

# ETSI TS 104 040 V4.0.0 (2024-10)



## **Publicly Available Specification (PAS); E2 interface: Service Model (O-RAN.WG3.E2SM-R003-v04.00)**

### **CAUTION**

*The present document has been submitted to ETSI as a PAS produced by O-RAN Alliance and approved by the ETSI Technical Committee Mobile Standards Group (MSG).*

*ETSI had been assigned all the relevant copyrights related to the document O-RAN.WG3.E2SM-R003-v04.00 on an "as is basis". Consequently, to the fullest extent permitted by law, ETSI disclaims all warranties whether express, implied, statutory or otherwise including but not limited to merchantability, non-infringement of any intellectual property rights of third parties. No warranty is given about the accuracy and the completeness of the content of the present document.*

---

**Reference**

DTS/MSG-001148

---

**Keywords**

interface, PAS, protocol, service model

**ETSI**

---

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° w061004871

---

**Important notice**

The present document can be downloaded from the  
ETSI [Search & Browse Standards](#) application.

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format on [ETSI deliver](#).

Users should be aware that the present document may be revised or have its status changed,  
this information is available in the [Milestones listing](#).

If you find errors in the present document, please send your comments to  
the relevant service listed under [Committee Support Staff](#).

If you find a security vulnerability in the present document, please report it through our  
[Coordinated Vulnerability Disclosure \(CVD\)](#) program.

---

**Notice of disclaimer & limitation of liability**

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2024.  
All rights reserved.

# Contents

Intellectual Property Rights .....	5
Foreword.....	5
Modal verbs terminology.....	5
1 Scope .....	6
2 References .....	6
2.1 Normative references .....	6
2.2 Informative references.....	7
3 Definition of terms, symbols and abbreviations.....	7
3.1 Terms.....	7
3.2 Symbols.....	7
3.3 Abbreviations .....	8
4 General .....	8
4.1 Procedure Specification Principles.....	8
4.2 Forwards and Backwards Compatibility .....	8
4.3 Specification Notations .....	8
5 E2SM services.....	8
6 Common Elements for E2SM Service Models .....	9
6.1 General .....	9
6.2 Information element definitions .....	10
6.2.1 General.....	10
6.2.2 E2SM common IEs.....	10
6.2.2.1 RAN Function Name.....	10
6.2.2.2 RIC Style Type.....	10
6.2.2.3 RIC Style Name .....	10
6.2.2.4 RIC Format Type .....	11
6.2.2.5 Cell Global ID.....	11
6.2.2.6 UE ID .....	11
6.2.2.7 Group ID .....	13
6.2.2.8 Core CP ID.....	13
6.2.2.9 QoS ID .....	13
6.2.2.10 Network Interface Type .....	13
6.2.2.11 Network Interface Identifier.....	14
6.2.2.12 Network Interface Message ID .....	14
6.2.2.13 RRC Message ID .....	15
6.2.2.14 Serving Cell PCI .....	15
6.2.2.15 Serving Cell ARFCN .....	15
6.2.2.16 Beam ID .....	15
6.2.2.17 Cell RNTI.....	16
6.2.3 3GPP derived IEs.....	16
6.2.3.1 PLMN Identity .....	16
6.2.3.2 Global NG-RAN Node ID .....	16
6.2.3.3 Global gNB ID.....	16
6.2.3.4 Global en-gNB ID.....	16
6.2.3.5 gNB-CU-UP ID.....	17
6.2.3.6 gNB-DU ID.....	17
6.2.3.7 NR CGI .....	17
6.2.3.8 Global ng-eNB ID.....	17
6.2.3.9 Global eNB ID .....	18
6.2.3.10 ng-eNB-DU ID.....	18
6.2.3.11 E-UTRA CGI .....	18
6.2.3.12 S-NSSAI .....	18
6.2.3.13 5QI .....	19
6.2.3.14 QCI.....	19

6.2.3.15	QoS Flow Identifier (QFI) .....	19
6.2.3.16	AMF UE NGAP ID .....	19
6.2.3.17	GUAMI .....	19
6.2.3.18	GUMMEI .....	20
6.2.3.19	NG-RAN Node UE XnAP ID .....	20
6.2.3.20	gNB-CU-CP UE E1AP ID .....	20
6.2.3.21	gNB-CU UE F1AP ID .....	20
6.2.3.22	ng-eNB-CU UE W1AP ID .....	20
6.2.3.23	eNB UE X2AP ID .....	21
6.2.3.24	eNB UE X2AP ID Extension .....	21
6.2.3.25	RAN UE ID .....	21
6.2.3.26	MME UE S1AP ID .....	21
6.2.3.27	Index to RAT/Frequency Selection Priority (IRFSP) .....	21
6.2.3.28	Subscriber Profile ID for RAT/Frequency priority (SPID) .....	22
6.2.3.29	NR PCI .....	22
6.2.3.30	NR ARFCN .....	22
6.2.3.31	5GS TAC .....	22
6.2.3.32	E-UTRA PCI .....	22
6.2.3.33	E-UTRA ARFCN .....	23
6.2.3.34	E-UTRA TAC .....	23
6.2.3.35	NR Frequency Info .....	23
6.2.3.36	NR SSB-Index .....	24
6.2.3.37	C-RNTI .....	24
6.3	Information Element Abstract Syntax (with ASN.1) .....	24
6.3.1	General .....	24
6.3.2	Information Element definitions .....	24
6.3.3	Message transfer syntax .....	32
<b>Annex A (informative):</b>	<b>Change history .....</b>	<b>33</b>
History .....		34

---

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

## Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

---

# Foreword

This Technical Specification (TS) has been produced by O-RAN Alliance and approved by ETSI Technical Committee Mobile Standards Group (MSG).

The present document is part of a TS-family covering the E2 interface as identified below:

- "E2 interface: General Aspects and Principles";
- "E2 interface: Application Protocol"; and
- "E2 interface: Service Model".

---

# Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

---

# 1 Scope

The present document describes the O-RAN specified RAN Function-specific Service Models supported over E2 (E2SM) and specifies the common elements for use in E2 service models.

---

## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference>.

NOTE 1: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

NOTE 2: In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in 3GPP Release 17.

The following referenced documents are necessary for the application of the present document.

- [1] Void.
- [2] [ETSI TS 104 038](#): "Publicly Available Specification (PAS); E2 interface: General Aspects and Principles (O-RAN.WG3.E2GAP-R003-v04.01)".
- [3] [ETSI TS 104 039](#): "Publicly Available Specification (PAS); E2 interface: Application Protocol (O-RAN.WG3.E2AP-R003-v04.00)".
- [4] [ORAN-WG3.E2SM-NI](#): "O-RAN E2 Service Model, RAN Function Network Interface (E2SM-NI)".
- [5] [O-RAN.WG3.E2SM-KPM](#): "O-RAN E2 Service Model, KPI Monitor (E2SM-KPM)".
- [6] [ETSI TS 138 413](#): "5G; NG-RAN; NG Application Protocol (NGAP) (3GPP TS 38.413)".
- [7] [ETSI TS 138 423](#): "5G; NG-RAN; Xn Application Protocol (XnAP) (3GPP TS 38.423)".
- [8] [ETSI TS 138 473](#): "5G; NG-RAN; F1 Application Protocol (F1AP) (3GPP TS 38.473)".
- [9] [ETSI TS 137 483](#): "5G; E1 Application Protocol (E1AP) (3GPP TS 37.483)".
- [10] [ETSI TS 136 413](#): "LTE; Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP) (3GPP TS 36.413)".
- [11] [ETSI TS 136 423](#): "LTE; Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 Application Protocol (X2AP) (3GPP TS 36.423)".
- [12] [ETSI TS 137 473](#): "LTE; 5G; W1 interface; Application Protocol (W1AP) (3GPP TS 37.473)".
- [13] Void.
- [14] [ETSI TS 136 331](#): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification (3GPP TS 36.331)".
- [15] [ETSI TS 138 331](#): "5G; NR; Radio Resource Control (RRC); Protocol specification (3GPP TS 38.331)".

- [16] [Recommendation ITU-T X.680 \(07/2002\)](#): "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".
- [17] [Recommendation ITU-T X.681 \(07/2002\)](#): "Information technology - Abstract Syntax Notation One (ASN.1): Information object specification".
- [18] [ETSI TS 103 982](#): "Publicly Available Specification (PAS); O-RAN Architecture Description (O-RAN.WG1.OAD-R003-v08.00)".
- [19] [O-RAN.WG3.E2SM-RC](#): "ORAN E2 Service Model, RAN Control (E2SM-RC)".
- [20] [O-RAN.WG3.E2SM-CCC](#): "ORAN E2 Service Model, Cell Configuration and Control (E2SM-CCC)".
- [21] [Recommendation ITU-T X.691 \(07/2002\)](#): "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE 1: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

NOTE 2: In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in 3GPP Release 17.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

- [i.1] ETSI TR 121 905: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; 5G; Vocabulary for 3GPP Specifications (3GPP TR 21.905)".
- [i.2] [ETSI TR 125 921 \(V7.0.0\)](#): "Universal Mobile Telecommunications System (UMTS); Guidelines and principles for protocol description and error handling (3GPP TR 25.921)".

---

## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the terms given in ETSI TR 121 905 [i.1], ETSI TS 104 038 [2] and ETSI TS 103 982 [18] and the following apply:

**Format Type:** identifier used to nominate a specific formatting approach used to encode one of the E2AP IEs defined in this E2SM

**RAN Function specific E2AP Information Element:** E2SM specific implementation of a container used to carry an E2AP [3] defined E2SM specific IE

**Style Type:** identifier used to nominate a specific approach or Style used to expose a given RIC Service (REPORT, INSERT, CONTROL and POLICY).

### 3.2 Symbols

Void.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TR 121 905 [i.1], ETSI TS 104 038 [2] and ETSI TS 103 982 [18] apply.

# 4 General

## 4.1 Procedure Specification Principles

The procedure specification principles defined in ETSI TS 104 039 [3] clause 4 shall apply.

## 4.2 Forwards and Backwards Compatibility

The forwards and backwards compatibility of the E2 interface uses the forward and backwards compatibility compatibilities offered by the E2AP [3] protocol.

## 4.3 Specification Notations

For the purposes of the present document, the following notations apply:

**IE** When referring to an Information Element (IE) in the present document the *Information Element Name* is written with the first letters in each word in upper case characters and all letters in *Italic* font followed by the abbreviation "IE", e.g. *E-RAB ID IE*.

**Value of an IE** When referring to the value of an Information Element (IE) in the present document the "Value" is written as it is specified in the present document enclosed by quotation marks, e.g. "Value".

# 5 E2SM services

As defined in ETSI TS 104 038 [2], a given RAN Function offers a set of services to be exposed over the E2 (REPORT, INSERT, CONTROL, POLICY and/or QUERY) using E2AP [3] defined procedures. Each of the E2AP Procedures listed in table 5-1 contains specific E2 Node RAN Function dependent Information Elements (IEs) which shall be defined by a specific E2SM.

**Table 5-1: Relationship between RAN Function specific E2AP Information Elements and E2AP Procedures**

RAN Function specific E2AP Information Elements	E2AP Information Element reference	Related E2AP Procedures
<i>RIC Event Trigger Definition IE</i>	E2AP [3], clause 9.2.9	RIC Subscription RIC Subscription Modification
<i>RIC Action Definition IE</i>	E2AP [3], clause 9.2.12	RIC Subscription RIC Subscription Modification
<i>RIC Indication Header IE</i>	E2AP [3], clause 9.2.17	RIC Indication
<i>RIC Indication Message IE</i>	E2AP [3], clause 9.2.16	RIC Indication
<i>RIC Call Process ID IE</i>	E2AP [3], clause 9.2.18	RIC Indication RIC Control
<i>RIC Control Header IE</i>	E2AP [3], clause 9.2.20	RIC Control
<i>RIC Control Message IE</i>	E2AP [3], clause 9.2.19	RIC Control
<i>RIC Control Outcome IE</i>	E2AP [3], clause 9.2.25	RIC Control
<i>RIC Query Header IE</i>	E2AP [3], clause 9.2.36	RIC Query
<i>RIC Query Definition IE</i>	E2AP [3], clause 9.2.37	RIC Query
<i>RIC Query Outcome IE</i>	E2AP [3], clause 9.2.38	RIC Query
<i>RAN Function Definition IE</i>	E2AP [3], clause 9.2.23	E2 Setup RIC Service Update



All of these RAN Function specific E2AP IEs are defined in ETSI TS 104 039 [3] as "OCTET STRING".

The purpose of the E2SM series of specifications is to define the approach that a given RAN Function specific E2 Service Model shall use to define the contents of these fields.

The supported O-RAN specified E2 Service Models are presented in table 5-2.

**Table 5-2: O-RAN specified E2 Service Models and related OIDs**

E2SM short name	OID	Syntax language	Scope
E2SM-NI [4]	iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) oran(53148) e2(1) version1 (1) e2sm(2) e2sm-NI-IEs (1)	ASN.1	RAN Function NI "Network Interface" performs the following functionalities: <ul style="list-style-type: none"> <li>Exposure of Network Interfaces.</li> <li>Modification of both incoming and outgoing network interface message contents.</li> <li>Execution of policies that may result in change of network behaviour.</li> </ul>
E2SM-KPM version1 [5]	iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) oran(53148) e2(1) version1 (1) e2sm(2) e2sm-KPM-IEs (2)	ASN.1	RAN function KPM "KPM Monitor" performs the following functionalities: <ul style="list-style-type: none"> <li>Exposure of O-DU's cell related performance IEs through periodic KPM Report.</li> <li>Exposure of O-CU-CP's cell/UE related performance IEs through periodic KPM Report.</li> <li>Exposure of O-CU-UP's bearer related performance IEs through periodic KPM Report.</li> </ul>
E2SM-KPM version2 [5]	iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) oran(53148) e2(1) version2 (2) e2sm(2) e2sm-KPMMON-IEs (2)	ASN.1	RAN function KPM "KPM Monitor" performs the following functionalities: <ul style="list-style-type: none"> <li>Exposure of available measurements from O-DU, O-CU-CP, and/or O-CU-UP via the RAN Function Definition IE.</li> <li>Periodic reporting of measurements subscribed from Near-RT RIC.</li> </ul>
E2SM-RC [19]	iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) oran(53148) e2(1) version1 (1) e2sm(2) e2sm-RC-IEs (3)	ASN.1	RAN function RC "RAN Control" performs the following functionalities: <ul style="list-style-type: none"> <li>Exposure of RAN control and UE context related information.</li> <li>Modification and initiation of RAN control related call processes and messages.</li> <li>Execution of policies that may result in change of RAN control behaviour.</li> </ul>
E2SM-CCC [20]	iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) oran(53148) e2(1) version1 (1) e2sm(2) e2sm-CCC-IEs (4)	JSON	RAN function CCC "Cell Configuration and Control" performs the following functionalities: <ul style="list-style-type: none"> <li>Exposure of node level and cell level configuration information.</li> <li>Initiate control and/or configuration of node level and cell level parameters.</li> </ul>

## 6 Common Elements for E2SM Service Models

### 6.1 General

Clause 6.2 presents the individual information elements that may be adopted by any specific E2SM including the specifications listed in table 5-1. Clause 6.3 provides the corresponding ASN.1 definition of each information element, this module may be associated with the ASN.1 definitions in a specific E2SM specification using the ASN.1 "Import" instruction.

The following attributes are used for the tabular description of the messages and information elements:

NOTE: The messages have been defined in accordance with the guidelines specified in ETSI TR 125 921 [i.2].

## 6.2 Information element definitions

### 6.2.1 General

When specifying information elements which are to be represented by bit strings, if not otherwise specifically stated in the semantics description of the concerned IE or elsewhere, the following principle applies with regards to the ordering of bits:

- The first bit (leftmost bit) contains the Most Significant Bit (MSB).
- The last bit (rightmost bit) contains the Least Significant Bit (LSB).
- When importing bit strings from other specifications, the first bit of the bit string contains the first bit of the concerned information.

### 6.2.2 E2SM common IEs

#### 6.2.2.1 RAN Function Name

This IE defines the name of a given *RAN Function Name* IE as a structured data.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RAN Function Short Name	M		PrintableString(SIZE(1..150, ...))	Suitable unique short name.
RAN Function Service Model OID	M		PrintableString(SIZE(1..1 000, ...))	Object Identifier of this specific E2SM. Formatted as per OID.
RAN Function Description	M		PrintableString(SIZE(1..150, ...))	Suitable text describing scope of E2SM.
RAN Function Instance	O		INTEGER	Suggested when E2 Node declares multiple RAN Function ID supporting the same E2SM specification.

#### 6.2.2.2 RIC Style Type

This IE defines the identifier of a given RIC Style.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RIC Style Type	M		INTEGER	

#### 6.2.2.3 RIC Style Name

This IE defines the name of a given RIC Style.

The same E2SM may support more than one Style for each RIC Service.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RIC Style Name	M		PrintableString(SIZE(1..150, ...))	

### 6.2.2.4 RIC Format Type

This IE defines the identifier of a given RIC Format.

The same E2SM may support more than one encoding Formats for each E2AP IE and each E2AP IE message encoding Format may be used by one or more RIC Service Styles.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RIC Format Type	M		INTEGER	

### 6.2.2.5 Cell Global ID

This IE is used to globally identify a cell in an E2 Node. The IE is derived from ETSI TS 138 423 [7], clause 9.2.3.25 "Target Cell Global ID".

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>RAT type</i>	M			
> <i>NR</i>				
>> <i>NR CGI</i>	M		6.2.3.7	
> <i>E-UTRA</i>				
>> <i>E-UTRA CGI</i>	M		6.2.3.11	

### 6.2.2.6 UE ID

This IE contains the O-RAN agreed UE ID data structure to be used on E2 interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>UEID case</i>	M			
> <i>gNB</i>				E2 Node of type gNB when connected to 5GC.
>> <i>AMF UE NGAP ID</i>	M		6.2.3.16	
>> <i>GUAMI</i>	M		6.2.3.17	
>> <i>gNB-CU UE F1AP ID List</i>	C- ifCUDUsep arated			More than 1 F1AP ID shall be reported by E2 Node only when NR-DC is established.
>>> <i>gNB-CU UE F1AP ID Item</i>		1..< <i>maxF1AP Id</i> >		
>>>> <i>gNB-CU UE F1AP ID</i>	M		6.2.3.21	
>> <i>gNB-CU-CP UE E1AP ID List</i>	C- ifCPUPsepa rated			
>>> <i>gNB-CU-CP UE E1AP ID Item</i>		1..< <i>maxE1AP Id</i> >		
>>>> <i>gNB-CU-CP UE E1AP ID</i>	M		6.2.3.20	
>> <i>RAN UE ID</i>	O		6.2.3.25	
>> <i>M-NG-RAN node UE XnAP ID</i>	C- ifDCSetup		6.2.3.19	To be reported by both MN and SN.
>> <i>Global gNB ID</i>	O		6.2.3.3	This IE shall not be used. <i>Global NG-RAN Node ID</i> IE shall replace this IE.
>> <i>Global NG-RAN Node ID</i>	C- ifDCSetup		6.2.3.2	To be reported only by SN.
>> <i>Cell RNTI</i>	O		6.2.2.17	
> <i>gNB-DU / en-gNB-DU</i>				E2 node of type gNB-DU.
>> <i>gNB-CU UE F1AP ID</i>	M		6.2.3.21	
>> <i>RAN UE ID</i>	O		6.2.3.25	
>> <i>Cell RNTI</i>	O		6.2.2.17	
> <i>gNB-CU-UP / en-gNB-CU-UP</i>				E2 node of type gNB-CU-UP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
>>gNB-CU-CP UE E1AP ID	M		6.2.3.20	
>>RAN UE ID	O		6.2.3.25	
>ng-eNB				E2 Node of type ng-eNB when connected to 5GC.
>>AMF UE NGAP ID	M		6.2.3.16	
>>GUAMI	M		6.2.3.17	
>>ng-eNB-CU UE W1AP ID	C-ifCUDUseparated		6.2.3.22	
>>M-NG-RAN node UE XnAP ID	C-ifDCSetup		6.2.3.19	To be reported by both MN and SN.
>>Global ng-eNB ID	O		6.2.3.8	This IE shall not be used. <i>Global NG-RAN Node ID</i> IE shall replace this IE.
>>Global NG-RAN Node ID	C-ifDCSetup		6.2.3.2	To be reported only by SN.
>>Cell RNTI	O		6.2.2.17	
>ng-eNB-DU				E2 node of type ng-eNB-DU.
>> ng-eNB-CU UE W1AP ID	M		6.2.3.22	
>>Cell RNTI	O		6.2.2.17	
>en-gNB				E2 Node of type en-gNB when connected to EPC and EN-DC is established.
>>MeNB UE X2AP ID	M		6.2.3.23	
>>MeNB UE X2AP ID Extension	O		6.2.3.24	
>>Global eNB ID	M		6.2.3.9	
>>gNB-CU UE F1AP ID	C-ifCUDUseparated		6.2.3.21	
>>gNB-CU-CP UE E1AP ID List	C-ifCPUPseparated			
>>>gNB-CU UE E1AP ID Item		1..<maxE1APId>		
>>>>gNB-CU-CP UE E1AP ID	M		6.2.3.20	
>> RAN UE ID	O		6.2.3.25	
>>Cell RNTI	O		6.2.2.17	
>eNB				E2 Node of type eNB when connected to EPC.
>>MME UE S1AP ID	M		6.2.3.26	
>>GUMMEI	M		6.2.3.18	
>>MeNB UE X2AP ID	C-ifDCSetup		6.2.3.23	To be reported by MeNB and SeNB.
>>MeNB UE X2AP ID Extension	C-ifDCSetup		6.2.3.24	To be reported by MeNB and SeNB.
>>Global eNB ID	C-ifDCSetup		6.2.3.9	To be reported only by SeNB.
>>Cell RNTI	O		6.2.2.17	

Range bound	Explanation
maxF1APId	Maximum number of F1AP UEID for a NR-NR DC is 4.
maxE1APId	Maximum number of E1AP UEID for UE connected with different CU-UP is 65 535.

Condition	Explanation
ifDCSetup	This IE shall be present in messages from E2 Node to NearRT-RIC if DC is established, whereas from NearRT-RIC to E2 Node messages, this IE may not be included.
ifCUDUSeparated	This IE shall be present in messages from E2 Node to NearRT-RIC for a CU-DU separated ng-eNB or (en-)gNB, whereas from NearRT-RIC to E2 Node messages, this IE may not be included.
ifCPUPSeparated	This IE shall be present in messages from E2 Node to NearRT-RIC for a CP-UP separated (en-)gNB, whereas from NearRT-RIC to E2 Node messages, this IE may not be included.

### 6.2.2.7 Group ID

This IE defines a generic "Group ID" suitable for both EPC and 5GC networks.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Core type</i>	M			
>5GC				
>>IRFSP	M		6.2.3.27	
>EPC				
>>SPID	M		6.2.3.28	

### 6.2.2.8 Core CP ID

This IE defines a generic "Core CP ID" suitable for both EPC and 5GC networks.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Core type</i>	M			
>5GC				
>>GUAMI	M		6.2.3.17	
>EPC				
>>GUMMEI	M		6.2.3.18	

### 6.2.2.9 QoS ID

This IE defines a generic "QoS ID" suitable for both EPC and 5GC networks.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>Core type</i>	M			
>5GC				
>>5QI	M		6.2.3.13	
>EPC				
>>QCI	M		6.2.3.14	

### 6.2.2.10 Network Interface Type

This IE defines the type of a standardized Network Interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Interface Type	M		ENUMERATED (NG, Xn, F1, E1, S1, X2, W1, ...)	NG refers to NG interface [6]. Xn refers to Xn interface [7]. F1 refers to F1 interface [8]. E1 refers to E1 interface [9]. S1 refers to S1 interface [10]. X2 refers to X2 interface [11]. W1 refers to W1 interface [12].

### 6.2.2.11 Network Interface Identifier

This IE defines the identifier of the network node terminating a specific network interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
<b>CHOICE</b> <i>Interface Identifier</i>	M			
>NG				For interface type NG [6].
>>GUAMI	M		6.2.3.17	
>Xn				For interface type Xn [7].
>>Global NG-RAN Node ID	M		6.2.3.2	
>F1				For interface type F1 [8].
>>Global gNB ID	M		6.2.3.2	
>>gNB-DU ID	M		6.2.3.6	
>E1				For interface type E1 [9].
>>Global gNB ID	M		6.2.3.2	
>>gNB-CU-UP ID	M		6.2.3.5	
>S1				For interface type S1 [10].
>>GUMMEI	M		6.2.3.18	
>X2				For interface type X2 [11].
>> <b>CHOICE</b> <i>Node Type</i>	M			
>>>Global eNB ID			6.2.3.9	For eNB.
>>>Global en-gNB ID			6.2.3.4	For en-gNB.
>W1				For interface type W1 [12].
>>Global ng-eNB ID	M		6.2.3.8	
>>ng-eNB-DU ID	M		6.2.3.10	

### 6.2.2.12 Network Interface Message ID

This IE defines the identifier for a specific message of a given Network Interface.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Interface Procedure ID	M		INTEGER	Elementary Procedure Code.
Message Type	M		ENUMERATED (InitiatingMessage, SuccessfulOutcome, UnsuccessfulOutcome, ...)	

### 6.2.2.13 RRC Message ID

This IE defines the identifier for a specific RRC message defined in either ETSI TS 136 331 [14] or ETSI TS 138 331 [15].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
<b>CHOICE</b> <i>RRC Type</i>	M			
> <i>LTE</i>				
>>LTE RRC Class	M		ENUMERATED (BCCH-BCH, BCCH-BCH-MBMS, BCCH-DL-SCH, BCCH-DL-SCH-BR, BCCH-DL-SCH-MBMS, MCCH, PCCH, DL-CCCH, DL-DCCH, UL-CCCH, UL-DCCH, SC-MCCH, ...)	Refers to RRC message class defined in ETSI TS 136 331 [14], clause 6.2.1.
> <i>NR</i>				
>>NR RRC Class	M		ENUMERATED (BCCH-BCH, BCCH-DL-SCH, DL-CCCH, DL-DCCH, PCCH, UL-CCCH, UL-CCCH1, UL-DCCH, ...)	Refers to RRC message class defined in ETSI TS 138 331 [15], clause 6.2.1.
RRC Message ID	M		INTEGER	Number starts from 0 from the first entry of a given RRC message class defined in ETSI TS 136 331 [14] or ETSI TS 138 331 [15].

### 6.2.2.14 Serving Cell PCI

This IE is used to identify the serving cell PCI in an E2 Node. The IE is derived from ETSI TS 138 473 [8], clause 9.3.1.10 and ETSI TS 136 423 [11], clause 9.2.8.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
<b>CHOICE</b> <i>RAT type</i>	M			
> <i>NR</i>				
>>NR PCI	M		6.2.3.29	
> <i>E-UTRA</i>				
>>E-UTRA PCI	M		6.2.3.32	

### 6.2.2.15 Serving Cell ARFCN

This IE is used to identify the serving cell ARFCN in an E2 Node. The IE is derived from ETSI TS 138 473 [8], clause 9.3.1.17 and ETSI TS 136 423 [11], clause 9.2.26.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
<b>CHOICE</b> <i>RAT type</i>	M			
> <i>NR</i>				
>>NR ARFCN	M		6.2.3.30	
> <i>E-UTRA</i>				
>>EARFCN	M		6.2.3.33	

### 6.2.2.16 Beam ID

This IE is used to identify the generic "Beam ID" suitable for NR Radio Access Technology (RAT).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
<b>CHOICE</b> <i>RAT</i>	M			
> <i>NR</i>				
>>NR SSB-index	M		6.2.3.36	SSB-Index is used in NR as the Beam identifier.

### 6.2.2.17 Cell RNTI

This represents a temporary UE Identifier in a cell in a Radio Network.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
C-RNTI	M		6.2.3.37	
Cell Global ID	M		6.2.2.5	Identifies the cell where the C-RNTI is generated.

## 6.2.3 3GPP derived IEs

### 6.2.3.1 PLMN Identity

This IE indicates the PLMN Identity.

Derived from ETSI TS 138 413 [6], clause 9.3.3.5.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		OCTET STRING (SIZE(3))	Defined in ETSI TS 138 413 [6], clause 9.3.3.5.

### 6.2.3.2 Global NG-RAN Node ID

This IE is used to globally identify an NG-RAN node of gNB and ng-eNB cases only.

Derived from ETSI TS 138 423 [7], clause 9.2.2.3.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>NG-RAN node</i>	M			
> <i>gNB</i>				
>>Global gNB ID	M		6.2.3.3	
> <i>ng-eNB</i>				
>>Global ng-eNB ID	M		6.2.3.8	

### 6.2.3.3 Global gNB ID

This IE is used to globally identify a gNB.

Derived from ETSI TS 138 413 [6], clause 9.3.1.6.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		6.2.3.1	
CHOICE <i>gNB ID</i>	M			
> <i>gNB ID</i>				
>>gNB ID	M		BIT STRING (SIZE(22..32))	Defined in ETSI TS 138 413 [6] clause 9.3.1.6.

### 6.2.3.4 Global en-gNB ID

This IE is used to globally identify an en-gNB.

Derived from ETSI TS 136 423 [11], clause 9.2.112.



IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		6.2.3.1	
CHOICE <i>en-gNB ID</i>	M			
> <i>en-gNB ID</i>				
>> <i>en-gNB ID</i>	M		BIT STRING (SIZE(22..32))	Defined in ETSI TS 136 423 [11], clause 9.2.112.

### 6.2.3.5 gNB-CU-UP ID

This IE uniquely identifies the gNB-CU-UP at least within a gNB-CU-CP.

Derived from ETSI TS 137 483 [9] clause 9.3.1.15.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
gNB-CU-UP ID	M		INTEGER (0..2 <sup>36</sup> -1)	Defined in ETSI TS 137 483 [9], clause 9.3.1.15.

### 6.2.3.6 gNB-DU ID

This IE uniquely identifies the gNB-DU at least within a gNB-CU.

Derived from ETSI TS 138 473 [8] clause 9.3.1.9.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
gNB-DU ID	M		INTEGER (0..2 <sup>36</sup> -1)	Defined in ETSI TS 138 473 [8], clause 9.3.1.9.

### 6.2.3.7 NR CGI

This IE is used to globally identify an NR cell.

Derived from ETSI TS 138 413 [6], clause 9.3.1.7.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		6.2.3.1	
NR Cell Identity	M		BIT STRING (SIZE(36))	Defined in ETSI TS 138 413 [6], clause 9.3.1.7.

### 6.2.3.8 Global ng-eNB ID

This IE is used to globally identify an ng-eNB.

Derived from ETSI TS 138 413 [6], clause 9.3.1.8.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		6.2.3.1	
CHOICE <i>ng-eNB ID</i>	M			
> <i>Macro ng-eNB ID</i>				
>> <i>Macro ng-eNB ID</i>	M		BIT STRING (SIZE(20))	Defined in ETSI TS 138 413 [6], clause 9.3.1.8.
> <i>Short Macro ng-eNB ID</i>				
>> <i>Short Macro ng-eNB ID</i>	M		BIT STRING (SIZE(18))	Defined in ETSI TS 138 413 [6], clause 9.3.1.8.
> <i>Long Macro ng-eNB ID</i>				
>> <i>Long Macro ng-eNB ID</i>	M		BIT STRING (SIZE(21))	Defined in ETSI TS 138 413 [6], clause 9.3.1.8.

### 6.2.3.9 Global eNB ID

This IE is used to globally identify an eNB.

Derived from ETSI TS 136 413 [10], clause 9.2.1.37.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		6.2.3.1	
CHOICE <i>eNB ID</i>	M			
> <i>Macro eNB ID</i>				
>>Macro eNB ID	M		BIT STRING (SIZE(20))	Defined in ETSI TS 136 413 [10], clause 9.2.1.37.
> <i>Home eNB ID</i>				
>>Home eNB ID	M		BIT STRING (SIZE(28))	Defined in ETSI TS 136 413 [10], clause 9.2.1.37.
> <i>Short Macro eNB ID</i>				
>> Short Macro eNB ID	M		BIT STRING (SIZE(18))	Defined in ETSI TS 136 413 [10], clause 9.2.1.37.
> <i>Long Macro eNB ID</i>				
>> Long Macro eNB ID	M		BIT STRING (SIZE(21))	Defined in ETSI TS 136 413 [10], clause 9.2.1.37.

### 6.2.3.10 ng-eNB-DU ID

This IE uniquely identifies the ng-eNB-DU at least within an ng-eNB-CU.

Derived from ETSI TS 137 473 [12], clause 9.3.1.9.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
ng-eNB-DU ID	M		INTEGER (0..2 <sup>36</sup> -1)	Defined in ETSI TS 137 473 [12], clause 9.3.1.9.

### 6.2.3.11 E-UTRA CGI

This IE is used to globally identify an E-UTRA cell.

Derived from ETSI TS 138 413 [6], clause 9.3.1.9.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		6.2.3.1	
E-UTRA Cell Identity	M		BIT STRING (SIZE(28))	Defined in ETSI TS 138 413 [6], clause 9.3.1.9.

### 6.2.3.12 S-NSSAI

This IE is used to indicate the S-NSSAI.

Derived from ETSI TS 138 413 [6] clause 9.3.1.24.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SST	M		OCTET STRING (SIZE(1))	Defined in ETSI TS 138 413 [6], clause 9.3.1.24.
SD	O		OCTET STRING (SIZE(3))	Defined in ETSI TS 138 413 [6], clause 9.3.1.24.

### 6.2.3.13 5QI

This IE is used to indicate 5QI value.

Derived from ETSI TS 138 413 [6] clause 9.3.1.28.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
5QI	M		INTEGER (0..255, ...)	Defined in ETSI TS 138 413 [6], clause 9.3.1.28.

### 6.2.3.14 QCI

This IE is used to indicate QCI value.

Derived from ETSI TS 136 413 [10], clause 9.2.1.15.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
QCI	M		INTEGER (0..255)	Defined in ETSI TS 136 413 [10], clause 9.2.1.15.

### 6.2.3.15 QoS Flow Identifier (QFI)

This IE identifies a QoS flow within a PDU Session.

Derived from ETSI TS 138 413 [6], clause 9.3.1.51.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
QoS Flow Identifier	M		INTEGER (0..63, ...)	Defined in ETSI TS 138 413 [6], clause 9.3.1.51.

### 6.2.3.16 AMF UE NGAP ID

This IE uniquely identifies a UE over the NG interface within a NG-RAN node.

Derived from ETSI TS 138 413 [6], clause 9.3.3.1.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
AMF UE NGAP ID	M		INTEGER (0..2 <sup>40</sup> - 1)	Defined in ETSI TS 138 413 [6], clause 9.3.3.1.

### 6.2.3.17 GUAMI

This IE indicates the AMF identity.

Derived from ETSI TS 138 413 [6], clause 9.3.3.3.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		6.2.3.1	
AMF Region ID	M		BIT STRING (SIZE(8))	
AMF Set ID	M		BIT STRING (SIZE(10))	Defined in ETSI TS 138 413 [6], clause 9.3.3.12.
AMF Pointer	M		BIT STRING (SIZE(6))	Defined in ETSI TS 138 413 [6], clause 9.3.3.19.

### 6.2.3.18 GUMMEI

This IE indicates the globally unique MME identity.

Derived from ETSI TS 136 413 [10], clause 9.2.3.9.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		6.2.3.1	
MME Group ID	M		OCTET STRING (SIZE(2))	
MME code	M		OCTET STRING (SIZE (1))	Defined in ETSI TS 136 413 [10], clause 9.2.3.12.

### 6.2.3.19 NG-RAN Node UE XnAP ID

This IE uniquely identifies a UE over the Xn interface within a NG-RAN node.

Derived from ETSI TS 138 423 [7], clause 9.2.3.16.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NG-RAN node UE XnAP ID	M		INTEGER (0..2 <sup>32</sup> - 1)	Defined in ETSI TS 138 423 [7], clause 9.2.3.16.

### 6.2.3.20 gNB-CU-CP UE E1AP ID

This IE uniquely identifies a UE over the E1 interface within a gNB-CU-CP.

Derived from ETSI TS 137 483 [9], clause 9.3.1.4.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
gNB-CU-CP UE E1AP ID	M		INTEGER (0..2 <sup>32</sup> - 1)	Defined in ETSI TS 137 483 [9], clause 9.3.1.4.

### 6.2.3.21 gNB-CU UE F1AP ID

This IE uniquely identifies a UE over the F1 interface within a gNB-CU.

Derived from ETSI TS 138 473 [8], clause 9.3.1.4.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
gNB-CU UE F1AP ID	M		INTEGER (0..2 <sup>32</sup> - 1)	Defined in ETSI TS 138 473 [8], clause 9.3.1.4.

### 6.2.3.22 ng-eNB-CU UE W1AP ID

This IE uniquely identifies a UE over the W1 interface within an ng-eNB-CU.

Derived from ETSI TS 137 473 [12], clause 9.3.1.4.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
ng-eNB-CU UE W1AP ID	M		INTEGER (0 ..2 <sup>32</sup> - 1)	Defined in ETSI TS 137 473 [12], clause 9.3.1.4.

### 6.2.3.23 eNB UE X2AP ID

This IE, combined with the eNB UE X2AP ID Extension when present regardless its value, uniquely identifies a UE over the X2 interface within an eNB.

Derived from ETSI TS 136 423 [11], clause 9.2.24.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eNB UE X2AP ID	M		INTEGER (0..4 095)	Defined in ETSI TS 136 423 [11], clause 9.2.24.

### 6.2.3.24 eNB UE X2AP ID Extension

This IE, combined with the eNB UE X2AP ID uniquely identifies a UE over the X2 interface within an eNB. If the setup of a UE associated signalling connection was initiated including the eNB UE X2AP ID Extension, the eNB UE X2AP ID Extension shall be used by both peers for the life-time of the respective UE-associated signalling connection.

Derived from ETSI TS 136 423 [11], clause 9.2.86.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
eNB UE X2AP ID Extension	M		INTEGER (0..4 095, ...)	Defined in ETSI TS 136 423 [11], clause 9.2.86.

### 6.2.3.25 RAN UE ID

This UE Identifier identifies a UE over E1 and F1 interface within a gNB.

Derived from ETSI TS 138 473 [8], clause 9.2.2.1.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RAN UE ID	O		OCTET STRING (SIZE (8))	Defined in ETSI TS 138 473 [8], clause 9.2.2.1.

### 6.2.3.26 MME UE S1AP ID

This IE uniquely identifies a UE over the S1 interface within a MME.

Derived from ETSI TS 136 413 [10], clause 9.2.3.3.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
MME UE S1AP ID	M		INTEGER (0..2 <sup>32</sup> - 1)	Defined in ETSI TS 136 413 [10], clause 9.2.3.3.

### 6.2.3.27 Index to RAT/Frequency Selection Priority (IRFSP)

This IE is used to define local configuration for RRM strategies such as camp priorities in Idle mode and control of inter-RAT/inter-frequency handover in Active mode.

Derived from ETSI TS 138 413 [6], clause 9.3.1.61.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Index to RAT/Frequency Selection Priority	M		INTEGER (1..256, ...)	Defined in ETSI TS 138 413 [6], clause 9.3.1.61.

### 6.2.3.28 Subscriber Profile ID for RAT/Frequency priority (SPID)

This IE is used to define camp priorities in Idle mode and to control inter-RAT/inter-frequency handover in Active mode.

Derived from ETSI TS 136 413 [10], clause 9.2.1.39.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Subscriber Profile ID for RAT/Frequency Priority	M		INTEGER (1..256)	Defined in ETSI TS 136 413 [10], clause 9.2.1.39.

### 6.2.3.29 NR PCI

This IE is used to identify an NR cell PCI.

Derived from ETSI TS 138 473 [8], clause 9.3.1.10.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NR PCI	M		INTEGER (0..1 007)	Derived from ETSI TS 138 473 [8], clause 9.3.1.10.

### 6.2.3.30 NR ARFCN

This IE is used to identify an NR ARFCN.

Derived from ETSI TS 138 473 [8], clause 9.3.1.17.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NR ARFCN	M		INTEGER (0..maxNRARFCN)	Derived from ETSI TS 138 473 [8], clause 9.3.1.17.

Range bound	Explanation
maxNRARFCN	Maximum value of NR ARFCNs. Value is 3279165.

### 6.2.3.31 5GS TAC

This IE is used to identify 5GS Tracking Area Code.

Defined in ETSI TS 138 473 [8], clause 9.3.1.29.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
5GS TAC	M		OCTET STRING (SIZE (3))	Defined in ETSI TS 138 473 [8], clause 9.3.1.29.

### 6.2.3.32 E-UTRA PCI

This IE is used to identify an E-UTRA cell PCI.

Derived from ETSI TS 136 423 [11], clause 9.2.8.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
E-UTRA PCI	M		INTEGER (0..503, ...)	Derived from ETSI TS 136 423 [11], clause 9.2.8.

### 6.2.3.33 E-UTRA ARFCN

This IE is used to identify an E-UTRA Frequency Info.

Defined in ETSI TS 136 423 [11], clause 9.2.26.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
EARFCN	M		INTEGER (0..maxEARFCN)	Defined in ETSI TS 136 423 [11], clause 9.2.26.

Range bound	Explanation
maxEARFCN	Maximum value of EARFCNs. Value is 65 535.

### 6.2.3.34 E-UTRA TAC

This IE is used to identify an E-UTRA Tracking Area Code.

Derived from ETSI TS 136 423 [11], clause 9.2.8.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
E-UTRA TAC	M		OCTET STRING (SIZE(2))	Derived from ETSI TS 136 423 [11], clause 9.2.8.

### 6.2.3.35 NR Frequency Info

This IE is used to define the carrier frequency and bands used in a cell.

Derived from ETSI TS 138 473 [8], clause 9.3.1.17.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NR ARFCN	M		6.2.3.30	
NR Frequency Band List		1		
>NR Frequency Band Item		1..<maxnoofNRCellBands>		
>>NR Frequency Band	M		INTEGER (1..1 024, ...)	Defined in ETSI TS 138 473 [8], clause 9.3.1.17.
>>Supported SUL band List		0..<maxnoofNRCellBands>		
>>>Supported SUL band Item	M		INTEGER (1..1 024, ...)	Defined in ETSI TS 138 473 [8], clause 9.3.1.17.
NRFrequency Shift 7p5khz	O		ENUMERATED (false, true, ...)	Defined in ETSI TS 138 473 [8], clause 9.3.1.17.

Range bound	Explanation
maxnoofNRCellBands	Maximum no. of frequency bands supported for a NR cell. Value is 32.

### 6.2.3.36 NR SSB-Index

This IE is used to identify the NR SSB-Index.

Derived from ETSI TS 138 331 [15], clause 6.3.2.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SSB-Index	M		INTEGER (0..maxNrofSSBs-1)	Derived from ETSI TS 138 331 [15], clause 6.3.2.

Range bound	Explanation
maxNrofSSBs-1	Maximum number of SSB resources in a resource set minus 1. Value is 63.

### 6.2.3.37 C-RNTI

This represents a temporary UE Identifier in a cell in a Radio Network.

Derived from ETSI TS 138 331 [15], clause 6.3.2.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
C-RNTI	M		INTEGER (0..65 535)	Defined in ETSI TS 138 331 [15], clause 6.3.2.

## 6.3 Information Element Abstract Syntax (with ASN.1)

### 6.3.1 General

E2SM ASN.1 definition conforms to Recommendation ITU-T X.680 [16] and Recommendation ITU-T X.681 [17].

Clause 6.3.2 presents the Abstract Syntax of the common E2SM information elements that may be used with RAN Function specific E2AP [3] Information Elements when encoded using ASN.1. In case there is contradiction between the ASN.1 definition in this clause and the tabular format in clause 6.2, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, in which the tabular format shall take precedence.

### 6.3.2 Information Element definitions

```
-- ASN1START
-- *****
-- E2SM
-- Information Element Definitions
-- *****

E2SM-COMMON-IEs {
iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) oran(53148) e2(1)
version1 (1) e2sm(2) e2sm-COMMON-IEs (0)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- -----
-- Constants
-- -----

maxElAPid          INTEGER ::= 65535
maxFlAPid          INTEGER ::= 4

-- IEs derived from 3GPP 36.423 (X2AP)
```



```

maxEARFCN                INTEGER ::= 65535

-- IEs derived from 3GPP 38.473 (F1AP)
maxNRARFCN                INTEGER ::= 3279165
maxnoofNrCellBands        INTEGER ::= 32

-- IEs derived from 3GPP 38.331 (NR RRC)
maxNrofSSBs-1            INTEGER ::= 63

-----

-- E2SM Common IEs
-----

Beam-ID ::= CHOICE {
    nR-Beam-ID            NR-SSB-Index,
    ...
}

Cell-RNTI ::= SEQUENCE {
    c-RNTI                RNTI-Value,
    cell-Global-ID        CGI,
    ...
}

CGI ::= CHOICE {
    nR-CGI                NR-CGI,
    eUTRA-CGI            EUTRA-CGI,
    ...
}

CoreCPID ::= CHOICE {
    fiveGC                GUAMI,
    ePC                  GUMMEI,
    ...
}

InterfaceIdentifier ::= CHOICE {
    nG                    InterfaceID-NG,
    xN                    InterfaceID-Xn,
    f1                    InterfaceID-F1,
    e1                    InterfaceID-E1,
    s1                    InterfaceID-S1,
    x2                    InterfaceID-X2,
    w1                    InterfaceID-W1,
    ...
}

InterfaceID-NG ::= SEQUENCE {
    guami                GUAMI,
    ...
}

InterfaceID-Xn ::= SEQUENCE {
    global-NG-RAN-ID    GlobalNGRANNodeID,
    ...
}

InterfaceID-F1 ::= SEQUENCE {
    globalGNB-ID        GlobalGNB-ID,
    gNB-DU-ID           GNB-DU-ID,
    ...
}

InterfaceID-E1 ::= SEQUENCE {
    globalGNB-ID        GlobalGNB-ID,
    gNB-CU-UP-ID       GNB-CU-UP-ID,
    ...
}

InterfaceID-S1 ::= SEQUENCE {
    gUMMEI              GUMMEI,
    ...
}

InterfaceID-X2 ::= SEQUENCE {
    nodeType            CHOICE {

```

```

        global-eNB-ID          GlobalENB-ID,
        global-en-gNB-ID      GlobalenGNB-ID,
        ...
    },
    ...
}

InterfaceID-W1 ::= SEQUENCE {
    global-ng-eNB-ID          GlobalNgENB-ID,
    ng-eNB-DU-ID             NGENB-DU-ID,
    ...
}

Interface-MessageID ::= SEQUENCE {
    interfaceProcedureID     INTEGER,
    messageType              ENUMERATED {initiatingMessage, successfulOutcome,
    unsuccessfulOutcome, ...},
    ...
}

InterfaceType ::= ENUMERATED {nG, xn, f1, e1, s1, x2, w1, ...}

GroupID ::= CHOICE {
    fiveGC                   FiveQI,
    ePC                      QCI,
    ...
}

QoSID ::= CHOICE {
    fiveGC                   FiveQI,
    ePC                      QCI,
    ...
}

RANfunction-Name ::= SEQUENCE{
    ranFunction-ShortName    PrintableString(SIZE(1..150, ...)),
    ranFunction-E2SM-OID     PrintableString(SIZE(1..1000, ...)),
    ranFunction-Description  PrintableString(SIZE(1..150, ...)),
    ranFunction-Instance     INTEGER OPTIONAL,
    ...
}

RIC-Format-Type ::= INTEGER

RIC-Style-Type ::= INTEGER

RIC-Style-Name ::= PrintableString(SIZE(1..150, ...))

RRC-MessageID ::= SEQUENCE {
    rrcType                  CHOICE {
        LTE                  RRCclass-LTE,
        nR                   RRCclass-NR,
        ...
    },
    messageID                INTEGER,
    ...
}

RRCclass-LTE ::= ENUMERATED {bcCH-BCH, bcCH-BCH-MBMS, bcCH-DL-SCH, bcCH-DL-SCH-BR, bcCH-DL-SCH-MBMS,
mCCH, pCCH, dL-CCCH, dL-DCCH, uL-CCCH, uL-DCCH, sC-MCCH, ...}

RRCclass-NR ::= ENUMERATED {bcCH-BCH, bcCH-DL-SCH, dL-CCCH, dL-DCCH, pCCH, uL-CCCH, uL-CCCH1, uL-
DCCH, ...}

ServingCell-ARFCN ::= CHOICE {
    nR                      NR-ARFCN,
    eUTRA                   E-UTRA-ARFCN,
    ...
}

ServingCell-PCI ::= CHOICE {
    nR                      NR-PCI,
    eUTRA                   E-UTRA-PCI,
    ...
}

```

```

UEID ::= CHOICE{
    gNB-UEID                UEID-GNB,
    gNB-DU-UEID             UEID-GNB-DU,
    gNB-CU-UP-UEID          UEID-GNB-CU-UP,
    ng-eNB-UEID             UEID-NG-ENB,
    ng-eNB-DU-UEID          UEID-NG-ENB-DU,
    en-gNB-UEID             UEID-EN-GNB,
    eNB-UEID                UEID-ENB,
    ...
}

UEID-GNB ::= SEQUENCE{
    amf-UE-NGAP-ID          AMF-UE-NGAP-ID,
    guami                   GUAMI,
    gNB-CU-UE-FlAP-ID-List UEID-GNB-CU-FlAP-ID-List OPTIONAL,
    -- C-ifCUDUSeparated: This IE shall be present in messages from E2 Node to NearRT-RIC for a CU-DU
    separated gNB, whereas from NearRT-RIC to E2 Node messages, this IE may not be included. More than 1
    FlAP ID shall be reported by E2 Node only when NR-DC is established.
    gNB-CU-CP-UE-EIAP-ID-List UEID-GNB-CU-CP-EIAP-ID-List OPTIONAL,
    -- C-ifCPUPSeparated: This IE shall be present in messages from E2 Node to NearRT-RIC for a CP-UP
    separated gNB, whereas from NearRT-RIC to E2 Node messages, this IE may not be included.
    ran-UEID                RANUEID OPTIONAL,
    m-NG-RAN-UE-XnAP-ID     NG-RANnodeUEXnAPID OPTIONAL,
    -- C-ifDCSetup: This IE shall be present in messages from E2 Node to NearRT-RIC if DC is
    established, whereas from NearRT-RIC to E2 Node messages, this IE may not be included. To be
    reported by both MN and SN.
    globalGNB-ID            GlobalGNB-ID OPTIONAL,
    -- This IE shall not be used. This IE is replaced with globalNG-RANNode-ID.
    ...,
    globalNG-RANNode-ID     GlobalNGRANNodeID OPTIONAL,
    -- C-ifDCSetup: This IE shall be present in messages from E2 Node to NearRT-RIC if DC is
    established, whereas from NearRT-RIC to E2 Node messages, this IE may not be included. To be
    reported only by SN.
    cell-RNTI               Cell-RNTI OPTIONAL
}

UEID-GNB-CU-CP-EIAP-ID-List ::= SEQUENCE (SIZE(1..maxEIAPid)) OF UEID-GNB-CU-CP-EIAP-ID-Item

UEID-GNB-CU-CP-EIAP-ID-Item ::= SEQUENCE{
    gNB-CU-CP-UE-EIAP-ID    GNB-CU-CP-UE-EIAP-ID,
    ...
}

UEID-GNB-CU-FlAP-ID-List ::= SEQUENCE (SIZE(1..maxFlAPid)) OF UEID-GNB-CU-CP-FlAP-ID-Item

UEID-GNB-CU-CP-FlAP-ID-Item ::= SEQUENCE{
    gNB-CU-UE-FlAP-ID       GNB-CU-UE-FlAP-ID,
    ...
}

UEID-GNB-DU ::= SEQUENCE{
    gNB-CU-UE-FlAP-ID       GNB-CU-UE-FlAP-ID,
    ran-UEID                RANUEID OPTIONAL,
    ...,
    cell-RNTI               Cell-RNTI OPTIONAL
}

UEID-GNB-CU-UP ::= SEQUENCE{
    gNB-CU-CP-UE-EIAP-ID    GNB-CU-CP-UE-EIAP-ID,
    ran-UEID                RANUEID OPTIONAL,
    ...
}

UEID-NG-ENB ::= SEQUENCE{
    amf-UE-NGAP-ID          AMF-UE-NGAP-ID,
    guami                   GUAMI,
    ng-eNB-CU-UE-WIAP-ID     NGENB-CU-UE-WIAP-ID OPTIONAL,
    -- C-ifCUDUSeparated: This IE shall be present in messages from E2 Node to NearRT-RIC for a CU-DU
    separated ng-eNB, whereas from NearRT-RIC to E2 Node messages, this IE may not be included.
    m-NG-RAN-UE-XnAP-ID     NG-RANnodeUEXnAPID OPTIONAL,
    -- C-ifDCSetup: This IE shall be present in messages from E2 Node to NearRT-RIC if DC is
    established, whereas from NearRT-RIC to E2 Node messages, this IE may not be included. To be
    reported by both MN and SN.
    globalNgENB-ID          GlobalNgENB-ID OPTIONAL,
    -- This IE shall not be used. This IE is replaced with globalNG-RANNode-ID.
    ...,
    globalNG-RANNode-ID     GlobalNGRANNodeID OPTIONAL,

```

```

-- C-ifDCSetup: This IE shall be present in messages from E2 Node to NearRT-RIC if DC is
established, whereas from NearRT-RIC to E2 Node messages, this IE may not be included. To be
reported only by SN.
  cell-RNTI          Cell-RNTI          OPTIONAL
}

UEID-NG-ENB-DU ::= SEQUENCE{
  ng-eNB-CU-UE-WLAP-ID  NGENB-CU-UE-WLAP-ID,
  ...,
  cell-RNTI          Cell-RNTI          OPTIONAL
}

UEID-EN-GNB ::= SEQUENCE{
  m-eNB-UE-X2AP-ID          ENB-UE-X2AP-ID,
  m-eNB-UE-X2AP-ID-Extension  ENB-UE-X2AP-ID-Extension  OPTIONAL,
  globalENB-ID              GlobalENB-ID,
  gNB-CU-UE-F1AP-ID          GNB-CU-UE-F1AP-ID          OPTIONAL,
  -- C-ifCUDU-separated: This IE shall be present in messages from E2 Node to NearRT-RIC for a CU-DU
  separated en-gNB, whereas from NearRT-RIC to E2 Node messages, this IE may not be included.
  gNB-CU-CP-UE-E1AP-ID-List  UEID-GNB-CU-CP-E1AP-ID-List  OPTIONAL,
  -- C-ifCPUP-separated: This IE shall be present in messages from E2 Node to NearRT-RIC for a CP-UP
  separated en-gNB, whereas from NearRT-RIC to E2 Node messages, this IE may not be included.
  ran-UEID                  RANUEID                  OPTIONAL,
  ...,
  cell-RNTI          Cell-RNTI          OPTIONAL
}

UEID-ENB ::= SEQUENCE{
  mME-UE-S1AP-ID          MME-UE-S1AP-ID,
  GUMMEI,
  m-eNB-UE-X2AP-ID          ENB-UE-X2AP-ID          OPTIONAL,
  -- This IE shall be present in messages from E2 Node to NearRT-RIC if DC is established, whereas
  from NearRT-RIC to E2 Node messages, this IE may not be included. To be reported by MeNB and SeNB.
  m-eNB-UE-X2AP-ID-Extension  ENB-UE-X2AP-ID-Extension  OPTIONAL,
  globalENB-ID              GlobalENB-ID              OPTIONAL,
  -- This IE shall be present in messages from E2 Node to NearRT-RIC if DC is established, whereas
  from NearRT-RIC to E2 Node messages, this IE may not be included. To be reported only by SeNB.
  ...,
  cell-RNTI          Cell-RNTI          OPTIONAL
}

-- *****
-- 3GPP derived IEs
-- *****
-- NOTE:
-- - Extension fields removed and replaced with "..."
-- - IE names modified across all extracts to use "PLMNIdentity"
-- *****
-- IEs derived from 3GPP 36.413 (S1AP)
-- *****
-- *****

ENB-ID ::= CHOICE {
  macro-eNB-ID  BIT STRING (SIZE (20)),
  home-eNB-ID   BIT STRING (SIZE (28)),
  ... ,
  short-Macro-eNB-ID  BIT STRING (SIZE(18)),
  long-Macro-eNB-ID   BIT STRING (SIZE(21))
}

GlobalENB-ID ::= SEQUENCE {
  pLMNIdentity  PLMNIdentity,
  eNB-ID        ENB-ID,
  ...
}

GUMMEI ::= SEQUENCE {
  pLMN-Identity  PLMNIdentity,
  mME-Group-ID   MME-Group-ID,
  mME-Code       MME-Code,
  ...
}

```

```

MME-Group-ID ::= OCTET STRING (SIZE (2))
MME-Code ::= OCTET STRING (SIZE (1))
MME-UE-SlAP-ID ::= INTEGER (0..4294967295)
QCI ::= INTEGER (0..255)
SubscriberProfileIDforRFP ::= INTEGER (1..256)

-- *****
-- IEs derived from 3GPP 36.423 (X2AP)
-- *****
-- Extension fields removed.
-- Note: to avoid duplicate names with NGAP, XnAP, etc.:
-- GNB-ID renamed ENGNB-ID,
-- GlobalGNB-ID renamed GlobalenGNB-ID,
-- UE-X2AP-ID renamed ENB-UE-X2AP-ID
-- UE-X2AP-ID-Extension renamed ENB-UE-X2AP-ID-Extension
-- *****

EN-GNB-ID ::= CHOICE {
    en-gNB-ID BIT STRING (SIZE (22..32)),
    ...
}

ENB-UE-X2AP-ID ::= INTEGER (0..4095)
ENB-UE-X2AP-ID-Extension ::= INTEGER (0..4095, ...)
E-UTRA-ARFCN ::= INTEGER (0..maxEARFCN)
E-UTRA-PCI ::= INTEGER (0..503, ...)
E-UTRA-TAC ::= OCTET STRING (SIZE(2))
GlobalenGNB-ID ::= SEQUENCE {
    pLMN-Identity PLMNIdentity,
    en-gNB-ID EN-GNB-ID,
    ...
}

-- *****
-- IEs derived from 3GPP 37.473 (W1AP)
-- *****

NGENB-CU-UE-W1AP-ID ::= INTEGER (0..4294967295)
NGENB-DU-ID ::= INTEGER (0..68719476735)

-- *****
-- IEs derived from 3GPP 38.331 (NR RRC)
-- *****

NR-SSB-Index ::= INTEGER (0..maxNrofSSBs-1)
RNTI-Value ::= INTEGER (0..65535)

-- *****
-- IEs derived from 3GPP 38.413 (NGAP)
-- Extension fields removed and replaced with ...
-- *****

AMFPointer ::= BIT STRING (SIZE(6))
AMFRegionID ::= BIT STRING (SIZE(8))

```

```

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

AMF-UE-NGAP-ID ::= INTEGER (0..1099511627775)

EUTRACellIdentity ::= BIT STRING (SIZE(28))

EUTRA-CGI ::= SEQUENCE {
    pLMNIdentity          PLMNIdentity,
    eUTRACellIdentity     EUTRACellIdentity,
    ...
}

FiveQI ::= INTEGER (0..255, ...)

GlobalGNB-ID ::= SEQUENCE {
    pLMNIdentity          PLMNIdentity,
    gNB-ID                GNB-ID,
    ...
}

GlobalNgENB-ID ::= SEQUENCE {
    pLMNIdentity          PLMNIdentity,
    ngENB-ID             NgENB-ID,
    ...
}

GNB-ID ::= CHOICE {
    gNB-ID                BIT STRING (SIZE(22..32)),
    ...
}

GUAMI ::= SEQUENCE {
    pLMNIdentity          PLMNIdentity,
    aMFRegionID          AMFRegionID,
    aMFSetID             AMFSetID,
    aMFPointer           AMFPointer,
    ...
}

IndexToRFSP ::= INTEGER (1..256, ...)

NgENB-ID ::= CHOICE {
    macroNgENB-ID        BIT STRING (SIZE(20)),
    shortMacroNgENB-ID   BIT STRING (SIZE(18)),
    longMacroNgENB-ID    BIT STRING (SIZE(21)),
    ...
}

NRCellIdentity ::= BIT STRING (SIZE(36))

NR-CGI ::= SEQUENCE {
    pLMNIdentity          PLMNIdentity,
    nRCellIdentity       NRCellIdentity,
    ...
}

PLMNIdentity ::= OCTET STRING (SIZE(3))

QosFlowIdentifier ::= INTEGER (0..63, ...)

SD ::= OCTET STRING (SIZE(3))

S-NSSAI ::= SEQUENCE {
    sST                   SST,
    sD                   SD,
    ...
}

SST ::= OCTET STRING (SIZE(1))

```

```

-- *****
-- IEs derived from 3GPP 38.423 (XnAP)
-- *****

```

```

NG-RANnodeUEXnAPID ::= INTEGER (0.. 4294967295)

GlobalNGRANNodeID ::= CHOICE {
  gNB                GlobalGNB-ID,
  ng-eNB             GlobalNgENB-ID,
  ...
}

-- *****
-- IEs derived from 3GPP 37.483 (E1AP)
-- *****

GNB-CU-CP-UE-E1AP-ID      ::= INTEGER (0..4294967295)

GNB-CU-UP-ID              ::= INTEGER (0..68719476735)

-- *****
-- IEs derived from 3GPP 38.473 (F1AP)
-- *****

FiveGS-TAC                ::= OCTET STRING (SIZE(3))

FreqBandNrItem            ::= SEQUENCE {
  freqBandIndicatorNr     INTEGER (1..1024, ...),
  ...
}

GNB-CU-UE-F1AP-ID        ::= INTEGER (0..4294967295)

GNB-DU-ID                ::= INTEGER (0..68719476735)

NR-PCI                   ::= INTEGER (0..1007)

NR-ARFCN                 ::= SEQUENCE {
  nrARFCN                 INTEGER (0..maxNRARFCN),
  ...
}

NRFrequencyBand-List ::= SEQUENCE (SIZE(1..maxnoofNrCellBands)) OF NRFrequencyBandItem

NRFrequencyBandItem ::= SEQUENCE {
  freqBandIndicatorNr     INTEGER (1..1024, ...),
  supportedSULBandList    SupportedSULBandList,
  ...
}

NRFrequencyInfo ::= SEQUENCE {
  nrARFCN                 NR-ARFCN,
  frequencyBand-List     NRFrequencyBand-List,
  frequencyShift7p5khz   NRFrequencyShift7p5khz          OPTIONAL,
  ...
}

NRFrequencyShift7p5khz ::= ENUMERATED {false, true, ...}

RANUEID                  ::= OCTET STRING (SIZE (8))

SupportedSULBandList ::= SEQUENCE (SIZE(0..maxnoofNrCellBands)) OF SupportedSULFreqBandItem

SupportedSULFreqBandItem ::= SEQUENCE {
  freqBandIndicatorNr     INTEGER (1..1024, ...),
  ...
}

```

```
END  
-- ASN1STOP
```

### 6.3.3 Message transfer syntax

E2SM shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in Recommendation ITU-T X.691 [21].



---

## Annex A (informative): Change history

<b>Date</b>	<b>Version</b>	<b>Information about changes</b>
February 2020	01.00	Initial version
October 2020	01.01	Editorial and functional corrections
October 2021	02.00	New feature: Common IEs with shared ASN.1
March 2022	02.01	Additional common IEs including O-RAN agreed UEID. Editorial and functional corrections
March 2023	03.00	New features: RIC Query. Editorial and functional corrections
June 2023	03.01	Alignment of O-RAN Drafting Rules (ODR) in preparation for ETSI PAS submission
October 2023	04.00	Additional common IEs. Editorial and functional corrections

---

## History

<b>Document history</b>		
V4.0.0	October 2024	Publication