REPUBLIC OF THE UNION OF MYANMAR

MINISTRY OF TRANSPORT AND COMMUNICATIONS

POSTS AND TELECOMMUNICATIONS DEPARTMENT

Public Consultation Document for Myanmar Numbering Plan

2016

Contents

Abbreviations

CC	Country Code
CDMA	Code Division Multiple Access
CLI	Calling Line Identity (also known as Caller ID)
CNA	Changed Number Announcement
DNS	Domain Name System
ETSI	European Telecommunications Standards Institute
GSM	Global System for Mobile communications
IP	Internet Protocol
ISN	International Significant Number
ISPC	International Signalling Point Code
ITU	International Telecommunication Union
MPT	Myanmar Posts and Telecommunications
MTC	Ministry of Transport and Communications
MVNO	Mobile Virtual Network Operator
NDC	National Destination Code
NGN	Next Generation Network
NSN	National Significant Number
NSPC	National Signalling Point Code
OTT	Over-The-Top
PSTN	Public Switched Telephone Network
PTD	Posts and Telecommunications Department
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol
SMS	Short Messaging Service
SN	Subscriber Number
STLM	Shwe Than Lwin Media
ToR	Terms of Reference
UK	United Kingdom
USA	United States of America
USSD	Unstructured Supplementary Service Data
VoIP	Voice over the Internet Protocol
YTP	Yatanarpon Teleport Public

1 Introduction

1.1 How to respond

This stakeholder consultation is part of a continuing review of Myanmar's Numbering Plan. Prepared by consultants working with PTD, it seeks stakeholders' views on proposals for the future of the Numbering Plan, and on related administrative and management procedures. The proposals, which include many detailed recommendations, aim to take account of views already expressed in early discussions.

A draft Numbering Plan reflecting many of the recommendations is provided in Annex A. Other recommendations will be given effect by other instruments, and in particular by amendments to the Numbering Rules which will be consulted on in due course.

Responses should if possible be in the English language (or include a translation into English) and must be sent to resource@ptd.gov.mm, copied to cbm@antelope.org.uk, by 30 December 2016. Responses will be shared with other interested parties, with the exception of any material that responders mark as confidential.

Stakeholders are invited to comment on any aspect of this document, but in particular to say whether or not they agree with the proposals, with reasons. For convenience, the detailed recommendations are reproduced below, together with the page where each (and the relevant discussion) can be found.

1.2 High-level proposals

Recent legislative changes have put the regulator nominally in control of the national numbering plan and its future. However it is not yet possible for any real control to be exercised, or clear forward planning to be undertaken, because the current use of numbers is not properly recorded, and is constantly changing.

Preliminary, urgent, proposals are therefore:

- To assemble and publish a full, correct record of current use of number blocks and short numbers, including all plans for new or changed use, together with their status.
- To put on hold any additional use of number blocks and short numbers, without specific regulatory authorisation, until this review has been completed.

The main proposals of the review so far are:

- If properly managed, the plan has plenty of capacity for all foreseeable requirements.
- Proper management procedures must now be introduced.
- A few modest numbering changes should suffice to make the plan robust for competition and new services, while improving user-friendliness.
- Large-scale changes to geographic numbering, such as MPT has envisaged, are not obviously needed. If such changes take place, they should be designed to achieve their objectives while minimising disruption to users. A design of this kind is put forward in this document.
- Long-term flexibility of the plan could be improved by some minor changes to NDCs. These could be carried out now or reserved until such time as they are clearly needed, with precautions to ensure that they remain easy.

1.3 List of detailed recommendations

1.3.1 High-level architecture

1.3.2 Geographic numbering

1.3.3 Mobile numbering

Recommendation 5.2.1: The NSN block '969 xxx xxxx' should be saved for the fourth mobile operator, with '968 xxx xxxx' and '967 xxx xxxx' earmarked for its expansion when necessary. 31

Recommendation 5.2.2: Existing mobile operators with only ten-digit GSM numbers should be invited to identify the number blocks into which they would prefer to expand long term, and the regulator should respect these preferences as far as practicable. 31

Recommendation 5.3.1: The regulator and the operators should consider moving from a 'utilisation threshold' to a 'months to exhaust' approach to permission to apply for new number blocks. 34

Recommendation 5.3.2: Mobile operators should provide their views on how many months it would be appropriate to build in to a 'months to exhaust' approach. The regulator should then specify how many months would be required. 34

Recommendation 5.3.3: If a utilisation threshold is retained, it should be set at a level which allows for a large distribution pipeline, so as not to disadvantage new market entrants. The level of 60% may be resaonable for the time being. 34

Recommendation 5.3.4: Whichever of these approaches is adopted, licensees should be permitted to apply for enough numbers to cover at least six months' forecast need from the date of the application. Each forecast should be accompanied by a copy of the previous forecast, showing actual outcomes. 34

Recommendation 5.3.5: Application and reporting procedures should use a simplified set of three status options for allocated numbers in place of the six currently used. When applying or reporting, licensees should provide brief explanations of their categorisation of numbers, for example why numbers are not available for assignment to end users. 34

Recommendation 5.3.6: Users should be entitled to a minimum period of non-use of 90 days before an account is deactivated. Deactivation must be preceded by clear warnings and a grace period of at least 15 days during which reactivation remains possible. "Use" here includes at least any outgoing or incoming communication and any credit recharge; it may but need not include simply switching the phone on. 35

Recommendation 5.3.7: Operators may retain deactivated numbers in their "cooling pool" for up to a given period from deactivation. The period will be set by the regulator and may be changed from time to time following consultation; initially it is one calendar year. 35

1.3.4 Short numbers

Recommendation 6.1.1: to achieve the desired co-ordination among operators, the regulator's management of short numbers should be extended to digits '2' to '9', with industry participation. As specified in the relevant Code of Practice, the regulator's management would be on a voluntary basis for mobile operators, and would last until an industry body is ready to take over this role. 37

Recommendation 6.3.1: Major emergency numbers, and others likely to be called by people in distress, should normally be of Type A. In particular, if special services are dedicated to highway emergencies, a standardised number to call them out should be provided; '198' would seem a natural candidate. (Existing access methods can continue in parallel if desired). 39

Recommendation 6.3.2: A set of related and unused numbers, such as '156xx' to '159xx', should be designated as Type A and set aside for potential public service use. These would be reserved for central and local government applications which need to be easily accessible to the general public. 39

Recommendation 6.3.3: An attractive and memorable number staring with '1' should be designated as Type A and set aside for use by a child helpline, when one is available in Myanmar. Other social welfare helplines could also get similar treatment. Both '1098' and '116' appear to be available and could be used, if there is a desire to join in either of these international harmonisation efforts; for that matter, the Thai '1387' and Malaysian '12999' also appear to be available. 40

Recommendation 6.4.1: Telecom services which are special to fixed networks only should continue to be provided on '10x', which should be designated Type B. 40

1.3.5 New services

1.3.6 Administration and management

1.4 The need to review numbering

Following a late market liberalisation and the licensing in 2013 of two new mobile operators to compete with the incumbent MPT, demand for mobile phones in Myanmar is booming, and correspondingly, so is demand for mobile phone numbers. An additional mobile licence has recently been issued, which will require its own number blocks. In parallel, the wider economy is also growing and there may be new demands for other kinds of numbers – fixed as well as mobile, and also possibly machine-related numbers and numbers for freephone and other special services.

So far numbering has catered to demand, but it is not clear that it can continue to do so indefinitely. PTD has therefore embarked on a thorough review of the Numbering Plan, leading to proposals both for handling immediate demand for numbers and for longer term development of the plan.

At the same time PTD has initiated a review of certain aspects of the existing Numbering Rules and allocation procedures, and considered the treatment of vanity numbers. Stakeholders will be consulted later on amendments to the Numbering Rules.

The recommendations are made in the broad national interest. However, PTD wishes to take account of the views of telecoms licensees, to ensure that recommendations are practicable in the Myanmar environment, and as far as possible are acceptable to licensees as well as to the general public.

1.5 Summary of relevant regulatory instruments

The regulatory instruments referred to in the course of this review are as follows.

1. The Numbering Rules 2013, which outline some features of the Numbering Plan and provide detail on numbering management and administration. This review will lead to a later consultation on amendments to the Numbering Rules. It is important to note that the Rules exist in both English and Myanma versions which differ in some respects, with the Myanma version being the official one.
2. Chapter VII of the Telecoms Law 2013, which outlines the regulator's powers and licensees' responsibilities in relation to the telecommunications numbering plan.
3. The Licensing Rules 2013, which permit Network Facilities Service (Individual) Licensees and Network Service Licensees to apply for numbers and offer directory and directory enquiry services. They also oblige licensees that have been allocated numbers to:

- Maintain accurate records of users' numbers and make these records available on reasonable terms to other licensees wishing to provide directory or directory enquiry services.
- Respect users' requests to be excluded from directories and directory enquiry services (if they provide these).
- Provide emergency service access free of charge on designated emergency codes.

4. Draft Guidelines on Annual Numbering Returns, which have been used both for making annual numbering returns and to accompany applications for numbering block allocations.
5. The Code of Practice for Special Access Codes, Short Codes, and Short Numbers (2014), which adds some detail on these topics.
6. The draft Framework for Vanity Numbers (2014).
7. A letter from PTD to the main licensees dated 28 August 2014, which sets out number charging arrangements.

1.6 Objectives for the numbering plan

The objectives for the review are those that are normal for numbering plans, and are summarised in paragraph 2 of the English version[1] of the Numbering Rules, namely to:

i. ensure an adequate supply of numbers at all times;
ii. make the plan as user friendly as possible;
iii. give competing service providers equal access to numbering resources;
iv. minimize disruption to existing users when changes are made (and in particular to avoid changing existing numbers as much as possible);
v. keep the costs of all changes to a minimum for both service providers and users; and
vi. ensure that any changes to the numbering plan do not adversely impact the existing tariffing structure.

This review interprets the objectives as applying over the lifetime of the numbering plan, which should be as long as possible and at least some decades. This means that costs of near term change are weighed against avoiding greater costs long term.

1.7 Terminology

In this document the following terms are used:

- A *National Destination Code (NDC)* is the digit or digits identifying a geographic area (in the fixed network), such as '1' for Yangon or '67' for Naypyitaw, or a non-geographic service type, such as '9' for mobile[2]. NDCs can be dialled from outside the country when preceded by the *Country Code* (CC).

[1] The Myanma version, which is definitive, omits this passage.

[2] The term "trunk code" is also often used with this meaning, but in the existing Myanmar Numbering Rules, it means the national prefix ('0'), and in the ITU definitions in E.101, it refers to identifying a geographic area.

- A *subscriber number (SN)* is the sequence of digits following a NDC that identifies a specific subscriber or network termination point within that NDC, such as '421053' for a particular office within Naypyitaw.

- A *National Significant Number (NSN)* comprises an NDC followed by a subscriber number. An *International Significant Number (ISN)* comprises a Country Code ('95' in the case of Myanmar) followed by an NSN. Where the word "number" is used on its own in this report, it refers to an NSN (unless the context requires otherwise, when the word refers to a subscriber number).

- The *national numbering plan* specifies the intended use of all NDCs, including the lengths of subscriber numbers within each. It applies to all operators and is meaningful internationally. It also covers *national-only numbers* (such as short codes) which cannot be accessed from outside the country. Numbering plans change infrequently, following consultation.

- The *allocation table* specifies the numbers that the regulator has allocated to each operator (or to each purpose, where all of the operators have to implement access to the number). The allocation table is changed in response to successful requests for the allocation of numbers; as such it conforms with, but includes more detail than, the national numbering plan[3].

- An *allocation* of numbers is a grant by the regulator of rights of use of numbers to an operator, while an *assignment* of numbers is a grant by an operator of rights to an end user. This is as in the existing Myanmar Numbering Rules, not as in the ITU definitions in E.101, where "assignment" is used for both these, and "allocation" is used for associating number ranges with areas or services, without granting rights of use. Further, a *sub-allocation* of numbers is a grant by an operator of rights to another operator. Other documents (from the ITU and elsewhere) have yet other usages.

- A *block* is a set of numbers that have the same first few digits as each other and the same length. Usually, a block includes all the numbers of this description and therefore the quantity of numbers that it contains is a power of 10. For instance, a block of numbers having '234' as the first three digits and a length of 6 digits contains a thousand numbers; it is often written as '234xxx' or '234 xxx'.

- A "six-digit number" is a number having six digits after the omission of spaces, such as '2 34567' (which has NDC '2' and subscriber number '34567'); it can also be referred to as having *length* 6. The terms "seven-digit number", "eight-digit number", "nine-digit number" and "ten-digit number" are used similarly.

- A *prefix* is a digit or set of digits dialled before a National (or International) Significant Number to signal to the network the caller's selection of a certain number format, service or carrier. It is not part of the numbering plan. Common prefixes are the national prefix '0' and international prefix '00', which are recommended by the ITU and used in Myanmar.

- A *short code* is a short sequence of digits (typically of 3 to 6 digits) that is usually used for a special service. By contrast with NDCs, short codes cannot be dialled successfully from outside the country. They are harmonised between operators to varying degrees. For example, all operators usually implement the same short codes for use in emergencies, but

[3] The Danish allocation table at https://ens.dk/sites/ens.dk/files/Tele/nummerliste8-cifredeabonnentnumre.xls is a good example.

different operators often have different short codes for their own customer service functions.

- A *clash* occurs when two or more numbers are treated as being the same as each other even though they are intended to be different. For instance, the six-digit numbers ‘234567’ and ‘234568’ clash with each other in a system that distinguishes between numbers on the basis of their first five digits only (in this case, ‘23456’).

2 Global trends in national numbering plans

Telephony numbering plans support service provision in two main ways, *quality* and *quantity*:

- Through the meaning embedded in numbers, usually in their early significant digits. For example, in Myanmar the first digit '1' means Yangon and the first digit '9' means mobile. The system of meaning, or coding, can be called the *quality* of the numbering plan.
- Through the *quantity* of numbers available for each desired meaning. This depends on the length of the numbers. For example, Ooredoo's mobile numbers starting '979' have 10 digits, yielding up to 10 million numbers, while MPT's mobile numbers starting '973' have 9 digits, yielding up to 1 million numbers.

Another aspect of quality is *uniformity*: generally, it is easier for the public (and, often, for operators) if they know how many digits to expect for recognised types of number, such as mobile. There can be trade-offs between quality and quantity: fewer subdivisions of the numbering space permit more efficient use.

The meaning in numbers is reduced when there is number portability. For example, with the most common type of portability, which is for mobile numbers, a number that was originally associated with one operator may belong to a different operator, so that element of meaning in the number is no longer reliable. Similarly, portability of geographic numbers between one geographic area and another reduces the geographic meaning coded into numbers. If (as has happened in a few countries) there is full portability between fixed and mobile, the meanings "fixed" and "mobile" are reduced. When call charges to fixed and mobile phones are similar, and of little concern to most users (because they are very low compared with disposable incomes), these distinctions may be deliberately abandoned to allow more efficient use of the numbering plan[4].

Historically, most countries' numbering plans were designed around the geography of the PSTN, with first digits used to indicate regions and often second digits used to indicate sub-regions. When mobile services arrived, they were numbered using any first digit that happened to be spare – often '9' or another late digit. Demand for mobile numbers now greatly outweighs demand for fixed numbers in most countries, and in response numbering plan reviews have shown two main trends, towards:

- Longer mobile numbers, following the early digits already in use. Adding a digit multiplies capacity by 10. Additional digits impose some burden on users, but with modern equipment this has become a minor factor.
- More NDCs being made available for mobile and other new services. If geographic numbering takes up too much of the available meaning[5] in the plan, it may be restructured to take up less. This is often done by prefixing all geographic numbers by a digit.

The alternative to an open numbering plan is a *closed numbering plan*, in which the whole national number (sometimes preceded by the national prefix) must be dialled for every call. Plans for smaller countries, such as Singapore, typically start closed – they may have little geographic structure, and

[4] This loss of meaning has gone furthest in Denmark, which manages well within the constraints of a uniform 8-digit numbering plan.

[5] Depending on how the plan is structured and publicly understood, this may mean too many NDCs or too many first digits having geographic significance.

relatively short numbers, so that dialling full national numbers is not burdensome. Around the world, there is a gradual movement towards open plans becoming closed, because:

- Calling from mobile phones increasingly predominates, and this usually requires full national dialling anyway.
- Lower transmission costs mean that the geography embedded in numbering plans becomes simpler, and the difference between charges for local and long distance charges reduces and often disappears. Then different dialling procedures are no longer needed to indicate different charges.
- Closing an open plan is an easy way to expand available geographic numbering capacity by 25%, as the digits 0 and 1 following the NDC can be used, as well as the previous 2 to 9. Subscriber numbers starting with 0 or 1 can be made available to new entrants in all geographic areas, providing them with consistent number blocks across the country.

Numbering plan design has always aimed to cater for the long term (measured in decades). Despite such good intentions, it has often fallen short: in particular, the enormous growth in cellular mobile took many by surprise and has required expedient measures in some countries to ensure the availability of enough numbers. On the other hand, the shift to Internet Protocol has led to talk of E.164 numbering becoming obsolete – yet it seems to have plenty of life left in it. In the face of such uncertainties, best practice in numbering planning is to allow plenty of flexibility, while not making changes before they are clearly needed. This means, in particular:

- Reserving a first digit that can be used as a prefix to expand the entire numbering plan (though actual expansion of this kind now seems to be used less than formerly).
- Having free NDCs that can be given any desired meaning. Preferably, they would not be “tainted by association” with meanings which are already embedded in public consciousness, like ‘9’ for mobile in Myanmar.
- Being able to expand the supply of any given kind of number within its existing meaning. Typically this is done by reserving one digit following the meaningful early digits.

Figure 1 summarises thoughts on long-term numbering planning from a cross-section of other Asia-Pacific countries. All are different, but all notably have consulted at some length on these plans.

Australia: A consultation was launched in November 2011 on future directions for the numbering plan, and, following consideration of responses, the regulator published its decisions in March 2015. Planned changes included additional numbers for mobiles and more flexible use of numbers generally. At the same time, numbering management is being outsourced and the exercise of discretion in numbering administration minimised, so that operations can be automated as far as possible.

Hong Kong: In June 2016, following a consultation published in October 2015, the regulator issued a statement on more efficient utilisation of the eight-digit numbering plan. It decided against extending the plan to 9 or 10 digits on grounds of avoiding the costs involved, estimated at HK$1.1bn. Instead it imposed several measures which taken together should prolong the expected life of the eight-digit plan by over a decade, from 2018 to 2029. Well before the end of that period, the longer term future of the plan will be studied.

India: In August 2010 the regulator published *Recommendations on Efficient Utilization of Numbering Resources*, following a consultation published in January 2010 and a Research Paper published in March 2009. The previous numbering plan review had led to the adoption in 2003 of a plan which proved inadequate for the unforeseen huge growth of mobile. Migration from 10 to 11 digits was considered but decided against on grounds of inconvenience and cost. Several approaches to more efficient use of the existing ten-digit plan were analysed. The Authority recommended moving to an integrated ten-digit numbering plan, in which fixed and mobile networks share the same numbering space, rather than being separate as before. The main change needed would be dialling 0 before mobile numbers when called from fixed lines, which was not done previously.

Malaysia: The Numbering Plan published in 2006 (after a consultation launched in 2002) sets out a series of planned changes and possible longer term changes, most of the latter to be preceded by further study. The planned changes included standardising the length of PSTN subscriber numbers from 6 and 7 digits to 8 digits. It appears that eight-digit PSTN subscriber numbers are in use in Kuala Lumpur but not yet elsewhere.

Singapore: The Numbering Plan dated July 2013 foresees possible future migration from 8 digits to 9 digits, and therefore does not allow nine-digit numbers to be used for the time being. First digits 2, 4, 5 and 7 are all unused.

Thailand: Following a numbering consultancy commissioned in early 2015, a working group of the regulator and telecom operators is currently considering options for the long term future of the numbering plan, aiming to make a decision by the end of 2016. A favoured option is to increase the length of fixed numbers by prefixing them all by the digit 1 (which is currently unused in this position).

Figure 1 Long term numbering planning in other Asia-Pacific countries

3 High level architecture of the numbering plan of Myanmar

3.1 Current use of NDCs

Myanmar has what is often called an *open numbering plan*, meaning it has different procedures for local and national dialling. Numbers are dialled nationally by dialling in sequence the national prefix (‘0’), an NDC (such as ‘2’ or ‘86’) having one or two digits, and a subscriber number having between five and nine digits.

The first dialled digit ‘0’ is set aside as the national (and first digit of the international) prefix. The first dialled digit ‘1’ is set aside for potentially harmonisable short codes.

Within the fixed network, numbers can be dialled locally, by dialling just the subscriber numbers without the national prefix and NDC. Fixed subscriber numbers can start with any of the digits from ‘2’ to ‘9’ without clashing with the national and international prefixes or the short codes beginning with ‘1’. Currently MPT applies local call charges when calls are dialled locally and long distance charges when calls are dialled nationally, even though the calls might be between nearby locations.

Within new mobile networks, there is no equivalent to local dialling: all calls to subscribers must use the national prefix and appropriate NDCs. MPT permits a form of “local” dialling (without the initial ‘09’) between its mobile subscribers.

Figure 2 provides an overview of current use of the first two digits of NDC space. Yangon and Mandalay have the single-digit NDCs ‘1’ and ‘2’ respectively, while NDCs starting with ‘3’ to ‘8’ all have two digits. A single two-digit NDC for new services (VoIP), ‘11’, is also in use. All first digits are used, and only 24 of the 90 possible two-digit combinations are entirely free. Annex B provides more detail on number allocations in the NDCs.

An immediate observation is that the plan is more lacking in *quality* than in *quantity* of numbers. This will be explored in detail in following sections.

First NSN digit	**Use of second NSN digit: geographic (G), mobile (M), non-geographic (N), military (D)**										**Unused second digits**	**Detail of use**	**Part of country**
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**			
1		N	G	G	G	G	G	G	G	G	1	Yangon	
2			G	G	G	G	G	G	G	G	2	Mandalay	
3	D	D	D		D		D	D			4	Military	
4			G	G	G	G	G				5	Ayeyawady, Rakhine	West
5			G	G	G	G	G	G	G	G	2	Bago, Yangon, Mon, Kayin, Tanintharyi	South
6	G	G	G	G	G	G	G	G	G	G	0	Magway, Mandalay, Naypyitaw	Centre
7	G	G	G	G	G	G					4	Chin, Sagaing, Kachin	North
8		G	G	G	G	G	G				4	Shan, Kayah, Mandalay	East
9			M	M	M	M	M	M	M	M	2	Mobile	
0												Trunk prefix	
Unused second digits	6	4	0	1	0	1	1	3	4	4	24		

Figure 2 Current uses of NSN digits

3.2 Unbalanced number allocations

Figure 3 shows that rather less than 1 million numbers have been allocated to the fixed network and about 144 million numbers have been allocated to the mobile network. Ooredoo has two blocks each of 10 million mobile numbers allocated to it, and Telenor four such blocks[6]. The rest are all allocated to MPT, to MecTel or to the military telephone network (except for a few allocated to YTP or STLM). The military telephone network has its own geographic structure which differs from that for the PSTN; by using one of only 10 first digits, it occupies 10% of the national numbering space with around 0.03% of the allocated numbers. Further details are provided in Annex B.

The figures for quantities of telephones in use and quantities of landlines per household from the Myanmar Statistical Information Service suggest that there might be about 0.5 million subscribers to the fixed network and 50 million subscribers to the mobile network; in fact the 2015 annual numbering return implies that there are slightly fewer than 0.6 million registered subscribers to the fixed network, but an unknown but possibly high proportion of these are inactive. Also, 2016 press releases from the operators indicate that there are more like 42 million subscribers to the mobile network: 18 million for MPT, 14 million for Telenor and 6 million for Ooredoo, plus 3.5 million for MecTel[7]. These would represent 50-65% utilisation of allocated fixed network numbers and 30-35% utilisation of allocated mobile network numbers[8].

Plainly, there is a big imbalance between the fixed network, which in terms of first digits occupies 80% of the national numbering space with about 1% of both allocated numbers and customers, and the mobile network, which occupies 10% of the numbering space with about 99% of both allocated numbers and customers. Mobile is also where most growth in demand for numbers is expected.

First NSN digit	**Quantity of allocated numbers (thousands) having NSN length…**					
	6	**7**	**8**	**9**	**10**	**6-10**
1		221	105			326
2	43	1	6			50
3		2	40			42
4		57	3	5		65
5		125		18		143
6		97	41	63		201
7		84	1			84
8		57	3	5		65
9			3,600	12,100	129,000	144,700

Figure 3 Current quantities of allocated numbers

[6] Ooredoo has lately been allocated a third block, which is not included in the calculations in this report.

[7] Mobile operators also need numbers in the supply chain (awaiting assignment to customers) and in the recycling process (after release by customers but not yet suitable for re-assignment).

[8] These utilisations (and most figures in this report) are derived from reconciliation of the different sources of information on allocated numbers in the middle of 2016. Some of them are quite unlike figures based on information at the start of 2016.

3.3 Varied number lengths

Figure 4 shows how NSN lengths vary between 6 and 9 digits on the fixed network and between 8 and 10 digits on the mobile network (except for the few mobile numbers that have NDC ‘1’); the first three NSN digits are the NDC plus the first (and, for ‘1’, ‘2’ and ‘9’, the second) digit of the subscriber number[9]. In some cases three NSN digits are not enough to identify blocks uniquely, or even to signify numbers all having the same length; for instance, in NDC ‘81’ the subscriber numbers ‘202 xxx’ and ‘2121 xxx’ have different quantities of digits but the same first three digits (‘812’)[10].

In NDC ‘9’ Ooredoo and Telenor both use only length 10, MecTel uses lengths 9 and 10, and MPT uses lengths 8, 9 and 10. If one operator can offer shorter numbers than others it has a competitive advantage, which may be seen as unfair.

Greater lengths pack more numbers into a given block, and hence are more efficient. The variety in length, as well as leading to inefficient use, may make users unsure when they have dialled a full number. This can cause wrong numbers to be dialled, and in turn lead to failed calls and wasted network resources.

The low quantity of numbers allocated to Mandalay, for example, is partly explained by the particularly inefficient use of the NDC ‘2’: there are 41 first three digits for six-digit numbers which could have provided eight-digit numbers instead.

In general, number blocks for the MPT fixed network appear to have been used with little regard for economy of numbering capacity or uniformity of number length. For example[11]:

- New blocks have been opened for 1,000 numbers specified just by their first two digits; for instance, in NDC ‘43’, ’ 53 xxx’ was opened in 2016, but ’563 xxx’, near the ’565 xxx’ which had already been opened, could have been used instead.
- New blocks have been opened with number lengths less than those for adjacent blocks; for instance, in NDC ‘2’, ‘56 xxx’ was opened in 2016, but ‘550 xxx’, with one more digit, was listed as opened in the 2015 annual numbering return.
- Different first digits of the subscriber number have been used when others have spare capacity; for instance, the seven allocated blocks of NDC ‘86’ use three first digits of the subscriber number (‘2’, ‘3’ and ‘4’) when they could have used just one, such as ‘2’.

Figure 4 illustrates the effect of such practices. In the fixed network 34% of the possible first three NSN digits (other than those having NDC ‘3’) have been used already, but allocated numbers are available for less than 2% of the population. In the mobile network 62% have been used already, but together Ooredoo and Telenor have used just 7% while MPT has used 49% and MecTel has used 6%.

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[9] Reconciling the different sources of information on allocated numbers involves (among other things) choosing some numbers to treat as misprints. The choices could be mistaken; in particular, in Figure 3, the NSNs with first digit ‘2’ that are said to have length 7 might actually have length 6, and the NSNs with first digit ‘4’ or ‘7’ that are said to have length 8 might actually have length 7.

[10] When two NSNs have the same first three digits but different lengths, they contribute to different columns of Figure 3, so the total quantity of used first three digits is less than the sum of the quantities of used first three digits for NSNs of different lengths.

[11] Examples like these are based on the ITU numbering change notices, which tell interconnecting operators around the world about newly opened blocks to which routes should be provided.

First NSN digit	Quantity of first three NSN digits with allocated numbers having NSN length…					
	6	7	8	9	10	6-10
1		29	12			40
2	41	1	2			41
3		2	4			6
4		24	2	2		24
5		38		3		39
6		40	4	5		42
7		30	1			28
8		27	1	4		26
9			38	11	13	62

Figure 4 Current quantities of used NSN digits

3.4 Ensuring adequate capacity and flexibility long term

The numbering plan in Myanmar shows the common features mentioned in the last section. Overall, as is discussed in more detail below, it does not lack capacity, but it does need careful management to avoid problems arising, and to provide flexibility long term. Geographic numbering, new service numbering and mobile numbering are discussed individually later in this document. However, certain high-level recommendations are already clear.

Recommendation 3.4.1: *If geographic NDCs are changed, the opportunity should be taken to free at least one and preferably more first digits from geographic NDCs, to provide long term flexibility. At the same time, the number of two-digit NDCs used by geographic numbering should be reduced, preferably freeing space which is contiguous in Figure 2 (to make it easier to give new meanings to the early digits).*

Recommendation 3.4.2: *If geographic subscriber numbers are changed, the opportunity should be taken to ensure that MPT's subscriber numbers begin with only a few first digits (taking all areas together), to make it easy for new entrants to find similar vacant blocks in different areas.*

Though it is not a current priority, there could be some advantage long term in closing the plan. As this would affect only fixed network subscribers, who are a small proportion of the total, the costs of closure would not be great, especially if the change coincides with number changes that must take place anyway.

Recommendation 3.4.3: *The option of closing the plan should be kept available for the future.*

Recommendation 3.4.4: *There shuld be a contingency plan of geographic NDCs which could be amalgamated or changed if and when the need for more NDC space arises.*

Recommendation 3.4.5: *Because of the well established advantages of more uniform number lengths, Myanmar should move towards greater uniformity in each NDC when the opportunity arises. Specifically, geographic subscriber numbers should move towards a uniform 7 digits in each NDC, and mobile numbers should normally be expected to have 10 significant digits (including the initial '9').*

4 Geographic numbering in Myanmar

4.1 Distribution of allocated numbers

4.1.1 Variations in allocation sizes

Figure 5 shows how allocated numbers are distributed between the regions and states, together with populations taken from the 2014 census. The difference between the figures for Mandalay and the figures for Naypyitaw (or even Yangon) is striking. (The figures take account of the split between Magway and Mandalay of NDC '61' but not of the few mobile numbers that have NDC '1'.)

Administrative area	State/ Region	Population (thousands)	Allocated numbers (thousands)	Allocated numbers per 100 population
Ayeyawady	Region	6,185	43	1
Bago	Region	4,867	68	2
Chin	State	479	8	2
Kachin	State	1,643	28	2
Kayah	State	287	9	4
Kayin	State	1,504	12	1
Magway	Region	3,917	43	2
Mandalay	Region	6,166	98	2
Mon	State	2,054	33	2
Naypyitaw		1,160	126	11
Rakhine	State	2,099	23	2
Sagaing	Region	5,325	49	1
Shan	State	5,824	92	2
Tanintharyi	Region	1,408	17	2
Yangon	Region	7,361	340	5
Mobile		50,280	144,700	288

Figure 5 Current allocations per administrative area

4.1.2 Differences between allocations in different NDCs

Some patterns recur in subscriber numbers; for instance, there are weightings towards numbers of the forms 'x0 xxx' and '2x xxx'. However, often dIfferent numbers have been allocated in different NDCs. This creates difficulties in, for example, finding unallocated subscriber number ranges that are the same in several NDCS. Figure 6 illustrates this for all the NDCs and for the NDCs '1', '2' and '67'.

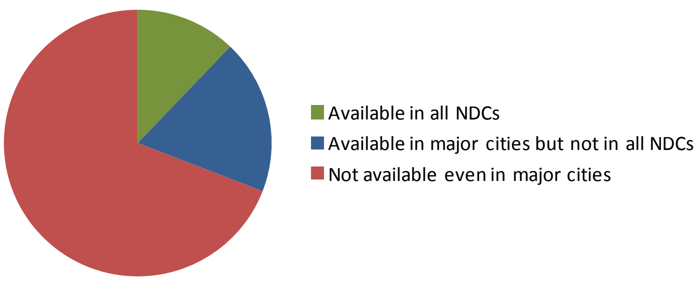

Figure 6 Proportions of matching 10,000-number blocks available in all NDCs and in major cities

4.1.3 Scattering of allocations across different NDCs

The fixed number allocations are scattered over the numbering space; the Mandalay area, for example, uses six NDCs (including one having a single digit). When calls are made between locations with different NDCs long distance charges apply, even though the locations might be nearby.

There is a case for clearing some numbering space currently used by MPT in the fixed network so that alternative operators or services could occupy it. For example, Over-The-Top (OTT) operators, which use the internet infrastructure but not conventional switching, might occupy their own space, instead of receiving sub-allocations from MPT (as currently one VoIP operator does). There are the following obvious approaches to clearing space[12]:

- Lengthening subscriber numbers to free early digits and reduce variations in lengths. For instance, numbers having NDC '2' in Mandalay and NSN lengths 6 or 7 could be extended to have NSN length 8 by prefixing the subscriber numbers by '41' or '4', thereby making available for allocation subscriber numbers starting with '2', '3', '6', '7' and '8' after the NDC '2'.
- Combining adjacent NDCs, with accompanying changes to affected subscriber numbers. For instance, the NDCs '68' and '69' could be combined, thereby freeing one of them for other purposes.
- Changing some NDCs without changes to subscriber numbers. For instance, the NDCs having first digit '4' could be replaced by NDCs having first digit '5' or '7', thereby freeing '4' for other purposes.
- Lengthening short NDCs. For instance, the main NDC for Mandalay could be changed from '2' to '20' or '21', thereby making available for use other NDCs starting with '2'.

4.2 Geographic subscriber numbers

4.2.1 Proposals for fixed network numbering in principle

MPT has prepared proposals to change subscriber numbers for the fixed network, to coincide with the ambitious fixed network modernisation plans. The proposals represent an important contribution to the development of the numbering plan. They appear to be designed to meet the following objectives for subscriber numbers for the fixed network:

- Subscriber numbers for the fixed network should have exactly seven digits. Achieving this objective would make subscriber numbers uniform in length, which would have benefits as noted above.
- Subscriber numbers for the fixed network should be different in different NDCs. This objective would allow the NDCs for the fixed network to be combined into one, and even to be removed completely if subscriber numbers in the fixed network were different also from

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[12] All the proposals in this document for number changes aim to map changed numbers into currently unused numbering space and thereby avoid clashes. This enables a period of parallel running between "old" and "new" numbers before the change takes place (a convenience for the industry) followed by changed number announcements on the "old" numbers after the change (a convenience for customers). Number changes which map changed numbers into used numbering space are possible but more difficult to manage; they are not recommended unless they are the only option.

subscriber numbers in the mobile network[13]. Closing the numbering plan in this way would offer benefits, but they do not appear to be substantial enough for it to be given high priority.

- Subscriber numbers for the fixed network should come from three blocks, each containing one million numbers. Achieving this objective would help to ensure that the numbers allocated were not scattered so widely across the numbering space, but other measures would be needed to keep the numbers together well.

Thus these objectives are all entirely appropriate when a numbering plan is being invented before any numbers have been allocated. However, this is not the position in Myanmar, where there are many fixed and mobile numbers in use. In fact:

- The costs of numbering changes can fall heavily on the users: if their numbers change, they need to change their letter heads, shop signs and vehicle signs, and if the numbers of their contacts change they need to update their address books.
- There are, of course, significant costs to the operators in changing numbers, but perhaps even more important than these are the effects on revenues: if the customers are told that their fixed network numbers are changing they might well choose to abandon the fixed network completely rather than pay for a connection that fewer people will use.
- Even limited changes to the numbering plan can easily go wrong; co-ordinating the publicity and rerouting requirements is difficult enough, without replacing the switches at the same time. Extensive changes, where such changes have never been attempted before, are very likely to go wrong.

Very large changes can achieve other objectives, but other, more modest, changes might also achieve those objectives. In addition, as shown in the next section, objectives to rearrange the NDCs can be achieved without changing many, or even any, subscriber numbers.

Recommendation 4.2.1: *Very large changes to subscriber numbers that affect most of the subscriber numbers for the fixed network are not obviously necessary; if their objectives are important, the changes should be modified to affect fewer subscribers while achieving similar objectives.*

4.2.2 Proposals for fixed network numbering in detail

Moving to a Next Generation Network (NGN) does not normally require changes to the national numbering plan, let alone very large changes such as those proposed by MPT. However, the MPT proposals might have other objectives besides those listed above. If PTD accepts the principle of making very large changes to subscriber numbers, there remains the question of what the changes should be.

MPT has developed its proposals for the changes very carefully, and the work summarised below depends heavily on them. However, the proposals as they stand have the following features that are not desirable:

- Subscriber numbers for the fixed network after the change would have first digit ‘2’, ‘8’ or ‘9’. The choice of ‘2’ would make the changes particularly difficult to implement without clashes between current numbers and changed numbers, as 30% of the subscriber numbers

[13] Users, and in some cases telephone systems, could be seriously confused if two numbers differed only because one was a shortened version of the other. In particular, NSNs for the fixed network that had first digit ‘9’ and length 7 could be confused with NSNs for the mobile network that had first digit ‘9’ and length 10.

currently start with '2'[14]. For instance, in NDC '82', both '22021' and '2202134' (the number intended to replace '22134') would be valid during the period of parallel running of the current and changed numbers, and both '22001' and '2200134' (the number intended to replace '20134') would be valid at the same time unless the changes were phased to eliminate '22001' before changing '20134'.

- The proposals would seem to change the first digit in at least 87% of the subscriber numbers that have five digits currently and the second digit in at least 27% of such numbers; similar proportions apply to the second and third digits of subscriber numbers that have six digits and to third and fourth digits of subscriber numbers that have six or seven digits. Overall 82% of subscriber numbers would have different final five digits before and after changing.
- The proposals would tend to lose the geographic significance of fixed network numbers. For instance, '42xxx' with NDC '73' would become '2635xxx'; '4000xxx' with NDC '2' would become '2806xxx'; and '580xxx' with NDC '1' would become '2337xxx'; the changed numbers would bear little relationship to either the current numbers or the locations.

In summary, the MPT proposals do not provide relatively simple rules that MPT employees and customers can use to determine the likely changes to the subscriber numbers of their contacts. However, the proposals can be modified to provide such simple rules. In the modified proposals, whose details are given in Annex D:

- Subscriber numbers after the changes have first digit '7', '8' or '9'. The choice of '7' minimises the risk of clashes between current numbers and changed numbers, as 3% of the subscriber numbers currently start with '7', while 12% start with '8' and 3% start with '9'.
- Clashes are avoided completely by requiring that in any NDC the changed subscriber numbers differ from the current subscriber numbers in their first two digits. For instance, '70', '72', '74' and '75' are currently used as the first two digits of subscriber numbers with NDC '82', so, though changed subscriber numbers with this NDC start with '7', they do not have '0', '2', '4' or '5' as their second digit (which is in fact always '8'). In particular, there is no need for the changes to be phased in order to avoid clashes.
- In any NDC all of the changed subscriber numbers have the same first digit as each other ('7', '8' or '9), which indicates broadly whether the NDC is in the north ('7'), the centre ('8') or the south ('9') of the country; moreover, they have the same first two digits as each other if they result from changing current subscriber numbers that have five digits. For instance, in NDC '67' (and indeed in every NDC in the centre of the country) all changed subscriber numbers have first digit '8'; also, in NDC '67' changing subscriber numbers that have five digits just entails prefixing them with '86', while changing '521 xxx' results in '8521 xxx' and '8421 xxx' remains unchanged.
- The first digit of the subscriber numbers that have seven digits currently is changed in 53% of cases; the second digit is changed in 5% of cases. The third and fourth digits are not changed.
- The first digit of the subscriber numbers that have six digits currently is changed in 29% of cases. The second and third digits are not changed.

[14] The choice of '9' as a first digit of subscriber numbers can also be questioned, as the Numbering Rules currently ban it (though there are already such numbers). However, the main purpose of this ban is presumed to be ensuring that a first digit is available for use in large numbering changes that themselves make available other first digits; the proposals by MPT obviously do make such first digits available.

- The first digit of the subscriber numbers that have five digits currently is changed in 16% of cases. The second digit is not changed. Overall 9% of subscriber numbers have different final five digits before and after changing, so 91% of blocks of 100,000 subscriber numbers (and any associated geographic significance) are preserved intact. For instance, ’38 xxx’ with NDC ‘67’ becomes ‘8638 xxx’, ‘’580 xxx’ with NDC ‘1’ becomes ‘9580 xxx’, and 5178 xxx’ with NDC ‘2’ becomes ‘7178 xxx’.
- Because there is no change to the second digit of subscriber numbers that have five digits currently, the third digit of subscriber numbers that have six digits currently and the fourth digit of subscriber numbers that have seven digits currently, all blocks of 10,000 subscriber numbers are preserved intact.

When modified in this way the proposals continue to meet the original objectives but also reduce very greatly the complexity of the changes for MPT employees and customers alike.

Further simplification is possible by making subscriber numbers have exactly seven digits without making subscriber numbers be different in different NDCs. With this further simplification, whose details are given in Annex E.

- The same subscriber numbers in different NDCs undergo the same changes as each other, with very few exceptions (which are needed to avoid clashes). Consequently blocks of numbers in different NDCs that are identical with each other before the changes are almost always identical with each other after the changes. For instance, ‘401 xxx’ becomes ‘7401 xxx’, regardless of whether the NDC is ‘1’ or ‘67’.
- Clashes are avoided completely by requiring that in any NDC the changed subscriber numbers differ from the current subscriber numbers in their first two digits.
- All of the changed subscriber numbers have the same first digit as each other (‘7’, for preference) if they result from changing current subscriber numbers that have six digits; moreover, they have the same first two digits as each other (‘78’, for preference) if they result from changing current subscriber numbers that have five digits.
- The subscriber numbers that have seven digits currently are not changed.
- The first digit of the subscriber numbers that have six digits currently is changed in 10% of cases. The second and third digits are not changed.
- The first digit of the subscriber numbers that have five digits currently is changed in 1% of cases. The second digit is not changed. Overall 1% of subscriber numbers have different final five digits before and after changing, so 99% of blocks of 100,000 subscriber numbers are preserved intact.
- Because there is no change to the second digit of subscriber numbers that have five digits currently, the third digit of subscriber numbers that have six digits currently and the fourth digit of subscriber numbers that have seven digits currently, all blocks of 10,000 subscriber numbers are preserved intact.

Recommendation 4.2.2*: If it is decided to make very large changes that affect most of the subscriber numbers for the fixed network, the changes should be based on modifications to the MPT proposals like those above, rather than on the original MPT proposals.*

Recommendation 4.2.3*: Additional geographic subscriber numbers that have first digits ‘9’, ‘8’ and ’7’ should not be allocated if the modifications to the MPT proposals are at all likely to be adopted .*

Recommendation 4.2.4*: No geographic subscriber numbers that have first digit pair '78' should be allocated, to preserve the possibility of making all geographic subscriber numbers have seven digits in a relatively simple way.*

Recommendation 4.2.5*: To maximise opportunities for operators to have identical number blocks in different geographic NDCs, sets of geographic subscriber number blocks which are identical either in all of the geographic NDCs or in the NDCs '1', '2' and '67' should not be allocated unless the the applicant for numbers has specifically requested identical blocks in those NDCs.*

Recommendation 4.2.6*: To avoid fragmenting numbering space unnecessarily, 10,000-number blocks should where possible be allocated from within partially-allocated 100,000-number blocks and 1,000-number blocks should where possible be allocated from within partially-allocated 10,000-number blocks.*

Recommendation 4.2.7*: Newly allocated geographic subscriber numbers should have seven digits.*

4.3 Geographic NDCs

Figure 7 shows the map of geographic numbering areas in Myanmar put forward in the first (1994) formal numbering plan for the country. The current geographic NDCs differ somewhat from those shown here, particularly by not using the first digit '3', which has been dedicated to use by the military. However, the overall impression remains valid, of a regional numbering plan with groups of adjacent NDCs sharing a first digit.

Figure 7 1994 plan for geographic NDCs

Figure 2 provides an overview of current geographic NDCs in Myanmar. Figure 8 summarises changes to them that MPT proposes, in conjunction with the geographic subscriber number changes discussed in the previous section. The second column shows on which of the two future main soft switches each state or region will be based – “N” for the North switch in Mandalay, and “S” for the South switch in Yangon.

Administrative area	N/S	Current NDCs	Proposed NDCs	Change
Ayeyawady	S	42, 44, 45, 46	40, 42	Frees 45, 46; uses new 40
Bago	S	52, 53, 54, 55	52, 53, 54	Gives whole of 55 to Yangon
Kayah	S	83	47	Complete change, frees 83, uses new 47
Kayin	S	58, 54	58	Gives whole of 54 to Bago
Magway	S	60,61,62,63,65,68,69	62, 63	Frees 60, 61, 65, 68, 69
Mon	S	57	57	None
Naypyitaw	S	67	67	None
Rakhine	S	43	43	None
Tanintharyi	S	59	59	None
Yangon	S	1, 45, 55, 56	1, 55, 56	Frees 45, takes whole of 55
Chin	N	70	70	None
Kachin	N	74	74	None
Mandalay	N	2, 61, 64, 66, 85, 86	2, 61, 64	Frees 66,85,86
Sagaing	N	71, 72, 73, 75	71, 75	Frees 72,73
Shan	N	81, 82, 84	81, 82, 84	None

Figure 8 Changes to geographic NDCs proposed by MPT

The connection between these NDC changes and the subscriber number changes proposed by MPT is not clear, especially as the subscriber number changes would permit all the geographic NDCs to be combined. In fact, the subscriber number changes proposed by MPT are much larger than those needed merely to avoid clashes when changing the NDCs: they would affect the subscriber numbers of at least 370,000 registered subscribers[15]. By comparison:

- Making changes with the sole purpose of avoiding clashes when making the NDC changes in Figure 8 would entail changing the subscriber numbers of at most 90,000 registered subscribers.
- Making changes with the sole purpose of avoiding clashes when making each administrative area have only one geographic NDC would entail changing the subscriber numbers of at most 110,000 registered subscribers.

The objectives of changing the NDCs appear to be simplification and reduction in the number of NDCs used, together with a better alignment with administrative areas (states and regions). These objectives are in keeping with longer term aims for the numbering planning, as discussed above. However, the importance of aligning the NDCs with administrative areas is not immediately apparent, even though MPT is currently a government department.

[15] The proposals by MPT display a way of reducing the quantity of NDCs, to at most three for each region or state. It is not clear why this would be worth doing, when the same proposals would permit each region or state, or even the entire country, to have one geographic NDC. It may relate to MPT’s plans for local charging, which could usefully be contributed to the discussion.

Overall, the changes would reduce the number of two-digit geographic NDCs from 35 to 26. They would generally keep or improve the geographic logic of the NDCs (with the strange exception of the change in the Kayah NDC from ‘83’ to ‘47’, when all other ‘4x’ NDCs are at the far side of the country). However, slight modifications to them might achieve greater long-term benefit with no more disruption. In particular:

- The Kayah NDC could be left unchanged.
- The Ayeyawady NDC could be different from ‘40’, to leave ‘40’ available for new services.

In future, if local and long distance charges converge, much more sweeping changes, including the complete abolition of geographic NDCs, could also be considered without risking constriction of geographic networks. As has been discussed above, both MPT’s proposed changes and the modified changes set out there lead to all geographic subscriber numbers in Myanmar easily being accommodated within a single seven-digit number range, with MPT’s customers concentrated on only three first digits, leaving plenty of room for competition and growth.

However, as noted in the previous section, there are other possible changes to the NDCs which achieve objectives such as reduction in the number of NDCs used with very much less disruption than those discussed here. For instance:

- All NDCs with first digit ‘4’ could be made available for purposes other than fixed network numbering by replacing those NDCs with ones having first digit ’5’ or ‘7’. The NDCs of about 30,000 registered subscribers would be changed, but the subscriber numbers would not be changed.
- All NDCs with second digit ‘0’ could be made available for new services by replacing the NDCs ‘70’ and ‘60’ (by ‘76’ and ‘87’, for example). The NDCs of about 5,000 registered subscribers would be changed, but the subscriber numbers would not be changed.

In these instances the NDCs could be merged with others (not just replaced by others) if the subscriber numbers were changed along with the NDCs.

Recommendation 4.3.1: *Very large changes to NDCs that affect most of the subscriber numbers for the fixed network are not obviously necessary; if their objectives are important, the changes should be modified to affect fewer subscribers while achieving similar objectives.*

Recommendation 4.3.2: *MPT’s current proposals for NDC changes should be amended to keep the ‘x0’ series of NDCs free for new services.*

Recommendation 4.3.3: *MPT should report to the regulator what future possible reductions in geographic NDC use are compatible with its network and charging plans. In the light of MPT’s report, the regulator should draw up plans for reducing geographic NDC use, if needed, and when this can be done without depriving the public of a necessary charge indicator.*

Recommendation 4.3.4: *New geographic NDCs should be created only as replacements for existing ones.*

Recommendation 4.3.5*: The remaining subscriber number blocks in NDCs ‘60’ and ’70’ should be protected, so that, if necessary, these NDCs could be made available for new services with minimum inconvenience to registered subscribers.*

5 Mobile numbering in Myanmar

5.1 Length of mobile numbers

Even if mobile only has the single first digit '9' of the numbering plan, with an NSN length of 10 digits that is a gross capacity of 1,000 million numbers – which at first sight seems enough for a country of around 50 million people. However, it is not all being used with this NSN length. Figure 9 summarises the current position. Worth noting are that:

- MPT is using five of the ten second digits exclusively and another two shared with other operators, while its associate MecTel is using another.
- Only two second digits plus another 18 blocks at the three-digit level (there are 100 of these, each potentially of 10 million numbers) are completely free.
- Ten-digit numbers are used in only 13 of the occupied 62 10-million-number blocks (those coloured green in the figure). Nine-digit numbers are used in a further 11 such blocks (coloured yellow), with 10% of the efficiency of ten-digit numbers, and eight-digit numbers are used in the remaining 38 such blocks (coloured red), with 1% of the efficiency of ten-digit numbers.

In other words, the current use of the space is inefficient.

First two NSN digits	**Quantity of fourth NSN digits with allocated numbers having third NSN digit…**										**GSM operator**	**CDMA operator**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**		
91												
92	10	10	10	10	10	6	10	10	10	10	MPT	-
93	10	10	10	3		10				10	-	MecTel
94	1	10	1	8	10		10	10		5	MPT	-
95	10	10	10	10	10	10	10	10	10	10	MPT	-
96	10	10	10	10	10	10	10	10	10	10	-	MPT
97			10			10	10	10	10		Telenor	MPT (973)
98	10	10	10	10	10	10	10	10	10	10	-	MPT
99	10					10	10				Ooredoo	MPT (991)
90												

Figure 9 Mobile number blocks now

Key for Figure 9 and Figure 10

Red shading: 8-digit numbers, yellow shading: 9-digit numbers, green shading: 10-digit numbers.

Figure 10 shows an example of how use could easily become more efficient, clearing number blocks for growth and completion. This example supposes that eight-digit and nine-digit GSM NSNs are changed to ten-digit numbers as follows:

- Eight-digit numbers starting '92' (of which around 88,000 are in active use) are changed to start '9222' (so '92 123456' becomes '9222 123456').
- Eight-digit numbers starting '95' (of which around 290,000 are in active use) are changed to start '9555' (so '95 123456' becomes '9555 123456').

- Nine-digit numbers starting ‘94’ (of which around 210,000 are in active use) are changed to start ‘949’ (so ‘94 1234567’ becomes ‘949 12345678’).

Similar changes could be applied to the CDMA numbers, but as these are in decline they might just be given a chance to die out over the next few years. There is however a plan to clear CDMA numbers from ‘96’, moving the customers concerned to part of ‘94’, with ten-digit numbers.

Because of incomplete data, it is not clear whether the specific changes above would avoid clashes with existing numbers. However, something like them could be devised to be workable for the industry and not a serious problem for the customers involved.

First two NSN digits	**Quantity of fourth NSN digits with allocated numbers having third NSN digit…**										**GSM operator**	**CDMA operator**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0**		
91												
92		1			10	6					MPT	-
93	10	10	10	3		10				10	-	MecTel
94		10		8	10				4	5	MPT	-
95					1						MPT	-
96	10	10	10	10	10	10	10	10	10	10	-	MPT
97			10			10	10	10	10		Telenor	MPT (973)
98	10	10	10	10	10	10	10	10	10	10	-	MPT
99	10					10	10				Ooredoo	MPT (991)
90												

Figure 10 Mobile number blocks after extending GSM numbers to 10 digits

MPT has requested not to be obliged to lengthen the numbers of its early adopting customers. However, there are strong arguments against acceding to such a request:

- Arguably, the short numbers give MPT an unfair competitive advantage (as well as occupying an unreasonable amount of numbering space). Mobile competition is central to market development in Myanmar.
- Uniform length mobile numbers would reduce user uncertainty and dialling error for many calls.
- The customers concerned might well accept the change without complaining; but if they do not, then it is only fair that MPT should aim to retain their business through good service rather than through short numbers.

Recommendation 5.1.1: *For competitive fairness, caller convenience and economical use of numbering space, GSM NSNs of less than 10 digits should be extended to 10 digits well in advance of more mobile numering space being needed. To minimise difficulties for called customers, a simple prefix mechanism should be identified and reserved for this purpose, avoiding clashes with other allocated number blocks.*

5.2 Numbers for expansion of mobile

A fourth mobile operator has recently been licensed and will need number blocks. An initial allocation cannot wait for blocks to be cleared, and should permit expansion into adjacent blocks. All operators should be treated similarly in this regard.

Recommendation 5.2.1: *The NSN block '969 xxx xxxx' should be saved for the fourth mobile operator, with '968 xxx xxxx' and '967 xxx xxxx' earmarked for its expansion when necessary.*

Recommendation 5.2.2: *Existing mobile operators with only ten-digit GSM numbers should be invited to identify the number blocks into which they would prefer to expand long term, and the regulator should respect these preferences as far as practicable.*

5.3 Utilisation of mobile numbers

Numbering Rule 15(b)(i)6 (English version, 12(b)(vi) Myanma version) requires applications for number blocks to be accompanied by "the current utilization of any similar allocations already made to the Licensee and a forecast of expected utilization over a specified period." Rule 9(h) (English version, 7(h) Myanma version) also requires each Licensee to "submit an Annual Numbering Return that provides information to the Department about the allocation's status and the Licensee's use of numbers."

Neither *utilization* nor *use* is defined in the Rules, but the draft form for annual numbering returns distinguishes the following six number status options:

1. RD Inv: numbers already sold to resellers or dealers.
2. Active: numbers already assigned to end users.
3. R&H: reserved and held numbers.
4. Admin: numbers used for administrative purposes.
5. Not used: remaining numbers that have not been assigned.
6. Cooling: numbers currently being quarantined from being re-assigned.

It also defines utilisation as the percentage of all allocated numbers in the four status options 'active', 'R&H', 'admin' and 'cooling', taken together.

Inspection of available annual number returns shows that operators are interpreting the status options and definition of utilisation differently from one another, and possibly also changing their own interpretations over time. Discussions with operators have also revealed needs for clarification and consistency in this area, together with reasonable criteria for the regulator to apply when assessing applications for additional blocks. Figure 11 offers a clearer picture of these status options.

Status symbol	Status option	Availability for assignment to end users	Remark
A	Not used	Yes, available	Available for distribution channel once paired and kitted.
B	RD inv	Yes, available	In distribution channel; supply locations may not match demand locations. Vanity numbers are included.
C	Reserved and held	No, already linked with specific user	Numbers which are close to being assigned to end users[16]. If only *held*, may revert to being available.
D	Active	No, already linked with specific user	Status continues until final deactivation; may differ from status "active" when counting subscribers.
E	Cooling	No, unavailable	Will become available again once cooled (i.e. with low risk of receiving calls for previous user, and all billing etc complete).
F	Admin	No, unavailable	Unlikely to become available – may be needed within the network, for example for testing purposes, or for other reasons (such as misdialling risk) are unsuitable or unavailable for assigning to end users.

Figure 11 Status options for allocated numbers

There is a particular difficulty in Myanmar over the status 'RD inv'[17], which can be thought of as the distribution pipeline. Usual international practice (reflected in the utilisation definition above) is not to include this in the definition of utilisation, because the numbers in question are available for assignment to end users. However, in Myanmar, the proportion of numbers in the pipeline is unusually large, because the market is expanding so fast; this includes expansion of the distribution network, parts of which need stocks of numbers[18] in advance of having any customers. It is also hard to forecast the needs of new distributors, and foolish to under-supply them, so some distributors may get excess stock while others run short.

The purpose of requiring a utilisation threshold for new number block applications is to encourage licensees to use number allocations efficiently. If utilisation thresholds continue to be required, the difficulty relating to 'RD inv' could be dealt with in the following ways:

- 'RD inv' could be added to the definition of utilisation. This is in fact how some operators have been interpreting the definition. However, this approach does not encourage operators to control the size of their pipeline; it could encourage premature applications for new numbers, and potentially irresponsible competitive gaming.

[16] A Canadian definition (see http://www.crtc.gc.ca/public/cisc/c-docs/cocaglag.doc) distinguishes between the two terms according to whether or not a customer has signed a contract for service using the numbers. If a legally binding service agreement is in place, the numbers are 'reserved'; before that stage is reached, the numbers are simply 'held'. During a competitive bidding process, more than one operator may *hold* numbers for the same customer, but when a supplier has been chosen, only one operator should *reserve* the numbers. These statuses are probably of little relevance in the context of Myanmar

[17] Presumably Inv is short for Inventory.

[18] Actually, stocks of SIM cards, each of which has a number.

- If a single utilisation threshold applies across all operators for the grant of new numbers, it could be set lower than usual[19] to allow for the size of the pipeline. Unfortunately, any single threshold has the disadvantage of favouring longer established operators who have a large base of allocated numbers and can get by with smaller pipelines. Arguably, periodic changes would also be required in the threshold to maintain an incentive as the market develops.
- The regulator could be expected to assess each application on its merits, with more detail being supplied in the application on the reasons for the existing utilisation level as well as the new requirements. This is labour-intensive for both operator and regulator, could further delay an already slow approval process, and opens the door to unfair treatment.

Alternatively, the requirement for a utilisation threshold could be dropped, and application criteria could be framed in terms of *months to exhaust*[20] rather than utilisation.

Here *exhaust* means 'run out of numbers to assign to end users', and the number of months is open to discussion in this consultation (the NANPA typically uses six months). Applications must demonstrate expected exhaustion within the given period, using past history as well as future projections, and taking account of both the pipeline and the pool of cooling numbers, some of which will be recyclable within the period. This appears to be objective and fair, and to provide the right signals to operators.

The two approaches of a utilisation threshold and months to exhaust are closely related. Using the symbols in the first column of Figure 11, the total of an operator's allocated numbers can be written as T = (A+B)+(C+D)+(E+F). Here (A+B) represents available numbers while (C+D) and (E+F) represent unavailable numbers.

Utilisation, U is defined as ((C+D)+(E+F))/T (or 1- (A+B)/T), generally expressed as a percentage. This takes no account of the demand for new numbers, but the Numbering Rules (15b)i6) and 15c) English version, 12b)i6) and 12c) Myanma version) specify that applications should include utilisation forecasts and be submitted 3 months in advance of the planned in-service date.

Months to exhaust, M, would normally be calculated to a first approximation as (A+B)/N, where N is the expected monthly demand for new numbers. The re-use of cooled numbers, if significant, can be allowed for by reducing the monthly demand for new numbers (N) by the monthly supply of cooled numbers (ΔE), giving the formula M = (A+B)/(N-ΔE).

Both approaches require assessments of current and expected use of numbers. The months to exhaust approach avoids the awkward specification of utilisation thresholds, replacing it by a number of months which can be the same for all licensees, and can take account of the regulator's capacity to handle allocation applications. For this reason it appears preferable.

It is notable that neither approach relies on the full detail of all six of the status options currently mentioned in the application form. A simplified set of three status options appears to be adequate for application and reporting purposes:

- Available for assignment to end users
- Already linked to end users
- Not available for assignment to end users

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[19] Thresholds for mobile numbers are usually somewhere between 50% and 80%, tending towards the higher end and rising over time.

[20] This term and approach are borrowed from the North American Numbering Plan Administration (NANPA).

A draft application form for the reservation or allocation of E.164 numbers, and a redrafted version of the annual numbering return template, are in Annex G and Annex F. Both incorporate the suggestions here, showing how they could be implemented.

Recommendation 5.3.1: *The regulator and the operators should consider moving from a 'utilisation threshold' to a 'months to exhaust' approach to permission to apply for new number blocks.*

Recommendation 5.3.2: *Mobile operators should provide their views on how many months it would be appropriate to build in to a 'months to exhaust' approach. The regulator should then specify how many months would be required.*

Recommendation 5.3.3: *If a utilisation threshold is retained, it should be set at a level which allows for a large distribution pipeline, so as not to disadvantage new market entrants. The level of 60% may be resaonable for the time being.*

Recommendation 5.3.4: *Whichever of these approaches is adopted, licensees should be permitted to apply for enough numbers to cover at least six months' forecast need from the date of the application. Each forecast should be accompanied by a copy of the previous forecast, showing actual outcomes.*

Recommendation 5.3.5: *Application and reporting procedures should use a simplified set of three status options for allocated numbers in place of the six currently used. When applying or reporting, licensees should provide brief explanations of their categorisation of numbers, for example why numbers are not available for assignment to end users.*

Different practices are also being followed by different operators in relation to the last status, "cooling", the process of recycling mobile numbers after use. Issues here include:

- What rights should users have relating to their numbers during extended periods of non-use?
- For what period should operators be entitled to "cool"[21] numbers before re-issue?

There is a tension here between user-friendliness and economical use of numbers. Shorter recycling stages are more economical but less user-friendly. There is also a question of how far regulatory intervention is appropriate in what may be seen as competitive decisions.

Given that there is no shortage of mobile numbers in Myanmar, and good and growing competition between mobile operators, this review proposes:

- To favour user-friendliness over economy in number use;
- To minimise regulatory intervention to what is needed to ensure competitive fairness.

Taken together, these point to specifying a minimum period during which users are entitled to retain their numbers even if no use is made of them, and a maximum period for which operators may "cool" numbers thereafter[22]. Both these actual periods could be debated and might be changed over time. The periods here reflect initial discussions in Myanmar and recent deliberations in India[23].

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[21] Alternative terms "quarantine" and "sterilise" are also current.

[22] The period of non-use before deactivation is not necessarily the same as the period of non-use before a subscriber ceases to be 'active' for the purposes of national and international statistics. The ITU requires that an 'active' subscriber have used the system within the previous three months.

[23] A press notice concluding these deliberations about deactivation was issued in 2013 at http://trai.gov.in/WriteReadData/WhatsNew/Documents/12-2013-Information%20Note%20to%20the%20Press.pdf

Recommendation 5.3.6: *Users should be entitled to a minimum period of non-use of 90 days before an account is deactivated. Deactivation must be preceded by clear warnings and a grace period of at least 15 days during which reactivation remains possible. "Use" here includes at least any outgoing or incoming communication and any credit recharge; it may but need not include simply switching the phone on.*

Recommendation 5.3.7: *Operators may retain deactivated numbers in their "cooling pool" for up to a given period from deactivation. The period will be set by the regulator and may be changed from time to time following consultation; initially it is one calendar year.*

6 Short numbers in Myanmar[24]

As mentioned above, the fixed network can use only the first digit ‘1’ to start short numbers, while the mobile networks can use any digit from ‘1’ to ‘9’. This means that to be accessible from all networks, short codes can only start with ‘1’. To date PTD has managed short number space starting with ‘1’ and left short numbers starting with ‘2’ to ‘9’ to the mobile operators. Given the prevalence of mobile connections, there could be significant public and commercial benefits from co-ordinated short number use among the mobile networks: customers who use more than one network[25], or who switch networks, would feel more confident about using the numbers.

6.1 Summary of existing rules and Code of Practice

The Numbering Rules of Myanmar dated 23 December 2013 make the following provisions for short numbers:

a) Section 11 (English version, 8 Myanma version) provides for carrier selection to be carried out by prefixes of the form 16xx, where xx denotes an alternative carrier (though this does not apply to mobile networks).

b) Section 14 (i) (English version, 11 (i) Myanma version) on Special Access Numbers (subheading in English version only) divides these into three Types[26]:

   i. Type A for commonly used services, such as emergency services, which all operators must implement on the same numbers, which the regulator designates for these purposes.

   ii. Type B for commonly used services, such as fault reporting, which operators are not obliged to provide; but if they do provide them, they should use numbers designated by the regulator.

   iii. Type C for other authorised services. These are allocated by the regulator to particular operators and need not be used by different operators in a harmonised manner, though operators are encouraged to harmonise so as to minimise customer confusion.

c) Section 14 (j) (English version, 11 (j) Myanma version) identifies codes ‘17xx’ and ‘18xx’ (without a trunk prefix[27]) for accessing voice-based services from fixed and mobile networks. It provides for special obligations to be imposed for those services, and in particular for Premium Rate Services and for Burst Oriented Services[28].

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[24] This document uses the term *short numbers* in a general sense, to encompass several special terms used in the existing rules and Code of Practice, not in the specialised sense used in the Code, as explained below.

[25] We have no information on the incidence of multiple SIM ownership in Myanmar, but assume that it is quite common, as in other countries with highly budget-conscious market segments.

[26] A similar typology is found in many other countries.

[27] Hence these cannot be National Destination Codes, and the use of this term to describe them is an error.

[28] Defined as services where a very high number of calls is expected in a very short timeframe, typical of numbers advertised on television for viewer participation (such as voting for a best performer).

d) Section 14 (k) (English version, 11 (k) Myanma version) suggests that Special Access Numbers should generally have four or five digits, that is, be of the form '1xxx' or '1xxxx', to ensure reasonable capacity.

A Code of Practice for Special Access Numbers, Short Codes and Short Numbers was approved in October 2014 (after the Numbering Rules in May 2014). It largely repeats the relevant part of the Rules, but also adds some details:

a) Type A codes include: '191' for Fire, '192' for Ambulance, '199' for Police and '112' as a Single emergency number (reserved for future use).

b) Type B codes are four digits in length with the format '11XY' – '18XY', excluding '112X'.

c) *Short codes* are used to access non-voice services such as SMS and USSD (they are sometimes referred to as non-diallable) while *short numbers* are used to access voice services (they are sometimes referred to as diallable). Both start with digits '2' to '9' and have from three to five digits; neither is part of the public numbering plan; no approval is needed for their use, but operators are required to include their current and planned use on annual numbering returns.

Recommendation 6.1.1: *to achieve the desired co-ordination among operators, the regulator's management of short numbers should be extended to digits '2' to '9', with industry participation. As specified in the relevant Code of Practice, the regulator's management would be on a voluntary basis for mobile operators, and would last until an industry body is ready to take over this role.*

6.2 Existing situation

Just as for national numbers, the sources of information available for short numbers show discrepancies, likely gaps, and incomplete descriptions. A full list compiling the best available information[29] is provided in Annex C.

It appears that operators have developed their use of short numbers (apart from the Type A emergency numbers[30]) with little or no reference to one another's usage, possible customer confusion or indeed the Numbering Rules or Code of Practice. For example:

- The '16xx' numbers are used not for carrier selection (which has not been requested) but for MPT's CDMA prepaid service ('161', '166') and MPT's mobile banking services ('166x').
- '17xx' and '18xx' are used for a variety of services which do not all appear to be voice-based; for example '177x' allows callers to choose their favourite Caller Ring Back Tones, and '188' is labelled as an SMS service.
- '123' is used by both MPT and Telenor, but not other operators, for prepaid credit top-up (MPT also offers '*123' to access the same service via USSD). Ooredoo offers SMS e-topup on '4999'.

[29] The Annex shows information which had been received up to a date in August 2016, when it was processed. More information has since been received from an additional operator's Annual Return, but has not yet been fully reflected in this document. Quick inspection of this new information reveals many more new short numbers on the list, though their usage status is unclear.

[30] All operators have implemented these. However, from the public telephone directory, MPT appears not to provide these three codes nationwide. Of course, the emergency services themselves are more important than the telephone codes provided to call on them – in some parts of the country, the former may well need improvement before it makes sense to encourage people to call them, imagining they will arrive soon.

- MecTel and Blue Ocean (via MPT) both provide services called Health Care, MecTel on ‘2121’ and Blue Ocean on ‘1886’.
- All operators provide SMS services, but the codes in question use all first digits ‘2’ to ‘9’ with no evident order, rationale or relation to codes used for voice services.

The records[31] show sparse use of the resource: of the 100 three-digit ‘1xx’ combinations, only 35 are in use by any operator, and of the 80 possible ‘Yxx’ combinations (‘Y’=’2’ to ‘9’), 27 are in use by any operator. There is no particular pattern to the currently used numbers, except that MPT’s fixed customer service numbers take the form ‘10x’.

Clearly, many more services of public value could be provided using short numbers. PTD have provided the following list of such services:

- Telephone Directory
- Ticketing Service
- Hotel Service
- Travel Service
- Highway Emergency
- Train Emergency
- Maritime Emergency
- Airline Emergency
- Gas Pipe Line Fault
- Electricity Fault
- Red Cross
- National Level Charity Program
- Bank Service (Hot Line)
- Mobile Banking
- Time Announcement
- Weather Forecast
- Immigration

The following sections discuss how best to take these matters forward.

6.3 Public service numbers

National major emergency numbers should clearly be of Type A. It is unclear what, if any, other services should be classified as “public service” or of Type A; for example, how requests from government departments for such numbers should be treated.

[31] Showing use in early 2016.

Country	Child helpline number(s)	Country	Child helpline number(s)
Afghanistan	707199199	Maldives	1412
Australia	1800 55 1800	Mongolia	108 and 1979
Bangladesh	1098	Nepal	1098
Brunei	141	New Zealand	0800 376633 and 0800 54375463
Cambodia	1280	Pakistan	1098
China	113 and 029 8807 2188	Philippines	163
EU	116111	Qatar	919
India	1098	Singapore	1800 2744 788
Indonesia	129	South Korea	1388, 1577 1391
Ireland	116111	Sri Lanka	1929 and 011 233 2332
Ireland	1800 666666	Thailand	1387
Japan	0120 99 7777	UK	116111 and 0800 1111
Kazakhstan	150	Vanuatu	87777
Kyrgyzstan	123	Vietnam	18001567
Malaysia	12999		

Figure 12 Child helpline numbers in selected countries

Figure 12 is of interest here for several reasons. Child helplines aim to provide confidential advice and support, free of charge, to children and young people in need. They are the best example of international efforts over the past decades (by Child Helpline International working with the ITU) not only to make such helplines available all over the world, but to provide them on memorable numbers and preferably with a degree of international harmonisation. The numbers shown in the figure show:

- Many countries have used short numbers starting with '1', but many others have used freephone or simply ordinary full-length telephone numbers.
- India and some of its immediate neighbours have standardised on the short number '1098'.
- Eight of the ten ASEAN members (shaded in the figure) have such numbers, but no two of these numbers are the same.
- The EU has reserved the '116' series for social welfare helplines, with '11611' or '116111' preferred for child helplines. This has been implemented in most member states, often in parallel with previously established numbers[32].

Recommendation 6.3.1: *Major emergency numbers, and others likely to be called by people in distress, should normally be of Type A. In particular, if special services are dedicated to highway emergencies, a standardised number to call them out should be provided; '198' would seem a natural candidate. (Existing access methods can continue in parallel if desired).*

Recommendation 6.3.2: *A set of related and unused numbers, such as '156xx' to '159xx', should be designated as Type A and set aside for potential public service use. These would be reserved for central and local government applications which need to be easily accessible to the general public.*

[32] In the UK the short freephone number '0800 1111' is the single freephone number permitted to be of only four digits after the code.

Recommendation 6.3.3: *An attractive and memorable number staring with '1' should be designated as Type A and set aside for use by a child helpline, when one is available in Myanmar. Other social welfare helplines could also get similar treatment. Both '1098' and '116' appear to be available and could be used, if there is a desire to join in either of these international harmonisation efforts; for that matter, the Thai '1387' and Malaysian '12999' also appear to be available.*

6.4 Common service numbers

Some short numbers lead to facilities that operators commonly provide to their customers, such as voice mail access, customer enquiries or complaints, balance checks and credit recharges, in connection with telecommunication services. It is convenient for customers, and conducive to competition, if these numbers broadly match across the sector. However, the facilities may vary somewhat by operator so it may not be practicable for all such numbers to be identical. The current Rules envisage such numbers being of Type B.

It is desirable for these telecom service numbers to be accessible from other networks, particularly where (as for fault reporting) the network in question may be unusable when access is needed. We call this "cross-network access"; it can be achieved in various ways. At present Ooredoo offers cross-network access through its own national network numbers, for example '+95 9 970000234' and '+95 9 970003131' as alternatives to '234' (customer service) and '3131' (voicemail access) respectively; Telenor similarly offers cross-network access to its customer service code '979' on '09 790097900'.

Carrier selection codes may best be considered here. These have proved of no interest so far and may well never attract interest, as alternative carriage services have moved online. Provision for them could therefore be reduced, and (if demand does not materialise) eventually eliminated.

Recommendation 6.4.1: *Telecom services which are special to fixed networks only should continue to be provided on '10x', which should be designated Type B.*

Recommendation 6.4.2: *Telecom services which apply to both fixed and mobile networks should be provided on '12x', which should be designated Type B.*

Recommendation 6.4.3: *Telecom services which are special to mobile networks only should be focused on '2xxx'. Mobile operators should aim to co-ordinate their use of this range, while continuing use of established service numbers in parallel, if they wish.*

Recommendation 6.4.4: *Operators should provide cross-network access to their telecom services, using a simple understandable convention (such as the examples given above).*

Recommendation 6.4.5: *The reservation of '16xx' for carrier selection codes should be changed to '160xx'.*

6.5 Other service numbers

Some short numbers have been identified for various non-telecom organisations such as businesses, public foundations, content service providers, banks and call centres. These numbers vary by network: a customer of one operator might call, or send a message to, a call centre by using such short codes while a customer of other operators would not be able to do so.

The mobile operators recognise that some non-telecom service providers will have customers using all mobile networks and will want these customers to be able to reach them in the same way. They have proposed an industry body, such as exist in some other countries[33], to co-ordinate the allocation of relevant codes. This appears to be a good idea but may take some time to come about; meanwhile it would be better for the regulator to lead on this function on behalf of the industry than for there to be no co-ordination.

If a worthwhile collection of short numbers is to be reserved for co-ordinated allocation, then operators will need to restrain their independent activities in this area. For example, until recently the mobile short numbers 'ABxxx', with 'A'='6' to '9' and 'B'='1' to '5', appeared to be unused and therefore a good candidate for co-ordinated allocation. However it now appears that one operator either has launched or is planning to launch its own services on part of this range.

There is a case for some services to be accessible only from one network, as part of its competitive appeal. For example, just one network might want to offer an extended range of musical ring tones; all might want to offer sporting results but possibly using different sources and presentations. It is desirable to have clarity about which types of service should have cross-network access.

It is an elementary consumer protection measure to make the cost of calls to any of these numbers clear to callers. This may be achieved through the structure of the number (e.g. higher charges corresponding to higher first digits) or through uncharged pre-connection messages (e.g. "this call will cost 50 MMK a minute; please press 1 if you want to continue").

Where content is provided as part of the service, there might need to be rules, for example about its accuracy and completeness. However, voice content services are becoming less popular with the growth in use of the internet and smart phones. Some services (such as subscription text messages) need quite complicated rules to prevent wrong-doing while allowing legitimate activity. For Myanmar, where such services are not yet widespread, banning certain types of service might be more effective than permitting them subject to complicated rules.

Recommendation 6.5.1: *The mobile operators should agree on ranges of mobile short numbers which are unused or can be freed, which will then be managed in a co-ordinated way on behalf of all of them. The aim is to enable non-telecom service providers to advertise numbers that work on all networks, and callers to make informed decisions on whether or not to call these numbers, taking account of the rates at which calls are charged.*

Recommendation 6.5.2: *Normal consumer protection requirements (such as price transparency and correct delivery of an advertised service) should apply to all services accessed through telephone numbers. The regulator should consider, in consultation with the sector, whether certain types of service present such high risks that they should not be allowed at all. Examples might include services charged at very high rates, and content which breaks social norms or potentially the law.*

Recommendation 6.5.3: *The regulator may wish some existing services that use short numbers to be moved to other numbers, in the interests of clearer and more rational use of the resource. Before deciding on the details of such moves, it should request and consider information from operators on the popularity and importance of the services.*

[33] For example, in the UK, South Africa and Canada.

6.6 Aligning voice and text services

The distinctions drawn in the Code of Practice between short codes (for non-voice services) and short numbers (for voice services) are not reflected in the choice of different first digits or different numbers lengths: the diallable (voice) ones start with ‘1’, ‘2’, ‘3’, ‘4’ and ‘6’ and have lengths 3 and 4, and the others start with ‘1’, ‘2’, ‘3,’, ‘4’, ‘5’, ‘6’, ‘7’, ‘8’ and ‘9’ and have lengths 3, 4, 5, and 6.

In some countries this distinction corresponds to a regulatory distinction: the voice short codes are controlled by the regulator and the others are controlled by industry associations (or not controlled at all). The regulatory distinction may once have been appropriate, but has become questionable now that text-to-speech and speech-to-text applications can convert SMS messages into voice messages and vice versa.

Furthermore, customers are used personal phone numbers being used equally for voice calls and text messages. They may well find it confusing if a single number leads to entirely different services depending on whether it is used for a voice call or a text message.

Recommendation 6.6.1: *Numbers for voice and non-voice special services should no longer be kept distinct and maanged separately. Rather, they should be managed jointly across both voice and SMS uses, with a single short number leading to corresponding voice and non-voice applications where both are provided.*

6.7 Aligning with Unstructured Supplementary Service Data

USSD uses short codes of the form ‘1XY’ preceded and followed by occurrences of ‘*’ or ‘#’. In the rules for them, from the European Telecommunications Standards Institute (ETSI), these short codes are intended to be interpreted by the home network if ‘X’ is ‘0’, ‘1’, ‘2’, ‘3’ or ‘4’ and by the visited network if ‘X’ is ‘5’, ‘6’, ‘7’, ‘8’ or ‘9’. Other short codes are interpreted by the visited network unless they begin with ‘7’ (when they are interpreted by the home network). The rules do not standardise the interpretations.

Telenor is already offering balance checks on both voice short code ‘124’ and Unstructured Supplementary Service Data (USSD) code ‘*124#’.

Codes might need to be chosen carefully and harmonised between networks: in one country a child help line service, on telephony short code ‘147’, was apparently mistaken for a service on USSD short code ‘147’. There is particular scope for confusion if short codes for other purposes (such as SMS) contain ‘*’ or ‘#’[34].

USSD is available for GSM networks but not for CDMA networks (though there are some similar proprietary systems). Typically there is no USSD communication between networks: USSD communication is intended to be instantaneous while SMS uses “store and forward” techniques.

Other codes of the form ‘WXY’ preceded and followed by occurrences of ‘*’ or ‘#’ have been given standard interpretations by ETSI for use in other networks as well as GSM networks; those having the form ‘1XY’ (so ‘W’ is ‘1’) are “for national use” and can be compatible with USSD codes.

Recommendation 6.7.1: *Codes of the form ‘WXY’ preceded and followed by occurrences of ‘*’ or ‘#’ should be chosen to have essentially the same interpretation as the corresponding short codes of the form ‘WXY’.*

[34] * and # are sometimes called the “extradecadic” digits.

7 Numbering for new services in Myanmar

Myanmar has not yet identified suitable numbering space for new services like freephone, shared cost services, or VoIP. Both regulator and operator would like to follow international good practice when deciding how to number new services. In particular, where there is a choice, they would like their practices to be consistent with those of near neighbours in ASEAN, such as Thailand and Malaysia.

So far, the only new services for which a definite numbering demand in Myanmar has been established are freephone and VoIP. This section first considers the general issue of new services numbering and then looks at freephone and VoIP individually.

Other new services may require numbering in future. However, several new services have been identified in standards for international numbers and copied in standards for national numbers (UPT, for example[35]), but very few have attracted much use anywhere, and the uses have sometimes been quite undesirable (for example the use of personal numbers for premium rate services). Also, specifying new service numbering that turns out to be inessential is contrary to the trend mentioned earlier towards more flexible use of numbering. For this reason, few recommendations are made here on specific new service numbering.

7.1 Approaches to numbering new services elsewhere

Requirements for numbering new services vary, and may include:

a) Distinctive service identities that will be easily recognised by the target public. Freephone is a good example, with the '800' "flag" by now well known around the world as meaning that a call to the number is free of charge. A variant of '800', such as '8xx' or 'x00', may indicate that the call is charged only at a low rate.

b) Distinctive service identities for services which could be unusually expensive to call, or where for other reasons a need is felt for user protection or even a barring option. Premium rate services are the usual example.

c) Lack of association with existing services. For example, some VoIP providers position their offerings as PSTN or mobile alternatives, and therefore want ordinary PSTN or mobile numbers, while others prefer to stress the difference from PSTN or mobile, and therefore want numbering that clearly does not belong to the PSTN or mobile.

d) Potentially large demand for numbers. The best current example is machine-related SIMs, which could be built into cars, household appliances, environmental sensors and much more.

e) Special network requirements. A common example is numbers that can attract huge concentrated traffic volumes, such as phone-in numbers advertised on television, or helplines during disasters.

f) Memorability. Particularly where numbers are advertised briefly, for example on broadcast media, a short string and / or an easily recognisable pattern may be desired.

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[35] For example, in 2011 Australia decided to withdraw the designated UPT numbering because it was unused; see *Telephone Numbering – Future Directions,* ACMA, at http://www.acma.gov.au/~/media/Numbering%20and%20Projects/Information/pdf/Telephone%20Numbering%20Future%20Directions.PDF

g) International accessibility. Some new services do not need to be accessible from outside the country, but those that do must be in suitable number ranges. This aspect is explored further below in relation to freephone.

h) International harmonisation. Where services are internationally accessible or will be used by many travellers, there may be value in using codes that are familiar in other countries that have strong ties with Myanmar.

i) Operational convenience. Apart from factors such as those above, it may simply be convenient for networks to be able to route to a number (or recognise its calling identity, as in the case of licensed telemarketers in India) based on its first few digits.

The options for new service numbering are:

- Where public recognition is not important, any unused national numbering space can be pressed into service. Typically, to simplify routing, existing geographic NDCs are avoided, but even these can be used if they have spare capacity (with number recognition and routing on the first digit following the NDC).

- Where public recognition matters, typically a distinctive set of NDCs is chosen with the primary meaning of "new service". Where a first digit of the numbering plan is free, such as '1' or '9', this may be used. The UK is an example where the first digit '8' is used to highlight specially tariffed services, and some other European countries have a similar convention. Where no free first digit is available, an alternative may be a free second digit, typically '0'; this convention is used in Japan and Taiwan. "Hundred" numbers such as '400' in China (used for local rate numbering) are also in widespread use for distinctive numbering.

- For local services in open numbering plans, parts of the local number range may be used, often at a different length from ordinary subscriber numbers. '96 xxx' is an example of this kind of number in China, and '555 xxxx' in the USA. Indian mobile numbers '98 ABC xxxxx' and '94 DEF xxxxx' are also currently like this.

- Where shortness and memorability are important and the quantity of numbers needed is not great, national short codes may be used. They have become especially popular for special services from mobiles. However, short codes are generally network-specific and not accessible internationally.

7.2 Numbering for new services

As discussed above, current use of NDCs leaves little distinctive space for new services. Earlier recommendations deal with reducing the space occupied by geographic numbering, in order to vacate suitable space for possible numbering scheme expansion and currently unforeseen new services.

Figure 2 gives an overview of currently used first two NSN digits. Figure 13 elaborates on that by showing how many of the possible next (that is, third) NSN digits are currently in use, a measure of intensity of use. (The figures do not take account of the third digit for the special NDC '11'.)

First NSN digit	Quantity of third NSN digits with allocated numbers having second NSN digit…										
	0	1	2	3	4	5	6	7	8	9	0-9
1			8	3	1	10	8		4	6	40
2			6	8	1	10	10	2	4		41
3	1	1	1		1		1	1			6
4			6	6	5	3	4				24
5			6	6	5	3	3	7	4	5	39
6	2	4	5	4	5	3	7	7	3	2	42
7	6	6	1	3	6	6					28
8		6	7	3	5	2	3				26
9			10	6	8	10	10	5	10	3	62
0-9	9	17	50	39	37	47	46	22	25	16	308

Figure 13 Current intensity of use of NDCs

As discussed earlier, there are no free first digits (rows) or consistent second digits (columns). However, from this figure two lightly used resources stand out:

- The first digit '3', which is currently dedicated to the military. In more detail, it has 42,000 allocated numbers, with unknown utilisation.
- The second digit '0'. In more detail, '60' has only around 1,000 registered subscribers and '70' only around 4,000 registered subscribers.

If they were free, both the first digit '3' and the second digit '0' would be attractive prospects for expansion or for new service numbering. The second digit '0' option is used for new services numbering in several other countries, including Japan and South Korea.

Recommendation 7.2.1: *If the first digit '3' ever becomes free, it should be reserved for possible long term expansion of the entire numbering plan.*

Recommendation 7.2.2: *Any geographic NDC changes should aim to free the '60' and '70' NDCs for new service numbering.*

Recommendation 7.2.3: *New services needing distinctive numbering near-term should exploit free NDCs whose second digit is '0'. Specific choices should take account of specific service requirements, including in particular any desired international harmonisation.*

7.3 Numbering for freephone[36]

Early discussions with the regulator and operators point to agreement that the globally recognised 800 flag should be built in to numbering for freephone in Myanmar. However, this still leaves various choices as outlined above.

Around the world, the most common choice is the NDC '800' (preceded in open plans by the national prefix, which is '0' in most of the world and '1' in the North American Numbering Plan). Number length is commonly the same as for mobile numbers, though it can be a digit more or less, and

[36] The terms 'freephone' and 'tollfree' are used interchangeably in this document, to mean zero charge to all callers. In some countries, however, 'tollfree' can mean charged at the same rate as a local call; and it is not uncommon for 'freephone' calls to be chargeable when made from mobile phones.

sometimes part of the range is set aside for shorter, more memorable numbers. (Vanity freephone numbers are often popular).

The '1800' short code range (though with full length numbers) is also sometimes used, and this practice applies in several countries of the Asia-Pacific region, often for some special reason. In particular:

- Australia uses the whole of '180', with 7 digits following '1800' and '1801', and 3 digits following '180x' ('x'='2' to '9'). Only '1800' is internationally accessible. The NDC '18' is not in use, which makes international access to '1800' possible, and '180' distinctive. '13x' is used for local rate special services and '19x' for premium rate services; the '19x' NDCs are in use for data network access.
- India uses '1800' plus 4 to 9 digits (in the "short code" range) for freephone, and other parts of '180x' for other Intelligent Network services. The NDC '180' is in use as the area code for Panipat (blocking international access to '180x' short codes) and the NDC '80' is in use as the area code for Bangalore (making the NDC '800' for freephone a difficult choice).
- Malaysia uses '1800' plus 6 digits (in the "short code" range) for freephone, and other '1x0' codes (where 'x' may be '3', '5', '6', '7' or '9') similarly for other special services. The rest of '1xx' is used with lengths 3, 4 or 5. The first digit '1' is not used for other purposes in the numbering plan. The code '080' is used for direct dialling to Brunei from bordering areas, so the NDC '800' would be unsuitable for freephone.
- Thailand uses '1800' for freephone (and '1900' for premium rate). The NDCs '80' and '90' are in use for mobile numbers, so the NDC '800' would be unsuitable for freephone.

Other ASEAN countries using '1800' (but for which no further information is currently available) are Cambodia and the Philippines[37]. Singapore and Brunei use both '800' and '1800'.

On the other hand, China uses the local range '800', and Japan, South Korea, and Taiwan all use the NDC '800'. Japan also uses the NDC '120', which was established already before '800' became popular.

Yet another option, in theory, is the NDC '1800' (which would be the same as the short code '1800' in a closed numbering plan with no national prefix). No examples have yet been found of this being used in open numbering plans. It is probably avoided because of the risk of customer confusion with similar but shorter NDCs (such as '180', or in Myanmar '1' followed by SNs starting with '80').

It would be consistent with the evidence to suppose that the choice of NDC '800' for freephone is normally preferred to the short code option, because short code space is scarce and often internationally inaccessible, but sometimes there are obstacles to it, such as:

- The code (or '80') already being in use for another purpose; this is the case in India, Malaysia and Thailand;
- A set of similar codes being desired for specially tariffed services, not all of which is available in NDC space; this is the case in Australia[38].

In the case of Myanmar:

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[37] This information on Cambodia and the Philippines was provided by MPT.

[38] Australian area codes were simplified (from 2 digits to 1 digit) in the late 1990s; before then, there was an '80' area code and freephone service was provided on '008' plus 6 digits, with the '1x' NDCs used for mobile.

- Short code ‘1800’ is free, but other parts of ‘18xx’ are heavily used for services provided by the Blue Ocean Call Centre.
- The subscriber number series ‘801xxxx’ is in use in Yangon, with NDC ‘1’, while ‘800xxxx’ is free. This means that international access to ‘1800’ would be possible but would require analysis of the first four digits after the country code before routing.
- NDC ‘80’ is free, though other ‘8x’ NDCs are in use (‘81’ to ‘84’ in the Shan Region and ‘85’ to ‘86’ in the Mandalay Region).

In the circumstances, it seems that NDC ‘800’ should be the preferred choice for Myanmar based on its merits for Myanmar’s own situation, even if ‘1800’ is used by some neighbouring countries.

Recommendation 7.3.1: *Freephone numbering should use the NDC ‘800’.*

Recommendation 7.3.2: *Interconnection and charging arrangements must ensure that all calls to this range from within Myanmar are actually free to callers. Calls from outside Myanmar will be charged on the same basis as other international calls; the subscriber to the number should decide whether or not to accept inbound international calls, if the operator offers both options*[39]*.*

Recommendation 7.3.3: *When reorganising geographic NDCs, consideration should be given to clearing more of initial digit 8 for non-geographic use.*

Recommendation 7.3.4: *Following the NDC, freephone numbers should take the form ‘yxx xxxx’ (seven digits) or ‘zxxx’ (four digits), where the division of the range between values of ‘y’ and ‘z’ is to be decided and includes some flexibility. For example, ‘z’ might initially take values ‘0’ and ‘1’ and ‘y’ initially take values ‘8’ and ‘9’, with the remaining values to be decided upon later in the light of demand for each number length. Initial allocations to operators should be in 1,000-number blocks for the seven-digit numbers and 100-number blocks for the four-digit numbers.*

7.4 Numbering for VoIP

As mentioned above, VoIP operators desiring national numbers may want to position their offerings in the market as alternatives to PSTN or mobile services, or as something new and different. In support of competition, the numbering plan should allow them the widest possible choice. Depending on the scale of their ambition, they may want to apply to the regulator for their own fixed or mobile number blocks, or to get a suitable sub-allocation from another operator.

Other countries have allocated numbers for VoIP services, but unlike freephone, little or no pattern can be seen in their codes. Figure 14 provides some examples. Other numbering plans examined do not appear to make specific provision for VoIP. In several countries numbers have been allocated for VoIP services but have not proved popular; operators and customers prefer familiar fixed or mobile numbers, because they do not have the connotations of “exotic tariff arrangements” (unlike premium rate numbers, for example) and permit simple comparisons of their tariffs with those of other familiar numbers.

A VoIP provider in Myanmar has suggested making a large amount of numbering space available for location-independent (VoIP) services, structured as follows:

‘0A BC xxx xxxx’, where ‘A’ is the service code and ‘BC’ an operator code.

[39] It may be desired to indicate the choice made within the number, to enable remote gateways to block traffic that is not authorised for reception within Myanmar. However this may not be possible while complying with the limitation in E.164 para 7.5.2 of 7-digit analysis at a gateway (including the country code) before routing.

Numbers would be allocated in 10,000 blocks, with the potential for an operator to have up to 50 million adjacent numbers. That means that initial values of 'C' for new allocations would be '0' and '5'.

Country	ASEAN	VoIP numbering	Notes
Japan	No	050 yxxx xxxx	y=0 is not in use
Malaysia	Yes	0154 yyy xxxx	yyy identifies the service provider
Singapore	Yes	3xxx xxxx	Uniform closed numbering plan
South Korea	No	070 xxxx xxxx	
Taiwan	No	07010 xxx xxx	
Thailand	Yes	060 xxx xxxx, 089 xxx xxxx	

Figure 14 VoIP numbering in some Asia-Pacific countries

This request would let only two VoIP operators share a two-digit NDC, whose capacity with a ten-digit NSN length is 100 million numbers; the maximum number of VoIP operators that could be accommodated on a single first NSN digit in the numbering plan as it stands is eight (using the four two-digit NDCs '76' to '79'). Furthermore, while a working forecast of up to 50 million VoIP numbers for the whole country may be reasonable, it is hardly likely that each of several operators could achieve this volume. The recommendation here therefore scales down the proposal to start with, noting that in due course additional NDCs should become available for this or other new services[40].

Recommendation 7.4.1: *Initial numbering for location-independent ("VoIP") services should be provided using 10 digit numbers on NDC '79', to be followed by '78' if demand should justify this. Numbers should be allocated in blocks of 10,000 numbers, with each operator having the opportunity of up to 2 million numbers in adjacent space; that is, the number structure is '79 AB xxx xxx', where 'B' initially takes values '0', '2', '4', '6' and '8' (allowing, for example, the first such operator to expand from '079 00 xxx xxx' into '079 01 xxx xxx').*

7.5 Numbering for other new services

No immediate demand has yet been identified for numbering for other new services in Myanmar. From experience in other countries, the following could be required in the not too distant future:

- Local rate services. These are similar in concept to freephone, but rather than being entirely free, calls are charged at a modest rate, which may match that of a PSTN local call or be capped at a certain affordable level. The services may be popular for helplines or for corporate contact. In other countries, these are often provided on codes which are similar in some way to the freephone code. If they are desired in Myanmar, then the NDC '400' (as used in China for similar services) could be a good choice, as it avoids association with the '900' and '600' codes which are used elsewhere for premium rate services.
- Premium rate services. These offer content or services over and above the call itself, and are charged at high rates, part of which is passed on to the provider of the non-telecoms service. Increasingly, such services are offered on mobile networks using their extended range of short codes. Mobile networks offer more consumer protection options than the PSTN, and at this stage it may not be worth opening PSTN premium rate services.

[40] The digits 'AB' in this recommendation are not intended to be understood as operator codes, which would be contrary to the potential introduction of number portability.

- Machine-related services. Communicating objects could use a large volume of numbers. As these numbers are not dialled by human beings, they can be longer than those that are. Mobile operators have expressed a preference for keeping such numbering within their own allocations for the time being, but may need the ability to migrate them elsewhere if demand takes off. If a range is introduced specifically for machine-related numbers, eligibility for allocations should be reconsidered: non-telecom service providers (such as car manufacturers) may have reasonable claims, in which case they could become like MVNOs in terms of numbering.

Recommendation 7.5.1: *The NDC '400' should be kept for local rate services, if these are to be offered in Myanmar. Number lengths and allocation arrangements should mirror those for the freephone NDC '800'.*

Recommendation 7.5.2: *If premium rate services are to be offered in Myanmar, beyond what is already accommodated on short codes, they should use the NDC '900'. Significant consumer protections must be put in place before such services are launched. Similar protections would also apply to premium rate services offered on short codes.*

Recommendation 7.5.3: *A currently vacant two-digit NDC that is not especially attractive to humans, such as '89', should be reserved for machine-related service numbering, and used at the maximum permissible total NSN length of 13 digits.*

8 Administration and management of numbering

8.1 Numbering records

As is common soon after liberalisation, the regulator relies heavily on the incumbent operator for information on number utilisation. A start has been made in Myanmar on gathering this information, but the process is not yet complete. This has serious consequences for the regulator's ability to manage the numbering plan, and also for deciding between approaches to changing geographic numbers[41].

Recommendation 8.1.1: *The regulator should carry out a full number audit without delay, including details of reserved number blocks (which in the case of the incumbent may not have been reserved formally, but simply regarded as available for use). Vacant geographic blocks of potential size 10,000 or mobile blocks of potential size 1 million[42] should be reclaimed by the regulator forthwith.*

Recommendation 8.1.2: *Immediately following the number audit, the regulator should publish[43] charts of all blocks in the numbering plan, showing which blocks are allocated or reserved and to whom. The level of detail should be as specified in the previous recommendation for geographic and mobile numbers, and by single code in the case of short codes. These charts should be updated each time allocations or reservations change.*

Recommendation 8.1.3: *Operators may bring into service only those numbering blocks which are already allocated to them, and only at the number length which is now appropriate for that block, in particular with seven-digit subscriber numbers in geographic NDCs and with nine-digit subscriber numbers in the mobile NDC (taking account of impending number changes). To maximise future flexibility new blocks should be allocated adjacent to those already in use unless the applicants can justify different choices.*

8.2 Numbering applications, returns and reports

8.2.1 Numbering applications

Numbering Rule 8 (English version, 6 Myanma version) outlines the principles, and Rule 15 (English version, 12 Myanma version) covers in detail the procedures, to be followed in relation to applications for allocation or reservations of numbers. A draft form has been used for applications for allocations. This review has asked about experience of using these procedures, with a view to addressing any issues which have arisen. Points identified include:

a) The need for clarity and fairness in the definitions relating to utilisation of existing number allocations, including in particular the treatment of numbers in the distribution pipeline, and the periods to be allowed for stages in number recycling.

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[41] Discrepancies between different available sources of information are a major obstacle to working out the details of a long term numbering plan.

[42] The potential size assumes geographic subscriber numbers of 7 digits and mobile numbers of 10 significant digits. So the blocks in question would be of the form ABCxx, ABCxxx, or ABCxxxx in geographic NDCs (depending on current subscriber number lengths), and of the form 09DEFxxxx, 09DEFxxxxx or 09DEFxxxxxx for mobile numbers.

[43] Publication could be through upload to a website or through direct distribution to all licensed operators. The former is simpler and more transparent.

b) The criteria to be used by the regulator when deciding on applications.

c) The lead times needed for applications.

The first of these has been discussed for mobile numbers in section 5.3, and several recommendations made. For consistency, it is proposed that whatever definitions and approaches are adopted for mobile numbers should also be adopted for other number types, with minimum necessary adaptations.

As for criteria, it is proposed that applications that are properly completed by appropriately licensed operators, and which provide a substantiated case for needing the numbers requested in accordance with the agreed approach and the Numbering Plan, should normally be granted. However, the regulator must retain discretion to question any application which it has reasonable grounds to suspect of containing errors, omissions or misrepresentations.

In relation to timing, the Numbering Rules specify that applications for numbers should be made 3 months ahead of their required in-service date, and “as far as possible” granted within 45 days. It appears that these times do not adequately allow for the complexity of operations in Myanmar.

It is therefore proposed to adopt as lead time for applications whatever number of months is decided upon in finalising *Recommendation 5.3.2*, assuming the ‘months to exhaust’ approach is adopted. Six months may be taken as a starting point for discussion. In addition, it is proposed that the regulator should deal with complete applications within 45 days other than in exceptional circumstances. Six months also seems a reasonable period for the new allocations to be expected to last (for example, an application made in January 2017 and brought into service in July 2017 could aim to cater for the level of demand expected in January 2018).

The process for reservations of number blocks does not appear yet to have been formally invoked in Myanmar. Its purpose is normally to streamline allocations by identifying in advance preferred blocks for allocation to each operator. For example, the regulator would not be expected to consult (as provided for in Rule 15 (f) (i) (4) (English version, 12 (f) (i) (dd) Myanma version) on allocations of blocks which have already been reserved, and the other considerations in 15 (f) (i) (English version, 12 (f) (i) Myanma version) would already largely have been made. This process should be used before any changes to it are suggested.

A draft application form for reservations and allocations, incorporating the suggested changes, is provided in Annex G.

Recommendation 8.2.1: *Similar definitions and criteria should be applied to the administration of all types of numbers, with minimum necessary adaptations. As there has been most experience of mobile number applications, decisions should first be taken in relation to mobile numbers, and then applied as appropriate to other number types.*

Recommendation 8.2.2: *The lead times for applying to numbers should be adequate for the complex implementations required in Myanmar, and consistent with the ‘months to exhaust’ decided upon, if that approach is adopted.The period for which newly allocated blocks are expected to last should also be related to these times; six months is put forward for initial consideration.*

Recommendation 8.2.3: *The regulator should deal with complete applications within 45 days, other than in exceptional circumstances.*

Recommendation 8.2.4: *The existing process for reservation of number blocks should be used, in order to streamline actual applications for reserved blocks.*

8.2.2 Numbering returns and reports

Numbering Rule 16 (b) (English version, 13 (b) Myanma version) requires holders of allocated numbers to submit annual returns to the regulator, including full details of the use of existing allocations and forecasts of future needs. The draft format suggested is the same as that for numbering applications, and in practice some operators have effectively been providing their numbering returns as support for numbering applications.

This process appears to be working reasonably well, though some minor improvements could be made, including:

- Clearer specification of exactly what is required, in order to get greater consistency from operators;
- Reduction in repeated submissions of unchanged information, while keeping the regulator abreast of rapidly changing information.

Annex F suggests amendments to the existing form with a view to achieving these improvements. A longer term goal may be to move towards a secure online system, accessible to licensees and the regulator, in which operators enter changed usage information as it arises. This could be run alongside the published numbering plan charts referred to in *Recommendation 8.1.2*.

Numbering Rule 16 (c) (English version, 13 (c) Myanma version) requires the regulator to make an annual numbering report, and specifies the content in some detail. It is expected that the details of existing number allocations and forecast for planned future demand will largely be based on aggregating the operators' annual returns. The main purpose of the report is to highlight new developments and possible needs for numbering plan changes, in plenty of time for due consideration and eventual changes, if needed. The regulator will be assisted in its forecasting by stakeholders' comments on the published report.

Recommendation 8.2.5: *Minor amendments to existing numbering return forms should reflect decisions made on other parts of the current consultation, aim for greater consistency and less repetition, and make any other improvements that may be suggested during the consultation. The regulator's Annual Numbering Report should be published as a consultation document, inviting stakeholders' inputs, so that the future of the numbering plan is kept under annual review.*

8.3 Regulatory charges for numbers

Charges for mobile numbers were introduced in Myanmar in 2014, at a rate of 15 MMK per year per number in an allocated block (adjusted each year by the rate of inflation). The calculation is to be based on the blocks shown as allocated in each year's Annual Numbering Return, and the charges are due to the regulator by 31 March.

Because this is a recent decision, the basic rate of 15 MMK per allocated number per year is not currently under review. However, two associated issues are under review:

- Whether the charge should apply to numbers at the length actually in use, or at the potential full length for the block in question.
- Whether to extend charging to PSTN numbers and/or short codes.

The enabling legislation for charging for numbers (Telecommunications Law Section 22, Numbering Rule 12 (English version, 10 Myanma version) and Operating Licence section 13.5(f)) does not state the intention behind the measure. Internationally, the following intentions are found:

a) To raise government revenues from the industry, in a competitively fair manner. Allocated numbers have been used in some countries, for example, as the basis for assessing universal service levies (though turnover is now the usual basis).

b) To cover the regulatory costs of number management and administration. EU legislation, for example, limits number charging to cost-recovering levels (except for numbers of 'exceptional economic value', such as vanity numbers, which are discussed below).

c) To incentivise good number husbandry, by providing savings to companies that use number blocks efficiently and return unused blocks. This appears to be the most common intention, as both a) and b) can be achieved by other means, such as general regulatory fees, which may save on administrative overheads.

d) To limit demand for scarce resources, such as a declining pool of spare numbers in a geographic area near exhaustion (introduced by Ofcom in the UK in 2012), or for short numbers (as practised in Australia, where charges are proportional to the numbering space occupied, so a four-digit short code costs as much as a block of 100,000 nine-digit numbers).

e) To reflect the value of the vanity numbers included in allocated blocks. The only known example of this intention is in Singapore.

The current charging level in Myanmar was decided using an international benchmarking exercise, which set the charge per number towards the lower end of charges for developing countries, without specific reasoning on intentions for charging, or reference to Myanmar specifics like the level of regulatory costs. It is therefore reasonable to suppose that the intention is the most common of the above, namely c), encouraging good number husbandry. However, to date the charges have been applied to numbers counted at the length actually in use, rather than to numbers counted on the basis of the block capacity at full number length. The latter would mean multiplying current charges by 10 for nine-digit mobile numbers and by 100 for eight-digit mobile NSNs.

On this understanding, and given that mobile numbering space could run short in Myanmar if it is used inefficiently, charges should apply to the potential capacity of the allocated mobile number blocks. This interpretation would provide a much stronger incentive for efficient use of number blocks than charging for numbers at the length actually in use. The start date for the new charges should be far enough ahead to allow the higher charges to be avoided by lengthening numbers.

Recommendation 8.3.1: *The regulator should clarify that from March 2018 mobile number charges will apply to all allocated blocks, assumed to be used at their full ten-digit capacity.*

The situation regarding geographic numbers and short numbers is less clear. MPT's modernisation plans and the current review should lead to a big reduction in use of numbering space, without the need for charges whose calculation would inevitably be messy. Nonetheless, charging can be retained as a potential extra regulatory tool in case of need.

Recommendation 8.3.2: *The regulator should retain reserve powers to charge for any kind of number, at levels calculated to achieve desired outcomes, if developments suggest that further incentives for efficiency are needed.*

8.4 Vanity numbers

8.4.1 Legal status

PTD has drafted, and consulted the operators about, a framework for vanity numbers. In that form the document lends itself well to discussion, so familiarity with it is assumed here. In its final form its legal status would need to be clear: it would be related to the pre-existing laws, licences and regulations and state what could be the legal consequences of infringing it.

The regulator is unlikely to have any direct legal authority over potential number traders (other than operators) who, having been assigned numbers by operators, would sell the rights of use (at fixed prices, in auctions or in lotteries). If the regulator wants to control number trading it must do so by placing requirements on the operators, such as preventing re-assignment for payment and reclaiming numbers not brought into service for one hundred and eighty days after being assigned.

However, the need for a framework for vanity numbers can be questioned, when the motivations for regulating number trading, vanity number definitions and vanity number prices are examined as below.

Recommendation 8.4.1: *If a framework for vanity numbers is finalised it should have clear legal purpose, standing and implications.*

Recommendation 8.4.2: *A finalised framework for vanity numbers should include any requirements that are to be imposed on operators to discourage or prevent the buying and selling of numbers by persons other than the operators.*

8.4.2 Number trading

If there are number traders, they might amass "too many" numbers: they might extort high prices from customers who just wanted to choose numbers that were special for personal reasons, or place pressure on the regulator to allocate more numbers even though the utilisation of the allocated numbers was low. This is alleged to happen in the USA, where one company has held 25% of the freephone numbers[44]. This form of number hoarding is discouraged by the Numbering Rules (in Rule 18(a)viii) (English version), 15(a)viii) (Myanma version)).

However, generally the reason for preventing number trading is unclear; it might be a belief that "national resources" should not be traded, or it might be administrative convenience. Moreover, land, which is the most obvious national resource, can be transferred or traded in most countries (if only on long leases). Also, domain names, which are analogous to phone numbers in several respects, can be transferred or traded in many countries.

Though number trading might be discouraged, it is likely to happen if there is demand; after all, selling numbers can masquerade as selling phones, SIMs or even companies[45]. Regulations that are not enforced ultimately lead to disrespect for the rule of law.

Recommendation 8.4.3: *The buying and selling of numbers by persons other than the operators might be discouraged but cannot be prevented.*

8.4.3 Rights of use

More important than inhibiting the secondary market is ensuring that assignees understand the rights of use of numbers relating to circumstances in which the regulator can withdraw numbers or the operators can reclaim, and subsequently recycle, numbers. The draft framework mentions in Clause 3(f) that operators and assignees do not have "ownership rights", but it does not say what

[44] In fact number trading is not permitted in the US, but number leasing, and trading in companies whose only assets are their numbers, are permitted.

[45] A survey by the consultants of regulations about vanity numbers in seventeen countries (mainly in Europe, the Middle East and south Asia) established that only three prohibited number trading. Numbers were openly advertised as being for sale in all seventeen countries, irrespective of formal prohibitions.

those are or what rights operators and assignees do have. The Numbering Rules make a similar statement (Rule 9(e) English version, 7(e) Myanma version); in the amendments to the Numbering Rules it should be elaborated to identify the rights.

In Australia some freephone and local rate numbers come with "extended rights of use", letting them be bought and sold or kept inactive for three years without being reclaimed. A similar principle is being contemplated for the United Arab Emirates (UAE), where at least one person who paid a spectacular price for a vanity number was shocked when he lost the number after failing to maintain his usage or his subscription. The merit of such schemes is very questionable, and very few countries have introduced them. The regulator must ultimately be able to withdraw numbers, and operators might be required to reclaim numbers that are being misused. In fact "extended rights of use" could at best extend the period in which a number could be inactive without being lost; the assignee might still need to take some action to avoid losing the number after a period.

Even if the rights of use of numbers are the same for vanity numbers as for other numbers, there could still be features of the services available with vanity numbers that are not available with other numbers. For instance, in some countries a vanity number is bought within a package that offers benefits such as discounts in stores and memberships of clubs; indeed, officially these benefits might be the essence of the package and the vanity number would be simply an extra. Of course, disentangling the charge component attributable to the vanity number is then particularly difficult.

Recommendation 8.4.4: *The rights of use of numbers should be made explicit and brought to the attention of end users.*

Recommendation 8.4.5: *Different numbers for the same service of the same operator should have the same rights of use, irrespective of the charges that the customers must pay to use them; thus there should be no "extended rights of use".*

8.4.4 Definitions of vanity numbers

The draft framework provides rules that define vanity numbers clearly. However, like all definitions of vanity numbers it can be challenged, because some apparently attractive numbers do not fit. For instance, ten-digit numbers with six occurrences of any digit, such as '56 1113 1171', and ten-digit numbers with four '0's in alternation, such as '56 3070 4090' ("fifty-six thirty seventy forty ninety"), can be popular. Some countries have vanity numbers that translate into words by the standard key pad mapping (as in '0800 flowers' in the US), through their sounds (as in '88' ("doubly fortunate") in China), or some other encoding (as in '786' ("bismallah") in Bangladesh and many other partly Muslim countries, such as the UK). Some people might be attracted by cultural references (such as '108') or to particular numbers, such as their birthdays.

If the regulator does not intend to charge for or sell vanity numbers in any special way, there does not seem to be a strong reason for defining vanity numbers in regulations. Indeed, there could be advantages in letting operators (and any other legitimate number traders) have their own definitions, to provide choice to customers who want their numbers to be special. For instance, one operator might define vanity numbers by rules like those in the draft framework, while another operator might let customers select their own numbers (on payment of small charges) but otherwise have no rules; in the latter case number traders other than the operators might devise their own rules and select numbers for resale with charges according to those rules[46].

Recommendation 8.4.6: *The regulator should not define vanity numbers.*

[46] This could be prevented by restricting the quantity of numbers that any customer could select.

Recommendation 8.4.7: *Operators might define vanity numbers. Any such definitions should be clear and comprehensible but precise, as with other terms in customer contracts.*

8.4.5 Prices for vanity numbers

Even if vanity numbers are not defined in regulations, the regulator might still consider regulating the charges for them. Low, or at least predictable and documented, charges would discourage the emergence of number traders other than the operators. However, some of the charges might need to be high, as otherwise sharp-eyed number traders would buy and resell particular numbers: ’56 5656 5656’ is much more appealing than ’56 4956 5656’ or even ’56 4949 4949’. Which charges might be high is not yet clear; using regulations to set charges, or even upper bounds on charges, could reduce flexibility.

Of course there might be circumstances in which one operator dominates the market; this is often so for fixed network services but much less often so for mobile network services. In these circumstances upper bounds on charges can be important to consumer protection. This applies to the numbers for services just as to the services themselves.

Recommendation 8.4.8: *The charges for vanity numbers made by operators should be regulated only in the same circumstances as the charges for services, typically when an operator has significant market power.*

8.5 Guidelines for numbering transitions

It seems likely that changes to Myanmar’s numbering plan will happen in stages over a period of years, rather than (as in some other countries) all at once on a given day. The staged approach is easier to manage, as it has a flatter manpower profile and can better survive unforeseen obstacles and delays. Its only real disadvantage is that publicity for the changes has to continue over the full period, and be targeted throughout towards the correct part of the public.

When planning a number change, the need to inform callers to obsolete numbers about the correct new numbers must be borne in mind. It is good practice to provide an informative Changed Number Announcement (CNA) similar to one of the following:

a) “This number has been changed to xxxxxx.”

b) “Numbers on this exchange have been changed. The new number starts with 89 rather than 3”.

c) “The area code for ABC has been changed from 082 to 047”.

In each case, a second part of the announcement may be one of:

i. “Your call will now be connected. Please note the new number for next time you call”.

ii. “Please dial again, using the new number”.

Announcements of this kind are usually provided for some months after a change. Later, the old numbers can be connected instead to a general announcement saying “Numbers in Myanmar have changed. Please call (a helpline number), text (an SMS short code) or see (URL) for more information”. Later still, the old numbers can be connected to Number Unobtainable tone, or (where appropriate) reused.

Identifying calls which should be routed to CNAs is easiest if new numbers and old numbers occupy distinct blocks, so that only the first few digits (preferably only the first digit) need be analysed to identify which is which. If this is impossible, then the decision must be taken on the length of the number. For calls dialled from mobiles it is enough to wait for the “send” indicator, which shows that the dialled number is complete. For calls dialled from fixed lines, it may be necessary to count digits and wait at what seems to be the end of the dialled sequence to see if it really is the end – a procedure known as *timeout*.

The number of different CNAs needed depends on the complexity of the change, as does also the level of misdialling to be expected and consequently the CNA capacity needed to meet demand.

Number information services should be considered. The usual directory enquiry service might well be overloaded during the change period. Tables allowing callers to look up new numbers from old numbers could be provided, with access possible via voice or text query, or online.

Operators will need to make changes not only in exchanges but also to their operational support systems, billing systems and so on. Businesses with private networks or PBXs will also have to make various changes to their own systems; most businesses will need to change their publicity materials. All this is made easier by generous advance notice of changes and periods of parallel running of old and new numbers. Informative leaflets and checklists for businesses could help them.

The general public need less advance notice, but changes should not take them by surprise. Often it is possible to associate the changes with service improvements.

The regulator is responsible for informing the ITU of forthcoming numbering changes that affect international connections, giving as much notice as possible. Operators will want also to ensure that international correspondents with which they have direct interconnections are fully informed.

Recommendation 8.5.1: *Numbering transitions in Myanmar should observe guidelines such as those provided here, with the regulator and the operators agreeing on details, such as time periods for advance notice and Changed Number Announcements, appropriate for specific numbering transitions.*

8.6 Number portability

8.6.1 Forms of number portability

Number portability takes various forms:

- Location number portability involves keeping the same phone number when changing from one location to another. When networks become based on IP, number translation and routing depend on fewer nodes, so numbers become portable over larger areas and lose geographic significance. Location number portability should ultimately be very easy.
- Service number portability involves keeping the same phone number when changing from one service to another (from cdmaone to GSM, for example). Differences between services can be difficult to define, especially for IP applications: to one customer an application may offer only voice whilst to another customer it offers text and video as well. Service number portability is therefore made easier by not using numbers to differentiate between services.
- Operator number portability involves keeping the same phone number when changing from one operator to another. Customers may change their operators in order to improve their services, so operator number portability, like service number portability, is made easier by not using numbers to differentiate between services (or, of course, between operators).

In Myanmar, operator number portability, or more specifically operator mobile number portability, is the form of number portability likely to have greatest relevance. However, operator geographic number portability could become applicable when the MPT network is updated in certain areas to be an NGN.

Recommendation 8.6.1: *The regulator should review periodically whether the MPT fixed network has evolved sufficiently in selected areas (such as the major cities) to justify and facilitate introducing operator geographic number portability there.*

8.6.2 Cases for and against number portability

The main argument for introducing operator number portability is that it stimulates competition and perhaps demand, both before its introduction and after its introduction. When there is operator number portability, consumers, and more significantly small businesses, no longer have a major disincentive to changing between operators, so they are more likely to choose the tariff and service packages that suit them best.

Mobile numbers are becoming identifiers that are important for other purposes, so the ability to port them is now widely regarded as a user right. Nonetheless, many prepaid customers in Myanmar are said to discard their SIMs (and therefore their numbers) after some months; they would not necessarily use operator number portability.

In fact, there are arguments against introducing operator number portability, at least in the early stages of market development. In particular, introducing operator number portability might distract operators from other national priorities: skilled staff might be diverted from tasks such as ensuring thorough network coverage, and operators might focus on competing for the existing (relatively high value) customers, not on extending service to customers with low incomes or outside cities.

There is also evidence that in some circumstances operator number portability can increase market concentration when it might be expected to decrease it: if one operator is already larger than the others and on-net tariffs are much lower than off-net tariffs, customers will be attracted to the larger operator, which their contacts use. The differences in tariffs are influenced strongly by the wholesale termination charges, which regulators can usually control.

After operator number portability is introduced the porting process might take some time to settle down and be used confidently and frequently; only later would the quantities of ported numbers grow. This possibility can affect the choice of portability implementation.

Portability implementations may or may not use centralised reference data bases. Those that do not use centralised reference data bases tend to have higher operating costs but lower capital costs than those that do, so they can be more economical for low rates of porting but less economical for high rates of porting. They also tend to lead to porting processes that are more prone to errors and delays; moreover, the vendors of centralised reference data bases, with “build and operate” contracts, might absorb the capital costs in the operating costs, if the incentives are sufficient. The choice of implementation can therefore depend on the projected rates of porting as well as on other factors.

Thus factors affecting when operator number portability should be introduced in Myanmar include:

- The extent to which services are available to customers with low incomes and outside cities.
- The level of wholesale termination charges.
- The projected rates of porting.

Customer surveys can help with determining whether wholesale termination charges are too high (in that they discourage customers from making off-net calls) or whether the projected rates of porting are realistic, but they need to be treated cautiously: they are likely to overstate how keen people are to port numbers and how successful operator number portability will be. In fact when operator number portability is introduced it is likely to be successful only if:

- It is well publicised and widely understood.
- It is simple, quick and free for the customer, involving only one point of contact (with the operator to whom the number is being ported).
- Customers can terminate contracts without incurring disproportionate charges for giving up services or keeping subsidised handsets.

Recommendation 8.6.2: *The regulator should review periodically (perhaps with customer surveys every two years) whether the mobile networks serve enough customers with low incomes and outside cities for operator mobile number portability to be provided.*

Recommendation 8.6.3: *The regulator should ensure that wholesale termination charges are low enough not to discourage customers from making off-net calls, regardess of when operator number portability is introduced.*

8.6.3 Alternatives to number portability

Some benefits of number portability might be achieved at lower cost, through free recorded announcements to let callers know when customers change their numbers and what calls to the changed numbers might cost. Free announcements could also offer to connect calls to the changed numbers for stated tariffs.

The scheme, sometimes known as “subscriber number portability”, has been suggested as an alternative to service provider number portability. It lets customers keep all the digits of their numbers except for those identifying the service provider, so (for example) ‘9 77 2345678’ might be changed to ‘9 97 2345678’, if the number is unused. This scheme was used for some time in Ireland, but it was widely regarded as not delivering the expected benefits and was replaced by operator number portability. If there are four competing operators, at different stages of growth, setting aside unused numbers for this purpose would entail more co-ordination than seems likely to be feasible.

Recommendation 8.6.4: *The regulator and the operators should consider, as an interim alternative to operator mobile number portability, setting aside some number blocks for matched assignment by all the mobile operators, so that an end user assigned a number in such a block by one of the operators is entitled to be assigned the matching numbers by all of the operators.*

8.7 ENUM

8.7.1 Purposes of ENUM

Networks depend on the Internet Protocol (IP) to an increasing extent, even when their users have traditional phones, with phone numbers. If phone numbers are to be used in IP networks, they must be mapped to IP addresses (for call destinations or for gateways into other networks). ENUM is one among various tools for helping to perform this mapping.

Strictly speaking, ENUM is purely the representation of a phone number to a domain name. It works with the internet Domain Name System (DNS), which can map each such domain name to several communication services, with different end points, ranked by preference. The end equipment then chooses one of the communication services according to the preferences and its own capability. It makes a further reference to DNS to obtain an IP address for the chosen communication service before initiating the communication. Figure 15 illustrates the mappings and the steps.

- The user somewhere dials a phone number; ‘02 7414 222’ in Myanmar is the example here.
- The end equipment represents the phone number as a domain name; ‘02 7414 222’ is represented as ‘2.2.2.4.1.4.7.2.5.9.e164.arpa’ by:
    - Removing the trunk prefix to get ‘2 7414 222’.
    - Completing the phone number with the country code to get ‘+95 2 7414 222’.
    - Deleting all characters except the digits to get ‘ 9527414222’.
    - Putting ‘.’ between the digits to get ‘9.5.2.7.4.1.4.2.2.2’.
    - Reversing the order of the digits to get ‘2.2.2.4.1.4.7.2.5.9’.
    - Attaching ‘.e164.arpa’ at the end to get ‘2.2.2.4.1.4.7.2.5.9.e164.arpa’.
- The end equipment sends the domain name to a domain name server.
- The domain name server sends a list of communication services, with an order of priority, to the end equipment, such as:
    - ‘tel:+95 9 9112 222’.
    - ‘sms:+95 9 9112 222’.
    - ‘sip:rem@antelope.mm’.
    - ‘mailto:rem@antelope.mm’.
    - ‘http://www.antelope.mm’.
- The end equipment tries the communication services in their order of priority; for instance:
    - It first tries the phone number ‘+95 99 112 222’.
    - If that fails, it tries the SMS number ‘+95 99 112 222’.
    - If that fails, it tries the SIP address ‘rem@antelope.mm’.
    - If that fails, it tries the email address ‘rem@antelope.mm’.
    - If that fails, it tries the web site ‘www.antelope.mm’.

Figure 15 Mappings and steps in the use of ENUM

In principle the communication services can be very general; for instance, they might involve:

- Making voice calls or video calls.
- Sending text messages, multimedia messages or email messages.
- Retrieving electronic business cards.
- Setting calendar schedules.
- Probing presence indications (such as "busy", "free" and "away").

Working with the internet DNS, ENUM can associate phone numbers with end points for OTT services such as VoIP, but it does not itself provide any communication services. Various widespread VoIP services, such as Skype, do not use ENUM, even though some, such as Viber, associate end points with phone numbers. Conversely, ENUM can be used in implementations of traditional telephony network features (such as number portability).

ENUM is defined generally, independent of national numbering plans at any level other than the country codes. It does not need to be related to national numbering plans and number allocation policies in other respects. It does not require changes to national number plans. In some countries special number ranges have been introduced for use with ENUM, but other number ranges can still be used with ENUM.

Recommendation 8.7.1: *No number range should be specifically associated with ENUM in the numbering plan.*

8.7.2 Experience with ENUM

ENUM was devised many years ago but has never been widely adopted. There have been trials in many countries (such as Australia, China, Indonesia, Japan, Malaysia, Singapore and South Korea) but there have been no widespread deployments and uses of ENUM in its original form. End equipment that can exploit ENUM in its original form (by requesting, and trying in turn, a list of communication services) is very difficult to find.

This apparently promising idea has met various problems, including the following:

- Users would need to enter information into DNS (including information that might be updated often, as with call and message redirection), contrary to its original design intention.
- Users would need to keep the entered information up-to-date.
- Operators might fail to provide information to DNS about competing communications services used by their customers.
- Spammers could harvest any information in DNS, which is publicly accessible, rather easily.
- End equipment vendors would await wide adoption before offering implementations.
- Users could have mobile phones offering some alternative related functions (such as social network applications, contact lists and redirection).
- Users could instead benefit from continuing falls in conventional telephony tariffs and from free voice over the internet without phone numbers.

Many of these problems are due directly to the use of ENUM by end users, as in its original form, which tends to be called “user ENUM”. There are now variants of ENUM, called “carrier ENUM” or “infrastructure ENUM”, which avoid these problems. These use essentially the ENUM representation of phone numbers (modified to replace ‘e164.arpa’ with different domain name labels) and the DNS technology in a system that is not publicly accessible: only operators (and other service providers) can enter information into, or retrieve information from, the system[47]. Such a system might be for use by just one operator (in the core network multimedia subsystem of an NGN, for example) or for use by subscribing operators (in the “Pathfinder” system for international GSM routing, for example). It raises no regulatory difficulties beyond those of any system that operators collectively adopt, such as the centralised reference data base for number portability.

Recommendation 8.7.2: *The regulator and the operators should ensure that, in any collectively adopted ENUM system, user information is up-to-date and not accessible from the public internet, all operators can be offered non-discriminatory pricing for the use of the system, and the system supplier is selected openly and reviewed periodically.*

[47] For a full discussion of all of this see *The potential for ENUM in Qatar* (Antelope Consulting, September 2013) at http://www.antelope.org.uk/publications/The%20potential%20for%20ENUM%20in%20Qatar.pdf.

8.8 Other numbering-related topics

8.8.1 Number presentation

The advantages of uniform number lengths have been mentioned several times in this document. Users are more likely to dial numbers correctly if they know how many digits to expect. The way that numbers are written also affects their ease of use. Breaking long numbers into shorter pieces (“chunking”) helps; for example, people reading an advertisement are likely to retain ‘0925 734 8891’ or ‘092 5734 8891’ better than ‘09257348891’. Standard number layouts, such as ‘0xxx xxx xxxx’ or ‘0xx xxxx xxxx’, can also help.

At present there does not appear to be any such standard number layout in Myanmar, and it is unrealistic to expect a centrally ordained one to be generally observed. However, each mobile operator could present its own numbers in a standard layout, and they may see advantage in commonality of these layouts. Fixed numbers also should be written with a clear separation between the NDC and the subscriber number, while seven-digit subscriber numbers, and possibly shorter ones, could be sensibly “chunked”.

Recommendation 8.8.1: *Operators should consider the advantages of writing numbers, especially long ones, in ways that make it easier for users to retain them. The regulator should encouraage the use of standard number layouts.*

8.8.2 Calling line identity

Calling Line Identity (CLI, also known as Caller ID) raises some practical and regulatory issues.

- There may be a desire for calling numbers displayed on receiving terminals to be presented in certain layouts, such as were discussed in the previous section. There is also a question, raised in discussions with operators, as to whether the displayed number should be in national or international form (even if the caller and called party are both in Myanmar). These matters could be resolved by the operators in Myanmar working together.
- Callers may want to conceal or even spoof (fake) their CLIs, while called parties want confidence in their authenticity. Smartphones and the internet make spoofing easy, with telemarketers and fraudsters exploiting anonymity provisions intended to protect personal privacy. Technical solutions are taking years to develop. Meanwhile, if unwanted calls and texts become a serious problem, user education may be the best approach.

Recommendation 8.8.2: *The regulator and operators in Myanmar should keep in touch with international developments to combat unwanted voice and text communications (“spam”), monitor the problem in Myanmar, and inform users as appropriate.*

8.8.3 Directory information

Licences in Myanmar permit licensees to provide directory services, and require them to provide number information on reasonable terms to other licensees who wish to provide directory information, while omitting numbers that customers wish to keep private. There do not appear to be specific safeguards to prevent misuse of number data bases. As more of the population becomes connected, demand for directory services may grow, and this lack of safeguards may be felt more acutely. Regulation may be needed to foster well run directory services that make specific numbers available as needed without encouraging spam or endangering personal privacy.

8.8.4 Use of phone numbers as identifiers

With yet more people getting mobile phones, phone numbers are becoming used as identifiers for other purposes, such as online messaging. As commented above, this could strengthen demand for number portability. However, without portability and with high churn and number reuse, a user may find that he cannot register his phone number as an identifier with the service of his choice because it has already been taken by an earlier user. Alternatively, if the new user registers successfully then the original user may lose access to the service.

This situation has to be handled by the other service provider, not the one responsible for assigning the phone number originally. One solution, similar to that used for webmail accounts where many users may have the same name and request the same email address, may be to add a suffix to the number to distinguish a subsequent user (e.g. ‘092 3456 7890-2’ for the second user of ‘092 3456 7890’). If service access must depend on retention of the same phone number, it is clearly important to warn users of this fact.

9 Other numbering systems

9.1 Established international requirements

Various other numbers besides E.164 numbers are significant for telecommunications regulation and are defined to some extent in ITU recommendations[48]. Unlike E.164 numbers, they are not seen by users often (or ever, in most cases), so they rarely create problems for regulators. However, possibly one operator might withhold information about allocations from another or might create shortages by having wasteful allocations. If these numbers are used in services that are, or are likely to become, competitive the regulator must take formal responsibility for them (though it might delegate their management to service providers). Figure 16 summarises the attributes of these numbers.

Thought Data Network Identification Codes (DNICs) and Telex Network Identification Code (TNICs) have been allocated to Myanmar in the past, they are unlikely to be allocated in the future because of advances in technology. However, International Mobile Station Identities (IMSIs), particularly the Mobile Network Codes (MNCs), and International Signalling Point Codes (ISPCs), particularly the Signalling Point Identifications (SPIs), are likely to be allocated. In these two cases, the regulator needs to observe the rate of allocation and, when supplies are exhausted, request from the ITU the allocation of new Mobile Country Codes (MCCs) or Signalling Area / Network Codes (SANCs), as appropriate, in the manner described in the ITU recommendations[49].

National Signalling Point Codes (NSPCs) are not standardised internationally; however, in Myanmar, as usually elsewhere, they have attributes like those of ISPCs in Figure 16. Thus they have SANCs and SPIs and are written in the form ‘A-BCD-E’, where ‘ABCD’ is the SANC and ‘E’ is the SPI. In the case of Myanmar, ISPCs are likely to have first digit ‘4’ (at least until a shortage of ISPCs leads to the pooling of the spare ones); to avoid confusion, therefore, NSPCs should not have first digit ‘4’.

A draft application form for the allocation of codes other than E.164 numbers is in Annex H.

Recommendation 9.1.1: The regulator should review trends in demand for codes periodically and in response to problems raised by the operators.

[48] The list at http://www.itu.int/en/publications/ITU-T/Pages/publications.aspx?parent=T-SP&view=T-SP1 indicates what the ITU has defined for publication.

[49] There can be 100 MNCs for each MCC in Myanmar, so exhaustion of MNCs might be unlikely, but there are at most 8 SPIs per SANC, so exhaustion of SPIs is likely.

Code	Components	Identified entity	Allocation responsibilities	Limits	ITU standard
International Signalling Point Code (ISPC)	Signalling Area / Network Code (SANC) , Signalling Point Identification (SPI)	A source or destination in a signalling network	ITU: SANCs, Regulator: SPIs	1,536 SANCs, 8 SPIs per SANC	Q.708
International Mobile Station Identity (IMSI)	Mobile Country Code (MCC) , Mobile Network Code (MNC) , Mobile Subscriber Identification Number (MSIN)	A home country, a home network an individual roaming subscriber	ITU: MCCs, Regulator: MNCs, Operator: MSINs	1000 MCCs, 100 or 1,000 MNCs per MCC, 10,000,000,000 or 1,000,000,000 MSINs per MCC	E.212
Data Network Identification Code (DNIC)	Data Country Code (DCC) , Network Digit (ND), Network Terminal Number (NTN)	A source or destination in a public data network	ITU: DCCs, Regulator: NDs, Operator: NTNs	900 DCCs, 10 NDs per DNIC, 10,000,000,000 NTNs per ND	X.121
Telex Network Identification Code (TNIC)	Telex Destination Code (TDC) , Telex Number (TN)	A source or destination in a telex network	ITU: TNICs, ITU: TDCs Regulator: TNs, Operator: TNs		F.69

Figure 16 Internationally established codes

9.2 Occasional national requirements

In some countries there are numbers that do not arise in international standards but that nonetheless need to be managed by regulators because of their uses in routing or administration. Which such numbers are needed varies with national network structures. For instance:

- For some implementations of carrier preselection, carrier preselection codes identify operators that carry calls because of carrier preselection.
- For some implementations of number portability, number portability codes identify points in recipient or transit networks; they are prefixed to the dialled numbers in signalling, so they need to be distinguished from allocated numbers.

Currently no such schemes seem to be required in Myanmar, but the need for them might arise.

Recommendation 9.2.1: The regulator and the operators should consider which, if any, national standards for signalling and internal network codes need to be provided.

Annex A Draft Numbering Plan

1. Status of this document

a) This is the initial telecommunications numbering plan for Myanmar prepared by the Department in accordance with the opening paragraph of Part II of the Numbering Rules 2013 (section 3 of Myanma version). It provides details of the meaning and use of numbers.

b) The Numbering Rules complement this Numbering Plan by providing further information on Numbering Plan administration and management. In particular, the Numbering Rules govern number block allocation.

c) Terms used in this Numbering Plan and in the Numbering Rules will have the same meaning. This Numbering Plan uses the following terms[50]:

   i. A *National Destination Code (NDC)* is the digit or digits identifying a geographic area (in the fixed network), such as '1' for Yangon or '67' for Naypyitaw, or a non-geographic service type, such as '9' for mobile. NDCs can be dialled from outside the country when preceded by the *Country Code* (CC).

   ii. A *subscriber number (SN)* is the sequence of digits following a NDC that identifies a specific subscriber or network termination point within that NDC, such as '421053' for a particular office within Naypyitaw.

   iii. A *National Significant Number (NSN)* comprises an NDC followed by an SN. Where the word "number" is used on its own, it refers to a National Significant Number (unless the context requires otherwise, when the word refers to a subscriber number). *First (or second) significant digit* means the first or second digit of an NSN.

   iv. The *national numbering plan* specifies the intended use of all NDCs, including the lengths of SNs within each. It applies to all operators and is meaningful internationally. It also covers *national-only numbers* (such as short codes) which cannot be accessed from outside the country. Numbering plans change infrequently, following consultation.

   v. A *seven-digit number* (for example) is an NSN having seven digits (also referred to as having length 7), such as '2345678' (which has NDC '2' and SN '345678').

   vi. A *prefix* is a digit or set of digits dialled before a National (or International) Significant Number to signal to the network the caller's selection of a certain number format, service or carrier. It is not part of the national numbering plan. Common prefixes are the national prefix '0' and international prefix '00', which are recommended by the ITU and used in Myanmar.

   vii. *Short codes* are short sequences of digits that are usually used to access special services, provided using either voice or messaging. By contrast with NDCs, they cannot be dialled successfully from outside the country. They are harmonised between operators to varying degrees.

   viii. A *geographic number* is an NSN whose NDC has geographic significance, referring to a specific area of the country. A *non-geographic number* is an NSN whose NDC does not have geographic significance. A *mobile number* is an NSN used for mobile services.

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[50] These explanations aim for consistency with the definitions in Section 5 of the English version of the Numbering Rules 2013. The official (Myanma) version omits this section.

ix. *Designation* is the setting aside of numbers or codes in the national numbering plan for particular usage, as in Numbering Rule 17d)i (English version), 14d)i (Myanma version).

2. Numbering Plan structure

a) Myanmar's telecommunications numbering plan is in accordance with ITU Recommendation E.164 entitled *The international public telecommunication numbering plan*. The country code is +95.

b) It is an open plan (that is, having separate procedures for local and national dialling) with National Significant Number (NSN) lengths between 7 and 10 digits, and National Destination Codes (NDCs) of 1 or 2 digits. The national prefix is 0 and the international prefix is 00.

c) The uses of first and second significant digits as at August 2016 are shown in Table 1.

NDC	Designation	Further details of use[51]	Minimum NSN length	Maximum NSN length
1	Geographic numbers	Yangon (Yangon)	7	8
10	None			
11	Non-geographic numbers	Location-independent voice services	8	8
2	Geographic numbers	Mandalay (Mandalay)	6	8
20	None			
21	None			
3	Military fixed network	33, 35, 38, 39 are not in use	7	8
40	None			
41	None			
42	Geographic numbers	Pathein (Ayeyawady)	7	7
43	Geographic numbers	Sittwe (Rakhine)	7	9
44	Geographic numbers	Hinthada (Ayeyawady)	7	7
45	Geographic numbers	Maubin (Ayeyawady)	7	7
46	Geographic numbers	Nyaungdon (Ayeyawady)	7	9
47	None			
48	None			
49	None			
50	None			
51	None			
52	Geographic numbers	Bago (Bago)	7	9
53	Geographic numbers	Pyay (Bago)	7	7
54	Geographic numbers	Taungoo (Bago)	7	9
55	Geographic numbers	Oakkan (Yangon)	7	7
56	Geographic numbers	Thanlyin (Yangon)	7	7
57	Geographic numbers	Mawlamyine (Mon)	7	7
58	Geographic numbers	Hpa An (Kayin)	7	9
59	Geographic numbers	Dawei (Tanintharyi)	7	7
60	Geographic numbers	Yenangyaung (Magway)	7	7
61	Geographic numbers	Chauk (Magway)	7	9
62	Geographic numbers	Pakokku (Magway)	7	7
63	Geographic numbers	Magway (Magway)	7	7
64	Geographic numbers	Meikhtila (Mandalay)	7	9

[51] For geographic NDCs, the further details consist of the main city or town served followed by its administrative region or state. NDC boundaries do not always align with administrative boundaries.

NDC	Designation	Further details of use[51]	Minimum NSN length	Maximum NSN length
65	Geographic numbers	Minbu (Magway)	7	9
66	Geographic numbers	Myingyan (Mandalay)	7	9
67	Geographic numbers	Naypyitaw (Naypyitaw)	7	9
68	Geographic numbers	Thayet (Magway)	7	7
69	Geographic numbers	Aunglan (Magway)	7	8
70	Geographic numbers	Hakha (Chin)	7	7
71	Geographic numbers	Monywa (Sagaing)	7	8
72	Geographic numbers	Sagaing (Sagaing)	7	7
73	Geographic numbers	Kalay (Sagaing)	7	7
74	Geographic numbers	Myitkyina (Kachin)	7	7
75	Geographic numbers	Shwebo (Sagaing)	7	7
76	None			
77	None			
78	None			
79	None			
80	None			
81	Geographic numbers	Taungyyi (Shan)	7	9
82	Geographic numbers	Lashio (Shan)	7	7
83	Geographic numbers	Loikaw (Kayah)	7	9
84	Geographic numbers	Kyine Ton (Shan)	7	7
85	Geographic numbers	Pyin Oo Lwin (Mandalay)	7	9
86	Geographic numbers	Mogoke (Mandalay)	7	7
87	None			
88	None			
89	None			
9	Mobile numbers	90, 91 are not in use	8	10

Table 1 Uses of first and second significant digits, August 2016

3. Geographic numbers

a) Geographic numbering generally signifies network termination within a given geographic area, indicated by the place name shown against the geographic NDC. These areas taken together cover the whole of Myanmar, with no gaps or overlaps. On reasonable request from licensees, the Department will provide necessary information about specific area boundaries.

b) A full geographic number consists of a geographic NDC followed by a subscriber number (SN). SNs start with digits 2, 3, 4, 5, 6, 7, 8 or 9 and are of length 5, 6 or 7 digits. Any given SN may recur in different geographic NDCs.

c) Calls within a geographic NDC will be connected if they are dialled using either of the following two procedures:

- The SN only, for example 234567;
- The full national number including the national prefix, for example 01 234567 (when both caller and called number are in Yangon).

Either procedure will attract the same (“local”) charge.

d) Calls from a geographic NDC to any other NDC must be dialled using the full national number including the national prefix, for example 02 234567 if the caller is in Yangon and the called number in Mandalay. Calls between NDCs may attract charges at other than local rates.

e) As long as these charging requirements are fulfilled, the actual location of a called party may be outside the geographic area signified by its NDC (“out of area number”).

4. **Mobile numbers**

a) The NDC 9 signifies mobile numbers. A full mobile number consists of a subscriber number (SN) following the NDC 9. Mobile SNs start with any digit. Since 2014, all new mobile SNs have 9 digits; some older mobile SNs have 7 or 8 digits.

b) Calls from mobile networks to fixed or mobile networks are dialled using full national numbers, including the national prefix.

c) The current option to connect calls that are dialled for delivery within a mobile network using only an SN will be removed.

5. **Other non-geographic numbers**

a) All mobile numbers are non-geographic numbers.

b) The NDC 11 is used at present for location-independent (and hence non-geographic) VoIP services, with SNs of 6 digits.

c) The following NDCs are identified for new non-geographic services, to be designated when needed:

- 800 (with SNs of 4 or 7 digits) for freephone/tollfree services, that is, services which impose no charge on the caller (both names are current and mean the same).
- 79 (with SNs of 8 digits) for location-independent voice services, potentially including both VoIP and satellite services.
- 89 (with SNs of the maximum 11 digits permitted by ITU recommendation E.164) for machine-related services, which are dialled by machines and not by humans.

d) When NDC 79 is designated, SNs in NDC 11 will be transferred to NDC 79, prefixed by a pair of digits (so as to have 8 instead of 6 digits). When this process is complete, NDC 11 will lose its designation.

e) The NDCs 10, 20, 40, 50, and 90 will be preferred for numbering of future non-geographic services requiring distinctive numbering. Other NDCs of the form X0 may also be used in this way if they become free from their current uses.

6. **Short codes**

a) Short codes (also known as short numbers) are numbers of at least 3 digits, but of less than the shortest SN length in the type of NDC from which they are dialled. This means that short codes dialled from fixed phones are of 3 or 4 digits, while short codes dialled from mobile phones are of 3, 4, 5, or 6 digits.

b) Where (as in current GSM technology) the end of dialling is marked by sending a channel request, a number range can be used simultaneously at different number lengths. For example, the codes 234, 2345, 23456 and 234567 could all be used from a mobile phone for different services without risk of misrouting (though care would be needed to avoid customer confusion and misdialling). With current fixed network technology, this is not possible without a risk of misrouting, so fixed subscriber number ranges and short code ranges do not overlap.

c) The first dialled digit 1 is set aside for short codes that may be dialled from fixed phones or mobile phones. These codes are managed by the Department; more information on them is provided in Table 2. There are currently four Type A codes, all related to emergency services. The Types of other codes have not yet been officially identified.

d) Short codes are not allowed to start with 0, to avoid confusion with the national prefix.

e) Short codes starting with digits 2, 3, 4, 5, 6, 7, 8 or 9 are in use from mobile phones, for both voice and messaging applications. These code ranges are not managed by the Department, but co-ordination of use among mobile network operators is encouraged.

f) It is intended to allow for more Type A codes, to clarify arrangements for other Types and to increase co-ordinated use of short codes among operators and across different media (voice and messaging). Table 3 shows the expected evolution of arrangements for short codes.

Type	Description	Example	Allocation	Regulation	Ranges	Voice or messaging
Type A	Common public services	Emergency services	Individually designated services	All licensees must provide these services on these numbers.	191, 192, 199, 112	Voice
Type B	Common service numbers	Customer enquiries, balance check and top-up	Individually designated services	If licensees provide these services, they must use these numbers (and must not use these numbers in other ways).	11X(Y) to 18X(Y) (shared with other types)	Voice
Carrier selection codes	Access from other networks to licensee in question	Alternative international carrier access	Allocated to specific licensees	Use would depend on other specific regulation which does not currently exist. No applications have been received.	16XY	Voice
Type C	Other service numbers	Weather forecast, sports results	Allocated to specific licensees	None, but co-ordination encouraged.	Any other code starting with 1	Voice
Others	None	Mobile banking	None	None	2 to 9	Both

Table 2 Current status of short code ranges

Type	Description	Example	Allocation	Regulation	Ranges	Voice or messaging
Type A	Public service numbers	Emergency services, social welfare helplines	Individually designated services	All licensees must provide these services on these numbers, free of charge to callers.	19X, 15X, 11X	Both
Type B	Common service numbers	Customer enquiries, balance check and top-up, national level charity program	Individually designated services	If licensees provide these services, they must use these numbers (and must not use these numbers in other ways).	10X (fixed), 12X (fixed and mobile), 2XY(Z) (mobile)	Both
Carrier selection codes	Access from other networks to licensee in question	Alternative international carrier access	Allocated to specific licensees	Use would depend on other specific regulation which does not currently exist. No applications have been received.	160XY	Both
Type C	Other service numbers (shared use)	Weather forecast, sports results	Allocated for specific applications via industry body working with PTD	All licensees to provide access for services provided by non-licensees. Call charges to be clearly signalled, with positive confirmation before incurring rates above standard.	Other parts of 1 and some* (J) of 2 to 9	Both
Others	Telecom and non-telecom service numbers (network specific)	Entertainment, mobile banking, business applications	None	Unregulated, in agreed ranges	Some* (U) (but not all) of 2 to 9	Both

Table 3 Planned status of short code ranges

* Short code space starting 2 to 9 will be divided into 3 categories:
U (Unco-ordinated): For each company to use as they see fit, without co-ordination
J (Joint): For all companies to use Jointly in a co-ordinated way
P (Protected): Protected for the time being, until future demand patterns become clear

Annex B Current fixed and mobile number allocations

Figure 17 shows the quantities of allocated numbers as calculated from recent records. The quantities are calculated given the blocks and numbers currently allocated. For instance, NDC '86' (which is one of several for the Mandalay area) has 7 allocated blocks, each having a thousand numbers of length 7 and identified by their first four digits (the two-digit NDC and the first two digits of the subscriber number), so there are 7 x 10^3 = 7,000 allocated numbers with NDC '86'.

The recent records used in the calculations are the annual numbering returns from the operators and the MPT proposals to change subscriber numbers for the fixed network. These documents are not entirely consistent with each other but have been combined by removing misprints and making plausible assumptions. They are also inconsistent with the records available earlier in the project, which in some cases lead to very much larger quantities of allocated numbers (typically because they assume that more numbers have been allocated and that more numbers are as long as they could be). Nonetheless they are believed to be correct in scale though not in detail.

With seven-digit subscriber numbers, each geographic NDC could potentially provide 8 million numbers. So this figure tells us that very little of the potential numbering capacity has been allocated, except in Yangon. Even for mobile, only around 25% of the potential numbering capacity (with ten-digit numbers) has been allocated. However, as discussed elsewhere in this document, shorter numbers are currently taking up a disproportionate amount of the meaning in numbers.

First NSN digit	Main use	Number holders	NDC	Administrative area	Quantity of allocated numbers (thousands)
1	Fixed network	MPT, YTP, STLM	1	Yangon	326
2	Fixed network	MPT, YTP	2	Mandalay	51
3	Fixed network	Military	30	Union	10
			31		10
			32		10
			34		10
			36		1
			37		1
4	Fixed network	MPT	42	Ayeyawady	16
			43	Rakhine	23
			44	Ayeyawady	9
			45	Ayeyawady	9
			46	Ayeyawady	9
5	Fixed network	MPT	52	Bago	24
			53	Bago	26
			54	Bago	18
			55	Yangon	7
			56	Yangon	6
			57	Mon	33
			58	Kayin	12
			59	Tanintharyi	17

First NSN digit	Main use	Number holders	NDC	Administrative area	Quantity of allocated numbers (thousands)
6	Fixed network	MPT	60	Magway	2
			61	Magway, Mandalay	11
			62	Magway	9
			63	Magway	15
			64	Mandalay	14
			65	Magway	6
			66	Mandalay	13
			67	Naypyitaw	126
			68	Magway	3
			69	Magway	3
7	Fixed network	MPT	70	Chin	8
			71	Sagaing	21
			72	Sagaing	4
			73	Sagaing	6
			74	Kachin	28
			75	Sagaing	18
8	Fixed network	MPT	81	Shan	39
			82	Shan	37
			83	Kayah	9
			84	Shan	16
			85	Mandalay	7
			86	Mandalay	7
9	Mobile network	MPT, MecTel, Ooredoo, Telenor	9	Union	144,700

Figure 17 Current number allocations per NDC

Annex C Use of short numbers in early 2016

Number	Service description	Note	Operator
100	Enquiries Inland		MPT
101	Booking Inland		MPT
102	Telephone Complaints		MPT
103	VIP Booking		MPT
104	Information Service		MPT
105	Telegram service		MPT
106	MPT Complaint (NPT PSTN)		MPT
112	Single emergency number (reserved for future)		All operators
121	Telephone Booking		MPT
1211	MEC Call Center		MEcTEL
1212	MEC Complaint Center		MEcTEL
122	Telephone Booking		MPT
123	Prepaid top-up		Telenor
123	GSM Prepaid Service		MPT
*123	GSM Prepaid Service		MPT
124	Balance inquiry		Telenor
*124	GSM Prepaid Service		MPT
*162	CDMA Prepaid Service		MPT
*166	CDMA Prepaid Service		MPT
130	Overseas Enquiry		MPT
131	Overseas Booking		MPT
133	Calling Card Access Code		MPT
1331	Mobile User Activation		MPT
137	International Test phone		MPT
144	Internet Access Code		MPT
1440	Missed Called Alert (Service Access Code)		MEcTEL
1441	Voice Mail Service (Registration code)		MEcTEL
153	VoIP International Call Access Code		MPT
1550	GSM VMS Service		MPT
161	CDMA Prepaid Service		MPT
166	CDMA Prepaid Service		MPT
1660	Mobile Banking (Test)		MPT
1663	Mobile Banking (MCB)		MPT
1666	Mobile Banking (Innwa Bank)		MPT
1667	Mobile Banking (CB Bank)		MPT
1668	Mobile Banking (MWD Bank)		MPT
1669	Mobile Micro Finance (I-Pay)		MPT
177	GSM CRBT (Fortune)		MPT
1772	GSM CRBT (Etrade)		MPT
1773	GSM CRBT (UNICO)		MPT
1818	YTP Call Centre		YTP
1830	Medical Association		YTP
1840	Immigration		YTP
1874	CB Bank		Blue Ocean Call Center

Number	Service description	Note	Operator
1875	Inbound Sports		Blue Ocean Call Center
1876	Inbound MPT/Inquiry		Blue Ocean Call Center
1877	Hotel Reservation		Blue Ocean Call Center
1878	AGD Bank		Blue Ocean Call Center
1879	Fortune Teller Services		Blue Ocean Call Center
188	M 188 SMS Service		MPT
1880	Ygn-Mdy HW Emergency		Blue Ocean Call Center
1881	e-govt Yangon		Blue Ocean Call Center
1882	Voice of Customers		Blue Ocean Call Center
1883	Online Ticketing Service		Blue Ocean Call Center
1883	Highway Emergency Response	Type B	Ooredoo
1884	Job Search Service		Blue Ocean Call Center
1885	Online TV Shopping		Blue Ocean Call Center
1886	Health Care Service		Blue Ocean Call Center
1887	Travel Hotline		Blue Ocean Call Center
1888	M188		Blue Ocean Call Center
191	Fire	Type A	All operators
192	Ambulance	Type A	All operators
199	Police	Type A	All operators
200	Voice mail	sms	Telenor
211	SMS Voting	sms	MEcTEL
211	VIP customers hotline		Ooredoo
2111	Enquiry Service		MEcTEL
2112	Consulting Service		MEcTEL
2113	Ticketing Service		MEcTEL
2114	Booking Service		MEcTEL
2115	Market Research Service		MEcTEL
2116	VAS(Activation/Registration)		MEcTEL
2117	Job Search Service		MEcTEL
2118	Information Technology Service		MEcTEL
2119	Auto mobile Service		MEcTEL
212	Corporate customers hotline		Ooredoo
2120	Banking Service		MEcTEL
2121	Health Car Service		MEcTEL
2121	Collect call white/ black list management via SMS Balance Inquiry-for prim 4242	sms	Ooredoo
2122	Order Inquiry and Taking Service		MEcTEL
2123	Customer Service Representative Outstanding		MEcTEL
2124	General Complaint		MEcTEL
2125	Sports Service		MEcTEL
213	Dealer hotline		Ooredoo
222	SMS Blast Service (Update News, Sport, Gold Price, Weather)	sms	MEcTEL
222	SMS Services	sms	Telenor
222	Contact Centre Outbound		Ooredoo
2222	Mobile Enquiry Service		MEcTEL

Number	Service description	Note	Operator
2230	Secondary and subaccount packages	sms	Ooredoo
2231	Prepaid Top Up (self)	sms	Ooredoo
2232	Top Up another	sms	Ooredoo
2235	Friends and Family	sms	Ooredoo
2236	Set Language	sms	Ooredoo
2237	Change subscriber password	sms	Ooredoo
2238	Primary Offer/Tariff Plan	sms	Ooredoo
2240	Astrology IVR subscriptions		Ooredoo
2244	Astrology IVR Portal		Ooredoo
234	Contact Centre		Ooredoo
2450	Balance Transfer	sms	Ooredoo
2455	Query postpaid balance	sms	Ooredoo
2460	SMS Satisfaction Survey	sms	Ooredoo
2462	Media Questionnaire Survey	sms	Ooredoo
2463	Customer Surveys (New)	sms	Ooredoo
3131	Voice Mail retrieval		Ooredoo
32665	SMS Services	sms	Telenor
3300	Voice SMS		Ooredoo
331	U 900 Compatibility check (on-net)	sms	Ooredoo
333	SMS Services	sms	Telenor
333	My Tune	sms	Telenor
3331	SMS Extra	sms	Ooredoo
3333	CRBT	sms	Ooredoo
3333	CRBT		Ooredoo
3339	CRBT gifting	sms	Ooredoo
334	My Tune	sms	Telenor
3455	MEC Call Center		MEcTEL
3456	Customer Care		MEcTEL
3456	MEC Complaint Center		MEcTEL
3636	MEC Call Center (1211 substitute)		MEcTEL
3939	MEC Call Center (1211 substitute)		MEcTEL
3999	First activation	sms	Ooredoo
4001-4005	SMS INFO (no request, subscriptions), media partnership	sms	Ooredoo
4006-4009	NOC Alarms (MO&MT)	sms	Ooredoo
4040	IVR Portal-M Radio (pay as you go)		Ooredoo
4141	SMS Chat	sms	Ooredoo
4242	OBD		Ooredoo
4545	SMS INFO (no request, subscriptions)	sms	Ooredoo
4548	Charity SMS code	sms	Ooredoo
4549	Music Streaming	sms	Ooredoo
4999	E-Top Up	sms	Ooredoo
4999	EVC Recharge (dealer)	sms	Ooredoo
500	SMS, USSD Services	sms	Telenor
5020	Youth Pack- Subscription	sms	Ooredoo
5030-5032	SMS Pack Activation	sms	Ooredoo

Number	Service description	Note	Operator
5044	Galaxy Edge	sms	Ooredoo
5045	Galaxy Edge	sms	Ooredoo
5542	Galaxy Note	sms	Ooredoo
5543	Galaxy Note	sms	Ooredoo
555	Customer Care	sms	Telenor
5555	RED Plan activation	sms	Ooredoo
5999-51010	Voucher Card Recharge, EVC Recharge (customer) CBS (package subscription success, balance inquiry, package inquiry, package expiry)	sms	Ooredoo
6001-6050	SMS Voting	sms	Ooredoo
6611	SMS Services	sms	Telenor
6622	SMS Services	sms	Telenor
6633	SMS Services	sms	Telenor
6644	SMS Services	sms	Telenor
6660	Phone Setting OTA and roaming steering	sms	Ooredoo
6660-6666	SMS 2TV	sms	Ooredoo
6666	SMS Services	sms	Telenor
6969	IVR Chat		Ooredoo
777	Customer Care	sms	Telenor
7777	Phalan-Phalan Activation	sms	Ooredoo
8081	IT OTP SMS solution (internal use)	sms	Ooredoo
8082	Testing; RF Drive team access code		Ooredoo
86277	USSD Services	sms	Telenor
979	SMS, USSD Services	sms	Telenor
979	Customer Care	sms	Telenor
9991	DMS (Sales) MT	sms	Ooredoo
9995	Dealer Magazine	sms	Ooredoo
9999	Dealer SIM activation	sms	Ooredoo

Figure 18 Use of short numbers

Annex D Changes to make geographic subscriber numbers be unique countrywide

The MPT objectives for changing geographic numbers include making subscriber numbers have exactly seven digits and making subscriber numbers be different in different NDCs. Relatively simple procedures that satisfy both of these objectives are as follows:

- Select for every NDC a digit pair that could be used at the start of changed geographic subscriber numbers but that does not occur at the start of current geographic subscriber numbers in the NDC and that occurs rarely, or not at all, at the start of current geographic subscriber numbers in nearby NDCs. Because there are fewer such digit pairs than NDCs some NDCs must have the same digit pairs and could potentially have the same changed subscriber numbers. Figure 19 exhibits digit pairs between '70' and '99' that seem to produce fewer potential clashes of changed subscriber numbers than others do.
- Remove potential clashes of changed subscriber numbers by:
    - Changing the second digit of clashing seven-digit subscriber numbers (replacing that digit by the second digit of the digit pair selected for the NDC, if possible).
    - Changing the first digit of clashing six-digit subscriber numbers (replacing that digit by the second digit of the digit pair selected for the NDC, if possible).
    - Changing the first digit of clashing five-digit subscriber numbers.

  Figure 20, which has 66 entries, provides changes appropriate to the given digit pairs; there are several possible variants of these (and of the rules for removing clashes), some of which reduce further the quantities of changed numbers.
- Change subscriber numbers by:
    - Substituting, in each NDC, the first digit of the digit pair selected for that NDC for the first digit of every seven-digit subscriber number.
    - Prefixing, in each NDC, the first digit of the digit pair selected for that NDC to every six-digit subscriber number.
    - Prefixing, in each NDC, the first and second digits of the digit pair selected for that NDC to every five-digit subscriber number.

  Each of the resulting subscriber numbers has seven digits and is unique throughout the country.

NDC	Administrative area	General location	Digit pair
1	Yangon	South	92
2	Mandalay	North	72
42	Ayeyawady	South	97
43	Rakhine	Centre	81
44	Ayeyawady	South	94
45	Ayeyawady	South	97
46	Ayeyawady	South	94
52	Bago	Centre	84
53	Bago	Centre	87
54	Bago	Centre	83
55	Yangon	South	90
56	Yangon	South	91
57	Mon	South	98
58	Kayin	South	90
59	Tanintharyi	South	91
60	Magway	North	74
61	Magway, Mandalay	North	70
62	Magway	North	73
63	Magway	North	74
64	Mandalay	North	70
65	Magway	North	74
66	Mandalay	North	79
67	Naypyitaw	Centre	86
68	Magway	North	73
69	Magway	North	73
70	Chin	North	77
71	Sagaing	North	75
72	Sagaing	North	75
73	Sagaing	North	75
74	Kachin	North	76
75	Sagaing	North	77
81	Shan	North	71
82	Shan	North	78
83	Kayah	Centre	82
84	Shan	North	78
85	Mandalay	North	70
86	Mandalay	North	70

Figure 19 Selection of digit pairs

NDC	Digits specifying 1,000-number block before making any changes	Digits specifying 1,000-number block after removing potential clashes
1	2317	2417
1	240	340
1	50x	80x
1	55x	65x
1	56x	36x
1	6xx	9xx
1	8010	8810
2	4000	4400
42	4x	9x
42	50	20
43	202x	212x
43	206x	216x
44	3x	7x
44	5x	8x
44	6x	9x
58	21	41
58	50	90
59	2x	7x
59	30	80
61	200	300
61	21	81
61	30	10

NDC	Digits specifying 1,000-number block before making any changes	Digits specifying 1,000-number block after removing potential clashes
61	60	90
62	50	70
64	2035	2935
64	2x	8x
64	40	70
64	50	80
65	2027	2927
65	2x	3x
65	30	90
65	40	80
66	2062	2962
67	40x	80x
67	42x	82x
67	43x	83x
67	59x	89x
68	21	91
68	40	90
68	50	20
69	200	900
69	21	81
69	40	80
70	2x	9x

NDC	Digits specifying 1,000-number block before making any changes	Digits specifying 1,000-number block after removing potential clashes
70	40	90
70	50	00
70	60	10
70	70	20
71	2x	8x
71	30	80
71	40	90
71	50	20
72	2x	9x
81	282	982
81	52	62
81	54	64
83	2x	8x
84	2x	0x
84	40	10
84	5x	1x
84	63	73
84	65	15
84	7x	9x
85	2050	2350
86	21	11
86	39	99

Figure 20 Mapping of subscriber numbers to avoid clashes (scheme 1)

Annex E Changes to make geographic subscriber numbers have the same lengths

The MPT objectives for changing geographic numbers include making subscriber numbers have exactly seven digits and making subscriber numbers be different in different NDCs. Rather simple procedures that satisfy the first of these objectives but not the second are as follows:

- Select a digit pair that could be used at the start of changed geographic subscriber numbers but that does not occur at the start of current geographic subscriber numbers in any NDC. There are only six such digit pairs (‘78’, ‘88’, ‘95’, ‘97’, ‘98’ and ‘99’); among them ‘78’ produces few clashes of potential changed subscriber numbers.
- Remove potential clashes of changed subscriber numbers by:
    - Changing the first digit of clashing six-digit subscriber numbers (replacing that digit by the second digit of the digit pair, if possible).
    - Changing the first digit of clashing five-digit subscriber numbers.

  Figure 21, which has only three entries, provides changes appropriate to the given selection of digit pairs; there are several possible variants of these (and of the rules for removing clashes), some of which reduce further the quantities of changed numbers.
- Change subscriber numbers by:
    - Prefixing the first digit of the selected digit pair to every six-digit subscriber number.
    - Prefixing the first and second digits of the selected digit pair to every five-digit subscriber number.

  Each of the resulting subscriber numbers has seven digits.

NDC	**Digits specifying 1,000-number block before making any changes**	**Digits specifying 1,000-number block after removing potential clashes**
43	565	665

NDC	**Digits specifying 1,000-number block before making any changes**	**Digits specifying 1,000-number block after removing potential clashes**
67	2x	4x

NDC	**Digits specifying 1,000-number block before making any changes**	**Digits specifying 1,000-number block after removing potential clashes**
67	5xx	8xx

Figure 21 Mapping of subscriber numbers to avoid clashes (scheme 2)

Annex F Draft Licensee Annual Numbering Return Form

This format is provided for the purpose of licensees' compliance with Section 16 of the Numbering Rules (English version, Section 13 Myanma version). This states that as part of the numbering audit process each holder of a numbering allocation shall submit an Annual Numbering Return referring to information at the end of the calendar year, on the use of each numbering allocation, the numbers that have been allocated to end users, and the forecast demand for each type of allocation. Licensees must submit the Annual Numbering Return within forty-five (45) days of the end of the calendar year.

The templates provided below should be completed and submitted in machine-readable form, for example as Excel spreadsheets, with rows added as necessary. The rows shown in italics are only examples, and should be deleted.

After the first annual return, please provide each list as an updated copy of the corresponding list from the previous year, highlighting additions, deletions and any other changes during the year in question.

PART A – GEOGRAPHIC NUMBERS

A1 Details of number blocks allocated to and in use by licensee[52]

Area code	**Subscriber number (SNs)**		**Name of area**	**Type of exchange**	**Registered subscribers as % of quantity of SNs**
	Exchange code and number range	**Quantity of numbers in range**			
2	*55 0000 – 55 9999*	*10,0000*	*Myitge*	*TWD-06*	*75%*

A2 Details of number blocks allocated to but not in use by licensee

Area code	**Subscriber number (SNs)**		**Reason not in use (e.g. recent allocation, sub-allocated[53], reserved for number change)**
	Exchange code and number range	**Quantity of numbers in range**	

A3 Details of number blocks reserved for licensee

Area code	**Subscriber number (SNs)**		**Start and end dates of reservation**	**Reason for reservation**
	Exchange code and number range	**Quantity of numbers in range**		

[52] Copy and complete this table for each body which has received a sub-allocation, identifying the body.

[53] Note that the licensee is responsible for the use made of sub-allocations. This must also be reported annually, either in a separate return by the body which has received the sub-allocation, or by the licensee as part of this return, completing a copy at least of Table A1 for each sub-allocation.

A4 Utilisation forecast

Please group areas together into as many groups as appropriate for forecasting purposes, explaining how this is done. For example, different growth factors may be applied to urban and rural areas. The Year 1 forecast should apply to 31 December of the year in which the return is made (that is, a year after the audit date).

	NDCs included in this group	**Description of the group**
Forecasting group 1		*Main cities*
Forecasting group 2		*Other urban areas*
Forecasting group 3		*Rural areas*

Group	**Total quantity of numbers in used blocks (as in A1)**	**Forecast registered subscribers (as % of total quantity of numbers in used blocks)**		
		Year 1	**Year 2**	**Year 3**
1	*350,000*	*80%*	*85%*	*90%*
2				
3				
All	Total of above[54]			

PART B – MOBILE NUMBERS

B1 Details of use of number blocks allocated to licensee

Column 1	**Column 2**	**Column 3**	**Column 4**	**Column 5**	**Column 6**	**Column 7**
Identity of allocated block(s)	**Quantity of numbers in allocated block(s)**	**Date block brought into service**	**Quantity of numbers already linked with end users**	**Quantity of numbers not available for end users**	**Quantity of numbers available for end users**	**Block utilization % = (column 4 + column 5) / (column 2)**
Totals						

Notes for B1

Column 1: Early digits of NSN(s) followed by 'x's showing number length. For example, a) 979 xxx xxxx or b) 9610 xxx xxx - 9613 xxx xxxx..
Column 2: The total quantity of numbers in the block or blocks in the first column. For the examples in the note on column 1, this would be a) 10,000,000, b) 4,000,000.
Column 3: If over a period, please give earliest date.
Column 4: Linked with end users: numbers that are either in active use (until any final deactivation date, status "active") or associated with a specific end user but not yet active (e.g. SIM card sold to an end user but not activated) (status "reserved and held").

[54] Please provide weighted average utilisation forecasts for total.

Column 5: Unavailable for end users: numbers that are sub-allocated[55], needed for internal network or administrative purposes, or that for other reasons cannot be assigned to end users (status "admin") plus numbers that have been deactivated and are cooling, pending reassignment (status "cooling").
Column 6: Available for end users: numbers that can be assigned to end users, meaning those that are allocated to the licensee but not used (status "not used"), and those in the distribution pipeline (status "RD inv").
Column 7: Please note that the quantities given in columns 4, 5 and 6 should add up to the total given in column 2. This means that the utilization percentage is 100% minus the percentage available for end users (column 5).

B2 Details of number blocks reserved for licensee

Identity of reserved block	Quantity of numbers in reserved block	Start and end dates of reservation	Reason for reservation

Notes for B2

Column 1: Early digits of NSN(s) followed by 'x's showing number length. For example, a) 979 xxx xxxx or b) 9610 xxx xxx - 9613 xxx xxxx..
Column 2: The total quantity of numbers in the block or blocks in the first column. For the examples in the note on column 1, this would be a) 10,000,000, b) 4,000,000.

B3 Utilisation forecast

Please group numbers as appropriate for forecasting purposes, explaining how this is done. For example, different treatments may be applied to ordinary numbers and vanity numbers, or to prepaid and postpaid subscriptions. Use as many groups as you wish. The Year 1 forecast should apply to 31 December of the year in which the return is made (that is, a year after the audit date).

	Number types included in this group
Forecasting group 1	
Forecasting group 2	

Group	**Total quantity of numbers in included blocks**	**Forecast block utilization (numbers covered by notes 4 and 5, as % of total quantity of numbers in included blocks)**		
		Year 1	**Year 2**	**Year 3**
1	*3,500,000*	*80%*	*85%*	*90%*
2				
All	Total of above[56]			

[55] Please see footnote about sub-allocation under Geographic Numbers. The same principle applies for mobile numbers: any sub-allocated block must be reported on, either by this licensee in a separate part of this return, or in a separate return by the body which received the sub-allocation.

[56] Please provide weighted average forecasts for total.

PART C – SHORT NUMBERS

C1 Short numbers in use or planned

Number	Service name	Type & medium[57]	Service description	Service launch year

PART D – INTERNATIONAL SIGNALLING POINT CODES

ISPC	Name of switch	Type of switch and manufacturer	Switch function[58]	Address of switch
4-028-1	*Yangon Signalling Gateway*	*Huawei Softswitch*	*STP*	*1 Sule Pagoda Road, Yangon*

PART E – NATIONAL SIGNALLING POINT CODES

NSPC	Purpose[59]	Type of switch and manufacturer	Address of switch
2-00-0	*Interconnection*	*Huawei Softswitch*	*1 Sule Pagoda Road, Yangon*

[57] "Type" as in the Numbering Rules (A, B or C); "medium" may be voice, SMS, or USSD.

[58] For example, STP, ISC, SEP, GMSC, SCP, OMC, LR, SSP, SCCP relay.

[59] For example, internal use or interconnection.

Annex G Draft Application Form for Reservation or Allocation of E.164 Numbers

Guidance note for applicants: Please complete this form electronically, expanding the space for entries or using separate sheets as needed. The form should be submitted in a way that makes the quantitative entries in parts 4 and 5 machine-readable, or accompanied by a spreadsheet containing these entries.

1. **Date of application:**
2. **Details of applicant**

Company name:

Relevant telecommunications licence:

Name and position of contact person:

Contact details for contact person:

3. **Details of numbering resources requested**

Is this a reservation or allocation request? Reservation/allocation [one or other please]

If reservation: for how many months is the reservation requested?

If allocation: have the requested resources already been reserved, in whole or part? Yes/no

If yes, please provide the date(s) of the relevant reservation application(s):

Guidance note for applicants: If a successful application for reservation is followed within 3 months by an application for allocation of the reserved resources, the information requested in sections 4 and 5 of this form may be provided once only (in either of the two applications), unless it is provided in the first application and changes significantly by the time of the second.

Description of service for which numbers are requested: mobile / fixed / location-independent / other

[In case of new services, please describe fully, including network diagrams as appropriate].

Planned date(s) for bringing requested numbers into service:

Is this a new or an existing service for the applicant? New/existing

Is this a new or an existing service in Myanmar? New/existing

First preference for numbering range(s):

Second preference for numbering range(s) (if first is not available):

Relevant block size for this type of number: 1,000,000 / 100,000 / 10,000 / 1,000

Number of blocks of this size requested:

Justification for quantity of numbers requested

[This section need not be completed where individual numbers or short codes are requested]

	Base date for forecasts: current application	Day	Month	Year
		Monthly average (=A)	Over next 6 months (=6*A)	Over next 12 months (=12*A)
Row1	Expected end-user demand			
Row2	Expected internal supply[60]			
Row3	Need for newly allocated numbers (=row1 minus row2)			

Unless this is your first application for this kind of numbers, please provide below the corresponding forecast from your most recent past application, and the actual outcome over a recent past period of 12 months (or of the period for which you have been operating, if this is less than 12 months).

	Base date for forecasts: previous application	Day	Month	Year
		Monthly average (=A)	Over next 6 months (=6*A)	Over next 12 months (=12*A)
Row1	Expected end-user demand			
Row2	Expected internal supply			
Row3	Need for newly allocated numbers (=row1 minus row2)			

	Start date for actual outcome	Day	Month	Year
	End date for actual outcome	Day	Month	Year
		Monthly average (=A)	Over 6 months (=6*A)	Over 12 months (=12*A)
Row1	Actual end-user demand			
Row2	Actual internal supply			
Row3	Actual need for newly allocated numbers (=row1 minus row2)			

Any comments or explanation you wish to provide, including in relation to the numbers given in the tables above:

Guidance note for applicants: PTD is unlikely to approve applications for blocks that are expected to be needed only more than a year after the application date.

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[60] "Internal supply" means, for example, recycled numbers or numbers no longer needed for administrative purposes.

4. Use of existing number allocations

Unless this will be your first allocation of numbers for this type of service, please provide information on how the numbers that you already hold for this type of service are used. Only numbers that are suitable for the currently required function need be included (e.g. in the case of geographic numbers, only those in the NDC(s) where service is to be provided). Each allocation made at a different date since 1 January 2014 should have its own row (please add rows as needed). Allocations already in place before 1 January 2014 may be combined into a single row.

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Identity of allocated block(s)	**Quantity of numbers in allocated block(s)**	**Date block brought into service**	**Quantity of numbers already linked with end users**	**Quantity of numbers not available for end users**	**Quantity of numbers available for end users**	**Block utilization % =** **(column 4 + column 5) / (column 2)**
Totals						

Notes to table

Column 1: Early digits of NSN(s) followed by 'x's showing number length. For example, if mobile, a) 979 xxx xxxx or b) 9610 xxx xxx - 9613 xxx xxxx; if fixed, c) 1 748 xxxx -1 749 xxxx.
Column 2: The total quantity of numbers in the block or blocks in the first column. For the examples in note 1, this would be a) 10,000,000, b) 4,000,000 and c) 20,000.
Column 3: If over a period, please give earliest date.
Column 4: Numbers that are either in active use (until any final deactivation date, status "active") or associated with a specific end user but not yet active (e.g. SIM card sold to an end user but not activated) (status "reserved and held").
Column 5: Numbers that are sub-allocated, needed for internal network or administrative purposes, or that for other reasons cannot be assigned to end users (status "admin") plus numbers that have been deactivated and are cooling, pending reassignment (status "cooling").
Column 6: Numbers that can be assigned to end users, meaning those that are allocated to the licensee but not used (status "not used"), and those in the distribution pipeline (status "RD inv").
Column 7: Please note that the quantities given in columns 4, 5 and 6 should add up to the total given in column 2. This means that the utilization percentage is 100% minus the percentage available for end users (column 5).

Please provide any explanations relating to the entries in the table above that you feel will be helpful to PTD in assessing this application:

Guidance note for applicants: PTD encourages applicants to make good use of their existing allocations before applying for new allocations. In assessing what is "good use", it will take into account the development of the market in question and the applicant's position within it.

5. Further information or comments

Please provide any additional material you wish in support of your application.

Annex H Draft Application Form for Allocation of Codes except E.164 Numbers

Guidance note for applicants: Please complete this form electronically, expanding the space for entries or using separate sheets as needed. The form should be submitted in a way that makes the quantitative entries in parts 4 and 5 machine-readable, or accompanied by a spreadsheet containing these entries.

1. **Date of application:**
2. **Details of applicant**

Company name:

Relevant telecommunications licence:

Name and position of contact person:

Contact details for contact person:

3. **Details of numbering resources requested**

Description of application for which codes are requested: ISPC / NSPC / MNC

Planned date(s) for bringing requested codes into service:

Quantity of codes requested:

Guidance note for applicants: The regulator will normally allocate only the following, depending on the kind of codes requested.

ISPC	Signalling Point Identification (SPI) between 0 and 7
NSPC	Signalling Area Network Code (SANC) between 0 and 1023 or between 1280 and 2047 Signalling Point Identification (SPI) between 0 and 7
MNC	Mobile Network Code (MNC) between 0 and 99

Function:

Guidance note for applicants: Please include the following, depending on the kind of codes requested.

ISPC	Node role (STP, ISC, SEP, GMSC, SCP, OMC, LR, SSP, SCCP relay, for example) Network relation (naming at least one connected operator and node in another country)
NSPC	Node role (interconnection, for example)
MNC	Network protocol (GSM, UMTS or LTE for example)

Identification:

Guidance note for applicants: Please include the following, depending on the kind of codes requested.

ISPC	Node name (to be notified to the ITU TSB for publication in the ITU Operational Bulletin) Node location (to be notified to the ITU TSB for publication in the ITU Operational Bulletin)
NSPC	Node name Node location
MNC	Network name (to be notified to the ITU TSB for publication in the ITU Operational Bulletin)

4. Further information or comments

Please provide any additional material you wish in support of your application.