 ORAN-WG3.E2SM-v01.00.00

\\

Technical Specification

O-RAN Working Group 3

Near-Real-time RAN Intelligent Controller  
E2 Service Model (E2SM)

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# Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Revision** | **Author** | **Description** |
| 2020.01.22 | 01.00.00 | Alistair URIE, Paul STEPHENS (Nokia) | Specification renamed v.01.00.00 for approval |

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# 1 Scope

This Technical Specification has been produced by the O-RAN Alliance.

The contents of the present document are subject to continuing work within O-RAN and may change following formal O-RAN approval. Should the O-RAN Alliance modify the contents of the present document, it will be re-released by O-RAN with an identifying change of release date and an increase in version number as follows:

Release x.y.z

where:

x the first digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc. (the initial approved document will have x=01).

y the second digit is incremented when editorial only changes have been incorporated in the document.

z the third digit included only in working versions of the document indicating incremental changes during the editing process.

The present document describes the O-RAN specified RAN Function-specific Service Models supported over E2 (E2SM) and presents a recommended layout for additional E2SM specifications in Annex A

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. 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.

[1] 3GPP TR 21.905: “Vocabulary for 3GPP Specifications”.

[2] O-RAN Working Group 3, Near-Real-time RAN Intelligent Controller, Architecture & E2 General Aspects and Principles (E2GAP)

[3] ORAN Working Group 3, Near-Real-time RAN Intelligent Controller, E2 Application Protocol (E2AP).

[4] ORAN Working Group 3, Near-Real-time RAN Intelligent Controller, E2 Service Model, Network Interface (E2SM-NI).

[5] ORAN WG3, O-RAN Working Group 3, Near-Real-time RAN Intelligent Controller, E2 Service Model, KPI Monitor (E2SM-KPM).

# 3 Definitions and Abbreviations

## 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

**E2 Node**: as defined in E2GAP [2].

**RAN Function**: as defined in E2GAP [2]

**E2 Service Model**: as defined in E2GAP [2]

## 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply. See E2GAP [2] for additional E2 related abbreviations.

(void)

# 4 General

## 4.1 Procedure Specification Principles

The principle for specifying the procedure logic is to specify the functional behaviour of the terminating node exactly and completely. Any rule that specifies the behaviour of the originating node shall be possible to be verified with information that is visible within the system.

The following specification principles have been applied for the procedure text in clause 8:

- The procedure text discriminates between:

1) Functionality which "shall" be executed.

The procedure text indicates that the receiving node "shall" perform a certain function Y under a certain condition. If the receiving node supports procedure X but cannot perform functionality Y requested in the REQUEST message of a Class 1 EP, the receiving node shall respond with the message used to report unsuccessful outcome for this procedure, containing an appropriate cause value.

2) Functionality which "shall, if supported" be executed.

The procedure text indicates that the receiving node "shall, if supported," perform a certain function Y under a certain condition. If the receiving node supports procedure X, but does not support functionality Y, the receiving node shall proceed with the execution of the EP, possibly informing the requesting node about the not supported functionality.

- Any required inclusion of an optional IE in a response message is explicitly indicated in the procedure text. If the procedure text does not explicitly indicate that an optional IE shall be included in a response message, the optional IE shall not be included. For requirements on including *Criticality Diagnostics* IE, see clause 10.

## 4.2 Forwards and Backwards Compatibility

The forwards and backwards compatibility of the protocol is assured by a mechanism where all current and future messages, and IEs or groups of related IEs, include ID and criticality fields that are coded in a standard format that will not be changed in the future. These parts can always be decoded regardless of the standard version.

## 4.3 Specification Notations

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

Service when referring to a Service in the specification the **SERVICE NAME** is written with upper case characters and in bold followed by the word "service", e.g. **REPORT** service.

Procedure When referring to an elementary procedure in the specification the Procedure Name is written with the first letters in each word in upper case characters followed by the word "procedure", e.g. Handover Preparation procedure.

Message When referring to a message in the specification the MESSAGE NAME is written with all letters in upper case characters followed by the word "message", e.g. HANDOVER REQUEST message.

IE When referring to an information element (IE) in the specification 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 specification the "Value" is written as it is specified in the specification enclosed by quotation marks, e.g. "Value".

## 4.3 Identifiers

For the purposes of the present document, the following identifiers are defined:

Style Type The identifier used to nominate a specific approach or Style used to exposing a given RIC Service (REPORT, INSERT, CONTROL and POLICY). The same E2SM may support more than one Style for each RIC Service.

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

# 5 E2SM services

As defined in E2 General Aspects and Principles [2], a given RAN Function offers a set of services to be exposed over the E2 (**REPORT**, **INSERT**, **CONTROL** and/or **POLICY**) 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).

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

|  |  |  |
| --- | --- | --- |
| RAN Function specific E2AP Information Elements | E2AP Information Element reference | Related E2AP Procedures |
| *RIC Event Trigger Definition* IE | E2AP [3] section 9.2.9 | RIC Subscription |
| *RIC Action Definition* IE | E2AP [3] section 9.2.12 | RIC Subscription |
| *RIC Indication Header* IE | E2AP [3] section 9.2.17 | RIC Indication |
| *RIC Indication Message* IE | E2AP [3] section 9.2.16 | RIC Indication |
| *RIC Call Process ID* IE | E2AP [3] section 9.2.18 | RIC Indication  RIC Control |
| *RIC Control Header* IE | E2AP [3] section 9.2.20 | RIC Control |
| *RIC Control Message* IE | E2AP [3] section 9.2.19 | RIC Control |
| *RIC Control Outcome IE* | E2AP [3] section 9.2.25 | RIC Control |
| *RAN Function Definition* IE | E2AP [3] section 9.2.23 | E2 Setup  RIC Service Update |

All of these RAN Function specific E2AP IEs are defined in E2AP [3] as “OCTET STRING”.

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

In the current version of the specifications, the following O-RAN specified E2 Service Models are supported:

**Table 5-1: O-RAN specified E2 Service Models and related OIDs**

|  |  |  |
| --- | --- | --- |
| **E2SM short name** | **OID** | **Scope** |
| E2SM-NI | iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) 53148 e2(1) version1 (1) e2sm(2) e2sm-NI-IEs (1) | RAN Function NI “Network Interface” performs the following functionalities:  - Exposure of Network Interfaces  - Modification of both incoming and outgoing network interface message contents  - Execution of policies that may result in change of network behavior |
| E2SM-KPM | iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) 53148 e2(1) version1 (1) e2sm(2) e2sm-KPM-IEs (2) | RAN function KPM “KPM Monitor” performs the following functionalities:  - Exposure of O-DU’s cell related performance IEs through periodic KPM Report.  - Exposure of O-CU-CP’s cell/UE related performce IEs through periodic KPM Report.  - Exposure of O-CU-UP’s bearer related performance IEs through periodic KPM Report |

# Annex A (informative): Recommended E2SM specification content

This annex describes the recommended contents of a RAN Function specific E2SM.

# 1 Scope

This Technical Specification has been produced by the O-RAN Alliance.

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where:

x the first digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc. (the initial approved document will have x=01).

y the second digit is incremented when editorial only changes have been incorporated in the document.

z the third digit included only in working versions of the document indicating incremental changes during the editing process.

Recommendation (paragraph to be deleted): Additional text is recommended to be added providing a short description of the scope of the specific E2SM

# 2 References

[1] 3GPP TR 21.905: “Vocabulary for 3GPP Specifications”.

[2] O-RAN Working Group 3, Near-Real-time RAN Intelligent Controller, Architecture & E2 General Aspects and Principles (E2GAP)

[3] ORAN Working Group 3, Near-Real-time RAN Intelligent Controller, E2 Application Protocol (E2AP).

[4] O-RAN Working Group 3, Near-Real-time RAN Intelligent Controller, E2 Service Model (E2SM)

Recommendation (paragraph to be deleted): The following additional references are recommended to be added if ASN.1 encoding is adopted for the specific RAN Function E2SM. If other encoding formats are adopted, then the equivalent references to the adopted data structure encoding format are required.

[5] 3GPP TR 25.921: "Guidelines and principles for protocol description and error handling".

[6] ITU-T Recommendation X.680 (2002-07): "Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[7] ITU-T Recommendation X.681 (2002-07): "Information technology – Abstract Syntax Notation One (ASN.1): Information object specification".

[8] ITU-T Recommendation X.691 (2002-07): "Information technology - ASN.1 encoding rules - Specification of Packed Encoding Rules (PER) "

[9] 3GPP 36.413, Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)

Recommendation (paragraph to be deleted): Additional references are recommended to be added referring specifications related to the RAN Function (i.e. specifications from 3GPP, IETF, other WGs in ORAN, etc.).

# 3 Definitions and Abbreviations

Recommendation (paragraph to be deleted): The RAN Function specific E2 Service Model specification is recommended to only include RAN Function specific definitions and abbreviations and refer to E2GAP [2] for E2 generic terms and, where appropriate, RAN Function specific specifications.

# 4 General

Recommendation (paragraph to be deleted): The RAN Function specific E2 Service Model specification is recommended to refer to, or copy text from, E2SM [4] for general considerations.

# 5 E2SM Services

Recommendation (paragraph to be deleted): The RAN Function specific E2 Service Model specification is recommended to copy from E2SM [4] the list of E2SM Services and modify according to the services supported by the specific E2SM.

# 6 RAN Function Service Model Description

Recommendation (paragraph to be deleted): The RAN Function specific E2 Service Model specification is recommended to use the notes in this section to provide a description of the services provided by the RAN function specific E2 Service Model.

## 6.1 RAN Function Overview

The RAN Function specific E2 Service Model specification is recommended to contain a short name, a description of the RAN function and the list of services that it provides as an E2 Node terminating the E2 Interface towards the NEAR-RT RIC.

## 6.2 RAN Function exposure services

### 6.2.1 **REPORT** service

The RAN Function specific E2 Service Model specification is recommended to contain further details of one or more supported **REPORT** service.

Furthermore, it is recommended to list the parameters that may be used to initiate the **REPORT** service.

### 6.2.2 **INSERT** service

The RAN Function specific E2 Service Model specification is recommended to contain further details of one or more supported **INSERT** service.

Furthermore, it is recommended to list the parameters that may be used to initiate the **INSERT** service.

### 6.2.3 **CONTROL** service

The RAN Function specific E2 Service Model specification is recommended to contain further details of one or more supported **CONTROL** service.

Furthermore, it is recommended to list the parameters that may be used to respond to the **CONTROL** service request.

### 6.2.4 **POLICY** service

The RAN Function specific E2 Service Model specification is recommended to contain further details of one or more supported **POLICY** service.

Furthermore, it is recommended to list the parameters that may be used to initiate the **POLICY** service.

# 7 RAN Function Description

Recommendation (paragraph to be deleted): The RAN Function specific E2 Service Model specification is recommended to use the notes in this section to provide a description of the messages defined by the RAN Function specific E2 Service Model .

## 7.1 Description

The E2AP [3] procedures E2 Setup and RIC Service Update are used to transport the RAN Function Description.

For the specific RAN Function, it is recommended that the *RAN Function Description* IE shall report the following information:

- RAN Function name along with associated information on E2SM definition

- Event trigger styles list along with the corresponding encoding type for each associated E2AP IE.

- RIC **REPORT** Service styles list along with the corresponding encoding type for each associated E2AP IE.

- RIC **INSERT** Service styles list along with the corresponding encoding type for each associated E2AP IE.

- RIC **CONTROL** Service styles list along with the corresponding encoding type for each associated E2AP IE.

- RIC **POLICY** Service styles list along with the corresponding encoding type for each associated E2AP IE.

## 7.2 RAN Function name

The RAN Function specific E2 Service Model specification is recommended to contain the following details in the RAN Function Name:

- RAN Function Short Name

- RAN Funtion Service Model OID (Object Identifier)

- RAN Function name description

- RAN Function Instance, required when and if E2 Node exposes more than one instance of a RAN Function based on this E2SM.

## 7.3 Event trigger definition styles

The RAN Function specific E2 Service Model specification is recommended to contain the following details in the Event Trigger Definition:

- List of supported Event Trigger Styles, descriptions and mapping between supported Event Trigger Styles and RIC Service Styles

- List of supported Event Trigger Formats and mapping between Event Trigger Styles and Event Trigger Formats

## 7.4 Supported RIC **REPORT** Services

The RAN Function specific E2 Service Model specification is recommended to contain the following details in the RIC **Report** Services:

- List of supported RIC **Report** Service Styles and descriptions

- For each RIC **Report** Service Style:

- Mapping to corresponding *RIC Action Definition* IE, *RIC Indication Header* IE and *RIC Indication Messages* IE Formats

- List of supported RAN Parameters used to configure the RIC **Report** Service using the *RIC Action Definition* IE

## 7.5 Supported RIC **INSERT** Services

The RAN Function specific E2 Service Model specification is recommended to contain the following details in the RIC **Insert** Services:

- List of supported RIC **Insert** Service Styles and descriptions

- For each RIC **Insert** Service Style:

- Mapping to corresponding *RIC Action Definition* IE, *RIC Indication Header* IE and *RIC Indication Messages* IE Formats

- List of supported RAN Parameters used to configure the RIC **Insert** Service using the *RIC Action Definition* IE

## 7.6 Supported RIC **CONTROL** Services

The RAN Function specific E2 Service Model specification is recommended to contain the following details in the RIC **Control** Services:

- List of supported RIC **Control** Service Styles and descriptions

- For each RIC **Control** Service Style:

- Mapping to corresponding *RIC Control Header* IE, *RIC Control Message* IE and *RIC Control Outcome* IE Formats

## 7.7 Supported RIC **POLICY** Services

The RAN Function specific E2 Service Model specification is recommended to contain the following details in the RIC **Policy** Services:

- List of supported RIC **Policy** Service Styles and descriptions

- For each RIC **Policy** Service Style:

- Mapping to corresponding *RIC Action Definition* IE

- List of supported RAN Parameters used to configure the RIC **Policy** Service using the *RIC Action Definition* IE

## 7.8 Supported RIC Service Styles and E2SM IE Formats

The RAN Function specific E2 Service Model specification is recommended to contain Table 7.8-1 and 7.8-2 providing a summary of the E2SM IE Formats defined to support the set of RIC Event Triggers and RIC Service Styles defined in this E2SM specification.

Table 7.8-1: Summary of the E2SM IE encoding Formats defined to support the set of RIC Event Trigger styles

|  |  |
| --- | --- |
| RIC Service and Style | Event Trigger Definition Format |
| Event Trigger | |
|  |  |
|  |  |
|  |  |

Table 7.8-2: Summary of the E2SM IE encoding Formats defined to support the set of RIC Service Styles

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| RIC Service and Style | Action Definition Format | Indication header Format | Indication message Format | Call Process ID Format | Control header Format | Control message Format |
| REPORT | | | | | | |
| Style 1 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| INSERT | | | | | | |
| Style 1 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| CONTROL | | | | | | |
| Style 1 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| POLICY | | | | | | |
| Style 1 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

# 8 Elements for E2SM Service Model

## 8.1 General

Sub clause 8.2 describes the structure of the information elements as required for the specific RAN Function E2 Service Model in tabular format. Sub clause 8.3 presents the individual information elements. Sub clause 8.4 provides the corresponding ASN.1 definition of each information element.

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

NOTE: The messages have been defined in accordance to the guidelines specified in 3GPP TR 25.921 [4].

## 8.2 Message Functional Definition and Content

Recommendation (paragraph to be deleted): The following section presents recommended IE definitions to be used if ASN.1 encoding is adopted for the specific RAN Function E2SM. If other encoding formats are adopted, then the following information may be used to guide the definition of equivalent data structures.

### 8.2.1 Messages for RIC Functional procedures

#### 8.2.1.1 RIC Event Trigger Definition IE

The RAN Function specific E2 Service Model specification is recommended to contain a description of this information element to be used for RIC **Report**, **Insert** and/or **Policy** services.

It is recommended to adopt a CHOICE format listing one or more RIC Event Trigger Definition formats

#### 8.2.1.2 RIC Action Definition IE

The RAN Function specific E2 Service Model specification is recommended to contain a description of this information element.

It is recommended to adopt a format providing the RIC Style Type and a CHOICE format listing one or more RIC Action Definition formats to be used for RIC **Report**, **Insert** and/or **Policy** services

#### 8.2.1.3 RIC Indication Header IE

The RAN Function specific E2 Service Model specification is recommended to contain a description of this information element to be used for RIC **Report** and/or **Insert** services.

It is recommended to adopt a CHOICE format listing one or more RIC Indication Header formats

#### 8.2.1.4 RIC Indication Message IE

The RAN Function specific E2 Service Model specification is recommended to contain a description of this information element to be used for RIC **Report** and/or **Insert** services.

It is recommended to adopt a CHOICE format listing one or more RIC Indication Message formats

#### 8.2.1.5 RIC Call Process ID IE

The RAN Function specific E2 Service Model specification is recommended to contain a description of this information element to be used for RIC **Insert** and/or **Control** services.

It is recommended to adopt a CHOICE format listing one or more RIC Call Process ID formats

#### 8.2.1.6 RIC Control Header IE

The RAN Function specific E2 Service Model specification is recommended to contain a description of this information element to be used for RIC C**ontrol** service.

It is recommended to adopt a CHOICE format listing one or more RIC Control Header formats

#### 8.2.1.7 RIC Control Message IE

The RAN Function specific E2 Service Model specification is recommended to contain a description of this information element to be used for RIC C**ontrol** service.

It is recommended to adopt a CHOICE format listing one or more RIC Control Message formats

#### 8.2.1.8 RIC Control Outcome IE

The RAN Function specific E2 Service Model specification is recommended to contain a description of this information element to be used for RIC C**ontrol** service.

It is recommended to adopt a CHOICE format listing one or more RIC Control Outcome formats

### 8.2.2 Messages for RIC Global Procedures

#### 8.2.2.1 RAN Function Definition IE

The RAN Function specific E2 Service Model specification is recommended to contain a description of this information element to be used for E2 SETUP REQUEST and RIC SERVICE UPDATE message sent by the E2 Node to a NEAR-RT RIC node and is used to provide all required information for the Near-RT RIC to determine how a given E2 Node has been configured to support a given RAN Function specific E2SM.

A useful structure to carry the required information is provided in the message table below. This is provided as guidance and may need to be adapted according to the specific requirements of the RAN Function.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| RAN Function Name | M |  | 8.3.2 |  |
| Sequence of subfunction Types |  | 1.. <maxofSFtypes> |  |  |
| >Subfunction Type | M |  | 8.3.21 |  |
| >Sequence of Event trigger styles |  | 0.. <maxofRICstyles> |  |  |
| >>RIC Event Trigger Style Type | M |  | 8.3.3 | ID of Event trigger style |
| >>RIC Event Trigger Style Name | M |  | 8.3.4 | Name of Event trigger style |
| >>RIC Event Trigger Format Type | M |  | 8.3.5 | Event trigger format used by Event trigger style |
| >Sequence of Report styles |  | 0.. <maxofRICstyles> |  |  |
| >>RIC Report Style Type | M |  | 8.3.3 | ID of Report style |
| >>RIC Report Style Name | M |  | 8.3.4 | Name of Report style |
| >>RIC Report Action Format Type | M |  | 8.3.5 | Action definition format used by Report style |
| >>Sequence of RAN parameters for Action |  | 0.. <maxofRANparameters> |  | RAN parameters used by Report style |
| >>>RAN Parameter ID | M |  | 8.3.7 |  |
| >>>RAN Parameter Name | M |  | 8.3.10 |  |
| >>>RAN Parameter Type | M |  | 8.3.6 |  |
| >>RIC Indication Header Format Type | M |  | 8.3.5 | Indication header format used by Report style |
| >>RIC Indication Message Format Type | M |  | 8.3.5 | Indication message format used by Report style |
| >Sequence of Insert styles |  | 0.. <maxofRICstyles> |  |  |
| >>RIC Insert Style Type | M |  | 8.3.3 | ID of Insert style |
| >>RIC Insert Style Name | M |  | 8.3.4 | Name of Insert style |
| >>RIC Insert Action Format Type | M |  | 8.3.5 | Action definition format used by Insert style |
| >>Sequence of RAN parameters for Action |  | 0.. <maxofRANparameters> |  | RAN parameters used by Insert style |
| >>>RAN Parameter ID | M |  | 8.3.7 |  |
| >>>RAN Parameter Name | M |  | 8.3.10 |  |
| >>>RAN Parameter Type | M |  | 8.3.6 |  |
| >>RIC Indication Header Format Type | M |  | 8.3.5 | Indication header format used by Insert style |
| >>RIC Indication Message Format Type | M |  | 8.3.5 | Indication message format used by Insert style |
| >>RIC Call Process ID Format Type | M |  | 8.3.5 | Call Processs ID format used by Insert style |
| >Sequence of Control styles |  | 0.. <maxofRICstyles> |  |  |
| >>RIC Control Style Type | M |  | 8.3.3 | ID of Control style |
| >>RIC Control Style Name | M |  | 8.3.4 | Name of Control style |
| >>RIC Control Header Format Type | M |  | 8.3.5 | Control header format used by control style |
| >>RIC Control Message Format Type | M |  | 8.3.5 | Control message format used by control style |
| >>RIC Call Process ID Format Type | M |  | 8.3.5 | Call Processs ID format used by control style |
| >Sequence of Policy styles |  | 0.. <maxofRICstyles> |  |  |
| >>RIC Policy Style Type | M |  | 8.3.3 |  |
| >>RIC Policy Style Name | M |  | 8.3.4 |  |
| >>RIC Policy Action Format Type | M |  | 8.3.5 | Action definition format used by Policy style |
| >>Sequence of RAN parameters for Action |  | 0.. <maxofRANparameters> |  | RAN parameters used by Policy style |
| >>>RAN Parameter ID | M |  | 8.3.7 |  |
| >>>RAN Parameter Name | M |  | 8.3.10 |  |
| >>>RAN Parameter Type | M |  | 8.3.6 |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxofSFtypes | Maximum no. of SubFunction Types supported by RAN Function <63> |
| maxofRICstyles | Maximum no. of Style of Report, Insert, Control or Policy actions supported by RAN Function. Value is <63>. |
| maxofRANparameters | Maximum no. of RAN Parameters for given style. Value is <65535> |

## 8.3 Information Element definitions

Recommendation (paragraph to be deleted): The following section presents recommended IE definitions to be used if ASN.1 encoding is adopted for the specific RAN Function E2SM. If other encoding formats are adopted, then the following information may be used to guide the definition of equivalent data structures.

### 8.3.1 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.

### 8.3.2 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,...)) |  |
| RAN Function Service Model OID | M |  | PrintableString(SIZE(1..1000,...)) |  |
| RAN Function Description | M |  | PrintableString(SIZE(1..150,...)) |  |
| RAN Function Instance | O |  | INTEGER | Default 0 assumed if absent |

### 8.3.3 RIC Style Type

This IE defines the Identifier of a given *RIC Style Type* IE.

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

Note: Assignment of RIC Style Type values is described in section 7

### 8.3.4 RIC Style Name

This IE defines the *RIC Style Name* IE.

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

Note: Assignment of RIC Style Name values is described in section 7

### 8.3.5 RIC Format Type

This IE defines the Identifier of a given *RIC Format Type* IE.

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

Note: Assignment of RIC Format Type values is described in section 7 and summarized in section 7.8.

### 8.3.6 RAN Parameter Type

This IE defines the RAN function specific *RAN Parameter Type* IE.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| RAN Parameter Type | M |  | ENUMERATED (integer, enumerated, boolean, bit string, octet string, printable string…) |  |

### 8.3.7 RAN Parameter ID

This IE defines the RAN function specific *RAN parameter ID* IE.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| RAN Parameter ID | M | 0..maxofRANparameters | INTEGER |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxofRANparameters | Maximum no. of RAN Parameter ID. Value is < 65535> |

### 8.3.8 RAN Parameter Test Condition

This IE defines the RAN Function specific *RAN Parameter Test Condition* IE to be used to compare the particular value of a given parameter with the target value.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| RAN Parameter Test Condition | M |  | ENUMERATED (equal, greaterthan, lessthan, contains, present, …) |  |

For all cases the test condition is Value (*RAN Parameter ID*) (*RAN Parameter Test Condition*) (*RAN Parameter Value*).

For example:

- If RAN Parameter Test Condition = “equal” then test condition is:  
Value (RAN Parameter ID) = (RAN Parameter Value)

- If RAN Parameter Test Condition = “greaterthan” then test condition is:  
Value (RAN Parameter ID) > (RAN Parameter Value)

### 8.3.9 RAN Parameter Value

This IE defines the *RAN Parameter Value* IE.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| CHOICE RAN Parameter Value | M |  |  |  |
| >INTEGER |  |  | INTEGER |  |
| >ENUMERATED |  |  | INTEGER |  |
| >BOOLEAN |  |  | BOOLEAN |  |
| >BIT STRING |  |  | BIT STRING |  |
| >OCTET STRING |  |  | OCTET STRING |  |
| >PRINTABLE STRING |  |  | PrintableString |  |

### 8.3.10 RAN Parameter Name

This IE defines the *RAN Parameter Name* IE of a given RAN Parameter ID.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| RAN Parameter Name | M |  | PrintableString(SIZE(1..150,...)) |  |

### 8.3.11 RAN Call process ID

#### 8.3.11.1 RAN Call process ID approach 1

This IE defines the required Call process ID approach 1.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Call process ID number |  |  | INTEGER |  |

#### 8.3.11.1 RAN Call process ID approach 2

This IE defines the required Call process ID approach 2IE.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Call process ID string |  |  | PrintableString(SIZE(1..150,…)) |  |

### 8.3.12 RIC Control Message Priority

This IE defines the *RIC Control Message Priority* IE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| ControlMessagePriority | M |  | INTEGER |  |

### 8.3.13 reserved

### 8.3.14 RAN UE Group ID

This IE defines the generic *RAN UE Group ID* IE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| RAN UE Group ID | M |  | INTEGER |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxofRANueGroups | Maximum no. of RAN UE Groups. Value is <255> |

### 8.3.15 RAN UE Group Definition

This IE defines the generic *RAN UE Group Definition* IE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Sequence of RAN Parameters |  | 0..<maxofRANparameters> |  | Defines RAN UE group |
| >RAN Parameter ID | M |  | 8.3.7 |  |
| >RAN Parameter Test Condition | M |  | 8.3.8 |  |
| >RAN Parameter Value | M |  | 8.3.9 |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxofRANparameters | Maximum no. of RAN Parameter ID. Value is <255> |

### 8.3.16 RAN Imperative Policy

This IE defines the generic *RAN Imperative Policy* IE

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Sequence of RAN Parameters |  | 0..<maxofRAN parameters> |  | Defines RAN UE group |
| >RAN Parameter ID | M |  | 8.3.7 |  |
| >RAN Parameter Value | M |  | 8.3.9 |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxofRANparameters | Maximum no. of RAN Parameter types in action definition supported by RAN Function. Value is <255>. |

### 8.3.17 reserved

### 8.3.18 reserved

### 8.3.19 reserved

### 8.3.20 reserved

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

Recommendation (paragraph to be deleted): The following section presents recommended IE syntax to be used if ASN.1 encoding is adopted for the specific RAN Function E2SM. If other encoding formats are adopted, then the following information may be used to guide the definition of equivalent data structures.

### 8.4.1 General

E2SM ASN.1 definition conforms to ITU-T Rec. X.680 [6] and ITU-T Rec. X.681 [7].

Sub clause 8.4.2 presents the Abstract Syntax of the E2SM information elements to be carried within the E2AP [3] protocol messages with ASN.1. In case there is contradiction between the ASN.1 definition in this sub clause and the tabular format in sub clause 8.2 and 8.3, 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.

If an E2SM information element carried as an OCTET STRING in an E2AP [3] message that is not constructed as defined above is received, this shall be considered as Abstract Syntax Error, and the message shall be handled as defined for Abstract Syntax Error in clause 9.

### 8.4.2 Information Element definitions

To be added for specific E2SM specification

## 8.5 Message transfer syntax

E2SM shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in ITU-T Rec. X.691 [8].

# 9 Handling of Unknown, Unforeseen and Erroneous Protocol Data

Section 10 of TS 36.413 [9] is applicable for the purposes of the present document.

# Annex A: Further information on RAN Function

## A.1 Background information

Recommendation (paragraph to be deleted): The following section presents any additional background information on the specific RAN Function and assumptions on how the functionality would be viewed by the near-RT RIC using the messages encoded in this E2SM.

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