3GPP TSG_CN **Tdoc NP-000367**
Plenary Meeting #8, Dusseldorf, Germany
21st – 23rd June 2000.

Source: **TSG_N WG "1"**

Title: **CRs to 3G Work Item "TEI"- IMEI hex coding**

Agenda item: **6.16**

Document for: **APPROVAL**

Introduction:

This document contains **"1"** CRs on **Work Item "TEI"- IMEI hex coding,** that have been agreed by **TSG_N WG "1",** and are forwarded to **TSG_N Plenary** meeting #8 for approval.

Tdoc	Spec	CR	Rev	CAT	Rel.	Old Ver	New Ver	Subject
N1-000779	24.008	CR192	1	C	R99	3.3.1	3.4.0	IMEI hex coding

3GPP CN WG1 Meeting #12
Hawaii, USA, 22.-26. May 2000

Document ***N1-000779*** ~~***N1-000627***~~

e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

24.008	CR	192r1	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG CN#	for approval	X	strategic	X	*(for SMG Use only)*
list expected approval meeting # here ↑		For information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM	X	ME	X	UTRAN / Radio		Core Network	X

Source: Nokia **Date:** 24.5.2000

Subject: Change of IMEI coding from BCD to hexadecimal.

Work item: TEI

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature	X		Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:

The current IMEI message structure is proposed to be changed to allow use of hexadecimal coding in addition of current BCD. The change is proposed in 3GPP TSG-CN,TSG-S, TSG-T and TSG-R to allow 16.7 million mobile terminals to be produced with one Type Approval Code. The current restriction for one million units per TAC is already a problem in the GSM terminal manufacturing and can only be predicted to worsen in the future.
Change to use hexadecimal coding is most simple since it does not affect to existing message lengths in GSM air interface and network interfaces.
In case of CN WG1, the change is only required to the table describing IMEI coding. IMEI is used for those UE's that have active emergency call without or with a defective USIM module. The change does not affect to message/information element length since BCD (actually TBCD) and hexadecimal digit coding consume equal amount of bits. In the MAP protocol, the only issue is to not use any 'sanity' check for this information element and allow all 4-bit binary values for all 15 digits of IMEI. The old IMEI coding in GSM system is fully backwards compatible with the changed coding for the message interface. (Depending on CN implementation it may be necessary to change the IMEI database control software. Note that in the MAP protocol the TBCD coding has been used for IMEI – in practise currently the coding is BCD, since IMEI is not using any of the special TBCD values ['*'=1010, '#'=1011, 'a'=1100, 'b'=1101, 'c'=1110]) The TBCD coding in MAP/RANAP for IMEI is technically only ruling out the use of code 'F' for the IMEI digits, this highlights further how small change in the message interface is proposed.

Clauses affected: section 10.5.1.3 and 10.5.1.4

Other specs Affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

Table 10.5.3/TS 24.008: *Location Area Identification* information element

MCC, Mobile country code (octet 2 and 3)
The MCC field is coded as in ITU-T Rec. E212, Annex A.

If the LAI is deleted the MCC and MNC shall take the value from the deleted LAI.

In abnormal cases, the MCC stored in the mobile station can contain elements not in the set {0, 1 ... 9}. In such cases the mobile station should transmit the stored values using full hexadecimal encoding. When receiving such an MCC, the network shall treat the LAI as deleted.

MNC, Mobile network code (octet 3 bits 5 to 8, octet 4)
The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. For PCS 1900 for NA, Federal regulation mandates that a 3-digit MNC shall be used. However a network operator may decide to use only two digits in the MNC in the LAI over the radio interface. In this case, bits 5 to 8 of octet 3 shall be coded as "1111". Mobile equipment shall accept LAI coded in such a way.

Note 1: In earlier versions of this protocol, the possibility to use a one digit MNC in LAI was provided on the radio interface. However as this was not used this possibility has been deleted.

Note 2: In earlier versions of this protocol, bits 5 to 8 of octet 3 were coded as "1111". Mobile equipment compliant with these earlier versions of the protocol may be unable to understand the 3-digit MNC format of the LAI, and therefore unable to register on a network broadcasting the LAI in this format.

In abnormal cases, the MNC stored in the mobile station can have:
- digit 1 or 2 not in the set {0, 1 ... 9}, or
- digit 3 not in the set {0, 1 ...9, F} hex.

In such cases the mobile station shall transmit the stored values using full hexadecimal encoding. When receiving such an MNC, the network shall treat the LAI as deleted.

The same handling shall apply for the network, if a 3-digit MNC is sent by the mobile station to a network using only a 2-digit MNC.

LAC, Location area code (octet 5 and 6)
In the LAC field bit 8 of octet 5 is the most significant bit and bit 1 of octet 6 the least significant bit.
The coding of the location area code is the responsibility of each administration except that two values are used to mark the LAC, and hence the LAI, as deleted. Coding using full hexadecimal representation may be used. The location area code consists of 2 octets.
If a LAI has to be deleted then all bits of the location area code shall be set to one with the exception of the least significant bit which shall be set to zero. If a SIM is inserted in a Mobile Equipment with the location area code containing all zeros, then the Mobile Equipment shall recognise this LAC as part of a deleted LAI

10.5.1.4 Mobile Identity

The purpose of the *Mobile Identity* information element is to provide either the international mobile subscriber identity, IMSI, the temporary mobile subscriber identity, TMSI/P-TMSI, the international mobile equipment identity, IMEI or the international mobile equipment identity together with the software version number, IMEISV.
The IMSI shall not exceed 15 digits, the TMSI/P-TMSI is 4 octets long, and the IMEI is composed of 15 hex digits ~~digits~~characters, the IMEISV is 16 hex digits ~~digits~~ characters (see TS 23.003).
For packet paging the network shall select the mobile identity type with the following priority:

1- P-TMSI: The P-TMSI shall be used if it is available.

2- IMSI: The IMSI shall be used in cases where no P-TMSI is available.

Table 10.5.4/TS 24.008: *Mobile Identity* information element

Type of identity (octet 3)
Bits

3	**2**	**1**	
0	0	1	IMSI
0	1	0	IMEI
0	1	1	IMEISV
1	0	0	TMSI/P-TMSI
0	0	0	No Identity note 1)

All other values are reserved.

Odd/even indication (octet 3)
Bit

4	
0	even number of identity digits or hexadecimal digits and also when the TMSI/P-TMSI is used
1	odd number of identity digits or hexadecimal digits

Identity digits (octet 3 etc)

~~For the IMSI, IMEI and IMEISV this field is coded using BCD coding.~~ For the IMSI this field is coded using BCD coding. For the IMEI and IMEISV this field is coded using hexadecimal coding. The exact coding of IMSI, IMEI and IMEISV is defined in TS 23.003.

If the number of identity digits is even then bits 5 to 8 of the last octet shall be filled with an end mark coded as "1111".

If the mobile identity is the TMSI/P-TMSI then bits 5 to 8 of octet 3 are coded as "1111" and bit 8 of octet4 is the most significant bit and bit 1 of the last octet the least significant bit. The coding of the TMSI/P-TMSI is left open for each administration.

NOTE: This can be used in the case when a fill paging message without any valid identity has to be sent on the paging subchannel.

10.5.1.5 Mobile Station Classmark 1

The purpose of the *Mobile Station Classmark 1* information element is to provide the network with information concerning aspects of high priority of the mobile station equipment. This affects the manner in which the network handles the operation of the mobile station. The Mobile Station Classmark information indicates general mobile station characteristics and it shall therefore, except for fields explicitly indicated, be independent of the frequency band of the channel it is sent on.
The *Mobile Station Classmark 1* information element is coded as shown in figure 10.5.5/TS 24.008 and table 10.5.5/TS 24.008.
The *Mobile Station Classmark 1* is a type 3 information element with 2 octets length.

8	7	6	5	4	3	2	1	
Mobile Station Classmark 1 IEI								octet 1
0 spare	Revision level		ES IND	A5/1	RF power capability			octet 2

Figure 10.5.5/TS 24.008 *Mobile Station Classmark 1* information element

A MS supporting GSM shall always encode all fields relevant for GSM radio access technology, even when accessing UMTS radio access technology. A UMTS MS which does not support GSM shall encode fields relevant only for GSM radio access tecnology using any value which has been defined for this version of the protocol and is not reserved.