

TELECOMMUNICATIONS NUMBERING ADVISORY COMMITTEE

Allocation of Numbers and Codes to Mobile Virtual Network Operators (MVNO)

Background

In NAC Paper No. 2/2000 – "Assignment of Mobile Network Codes to 3G Mobile Systems and TETRA Systems", it described the operations of the future 3rd Generation (3G) mobile systems and Terrestrial Trunked Radio (TETRA) systems in Hong Kong and the need for these systems to make use of Mobile Network Codes (MNCs) in the operation in accordance with the relevant recommendations and standards from the Telecommunication Standardisation Sector of International Telecommunication Union (ITU-T) and European Telecommunications Standards Institute (ETSI). Members had already supported the assignment of the MNCs for the future 3G mobile systems and TETRA systems in Hong Kong.

Introduction

2. In February 2001, the Government announced "The Licensing Framework for Third Generation Mobile Services" that 3G mobile network operators should open at least 30% of their network capacity for access by non-affiliated Mobile Virtual Network Operators (MVNOs) and/or content providers. It was considered that the Open Network Access requirement would create a competitive e-commerce market with innovative services conveyed on the 3G mobile networks.

3. Following the Government's decision to introduce MVNO in Hong Kong, it is necessary to devise a regulatory framework to cope with the potential development of MVNO and identify and allocate sufficient numbering resources to support the operation and the growth of MVNO. This paper discusses the proposed arrangement in allocating the required numbering resources to them.

System Configurations of Mobile Virtual Networks

4. In simple term, MVNO is a licensed mobile virtual network operator or service provider who does not have any radio spectrum allocated to it by the Telecommunications Authority (TA). In order to provide services to its customers, the MVNO would need to access to the radio networks of one or more licensed 3G mobile network operators through commercial arrangement. In essence, the MVNO should enable its customers to roam into the network of the serving 3G mobile network operator.

5. There are different system configurations under which a MVNO could implement its services. In its simplest form, a MVNO may rely heavily on the 3G mobile network operators' facilities including the Base Stations (BS), the Base Station Controllers (BSC) and the Mobile Switching Centres (MSC). With this configuration, all the calls of the MVNO's customers would be handled entirely by the network operator. The MVNO would only need to cater for the terms and conditions for using the network and facilities of the 3G mobile network operators and bill its own customers.

6. On the other hand, the MVNO would only utilize the network elements relating to radio transmission part of the network operator's facilities. The MVNO would build its own network infrastructure including the MSC, Home Location Register (HLR), Visitor Location Register (VLR), billing systems, etc. in order to route the calls for its customers. Between these two extremes of system configurations described above, there are also other configurations for which the network operators and the MVNOs could adopt under a commercial arrangement.

Numbering resources requirement of MVNO

7. It is noted that MVNOs may have different system configurations. However, like the 2G or the future 3G mobile network operators, they could issue their own SIM cards to their customers. There is a need for the TA to consider assigning a Mobile Country Code (MCC) and a Mobile Network Code (MNC) to each MVNO.

8. Referring to the ITU-T recommendations and ETSI standards, the MNC in the National Mobile Station Identity (NMSI) and International Mobile

Station Identity (IMSI) uniquely identifies the home public land mobile network (PLMN) of the mobile station (MS) nationally and internationally respectively. According to ITU-T Recommendation E.212, the NMSI is structured as:

MNC + Mobile Station Identity Number (MSIN)

and the IMSI is structured as:

Mobile Country Code (MCC) + MNC + MSIN

where

MCC Mobile Country Code uniquely identifies the country of domicile of the mobile station. The MCC "454" is assigned for use in Hong Kong.

MNC Mobile Network Code identifies the home public land mobile network (PLMN) of the mobile station. The MNCs for PLMN operators in Hong Kong are assigned by the TA.

MSIN Mobile Station Identity Number uniquely identifies the mobile station within a PLMN. The MSINs are assigned by the operators.

9. Both MCC and MNC are numbering resources allocated by the ITU and administered by OFTA. ITU has assigned to Hong Kong 1 MCC (454) and 100 MNC (00-99). Currently, 10 MNC were assigned to public mobile networks and 1 MNC to a private TETRA network. The MCC is shared by all the mobile networks. As MNC is a finite resource, the TA should assign the MNC to the MVNO in a prudent manner.

10. The TA considers that MNC should only be assigned to a MVNO on an as-need basis. It has been described earlier that MVNO may operate a network that mirrors the structure of the network operators. The only difference is that the MVNO does not operate any radio base stations and related facilities. For this type of MVNO, sometimes called the "full" MVNO, the MVNO would need a MNC so that calls could be routed from other networks into the MVNO network and processed by its own MSC, HLR, VLR, etc. The MVNO could then have a complete control of the routing of the calls and hence the services

offered to its customers.

11. On the other hand, if the MVNO fully relies on the network facilities of the 3G mobile network operators, the TA considers that the MVNO could share the same MNC with the 3G mobile network operators concerned as all calls of the MVNO would be in effect entirely processed and routed by these network operators. This resembles the simple service re-seller arrangement in the 2G environment. Based on the above considerations, the TA proposes that MNC would only be assigned to those MVNOs who operate by themselves a MSC and the associated facilities including the HLR and VLR.

12. The other important numbering resource required by MVNO is the subscriber numbers or the directory numbers. These are the 8-digit numbers in the number levels with the leading digit “6” or “9” of the Hong Kong Numbering Plan. It appears that there are two options – (a) the MVNO shares the number blocks of the network operators or (b) the MVNO would be assigned with its own number blocks. The TA considers that the first option has the major drawback in restricting the freedom of MVNO to change to another serving network operator. In the event that the MVNO connects to two or more network operators, it would be difficult for the MVNO to manage and share the network operators’ number blocks. The TA proposes that individual MVNOs should be assigned with their own subscriber number blocks.

Availability of Numbering Resources

13. Currently, the 90 spare MNC would be assigned to TETRA networks and the public mobile networks. The potential number of TETRA networks in Hong Kong would be limited by the frequency planning and the availability of spectrum resources. It is estimated that the spectrum planned for trunked mobile radio could accommodate about 30 TETRA networks, which would leave at least 60 MNC for the 3G mobile network operators and the MVNOs. It is considered that the existing available resources of MNC should be able to support the future operation and development of 3G mobile and TETRA networks. If there is a need for additional MCC and MNC in future, OFTA may write to the ITU and apply for them.

14. As regards the subscriber numbers, the TA is concerned about whether there is sufficient remaining capacity to cater for the requirements of 3G mobile

network operators and MVNOs. Following the consumption of the whole number level “9”, the number level “6” has been opened for mobile services. Currently, number level “62” is nearly exhausted. As number levels “66” and “69” have been reserved for the purpose of transition to a potential 9-digit mobile numbering plan, there are only five spare number levels available (i.e. 4.5 million spare numbers). With the continued consumption of subscriber numbers by the 2G mobile networks, there would be a chance that the subscriber numbers may not be sufficient to cope with the forthcoming 3G mobile services. The TA considers that it is important to conserve the existing subscriber number resource. One option is to freeze further allocation of numbers in the number level “6” and “9” so that number resources could be reserved for 3G mobile services and the other option is to raise the existing utilisation level from 60% to 80% or even higher value. In the NAC Paper No. 8/2001- "Availability of Subscribers Numbers to 3G Mobile Services", the issue and the above TA's proposal would be discussed in greater detail.

Advice Sought

15. Members are invited to give their views and comments on this paper.

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