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Short Consultation on National Numbering Plan

National Numbering Plan Review

A short Consultation issued by the
Telecommunications Regulatory Authority

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The address for responses to this document is:

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Alternatively, e-mail responses may be sent to the
Authority's e-mail address at consult@tra.org.bh

The deadline for responses is 5 p.m. on 13 September 2007.

Purpose: to clarify unresolved numbering issues raised in the previous consultation, with emphasis on the need for nomadic numbering.



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Introduction

On 20 October 2005, TRA issued a consultation on the development of the National Numbering Plan (NNP) in relation to the allocation and categorization of numbering resources in the Kingdom of Bahrain. The consultation discussed 37 subjects related to numbering and numbering ranges, including the requirement for Internet Protocol (IP) network-based service numbering. TRA feels that the responses received from the industry showed a lack of understanding of the issues for such services as Voice over IP and the problems related to numbering schemes and the obligations of licenced operators under the Telecommunications Law and the National Numbering Plan (NNP).

The emergence of new technologies and services and the current deployment in Bahrain of new fixed wireless networks make it essential to further discuss the requirement for new numbering designations.

To enhance the appreciation of these issues, TRA arranged three workshops with licenced operators to highlight the subject and to introduce the reasons why it should be given further consideration. This formal consultation process will now conclude the process and result in a revised National Numbering Plan.

This short consultation will review and discuss possible ways of proceeding with regard to the management of Nomadic Telephony numbering, taking into account number portability and the categorization of these emerging numbering issues. In particular, it will readdress the issues raised in consultations 35, 36 and 37 of October 2005, which relate to nomadic numbering.

The purpose of having a clear numbering policy is to enable subscribers of licenced operators to easily identify the various services and potential costs associated with those services. Emerging technologies in Bahrain make it even more essential to consider new numbering classifications, of which a separate numbering range for nomadic service terminals is an example.

Separate numbering for such devices could remain in the "find me anywhere" category currently used with mobile services, however, in order to assist consumers in understanding that some terminals may not be strictly associated with a mobile network, or a fixed network, and under some circumstances [may also operate overseas may be a requirement.

In particular, emergency services should be aware that a number calling 999 may not be in a fixed geographical location, and if a

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location is required that may not be forthcoming from the caller, it would have to be traced via the network operator.

The previous consultation referred to new network scenarios, such as IP Telephony. The terminology has been adjusted to reflect the service scenario, as opposed to the network-specific technology. The following outlines TRA's findings from the previous consultation and asks questions of the industry in order to clarify its requirements.

These subjects were introduced and discussed in the numbering working group, and TRA feels confident that the industry has been informed to a level where a short consultation is justified, and therefore requests responses within two weeks of publication of this document.

1. The Need for Nomadic Telephony Numbering – Consultation 1

Question 1

- a) Do you agree that there is a need for a specific numbering range for Nomadic Telephony services in the Kingdom of Bahrain? What are the reasons for your answer?*
- b) If you recommend a separate range, propose the numbering range to be used for Nomadic Telephony services. Reference the National Numbering Plan on www.tra.org.bh*

TRA wishes to facilitate the entry of new services, service providers and operators into the Bahrain telecommunications market so as to encourage marketplace competition, thus benefiting the consumer, while at the same time introducing certain technological enhancements and greater network efficiency. Some of these new technologies also suffer from certain limitations, at least for the present, so TRA wishes to ensure the avoidance of any harmful effects for consumers, or long-term damage to the wider communications infrastructure.

Whilst TRA stands by its stated position in respect of remaining technology neutral, it must be acknowledged that the subject of Nomadic Telephony numbering has been under consultation in virtually all numbering administrations around the world. In the absence of detailed input to the consultation, TRA has investigated the situation in other parts of the world in order to provide the information necessary for making an informed decision.

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The USA experience

In 2005, the United States Federal Communications Commission (FCC) granted a waiver to a VoIP operator allowing access to the North American Numbering Pool. Previously, VoIP operators were not considered the same as established operators with legacy networks.

Certain conditions were applied with the waiver which required the operator to show that they had an interconnect agreement in place, and were ready to offer services, meaning that VoIP carriers could only obtain numbering resources through the purchase of interconnect-based services. The waiver rules were not final, and were subject to further review.

A review later produced a report basing its analysis on the underlying principle that telephone numbers are assigned to all providers, including VoIP providers, and that calls to a telephone number from the PSTN are expected to be completed.

The report supported the waiver and made recommendations on the following principles:

1. The underlying principle that calls to telephone numbers from the PSTN are expected to be completed;
2. That telephone numbers should be assignable to all providers, including VoIP providers, if their intent is to assign numbers in a manner that promotes communication with the PSTN;
3. That all providers should have access to numbering resources in a fair and equitable manner, irrespective of industry segment or group, or technology;
4. With respect to item 3 above: All providers should share and bear the same “numbering-related” responsibilities, including cost obligations.

Other obligations were included, such as to:

1. Participate in Local Number Portability (LNP) FCC mandated port-in and port-out requirements and be treated just as any other provider who is porting customers' numbers.
2. Contribute to number administration, number pooling and local number portability industry cost obligations.

One element of the review was the actual method of interconnect, where historically VoIP service providers interface at a local

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exchange using a Primary Rate Interface (PRI) (which means that the VoIP gateway resembles a PBX).

If the numbers were to be allocated from the central pool, the VoIP operator could apply for a state-wide number range (equivalent to a national number range in Bahrain), but would then require an interconnect at the trunk or transit level, and hence require a Signalling System Number 7 interface (currently the most common technology). The operator would also qualify for and be allowed to charge for call termination for voice calls originating from the PSTN and terminating on their own numbers.

Recently, the administration in the USA completed a legal process whereby VoIP providers are now subject to lawful interception. This means monitoring and recording of voice and data calls by the security services of the country.

Other obligations under the administration's registration processes invoke the requirement to include such information as:

- Registrant's legal name
- Registrant's principle business address and telephone number
- Contact information for the person responsible for the Universal Service Fund
- Contact information for the person responsible for Telecommunications Relay Systems
- Contact information for the person responsible for numbering resources
- Contact information for the person responsible for E.911 (calls to emergency services)
- Contact information for the person responsible for consumer issues

These requirements show that VoIP operators in the USA are obliged, if they want to apply for number resources, to operate in the same way as existing telecommunications companies, and will have the same obligations for consumer issues, quality of service, provision of emergency call services (i.e. database of customers' names and addresses, and location if applicable), and obligations to contribute to funds for Universal Service provision and Number Portability administration.

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The Ireland experience

In October 2004 the Commission for Communications Regulation (ComReg) in Ireland published the response (ComReg 04/103) to a consultancy paper issued in June that year on the implications of Voice over Internet Protocol (VoIP) technology and on how to respond to its emergence. At the end of the process ComReg opened the national numbering scheme to ensure it met the needs of the new VoIP providers. It changed the eligibility criteria for geographic numbers to include some service providers where their VoIP service was equivalent to the Publicly Available Telephone Service (PATS), and introduced a new non-geographic number range for use with IP-based services. In addition, it provided a set of guidelines (ComReg 05/50) for VoIP service providers aimed at helping them to ensure their services offer maximum benefit to consumers, while also ensuring that consumers are alerted to any limitations in service they can expect to encounter.

Further, in 2005 ComReg initiated a review of the VoIP market resulting in a new consultation document (ComReg 06/13) dated 3rd March 2006, in which it reviews the status of the numbering and number portability, social obligations such as the provision of access to emergency services and other consumer issues such as port blocking.

With regard to geographic numbering, the issue was raised that geographic numbers could technically be utilised without regard to the physical geographic location of the end user and area for which the number is allocated. If this is allowed to happen, any user anywhere in the world could request an allocation of a geographic number, potentially even multiple numbers from many different geographic areas. This could lead to a situation where an excessive demand for national number resources from outside the country could trigger costly capacity-based number changes, without clearly identified nation-based economic benefits in return.

Obligations were placed on some service providers (where the service is equivalent to PATS), specifically the obligation to ensure uninterrupted access to emergency services and to ensure that end users are able to call the emergency services (112 and 999) free of charge.

Another issue is the caller location information that is available with the fixed telephony and mobile services. It is perceived that the nomadic element of VoIP is an attractive aspect of the service, and that location information may then be of concern for emergency service use, but at this stage cannot be guaranteed for use by emergency services.

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It is clear that some VoIP providers around the world are achieving a similar status to the legacy network telecommunication type operators, and that obligations are being imposed on those operators that bring them directly into the legal framework of the legacy telecommunications business, and as such must consider responsibility for such things as consumer protection, quality of service, emergency service calling, and many other obligations such as calling line identity and providing directory listings.

Finally, the method of interconnection between legacy networks versus peering and transit arrangements must be resolved together with the relevant network cost aspects for termination rates and the methods used for settlement related to traffic handling either by means of per unit volume costing or agreed handling levels per unit cost.

2. Specific Ranges for Nomadic Telephony - Consultation 2

Question 2

If you agree that a separate number range for Nomadic Telephony services is justified, what are the major issues to be considered that inform the market and protect the consumer?

TRA has considered other numbering issues which may in the future be raised, such as whether numbering should be:

- linked to Quality of Service (QoS), especially voice quality during calls
- related to requirements to provide the capability to call emergency services and provide location information, or
- related to requirements for law enforcement

Linking numbering to quality of service is not generally considered advisable, simply because quality of service depends on both the technology used and the way in which networks are designed and operated.

Connection of emergency calls from IP-based technologies is generating a good deal of attention. These issues are important, but do not generally affect the organisation of numbering, only the rules of allocation. The capability of routing a call to an emergency response centre, together with the calling line identity and its

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associated location information is a condition that will need to be enforced.

Law enforcement has two areas of concern, that again do not affect the organisation of numbering, only the qualification for allocation. These are lawful interception and data retention. A subscriber's usage history may be required to be held by service providers in case of future legal action. Both activities require the appropriate legal processes to be followed and are supported traditionally by service providers. However, the effects of introducing IP-based technologies bring restrictions that may be a reason to refuse the allocation of numbers to service providers.

Two other issues need to be considered that only apply to operators:

- The price for calling the numbers;
- The connectivity to the numbers (the ability to call them).

For specially tariffed numbers regulators take different approaches between fixing the price for all calls to the numbers and fixing the price only for calls from operators with significant market power. For "normal" numbers there is the question about whether a price ceiling should be set as a consumer protection measure. Generally, these aspects of price do not influence the basis for planning of numbering and the allocation procedures.

Connectivity does have an influence on introduction of new number ranges and the scope specified for each different number range. If there is any risk that operators will fail to offer connectivity to new number ranges, then unless regulators are willing to enforce connectivity it would be advisable to adopt an alternative policy of widening the scope of existing ranges where there is connectivity.

A consequence of the separation of services and connectivity is the characteristic of nomadicity, where a user may be located anywhere relative to their service provider and relative to a gateway to another network type such as the PSTN. With the Internet, nomadicity is worldwide but with an NGN it is limited to the network that the user subscribes to. Use of services beyond that network may be treated as roaming and a higher tariff may be charged.

Nomadicity means that, unless special measures are taken, there can be no control or effective restriction on the location of a number within the nomadicity area, and this in practice may be anywhere worldwide via the Internet.

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The Internet uses names instead of numbers and the Domain Name System (DNS) converts names into IP addresses, which are used for the end-to-end routing of packets through the Internet. NGNs will also need their own DNS but it is not yet decided whether this will be:

- The same public DNS that is used by the Internet
- A common DNS available only to NGN operators
- Individual DNSs provided by each operator for their own use

DNS technologies may be used for handling numbers, which may be stored in number translation databases. Storage in a different form does not necessarily affect how a number is used or how numbers should be arranged, but the methods of using numbers may affect how numbers should be arranged. For example, where networks analyse numbers partially in blocks, e.g. analyse the first X digits and later analyse deeper into the number, then all the numbers in a block may need to retain certain characteristics. In contrast, if the analysis system always treats each number individually, as DNS does with names, then there is no requirement for all the numbers in a block to retain the same characteristics.

Voice over Internet services use various identification methods including E.164 numbers, SIP addresses and proprietary names such as "Skype" names. E.164 numbers are needed in particular for incoming calls from the PSTN.

The use of new number ranges can lead to the following problems:

- Existing operators refuse to open connectivity to the new ranges because they do not want to encourage competition from voice over internet services;
- Existing operators charge higher tariffs for calls;
- Calls to these numbers are not included in flat rate tariff arrangements and/or are not included in call package offers.

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3. Existing Number Ranges used for Nomadic Telephony – Consultation 3

Question 3

If a separate range for nomadic telephony services is not justified, which would be your preferred choice of numbers from the existing ranges available, and why? Reference the National Numbering Plan on www.tra.org.bh

Within a country there are normally up to four options for numbers for voice over Internet services:

- Geographic numbers under the existing geographic plan;
- Numbers in a new non-geographic range created for nomadic services;
- Existing special tariff numbers, such as relatively non-geographic/low-price premium rate numbers;
- Personal numbers.

An option favoured by some providers of voice over Internet services is the use of sub-ranges within the main geographical range as a means of making it more difficult to discriminate against the new numbers. This would be like a virtual region for new services and this solution would work best if there is no distinction between local and long-distance calls in the country concerned.

Voice over Internet providers often operate "behind" new entrant telecom operators and use the existing interconnection arrangements of these operators for their services. These arrangements may be used especially in countries where the regulatory framework makes the commercial operation of Voice over Internet services especially difficult as they may overcome some of the disadvantages such as the unavailability of geographic numbers and potentially the set-up costs of handling number portability processes.

Some service providers operate PSTN gateways in many different countries and offer their subscribers numbers in distant countries so that their correspondents may call them cheaply using a local or national number. This arrangement gives the benefits of VoIP, such as avoiding higher tariffs, to the less technically aware or low income people and is the inverse of the normal arrangement for VoIP where only persons with a PC and broadband access benefit from the use of VoIP. The arrangement is similar in some respects to the sale of

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mobile accounts to visitors to a country as a means of avoiding high roaming charges.

The range of "Find Me Anywhere" numbers may also be considered to incorporate nomadic telephony services, as the CLI and location information may be considered comparable. It should be considered that mobile network tariffs associated with the range would be difficult to segregate in the short term. The introduction of number portability would, however, negate the issue in the future.

4. Guarantees of Connectivity - Consultation 4

Question 4

Numbers allocated from the National Numbering Plan are a national resource. Is it required to have a condition in the National Numbering Plan guaranteeing that any numbers allocated to licensed operators must have the capability to be called by a customer of any other licenced operator?

Connectivity does have an influence on introduction of new number ranges and the scope specified for each different number range. If there is any risk that operators will fail to offer connectivity to new number ranges, then unless regulators are willing to enforce connectivity it would be advisable to adopt an alternative policy of widening the scope of existing ranges where there is connectivity. In Europe, under the Universal Services Directive, Member States are required to ensure that at least one undertaking provides the ability to make local and national calls, but the application of this to new services such as nomadic services provided by VoIP is not totally clear. Furthermore, even if this requirement is met by the incumbent, if other operators decide not to connect calls to VoIP services in a new number range for nomadic services, then the VoIP operators are disadvantaged significantly. This situation could easily arise if, say, 6 operators have 60% of the market between them yet none are designated as having significant market power.

Connectivity problems also occur where operators in foreign countries analyse the called number beyond the country code and may not connect calls to new number ranges.

With the break-up of the monopoly held by Batelco in the field of telecommunications, the Kingdom of Bahrain now has numerous licensed operators capable of providing established services, as well as the potential for a new range of services using the capability of

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new network technology. These new operators can have their own number ranges for their own customers, but there is no guarantee that customers of one operator can call customers of another operator.

5. The Need for Corporate Numbering – Consultation 5

Question 5

TRA requests respondents' views on whether to continue with the assignment of the (5 series) numbering range for corporate use or reassign the range for another use. If the latter, what should that reassignment be?

The previous National Numbering Plan *Consultation-26* raised the issue of corporate numbering format and allocation of number blocks. However, it did not discuss the continued need for corporate numbering. After discussion with licenced operators and at their request, the subject of the continued use of corporate numbers is raised again.

The rationale for corporate numbers is that large companies can easily be identified and the numbers used in marketing material will never need to change. Corporate entities can keep their numbers separate from geographical ranges allowing the same numbers to be used in case these companies move or expand from one geographical area to another.

The effect on a corporation when forced to change its contact details is a major disruption requiring changes to stationary, business cards, advertising and websites as well as having to inform all existing customers.

However, in the absence of number portability, the corporation is unlikely to move to a new supplier for telecommunications services.

If continued, the corporate numbering range will reserve 1,000,000 numbers while the total number of corporations in Bahrain is only approximately 500. This may be perceived as uneconomical use of national numbering resources.

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6. SMS and MMS Numbering – Consultation 6

Question 6

a. Respondents are invited to comment on whether there is a need to introduce a specific numbering format for message services.

b. Respondents are invited to comment on whether there should be a categorization of numbers into ranges based on cost or content.

c. Respondents are invited to mention other issues to be considered by the Authority or the operators regarding the use of a separate message numbering range.

In the initial stages of development of the messaging market, text messages were sent exclusively between mobile phone subscribers, and between the Internet and mobile phone subscribers, using public mobile numbers from national numbering plans.

For exchange of messages between users, the telephone number is used, for practical reasons, as the recipient's address. Subscribers send SMS text messages to any other subscriber just as they call any subscriber on any mobile network today. Messages originating from a subscriber are first routed to a short message exchange center on the basis of the called party's mobile number. Given that every user of a mobile telephone network has a number, no special SMS numbering is necessary.

In subsequent stages, businesses began to offer value-added services based on SMS to end users, usually at a higher charge than normal SMS. The information provided by these services is supplied on request or periodically as part of a subscription. The most popular applications include the downloading of ring tones, voting, and sports information.

Mobile or M-commerce applications – for example, paying a parking meter – have also started to emerge in some countries. Increasing numbers of fixed network operators are also starting to offer SMS to their customers.

In Europe, value-added services based on SMS most commonly use 3-6 digit short codes. Initially, operators allocated these numbers to content providers independently of each other. The codes were considered by operators to be specific to their networks. In many countries, however, a need has been identified for coordination of the allocation of these codes in order to prevent different network-specific numbers from being allocated by different operators for the

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same service, and in those cases the operators or service providers have coordinated their allocation and use.

In Hong Kong, for example, the codes “50(1-9)” are designated for value-added SMS.

Public Mobile Radiotelephone Service Operators, Personal Communications Service Operators and Mobile Carrier Licensees are entrusted by the Regulator to administer these codes. The Regulator may appoint other operators (e.g. Fixed Telecommunications Network Services or Fixed Carrier Licensees and Mobile Virtual Network Operators offering SMS) to administer these codes. TRA has allocated numbers for Short Codes services but does not specify a special categorization of the numbering ranges for assignment purposes based on cost or service.