**3GPP TSG-RAN WG#107-e *R3-20xxxx***

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network |  |

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| ***Title:*** | ALT 1: | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** | R3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change 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](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As part of the WID on LTE-based 5G Terrestrial Broadcast (RP-191924), new numerology / parameters are being added to the MBSFN area configuration, which should be supported in the M2 interface. These include the support of carrier spacing values of 2.5kHz and 0.37 kHz, and also two values for the staggering length for MBSFN-RS associated with PMCH, for subcarrier spacing of 0.37 kHz. These parameters are documented in the LS received from RAN1 in R3-200081.  Additionally, the current M2 signalling does not support allocation of more than 6 subframes to MCCH. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The subcarrier spacing is extended to include 3 new enumerated values, which includes all the combinations of the new parameters and follows the RRC format, without the need to introduce a new IE.  A new IE is defined (*Subframe Allocation Info Extended* IE) which can be used to replace the legacy *Subframe Allocation Info* IE, enabling the allocation the 10 subframes. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No support for LTE-based 5G Terrestrial Broadcast enhancements in TS 36.443. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 8.6.2, 8.7.2, 8.8.2, 9.2.1.13, 9.3.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **x** |  | Other core specifications | | | | TS 36.331 CR#4190  TS 36.306 CR#1729  TS 36.211 CR#0504  TS 36.312 CR#1294 | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## 

## 8.6 M2 Setup

### 8.6.1 General

The purpose of the M2 Setup procedure is to exchange application level data needed for the eNB and MCE to interoperate correctly on the M2 interface and to configure MCCH related content on the BCCH for each of the cells controlled by the eNB which is foreseen to participate in MBMS service data transmission. This procedure shall be the first M2AP procedure triggered after the TNL association has become operational. The procedure uses non MBMS-service-associated signalling.

This procedure erases any existing application level configuration data in the eNB and the MCE and MCCH related BCCH data in all cells served by the eNB. This procedure also re-initialises the E-UTRAN M2AP MBMS service related contexts (if any) and erases all related signalling connections in the two nodes like a Reset procedure would do.

### 8.6.2 Successful Operation



Figure 8.6.2-1. M2 Setup procedure. Successful operation.

The eNB initiates the procedure by sending a M2 SETUP REQUEST message including the appropriate data to the MCE. The eNB shall include in the M2 SETUP REQUEST message the cell(s) which is (are) foreseen to participate in MBMS service data transmission.

The MCE responds with M2 SETUP RESPONSE message including the appropriate data. The MCE shall provide the MCCH related BCCH configuration for all cells indicated in the M2 SETUP REQUEST message.

The exchanged data shall be stored in the respective node, MCCH related BCCH configuration broadcasted as provided by the MCE in the respective cell(s), and used for the duration of the TNL association or until any further configuration update procedure is performed.

When this procedure is finished the M2 interface is operational, all affected cells are ready for MBMS service data transmission and other M2 messages can be exchanged.

If the M2 SETUP REQUEST message contains the *eNB Name* IE the MCE may use this IE as a human readable name of the eNB.

If the M2 SETUP RESPONSE message contains the *MCE Name* IE the eNB may use this IE as a human readable name of the MCE.

The eNB shall broadcast the MCCH related BCCH configuration only in those cells indicated in the *Cell Information List* IE contained in the M2 SETUP RESPONSE message for which the *Cell Reservation Info* IE within the *MCCH related BCCH Configuration Item* IE is not set to “reserved Cell”.

If the M2 SETUP RESPONSE message contains the *Modification Period Extended* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall take its value into account instead of the value signalled in the *Modification Period* IE.

If the M2 SETUP RESPONSE message contains the *Repetition Period Extended* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall take its value into account instead of the value signalled in the *Repetition Period* IE.

If the M2 SETUP RESPONSE message contains the *Subframe Allocation Info Extended* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall, if supported, take its value into account instead of the value signalled in the *Subframe Allocation Info* IE.

**>>> NEXT CHANGE <<<**

## 8.7 eNB Configuration Update

### 8.7.1 General

The purpose of the eNB Configuration Update procedure is to update application level configuration data needed for the eNB and MCE to interoperate correctly on the M2 interface. This procedure does not affect existing MBMS-service-related contexts, if any.

The procedure uses non MBMS-service-associated signalling.

### 8.7.2 Successful Operation



Figure 8.7.2-1. eNB Configuration Update procedure. Successful operation.

The eNB initiates the procedure by sending an ENB CONFIGURATION UPDATE message to the MCE including an appropriate set of updated configuration data that it has just taken into operational use. The eNB CONFIGURATION UPDATE message may contain:

- the *Global eNB ID* IE,

- the *eNB Name* IE,

- the *eNB MBMS Configuration data per cell* IE.

If the *Global eNB ID* IE is not included in the ENB CONFIGURATION UPDATE message, the MCE shall interpret that the existing eNB ID is not changed.

If the *eNB Name* IE is not included in the ENB CONFIGURATION UPDATE message, the MCE shall interpret that the existing eNB name, if any, is not changed.

The MCE responds with the ENB CONFIGURATION UPDATE ACKNOWLEDGE message to acknowledge that it successfully updated the configuration data. If the ENB CONFIGURATION UPDATE message does not contain the information for an existing cell, the MCE shall interpret that the corresponding configuration data for that cell is not changed and shall continue to operate the M2 with the existing related configuration data for that cell.

If the ENB CONFIGURATION UPDATE ACKNOWLEDGE message contains the *Cell Information List* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall broadcast that MCCH related BCCH configuration only in those cells indicated in the IE for which the *Cell Reservation Info* IE is not set to “reservedCell”. If the ENB CONFIGURATION UPDATE ACKNOWLEDGE message does not contain the *Cell Information List* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall not broadcast that MCCH related BCCH configuration in any cell. If the ENB CONFIGURATION UPDATE ACKNOWLEDGE message contains the *Modification Period Extended* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall take its value into account instead of the value signalled in the *Modification Period* IE. If the ENB CONFIGURATION UPDATE ACKNOWLEDGE message contains the *Repetition Period Extended* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall take its value into account instead of the value signalled in the *Repetition Period* IE. If the ENB CONFIGURATION UPDATE ACKNOWLEDGE message does not contain the *MCCH related BCCH Configuration Item* IE for an existing MBSFN area, the eNB shall interpret that the corresponding configuration data for that MBSFN area is not changed and shall continue to operate the M2 with the existing related configuration data for that MBSFN area.

If the ENB CONFIGURATION UPDATE ACKNOWLEDGE message contains the *Subframe Allocation Info Extended* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall, if supported, take its value into account instead of the value signalled in the *Subframe Allocation Info* IE.

The eNB may update the configured MBMS Services Areas and the MBSFN Synchronisation Area per cell:

- If the eNB includes the *E-UTRAN CGI* IE for a cell within the ENB CONFIGURATION UPDATE message, the MCE shall assume that the eNB does neither broadcast MCCH related configuration in the BCCH nor any MBMS service data in that cell any more.

- If the eNB includes the *eNB MBMS Configuration data Item* IE for a cell within the ENB CONFIGURATION UPDATE message, the MCE may decide to include in the ENB CONFIGURATION UPDATE ACKNOWLEDGE message the MCCH related BCCH configuration for the related MBSFN area(s).

If the eNB CONFIGURATION UPDATE message contains the *eNB Name* IE, the MCE may use this IE as a human readable name of the eNB.

The updated configuration data shall be stored in both eNB and MCE and used for the duration of the TNL association or until any further update is triggered by the eNB or the MCE.

The eNB may initiate a further eNB Configuration Update procedure only after a previous eNB Configuration Update procedure has been completed.

**>>> NEXT CHANGE <<<**

## 8.8 MCE Configuration Update

### 8.8.1 General

The purpose of the MCE Configuration Update procedure is to update application level configuration data needed for the eNB and MCE to interoperate correctly on the M2 interface and to re-configure MCCH related content on the BCCH for the MBSFN areas contributed by the eNB which is foreseen to participate in MBMS service data transmission. The procedure uses non MBMS-service-associated signalling. This procedure does not affect existing MBMS-service-related contexts, if any.

### 8.8.2 Successful Operation



Figure 8.8.2-1. MCE Configuration Update procedure. Successful operation.

The MCE initiates the procedure by sending an MCE CONFIGURATION UPDATE message to the eNB including an appropriate set of updated configuration data. The MCE CONFIGURATION UPDATE message may contain:

- the *Global MCE ID* IE,

- the *MCE Name* IE,

- the *MCCH related BCCH Configuration data per MBSFN area* IE.

If the *Global MCE ID* IE is not included in the MCE CONFIGURATION UPDATE message, the eNB shall interpret that the existing MCE ID is not changed.

If the *MCE Name* IE is not included in the MCE CONFIGURATION UPDATE message, the eNB shall interpret that the existing MCE name, if any, is not changed.

The eNB responds with the MCE CONFIGURATION UPDATE ACKNOWLEDGE message to acknowledge that it successfully updated the configuration data.

If the MCE CONFIGURATION UPDATE message contains the *Cell Information List* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall broadcast that MCCH related BCCH configuration only in those cells indicated in the IE for which the Cell Reservation Info IE is not set to “reservedCell”. If the MCE CONFIGURATION UPDATE message does not contain the *Cell Information List* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall not broadcast that MCCH related BCCH configuration in any cell. If the MCE CONFIGURATION UPDATE message contains the *Modification Period Extended* IE within the *MCCH related BCCH Confiruation Item* IE, the eNB shall take its value into account instead of the value signalled in the *Modification Period* IE. If the MCE CONFIGURATION UPDATE message contains the *Repetition Period Extended* IE within the *MCCH related BCCH Confiruation Item* IE, the eNB shall take its value into account instead of the value signalled in the *Repetition Period* IE. If the MCE CONFIGURATION UPDATE message does not contain the *MCCH related BCCH Configuration Item* IE for an existing MBSFN area, the eNB shall interpret that the corresponding configuration data for that MBSFN area is not changed and shall continue to operate the M2 with the existing related configuration data for that MBSFN area.

If the MCE CONFIGURATION UPDATE message contains the *MCE Name* IE, the eNB may use this IE as a human readable name of the MCE.

The updated configuration data shall be stored in both eNB and MCE and used for the duration of the TNL association or until any further update is triggered by the MCE or the eNB.

The MCE may initiate a further MCE Configuration Update procedure only after a previous MCE Configuration Update procedure has been completed.

If the MCE CONFIGURATION UPDATE message contains the *Subcarrier Spacing MBMS* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall, if supported, store this value and use it in MBMS operation.

If the MCE CONFIGURATION UPDATE message contains the *Subframe Allocation Info Extended* IE within the *MCCH related BCCH Configuration Item* IE, the eNB shall, if supported, take its value into account instead of the value signalled in the *Subframe Allocation Info* IE.

**>>> NEXT CHANGE <<<**

#### 9.2.1.13 MCCH related BCCH Configuration Item

This information element provides MCCH related BCCH configuration information to the eNB.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| MBSFN Area Id | M |  | 9.2.1.14 |  | − | − |
| PDCCH Length | M |  | ENUMERATED (s1, s2,…) | This IE is encoded along the number of OFDM symbols for PDCCH as of table 6.7-1. In TS 36.211 [12]. | − | − |
| Repetition Period | M |  | ENUMERATED (rf32, rf64, rf128, rf256) | The same encoding as the *mcch-RepetitionPeriod* IE in the *mcch-Config* IE as specified in TS 36.331 [11]. | − | − |
| Repetition Period Extended | O |  | ENUMERATED (rf1, rf2, rf4, rf8, rf16, …) | The same encoding as the *mcch-RepetitionPeriod-v14x0* IE in the *mcch-Config* IE as specified in TS 36.331 [11]. If this IE is present, the value signalled in the *Repetition Period* IE is ignored. | YES | reject |
| Offset | M |  | INTEGER (0..10) | The same encoding as the *mcch-Offset* in *mcch-Config* IE as specified in TS 36.331 [11]. | − | − |
| Modification Period | M |  | ENUMERATED (rf512, rf1024) | The same encoding as the *mcch-ModificationPeriod* IE in the *mcch-Config* IE as specified in TS 36.331 [11]. | − | − |
| Modification Period Extended | O |  | ENUMERATED (rf1, rf2, rf4, rf8, rf16, rf32, rf64, rf128, rf256, …) | The same encoding as the *mcch-ModificationPeriod-v14x0* IE in the *mcch-Config* IE as specified in TS 36.331 [11]. If this IE is present, the value signalled in the *Modification Period* IE is ignored. | YES | reject |
| Subframe Allocation Info | M |  | BIT STRING (SIZE(6)) | The same encoding as the *sf-AllocInfo* IE specified in TS 36.331 [11]. | − | − |
| Modulation and Coding Scheme | M |  | ENUMERATED (n2, n7, n13, n19) | The same encoding as the *signallingMCS* IE specified in TS 36.331 [11]. | − | − |
| **Cell Information List** |  | *0..1* |  |  |  |  |
| **>Cell Information** |  | *1 to <maxnoofCells>* |  |  |  |  |
| >>E-UTRAN CGI | M |  | 9.2.1.11 |  | − | − |
| >>Cell Reservation Info | M |  | ENUMERATED (reservedCell, nonReservedCell, …) |  | − | − |
| Subcarrier Spacing MBMS | O |  | ENUMERATED (khz-7dot5, khz-1dot25, … khz-2dot5, khz-0dot37) | Semantics along the definition of the *subcarrierSpacingMBMS-r14* IE, and the *subcarrierSpacingMBMS-r16* IE as specified in TS 36.331 [11]. | YES | reject |
| Time separation | O |  | ENUMERATED (sl2, sl4, … ) | The same encoding as the *timeSeparation-r16* IE specified in TS 36.331 [11]. | YES | reject |
| Subframe Allocation Info Extended | C-  ifSubCarrierSpacing |  | BIT STRING (SIZE(10)) | The same encoding as the *sf-AllocInfo-r16*  IE specified in TS 36.331 [11]. If this IE is present, the value signalled in the *Subframe Allocation Info* IE is ignored. | YES | reject |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofCells | Maximum no. of cells that may be served by an eNB. The value for maxnoofCells is 256. |

|  |  |
| --- | --- |
| Condition | Explanation |
| ifSubCarrierSpacing | This IE shall be present if the *Subcarrier Spacing MBMS* IE is present. |

**>>> NEXT CHANGE <<<**

### 9.3.5 Information Element definitions

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Information Element Definitions

--

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

M2AP-Ies {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

eps-Access (21) modules (3) m2ap (4) version1 (1) m2ap-Ies (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

id-MCH-Scheduling-PeriodExtended,

id-MCH-Scheduling-PeriodExtended2,

id-Modification-PeriodExtended,

id-Modulation-Coding-Scheme2,

id-Repetition-PeriodExtended,

id-Subcarrier-SpacingMBMS,

id-SubframeAllocationExtended,

id-SubframeAllocationInfoExtended,

id-TimeSeparation,

maxnoofMBSFNareas,

maxnoofPMCHsperMBSFNarea,

maxnoofCells,

maxnoofMBMSServiceAreasPerCell,

maxnoofSessionsPerPMCH,

maxnooferrors,

maxnoofCellsforMBMS

FROM M2AP-Constants

Criticality,

ProcedureCode,

ProtocolIE-ID,

TriggeringMessage

FROM M2AP-CommonDataTypes

ProtocolExtensionContainer{},

ProtocolIE-Single-Container{},

M2AP-PROTOCOL-EXTENSION,

M2AP-PROTOCOL-IES

FROM M2AP-Containers;

**--- skip unchanged asn.1 ---**

MCCH-Update-Time ::= INTEGER (0..255)

MCCHrelatedBCCH-ConfigPerMBSFNArea-Item ::= SEQUENCE {

mbsfnArea MBSFN-Area-ID,

pdcchLength ENUMERATED {s1, s2, ...},

repetitionPeriod ENUMERATED {rf32, rf64, rf128, rf256},

offset INTEGER (0..10),

modificationPeriod ENUMERATED {rf512, rf1024},

subframeAllocationInfo BIT STRING (SIZE(6)),

modulationAndCodingScheme ENUMERATED {n2, n7, n13, n19},

cellInformationList Cell-Information-List OPTIONAL,

iE-Extensions ProtocolExtensionContainer { { MCCHrelatedBCCH-ConfigPerMBSFNArea-Item-ExtIEs} } OPTIONAL,

...

}

MCCHrelatedBCCH-ConfigPerMBSFNArea-Item-ExtIEs M2AP-PROTOCOL-EXTENSION ::= {

-- Extension for Rel-14 to support MCCH repetition period values –-

{ID id-Repetition-PeriodExtended CRITICALITY reject EXTENSION Repetition-PeriodExtended PRESENCE optional}|

-- Extension for Rel-14 to support MCCH modification period values –-

{ID id-Modification-PeriodExtended CRITICALITY reject EXTENSION Modification-PeriodExtended PRESENCE optional}|

{ID id-Subcarrier-SpacingMBMS CRITICALITY reject EXTENSION Subcarrier-SpacingMBMS PRESENCE optional}|

{ID id-TimeSeparation CRITICALITY reject EXTENSION TimeSeparation PRESENCE optional}|

{ID id-SubframeAllocationInfoExtended CRITICALITY reject EXTENSION SubframeAllocationInfoExtended PRESENCE conditional},

...

}

**--- skip unchanged asn.1 ---**

SFN ::= INTEGER (0..1023)

Subcarrier-SpacingMBMS ::= ENUMERATED {khz-7dot5, khz-1dot25, ..., khz-2dot5, khz-0dot37}

SubframeAllocationExtended ::= CHOICE {

oneFrameExtension BIT STRING (SIZE(2)),

fourFrameExtension BIT STRING (SIZE(8)),

choice-extension ProtocolIE-Single-Container { { SubframeAllocationExtended-ExtIEs} },

...

}

SubframeAllocationExtended-ExtIEs M2AP-PROTOCOL-IES ::= { ...

}

SubframeAllocationInfoExtended ::= BIT STRING (SIZE(10))

-- T

TimeSeparation ::= ENUMERATED {sl2, sl4, ...}

TimeToWait ::= ENUMERATED {v1s, v2s, v5s, v10s, v20s, v60s, ...}

TMGI ::= SEQUENCE {

pLMNidentity PLMN-Identity,

serviceID OCTET STRING (SIZE (3)),

iE-Extensions ProtocolExtensionContainer { {TMGI-ExtIEs} } OPTIONAL,

...

}

**>>> NEXT CHANGE <<<**

### 9.3.7 Constant definitions

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Constant definitions

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

M2AP-Constants {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

eps-Access (21) modules (3) m2ap (4) version1 (1) m2ap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

**--- skip unchanged asn.1 ---**

id-SC-PTM-Information ProtocolIE-ID ::= 45

id-Modification-PeriodExtended ProtocolIE-ID ::= 46

id-Repetition-PeriodExtended ProtocolIE-ID ::= 47

id-MCH-Scheduling-PeriodExtended2 ProtocolIE-ID ::= 48

id-Subcarrier-SpacingMBMS ProtocolIE-ID ::= 49

id-SubframeAllocationExtended ProtocolIE-ID ::= 50

id-SubframeAllocationInfoExtended ProtocolIE-ID ::= XX

id-TimeSeparation ProtocolIE-ID ::= YY