**3GPP TSG-RAN2 Meeting #125 *R2-240xxxx***

**, Greece, 26th Feb- 1st Mar**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.331** | **CR** |  | **rev** | **-** | **Current version:** | **18.0.0** |  |
|  | | | | | | | | |
| *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 |  | Core Network |  |

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| ***Title:*** | ASN1 guideline for late non-critical extension [LateNonCriticalExt] | | | | | | | | | |
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| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
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| ***Work item code:*** | TEI18 | | | | |  | ***Date:*** | | | 2024-02-26 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | Currently, the description for the usage of late-non-critical extention is missing in the section of general guideline for ASN.1. However, in R18 or in the future release, late non-critical exntesion might appear more often with the legacy R15-R17 releases need to be extended. | | | | | | | | |
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| ***Summary of change:*** | | Add a general guideline for late NonCritical extention | | | | | | | | |
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| ***Consequences if not approved:*** | | When to use late non-critical extention and how to write it might be unclear. | | | | | | | | |
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| ***Clauses affected:*** | | A.4.3, A.4.3.x (new) | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

================================================CHANGE BEGINS==============================================================

## A.4.3 Non-critical extension of messages

### A.4.3.1 General principles

The mechanisms to extend a message in a non-critical manner are defined in A.3.3. W.r.t. the use of extension markers, the following additional guidelines apply:

- When further non-critical extensions are added to a message that has been critically extended, the inclusion of these non-critical extensions in earlier critical branches of the message should be avoided when possible.

- The extension marker ("...") is the primary non-critical extension mechanism that is used but empty sequences may be used if length determinant is not required. Examples of cases where a length determinant is not required:

- at the end of a message;

- at the end of a structure contained in a BIT STRING or OCTET STRING.

- When an extension marker is available, non-critical extensions are preferably placed at the location (e.g. the IE) where the concerned parameter belongs from a logical/ functional perspective (referred to as the '*default extension location*').

- It is desirable to aggregate extensions of the same release or version of the specification into a group, which should be placed at the lowest possible level.

- In specific cases it may be preferable to place extensions elsewhere (referred to as the '*actual extension location*') e.g. when it is possible to aggregate several extensions in a group. In such a case, the group should be placed at the lowest suitable level in the message.

- In case placement at the default extension location affects earlier critical branches of the message, locating the extension at a following higher level in the message should be considered.

- In case an extension is not placed at the default extension location, an IE should be defined. The IE's ASN.1 definition should be placed in the same ASN.1 clause as the default extension location. In case there are intermediate levels in-between the actual and the default extension location, an IE may be defined for each level. Intermediate levels are primarily introduced for readability and overview. Hence intermediate levels need not always be introduced e.g. they may not be needed when the default and the actual extension location are within the same ASN.1 clause.

- In case a new field is needed for a type, but the release or version of the field is earlier than the latest existing extension at the end of the type, the extension should be made via the late non-critical extension in the closest upper level to the type where a container for the late non-critical extension is given.

===============================================NEXT CHANGE==================================================================

#### A.4.3.2 Further guidelines

Further to the general principles defined in the previous clause, the following additional guidelines apply regarding the use of extension markers:

- Extension markers within SEQUENCE

- Extension markers are primarily, but not exclusively, introduced at the higher nesting levels

- Extension markers are introduced for a SEQUENCE comprising several fields as well as for information elements whose extension would result in complex structures without it (e.g. re-introducing another list)

- Extension markers are introduced to make it possible to maintain important information structures e.g. parameters relevant for one particular RAT

- Extension markers are also used for size critical messages (i.e. messages on BCCH, BR-BCCH, PCCH and CCCH), although introduced somewhat more carefully

- The extension fields introduced (or frozen) in a specific version of the specification are grouped together using double brackets.

- Extension markers within ENUMERATED

- Spare values are used until the number of values reaches the next power of 2, while the extension marker caters for extension beyond that limit

- A suffix of the form "vXYZ" is used for the identifier of each new value, e.g. "value-vXYZ".

- Extension markers within CHOICE:

- Extension markers are introduced when extension is foreseen and when comprehension is not required by the receiver i.e. behaviour is defined for the case where the receiver cannot comprehend the extended value (e.g. ignoring an optional CHOICE field). It should be noted that defining the behaviour of a receiver upon receiving a not comprehended choice value is not required if the sender is aware whether or not the receiver supports the extended value.

- A suffix of the form "vXYZ" is used for the identifier of each new choice value, e.g. "choice-vXYZ".

Non-critical extensions at the end of a message/ of a field contained in an OCTET or BIT STRING:

- When a nonCriticalExtension or lateNonCriticalExtentionis actually used, a "Need" statement should not be provided for the field, which always is a group including at least one extension and a field facilitating further possible extensions. For simplicity, it is recommended not to provide a "Need" statement when the field is not actually used either.

Further, more general, guidelines:

- In case a need statement is not provided for a group, a "Need" statement is provided for all individual extension fields within the group i.e. including for fields that are not marked as OPTIONAL. The latter is to clarify the action upon absence of the whole group.

================================================NEXT CHANGE==================================================================

### A.4.3.x Typical example of late non-critical extensions

The following example illustrates the case when late non-critical extention should be used.

A field extension *field5-r15* for *TypeName1-r15-IEs* is needed during the R17 discussion upon the v17.2.0 version of the RRC specification. But for *typeName1-r15-IEs*, an extension has already been defined upon RRC version v16.4.0 via non-critical extension in *TyppName1-v1640-IEs*. In this case,

- First, a new type with *TypeName1-v15m0-IEs* needs to be defined based on the lastest R15 version of the RRC specification (i.e., RRC version v15.m.0). Within the type, a container needs to be defined for the late non-critical extension between RRC version v15.0.0 (i.e., the initial version of the RRC spec) and version v17.2.0 (the version of the RRC specification at the time when the new field *field-r15* needs to be added).

- Then, the new field *field5-r15* shall be added by the non-critical extension of the type *TypeName1-v15m0-IEs* with *TypeName1-v1720-IEs* via normal non-crtical extension. Within the type *TypeName1-v1720-IEs*, a container for late non-critical extensions for future RRC releases also need to be defined.

-- /example/ ASN1START

TypeName1-r15-IEs ::= SEQUENCE {

field1 InformationElement1,

field2 InformationElement2,

field3 InformationElement3 OPTIONAL, -- Need N

lateNonCriticalExtention OCTET STRING (CONTAINING TypeName1-v15m0-IEs) OPTIONAL

nonCriticalExtension TypeName1-v1640-IEs OPTIONAL

}

-- Regular non-critical extensions

TypeName1-v1640-IEs ::= SEQUENCE {

field4-r16 InformationElement4-r16 OPTIONAL, -- Need S

nonCriticalExtension SEQUENCE {} OPTIONAL

}

-- Late non-critical extensions

TypeName1-v15m0-IEs ::= SEQUENCE {

-- The following field is used for late non-critical extensions between RRC version v15.0.0 and v17.2.0

lateNonCriticalExtension OCTET STRING OPTIONAL, -- Need R

nonCriticalExtension TypeName1-v1720 OPTIONAL

}

TypeName1-v1720-IEs ::= SEQUENCE {

field5-r15 InformationElement5-r15 OPTIONAL, -- Need R

-- The followig fields are used for late non-critical extension after RRC version v17.2.0

lateNonCriticalExtension OCTET STRING OPTIONAL

nonCriticalExtension SEQUENCE {}

}

-- ASN1STOP

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