 O-RAN.WG3.E2AP-v01.01

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Technical Specification

O-RAN Working Group 3,  
 Near-Real-time RAN Intelligent Controller,  
 E2 Application Protocol (E2AP)

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# Revision History

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| --- | --- | --- | --- |
| **Date** | **Revision** | **Author** | **Description** |
| 2020.01.22 | 01.00.00 | Alistair URIE, Paul STEPHENS (Nokia) | Specification renamed v01.00.00 for approval |
| 2020.01.28 | 01.00.00 | Alistair URIE, Paul STEPHENS (Nokia) | Editorial corrections collected during WG3 approval process |
| 2020.07.08 | 01.00.01 | Alistair URIE (Nokia) | Addition of CR adopted during meeting #60 |
| 2020.07.13 | 01.00.02 | Alistair URIE (Nokia), Jaemin HAN (Intel) | ASN.1 corrections, Table correction to align with ASN.1 |
| 2020.07.15 | V01.01 | Paul Stephens (Nokia) | Incremented version for Publication |

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# Foreward

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.

# 1 Scope

The present document specifies the Near-RT RIC layer signalling protocol for the E2 interface.

The E2 interface provides means for interconnecting a Near-RT RIC and an E2 Node. The E2 Application Protocol (E2AP) supports the functions of E2 interface by signalling procedures defined in the present document. E2AP is developed in accordance to the general principles stated in O-RAN E2 General Aspects & Principles [2].

# 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 *in the same Release as the present document*.

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

[2] O-RAN-WG3.E2GAP: “O-RAN Working Group 3 Near-Real-time RAN Intelligent Controller, E2 General Aspects and Principles”.

[3] O-RAN-WG3.E2SM: “O-RAN Working Group 3, Near-Real-time RAN Intelligent Controller, E2 Service Model (E2SM)”.

[4] ORAN-WG2.A1.GA&P: “O-RAN Working Group 2, A1 interface: General Aspects and Principles”.

[6] 3GPP TS 36.401: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Architecture Description".

[7] 3GPP TS 38.401: "NG-RAN; Architecture description".

[8] 3GPP TS 36.423: “Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 application protocol (X2AP)”.

[9] O-RAN-WG1.OAM Architecture: “O-RAN Operations and Maintenance Architecture”.

[10] 3GPP TS 38.410: “NG general aspects and principles”.

[11] 3GPP TS 38.420: “Xn general aspects and principles”.

[12] 3GPP TS 38.470: “F1 general aspects and principles”.

[13] 3GPP TS 36.413: “S1 Application Protocol (S1AP)”.

[14] 3GPP TS 25.921: “Guidelines and principles for protocol description and error handling”.

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

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

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

[18] 3GPP TS 38.300: “NR; NR and NG-RAN Overall Description; Stage 2”.

# 3 Definitions and Abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply.

A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**A1**: Interface between non-RT RIC and Near-RT RIC to enable policy-driven guidance of Near-RT RIC applications/functions, and support AI/ML workflow [4].

**E2**: Interface connecting the Near-RT RIC and one or more O-CU-CPs, one or more O-CU-UPs, and one or more O-DUs [2].

**E2 Node**: a logical node terminating E2 interface. In this version of the specification, ORAN nodes terminating E2 interface are:

- for NR access: O-CU-CP, O-CU-UP, O-DU or any combination as defined in [9];

- for E-UTRA access: O-eNB.

**non-RT RIC (O-RAN non-real-time RAN Intelligent Controller)**: a logical function that enables non-real-time control and optimization of RAN elements and resources, AI/ML workflow including model training and updates, and policy-based guidance of applications/features in Near-RT RIC.

**Near-RT RIC (O-RAN near-real-time RAN Intelligent Controller)**: a logical function that enables near-real-time control and optimization of RAN elements and resources via fine-grained (e.g. UE basis, Cell basis) data collection and actions over E2 interface.

**O-CU**: (O-RAN Central Unit): a logical node hosting RRC, SDAP and PDCP protocols [7].

**O-CU-CP**: (O-RAN Central Unit – Control Plane): a logical node hosting the RRC and the control plane part of the PDCP protocol [7].

**O-CU-UP**: (O-RAN Central Unit – User Plane): a logical node hosting the user plane part of the PDCP protocol and the SDAP protocol [7].

**O-DU**: (O-RAN Distributed Unit): a logical node hosting RLC/MAC/High-PHY layers based on a lower layer functional split.

**O-eNB:** an eNB [6] or ng-eNB [18] that supports E2 interface.

**O-RU**: (O-RAN Radio Unit): a logical node hosting Low-PHY layer and RF processing based on a lower layer functional split. This is similar to 3GPP’s “TRP” or “RRH” but more specific in including the Low-PHY layer (FFT/iFFT, PRACH extraction).

**O1**: Interface between orchestration & management entities (Orchestration/NMS) and O-RAN managed elements, for operation and management, by which FCAPS management, Software management, File management and other similar functions shall be achieved.

**RAN Function**: A specific Function in a E2 Node; examples include network interfaces (i.e. X2AP [8], F1 [12], S1AP [13], Xn [11], NGc [10]) interfaces and RAN internal functions handling UEs, Cells, etc.

**RIC Service**: A Service provided on an E2 Node to provide access to messages and measurements and / or enable control of the E2 Node from the Near-RT RIC.

## 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply.

Near-RT RIC near-real-time RAN Intelligent Controller

non-RT RIC non-real-time RAN Intelligent Controller:

O-CU O-RAN Central Unit

O-CU-CP O-RAN Central Unit – Control Plane

O-CU-UP O-RAN Central Unit – User Plane

O-DU O-RAN Distributed Unit

O-RU O-RAN Radio Unit

# 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 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:

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".

## 4.4 Identifiers

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

**Global E2 Node ID**: Global identifier of an E2 Node. Defined as the global eNB or gNB identifier and an optional local identifier of an CU-UP or DU which is required when and if an individual DU or CU-UP supports a direct E2 interface.

**Global RIC ID**: Global identifier of a Near-RT RIC.

**RAN Function ID**: Local identifier of a specific RAN Function within an E2 Node that supports one or more RIC Services using a specific E2 Service Model. Note that same E2SM may be used by more than one RAN Function in the same E2 Node.

**RAN Function OID**: RAN Function Object Identifier. Used to identify specific RAN function definition (i.e. E2SM used by specific RAN Function).

**RIC Action ID**: Local identifier used Near-RT RIC to identify a specific Action within a specific RIC Subscription Request, used by E2 Node in subsequent RIC Indication messages.

**RIC Call Process ID**: Local identifier used by E2 Node to identify the suspended associated procedure instance during a RIC Service “Insert”, used by Near-RT RIC in subsequent RIC Control procedure.

**RIC Request ID**: Local identifier used by the Near-RT RIC to identify a specific RIC Subscription procedure or RIC Control procedure, used by E2 Node in subsequent RIC Indication messages.

# 5 E2AP Services

The present clause describes the services an E2 Node offers to the Near-RT RIC.

5.1 E2AP procedure modules

The E2 interface E2AP procedures are divided into two modules as follows:

1. E2AP Near-RT RIC Functional Procedures;

2. E2AP Global Procedures;

The E2AP Near-RT RIC functional procedures module contains procedures used to pass application specific messages between Near-RT RIC applications and a target function in an E2 node [2]

The Global Procedures module contains procedures that are not directly related to a specific application.

5.2 Parallel transactions

Parallel transactions, that is, multiple ongoing E2AP procedures related to the same Application and E2 node, are supported.

# 6 Services expected from Signalling Transport

The signalling connection shall provide in sequence delivery of E2AP messages. E2AP shall be notified if the signalling connection breaks.

# 7 Functions of E2AP

The functions of E2AP are described in O-RAN Working Group 3 Near-Real-time RAN Intelligent Controller General Aspects and Principles [2].

# 8 E2AP Procedures

## 8.1 Elementary Procedures

In the following tables, all EPs are divided into Class 1 and Class 2 EPs.

**Table 8.1-1: Class 1 Elementary Procedures**

| **Initiated by** | **Elementary Procedure** | **Initiating Message** | **Successful Outcome** | **Unsuccessful Outcome** | |
| --- | --- | --- | --- | --- | --- |
| **Response message** | **Response message** | |
| Near-RT RIC | RIC Subscription | RIC SUBSCRIPTION REQUEST | RIC SUBSCRIPTION RESPONSE | RIC SUBSCRIPTION FAILURE |
| Near-RT RIC | RIC Subscription Delete | RIC SUBSCRIPTION DELETE REQUEST | RIC SUBSCRIPTION DELETE RESPONSE | RIC SUBSCRIPTION DELETE FAILURE |
| E2 Node | RIC Service Update | RIC SERVICE UPDATE | RIC SERVICE UPDATE ACKNOWLEDGE | RIC SERVICE UPDATE FAILURE |
| Near-RT RIC | RIC Control | RIC CONTROL REQUEST | RIC CONTROL ACKNOWLEDGE | RIC CONTROL FAILURE |
| E2 Node | E2 Setup | E2 SETUP REQUEST | E2 SETUP RESPONSE | E2 SETUP FAILURE |
| E2 Node | E2 Node Configuration Update | E2 NODE CONFIGURATION UPDATE | E2 NODE CONFIGURATION UPDATE ACKNOWLEDGE | E2 NODE CONFIGURATION UPDATE FAILURE | | |
| Near-RT RIC | E2 Connection Update | E2 CONNECTION UPDATE | E2 CONNECTION UPDATE ACKNOWLEDGE | E2 CONNECTION UPDATE FAILURE |
| Near-RT RIC or E2 Node | Reset | RESET REQUEST | RESET RESPONSE |  |

**Table 8.1-2: Class 2 Elementary Procedures**

| **Initiated by** | **Elementary Procedure** | **Initiating Message** |
| --- | --- | --- |
| E2 Node | RIC Indication | RIC INDICATION |
| Near-RT RIC | RIC Service Query | RIC SERVICE QUERY |
| E2 Node or Near-RT RIC | Error Indication | ERROR INDICATION |

## 8.2 Near-RT RIC Functional Procedures

### 8.2.1 RIC Subscription procedure

#### 8.2.1.1 General

This procedure is used to establish E2 subscriptions on E2 Node consisting of an event trigger and a sequence of actions, each with a corresponding subsequent action.

#### 8.2.1.2 Successful Operation

@startuml

skinparam ParticipantPadding 50

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

near -> ran: RIC SUBSCRIPTION REQUEST

ran->near: RIC SUBSCRIPTION RESPONSE

@enduml

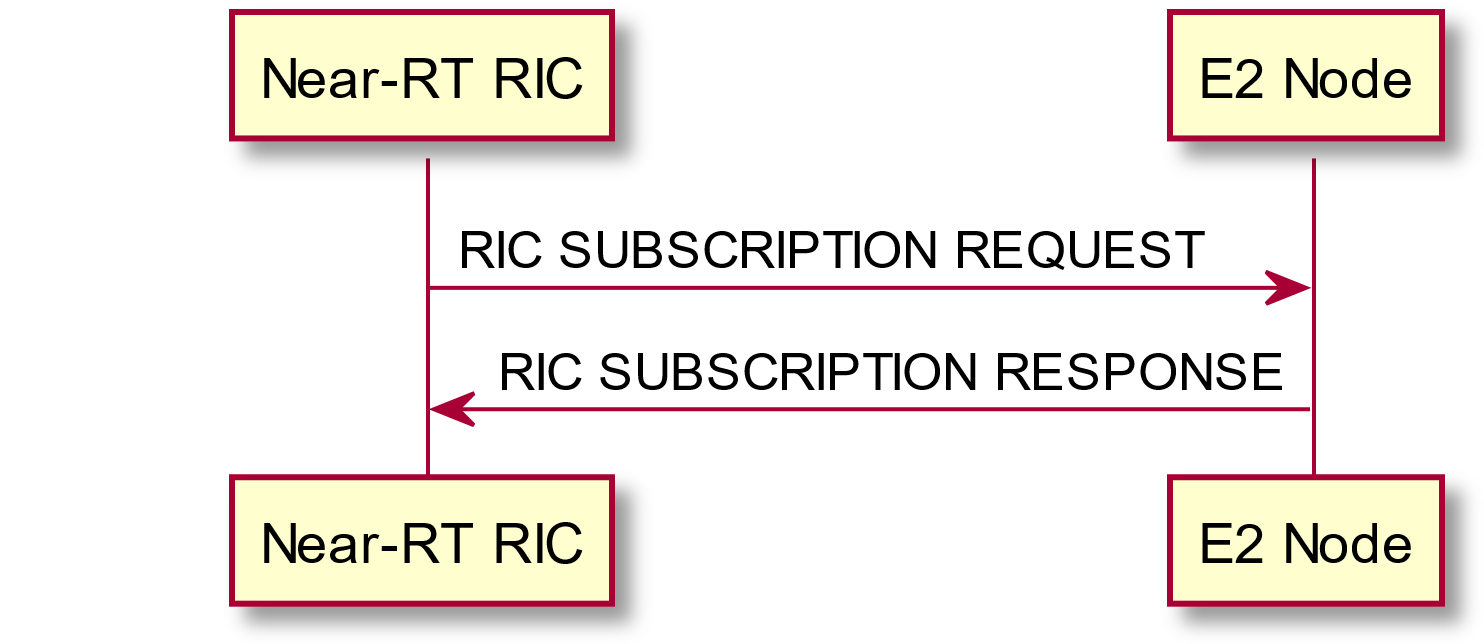


Figure 8.2.1.2-1: Near-RT RIC Subscription procedure, successful operation

The Near-RT RIC initiates the procedure by sending the RIC SUBSCRIPTION REQUEST message containing a unique RIC Request ID to the target E2 Node. When the Near-RT RIC sends the RIC SUBSCRIPTION message, it shall start the timer TRICEVENTcreate.

At reception of the RIC SUBSCRIPTION REQUEST message the target E2 Node shall:

- Determine the target function using the information in the *RAN Function ID* IE and configure the requested event trigger using information in the *RIC Subscription Details* IE.

- If one or more **Report**, **Insert** and/or **Policy** RIC service actions are included in the *RIC Subscription Details* IE then the target function shall validate the event trigger and requested action sequence and, if accepted, store the required *RIC Request ID, RIC Event Trigger Definition* IE and sequence of *RIC Action ID* IE, *RIC Action Type* IE*, RIC Action Definition* IE, if included, and *RIC Subsequent Action* IE, if included.

If the requested trigger and at least one required action are accepted by the target E2 Node, the target E2 Node shall reserve necessary resources and send the RIC SUBSCRIPTION RESPONSE message back to the Near-RT RIC. The target E2 Node shall include in the response message the actions for which resources have been prepared at the target E2 Node in the *RIC Actions Admitted List* IE. The target E2 Node shall include the actions that have not been admitted in the *RIC Actions Not Admitted List* IE with an appropriate cause value.

Upon reception of the RIC SUBSCRIPTION RESPONSE message the Near-RT RIC shall stop the timer TRICEVENTcreate and terminate the Subscription Request procedure.

#### 8.2.1.3 Unsuccessful Operation

@startuml

skinparam ParticipantPadding 50

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

near -> ran: RIC SUBSCRIPTION REQUEST

ran->near: RIC SUBSCRIPTION FAILURE

@enduml

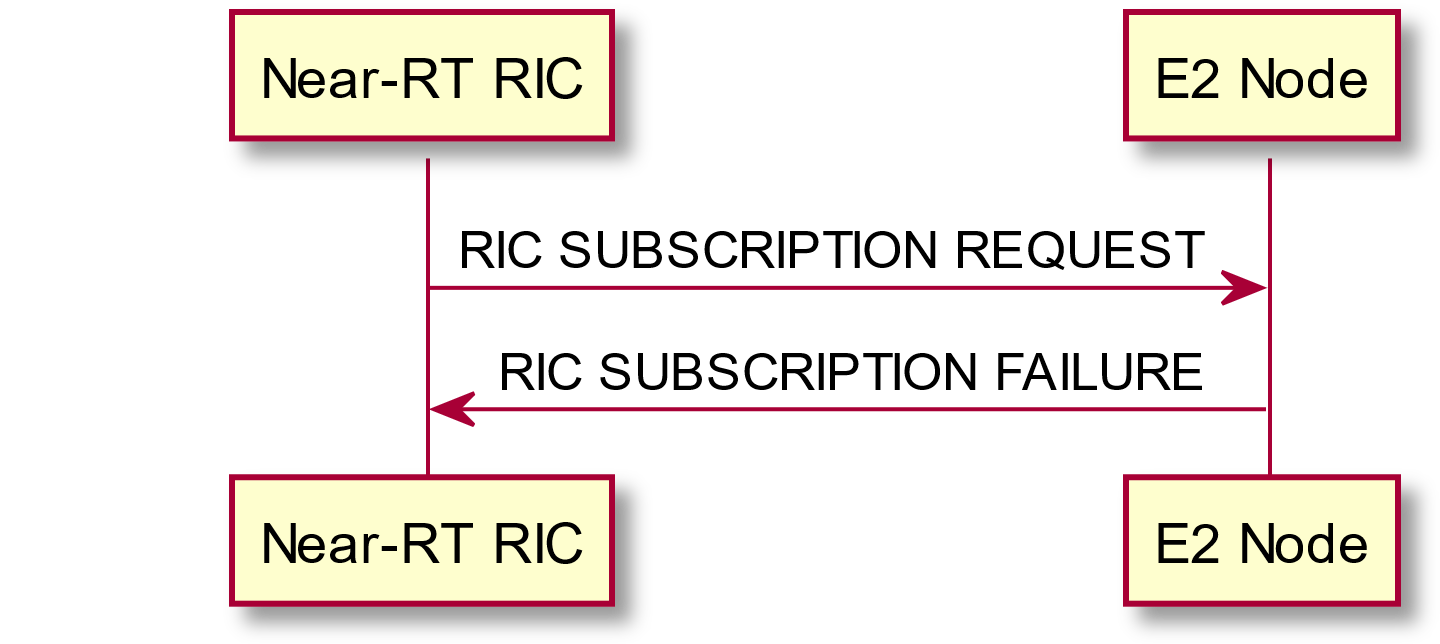


Figure 8.2.1.3-1: Near-RT RIC Subscription procedure, unsuccessful operation

If the target E2 Node does not admit at least one requested action, or detects an inconsistency in the sequence of actions or in the subsequent action definitions, or a failure occurs during the RIC Subscription procedure, the target E2 Node shall send the RIC SUBSCRIPTION FAILURE message to the Near-RT RIC. The E2 Node shall include the *RIC Actions Not Admitted List* IE with an appropriate cause value.

Upon reception of the RIC SUBSCRIPTION FAILURE message the Near-RT RIC shall stop the timer TRICEVENTcreate and terminate the RIC Subscription procedure.

**Interactions with RIC Subscription Delete procedure:**

If there is no response from the target E2 Node to the RIC SUBSCRIPTION REQUEST message before the timer TRICEVENTcreate expires in the Near-RT RIC, the Near-RT RIC shall cancel the RIC Subscription towards the target E2 Node by initiating the RIC Subscription Delete procedure with an appropriate cause value. The Near-RT RIC shall ignore any RIC SUBSCRIPTION RESPONSE or RIC SUBSCRIPTION FAILURE message received after the initiation of the RIC Subscription Delete procedure and remove any reference and release any resources related to the concerned E2.

#### 8.2.1.4 Abnormal Conditions

If the target E2 Node receives a RIC SUBSCRIPTION REQUEST message containing *RIC Subscription Details* IE that does not align with the Near-RT RIC Service Model [3], the target E2 Node shall send the RIC SUBSCRIPTION FAILURE message to the Near-RT RIC with an appropriate cause value.

If the target E2 Node receives a RIC SUBSCRIPTION REQUEST message which contains a *RAN Function ID* IE that was not previously announced as a supported RAN function in the E2 Setup procedure or the RIC Service Update procedure, the target E2 Node shall send the RIC SUBSCRIPTION FAILURE message to the Near-RT RIC with an appropriate cause value.

If the target E2 Node receives a RIC SUBSCRIPTION REQUEST message containing identical contents, that is, same *RAN Function ID* IE, same *RIC Event Trigger Definition* IE and same sequence of actions, the target E2 Node shall send the RIC SUBSCRIPTION FAILURE message to the Near-RT RIC with an appropriate cause value.

### 8.2.2 RIC Subscription Delete procedure

#### 8.2.2.1 General

This procedure is used to delete E2 subscriptions on E2 Node.

#### 8.2.2.2 Successful Operation

@startuml

skinparam ParticipantPadding 50

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

near -> ran: RIC SUBSCRIPTION DELETE REQUEST

ran->near: RIC SUBSCRIPTION DELETE RESPONSE

@enduml

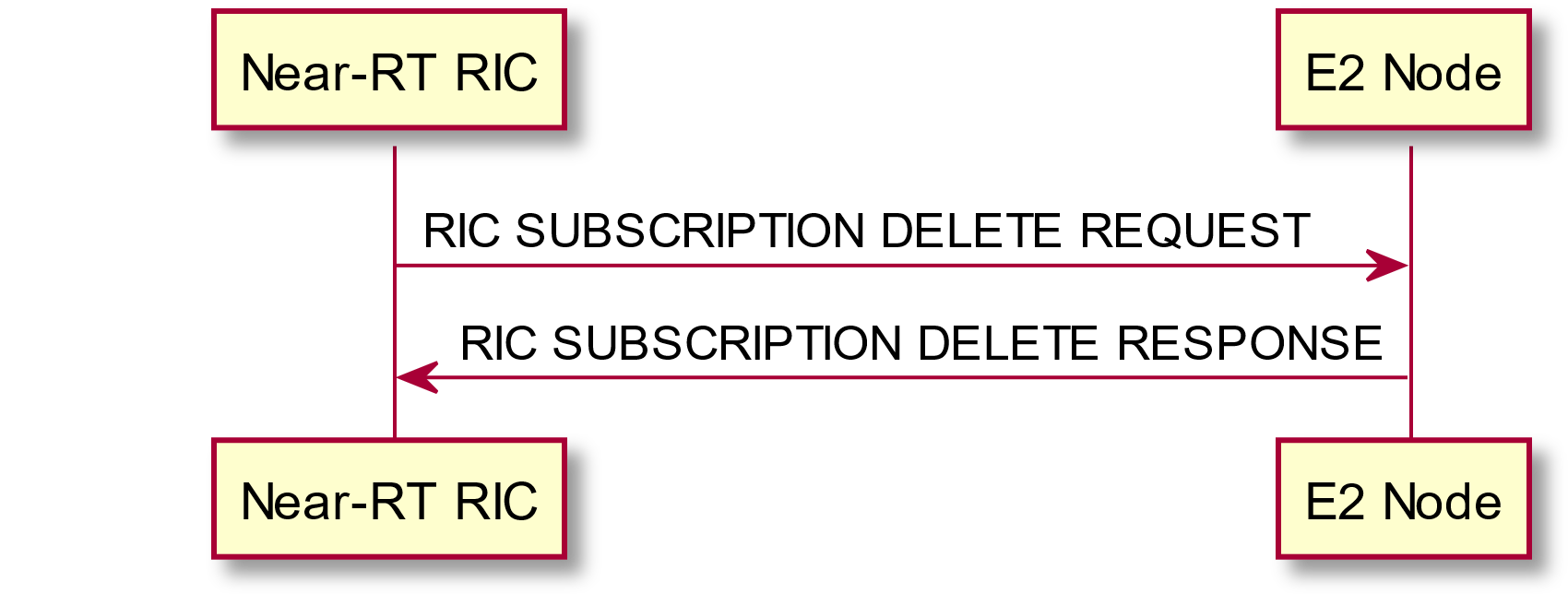


Figure 8.2.1.2-1: Near-RT RIC Subscription Delete procedure, successful operation

The Near-RT RIC initiates the procedure by sending the RIC SUBSCRIPTION DELETE REQUEST message to the target E2 Node. When the Near-RT RIC sends the RIC SUBSCRIPTION DELETE REQUEST message, it shall start the timer TRICEVENTdelete.

At reception of the RIC SUBSCRIPTION DELETE REQUEST message the target E2 Node shall:

- Determine the target function using the information in the *RAN Function ID* IE and delete the corresponding RIC EVENT trigger using information in the *RIC Request ID* IE.

- If one or more subsequent actions were included in the previously received RIC Subscription, then the target function shall delete the required actions along with the corresponding *RIC Request ID* IE.

The target E2 Node shall release necessary resources and send the RIC SUBSCRIPTION DELETE RESPONSE message back to the Near-RT RIC.

Upon reception of the RIC SUBSCRIPTION DELETE RESPONSE message the Near-RT RIC shall stop the timer TRICEVENTdelete, and terminate the RIC Subscription Delete procedure.

#### 8.2.2.3 Unsuccessful Operation

@startuml

skinparam ParticipantPadding 50

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

near -> ran: RIC SUBSCRIPTION DELETE REQUEST

ran->near: RIC SUBSCRIPTION DELETE FAILURE

@enduml

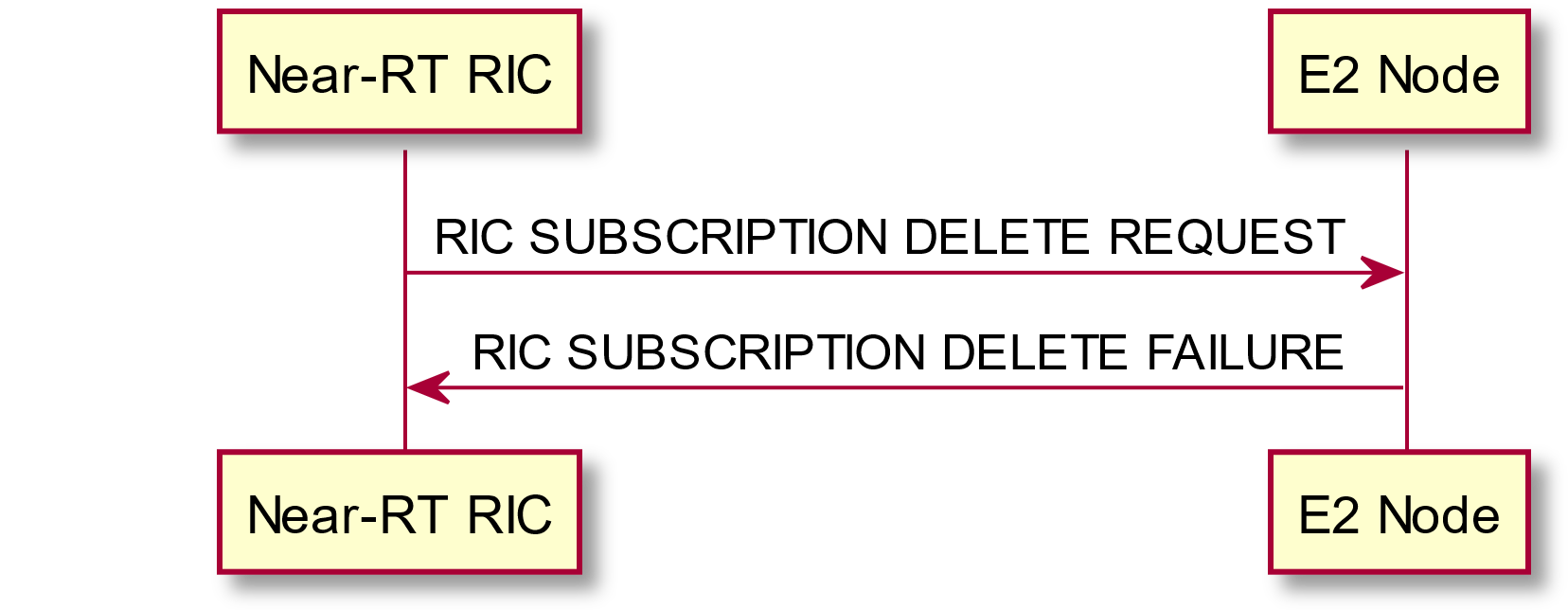


Figure 8.2.1.3-1: RIC Subscription Delete procedure, unsuccessful operation

If the target E2 Node has no stored subscription for the same *RIC Request ID* IE included in the RIC SUBSCRIPTION DELETE REQUEST message, or a failure occurs during the RIC Subscription Delete procedure, the target E2 Node shall send the RIC SUBSCRIPTION DELETE FAILURE message to the Near-RT RIC. The message shall contain with an appropriate cause value.

Upon reception of the RIC SUBSCRIPTION DELETE FAILURE message the Near-RT RIC shall stop the timer TRICEVENTdelete, and terminate the RIC Subscription Delete procedure.

#### 8.2.2.4 Abnormal Conditions

If the target E2 Node receives a RIC SUBSCRIPTION DELETE REQUEST message containing a *RIC Request ID* IE that is not known, the target E2 Node shall send the RIC SUBSCRIPTION DELETE FAILURE message to the Near-RT RIC. The message shall contain with an appropriate cause value.

If the target E2 Node receives a RIC SUBSCRIPTION DELETE REQUEST message contains a *RAN Function ID* IE that was not previously announced as a supported RAN function in the E2 Setup procedure or the RIC Service Update procedure, the target E2 Node shall send the RIC SUBSCRIPTION DELETE FAILURE message to the Near-RT RIC. The message shall contain with an appropriate cause value.

### 8.2.3 RIC Indication procedure

#### 8.2.3.1 General

The purpose of the RIC Indication procedure is to transfer a message associated with a **Report** and/or **Insert** RIC Service to the Near-RT RIC corresponding to a previously successful RIC Subscription procedure and the corresponding detection of the Event Trigger.

#### 8.2.3.2 Successful Operation

@startuml

skinparam ParticipantPadding 50

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran->near: RIC INDICATION

@enduml

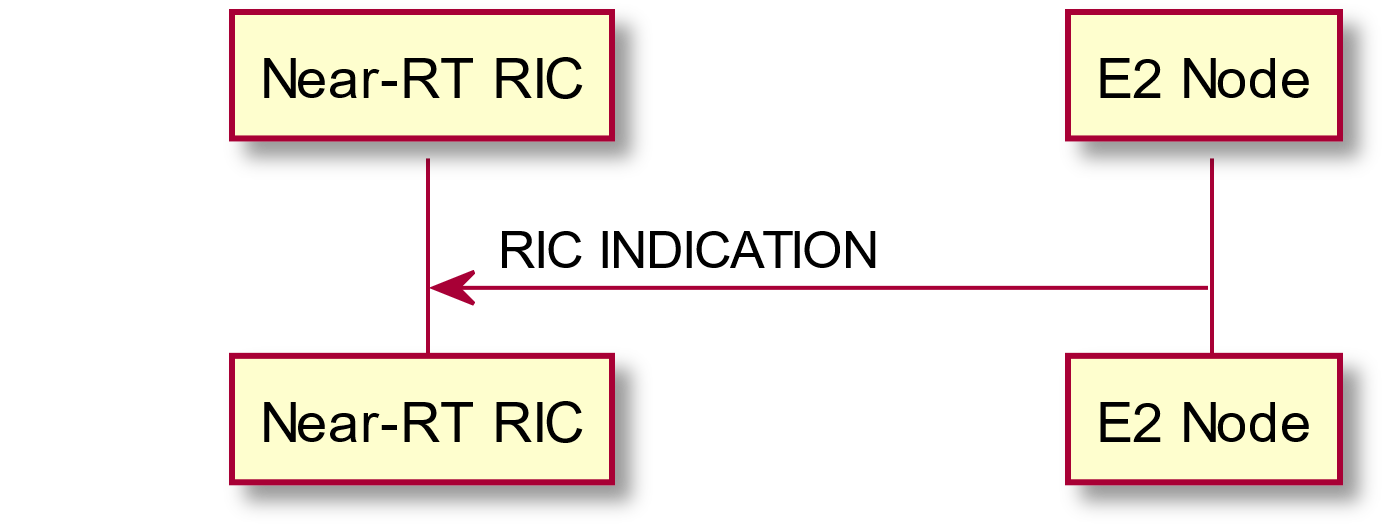


Figure 8.2.3.2-1: Near-RT RIC Indication procedure, successful operation

An E2 Node initiates the procedure by sending RIC INDICATION message containing the associated *RIC Request ID* IE, *RAN Function ID* IE, *RIC Action ID* IE, optionally sequence number *RIC Indication SN* IE, *RIC Indication Type* IE, *RIC Indication Header* IE, *RIC Indication Message* IE and optionally a *RIC Call Process ID* IE to the Near-RT RIC.

- If the *RIC Subsequent Action* *Type* IE was set to Continue or Halt and a non-zero timer value was carried in the *RIC Time to Wait* IE within the *RIC Subsequent Action* IE, then the RIC INDICATION message shall provide the *RIC Call Process ID* IE and the E2 Node shall store current call state and suspend further processing of the associated RAN function.

The receiving Near-RT RIC shall use the *RIC Request ID* IE to route the Indication to the Near-RT RIC functionality that originated the corresponding RIC Subscription procedure.

If present, the receiving Near-RT RIC may use the *RIC Call Process ID* IE in a subsequent RIC Control procedure.

If the E2 Node had stored an associated *RIC Subsequent Action* IE then, after successful transmission of the RIC INDICATION message, the originating E2 Node shall progress accordingly:

- If the *RIC Subsequent Action Type* IE was set to Continue or Halt, the associated *RIC Time to Wait* timer has not yet expired, and a RIC CONTROL REQUEST message is received with the same *RIC Call Process ID* IE, then the E2 Node shall use the RIC CONTROL REQUEST information along with the stored call state and continue to execute any remaining actions in the sequence of RIC Actions defined in the RIC Subscription procedure prior to resuming normal functionality of the associated RAN function.

- If the *RIC Subsequent Action Type* IE was set to Continue and the associated *RIC Time to Wait* timer has expired or was set to zero, then the E2 Node shall use the stored call state and continue to execute any remaining actions in the sequence of RIC Actions defined in the RIC Subscription procedure prior to resuming normal functionality of the associated RAN function.

- If the *RIC Subsequent Action Type* IE was set to Halt and the associated *RIC Time to Wait* timer has expired or was set to zero, then the E2 Node shall abort normal functionality of the associated RAN function. In this case, any remaining actions in the sequence of RIC Actions defined in the RIC Subscription procedure shall also be aborted.

|  |  |  |  |
| --- | --- | --- | --- |
| Subsequent Action | Wait timer | Condition | Outcome |
| Continue or Halt | non-zero | E2 Node detected the event trigger in the *RIC Event Trigger Definition* IE. | RIC INDICATION message shall provide the *RIC Call Process ID* IE and E2 Node shall store current call state and suspend further processing of the associated RAN function. |
| Continue or Halt | not yet expired | E2 Node received the RIC CONTROL REQUEST message with the same *RIC call process ID* IE. | E2 Node shall use the RIC CONTROL information along with the stored call state and continue to execute any remaining actions in the sequence of RIC Actions defined in the RIC Subscription procedure prior to resuming normal functionality of the associated RAN function. |
| Continue | expired or was set to zero |  | E2 Node shall use the stored call state and continue to execute any remaining actions in the sequence of RIC Actions defined in the RIC Subscription procedure prior to resuming normal functionality of the associated RAN function. |
| Halt | expired or was set to zero |  | E2 Node shall abort normal functionality of the associated RAN function. |

Table 8.2.3.2-1: RIC Indication procedure, successful operation

#### 8.2.3.3 Unsuccessful Operation

Not applicable.

#### 8.2.3.4 Abnormal Conditions

Not applicable.

### 8.2.4 RIC Control procedure

#### 8.2.4.1 General

The purpose of the RIC Control procedure is to initiate or resume a specific functionality in the E2 Node.

#### 8.2.4.2 Successful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran<-near: RIC CONTROL REQUEST

ran-->near: RIC CONTROL ACKNOWLEDGE

@enduml

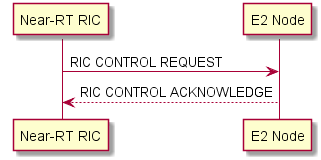


Figure 8.2.4.2-1: RIC Control procedure, successful operation

The Near-RT RIC initiates the procedure by sending the RIC CONTROL REQUEST message containing the associated *RIC Request ID* IE, *RAN Function ID* IE, optionally *RIC Call Process ID* IE, *RIC Control Header* IE, *RIC Control Message* IE and optionally *RIC Control Ack Request* IE to the E2 Node.

When the Near-RT RIC sends the RIC CONTROL REQUEST message and the optional *RIC Control Ack Request* IE has been set to Ack, it shall start the timer TRICcontrol.

At reception of the RIC CONTROL REQUEST message the target E2 Node shall:

- Determine the target function using the information in the *RAN Function ID* IE and initiate the requested RIC Control procedure action using information in the *RIC Control Message* IE.

- If the *RIC Call Process ID* IE is included in the RIC CONTROL REQUEST message, the E2 Node shall use this IE to identify a specific call process that was previously announced in the RIC INDICATION message.

- If the RIC CONTROL REQUEST message contains the *RIC Control Ack Request* IE set to “Ack” and the E2 Node has successfully processed the requested RIC Control procedure action, then the E2 Node shall respond with the RIC CONTROL ACKNOWLEDGE message.

Upon reception of the RIC CONTROL ACKNOWLEDGE message, the Near-RT RIC shall stop the timer TRICcontrol and terminate the RIC Control procedure. The Near-RT RIC may use the information contained in the *RIC Control Status* IE and the optional *RIC Control Outcome* IE to determine subsequent actions.

#### 8.2.4.3 Unsuccessful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran<-near: RIC CONTROL REQUEST

ran->near: RIC CONTROL FAILURE

@enduml

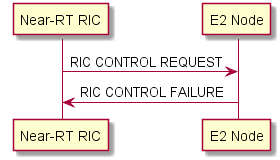


Figure 8.2.4.3-1: RIC Control procedure, unsuccessful operation

If the RIC CONTROL REQUEST message contains an optional *RIC Call Process ID* IE that is invalid or refers to an expired Call Process, then the E2 Node shall respond with a RIC CONTROL FAILURE message with an appropriate cause value.

If the E2 Node fails to perform the requested RIC Control procedure action, then the E2 Node shall respond with the RIC CONTROL FAILURE message with an appropriate cause value.

Upon reception of the RIC CONTROL FAILURE message the Near-RT RIC shall stop the timer TRICcontrol, if running, and terminate the RIC Control procedure.

#### 8.2.4.4 Abnormal Conditions

If the target E2 Node receives a RIC CONTROL REQUEST message which contains a *RAN Function ID* IE that was not previously announced as a supported RAN function in the E2 Setup procedure or the RIC Service Update procedure, or the E2 Node does not support the specific RIC Control procedure action, then the target E2 Node shall ignore message and send an ERROR INDICATION message to the Near-RT RIC.

Upon reception of the ERROR INDICATION message with Cause IE related to the RIC CONTROL REQUEST the Near-RT RIC shall stop the timer TRICcontrol and terminate the RIC Control procedure.

If there is no response from the target E2 Node to the RIC CONTROL REQUEST message with the optional *RIC Control Ack* IE set to Ack before timer TRICcontrol expires in the RIC, the Near-RT RIC should send an ERROR INDICATION with the appropriate value for the *Cause* IE.

## 8.3 Global Procedures

### 8.3.1 E2 Setup procedure

#### 8.3.1.1 General

The purpose of the E2 Setup procedure is to establish the signaling connection between E2 Node and Near-RT RIC. This procedure erases any existing application level configuration data in the two nodes and replaces it by the one received. This procedure also resets the E2 interface like a Reset procedure would do.

Note that this procedure performs the basic interface setup and transfers E2 Node specific configuration information to the Near-RT RIC.

This procedure shall be initiated by the E2 Node.

#### 8.3.1.2 Successful Operation

@startuml

skinparam ParticipantPadding 50

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran->near: E2 SETUP REQUEST

ran<-near: E2 SETUP RESPONSE

@enduml

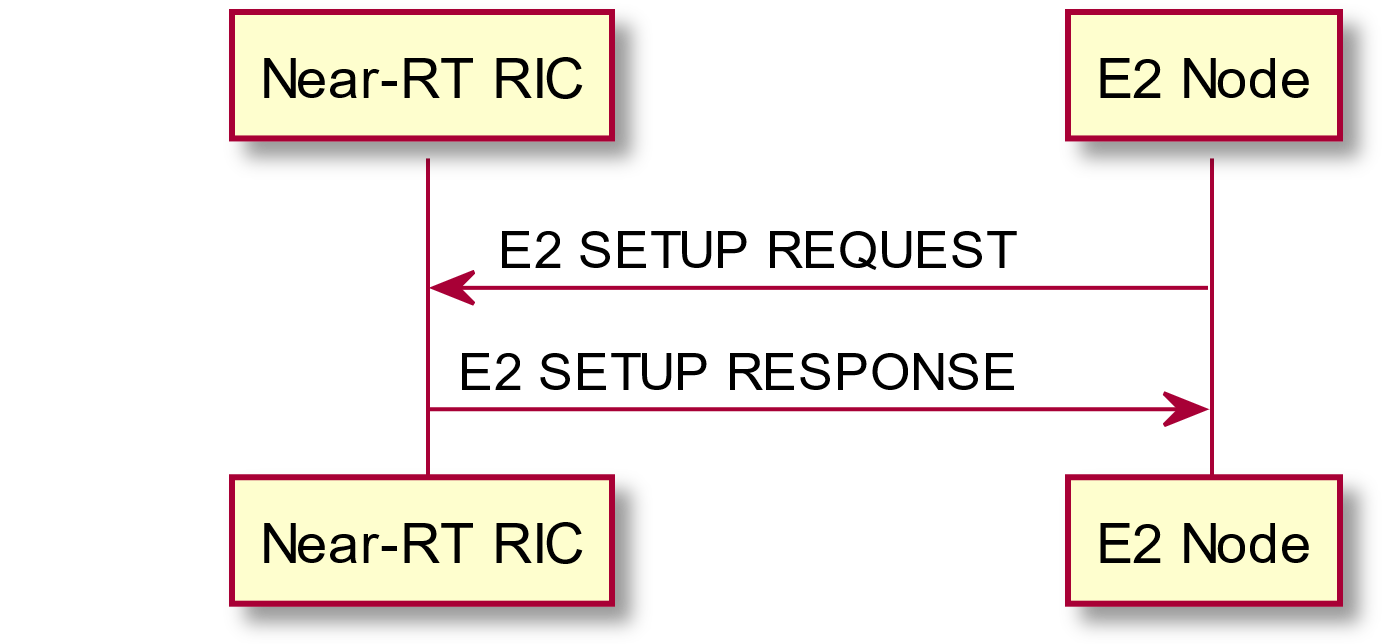


Figure 8.3.1.2-1: E2 Setup procedure, successful operation

An E2 Node initiates the procedure by sending the E2 SETUP REQUEST message including the appropriate data to a Near-RT RIC. The Near-RT RIC replies with the E2 SETUP RESPONSE message including the appropriate data.

If the E2 SETUP REQUEST message contains the optional *List of RAN Functions Added* IE, also present in the RIC SERVICE UPDATE message, and Near-RT RIC has successfully processed the *List of RAN Functions Added* IE, then Near-RT RIC shall respond with the E2 SETUP RESPONSE message which contains the *List of RAN Functions* *Accepted* IE and/or the *List of RAN Functions Rejected* IE, also present in the RIC SERVICE UPDATE ACKNOWLEDGE message.

If the E2 SETUP REQUEST message contains the optional *E2 Node Component Configuration Update List* IE, also present in the E2 NODE CONFIGURATION UPDATE message, and Near-RT RIC has successfully processed this information, then Near-RT RIC shall contain, in the E2 SETUP RESPONSE message, the *E2 Node Component Configuration Update Acknowledge List* IE, also present in the E2 NODE CONFIGURATION UPDATE ACKNOWLEDGE message.

Note that the RIC Service Update procedure is defined in section 8.3.4 and the E2 Node Configuration Update procedure is defined in section 8.3.5.

#### 8.3.1.3 Unsuccessful Operation

@startuml

skinparam ParticipantPadding 50

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran->near: E2 SETUP REQUEST

ran<-near: E2 SETUP FAILURE

@enduml

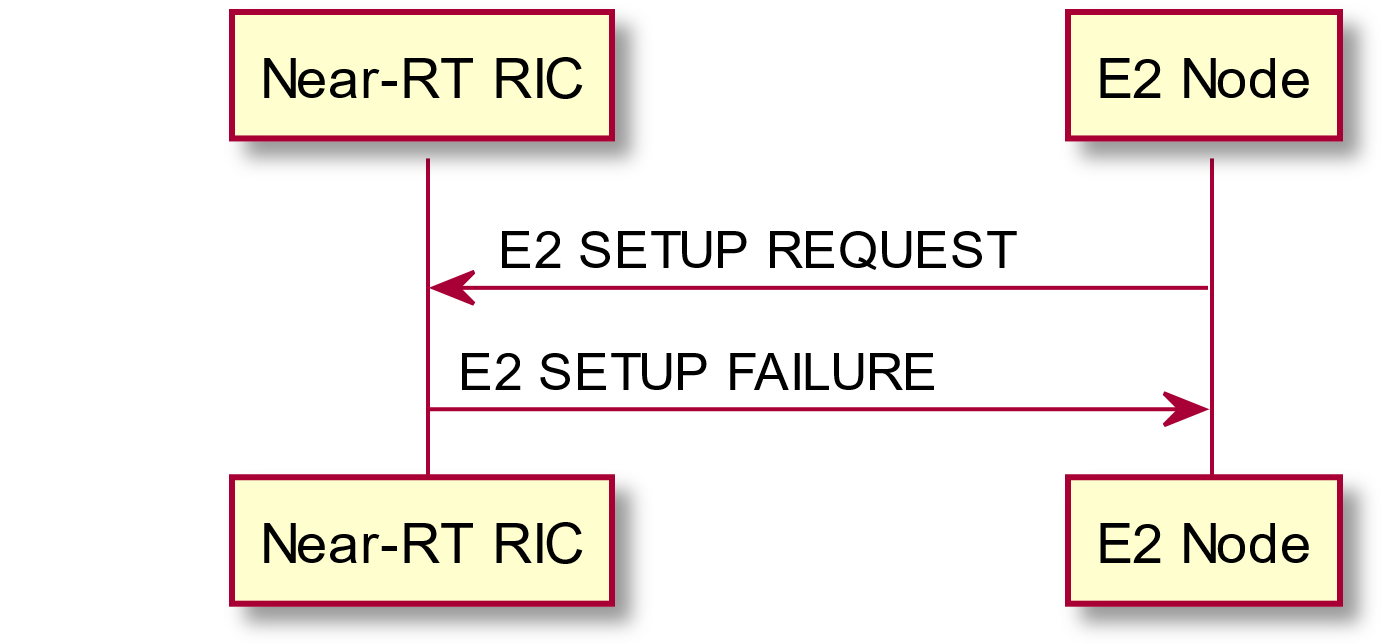


Figure 8.3.1.3-1: E2 Setup procedure, unsuccessful operation

If the Near-RT RIC cannot accept the setup it shall respond with an E2 SETUP FAILURE message with an appropriate cause value. The Near-RT RIC may provide an alternative *Transport Layer Information* IE for the E2 Node to use when reinitiating the E2 Setup procedure towards the Near-RT RIC.

If the E2 SETUP FAILURE message includes the *Time To Wait* IE, the E2 node shall wait at least for the indicated time before reinitiating the E2 Setup procedure towards the Near-RT RIC.

#### 8.3.1.4 Abnormal Conditions

If the first message received for a specific TNL association is not an E2 SETUP REQUEST, E2 SETUP RESPONSE, or E2 SETUP FAILURE message then this shall be treated as a logical error.

If the E2 node does not receive either the E2 SETUP RESPONSE message or the E2 SETUP FAILURE message, the E2 node may reinitiate the E2 Setup procedure towards the same Near-RT RIC using the same TNL association, provided that the content of the new E2 SETUP REQUEST message is identical to the content of the previously unacknowledged E2 SETUP REQUEST message.

### 8.3.2 Reset procedure

#### 8.3.2.1 General

The purpose of the Reset procedure is to align the resources in E2 Node and Near-RT RIC in the event of an abnormal failure. The procedure resets the E2 interface. This procedure doesn’t affect the application level configuration data exchanged during the E2 Setup procedure, E2 Node Configuration Update procedure and RIC Service Update procedure.

#### 8.3.2.2 Successful Operation

This procedure may be initiated by either Near-RT RIC or E2 Node.

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran->near: RESET REQUEST

ran<-near: RESET RESPONSE

@enduml

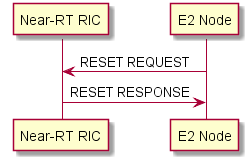


Figure 8.3.2.2-1: Reset, successful operation (E2 Node Initiated)

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran<-near: RESET REQUEST

ran->near: RESET RESPONSE

@enduml

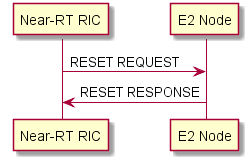


Figure 8.3.2.2-2: Reset, successful operation (Near-RT RIC Initiated)

When the Reset procedure is initiated, the Near-RT RIC and E2 Node shall:

- Delete any pre-established RIC Subscriptions,

- Gracefully terminate any ongoing Near-RT RIC call processes using **INSERT**, **CONTROL** or **POLICY** services while ensuring that impact to ongoing calls for connected UE is minimized.

After the Reset has been completed, the Near-RT RIC shall re-issue any required Subscriptions.

**Interactions with other procedures:**

If the RESET REQUEST message is received, any other ongoing procedure (except for another Reset procedure) on the same E2 interface related to ongoing RIC Services shall be aborted.

#### 8.3.2.3 Unsuccessful Operation

Void.

#### 8.3.2.4 Abnormal Conditions

If the initiating node does not receive the RESET RESPONSE message, the initiating node may reinitiate the Reset procedure towards the same target node, provided that the content of the new RESET REQUEST message is identical to the content of the previously unacknowledged RESET REQUEST message.

### 8.3.3 Error Indication

#### 8.3.3.1 General

The Error Indication procedure is initiated by either the E2 Node or the Near-RT RIC to report detected errors in one incoming message, provided they cannot be reported by an appropriate failure message.

#### 8.3.3.2 Successful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran->near: ERROR INDICATION

@enduml

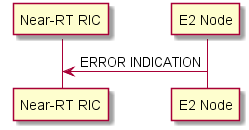


Figure 8.3.3.2-1: Error Indication, (E2 Node initiated) successful operation.

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran<-near: ERROR INDICATION

@enduml

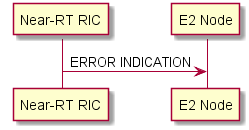


Figure 8.3.3.2-2: Error Indication, (Near-RT RIC Initiated) successful operation.

When the conditions defined in clause 10 are fulfilled, the Error Indication procedure is initiated by an ERROR INDICATION message sent from the node detecting the error situation.

The ERROR INDICATION message shall contain at least either the *Cause* IE or the *Criticality Diagnostics* IE and may include *RAN Function ID* IE and *RIC Request ID* IE.

#### 8.3.3.3 Unsuccessful Operation

Not applicable.

#### 8.3.3.4 Abnormal Conditions

Not applicable.

### 8.3.4 RIC Service Update procedure

#### 8.3.4.1 General

The purpose of the RIC Service Update procedure is to update application level configuration data needed for E2 Node and Near-RT RIC to interoperate correctly over the E2 interface.

#### 8.3.4.2 Successful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran<--near: RIC SERVICE QUERY

ran->near: RIC SERVICE UPDATE

ran<-near: RIC SERVICE UPDATE ACKNOWLEDGE

@enduml

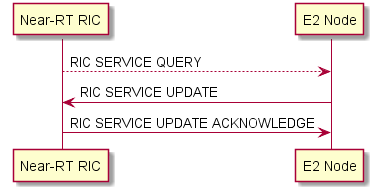


Figure 8.3.4.2-1: RIC Service Update procedure, successful operation

An E2 Node initiates the procedure by sending a RIC SERVICE UPDATE message to the Near-RT RIC. Such message shall include an appropriate set of up-to-date Near-RT RIC service-related configuration data, including, but not limited to, the complete lists of added, modified and deleted supported Near-RT RIC Service functions that E2 Node has just taken into operational use along with a revision counter for each item in each list.

Upon reception of a RIC SERVICE UPDATE message, Near-RT RIC shall update the information for E2 Node as follows:

Update of Supported Near-RT RIC service Information:

- If the *List of RAN Function Added* IE is contained in the RIC SERVICE UPDATE message, Near-RT RIC shall add each listed accepted function information according to the information in the *RAN Function ID* IE and *RAN Function Definition* IE and store the corresponding *RAN Function Revision* IE.

- If the *List of RAN Function Modified* IE is contained in the RIC SERVICE UPDATE message, Near-RT RIC shall modify accepted information of supported functions according to the information in the *RAN Function Definition* IE and update the corresponding *RAN Function Revision* IE.

- If the *List of RAN Function Deleted* IE is contained in the RIC SERVICE UPDATE message, Near-RT RIC shall delete information of RAN Function indicated by the *RAN Function ID* IE along with the corresponding *RAN Function Revision* IE.

These changes may be processed in the Near-RT-RIC and may be used when issuing RIC SUBSCRIPTION REQUEST and RIC CONTROL to provide valid *RAN Function ID* IE.

After successful update of requested information, Near-RT RIC shall reply with the RIC SERVICE UPDATE ACKNOWLEDGE message to inform the initiating E2 Node that the requested update of application data was performed successfully. In case the Near-RT RIC receives a RIC SERVICE UPDATE message without any IE except for *Message Typ*eIE, it shall reply with RIC SERVICE UPDATE ACKNOWLEDGE message without performing any updates to the existing configuration.

Optionally, the RIC SERVICE UPDATE message to the Near-RT RIC may have been sent as a response to the Near-RT RIC initiated RIC SERVICE QUERY message. In this case the E2 Node shall use the Near-RT RIC supplied *RAN Function Accepted* IE to prepare the *RAN Function Added* IE, *RAN Function Modified* IE and/or *RAN Function Deleted* IE to ensure realignment between the E2 Node and the Near-RT RIC in terms of the current list and revision of supported Near-RT RIC Service functions that the E2 Node has just taken into operational use.

#### 8.3.4.3 Unsuccessful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran<--near: RIC SERVICE QUERY

ran->near: RIC SERVICE UPDATE

ran<-near: RIC SERVICE UPDATE FAILURE

@enduml

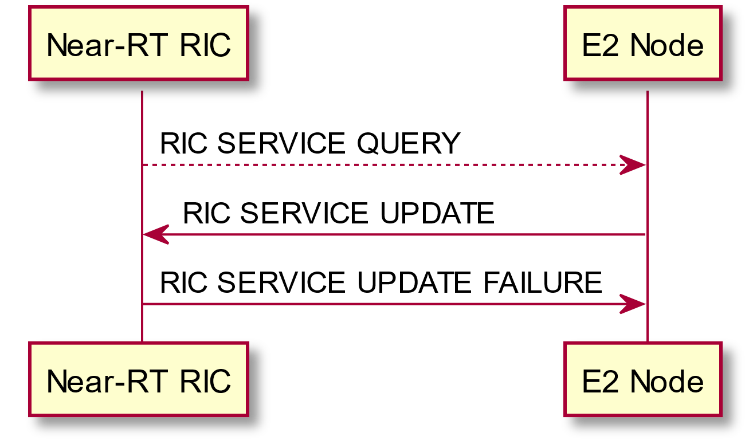


Figure 8.3.4.3-1: RIC Service Update procedure, unsuccessful operation

If the Near-RT RIC cannot accept the update it shall respond with a RIC SERVICE UPDATE FAILURE message and appropriate cause value.

If the RIC SERVICE UPDATE FAILURE message includes the *Time To Wait* IE, the E2 Node shall wait at least for the indicated time before reinitiating the RIC Service Update procedure towards the same Near-RT RIC. Both nodes shall continue to operate the E2 with their existing Near-RT RIC Service data.

#### 8.3.4.4 Abnormal Conditions

If the E2 Node after initiating a RIC Service Update procedure receives neither the RIC SERVICE UPDATE ACKNOWLEDGE message nor the RIC SERVICE UPDATE FAILURE message, the E2 Node may reinitiate the RIC Service Update procedure towards the same Near-RT RIC, provided that the content of the new RIC SERVICE UPDATE message is identical to the content of the previously unacknowledged RIC SERVICE UPDATE message.

If the E2 Node receives a RIC SERVICE QUERY message with one or more unknown entries in the *List of RAN Functions Accepted* IE, then the E2 Node shall ignore this list and resume with a complete list of supported functions.

### 8.3.5 E2 Node Configuration Update procedure

#### 8.3.5.1 General

The purpose of the E2 Node Configuration Update procedure is to update application level E2 Node configuration data needed for E2 Node and Near-RT RIC to interoperate correctly over the E2 interface.

#### 8.3.5.2 Successful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran->near: E2 NODE CONFIGURATION UPDATE

ran<-near: E2 NODE CONFIGURATION UPDATE ACKNOWLEDGE

@enduml

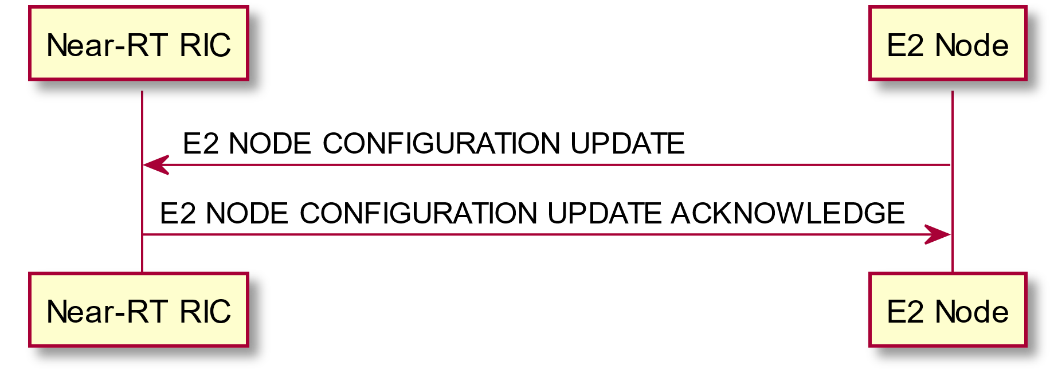


Figure 8.3.5.2-1: E2 Node Configuration Update procedure, successful operation

An E2 Node initiates the procedure by sending a E2 NODE CONFIGURATION UPDATE message to the Near-RT RIC. Such message shall include an appropriate set of up-to-date E2 Node-related configuration data that the E2 Node has just taken into operational use.

Upon reception of the E2 NODE CONFIGURATION UPDATE message, Near-RT RIC shall update the information for the E2 Node as follows:

Update of E2 Node configuration information in Near-RT RIC:

- If *E2 Node Component Configuration Update Item* IE is contained in the E2 NODE CONFIGURATION UPDATE message, Near-RT RIC shall add, modify and/or delete the E2 Node Component Configuration information accordingly.

After successful update of requested information, Near-RT RIC shall reply with the E2 NODE CONFIGURATION UPDATE ACKNOWLEDGE message to inform the initiating E2 Node that the requested update of application data was performed successfully. In case the Near-RT RIC receives a E2 NODE CONFIGURATION UPDATE message without any IE except for *Message Typ*eIE it shall reply with the E2 NODE CONFIGURATION UPDATE ACKNOWLEDGE message without performing any updates to the existing configuration.

#### 8.3.5.3 Unsuccessful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

participant “Near-RT RIC” as near

participant “E2 Node” as ran

ran->near: E2 NODE CONFIGURATION UPDATE

ran<-near: E2 NODE CONFIGURATION UPDATE FAILURE

@enduml

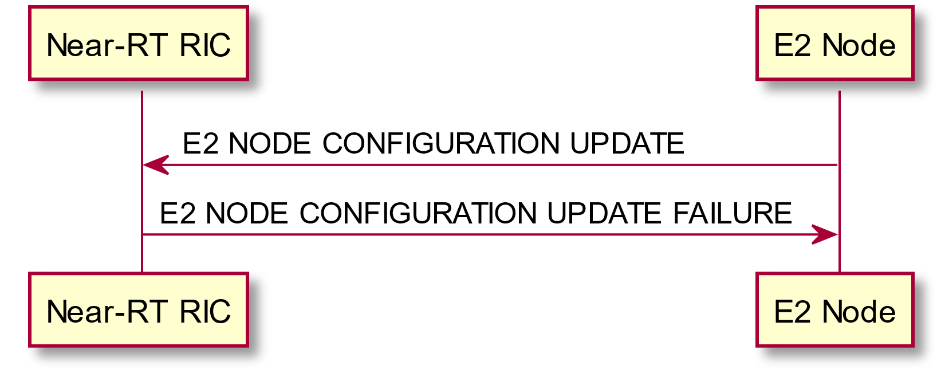


Figure 8.3.5.3-1: E2 Node Configuration Update procedure, unsuccessful operation

If Near-RT RIC cannot accept the E2 NODE CONFIGURATION UPDATE message it shall respond with the E2 NODE CONFIGURATION UPDATE FAILURE message and appropriate cause value.

If the E2 NODE CONFIGURATION UPDATE FAILURE message includes the *Time To Wait* IE the E2 Node shall wait at least for the indicated time before reinitiating the E2 Node Configuration Update procedure towards the same Near-RT RIC. Both nodes shall continue to operate with their existing configuration data.

#### 8.3.5.4 Abnormal Conditions

If an E2 Node, after initiating the E2 Node Configuration Update procedure, receives neither the E2 NODE CONFIGURATION UPDATE ACKNOWLEDGE message nor the E2 NODE CONFIGURATION UPDATE FAILURE message, the E2 Node may reinitiate the E2 Node Configuration Update procedure towards the same Near-RT RIC, provided that the content of the new E2 NODE CONFIGURATION UPDATE message is identical to the content of the previously unacknowledged E2 NODE CONFIGURATION UPDATE message.

### 8.3.6 E2 Connection Update procedure

#### 8.3.6.1 General

The purpose of the E2 Connection Update procedure is to update the E2 interface connection between the E2 Node and Near-RT RIC.

#### 8.3.6.2 Successful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

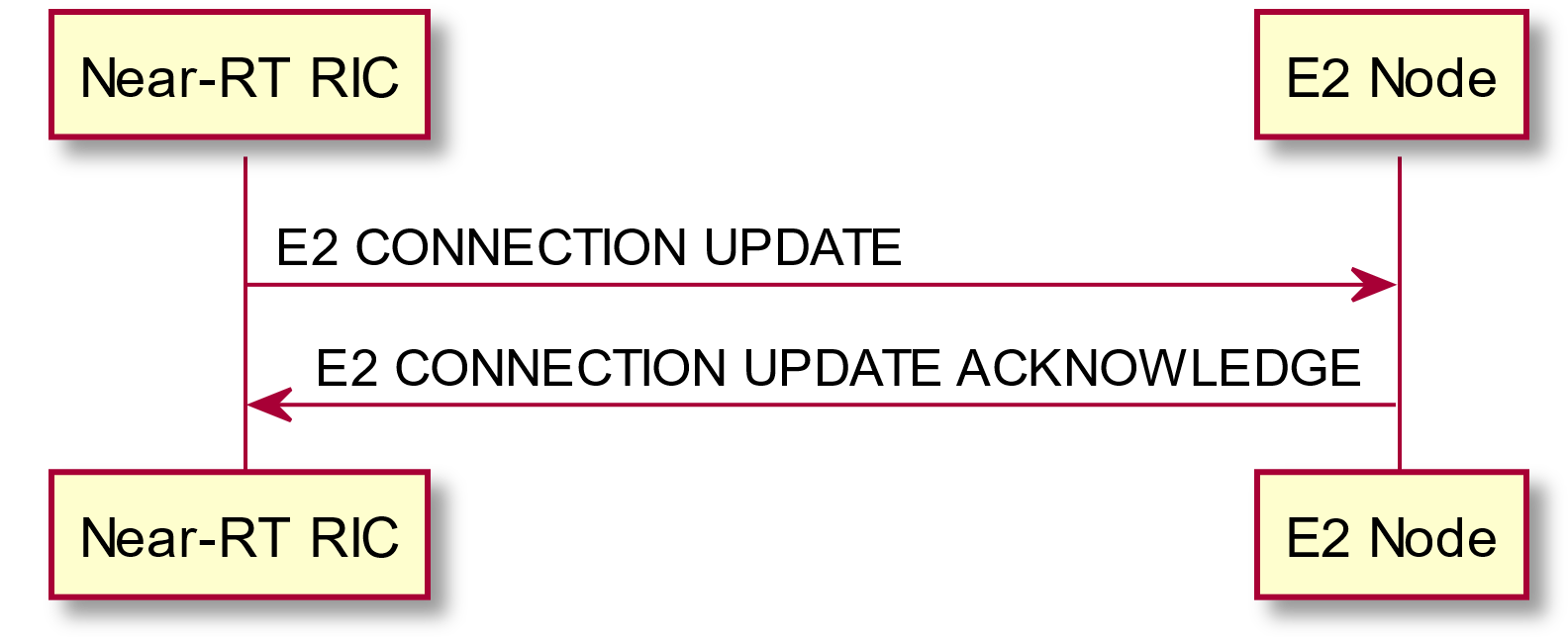
participant “Near-RT RIC” as near

participant “E2 Node” as ran

near->ran: E2 CONNECTION UPDATE

near<-ran: E2 CONNECTION UPDATE ACKNOWLEDGE

@enduml



**Figure 8.3.6.2-1: E2 Connection Update procedure, successful operation**

The Near-RT RIC initiates the procedure by sending a E2 CONNECTION UPDATE message to the E2 Node. Such message shall include an appropriate set of up-to-date E2 interface connection data that the E2 Node shall take into account when modifying the E2 interface connection.

Upon reception of a E2 CONNECTION UPDATE message, the E2 Node shall update as follows:

If *E2 Connection To Add List* IE is contained in the E2 CONNECTION UPDATE message, then the E2 Node shall, if supported, use it to establish additional TNL Association(s) and configure for use for RIC services and/or E2 support functions according to the *TNL Association Usage* IE in the message.

If *E2 Connection To Modify List* IE is contained in the E2 CONNECTION UPDATE message, then the E2 Node shall, if supported, use it to modify the existing usage for RIC services and/or E2 support functions, according to the *TNL Association Usage* IE in the message.

If *E2 Connection To Remove List* IE is contained in the E2 CONNECTION UPDATE message, then the E2 Node shall, if supported, use it to remove the existing connection(s). If only one connection remains after successful removal of other connections, the E2 Node shall use this remaining connection for all the RIC services and E2 support functions.

After successful update of E2 interface connection(s), the E2 Node shall reply with the E2 CONNECTION UPDATE ACKNOWLEDGE message to inform the initiating Near-RT RIC that the requested E2 connection update was performed successfully. In case the E2 Node receives a E2 CONNECTION UPDATE message without any IE except for *Message Typ*eIE, it shall reply with the E2 CONNECTION ACKNOWLEDGE message without performing any updates to the existing connections.

#### 8.3.6.3 Unsuccessful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

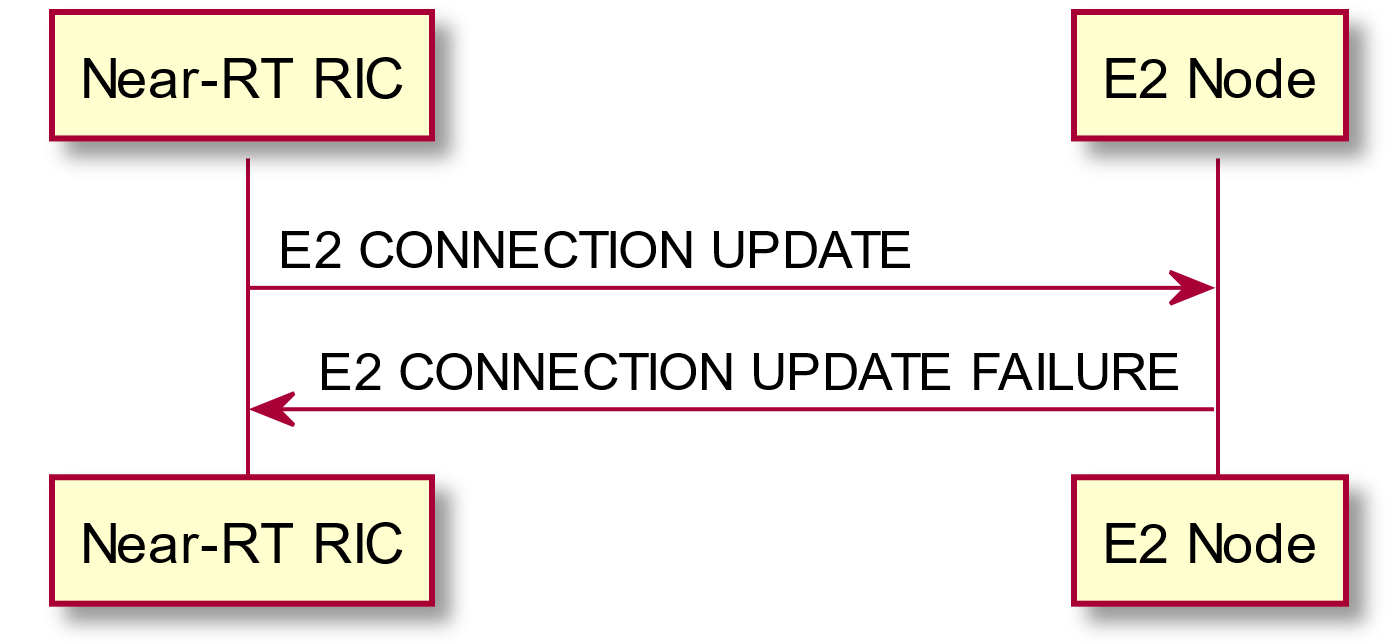
participant “Near-RT RIC” as near

participant “E2 Node” as ran

near->ran: E2 CONNECTION UPDATE

near<-ran: E2 CONNECTION UPDATE FAILURE

@enduml



**Figure 8.3.6.3-1: E2 Connection Update procedure, unsuccessful operation**

If the E2 Node cannot accept the update, it shall respond with a E2 CONNECTION UPDATE FAILURE message and appropriate cause value.

If the E2 CONNECTION UPDATE FAILURE message includes the *Time To Wait* IE, the Near-RT RIC shall wait at least for the indicated time before reinitiating the E2 Connection Update procedure towards the same E2 Node. Both nodes shall continue to operate with their existing connection(s).

#### 8.3.6.4 Abnormal Conditions

If the Near-RT RIC, after initiating E2 Connection Update procedure, receives neither the E2 CONNECTION UPDATE ACKNOWLEDGE message nor the E2 CONNECTION UPDATE FAILURE message, the Near-RT RIC may reinitiate the E2 Connection Update procedure towards the same E2 Node, provided that the content of the new E2 CONNECTION UPDATE message is identical to the content of the previously unacknowledged E2 CONNECTION UPDATE message.

# 9 Elements for E2AP Communication

## 9.0 General

Sub clauses 9.1 and 9.2 describe the structure of the messages and information elements required for the E2AP protocol in tabular format. Sub clause 9.3 provides the corresponding ASN.1 definition.

The following attributes are used for the tabular description of the messages and information elements: Presence, Range Criticality and Assigned Criticality. Their definition and use can be found in TS 36.413 [13].

NOTE: The messages have been defined in accordance to the guidelines specified in TR 25.921 [14].

## 9.1 Message Functional Definition and Content

### 9.1.1 Messages for Near-RT RIC Functional Procedures

9.1.1.1 RIC SUBSCRIPTION REQUEST

This message is sent by the Near-RT RIC to an E2 Node to create a new Subscription in the E2 Node.

Direction: Near-RT RIC → E2 Node.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| RIC Request ID | M |  | 9.2.7 |  | YES | reject |
| RAN Function ID | M |  | 9.2.8 |  | YES | reject |
| RIC Subscription Details | M |  |  |  | YES | reject |
| >RIC Event Trigger Definition | M |  | 9.2.9 |  | - |  |
| >Sequence of Actions |  | 1.. <maxofRICactionID> |  |  | EACH | ignore |
| >>RIC Action ID | M |  | 9.2.10 |  | - |  |
| >>RIC Action Type | M |  | 9.2.11 |  | - |  |
| >>RIC Action Definition | O |  | 9.2.12 |  | - |  |
| >>RIC Subsequent Action | O |  | 9.2.13 |  | - |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofRICActionID | Maximum no. of Actions to be requested by Near-RT RIC. Value is 16. |

9.1.1.2 RIC SUBSCRIPTION RESPONSE

This message is sent by the E2 Node to accept the request from the Near-RT RIC to create a new Subscription in the E2 Node.

Direction: E2 Node → Near-RT RIC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| RIC Request ID | M |  | 9.2.7 |  | YES | reject |
| RAN Function ID | M |  | 9.2.8 |  | YES | reject |
| RIC Actions Admitted List |  | 1.. <maxofRICactionID> |  |  | YES | reject |
| >RIC Action ID | M |  | 9.2.10 |  | - |  |
| RIC Actions Not Admitted List |  | 0.. <maxofRICactionID> |  |  | YES | reject |
| >RIC Action ID | M |  | 9.2.10 |  | - |  |
| >Cause | M |  | 9.2.1 |  | - |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofRICActionID | Maximum no. of Actions to be requested by Near-RT RIC. Value is 16. |

9.1.1.3 RIC SUBSCRIPTION FAILURE

This message is sent by the E2 Node to inform the Near-RT RIC that the request to create a new Subscription in the E2 Node failed.

Direction: E2 Node → Near-RT RIC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| RIC Request ID | M |  | 9.2.7 |  | YES | reject |
| RAN Function ID | M |  | 9.2.8 |  | YES | reject |
| RIC Actions Not Admitted List |  | 1.. <maxofRICactionID> |  |  | YES | reject |
| >RIC Action ID | M |  | 9.2.10 |  | - |  |
| >Cause | M |  | 9.2.1 |  | - |  |
| Criticality Diagnostics | O |  | 9.2.2 |  | YES | ignore |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofRICActionID | Maximum no. of Actions to be requested by Near-RT RIC. Value is 16. |

9.1.1.4 RIC SUBSCRIPTION DELETE REQUEST

This message is sent by the Near-RT RIC to an E2 Node to request the deletion of an existing Subscription in the E2 Node previously created for the Near-RT RIC.

Direction: Near-RT RIC → E2 Node.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| RIC Request ID | M |  | 9.2.7 |  | YES | reject |
| RAN Function ID | M |  | 9.2.8 |  | YES | reject |

9.1.1.5 RIC SUBSCRIPTION DELETE RESPONSE

This message is sent by the E2 Node to accept the request from a Near-RT RIC to delete an existing Subscriptionin the E2 Node

Direction: E2 Node → Near-RT RIC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| RIC Request ID | M |  | 9.2.7 |  | YES | reject |
| RAN Function ID | M |  | 9.2.8 |  | YES | reject |

9.1.1.6 RIC SUBSCRIPTION DELETE FAILURE

This message is sent by the E2 Node to inform the Near-RT RIC that the request to delete an existing Subscription in the E2 Node failed.

Direction: E2 Node → Near-RT RIC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| RIC Request ID | M |  | 9.2.7 |  | YES | reject |
| RAN Function ID | M |  | 9.2.8 |  | YES | reject |
| Cause | M |  | 9.2.1 |  | YES | ignore |
| Criticality Diagnostics | O |  | 9.2.2 |  | YES | ignore |

9.1.1.7 RIC INDICATION

This message is sent by an E2 Node to transfer Report information to a Near-RT RIC.

Direction: E2 Node → Near-RT RIC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| RIC Request ID | M |  | 9.2.7 |  | YES | reject |
| RAN Function ID | M |  | 9.2.8 |  | YES | reject |
| RIC Action ID | M |  | 9.2.10 |  | YES | reject |
| RIC Indication SN | O |  | 9.2.14 |  | YES | reject |
| RIC Indication Type | M |  | 9.2.15 |  | YES | reject |
| RIC Indication Header | M |  | 9.2.17 |  | YES | reject |
| RIC Indication Message | M |  | 9.2.16 |  | YES | reject |
| RIC Call process ID | O |  | 9.2.18 |  | YES | reject |

9.1.1.8 RIC CONTROL REQUEST

This message is sent by a Near-RT RIC to an E2 Node to initiate or resume a control function logic.

Direction: Near-RT RIC → E2 Node.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| RIC Request ID | M |  | 9.2.7 |  | YES | reject |
| RAN Function ID | M |  | 9.2.8 |  | YES | reject |
| RIC Call Process ID | O |  | 9.2.18 |  | YES | reject |
| RIC Control Header | M |  | 9.2.20 |  | YES | reject |
| RIC Control Message | M |  | 9.2.19 |  | YES | reject |
| RIC Control Ack Request | O |  | 9.2.21 |  | YES | reject |

9.1.1.9 RIC CONTROL ACKNOWLEDGE

This message is sent by the E2 Node to inform the Near-RT RIC that the RIC CONTROL REQUEST message was received and to provide information on the outcome of the request.

Direction: E2 Node → Near-RT RIC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| RIC Request ID | M |  | 9.2.7 |  | YES | reject |
| RAN Function ID | M |  | 9.2.8 |  | YES | reject |
| RIC Call process ID | O |  | 9.2.18 |  | YES | reject |
| RIC Control Status | M |  | 9.2.22 |  | YES | reject |
| RIC Control Outcome | O |  | 9.2.25 |  | YES | reject |

9.1.1.10 RIC CONTROL FAILURE

This message is sent by the E2 Node to inform the Near-RT RIC that the RIC CONTROL REQUEST message was failed to be executed.

Direction: E2 Node → Near-RT RIC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| RIC Request ID | M |  | 9.2.7 |  | YES | reject |
| RAN Function ID | M |  | 9.2.8 |  | YES | reject |
| RIC Call process ID | O |  | 9.2.18 |  | YES | reject |
| Cause | M |  | 9.2.1 |  | YES | ignore |
| RIC Control Outcome | O |  | 9.2.25 |  | YES | reject |

### 9.1.2 Messages for Global Procedures

9.1.2.1 ERROR INDICATION

This message is used to indicate that some error has been detected in the E2 Node or Near-RT RIC.

Direction: E2 Node → Near-RT RIC or Near-RT RIC → E2 Node.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.3 |  | YES | ignore |
| RIC Request ID | O |  | 9.2.7 |  | YES | reject |
| RAN Function ID | O |  | 9.2.8 |  | YES | reject |
| Cause | O |  | 9.2.1 |  | YES | ignore |
| Criticality Diagnostics | O |  | 9.2.2 |  | YES | ignore |

9.1.2.2 E2 SETUP REQUEST

This message is sent by an E2 Node to a Near-RT RIC to transfer the initialization information.

Direction: E2 Node 🡪 Near-RT RIC

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** | |
| Message Type | M |  | 9.2.3 |  | YES | reject | |
| Global E2 Node ID | M |  | 9.2.6 |  | YES | reject | |
| **List of RAN Functions Added** |  | *0 .. <maxofRANfunctionID>* |  |  | YES | reject | |
| >RAN Function ID | M |  | 9.2.8 | Id of the declared Function | - |  | |
| >RAN Function Definition | M |  | 9.2.23 | Definition of Function | - |  | |
| >RAN Function Revision | M |  | 9.2.24 | Revision counter | - |  | |
| >RAN Function OID | O |  | 9.2.31 | Object identifier of corresponding E2SM | - |  | |
| **E2 Node Component Configuration Update List** |  | *0..1* |  |  | YES | reject |
| >E2 Node Component Configuration Update Item |  | *1.. <maxofE2nodeComponents>* |  |  | EACH | reject |
| >>E2 Node Component Type | M |  | 9.2.26 | E2 Node component type | - |  |
| >>E2 Node Component ID | O |  | 9.2.32 | E2 Node Component Identifier | - |  |
| >>E2 Node Component Configuration Update | M |  | 9.2.27 | Contents depends on component type | - |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofRANfunctionID | Maximum no. of RAN Functions supported by E2 Node. Value is 256. |
| maxofE2nodeComponents | Maximum no. of E2 Node components supported by E2 Node. Value is 1024 |

9.1.2.3 E2 SETUP RESPONSE

This message is sent by a Near-RT RIC to an E2 Node to transfer the initialization information.

Direction: Near-RT RIC →E2 Node

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** | |
| Message Type | | M |  | 9.2.3 |  | YES | reject | |
| Global RIC ID | | M |  | 9.2.4 |  | YES | reject | |
| List of RAN Functions Accepted | |  | *0 .. <maxofRANfunctionID>* |  | Complete list of Functions accepted by Near-RT RIC | YES | Reject | |
| >RAN Function ID | M | |  | 9.2.8 | Id of the declared Function | - |  | |
| List of RAN Functions Rejected |  | | *0 .. <maxofRANfunctionID>* |  | Complete list of Functions not accepted by Near-RT RIC | YES | reject | |
| >RAN Function ID | M | |  | 9.2.8 | Id of the declared Function | - |  | |
| >Cause | M | |  | 9.2.1 | Reason for not accepting function | - |  | |
| **E2 Node Component Configuration Update Acknowledge List** | |  | *0 .. <maxofE2nodeComponents>* |  | Complete list of E2 Node Components in the E2 SETUP REQUEST message | YES | reject |
| >E2 Node Component Configuration Update Acknowledge Item |  | |  |  |  | EACH | reject |
| >>E2 Node Component Type | M | |  | 9.2.26 | E2 Node component type | - |  |
| >>E2 Node Component ID | O | |  | 9.2.32 | E2 Node Component Identifier | - |  |
| >>E2 Node Component Configuration Update Acknowledge | M | |  | 9.2.28 | Success or failure with Cause | - |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofRANfunctionID | Maximum no. of RAN Functions supported by E2 Node. Value is 256. |
| maxofE2nodeComponents | Maximum no. of E2 Node components supported by E2 Node. Value is 1024 |

9.1.2.4 E2 SETUP FAILURE

This message is sent by the Near-RT RIC to indicate E2 Setup failure.

Direction: Near-RT RIC → E2 Node

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| Cause | M |  | 9.2.1 |  | YES | ignore |
| Time To Wait | O |  | 9.2.5 |  | YES | ignore |
| Criticality Diagnostics | O |  | 9.2.2 |  | YES | Ignore |
| Transport Layer Information | O |  | 9.2.29 |  | YES | ignore |

9.1.2.5 RESET REQUEST

This message is sent from a Near-RT RIC to an E2 Node or from an E2 Node to a Near-RT RIC and is used to request the E2 interface between the E2 node and the Near-RT RIC to be reset.

Direction: Near-RT RIC → E2 Node, or E2 Node → Near-RT RIC

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| Cause | M |  | 9.2.1 |  | YES | ignore |

9.1.2.6 RESET RESPONSE

This message is sent by an E2 Node to a Near-RT RIC or from a Near-RT RIC to an E2 Node as a response to a RESET REQUEST message.

Direction: Near-RT RIC → E2 Node, or E2 Node → Near-RT RIC

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| Criticality Diagnostics | O |  | 9.2.2 |  | YES | ignore |

9.1.2.7 RIC SERVICE UPDATE

This message is sent by an E2 Node to the Near-RT RIC to transfer updated information on RIC Services supported by the E2 Node.

Direction: E2 Node → Near-RT RIC

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| **List of RAN Functions Added** |  | *0 .. <maxofRANfunctionID>* |  |  | YES | reject |
| >RAN Function ID | M |  | 9.2.8 | Id of the declared Function | - |  |
| >RAN Function Definition | M |  | 9.2.23 | Definition of Function | - |  |
| >RAN Function Revision | M |  | 9.2.24 | Revision counter | - |  |
| >RAN Function OID | O |  | 9.2.31 | Object identifier of corresponding E2SM | - |  |
| **List of RAN Functions Modified** |  | *0 .. <maxofRANfunctionID>* |  |  | YES | reject |
| >RAN Function ID | M |  | 9.2.8 | Id of the declared Function | - |  |
| >RAN Function Definition | M |  | 9.2.23 | Definition of Function | - |  |
| >RAN Function Revision | M |  | 9.2.24 | Revision counter | - |  |
| >RAN Function OID | O |  | 9.2.31 | Object identifier of corresponding E2SM | - |  |
| **List of RAN Functions Deleted** |  | *0 .. <maxofRANfunctionID>* |  |  | YES | reject |
| >RAN Function ID | M |  | 9.2.8 | Id of the declared Function | - |  |
| >RAN Function Revision | M |  | 9.2.24 | Revision counter | - |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofRANfunctionID | Maximum no. of Functions accepted by Near-RT RIC. Value is 256. |

9.1.2.8 RIC SERVICE UPDATE ACKNOWLEDGE

This message is sent by the Near-RT RIC to the E2 Node to acknowledge update of RIC Services supported by the E2 Node.

Direction: Near-RT RIC → E2 Node.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** | | |
| Message Type | | M |  | 9.2.3 |  | YES | reject | | |
| List of RAN Functions Accepted |  | | *0 .. <maxofRANfunctionID>* |  | Complete list of Functions accepted by Near-RT RIC | YES | reject | | |
| >RAN Function ID | M | |  | 9.2.8 | Id of the declared Function | - |  | | |
| >RAN Function Revision | | M |  | 9.2.24 | Revision counter | - | |  |
| List of RAN Functions Rejected |  | | *0 .. <maxofRANfunctionID>* |  | Complete list of Functions not accepted by Near-RT RIC | YES | reject | | |
| >RAN Function ID | M | |  | 9.2.8 | Id of the declared Function | - |  | | |
| >Cause | M | |  | 9.2.1 | Reason for not accepting function | - |  | | |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofRANfunctionID | Maximum no. of Functions accepted by Near-RT RIC. Value is 256. |

9.1.2.9 RIC SERVICE UPDATE FAILURE

This message is sent by the Near-RT RIC to the E2 Node to indicate RIC SERVICE Update Failure.

Direction: Near-RT RIC → E2 Node

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M | |  | 9.2.3 |  | YES | reject |
| List of RAN Functions Rejected |  | | *1 .. <maxofRANfunctionID>* |  | Complete list of Functions not accepted by Near-RT RIC | YES | reject |
| >RAN Function ID | M | |  | 9.2.8 | Id of the declared Function | - |  |
| >Cause | M | |  | 9.2.1 | Reason for not accepting function | - |  |
| Time To Wait | | O |  | 9.2.5 |  | YES | ignore |
| Criticality Diagnostics | | O |  | 9.2.2 |  | YES | ignore |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofRANfunctionID | Maximum no. of Functions accepted by Near-RT RIC. Value is 256. |

9.1.2.10 RIC SERVICE QUERY

This message is sent by a Near-RT RIC to an E2 Node to request a E2 Node initiated RIC Service Update procedure.

Direction: Near-RT RIC → E2 Node.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | | M |  | 9.2.3 |  | YES | reject |
| List of RAN Functions Accepted |  | | *0 .. <maxofRANfunctionID>* |  | Complete list of Functions previously accepted by Near-RT RIC | YES | reject |
| >RAN Function ID | M | |  | 9.2.8 | Id of the declared Function | - |  |
| >RAN Function Revision | M | |  | 9.2.24 | Revision counter | - |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofRANfunctionID | Maximum no. of Functions accepted by Near-RT RIC. Value is 256. |

9.1.2.11 E2 NODE CONFIGURATION UPDATE

This message is sent by an E2 Node to the Near-RT RIC to transfer updated information on the E2 Node Configuration information.

Direction: E2 Node → Near-RT RIC

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| **E2 Node Component Configuration Update List** |  | *0 .. <maxofE2nodeComponents>* |  |  | YES | reject |
| >E2 Node Component Configuration Update Item |  |  |  |  | EACH | reject |
| >>E2 Node Component Type | M |  | 9.2.26 | E2 Node component type | - |  |
| >>E2 Node Component ID | O |  | 9.2.32 | E2 Node Component Identifier | - |  |
| >>E2 Node Component Configuration Update | M |  | 9.2.27 | Contents depends on component type | - |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofE2nodeComponents | Maximum no. of E2 Node components supported by E2 Node. Value is 1024. |

9.1.2.12 E2 NODE CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by Near-RT RIC to E2 Node to acknowledge update of E2 Node Configuration supported by the E2 Node.

Direction: Near-RT RIC → E2 Node.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| **E2 Node Component Configuration Update Acknowledge List** |  | *0 .. <maxofE2nodeComponents>* |  |  | YES | reject |
| >E2 Node Component Configuration Update Acknowledge Item |  |  |  |  | EACH | reject |
| >>E2 Node Component Type | M |  | 9.2.26 | E2 Node component type | - |  |
| >>E2 Node Component ID | O |  | 9.2.32 | E2 Node Component Identifier | - |  |
| >>E2 Node Component Configuration Update Acknowledge | M |  | 9.2.28 | Success or failure with Cause | - |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofE2nodeComponents | Maximum no. of E2 Node components supported by E2 Node. Value is 1024. |
|  |  |

9.1.2.13 E2 NODE CONFIGURATION UPDATE FAILURE

This message is sent by Near-RT RIC to E2 Node to indicate RAN Configuration Update Failure.

Direction: Near-RT RIC → E2 Node

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| Cause | M |  | 9.2.1 | Cause | YES | reject |
| Time To Wait | O |  | 9.2.5 |  | YES | ignore |
| Criticality Diagnostics | O |  | 9.2.2 |  | YES | ignore |

9.1.2.14 E2 CONNECTION UPDATE

This message is sent by Near-RT RIC to E2 Node to initiate update of E2 Connection supported by the E2 Node.

Direction: Near-RT RIC  E2 Node.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| **E2 Connection To Add List** |  | *0..1* |  |  | YES | ignore |
| >E2 Connection to Add Item IEs |  | *1 .. <maxofTNLA>* |  |  | EACH | ignore |
| >>Transport Layer Information | M |  | 9.2.29 | Transport layer address and port number of Near-RT RIC |  |  |
| >>TNL Association Usage | M |  | 9.2.30 | Indicates how E2 connection is to be used |  |  |
| **E2 Connection To Remove List** |  | *0..1* |  |  | YES | ignore |
| >E2 Connection to Remove Item IEs |  | *1 .. <maxofTNLA>* |  |  | EACH | ignore |
| >>Transport Layer Information | M |  | 9.2.29 | Transport layer address and port number of Near-RT RIC |  |  |
| **E2 Connection To Modify List** |  | *0..1* |  |  | YES | ignore |
| >E2 Connection to Modify Item IEs |  | *1 .. <maxofTNLA>* |  |  | EACH | ignore |
| >>Transport Layer Information | M |  | 9.2.29 | Transport layer address and port number of Near-RT RIC |  |  |
| >>TNL Association Usage | M |  | 9.2.30 | Indicates how E2 connection is to be used |  |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofTNLA | Maximum no. of TNL Associations supported by E2 Node. Value is 32. |
|  |  |

9.1.2.15 E2 CONNECTION UPDATE ACKNOWLEDGE

This message is sent by E2 Node to the Near-RT RIC to acknowledge update of E2 Connection supported by the E2 Node.

Direction: E2 Node  Near-RT RIC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| **E2 Connection Setup List** |  | *0..1* |  |  | YES | ignore |
| >E2 Connection Setup Item IEs |  | *1 .. <maxofTNLA>* |  |  | EACH | ignore |
| >>Transport Layer Information | M |  | 9.2.29 | Transport layer address and port number of Near-RT RIC |  |  |
| >>TNL Association Usage | M |  | 9.2.30 | Indicates how E2 connection is to be used |  |  |
| **E2 Connection Failed to Setup List** |  | *0..1* |  |  | YES | ignore |
| >E2 Connection failed to setup Item IEs |  | *1 .. <maxofTNLA>* |  |  | EACH | ignore |
| >>Transport Layer Information | M |  | 9.2.29 | Transport layer address and port number of Near-RT RIC |  |  |
| >>Cause | M |  | 9.2.1 |  |  |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxofTNLA | Maximum no. of TNL Associations supported by E2 Node. Value is 32. |
|  |  |

9.1.2.16 E2 CONNECTION UPDATE FAILURE

This message is sent by E2 Node to the Near-RT RIC to inform failure of the requested E2 Connection updates.

Direction: E2 Node  Near-RT RIC.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M | |  | 9.2.3 |  | YES | reject |
| Cause | M | |  | 9.2.1 |  | YES | reject |
| Time To Wait | | O |  | 9.2.5 |  | YES | ignore |
| Criticality Diagnostics | | O |  | 9.2.2 |  | YES | ignore |

## 9.2 Information Element definitions

### 9.2.0 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.

### 9.2.1 Cause

The purpose of the *Cause* IE is to indicate the reason for a particular event for the E2AP protocol.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE Type and Reference** | **Semantics Description** |
| CHOICE *Cause Group* | M |  |  |  |
| >RIC services |  |  |  |  |
| >>RIC Request | O |  | ENUMERATED  (RAN Function ID Invalid, Action not supported, Excessive actions, Duplicate action, Duplicate Event Trigger, Function resource limit, RIC Request ID unknown, Inconsistent Action/subsequent Action sequence, Control message invalid, RIC Call process ID Invalid, unspecified, …) |  |
| >>RIC Service | O |  | ENUMERATED  (Function Not Required, Excessive functions, RIC Resource Limit,…) |  |
| *>Transport Layer* |  |  |  |  |
| >>Transport Layer Cause | M |  | ENUMERATED (Unspecified, Transport Resource Unavailable, ...) |  |
| *>Protocol* |  |  |  |  |
| >>Protocol Cause | M |  | ENUMERATED (Transfer Syntax Error, Abstract Syntax Error (Reject), Abstract Syntax Error (Ignore and Notify), Message not Compatible with Receiver State,  Semantic Error,  Abstract Syntax Error (Falsely Constructed Message), Unspecified, ...) |  |
| *>Misc* |  |  |  |  |
| >>Miscellaneous Cause | M |  | ENUMERATED (Control Processing Overload, Hardware Failure, O&M Intervention, Unspecified, ...) |  |

The meaning of the different cause values is described in the following table. In general, "not supported" cause values indicate that the related capability is missing. On the other hand, "not available" cause values indicate that the related capability is present, but insufficient resources were available to perform the requested action.

|  |  |
| --- | --- |
| RIC Service cause | Meaning |
| Unspecified | Sent for RIC service cause when none of the specified cause values applies. |
| RAN Function ID Invalid | Requested function Id invalid or not known by E2 Node |
| Action not supported | Requested Action not supported by RAN function |
| Excessive actions | Excessive number of actions requested for RAN Function |
| Duplicate action | Same action requested more than once in same subscription request |
| Duplicate Event Trigger | Subscription request has same event trigger as previously accepted subscription request |
| Function resource limit | RAN function has reached resource limit |
| RIC Request ID unknown | RIC Request ID sent to Near-RT RIC is unknown |
| Inconsistent Action/subsequent Action sequence | RAN Function has detected inconsistent sequence of requested Action and Subsequent Action |
| Control message invalid | RAN Function has detected invalid RIC CONTROL REQUEST message |
| RIC Call process ID Invalid | RAN function has detected invalid RIC Call Process ID in RIC CONTROL REQUEST |

|  |  |
| --- | --- |
| Transport Layer cause | Meaning |
| Unspecified | Sent when none of the above cause values applies but still the cause is Transport Network Layer related. |
| Transport Resource Unavailable | The required transport resources are not available. |

|  |  |
| --- | --- |
| **Protocol cause** | **Meaning** |
| Transfer Syntax Error | The received message included a transfer syntax error. |
| Abstract Syntax Error (Reject) | The received message included an abstract syntax error and the concerning criticality indicated "reject". |
| Abstract Syntax Error (Ignore And Notify) | The received message included an abstract syntax error and the concerning criticality indicated "ignore and notify". |
| Message Not Compatible With Receiver State | The received message was not compatible with the receiver state. |
| Semantic Error | The received message included a semantic error. |
| Abstract Syntax Error (Falsely Constructed Message) | The received message contained IEs or IE groups in wrong order or with too many occurrences. |
| Unspecified | Sent when none of the above cause values applies but still the cause is Protocol related. |

| **Miscellaneous cause** | **Meaning** |
| --- | --- |
| Control Processing Overload | Control processing overload. |
| Not EnoughUser Plane Processing Resources Available | No enough resources are available related to user plane processing. |
| Hardware Failure | Action related to hardware failure. |
| O&M Intervention | The action is due to O&M intervention. |
| Unspecified Failure | Sent when none of the above cause values applies and the cause is not related to any of the categories Radio Network Layer, Transport Network Layer, NAS or Protocol. |

### 9.2.2 Criticality Diagnostics

The *Criticality Diagnostics* IE is sent by the E2 Node or the Near-RT RIC when parts of a received message have not been comprehended or were missing, or if the message contained logical errors. When applicable, it contains information about which IEs were not comprehended or were missing.

For further details on how to use the *Criticality Diagnostics* IE, (see clause 10). The conditions for inclusion of the *Transaction ID* IE are described in clause 10.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| Procedure Code | O |  | INTEGER (0..255) | Procedure Code is to be used if Criticality Diagnostics is part of Error Indication procedure, and not within the response message of the same procedure that caused the error. |
| Triggering Message | O |  | ENUMERATED(initiating message, successful outcome, unsuccessful outcome) | The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication procedure. |
| Procedure Criticality | O |  | ENUMERATED(reject, ignore, notify) | This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure). |
| RIC Request ID | O |  | 9.2.7 |  |
| **Information Element Criticality Diagnostics** |  | *0 .. <maxnoof Errors>* |  |  |
| >IE Criticality | M |  | ENUMERATED(reject, ignore, notify) | The IE Criticality is used for reporting the criticality of the triggering IE. The value 'ignore' shall not be used. |
| >IE ID | M |  | INTEGER (0..65535) | The IE ID of the not understood or missing IE. |
| >Type of Error | M |  | ENUMERATED(not understood, missing, ...) |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxnoofErrors | Maximum no. of IE errors allowed to be reported with a single message. The value for maxnoofErrors is 256. |

### 9.2.3 Message Type

The *Message Type* IE uniquely identifies the message being sent. It is mandatory for all messages.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| **Message Type** |  |  |  |  |
| >Procedure Code | M |  | INTEGER (0..255) |  |
| >Type of Message | M |  | CHOICE (Initiating Message, Successful Outcome, Unsuccessful Outcome, ...) |  |

### 9.2.4 Global RIC ID

This IE is used to globally identify an Near-RT RIC.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| PLMN Identity | M |  | 3GPP 38.423 clause 9.2.2.4 |  |
| Near-RT RIC ID | M |  | BIT STRING (SIZE(20)) |  |

### 9.2.5 Time to wait

This IE defines the minimum allowed waiting times.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| Time to wait | M |  | ENUMERATED(1s, 2s, 5s, 10s, 20s, 60s) |  |

### 9.2.6 Global E2 Node ID

This IE is used to globally identify an E2 node.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| CHOICE *Global E2 Node* | M |  |  |  |
| *>gNB* |  |  |  |  |
| >>Global gNB ID | M |  | 3GPP 38.423 clause 9.2.2.1 |  |
| >>gNB-CU-UP ID | O |  | 3GPP 38.463 clause 9.3.1.15 |  |
| >>gNB-DU ID | O |  | 3GPP 38.473 clause 9.3.1.9 |  |
| >en-gNB |  |  |  |  |
| >>Global en-gNB ID |  |  | 3GPP 36.423 clause 9.2.112 |  |
| >*ng-eNB* |  |  |  |  |
| >>Global ng-eNB ID | M |  | 3GPP 38.423 clause 9.2.2.2 |  |
| >eNB |  |  |  |  |
| >>Global eNB ID | M |  | 3GPP 36.423 clause 9.2.22 |  |

### 9.2.7 RIC Request ID

This information element indicates the REQUEST ID number.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Requestor ID | M |  | INTEGER (0.. 65535) |  |
| RIC Instance ID | M |  | INTEGER (0..65535) |  |

### 9.2.8 RAN Function ID

This information element indicates the RAN Function ID number, to be unique within a given E2 Node.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RAN Function ID | M |  | INTEGER (0..4095) | Value 0 reserved for Near-RT RIC internal usage |

### 9.2.9 RIC Event Trigger Definition

This information element indicates the RIC event trigger description used by the RIC Subscription procedure.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Event Trigger Definition | M |  | OCTET STRING | Defined in RAN Function specific E2 Service Model [3] |

### 9.2.10 RIC Action ID

This information element indicates the Action ID number, to be unique within the given RIC Request ID.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Action ID | M |  | INTEGER (0..255) |  |

### 9.2.11 RIC Action Type

This IE defines the type of action to be executed.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Action Type | M |  | ENUMERATED (Insert, Report, Policy, …) |  |

### 9.2.12 RIC Action Definition

This information element provides parameters to used when executed a **REPORT**, **INSERT** or **POLICY** service.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Action Definition | M |  | OCTET STRING | Defined in RAN Function specific E2 Service Model [3] |

### 9.2.13 RIC Subsequent Action

This IE defines the subsequent action to be taken after completing a particular Action. Shall be present when RIC Action Type set to **Insert**.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Subsequent Action Type | M |  | ENUMERATED (Continue, Halt, …) |  |
| RIC Time to Wait | O |  | ENUMERATED (zero, 1ms, 2ms, 5ms, 10ms, 20ms, 30ms, 40ms, 50ms, 100ms, 200ms, 500ms, 1s, 2s, 5s, 10s, 20s, 60s, …) | Required when required Wait greater than zero. |

### 9.2.14 RIC Indication Sequence Number (SN)

This information element indicates the Indication Sequence Number (SN).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Indication SN | M |  | INTEGER (0..65535) |  |

### 9.2.15 RIC Indication Type

This IE defines the Indication Type.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Indication Type | M |  | ENUMERATED (Insert, Report, …) |  |

### 9.2.16 RIC Indication message

This information element carries the RIC indication message used for INSERT and REPORT procedures.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Indication message | M |  | OCTET STRING | Defined in RAN Function specific E2 Service Model [3] |

### 9.2.17 RIC Indication header

This information element carries the RIC indication header used for INSERT and REPORT procedures.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Indication header | M |  | OCTET STRING | Defined in RAN Function specific E2 Service Model [3] |

### 9.2.18 RIC Call Process ID

This information element carries the RIC Call Process ID, meaning shall be unique within a given Function on a given E2 Node.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Call Process ID | M |  | OCTET STRING | Defined in RAN Function specific E2 Service model [3] |

### 9.2.19 RIC Control message

This information element carries the RIC control message for the RIC CONTROL procedure.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Control Message | M |  | OCTET STRING | Defined in RAN Function specific E2 Service model [3] |

### 9.2.20 RIC Control header

This information element carries the RIC control header used for CONTROL procedures.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Control header | M |  | OCTET STRING | Defined in RAN Function specific E2 Service Model [3] |

### 9.2.21 RIC Control Ack Request

This IE defines whether and when the RIC CONTROL ACKNOWLEDGE message should be replied as described in the below table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Control Ack Request | M |  | ENUMERATED (NoAck, Ack, NAck, …) |  |

The meaning of the different values is described in the following table.

|  |  |
| --- | --- |
| RIC Service cause | Meaning |
| NoAck | Optional RIC Control Acknowledgement is not required |
| Ack | Optional RIC Control Acknowledgement is required |
| NAck | Optional RIC Control Acknowledgement is only required to report failure |

### 9.2.22 RIC Control Status

This IE defines the status of the requested RIC Control procedure.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Control Status | M |  | ENUMERATED (Success, Rejected, Failed …) |  |

### 9.2.23 RAN Function Definition

This information element carries the RAN Function Definition.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RAN Function Definition | M |  | OCTET STRING | Defined in RAN Function specific E2 Service Model [3] |

### 9.2.24 RAN Function Revision

This information element carries the RAN Function Revision.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RAN Function Revision | M |  | INTEGER (0..4095) |  |

### 9.2.25 RIC Control Outcome

This information element carries the RIC Control Outcome.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RIC Control Outcome | M |  | OCTET STRING | Defined in RAN Function specific E2 Service Model [3] |

### 9.2.26 E2 Node Component Type

This IE is used to identify an E2 node component type.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| E2 node component type | M |  | ENUMERATED (gNB, gNB-CU-UP, gNB-DU, en-gNB, eNB, ng-eNB, …) |  |

### 9.2.27 E2 Node Component Configuration Update

This IE is used to carry the E2 Node component configuration update information of a specific E2 Node component. In all cases the information is a data structure defined by the appropriate 3GPP specification and carried as an OCTET STRING.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| CHOICE *E2 node component type* | M |  |  |  |
| *>gNB* |  |  |  |  |
| >>NGAP gNB-CU-CP configuration update | O |  | OCTET STRING | Content defined by 3GPP 38.413 clause 9.2.6.4 |
| >> XnAP gNB CU-CP configuration update | O |  | OCTET STRING | Content defined by 3GPP 38.423 clause 9.1.3.4 |
| >>E1AP gNB-CU-UP configuration update | O |  | OCTET STRING | Content defined by 3GPP 38.463 clause 9.2.1.10 |
| >>F1AP gNB-DU configuration update | O |  | OCTET STRING | Content defined by 3GPP 38.473 clause 9.2.1.7 |
| >en-gNB |  |  |  |  |
| >>X2AP en-gNB configuration update | O |  | OCTET STRING | Content defined by 3GPP 36.423 clause 9.1.2.8 |
| >*ng-eNB* |  |  |  |  |
| >>NGAP ng-eNB configuration update | O |  | OCTET STRING | Content defined by 3GPP 38.413 clause 9.2.6.4 |
| >>XnAP ng-eNB configuration update | O |  | OCTET STRING | Content defined by 3GPP 38.423 clause 9.1.3.4 |
| >eNB |  |  |  |  |
| >>S1AP eNB configuration update | O |  | OCTET STRING | Content defined by 3GPP 36.413 clause 9.1.8.7 |
| >>X2AP eNB config update | O |  | OCTET STRING | Content defined by 3GPP 36.423 clause 9.1.2.8 |

### 9.2.28 E2 Node Component Configuration Update Acknowledge

This IE is used to carry the E2 Node component configuration update acknowledge of a specific E2 Node component.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Outcome | M |  | ENUMERATED (success, failure,…) |  |
| Cause | O |  | 9.2.1 | Cause for failure |

### 9.2.29 Transport Layer Information

This information element provides Near-RT RIC address and optionally port number to be used by an E2 Node.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| Transport Layer Address | M |  | BIT STRING (SIZE(1..160,…)) | To be passed to transport layer without interpretation |
| Transport Layer Port | O |  | BIT STRING (SIZE(16)) | To be passed to transport layer without interpretation |

### 9.2.30 TNL Association Usage

This information element provides TNL association usage.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| TNL Association Usage | M |  | ENUMERATED (ric service, support functions, both,..) | Indicates whether E2 connection to be used for RIC services only, or E2 support functions only, or both |

### 9.2.31 RAN Function OID

This information element carries the RAN Function OID

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| RAN Function Service Model OID | M |  | PrintableString(SIZE(1..1000,...)) | Object Identifier of the specific RAN Function definition. Formatted as per OID (e.g. 1.3.6.1.4.1.53148.1.2.1 for E2SM-NI) |

### 9.2.32 E2 Node Component ID

This IE is used to locally identify an E2 node component.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| CHOICE *E2 node component type* | M |  |  |  |
| >*gNB-CU-UP* |  |  |  |  |
| >>gNB-CU-UP ID | M |  | 3GPP 38.463 clause 9.3.1.15 |  |
| >*gNB-DU* |  |  |  |  |
| >>gNB-DU ID | M |  | 3GPP 38.473 clause 9.3.1.9 |  |

## 9.3 Message and Information Element Abstract Syntax (with ASN.1)

### 9.3.1 General

E2AP ASN.1 definition conforms to ITU-T Rec. X.691 [15], ITU-T Rec. X.680 [16] and ITU-T Rec. X.681 [17].

The ASN.1 definition specifies the structure and content of E2AP messages. E2AP messages can contain any IEs specified in the object set definitions for that message without the order or number of occurrence being restricted by ASN.1. However, for this version of the standard, a sending entity shall construct an E2AP message according to the PDU definitions module and with the following additional rules:

- IEs shall be ordered (in an IE container) in the order they appear in object set definitions.

- Object set definitions specify how many times IEs may appear. An IE shall appear exactly once if the presence field in an object has value "mandatory". An IE may appear at most once if the presence field in an object has value "optional" or "conditional". If in a tabular format there is multiplicity specified for an IE (i.e., an IE list) then in the corresponding ASN.1 definition the list definition is separated into two parts. The first part defines an IE container list where the list elements reside. The second part defines list elements. The IE container list appears as an IE of its own. For this version of the standard an IE container list may contain only one kind of list elements.

NOTE: In the above "IE" means an IE in the object set with an explicit ID. If one IE needs to appear more than once in one object set, then the different occurrences will have different IE IDs.

If an E2AP 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 subclause 10.3.6.

### 9.3.2 Usage of private message mechanism for non-standard use

The private message mechanism for non-standard are not supported with E2AP.

### 9.3.3 Elementary Procedure Definitions

-- ASN1START

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

--

-- Elementary Procedure definitions

-- Derived from 3GPP 38.413 v15.4.0 NGAP

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

E2AP-PDU-Descriptions {

iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) 53148 e2(1) version1 (1) e2ap(1) e2ap-PDU-Descriptions (0) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

--

-- IE parameter types from other modules.

--

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

IMPORTS

Criticality,

ProcedureCode

FROM E2AP-CommonDataTypes

E2connectionUpdate,

E2connectionUpdateAcknowledge,

E2connectionUpdateFailure,

E2nodeConfigurationUpdate,

E2nodeConfigurationUpdateAcknowledge,

E2nodeConfigurationUpdateFailure,

E2setupFailure,

E2setupRequest,

E2setupResponse,

ErrorIndication,

ResetRequest,

ResetResponse,

RICcontrolAcknowledge,

RICcontrolFailure,

RICcontrolRequest,

RICindication,

RICserviceQuery,

RICserviceUpdate,

RICserviceUpdateAcknowledge,

RICserviceUpdateFailure,

RICsubscriptionFailure,

RICsubscriptionRequest,

RICsubscriptionResponse,

RICsubscriptionDeleteFailure,

RICsubscriptionDeleteRequest,

RICsubscriptionDeleteResponse

FROM E2AP-PDU-Contents

id-E2connectionUpdate,

id-E2nodeConfigurationUpdate,

id-E2setup,

id-ErrorIndication,

id-Reset,

id-RICcontrol,

id-RICindication,

id-RICserviceQuery,

id-RICserviceUpdate,

id-RICsubscription,

id-RICsubscriptionDelete

FROM E2AP-Constants;

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

--

-- Interface Elementary Procedure Class

--

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

E2AP-ELEMENTARY-PROCEDURE ::= CLASS {

&InitiatingMessage ,

&SuccessfulOutcome OPTIONAL ,

&UnsuccessfulOutcome OPTIONAL ,

&procedureCode ProcedureCode UNIQUE ,

&criticality Criticality DEFAULT ignore

}

WITH SYNTAX {

INITIATING MESSAGE &InitiatingMessage

[SUCCESSFUL OUTCOME &SuccessfulOutcome]

[UNSUCCESSFUL OUTCOME &UnsuccessfulOutcome]

PROCEDURE CODE &procedureCode

[CRITICALITY &criticality]

}

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

--

-- Interface PDU Definition

--

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

E2AP-PDU ::= CHOICE {

initiatingMessage InitiatingMessage,

successfulOutcome SuccessfulOutcome,

unsuccessfulOutcome UnsuccessfulOutcome,

...

}

InitiatingMessage ::= SEQUENCE {

procedureCode E2AP-ELEMENTARY-PROCEDURE.&procedureCode ({E2AP-ELEMENTARY-PROCEDURES}),

criticality E2AP-ELEMENTARY-PROCEDURE.&criticality ({E2AP-ELEMENTARY-PROCEDURES}{@procedureCode}),

value E2AP-ELEMENTARY-PROCEDURE.&InitiatingMessage ({E2AP-ELEMENTARY-PROCEDURES}{@procedureCode})

}

SuccessfulOutcome ::= SEQUENCE {

procedureCode E2AP-ELEMENTARY-PROCEDURE.&procedureCode ({E2AP-ELEMENTARY-PROCEDURES}),

criticality E2AP-ELEMENTARY-PROCEDURE.&criticality ({E2AP-ELEMENTARY-PROCEDURES}{@procedureCode}),

value E2AP-ELEMENTARY-PROCEDURE.&SuccessfulOutcome ({E2AP-ELEMENTARY-PROCEDURES}{@procedureCode})

}

UnsuccessfulOutcome ::= SEQUENCE {

procedureCode E2AP-ELEMENTARY-PROCEDURE.&procedureCode ({E2AP-ELEMENTARY-PROCEDURES}),

criticality E2AP-ELEMENTARY-PROCEDURE.&criticality ({E2AP-ELEMENTARY-PROCEDURES}{@procedureCode}),

value E2AP-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome ({E2AP-ELEMENTARY-PROCEDURES}{@procedureCode})

}

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

--

-- Interface Elementary Procedure List

--

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

E2AP-ELEMENTARY-PROCEDURES E2AP-ELEMENTARY-PROCEDURE ::= {

E2AP-ELEMENTARY-PROCEDURES-CLASS-1 |

E2AP-ELEMENTARY-PROCEDURES-CLASS-2,

...

}

E2AP-ELEMENTARY-PROCEDURES-CLASS-1 E2AP-ELEMENTARY-PROCEDURE ::= {

ricSubscription |

ricSubscriptionDelete |

ricServiceUpdate |

ricControl |

e2setup |

e2nodeConfigurationUpdate |

e2connectionUpdate |

reset,

...

}

E2AP-ELEMENTARY-PROCEDURES-CLASS-2 E2AP-ELEMENTARY-PROCEDURE ::= {

ricIndication |

ricServiceQuery |

errorIndication,

...

}

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

--

-- Interface Elementary Procedures

--

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

-- New for v01.01

e2connectionUpdate E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE E2connectionUpdate

SUCCESSFUL OUTCOME E2connectionUpdateAcknowledge

UNSUCCESSFUL OUTCOME E2connectionUpdateFailure

PROCEDURE CODE id-E2connectionUpdate

CRITICALITY reject

}

e2nodeConfigurationUpdate E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE E2nodeConfigurationUpdate

SUCCESSFUL OUTCOME E2nodeConfigurationUpdateAcknowledge

UNSUCCESSFUL OUTCOME E2nodeConfigurationUpdateFailure

PROCEDURE CODE id-E2nodeConfigurationUpdate

CRITICALITY reject

}

e2setup E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE E2setupRequest

SUCCESSFUL OUTCOME E2setupResponse

UNSUCCESSFUL OUTCOME E2setupFailure

PROCEDURE CODE id-E2setup

CRITICALITY reject

}

errorIndication E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE ErrorIndication

PROCEDURE CODE id-ErrorIndication

CRITICALITY ignore

}

reset E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE ResetRequest

SUCCESSFUL OUTCOME ResetResponse

PROCEDURE CODE id-Reset

CRITICALITY reject

}

ricControl E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE RICcontrolRequest

SUCCESSFUL OUTCOME RICcontrolAcknowledge

UNSUCCESSFUL OUTCOME RICcontrolFailure

PROCEDURE CODE id-RICcontrol

CRITICALITY reject

}

ricIndication E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE RICindication

PROCEDURE CODE id-RICindication

CRITICALITY ignore

}

ricServiceQuery E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE RICserviceQuery

PROCEDURE CODE id-RICserviceQuery

CRITICALITY ignore

}

ricServiceUpdate E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE RICserviceUpdate

SUCCESSFUL OUTCOME RICserviceUpdateAcknowledge

UNSUCCESSFUL OUTCOME RICserviceUpdateFailure

PROCEDURE CODE id-RICserviceUpdate

CRITICALITY reject

}

ricSubscription E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE RICsubscriptionRequest

SUCCESSFUL OUTCOME RICsubscriptionResponse

UNSUCCESSFUL OUTCOME RICsubscriptionFailure

PROCEDURE CODE id-RICsubscription

CRITICALITY reject

}

ricSubscriptionDelete E2AP-ELEMENTARY-PROCEDURE ::= {

INITIATING MESSAGE RICsubscriptionDeleteRequest

SUCCESSFUL OUTCOME RICsubscriptionDeleteResponse

UNSUCCESSFUL OUTCOME RICsubscriptionDeleteFailure

PROCEDURE CODE id-RICsubscriptionDelete

CRITICALITY reject

}

END

-- ASN1STOP

### 9.3.4 PDU definitions

-- ASN1START

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

--

-- PDU definitions for E2AP

-- Derived from 3GPP 38.413 v15.4.0 NGAP

--

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

E2AP-PDU-Contents {

iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) 53148 e2(1) version1 (1) e2ap(1) e2ap-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

--

-- IE parameter types from other modules.

--

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

IMPORTS

Cause,

CriticalityDiagnostics,

E2nodeComponentConfigUpdate,

E2nodeComponentConfigUpdateAck,

E2nodeComponentID,

E2nodeComponentType,

GlobalE2node-ID,

GlobalRIC-ID,

RANfunctionDefinition,

RANfunctionID,

RANfunctionOID,

RANfunctionRevision,

RICactionDefinition,

RICactionID,

RICactionType,

RICcallProcessID,

RICcontrolAckRequest,

RICcontrolHeader,

RICcontrolMessage,

RICcontrolOutcome,

RICcontrolStatus,

RICeventTriggerDefinition,

RICindicationHeader,

RICindicationMessage,

RICindicationSN,

RICindicationType,

RICrequestID,

RICsubsequentAction,

TimeToWait,

TNLinformation,

TNLusage

FROM E2AP-IEs

ProtocolIE-Container{},

ProtocolIE-ContainerList{},

ProtocolIE-SingleContainer{},

E2AP-PROTOCOL-IES,

E2AP-PROTOCOL-IES-PAIR

FROM E2AP-Containers

id-Cause,

id-CriticalityDiagnostics,

id-E2connectionSetup,

id-E2connectionSetupFailed,

id-E2connectionSetupFailed-Item,

id-E2connectionFailed-Item,

id-E2connectionUpdate-Item,

id-E2connectionUpdateAdd,

id-E2connectionUpdateModify,

id-E2connectionUpdateRemove,

id-E2connectionUpdateRemove-Item,

id-E2nodeComponentConfigUpdate,

id-E2nodeComponentConfigUpdate-Item,

id-E2nodeComponentConfigUpdateAck,

id-E2nodeComponentConfigUpdateAck-Item,

id-GlobalE2node-ID,

id-GlobalRIC-ID,

id-RANfunctionID,

id-RANfunctionID-Item,

id-RANfunctionIEcause-Item,

id-RANfunction-Item,

id-RANfunctionsAccepted,

id-RANfunctionsAdded,

id-RANfunctionsDeleted,

id-RANfunctionsModified,

id-RANfunctionsRejected,

id-RICaction-Admitted-Item,

id-RICactionID,

id-RICaction-NotAdmitted-Item,

id-RICactions-Admitted,

id-RICactions-NotAdmitted,

id-RICaction-ToBeSetup-Item,

id-RICcallProcessID,

id-RICcontrolAckRequest,

id-RICcontrolHeader,

id-RICcontrolMessage,

id-RICcontrolOutcome,

id-RICcontrolStatus,

id-RICindicationHeader,

id-RICindicationMessage,

id-RICindicationSN,

id-RICindicationType,

id-RICrequestID,

id-RICserviceQuery,

id-RICsubscriptionDetails,

id-TimeToWait,

id-TNLinformation,

maxofE2nodeComponents,

maxofRANfunctionID,

maxofRICactionID,

maxofTNLA

FROM E2AP-Constants;

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

--

-- MESSAGES FOR NEAR-RT RIC FUNCTIONAL PROCEDURES

--

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

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

--

-- RIC Subscription Elementary Procedure

--

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

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

--

-- RIC SUBSCRIPTION REQUEST

--

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

RICsubscriptionRequest ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICsubscriptionRequest-IEs}},

...

}

RICsubscriptionRequest-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE mandatory}|

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE mandatory}|

{ ID id-RICsubscriptionDetails CRITICALITY reject TYPE RICsubscriptionDetails PRESENCE mandatory},

...

}

RICsubscriptionDetails ::= SEQUENCE {

ricEventTriggerDefinition RICeventTriggerDefinition,

ricAction-ToBeSetup-List RICactions-ToBeSetup-List,

...

}

RICactions-ToBeSetup-List ::= SEQUENCE (SIZE(1..maxofRICactionID)) OF ProtocolIE-SingleContainer { {RICaction-ToBeSetup-ItemIEs} }

RICaction-ToBeSetup-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICaction-ToBeSetup-Item CRITICALITY ignore TYPE RICaction-ToBeSetup-Item PRESENCE mandatory },

...

}

RICaction-ToBeSetup-Item ::= SEQUENCE {

ricActionID RICactionID,

ricActionType RICactionType,

ricActionDefinition RICactionDefinition OPTIONAL,

ricSubsequentAction RICsubsequentAction OPTIONAL,

...

}

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

--

-- RIC SUBSCRIPTION RESPONSE

--

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

RICsubscriptionResponse ::= SEQUENCE {

protocolIEs ProtocolIE-Container{{RICsubscriptionResponse-IEs}},

...

}

RICsubscriptionResponse-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE mandatory } |

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE mandatory } |

{ ID id-RICactions-Admitted CRITICALITY reject TYPE RICaction-Admitted-List PRESENCE mandatory } |

{ ID id-RICactions-NotAdmitted CRITICALITY reject TYPE RICaction-NotAdmitted-List PRESENCE optional },

...

}

RICaction-Admitted-List ::= SEQUENCE (SIZE(1..maxofRICactionID)) OF ProtocolIE-SingleContainer{{RICaction-Admitted-ItemIEs}}

RICaction-Admitted-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICaction-Admitted-Item CRITICALITY ignore TYPE RICaction-Admitted-Item PRESENCE mandatory },

...

}

RICaction-Admitted-Item ::= SEQUENCE {

ricActionID RICactionID,

...

}

RICaction-NotAdmitted-List ::= SEQUENCE (SIZE(0..maxofRICactionID)) OF ProtocolIE-SingleContainer { {RICaction-NotAdmitted-ItemIEs} }

RICaction-NotAdmitted-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICaction-NotAdmitted-Item CRITICALITY ignore TYPE RICaction-NotAdmitted-Item PRESENCE mandatory },

...

}

RICaction-NotAdmitted-Item ::= SEQUENCE {

ricActionID RICactionID,

cause Cause,

...

}

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

--

-- RIC SUBSCRIPTION FAILURE

--

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

RICsubscriptionFailure ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICsubscriptionFailure-IEs}},

...

}

RICsubscriptionFailure-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE mandatory }|

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE mandatory }|

{ ID id-RICactions-NotAdmitted CRITICALITY reject TYPE RICaction-NotAdmitted-List PRESENCE mandatory }|

{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

...

}

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

--

-- RIC Subscription Delete Elementary Procedure

--

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

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

--

-- RIC SUBSCRIPTION DELETE REQUEST

--

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

RICsubscriptionDeleteRequest ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICsubscriptionDeleteRequest-IEs}},

...

}

RICsubscriptionDeleteRequest-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE mandatory }|

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE mandatory },

...

}

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

--

-- RIC SUBSCRIPTION DELETE RESPONSE

--

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

RICsubscriptionDeleteResponse ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICsubscriptionDeleteResponse-IEs}},

...

}

RICsubscriptionDeleteResponse-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE mandatory }|

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE mandatory },

...

}

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

--

-- RIC SUBSCRIPTION DELETE FAILURE

--

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

RICsubscriptionDeleteFailure ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICsubscriptionDeleteFailure-IEs}},

...

}

RICsubscriptionDeleteFailure-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE mandatory }|

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE mandatory }|

{ ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory }|

{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

...

}

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

--

-- RIC Indication Elementary Procedure

--

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

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

--

-- RIC INDICATION

--

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

RICindication ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICindication-IEs}},

...

}

RICindication-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE mandatory }|

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE mandatory }|

{ ID id-RICactionID CRITICALITY reject TYPE RICactionID PRESENCE mandatory }|

{ ID id-RICindicationSN CRITICALITY reject TYPE RICindicationSN PRESENCE optional }|

{ ID id-RICindicationType CRITICALITY reject TYPE RICindicationType PRESENCE mandatory }|

{ ID id-RICindicationHeader CRITICALITY reject TYPE RICindicationHeader PRESENCE mandatory }|

{ ID id-RICindicationMessage CRITICALITY reject TYPE RICindicationMessage PRESENCE mandatory }|

{ ID id-RICcallProcessID CRITICALITY reject TYPE RICcallProcessID PRESENCE optional },

...

}

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

--

-- RIC Control Elementary Procedure

--

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

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

--

-- RIC CONTROL REQUEST

--

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

RICcontrolRequest ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICcontrolRequest-IEs}},

...

}

RICcontrolRequest-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE mandatory }|

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE mandatory }|

{ ID id-RICcallProcessID CRITICALITY reject TYPE RICcallProcessID PRESENCE optional }|

{ ID id-RICcontrolHeader CRITICALITY reject TYPE RICcontrolHeader PRESENCE mandatory }|

{ ID id-RICcontrolMessage CRITICALITY reject TYPE RICcontrolMessage PRESENCE mandatory }|

{ ID id-RICcontrolAckRequest CRITICALITY reject TYPE RICcontrolAckRequest PRESENCE optional },

...

}

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

--

-- RIC CONTROL ACKNOWLEDGE

--

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

RICcontrolAcknowledge ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICcontrolAcknowledge-IEs}},

...

}

RICcontrolAcknowledge-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE mandatory }|

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE mandatory }|

{ ID id-RICcallProcessID CRITICALITY reject TYPE RICcallProcessID PRESENCE optional }|

{ ID id-RICcontrolStatus CRITICALITY reject TYPE RICcontrolStatus PRESENCE mandatory } |

{ ID id-RICcontrolOutcome CRITICALITY reject TYPE RICcontrolOutcome PRESENCE optional },

...

}

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

--

-- RIC CONTROL FAILURE

--

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

RICcontrolFailure ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICcontrolFailure-IEs}},

...

}

RICcontrolFailure-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE mandatory }|

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE mandatory }|

{ ID id-RICcallProcessID CRITICALITY reject TYPE RICcallProcessID PRESENCE optional }|

{ ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory } |

{ ID id-RICcontrolOutcome CRITICALITY reject TYPE RICcontrolOutcome PRESENCE optional },

...

}

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

--

-- MESSAGES FOR GLOBAL PROCEDURES

--

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

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

--

-- Error Indication Elementary Procedure

--

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

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

--

-- ERROR INDICATION

--

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

ErrorIndication ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{ErrorIndication-IEs}},

...

}

ErrorIndication-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RICrequestID CRITICALITY reject TYPE RICrequestID PRESENCE optional }|

{ ID id-RANfunctionID CRITICALITY reject TYPE RANfunctionID PRESENCE optional }|

{ ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE optional }|

{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

...

}

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

--

-- E2 Setup Elementary Procedure

--

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

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

--

-- E2 SETUP REQUEST

--

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

E2setupRequest ::= SEQUENCE {

protocolIEs ProtocolIE-Container { {E2setupRequestIEs} },

...

}

E2setupRequestIEs E2AP-PROTOCOL-IES ::= {

{ ID id-GlobalE2node-ID CRITICALITY reject TYPE GlobalE2node-ID PRESENCE mandatory }|

{ ID id-RANfunctionsAdded CRITICALITY reject TYPE RANfunctions-List PRESENCE optional }|

{ ID id-E2nodeComponentConfigUpdate CRITICALITY reject TYPE E2nodeComponentConfigUpdate-List PRESENCE optional },

...

}

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

--

-- E2 SETUP RESPONSE

--

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

E2setupResponse ::= SEQUENCE {

protocolIEs ProtocolIE-Container { {E2setupResponseIEs} },

...

}

E2setupResponseIEs E2AP-PROTOCOL-IES ::= {

{ ID id-GlobalRIC-ID CRITICALITY reject TYPE GlobalRIC-ID PRESENCE mandatory }|

{ ID id-RANfunctionsAccepted CRITICALITY reject TYPE RANfunctionsID-List PRESENCE optional }|

{ ID id-RANfunctionsRejected CRITICALITY reject TYPE RANfunctionsIDcause-List PRESENCE optional }|

{ ID id-E2nodeComponentConfigUpdateAck CRITICALITY reject TYPE E2nodeComponentConfigUpdateAck-List PRESENCE optional },

...

}

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

--

-- E2 SETUP FAILURE

--

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

E2setupFailure ::= SEQUENCE {

protocolIEs ProtocolIE-Container { {E2setupFailureIEs} },

...

}

E2setupFailureIEs E2AP-PROTOCOL-IES ::= {

{ ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory }|

{ ID id-TimeToWait CRITICALITY ignore TYPE TimeToWait PRESENCE optional }|

{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional }|

{ ID id-TNLinformation CRITICALITY ignore TYPE TNLinformation PRESENCE optional },

...

}

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

--

-- E2 Connection Update Elementary Procedure

--

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

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

--

-- E2 CONNECTION UPDATE

--

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

E2connectionUpdate ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{E2connectionUpdate-IEs}},

...

}

E2connectionUpdate-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-E2connectionUpdateAdd CRITICALITY reject TYPE E2connectionUpdate-List PRESENCE optional }|

{ ID id-E2connectionUpdateRemove CRITICALITY reject TYPE E2connectionUpdateRemove-List PRESENCE optional }|

{ ID id-E2connectionUpdateModify CRITICALITY reject TYPE E2connectionUpdate-List PRESENCE optional },

...

}

E2connectionUpdate-List ::= SEQUENCE (SIZE(1..maxofTNLA)) OF ProtocolIE-SingleContainer { {E2connectionUpdate-ItemIEs} }

E2connectionUpdate-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-E2connectionUpdate-Item CRITICALITY ignore TYPE E2connectionUpdate-Item PRESENCE mandatory },

...

}

E2connectionUpdate-Item ::= SEQUENCE {

tnlInformation TNLinformation,

tnlUsage TNLusage,

...

}

E2connectionUpdateRemove-List ::= SEQUENCE (SIZE(1..maxofTNLA)) OF ProtocolIE-SingleContainer { {E2connectionUpdateRemove-ItemIEs} }

E2connectionUpdateRemove-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-E2connectionUpdateRemove-Item CRITICALITY ignore TYPE E2connectionUpdateRemove-Item PRESENCE mandatory },

...

}

E2connectionUpdateRemove-Item ::= SEQUENCE {

tnlInformation TNLinformation,

...

}

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

--

-- E2 CONNECTION UPDATE ACKNOWLEDGE

--

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

E2connectionUpdateAcknowledge ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{E2connectionUpdateAck-IEs}},

...

}

E2connectionUpdateAck-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-E2connectionSetup CRITICALITY reject TYPE E2connectionUpdate-List PRESENCE optional }|

{ ID id-E2connectionSetupFailed CRITICALITY reject TYPE E2connectionSetupFailed-List PRESENCE optional },

...

}

E2connectionSetupFailed-List ::= SEQUENCE (SIZE(1..maxofTNLA)) OF ProtocolIE-SingleContainer { {E2connectionSetupFailed-ItemIEs} }

E2connectionSetupFailed-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-E2connectionSetupFailed-Item CRITICALITY ignore TYPE E2connectionSetupFailed-Item PRESENCE mandatory },

...

}

E2connectionSetupFailed-Item ::= SEQUENCE {

tnlInformation TNLinformation,

cause Cause,

...

}

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

--

-- E2 CONNECTION UPDATE FAILURE

--

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

E2connectionUpdateFailure ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{E2connectionUpdateFailure-IEs}},

...

}

E2connectionUpdateFailure-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-Cause CRITICALITY reject TYPE Cause PRESENCE optional }|

{ ID id-TimeToWait CRITICALITY ignore TYPE TimeToWait PRESENCE optional }|

{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

...

}

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

--

-- E2 Node Configuration Update Elementary Procedure

--

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

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

--

-- E2 NODE CONFIGURATION UPDATE

--

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

E2nodeConfigurationUpdate ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{E2nodeConfigurationUpdate-IEs}},

...

}

E2nodeConfigurationUpdate-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-E2nodeComponentConfigUpdate CRITICALITY reject TYPE E2nodeComponentConfigUpdate-List PRESENCE optional },

...

}

E2nodeComponentConfigUpdate-List ::= SEQUENCE (SIZE(1..maxofE2nodeComponents)) OF ProtocolIE-SingleContainer { {E2nodeComponentConfigUpdate-ItemIEs} }

E2nodeComponentConfigUpdate-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-E2nodeComponentConfigUpdate-Item CRITICALITY reject TYPE E2nodeComponentConfigUpdate-Item PRESENCE mandatory },

...

}

E2nodeComponentConfigUpdate-Item ::= SEQUENCE {

e2nodeComponentType E2nodeComponentType,

e2nodeComponentID E2nodeComponentID OPTIONAL,

e2nodeComponentConfigUpdate E2nodeComponentConfigUpdate,

...

}

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

--

-- E2 NODE CONFIGURATION UPDATE ACKNOWLEDGE

--

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

E2nodeConfigurationUpdateAcknowledge ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{E2nodeConfigurationUpdateAcknowledge-IEs}},

...

}

E2nodeConfigurationUpdateAcknowledge-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-E2nodeComponentConfigUpdateAck CRITICALITY reject TYPE E2nodeComponentConfigUpdateAck-List PRESENCE optional },

...

}

E2nodeComponentConfigUpdateAck-List ::= SEQUENCE (SIZE(1..maxofE2nodeComponents)) OF ProtocolIE-SingleContainer { {E2nodeComponentConfigUpdateAck-ItemIEs} }

E2nodeComponentConfigUpdateAck-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-E2nodeComponentConfigUpdateAck-Item CRITICALITY reject TYPE E2nodeComponentConfigUpdateAck-Item PRESENCE mandatory },

...

}

E2nodeComponentConfigUpdateAck-Item ::= SEQUENCE {

e2nodeComponentType E2nodeComponentType,

e2nodeComponentID E2nodeComponentID OPTIONAL,

e2nodeComponentConfigUpdateAck E2nodeComponentConfigUpdateAck,

...

}

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

--

-- E2 NODE CONFIGURATION UPDATE FAILURE

--

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

E2nodeConfigurationUpdateFailure ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{E2nodeConfigurationUpdateFailure-IEs}},

...

}

E2nodeConfigurationUpdateFailure-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory }|

{ ID id-TimeToWait CRITICALITY ignore TYPE TimeToWait PRESENCE optional }|

{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

...

}

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

--

-- Reset Elementary Procedure

--

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

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

--

-- RESET REQUEST

--

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

ResetRequest ::= SEQUENCE {

protocolIEs ProtocolIE-Container { {ResetRequestIEs} },

...

}

ResetRequestIEs E2AP-PROTOCOL-IES ::= {

{ ID id-Cause CRITICALITY ignore TYPE Cause PRESENCE mandatory },

...

}

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

--

-- RESET RESPONSE

--

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

ResetResponse ::= SEQUENCE {

protocolIEs ProtocolIE-Container { {ResetResponseIEs} },

...

}

ResetResponseIEs E2AP-PROTOCOL-IES ::= {

{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

...

}

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

--

-- RIC Service Update Elementary Procedure

--

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

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

--

-- RIC SERVICE UPDATE

--

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

RICserviceUpdate ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICserviceUpdate-IEs}},

...

}

RICserviceUpdate-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RANfunctionsAdded CRITICALITY reject TYPE RANfunctions-List PRESENCE optional }|

{ ID id-RANfunctionsModified CRITICALITY reject TYPE RANfunctions-List PRESENCE optional }|

{ ID id-RANfunctionsDeleted CRITICALITY reject TYPE RANfunctionsID-List PRESENCE optional },

...

}

RANfunctions-List ::= SEQUENCE (SIZE(0..maxofRANfunctionID)) OF ProtocolIE-SingleContainer { {RANfunction-ItemIEs} }

RANfunction-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-RANfunction-Item CRITICALITY ignore TYPE RANfunction-Item PRESENCE mandatory },

...

}

RANfunction-Item ::= SEQUENCE {

ranFunctionID RANfunctionID,

ranFunctionDefinition RANfunctionDefinition,

ranFunctionRevision RANfunctionRevision,

...,

ranFunctionOID RANfunctionOID OPTIONAL

}

RANfunctionsID-List ::= SEQUENCE (SIZE(0..maxofRANfunctionID)) OF ProtocolIE-SingleContainer{{RANfunctionID-ItemIEs}}

RANfunctionID-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-RANfunctionID-Item CRITICALITY ignore TYPE RANfunctionID-Item PRESENCE mandatory },

...

}

RANfunctionID-Item ::= SEQUENCE {

ranFunctionID RANfunctionID,

ranFunctionRevision RANfunctionRevision,

...

}

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

--

-- RIC SERVICE UPDATE ACKNOWLEDGE

--

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

RICserviceUpdateAcknowledge ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICserviceUpdateAcknowledge-IEs}},

...

}

RICserviceUpdateAcknowledge-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RANfunctionsAccepted CRITICALITY reject TYPE RANfunctionsID-List PRESENCE optional }|

{ ID id-RANfunctionsRejected CRITICALITY reject TYPE RANfunctionsIDcause-List PRESENCE optional },

...

}

RANfunctionsIDcause-List ::= SEQUENCE (SIZE(0..maxofRANfunctionID)) OF ProtocolIE-SingleContainer { {RANfunctionIDcause-ItemIEs} }

RANfunctionIDcause-ItemIEs E2AP-PROTOCOL-IES ::= {

{ ID id-RANfunctionIEcause-Item CRITICALITY ignore TYPE RANfunctionIDcause-Item PRESENCE mandatory },

...

}

RANfunctionIDcause-Item ::= SEQUENCE {

ranFunctionID RANfunctionID,

cause Cause,

...

}

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

--

-- RIC SERVICE UPDATE FAILURE

--

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

RICserviceUpdateFailure ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICserviceUpdateFailure-IEs}},

...

}

RICserviceUpdateFailure-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RANfunctionsRejected CRITICALITY ignore TYPE RANfunctionsIDcause-List PRESENCE optional }|

{ ID id-TimeToWait CRITICALITY ignore TYPE TimeToWait PRESENCE optional }|

{ ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },

...

}

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

--

-- RIC Service Query Elementary Procedure

--

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

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

--

-- RIC SERVICE QUERY

--

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

RICserviceQuery ::= SEQUENCE {

protocolIEs ProtocolIE-Container {{RICserviceQuery-IEs}},

...

}

RICserviceQuery-IEs E2AP-PROTOCOL-IES ::= {

{ ID id-RANfunctionsAccepted CRITICALITY reject TYPE RANfunctionsID-List PRESENCE optional },

...

}

END

-- ASN1STOP

### 9.3.5 Information Element Definitions

-- ASN1START

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

-- E2AP

-- Information Element Definitions

--

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

E2AP-IEs {

iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) 53148 e2(1) version1 (1) e2ap(1) e2ap-IEs (2)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

Criticality,

Presence,

ProcedureCode,

ProtocolIE-ID,

TriggeringMessage

FROM E2AP-CommonDataTypes

maxnoofErrors,

maxProtocolIEs

FROM E2AP-Constants;

-- A

-- B

-- C

Cause ::= CHOICE {

ricRequest CauseRIC,

ricService CauseRICservice,

transport CauseTransport,

protocol CauseProtocol,

misc CauseMisc,

...

}

CauseMisc ::= ENUMERATED {

control-processing-overload,

hardware-failure,

om-intervention,

unspecified,

...

}

CauseProtocol ::= ENUMERATED {

transfer-syntax-error,

abstract-syntax-error-reject,

abstract-syntax-error-ignore-and-notify,

message-not-compatible-with-receiver-state,

semantic-error,

abstract-syntax-error-falsely-constructed-message,

unspecified,

...

}

CauseRIC ::= ENUMERATED {

ran-function-id-Invalid,

action-not-supported,

excessive-actions,

duplicate-action,

duplicate-event,

function-resource-limit,

request-id-unknown,

inconsistent-action-subsequent-action-sequence,

control-message-invalid,

call-process-id-invalid,

unspecified,

...

}

CauseRICservice ::= ENUMERATED{

function-not-required,

excessive-functions,

ric-resource-limit,

...

}

CauseTransport ::= ENUMERATED {

unspecified,

transport-resource-unavailable,

...

}

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

-- copied from 3GPP 38.413 NGAP IEs v15.5.0

-- note: ie-Extensions removed

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

CriticalityDiagnostics ::= SEQUENCE {

procedureCode ProcedureCode OPTIONAL,

triggeringMessage TriggeringMessage OPTIONAL,

procedureCriticality Criticality OPTIONAL,

ricRequestorID RICrequestID OPTIONAL,

iEsCriticalityDiagnostics CriticalityDiagnostics-IE-List OPTIONAL,

...

}

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE(1..maxnoofErrors)) OF CriticalityDiagnostics-IE-Item

CriticalityDiagnostics-IE-Item ::= SEQUENCE {

iECriticality Criticality,

iE-ID ProtocolIE-ID,

typeOfError TypeOfError,

...

}

-- D

-- E

-- Following IE used to carry 3GPP defined RAN Configuration Update message defined in F1AP, E1AP, XnAP, etc.

E2nodeComponentConfigUpdate ::= CHOICE{

gNBconfigUpdate E2nodeComponentConfigUpdateGNB,

en-gNBconfigUpdate E2nodeComponentConfigUpdateENgNB,

ng-eNBconfigUpdate E2nodeComponentConfigUpdateNGeNB,

eNBconfigUpdate E2nodeComponentConfigUpdateENB,

...

}

E2nodeComponentConfigUpdateGNB ::= SEQUENCE{

ngAPconfigUpdate OCTET STRING OPTIONAL,

xnAPconfigUpdate OCTET STRING OPTIONAL,

e1APconfigUpdate OCTET STRING OPTIONAL,

f1APconfigUpdate OCTET STRING OPTIONAL,

...

}

E2nodeComponentConfigUpdateENgNB ::= SEQUENCE{

x2APconfigUpdate OCTET STRING OPTIONAL,

...

}

E2nodeComponentConfigUpdateNGeNB ::= SEQUENCE{

ngAPconfigUpdate OCTET STRING OPTIONAL,

xnAPconfigUpdate OCTET STRING OPTIONAL,

...

}

E2nodeComponentConfigUpdateENB ::= SEQUENCE{

s1APconfigUpdate OCTET STRING OPTIONAL,

x2APconfigUpdate OCTET STRING OPTIONAL,

...

}

E2nodeComponentConfigUpdateAck ::= SEQUENCE{

updateOutcome ENUMERATED {success, failure, ...},

failureCause Cause OPTIONAL,

...

}

E2nodeComponentType ::= ENUMERATED {gNB, gNB-CU-UP, gNB-DU, en-gNB, eNB, ng-eNB, ...}

E2nodeComponentID ::= CHOICE{

e2nodeComponentTypeGNB-CU-UP E2nodeComponentGNB-CU-UP-ID,

e2nodeComponentTypeGNB-DU E2nodeComponentGNB-DU-ID,

...

}

E2nodeComponentGNB-CU-UP-ID ::= SEQUENCE{

gNB-CU-UP-ID GNB-CU-UP-ID,

...

}

E2nodeComponentGNB-DU-ID ::= SEQUENCE{

gNB-DU-ID GNB-DU-ID,

...

}

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

-- copied from 3GPP X2AP IEs v15.4.0

-- note: ie-Extensions removed

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

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))

}

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

-- copied from 3GPP 38.423 v15.5.0 XnAP IEs

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

ENB-ID-Choice ::= CHOICE {

enb-ID-macro BIT STRING (SIZE(20)),

enb-ID-shortmacro BIT STRING (SIZE(18)),

enb-ID-longmacro BIT STRING (SIZE(21)),

...

}

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

-- copied from 3GPP X2AP IEs v15.4.0

-- note: ie-Extensions removed

-- Note: to avoid duplicate names with XnAP, GNB-ID renamed ENGNB-ID, GlobalGNB-ID renamed GlobalenGNB-ID

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

ENGNB-ID ::= CHOICE {

gNB-ID BIT STRING (SIZE (22..32)),

...

}

-- F

-- G

GlobalE2node-ID ::= CHOICE{

gNB GlobalE2node-gNB-ID,

en-gNB GlobalE2node-en-gNB-ID,

ng-eNB GlobalE2node-ng-eNB-ID,

eNB GlobalE2node-eNB-ID,

...

}

GlobalE2node-en-gNB-ID ::= SEQUENCE{

global-gNB-ID GlobalenGNB-ID,

...

}

GlobalE2node-eNB-ID ::= SEQUENCE{

global-eNB-ID GlobalENB-ID,

...

}

GlobalE2node-gNB-ID ::= SEQUENCE{

global-gNB-ID GlobalgNB-ID,

gNB-CU-UP-ID GNB-CU-UP-ID OPTIONAL,

gNB-DU-ID GNB-DU-ID OPTIONAL,

...

}

GlobalE2node-ng-eNB-ID ::= SEQUENCE{

global-ng-eNB-ID GlobalngeNB-ID,

...

}

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

-- copied from 3GPP X2AP IEs v15.4.0

-- note: ie-Extensions removed

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

GlobalENB-ID ::= SEQUENCE {

pLMN-Identity PLMN-Identity,

eNB-ID ENB-ID,

...

}

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

-- copied from 3GPP X2AP IEs v15.4.0

-- Note: to avoid duplicate names with XnAP, GNB-ID renamed ENGNB-ID, GlobalGNB-ID renamed GlobalenGNB-ID

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

GlobalenGNB-ID ::= SEQUENCE {

pLMN-Identity PLMN-Identity,

gNB-ID ENGNB-ID,

...

}

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

-- copied from 3GPP 38.423 v15.5.0 XnAP IEs

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

GlobalgNB-ID ::= SEQUENCE {

plmn-id PLMN-Identity,

gnb-id GNB-ID-Choice,

...

}

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

-- copied from 3GPP 38.423 v15.5.0 XnAP IEs

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

GlobalngeNB-ID ::= SEQUENCE {

plmn-id PLMN-Identity,

enb-id ENB-ID-Choice,

...

}

GlobalRIC-ID ::= SEQUENCE{

pLMN-Identity PLMN-Identity,

ric-ID BIT STRING (SIZE (20)),

...

}

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

-- copied from 3GPP 38.463 v15.5.0 E1AP IEs

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

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

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

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

-- copied from 3GPP 38.423 v15.5.0 XnAP IEs

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

GNB-ID-Choice ::= CHOICE {

gnb-ID BIT STRING (SIZE(22..32)),

...

}

-- H

-- I

-- J

-- K

-- L

-- M

-- N

-- O

-- P

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

-- copied from 3GPP X2AP IEs v15.4.0

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

PLMN-Identity ::= OCTET STRING (SIZE(3))

-- Q

-- R

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

-- Following IE defined in E2SM

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

RANfunctionDefinition ::= OCTET STRING

RANfunctionID ::= INTEGER (0..4095)

RANfunctionOID ::= PrintableString(SIZE(1..1000,...))

RANfunctionRevision ::= INTEGER (0..4095)

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

-- Following IE defined in E2SM

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

RICactionDefinition ::= OCTET STRING

RICactionID ::= INTEGER (0..255)

RICactionType ::= ENUMERATED{

report,

insert,

policy,

...

}

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

-- Following IE defined in E2SM

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

RICcallProcessID ::= OCTET STRING

RICcontrolAckRequest ::= ENUMERATED{

noAck,

ack,

nAck,

...

}

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

-- Following IE defined in E2SM

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

RICcontrolHeader ::= OCTET STRING

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

-- Following IE defined in E2SM

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

RICcontrolMessage ::= OCTET STRING

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

-- Following IE defined in E2SM

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

RICcontrolOutcome ::= OCTET STRING

RICcontrolStatus ::= ENUMERATED{

success,

rejected,

failed,

...

}

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

-- Following IE defined in E2SM

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

RICeventTriggerDefinition ::= OCTET STRING

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

-- Following IE defined in E2SM

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

RICindicationHeader ::= OCTET STRING

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

-- Following IE defined in E2SM

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

RICindicationMessage ::= OCTET STRING

RICindicationSN ::= INTEGER (0..65535)

RICindicationType ::= ENUMERATED{

report,

insert,

...

}

RICrequestID ::= SEQUENCE {

ricRequestorID INTEGER (0..65535),

ricInstanceID INTEGER (0..65535),

...

}

RICsubsequentAction ::=SEQUENCE{

ricSubsequentActionType RICsubsequentActionType,

ricTimeToWait RICtimeToWait,

...

}

RICsubsequentActionType ::= ENUMERATED{

continue,

wait,

...

}

RICtimeToWait ::= ENUMERATED{

zero,

w1ms,

w2ms,

w5ms,

w10ms,

w20ms,

w30ms,

w40ms,

w50ms,

w100ms,

w200ms,

w500ms,

w1s,

w2s,

w5s,

w10s,

w20s,

w60s,

...

}

-- S

-- T

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

-- copied from 3GPP 38.413 NGAP IEs v15.5.0

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

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

TNLinformation ::= SEQUENCE{

tnlAddress BIT STRING (SIZE(1..160,...)),

tnlPort BIT STRING (SIZE(16)) OPTIONAL,

...

}

TNLusage ::= ENUMERATED{ric-service, support-function, both, ...}

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

-- copied from 3GPP 38.413 NGAP IEs v15.5.0

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

TypeOfError ::= ENUMERATED {

not-understood,

missing,

...

}

-- U

-- V

-- W

-- X

-- Y

-- Z

END

-- ASN1STOP

### 9.3.6 Common definitions

-- ASN1START

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

--

-- Common definitions

-- Derived from 3GPP 38.413 v15.4.0

--

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

E2AP-CommonDataTypes {

iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) 53148 e2(1) version1 (1) e2ap(1) e2ap-CommonDataTypes (3) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

Criticality ::= ENUMERATED { reject, ignore, notify }

Presence ::= ENUMERATED { optional, conditional, mandatory }

ProcedureCode ::= INTEGER (0..255)

ProtocolIE-ID ::= INTEGER (0..65535)

TriggeringMessage ::= ENUMERATED { initiating-message, successful-outcome, unsuccessfull-outcome }

END

-- ASN1STOP

### 9.3.7 Constant definitions

-- ASN1START

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

--

-- Constant definitions

--

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

E2AP-Constants {

iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) 53148 e2(1) version1 (1) e2ap(1) e2ap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

ProcedureCode,

ProtocolIE-ID

FROM E2AP-CommonDataTypes;

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

--

-- Elementary Procedures

--

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

id-E2setup ProcedureCode ::= 1

id-ErrorIndication ProcedureCode ::= 2

id-Reset ProcedureCode ::= 3

id-RICcontrol ProcedureCode ::= 4

id-RICindication ProcedureCode ::= 5

id-RICserviceQuery ProcedureCode ::= 6

id-RICserviceUpdate ProcedureCode ::= 7

id-RICsubscription ProcedureCode ::= 8

id-RICsubscriptionDelete ProcedureCode ::= 9

id-E2nodeConfigurationUpdate ProcedureCode ::= 10

id-E2connectionUpdate ProcedureCode ::= 11

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

--

-- Extension constants

--

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

maxProtocolIEs INTEGER ::= 65535

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

--

-- Lists

--

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

maxnoofErrors INTEGER ::= 256

maxofE2nodeComponents INTEGER ::= 1024

maxofRANfunctionID INTEGER ::= 256

maxofRICactionID INTEGER ::= 16

maxofTNLA INTEGER ::= 32

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

--

-- IEs

--

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

id-Cause ProtocolIE-ID ::= 1

id-CriticalityDiagnostics ProtocolIE-ID ::= 2

id-GlobalE2node-ID ProtocolIE-ID ::= 3

id-GlobalRIC-ID ProtocolIE-ID ::= 4

id-RANfunctionID ProtocolIE-ID ::= 5

id-RANfunctionID-Item ProtocolIE-ID ::= 6

id-RANfunctionIEcause-Item ProtocolIE-ID ::= 7

id-RANfunction-Item ProtocolIE-ID ::= 8

id-RANfunctionsAccepted ProtocolIE-ID ::= 9

id-RANfunctionsAdded ProtocolIE-ID ::= 10

id-RANfunctionsDeleted ProtocolIE-ID ::= 11

id-RANfunctionsModified ProtocolIE-ID ::= 12

id-RANfunctionsRejected ProtocolIE-ID ::= 13

id-RICaction-Admitted-Item ProtocolIE-ID ::= 14

id-RICactionID ProtocolIE-ID ::= 15

id-RICaction-NotAdmitted-Item ProtocolIE-ID ::= 16

id-RICactions-Admitted ProtocolIE-ID ::= 17

id-RICactions-NotAdmitted ProtocolIE-ID ::= 18

id-RICaction-ToBeSetup-Item ProtocolIE-ID ::= 19

id-RICcallProcessID ProtocolIE-ID ::= 20

id-RICcontrolAckRequest ProtocolIE-ID ::= 21

id-RICcontrolHeader ProtocolIE-ID ::= 22

id-RICcontrolMessage ProtocolIE-ID ::= 23

id-RICcontrolStatus ProtocolIE-ID ::= 24

id-RICindicationHeader ProtocolIE-ID ::= 25

id-RICindicationMessage ProtocolIE-ID ::= 26

id-RICindicationSN ProtocolIE-ID ::= 27

id-RICindicationType ProtocolIE-ID ::= 28

id-RICrequestID ProtocolIE-ID ::= 29

id-RICsubscriptionDetails ProtocolIE-ID ::= 30

id-TimeToWait ProtocolIE-ID ::= 31

id-RICcontrolOutcome ProtocolIE-ID ::= 32

id-E2nodeComponentConfigUpdate ProtocolIE-ID ::= 33

id-E2nodeComponentConfigUpdate-Item ProtocolIE-ID ::= 34

id-E2nodeComponentConfigUpdateAck ProtocolIE-ID ::= 35

id-E2nodeComponentConfigUpdateAck-Item ProtocolIE-ID ::= 36

id-E2connectionSetup ProtocolIE-ID ::= 39

id-E2connectionSetupFailed ProtocolIE-ID ::= 40

id-E2connectionSetupFailed-Item ProtocolIE-ID ::= 41

id-E2connectionFailed-Item ProtocolIE-ID ::= 42

id-E2connectionUpdate-Item ProtocolIE-ID ::= 43

id-E2connectionUpdateAdd ProtocolIE-ID ::= 44

id-E2connectionUpdateModify ProtocolIE-ID ::= 45

id-E2connectionUpdateRemove ProtocolIE-ID ::= 46

id-E2connectionUpdateRemove-Item ProtocolIE-ID ::= 47

id-TNLinformation ProtocolIE-ID ::= 48

END

-- ASN1STOP

### 9.3.8 Container definitions

-- ASN1START

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

--

-- Container definitions

--

-- derived from 3GPP 38.413 v15.4.0

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

E2AP-Containers {

iso(1) identified-organization(3) dod(6) internet(1) private(4) enterprise(1) 53148 e2(1) version1 (1) e2ap(1) e2ap-Containers (5) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

--

-- IE parameter types from other modules.

--

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

IMPORTS

Criticality,

Presence,

PrivateIE-ID,

ProtocolExtensionID,

ProtocolIE-ID

FROM E2AP-CommonDataTypes

maxProtocolIEs

FROM E2AP-Constants;

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

--

-- Class Definition for Protocol IEs

--

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

E2AP-PROTOCOL-IES ::= CLASS {

&id ProtocolIE-ID UNIQUE,

&criticality Criticality,

&Value,

&presence Presence

}

WITH SYNTAX {

ID &id

CRITICALITY &criticality

TYPE &Value

PRESENCE &presence

}

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

--

-- Class Definition for Protocol IEs

--

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

E2AP-PROTOCOL-IES-PAIR ::= CLASS {

&id ProtocolIE-ID UNIQUE,

&firstCriticality Criticality,

&FirstValue,

&secondCriticality Criticality,

&SecondValue,

&presence Presence

}

WITH SYNTAX {

ID &id

FIRST CRITICALITY &firstCriticality

FIRST TYPE &FirstValue

SECOND CRITICALITY &secondCriticality

SECOND TYPE &SecondValue

PRESENCE &presence

}

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

--

-- Container for Protocol IEs

--

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

ProtocolIE-Container {E2AP-PROTOCOL-IES : IEsSetParam} ::=

SEQUENCE (SIZE (0..maxProtocolIEs)) OF

ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-SingleContainer {E2AP-PROTOCOL-IES : IEsSetParam} ::=

ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Field {E2AP-PROTOCOL-IES : IEsSetParam} ::= SEQUENCE {

id E2AP-PROTOCOL-IES.&id ({IEsSetParam}),

criticality E2AP-PROTOCOL-IES.&criticality ({IEsSetParam}{@id}),

value E2AP-PROTOCOL-IES.&Value ({IEsSetParam}{@id})

}

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

--

-- Container for Protocol IE Pairs

--

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

ProtocolIE-ContainerPair {E2AP-PROTOCOL-IES-PAIR : IEsSetParam} ::=

SEQUENCE (SIZE (0..maxProtocolIEs)) OF

ProtocolIE-FieldPair {{IEsSetParam}}

ProtocolIE-FieldPair {E2AP-PROTOCOL-IES-PAIR : IEsSetParam} ::= SEQUENCE {

id E2AP-PROTOCOL-IES-PAIR.&id ({IEsSetParam}),

firstCriticality E2AP-PROTOCOL-IES-PAIR.&firstCriticality ({IEsSetParam}{@id}),

firstValue E2AP-PROTOCOL-IES-PAIR.&FirstValue ({IEsSetParam}{@id}),

secondCriticality E2AP-PROTOCOL-IES-PAIR.&secondCriticality ({IEsSetParam}{@id}),

secondValue E2AP-PROTOCOL-IES-PAIR.&SecondValue ({IEsSetParam}{@id})

}

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

--

-- Container Lists for Protocol IE Containers

--

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

ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, E2AP-PROTOCOL-IES : IEsSetParam} ::=

SEQUENCE (SIZE (lowerBound..upperBound)) OF

ProtocolIE-SingleContainer {{IEsSetParam}}

ProtocolIE-ContainerPairList {INTEGER : lowerBound, INTEGER : upperBound, E2AP-PROTOCOL-IES-PAIR : IEsSetParam} ::=

SEQUENCE (SIZE (lowerBound..upperBound)) OF

ProtocolIE-ContainerPair {{IEsSetParam}}

END

-- ASN1STOP

## 9.4 Message transfer syntax

E2AP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in ITU-T Rec. X.691 [15].

## 9.5 Timers

The following Timers are defined for use over the E2 interface in Near-RT RIC and E2 Node.

TRICEVENTcreate

- Specifies the maximum time for the RIC Subscription Request event creation procedure in the E2 Node.

TRICEVENTdelete

- Specifies the maximum time for the RIC Subscription Request event deletion procedure in the E2 Node.

TRICcontrol

- Specifies the maximum time for the RIC Control Request event request procedure in the E2 Node.

Time To Wait

Specifies the time to wait used in failure cases for E2 Setup procedure and RIC Service Update procedure. It is also used in the *RIC Subsequent Action* IE.

# 10 Handling of Unknown, Unforeseen and Erroneous Protocol Data

Section 10 of TS 36.413 [13] is applicable for the purposes of the present document.

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