TSG-RAN Meeting #22 **RP-030628**
Maui, USA, 09-12 December 2003

Title: **Correction of UTRAN GPS reference time quality: 25.331 CRs to R'99, Rel-4 and Rel-5**

Source: **TSG-RAN WG2**

Agenda item: **7.3.2**

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
25.331	2107	-	R99	Correction of UTRAN GPS Reference Time quality	F	3.16.0	3.17.0	R2-032551	TEI
25.331	2108	-	Rel-4	Correction of UTRAN GPS Reference Time quality	A	4.11.0	4.12.0	R2-032552	TEI
25.331	2109	-	Rel-5	Correction of UTRAN GPS Reference Time quality	A	5.6.0	5.7.0	R2-032553	TEI

3GPP TSG-RAN2 Meeting #39
San Diego, U.S.A., 17-21 November, 2003

Tdoc ⌘R2-032551

CR-Form-v7

CHANGE REQUEST

⌘ **25.331** **CR** **2107** ⌘ **rev** **-** ⌘ Current version: **3.16.0** ⌘

*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:	⌘	Correction of UTRAN GPS Reference Time quality
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	November 20, 2003
Category:	⌘	**F**
Release:	⌘	R99

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: ⌘

Recent RAN WG4 discussions have focused upon the development of positioning related performance requirements for A-GPS capable UEs. Some of these proposals consider establishing such requirements across more than just one basic level of GPS reference time assistance quality.

However, these discussions have revealed certain issues concerning the current specification of GPS reference time quality levels:

1) In some cases where the network provides UTRAN-GPS time assistance to the UE, it is not possible for the UTRAN to clearly indicate the quality of the timing relationship provided.

2) In other cases where the network provides UTRAN-GPS time assistance to the UE, the quality level indicator(s) specified in TS 25.331 and the existing UTRAN GPS timing measurement requirements in TS 25.133 are not consistent.

As a result, it is unclear how to specify A-GPS performance requirements (or test scenarios) for cases in which the UTRAN-GPS timing relationship is somehow accurately known (e.g. ±5usec).

Summary of change: ⌘

1) Procedural aspects:
- corrected that when provided by the network, UTRAN-GPS timing relationship info can always be considered accurate to within at least 20000 chips (±5.2 ms)
- corrected that when provided by the network, presence of IE “SFN-TOW Uncertainty” indicates that associated UTRAN-GPS timing relationship info is accurate to within at least 20 chips (±5.2 usec)

2) Tabular aspects:
- value “lessThan10” of IE “SFN-TOW Uncertainty” changed to

		"lessThan20chips" - value "moreThan10" of IE "SFN-TOW Uncertainty" removed - comment added to indicate one spare value needed for this IE 3) ASN.1 related aspects: - value "lessThan10" of IE "SFN-TOW Uncertainty" changed to "lessThan20chips" - value "moreThan10" replaced with "spare1" **Isolated Impact Change Analysis.** These changes correct how UTRAN indicates and how UE interprets the quality of UTRAN-GPS reference timing assistance when it is provided. It would not affect implementations behaving like indicated in the CR, it would affect implementations supporting the corrected functionality otherwise. **Impact on Test specifications** Such corrections are needed to enable the development of the associated A-GPS test specifications.
Consequences if not approved:	⌘	The indication of UTRAN-GPS timing quality from UTRAN to UE will remain ambiguous for some cases, and inconsistent with existing TS 25.133 UTRAN measurement requirements for other cases. Therefore, it will not be possible to develop test specifications that involve the transfer of accurate UTRAN-GPS timing assistance information from network to UE.

Clauses affected:	⌘	8.6.7.19.3.1, 8.6.7.19.3.7, 10.3.7.96, 11.3			
		Y	**N**		
Other specs affected:	⌘	**X**		Other core specifications	⌘ TS 25.133
		X		Test specifications	TS 34.121, TS 34.123
			X	O&M Specifications	
Other comments:	⌘				

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 >***

8.6.7.19.3 UE positioning GPS assistance data

The UE may receive GPS assistance data in System Information Block types 15, 15.1, 15.2, or 15.3, or in the ASSISTANCE DATA DELIVERY message, or in the MEASUREMENT CONTROL message.

8.6.7.19.3.1 UE positioning GPS acquisition assistance

If the IE "UE positioning GPS acquisition assistance" is included, the UE shall:

1> update the variable UE_POSITIONING_GPS_DATA as follows:

2> delete all information currently stored in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA;

2> store the received acquisition assistance information in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA;

2> store the IE "GPS TOW msec" in the IE "UE positioning GPS acquisition assistance" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the current GPS Time-of-Week;

1> if the IEs "SFN" and "UTRAN GPS timing of cell frames" are included:

2> if the UE is able to utilise these IEs:

3> store these IEs in the IE "UE positioning GPS acquisition assistance " in variable UE_POSITIONING_GPS_DATA;

3> interpret the presence of these IEs to indicate that UTRAN is providing a relationship between GPS time and air-interface timing that is accurate to at least 20000 chips;

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:

4> if the UE is not in CELL_DCH state:

5> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and radio interface timing of the NODE B transmission in the serving cell.

4> if the UE is in CELL_DCH state:

5> ignore IEs "SFN" and "UTRAN GPS timing of cell frames".

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:

4> store this IE in the IE "UE positioning acquisition assistance" in variable UE_POSITIONING_GPS_DATA;

4> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id".

[…]

[…] < ***NEXT MODIFIED SECTION >***

8.6.7.19.3.7 UE positioning GPS reference time

If the IE "UE positioning GPS reference time" is included, the UE shall:

1> store the IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

1> store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the current GPS Time-of-Week;

1> if the IE "SFN" and IE "UTRAN GPS timing of cell frames" are included:

2> if the UE is able to utilise the IEs:

3> store these IEs in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;

3> interpret the presence of these IEs to indicate that UTRAN is providing a relationship between GPS time and air-interface timing that is accurate to at least 20000 chips;

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:

4> if the UE is not in CELL_DCH state:

5> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the serving cell.

4> if the UE is in CELL_DCH state:

5> ignore IEs "SFN" and "UTRAN GPS timing of cell frames".

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:

4> store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;

4> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id".

1> if the IE "SFN-TOW Uncertainty" is included:

2> store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it to determine if the relationship between GPS time and air-interface timing of the NODE B transmission is known to within at least 20 chips~~10ms~~.

1> if the IE "$T_{UTRAN-GPS}$ drift rate" is included:

2> store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA; and

2> may use it as an estimate of the drift rate of the NODE B clock relative to GPS time.

1> if the IE "GPS TOW Assist" is included:

2> for each satellite:

3> delete all information currently stored in the IE "GPS TOW Assist" in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA;

3> store the received GPS TOW Assist information in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA.

[…] < ***NEXT REFERENCE SECTION >***

10.3.7.88 UE positioning GPS acquisition assistance

This IE contains parameters that enable fast acquisition of the GPS signals in UE-assisted GPS positioning.

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
GPS TOW msec	MP		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds rounded down to the nearest millisecond unit.
UTRAN GPS reference time	OP			
>UTRAN GPS timing of cell frames	MP		Integer(0 ... 2322431999999)	GPS timing of cell frames in steps of 1 chip.
>CHOICE *mode*	OP			
>>FDD				
>>>Primary CPICH Info	MP		Primary CPICH Info 10.3.6.60	Identifies the reference cell for the GPS TOW-SFN relationship
>>TDD				
>>>cell parameters id	MP		Cell parameters id 10.3.6.9	Identifies the reference cell for the GPS TOW-SFN relationship
>SFN	MP		Integer(0..4095)	The SFN which the UTRAN GPS timing of cell frames time stamps.
Satellite information	MP	1 to <maxSat>		
>SatID	MP		Integer (0..63)	
>Doppler (0th order term)	MP		Real(-5120..5117.5 by step of 2.5)	Hz
>Extra Doppler	OP			
>>Doppler (1st order term)	MP		Real (-0.966..0.483 by step of 0.023)	Scaling factor 1/42
>>Doppler Uncertainty	MP		Enumerated (12.5,25,50, 100,200)	Hz. Three spare values are needed.
>Code Phase	MP		Integer(0..1022)	Chips, specifies the centre of the search window
>Integer Code Phase	MP		Integer(0..19)	1023 chip segments
>GPS Bit number	MP		Integer(0..3)	Specifies GPS bit number (20 1023 chip segments)
>Code Phase Search Window	MP		Integer(1023,1,2,3,4,6,8,12,16,24,32,48,64,96,128,192)	Specifies the width of the search window.
>Azimuth and Elevation	OP			
>>Azimuth	MP		Real(0..348.75 by step of 11.25)	Degrees
>>Elevation	MP		Real(0..78.75 by step of 11.25)	Degrees

[…] < ***NEXT MODIFIED SECTION >***

10.3.7.96 UE positioning GPS reference time

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
GPS Week	MP		Integer(0..1023)	
GPS TOW msec	MP		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).
UTRAN GPS reference time	OP			
>UTRAN GPS timing of cell frames	MP		Integer(0..2322431999999)	UTRAN GPS timing of cell frames in steps of 1 chip
>CHOICE *mode*	OP			
>>FDD				
>>>Primary CPICH Info	MP		Primary CPICH Info 10.3.6.60	Identifies the reference cell for the GPS TOW-SFN relationship
>>TDD				
>>>cell parameters id	MP		Cell parameters id 10.3.6.9	Identifies the reference cell for the GPS TOW-SFN relationship
>SFN	MP		Integer(0..4095)	The SFN which the UTRAN GPS timing of cell frames time stamps.
SFN-TOW Uncertainty	OP		Enumerated (lessThan20 chips~~10, moreThan10~~)	This field indicates the uncertainty of the relation GPS TOW/SFN. lessThan20chips~~10~~ means the relation is accurate to at least 20 chips~~10 ms~~. One spare value is needed.
$T_{UTRAN-GPS}$ drift rate	OP		Integer (0, 1, 2, 5, 10, 15, 25, 50, -1, -2, -5, -10, -15, -25, -50)	in 1/256 chips per sec.
GPS TOW Assist	OP	1 to <maxSat>		
>SatID	MP		Enumerated(0..63)	
>TLM Message	MP		Bit string(14)	
>TLM Reserved	MP		Bit string(2)	
>Alert	MP		Boolean	
>Anti-Spoof	MP		Boolean	

[…] < ***NEXT MODIFIED SECTION >***

```
SFN-SFN-RelTimeDifference1 ::=      SEQUENCE {
    sfn-Offset                          INTEGER (0 .. 4095),
    sfn-sfn-Reltimedifference           INTEGER (0.. 38399)
}

SFN-TOW-Uncertainty ::=             ENUMERATED {
                                        lessThan20chips10,
                                        spare1moreThan10 }

SIR ::=                             INTEGER (0..63)
```

[…]

3GPP TSG-RAN2 Meeting #39
San Diego, U.S.A., 17-21 November, 2003

Tdoc ⌘R2-032552

CR-Form-v7

CHANGE REQUEST

⌘ **25.331** **CR** **2108** ⌘ **rev** **-** ⌘ Current version: **4.11.0** ⌘

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

Title:	⌘	Correction of UTRAN GPS Reference Time quality
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	November 20, 2003
Category:	⌘	**A**
Release:	⌘	Rel-4

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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Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change: ⌘

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However, these discussions have revealed certain issues concerning the current specification of GPS reference time quality levels:

1) In some cases where the network provides UTRAN-GPS time assistance to the UE, it is not possible for the UTRAN to clearly indicate the quality of the timing relationship provided.

2) In other cases where the network provides UTRAN-GPS time assistance to the UE, the quality level indicator(s) specified in TS 25.331 and the existing UTRAN GPS timing measurement requirements in TS 25.133 are not consistent.

As a result, it is unclear how to specify A-GPS performance requirements (or test scenarios) for cases in which the UTRAN-GPS timing relationship is somehow accurately known (e.g. ±5usec).

Summary of change: ⌘

1) Procedural aspects:
- corrected that when provided by the network, UTRAN-GPS timing relationship info can always be considered accurate to within at least 20000 chips (±5.2 ms)
- corrected that when provided by the network, presence of IE “SFN-TOW Uncertainty” indicates that associated UTRAN-GPS timing relationship info is accurate to within at least 20 chips (±5.2 usec)

2) Tabular aspects:
- value “lessThan10” of IE “SFN-TOW Uncertainty” changed to

		"lessThan20chips" - value "moreThan10" of IE "SFN-TOW Uncertainty" removed - comment added to indicate one spare value needed for this IE 3) ASN.1 related aspects: - value "lessThan10" of IE "SFN-TOW Uncertainty" changed to "lessThan20chips" - value "moreThan10" replaced with "spare1" **Isolated Impact Change Analysis.** These changes correct how UTRAN indicates and how UE interprets the quality of UTRAN-GPS reference timing assistance when it is provided. It would not affect implementations behaving like indicated in the CR, it would affect implementations supporting the corrected functionality otherwise. **Impact on Test specifications** Such corrections are needed to enable the development of the associated A-GPS test specifications.
Consequences if not approved:	⌘	The indication of UTRAN-GPS timing quality from UTRAN to UE will remain ambiguous for some cases, and inconsistent with existing TS 25.133 UTRAN measurement requirements for other cases. Therefore, it will not be possible to develop test specifications that involve the transfer of accurate UTRAN-GPS timing assistance information from network to UE.

Clauses affected:	⌘	8.6.7.19.3.1, 8.6.7.19.3.7, 10.3.7.96, 11.3			
		Y	**N**		
Other specs affected:	⌘	**X**		Other core specifications	⌘ TS 25.133
		X		Test specifications	TS 34.121, TS 34.123
			X	O&M Specifications	
Other comments:	⌘				

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[…] < ***NEXT MODIFIED SECTION >***

8.6.7.19.3 UE positioning GPS assistance data

The UE may receive GPS assistance data in System Information Block types 15, 15.1, 15.2, or 15.3, or in the ASSISTANCE DATA DELIVERY message, or in the MEASUREMENT CONTROL message.

8.6.7.19.3.1 UE positioning GPS acquisition assistance

If the IE "UE positioning GPS acquisition assistance" is included, the UE shall:

1> update the variable UE_POSITIONING_GPS_DATA as follows:

2> delete all information currently stored in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA;

2> store the received acquisition assistance information in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA;

2> store the IE "GPS TOW msec" in the IE "UE positioning GPS acquisition assistance" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the current GPS Time-of-Week;

1> if the IEs "SFN" and "UTRAN GPS timing of cell frames" are included:

2> if the UE is able to utilise these IEs:

3> store these IEs in the IE "UE positioning GPS acquisition assistance " in variable UE_POSITIONING_GPS_DATA;

3> interpret the presence of these IEs to indicate that UTRAN is providing a relationship between GPS time and air-interface timing that is accurate to at least 20000 chips;

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:

4> if the UE is not in CELL_DCH state:

5> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and radio interface timing of the NODE B transmission in the serving cell.

4> if the UE is in CELL_DCH state:

5> ignore IEs "SFN" and "UTRAN GPS timing of cell frames".

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:

4> store this IE in the IE "UE positioning acquisition assistance" in variable UE_POSITIONING_GPS_DATA;

4> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id".

[…]

[…] < ***NEXT MODIFIED SECTION >***

8.6.7.19.3.7 UE positioning GPS reference time

If the IE "UE positioning GPS reference time" is included, the UE shall:

1> store the IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

1> store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the current GPS Time-of-Week;

1> if the IE "SFN" and IE "UTRAN GPS timing of cell frames" are included:

2> if the UE is able to utilise the IEs:

3> store these IEs in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;

3> interpret the presence of these IEs to indicate that UTRAN is providing a relationship between GPS time and air-interface timing that is accurate to at least 20000 chips;

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:

4> if the UE is not in CELL_DCH state:

5> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the serving cell.

4> if the UE is in CELL_DCH state:

5> ignore IEs "SFN" and "UTRAN GPS timing of cell frames".

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:

4> store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;

4> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id".

1> if the IE "SFN-TOW Uncertainty" is included:

2> store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it to determine if the relationship between GPS time and air-interface timing of the NODE B transmission is known to within at least 20 chips~~10ms~~.

1> if the IE "$T_{UTRAN-GPS}$ drift rate" is included:

2> store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA; and

2> may use it as an estimate of the drift rate of the NODE B clock relative to GPS time.

1> if the IE "GPS TOW Assist" is included:

2> for each satellite:

3> delete all information currently stored in the IE "GPS TOW Assist" in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA;

3> store the received GPS TOW Assist information in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA.

[…] < ***NEXT REFERENCE SECTION >***

10.3.7.88 UE positioning GPS acquisition assistance

This IE contains parameters that enable fast acquisition of the GPS signals in UE-assisted GPS positioning.

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
GPS TOW msec	MP		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds rounded down to the nearest millisecond unit.
UTRAN GPS reference time	OP			
>UTRAN GPS timing of cell frames	MP		Integer(0 ... 2322431999999)	GPS timing of cell frames in steps of 1 chip.
>CHOICE *mode*	OP			
>>FDD				
>>>Primary CPICH Info	MP		Primary CPICH Info 10.3.6.60	Identifies the reference cell for the GPS TOW-SFN relationship
>>TDD				
>>>cell parameters id	MP		Cell parameters id 10.3.6.9	Identifies the reference cell for the GPS TOW-SFN relationship
>SFN	MP		Integer(0..4095)	The SFN which the UTRAN GPS timing of cell frames time stamps.
Satellite information	MP	1 to <maxSat>		
>SatID	MP		Integer (0..63)	
>Doppler (0th order term)	MP		Real(-5120..5117.5 by step of 2.5)	Hz
>Extra Doppler	OP			
>>Doppler (1st order term)	MP		Real (-0.966..0.483 by step of 0.023)	Scaling factor 1/42
>>Doppler Uncertainty	MP		Enumerated (12.5,25,50, 100,200)	Hz. Three spare values are needed.
>Code Phase	MP		Integer(0..1022)	Chips, specifies the centre of the search window
>Integer Code Phase	MP		Integer(0..19)	1023 chip segments
>GPS Bit number	MP		Integer(0..3)	Specifies GPS bit number (20 1023 chip segments)
>Code Phase Search Window	MP		Integer(1023,1,2,3,4,6,8,12,16,24,32,48,64,96,128,192)	Specifies the width of the search window.
>Azimuth and Elevation	OP			
>>Azimuth	MP		Real(0..348.75 by step of 11.25)	Degrees
>>Elevation	MP		Real(0..78.75 by step of 11.25)	Degrees

[…] < ***NEXT MODIFIED SECTION >***

10.3.7.96 UE positioning GPS reference time

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
GPS Week	MP		Integer(0..1023)	
GPS TOW msec	MP		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).
UTRAN GPS reference time	OP			
>UTRAN GPS timing of cell frames	MP		Integer(0..2322431999999)	UTRAN GPS timing of cell frames in steps of 1 chip
>CHOICE *mode*	OP			
>>FDD				
>>>Primary CPICH Info	MP		Primary CPICH Info 10.3.6.60	Identifies the reference cell for the GPS TOW-SFN relationship
>>TDD				
>>>cell parameters id	MP		Cell parameters id 10.3.6.9	Identifies the reference cell for the GPS TOW-SFN relationship
>SFN	MP		Integer(0..4095)	The SFN which the UTRAN GPS timing of cell frames time stamps.
SFN-TOW Uncertainty	OP		Enumerated (lessThan20 chips~~10, moreThan10~~)	This field indicates the uncertainty of the relation GPS TOW/SFN. lessThan20chips~~10~~ means the relation is accurate to at least 20 chips~~10 ms~~. One spare value is needed.
$T_{UTRAN-GPS}$ drift rate	OP		Integer (0, 1, 2, 5, 10, 15, 25, 50, -1, -2, -5, -10, -15, -25, -50)	in 1/256 chips per sec.
GPS TOW Assist	OP	1 to <maxSat>		
>SatID	MP		Enumerated(0..63)	
>TLM Message	MP		Bit string(14)	
>TLM Reserved	MP		Bit string(2)	
>Alert	MP		Boolean	
>Anti-Spoof	MP		Boolean	

[…] < ***NEXT MODIFIED SECTION >***

```
SFN-SFN-RelTimeDifference1 ::=      SEQUENCE {
    sfn-Offset                          INTEGER (0 .. 4095),
    sfn-sfn-Reltimedifference           INTEGER (0.. 38399)
}

SFN-TOW-Uncertainty ::=             ENUMERATED {
                                        lessThan20chips10,
                                        spare1moreThan10 }

SIR ::=                             INTEGER (0..63)
```

[…]

3GPP TSG-RAN2 Meeting #39
San Diego, U.S.A., 17-21 November, 2003

Tdoc ⌘R2-032553

CR-Form-v7

CHANGE REQUEST

⌘ **25.331** **CR** **2109** ⌘ **rev** **-** ⌘ Current version: **5.6.0** ⌘

*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:	⌘	Correction of UTRAN GPS Reference Time quality
Source:	⌘	RAN WG2
Work item code:	⌘	TEI
Date:	⌘	November 20, 2003
Category:	⌘	**A**
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: ⌘

Recent RAN WG4 discussions have focused upon the development of positioning related performance requirements for A-GPS capable UEs. Some of these proposals consider establishing such requirements across more than just one basic level of GPS reference time assistance quality.

However, these discussions have revealed certain issues concerning the current specification of GPS reference time quality levels:

1) In some cases where the network provides UTRAN-GPS time assistance to the UE, it is not possible for the UTRAN to clearly indicate the quality of the timing relationship provided.

2) In other cases where the network provides UTRAN-GPS time assistance to the UE, the quality level indicator(s) specified in TS 25.331 and the existing UTRAN GPS timing measurement requirements in TS 25.133 are not consistent.

As a result, it is unclear how to specify A-GPS performance requirements (or test scenarios) for cases in which the UTRAN-GPS timing relationship is somehow accurately known (e.g. ±5usec).

Summary of change: ⌘

1) Procedural aspects:
- corrected that when provided by the network, UTRAN-GPS timing relationship info can always be considered accurate to within at least 20000 chips (±5.2 ms)
- corrected that when provided by the network, presence of IE “SFN-TOW Uncertainty” indicates that associated UTRAN-GPS timing relationship info is accurate to within at least 20 chips (±5.2 usec)

2) Tabular aspects:
- value “lessThan10” of IE “SFN-TOW Uncertainty” changed to

		"lessThan20chips" - value "moreThan10" of IE "SFN-TOW Uncertainty" removed - comment added to indicate one spare value needed for this IE 3) ASN.1 related aspects: - value "lessThan10" of IE "SFN-TOW Uncertainty" changed to "lessThan20chips" - value "moreThan10" replaced with "spare1" **Isolated Impact Change Analysis.** These changes correct how UTRAN indicates and how UE interprets the quality of UTRAN-GPS reference timing assistance when it is provided. It would not affect implementations behaving like indicated in the CR, it would affect implementations supporting the corrected functionality otherwise. **Impact on Test specifications** Such corrections are needed to enable the development of the associated A-GPS test specifications.
Consequences if not approved:	⌘	The indication of UTRAN-GPS timing quality from UTRAN to UE will remain ambiguous for some cases, and inconsistent with existing TS 25.133 UTRAN measurement requirements for other cases. Therefore, it will not be possible to develop test specifications that involve the transfer of accurate UTRAN-GPS timing assistance information from network to UE.

Clauses affected:	⌘	8.6.7.19.3.1, 8.6.7.19.3.7, 10.3.7.96, 11.3			
		Y	**N**		
Other specs affected:	⌘	**X**		Other core specifications	⌘ TS 25.133
		X		Test specifications	TS 34.121, TS 34.123
			X	O&M Specifications	
Other comments:	⌘				

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 >***

8.6.7.19.3 UE positioning GPS assistance data

The UE may receive GPS assistance data in System Information Block types 15, 15.1, 15.2, or 15.3, or in the ASSISTANCE DATA DELIVERY message, or in the MEASUREMENT CONTROL message.

8.6.7.19.3.1 UE positioning GPS acquisition assistance

If the IE "UE positioning GPS acquisition assistance" is included, the UE shall:

1> update the variable UE_POSITIONING_GPS_DATA as follows:

2> delete all information currently stored in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA;

2> store the received acquisition assistance information in the IE "UE positioning GPS acquisition assistance" in the variable UE_POSITIONING_GPS_DATA;

2> store the IE "GPS TOW msec" in the IE "UE positioning GPS acquisition assistance" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the current GPS Time-of-Week;

1> if the IEs "SFN" and "UTRAN GPS timing of cell frames" are included:

2> if the UE is able to utilise these IEs:

3> store these IEs in the IE "UE positioning GPS acquisition assistance " in variable UE_POSITIONING_GPS_DATA;

3> interpret the presence of these IEs to indicate that UTRAN is providing a relationship between GPS time and air-interface timing that is accurate to at least 20000 chips;

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:

4> if the UE is not in CELL_DCH state:

5> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and radio interface timing of the NODE B transmission in the serving cell.

4> if the UE is in CELL_DCH state:

5> ignore IEs "SFN" and "UTRAN GPS timing of cell frames".

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:

4> store this IE in the IE "UE positioning acquisition assistance" in variable UE_POSITIONING_GPS_DATA;

4> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id".

[…]

[…] < ***NEXT MODIFIED SECTION >***

8.6.7.19.3.7 UE positioning GPS reference time

If the IE "UE positioning GPS reference time" is included, the UE shall:

1> store the IE "GPS Week" in "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as the current GPS week;

1> store the IE "GPS TOW msec" in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it as an estimate of the current GPS Time-of-Week;

1> if the IE "SFN" and IE "UTRAN GPS timing of cell frames" are included:

2> if the UE is able to utilise the IEs:

3> store these IEs in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;

3> interpret the presence of these IEs to indicate that UTRAN is providing a relationship between GPS time and air-interface timing that is accurate to at least 20000 chips;

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is not included:

4> if the UE is not in CELL_DCH state:

5> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the serving cell.

4> if the UE is in CELL_DCH state:

5> ignore IEs "SFN" and "UTRAN GPS timing of cell frames".

3> if the IE "Primary CPICH Info" for FDD or IE "cell parameters id" for TDD is also included:

4> store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA;

4> use IEs "SFN" and "UTRAN GPS timing of cell frames" to estimate the relationship between GPS time and air-interface timing of the NODE B transmission in the cell indicated by "Primary CPICH info" or "cell parameters id".

1> if the IE "SFN-TOW Uncertainty" is included:

2> store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA and use it to determine if the relationship between GPS time and air-interface timing of the NODE B transmission is known to within at least 20 chips~~10ms~~.

1> if the IE "$T_{UTRAN-GPS}$ drift rate" is included:

2> store this IE in the IE "UE positioning GPS reference time" in variable UE_POSITIONING_GPS_DATA; and

2> may use it as an estimate of the drift rate of the NODE B clock relative to GPS time.

1> if the IE "GPS TOW Assist" is included:

2> for each satellite:

3> delete all information currently stored in the IE "GPS TOW Assist" in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA;

3> store the received GPS TOW Assist information in the IE "UE positioning GPS reference time" in the variable UE_POSITIONING_GPS_DATA.

[…] < ***NEXT REFERENCE SECTION >***

10.3.7.88 UE positioning GPS acquisition assistance

This IE contains parameters that enable fast acquisition of the GPS signals in UE-assisted GPS positioning.

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
GPS TOW msec	MP		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds rounded down to the nearest millisecond unit.
UTRAN GPS reference time	OP			
>UTRAN GPS timing of cell frames	MP		Integer(0 ... 2322431999999)	GPS timing of cell frames in steps of 1 chip.
>CHOICE *mode*	OP			
>>FDD				
>>>Primary CPICH Info	MP		Primary CPICH Info 10.3.6.60	Identifies the reference cell for the GPS TOW-SFN relationship
>>TDD				
>>>cell parameters id	MP		Cell parameters id 10.3.6.9	Identifies the reference cell for the GPS TOW-SFN relationship
>SFN	MP		Integer(0..4095)	The SFN which the UTRAN GPS timing of cell frames time stamps.
Satellite information	MP	1 to <maxSat>		
>SatID	MP		Integer (0..63)	
>Doppler (0th order term)	MP		Real(-5120..5117.5 by step of 2.5)	Hz
>Extra Doppler	OP			
>>Doppler (1st order term)	MP		Real (-0.966..0.483 by step of 0.023)	Scaling factor 1/42
>>Doppler Uncertainty	MP		Enumerated (12.5,25,50, 100,200)	Hz. Three spare values are needed.
>Code Phase	MP		Integer(0..1022)	Chips, specifies the centre of the search window
>Integer Code Phase	MP		Integer(0..19)	1023 chip segments
>GPS Bit number	MP		Integer(0..3)	Specifies GPS bit number (20 1023 chip segments)
>Code Phase Search Window	MP		Integer(1023,1,2,3,4,6,8,12,16,24,32,48,64,96,128,192)	Specifies the width of the search window.
>Azimuth and Elevation	OP			
>>Azimuth	MP		Real(0..348.75 by step of 11.25)	Degrees
>>Elevation	MP		Real(0..78.75 by step of 11.25)	Degrees

[…] < ***NEXT MODIFIED SECTION >***

10.3.7.96 UE positioning GPS reference time

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
GPS Week	MP		Integer(0..1023)	
GPS TOW msec	MP		Integer(0..6.048*10^8-1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).
UTRAN GPS reference time	OP			
>UTRAN GPS timing of cell frames	MP		Integer(0..2322431999999)	UTRAN GPS timing of cell frames in steps of 1 chip
>CHOICE *mode*	OP			
>>FDD				
>>>Primary CPICH Info	MP		Primary CPICH Info 10.3.6.60	Identifies the reference cell for the GPS TOW-SFN relationship
>>TDD				
>>>cell parameters id	MP		Cell parameters id 10.3.6.9	Identifies the reference cell for the GPS TOW-SFN relationship
>SFN	MP		Integer(0..4095)	The SFN which the UTRAN GPS timing of cell frames time stamps.
SFN-TOW Uncertainty	OP		Enumerated (lessThan20 chips~~10, moreThan10~~)	This field indicates the uncertainty of the relation GPS TOW/SFN. lessThan20chips~~10~~ means the relation is accurate to at least 20 chips~~10 ms~~. One spare value is needed.
$T_{UTRAN-GPS}$ drift rate	OP		Integer (0, 1, 2, 5, 10, 15, 25, 50, -1, -2, -5, -10, -15, -25, -50)	in 1/256 chips per sec.
GPS TOW Assist	OP	1 to <maxSat>		
>SatID	MP		Enumerated(0..63)	
>TLM Message	MP		Bit string(14)	
>TLM Reserved	MP		Bit string(2)	
>Alert	MP		Boolean	
>Anti-Spoof	MP		Boolean	

[…] < ***NEXT MODIFIED SECTION >***

```
SFN-SFN-RelTimeDifference1 ::=      SEQUENCE {
    sfn-Offset                          INTEGER (0 .. 4095),
    sfn-sfn-Reltimedifference           INTEGER (0.. 38399)
}

SFN-TOW-Uncertainty ::=             ENUMERATED {
                                        lessThan20chips10,
                                        spare1moreThan10 }

SIR ::=                             INTEGER (0..63)
```

[…]