TSG RAN Meeting #19 **RP-030065**
Birmingham, UK, 11 - 14 March 2003

Title **CRs (Rel-5 only) to 25.453**
Source **TSG RAN WG3**
Agenda Item **8.3.5**

RAN3 Tdoc	Spec	curr. Vers.	new Vers.	REL	CR	Rev	Cat	Title	Work item
R3-030079	25.453	5.4.0	5.5.0	REL-5	023	-	F	CR on GPS Almanac and Satellite Health	TEI5
R3-030080	25.453	5.4.0	5.5.0	REL-5	024	-	F	CR on GPS Measured Results	TEI5

3GPP TSG-RAN WG3 Meeting #34 ***Tdoc R3-030079***
Sophia Antipolis, France, 17th – 21st February 2003

CR-Form-v7

CHANGE REQUEST

⌘ **25.453** **CR** **023** ⌘ **rev** **-** ⌘ Current version: **5.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

Title:	⌘	CR on GPS Almanac and Satellite Health		
Source:	⌘	RAN WG3		
Work item code:	⌘	TEI5	***Date:*** ⌘	17/02/2002
Category:	⌘	**F**	***Release:*** ⌘	REL-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	Currently, the tabular and ASN.1 descriptions of the "SV Global Health" parameter of the "GPS Almanac and Satellite Health" IE (clause 9.2.2.9) indicate a bitstring of length 192 bits. However, a length of 364 is required to actually transfer this "SV Global Health" parameter.
Summary of change:	⌘	The tabular and ASN.1 descriptions of the "SV Global Health" parameter of the "GPS Almanac and Satellite Health" IE are modified to indicate the correct bitstring length of 364 bits. Impact Analysis: Impact assessment towards the previous version of the specification (same release): This CR has isolated impact with the previous version of the specification (same release). This CR has isolated impact under protocol point of view. The impact can be considered isolated because the change only affects one function, namely Information Exchange.
Consequences if not approved:	⌘	In response to an INFORMATION EXCHANGE INITIATION REQUEST message for GPS Almanac and Satellite Health information initiated by the RNC, the SAS will be unable to provide the "SV Global Health" parameter in the corresponding Information Report(s).

Clauses affected:	⌘	9.2.2.9, 9.3.4

		Y	N			
Other specs affected:	⌘		X	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘	Note that this R3-030079 is exact same proposal as R3-022332 submitted to RAN3 #33 meeting.				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

… <NEXT MODIFIED SECTION> …

9.2.2.9 GPS Almanac and Satellite Health

This IE contains a reduced-precision subset of the clock and ephemeris parameters.

Table 35

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
WN_a	M		Bit string(8)	
Satellite information		*1..<maxSat>*		
>DataID	M		Bitstring(2)	See [10]
>SatID	M		Enumerated(0..63)	Satellite ID
>e	M		Bit string(16)	Eccentricity [10]
>t_{oa}	M		Bit string(8)	Reference Time Ephemeris [10]
>δI	M		Bit string(16)	
>OMEGADOT	M		Bit string(16)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [10]
>SV Health	M		Bit string(8)	
>$A^{1/2}$	M		Bit string(24)	Semi-Major Axis (meters)$^{1/2}$ [10]
>$OMEGA_0$	M		Bit string(24)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [10]
>M_0	M		Bit string(24)	Mean Anomaly at Reference Time (semi-circles) [10]
>ω	M		Bit string(24)	Argument of Perigee (semi-circles) [10]
>af_0	M		Bit string(11)	apparent clock correction [10]
>af_1	M		Bit string(11)	apparent clock correction [10]
SV Global Health	O		Bit string(364~~19 2~~)	This enables GPS time recovery and possibly extended GPS correlation intervals

Table 36

Range bound	Explanation
MaxSat	Maximum number of satellites for which data is included in this IE.

… <NEXT MODIFIED SECTION> …

```
-- **************************************************************
--
-- GPS Almanac and Satellite Health
--
-- **************************************************************


GPS-AlmanacAndSatelliteHealth ::=   SEQUENCE {
    wn-a                                BIT STRING (SIZE (8)),
    almanacSatInfoList                  AlmanacSatInfoList,
    svGlobalHealth                      BIT STRING (SIZE (364192)) OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { GPS-
AlmanacAndSatelliteHealth-ExtIEs } }        OPTIONAL,
    ...
}

GPS-AlmanacAndSatelliteHealth-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}


AlmanacSatInfoList ::=              SEQUENCE (SIZE (1..maxSat)) OF
                                        AlmanacSatInfo

AlmanacSatInfo ::=                  SEQUENCE {
    dataID                              BIT STRING (SIZE (2)),
    satID                               INTEGER (0..63),
    e                                   BIT STRING (SIZE (16)),
    t-oa                                BIT STRING (SIZE (8)),
    deltaI                              BIT STRING (SIZE (16)),
    omegaDot                            BIT STRING (SIZE (16)),
    satHealth                           BIT STRING (SIZE (8)),
    a-Sqrt                              BIT STRING (SIZE (24)),
    omega0                              BIT STRING (SIZE (24)),
    m0                                  BIT STRING (SIZE (24)),
    omega                               BIT STRING (SIZE (24)),
    af0                                 BIT STRING (SIZE (11)),
    af1                                 BIT STRING (SIZE (11))
}


-- **************************************************************
--
-- GPS Clock And Ephemeris Parameters
--
-- **************************************************************
```

3GPP TSG-RAN WG3 Meeting #34 **Tdoc R3-030080**
Sophia Antipolis, France, 17th – 21st February 2003

CR-Form-v7

CHANGE REQUEST

⌘ **25.453** **CR** **024** ⌘ **rev** **-** ⌘ Current version: **5.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

Title:	⌘	CR on GPS Measured Results		
Source:	⌘	RAN WG3		
Work item code:	⌘	TEI5	***Date:*** ⌘	17/02/2002
Category:	⌘	**F**	***Release:*** ⌘	REL-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
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Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change:	⌘	Currently, the tabular and ASN.1 descriptions of the "Whole GPS Chips" parameter of the "GPS Measured Results" IE (clause 9.2.2.12) indicate an integer encoding range of [0..1023]. However, it is only possible for a UE to report this "Whole GPS Chips" parameter within an integer range of [0..1022]. Therefore, the value "1023" is essentially undefined for this parameter.
Summary of change:	⌘	The tabular and ASN.1 descriptions of the "Whole GPS Chips" parameter of the "GPS Measured Results" IE are modified to indicate the correct reporting range of [0..1022]. Impact Analysis: Impact assessment towards the previous version of the specification (same release): This CR has isolated impact with the previous version of the specification (same release). This CR has isolated impact under protocol point of view. The impact can be considered isolated because the change only affects one function, namely Position Calculation.
Consequences if not approved:	⌘	With the current integer range of [0..1023], it is possible that an undefined "Whole GPS Chips" value for one or more GPS satellites may be passed from RNC to SAS in conjunction with a POSITION CALCULATION REQUEST message. Consequently, position computation errors may result in the SAS and an erroneous or degraded position estimate may be returned to the RNC.

Clauses affected:	⌘	9.2.2.12, 9.3.4			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘	Note that this R3-030080 is exact same proposal as R3-022333 submitted to RAN3 #33 meeting.			

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

… <NEXT MODIFIED SECTION> …

9.2.2.12 GPS Measured Results

The purpose of this information element is to provide reported GPS measurement information from the SRNC to the SAS.

Table 39

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GPS TOW msec	M		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). This time is the GPS TOW measured by the UE. GPS Time of Week in microseconds = 1000 * GPS TOW msec + GPS TOW rem usec
GPS TOW rem usec	O		Integer(0..999)	GPS Time of Week in microseconds MOD 1000.
Measurement Parameters		*1..<maxSat>*		
>Satellite ID	M		Enumerated(0..63)	
>C/N_o	M		Integer(0..63)	The estimate of the carrier-to-noise ratio of the received signal from the particular satellite used in the measurement. It is given in units of dB-Hz (Typical levels will be in the range of 20 – 50 dB-Hz).
>Doppler	M		Integer(-32768..32768)	Hz, scale factor 0.2.
>Whole GPS Chips	M		Integer(0..1022~~3~~)	Unit in GPS chips
>Fractional GPS Chips	M		Integer(0..(2^10-1))	Scale factor 2^{-10}
>Multipath Indicator	M		Enumerated(NM, low, medium, high)	See note 1
>Pseudorange RMS Error	M		Enumerated(range index 0..range index 63)	See note 2
NOTE 1: Table 41 gives the mapping of the multipath indicator field. NOTE 2: Table 42 gives the bitmapping of the Pseudorange RMS Error field.				

Table 40

Range bound	Explanation
MaxSat	Maximum number of satellites for which data is included in this IE.

Table 41

Value	Multipath Indication
NM	Not measured
Low	MP error < 5m
Medium	5m < MP error < 43m
High	MP error > 43m

Table 42

Range Index	Mantissa	Exponent	Floating-Point value, x_i	Pseudorange value, P
0	000	000	0.5	P < 0.5
1	001	000	0.5625	0.5 <= P < 0.5625
i	X	Y	0.5 * (1 + x/8) * 2y	xi-1 <= P < xi
62	110	111	112	104 <= P < 112
63	111	111	--	112 <= P

… <NEXT MODIFIED SECTION> …

```
-- **************************************************************
--
-- GPS Measured Results
--
-- **************************************************************

MeasuredResultsList ::=             SEQUENCE (SIZE (0..maxNrOfSets)) OF
    GPS-MeasuredResults

maxNrOfSets                         INTEGER ::= 3

GPS-MeasuredResults ::=             SEQUENCE {
    gps-TOW-1msec                       INTEGER (0..604799999),
    gps-MeasurementParamList            GPS-MeasurementParamList,
    gps-TOW-rem-usec                    INTEGER (0..999)            OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { GPS-MeasuredResults-ExtIEs } }
}       OPTIONAL,
    ...
}

GPS-MeasuredResults-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GPS-MeasurementParamList ::=        SEQUENCE (SIZE (1..maxSat)) OF
                                        GPS-MeasurementParam

GPS-MeasurementParam ::=            SEQUENCE {
    satelliteID                         INTEGER (0..63),
    c-N0                                INTEGER (0..63),
    doppler                             INTEGER (-32768..32768),
    wholeGPS-Chips                      INTEGER (0..10223),
    fractionalGPS-Chips                 INTEGER (0..1023),
    multipathIndicator                  MultipathIndicator,
    pseudorangeRMS-Error                INTEGER (0..63)
}

MultipathIndicator ::=              ENUMERATED {
                                        nm,
                                        low,
                                        medium,
                                        high }


-- **************************************************************
--
-- GPS Navigation Model
--
-- **************************************************************
```