DRAFT NUMBERING POLICY FOR BOTSWANA

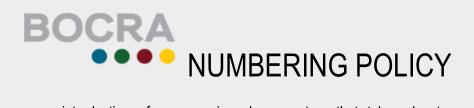# NUMBERING POLICY

Executive Summary

Introduction

1. This report presents the findings of a consultancy study carried out internally to review a telephone numbering policy to assist BOCRA's decision making process in telephone numbering matters.

2. It also takes account of other relevant factors, including:

2.2.1 Ensuring the optimum utilization of the numbering resources;

2.2.2 Possibility of the introduction of new services and technologies;

2.2.3 The existing Code of Conduct in the use of Numbering resources;

2.2.4 The changes in the regulatory environment especially the Communications Regulatory Authority Act, 2012(CRA Act) which changed the Authority's mandate; and

2.2.5 Newly developed regulations to facilitate enforcement of the provisions of the Communications Regulatory Authority Act.

Review of current arrangements

3. This review considered the recommendations that were proposed in the previous numbering policy, to assessin what has been implemented and what was still relevant to the market. Among the recommendations that were not implemented because the market was not ready, then included Number Portability, Carrier Select and Carrier Pre Select, the harmonization of emergency numbers, the migration of 0800 numbers to 800, market assessment on the usage of Special Numbers (Premium rate Services in the range 900).

4. In reviewing this policy, the Authority considered further liberalization of the communication sector, which allowed all operators to have a service neutral license to provide both fixed and mobile services. Auditing of the existing different categories of numbers allocated and used by the operators was also considered to inform decision making. Operators were consulted in terms of the number utilization, their forecast, their position on number portability and usage of machine to machine communication. The code of conduct on the use of numbers and possibility of charging for numbers also forms the basis for the review.

5. Part of the review was also to incorporate the new regulations as well as update BOCRA mandate which seeks to address changes in the communication sector.

6. Part One of this report reviews the current Numbering Plan and its administration. The main findings of the review are that Botswana has adequate capacity in the Numbering Plan for the next 10 years, considering that implementation of Machine to Machine (M2M) and the internet of things (IoT) will require new numbering ranges as well as the need to cater for new licensees and services, and that BOCRA need to manage numbering allocations in greater detail to ensure a level playing field for all operators and service providers. New numbers will also be identified that would facilitate the

introduction of new services by operators that take advantage of technological developments in telecommunications switching, such as other non-geographic services like Freephone.
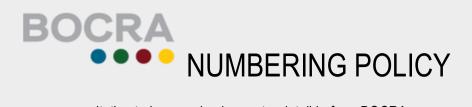
Numbering Policy

7.   Part Two of the report presents recommendations for a numbering policy to address the issues identified in review of the current arrangements. The policy review has been developed after consultation with operators.

8.   The proposed review is based on the principles that it should:

8.1   Ensure adequate provision of numbers for future growth in telecommunications market;

8.2   Promote fair competition between all entrants in the market;

8.3   Meet the needs of telecommunications users in terms of simplicity of use and the information conveyed by a number.

8.4   Facilitate the introduction of new services and new technologies such as Machine to Machine communication (M2M).

8.5   Avoid unnecessary costs for operators which may result from migration to the new numbering range, and hence higher charges to users; and

8.6   Be compatible with international obligations and recommendations.

8.7   The principles underlying the revised Numbering Plan are proposed at Appendix 9 and the proposed arrangements for administering numbers are set out in Appendix 10.

8.8   The revised Plan does not require any changes to existing Geographic numbers, but requires that additional numbers be set aside for Machine to Machine (M2M) communication which is currently utilizing the existing mobile numbers and that new numbers in the 800 range be reserved for Mobile expansion. The migration of M2M in the current mobile range will free mobile numbers that are utilized for M2M services.

Emergency Numbers

9   Several different codes are in use as emergency numbers (112, 911, 997, 998, 999, 995 and 996,) and the service associated with the numbers are the same among the three current network Operators. This is because 112 is mandatory for GSM mobile networks and is increasingly being adopted as the single code internationally, including in the SADC region. The introduction of one single number for emergency services is still a challenge as these services are not synchronized and operated from a single point.

Number Portability

10   Assessment of the introduction of Number Portability by the operators has shown that the operators are ready to take up this service. This will be a good move towards greater liberalization. Further consultation with the operators on the matter is ongoing with the aim of introducing number portability once the consultation is completed.

11   The three mobile operators have modern switches and Number Portability could be introduced between mobile networks relatively simply. However, it still requires further

consultation to be examine in greater detail before BOCRA can request that Operators to implement Number Portability

12   Once this service is introduced across all networks, it would go some way towards enhancing competition as well as meeting users' convenience. It is recommended that non-Geographic numbers, such as Freephone, should be able to be ported on a block basis from one network to another.

13   Draft Regulations for Number Portability are included as an Appendix 13

Carrier Selection

14   Some form of carrier selection is fundamental to the effective entry of competitive long-distance networks and competing international gateway operators, as it allows calls to be made via the most cost-effective route without the new entrant having to install a line to every customer's premises. It also facilitates competition from service providers that do not have their own infrastructure, for example, those offering national or international services over other operators' networks. Determining when to introduce carrier selection will be a policy decision for the Government and BOCRA considering the emphasis they wish to put on the possibility that infrastructure competition will develop.

15   The report discusses two ways in which carrier selection can be introduced: Carrier Select (CS) and Carrier Preselect (CPS). CS involve a short access code being put in front of the called number on a call by call basis to indicate the chosen alternative carrier. CPS involves the user selecting an alternative carrier whose identity is then programmed into the switch so that calls are automatically routed via the chosen alternative carrier. CS could be implemented at very much lower cost than CPS and in practice it can be made just as convenient for the user by connecting a small "smart box" to the telephone socket that automatically inserts the access code in front of every call or, for businesses, by programming the PABX to do the same.

16   It is recommended that access codes for CS are made available as soon as a decision to introduce carrier selection is made and that the introduction of CPS is deferred for the foreseeable future, pending a study by the industry of its costs and effectiveness.

17   Draft Regulations for carrier selection are included as an Appendix 14

Legal issues

18   BOCRA has powers to deal with breaches of the licence conditions and Numbering Plan. The conclusion is that the Authority need to have effective enforcement powers.

Administration of the ccTLD

19   After considering several possibilities, BOCRA conclude that it is best placed to take on the role of management of the dot-bw ccTLD. In this role, BOCRA will appoint registrars of domain names, enforcing the relevant rules, managing a contract with the registrars

for dot-bw and ensuring that domain names servers are up and running 24 hrs a day, 365 days a year and providing a dispute resolution procedure. BOCRA would not be directly involved in the process of registering domain names.

20   While there can be only one registry that acts as a manager of the ccTLD, some countries operate with competing "Registrars" who effectively act as retailers for the domain name registration. In this system, accredited registrars would invite applications for domain names, vet them for compliance with the accepted rules and send the accepted registrations on to the registry for entry in the register. Botswana should have a system of competing registrars, who would typically be ISPs who will have an ongoing relationship with end users. This would then leave BOCRA with those functions which are more regulatory than operational, which fits well with its responsibilities.

21   The Communications Regulatory Act 2012 expressly gives the Authority the mandate to administer domain names, as per section 38 of the Act.

22   The rules and procedures adopted by BOCRA as ccTLD manager were drawn up in consultation with the internet community, in keeping with the principle that the internet should be governed by bottom-up consensus. At the initial stage the Technical Advisory Committee, which constituted representatives of internet community was formed to formulate policies that govern the.bw administration.

Implementation

23   Benchmarking exercise was carried out in the different parts of the world, including Africa to assess the necessary infrastructure required for administration of. bw. All relevant stakeholders, including the previous .bw administrators were part of the consultation team to migrate the .bw from BTC to BOCRA through the ICANN redelegation process in 2012.

24   The review work falls into four work streams which are listed below

24.1   Revised telephone Numbering Plan;
24.2   Management of the ccTLD;
24.3   Licensing; and
24.4   Legislative.

Part One – Review of the current Numbering Plan and its Administration

1   Introduction

In 2017, BOCRA carried out a consultation with the operators on the efficient management of numbering resources and the possibility of introducing charging of numbers to reduce mismanagement by the operators. After the consultation, the views of the operators were taken

into consideration and the code of conduct for management of numbers was agreed between BOCRA and the three operators. Further to that in April 2018, the Botswana Communications Regulatory Authority (BOCRA) decided to carry out a consultancy study in house to review the current numbering policy considering among others the fact that the mobile numbers were near exhaustion.

The specific objectives included:

- Coming up with the optimum utilization of the numbering resources;
- Looking at the possibility of the introduction of new services and technologies;
- Implementation of Code of Conduct for telephone numbering management by Service Providers;
- Incorporating the new regulations to enforce the requirements of the Communications Regulatory Authority Act.

Part One reviews the current usage of the telephone numbering resources in Botswana in relation to international best practice, relevant Regional Agreements and the numbering recommendations of the International Telecommunications Union (ITU).

Part One includes seven further sections:

Section 2 describes the current telephone numbering plan and its administration;

Section 3 reviews, international best practices on telephone numbering and number administration for benchmarking purposes;

Section 4 reviews the Regional Agreements on numbering issues, including the numbering harmonization in the SADC[1] region;

Section 5 reviews the ITU procedures for the allocation and management of telephone numbering resources;

Section 6 reviews the current telephone signalling system administration and other non-dialled codes;

Section 7 reviews current practices in the administration and management of the country code Top Level Domain (ccTLD) in Botswana (i.e. The. bw Internet domain name); and

Section 8 summarizes the conclusions of the previous sections.

Part Two, which begins at section 9, presents a numbering policy to address the issues identified during a review of the current arrangement

2 The current Numbering Plan and its administration

This section reviews Botswana's current Numbering Plan and the use of numbers against the Plan.

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[1] Southern Africa Development Community

2.1   **Overview of the Plan and its origins**

The Numbering Plan[2] was published following studies in 1999. A series of code changes took place up to 2007 when the Plan finally stabilized. The migration to the current Plan was generally carried out in the way it was recommended in the report of the 1999 study[3]. However, there still remain some anomalies which are discussed later.

The Botswana Telephone Numbering Plan is structured as shown in Table 1. Geographic numbers are seven digits long and Mobile numbers are eight digits long.

Table 1: The current Numbering Plan

First digit	Second digit									
	0	1	2	3	4	5	6	7	8	9
0	Int'l [(a)]	Short international dialing in the region								
0800	Freephones									
1	Short codes									
2	NG [(b)]	Geographic numbering (Francistown region)								
3	NG	Geographic numbering (Gaborone)								
4	NG	Geographic numbering (Palapye region)								
5	NG	Geographic numbering (South-East region)								
6	NG	Geographic numbering (North and West regions)								
7	Mobile and VoIP numbering									
8	Mobile extension & M2M									
9	PRS [(c)]	Reserved for future use								Em [(d)]

Notes   (a) Int'l: international access code

(b) NG: non-geographic numbering

(c) PRS: premium rate services (non-geographic)

(d) Em: emergency code(s) (999, 998, 997, 112)

2.2   Level 0

Level 0 is currently used for 00 International access and Freephone numbers beginning with 0800. A proposal is to leave 0800 as is and come up with the principle of how all the operators can access the 0800, which is mostly used by BTC.

The code 0900 is not in service, but it has been suggested in the previous review that it should be used for Premium Rate Services (PRS), no Service Provider has shown interest in the

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[2] A copy of the full Plan is at Appendix 2
[3] *The future of Botswana's numbering plan*; available at
http://www.BOCRA.org.bw/pubs/Numbering%20Plan%20Report%20(Final).pdf

Premium Rate Service. In order to comply with close numbering plan, it is recommended that all PRS service be allocated in 900 when they come into use.

The Numbering Plan shows range 01 to 09 as available for the possible introduction of international short code dialling within the SADC region. This has its origin in a proposal by CRASA[4] but the understanding is that there is no intention of proceeding with international short codes within the region.

2.3   Geographic numbers (Levels 2 to 6)

The Plan shows a total capacity of 5 million numbers available to Fixed Line (Geographic) services, in the ranges 2xx xxxx to 6xx xxxx. The total number used by BTC is about 256,841 and this number would increase as soon as Mascom starts deploying fixed service on its 220,000 allocated numbers. The utilization by BTC is as per Table 2.

The ranges 20, 30, 40, 50 and 60 are currently shown in the Numbering Plan as designated for Non-Geographic use, though none of these is in service.

This range includes:

> 200xxxx,210xxxx,220xxxx,270xxxx,300xxxx,330xxxx,340xxxx,380xxxx,400xxxx,410xx xx,420xxxx,430xxxx,500xxxx,550xxxx,600xxxx,630xxxx,660xxxx, & 690xxxx.

2.4   Personal, Paging and Mobile numbers (Level 7)

Personal Numbers

Level 7 is shown in the Numbering Plan as available for mobile numbering as well as VoIP numbering. The ranges 700xxxxx,780xxxxx,793xxxxx are the only ranges

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[4] Communications Regulators' Association of Southern Africa see section 4

remaining on this whole block. It is recommended that level 8 be opened for future mobile expansion as well as M2M.

Mobile numbers, 71,72 & 73

There are currently three ranges, each of 1 million capacity each, allocated to the three mobile operators, Mascom, Orange and BTC. To avoid branding by operators, allocations of 100 Thousand and 10 thousand numbers have been made to all the operators across different blocks that were free. The operators have provided the utilization statistics shown in Table 3, 4 and 5.

Both operators have been demonstrating a high dependence on "branding", an issue discussed in section 3.5 below.

The mobile ranges are allocated as per Table 2-4 for BTC, Orange and Mascom respectively

Table 2: BTC Mobile Number Utilization

Range	73	749	758 – 759	768
Maximum capacity allocated per block	1,000,000	100,000	200,000	100,000
In service, with subscribers	537,722	51,323	45,058	34,147
In the sales loop (prepaid, held by dealers)	211,435	15,648	9,529	3,360
In quarantine	72,446	9,762	17,574	24,529
Test Numbers				
Support of the International is roaming	690			
Support of Local is roaming				
Network IVR services				
M2M				
Data				
Total	1,400,000			
Translation (Fixed)	15,353			

Used capacity				
Unused capacity	178,397	23,267	127,839	**37,664**
Subscriber forecast	**None provided**	**Years)**		

Table 3: Orange Mobile Number Utilization

Range	72	743-744	748	750-757	763-769	774-775
Maximum capacity allocated per block	1,000,000	200,000	100,000	500,000	400,000	200,000
In service, with subscribers	925,034	185,297	91,198	491,175	386,430	195,706
In the sales loop (prepaid, held by dealers)	70,313	13,236	8,019	8645	13056	4097
In quarantine	4,653	1,467	773	180	514	197
Test Numbers	1,100	90,000				
Support of the International is roaming	40,000	1,430				
Support of Local is roaming	60,000					
Network IVR services	1,000					
M2M	**5,622**	**5853**	**6431**	**7066**	**7763**	8529
Data	9,904					
Prepaid	976,784					
Post paid	16,505					
Active, Suspended	50,585					
Total	715,373	474,743				
Unused capacity	284,627 (28.5%)	525,257 (52,5%)				
Subscriber forecast		**500,000 (10Yrs)**				

Table 4: Mascom Mobile Number Utilization

Range	71	740 -742, 745-747	754-756 & 759	760-767	770-771,776-778
Maximum capacity Allocated per block	1,000,000	600,000	400,000	500,000	**500,000**
In service, with subscribers	635,636	562,424	365,851	472178	478,459
In the sales loop (prepaid, held by dealers)					
In quarantine	164,364	37,576	34,149	27,822	21,541
Test Numbers					
Support of the International is roaming					
Support of Local is roaming					
Network IVR services					
Total	3,000,000				
Unused capacity	285,452				
Subscriber forecast	None				

2.5   Corporate and private network numbering space

There are no ranges in use or set aside for corporate use. Private networks are not allowed to interconnect with the public telephone network in Botswana, though it is possible this will be permitted in the future. The implications are addressed in section 3 below.

2.6   Non-Geographic and special service numbers

BTC reports a total of 205 connections in the 0800 xxxxxx number range, 2 connections for Mascom and 3 Connection for Orange, which has a maximum capacity of 1 million numbers.

The range 900 is available for Premium Rate Services (PRS) However, there is no allocation on this range

There are no other special service numbers.

Level 8 shown in the published Plan as being for Non-Geographic services, including Freephone and 90 shown in the Plan as being for PRS are not in use. The level 8 is recommended for use by mobile and M2M communication to address the exhaustion in the mobile range.

2.7 Short codes (including Emergency Service numbers)

BTC, Mascom and Orange have each submitted a listing of their use of short codes. These lists are shown in Appendices 3 to 5 as extracted from Numbering Database kept by BOCRA.

Currently, except for Emergency numbers, short codes are used only on-network; hence a code dialled on the Orange network, e.g. 133 for Voicemail, does not clash with the Call Centre service available using 133 on the Mascom network. This implies that in network operation terms, there is no reason why codes should not be duplicated. However, there are consumer related issues discussed in section 3 below.

Short codes have been authorized for use by Mascom, Orange and BTC in the ranges 10X (X) to 19X (X). In addition, codes in 9XX have been authorized for all operators. Table 5 shows a summary of the short codes used by operators, both compliant and, by inference, non-compliant. The areas of non-compliance and issues arising will be addressed in section 3.

Table 5: Number of short codes used by operators

Operator	Short Codes listed	Compliant Short Codes	Unused Codes
BTC	53	53	0
Mascom	41	27	0
Orange	286	286	0

There are several short codes in use by the operators for calling Emergency Services as shown in Table 6

Table 6 : Emergency numbers in use by each operator

Code	BTC	Mascom	Orange
112	Emergency	Emergency	Emergency
911	MedRescue	MedRescue	MedRescue

997	Ambulance	Ambulance	Ambulance
998	Fire	Fire	Fire
999	Police (Automatic routing to local police officer)	Police (Automatic routing to local police officer)	Police (Automatic routing to local police officer)

2.8 Numbering administrations

The Act and associated Regulations give BOCRA power to administer the numbering arrangements, as shown in the legal analysis in section 2.9 below. Blocks of numbers are allocated to operators by BOCRA. In the case of E.164 ranges, allocations are at the National Destination Code (NDC) level, e.g. The three Mobile operators have the whole of 71, 72 & 73, BTC has the whole of the specific ranges identified in the published Plan, and Mascom has been allocated 290,000 numbers from the different numbering ranges across the country.

In the case of the short code ranges, BOCRA has bulk allocated part of level 1 to Mobile operators. Each operator is free to use any of the codes in these ranges. The tariff of every new service must be approved by BOCRA.

2.9 Legal basis

Primary legislation

The main legislation governing telecommunications in Botswana is the Communications Regulatory Authority Act of 2012, which give BOCRA the mandate to regulate the communications sector in Botswana comprising of Telecommunications, Internet and Information and Communications Technologies (ICTs), Radio communications, Broadcasting, Postal services and related matters. The CRA Act replaced the Broadcasting Act [Cap 72:04], the Telecommunications Act [Cap 72:03], and caused the amendment of the Postal Services Act to create a converged or an integrated regulatory authority for the communications industry.

This Act established BOCRA as an independent regulator and prescribed its membership, meeting arrangements, functions, powers and duties. The Act also introduced a system of licensing of telecommunications providers, Broadcasting and Postal service providers.

The policy objectives to be pursued by BOCRA are set out in the Communications Regulatory Authority Act. They can be summarized as:

- Efficient management and use of scarce resources in the form of radio frequency spectrum and Numbering.

- Licensing and monitoring of service providers;
- Developing and promoting appropriate strategies and policies that encourage infrastructure development and use of ICT services;
- Ensuring security and efficiency of telecommunications networks;
- Comparative engagement and exchange with international telecommunication regulatory and standardization bodies for global harmonization and coordination; and
- Promoting the interests of consumers in respect of prices, quality and variety of services and equipment

BOCRA's authority to administer the numbering system derives from section 38 of the Act, which imposes the following duty on BOCRA:

"38. (1) The Authority shall establish and maintain a non-discriminatory and efficient numbering and domain name system regulatory framework to be applied by all providers and licensed operators in order to ensure *fair access to such services and the efficient allocation of numbers and domain* names,

(2) The Authority shall maintain and manage a central numbering and domain names database system which shall consist of scheme of identification to ensure that electronic communications *are correctly and efficiently directed to the point of reception"*

Regulations

The Communications Regulatory Authority Act also empowers BOCRA to regulations[5] and it has done so with the Botswana Communications Regulations of 2018. The regulations include the following provisions which require compliance by licensees with the numbering system and deal with how BOCRA is to allocate numbers to licensees:

"34(1). Every licensee shall comply with such numbering and addressing system as is determined by the Authority.

(2) The Authority shall allocate, to each licensee, a number or address capacity, which the Authority considers reasonable taking into account the number of subscribers which the Authority has forecast, the need for operator codes, and any other relevant factors; and the

(3) The authority shall, when so allocating number capacity, specify, in writing, the purpose for which such capacity may be used.

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[5] Communication Regulatory Authority Act 2012 amended the Telecommunications Act, 2004 (No. 38 of 2004) to give the Minister the power to make regulations. Any replacement of regulations will therefore have to be made by the Minister.

(4) A licensee shall apply in writing to the Authority, with the necessary justification to supply it with additional number capacity or address capacity.

(5) A licensee shall use only the number or address capacity allocated to it in accordance with sub regulation (3), and only for the purpose for which it has been allocated.

(6) The Authority may revoke the number or address capacity allocated to the licensee if not used for the purpose for which it was intended or for other reasonable cause as may have been disclosed to the licensee by the Authority"

Licences

There are also numbering provisions in the licences of operators which require the allocation of numbers to customers to be subjected to any conditions which BOCRA may stipulate, including the payment of fees and number portability between operators. The relevant licence conditions are reproduced in Appendix 6.

3 International best practice on telephone numbering and number administration

Section 3 addresses the extent to which the Botswana Numbering Plan, and its implementation, conforms to international best practice.

3.1 Overall structure of the Plan

Nature of the Plan

The Botswana Telephone Numbering Plan is a Closed Plan, in that:
- There is no separation between the National Destination Code (NDC) and the Significant Number (SN); and
- There is no escape code required to differentiate E.164 Geographic and Non-Geographic numbers from short codes.

Closed Plans are considered optimal for countries with a comparatively small population where the Geographic numbers are usually short, though Closed Plans are also now being increasingly used in countries with larger populations. In the SADC region, Closed Plans are to be found in Lesotho, Malawi, Mauritius, Seychelles, Swaziland and South Africa. Many other examples of Closed Plans can be found in Denmark, Belgium, Spain, Hong Kong, and one of the smallest countries, Gibraltar, and the largest, China.

The main advantages of a Closed Plan are:

- Shorter overall number length as there is no need for an additional digital as a breakout code such as 1 or 0;
- Increased efficiency of number utilization for Geographic ranges as the number includes the National Destination Code, hence another prefix can be opened to expand the capacity of a given area, with the same dialling plan for old and new numbers; and
- Numbers have a consistent presentation, frequently of a uniform length, which aids consumer recognition and aids dialling accuracy. However, this is not always the case: Botswana's Fixed Line numbers are one digit shorter than Mobile.

A Closed Plan can, however, impose certain constraints on dialling from mobile phones:

- Normally the keys 0 – 9 are assumed to have the same function as the keys on a Fixed landline phone, which is currently the case except in level 1; this differs from an Open Plan where a breakout code is required to reach an E. 164 number from a mobile phone. Hence,

great care must be taken not to locate on-network services outside the agreed areas of level 1 since they would clash with the uses of level 0 and 2 – 9 defined in the Numbering Plan.

- Short codes need to be coordinated between operators if clashes are to be avoided.

The benefits of a Closed Plan are being experienced in Botswana, and that will continue to be the case as the Closed Plan will facilitate the introduction of further liberalization. However, there remain some concerns about the use of the 0800 range for Freephone services when 800 would be more appropriate for a Closed Plan. The possibility of migrating these numbers to level 8 will need to be addressed.

A detailed analysis for each type of numbers, giving a comparison with best international practice and identifying potential problems, is given below in sections 3.3 to 3.8.

Number length

The best international practice is to have uniform number lengths for Geographic and Non-Geographic ranges, including mobiles. This is also a CRASA recommendation.
In Botswana, Geographic numbers (7 digits) are one digit shorter than Mobile numbers (8 digits).

Capacity

The Botswana Numbering Plan, with its 8-digits numbering spectrum, would appear to have adequate capacity for the next 10 years. Table 7 presents a comparison with other countries having 8 or more digits.

Table 7: Comparison of numbering capacity with other countries

Country/ Closed Plan [C] Open Plan [O]	Teledensity* Lines per 100 population	Population	Numbering spectrum available (excluding break-out code where used)
Botswana [C]	8	2.2m	8-digits
Jordan [O]	12.9	10.2m	9-digits
Belgium [C]	49.8	11.49m	8-digits
South Africa [C]	10.4	54.8.m	9-digits
UK [O]	68.3	65.6m	10-digits

Source: https://www.cia.gov/library/publications/the-world-factbook/fields/2119.html#be of 2017.

The comparison is between countries at an early stage in telephony liberalization, and those with fully developed telecommunications markets such as Belgium and the UK. As an overall position, the Botswana Plan still has plenty of numbers for the future, as the comparison with the plans used in Belgium and South Africa confirms.

Issues with structure and capacity

Five of the initial digits, in the ranges 2 to 6, are used for Geographic numbering (with 256,841 numbers in use) whereas only range 7 is available for Mobile numbers as well as VoIP with 6,200,000 numbers in use by mobile operators and 600,000 used for VoIP services.

In the longer term, it may be necessary to reduce the proportion of the spectrum taken up by Geographic numbers as well as mobile number, to allow continued growth of other services. Methods of achieving this are suggested in Part Two of the report, as migration techniques are most effective when planned long in advance.

Pricing Information

International practice is divided between wide adoption of the UK model, in which consumers are given an indication of the price of the call from the initial digit, and non-structured Plans as seen in North America, where for economic reasons a decision has been taken to continue until the Plan becomes exhausted. Hence, in the USA it has been possible to brand only a handful of products where the opportunity still exists, 1800 Freephone being the best-known example.

The Botswana Plan is reasonable consumer friendly, along the lines of the UK model, in that lower priced Fixed Line calls can be identified in the lower ranges 2 to 6 with higher priced Mobile calls being in the range 7. An exception to this pattern is the use of 0800 as a free number which could be confusing for customers.

3.2   The proposed programme for further Liberalisation

Long Term

The existing fixed and cellular operators have Service Neutral licenses and can to apply for any type of numbers, including Non-Geographic;

New entrants will be able to apply for national Service Neutral licenses and hence the same access to numbers as existing national operators.

The programme will therefore require new number ranges to cover Service Neutral (i.e. Converged services) and Carrier Selection issues and ISPs will want to have access to existing number ranges for VoIP services.

BOCRA NUMBERING POLICY

The existing ranges, i.e. Geographic, Non-Geographic and Mobile, are allocated to the three existing companies, BTC, Mascom and Orange. In future, BOCRA will need to manage this spectrum at block or individual code level to ensure that when new services are introduced, a fair level playing field is in place to allow access to the necessary numbers.

3.3   Geographic numbers

Demand for numbers

There are several factors which determine the amount of numbering required for Geographic services, including the demand for more lines, and the effects of new entrants each requiring footprint. Table 8 shows the major drivers.

Table 8: Drivers of changes in demand for Geographic numbers

Driver	Effect, medium term	Effect, long term
Population changes	No major effect on number of Fixed Lines	Unlikely to result in any significant demand for more numbers (Teledensity is likely to increase through continued take-up of Mobile)
Use of second lines for facsimile services	Not a major effect	Facsimile use is reducing due to substitution by email
Use of second lines for Internet dial-up	Most users will use existing lines	Second line usage is shrinking in advanced economies due to the availability of lower cost broadband.
Introduction of Service Neutral licenses	The footprint will be required by new players.	The footprint will be required by new players.
Numbers required for rural telecommunications services	Geographic (and Non-Geographic) numbers required	Little, the rural areas have plenty of numbering space

International experience suggests that the highest demand for additional numbering capacity results from the requirement for footprint for new entrants, particularly ISPs offering VoIP services. The practice in Europe and the USA is to allow new entrants access to Geographic footprint on the same basis as that already enjoyed by the incumbent. This can impose a significant demand on remaining capacity, especially if tariff constraints require several blocks of numbers to be issued in an NDC.

However, this could be managed by limiting the size of the blocks allocated to operators to 1000 numbers, a practice used in South Africa, the UK and the USA.

Availability of capacity

Botswana's Numbering Plan shows a total capacity of nearly 5 million numbers available to Fixed Line (Geographic) services, in the ranges 2xx xxxx to 6xx xxxx. The total of numbers in service is about 256,841. The ITU-T reports a Teledensity of 6.2 %[6] for Botswana, slightly lower than South Africa at 6.4%.

A detailed forecast of future demand has not been prepared, as the available capacity far exceeds the Botswana's population of around 1.6 million. Studies conducted at the UK Regulator in the 1990s indicated that the terminal numbering usage in a saturated market tends to average about 0.5 numbers per head of population; discussion with other Regulators has confirmed that a similar relationship exists in other countries. Allowing for 50% effective utilisation, this would indicate that a numbering spectrum of around 1.5 million numbers will ultimately be required in Botswana, which is well within the 5 million available.

Blocks of 10,000 numbers from each of the ranges are currently issued to BTC except for 3xx xxxx (Gaborone), the ranges have relatively low utilization. About 40,612 connected lines out of the total of 256.841 are in the Gaborone area. However, even in the 3xx xxxx range there remain adequate unallocated blocks of 10,000 numbers.

Hence, the long-term issue is whether there continues to be justification for taking up initial digits 2 to 6 for Geographic numbers when international experience is that virtually all the growth in demand for telecommunications numbering is in the Non-Geographic and Mobile ranges.

3.4   Personal Numbers (Level 7)

Level 7 is shown in the Numbering Plan as available for personal numbering as well as mobile numbering. The inclusion of Personal Numbers within the Plan was probably influenced by the introduction of 070 in the UK in the mid-1990s, which is under review[7] to see how best to regulate it. It is difficult to define best international practice for Personal Numbers as only the UK appears to have gone down this path. Indeed, the UK experience has been largely negative, with very low take up and some unwelcome consequences where the numbers have been used. As a result, the major player, British Telecom, has now withdrawn its service.

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[6] ITU ICT-Eye:http://www.itu.int/icteye

[7]https://www.ofcom.org.uk/__data/assets/pdf_file/0024/118464/Draft-statement-Review-of-the-070-number-range.pdf

Before deciding to open for such a service in Botswana, BOCRA will want to consider the UK experience, including the following practical problems:

- Use of 070 confused callers into thinking they were calling mobile numbers;
- This resulted in service providers charging high tariffs, often more than mobile rates;
- 070 is in effect a *de facto* unregulated Premium Rate Service (PRS), which resulted in it being used illegally in connection with scams;
- Personal Numbers are extremely difficult to control as several parties are involved in the calling chain; and
- Several consultations have been undertaken, resulting in rules for the use of Personal Numbers; these continue to be broken.

Consequently, Ofcom is considering the future of these services in the UK. One option is to withdraw the service.

BOCRA is advised to take this feedback into account before further work is undertaken towards the introduction of 70 in Botswana.

3.5 Mobile numbers (ranges 71, 72 and 73)

Adequacy of capacity

The statistics shown in section 2 suggest that neither of the Mobile operators requires additional capacity in the short term.

Orange has 215,246, numbers remaining, against an existing subscriber base of 2,5000,000. Orange uses a state-of-the-art number distribution technique, in that a number is allocated from a centrally held pool only when a starter pack is activated. Orange had indicated that they will require 500,000 numbers in 10 years. This is best international practice, in that it avoids numbers being locked into the dealer chain.

Mascom has 1,002,881 numbers remaining, against an existing subscriber base of 3,000,000. This includes a buffer stock number held in the form of pre-paid packs at dealers. However, Mascom does appear to recycle numbers after 4 months, in line with best international practice.

BTC has 365,167 numbers remaining, against an existing subscriber base of 1,400,000.
In summary, neither operator would appear to need capacity in the foreseeable future.

Effects of further liberalization

There are several issues to be considered:

- Best international practice indicates that a Mobile Virtual Network Operator (MVNO) may either use a sub-allocation from an existing operator, or have a dedicated range from the outset;
- The effect of number portability, should it be introduced, would be to allow an MVNO to take its service to a different host operator, which is already occurring in Europe; and
- A Service Neutral operator, or a new VoIP entrant, might require Mobile capacity.

As there are currently 2.7 million numbers remaining in the range 7 (70 and 78-79) there is plenty of capacity for new players. However, it will be necessary to change the current practice of allocating in blocks of 1 million numbers. In the UK, where the Mobile numbering space is one billion, the unit of allocation is limited to 100,000 numbers. South Africa also has the facility to allocate in 100,000 number blocks.

Branding of Mobile Numbers

Branding is a controversial issue, which can cause considerable regulatory concern. International practices differ, but the consensus in highly developed markets is that branding by the operator should be discouraged. The reasons for this are:

- Branding is a barrier to entry against established strong brands;
- Branding is wasteful of capacity; UK practice is to interleave allocations behind level 7 at 100,000 number block level;
- Branding causes confusion when number portability is introduced. For example, when a number has been ported to another network, a caller may expect from the "brand" a cheaper on network call when an off-network call is being made; and
- Customer value number portability more than they value branding.

Indeed, USA practice is to use local numbering space for mobiles so that it is not even possible to identify whether a called number is Mobile or Fixed. However, the USA is a special case as there are no tariff implications for the called party pays for the mobile element of a call.

Areas of non-compliance with the Numbering Plan

Mascom has several short codes in level 7 and BOCRA has already requested it to migrate these to level 1 to comply with the Numbering Plan. Table 9 lists all the non-compliant short codes that are in use.

Table 9: noncompliant short codes used by Mascom

Short code	Service
474474	GPRS Subscription
55333	Tsa Mahala
71100	MyMascom – Ringtones & Logos
71101	SMPP.4
71123	Voice Mail
71130	Prepaid Made Easy, Thebe Insurance
71133	
71147	HIV/AIDS Control Centre
711600	Emergency Road, Home and Medical Assistance
71166	Road Side Assistance
71168	BBC News Update
711737	PEP Competition
71190	Yarona FM Jingle
71191	Free Life Cover, Botswana Life
71196	Dialog Box

However, Mascom would like to be able to retain 71123 so that users can call the same short code to retrieve their voicemail when they are roaming abroad as they do on their home network (i.e. Dialling +267 71123 from abroad).

Best international practice however is not to send the call through in the dialled stream, but to rely on two-stage call set-up. This can either be Calling Line Identity (CLI) followed, if required, by a PIN, or the caller's mailbox number can be dialled, followed by a PIN when the voicemail answers.

3.6   Corporate and private network numbering space

A total of 20 private network licenses has been issued and the following are among the largest operators of private networks;

- Debswana; and Botswana Police Service (no license required).

- Private networks are not allowed to interconnect with the public telephone network in Botswana, though this could well be permitted in the future.

There are no specific numbering ranges in use or set aside in the Plan for corporate use. The concept of corporate numbering ranges emerged in the 1990s in various countries, especially the UK. However, though the UK Regulator undertook a series of consultations there has been little consensus that such a service is needed. The issues that have inhibited the take-up of these services include:

- Reluctance of network operators to offer attractive tariffs;
- The emergence of other numbering products, especially Number Translation Services, which present a Non-Geographic interface to the consumer;
- The need to be able to issue individual numbers to organizations, which is not feasible until New Generation Networks are in place; and
- The possibility in the future of new types of numbering, which can be substituted for an E.164 range.

Nevertheless, the UK Regulator has continued to reserve the range +44 55 for possible use of corporate numbers and continues to consult on its future. We consider this issue further in Part Two.

There would appear to be an adequate numbering spectrum available to accommodate corporate and private networks in the Numbering Plan, should this be required in the future.

3.7 Non-Geographic numbers and special services

0800 Freephone

Botswana's numbering arrangements depart from international best practice, in continuing to use 0800 for Freephone numbers.

The continued use of level 0 is a legacy of the earlier Open Plan in which the initial 0 was required as a breakout code. Comments as to the justification for continuing to use 0800, rather than 800, have included "0800 is an international product". This does not, however, accord with the general international practice, which is to show the Freephone number in a Closed Plan as 800.

Even in Open Plans, over 90% of Freephone numbers use level 1, for example, 1800 in North America and in the Republic of Ireland.

0800 is found frequently in the SADC Region, the largest user of Freephone being South Africa.

It is recommended that the use of 0800, rather than 800, be re-examined. A possible approach is to leave it as is because there are currently more customers using these numbers and that 800 range be reserved for future expansion of mobile numbers.

Other new players who require access to services such as Freephone, should be allocated the existing free ranges in the 0800 and proper allocation be made to allow for continued allocations of 100 numbers.

0900 Premium Rate Service Range

For the same reasons, the future Premium Rate Service range (currently expected to be 0900) should be 900, in line with best international practice and the published Numbering Plan. It should also be open for use by any operator.

3.8   Short codes (including Emergency Service numbers)

Level 1 codes

The audit of the numbers in use, recorded in section 2 above, identifies that short codes which are managed by BOCRA will still be available for the foreseeable future due to proper management.

Also, examination of the lists of short codes in the service provided by each operator, and reproduced in Appendices 3 to 5, shows that all codes, such as 112, are replicated with the same function across each network.

Best international practice is not to use a short code for such services, but to use an E.164 range, when available, which has not been the case up to now. From the regulatory perspective, revenue shared services should be on a PRS range, such as 90, where they are specific to a single termination number, and should be open to competition by number portability.

There is a further problem in the pipeline in that the supply of attractive short codes will exhaust in the medium term, and it will not be possible for new entrants to get a fair share, i.e. It will become a barrier to entry. This is already the case in South Africa and several other countries that failed to make PRS ranges available in time to meet market demands, the result being that operators used the only source remaining, i.e. Level 1.

BOCRA is considering how to avoid the problem in the future and sees one option as being to allocate separate blocks of numbers to each operator, within which they can self-allocate.

NUMBERING POLICY

There is still time to implement a robust solution in Botswana and the best example available to date for controlling short codes has been developed in the U K, which classifies codes as Type A, B and C. This is also used in South Africa, Lebanon, and other countries which have faced similar problems. This approach, which is illustrated in Table 10, also requires Premium Rate Services and other Revenue Share services to use E.164 numbers in ranges 9.

Table 10: Classification of short codes

Code Type	Use	Example
A	Nationally important services	112, Emergency
B	Access to other networks	1812, access to Second National Operator
C	On network, zero or low cost	Directory services

This concept is developed further in Part Two of the present report.

Emergency Service numbers

To avoid confusion to customers, especially at a time when they are distracted by an emergency, it is desirable that the emergency numbers should not only be the same on each network but should have the same response.

International best practice is to have uniform emergency numbers which produce the same response regardless of the network from which the call is made. The least confusing arrangement is probably that in use in the UK, where a call to either 112 or 999 is answered by a human operator who will forward the call to the appropriate emergency service. CRASA's harmonization guidelines[8] also recommend such an integrated service.

It is desirable to try to secure some improvements in the arrangements in Botswana and options have been explored with the operators and emergency services to see if a consensus can be reached on the way forward (see section 11.3 below).

3.9   Numbering administrations

International best practice is for the administration of numbers and network codes to be undertaken by an independent authority to ensure a level playing field for all operators. This is usually

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[8]http://www.crasa.org.bw/common_up/crasa-setup/10-03-2015_SADC%20%20POLICY%20%20GUIDELINES%20ON%20NUMBERING%20%20%20HARMINISATION%20%202003.pdf

undertaken by the Regulator, who has the ITU-T defined role of Administrator, though in the United States that role is undertaken by an industry funded body, NANPA, supervised by the Regulator.

In addition to Geographic and Mobile numbers, the Administrator should control the allocations of Non-Geographic numbers, short codes and network codes such as International and National Signalling Point Codes.

The Communications Regulatory Authority Act and associated Regulations give BOCRA responsibility for establishing and administering the Numbering Plan in Botswana.

BOCRA will now need to manage the numbering spectrum more pro-actively to fulfil its statutory duty to "maintain a non-discriminatory and efficient numbering system in order to provide fair access to [telecommunications] services"[9].

A major issue in controlling allocations to the enlarged pool of operators is the block size of the allocation. This is explored further in Part Two.

Other responsibilities of the Administrator should include:

- Maintenance of a public register of allocations and unused capacity;
- Open publication of this information, e.g. On the Internet, as is done in most European countries and, shortly, in South Africa;
- Publication of rules for allocation and withdrawal (often referred to as Numbering code of conduct);
- Number code husbandry; and;
- Consultation on the opening of new number ranges.

A natural consequence of this change in the complexity of BOCRA's numbering task is that it will no longer be possible to publish detailed down to block level in the Numbering Plan, which will therefore have to be simplified. The detail would be published separately, as happens in many countries, including South Africa and the U K.

As liberalization proceeds, it becomes necessary for an independent body to take over numbering administration at a more detailed level to ensure fairness between all operators. In addition to E.164 Geographic, Non-Geographic and Mobile numbers, it will also become necessary for BOCRA to allocate Carrier Selection codes from the short code, range and it is recommended that it should also

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[9] Section 38 of Communications Regulatory Authority Act

take over the administration of International Signalling Point Codes to facilitate the entry of new international carriers.

In the longer term, it is also desirable for BOCRA to assume responsibility for the administration of the other non-dialled codes listed in section 6 below, as is standard practice in South Africa and all European Union countries.

3.10   Legal issues

Section 2.9 describes the legal basis of BOCRA's powers to administer the numbering arrangements in Botswana and the regulations and licenses through which it exercises those powers. The following paragraphs discuss some of the legal issues arising from this analysis.

Enforcement powers

International practice is generally to impose criminal sanctions for contraventions of the law by non-licensees, for example for providing telecommunications services or operating radio equipment without a license. However, breaches of their obligations by licensees are usually dealt with by the Regulator issuing an enforcement Order requiring the breach to be remedied and in appropriate cases by the imposition of an administrative penalty by the Regulator.

Where a licence or other requirements of BOCRA is not being adhered to, the Act gives BOCRA power to revoke, suspend or impose further conditions on the licence. This would seem to have the same effect as an enforcement Order since the further conditions could include the appropriate remedial action.

Licence conditions

The effect of allocating number blocks within the licence is to reduce the Regulator's flexibility to manage the numbering spectrum in smaller blocks, as we expect to be necessary in future so that new entrants can be treated in a fair and non-discriminatory way.

This will be examined in Part Two to see the practicability of modifying the licences to deal with this issue and to achieve consistency among the three existing operators and with new licensees.
The licences of service providers include a power for BOCRA to impose a penalty for breach of a licence condition.

Numbering regulations and guidelines

As more operators and service providers become users of numbers, it will be necessary for BOCRA to adopt a more open and transparent approach and Part Two gives the hierarchy of generally

applicable regulations, licence obligations, guidelines and procedures which will achieve this within the legislative framework of the Act.

Other legal issues

Telecommunications numbers often give rise to questions about other legal matters such as ownership of numbers, privacy and the rights or obligations to publish directories (whether on paper or electronically). We also examine these, as well as the legal issues relating to Botswana's administration and management of its ccTLD, which are discussed in section 7 below.

3.11 Summary of conclusions

The following are the principal conclusions from the analysis in this section:

- Botswana has adequate capacity in its Numbering Plan for the next 10 to 20 years (section 3.1);
- In the longer term, it may be necessary to reduce the proportion of the numbering spectrum taken up by Geographic numbers to allow continued growth of other services (sections 3.1 and 3.3);
- implementation of the liberalized market will require new number ranges to cover Service Neutral and Carrier Selection issues and ISPs will want access to existing number ranges for VoIP services (section 3.2);
- to ensure there is a level playing field for all operators and service providers, BOCRA will need to manage the numbering spectrum at block or individual code level (section 3.2);
- BOCRA should consider the negative experience in other countries before further work is undertaken on the introduction of Personal Numbers (section 3.4);
- neither Mobile operator appears in need additional of additional numbering capacity for the foreseeable future (section 3.5);
- there is an adequate spectrum available in the Numbering Plan to accommodate corporate numbers and private networks, but the future of corporate numbers should be examined further (section 3.6);
- the case for continuing to use 0800, rather than 800, for Freephone services should be examined further (section 3.7);
- the future Premium Rate Services range should be 900, rather than 0900 (section 3.7);
- better arrangements for the management of short codes should be put in place (section 3.8);
- improvements should be sought in the way emergency numbers are used (section 3.8);
- BOCRA should take over the administration of International Signalling Point Codes (section 3.9);
- In the longer term, BOCRA should assume responsibility for administering the other non-dialled codes listed in section 6 (section 3.9);
- BOCRA should have a more effective enforcement powers over numbering (section 3.10);

- The possibility of harmonizing the numbering conditions in operators' licenses should be examined (section 3.10); and
- as further liberalization is introduced, BOCRA should adopt a more open and transparent approach to numbering administration, with a hierarchy of generally applicable regulations, license obligations, guidelines and procedures (section 3.10).

4 Regional agreements

4.1   Relevant agreements

BOCRA is a member of the Communications Regulators' Association of Southern Africa (CRASA), an organization for regulators in the SADC region.

Following a consultancy study in 2002 CRASA adopted guidelines on numbering so that individual countries and the region could benefit from developing national numbering plans in a co-ordinated and harmonized way.

It is therefore desirable that, in developing or modifying its Numbering Plan, Botswana should move towards compliance with the guidelines where this is feasible.

The guidelines envisage a Numbering Operational Group (NOG) and Numbering Support Office (NSO) to focus the region's numbering expertise and facilitate the harmonization process.

4.2 Conformance with agreements

A detailed analysis of the level of Botswana's current compliance with CRASA's guidelines is given in Appendix 7.

It appears that CRASA has not established the NSO as envisaged in the guidelines and therefore no reports are available on the extent to which the region has moved towards harmonization. It is clear, however, that individual countries are moving in that direction as the opportunity arises and it is therefore desirable that Botswana should continue to do so.

4.3 Conclusions

Botswana is compliant, with the exceptions being:

- The current use of 0800 rather than 800 for Freephone;

5 ITU procedures for allocation and management of telephone numbering resources

Botswana, as a member state of the International Telecommunications Union (ITU), is required to follow ITU-T recommendations, including those on numbering.

BOCRA is also responsible in Botswana for co-ordinating any work on standards relating to numbering and acting as an interface with the ITU on international numbering matters.

5.1 Relevant procedures

Relevant ITU-T recommendations are listed in Table 11.

Table 11: ITU-T recommendations on numbering

E.123	Standard notation for National and International telephone numbers
E.129	Presentation of National Numbering Plans
E.152	International Freephone Service
E.160	Definitions relating to national and international Numbering Plan
E.161	Arrangements of figures, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network
E.163	Numbering Plans for international telephone service
E.164	Numbering Plans for the ISDN era
E.165	Timetable for coordinated implementation of the full capacity of the Numbering Plan for the ISDN era
E.166	Numbering Plan for inter-working in the ISDN era
E.191	B- ISDN Addressing
E.195	ITU-T International numbering resource administration
E.212	International identification plan for Mobile Terminals and mobile users
Q.704	Signalling Network Functions and Messages
Q.705	Signalling Network Structure
Q.708	Numbering of International Signalling Point Codes
X.121	International Numbering Plan for Public Data Networks

X.400	Message handling services: Message handling system and service overview

The most important recommendations from the study is in the zone of E.164 and requires that:

- Numbers should consist of the Country Code + National Destination Code + Subscriber Number with a maximum length of 15 digits; and
- Where the country code is three digits, as in Botswana, the maximum number of digits to be examined for routing and billing is 7 (including the country code).

5.2 Conformance with procedures

Botswana's practices conform to the recommendations identified in the preceding paragraph in that:
- The maximum length for a number dialled internationally in Botswana is 11 digits; and
- The maximum number of digits to be examined for routing and billing is 7 for blocks down to 1,000 numbers.

As noted in section 3.9 above, in its role as Administrator for the purposes of ITU recommendations, BOCRA should also control network codes and National and International Signalling Point Codes and communicate all changes to service providers.

There are no other issues concerning compliance with ITU recommendations.

5.3 Conclusions

ITU recommendations are designed to ensure the interoperability of telecommunications networks so that any user can successfully call any other user wherever they are in the world.

As one would expect, Botswana complies with every essential element of the recommendations.

6 Telephone signalling system administration and other non-dialled codes

In addition to E.164 and the other codes dialled by subscribers, there are codes used for other purposes in telecommunications networks that are common across the industry and need to be made available on a fair basis to all eligible operators.

Some of these codes are required by the ITU-T to be controlled by the Administration, i.e. International Signalling Point Codes (ISPCs), National Signalling Point Codes (NSPCs), Mobile Network Codes (MNC) and Data Network Identification Codes (DNICs).

When Carrier Preselect and number portability are introduced, additional codes will be required to enable signalling between operators.

6.1   International Signalling Point Codes (ISPCs)

ISPCs are like NSPCs in that they identify the address of a switch, except that ISPCs identify switches which act as a gateway for international call traffic. A switch may have both an ISPC and a NSPC(s).

Table 12 shows the use of ISPCs in Botswana

Table 12: International Signalling Point Codes (ISPCs) used in Botswana

Node	Point Codes	Hex	ITU 3-8-3
BTC Tollops (GISC)	0-13120	3340	6-104-0
BTC FTISC	0-13121	3341	6-104-1
Telkom-JBZ	0-13170	3372	6-110-2
Telekom-JSZ	0-13171	3373	6-110-3
Cable & Wireless	0-4672	1240	2-072-0
BT (UK)	0-4644	1224	2-068-4
AT&T	0-6331	18BB	3-023-3
NTC (Namibia)	0-13072	3310	6-098-0
ZTC (Harare)	0-13060	3304	6-096-4
ZTC (Gweru)	0-13061	3305	6-096-5
FTJBD	0-3370	003341	
FTJSZ_STP	0-3373	003341	
FTJSD	0-3371	003341	
FTUSA	0-18A0	003341	
FTUSA_STP	0-18BB	003341	
FTLUS	0-32D2	003341	
FTHAR	0-3304	003341	
FTGWR	0-3305	003341	
FTNAM	0-3310	003341	

FTGBI	0-3340	003341	
FTUKB	0-123D	003341	
FTMTN1	0-336C	003341	
FTMTN_STP_1	0-337D	003341	
FTMTN_STP_2	0-3375	003341	
FTMTN2	0-336B	003341	
FTECON	0-3368	003341	
FTECON_STP	0-3369	003341	
Sprint_STP	0-6342	18C6	6-024-6
TolMTN	0-336B	003340	
TOLMTN_STP_1	0-3375	003340	
TOLMTN_STP_2	0-337D	003340	
USA	0-18A0	003340	
USA_STP	0-18BA	003340	
Spint	0—18BC	003340	
TATA	0-3F6B	003340	
TATA_STP	0-1858	003340	
Glasgow	0-123D	003340	
NEOTEL	0-3382	003340	
SA_JBD	0-3370	003340	
SA_JBD_STP	0-3372	003340	
SA_JSD	0-3371	003340	
FTINTLO	0-3341	003340	
Mascom (GASPX01)	0-13122	3342	6-104-1
Mascom (GAMBC01)	0-13127	3347	6-104-7
Mascom	0-13128		
Orange (OBO_IGW1)	0-13123	3343	6-104-3
Orange (OBO_IGW1)	0-13124	3344	6-104-4

The above table lists 6 ISPCs in use in the Botswana range of 6-104 and a further forty (40), which are ISPCs of international carriers in other countries, e.g. 2-068-4 is a switch at BT in the UK.

ISPCs are allocated as single codes from ranges issued in Botswana by the ITU-T. Generally, one ISPC is allocated per switch (although there may be occasions when more than one code is allocated).

International practice varies between the national Administrator allocating ISPCs. However, best practice is for the ISPC interface with ITU-T to be handled by the Administration, i.e. BOCRA. This is the case in South Africa, where the task is handled by its Regulator, ICASA.

The ITU-T issues one ISPC range at a time, and only when current capacity has reached around 75% utilization.

6.2 National Signalling Point Codes (NSPCs)

NSPCs are used to identify the addresses of switches which act as the point of interconnection between operators. They are non-dialable by customers.

There are 108 national signalling point codes covering BTC switches, 108 NSPC's to Mascom and 124 mobile NSP allocated to Orange

International practice varies between the national Administrator issuing NSPCs. However, best practice is for the NSPC allocations to be handled by an independent body, i.e. BOCRA.
Generally, one NSPC is allocated per switch (although there may be occasions when more than one code is allocated), e.g. In the UK they are allocated as single codes from the range 12288-16383.

NSPCs are effectively almost an infinite resource. There should therefore be no difficulty in meeting demand as each new operator, including VoIP services, requires one or more NSPCs.

6.3 Mobile Network Codes (MNCs)

MNCs are one of three fields that make up the International Mobile Subscriber Identity (IMSI) – the other parts being the Mobile Country Code (MCC) and the Mobile Subscriber Identification Number (MSIN).

IMSIs are codes (up to 15 decimal digits) used within networks to identify a unique mobile terminal or mobile subscriber internationally. The MNC part (which is usually 2 decimal digits), in combination with the MCC (3 digits), uniquely identifies the home network of the mobile terminal or mobile user. The two MCC+MNC combinations in use in Botswana are 652-01 for Mascom 652-02 for Orange and 652-03 for BTC. These are listed in the published Numbering Plan.

6.4   Data Network Identification Codes (DNICs)

Data Network Identification Codes (DNICs) are used by operators to signal to X.121 packet-switched data services. DNICs are made up of 4 digits in the format 'ABC D'. The ABC part is known as the Data Country Code (DCC). Where a DCC has been issued, the ITU-T normally expects DNICs to be managed by the Administrator, i.e. BOCRA in Botswana. ITU-T does not list an active DNIC in Botswana, though an Internet search suggests that a DCC of 652 may be active with a DNIC of 652 0.

6.5   Number Portability Prefix Codes (NPPCs)

NPPCs are allocated for the purposes of providing number portability between operators in order that customers can keep their numbers when changing operators. They are used within the network and are non-dialable by the customer. Mobile networks will require Mobile Network Portability Prefix Codes (MNPPCs).

No NPPCs or MNPPCs are currently in service in Botswana as number portability has not been implemented to date.

6.6   Carrier Pré-Sélection Codes (CPS)

CPS codes are used by operators to offer a service whereby a customer can pre-arrange with their operator to have specific calls routed via another operator's network to get cheaper calls.

CPS codes provide a similar service to Indirect Access codes (used where a customer dials a code on a call-by-call basis), except that the CPS code is not dialled by the customer but set up within the operator's network.

6.7   Telex Numbering

Telex continues to be used in Botswana but only on a very limited basis. BTC switched off its exchange in 1999, and remaining Telex facilities are understood to be handled by BT. As there are no competition issues, it is not proposed to research this further.

6.8   Conclusions

There are no problems with these codes at present and none is foreseen. However, as noted in section 3.9 above, BOCRA should take over their administration.

7 Administration and management of the country code Top Level Domain (ccTLD)

A ccTLD is the two-letter domain name that appears at the extreme right of an Internet domain name to identify a country. Thus, ". bw" is the ccTLD representing Botswana in "www.BOCRA.org.bw". Each country has such a unique two-letter ccTLD. This section discusses the arrangements for administering and managing Botswana's ccTLD.

7.1 Current Arrangements

The Botswana Communications Regulatory Authority has been mandated by the government of Botswana to manage and operate the .bw ccTLD. This was followed by the formation of a Technical Advisory Committee made up of the 'Local Internet Community'. This public-private partnership was the initial step in facilitating the redelegation of the ccTLD from Botswana Telecommunications Corporation and the University of Botswana to BOCRA.

Since ccTLDs are a national resource, BOCRA's mandate as per Section 38 of the Act is to manage .bw in a manner, which serves public and industrial interests. BOCRA being the communications regulator, and having full government support, will be able to push Botswana forward in the global Internet community.

BOCRA's role is to, among others:

- Act as a trustee for the.bw country-code-top-level-domain;
- Become the.bw domain administrative contact as well as technical contact
- Administer the .bw ccTLD and its Second Level Domains;
- Maintain and promote the operational stability and utility of the .bw ccTLD;
- Ensure a cost-effective administration of the .bw ccTLD and its sub-domains;
- Provide name service for all .bw and ensure that the database is secure and stable;

. bw Name structure

The structure of a domain name within the.bw DNS has three levels. Each complete name must be unique and comprise all three levels, each separated by a period (.) i.e. Name. Domain. bw.

Table 13 shows the structure of .bw

Table 13 structure of .bw

bw	Country	Fixed as .bw for all domains delegated to, and managed by, the Registry
Domain	Second	Specifies a "community of interest" as defined in .bw policy
Name	Third	Names listed on behalf of users, must be consistent with .bw policy
Sub-Domain	Fourth and subsequent	Responsibility of the registrant of the third level name.

The .bw registration has the different registration categories as shown in Table 14. The most used category being co.bw for companies

Table 14 categories of bw registration

Bw	Registrations at the level have been stopped, All entities who are currently registered under this level will be given a 3 year grace period to migrate to any other level.
co.bw	For commercial entities
Org. bw	For non-profit organizations
ac.bw	For academic institutions

Net. Bw	Same as co.bw and Gov. bw
gov.bw	For government institutions

Registrars

. bw ccTLD is open to both local and international registrars. Currently there are 45 local registrars and 10 International registrars.

Administrative Policies

To maintain a stable and well-coordinated name space the .bw ccTLD has some legal, administrative policies which are used on a day to day operations. The legal policies are as follows:

Registrar Accreditation Policy

This document is an agreement between BOCRA and any new Registrar that needs to be accredited to the.bw Registry.

WHOIS Policy

The Whois service will provide public access to the information in the.bw domain name register. The Whois Policy stipulates how the Whois service is to be used by the public to mitigate against abuse.

Registration Agreement Policy

This agreement binds the registrant to ccTLD policy and the complaint resolution service.

Domain Life Cycle Policy

This document sets out policy on the registration, renewal, transfer, expiry and deletion of domain names in .bw zones.

Acceptable Use Policy

The Acceptable Use Policy ("AUP") sets out the actions prohibited to users of the Botswana Communications Regulatory Authority's.bw Registry.

Privacy Policy

The Privacy Policy seeks to protect registrant data within the.bw registry.

8. Summary of conclusions

Conclusions from the review of the current Numbering Plan and its administration are summarized below. They have been considered in developing the numbering policy discussed in Part Two below.

International best practice on telephone numbering and number administration (Section 3)

- Botswana has adequate capacity in its Numbering Plan for the next 10-20 years;
- In the longer term, it will be necessary to reduce the proportion of the numbering spectrum taken up by Geographic numbers to allow continued growth of other services;
- implementation of the new BOCRA mandate will require new number ranges to cover Service Neutral, Carrier Selection issues, Number Portability and new ISPs will want access to existing number ranges for VoIP services;
- to ensure there is a level playing field for all operators and service providers, BOCRA will need to manage the numbering spectrum at block or individual code level;
- BOCRA should consider the negative experience in other countries before further work is undertaken on the introduction of Personal Numbers;
- there is an adequate spectrum available in the Numbering Plan to accommodate corporate numbers and private networks, but the future of corporate numbers should be examined further;
- the use of 0800, rather than 800, for Freephone services should continue and 800 to be reserved for future expansion of Mobile and M2M communication;
- proposed ranges for M2M numbers will be discussed further in section 12
  access to number ranges such as Freephone should be opened to all operators;
- the future Premium Rate Services range should be 90, and the rest of 91-98 should be reserved for future use;
- BOCRA should administer short codes and ensure that Operators comply with their use;
- improvements should be sought in the way emergency numbers are used;
- BOCRA should administration National and International Signalling Point Codes more effectively;
- in the longer term, BOCRA should assume responsibility for administering the other non-dialled codes listed in section 6;

- BOCRA resume a more effective enforcement powers over numbering as mandated by the Act;
- the harmonization of the numbering conditions of operators' licences should be done; and
- as further liberalization is introduced, BOCRA should adopt a more open and transparent approach to numbering administration, with a hierarchy of generally applicable regulations, licence obligations, guidelines and procedures.
- BOCRA to open 114-116 to use for emergency services and harmonize 116 within the SADC region for Child help line.

Regional agreements (Section 4)

Botswana's numbering arrangements are generally in conformance with CRASA's guidelineswith a few exceptions that need consideration.

ITU procedures for allocation and management of telephone numbering resources (Section 5)

Botswana complies with every essential element of ITU recommendations.

Telephone signalling system administration and other non-dialled codes (Section 6)

There are no problems with the administration of telephone signalling system or other non-dialled codes.

Administration and management of the country code Top Level Domain (Section 7)

BOCRA as the administrator of the .bw ccTLD falls within international practice

Part Two – Future Telephone Numbering Policy

9   Introduction to Part Two

Part Two of the report presents a numbering policy to address the issues identified in the review of the current numbering plan and its administration, as summarized in section 8 above. In reviewing the policy, BOCRA has consulted extensively with network operators.

This part of our report consists of 13 sections, which include a discussion of future numbering policy (section 10), proposals for a revised numbering plan (section 11 and Appendix 9) and arrangements for administering the plan (section 12 and Appendix 10).   Remaining sections cover the related issues, including administration of Botswana's country code Top Level Domain (ccTLD) (section 20).

10   Future numbering policy

10.1   Introduction

The inputs to the development of the Numbering Policy are:

- The results of the review of the current arrangements as discussed in Part One of this report, including an assessment of BOCRA's new mandate as informed by the CRA Act and National Broadband Strategy (NBS).

In reviewing the Numbering Policy, BOCRA has considered principles which are based on international best practice. Full account has also been taken of international agreements and ITU-T requirements to which Botswana is a signatory.

10.2   Principles

International experience shows that a good national numbering policy is one which:
- ensures adequate provision for future growth in telecommunications usage due to further liberalization;
- promotes fair competition between all entrants to a liberalized market;
- meets the needs of telecommunications users in terms of simplicity of use and the information conveyed by a number (for example the cost of calling the number);
- facilitates the introduction of new services and new technologies;
- avoids unnecessary costs for operators, and hence higher charges to users; and
- Is compatible with international obligations and recommendations.

These are the underlying principles we have adopted in developing a Numbering Policy in Botswana and it is recommended that BOCRA follows them in any future development of the Policy.

Numbering Policy is underwritten by the publication of an agreed Numbering Plan and associated code of conduct. The proposed Numbering Plan is based on the principles listed above. To achieve this, the Plan incorporates the following characteristics:

a) designation of sufficient capacity to meet the growth of telephone services, considering the characteristics of available technologies, the geographic distribution of demand and the prospect of increasing telephone density, particularly in the under-served rural areas and among the business communities;

b) designation of numbering capacity for the future introduction of services which may be new to Botswana but are proven to be commercially successful in other countries;

c) spare capacity in the form of codes and number ranges that are not associated with any known services and therefore potentially suitable for unforeseen expansion or the introduction of brand new services;

d) significance in the first few digits of national numbers to enable callers to recognize service characteristics and call charges, and for network operators to be able to route calls efficiently;

e) a neutral position in the allocation of numbering capacity, to support fair competition where multiple operators are competing to provide service to existing and new customers;

f) independent identification and association of codes and numbers–blocks with geographic areas and non-geographic services, so that the Numbering Plan is not locked into any structure that network operators use to provide services, nor to the names of the exchanges; and

g) suitability for independent administration, including the application and allocation procedures and provision of information on the status of all codes and blocks of numbers.

10.3   Recommendations to facilitate competition and the provision of rural services

The following numbering allocation steps are recommended to facilitate competition and the provision of rural services by new entrants with service neutral rural/district level licences. Carrier Selection should be introduced as soon as possible to enable the new Service Neutral licensees to be accessed from existing networks;

All numbering ranges, Geographic and Non-Geographic should be open to all operators with Service Neutral or VoIP licences.

A new range 800 to be open to all operators for future mobile expansion

Further Number Translation Services should follow in ranges 9;

Level 1 Short Codes should be made available to all eligible operators, with new rules to ensure a level playing field.

These recommendations are incorporated in the proposed new Numbering Plan, which is discussed in the following section. The implementation of Carrier Selection is considered more fully in section 8.

As noted above, it will be important to maintain a level playing field with existing operators in allocating numbers to new Service Neutral licensees, including those offering mobile or wireless local loop services in rural areas. For mobile services, any range in level 7 that has not already been allocated is available for this purpose. Wireless local loop operators should be allocated unused blocks of geographic numbers in the same ranges already in use by BTC, i.e. 20 – 69, according to the zone in which they are operating. Recommendations on the size of block to be allocated are included in section 12.1 below.

In the event of a range becoming exhausted, there is adequate capacity in other ranges that can be opened without technical penalty. Such new capacity should be available to all operators, including new providers of geographic services. In the case of Gaborone area, range 5 (currently used in the southeast region) would appear to be the most suitable choice for expansion.

11 A revised Numbering Plan

11.1 The proposed Plan

The Numbering Plan is at Appendix 9 and Numbering code of conduct at Appendix 10.

The proposed Plan builds on the existing Plan and takes account of the principles and requirements discussed in the previous section. Table 15 summarizess the principal issues and the solutions adopted in the Plan.

Table 15: Summary of principal issues

NUMBERING POLICY

Issue	Problem	Recommended solutions	Process and timescale
• Geographic numbers currently take up nearly half of the Numbering Spectrum • No short or medium term shortage of numbers	• Geo numbers are 7 digits • Ranges 2-6 used for Geo	Make Geographic fixed line Numbers 1 digit longer, i.e. Migrate behind a common digit [Options for migration are analyzed in Appendix 3]	No immediate shortage Undertake a Flash Change[10] when additional capacity is required.
• 0800 is not consistent with a Closed Plan • 0800 is mostly used by BTC • 0800 is available to other operators	• The number is longer than necessary	• Open 800 for future mobile expansion • Introduce other Network Translated Services in range 9	Keep checking on utilization for 12 months
Proposed 900 is consistent with a Closed Plan	• The number is longer than necessary • The range 09 is designated for PRS.	Designate 90 for PRS	900 numbers are not in service.
Short Code Clashes	Uncoordinated use by mobile operators	Use Type A, B and C classification system	Implemented
Emergency Codes, proliferation of numbers	Inconsistent results across networks cause customer confusion.	• Recommend harmonized scheme • Single number?	112 available on all networks. Use Government emergency centre when established.

The following paragraphs discuss some of these in more detail.

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[10] A Flash Change can be undertaken where it is not wished to dedicate a digit to migration of existing numbers, the downside being that opportunities for parallel running during the change are limited. It has been used in recent years with good results, e.g. in the UK.

11.2 Non-Geographic Services

Number Translated Service (NTS) numbers

A Number Translated Service (NTS) number is Non-Geographic, and is translated via a lookup table or an Intelligent Network database to a Network Termination Point, either on a fixed or a mobile network. Such numbers could also terminate on a VoIP gateway.

BTC is currently the only operator using the Number Translated Services in Botswana. In other countries, including South Africa, NTS ranges are extensively used, generating considerable traffic, being open to all callers.

The 0800 service is open to all operators; It is recommended that other products, known to be successful in other countries can be trialled, including an NTS number open to all operators in which calls to a fixed, mobile, or VoIP gateway can be called at a tariff not exceeding National rate.

In addition to opening the codes 800 for future mobile expansion, there is ample evidence, from other countries, for the introduction of other non-geographic ranges.

Some examples of NTS numbers used in other countries are shown in Table 17

Table 17: NTS services in other countries

Country	Code	Use as an NTS
S Africa	0862	Local rate
S Africa	087X	Value added services
UK	0845	Local rate
UK	0870	National rate
UK	0844	Internet dial-up, revenue share
Spain	800	Freephone

These codes are used in preference to Short Codes as, being in the E.164 domain, they are open to the whole market, and open to competition. The market for calls made in NTS ranges in these countries can, in certain cases, be larger than for calls made to Geographic numbers.

BTC has established a National tariff and abandon the local-long distance divide; this indicates that a local rate NTS range may not be required in Botswana.

However, there is a role for a lower than National rate NTS range of Internet dial-up to replace Virtual Point of Presence (VPOP) services. This requires the establishment of competitive tariff arrangements, to allow revenue sharing to return revenue to the ISP recipient of the call

Tariff for NTS Services in range 9

The issue of capping NTS often proves contentious, due to operator hostility to regulatory intervention.

The rationale for capping is complex, as experience elsewhere is that when a cap is set operators may regard this as a target for value added services, e.g. In the UK the cap of £0.1 per minute (currently 12 Pulal/minute) in the Special Services ranges 08 tends to be used as a profit share range, to bypass rules on Premium Rate Services in level 09. In contrast, the South Africa regulator has set a cap of National Rate; this has the disadvantage that National Rate tends to fall in a competitive market, whereas the NTS range tends to stay at the original tariff.

It is recommended that BOCRA, working with the industry, should determine the most appropriate sub-structure for new price points between Freephone and national rate. Although the 'meaning' of the numbers is more likely to come from terminating operator branding, it is important that tariff visibility be maintained.

Initially, it will be necessary to establish an NTS formula which channels, services in a limited range of retail price points.

In the longer term, however, NTS services would no longer be confined to certain prices. An operator selling an NTS service would set its own termination charge (the charge the originating operator pays to terminate the call). The originating operator will add to that its own retention, to cover the costs of originating the call and billing the customer. The sum of these two charges will produce the retail price.

BTC's originating retention would remain regulated using the same principles that apply under the existing NTS formula. Other non-dominant originating operators would set their own retention and their retail prices for calls would be agreed with the various terminating operators. Terminating operators wishing to compete aggressively would be able to reduce their termination charge to produce a lower retail price. Those wishing to offer special services can charge more. Any change in the termination charge would feed straight through to retail prices.

This new flexibility would allow operators to offer services at various prices above or below the current local call rate.

A possible approach BOCRA might take is to start with a cap for range 9 of National Rate and, once the market is competitive, to drop the cap in favour of tariff registration. This, in effect, is what is happening in the UK, though the £0.1 cap remains.

The allocation process would be that BOCRA administers the ranges and all codes would be open to any operator with a relevant licence numbering condition.

A suggested starting plan for allocating codes in the range 9 is shown in Table 18.

Table 18: Suggested arrangement of codes in range 9

Code	Service	Comment
900	PRS	Future PRS. Currently not used
920	Freephone	Free (to fixed line access)
94X	Low-call, revenue share	A future service, charged at local rate, typical use is internet dial-up
950	Shared Cost	Caller pays 50%, called party 50%
960	National rate	
97X	Relocated short codes	Capped to National rate, 8-digits
98X	Relocated short codes	Capped to National rate, 5-digits

Charges for Freephone calls

Charging for Freephone calls from a mobile phone is a complex and potentially difficult issue. International practice is frequently for calls made from a mobile phone to Freephone numbers to be charged, unless the call terminates on the mobile operator's own network. This practice runs the risk that the user of a mobile phone thinking the call is free when in fact it is charged for.

When a call is made to a fixed line Freephone subscriber, the charge is often based on the costs incurred by the mobile operator of transporting the call over its mobile network before handover to the fixed line operator (whose costs are met as usual from the charge paid by the called Freephone party). If the caller has an inclusive minute's package, this call is commonly included in this arrangement, and hence, potentially free if there are unused minutes.

This issue is likely to arise in Botswana when, as we recommend, Freephone numbers are open to calls from mobile networks. While mobile users may have to face a charge, they will have the benefit

of being able to call services that were not previously available to them and, of course, those organizations seeking to make their services readily available through Freephone numbers will benefit from the additional potential customers yeilding significant benefits in Botswana since mobile users greatly outnumber fixed line users. Since the costs incurred in carrying a call across all networks are likely to be higher when a call originates from a mobile user, it would not be appropriate for BOCRA to prohibit such charges. However, it is important that users are aware that they will be charged and BOCRA should insist that mobile operators publish this fact when such charges are introduced. A statement about the charges is included in the draft Users' Guide at Appendix 12.

The question of charging will become more complex if mobile operators themselves introduce Freephone numbers since these will be capable of being called from other networks, by both fixed and mobile users. There are many ways of addressing these issues, if they arise.

Tariff for NTS Services in range 9

The range 9 is proposed for Premium Rate Services (PRS). On the assumption that the tariff is above National Rate, there is immediate scope for its introduction, as the principle of Revenue Share can be accommodated. In the longer term, a move to terminating operators setting their own rates will allow certain PRS services to be priced at lower rates.

The allocation process would be that BOCRA administers the ranges and all codes are open to any operator with a relevant licence numbering condition.

As suggested starting plan for range 9 is set out in Table 19

Table 19: Suggested arrangement of codes in range 9

Code	Service	Comment
900 – 909	PRS	Three operators allocated 100,000 thousand numbers, 8-digits
910-919	PRS	5-digits
93X	Future use	free, 8-digits

Corporate Numbering

The concept of corporate numbering ranges emerged in the 1990s in various countries, especially the UK. However, though the UK regulator undertook a series of consultations, there has been little consensus that such a service is needed. The issues that have inhibited the take-up of these services include:

- Reluctance of network operators to offer attractive tariffs;

NUMBERING POLICY

- The emergence of other numbering products, especially Number Translation Services, which present a Non-Geographic interface to the consumer;
- The need to be able to issue individual numbers to organizations, which is not feasible until New Generation Networks are in place; and
- The possibility in the future of new types of numbering, which can be substituted for an E.164 range.

Specific numbering ranges are not made available for corporate use in Botswana and none is set aside in the current Plan. There would appear, however, to be an adequate numbering spectrum available to accommodate corporate and private networks in the proposed Numbering Plan, should this be required in the future.

Discussions with stakeholders did not reveal any interest in the introduction of a specific range of corporate numbering in Botswana.

11.3   Emergency numbers

Background

There are several short code numbers in use by the operators for calling Emergency Services as shown in Table 20.

Table 20: Emergency numbers in use by each operator

Code	BTC	Mascom	Orange
112	Not used	Emergency	Emergency
911	MedRescue	MedRescue	MedRescue
997	Ambulance	Ambulance	Ambulance
998	Fire	Fire	Fire
999	Police (Automatic routing to local police officer)	Police (Automatic routing to local police officer)	Police (Automatic routing to local police officer)

To avoid confusion to customers, especially at a time when they are distracted by an emergency, it is desirable that the emergency numbers should not only be the same on each network but should have the same response.

International best practice is to have uniform emergency numbers which produce the same response regardless of the network from which the call is made. The least confusing arrangement is probably that in use in the UK, where a call to either 112 or 999 is answered by a human operator who will forward the call to the appropriate emergency service. The harmonization guidelines of the Communications Regulators' Association of Southern Africa also recommend such an integrated service.

Various options for improving the situation have been discussed with stakeholders with a view to seeking a consensus on the way forward. These are explored in the following paragraphs.

What numbers should be used?

The numbers 997, 998, and 999 have traditionally been used for calls to the Ambulance, Fire and Police services respectively. These numbers are in use on all networks and produce the same response on all networks. With the advent of cellular services, 112 has been introduced as this is a requirement of the GSM MoU which is being adopted throughout most of the world for mobile networks. The intention is that 112 should provide an integrated service, i.e. It should provide access to all the Emergency Services.

If BOCRA accepts the principle that the same numbers should be used on all networks and should produce the same response, there appear to be three basic options for the future:

A.   Retain 997, 998 and 999 as at present and make 112 an integrated service on all networks;

B.   Phase out 997, 998 and 999 and make 112 the only emergency number; and

C.   Promote 112 as the single emergency number, retaining 997, 998 and 999 indefinitely, but having them routed to the same point as 112 (i.e. An integrated service would be provided on all numbers but only one of them would be advertised).

Option A has the advantage of retaining what people are familiar with, but it is not giving a clear message to the public in that they will not be sure which is the best number to call, e.g. If your house is on fire is it better to dial 112 or 998? Also, in the stressful time of an emergency a person may not remember whether the Fire service is 997 or 998.

Option B does not have the potential to cause the confusion identified in the previous paragraph since it gives a clear unambiguous message: dial 112 in any emergency. But for those who may not have received that message, it has the disadvantage that if they dial 998 they will not get connected to the Fire Service. Any phasing out of 997, 998 and 999 should therefore be over a long

timescale. This option also has the slight disadvantage that any additional costs involved in maintaining the automatic routing to the separate services will continue to be incurred prior to the numbers being phased out.

Option C does not suffer any of the disadvantages identified for the other options. It gives a clear and unambiguous message to users, but continues to connect any callers who may not have received the message. The only disadvantage is that it uses four numbers where, arguably, only one is needed. In fact, the effect of continuing to reserve 997 to 999 for this purpose prevents the whole of the ranges 997 xxxxx to 999 xxxxx being used for other purposes, a total of 300,000 numbers. A judgement therefore must be made as to whether these numbers are likely to be needed in the long term for other purposes.

Based on this analysis Option C appears to have considerable merit and this view is supported by stakeholders. If there is concern that it unnecessarily sterilizes 300,000 numbers, a solution would be to monitor the number of calls to 997, 998 or 999 in about 5 years' time and if no calls are made over a 12-month period then the numbers could be withdrawn. Such a test could be repeated in a further 5 years if there were still calls.

What service should be provided when the numbers are called?

An integrated service has considerable advantages. Because people do not have to remember more than one number, there is less possibility of their dialling the wrong number. Also, it is a requirement of the GSM standard that such a service is provided on 112 and, because this is being widely adopted around the world, Botswana will increasingly receive a familiar service when they are abroad. Visitors to Botswana will similarly receive a service they are familiar with. Legislation in South Africa, mandates 112 as the sole emergency number for the future.

The conclusion is therefore that an integrated service is preferable to separate numbers for Ambulance, Fire and Police and this is supported by stakeholders.

A secondary question is who should provide the call centre that handles the calls to an integrated service and routes them on to the required Emergency Service. At present the obligation would fall on each operator and it would be for them to decide whether to provide the service through their own employees, to outsource it to a commercial call center or, possibly, to come to arrangements under which they will provide a common facility shared between them.

An alternative approach would be for a Government agency to establish a national emergency call centre, which it would set-off. We understand that the Botswana Police Service is studying the feasibility of establishing such an emergency coordination centre. If this is implemented, and suitable

arrangements made with the Ambulance and Fire services, we believe it would be the best arrangement since it would strengthen the customer perception that the same service is achieved whichever network or number is used for the call.

Who should pay?

The licences of the network operators require them to provide calls to the Emergency Services which are free of charge to the user. We see no reason to propose changes to such an arrangement. It imposes an equal burden on all operators and does not, therefore, distort competition.

If a national coordination centre is set up, the question may arise of how that should be financed. If the network operators were required to finance it, either partially or fully, they would expect to recover the costs through the tariffs charged for normal (i.e. non-emergency) telephone calls. This would effectively be a tax on telephone subscribers.

However, one can regard the provision of the call centre as a public service which is available to all citizens, not just those who are telephone subscribers, since in an emergency someone will make the emergency call regardless of whether the affected person has a phone of their own. Thus, it would be more equitably if the costs are borne by the public through taxation rather than by telephone subscribers.

Our conclusion is therefore that telephone subscribers should not bear the costs of providing a national emergency control centre if one is established.

Commercial emergency services

Currently, all operators provide calls to MedRescue on the short code 911. Calls to 911 are required by the operators' licences to be free of charge to the user. This raises several questions about the use of numbering resources for commercial services and who should pay for the costs involved.

MedRescue is a service provided by MRI Botswana Ltd (MRI), a company. Listed on the Botswana Stock Exchange. MedRescue's services are generally available only to those who choose to subscribe to them and it would therefore be inappropriate for the costs associated with its operations to be borne by telephone users in general. Thus, while calls to 911 are free to the user, there should be commercial arrangements between the network operators and MRI which ensure that the costs are met by MRI.

Currently, the licence of the network operators defines the emergency organizations to which calls can be made free of charge as including medical and veterinary services "whether such emergency organizations are owned and managed on a private or public basis". It is a matter of public policy for Botswana whether it is appropriate to continue to provide this facility for private medical and veterinary services. However, if such facilities are provided, they should be paid for by the private organizations. We found strong support among stakeholders for private services to continue to be free of charge to the caller.

It is also a matter of public policy, whether these private organizations have such importance in Botswana that they should be allocated short codes in the 9xx range by BOCRA or whether they should be treated for numbering purposes in the same way as other commercial organizations. In South Africa, such a service has been allocated a Freephone number in the 08xx range. We recommend that the same policy should be adopted by BOCRA, particularly as it will avoid confusion with 9XX PRS services when they are introduced. No provision has been made in the proposed Numbering Plan for the continued use of 9XX for Emergency Services.

12. Administration of number allocations

12.1 Numbering Code of Conduct

International practice in a multi-operator environment is for operators to share numbering ranges to ensure a level playing field. This requires numbering administration to be undertaken by the regulator at a more detailed level than is currently the case in Botswana.

The current practice is for BOCRA to allocate number blocks at the 10,000 level to Mobile operators and 1000 block level for geographic numbers.

The need for BOCRA to take over more detailed management of the number blocks was explained to stakeholders; this is also recommended by the ITU-T for a competitive environment. Little comment was received from operators, though both Mobile operators commented that the current situation of self-allocation in level 1 codes needed addressing to avoid anarchy. Mascom expressed concern that the timescales of having to apply for every new code or number range could cause operational problems. BOCRA believes this should be manageable as Mobile operators already have the constraint of needing approval of the tariff for each code used.

Operators were referred to the recommended code of conduct which would specify that BOCRA would approve applications in straightforward cases in 21 working days. Mascom would like to see BOCRA accept a Service Level Agreement (SLA) in which turnaround times are specified.

The recommendations are incorporated in the proposed Numbering Code of Conduct at Appendix 2.

In allocating blocks and numbers in accordance with the procedure in the code of conduct, we recommend the following practices.

Mobile numbers should be allocated in 10,000 blocks to the Mobile operators when a new range is open. This will conserve capacity and avoid potentially anti-competitive effects of Branding.

Smaller Players with a Service Neutral licence should get number blocks of 1,000 capacities in Mobile ranges to conserve capacity.

Geographic numbers should be allocated, where possible, in blocks of 1000 numbers to conserve capacity.

Non-geographic ranges, e.g. 800 should be allocated in blocks of 1000 numbers to conserve capacity.
The Short Code ranges should be administered centrally (see below)

12.2   Conserving capacity

Under-used numbering space

It is recommended that any numbering block not currently in use by BTC is under the control of BOCRA and available for allocation in accordance with the Numbering Plan and code of conduct. Some blocks of 10,000 geographic numbers that are in use have quite low utilization at present, but it would not be desirable to reclaim the unused parts of these blocks as this would require the introduction of "number pooling" arrangements based on a lower block size of 1,000 numbers. Number pooling would introduce significant administrative and technical overheads and should only be contemplated in cases of exceptional need (as is happening in the UK and US, and will be in future in South Africa).

In order to identify any capacity constraints or unused allocations and take timely action to deal with them, it is good practice for a Regulator to conduct an initial audit on taking over responsibility for

administering a Numbering Plan and to repeat this periodically, annually where there are capacity concerns and otherwise every three years.

The assessment is that Botswana's Numbering Plan has adequate capacity for growth and the introduction of new services for the foreseeable future. If additional capacity is eventually required, geographic numbers can then be migrated to eight digit numbers with a single leading digit to release some 40 million numbers for future services. This is discussed in more detail in section 10.3 and Appendix 11.

Sterilization and re-use of numbers

While the proposed Code of conduct includes provision for BOCRA to withdraw numbers allocated to an operator in specified circumstances, it is also good practice for operators to recycle numbers to conserve capacity. However, the need to conserve capacity should be balanced against customers' desire not to be troubled by calls intended for the previous use of a number. So that this balance can be appropriately drawn by operators in different circumstances, for example, according to the likelihood of a number allocation being exhausted or of a particular number continuing to receive calls for a previous user, it is recommended that BOCRA should avoid laying down rigid rules.

Existing operators usually have in-house procedures, but it is common for new entrants seek advice from the Regulator. To assist in defining appropriate sterilization times, BOCRA has developed a Code of Practice in consultation with operators in 2017.

12.3   Charging for numbers

The current operators' licences, refer to the option of charges being levied by BOCRA for allocations of numbering capacity, no charges are currently levied.

International practice varies from, at one end of the spectrum, charging a commercial rate that reflects the perceived value of numbers through to the basic recovery of costs. In the European Union, for example, regulators can introduce cost recovery charging but are discouraged from charging above cost, unless there is a need to conserve numbers.

While there could be some merit in charging a small fee to incentivize operators not to apply unnecessarily for number allocations, it is recommended that, given the additional administrative burden (for operators and BOCRA) and the absence of any shortage of numbers for the foreseeable future, BOCRA should not introduce charging. Consultation was made with the Operators on

possible charging of numbers in 2017, the result of which it was agreed that there should be a Code of Conduct on the use of numbers in order to manage them efficiently. This position can be reviewed if capacity problems emerge or periodic audits suggest that operators are hoarding numbers.

12.4   Management of short codes

Future Use of Short Codes

Experience in other countries is that the level 1 Short Code domain is not the best resource for the development of new products, as it can quickly get congested. Also ranges 8 and 9 are open to competition, can be called from all networks, and are open to Number Portability. The proposed structure of Short Codes into Types A, B and C as shown in Table 21

Table 21: Types of Short Code

Code Type	Use	Example
A	Nationally important services	112, Emergency
B	Access to other networks	Carrier Select (CS) using a code such as 1612
C	On network, zero or low cost	Directory services

Apart from these types the underlying approach in restructuring Short Codes is that, as far as possible, other services justifying shorter numbers should be in ranges 9, where they are open to the whole market and to competition via Number Portability.

The proposed Numbering Plan includes proposals for the ranges in level 1 that should be used for the different types of short codes and for the codes used for carrier selection.

Unstructured Supplementary Service Data Codes (USSDs).

BOCRA keeps a register of all USSDs as there is need to register the tariffs used as well as ensure that there are no clashes in the use of this code.

12.5   Management of M2M Communication

Machine to Machine (M2M) refers to technologies that allow both wireless and wired systems to communicate with other devices of similar ability. Apart from M2M, other terms are also being used
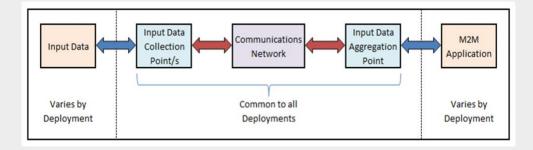
to describe such communication such as Internet of Things (IoT), Internet of Everything, Embedded Wireless, Smart systems etc.

The continued improvement in the infrastructural environment around M2M has led to a rapid growth of applications and services that meet users' business and lifestyle needs. M2M communications are already deployed in several countries such as Belgium (2012), Denmark (2009), Netherlands (2011), Norway (2009), Spain (2012), Sweden (2011), France, Canada, USA, UK, Newzealand, China and Ireland just to mention a few. These deployments are based on existing numbering/addressing resources. It is essential that a more targeted long term numbering resource designed specifically for M2M purposes should be made available to satisfy the demand for numbers arising from the emerging M2M services.

The basic building block of the Internet of Things is M2M communication in which devices communicate directly with one another with minimal or no human intervention. Different networking technologies are used to connect M2M devices, depending on the amount of mobility needed, quality required , data rate, Duty Cycle and the degree of dispersion of devices over an area. Mobile wireless is a technology suited for many applications, whilst fixed-line communications are also suited in cases where mobility is not essential and where physical access between devices is not a problem.

Applications deployed using M2M have so far been relatively specialized in nature, though this may change as the market and services evolve, with parties considering M2M as a potential source of new revenue and/or as a means of creating efficiencies and cost savings.

Figure 1: M2M generic application process [11]

M2M communications solutions are already in operation in several parts of the world utilizing existing national numbering ranges and addressing resources, a situation that has been sufficient. M2M applications require networks capable of long range connectivity including coverage across national borders, ubiquitous coverage and flexible scalability. Internet Protocol version 6 (IPv6) addressing has potential as a long term solution for addressing M2M devices, but E.164 numbering appears to

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[11] https://www.comreg.ie/media/dlm_uploads/2015/12/ComReg1333.pdf

be preferred by operators and M2M service providers in the short to medium term, as it leverages on the existing capabilities of billing, routing, authentication etc. of existing fixed and mobile networks.

While E.164 numbering can offer relatively simple implementation within current network infrastructures, the potential numbers of M2M devices to be accommodated is huge and this implies a need for very large numbering blocks to address M2M devices. The expected annual growth rate of M2M numbers over the period 2010 to 2020 is approximated to 20% according to Comreg Report;

In the longer term, IPv6 addressing will become important as an alternative numbering resources for M2M applications. However, there is great uncertainty about how long this will take and therefore M2M numbering policy should be flexible enough to act as a longer-term solution;

There can be several possibilities of availing numbers for M2M, by using the existing mobile range, using a new range of numbers, using an international numbering solution as per ITU Recommendation E212, and the use of network internal numbers. All this have their own issues such as risk of exhausting the existing ranges, in the case of non-geographic and existing PRS no limitation on access from oversea, inter-operators billing difficult and risk of incurring unnecessary expense,

To meet the demand for M2M, BOCRA has set aside a 10 digit number at level 8 for this service. The range 8970xxxxxx – 8990xxxxxx. All new allocations should follow the new range, and the existing M2M numbers currently using mobile numbers would be required to migrate to this range within 6 months.

13   Users' guide

Telephone users should be made aware of the use of numbers so that they understand the way that the numbers indicate the type of service being called and the relative costs of calls. This requirement will become more apparent as competition develops and new services are introduced.

Without consumer education, the benefits of the well-structured numbering plan will not be fullyrealizedd.

A draft Users' Guide is at Appendix 12. This guide will be made available on BOCRA's website and Operators are required to publish it in their Directories and on their websites.

The Guide will need to be updated from time to time to reflect market and regulatory developments, but the aim should be for each edition to have a reasonably long life so that the information in users' hands does not quickly become out of date. The level of detail in Appendix 6 has been chosen with that objective in mind.

14   Number portability

14.1   The case for Number Portability and options for implementation

Introduction

BOCRA has powers to require Number Portability, as referred to in the licences the three operators. Since further liberalization of the market has been made it now makes it relevant to study the case for introducing Number Portability. The licences of existing operators state:

Section 23.4 of the mobile license state that "The Authority may, after consulting the Licensee and other Stakeholders, direct that the Licensee put in place arrangements to enable Number Portability in accordance with any Regulations or any guidelines issued under the Act"

14.2   Costs and benefits of Number Portability

Summary

The costs of implementing Number Portability are difficult to establish as operators tend to be very guarded with such commercially sensitive information. In addition, the costs of firmware upgrades to switches vary according to the current state of build.

Relative costs and benefits of each form of implementation

There are three types of full Number Portability generally in service, i.e. Onward Routing (OR), All Call Query (ACQ) and Query on Release (QoR).

Onward Routing (OR) has the lowest cost of implementation. It is used extensively in Europe, including the UK and France, as it can be implemented on existing switches without a central call office and associated registry.

The OR technique is also used extensively by Mobile networks and it is an option that could be deployed between Mascom, Orange and BTC

All Call Query (ACQ) systems use a central call office approach, with a central registry process and either a central database (CDB) or a decentralized database held by each operator, synchronized to a CDB. Costs of implementation are high;

Query on Release (QoR) systems are frequently found in central Europe, but are no longer likely to be implemented as the overall costs are comparable to ACQ without the commensurate operational benefits.

Analysis of the situation in Botswana

International experience is that, in the changing technological climate facing operators, it is no longer likely to be cost effective to implement a centralized call office system, such as ACQ. Indeed, the majority of recent implementations have been in countries where there is high regulatory intervention, e.g. The European Union, which mandates it, or in highly centralized economies such as Hong Kong or Singapore, where there are many competing operators already in the market.

Recent studies tend to confirm that the benefits of introducing Number Portability predicted in earlier studies have not been realized. The most pragmatic of these studies has been initiated by Ofcom, which has reached the following conclusions.

There is a negative Net Present Value in undertaking a full ACQ or QoR implementation of Number Portability.

The payback period for ACQ Number Portability exceeds 10 years; even this figure is dependent on the savings to consumers resulting from a very high incidence of network operator failures, unlikely to be such an issue in a market the size of Botswana.

It is possible there will be significant reductions in the cost of ACQ platforms in the next three to five years, and

The issue of Number Portability should be revisited once NGN is in place in the fixed network.

Finally, it should be borne in mind that at present there are no other fixed networks to port to in Botswana.

This analysis suggests there is a weak case at present for a full-scale implementation of Individual Number Portability in Botswana.

However, discussion with operators has shown that operators want Number Portability, subject to the necessary investment in processes being met with the operators concerned.

However, it must be emphasized that whereas the Mobile operators appear to have the necessary firmware to implement Onward Routing Number Portability, the costs should not be under-estimated.

It is recommended that the case for Individual Fixed line and Mobile Number Portability should be examined in detail by the operators before BOCRA decides whether to mandate it.

The concept proposed is that BOCRA would introduce a range in level 7, in which number blocks as small as 10,000 or even 1,000 are allocated directly by BOCRA to end users; by inference, these would have to be in a range different to Mascom's 71 or Orange's 72 or BTC's 73 as the routing would require further digit resolution.

Operators would be required to route calls to the numbers by virtue of the draft Number Portability Regulations proposed in Appendix 13 (paragraphs 2.1 to 2.4).

Who could be eligible for Number Portability?

This depends on the terms of the Service Neutral License. A basic assumption behind Number Portability is that both recipient and donor operators must be at risk of losing customers, i.e. *Number Portability must be reciprocal*.

This tends to mitigate against new entrants, particularly operators offering VoIP services. It is too early to say at which stage VoIP operators qualify for Number Portability, as in addition to the need for there to be an established base of customers, there are issues of quality. The same issue is currently being debated in Europe, as regulators are faced with two potentially conflicting Directives, i.e. That VoIP operator must have a level playing field of all numbering resources, but also that all numbering allocations must be open to Number Portability. A half-way house has been suggested in which two grades of VoIP operators are identified. The first would be a quality managed VoIP service which is subject to the same conditions as an established operator, including an obligation to handle emergency calls; this type of operator would get Number Portability access. These VoIP operators are described as Publicly Available Telecommunications Services (PATS). The second would be a lower grade of service VoIP operators having fewer regulatory constraints with no rules on service and no rights to Number Portability. However, there are technical constraints which suggest that the VoIP operator would have to be content, for the time being, with the same block controls that must apply to the existing operators.

What processes could apply to Number Portability?

A suggested starting point for regulations or Guidelines is shown in Appendix 13. This draft is based on international practice and is similar to the regulations recently developed by South Africa.

The Regulations require participating players to set up inter-operator processes. There are several examples of processes which can be found on the regulatory websites of other countries, for example www.ofcom.org.uk/telecoms/ioi/numbers/num_port_info/ which gives suggested processes for Number Portability for Geographic, Non-Geographic and Mobile numbers.

14.3 Location Portability

Location Portability is the ability for a subscriber to keep the same number while moving from an area defined by his National Destination Code to another area which has a different NDC. This does not imply any change of operator or service provider and therefore falls outside the definition of Number Portability in the current draft licences and the draft Service Neutral licence being developed. Such a facility is likely to be most attractive to a business which relocates from one town to another and does not want to lose customers by changing its telephone number or which wishes to appear to have a presence in a town where it is not located, though the service may also appeal to some residential customers.

Where Location Portability is introduced, a fundamental principle is that a caller should pay the same cost as would have been incurred if the number had not been ported. Thus, if a number were ported from Gaborone to Francistown, a caller to that number should pay the same call charges as would have applied if the called party were still located in Gaborone. This ensures that the tariff information carried by a number is retained and callers are able to distinguish whether they are paying for a local call or a long-distance call.

BTC already offers the ability for subscribers to retain their number if they move within the Gaborone area and this does not give rise to any tariff issues that might cause regulatory concern. BTC has dropped its three tariff bands in favor of a single national rate, making it possible to introduce Location Portability across the whole of Botswana without any tariff implications.

There is no reason why BOCRA should either mandate the introduction of Location Portability nor seek to prevent it, provided an operator maintains the principle that a caller must be charged the expected tariff. As competition is introduced, it is important to allow operators to decide what

additional services they offer, provided their basic obligations are met, so that they can compete on service offerings and quality as well as on price.

A potential complication arises if Number Portability between fixed line operators is introduced and a subscriber who has ported location then seeks to change operator. To retain the principle of tariff transparency, the recipient operator would have to negotiate terms that were acceptable to all parties. Failure to agree could lead to a situation where BOCRA's dispute resolution functions were required to be exercised in the light of the particular circumstances

15   Carrier Select and Carrier Preselect

15.1   The Case for the introduction of Carrier Selection

Introduction

Some form of carrier selection is fundamental to the effective entry of competitive long distance networks and competing international gateway operators, as it allows calls to be made via the most cost effective routes without the new entrant having to install a line to every customer's premises. It also facilitates competition from service providers that do not have their own infrastructure, for example, those offering national or international services over other operators' networks. On the other hand, its early introduction may inhibit the development of alternative infrastructure where that is economically feasible. Determining when to introduce carrier selection will be a policy decision for the Government and BOCRA in the light of the emphasis they wish to put on the possibility that infrastructure competition will develop.

The options to be considered for the introduction of carrier selection are:

Carrier Select (CS) i.e. An Access code in the range 1XX (X) is added to the number by the caller, on a call by call basis. This can be dialed by the caller, pre-programmed on an auto-dealer, or added by a Private Automatic Branch Exchange (PABX). Most modern operators' switches already incorporate the facility to re-route calls so the implementation costs are potentially low, and the timescale to introduce the service is short.

Carrierpreselectt (CPS*)* i.e. The pre-programming of a routing code onto an exchange. These routes calls away from the caller's network on a selective basis, which can include the time of day and a decision to route just international calls, national calls or both. Also, though the service might have been handed over to another operator under CPS, the caller is still able to choose their network provider for a particular call by dialling a 1XX (X) access code. This facility requires a relatively modern release of switch firmware, and considerable investment in inter-operator processes. The

timescale to implement CPS can be in excess of 12 months, depending on the current firmware status of the donor operator.

These options have been discussed with stakeholders. We have also considered the costs of the two options.

We conclude from this that Access Code derived Carrier Select (CS) can be undertaken quickly at minimal investment, whereas Carrier Preselect (CPS) will take a lot longer and require considerable investment.

It is recommended that the Access Codes for Carrier Select (CS) are made available, and that plans to introduce Carrier Preselect (CPS) are deferred for the foreseeable future, pending a study by the industry of its cost effectiveness.

15.2   Regulations for Carrier Selection

Proposed Regulations and a Functional Specification for carrier selection are provided in Appendix 14. This covers the introduction of CS and a later introduction of CPS.

15.3   Process for implementing carrier selection

Carrier preselect (CPS)

This is more complex and the procedure typically takes up to 12 months to implement.

Further detail on the processes and the issues behind Carrier Pre-Selection can be found on the Ofcom web site at www.ofcom.org.uk/static/archive/oftel/ind_info/network_inter/cps_icps.htm.
As CPS codes are not dialled, being pre-programmed on the operator's switch, the range used is not critical. A commonly used range of European switches, including the Ericsson AXE10, is 8000 - 8899.

However, when CPS codes are used, it is normal practice to make available to customers a CPS override code. When the customer dials the override code in front of a dialled number, the call will be carried by the operator that provides the customer's connection rather than the operator whose CPS code is programmed on the switch. Codes in the range 16X or 16XX have been allocated in the proposed Numbering Plan for CPS override codes.

16   Administration of National and International Signalling Point Codes

Principles

There are several codes which are not dialled but which are fundamental to the interoperability of the telecommunications network, such as International Signalling Point Codes (ISPCs), National Signalling Point Codes (NSPCs), the Mobile Country Codes (MCC), Mobile Network Codes (MNCs) and Data Network Identification Codes (DNICs).

International Network Codes issued by the ITU-T.

International Signalling Point Codes (ISPCs)

ITU-T issues one ISPC range at a time, and only when current capacity has reached around 75% utilization will there be cionsideration for a new point code. The ISPC range 6-104 and 6-105 has been allocated to Botswana.

The information on BOCRA numbering database indicates that there are currently 6 ISPCs in use out of the 16 sub-codes available, i.e. . 6-104-0 ,6-104-1, 6-104-2, 6-104-3, 6-104-4 and 6-102-7. This leaves the remaining ISPCs 6-105-0 to 6-105-7 available for issue by BOCRA to other international carriers when they are licensed.

It is unlikely that it will be necessary for BOCRA to apply for another range for some time, given that there are still more sub-codes free.

There are no complex process issues involved in administrating ISPCs, the only requirement being to ensure that the carrier is entitled to receive one. BOCRA must advise the Telecommunications Standards Bureau (TSB) of the ITU-T of each allocation, using the form available from the TSB.

Mobile Country Code (MCC,)

This has already been issued by the ITU-T to BOCRA.

National Signalling Point Codes (NSPCs)

NSPCs are almost an infinite resource. There is therefore no difficulty in meeting demand from new operators, including VoIP service providers. Generally, one NSPC is allocated per switch, although there may be occasions when more than one code is allocated.

Reference is made to Appendix 7 which describes a structured approach that BOCRA should adopt for the issue of future NSPCs to existing and new operators. This structured approach has been devised in a way that will avoid the need to change any existing NSPCs.

Data Network Identification Codes (DNICs)

There is no information available at BTC on DNICs. An internet search suggests the Data Country Code (DCC) of 652 may be active with an in-service DNIC of 652 0; the user of this code is not disclosed.

Where a DCC has been issued, the ITU-T normally expects the DNIC range to be managed by the Administrator, i.e. BOCRA in Botswana. It is recommended that BOCRA controls the DNIC range 652 0 to 652 7 in a small table. As these codes are in short supply, care should be taken not to issue a unique DNIC where sub-allocation of part of an existing DNIC will suffice, which is usually the case.

Internal Network Codes that could be administered by BOCRA.

There are other codes that are required in a liberalized environment to facilitate the entry of competition, such as Carrier Preselect Codes and Number Portability Prefix codes (NPPCs). Other codes can arise, depending on the structure of the networks, such as Targeted Transfer Codes.

Normally, in a monopoly environment, these codes are administered by the incumbent, but international experience shows, that new entrants feel disadvantaged with the continuation of this arrangement. In the longer term, BOCRA should administer other network codes where there are potential competition issues.

17   ENUM functionality
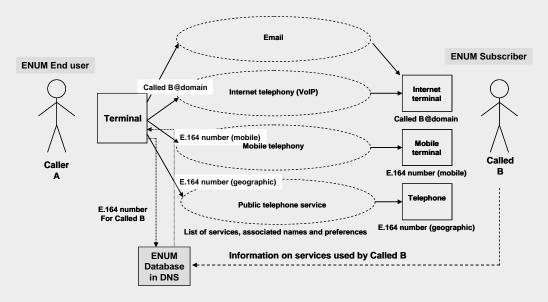
17.1   What is ENUM?

ENUM is a proposed international public database that links E.164 telephone numbers to the internet Domain Name System (DNS) and other internet related addresses. It is designed to enable end users to communicate with someone on different electronic communications devices, e.g. E-mail, VoIP telephony or fax by using the telephone number converted into a domain name.

NUMBERING POLICY

An early use of ENUM is expected to be the linking of different VoIP servers so that calls can be completed over the internet without being passed over the public telephone network for completion. This will avoid the high costs and reduced quality resulting from the handover from one type of network to another

Under the ITU protocol for ENUM, published as RFC 3761[12], E.164 numbers are converted into a domain name in the "e.164.arpa" domain by reversing the digits of the full international telephone number and then inserting dots (".") Between each digit.   Thus, the number +267 3957755 becomes 5.5.7.7.5.9.3.7.6.2. e164.arpa. This unique domain name is then looked up in the ENUM database to find information about the preferred methods for contacting the owner of that number via other services such as VoIP telephony. Figure 2 illustrates how ENUM would be used to complete a communication between "Caller A" and "Called B" (a subscriber who had chosen to have his details stored in the ENUM database).

Figure 2: Completing a call with ENUM

Although the diagram shows an end user interrogating the ENUM database, this could be done automatically by software in the user's terminal or by a service provider who was providing a service to the end user. Thus, the end user, who does not need to be an ENUM subscriber, maybe unaware that ENUM is being used.

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[12] See www.ietf.org/rfc/rfc3761.txt?number=3761

The significance of ENUM is that it provides a bridge between circuit switched public telephone networks and the packet switched networks making up the internet. There is a wide range of views about the prospects for ENUM but such a bridge could become important as telephone networks and the internet converge in the future. However, ITU ENUM is not the only way in which VoIP servers can communicate with each other and its commercial future is far from assured.

17.2   Public policy issues

The ITU-T has stated:

"Member States will have the right to choose whether to participate in the common designated ENUM domain, or not to participate in it, at their discretion."

Thus, Botswana must decide whether to participate and, if it does decide to participate, how to handle a number of public policy issues.

Administrative structure

Within DNS the location. 7.6.2. e164. arpa is the top of the hierarchy of Botswana numbers. The entity that runs the systems for this location is called the ENUM Tier 1 Registry and its functions are analogous to the ccTLD manager in that its systems point to the name servers that hold information about ENUM subscribers. The Tier 1 Registry is a monopoly and this raises questions about how it should be appointed and regulated in the interests of the community as a whole.

The Tier 2 name servers are run by ENUM registrars who can be competing organizations that interact with ENUM subscribers, for example to correct, verify and update information about the subscriber and store it online as part of the DNS. This level is where most of the administration and costs are incurred and where there may be more scope for innovation and service differentiation. The activities of the Registrars raise policy issues in relation to the control and authentication of subscribers and in relation to privacy. The Registrars would be required to adhere to a code of practice or regulations dealing with these issues.

Control and authentication of subscribers

Control and authentication are important aspects of adding and updating entries in the ENUM database. Otherwise the system is open to a number of abuses, for example, use of the telephone number by someone else with a view to stealing incoming traffic, which might contain confidential business information, or service providers making unauthorized changes to take customers from their competitors ("slamming").

It is recommended that subscribers must opt-in to ENUM individually, i.e. Service providers cannot make bulk entries in the database on behalf of their customers. This ensures that subscribers are willing to have their details made public in this way and also that the data is complete and accurate since any one service provider may only have partial information. It also fosters competition if there are competing registrars since each subscriber can make a choice of registrars.

Each subscriber will also need to be authenticated before their information is added to the database. This will involve two steps:

- Identification – to prove that the subscriber is who they say they are; and
- Validation – to prove that the subscriber has the right to use the telephone number.

Validation is important to maintain the integrity of the E.164 numbering system. While the telephone service provider will be the entity that is well placed to validate a subscriber's right to use the number, not all service providers may want to facilitate ENUM entries since it may result in a loss of traffic to e-mail or VoIP. It will therefore be necessary to offer alternative methods of validation such as use of directory enquiries or the production of bills.

Privacy

Since ENUM is a public database and any member of the public has access to the information it contains, the opt-in principle is important to ensure that subscribers have consented to the information being included.

Legal requirements of data protection and privacy are being developed under the Maitlamo project and these will apply to the organizations involved in providing ENUM. No additional regulation should therefore be required.

Internet registries usually provide a WHOIS service that allows anyone to find out the owner of a domain name. Although the ENUM entries are domain names, to preserve privacy there should be no WHOIS service giving the identity of a telephone subscriber from their telephone number in a domain name form. It is for each telephone subscriber to decide the extent their details are revealed in telephone directories or Directory Enquiry services.

17.3 Implications for Botswana

Our consultations have not revealed any demand for ENUM in Botswana. Indeed, very few people are aware of it, even among the network operators. Given the current lack of interest, we do not recommend that BOCRA should take any steps at present to set up a system or to raise awareness. To do so would risk imposing costs on the industry that will not offer any benefit.

NUMBERING POLICY

It may be that if vigorous competition develops, new services become widely adopted and ENUM is seen to be successfully implemented in other countries, the situation will change. At that stage, BOCRA may want to apply to RIPE-NCC and the Telecommunications Standardization Board (TSB) of ITU-T for formal delegation of the 267-country code for ENUM[13]. This would result in an entry in the ENUM Tier 0 DNS maintained by RIPE-NCC.

By waiting in this way, BOCRA will not be running the risk that some other organization will hijack the country code since the TSB will not accept a request for delegation until the administration of the Member State has notified the TSB that it approves the delegation[14].

If the new arrangements for the administration of Botswana's ccTLD are introduced as proposed in section 13 below, organizations may well become established which could undertake the roles of Tier 1 registry and Tier 2 registrars.   As in several other countries, the first step is likely to be a trial. Details of the code of practice and other technical and administrative procedures for ENUM would then be developed in cooperation between BOCRA and other stakeholders. It should not be necessary for BOCRA to play a formal role in managing any of the ENUM processes since it would essentially be an industry initiative.

18   Enforcement

18.1   Licence conditions

Currently, licence conditions dealing with numbering are the same among all operators. As new competitors enter the market and services such as number portability and carrier selection are introduced, it will become increasingly important that all competitors are under the same numbering obligations. It is therefore desirable that there should be a standard licence condition that applies to all licensees on the following lines:

> *The Licensee shall comply with the Numbering Plan and any Rules or guidelines issued by BOCRA from time to time in relation to the use of Numbers and of other codes within its network, including the payment of fees related to the administration of numbers.*

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[13] Details of the procedure can be found at www.ripe.net/enum
[14] See the procedures at www.itu.int/ITU-T/inr/enum/procedures.html

The Licensee shall not allocate to Users any Number other than is within a numbering block allocated to it by BOCRA for the purpose of terminating Calls on the Licensed System and is, for the intended use, consistent with the Numbering Plan.

The Licensee shall manage the Numbers allocated to it efficiently and with a view to conserving them as a national resource.

BOCRA may, after consulting the Licensee and others, direct that the Licensee put in place arrangements to enable Number Portability in accordance with any Rules or any guidelines issued under the Act.

Neither the Licensee nor any of its Users shall acquire any proprietary right in a Number or a range of Numbers. The Licensee shall not sell or purport to sell any Number or range of Numbers to Another Operator, and may not assign or transfer a Number to any person other than the intended User of that Number without the prior written consent of BOCRA.

BOCRA may, on reasonable notice, require the Licensee to return any unused Numbers or number blocks to the BOCRA, and may, after consulting the Licensee and others, vary the Numbering Plan.

This is designed to require adherence to the published Numbering Plan, to publish Code of conduct specifying how numbers are to be applied for and used, to published procedures for implementing carrier selection and/or number portability and to any conditions attached to a particular allocation of numbers by BOCRA.

It is recommended that such a condition is included in the licences issued to new entrants and to existing operators whose licences are reissued as service neutral licences.

On the face of it, section 43 (1) of the Act *prima face* provides for licence amendments only at the request of the licensee and this would be consistent with the view that sees licences as contracts under which the licensee makes long term financial commitments and accordingly restrains or limits the Authority's right to initiate amendments. The other provision in the Act providing for licence amendment is section 44 which applies only where there has been a contravention. It may, therefore, seem from the Act that BOCRA's powers to amend a licence are limited. However, the Interpretation Act, which is an Act of Parliament for interpretation of the Constitution and other enactments, provides otherwise.

Since BOCRA has the power to grant the telecommunications licences, it follows that by interpretation, it has the power to amend and or initiate the amendment of the issued licences.

18.2   Hierarchy of Regulations, Numbering Plan and Numbering Code of conduct

In some countries, detailed procedures for administering numbers have been laid down as Code of Conduct published by the regulator while in other countries they have been incorporated into the regulations. The former is preferred because it is generally easier to amend Code of Conduct than Regulations, since the latter must be made or approved by the Minister which may make it more difficult for the procedures to keep pace with changing circumstances.

It is therefore recommended that BOCRA publishes the proposed Numbering Plan and Numbering Code of Conduct which taken together would then constitute the "numbering system" mentioned in section 38 and in Regulation 34 of the Regulations[15]. Licensees would be required to comply with them by virtue of Regulation 34 and the licence condition proposed in section 18.1 above. The Code of Conduct will be consistent with Regulation 34 (2) and so there would appear to be no need to change the Regulations.

It should be noted that Regulation 34 creates a substantive obligation on licensees. The general legislative approach is that the substantive rights and obligations are created by the Act and the Regulations provide for processes and procedures for the realization of statutory rights and obligations.

18.3   Enforcement powers

The Act and the Regulations provide for revocation of the number and address capacity allocated for breaches of their requirements. Thus, a failure of an operator to comply with the numbering system (as required by Regulation 34) would be an offense which will lead to the revoking of the allocated number and address capacity allocated.

Imposition of further conditions

Section 42 of the Act also deals with contraventions. It provides:

> *42. (3) Any person who contravenes subsection (1) is liable to a civil penalty not exceeding P50, 000 to be imposed by the Authority and where a body corporate is in contravention of subsection (1), the Authority may impose a civil penalty not exceeding 10 per cent of the turnover of such a body corporate in the previous financial year.*

It will be seen that section 38 is very broad in its scope and coverage. In covering contravention of "any provision of the Act" or "any lawful direction or requirement" and contravention of "any licence",

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[15] The Botswana Communication Regulatory Authority Regulations of 2018

its provisions are sufficiently wide that breach of the numbering system (i.e. The Numbering Plan and Conditions) will be covered. In terms of section 38 of the Act, the providers and operators are required to apply the numbering system in a way that ensures fair access to services as established by the authority. Failure to abide is a breach resulting in the Authority being entitled to make a decision to revoke, suspend or impose further conditions on the licensee.

Once a licensee has breached a licence condition, the Authority may, as part of the imposition of further conditions under section 38, provide that failure to comply with the "further conditions" would attract a fine and or penalty. Accordingly, the power to impose "further conditions" in terms of section 38 is a potentially useful tool that can be invoked to ensure compliance other than through the criminal law system.

Licence conditions authorising financial penalties

BOCRA has included in recent licences a provision giving it the power to impose a fine or penalty in the event of breach of any of the licences conditions. This is in line with best international practice for the enforcement of licences and it is recommended that such a provision is included in all new licences.

In terms of Botswana's administrative law principles, public authorities such as BOCRA are creatures of statute. They are created for specific purposes and endowed with powers necessary to enable them to execute their functions. Accordingly, statutory bodies can generally exercise powers expressly given to them by an Act of Parliament establishing them and/or powers that are reasonably necessary to enable them, or require, that an act or thing be done or are incidental to the doing thereof (section 15 (2) of the Interpretation Act [CAP: 01: 04]).

Notwithstanding the provision for criminal penalties for breach of licence conditions, the Act (section 44 empowers BOCRA to grant licences subject to such conditions and restrictions as the Authority considers necessary. There are no statutory restrictions on the types of conditions the Authority may impose. The only restriction is that such conditions should be considered necessary by the Authority.

Section 44 is broad enough to empower the Authority to include provisions in the licences authorizing the imposition of fines and or penalties for breach of licence conditions. It is concluded that the licence conditions are valid and effectively empower the Authority to impose fines and/or penalties for breaches of the licence including those relating to numbering.

19 Other legal issues

19.1 Ownership of numbers

Introduction

Telephone numbers should be considered a national resource, but their "ownership" is not always clear. A network operator may want rights to a range of numbers which have become associated with its "brand" or with a particular service it offers. Individual businesses may seek rights to retain a number associated with them, either because they have invested in promoting it (e.g. 800-FLOWERS in the US) or because they fear losing customers if their number is changed.

On the other hand, a regulator needs to retain the flexibility to manage the numbering in the national interest and therefore wants to avoid a situation where others might acquire rights, though the regulator will always be anxious not to cause unnecessary problems for network operators or users. The regulator therefore prefers a legal basis where it "rents" blocks of numbers to network operators who then "sub-let" them to individual users.

Telecommunications Legislation

In the Numbering Code of conduct for Botswana it is made clear that no licensee is entitled to ownership or any other interest in numbers allocated to the licensee or to their customers. It will also be clear that numbers can be withdrawn from operators in specified circumstances. Provision is also made for BOCRA to charge operators for numbers (to incentivize them to be efficient in their use of numbers). The ownership provisions will also be given greater authority from the reference to ownership in the proposed licence condition.

These provisions deal with the future regime under the Communications Regulatory Authority Act, but we have also considered whether there might be any claim to ownership under Botswana's intellectual property laws.

Copyright

It is our opinion that operators could not successfully claim proprietary rights under copyright law. Copyright is governed by the Copyright and Neighbouring Right Act of 2000 (which came into force on 1 October 2006[16]). In section 6 (2) of that Act, no protection is extended to "any idea, procedure, system, method of operation, concept, principle, discovery or mere data". The reason being that the

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[16] By virtue of Statutory Instrument No. 71 of 2006

objects of copyright law is not designed to create monopolies over information. To the extent that numbers are information and or facts they are not protected under copyright law.

For numbers have any protection under copyright law, they must be an original intellectual creation. Anything less renders them not protectable under copyright law. Numbers can only acquire this originality by virtue of their ordering or compilation by selection and arrangement into "a work" that would be recognized as copyrightable and thus be protected under the 2000 Copyright and Neighbouring Rights Act as "derivative works" (section 4 (b)). The protection here does not extend to the data, facts or material used, but by reason of their selection, coordination or arrangement of their contents. It is not in dispute that the arrangement of numbers has been carried out by BOCRA and not the operators or users. That is, even if it is found or assumed that the numbering blocks (access codes) have been selected, coordinated and arranged such that they can be copyrightable, the owner of such right would BOCRA and through it the State. In terms of the Copyright and NeighbouringRights Act all copyrighted work made by or under the direction of the State or Government Department subsists in the State (section 5).

Trademark law

Notwithstanding the above, it is our opinion that the operators may successfully claim protection under trademark law. In order to succeed an operator would have to show that:

The number block (or "access code") allocated to it has a distinct feature that distinguishes the operator from others and that in the eyes of the public a particular access code is directly associated with the concerned operator; and

The licence does not contain provisions which show that the operator was not expected to "brand" or build a commercial link with the access code.

The possibility of a trade mark based claim could arise only in relation to mobile operators in view of the fact that their licences granted them specific access codes (71 to Mascom, 72 to Orange and 73 to BTC). Over the years, the operators have been advertising a lot with respect to the access code. Each of the access codes has become synonymous with its network operator. This has been strengthened by the tariff regime that makes it cheaper to call Mascom to Mascom, Orange to Orange and BTC to BTC calls as against making calls between networks.

A trademark law claim could be under statute (Industrial Property Act) or under common law. To claim under the Industrial Property, Act an operator must have registered the access code as its mark; none appears to have done so.

The common-law action is however independent of registration. The operator would only have to show that the access code has now acquired a distinctive feature that connects the mark to the operator in the eyes of the public. In addition, it would be necessary to show that the licence does not prohibit the contemplated claim of the right of the mark or code. It is our opinion that by granting the access code to the operator of the licence BOCRA has contributed to a reasonable expectation on the part of the operators that they have a right over the access code and that they could build goodwill around the code. This suggests that the common law right to the protection of the service mark may succeed. The High Court has recently, albeit *obiter*, accepted the common law right of trade mark into Botswana law (*Botswana Telecommunications Corporation vs. AC Braby & BT Directories Misca 423/2005, unreported*).

Clause 23.5 of the mobile licences is intended to ensure that the operators should not claim any ownership rights since it subjects operators to any conditions BOCRA may impose relating *inter alia* to number portability between the operators. While this is a credible argument, we believe it would be stretching the interpretation of the concerned clause too far. Number portability while it can be facilitated by not transferring ownership of numbers to operators, can also be achieved even if the numbers have been transferred to the operators, though it would be more cumbersome to achieve number portability under the latter situation. The view is that clause 21.2 would not exclude or serve as a bar to a common law claim for a breach of a common law service mark.

Clause 23.5, expressly provide that neither operators nor users have any right of ownership and that such rights are reserved to BOCRA/the state.

19.2   Data privacy and the publication of directories

Section 1.2.28 of licence Condition requires that licensee should produce an annual directory including details of its entire customer base "save for those customers who have requested that their telephone numbers should not be listed". Its licence also requires that licensee co-ordinate directory information services with other operators, including making the information available to their users and providing on-line access to the database.

Regulation 62 also protects the privacy of data and section 54 (1) (c) of the Act appears to provide the legal basis for the protection of data.

These provisions appear to protect the privacy of customers to the extent that customers can insist on their numbers not being listed, while ensuring that all telephone users have access to directory information. There is, however, a procedural problem. By practice, licences are considered as

confidential by BOCRA and accordingly are not public documents. This means that customers are generally not aware of the licence conditions of operators, including the conditions that relate to numbering. To this extent, the right of privacy may be compromised.

There appear to be two possible ways to address the issues. First, the customer's right to insist on their number not being published and or disclosed and exceptions thereto could be included in the regulations thus making the right public. Secondly, operators could be required to inform the customers in writing of this right as part of the customer service agreement. We recommend that, if new regulations are to be issued, the matter is dealt with there. Otherwise, we recommend that BOCRA checks the customers' rights are adequately explained in any new or amended customer service agreement it is asked to approve. We have also included this information in the Users' Guide at Appendix 12 (see section 13 above).

19.3   Copyright in directories

In the past, incumbent operators in other countries have sometimes attempted to claim copyright in their directories. This usually only arises where operators are required to make directory information available to competing operators – possibly for publication to their users – or where competition has been introduced in directory enquiry services.

It is probable that an operator in Botswana could claim copyright in a directory it has compiled since section 4 (b) of the Copyright and Neighbouring Rights Act 2000 gives protection to derivativeworks, includingg mere data (databases) provided that such databases are original by reason of their selection, coordination or arrangements. Section 36 of the same Act incorporates the provisions of any international treaty to which the Republic of Botswana is a party in the said Copyright and Neighbouring Rights Act. Botswana is a party to the Berne Code of conduct which extends protection to computer programs, databases, home taping, satellite broadcasting, cable broadcasting and new standards for distribution. These protections would be part of Botswana law by virtue of section 36.

In addition, the incumbent operator, BTC, has successfully claimed common law trademark protection over its directory in Court[17] The case did not involve another operator, but the court nevertheless accepted that BTC has a common-law trademark right over the directory. Unfortunately, the Court did not refer to section 39 (2) (e) of the Act, which liberalized the publication of directories, and therefore did not attempt to reconcile the protection it gave BTC over the directory with the promotion of competition in the publication of directories.

However, it is reasonable to assume that any claim of copyright could be overridden by an appropriate condition in an operator's licence, for example, requiring directory information to be made available to an interconnected operator for publication in its directory. A licence is akin to a contract

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[17] *Botswana Telecommunications Corporation vs. Ac Braby & BT Directories Misca No. 423/2005*

and therefore the owner may waive his rights to copyright. The Copyright and Neighbouring Rights Act expressly provides for this possibility under section 22.

Section 5 ((3) of the Act also offers a possible way out of any claims of copyright to the directories. This section empowers BOCRA to direct licensees to provide directory information regarding their subscribers and or clients to the Authority and or any person designated by the Authority. Read with section 39 (2) (e), which liberalizes the publication of directories, this section would enable BOCRA to deal with issues relating to directories.

20   Administration of Botswana's ccTLD

20.1   Introduction

BOCRA administers the .bw country code Top Level Domain (ccTLD). In this capacity it main activity is to Maintain the name servers for ,bw and ensuring they are connected to the internet at all times.

20.2   The choice of manager

The qualities set out in 1994 by those then managing the Top-Level Domain Name System at a global level[18] remain valid today. Any new manager must therefore see it as a trustee of the "dot-bw" domain, both for Botswana and for the global internet community, and must be able to make an equitable, just, honest and competent job. We also start from the premise that the manager should continue to be located in Botswana.

20.3   Should there be competition among competing Registrars?

While there can be only one registry that acts as a manager of the ccTLD, some countries operate with competing "Registrars" who effectively act as retailers for the domain name registration. In this system, accredited registrars would invite applications for domain names, vet them for compliance with the accepted rules and send the accepted registrations on to the registry for entry in the register. The registrars would set their own fees and pass on to the Registry its standard fee.

20.4   Which organization should have technical responsibility for operating the DNS servers?

The DNS servers must be available 24 hours a day, seven days a week and always be accessible from the global internet, not just from within Botswana. It is good practice to locate them in different parts of the world to ensure that a robust service is provided.

Given our recommendations above, we believe these criteria will be met by the appointment of an entity outside Botswana with the necessary technical competence. This appointment will be under

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[18] See RFC 1591, available at http://www.rfc-archive.org/getrfc.php?rfc=1591

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contract for a period of years and we recommend that competitive bids should be sought from contractors. The appointed operator would have no legal standing since it would simply be carrying out tasks on behalf of BOCRA, which would retain the formal role of ccTLD manager responsible for the registry function. The appointed operator would, however, have a working relationship with the registrars and should be recorded at ICANN as the technical contact for the "dot-bw" domain.

20.5   An appropriate legal framework

The Communications Regulatory Authority Act of 2012, gives BOCRA the mandate to manage the numbers and "dot-bw" domain name.

On the other hand, the Act gives BOCRA the duty to supervise and promote the provision of efficient telecommunications services in Botswana and provides for the licensing of telecommunications services and systems. The DNS servers operated by the ccTLD manager are a telecommunications system and it is providing a telecommunications service by resolving domain names; such a view is consistent with the position that ISPs need a licence.

The requirements of section 38 (1) of the Act apply to domain names as well as telephone numbers. Section 38 (2) requires BOCRA to "maintain and manage a central numbering and domain database system which shall be consist of a scheme of identification to ensure that electronic communications are correctly and efficiently directed to the point of reception". On this interpretation, BOCRA would have the power to appoint and supervise the ccTLD manager without the need for new legislation.

We have carefully considered these arguments and our conclusion is that section 3 (())(2) can be relied on as a basis for regulating the allocation of domain names. We conclude, therefore, that no new legislation is required.

20.6   Industry guidelines for administration of the ccTLD

The model regulation envisages that the rules for assigning domain names would be drawn up by the ccTLD manager, possible after consultation about the structure of names. It will be important for Botswana's internet community that BOCRA (as manager) should be able to react to changing circumstances in an environment like the internet which is still evolving, for example in relation to the structure of second level domain names. We therefore recommend that the rules should be published by BOCRA as procedures and enforced by contract with registrars, since they can then be more readily changed than if they were set in regulations or licences. What is important is that they meet the needs of the community, are published and are applied equitably.

An important issue to be decided is whether domain names should be accepted only from entities resident in Botswana or whether registration should be open to anyone around the world. Some ccTLD managers impose no geographical limits and simply seek to attract as much business as possible in competition with the global TLDs such as "dot-com" or "dot-org". This is most likely to happen where the manager is a profit-seeking private company (as happened with "dot-br" in Brazil)

or where the two-letter country code presents an opportunity to market domain names to a particular business sector (as with "dot-tv" to television companies or "dot-nu" to news organisations).

It is not obvious that Botswana has any such opportunity to exploit and we imagine its policy is more likely to be to enhance rather than devalue the association of "dot-bw" with nationalorganizationss. It is therefore suggested that it may be appropriate for the rules to require that domain names are registered only to people or businesses that are associated with Botswana. It would probably narrow the field too much to require that domain name holders are either citizens or businesses registered in the country since this could exclude others legitimately conducting business in Botswana, e.g. Branches of foreign registered companies.

In developing the rules and procedures BOCRA and the working party may want to consider what other countries have done. The following has relevant information on their web sites:

New Zealand: www.internetnz.net.nz

Sweden: www.iis.se/english

United Kingdom: www.nominet.org.uk

CENTR[19]: www.centr.org.

South Africa is also working up arrangements, but its situation is less analogous as it starts from a position of multiple registries[20].

21 Implementation

The proposals in the report were discussed at a well attended stakeholders' workshop at the end of October 2006 and there was general agreement to the proposals and recommendations. The revised Numbering Plan was accepted, as were the proposals on emergency numbers and for the management of the ccTLD.

The areas where views differed were the desirability of introducing Number Portability and carrier selection. BTC, Mascom, Orange and BISPA each expressed their views based on what they perceived to be their commercial interests. As we indicate in the report, decisions about when to require these services are matters of policy and licensing. This report provides the framework for their introduction when that decision is taken.

Given the positive reception at the workshop, BOCRA through the technical advisory panel went on benchmarking on the systems for management of the registry as well as the policies govern it. The work falls most conveniently into four work streams which can be pursued in parallel:

- Revised telephone Numbering Plan;

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[19] An association of Internet Country Code Top-Level Domain Registries
[20] See www.zadna.org.za

- Management of the ccTLD;
- Licensing; and
- Legislative.

Revised telephone Numbering Plan

Before the proposed new Numbering Plan and Code of conduct are adopted we recommend that a formal consultation is carried out by sending drafts to operators and service providers with a covering letter explaining the contents and seeking views on implementation timescales, e.g. Since the phasing out of 0800 numbers, rationalization of short codes, etc. Any representations should be considered and, after any amendments, the Plan would be adopted. It should be published on BOCRA's website and sent to every licensee.

A separate and parallel strand is the work to establish BOCRA's internal procedures. A database will need to be prepared and staff appointed and trained to operate the number allocations. Given the more detailed work that will be involved in allocating blocks and codes and the prospect of increased demand following liberalization, BOCRA will want to be well prepared so that it can meet the timescales in the Code of Conduct and the legitimate expectations of operators in an increasingly competitive market.

The timetable for implementing some aspects of the Numbering Plan and the new services it is intended to facilitate will be dependent on the speed with which operators are able to agree on interconnect and tariffing issues following adoption of the Plan and relevant regulations. Table 22 set out the main steps and typical timescales for implementing them based on experience elsewhere.

Table 22: Implementation Master Plan/Timetable

	Item	Minimum timescale	Critical items
1	Final consultation and BOCRA decision on services to be introduced		
2	Finalise Licence Conditions		
3	Establish Numbering Advisory Group, agree Tariffs, etc.		
4	Finalize Numbering Plan and regulations	3 - 6 months	Further consultation with Operators
5	Establish Numbering Administration procedures*	6 -12 months after agreeing Numbering Plan	Data build, generate a specification on requirements for storage and administration of numbering ranges (spreadsheet or database), application forms, website construction
6	Introduction of Carrier Select*	Minimum of 12 months†	Interconnect agreements, tariffs to transfer calls

	Item	Minimum timescale	Critical items
7	Introduction of Carrier Pre-Select*	36 months†	Investment in switch firmware, processes, Interconnect agreements, tariffs to transfer calls
8	Number Portability, call-forwarding method*	18 months†	Processes, porting fees
9	Number Portability, All Call Query method*	30 months† (based on RSA experience)	Investment in switch firmware and portability platform, processes, porting fees
10	Open new Number Translated ranges in level 8 and 9*	12 months	Interconnect agreements, tariffs to transfer calls
11	Short Code rationalisation*	12 – 18 months	Dependent on ranges 8 and 9 being open to start migrating

* It will be difficult to make much progress on these items until the initial steps (1-4) are substantially complete.

† From the date of the relevant decision to introduce carrier selection or number portability

It is recommended that consultations should take place between BOCRA and operators or other interested parties. Moreover, the proposed licence conditions and the Numbering Code of Conduct provide for consultations before changes are made to the Numbering Plan or Code of Conduct. In some circumstances, for example, before changing the Plan, BOCRA will want to engage in a formal written consultation, but in some countries the regulator finds it useful to provide a forum for discussion of numbering issues before formal consultations are held.

We recommend that BOCRA should establish a Numbering Advisory Group (NAG) for this purpose consisting of invited representatives of operators, service providers, users and any other stakeholders, together with numbering staff at BOCRA. The NAG would meet periodically (say quarterly, or more frequently when necessary) under the auspices of BOCRA to consider issues tabled by BOCRA or any of the NAG's other members. Its functions would be advisory and it would have no formal status. It would, however, provide a useful sounding board for proposed developments in the numbering arrangements and their administration. The NAG would also provide a basis for establishing working groups on specific topics such as the development of carrier selection or number portability procedures among operators.

Management of the ccTLD

The next steps saw BOCRA setting up the rules and procedures with the industry working party (Technical Advisory Committee). BOCRA appointed a representative to work with stakeholders on this.

When all the procedures were agreed, BOCRA then invite tenders for the procurement of the registry hardware and software and the recruitment of the registry manager.

In parallel with these activities, BOCRA initiates discussions with ICANN on the redelegation process to change management of .bw from BTC to BOCRA. All chain of communications between the parties was agreed which finally lead to ICANN's acceptance of the redelegation.

The next step was for BOCRA to define the technical criteria for organizations to be accredited as registrars and invite applications from entities that meet all the criteria (including non-technical).

Finally, transitional arrangements were negotiated with BTC and BOCRA took over the management of the name servers and transfer of data and a switch over date was agreed with ICANN and BTC.

Licensing

The drafting of new licences is already in hand and the proposed new numbering and enforcement conditions will be introduced as part of that process.

Legislation

We have not recommended any changes to the Communications Regulations.

However, we recommend that any doubt over BOCRA's powers in certain areas should be removed by minor changes to the Act, particularly the transfer of the contents of Regulation 34 of the Act and the introduction of specific provisions relating to financial penalties and domain names. These proposals are summarized in Table 23.

Table 23: Summary of proposed legislative changes

Proposal	Relevant section of this report
Insert a new section imposing an obligation to comply with the numbering system (currently in regulation 34)	18.2
Provide for BOCRA to impose administrative fines and penalties for breach of licence conditions	18.3
Insert an express provision empowering BOCRA to regulate the allocation of internet domain names	20.5

Section 38 authorizes BOCRA to regulate domain names, then these changes are not urgent and can be implemented when new legislation under the Maitlamo program is put in place, unless there is a legislative opportunity before them.

We note that our proposals fit well with some of the changes proposed in the draft Botswana National ICT Policy (Maitlamo project), for example the need for a dispute procedure for domain names identified at page G11 of Appendix G