 O-RAN.WG3.E2AP-v01.01

\\

Technical Specification

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

Prepared by the O-RAN Alliance e.V. Copyright © 2020 by the O-RAN Alliance e.V.

By using, accessing or downloading any part of this O-RAN specification document, including by copying, saving, distributing, displaying or preparing derivatives of, you agree to be and are bound to the terms of the O-RAN Adopter License Agreement contained in the Annex ZZZ of this specification. All other rights reserved.

Copyright © 2020 by the O-RAN Alliance e.V. Your use is subject to the terms of the O-RAN Adopter License Agreement in the Annex ZZZ. 1

# Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |

"© 2019. 3GPP™ TSs and TRs are the property of ARIB, ATIS, CCSA, ETSI, TSDSI, TTA and TTC who jointly own the copyright in them. They are subject to further modifications and are therefore provided to you "as is" for information purposes only. Further use is strictly prohibited."

"© 2020. 3GPP™ TSs and TRs are the property of ARIB, ATIS, CCSA, ETSI, TSDSI, TTA and TTC who jointly own the copyright in them. They are subject to further modifications and are therefore provided to you "as is" for information purposes only. Further use is strictly prohibited."

Contents

Revision History 2

Foreward 5

1 Scope 6

2 References 6

3 Definitions and Abbreviations 7

3.1 Definitions 7

3.2 Abbreviations 8

4 General 8

4.1 Procedure Specification Principles 8

4.2 Forwards and Backwards Compatibility 9

4.3 Specification Notations 9

5 E2AP Services 10

6 Services expected from Signalling Transport 11

7 Functions of E2AP 12

8 E2AP Procedures 13

8.1 Elementary Procedures 13

8.2 Near-RT RIC functional procedures 13

8.2.1 RIC Subscription procedure 13

8.2.2 RIC Subscription Delete procedure 15

8.2.3 RIC Indication procedure 16

8.2.4 RIC Control procedure 18

8.3 Global Procedures 20

8.3.1 E2 Setup procedure 20

8.3.2 Reset procedure 21

8.3.3 Error Indication 22

8.3.4 RIC Service Update procedure 23

9 Elements for E2AP Communication 25

9.0 General 25

9.1 Message Functional Definition and Content 25

9.1.1 Messages for Near-RT RIC Functional Procedures 25

9.1.2 Messages for Global Procedures 29

9.2 Information Element definitions 33

9.2.0 General 33

9.2.1 Cause 33

9.2.2 Criticality Diagnostics 35

9.2.3 Message Type 35

9.2.4 Global RIC ID 36

9.2.5 Time to wait 36

9.2.6 Global E2 Node ID 36

9.2.7 RIC Request ID 36

9.2.8 RAN Function ID 36

9.2.9 RIC Event Trigger Definition 37

9.2.10 RIC Action ID 37

9.2.11 RIC Action Type 37

9.2.12 RIC Action Definition 37

9.2.13 RIC Subsequent Action 38

9.2.14 RIC Indication Sequence Number (SN) 38

9.2.15 RIC Indication Type 38

9.2.16 RIC Indication message 38

9.2.17 RIC Indication header 38

9.2.18 RIC Call Process ID 39

9.2.19 RIC Control message 39

9.2.20 RIC Control header 39

9.2.21 RIC Control Ack Request 39

9.2.22 RIC Control Status 40

9.2.23 RAN Function Definition 40

9.2.24 RAN Function Revision 40

9.2.25 RIC Control Outcome 40

9.3 Message and Information Element Abstract Syntax (with ASN.1) 40

9.3.1 General 40

9.3.2 Usage of private message mechanism for non-standard use 41

9.3.3 Elementary Procedure Definitions 41

9.3.4 PDU definitions 44

9.3.5 Information Element Definitions 53

9.3.6 Common definitions 58

9.3.7 Constant definitions 58

9.3.8 Container definitions 59

9.4 Message transfer syntax 61

9.5 Timers 61

10 Handling of Unknown, Unforeseen and Erroneous Protocol Data 63

Annex ZZZ : O-RAN Adopter License Agreement 64

Section 1: DEFINITIONS 64

Section 2: COPYRIGHT LICENSE 64

Section 3: FRAND LICENSE 64

Section 4: TERM AND TERMINATION 65

Section 5: CONFIDENTIALITY 65

Section 6: INDEMNIFICATION 65

Section 7: LIMITATIONS ON LIABILITY; NO WARRANTY 66

Section 8: ASSIGNMENT 66

Section 9: THIRD-PARTY BENEFICIARY RIGHTS 66

Section 10: BINDING ON AFFILIATES 66

Section 11: GENERAL 66

# 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. 为了能够更好的阅读当前文档，相关术语和定义在3GPP TR 21.905和下面提供

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

本文档术语的定义优先于其他文档，比如3GPP相关文档

**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].

non-RT RIC和Near-RT RIC之间接口，它用来Near-RT RIC 应用/函数的数据传输和支撑AI/ML的工作流。

**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: 该接口用来连接Near-RT RIC 和一个或者多个O-CU-CPs,一个或者多个O-CU-Ups,和一个或者多个O-DUs

**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.

E2 Node：E2接口的逻辑终端。在这个版本的说明文档中，E2接口的ORAN节点有：

* 对于NR接入：O-CU-CP, O-CU-UP, O-DU，或者任何在参考[9]中的定义

**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.

Non-RT RIC (O-RAN non-real-time RAN Intelligent Controller): 一个逻辑功能结构，用来做非实时的控制和优化RAN元素、资源、AI/ML模型训练和更新的工作流以及near-RT RIC中基于策略应用/特性的指导。

**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.

Near-RT RIC（O-ran 近实时无线接入网的智能控制器）：这是一个逻辑功能，它用来近实时的控制和优化RAN 元素和资源，优化的依据来源于在E2接口有效的数据获取

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

O-CU: 一个逻辑节点，包含RRC、SDAP、PDCP协议。

**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-CP: (O-RAN 中心单元-控制面)：一个逻辑节点，包含RRC和PDCP协议的控制面。

**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-CU-UP: 一个逻辑节点，包含PDCP协议和SDAP协议的用户面。

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

O-DU：O-ran分布式单元，一个逻辑节点，包含基于底层功能分割的RLC/MAC/High-PHY层

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

**O-eNB: 一个eNB或者ng-eNB，支持E2接口**

**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).

O-RU：O-ran射频单元，一个逻辑节点，它用来包含基于底层功能分隔的Low-PHY层和RF过程

**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.

O1：在编排和管理单元和O-RAN管理元素之间的接口，用于操作和管理，应该被实现的管理有：FCAPS管理、软件管理、文件管理、其他类似功能。

**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.

RAN 功能：在E2Node中一个明确的功能；

**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.

RIC服务：由E2节点提供的服务，用来提供消息和测量的访问和/或从近实时控制E2节点。

## 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.

全局的E2节点的标识。定义为全局的eNB或者gNB的标识和一个可选择性的CU-UP或者DU局部标识，当如果一个独特的DU或者CU-UP支持一个直接的E2接口。

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

RIC平台ID

**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.

在E2Node中特定RAN功能局部标识，这些标识支持一个或多个RIC服务，在特定E2服务模型中的服务。需要注意的是在相同的E2Node中，多个RAN功能可以使用相同的E2SM。

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

RAN功能对象ID，用来标识特定的RAN功能定义（比如 特定的RAN功能使用E2SM的）

**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.

在特定的RIC订阅请求中，局部的定位用于近实时去标识特定的动作，这些标识由E2节点后续RIC指示消息中使用。

**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.

在一个RIC插入（“insert”）服务中，E2节点去标识挂起关联过程实例局部标识，这个标识用于Near-RT RIC后续RIC控制过程。

**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.

Near-RT RIC标识一个特定的RIC订阅过程或者RIC控制过程中使用的局部标识，由E2Node中在或许RIC指示消息中使用。

# 5 E2AP Services

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

本条款描述的是由E2节点提供给Near-RT RIC的服务

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]

E2AP Near-RT RIC功能性过程模块包含用于在Near-RT RIC应用和在E2节点中的目标功能之间传输应用特定的消息。

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

全局过程模块包含非直接联系相关应用的过程。

5.2 Parallel transactions

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

并行传输需要支持

多个运行的E2AP过程可同时关联相同的应用和E2node

# 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.

信令连接应该按顺序地发送E2AP消息。E2AP应该能够被告知如果信令连接中断。

# 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.

这个过程是用来在E2Node上建立E2订阅，这个订阅是由一个事件触发器和一系列动作组成，每隔动作都有相应的后续动作。

#### 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

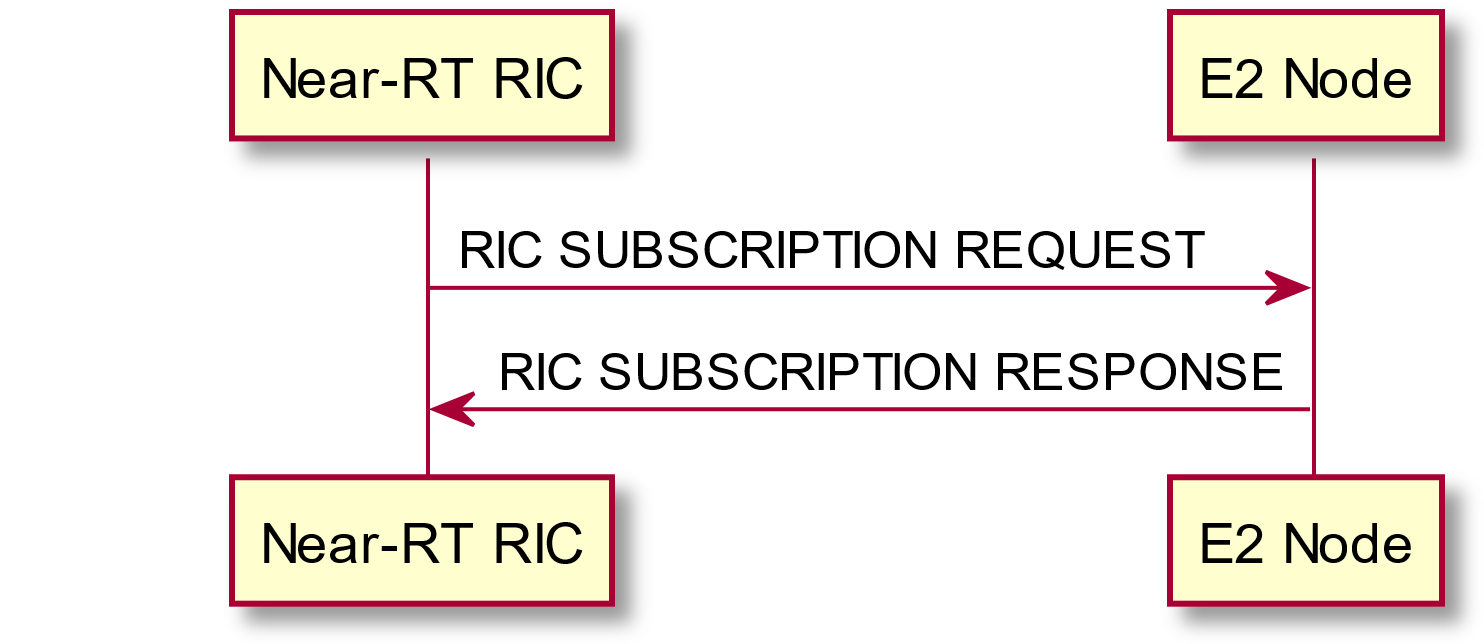


Figure 8.2.1.2-1: Near-RT RIC Subscription procedure, successful operation

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.

Near-RT RIC初始化通过发送RIC SUBSCRIPTION REQUEST 消息给E2节点来初始化这个过程，这个消息包含唯一的RIC Request ID。当Near-RT RIC发送RIC SUBSCRIPTION消息，它应该开始一个TRICEVENTcreate。

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

接受到了消息之后，E2Node应该干什么

- 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.

查看信息中的RAN Function ID IE 决定目标函数，依据RIC subsctription Details IE 配置请求事件触发器。

- 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.

如果*RIC Subscription Details* IE包含一个或者多个的Report，Insert 和/或 Policy RIC服务动作，那么目标函数应该验证事件触发器和被请求的动作序列，并且，如果该消息接受，那么存储请求的RIC Request ID, *RIC Event Trigger Definition* IE 和一串*RIC Action ID* IE, *RIC Action Type* IE*, RIC Action Definition* IE（如果包含）和 *RIC Subsequent Action* IE（如果包含）

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

如果请求触发器和至少一个被要求的动作被目标E2Node接收，那么目标E2Node应该储备必要的资源和发送RIC SUBSCRIPTION RESPONSE消息回去给Near-RT RIC。目标E2Node应该在响应消息中包括在目标E2节点准备的资源的动作，这些资源封装在RIC Actions Admitted List IE。目标E2节点应该包含不被RIC Actions Not Admitted List IE中认可的动作。

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.

接收到了返回消息时，Near-RT RIC应该停止时间timer TRICEVENTcreat 并且终止订阅请求过程。

#### 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

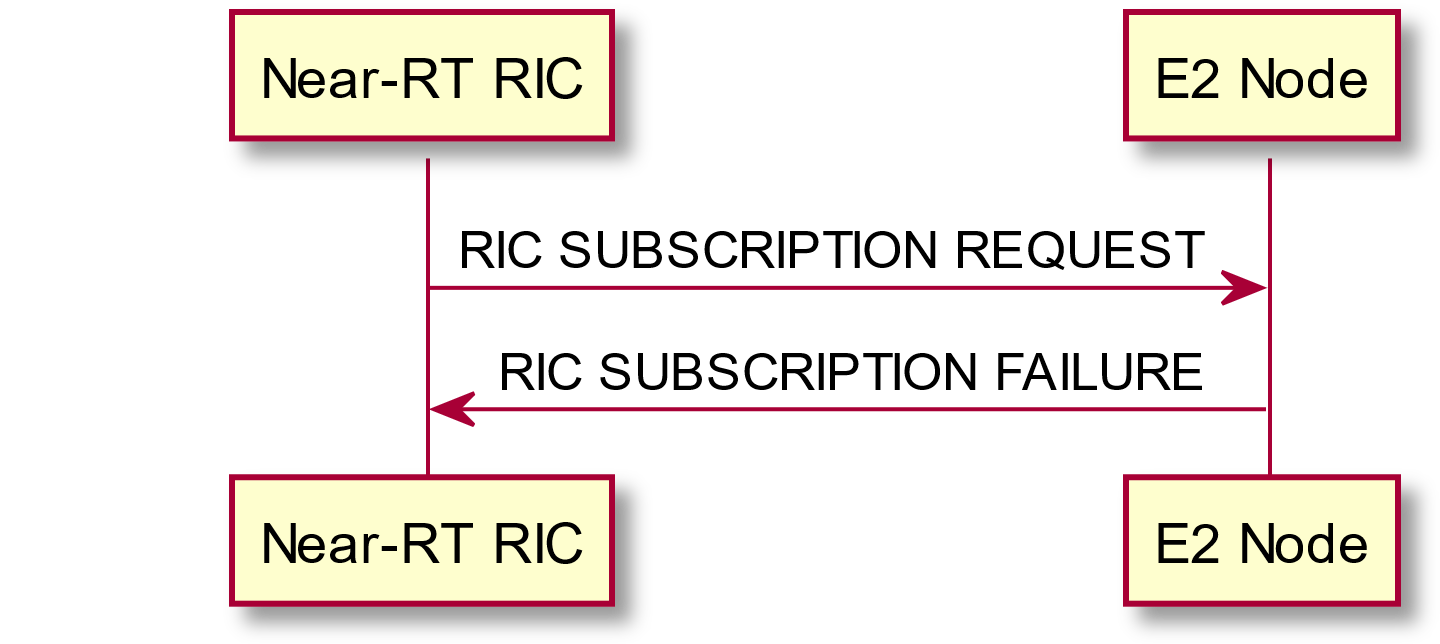


Figure 8.2.1.3-1: Near-RT RIC Subscription procedure, unsuccessful operation

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.

如果目标E2Node有一个请求没有接受或者检测到不一致的动作序列或者随后的动作不一致，或者在RIC订阅过程中的失败发生，目标E2节点应该发送RIC SUBSCRIPTION FAILURE消息给Near-RT RIC。E2节点应该包括应该包括适当的原因值在the *RIC Actions Not Admitted List* IE中。

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

出现了RIC SUBSCRIPTION FAILURE异常后，Near-RT RIC 应该停止timer TRICEVENTcreate 和终止RIC订阅过程。

**Interactions with RIC Subscription Delete procedure:**

**与订阅删除过程交互**

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.

如果在timer TRICEVENTcreate 过期之前，没有收到RIC SUBSCRIPTION REQUEST 消息的响应，那么Near-RT RIC应该取消面向目标E2节点的RIC订阅，通过发起带有恰当原因值的RIC Subscription Delete 过程。在发起了RIC Subscription Delete 过程之后，Near-RT RIC应该忽略任何RIC SUBSCRIPTION RESPONSE或者RIC SUBSCRIPTION FAILURE消息的接受并且移除任何关联和释放任何相关资源。

#### 8.2.1.4 Abnormal Conditions

异常条件

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.

如果目标节点接收到RIC SUBSCRIPTION REQUEST消息包含并没有按照Near-RT RIC Service Model [3]规范的*RIC Subscription Details* IE，目标E2节点应该发送RIC SUBSCRIPTION FAILURE 消息并附上相应的理由值。

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.

如果目标节点接收到了RIC SUBSCRIPTION REQUEST消息包含*RAN Function ID IE,* 其中这个IE没有在E2Setup过程中或者RIC服务更新过程中声明，那么目标E2节点应该发送RIC SUBSCRIPTION FAILURE消息并且附上恰当的原因值。

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.

如果目标E2节点接收到RIC SUBSCRIPTION REQUEST消息包含标识内容，比如相同的*RAN Function ID* IE, 和*RIC Event Trigger Definition* 和相同的动作序列，那么目标E2节点应该发送RIC SUBSCRIPTION FAILURE消息并且附上恰当的原因值。

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

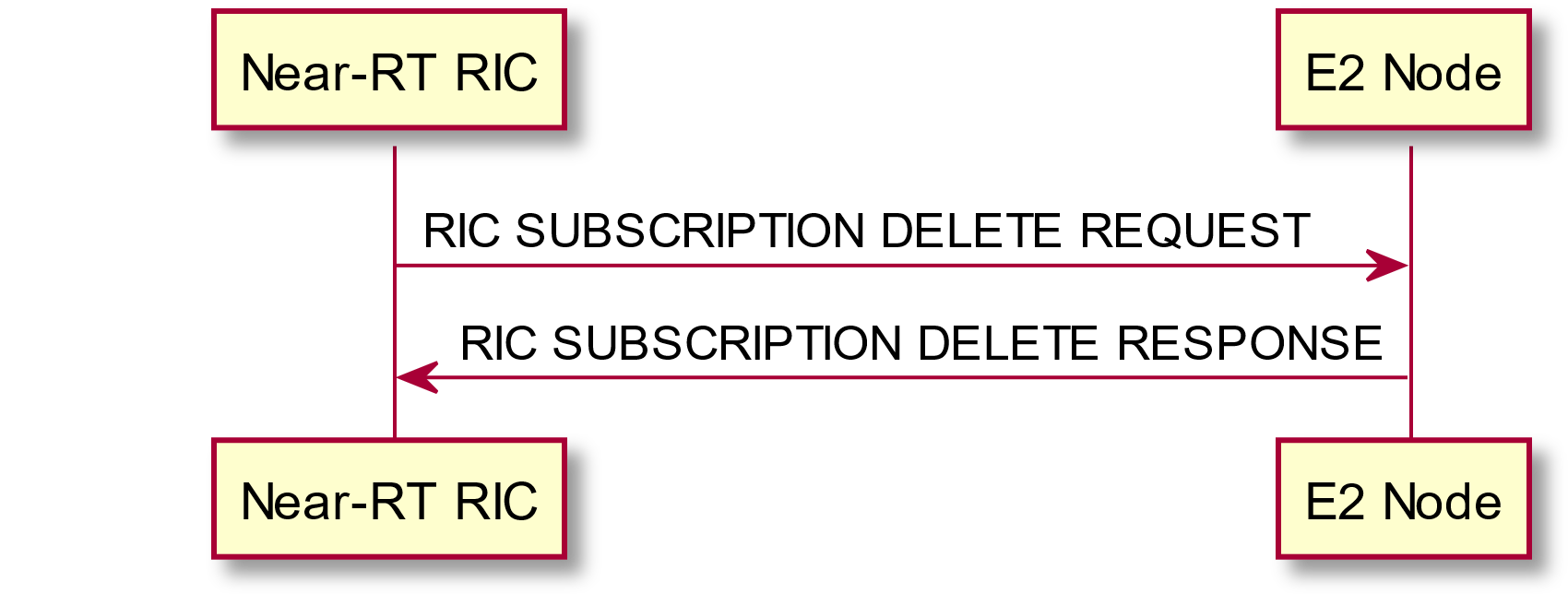


Figure 8.2.1.2-1: Near-RT RIC Subscription Delete procedure, successful operation

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.

Near-RT RIC 发起一个RIC SUBSCRIPTION DELETE REQUEST消息给目标E2节点的过程。当Near-RT RIC发送RIC SUBSCRIPTION DELETE REQUEST消息时，它应该开始一个timer TRICEVENTdelete .

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

接收到RIC SUBSCRIPTION DELETE REQUEST消息时，E2Node应该：

- 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.

依据*RAN Function ID* IE信息决定目标函数，依据*RIC Request ID* IE信息删除相应的RIC事件触发器

- 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.

如果有一个或者多个动作包含于在前面的接受的RIC订阅中，那么目标函数应该根据相应的*RIC Request ID* IE 删除要求的动作。

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

目标E2Node应该释放相对于的资源并且发送RIC SUBSCRIPTION DELETE RESPONSE 消息给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.

在接收到RIC SUBSCRIPTION DELETE RESPONSE消息时，Near-RT RIC应该停止timer TRICEVENTdelete 和终止RIC 订阅删除过程。

#### 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

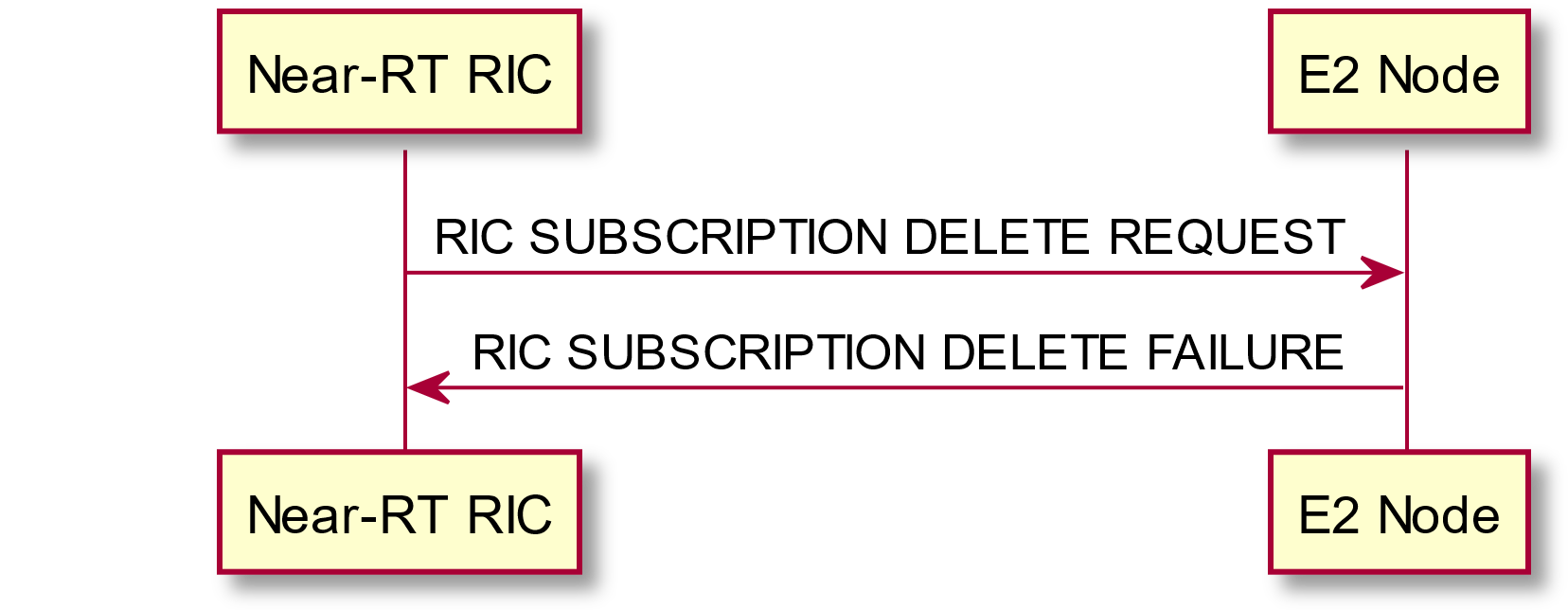


Figure 8.2.1.3-1: RIC Subscription Delete procedure, unsuccessful operation

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.

如果E2节点内没有在RIC SUBSCRIPTION DELETE REQUEST消息中找到对应的*RIC Request ID* IE或者在RIC Subscription Delete 过程失败了，那么目标E2节点应该发送RIC SUBSCRIPTION DELETE FAILURE给Near-RT RIC.这个消息应该包含恰当的理由值

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.

在Near-RT RIC平台接受RIC SUBSCRIPTION DELETE FAILURE消息应该停止timer TRICEVENTdelete 并且终止RIC Subscription Delete过程。

#### 8.2.2.4 Abnormal Conditions 异常情况

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.

目标E2节点在RIC SUBSCRIPTION DELETE REQUEST消息中接收到一个不知道的*RIC Request ID* IE，目标节点应该发送RIC SUBSCRIPTION DELETE FAILURE消息给Near-RT RIC.这个消息应该包含恰当的原因值。

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.

如果目标E2节点接收RIC SUBSCRIPTION DELETE REQUEST消息，这个消息中包含的*RAN Function ID* IE没有在先前声明（E2 Setup过程或者RIC Service Update过程）的过程中能支持的RAN功能，目标节点应该发送RIC SUBSCRIPTION DELETE FAILURE消息给Near-RT RIC.这个消息应该包含恰当的原因值。

### 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.

RIC指示过程的目的是去传输消息给Near-RT RIC，这个消息关联Report和/或Insert RIC Service,这个消息的作用是响应之前成功订阅的过程和相应事件触发器的检测。

#### 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

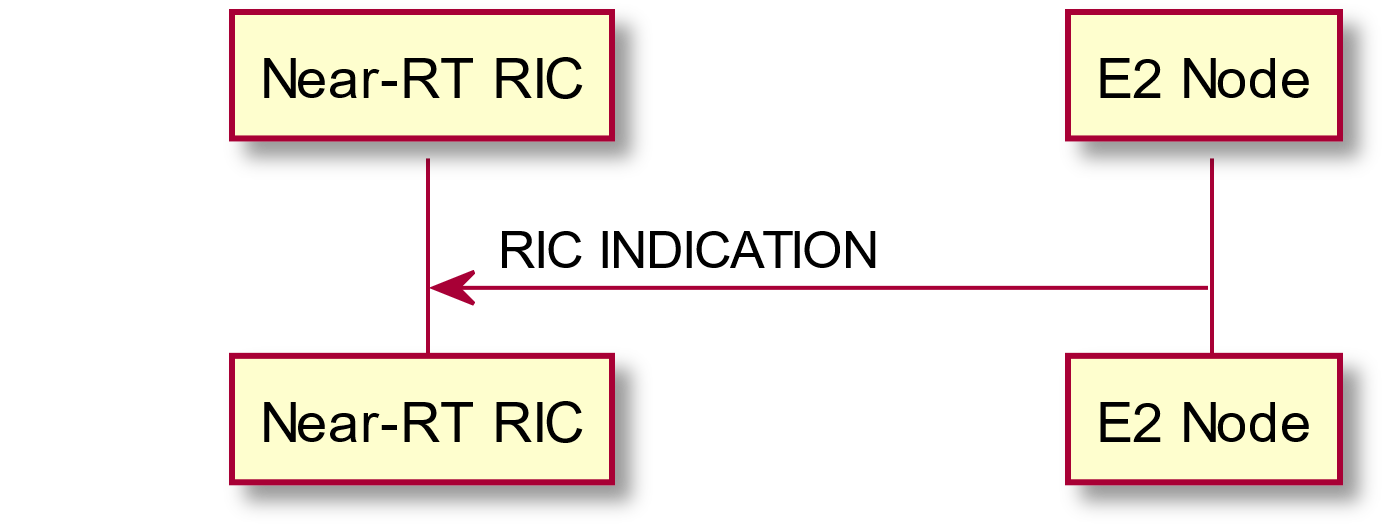


Figure 8.2.3.2-1: Near-RT RIC Indication procedure, successful operation

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.

一个E2节点发起一个RIC INDICATION消息的过程给Near-RT RIC，这个消息中关联*RIC Request ID* IE, *RAN Function ID* IE, *RIC Action ID* IE，以及可选择性的序列号*RIC Indication SN* IE，*RIC Indication Type* IE, *RIC Indication Header* IE, *RIC Indication Message* IE和可选择性的一个*RIC Call Process ID.*

- 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.

如果RIC *Subsequent Action* *Type* IE被设置成Continue或者Halt并且在*RIC Subsequent Action* IE 中的RIC Time to Wait IE是一个非零timer值，那么RIC INDICATION消息应该提供RIC Call Process ID IE并且E2节点应该存储当前调用状态并且挂起相关的RAN功能

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.

接收的Near-RT RIC应该使用RIC Request ID IE去路由Indication过程到发起相应地RIC订阅过程的Near-RT RIC 功能。

接收近实时 RIC 应使用 RIC 请求 ID IE 将指示路由到发起相应 RIC 订阅过程的近实时 RIC 功能。

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

如果存在，那么Near-RT RIC应该在后续的RIC Control过程中使用RIC Call Process ID IE 。

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:

如果E2节点存入了已关联*RIC Subsequent Action*，那么在成功传输RIC INDICATION消息之后，始发E2节点应该相应进行：

- 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.

如果*RIC Subsequent Action Type* IE 被设置成继续或者停止，关联的*RIC Time to Wait* timer 还没有过期，以及拥有相同的RIC Call Process ID IE的RIC CONTROL REQUEST消息被接收，那么E2节点应该使用RIC CONTROL REQUEST 消息以及存储调用状态，并且在恢复关联的RAN功能的正常功能之前，继续执行在RIC动作序列中任何保留的动作，这个RIC动作序列在先前的RIC订阅过程中已经定义

- 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.

如果*RIC Subsequent Action Type* IE 被设置成 Continue并且关联的RIC Time to Wait timer已经过期或者值为0，那么E2节点应该使用存储的调用状态并且在恢复关联RAN功能的正常功能之前，继续执行定义在RIC订阅过程中RIC动作序列中任何保留动作。

- 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.  
如果*RIC Subsequent Action Type* IE设置成为Halt并且关联的*RIC Time to Wait* timer已经过期或者值为0，那么E2节点应该终止关联RAN功能的正常功能。在这种情况下，任何在RIC订阅过程中定义的RIC动作序列中的保留的动作也应该终止。

|  |  |  |  |
| --- | --- | --- | --- |
| 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.

RIC控制过程的目的是在E2节点中发起或者恢复一项特定的功能。

#### 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

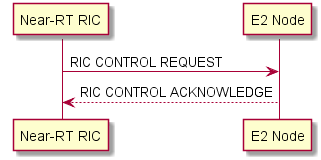


Figure 8.2.4.2-1: RIC Control procedure, successful operation

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.

Near-RT RIC发起一个控制过程，这个控制过程通过发送包含*RIC Request ID* IE, *RAN Function ID* IE, optionally *RIC Call Process ID* IE, *RIC Control Header* IE, *RIC Control Message* IE和*RIC Control Ack Request* IE（可选择）的RIC CONTROL REQUEST消息给E2节点。

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.

当Near-RT RIC发送RIC CONTROL REQUEST消息并且可选字段*RIC Control Ack Request* IE已经被设置成Ack，Near-RT RIC应该开始timer TRICcontrol.

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

接收到了RIC CONTROL REQUEST消息E2节点应该做什么：

- 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.

通过*RAN Function ID* IE中的信息决定目标函数和通过*RIC Control Message* IE中信息发起RIC Control过程动作。

- 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.

如果在RIC CONTROL REQUEST消息中包含*RIC Call Process ID* IE，E2节点应该使用这个IE去确定一个特定的调用过程，这个调用过程要在RIC INDICATION消息中提前声明。

- 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.

如果RIC CONTROL REQUEST消息中包含*RIC Control Ack Request* IE被设置成“Ack”并且E2节点成功的处理RIC Control过程的请求动作，那么E2节点应该响应一个RIC CONTROL ACKNOWLEDGE消息。

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.

在RIC CONTROL ACKNOWLEDGE消息的接收上，Near-RT RIC应该停止timer TRICcontrol 并且终止控制过程。Near-RT RIC应该使用包含*RIC Control Status* IE 和*RIC Control Outcome* IE（可选择）的信息去决定接下来的动作。

#### 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

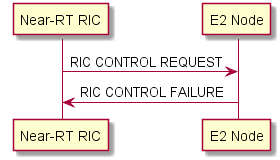


Figure 8.2.4.3-1: RIC Control procedure, unsuccessful operation

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.

如果RIC CONTROL REQUEST消息中包含无效或者参考一个过时的调用过程的*RIC Call Process ID* IE（可选择），那么E2节点应该响应一个RIC CONTROL FAILURE消息并且附上适当的值。

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.

如果E2节点执行请求RIC Control 过程动作失败，那么E2节点应该响应RIC CONTROL FAILURE消息并且附加上适当的原因值。

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.

在接收到RIC CONTROL FAILURE消息后，Near-RT RIC平台应该停止timer TRICcontrol （如果timer在运行）并且终止RIC Control过程。

#### 8.2.4.4 Abnormal Conditions异常过程

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.

如果目标E2节点接收到了一个包含RAN Function ID IE（这个IE没有被在先前E2 Setup过程或者RIC Service Update过程中作为一个支持的RAN功能所声明）或者E2节点并没有支持特定RIC 控制过程动作，然后目标E2节点应该忽略该消息并且发送一个ERROR INDICATION消息给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.

在带有关联RIC CONTROL REQUEST 的Cause IE的ERROR INDICATION消息上，Near-RT RIC应该停止timer TRICcontrol 和停止RIC控制过程。

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.

如果在RIC中timer TRICcontrol 之前，没有来自目标节点E2到设置成值为Ack的*RIC Control Ack* IE的响应，Near-RT RIC应该发送ERROR INDICATION 并带有适当的Cause IE的值。

## 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.

E2 Setup过程是去在E2节点与Near-RT RIC中间建立信令连接。这个过程删除了任何在两个节点存在的应用等级配置数据并将其配置为现在的数据。这个过程同样重置了E2接口像Reset过程一样。

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

注意这个过程执行基本的接口设置和传输了E2节点的基本配置设置消息给Near-RT RIC。

This procedure shall be initiated by the E2 Node. 这个过程由E2Node发起

#### 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

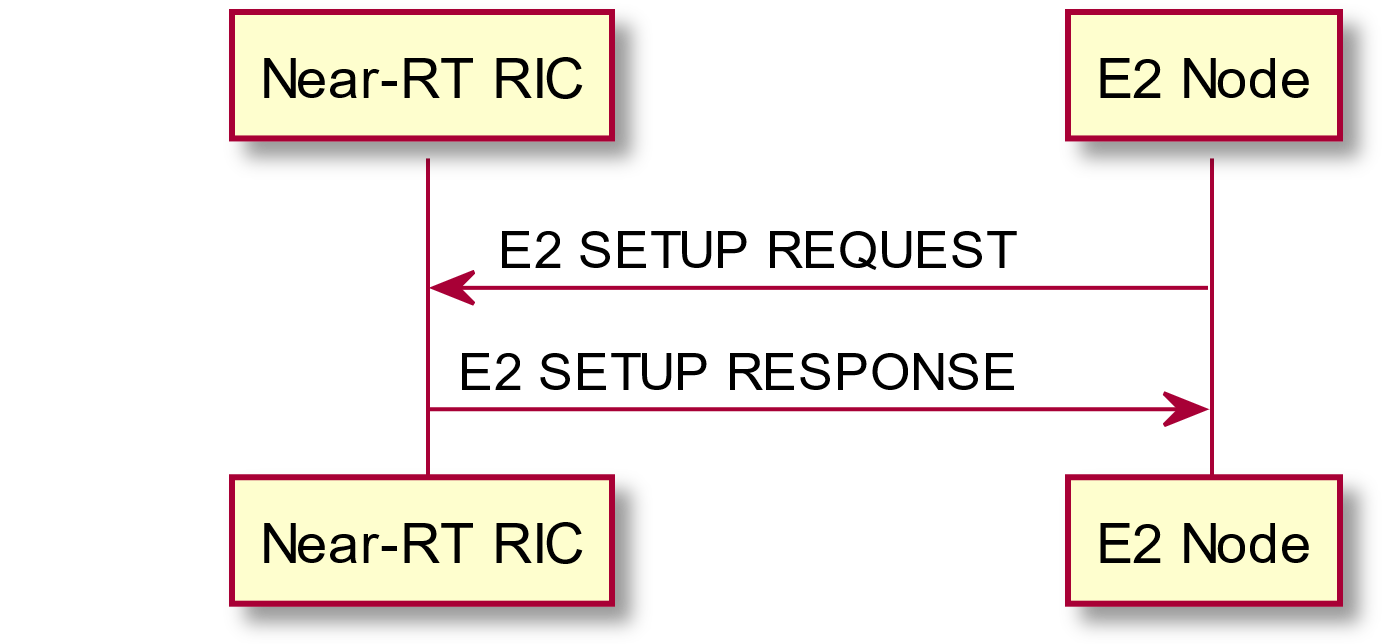


Figure 8.3.1.2-1: E2 Setup procedure, successful operation

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.

一个E2节点通过发起一个过程，这个过程是发送一个包含恰当数据的E2 SET REQUEST消息给Near-RT RIC。Near-RT RIC平台返回包含适当数据的E2 SETUP RESPONSE消息。

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.

如果E2 SETUP REQUEST消息中包含*List of RAN Functions Added* IE(可选择)，这个IE也同样出现在RIC SERVICE UPDATE消息中，并且Near-RT RIC已经成功处理了*List of RAN Functions Added* IE，然后Near-RT RIC 应该响应E2 SETUP RESPONSE消息，这个消息包含*List of RAN Functions* *Accepted* IE 和/或the *List of RAN Functions Rejected* IE（这个IE同样存在RIC SERVICE UPDATE ACKNOWLEDGE中）,

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.

如果 E2 SETUP REQUEST 消息包含*E2 Node Component Configuration Update List* IE（该消息可选择），这个IE同样也存在E2 节点 CONFIGURATION UPDATE消息中，并且Near-RT RIC成功处理这个信息，然后Near-RT RIC应该包含，在E2 SETUP RESPONSE 消息中，*E2 Node Component Configuration Update Acknowledge List* IE（这个IE存在E2 NODE CONFIGURATION UPDATE ACKNOWLEDGE消息中）。

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.

RIC Service Update procedure定义在8.3.4 E2 Node Configuration Update procedure定义在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

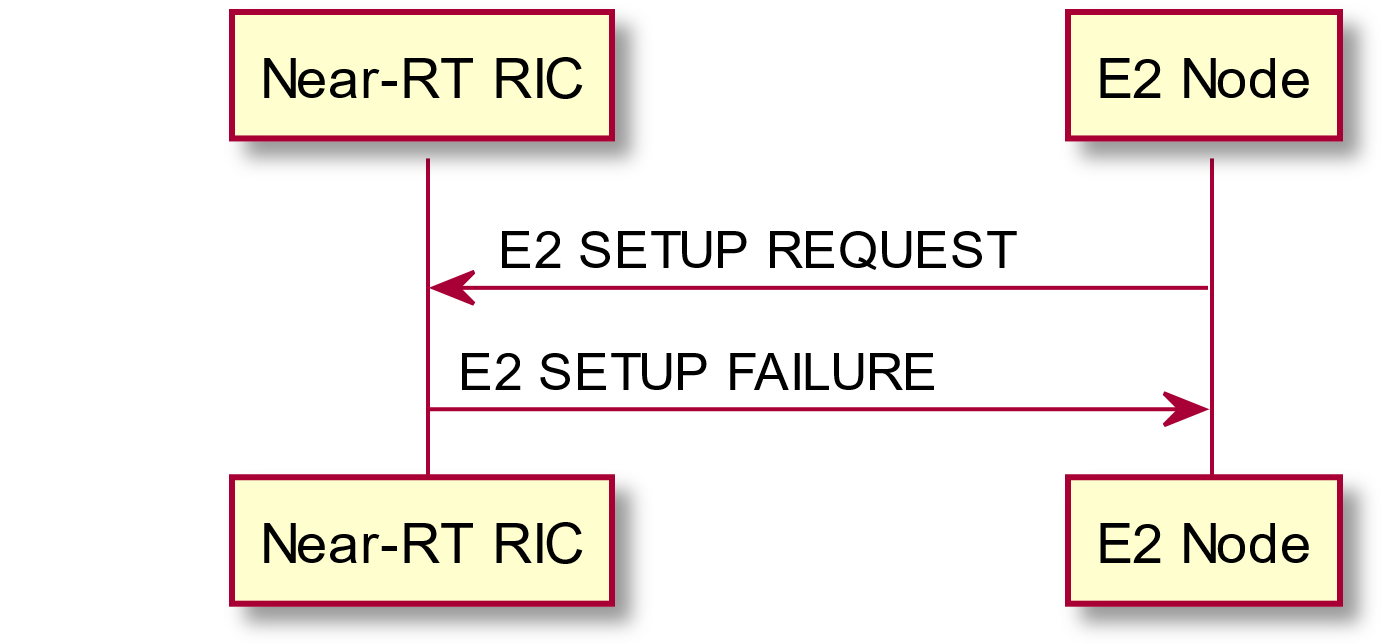


Figure 8.3.1.3-1: E2 Setup procedure, unsuccessful operation

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.

如果Near-RT RIC不能接收这个setup过程，那么它应该响应E2 SETUP FAILURE消息并附上适当的原因值。当重新初始化面向Near-RT RIC的E2 Setup过程，Near-RT RIC也许提供了可选择性*Transport Layer Information* IE 给E2节点去使用。

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.

如果E2 SETUP FAILURE 消息包含 *Time To Wait* IE，那么在重新初始化面向Near-RT RIC的E2 Setup过程之前，E2节点应该等待至少指示时间（*Time To Wait*）。

#### 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.

如果接收的TNL关联的第一条消息不是一条E2 SETUP REQUEST, E2 SETUP RESPONSE, or E2 SETUP FAILURE消息，那么被认为是逻辑错误。

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.

如果E2节点既没有E2 SETUP RESPONSE 消息或者E2 SETUP FAILURE消息，E2节点应该面向使用相同的TNL关联的相同的Near-RT RIC重新初始化E2 Setup 过程，依据新的E2 SETUP REQUSEST消息内容是定位先前没有承认的E2 SETUP REQUEST消息的内容。

### 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.

Reset过程的目的是使得在不正常失败的事件中E2节点和Near-RT RIC的资源同步。这个过程重置了E2接口。在E2 Setup，E2 Node Configuration Update 过程和RIC Service Update过程中,Reset这个过程并没有影响应用等级配置的数据交换。

#### 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

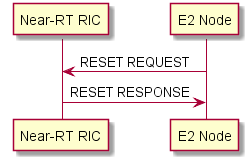


Figure 8.3.2.2-1: Reset, successful operation (E2 Node Initiated)

@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

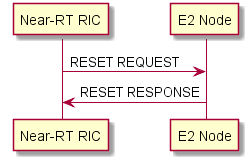


Figure 8.3.2.2-2: Reset, successful operation (Near-RT RIC Initiated)

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

- Delete any pre-established RIC Subscriptions,

删除预先的建立的RIC订阅

- 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.

优雅的结束任何正在运行的Near-RT RIC 使用**INSERT**, **CONTROL** or **POLICY服务的**调用过程并且保证对正在调用的连接UE影响最小

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.

在Reset完成之后，Near-RT RIC应该重新发起任何要求的请求。

其他过程的交互：

如果RESET REQUEST 消息被接收，在相同的E2接口联系的正在运行的RIC服务的任何其他正在运行的过程（除了其他Reset过程）都应该被终止。

#### 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.

如果初始化节点并没有接收到RESET RESPONSE 消息，初始化节点也许应该重新初始化Reset过程，条件是新的RESET REQUEST消息的内容是可以定位先前没有确认的RESET REQUEST消息内容。

### 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.

Error Indication 过程是既可以由E2节点也可以由Near-RT RIC初始化，它被用来报道检测错误在一个正在来的消息中，如果他们不能被一个适当的错误消息汇报。

错误指示过程由E2节点或Near-RT RIC发起，以在传入消息中报告检测到的错误(如果它们不能通过适当的故障消息报告)。

#### 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

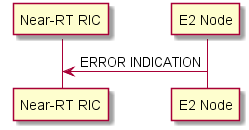


Figure 8.3.3.2-1: Error Indication, (E2 Node initiated) successful operation.

@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

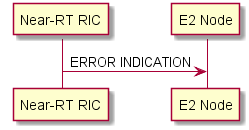


Figure 8.3.3.2-2: Error Indication, (Near-RT RIC Initiated) successful operation.

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.

当满足第十节定义的条件时，这个Erro Indication 过程是由检测到错误情况的节点发出的ERROR INDICATION消息初始化。

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.

ERROR INDICATION 消息应该至少包含Cause IE或者Criticality Diagnostics IE并且包含*RAN Function ID* IE 和*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.

RIC Service Update过程的目的是更新E2节点和Near-RT RIC节点所需要的应用等级配置数据，这个配置数据用来在E2接口的正确交互。

#### 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

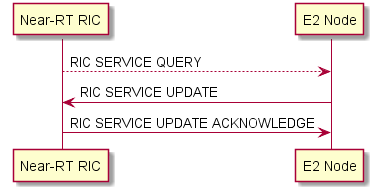


Figure 8.3.4.2-1: RIC Service Update procedure, successful operation

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.

一个E2节点通过发送RIC SERVICE UPDATE消息给Near-RT RIC初始化这个过程。这个消息应该包含一个适当的up-to-date Near-RT 服务相关配置数据集，包括，但是不限于

此类消息应包括一组适当的最新近实时 RIC 服务相关配置数据，包括但不限于 E2 节点已添加、修改和删除的受支持近实时 RIC 服务功能的完整列表刚刚与每个列表中每个项目的修订计数器一起投入使用。

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

收到RIC SERVICE UPDATE 消息后，Near-RT RIC 应该更新E2节点的信息，如下所示：

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.

如果*List of RAN Function Added* IE 包含RIC SERVICE UPDATE消息，Near-RT RIC应该根据在*RAN Function ID* IE and *RAN Function Definition* IE中的信息添加每隔列表可接受的功能信息和储存相应的*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.

如果*List of RAN Function Modified* IE包含于RIC SERVICE UPDATE消息中，Near-RT RIC应该修改根据*RAN Function Definition* IE中的信息修改已支持的功能的接受信息并且更新相应的*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.

如果*List of RAN Function Deleted* IE包含在RIC SERVICE UPDATE中，Near-RT RIC应该删除在相应*RAN Function Revision* IE下由*RAN Function ID* IE指示的RAN功能信息。

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.

这些改变也许在Near-RT-RIC中处理并且可以在发行RIC SUBSCRIPTION REQUEST 和RIC CONTROL时使用，以提供有效的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.

在请求信息成功跟新之后，Near-RT RIC 应该回复the RIC SERVICE UPDATE ACKNOWLEDGE消息去通知发起的E2节点请求应用数据的更新别成功执行。如果Near-RT RIC接收到了没有任何IE除了Message Type IE的RIC SERVICE UPDATE消息，它应该回复RIC SERVICE UPDATE ACKNOWLEDGE消息但是不执行任何更新。

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.

可选择性地，发往Near-RT RIC的RIC SERVICE UPDATE消息可能被当成发送给Near-RT RIC的RIC SERVICE QUERY消息的一个回应。在这种情况下，E2节点应该。。。

#### 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

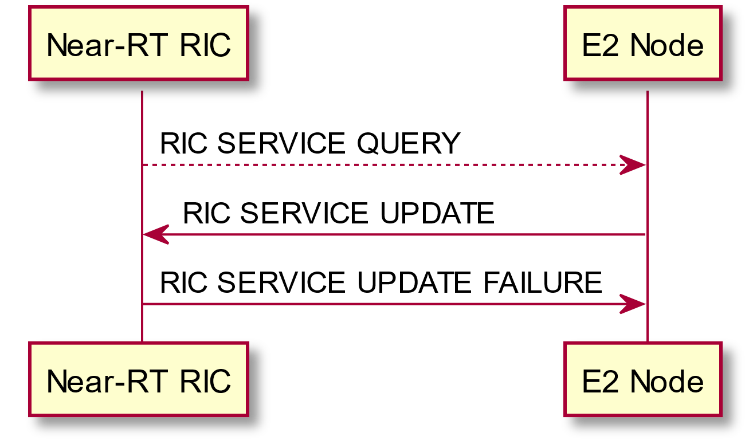


Figure 8.3.4.3-1: RIC Service Update procedure, unsuccessful operation

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

如果Near-RT RIC不能接收更新，那么它应该返回RIC SERVICE UPDATE FAILURE消息，并且附上适当的原因值。

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.

如果在RIC SERVICE UPDATE FAILURE消息中包含*Time To Wait* IE，E2节点应该至少等待指示事件再重新像Near-RT RIC发起RIC Service Update过程。两个节点应该按照原来存在的Near-RT RIC服务数据继续操作E2接口。

#### 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.

如果E2节点在发起一个RIC Service Update过程之后既没有接收到RIC SERVICE UPDATE ACKNOWLEDGE消息也没有接收到RIC SERVICE UPDATE FAILURE消息，那么E2节点应该重新面向相同的Near-RT RIC发起RIC Service Update过程，依据新的RIC SERVICE UPDATE 消息的内容和原来没有被认可的RIC SERVICE UPDATE 消息中的内容具有一致性。

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.

如果E2节点接收到了RIC SERVICE QUERY消息在*List of RAN Functions Accepted* IE中带有一个或者多个不知道的条目，那么E2节点应该忽略这个列表并且恢复完整，，，

### 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.

E2节点的配置更新过程的目的去更新E2节点和Near-RT RIC所需要的应用等级E2节点配置数据，为了能够在E2接口上能够正确交互。

#### 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

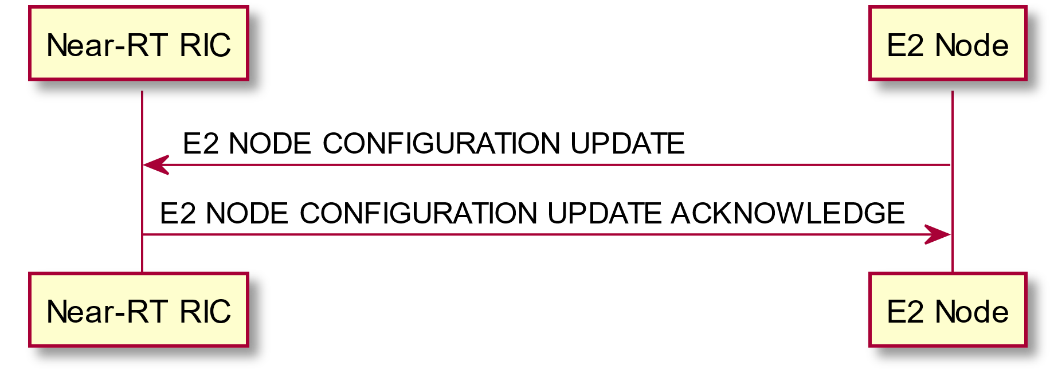


Figure 8.3.5.2-1: E2 Node Configuration Update procedure, successful operation

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.

一个E2节点通过发送E2 NODE CONFIGURATION UPDATE消息给Near-RT RIC发起一个Configuration Update过程。这个消息里面应该包含E2节点应该包含适当的最新的E2节点相关的配置数据集（E2节点刚刚投入运营使用）

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

当接收到E2 NODE CONFIGURATION UPDATE时，Near-RT RIC应该更新对E2节点更新信息如下：

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.

如果E2节点*Component Configuration Update Item* IE包含E2 NODE CONFIGURATION UPDATE消息，Near-RT RIC 应该相应地添加，修改，和/或删除E2节点Component Configuration信息。

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.

在成功地请求信息更新之后，Near-RT RIC 应该回复E2节点CONFIGURATION UPDATE ACKNOWLEDGE消息去通知发起地E2节点请求更新的数据执行更新成功。如果Near-RT RIC接收到E2 NODE CONFIGURATION UPDATE消息中没有任何IE除了*Message Typ*eIE，它应该回复CONFIGURATION UPDATE ACKNOWLEDGE消息并且没有执行任何更新配置。

#### 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

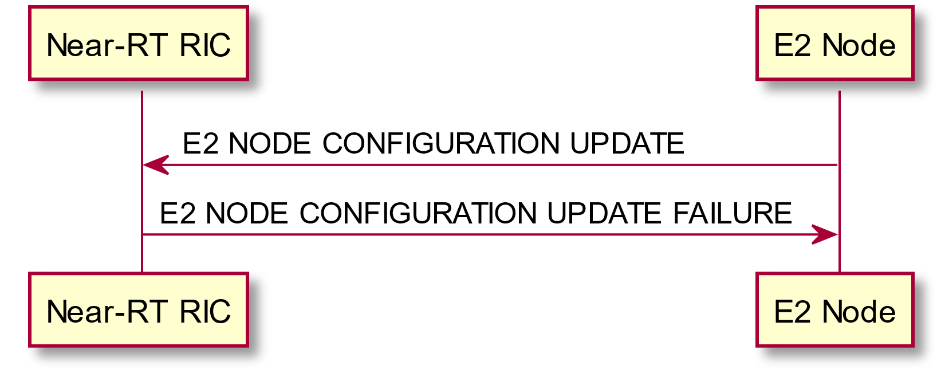


Figure 8.3.5.3-1: E2 Node Configuration Update procedure, unsuccessful operation

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.

如果Near-RT RIC不能接收E2节点CONFIGURATION UPDATE消息，它应该回应NODE CONFIGURATION UPDATE FAILURE消息给E2节点并且附上相应的原因值。

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.

在E2节点Configuration Update过程重新面向Near-RT RIC之前，如果E2节点CONFIGURATION UPDATE FAILURE消息中包含*Time To Wait* IE，那么E2节点应该等待指示事件。两个节点都应该继续按照已存在的配置数据进行配置。

#### 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.

在初始化E2节点Configuration Update过程之后，如果一个E2节点既不是E2节点CONFIGURATION UPDATE ACKNOWLEDGE消息也不是CONFIGURATION UPDATE FAILURE消息，E2节点应该面向相同的Near-RT RIC重新初始化E2节点过程，条件是新的E2节点CONFIGURATION UPDATE消息与原来未被确认的E2节点CONFIGURATION UPDATE消息内容一致。（也就是重新发送一遍）

### 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.

E2 Connection Update 过程的目的是更新在E2节点与Near-RT RIC之间的E2接口的连接。

#### 8.3.6.2 Successful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

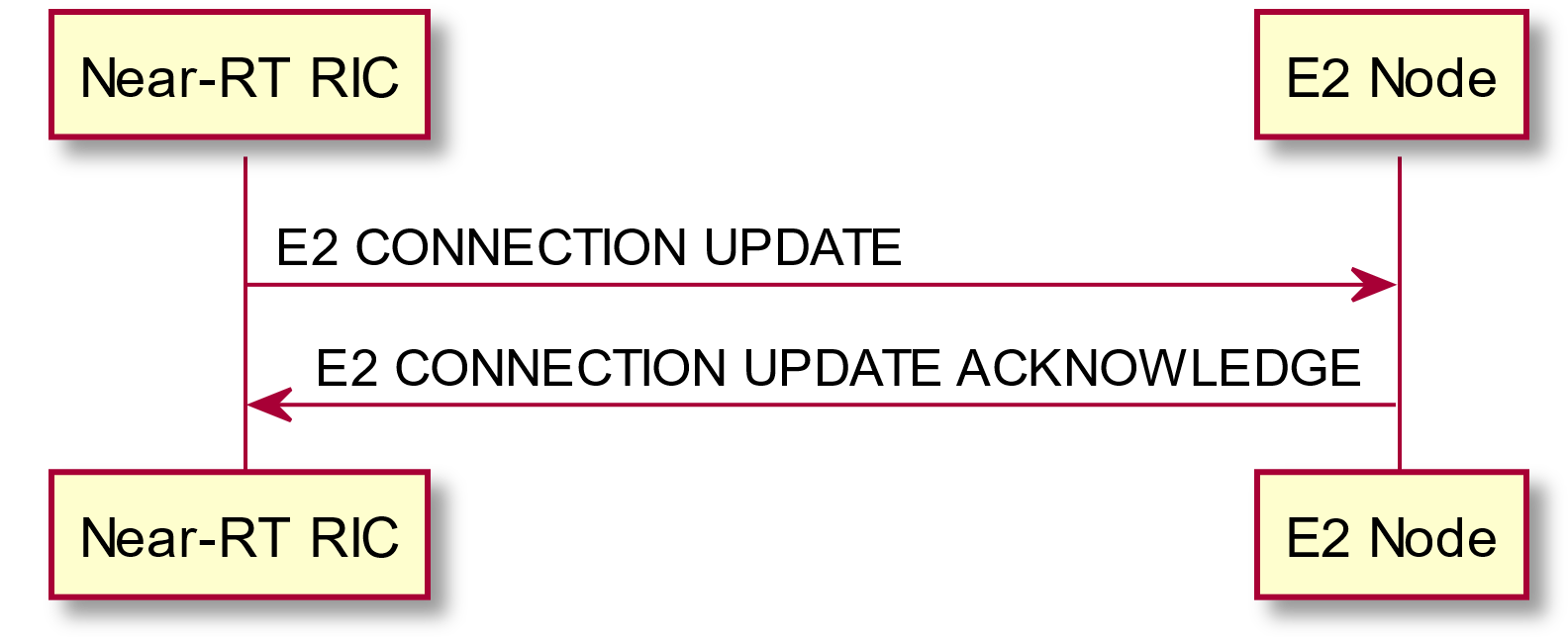
participant “Near-RT RIC” as near

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.

Near-RT RIC通过发送E2 CONNECTION UPDATE消息给E2节点初始化这个过程。这样的消息应该包括一个恰当的最新E2接口连接数据集，这些数据集应该在修改E2接口连接时E2节点应该被考虑进去。

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.

如果E2 *Connection To Add List* IE包含于E2 CONNECTION UPDATE消息中，那么E2节点，如果支持的话，应该根据消息中的*TNL Association Usage* IE来建立额外的TNL关联和配置RIC服务和/或E2支持的功能的使用。

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.

如果E2 CONNECTION UPDATE消息中包含*E2 Connection To Modify List* IE，那么E2节点应该，如果支持的话，根据消息中的*TNL Association Usage* IE使用它去修改存在的RIC服务存在的使用和/或E2支持的功能。

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.

如果E2 CONNECTION UPDATE 包含*E2 Connection To Remove List* IE，然后E2节点应该，如果支持的话，使用它去移除存在的连接。如果移除其他连接后只有一个连接保留着，E2节点应该使用这个连接连接所有的RIC服务和E2至此的功能。

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.

在E2接口连接成功更新之后，E2节点应该回复E2 CONNECTION UPDATE ACKNOWLEDGE消息给发起的Near-RT RIC,请求E2连接更新执行成功。如果E2节点接收到一个E2 CONNECTION UPDATE消息没有带任何IE除了*Message Typ*eIE，它应该回复E2 CONNECTION ACKNOWLEDGE消息并且不做任何更新在已存在的连接中。

#### 8.3.6.3 Unsuccessful Operation

@startuml

skinparam ParticipantPadding 5

skinparam BoxPadding 10

skinparam lifelineStrategy solid

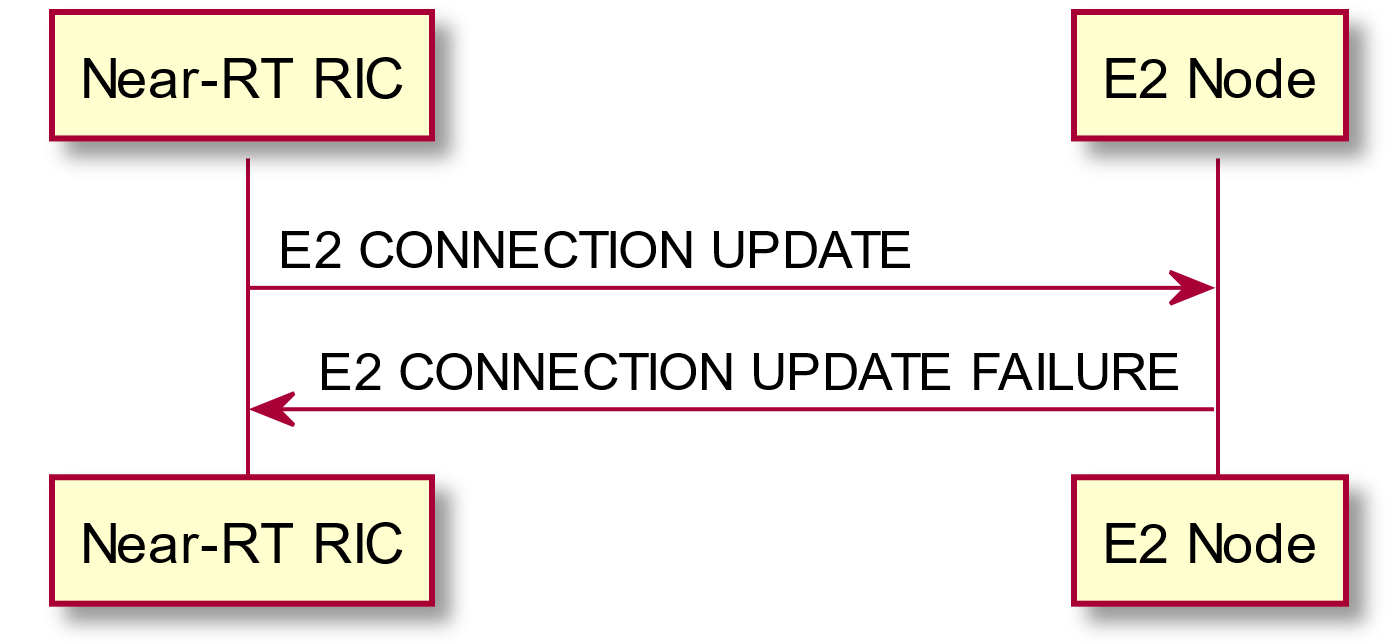
participant “Near-RT RIC” as near

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.

如果E2节点不能接收这个更新，那么它应该返回E2 CONNECTION UPDATE FAILURE消息并且附上相对应的原因值。

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).

如果E2 CONNECTION UPDATE FAILURE消息中包含*Time To Wait* IE，那么在重新发起面向相同的E2Node的E2 Connection Update 过程之前，Near-RT RIC应该等待至少指示时间。

#### 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.

在发起一个E2 Connection Update 过程后，如果Near-RT RIC既没有接收到CONNECTION UPDATE ACKNOWLEDGE消息也没有接收到E2 CONNECTION UPDATE FAILURE消息，那么Near-RT RIC应该重新发起面向相同E2节点的E2 Connection Update更新过程，条件是两次的E2 CONNECTION UPDATE消息是一样的。

# 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:

ASN.1定义明确E2AP消息的结构和内容。E2AP消息能够包含任何IE

- 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.

Annex ZZZ : O-RAN Adopter License Agreement

BY DOWNLOADING, USING OR OTHERWISE ACCESSING ANY O-RAN SPECIFICATION, ADOPTER AGREES TO THE TERMS OF THIS AGREEMENT.

This O-RAN Adopter License Agreement (the “Agreement”) is made by and between the O-RAN Alliance and the entity that downloads, uses or otherwise accesses any O-RAN Specification, including its Affiliates (the “Adopter”).

This is a license agreement for entities who wish to adopt any O-RAN Specification.

## Section 1: DEFINITIONS

1.1 “Affiliate” means an entity that directly or indirectly controls, is controlled by, or is under common control with another entity, so long as such control exists. For the purpose of this Section, “Control” means beneficial ownership of fifty (50%) percent or more of the voting stock or equity in an entity.

1.2 “Compliant Implementation” means any system, device, method or operation (whether implemented in hardware, software or combinations thereof) that fully conforms to a Final Specification.

1.3 “Adopter(s)” means all entities, who are not Members, Contributors or Academic Contributors, including their Affiliates, who wish to download, use or otherwise access O-RAN Specifications.

1.4 “Minor Update” means an update or revision to an O-RAN Specification published by O-RAN Alliance that does not add any significant new features or functionality and remains interoperable with the prior version of an O-RAN Specification. The term “O-RAN Specifications” includes Minor Updates.

1.5 “Necessary Claims” means those claims of all present and future patents and patent applications, other than design patents and design registrations, throughout the world, which (i) are owned or otherwise licensable by a Member, Contributor or Academic Contributor during the term of its Member, Contributor or Academic Contributorship; (ii) such Member, Contributor or Academic Contributor has the right to grant a license without the payment of consideration to a third party; and (iii) are necessarily infringed by a Compliant Implementation (without considering any Contributions not included in the Final Specification). A claim is necessarily infringed only when it is not possible on technical (but not commercial) grounds, taking into account normal technical practice and the state of the art generally available at the date any Final Specification was published by the O-RAN Alliance or the date the patent claim first came into existence, whichever last occurred, to make, sell, lease, otherwise dispose of, repair, use or operate a Compliant Implementation without infringing that claim. For the avoidance of doubt in exceptional cases where a Final Specification can only be implemented by technical solutions, all of which infringe patent claims, all such patent claims shall be considered Necessary Claims.

1.6 “Defensive Suspension” means for the purposes of any license grant pursuant to Section 3, Member, Contributor, Academic Contributor, Adopter, or any of their Affiliates, may have the discretion to include in their license a term allowing the licensor to suspend the license against a licensee who brings a patent infringement suit against the licensing Member, Contributor, Academic Contributor, Adopter, or any of their Affiliates.

## Section 2: COPYRIGHT LICENSE

2.1 Subject to the terms and conditions of this Agreement, O-RAN Alliance hereby grants to Adopter a nonexclusive, nontransferable, irrevocable, non-sublicensable, worldwide copyright license to obtain, use and modify O-RAN Specifications, but not to further distribute such O-RAN Specification in any modified or unmodified way, solely in furtherance of implementations of an O-RAN

Specification.

2.2 Adopter shall not use O-RAN Specifications except as expressly set forth in this Agreement or in a separate written agreement with O-RAN Alliance.

## Section 3: FRAND LICENSE

3.1 Members, Contributors and Academic Contributors and their Affiliates are prepared to grant based on a separate Patent License Agreement to each Adopter under Fair Reasonable And Non- Discriminatory (FRAND) terms and conditions with or without compensation (royalties) a nonexclusive, non-transferable, irrevocable (but subject to Defensive Suspension), non-sublicensable, worldwide patent license under their Necessary Claims to make, have made, use, import, offer to sell, lease, sell and otherwise distribute Compliant Implementations; provided, however, that such license shall not extend: (a) to any part or function of a product in which a Compliant Implementation is incorporated that is not itself part of the Compliant Implementation; or (b) to any Adopter if that Adopter is not making a reciprocal grant to Members, Contributors and Academic Contributors, as set forth in Section 3.3. For the avoidance of doubt, the foregoing licensing commitment includes the distribution by the Adopter’s distributors and the use by the Adopter’s customers of such licensed Compliant Implementations.

3.2 Notwithstanding the above, if any Member, Contributor or Academic Contributor, Adopter or their Affiliates has reserved the right to charge a FRAND royalty or other fee for its license of Necessary Claims to Adopter, then Adopter is entitled to charge a FRAND royalty or other fee to such Member, Contributor or Academic Contributor, Adopter and its Affiliates for its license of Necessary Claims to its licensees.

3.3 Adopter, on behalf of itself and its Affiliates, shall be prepared to grant based on a separate Patent License Agreement to each Members, Contributors, Academic Contributors, Adopters and their Affiliates under Fair Reasonable And Non-Discriminatory (FRAND) terms and conditions with or without compensation (royalties) a nonexclusive, non-transferable, irrevocable (but subject to Defensive Suspension), non-sublicensable, worldwide patent license under their Necessary Claims to make, have made, use, import, offer to sell, lease, sell and otherwise distribute Compliant Implementations; provided, however, that such license will not extend: (a) to any part or function of a product in which a Compliant Implementation is incorporated that is not itself part of the Compliant Implementation; or (b) to any Members, Contributors, Academic Contributors, Adopters and their Affiliates that is not making a reciprocal grant to Adopter, as set forth in Section 3.1. For the avoidance of doubt, the foregoing licensing commitment includes the distribution by the Members’, Contributors’, Academic Contributors’, Adopters’ and their Affiliates’ distributors and the use by the Members’, Contributors’, Academic Contributors’, Adopters’ and their Affiliates’ customers of such licensed Compliant Implementations.

## Section 4: TERM AND TERMINATION

4.1 This Agreement shall remain in force, unless early terminated according to this Section 4.

4.2 O-RAN Alliance on behalf of its Members, Contributors and Academic Contributors may terminate this Agreement if Adopter materially breaches this Agreement and does not cure or is not capable of curing such breach within thirty (30) days after being given notice specifying the breach.

4.3 Sections 1, 3, 5 - 11 of this Agreement shall survive any termination of this Agreement. Under surviving Section 3, after termination of this Agreement, Adopter will continue to grant licenses (a) to entities who become Adopters after the date of termination; and (b) for future versions of O-RAN Specifications that are backwards compatible with the version that was current as of the date of termination.

## Section 5: CONFIDENTIALITY

Adopter will use the same care and discretion to avoid disclosure, publication, and dissemination of O-RAN Specifications to third parties, as Adopter employs with its own confidential information, but no less than reasonable care. Any disclosure by Adopter to its Affiliates, contractors and consultants should be subject to an obligation of confidentiality at least as restrictive as those contained in this Section. The foregoing obligation shall not apply to any information which is: (1) rightfully known by Adopter without any limitation on use or disclosure prior to disclosure; (2) publicly available through no fault of Adopter; (3) rightfully received without a duty of confidentiality; (4) disclosed by O-RAN Alliance or a Member, Contributor or Academic Contributor to a third party without a duty of confidentiality on such third party; (5) independently developed by Adopter; (6) disclosed pursuant to the order of a court or other authorized governmental body, or as required by law, provided that Adopter provides reasonable prior written notice to O-RAN Alliance, and cooperates with O-RAN Alliance and/or the applicable Member, Contributor or Academic Contributor to have the opportunity to oppose any such order; or (7) disclosed by Adopter with O-RAN Alliance’s prior written approval.

## Section 6: INDEMNIFICATION

Adopter shall indemnify, defend, and hold harmless the O-RAN Alliance, its Members, Contributors or Academic Contributors, and their employees, and agents and their respective successors, heirs and assigns (the “Indemnitees”), against any liability, damage, loss, or expense (including reasonable attorneys’ fees and expenses) incurred by or imposed upon any of the Indemnitees in connection with any claims, suits, investigations, actions, demands or judgments arising out of Adopter’s use of the licensed O-RAN Specifications or Adopter’s commercialization of products that comply with O-RAN Specifications.

## Section 7: LIMITATIONS ON LIABILITY; NO WARRANTY

EXCEPT FOR BREACH OF CONFIDENTIALITY, ADOPTER’S BREACH OF SECTION 3, AND ADOPTER’S INDEMNIFICATION OBLIGATIONS, IN NO EVENT SHALL ANY PARTY BE LIABLE TO ANY OTHER PARTY OR THIRD PARTY FOR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES RESULTING FROM ITS PERFORMANCE OR NON-PERFORMANCE UNDER THIS AGREEMENT, IN EACH CASE WHETHER UNDER CONTRACT, TORT, WARRANTY, OR OTHERWISE, AND WHETHER OR NOT SUCH PARTY HAD ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES. O-RAN SPECIFICATIONS ARE PROVIDED “AS IS” WITH NO WARRANTIES OR CONDITIONS WHATSOEVER, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE. THE O-RAN ALLIANCE AND THE MEMBERS, CONTRIBUTORS OR ACADEMIC CONTRIBUTORS EXPRESSLY DISCLAIM ANY WARRANTY OR CONDITION OF MERCHANTABILITY, SECURITY, SATISFACTORY QUALITY, NONINFRINGEMENT, FITNESS FOR ANY PARTICULAR PURPOSE, ERROR-FREE OPERATION, OR ANY WARRANTY OR CONDITION FOR O-RAN SPECIFICATIONS.

## Section 8: ASSIGNMENT

Adopter may not assign the Agreement or any of its rights or obligations under this Agreement or make any grants or other sublicenses to this Agreement, except as expressly authorized hereunder, without having first received the prior, written consent of the O-RAN Alliance, which consent may be withheld in O-RAN Alliance’s sole discretion. O-RAN Alliance may freely assign this Agreement.

## Section 9: THIRD-PARTY BENEFICIARY RIGHTS

Adopter acknowledges and agrees that Members, Contributors and Academic Contributors (including future Members, Contributors and Academic Contributors) are entitled to rights as a third-party beneficiary under this Agreement, including as licensees under Section 3.

## Section 10: BINDING ON AFFILIATES

Execution of this Agreement by Adopter in its capacity as a legal entity or association constitutes that legal entity’s or association’s agreement that its Affiliates are likewise bound to the obligations that are applicable to Adopter hereunder and are also entitled to the benefits of the rights of Adopter hereunder.

## Section 11: GENERAL

This Agreement is governed by the laws of Germany without regard to its conflict or choice of law provisions.

This Agreement constitutes the entire agreement between the parties as to its express subject matter and expressly supersedes and replaces any prior or contemporaneous agreements between the parties, whether written or oral, relating to the subject matter of this Agreement.

Adopter, on behalf of itself and its Affiliates, agrees to comply at all times with all applicable laws, rules and regulations with respect to its and its Affiliates’ performance under this Agreement, including without limitation, export control and antitrust laws. Without limiting the generality of the foregoing, Adopter acknowledges that this Agreement prohibits any communication that would violate the antitrust laws.

By execution hereof, no form of any partnership, joint venture or other special relationship is created between Adopter, or O-RAN Alliance or its Members, Contributors or Academic Contributors. Except as expressly set forth in this Agreement, no party is authorized to make any commitment on behalf of Adopter, or O-RAN Alliance or its Members, Contributors or Academic Contributors.

In the event that any provision of this Agreement conflicts with governing law or if any provision is held to be null, void or otherwise ineffective or invalid by a court of competent jurisdiction, (i) such provisions will be deemed stricken from the contract, and (ii) the remaining terms, provisions, covenants and restrictions of this Agreement will remain in full force and effect.

Any failure by a party or third party beneficiary to insist upon or enforce performance by another party of any of the provisions of this Agreement or to exercise any rights or remedies under this Agreement or otherwise by law shall not be construed as a waiver or relinquishment to any extent of the other parties’ or third party beneficiary’s right to assert or rely upon any such provision, right or remedy in that or any other instance; rather the same shall be and remain in full force and effect.