



Question(s): 1/2

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LIAISON STATEMENT**For action to:** 3GPP, GSMA, WBA**For comment to:****For information to:** ITU-T SG20, SG13 & SG3**Approval:** ITU-T SG2 management (24 July 2017, by correspondence)**Deadline:** 24 November 2017

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Keywords: IMSI, E.212**Abstract:** This is a liaison to 3GPP, GSMA, WBA entitled “Evolution of IMSI format and E.212 Recommendation”

1 Introduction

This liaison is seeking information regarding the potential impact if changes are made to the IMSI as specified in Recommendation E.212. Those changes if any would be driven by new use cases and the need for more capacity in the identification plan. In addition, the need for changes (e.g. IoT/MTC/M2M type communications) may result from requirements relative to 5G networks or other new use cases relative to IMSIs.

Faced with an increase of demand for IMSIs, the following options were identified:

- *Option 1 - No change* – Keep the current format of MCC, MNC and MSIN and address the new demands with assignments of new MNCs or MCCs and changes to assignment or management practices
- *Option 2 - Format extension* – extend the IMSIs i.e. assess the extent of the demand and adapt the MSIN or the MNC formats
- *Option 3 – Use of schemes that may not be backward compatible* – keep IMSIs only for legacy services and use “something else” for new services
- *Option 4 – Change in encoding* – keep the current format, but allow for hexadecimal encoding (0-9, A-F)

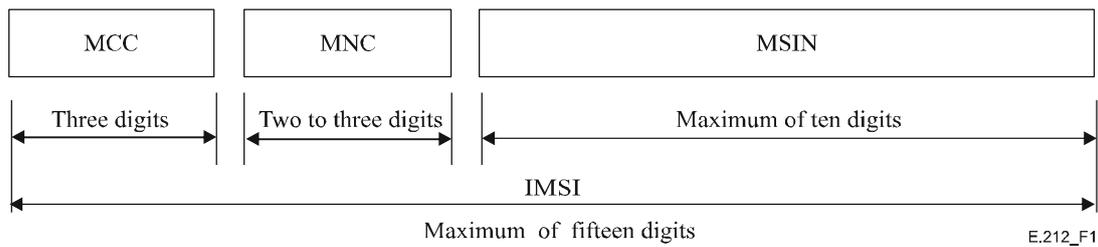
2 Background

Mobile subscriber identification is based on Recommendation E.212. For 20 years, IMSIs have indeed been used to uniquely identify a network (MCC/MNC) and within a network a subscriber (MSIN). By extension, IMSIs and MCC/MNCs have also been used in a number of different contexts where the current format and the associated management policies apply. From 2G (GSM) to 4G, the E.212 format has remained unchanged.

The advent of the Internet of Things, cellular IoT and the definition of the 5th Generation of mobile networks offer a new context where the overall need for identifiers will increase and the business models and architectures may change. Other reasons for using more IMSIs may also emerge.

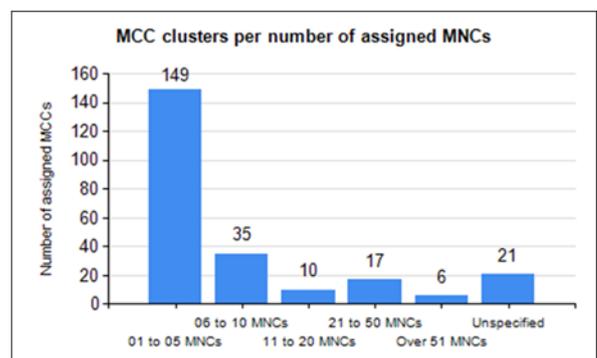
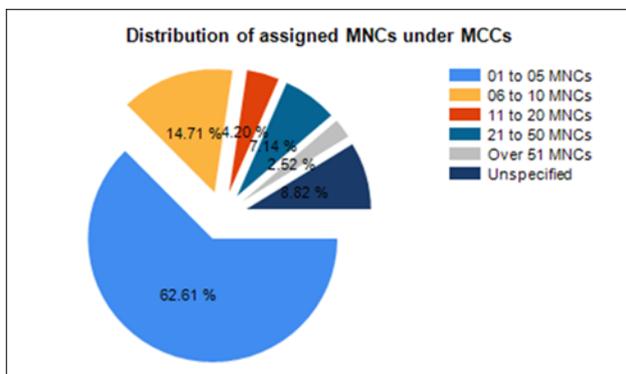
In the context of IoT, a number of different identifier schemes will probably coexist and the rationale for a single scheme will be difficult to justify. It is likely however that the E.212 identification plan and IMSIs will have a role to play for cellular networks. For example, a large number of elements of the past and current generations of mobile networks use IMSIs as primary identifiers (core networks, operations support systems/business support systems (OSS/BSS), subscriber data management systems, etc.) and the need or the absence of ensuring backward compatibility for those systems will be central to the continuing use of IMSIs for future generations.

For your convenience, we recall that ITU-T Recommendation E.212 specifies the IMSI format as follows:



MCC Mobile Country Code
MNC Mobile Network Code
MSIN Mobile Subscription Identification Number
IMSI International Mobile Subscription Identity

At this stage, although there might be pressure locally, it is fair to say that despite the massive growth of mobile devices and users worldwide, the overall ‘economy’ of the plan is robust. Based on data made available to ITU-T Study Group 2 in April 2017 (dated 20 March 2017) by the ITU-T secretariat and reproduced below, if current trends continue, exhaustion would not take place in the near future.



This liaison outlines several options on which Question 1/2 would welcome your views.

4 Review of the options

a) Option 1: no change to current format

This option would consist of addressing all new requirements, whether with respect to volume of IMSIs or functional requirements, with the assignment of additional MNCs and MCCs and changes in the way resources are assigned. Issues which may arise may include:

- can one mobile network and OSS/BSS use several MNC to host IMSIs? (For example, can the same network produce IMSIs on 111 01 and 111 02?)
- if a country were to have non-contiguous MCCs, would it be a problem for roaming devices?

Other measures may also help meeting the demands:

- introduction of non unique IMSIs through a dedicated MCC for private use. For example, some use cases are relative to MNCs used in “private environments” where global uniqueness is not necessary. Such scenarios may be addressed by the use of a MCC code dedicated to private use (similar to the RFC 1918 IPv4 private space, e.g. IP addresses of the form 192.168.x.x).
- development of procedures for recycling IMSIs.
- more stringent allocation procedures (e.g. need based allocation, economic incentives etc.)

b) Option 2: extend the IMSIs

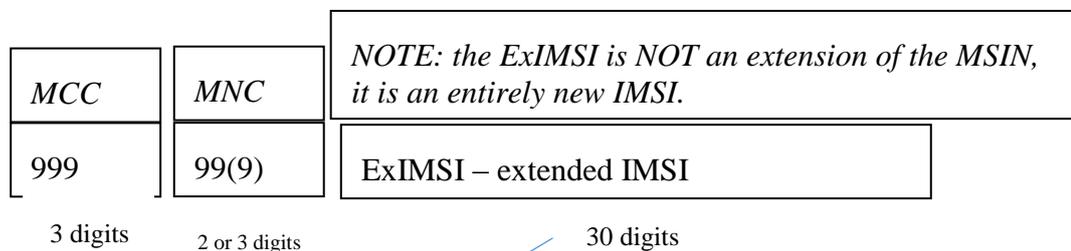
For the sake of simplicity, this option can be divided into two sub-options:

- extend the MSIN and keep the current format of MCC/MNC
- extend both the IMSI and the MCC/MNC

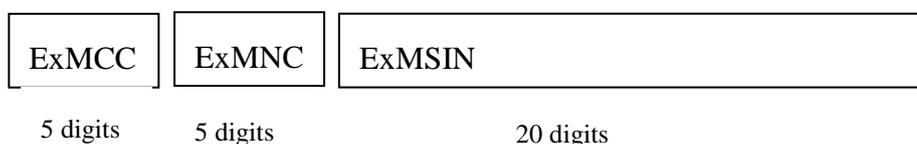
In order to stimulate discussions, we offer the following approaches as examples. It is important to understand that these are offered purely to stimulate discussions and that no decision not even tentative have been made at this time. We would welcome other proposals.

A possible approach to consider for an extension is to assign a MCC-MNC for the extension, e.g. MCC/MNC 999-99(9):

- define a new format either in E.212 or in a new recommendation for clarity.
- The old IMSI MCC/MCC 999 99 is used as an escape code and the following 30 digits define the ExIMSI. It would also be possible to use only MCC 999 as an escape code, and your views would be welcome on this.



ExIMSI would be defined as:



The ExIMSI is 30 digit long:

- ExMCC is the “country code” which may be geographic, regional or non geographic – part of the plan may replicate the current MCC plan.
- ExMNC is the extended Mobile Network Code.
- ExMSIN is the extended Mobile Subscriber Identification Number.

The lengths are illustrative and the ExIMSI length could also be made variable.

These are initial elements for review. They are intended to provide elements to clarify the scenario but do not constitute a proposal at this stage. Among other aspects, the impact on E.118 identifiers of such a change also needs to be further investigated.

c) Option 3: Use of schemes that may not be backward-compatible

Under this option, new use cases are addressed by other schemes (existing or to be created) and backward-compatibility between the new schemes and IMSIs is not central. The use of E.212 resources would then be limited to “legacy” services.

Such another scheme could either be a complete replacement of the current specification and/or role of E.212 identification or it could be a partial replacement. For illustration and to stimulate discussion, you will find below two such partial replacement schemes:

- Cases where network identification is achieved using the IMSI but user identification may be done via other schemes (eg identifiers such as MAC addresses, IMEIs, network access identifiers, URIs, etc). This would allow use of the current MSIN field for network identification.
- Conversely, cases where user identification is achieved using the IMSI but network identification may be done via other schemes (e.g. database lookups etc). This would allow use of the current MNC field to expand the length of the MSIN.

d) Option 4: hexadecimal encoding

This scenario consists in allowing hexadecimal digits to be used within IMSIs so as to extend the plan. In the ETSI specification for the SIM card (GSM 11.11ⁱ), four bits are used for each digit of the IMSI, so use of hexadecimal digits would appear to be possible at that level but not necessarily at other levels (radio and core networks, OSS/BSS etc.).

5 Questions

Q1/2 would welcome your views on:

- the pros and cons of the options 1 to 4.
- the potential impacts in terms of routing, billing and accounting, etc.
- issues relative to migration and coexistence.
- the issues which may arise for each option for example:
 - o can one mobile network and OSS/BSS use several MNC to host IMSIs? (For example, can the same network produce IMSIs on 111 01 and 111 02?)
 - o if a country were to have non-contiguous MCCs, would it be a problem for roaming devices?
- will functions such as virtualisation with a need to identify a service provider, or the use of encrypted IMSIs generate a need for changes to Recommendation E.212?

Any other views relevant to the issues outlined above would be welcome.

ⁱ http://www.etsi.org/deliver/etsi_gts/11/1111/05.03.00_60/gsm1111v050300p.pdf