

3GPP TSG-RAN Meeting #19  
Birmingham, England, 11-14 March 2003

*Tdoc* ⌘ *RP-030146*

**Agenda Item:** 7.2.3

**Source:** Motorola, Nokia

**Title:** Proposed CR to 25.331R99 on Correction on GPS navigation model update mechanism

**Document for:** Discussion and decision

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A CR to 25.331 on 'Correction on GPS navigation model update mechanism' was presented at the RAN2#34 meeting in Sophia Antipolis (R2-030162). This CR was not agreed during the RAN2 and was moved to discussion on the RAN2 email reflector. The attached CR is the outcome of the email discussion but as it did not meet the email agreement deadline it is submitted to RAN plenary with a company source.

**3GPP TSG-RAN Meeting #19**  
**Birmingham, England, 11-14 March 2003**

**Tdoc # RP-030146**

CR-Form-v7
<b>CHANGE REQUEST</b>
# <b>25.331 CR 1904</b> # rev <b>-</b> # Current version: <b>3.13.0</b> #

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

<b>Title:</b>	# Correction on GPS navigation model update mechanism		
<b>Source:</b>	# Motorola, Nokia		
<b>Work item code:</b>	# TEI <span style="float: right;"><b>Date:</b> # 11/02/2003</span>		
<b>Category:</b>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">                             # <b>F</b>                              Use <u>one</u> of the following categories:  <b>F</b> (correction)  <b>A</b> (corresponds to a correction in an earlier release)  <b>B</b> (addition of feature),  <b>C</b> (functional modification of feature)  <b>D</b> (editorial modification)                              Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a>.                         </td> <td style="width: 50%; vertical-align: top;"> <b>Release:</b> # R99                              Use <u>one</u> 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)                         </td> </tr> </table>	# <b>F</b> Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	<b>Release:</b> # R99 Use <u>one</u> 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)
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<b>Reason for change:</b>	# In GERAN#10, GP-022107 was agreed. That CR removed certain GPS assistance data parameters from GSM R98 (delta PRC2, delta PRC3, delta RRC2, and delta RRC3). The motivation in that CR applies equally well to UTRAN:  The GPS constellation does not guarantee broadcast satellite ephemeris updates at regular predictable intervals. The present method inserted in the standard for delivery of PRC/RRC (current ephemeris issue) and the delta PRC2/RRC2 (two issues of ephemeris in the past) and the delta PRC3/RRC3 (three issues of ephemeris in the past) will only work if the GPS system updates the ephemeris on periodic even intervals (example, every two hour period) because the present method does not identify the IODEs of the ephemeris associated with delta PRC2/RRC2 and delta PRC3/RRC3. The UE can only identify a time-based rule to application of delta PRC2/RRC2 and delta PRC3/RRC3 based on time – toe calculation, which of course only works if the updates are regular periodic. Recent data observations from the GPS constellation prove that the broadcast satellite ephemeris does not update at predictable periodic intervals. To illustrate the problem, the following sequence of ephemeris updates was observed on Feb 22, 2002 for SVID 1. Other similar sequences were observed throughout a 3 day period. The TOW refers to the time in which the GPS receiver obtained a new ephemeris set. The IODE and TOE elements are the new ephemeris IODE and TOE values for the new ephemeris elements. ΔTOW and ΔTOE refer to the change in the parameter since the last update.  <table style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: left;">IODE</th> <th style="text-align: left;">TOW</th> <th style="text-align: left;">TOE</th> <th style="text-align: left;">ΔTOW</th> <th style="text-align: left;">ΔTOE</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>28800</td> <td>35984</td> <td></td> <td></td> </tr> <tr> <td>81</td> <td>36000</td> <td>43200</td> <td>7200 sec</td> <td>7216 sec</td> </tr> <tr> <td>82</td> <td>43200</td> <td>50400</td> <td>7200 sec</td> <td>7200 sec</td> </tr> </tbody> </table>	IODE	TOW	TOE	ΔTOW	ΔTOE	80	28800	35984			81	36000	43200	7200 sec	7216 sec	82	43200	50400	7200 sec	7200 sec
IODE	TOW	TOE	ΔTOW	ΔTOE																	
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104	47520	50384	4320 sec	-16 sec
105	50400	57584	2880 sec	7200 sec

During a 3 day period of observation approximately 10% of the ephemeris update cases showed this a-periodic behaviour of TOW and/or TOE. The toe parameter on each subsequent update does not always march forward on every IODE change. Likewise, the time in which the ephemeris is updated does not occur at even 2 hour intervals.

The present specification describes populating the delta PRC2/RRC2 and delta PRC3/RRC3 fields based on ephemeris 2 issues and 3 issues ago respectively and does not transmit the IODEs associated with the delta PRC2/RRC2 and delta PRC3/RRC3 parameters.

**Summary of change:** ¶ Two new IEs IODE2 and IODE3 are added to identified the IODE value of the ephemeris data associated with delta PRC2/RRC2 and delta PRC3/RRC3 parameters. The text describing the meaning of delta PRC2/RRC2 and delta PRC3/RRC3 is updated to reflect the introduction of the new IEs. This text is also moved from the current section which only applies to reception of the IEs on system information into the semantic column of the tabular description so that it is applicable for system information and dedicated messages.

**Impact Analysis**

The change has isolated impact to GPS navigation model update mechanism.

If neither UE nor UTRAN implements the CR, then the UE will use a time based rule in order to apply Delta PRC2/RRC2 and Delta PRC3/RRC3. As shown this approach does not work if ephemeris updates are not regular periodic. Position accuracy will be harmed when the ephemeris updating shows the aperiodic behaviour.

If UE does not implement the CR but UTRAN does implement the CR then the UE will ignore the new IEs. The UE will use a time based rule in order to apply Delta PRC2/RRC2 and Delta PRC3/RRC3. The impact is similar to above.

If UTRAN does not implement the CR but UE does implement the CR then the UE will not receive the IEs necessary in order to interpret Delta PRC2/RRC2 and Delta PRC3/RRC3. The UE will only be able to resort to the time based rule with impact similar to above.

**Consequences if not approved:** ¶ The navigation model update mechanism does not work. The UE cannot use the Delta PRC2/RRC2 and Delta PRC3/RRC3 values for updating the navigation model of a satellite as the present method does not identify the IODEs associated with Delta PRC2/RRC2 and Delta PRC3/RRC3. The UE can only identify a time-based rule to application of Delta PRC2/RRC2 and Delta PRC3/RRC3 based on time – toe calculation, which only works if the updates are regular periodic. The updates do not occur in a regular periodic way 10% time and during this 10% of the time location accuracy is seriously degraded.

**Clauses affected:** ¶ 8.1.1.6.15.1, 10.3.7.91, 11.2

<b>Other specs affected:</b>	¶	<input type="checkbox"/> Y	<input type="checkbox"/> N	Other core specifications	¶	
		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Test specifications
		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			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.

#### 8.1.1.6.15.1 System Information Block type 15.1

The UE should store all the relevant IEs included in this system information block in variable UE\_POSITIONING\_GPS\_DATA. The UE shall:

- 1> act on "DGPS information" in the IE "DGPS Corrections" in a similar manner as specified in [13] except that the scale factors for PRC and RRC are different. ~~In addition, the IE group DGPS information also includes Delta PRC2 and Delta RRC2. Delta PRC2 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris two issues ago IODE - 2. Delta RRC2 is the difference in the pseudorange rate of change correction between the satellite's ephemeris identified by IODE and IODE - 2. These two additional IEs can extend the life of the raw ephemeris data up to 6 hours. If the IEs "Delta PRC3" and "Delta RRC3" are included, UE may use them as appropriate e.g. to extend the life of the raw ephemeris data up to 8 hours;~~
- 1> act upon the received IE " UE Positioning GPS DGPS corrections" as specified in subclause 8.6.7.19.3.3.

### 10.3.7.91 UE positioning GPS DGPS corrections

This IE contains DGPS corrections to be used by the UE.

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
GPS TOW sec	MP		Integer(0..604799)	seconds GPS time-of-week when the DGPS corrections were calculated
Status/Health	MP		Enumerated(UDRE scale 1.0, UDRE scale 0.75, UDRE scale 0.5, UDRE scale 0.3, UDRE scale 0.2, UDRE scale 0.1, no data, invalid data)	
DGPS information	CV- <i>Status/Health</i>	1 to <maxSat>		If the Cipher information is included these fields are ciphered.
>SatID	MP		Enumerated(0..63)	
>IODE	MP		Integer(0..255)	
>UDRE	MP		Enumerated(UDRE ≤ 1.0 m, 1.0m < UDRE ≤ 4.0m, 4.0m < UDRE ≤ 8.0m, 8.0m < UDRE)	The value in this field shall be multiplied by the UDRE Scale Factor in the IE Status/Health to determine the final UDRE estimate for the particular satellite.
>PRC	MP		Real(-655.04..655.04 by step of 0.32)	meters (different from [13])
>RRC	MP		Real(-4.064..4.064 by step of 0.032)	meters/sec (different from [13])
>Delta PRC2	MP		Integer(-127..127)	meters <a href="#">Delta PRC2 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE2.</a>
>Delta RRC2	MP		Real(-0.224..0.224 by step of 0.032)	meters/sec <a href="#">Delta RRC2 is the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE2.</a>
<a href="#">&gt;IODE2</a>	<a href="#">OP</a>		<a href="#">Integer(0..255)</a>	

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
>Delta PRC3	CV-DCCH		Integer(-127..127)	meters <a href="#">Delta PRC3 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE3.</a>
>Delta RRC3	CV-DCCH		Real(-0.224..0.224 by step of 0.032)	meters/sec <a href="#">Delta RRC3 is the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE3.</a>
<a href="#">&gt;IODE3</a>	<a href="#">OP</a>		<a href="#">Integer(0..255)</a>	

Condition	Explanation
<i>Status/Health</i>	This IE is mandatory present if "status" is not equal to "no data" or "invalid data", otherwise the IE is not needed.
<i>DCCH</i>	This IE is mandatory present if the IE " UE positioning GPS DGPS corrections" it is included in the point-to-point message. It is optional if the IE "UE positioning GPS DGPS corrections" is included in the broadcast message. Otherwise it is not needed.

```

-- *****
--
-- Assistance Data Delivery
--
-- *****

AssistanceDataDelivery ::= CHOICE {
  r3 SEQUENCE {
    assistanceDataDelivery-r3 AssistanceDataDelivery-r3-IEs,
    v3a0NonCriticalExtensions SEQUENCE {
      assistanceDataDelivery-v3a0ext AssistanceDataDelivery-v3a0ext,
      laterNonCriticalExtensions SEQUENCE {
        -- Container for additional R99 extensions
        assistanceDataDelivery-r3-add-ext BIT STRING OPTIONAL,
        v3e0NonCriticalExtensions SEQUENCE {
          assistanceDataDelivery-v3e0ext AssistanceDataDelivery-v3e0ext OPTIONAL,
          nonCriticalExtensions SEQUENCE {} OPTIONAL
        } OPTIONAL
      } OPTIONAL
    } OPTIONAL
  },
  later-than-r3 SEQUENCE {
    rrc-TransactionIdentifier RRC-TransactionIdentifier,
    criticalExtensions SEQUENCE {}
  }
}

AssistanceDataDelivery-r3-IEs ::= SEQUENCE {
  -- User equipment IEs
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  -- Measurement Information Elements
  ue-positioning-GPS-AssistanceData UE-Positioning-GPS-AssistanceData
OPTIONAL,
  ue-positioning-OTDOA-AssistanceData-UEB UE-Positioning-OTDOA-AssistanceData-UEB
OPTIONAL
}

AssistanceDataDelivery-v3a0ext ::= SEQUENCE {
  sfn-Offset-Validity SFN-Offset-Validity OPTIONAL
}

AssistanceDataDelivery-v3e0ext ::= SEQUENCE {
  iode2 IODE,
  iode3 IODE
}

```



```

-- *****
--
-- MEASUREMENT CONTROL
--
-- *****

MeasurementControl ::= CHOICE {
  r3                               SEQUENCE {
    measurementControl-r3          MeasurementControl-r3-IEs,
    v390nonCriticalExtensions      SEQUENCE {
      measurementControl-v390ext   MeasurementControl-v390ext,
      v3a0NonCriticalExtensions    SEQUENCE {
        measurementControl-v3a0ext MeasurementControl-v3a0ext,
        laterNonCriticalExtensions SEQUENCE {
          -- Container for additional R99 extensions
          measurementControl-r3-add-ext BIT STRING OPTIONAL,
          v3e0NonCriticalExtensions     SEQUENCE {
            measurementControl-v3e0ext MeasurementControl-v3e0ext OPTIONAL,
            nonCriticalExtensions      SEQUENCE {} OPTIONAL
          } OPTIONAL
        } OPTIONAL
      } OPTIONAL
    } OPTIONAL
  },
  later-than-r3                   SEQUENCE {
    rrc-TransactionIdentifier      RRC-TransactionIdentifier,
    criticalExtensions             SEQUENCE {}
  }
}

MeasurementControl-r3-IEs ::= SEQUENCE {
  -- User equipment IEs
  rrc-TransactionIdentifier      RRC-TransactionIdentifier,
  -- Measurement IEs
  measurementIdentity           MeasurementIdentity,
  -- TABULAR: The measurement type is included in MeasurementCommand.
  measurementCommand            MeasurementCommand,
  measurementReportingMode      MeasurementReportingMode OPTIONAL,
  additionalMeasurementList     AdditionalMeasurementID-List OPTIONAL,
  -- Physical channel IEs
  dpch-CompressedModeStatusInfo DPCH-CompressedModeStatusInfo OPTIONAL
}

MeasurementControl-v390ext ::= SEQUENCE {
  ue-Positioning-Measurement-v390ext UE-Positioning-Measurement-v390ext OPTIONAL
}

MeasurementControl-v3a0ext ::= SEQUENCE {
  sfn-Offset-Validity           SFN-Offset-Validity OPTIONAL
}

MeasurementControl-v3e0ext ::= SEQUENCE {
  iode2                         IOE,
  iode3                         IOE
}

```

```
SysInfoType15-1 ::= SEQUENCE {
  -- DGPS corrections
  ue-positioning-GPS-DGPS-Corrections UE-Positioning-GPS-DGPS-Corrections,
  Extension mechanism for non-release99 information
  v3e0NonCriticalExtensions SEQUENCE {
    sysInfoType15-1-v3e0ext SysInfoType15-1-v3e0ext OPTIONAL,
    nonCriticalExtensions SEQUENCE {} OPTIONAL
  }
}

SysInfoType15-1-v3e0ext ::= SEQUENCE {
  iode2 IODE,
  iode3 IODE OPTIONAL
}
```

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<h2 style="margin: 0;">CHANGE REQUEST</h2>
# <b>25.331 CR 1905</b> # rev <b>-</b> # Current version: <b>4.8.0</b> #

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<b>Reason for change:</b>	# In GERAN#10, GP-022107 was agreed. That CR removed certain GPS assistance data parameters from GSM R98 (delta PRC2, delta PRC3, delta RRC2, and delta RRC3). The motivation in that CR applies equally well to UTRAN:  The GPS constellation does not guarantee broadcast satellite ephemeris updates at regular predictable intervals. The present method inserted in the standard for delivery of PRC/RRC (current ephemeris issue) and the delta PRC2/RRC2 (two issues of ephemeris in the past) and the delta PRC3/RRC3 (three issues of ephemeris in the past) will only work if the GPS system updates the ephemeris on periodic even intervals (example, every two hour period) because the present method does not identify the IODEs of the ephemeris associated with delta PRC2/RRC2 and delta PRC3/RRC3. The UE can only identify a time-based rule to application of delta PRC2/RRC2 and delta PRC3/RRC3 based on time – toe calculation, which of course only works if the updates are regular periodic. Recent data observations from the GPS constellation prove that the broadcast satellite ephemeris does not update at predictable periodic intervals. To illustrate the problem, the following sequence of ephemeris updates was observed on Feb 22, 2002 for SVID 1. Other similar sequences were observed throughout a 3 day period. The TOW refers to the time in which the GPS receiver obtained a new ephemeris set. The IODE and TOE elements are the new ephemeris IODE and TOE values for the new ephemeris elements. ΔTOW and ΔTOE refer to the change in the parameter since the last update.																				
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<b>Summary of change:</b> ⌘	<p>Two new IEs IODE2 and IODE3 are added to identified the IODE value of the ephemeris data associated with delta PRC2/RRC2 and delta PRC3/RRC3 parameters. The text describing the meaning of delta PRC2/RRC2 and delta PRC3/RRC3 is updated to reflect the introduction of the new IEs. This text is also moved from the current section which only applies to reception of the IEs on system information into the semantic column of the tabular description so that it is applicable for system information and dedicated messages.</p> <p><b>Impact Analysis</b> The change has isolated impact to GPS navigation model update mechanism.</p> <p>If neither UE nor UTRAN implements the CR, then the UE will use a time based rule in order to apply Delta PRC2/RRC2 and Delta PRC3/RRC3. As shown this approach does not work if ephemeris updates are not regular periodic. Position accuracy will be harmed when the ephemeris updating shows the aperiodic behaviour.</p> <p>If UE does not implement the CR but UTRAN does implement the CR then the UE will ignore the new IEs. The UE will use a time based rule in order to apply Delta PRC2/RRC2 and Delta PRC3/RRC3. The impact is similar to above.</p> <p>If UTRAN does not implement the CR but UE does implement the CR then the UE will not receive the IEs necessary in order to interpret Delta PRC2/RRC2 and Delta PRC3/RRC3. The UE will only be able to resort to the time based rule with impact similar to above.</p>				
<b>Consequences if not approved:</b> ⌘	<p>The navigation model update mechanism does not work. The UE cannot use the Delta PRC2/RRC2 and Delta PRC3/RRC3 values for updating the navigation model of a satellite as the present method does not identify the IODEs associated with Delta PRC2/RRC2 and Delta PRC3/RRC3. The UE can only identify a time-based rule to application of Delta PRC2/RRC2 and Delta PRC3/RRC3 based on time – toe calculation, which only works if the updates are regular periodic. The updates do not occur in a regular periodic way 10% time and during this 10% of the time location accuracy is seriously degraded.</p>				

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- 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.

#### 8.1.1.6.15.1 System Information Block type 15.1

The UE should store all the relevant IEs included in this system information block in variable UE\_POSITIONING\_GPS\_DATA. The UE shall:

- 1> act on "DGPS information" in the IE "DGPS Corrections" in a similar manner as specified in [13] except that the scale factors for PRC and RRC are different. ~~In addition, the IE group DGPS information also includes Delta PRC2 and Delta RRC2. Delta PRC2 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris two issues ago IODE - 2. Delta RRC2 is the difference in the pseudorange rate of change correction between the satellite's ephemeris identified by IODE and IODE - 2. These two additional IEs can extend the life of the raw ephemeris data up to 6 hours. If the IEs "Delta PRC3" and "Delta RRC3" are included, UE may use them as appropriate e.g. to extend the life of the raw ephemeris data up to 8 hours;~~
- 1> act upon the received IE " UE Positioning GPS DGPS corrections" as specified in subclause 8.6.7.19.3.3.

### 10.3.7.91 UE positioning GPS DGPS corrections

This IE contains DGPS corrections to be used by the UE.

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
GPS TOW sec	MP		Integer(0..604799)	seconds GPS time-of-week when the DGPS corrections were calculated
Status/Health	MP		Enumerated(UDRE scale 1.0, UDRE scale 0.75, UDRE scale 0.5, UDRE scale 0.3, UDRE scale 0.2, UDRE scale 0.1, no data, invalid data)	
DGPS information	CV- <i>Status/Health</i>	1 to <maxSat>		If the Cipher information is included these fields are ciphered.
>SatID	MP		Enumerated(0..63)	
>IODE	MP		Integer(0..255)	
>UDRE	MP		Enumerated(UDRE ≤ 1.0 m, 1.0m < UDRE ≤ 4.0m, 4.0m < UDRE ≤ 8.0m, 8.0m < UDRE)	The value in this field shall be multiplied by the UDRE Scale Factor in the IE Status/Health to determine the final UDRE estimate for the particular satellite.
>PRC	MP		Real(-655.04..655.04 by step of 0.32)	meters (different from [13])
>RRC	MP		Real(-4.064..4.064 by step of 0.032)	meters/sec (different from [13])
>Delta PRC2	MP		Integer(-127..127)	meters <a href="#">Delta PRC2 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE2.</a>
>Delta RRC2	MP		Real(-0.224..0.224 by step of 0.032)	meters/sec <a href="#">Delta RRC2 is the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE2.</a>
<a href="#">&gt;IODE2</a>	<a href="#">OP</a>		<a href="#">Integer(0..255)</a>	

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
>Delta PRC3	CV-DCCH		Integer(-127..127)	meters <a href="#">Delta PRC3 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE3.</a>
>Delta RRC3	CV-DCCH		Real(-0.224..0.224 by step of 0.032)	meters/sec <a href="#">Delta RRC3 is the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE3.</a>
<a href="#">&gt;IODE3</a>	<a href="#">OP</a>		<a href="#">Integer(0..255)</a>	

Condition	Explanation
<i>Status/Health</i>	This IE is mandatory present if "status" is not equal to "no data" or "invalid data", otherwise the IE is not needed.
<i>DCCH</i>	This IE is mandatory present if the IE " UE positioning GPS DGPS corrections" it is included in the point-to-point message. It is optional if the IE "UE positioning GPS DGPS corrections" is included in the broadcast message. Otherwise it is not needed.



```

-- *****
--
-- Assistance Data Delivery
--
-- *****

AssistanceDataDelivery ::= CHOICE {
  r3                               SEQUENCE {
    assistanceDataDelivery-r3      AssistanceDataDelivery-r3-IEs,
    v3aoNonCriticalExetensions     SEQUENCE {
      assistanceDataDelivery-v3a0ext AssistanceDataDelivery-v3a0ext,
      laterNonCriticalExtensions   SEQUENCE {
        -- Container for additional R99 extensions
        assistanceDataDelivery-r3-add-ext BIT STRING OPTIONAL,
        v3e0NonCriticalExtensions       SEQUENCE {
          assistanceDataDelivery-v3e0ext AssistanceDataDelivery-v3e0ext OPTIONAL,
          v4xyNonCriticalExtensions     SEQUENCE {
            assistanceDataDelivery-v4xyext
            AssistanceDataDelivery-v4xyext-IEs,
            nonCriticalExtensions       SEQUENCE {} OPTIONAL
          } OPTIONAL
        } OPTIONAL
      } OPTIONAL
    } OPTIONAL
  },
  later-than-r3                   SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions              SEQUENCE {}
  }
}

AssistanceDataDelivery-r3-IEs ::= SEQUENCE {
  -- User equipment IEs
  rrc-TransactionIdentifier         RRC-TransactionIdentifier,
  -- Measurement Information Elements
  ue-positioning-GPS-AssistanceData UE-Positioning-GPS-AssistanceData
  OPTIONAL,
  ue-positioning-OTDOA-AssistanceData-UEB UE-Positioning-OTDOA-AssistanceData-UEB
  OPTIONAL
}

AssistanceDataDelivery-v3a0ext ::= SEQUENCE {
  sfn-Offset-Validity              SFN-Offset-Validity OPTIONAL
}

AssistanceDataDelivery-v3e0ext ::= SEQUENCE {
  iode2                             IODE,
  iode3                             IODE
}

AssistanceDataDelivery-v4xyext-IEs ::= SEQUENCE {
  ue-Positioning-OTDOA-AssistanceData-r4ext UE-Positioning-OTDOA-AssistanceData-r4ext OPTIONAL
}

```

```

-- *****
--
-- MEASUREMENT CONTROL
--
-- *****

MeasurementControl ::= CHOICE {
  r3
    SEQUENCE {
      measurementControl-r3          MeasurementControl-r3-IEs,
      v390nonCriticalExtensions      SEQUENCE {
        measurementControl-v390ext   MeasurementControl-v390ext,
        v3a0NonCriticalExtensions    SEQUENCE {
          measurementControl-v3a0ext MeasurementControl-v3a0ext,
          laterNonCriticalExtensions SEQUENCE {
            -- Container for additional R99 extensions
            measurementControl-r3-add-ext BIT STRING OPTIONAL,
            v3e0NonCriticalExtensions    SEQUENCE {
              measurementControl-v3e0ext MeasurementControl-v3e0ext OPTIONAL,
              v4xyNonCriticalExtensions SEQUENCE {
                measurementControl-v4xyext MeasurementControl-v4xyext-IEs,
                nonCriticalExtensions    SEQUENCE {}
              }
            }
          }
        }
      }
    } OPTIONAL
  },
  later-than-r3
    SEQUENCE {
      rrc-TransactionIdentifier RRC-TransactionIdentifier,
      criticalExtensions        CHOICE {
        r4
          SEQUENCE {
            measurementControl-r4 MeasurementControl-r4-IEs,
            nonCriticalExtensions SEQUENCE {} OPTIONAL
          },
        criticalExtensions SEQUENCE {}
      }
    }
}

MeasurementControl-r3-IEs ::= SEQUENCE {
  -- User equipment IEs
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  -- Measurement IEs
  measurementIdentity MeasurementIdentity,
  -- TABULAR: The measurement type is included in MeasurementCommand.
  measurementCommand MeasurementCommand,
  measurementReportingMode MeasurementReportingMode OPTIONAL,
  additionalMeasurementList AdditionalMeasurementID-List OPTIONAL,
  -- Physical channel IEs
  dpch-CompressedModeStatusInfo DPCH-CompressedModeStatusInfo OPTIONAL
}

MeasurementControl-v4xyext-IEs ::= SEQUENCE {
  ue-Positioning-OTDOA-AssistanceData-r4ext UE-Positioning-OTDOA-AssistanceData-r4ext OPTIONAL
}

MeasurementControl-v390ext ::= SEQUENCE {
  ue-Positioning-Measurement-v390ext UE-Positioning-Measurement-v390ext OPTIONAL
}

MeasurementControl-v3a0ext ::= SEQUENCE {
  sfm-Offset-Validity SFM-Offset-Validity OPTIONAL
}

MeasurementControl-v3e0ext ::= SEQUENCE {
  iode2 IODE,
  iode3 IODE
}

MeasurementControl-r4-IEs ::= SEQUENCE {
  -- Measurement IEs
  measurementIdentity MeasurementIdentity,
  -- TABULAR: The measurement type is included in measurementCommand.
  measurementCommand MeasurementCommand-r4,
  measurementReportingMode MeasurementReportingMode OPTIONAL,
  additionalMeasurementList AdditionalMeasurementID-List OPTIONAL,
  -- Physical channel IEs

```

Error! No text of specified style in document.

Error! No text of specified style in document.

```
} dpch-CompressedModeStatusInfo DPCH-CompressedModeStatusInfo OPTIONAL
```

```

SysInfoType15-1 ::= SEQUENCE {
  -- DGPS corrections
  ue-positioning-GPS-DGPS-Corrections          UE-Positioning-GPS-DGPS-Corrections,
  Extension mechanism for non-release99 information
  v3e0NonCriticalExtensions SEQUENCE {
    sysInfoType15-1-v3e0ext SysInfoType15-1-v3e0ext OPTIONAL,
    nonCriticalExtensions SEQUENCE {} OPTIONAL
  }
}

SysInfoType15-1-v3e0ext ::= SEQUENCE {
  iode2 IODE,
  iode3 IODE OPTIONAL
}

```

**3GPP TSG-RAN Meeting #19**  
**Birmingham, England, 11-14 March 2003**

**Tdoc # RP-030146**

CR-Form-v7
<b>CHANGE REQUEST</b>
# <b>25.331 CR 1906</b> # rev <b>-</b> # Current version: <b>5.3.0</b> #

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

<b>Title:</b>	# Correction on GPS navigation model update mechanism		
<b>Source:</b>	# Motorola, Nokia		
<b>Work item code:</b>	# TEI <span style="float: right;"><b>Date:</b> # 11/02/2003</span>		
<b>Category:</b>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;">                             # <b>A</b>                              Use <u>one</u> of the following categories:  <b>F</b> (correction)  <b>A</b> (corresponds to a correction in an earlier release)  <b>B</b> (addition of feature),  <b>C</b> (functional modification of feature)  <b>D</b> (editorial modification)                              Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a>.                         </td> <td style="width: 50%; vertical-align: top;"> <b>Release:</b> # Rel-5                              Use <u>one</u> 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)                         </td> </tr> </table>	# <b>A</b> Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	<b>Release:</b> # Rel-5 Use <u>one</u> 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)
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<b>Reason for change:</b>	# In GERAN#10, GP-022107 was agreed. That CR removed certain GPS assistance data parameters from GSM R98 (delta PRC2, delta PRC3, delta RRC2, and delta RRC3). The motivation in that CR applies equally well to UTRAN:  The GPS constellation does not guarantee broadcast satellite ephemeris updates at regular predictable intervals. The present method inserted in the standard for delivery of PRC/RRC (current ephemeris issue) and the delta PRC2/RRC2 (two issues of ephemeris in the past) and the delta PRC3/RRC3 (three issues of ephemeris in the past) will only work if the GPS system updates the ephemeris on periodic even intervals (example, every two hour period) because the present method does not identify the IODEs of the ephemeris associated with delta PRC2/RRC2 and delta PRC3/RRC3. The UE can only identify a time-based rule to application of delta PRC2/RRC2 and delta PRC3/RRC3 based on time – toe calculation, which of course only works if the updates are regular periodic. Recent data observations from the GPS constellation prove that the broadcast satellite ephemeris does not update at predictable periodic intervals. To illustrate the problem, the following sequence of ephemeris updates was observed on Feb 22, 2002 for SVID 1. Other similar sequences were observed throughout a 3 day period. The TOW refers to the time in which the GPS receiver obtained a new ephemeris set. The IODE and TOE elements are the new ephemeris IODE and TOE values for the new ephemeris elements. ΔTOW and ΔTOE refer to the change in the parameter since the last update.  <table style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: left;">IODE</th> <th style="text-align: left;">TOW</th> <th style="text-align: left;">TOE</th> <th style="text-align: left;">ΔTOW</th> <th style="text-align: left;">ΔTOE</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>28800</td> <td>35984</td> <td></td> <td></td> </tr> <tr> <td>81</td> <td>36000</td> <td>43200</td> <td>7200 sec</td> <td>7216 sec</td> </tr> <tr> <td>82</td> <td>43200</td> <td>50400</td> <td>7200 sec</td> <td>7200 sec</td> </tr> </tbody> </table>	IODE	TOW	TOE	ΔTOW	ΔTOE	80	28800	35984			81	36000	43200	7200 sec	7216 sec	82	43200	50400	7200 sec	7200 sec
IODE	TOW	TOE	ΔTOW	ΔTOE																	
80	28800	35984																			
81	36000	43200	7200 sec	7216 sec																	
82	43200	50400	7200 sec	7200 sec																	

104	47520	50384	4320 sec	-16 sec
105	50400	57584	2880 sec	7200 sec

During a 3 day period of observation approximately 10% of the ephemeris update cases showed this a-periodic behaviour of TOW and/or TOE. The toe parameter on each subsequent update does not always march forward on every IODE change. Likewise, the time in which the ephemeris is updated does not occur at even 2 hour intervals.

The present specification describes populating the delta PRC2/RRC2 and delta PRC3/RRC3 fields based on ephemeris 2 issues and 3 issues ago respectively and does not transmit the IODEs associated with the delta PRC2/RRC2 and delta PRC3/RRC3 parameters.

**Summary of change:** ¶ Two new IEs IODE2 and IODE3 are added to identified the IODE value of the ephemeris data associated with delta PRC2/RRC2 and delta PRC3/RRC3 parameters. The text describing the meaning of delta PRC2/RRC2 and delta PRC3/RRC3 is updated to reflect the introduction of the new IEs. This text is also moved from the current section which only applies to reception of the IEs on system information into the semantic column of the tabular description so that it is applicable for system information and dedicated messages.

**Impact Analysis**

The change has isolated impact to GPS navigation model update mechanism.

If neither UE nor UTRAN implements the CR, then the UE will use a time based rule in order to apply Delta PRC2/RRC2 and Delta PRC3/RRC3. As shown this approach does not work if ephemeris updates are not regular periodic. Position accuracy will be harmed when the ephemeris updating shows the aperiodic behaviour.

If UE does not implement the CR but UTRAN does implement the CR then the UE will ignore the new IEs. The UE will use a time based rule in order to apply Delta PRC2/RRC2 and Delta PRC3/RRC3. The impact is similar to above.

If UTRAN does not implement the CR but UE does implement the CR then the UE will not receive the IEs necessary in order to interpret Delta PRC2/RRC2 and Delta PRC3/RRC3. The UE will only be able to resort to the time based rule with impact similar to above.

**Consequences if not approved:** ¶ The navigation model update mechanism does not work. The UE cannot use the Delta PRC2/RRC2 and Delta PRC3/RRC3 values for updating the navigation model of a satellite as the present method does not identify the IODEs associated with Delta PRC2/RRC2 and Delta PRC3/RRC3. The UE can only identify a time-based rule to application of Delta PRC2/RRC2 and Delta PRC3/RRC3 based on time – toe calculation, which only works if the updates are regular periodic. The updates do not occur in a regular periodic way 10% time and during this 10% of the time location accuracy is seriously degraded.

**Clauses affected:** ¶ 8.1.1.6.15.1, 10.3.7.91, 11.2

<b>Other specs affected:</b>	¶	<input type="checkbox"/> Y	<input type="checkbox"/> N	Other core specifications	¶	
		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Test specifications
		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			O&M Specifications
		<input type="checkbox"/>	<input type="checkbox"/>			

**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.

#### 8.1.1.6.15.1 System Information Block type 15.1

The UE should store all the relevant IEs included in this system information block in variable UE\_POSITIONING\_GPS\_DATA. The UE shall:

- 1> act on "DGPS information" in the IE "DGPS Corrections" in a similar manner as specified in [13] except that the scale factors for PRC and RRC are different. ~~In addition, the IE group DGPS information also includes Delta PRC2 and Delta RRC2. Delta PRC2 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris two issues ago IODE - 2. Delta RRC2 is the difference in the pseudorange rate of change correction between the satellite's ephemeris identified by IODE and IODE - 2. These two additional IEs can extend the life of the raw ephemeris data up to 6 hours. If the IEs "Delta PRC3" and "Delta RRC3" are included, UE may use them as appropriate e.g. to extend the life of the raw ephemeris data up to 8 hours;~~
- 1> act upon the received IE " UE Positioning GPS DGPS corrections" as specified in subclause 8.6.7.19.3.3.



### 10.3.7.91 UE positioning GPS DGPS corrections

This IE contains DGPS corrections to be used by the UE.

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
GPS TOW sec	MP		Integer(0..604799)	seconds GPS time-of-week when the DGPS corrections were calculated
Status/Health	MP		Enumerated(UDRE scale 1.0, UDRE scale 0.75, UDRE scale 0.5, UDRE scale 0.3, UDRE scale 0.2, UDRE scale 0.1, no data, invalid data)	
DGPS information	CV- <i>Status/Health</i>	1 to <maxSat>		If the Cipher information is included these fields are ciphered.
>SatID	MP		Enumerated(0..63)	
>IODE	MP		Integer(0..255)	
>UDRE	MP		Enumerated(UDRE ≤ 1.0 m, 1.0m < UDRE ≤ 4.0m, 4.0m < UDRE ≤ 8.0m, 8.0m < UDRE)	The value in this field shall be multiplied by the UDRE Scale Factor in the IE Status/Health to determine the final UDRE estimate for the particular satellite.
>PRC	MP		Real(-655.04..655.04 by step of 0.32)	meters (different from [13])
>RRC	MP		Real(-4.064..4.064 by step of 0.032)	meters/sec (different from [13])
>Delta PRC2	MP		Integer(-127..127)	meters <a href="#">Delta PRC2 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE2.</a>
>Delta RRC2	MP		Real(-0.224..0.224 by step of 0.032)	meters/sec <a href="#">Delta RRC2 is the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE2.</a>
<a href="#">&gt;IODE2</a>	<a href="#">OP</a>		<a href="#">Integer(0..255)</a>	

Information Element/Group name	Need	Multi	Type and Reference	Semantics description
>Delta PRC3	CV-DCCH		Integer(-127..127)	meters <a href="#">Delta PRC3 is the difference in the pseudorange correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE3.</a>
>Delta RRC3	CV-DCCH		Real(-0.224..0.224 by step of 0.032)	meters/sec <a href="#">Delta RRC3 is the difference in the pseudorange rate-of-change correction between the satellite's ephemeris identified by IODE and the previous ephemeris identified by IODE3.</a>
<a href="#">&gt;IODE3</a>	<a href="#">OP</a>		<a href="#">Integer(0..255)</a>	

Condition	Explanation
<i>Status/Health</i>	This IE is mandatory present if "status" is not equal to "no data" or "invalid data", otherwise the IE is not needed.
<i>DCCH</i>	This IE is mandatory present if the IE " UE positioning GPS DGPS corrections" it is included in the point-to-point message. It is optional if the IE "UE positioning GPS DGPS corrections" is included in the broadcast message. Otherwise it is not needed.

```

-- *****
--
-- Assistance Data Delivery
--
-- *****

AssistanceDataDelivery ::= CHOICE {
  r3 SEQUENCE {
    assistanceDataDelivery-r3 AssistanceDataDelivery-r3-IEs,
    v3aoNonCriticalExetensions SEQUENCE {
      assistanceDataDelivery-v3a0ext AssistanceDataDelivery-v3a0ext,
      laterNonCriticalExtensions SEQUENCE {
        -- Container for additional R99 extensions
        assistanceDataDelivery-r3-add-ext BIT STRING OPTIONAL,
        v3e0NonCriticalExtensions SEQUENCE {
          assistanceDataDelivery-v3e0ext AssistanceDataDelivery-v3e0ext OPTIONAL,
          v4xyNonCriticalExtensions SEQUENCE {
            assistanceDataDelivery-v4xyext
            AssistanceDataDelivery-v4xyext-IEs,
            nonCriticalExtensions SEQUENCE {} OPTIONAL
          } OPTIONAL
        } OPTIONAL
      } OPTIONAL
    },
    later-than-r3 SEQUENCE {
      rrc-TransactionIdentifier RRC-TransactionIdentifier,
      criticalExtensions SEQUENCE {}
    }
  }

AssistanceDataDelivery-r3-IEs ::= SEQUENCE {
  -- User equipment IEs
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  -- Measurement Information Elements
  ue-positioning-GPS-AssistanceData UE-Positioning-GPS-AssistanceData
  OPTIONAL,
  ue-positioning-OTDOA-AssistanceData-UEB UE-Positioning-OTDOA-AssistanceData-UEB
  OPTIONAL
}

AssistanceDataDelivery-v3a0ext ::= SEQUENCE {
  sfn-Offset-Validity SFN-Offset-Validity OPTIONAL
}

AssistanceDataDelivery-v4xyext-IEs ::= SEQUENCE {
  ue-Positioning-OTDOA-AssistanceData-r4ext UE-Positioning-OTDOA-AssistanceData-r4ext OPTIONAL
}

AssistanceDataDelivery-v3e0ext ::= SEQUENCE {
  iode2 IOE,
  iode3 IOE
}

```

```

-- *****
--
-- MEASUREMENT CONTROL
--
-- *****

MeasurementControl ::= CHOICE {
  r3
    SEQUENCE {
      measurementControl-r3          MeasurementControl-r3-IEs,
      v390nonCriticalExtensions      SEQUENCE {
        measurementControl-v390ext  MeasurementControl-v390ext,
        v3a0NonCriticalExtensions   SEQUENCE {
          measurementControl-v3a0ext MeasurementControl-v3a0ext,
          laterNonCriticalExtensions SEQUENCE {
            -- Container for additional R99 extensions
            measurementControl-r3-add-ext BIT STRING OPTIONAL,
            v3e0NonCriticalExtensions    SEQUENCE {
              measurementControl-v3e0ext MeasurementControl-v3e0ext OPTIONAL,
              v4xyNonCriticalExtensions SEQUENCE {
                measurementControl-v4xyext MeasurementControl-v4xyext-IEs,
                v5xyNonCriticalExtensions SEQUENCE {
                  measurementControl-v5xyext MeasurementControl-v5xyext-IEs,
                  nonCriticalExtensions   SEQUENCE {}
                }
              }
            }
          }
        }
      }
    }
  OPTIONAL
},
  later-than-r3
    SEQUENCE {
      rrc-TransactionIdentifier RRC-TransactionIdentifier,
      criticalExtensions        CHOICE {
        r4
          SEQUENCE {
            measurementControl-r4          MeasurementControl-r4-IEs,
            v5xyNonCriticalExtensions     SEQUENCE {
              measurementControl-v5xyext  MeasurementControl-v5xyext-IEs,
              nonCriticalExtensions       SEQUENCE {} OPTIONAL
            }
          } OPTIONAL
        },
      criticalExtensions          SEQUENCE {}
    }
  }
}

MeasurementControl-r3-IEs ::= SEQUENCE {
  -- User equipment IEs
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  -- Measurement IEs
  measurementIdentity      MeasurementIdentity,
  -- TABULAR: The measurement type is included in MeasurementCommand.
  measurementCommand      MeasurementCommand,
  measurementReportingMode MeasurementReportingMode OPTIONAL,
  additionalMeasurementList AdditionalMeasurementID-List OPTIONAL,
  -- Physical channel IEs
  dpch-CompressedModeStatusInfo DPCH-CompressedModeStatusInfo OPTIONAL
}

MeasurementControl-v4xyext-IEs ::= SEQUENCE {
  ue-Positioning-OTDOA-AssistanceData-r4ext UE-Positioning-OTDOA-AssistanceData-r4ext OPTIONAL
}

MeasurementControl-v390ext ::= SEQUENCE {
  ue-Positioning-Measurement-v390ext UE-Positioning-Measurement-v390ext OPTIONAL
}

MeasurementControl-v3a0ext ::= SEQUENCE {
  sfm-Offset-Validity SFN-Offset-Validity OPTIONAL
}

MeasurementControl-v3e0ext ::= SEQUENCE {
  iode2 IOE,
  iode3 IOE
}

MeasurementControl-r4-IEs ::= SEQUENCE {
  -- Measurement IEs

```

```

    measurementIdentity      MeasurementIdentity,
    -- TABULAR: The measurement type is included in measurementCommand.
    measurementCommand       MeasurementCommand-r4,
    measurementReportingMode MeasurementReportingMode      OPTIONAL,
    additionalMeasurementList AdditionalMeasurementID-List  OPTIONAL,
    -- Physical channel IEs
    dpch-CompressedModeStatusInfo DPCH-CompressedModeStatusInfo  OPTIONAL
}

MeasurementControl-v5xyext-IEs ::= SEQUENCE {
    measurementCommand-v5xyext CHOICE {
        -- the choice "intra-frequency" shall be used for the case of intra-frequency measurement,
        -- as well as when intra-frequency events are configured for inter-frequency measurement
        intra-frequency          Intra-FreqEventCriteriaList-v5xyext,
        inter-frequency          Inter-FreqEventCriteriaList-v5xyext
    }
    OPTIONAL,
    intraFreqReportingCriteria-lb-r5ext IntraFreqReportingCriteria-lb-r5ext  OPTIONAL
}

```

```

SysInfoType15-1 ::= SEQUENCE {
  -- DGPS corrections
  ue-positioning-GPS-DGPS-Corrections          UE-Positioning-GPS-DGPS-Corrections,
  Extension mechanism for non-release99 information
  v3e0NonCriticalExtensions SEQUENCE {
    sysInfoType15-1-v3e0ext SysInfoType15-1-v3e0ext OPTIONAL,
    nonCriticalExtensions SEQUENCE {} OPTIONAL
  }
} OPTIONAL

SysInfoType15-1-v3e0ext ::= SEQUENCE {
  iode2 IODE,
  iode3 IODE OPTIONAL
}

```