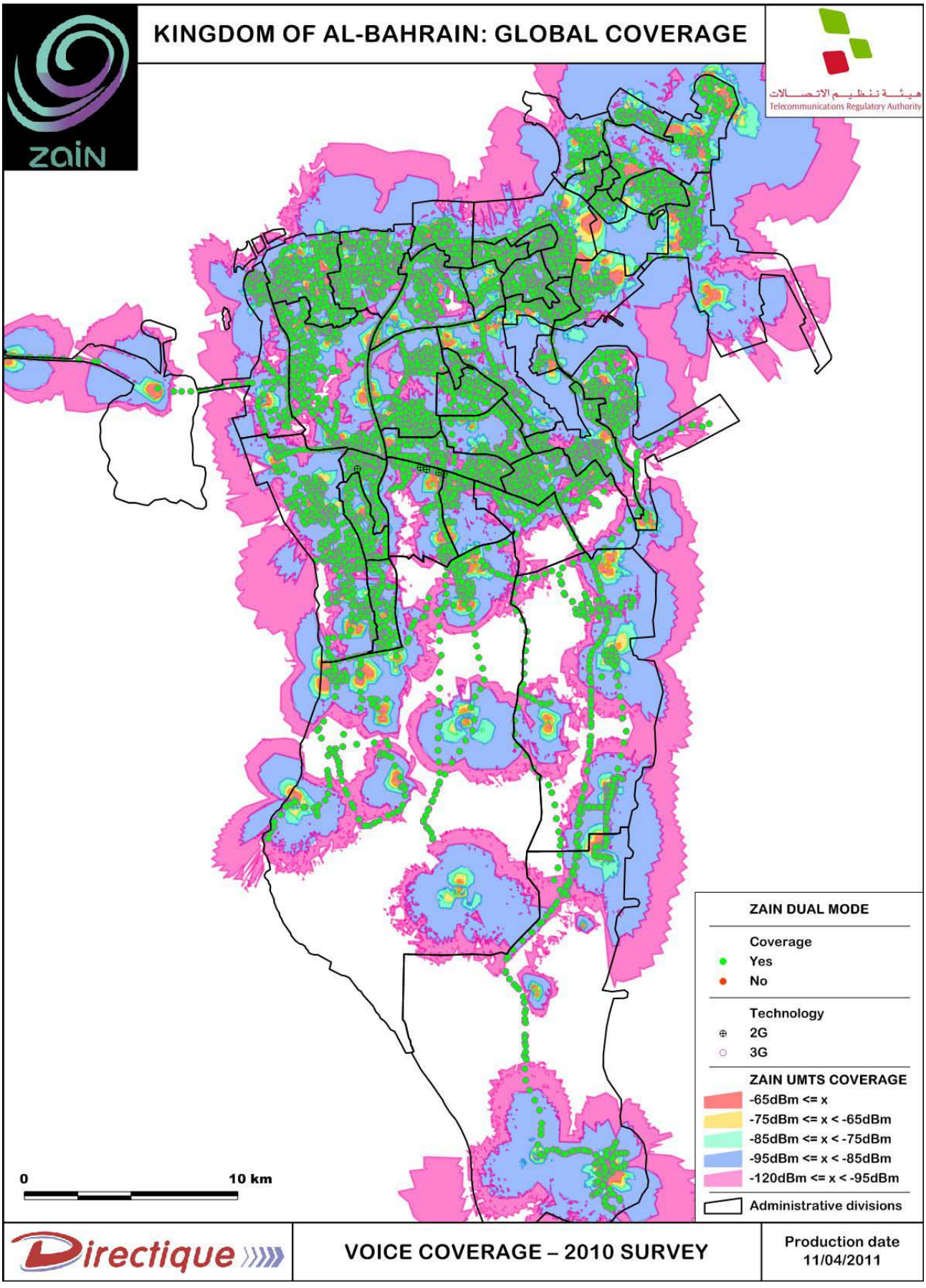

KINGDOM OF AL-BAHRAIN: GLOBAL COVERAGE
هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority
BATELCO SINGLE MODE
Coverage
Yes
No
BATELCO GSM COVERAGE
-65dBm <= x
-71dBm <= x < -65dBm
-77dBm <= x < -71dBm
-87dBm <= x < -77dBm
-98dBm <= x < -87dBm
-108dBm <= x < -98dBm
Administrative divisions
0
10 km
Directique
VOICE COVERAGE – 2010 SURVEY
Production date
11/04/2011

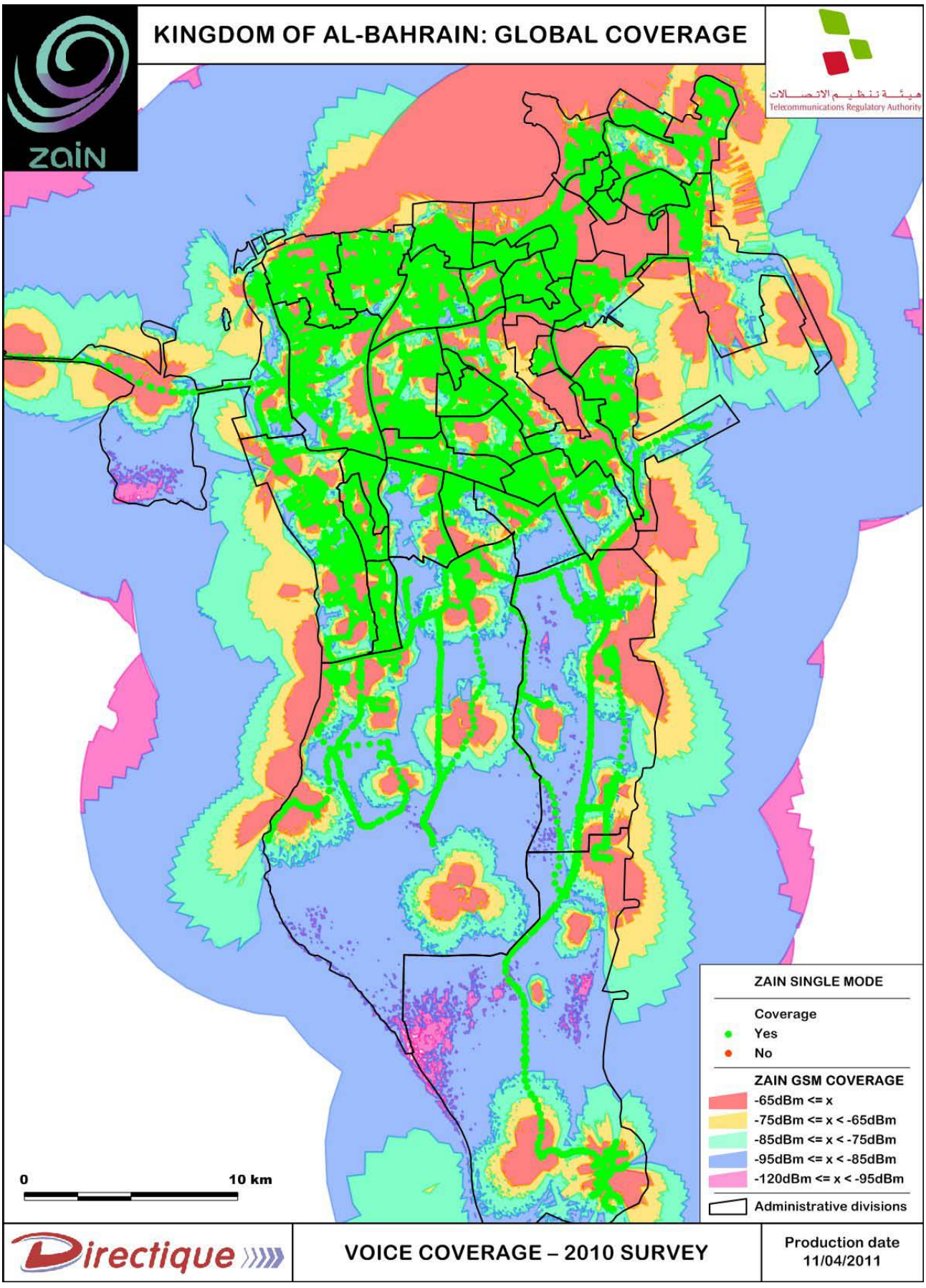
4.2.2 Viva


VIVA
KINGDOM OF AL-BAHRAIN: GLOBAL COVERAGE
هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority
VIVA DUAL MODE
Coverage
Yes
No
Technology
2G
3G
VIVA UMTS COVERAGE
-65dBm <= x
-71dBm <= x < -65dBm
-80dBm <= x < -71dBm
-90dBm <= x < -80dBm
-93dBm <= x < -90dBm
-110dBm <= x < -93dBm
Administrative divisions
0
10 km
Directique
VOICE COVERAGE – 2010 SURVEY
Production date
11/04/2011


VIVA
KINGDOM OF AL-BAHRAIN: GLOBAL COVERAGE
هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority
VIVA SINGLE MODE
Coverage
Yes
No
VIVA GSM COVERAGE
-65dBm <= x
-71dBm <= x < -65dBm
-83dBm <= x < -71dBm
-91dBm <= x < -83dBm
-104dBm <= x < -91dBm
Administrative divisions
0
10 km
Directique
VOICE COVERAGE – 2010 SURVEY
Production date
11/04/2011

4.2.3 Zain


KINGDOM OF AL-BAHRAIN: GLOBAL COVERAGE
zain
هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority
ZAIN DUAL MODE
Coverage
Yes
No
Technology
2G
3G
ZAIN UMTS COVERAGE
-65dBm <= x
-75dBm <= x < -65dBm
-85dBm <= x < -75dBm
-95dBm <= x < -85dBm
-120dBm <= x < -95dBm
Administrative divisions
0
10 km
Directique
VOICE COVERAGE – 2010 SURVEY
Production date
11/04/2011


KINGDOM OF AL-BAHRAIN: GLOBAL COVERAGE
zain
هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority
ZAIN SINGLE MODE
Coverage
Yes
No
ZAIN GSM COVERAGE
-65dBm <= x
-75dBm <= x < -65dBm
-85dBm <= x < -75dBm
-95dBm <= x < -85dBm
-120dBm <= x < -95dBm
Administrative divisions
0
10 km
Directique
VOICE COVERAGE – 2010 SURVEY
Production date
11/04/2011

5 CONCLUSION

This is the first instance that TRA performs a mobile coverage audit of the population in the Kingdom for the three Mobile Operators, Batelco, Viva and Zain and the objective of this audit has been fully met.

Measurements of the outdoor coverage for the 3 Mobile Operators is almost perfect, being equal to or very close to 100% of the population in all Governorates along the audited route and this show a strong commitment from all Mobile Operators in the Kingdom not only to meet their license obligation but also to exceed their obligation and provide an excellent network coverage for the benefit of consumers.

Directique was able to establish for each Operator a direct correlation between the number of households covered and the percentage of the population, resulting directly from such coverage thus validate the 2G and 3G coverage maps provided by each Mobile Operator against the outdoor coverage measured during the audit. Results observed have been very similar to Operator's predictions and in some instances even better than the Operators' predictions.

TRA also highlight that this is the first time Mobile Operators 2G and 3G coverage maps are made publicly available and TRA encourages Mobile Operators to publish those maps on their web site and maintain them up to date for the benefit of general public.

Some limited areas in the Kingdom could not be accessed by the test team during the audit and therefore no coverage measurements was performed; TRA will evaluate with the relevant private owners and public authorities the opportunity to carry additional tests and further complete measurements.

6 ANNEX

The following pages contain detailed coverage results tables for the three Mobile Operators.

Legend:

Dual mode:	Mobile phone selecting best signal between 2G and 3G
2G:	Mobile phone locked to the Mobile Operator 2G network
Governorate:	Governorate name
Code:	Governorate area as defined in administrative division map page 8
Nb:	Number of test calls
Coverage:	Resulting computed population coverage in percent

		Batelco dual			Batelco 2G		
Governorate	***Code***	***Nb***	***% Coverage***		***Nb***	***% Coverage***	
1	CAP1	304	100%	± 0.0%	734	100%	± 0.0%
2	CAP2	107	100%	± 0.0%	188	100%	± 0.0%
3	CAP3	190	100%	± 0.0%	435	100%	± 0.0%
4	CAP4	389	100%	± 0.0%	792	100%	± 0.0%
5	CAP5	286	100%	± 0.0%	476	100%	± 0.0%
6	CAP6	187	100%	± 0.0%	372	100%	± 0.0%
7	CAP7	249	100%	± 0.0%	456	100%	± 0.0%
8	CAP8	94	100%	± 0.0%	156	100%	± 0.0%
Capital	***CAP***	***1806***	***100%***	*± 0.0%*	***3609***	***100%***	*± 0.0%*
1	CEN1	195	100%	± 0.0%	268	100%	± 0.0%
2	CEN2	522	100%	± 0.0%	987	100%	± 0.0%
3	CEN3	51	100%	± 0.0%	66	100%	± 0.0%
4	CEN4	155	100%	± 0.0%	238	100%	± 0.0%
5	CEN5	392	100%	± 0.0%	540	100%	± 0.0%
6	CEN6	393	100%	± 0.0%	674	100%	± 0.0%
7	CEN7	260	100%	± 0.0%	322	100%	± 0.0%
8	CEN8	399	100%	± 0.0%	525	100%	± 0.0%
9	CEN9	269	100%	± 0.0%	424	100%	± 0.0%
Central	***CEN***	***2636***	***100%***	*± 0.0%*	***4044***	***100%***	*± 0.0%*
1	MUH1	100	100%	± 0.0%	236	100%	± 0.0%
2	MUH2	146	100%	± 0.0%	320	100%	± 0.0%
3	MUH3	28	100%	± 0.0%	78	100%	± 0.0%
4	MUH4	183	100%	± 0.0%	503	100%	± 0.0%
5	MUH5	56	100%	± 0.0%	133	100%	± 0.0%
6	MUH6	68	100%	± 0.0%	114	100%	± 0.0%
7	MUH7	223	100%	± 0.0%	384	100%	± 0.0%
8	MUH8	173	100%	± 0.0%	321	100%	± 0.0%
Muharraq	***MUH***	***977***	***100%***	*± 0.0%*	***2089***	***100%***	*± 0.0%*
1	N1	463	100%	± 0.0%	902	100%	± 0.0%
2	N2	643	100%	± 0.0%	841	100%	± 0.0%
3	N3	753	100%	± 0.0%	1087	100%	± 0.0%
4	N4	314	100%	± 0.0%	514	100%	± 0.0%
5	N5	542	100%	± 0.0%	921	100%	± 0.0%
6	N6	301	100%	± 0.0%	372	100%	± 0.0%
7	N7	174	100%	± 0.0%	244	100%	± 0.0%
8	N8	164	100%	± 0.0%	248	100%	± 0.0%
9	N9	555	100%	± 0.0%	889	100%	± 0.0%
Northern	***N***	***3909***	***100%***	*± 0.0%*	***6018***	***100%***	*± 0.0%*
1	S1	169	100%	± 0.0%	202	100%	± 0.0%
2	S2	197	100%	± 0.0%	234	100%	± 0.0%
3	S3	289	100%	± 0.0%	343	100%	± 0.0%
4	S4	466	100%	± 0.0%	794	100%	± 0.0%
5	S5	472	100%	± 0.0%	573	100%	± 0.0%
6	S6	432	100%	± 0.0%	555	100%	± 0.0%
Southern	***S***	***2025***	***100%***	*± 0.0%*	***2701***	***100%***	*± 0.0%*
Total		***11353***	***100%***	*± 0.0%*	***18461***	***100%***	*± 0.0%*

		Viva dual			Viva 2G		
Governorate	***Code***	***Nb***	***% Coverage***		***Nb***	***% Coverage***	
1	CAP1	314	100%	± 0.0%	710	100%	± 0.5%
2	CAP2	106	100%	± 0.0%	187	100%	± 0.0%
3	CAP3	195	100%	± 0.0%	439	100%	± 0.0%
4	CAP4	404	100%	± 0.0%	772	99.9%	± 0.3%
5	CAP5	301	100%	± 0.0%	469	100%	± 0.0%
6	CAP6	195	100%	± 0.0%	365	100%	± 0.0%
7	CAP7	243	100%	± 0.0%	447	100%	± 0.0%
8	CAP8	92	100%	± 0.0%	151	100%	± 0.0%
Capital	***CAP***	***1850***	***100%***	*± 0.0%*	***3540***	***99.9%***	*± 0.1%*
1	CEN1	195	100%	± 0.0%	263	100%	± 0.0%
2	CEN2	551	100%	± 0.0%	954	100%	± 0.0%
3	CEN3	59	100%	± 0.0%	88	100%	± 0.0%
4	CEN4	209	100%	± 0.0%	280	100%	± 0.0%
5	CEN5	400	100%	± 0.0%	528	100%	± 0.0%
6	CEN6	410	100%	± 0.0%	657	100%	± 0.0%
7	CEN7	274	100%	± 0.0%	311	100%	± 0.0%
8	CEN8	415	100%	± 0.0%	516	100%	± 0.0%
9	CEN9	277	100%	± 0.0%	419	100%	± 0.0%
Central	***CEN***	***2790***	***100%***	*± 0.0%*	***4016***	***100%***	*± 0.0%*
1	MUH1	106	100%	± 0.0%	238	100%	± 0.0%
2	MUH2	156	100%	± 0.0%	330	100%	± 0.0%
3	MUH3	33	100%	± 0.0%	81	100%	± 0.0%
4	MUH4	193	100%	± 0.0%	502	100%	± 0.0%
5	MUH5	58	100%	± 0.0%	131	100%	± 0.0%
6	MUH6	73	100%	± 0.0%	124	100%	± 0.0%
7	MUH7	235	100%	± 0.0%	383	100%	± 0.0%
8	MUH8	172	100%	± 0.0%	307	100%	± 0.0%
Muharraq	***MUH***	***1026***	***100%***	*± 0.0%*	***2096***	***100%***	*± 0.0%*
1	N1	482	100%	± 0.0%	881	100%	± 0.0%
2	N2	666	100%	± 0.0%	845	100%	± 0.0%
3	N3	786	100%	± 0.0%	1085	100%	± 0.0%
4	N4	321	100%	± 0.0%	518	100%	± 0.0%
5	N5	563	100%	± 0.0%	914	100%	± 0.0%
6	N6	308	100%	± 0.0%	366	100%	± 0.0%
7	N7	178	100%	± 0.0%	236	100%	± 0.0%
8	N8	162	100%	± 0.0%	250	100%	± 0.0%
9	N9	566	100%	± 0.0%	891	100%	± 0.0%
Northern	***N***	***4032***	***100%***	*± 0.0%*	***5986***	***100%***	*± 0.0%*
1	S1	168	100%	± 0.0%	201	100%	± 0.0%
2	S2	192	100%	± 0.0%	230	100%	± 0.0%
3	S3	289	99.7%	± 0.7%	322	100%	± 0.0%
4	S4	479	100%	± 0.0%	796	100%	± 0.0%
5	S5	484	100%	± 0.0%	570	100%	± 0.0%
6	S6	443	100%	± 0.0%	556	100%	± 0.0%
Southern	***S***	***2055***	***99.95%***	*± 0.10%*	***2675***	***100%***	*± 0.0%*
Total		***11753***	***99.99%***	*± 0.02%*	***18313***	***99.98%***	*± 0.02%*

		Zain dual			Zain 2G		
Governorate	***Code***	***Nb***	***% Coverage***		***Nb***	***% Coverage***	
1	CAP1	280	100%	± 0.0%	734	100%	± 0.0%
2	CAP2	89	100%	± 0.0%	183	100%	± 0.0%
3	CAP3	175	100%	± 0.0%	421	100%	± 0.0%
4	CAP4	337	100%	± 0.0%	751	100%	± 0.0%
5	CAP5	262	100%	± 0.0%	470	100%	± 0.0%
6	CAP6	175	100%	± 0.0%	347	100%	± 0.0%
7	CAP7	212	100%	± 0.0%	431	100%	± 0.0%
8	CAP8	81	100%	± 0.0%	155	100%	± 0.0%
Capital	***CAP***	***1611***	***100%***	*± 0.0%*	***3492***	***100%***	*± 0.0%*
1	CEN1	160	100%	± 0.0%	265	100%	± 0.0%
2	CEN2	443	100%	± 0.0%	998	100%	± 0.0%
3	CEN3	55	100%	± 0.0%	76	100%	± 0.0%
4	CEN4	170	100%	± 0.0%	281	100%	± 0.0%
5	CEN5	351	100%	± 0.0%	533	100%	± 0.0%
6	CEN6	332	100%	± 0.0%	665	100%	± 0.0%
7	CEN7	213	100%	± 0.0%	320	100%	± 0.0%
8	CEN8	332	100%	± 0.0%	530	100%	± 0.0%
9	CEN9	231	100%	± 0.0%	419	100%	± 0.0%
Central	***CEN***	***2287***	***100%***	*± 0.0%*	***4087***	***100%***	*± 0.0%*
1	MUH1	87	100%	± 0.0%	239	100%	± 0.0%
2	MUH2	126	100%	± 0.0%	336	100%	± 0.0%
3	MUH3	29	100%	± 0.0%	77	100%	± 0.0%
4	MUH4	151	100%	± 0.0%	505	100%	± 0.0%
5	MUH5	45	100%	± 0.0%	130	100%	± 0.0%
6	MUH6	57	100%	± 0.0%	115	100%	± 0.0%
7	MUH7	195	100%	± 0.0%	378	100%	± 0.0%
8	MUH8	143	100%	± 0.0%	317	100%	± 0.0%
Muharraq	***MUH***	***833***	***100%***	*± 0.0%*	***2097***	***100%***	*± 0.0%*
1	N1	368	100%	± 0.0%	898	100%	± 0.0%
2	N2	552	100%	± 0.0%	817	100%	± 0.0%
3	N3	668	100%	± 0.0%	951	100%	± 0.0%
4	N4	266	100%	± 0.0%	296	100%	± 0.0%
5	N5	456	100%	± 0.0%	925	100%	± 0.0%
6	N6	250	100%	± 0.0%	369	100%	± 0.0%
7	N7	148	100%	± 0.0%	251	100%	± 0.0%
8	N8	133	100%	± 0.0%	244	100%	± 0.0%
9	N9	470	100%	± 0.0%	893	100%	± 0.0%
Northern	***N***	***3311***	***100%***	*± 0.0%*	***5644***	***100%***	*± 0.0%*
1	S1	138	100%	± 0.0%	204	100%	± 0.0%
2	S2	173	100%	± 0.0%	234	100%	± 0.0%
3	S3	249	100%	± 0.0%	350	100%	± 0.0%
4	S4	392	100%	± 0.0%	803	100%	± 0.0%
5	S5	392	100%	± 0.0%	581	100%	± 0.0%
6	S6	365	100%	± 0.0%	560	100%	± 0.0%
Southern	***S***	***1709***	***100%***	*± 0.0%*	***2732***	***100%***	*± 0.0%*
Total		***9751***	***100%***	*± 0.0%*	***18052***	***100%***	*± 0.0%*