





























































































- 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 GTP Tunnel Endpoint

The *GTP Tunnel Endpoint* IE identifies an X2 transport bearer or the S-GW endpoint of the S1 transport bearer associated to an E-RAB. It contains a Transport Layer Address and a GTP Tunnel Endpoint Identifier. The Transport Layer Address is an IP address to be used for the X2 user plane transport (see [8]) or for the S1 user plane transport (see [19]). The GTP Tunnel Endpoint Identifier is to be used for the user plane transport between eNB and the S-GW or between eNBs.

<b>IE/Group Name</b>	<b>Presence</b>	<b>Range</b>	<b>IE type and reference</b>	<b>Semantics description</b>	<b>Criticality</b>	<b>Assigned Criticality</b>
Transport Layer Address	M		BIT STRING (1..160, ...)	For details on the Transport Layer Address, see ref. [8], [19]	–	–
GTP TEID	M		OCTET STRING (4)		–	–

## 9.2.2 Trace Activation

Defines parameters related to trace activation.



































IE/Group Name	Presence	Range	IE type and reference	Semantics description
Priority Level	M		INTEGER (0..15)	<b>Desc.:</b> This IE should be understood as 'priority of allocation and retention' (see [12]). <b>Usage:</b> Value 15 means 'no priority'. Values between 1 and 14 are ordered in decreasing order of priority, i.e. 1 is the highest and 14 the lowest. Value 0 shall be treated as a logical error if received.
Pre-emption Capability	M		ENUMERATED (shall not trigger pre-emption, may trigger pre-emption)	<b>Desc.:</b> This IE indicates the pre-emption capability of the request on other E-RABs <b>Usage:</b> The E-RAB shall not pre-empt other E-RABs or, the E-RAB may pre-empt other E-RABs The Pre-emption Capability indicator applies to the allocation of resources for an E-RAB and as such it provides the trigger to the pre-emption procedures/processes of the eNB.
Pre-emption Vulnerability	M		ENUMERATED (not pre-emptable, pre-emptable)	<b>Desc.:</b> This IE indicates the vulnerability of the E-RAB to preemption of other E-RABs. <b>Usage:</b> The E-RAB shall not be pre-empted by other E-RABs or the E-RAB may be pre-empted by other RABs. Pre-emption Vulnerability indicator applies for the entire duration of the E-RAB, unless modified and as such indicates whether the E-RAB is a target of the pre-emption procedures/processes of the eNB

## 9.2.32 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, ...)	



IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Last Visited Cell List		1 to maxnoofCells		Most recent information is added to the top of this list	-	-
>Last Visited Cell Information	M		9.2.39		-	-

Range bound	Explanation
maxnoofCells	Maximum number of last visited cell information records that can be reported in the IE. Value is 16.

## 9.2.39 Last Visited Cell Information

The Last Visited Cell Information may contain E-UTRAN or UTRAN or GERAN cell specific information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
CHOICE <i>Last Visted Cell Information</i>	M				-	-
> <i>E-UTRAN Cell</i>					-	-
>>Last Visited E-UTRAN Cell Information	M		9.2.40		-	-
> <i>UTRAN Cell</i>					-	-
>>Last Visited UTRAN Cell Information	M		OCTET STRING	Defined in [24]		
> <i>GERAN Cell</i>					-	-
>>Last Visited GERAN Cell Information	M		9.2.41		-	-

## 9.2.40 Last Visited E-UTRAN Cell Information

The Last Visited E-UTRAN Cell Information contains information about a cell that is to be used for RRM purposes.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Global Cell ID	M		ECCI 9.2.14		-	-
Cell Type	M		9.2.42		-	-
Time UE stayed in Cell	M		INTEGER (0..4095)	The duration of the time the UE stayed in the cell in seconds. If the UE stays in a cell more than 4095s, this IE is set to 4095	-	-





IE/Group Name	Presence	Range	IE type and reference	Semantics description
Handover Trigger Change Lower Limit	M		INTEGER (-20..20)	The actual value is IE value * 0.5 dB.
Handover Trigger Change Upper Limit	M		INTEGER (-20..20)	The actual value is IE value * 0.5 dB.

## 9.2.50 PRACH Configuration

This IE indicates the PRACH resources used in neighbor cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
RootSequenceIndex	M		INTEGER (0..837)	See section 5.7.2. in [10]	-	-
ZeroCorrelationZoneConfiguration	M		INTEGER (0..15)	See section 5.7.2. in [10]	-	-
HighSpeedFlag	M		BOOLEAN	TRUE corresponds to Restricted set and FALSE to Unrestricted set, see section 5.7.2 in [10]	-	-
PRACH-FrequencyOffset	M		INTEGER (0..94)	See section 5.7.1 of [10]	-	-
PRACH-ConfigurationIndex	O		INTEGER (0..63)	Mandatory for TDD, shall not be present for FDD. See section 5.7.1. in [10]	-	-

## 9.2.51 Subframe Allocation

The *Subframe Allocation* IE is used to indicate the subframes that are allocated for MBSFN within the radio frame allocation period as defined in [9].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>Subframe Allocation</i>	M			
>Oneframe	M		BITSTRING (SIZE(6))	
>Fourframes	M		BITSTRING (SIZE(24))	

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

### 9.3.1 General

Sub clause 9.3 presents the Abstract Syntax of the X2AP protocol with ASN.1. In case there is contradiction between the ASN.1 definition in this sub clause and the tabular format in sub clause 9.1 and 9.2, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, in which the tabular format shall take precedence.

The ASN.1 definition specifies the structure and content of X2AP messages. X2AP 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 a X2AP message according to the PDU definitions module and with the following additional rules (Note that in the following IE means an IE in the object set with an explicit id. If one IE needed to appear more than once in one object set, then the different occurrences have different IE ids):

- 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 in which 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.

If a X2AP message that is not constructed as defined above is received, this shall be considered as Abstract Syntax Error, and the message shall be handled as defined for Abstract Syntax Error in clause 10.

### 9.3.2 Usage of Private Message Mechanism for Non-standard Use

The private message mechanism for non-standard use may be used:

- for special operator (and/or vendor) specific features considered not to be part of the basic functionality, i.e. the functionality required for a complete and high-quality specification in order to guarantee multivendor inter-operability.
- by vendors for research purposes, e.g. to implement and evaluate new algorithms/features before such features are proposed for standardisation.

The private message mechanism shall not be used for basic functionality. Such functionality shall be standardised.

### 9.3.3 Elementary Procedure Definitions

```
-- *****  
--  
-- Elementary Procedure definitions  
--  
-- *****
```

```
X2AP-PDU-Descriptions {  
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)  
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-PDU-Descriptions (0) }
```

```
DEFINITIONS AUTOMATIC TAGS ::=
```

```
BEGIN
```

```
-- *****  
--  
-- IE parameter types from other modules.  
--  
-- *****
```

```
IMPORTS
```

```
    Criticality,  
    ProcedureCode  
FROM X2AP-CommonDataTypes
```

```
    CellActivationRequest,  
    CellActivationResponse,  
    CellActivationFailure,  
    ENBConfigurationUpdate,  
    ENBConfigurationUpdateAcknowledge,  
    ENBConfigurationUpdateFailure,  
    ErrorIndication,  
    HandoverCancel,  
    HandoverReport,  
    HandoverPreparationFailure,  
    HandoverRequest,  
    HandoverRequestAcknowledge,  
    LoadInformation,  
    PrivateMessage,  
    ResetRequest,  
    ResetResponse,  
    ResourceStatusFailure,  
    ResourceStatusRequest,  
    ResourceStatusResponse,  
    ResourceStatusUpdate,  
    RLFIndication,  
    SNStatusTransfer,  
    UEContextRelease,  
    X2SetupFailure, X2SetupRequest,  
    X2SetupResponse,  
    MobilityChangeRequest,  
    MobilityChangeAcknowledge,  
    MobilityChangeFailure
```

```
FROM X2AP-PDU-Contents
```

```
    id-cellActivation,
```

```

id-eNBConfigurationUpdate,
id-errorIndication,
id-handoverCancel,
id-handoverReport,
id-handoverPreparation,

id-loadIndication,
id-privateMessage,
id-reset,

id-resourceStatusReporting,
id-resourceStatusReportingInitiation,
id-rLFIndication,
id-snStatusTransfer,
id-uEContextRelease,
id-x2Setup,
id-mobilitySettingsChange

```

```
FROM X2AP-Constants;
```

```

-- *****
--
-- Interface Elementary Procedure Class
--
-- *****

```

```

X2AP-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
--
-- *****

```

```

X2AP-PDU ::= CHOICE {
    initiatingMessage      InitiatingMessage,
    successfulOutcome      SuccessfulOutcome,
    unsuccessfulOutcome    UnsuccessfulOutcome,
}

```

```

}
...
}
InitiatingMessage ::= SEQUENCE {
  procedureCode X2AP-ELEMENTARY-PROCEDURE.&procedureCode      ({X2AP-ELEMENTARY-PROCEDURES}),
  criticality   X2AP-ELEMENTARY-PROCEDURE.&criticality         ({X2AP-ELEMENTARY-PROCEDURES}@procedureCode),
  value        X2AP-ELEMENTARY-PROCEDURE.&InitiatingMessage   ({X2AP-ELEMENTARY-PROCEDURES}@procedureCode)
}

SuccessfulOutcome ::= SEQUENCE {
  procedureCode X2AP-ELEMENTARY-PROCEDURE.&procedureCode      ({X2AP-ELEMENTARY-PROCEDURES}),
  criticality   X2AP-ELEMENTARY-PROCEDURE.&criticality         ({X2AP-ELEMENTARY-PROCEDURES}@procedureCode),
  value        X2AP-ELEMENTARY-PROCEDURE.&SuccessfulOutcome   ({X2AP-ELEMENTARY-PROCEDURES}@procedureCode)
}

UnsuccessfulOutcome ::= SEQUENCE {
  procedureCode X2AP-ELEMENTARY-PROCEDURE.&procedureCode      ({X2AP-ELEMENTARY-PROCEDURES}),
  criticality   X2AP-ELEMENTARY-PROCEDURE.&criticality         ({X2AP-ELEMENTARY-PROCEDURES}@procedureCode),
  value        X2AP-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome ({X2AP-ELEMENTARY-PROCEDURES}@procedureCode)
}

-- *****
--
-- Interface Elementary Procedure List
--
-- *****

X2AP-ELEMENTARY-PROCEDURES X2AP-ELEMENTARY-PROCEDURE ::= {
  X2AP-ELEMENTARY-PROCEDURES-CLASS-1 |
  X2AP-ELEMENTARY-PROCEDURES-CLASS-2 ,
  ...
}

X2AP-ELEMENTARY-PROCEDURES-CLASS-1 X2AP-ELEMENTARY-PROCEDURE ::= {
  handoverPreparation |
  reset |
  x2Setup |
  resourceStatusReportingInitiation |
  eNBConfigurationUpdate |
  mobilitySettingsChange |
  cellActivation |
  ...
}

X2AP-ELEMENTARY-PROCEDURES-CLASS-2 X2AP-ELEMENTARY-PROCEDURE ::= {
  snStatusTransfer |
  uEContextRelease |
  handoverCancel |
  errorIndication |
  resourceStatusReporting |
  loadIndication |
  privateMessage |
  rLFIndication |
  handoverReport,
}

```

```
...
}

-- *****
--
-- Interface Elementary Procedures
--
-- *****

handoverPreparation X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      HandoverRequest
    SUCCESSFUL OUTCOME      HandoverRequestAcknowledge
    UNSUCCESSFUL OUTCOME    HandoverPreparationFailure
    PROCEDURE CODE          id-handoverPreparation
    CRITICALITY             reject
}

snStatusTransfer X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      SNStatusTransfer
    PROCEDURE CODE          id-snStatusTransfer
    CRITICALITY             ignore
}

ueContextRelease X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      UEContextRelease
    PROCEDURE CODE          id-ueContextRelease
    CRITICALITY             ignore
}

handoverCancel X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      HandoverCancel
    PROCEDURE CODE          id-handoverCancel
    CRITICALITY             ignore
}

handoverReport X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      HandoverReport
    PROCEDURE CODE          id-handoverReport
    CRITICALITY             ignore
}

errorIndication X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ErrorIndication
    PROCEDURE CODE          id-errorIndication
    CRITICALITY             ignore
}

reset X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      ResetRequest
    SUCCESSFUL OUTCOME      ResetResponse
    PROCEDURE CODE          id-reset
}
```

```

    CRITICALITY          reject
}

x2Setup X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE    X2SetupRequest
    SUCCESSFUL OUTCOME    X2SetupResponse
    UNSUCCESSFUL OUTCOME X2SetupFailure
    PROCEDURE CODE        id-x2Setup
    CRITICALITY           reject
}

loadIndication X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE    LoadInformation
    PROCEDURE CODE        id-loadIndication
    CRITICALITY           ignore
}

enBConfigurationUpdate X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE    ENBConfigurationUpdate
    SUCCESSFUL OUTCOME    ENBConfigurationUpdateAcknowledge
    UNSUCCESSFUL OUTCOME ENBConfigurationUpdateFailure
    PROCEDURE CODE        id-enBConfigurationUpdate
    CRITICALITY           reject
}

resourceStatusReportingInitiation X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE    ResourceStatusRequest
    SUCCESSFUL OUTCOME    ResourceStatusResponse
    UNSUCCESSFUL OUTCOME ResourceStatusFailure
    PROCEDURE CODE        id-resourceStatusReportingInitiation
    CRITICALITY           reject
}

resourceStatusReporting X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE    ResourceStatusUpdate
    PROCEDURE CODE        id-resourceStatusReporting
    CRITICALITY           ignore
}

rLFIndication X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE    rLFIndication
    PROCEDURE CODE        id-rLFIndication
    CRITICALITY           ignore
}

privateMessage X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE    PrivateMessage
    PROCEDURE CODE        id-privateMessage
    CRITICALITY           ignore
}

mobilitySettingsChange X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE    MobilityChangeRequest

```

```

    SUCCESSFUL OUTCOME      MobilityChangeAcknowledge
    UNSUCCESSFUL OUTCOME    MobilityChangeFailure
    PROCEDURE CODE          id-mobilitySettingsChange
    CRITICALITY              reject
}

cellActivation X2AP-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      CellActivationRequest
    SUCCESSFUL OUTCOME      CellActivationResponse
    UNSUCCESSFUL OUTCOME    CellActivationFailure
    PROCEDURE CODE          id-cellActivation
    CRITICALITY              reject
}

END

```

### 9.3.4 PDU Definitions

```

-- *****
--
-- PDU definitions for X2AP.
--
-- *****

X2AP-PDU-Contents {
    itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
    eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- *****
--
-- IE parameter types from other modules.
--
-- *****

IMPORTS

    AS-SecurityInformation,
    Cause,
    CompositeAvailableCapacityGroup,
    COUNTvalue,
    CriticalityDiagnostics,
    CRNTI,
    DeactivationIndication,
    DL-Forwarding,
    ECGI,
    E-RAB-ID,
    E-RAB-Level-QoS-Parameters,
    E-RAB-List,

```

EUTRANTraceID,  
GlobalENB-ID,  
GTPtunnelEndpoint,  
GUGroupIDList,  
GUMMEI,  
HandoverReportType,  
HandoverRestrictionList,  
LocationReportingInformation,  
Neighbour-Information,  
PCI,  
PDCP-SN,  
PLMN-Identity,  
ReceiveStatusofULPDCPSDUs,  
Registration-Request,  
RelativeNarrowbandTxPower,  
RadioResourceStatus,  
UE-RLF-Report-Container,  
RRC-Context,  
ServedCell-Information,  
ServedCells,  
ShortMAC-I,  
SRVCCOperationPossible,  
SubscriberProfileIDforRFP,  
TargeteNBtoSource-eNBTransparentContainer,  
TimeToWait,  
TraceActivation,  
TraceDepth,  
  
TransportLayerAddress,  
UEAggregateMaximumBitRate,  
UE-HistoryInformation,  
UE-S1AP-ID,  
UESecurityCapabilities,  
UE-X2AP-ID,  
UL-HighInterferenceIndicationInfo,  
UL-InterferenceOverloadIndication,  
HWLoadIndicator,  
S1TNLLoadIndicator,  
Measurement-ID,  
ReportCharacteristics,  
MobilityParametersInformation,  
MobilityParametersModificationRange

FROM X2AP-IEs

PrivateIE-Container{ },  
ProtocolExtensionContainer{ },  
ProtocolIE-Container{ },  
ProtocolIE-ContainerList{ },  
ProtocolIE-ContainerPair{ },  
ProtocolIE-ContainerPairList{ },

```
ProtocolIE-Single-Container{} ,
X2AP-PRIVATE-IES,
X2AP-PROTOCOL-EXTENSION,
X2AP-PROTOCOL-IES,
X2AP-PROTOCOL-IES-PAIR
FROM X2AP-Containers
```

```
id-ActivatedCellList,
id-Cause,
id-CellInformation,
id-CellInformation-Item,
id-CellMeasurementResult,
id-CellMeasurementResult-Item,
id-CellToReport,
id-CellToReport-Item,
id-CompositeAvailableCapacityGroup,
id-CriticalityDiagnostics,
id-DeactivationIndication,
id-E-RABs-Admitted-Item,
id-E-RABs-Admitted-List,
id-E-RABs-NotAdmitted-List,
id-E-RABs-SubjectToStatusTransfer-List,
id-E-RABs-SubjectToStatusTransfer-Item,
id-E-RABs-ToBeSetup-Item,
id-GlobalENB-ID,
id-GUGroupIDList,
id-GUGroupIDToAddList,
id-GUGroupIDToDeleteList,
id-GUMMEI-ID,
id-New-eNB-UE-X2AP-ID,
id-Old-eNB-UE-X2AP-ID,
id-Registration-Request,
id-ReportingPeriodicity,
id-ServedCells,
id-ServedCellsToActivate,
id-ServedCellsToAdd,
id-ServedCellsToModify,
id-ServedCellsToDelete,
id-SRVCCOperationPossible,
id-TargetCell-ID,
id-TargeteNBtoSource-eNBTransparentContainer,
id-TimeToWait,
id-TraceActivation,
id-UE-ContextInformation,
id-UE-HistoryInformation,
id-UE-X2AP-ID,
id-Measurement-ID,
id-ReportCharacteristics,
id-ENB1-Measurement-ID,
id-ENB2-Measurement-ID,
id-ENB1-Cell-ID,
id-ENB2-Cell-ID,
id-ENB2-Proposed-Mobility-Parameters,
```









```

UEContextRelease-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-Old-eNB-UE-X2AP-ID          CRITICALITY reject  TYPE UE-X2AP-ID          PRESENCE mandatory} |
  { ID id-New-eNB-UE-X2AP-ID          CRITICALITY reject  TYPE UE-X2AP-ID          PRESENCE mandatory} ,
  ...
}

-- *****
--
-- HANDOVER CANCEL
--
-- *****

HandoverCancel ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    {{HandoverCancel-IEs}},
  ...
}

HandoverCancel-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-Old-eNB-UE-X2AP-ID          CRITICALITY reject  TYPE UE-X2AP-ID          PRESENCE mandatory} |
  { ID id-New-eNB-UE-X2AP-ID          CRITICALITY ignore  TYPE UE-X2AP-ID          PRESENCE optional} |
  { ID id-Cause                       CRITICALITY ignore  TYPE Cause                PRESENCE mandatory} ,
  ...
}

-- *****
--
-- ERROR INDICATION
--
-- *****

ErrorIndication ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    {{ErrorIndication-IEs}},
  ...
}

ErrorIndication-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-Old-eNB-UE-X2AP-ID          CRITICALITY ignore  TYPE UE-X2AP-ID          PRESENCE optional} |
  { ID id-New-eNB-UE-X2AP-ID          CRITICALITY ignore  TYPE UE-X2AP-ID          PRESENCE optional} |
  { ID id-Cause                       CRITICALITY ignore  TYPE Cause                PRESENCE optional} |
  { ID id-CriticalityDiagnostics       CRITICALITY ignore  TYPE CriticalityDiagnostics PRESENCE optional} ,
  ...
}

-- *****
--
-- Reset Request
--
-- *****

ResetRequest ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    {{ResetRequest-IEs}},
  ...
}

```

```

ResetRequest-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-Cause          CRITICALITY ignore TYPE Cause          PRESENCE mandatory },
  ...
}

-- *****
--
-- Reset Response
--
-- *****

ResetResponse ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    {{ResetResponse-IEs}},
  ...
}

ResetResponse-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
  ...
}

-- *****
--
-- X2 SETUP REQUEST
--
-- *****

X2SetupRequest ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    {{X2SetupRequest-IEs}},
  ...
}

X2SetupRequest-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-GlobalENB-ID          CRITICALITY reject TYPE GlobalENB-ID          PRESENCE mandatory} |
  { ID id-ServedCells           CRITICALITY reject TYPE ServedCells           PRESENCE mandatory} |
  { ID id-GUGroupIDList         CRITICALITY reject TYPE GUGroupIDList         PRESENCE optional},
  ...
}

-- *****
--
-- X2 SETUP RESPONSE
--
-- *****

X2SetupResponse ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    {{X2SetupResponse-IEs}},
  ...
}

X2SetupResponse-IEs X2AP-PROTOCOL-IES ::= {

```

```

    { ID id-GlobalENB-ID          CRITICALITY reject TYPE GlobalENB-ID          PRESENCE mandatory } |
    { ID id-ServedCells           CRITICALITY reject TYPE ServedCells           PRESENCE mandatory } |
    { ID id-GUGroupIDList         CRITICALITY reject TYPE GUGroupIDList         PRESENCE optional } |
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- *****
--
-- X2 SETUP FAILURE
--
-- *****

X2SetupFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{X2SetupFailure-IEs}},
    ...
}

X2SetupFailure-IEs X2AP-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 },
    ...
}

-- *****
--
-- LOAD INFORMATION
--
-- *****

LoadInformation ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{LoadInformation-IEs}},
    ...
}

LoadInformation-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-CellInformation CRITICALITY ignore TYPE CellInformation-List PRESENCE mandatory } ,
    ...
}

CellInformation-List ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ProtocolIE-Single-Container { {CellInformation-ItemIEs} }

CellInformation-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-CellInformation-Item CRITICALITY ignore TYPE CellInformation-Item PRESENCE mandatory }
}

CellInformation-Item ::= SEQUENCE {
    cell-ID              ECGI,

```



```

ENBConfigurationUpdateAcknowledge ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{ENBConfigurationUpdateAcknowledge-IEs}},
    ...
}

ENBConfigurationUpdateAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-CriticalityDiagnostics          CRITICALITY ignore TYPE CriticalityDiagnostics          PRESENCE optional          },
    ...
}

-- *****
--
-- ENB CONFIGURATION UPDATE FAIURE
--
-- *****

ENBConfigurationUpdateFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{ENBConfigurationUpdateFailure-IEs}},
    ...
}

ENBConfigurationUpdateFailure-IEs X2AP-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        },
    ...
}

-- *****
--
-- Resource Status Request
--
-- *****

ResourceStatusRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{ResourceStatusRequest-IEs}},
    ...
}

ResourceStatusRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-ENB1-Measurement-ID            CRITICALITY reject TYPE Measurement-ID            PRESENCE mandatory        }|
    { ID id-ENB2-Measurement-ID            CRITICALITY ignore TYPE Measurement-ID            PRESENCE conditional     }|-- The IE shall be present if the
Registration Request IE is set to 'Stop'--
    { ID id-Registration-Request           CRITICALITY reject TYPE Registration-Request           PRESENCE mandatory        }|
    { ID id-ReportCharacteristics          CRITICALITY reject TYPE ReportCharacteristics          PRESENCE optional        }|
    { ID id-CellToReport                   CRITICALITY ignore TYPE CellToReport-List             PRESENCE mandatory        }|
    { ID id-ReportingPeriodicity           CRITICALITY ignore TYPE ReportingPeriodicity           PRESENCE optional        },
    ...
}

```

```

CellToReport-List ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ProtocolIE-Single-Container { {CellToReport-ItemIEs} }

CellToReport-ItemIEs X2AP-PROTOCOL-IES ::= {
  { ID id-CellToReport-Item CRITICALITY ignore TYPE CellToReport-Item PRESENCE mandatory }
}

CellToReport-Item ::= SEQUENCE {
  cell-ID ECGI,
  iE-Extensions ProtocolExtensionContainer { {CellToReport-Item-ExtIEs} } OPTIONAL,
  ...
}

CellToReport-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

ReportingPeriodicity ::= ENUMERATED {
  one-thousand-ms,
  two-thousand-ms,
  five-thousand-ms,
  ten-thousand-ms,
  ...
}

-- *****
--
-- Resource Status Response
--
-- *****

ResourceStatusResponse ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{ResourceStatusResponse-IEs}},
  ...
}

ResourceStatusResponse-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-ENB1-Measurement-ID CRITICALITY reject TYPE Measurement-ID PRESENCE mandatory}|
  { ID id-ENB2-Measurement-ID CRITICALITY reject TYPE Measurement-ID PRESENCE mandatory}|
  { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
  ...
}

-- *****
--
-- Resource Status Failure
--
-- *****

ResourceStatusFailure ::= SEQUENCE {
  protocolIEs ProtocolIE-Container {{ResourceStatusFailure-IEs}},
  ...
}

```

```

}
ResourceStatusFailure-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-ENB1-Measurement-ID      CRITICALITY reject  TYPE Measurement-ID      PRESENCE mandatory}|
  { ID id-ENB2-Measurement-ID      CRITICALITY reject  TYPE Measurement-ID      PRESENCE mandatory}|
  { ID id-Cause                    CRITICALITY ignore  TYPE Cause                PRESENCE mandatory} |
  { ID id-CriticalityDiagnostics    CRITICALITY ignore  TYPE CriticalityDiagnostics PRESENCE optional },
  ...
}

-- *****
--
-- Resource Status Update
--
-- *****

ResourceStatusUpdate ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container      {{ResourceStatusUpdate-IEs}},
  ...
}

ResourceStatusUpdate-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-ENB1-Measurement-ID      CRITICALITY reject  TYPE Measurement-ID      PRESENCE mandatory}|
  { ID id-ENB2-Measurement-ID      CRITICALITY reject  TYPE Measurement-ID      PRESENCE mandatory}|
  { ID id-CellMeasurementResult    CRITICALITY ignore  TYPE CellMeasurementResult-List  PRESENCE mandatory},
  ...
}

CellMeasurementResult-List ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ProtocolIE-Single-Container { {CellMeasurementResult-ItemIEs} }

CellMeasurementResult-ItemIEs X2AP-PROTOCOL-IES ::= {
  { ID id-CellMeasurementResult-Item CRITICALITY ignore  TYPE CellMeasurementResult-Item  PRESENCE mandatory }
}

CellMeasurementResult-Item ::= SEQUENCE {
  cell-ID              ECGI,
  hWOverLoadIndicator  HWLoadIndicator          OPTIONAL,
  s1TNLOverLoadIndicator S1TNLLoadIndicator      OPTIONAL,
  radioResourceStatus  RadioResourceStatus          OPTIONAL,
  iE-Extensions        ProtocolExtensionContainer { {CellMeasurementResult-Item-ExtIEs} } OPTIONAL,
  ...
}

CellMeasurementResult-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  { ID id-CompositeAvailableCapacityGroup CRITICALITY ignore  EXTENSION CompositeAvailableCapacityGroup  PRESENCE optional },
  ...
}

-- *****
--
-- PRIVATE MESSAGE
--

```

```

-- *****
PrivateMessage ::= SEQUENCE {
    privateIEs      PrivateIE-Container  {{PrivateMessage-IEs}},
    ...
}

PrivateMessage-IEs X2AP-PRIVATE-IES ::= {
    ...
}

-- *****
--
-- MOBILITY CHANGE REQUEST
--
-- *****

MobilityChangeRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container  {{MobilityChangeRequest-IEs}},
    ...
}

MobilityChangeRequest-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-ENB1-Cell-ID          CRITICALITY reject  TYPE ECGI                PRESENCE
mandatory }|
    { ID id-ENB2-Cell-ID          CRITICALITY reject  TYPE ECGI                PRESENCE
mandatory }|
    { ID id-ENB1-Mobility-Parameters  CRITICALITY ignore  TYPE MobilityParametersInformation  PRESENCE optional
    }|
    { ID id-ENB2-Proposed-Mobility-Parameters  CRITICALITY reject  TYPE MobilityParametersInformation  PRESENCE mandatory
    }|
    { ID id-Cause                  CRITICALITY reject  TYPE Cause                        PRESENCE
mandatory },
    ...
}

-- *****
--
-- MOBILITY CHANGE ACKNOWLEDGE
--
-- *****

MobilityChangeAcknowledge ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container  {{MobilityChangeAcknowledge-IEs}},
    ...
}

MobilityChangeAcknowledge-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-ENB1-Cell-ID          CRITICALITY reject  TYPE ECGI                PRESENCE mandatory }|
    { ID id-ENB2-Cell-ID          CRITICALITY reject  TYPE ECGI                PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics  CRITICALITY ignore  TYPE CriticalityDiagnostics  PRESENCE optional },
    ...
}

```

```
-- *****
--
-- MOBILITY CHANGE FAILURE
--
-- *****

MobilityChangeFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{MobilityChangeFailure-IEs}},
    ...
}

MobilityChangeFailure-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-ENB1-Cell-ID          CRITICALITY ignore TYPE ECGI          PRESENCE
    mandatory }|
    { ID id-ENB2-Cell-ID          CRITICALITY ignore TYPE ECGI          PRESENCE
    mandatory }|
    { ID id-Cause                  CRITICALITY ignore TYPE Cause
    PRESENCE mandatory }|
    { ID id-ENB2-Mobility-Parameters-Modification-Range CRITICALITY ignore TYPE MobilityParametersModificationRange PRESENCE
    optional }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics
    PRESENCE optional },
    ...
}

-- *****
--
-- Radio Link Failure Indication
--
-- *****

RLFIndication ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{RLFIndication-IEs}},
    ...
}

RLFIndication-IEs X2AP-PROTOCOL-IES ::= {
    { ID id-FailureCellPCI          CRITICALITY ignore TYPE PCI          PRESENCE mandatory}|
    { ID id-Re-establishmentCelleCGI CRITICALITY ignore TYPE ECGI          PRESENCE mandatory}|
    { ID id-FailureCellCRNTI        CRITICALITY ignore TYPE CRNTI          PRESENCE mandatory}|
    { ID id-ShortMAC-I              CRITICALITY ignore TYPE ShortMAC-I       PRESENCE optional}|
    { ID id-UE-RLF-Report-Container CRITICALITY ignore TYPE UE-RLF-Report-Container PRESENCE optional},
    ...
}

-- *****
--
-- Cell Activation Request
--
-- *****

CellActivationRequest ::= SEQUENCE {
```

```
    protocolIEs          ProtocolIE-Container    {{CellActivationRequest-IEs}},
    ...
}

CellActivationRequest-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-ServedCellsToActivate  CRITICALITY reject  TYPE ServedCellsToActivate  PRESENCE mandatory },
  ...
}

ServedCellsToActivate ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ServedCellsToActivate-Item

ServedCellsToActivate-Item ::= SEQUENCE {
  ecgi          ECGI,
  iE-Extensions ProtocolExtensionContainer { { ServedCellsToActivate-Item-ExtIEs} } OPTIONAL,
  ...
}

ServedCellsToActivate-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- Cell Activation Response
--
-- *****

CellActivationResponse ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    {{CellActivationResponse-IEs}},
  ...
}

CellActivationResponse-IEs X2AP-PROTOCOL-IES ::= {
  { ID id-ActivatedCellList  CRITICALITY ignore  TYPE ActivatedCellList  PRESENCE mandatory } |
  { ID id-CriticalityDiagnostics  CRITICALITY ignore  TYPE CriticalityDiagnostics  PRESENCE optional },
  ...
}

ActivatedCellList ::= SEQUENCE (SIZE (1..maxCellineNB)) OF ActivatedCellList-Item

ActivatedCellList-Item ::= SEQUENCE {
  ecgi          ECGI,
  iE-Extensions ProtocolExtensionContainer { { ActivatedCellList-Item-ExtIEs} } OPTIONAL,
  ...
}

ActivatedCellList-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

-- *****
--
-- CELL ACTIVATION FAILURE
--
```

```

-- *****
CellActivationFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{CellActivationFailure-IEs}},
    ...
}

CellActivationFailure-IEs X2AP-PROTOCOL-IEs ::= {
    { ID id-Cause          CRITICALITY ignore TYPE Cause          PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

END

```

### 9.3.5 Information Element definitions

```

-- *****
--
-- Information Element Definitions
--
-- *****

X2AP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

    id-E-RAB-Item,
    id-Number-of-Antennaports,
    id-MBSFN-Subframe-Info,
    id-PRACH-Configuration,

    maxnoofBearers,
    maxCelllineNB,
    maxEARFCN,
    maxInterfaces,

    maxnoofBPLMNs,
    maxnoofCells,
    maxnoofEPLMNs,
    maxnoofEPLMNsPlusOne,
    maxnoofForbLACs,
    maxnoofForbTACs,
    maxnoofNeighbours,
    maxnoofPRBs,
    maxNrOfErrors,
    maxPools,

```

```

maxnoofMBSFN

FROM X2AP-Constants

    Criticality,
    ProcedureCode,
    ProtocolIE-ID,
    TriggeringMessage
FROM X2AP-CommonDataTypes

    ProtocolExtensionContainer{},
    ProtocolIE-Single-Container{},

    X2AP-PROTOCOL-EXTENSION,
    X2AP-PROTOCOL-IES
FROM X2AP-Containers;

-- A

AS-SecurityInformation ::= SEQUENCE {
    key-eNodeB-star      Key-eNodeB-Star,
    nextHopChainingCount NextHopChainingCount,
    iE-Extensions        ProtocolExtensionContainer { { AS-SecurityInformation-ExtIEs } } OPTIONAL,
    ...
}

AS-SecurityInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

AllocationAndRetentionPriority ::= SEQUENCE {
    priorityLevel          PriorityLevel,
    pre-emptionCapability  Pre-emptionCapability,
    pre-emptionVulnerability Pre-emptionVulnerability,
    iE-Extensions         ProtocolExtensionContainer { {AllocationAndRetentionPriority-ExtIEs} } OPTIONAL,
    ...
}

AllocationAndRetentionPriority-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- B

BitRate ::= INTEGER (0..1000000000)
BroadcastPLMNs-Item ::= SEQUENCE (SIZE(1..maxnoofBPLMNs)) OF PLMN-Identity

-- C

CapacityValue ::= INTEGER (0..100)

```

```
CellCapacityClassValue ::= INTEGER (1..100, ...)
```

```
Cause ::= CHOICE {
    radioNetwork      CauseRadioNetwork,
    transport         CauseTransport,
    protocol          CauseProtocol,
    misc              CauseMisc,
    ...
}
```

```
CauseMisc ::= ENUMERATED {
    control-processing-overload,
    hardware-failure,
    om-intervention,
    not-enough-user-plane-processing-resources,
    unspecified,
    ...
}
```

```
CauseProtocol ::= ENUMERATED {
    transfer-syntax-error,
    abstract-syntax-error-reject,
    abstract-syntax-error-ignore-and-notify,
    message-not-compatible-with-receiver-state,
    semantic-error,
    unspecified,
    abstract-syntax-error-falsely-constructed-message,
    ...
}
```

```
CauseRadioNetwork ::= ENUMERATED {
    handover-desirable-for-radio-reasons,
    time-critical-handover,
    resource-optimisation-handover,
    reduce-load-in-serving-cell,
    partial-handover,
    unknown-new-eNB-UE-X2AP-ID,
    unknown-old-eNB-UE-X2AP-ID,
    unknown-pair-of-UE-X2AP-ID,
    ho-target-not-allowed,
    tx2relocoverall-expiry,
    trelocprep-expiry,
    cell-not-available,
    no-radio-resources-available-in-target-cell,
    invalid-MME-GroupID,
    unknown-MME-Code,
    encryption-and-or-integrity-protection-algorithms-not-supported,
    reportCharacteristicsEmpty,
    noReportPeriodicity,
    existingMeasurementID,
    unknown-eNB-Measurement-ID,
    measurement-temporarily-not-available,
    unspecified,
}
```

```

    ...,
    load-balancing,
    handover-optimisation,
    value-out-of-allowed-range,
    multiple-E-RAB-ID-instances,
    switch-off-ongoing,
    not-supported-QCI-value
}

CauseTransport ::= ENUMERATED {
    transport-resource-unavailable,
    unspecified,
    ...
}

Cell-Size ::= ENUMERATED {verysmall, small, medium, large, ... }

CellType ::= SEQUENCE {
    cell-Size                Cell-Size,
    iE-Extensions            ProtocolExtensionContainer { { CellType-ExtIEs}} OPTIONAL,
    ...
}

CellType-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CompositeAvailableCapacityGroup ::= SEQUENCE {
    dL-CompositeAvailableCapacity    CompositeAvailableCapacity,
    uL-CompositeAvailableCapacity    CompositeAvailableCapacity,
    iE-Extensions                    ProtocolExtensionContainer { { CompositeAvailableCapacityGroup-ExtIEs} } OPTIONAL,
    ...
}

CompositeAvailableCapacityGroup-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CompositeAvailableCapacity ::= SEQUENCE {
    cellCapacityClassValue          CellCapacityClassValue                OPTIONAL,
    capacityValue                   CapacityValue,
    iE-Extensions                   ProtocolExtensionContainer { { CompositeAvailableCapacity-ExtIEs} } OPTIONAL,
    ...
}

CompositeAvailableCapacity-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

COUNTvalue ::= SEQUENCE {
    pDCP-SN                        PDCP-SN,

```

```

    hFN                                HFN,
    iE-Extensions                       ProtocolExtensionContainer { { COUNTvalue-ExtIEs } } OPTIONAL,
    ...
}

COUNTvalue-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CriticalityDiagnostics ::= SEQUENCE {
    procedureCode                       ProcedureCode                               OPTIONAL,
    triggeringMessage                   TriggeringMessage                       OPTIONAL,
    procedureCriticality                 Criticality                               OPTIONAL,
    iEsCriticalityDiagnostics            CriticalityDiagnostics-IE-List           OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} } OPTIONAL,
    ...
}

CriticalityDiagnostics-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxNrOfErrors)) OF
    SEQUENCE {
        iECriticality                   Criticality,
        iE-ID                           ProtocolIE-ID,
        typeOfError                     TypeOfError,
        iE-Extensions                   ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs} } OPTIONAL,
        ...
    }

CriticalityDiagnostics-IE-List-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

CRNTI ::= BIT STRING (SIZE (16))

CyclicPrefixDL ::= ENUMERATED {
    normal,
    extended,
    ...
}

CyclicPrefixUL ::= ENUMERATED {
    normal,
    extended,
    ...
}

-- D

```

```

DeactivationIndication ::= ENUMERATED {
    deactivated,
    ...
}

DL-Forwarding ::= ENUMERATED {
    dl-forwardingProposed,
    ...
}

-- E

EARFCN ::= INTEGER (0..maxEARFCN)

FDD-Info ::= SEQUENCE {
    uL-EARFCN                EARFCN,
    dL-EARFCN                EARFCN,
    uL-Transmission-Bandwidth Transmission-Bandwidth,
    dL-Transmission-Bandwidth Transmission-Bandwidth,
    iE-Extensions            ProtocolExtensionContainer { {FDD-Info-ExtIEs} } OPTIONAL,
    ...
}

FDD-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TDD-Info ::= SEQUENCE {
    eARFCN                EARFCN,
    transmission-Bandwidth Transmission-Bandwidth,
    subframeAssignment    SubframeAssignment,
    specialSubframe-Info   SpecialSubframe-Info,
    iE-Extensions            ProtocolExtensionContainer { {TDD-Info-ExtIEs} } OPTIONAL,
    ...
}

TDD-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

EUTRA-Mode-Info ::= CHOICE {
    fDD    FDD-Info,
    tDD    TDD-Info,
    ...
}

ECGI ::= SEQUENCE {
    pLMN-Identity        PLMN-Identity,
    eUTRANCellIdentifier EUTRANCellIdentifier,
    iE-Extensions        ProtocolExtensionContainer { {ECGI-ExtIEs} } OPTIONAL,
    ...
}

ECGI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}
ENB-ID ::= CHOICE {
    macro-eNB-ID    BIT STRING (SIZE (20)),
    home-eNB-ID    BIT STRING (SIZE (28)),
    ...
}
EncryptionAlgorithms ::= BIT STRING (SIZE (16, ...))
EPLMNs ::= SEQUENCE (SIZE(1..maxnoofEPLMNs)) OF PLMN-Identity
E-RAB-ID ::= INTEGER (0..15, ...)
E-RAB-Level-QoS-Parameters ::= SEQUENCE {
    qCI                QCI,
    allocationAndRetentionPriority AllocationAndRetentionPriority,
    gbrQosInformation  GBR-QosInformation OPTIONAL,
    iE-Extensions      ProtocolExtensionContainer { { E-RAB-Level-QoS-Parameters-ExtIEs } } OPTIONAL,
    ...
}
E-RAB-Level-QoS-Parameters-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}
E-RAB-List ::= SEQUENCE (SIZE(1.. maxnoofBearers)) OF ProtocolIE-Single-Container { {E-RAB-ItemIEs} }
E-RAB-ItemIEs X2AP-PROTOCOL-IES ::= {
    { ID id-E-RAB-Item    CRITICALITY ignore    TYPE E-RAB-Item    PRESENCE mandatory },
    ...
}
E-RAB-Item ::= SEQUENCE {
    e-RAB-ID            E-RAB-ID,
    cause               Cause,
    iE-Extensions       ProtocolExtensionContainer { {E-RAB-Item-ExtIEs} } OPTIONAL,
    ...
}
E-RAB-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}
EUTRANCellIdentifier ::= BIT STRING (SIZE (28))
EUTRANTraceID        ::= OCTET STRING (SIZE (8))

EventType ::= ENUMERATED{
    change-of-serving-cell,
    ...
}

```

```

-- F

ForbiddenInterRATs ::= ENUMERATED {
    all,
    geran,
    utran,
    cdma2000,
    ...,
    geranandutran,
    cdma2000andutran
}

ForbiddenTAs ::= SEQUENCE (SIZE(1.. maxnoofEPLMNsPlusOne)) OF ForbiddenTAs-Item

ForbiddenTAs-Item ::= SEQUENCE {
    pLMN-Identity      PLMN-Identity,
    forbiddenTACs     ForbiddenTACs,
    iE-Extensions     ProtocolExtensionContainer { {ForbiddenTAs-Item-ExtIEs} } OPTIONAL,
    ...
}

ForbiddenTAs-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ForbiddenTACs ::= SEQUENCE (SIZE(1..maxnoofForbTACs)) OF TAC

ForbiddenLAs ::= SEQUENCE (SIZE(1..maxnoofEPLMNsPlusOne)) OF ForbiddenLAs-Item

ForbiddenLAs-Item ::= SEQUENCE {
    pLMN-Identity      PLMN-Identity,
    forbiddenLACs     ForbiddenLACs,
    iE-Extensions     ProtocolExtensionContainer { {ForbiddenLAs-Item-ExtIEs} } OPTIONAL,
    ...
}

ForbiddenLAs-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ForbiddenLACs ::= SEQUENCE (SIZE(1..maxnoofForbLACs)) OF LAC

Fourframes ::= BIT STRING (SIZE (24))

-- G

GBR-QosInformation ::= SEQUENCE {
    e-RAB-MaximumBitrateDL      BitRate,
    e-RAB-MaximumBitrateUL      BitRate,
    e-RAB-GuaranteedBitrateDL   BitRate,
    e-RAB-GuaranteedBitrateUL   BitRate,
    iE-Extensions               ProtocolExtensionContainer { { GBR-QosInformation-ExtIEs} } OPTIONAL,

```

```

}
...
}
GBR-QoSInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}
GlobalENB-ID ::= SEQUENCE {
  pLMN-Identity      PLMN-Identity,
  eNB-ID             ENB-ID,
  iE-Extensions      ProtocolExtensionContainer { {GlobalENB-ID-ExtIEs} } OPTIONAL,
  ...
}
GlobalENB-ID-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}
GTPtunnelEndpoint ::= SEQUENCE {
  transportLayerAddress  TransportLayerAddress,
  gTP-TEID              GTP-TEI,
  iE-Extensions         ProtocolExtensionContainer { {GTPtunnelEndpoint-ExtIEs} } OPTIONAL,
  ...
}
GTPtunnelEndpoint-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}
GTP-TEI                ::= OCTET STRING (SIZE (4))
GUGroupIDList          ::= SEQUENCE (SIZE (1..maxPools)) OF GU-Group-ID
GU-Group-ID            ::= SEQUENCE {
  pLMN-Identity      PLMN-Identity,
  mME-Group-ID      MME-Group-ID,
  iE-Extensions      ProtocolExtensionContainer { {GU-Group-ID-ExtIEs} } OPTIONAL,
  ...
}
GU-Group-ID-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}
GUMMEI                ::= SEQUENCE {
  gU-Group-ID      GU-Group-ID,
  mME-Code         MME-Code,
  iE-Extensions    ProtocolExtensionContainer { {GUMMEI-ExtIEs} } OPTIONAL,
  ...
}

```

```

GUMMEI-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- H

HandoverReportType ::= ENUMERATED {
    hoTooEarly,
    hoToWrongCell,
    ...
}

HandoverRestrictionList ::= SEQUENCE {
    servingPLMN          PLMN-Identity,
    equivalentPLMNs      EPLMNs                                OPTIONAL,
    forbiddenTAs         ForbiddenTAs                          OPTIONAL,
    forbiddenLAs         ForbiddenLAs                          OPTIONAL,
    forbiddenInterRATs   ForbiddenInterRATs                   OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { {HandoverRestrictionList-ExtIEs} } OPTIONAL,
    ...
}

HandoverRestrictionList-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

HFN ::= INTEGER (0..1048575)

HWLoadIndicator ::= SEQUENCE {
    dLHWLoadIndicator    LoadIndicator,
    uLHWLoadIndicator    LoadIndicator,
    iE-Extensions        ProtocolExtensionContainer { { HWLoadIndicator-ExtIEs} } OPTIONAL,
    ...
}

HWLoadIndicator-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- I

IntegrityProtectionAlgorithms ::= BIT STRING (SIZE (16, ...))

InterfacesToTrace ::= BIT STRING (SIZE (8))
-- J
-- K

Key-eNodeB-Star ::= BIT STRING (SIZE(256))

-- L

```

```

LAC ::= OCTET STRING (SIZE (2)) --(EXCEPT ('0000'H|'FFFE'H))

LastVisitedCell-Item ::= CHOICE {
    e-UTRAN-Cell          LastVisitedEUTRANCellInformation,
    uTRAN-Cell           LastVisitedUTRANCellInformation,
    gERAN-Cell           LastVisitedGERANCellInformation,
    ...
}

LastVisitedEUTRANCellInformation ::= SEQUENCE {
    global-Cell-ID      ECGI,
    cellType            CellType,
    time-UE-StayedInCell Time-UE-StayedInCell,
    iE-Extensions       ProtocolExtensionContainer { { LastVisitedEUTRANCellInformation-ExtIEs} } OPTIONAL,
    ...
}

LastVisitedEUTRANCellInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

LastVisitedUTRANCellInformation ::= OCTET STRING

LastVisitedGERANCellInformation ::= CHOICE {
    undefined           NULL,
    ...
}

LoadIndicator ::= ENUMERATED {
    lowLoad,
    mediumLoad,
    highLoad,
    overLoad,
    ...
}

LocationReportingInformation ::= SEQUENCE {
    eventType           EventType,
    reportArea          ReportArea,
    iE-Extensions       ProtocolExtensionContainer { {LocationReportingInformation-ExtIEs} } OPTIONAL,
    ...
}

LocationReportingInformation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

-- M

```

```

MME-Group-ID ::= OCTET STRING (SIZE (2))

MME-Code ::= OCTET STRING (SIZE (1))

Measurement-ID ::= INTEGER (1..4095, ...)

MBSFN-Subframe-Infolist ::= SEQUENCE (SIZE(1..maxnoofMBSFN)) OF MBSFN-Subframe-Info

MBSFN-Subframe-Info ::= SEQUENCE {
    radioframeAllocationPeriod RadioframeAllocationPeriod,
    radioframeAllocationOffset RadioframeAllocationOffset,
    subframeAllocation SubframeAllocation,
    iE-Extensions ProtocolExtensionContainer { { MBSFN-Subframe-Info-ExtIEs } } OPTIONAL,
    ...
}

MBSFN-Subframe-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

MobilityParametersModificationRange ::= SEQUENCE {
    handoverTriggerChangeLowerLimit INTEGER (-20..20),
    handoverTriggerChangeUpperLimit INTEGER (-20..20),
    ...
}

MobilityParametersInformation ::= SEQUENCE {
    handoverTriggerChange INTEGER (-20..20),
    ...
}

-- N

Neighbour-Information ::= SEQUENCE (SIZE (0..maxnoofNeighbours)) OF SEQUENCE {
    eCGI ECGI,
    pCI PCI,
    eARFCN EARFCN,
    iE-Extensions ProtocolExtensionContainer { {Neighbour-Information-ExtIEs} } OPTIONAL,
    ...
}

Neighbour-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

NextHopChainingCount ::= INTEGER (0..7)

Number-of-Antennaports ::= ENUMERATED {
    an1,
    an2,
    an4,
    ...
}

```

```

}
-- O

Oneframe ::= BIT STRING (SIZE (6))

-- P

PDCP-SN ::= INTEGER (0..4095)

PCI ::= INTEGER (0..503, ...)

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

PRACH-Configuration ::= SEQUENCE {
    rootSequenceIndex          INTEGER (0..837),
    zeroCorrelationIndex       INTEGER (0..15),
    highSpeedFlag              BOOLEAN,
    prach-FreqOffset           INTEGER (0..94),
    prach-ConfigIndex          INTEGER (0..63)          OPTIONAL, -- present for TDD--
    iE-Extensions              ProtocolExtensionContainer { {PRACH-Configuration-ExtIEs} } OPTIONAL,
    ...
}

PRACH-Configuration-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

Pre-emptionCapability ::= ENUMERATED {
    shall-not-trigger-pre-emption,
    may-trigger-pre-emption
}

Pre-emptionVulnerability ::= ENUMERATED {
    not-pre-emptable,
    pre-emptable
}

PriorityLevel ::= INTEGER { spare (0), highest (1), lowest (14), no-priority (15) } (0..15)

-- Q

QCI ::= INTEGER (0..255)

-- R

ReceiveStatusofULPDCPSDUs ::= BIT STRING (SIZE(4096))

Registration-Request ::= ENUMERATED {
    start,
    stop,
    ...
}

```

```

}
RelativeNarrowbandTxPower ::= SEQUENCE {
    rNTP-PerPRB                BIT STRING (SIZE(6..110, ...)),
    rNTP-Threshold              RNTP-Threshold,
    numberOfCellSpecificAntennaPorts  ENUMERATED {one, two, four, ...},
    p-B                        INTEGER (0..3, ...),
    pDCCH-InterferenceImpact    INTEGER (0..4, ...),
    iE-Extensions              ProtocolExtensionContainer { { RelativeNarrowbandTxPower-ExtIEs } } OPTIONAL,
    ...
}
RelativeNarrowbandTxPower-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}
ReportArea ::= ENUMERATED{
    ecgi,
    ...
}
ReportCharacteristics ::= BIT STRING (SIZE (32))
RNTP-Threshold ::= ENUMERATED {
    minusInfinity,
    minusEleven,
    minusTen,
    minusNine,
    minusEight,
    minusSeven,
    minusSix,
    minusFive,
    minusFour,
    minusThree,
    minusTwo,
    minusOne,
    zero,
    one,
    two,
    three,
    ...
}
RRC-Context ::= OCTET STRING

RadioResourceStatus ::= SEQUENCE {
    dL-GBR-PRB-usage          DL-GBR-PRB-usage,
    uL-GBR-PRB-usage          UL-GBR-PRB-usage,
    dL-non-GBR-PRB-usage      DL-non-GBR-PRB-usage,
    uL-non-GBR-PRB-usage      UL-non-GBR-PRB-usage,
    dL-Total-PRB-usage        DL-Total-PRB-usage,
    uL-Total-PRB-usage        UL-Total-PRB-usage,
}

```

```

        iE-Extensions                ProtocolExtensionContainer { {RadioResourceStatus-ExtIEs} } OPTIONAL,
    }
    ...
}

RadioResourceStatus-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

DL-GBR-PRB-usage ::= INTEGER (0..100)
UL-GBR-PRB-usage ::= INTEGER (0..100)
DL-non-GBR-PRB-usage ::= INTEGER (0..100)
UL-non-GBR-PRB-usage ::= INTEGER (0..100)
DL-Total-PRB-usage ::= INTEGER (0..100)
UL-Total-PRB-usage ::= INTEGER (0..100)

RadioframeAllocationPeriod ::= ENUMERATED{
    n1,
    n2,
    n4,
    n8,
    n16,
    n32,
    ...
}

RadioframeAllocationOffset ::= INTEGER (0..7, ...)

-- S

S1TNNLoadIndicator ::= SEQUENCE {
    dLS1TNNLoadIndicator      LoadIndicator,
    uLS1TNNLoadIndicator      LoadIndicator,
    iE-Extensions            ProtocolExtensionContainer { { S1TNNLoadIndicator-ExtIEs} } OPTIONAL,
    ...
}

S1TNNLoadIndicator-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

ServedCells ::= SEQUENCE (SIZE (1.. maxCelllineNB)) OF SEQUENCE {
    servedCellInfo           ServedCell-Information,
    neighbour-Info           Neighbour-Information OPTIONAL,
    iE-Extensions            ProtocolExtensionContainer { {ServedCell-ExtIEs} } OPTIONAL,
    ...
}

```

```

ServedCell-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

ServedCell-Information ::= SEQUENCE {
  pci          PCI,
  cellId       ECGI,
  tac          TAC,
  broadcastPLMNs BroadcastPLMNs-Item,
  eutraModeInfo EutraMode-Info,
  ieExtensions ProtocolExtensionContainer { {ServedCell-Information-ExtIEs} } OPTIONAL,
  ...
}

ServedCell-Information-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  { ID id-Number-of-Antennaports      CRITICALITY ignore EXTENSION Number-of-Antennaports      PRESENCE optional } |
  { ID id-PRACH-Configuration         CRITICALITY ignore EXTENSION PRACH-Configuration         PRESENCE optional } |
  { ID id-MBSFN-Subframe-Info        CRITICALITY ignore EXTENSION MBSFN-Subframe-Infolist        PRESENCE optional },
  ...
}

ShortMAC-I ::= BIT STRING (SIZE(16))

SRVCCOperationPossible ::= ENUMERATED {
  possible,
  ...
}

SubframeAssignment ::= ENUMERATED {
  sa0,
  sa1,
  sa2,
  sa3,
  sa4,
  sa5,
  sa6,
  ...
}

SpecialSubframe-Info ::= SEQUENCE {
  specialSubframePatterns SpecialSubframePatterns,
  cyclicPrefixDL          CyclicPrefixDL,
  cyclicPrefixUL          CyclicPrefixUL,
  ieExtensions            ProtocolExtensionContainer { { SpecialSubframe-Info-ExtIEs } } OPTIONAL,
  ...
}

SpecialSubframe-Info-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
  ...
}

SpecialSubframePatterns ::= ENUMERATED {

```

```

    ssp0,
    ssp1,
    ssp2,
    ssp3,
    ssp4,
    ssp5,
    ssp6,
    ssp7,
    ssp8,
    ...
}

SubscriberProfileIDforRFP ::= INTEGER (1..256)

SubframeAllocation ::= CHOICE {
    oneframe                Oneframe,
    fourframes              Fourframes,
    ...
}

-- T

TAC ::= OCTET STRING (SIZE (2))

TargeteNBtoSource-eNBTransparentContainer ::= OCTET STRING

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

Time-UE-StayedInCell ::= INTEGER (0..4095)

TraceActivation ::= SEQUENCE {
    eUTRANTraceID          EUTRANTraceID,
    interfacesToTrace      InterfacesToTrace,
    traceDepth              TraceDepth,
    traceCollectionEntityIPAddress TraceCollectionEntityIPAddress,
    iE-Extensions          ProtocolExtensionContainer { {TraceActivation-ExtIEs} } OPTIONAL,
    ...
}

TraceActivation-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

TraceCollectionEntityIPAddress ::= BIT STRING (SIZE(1..160, ...))

```

```

TraceDepth ::= ENUMERATED {
    minimum,
    medium,
    maximum,
    minimumWithoutVendorSpecificExtension,
    mediumWithoutVendorSpecificExtension,
    maximumWithoutVendorSpecificExtension,
    ...
}

Transmission-Bandwidth ::= ENUMERATED {
    bw6,
    bw15,
    bw25,
    bw50,
    bw75,
    bw100,
    ...
}

TransportLayerAddress ::= BIT STRING (SIZE(1..160, ...))

TypeOfError ::= ENUMERATED {
    not-understood,
    missing,
    ...
}

-- U

UE-HistoryInformation ::= SEQUENCE (SIZE(1..maxnoofCells)) OF LastVisitedCell-Item

UE-S1AP-ID ::= INTEGER (0.. 4294967295)

UE-X2AP-ID ::= INTEGER (0..4095) -- Value FFS

UEAggregateMaximumBitRate ::= SEQUENCE {
    uEaggregateMaximumBitRateDownlink BitRate,
    uEaggregateMaximumBitRateUplink BitRate,
    iE-Extensions ProtocolExtensionContainer { {UEAggregate-MaximumBitrate-ExtIEs} } OPTIONAL,
    ...
}

UEAggregate-MaximumBitrate-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
    ...
}

UESecurityCapabilities ::= SEQUENCE {

```

```

    encryptionAlgorithms           EncryptionAlgorithms,
    integrityProtectionAlgorithms  IntegrityProtectionAlgorithms,
    iE-Extensions                  ProtocolExtensionContainer { { UESecurityCapabilities-ExtIEs } } OPTIONAL,
...
}

UESecurityCapabilities-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}

UL-InterferenceOverloadIndication ::= SEQUENCE (SIZE(1..maxnoofPRBs)) OF UL-InterferenceOverloadIndication-Item

UL-InterferenceOverloadIndication-Item ::= ENUMERATED {
    high-interference,
    medium-interference,
    low-interference,
    ...
}

UL-HighInterferenceIndicationInfo ::= SEQUENCE (SIZE(1..maxCelllineNB)) OF UL-HighInterferenceIndicationInfo-Item

UL-HighInterferenceIndicationInfo-Item ::= SEQUENCE {
    target-Cell-ID                ECGI,
    ul-interferenceindication      UL-HighInterferenceIndication,
    iE-Extensions                  ProtocolExtensionContainer { { UL-HighInterferenceIndicationInfo-Item-ExtIEs } } OPTIONAL,
    ...
}

UL-HighInterferenceIndicationInfo-Item-ExtIEs X2AP-PROTOCOL-EXTENSION ::= {
...
}

UL-HighInterferenceIndication ::= BIT STRING (SIZE(1..110, ...))

UE-RLF-Report-Container ::= OCTET STRING
-- This IE is a transparent container and shall be encoded as the rlfReport field contained in the UEInformationResponse message as defined in [9]

-- V
-- W
-- X
-- Y
-- Z

END

```

### 9.3.6 Common definitions

```

-- *****
--
-- Common definitions
--
-- *****

```

```

X2AP-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-CommonDataTypes (3) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- *****
--
-- Extension constants
--
-- *****

maxPrivateIEs                INTEGER ::= 65535
maxProtocolExtensions        INTEGER ::= 65535
maxProtocolIEs               INTEGER ::= 65535

-- *****
--
-- Common Data Types
--
-- *****

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

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

PrivateIE-ID    ::= CHOICE {
    local        INTEGER (0.. maxPrivateIEs),
    global       OBJECT IDENTIFIER
}

ProcedureCode   ::= INTEGER (0..255)

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

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

END

```

### 9.3.7 Constant definitions

```

-- *****
--
-- Constant definitions
--
-- *****

X2AP-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

```

```

eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    ProcedureCode,
    ProtocolIE-ID
FROM X2AP-CommonDataTypes;

-- *****
--
-- Elementary Procedures
--
-- *****

id-handoverPreparation      ProcedureCode ::= 0
id-handoverCancel          ProcedureCode ::= 1
id-loadIndication          ProcedureCode ::= 2
id-errorIndication         ProcedureCode ::= 3
id-snStatusTransfer        ProcedureCode ::= 4
id-uEContextRelease        ProcedureCode ::= 5
id-x2Setup                 ProcedureCode ::= 6
id-reset                   ProcedureCode ::= 7
id-eNBConfigurationUpdate  ProcedureCode ::= 8
id-resourceStatusReporting ProcedureCode ::= 9
id-resourceStatusReporting ProcedureCode ::= 10
id-privateMessage          ProcedureCode ::= 11
id-mobilitySettingsChange  ProcedureCode ::= 12
id-rLFIndication           ProcedureCode ::= 13
id-handoverReport          ProcedureCode ::= 14
id-cellActivation          ProcedureCode ::= 15

-- *****
--
-- Lists
--
-- *****

maxEARFCN          INTEGER ::= 65535
maxInterfaces      INTEGER ::= 16
maxCelllineNB      INTEGER ::= 256
maxnoofBearers     INTEGER ::= 256
maxNrOfErrors      INTEGER ::= 256
maxnoofPDCP-SN     INTEGER ::= 16      -- FFS Value to be checked
maxnoofEPLMNs      INTEGER ::= 15
maxnoofEPLMNsPlusOne INTEGER ::= 16
maxnoofForbLACs    INTEGER ::= 4096
maxnoofForbTACs    INTEGER ::= 4096
maxnoofBPLMNs      INTEGER ::= 6
maxnoofNeighbours  INTEGER ::= 512

```

```

maxnoofPRBs          INTEGER ::= 110
maxPools              INTEGER ::= 16
maxnoofCells         INTEGER ::= 16
maxnoofMBSFN         INTEGER ::= 8

```

```

-- *****
--
-- IEs
--
-- *****

```

```

id-E-RABs-Admitted-Item          ProtocolIE-ID ::= 0
id-E-RABs-Admitted-List         ProtocolIE-ID ::= 1
id-E-RAB-Item                   ProtocolIE-ID ::= 2
id-E-RABs-NotAdmitted-List      ProtocolIE-ID ::= 3
id-E-RABs-ToBeSetup-Item        ProtocolIE-ID ::= 4
id-Cause                        ProtocolIE-ID ::= 5
id-CellInformation              ProtocolIE-ID ::= 6
id-CellInformation-Item         ProtocolIE-ID ::= 7
id-New-eNB-UE-X2AP-ID          ProtocolIE-ID ::= 9
id-Old-eNB-UE-X2AP-ID          ProtocolIE-ID ::= 10
id-TargetCell-ID               ProtocolIE-ID ::= 11
id-TargeteNBtoSource-eNBTransparentContainer ProtocolIE-ID ::= 12
id-TraceActivation              ProtocolIE-ID ::= 13
id-UE-ContextInformation        ProtocolIE-ID ::= 14
id-UE-HistoryInformation        ProtocolIE-ID ::= 15
id-UE-X2AP-ID                  ProtocolIE-ID ::= 16
id-CriticalityDiagnostics       ProtocolIE-ID ::= 17
id-E-RABs-SubjectToStatusTransfer-List ProtocolIE-ID ::= 18
id-E-RABs-SubjectToStatusTransfer-Item ProtocolIE-ID ::= 19
id-ServedCells                 ProtocolIE-ID ::= 20
id-GlobalENB-ID                ProtocolIE-ID ::= 21
id-TimeToWait                  ProtocolIE-ID ::= 22
id-GUMMEI-ID                   ProtocolIE-ID ::= 23
id-GUGroupIDList               ProtocolIE-ID ::= 24
id-ServedCellsToAdd            ProtocolIE-ID ::= 25
id-ServedCellsToModify         ProtocolIE-ID ::= 26
id-ServedCellsToDelete         ProtocolIE-ID ::= 27
id-Registration-Request        ProtocolIE-ID ::= 28
id-CellToReport                ProtocolIE-ID ::= 29
id-ReportingPeriodicity        ProtocolIE-ID ::= 30
id-CellToReport-Item           ProtocolIE-ID ::= 31
id-CellMeasurementResult       ProtocolIE-ID ::= 32
id-CellMeasurementResult-Item  ProtocolIE-ID ::= 33
id-GUGroupIDToAddList          ProtocolIE-ID ::= 34
id-GUGroupIDToDeleteList       ProtocolIE-ID ::= 35
id-SRVCCOperationPossible      ProtocolIE-ID ::= 36
id-Measurement-ID              ProtocolIE-ID ::= 37
id-ReportCharacteristics       ProtocolIE-ID ::= 38
id-ENB1-Measurement-ID         ProtocolIE-ID ::= 39
id-ENB2-Measurement-ID         ProtocolIE-ID ::= 40

```

id-Number-of-Antennaports	ProtocolIE-ID ::= 41
id-CompositeAvailableCapacityGroup	ProtocolIE-ID ::= 42
id-ENB1-Cell-ID	ProtocolIE-ID ::= 43
id-ENB2-Cell-ID	ProtocolIE-ID ::= 44
id-ENB2-Proposed-Mobility-Parameters	ProtocolIE-ID ::= 45
id-ENB1-Mobility-Parameters	ProtocolIE-ID ::= 46
id-ENB2-Mobility-Parameters-Modification-Range	ProtocolIE-ID ::= 47
id-FailureCellPCI	ProtocolIE-ID ::= 48
id-Re-establishmentCellECGI	ProtocolIE-ID ::= 49
id-FailureCellCRNTI	ProtocolIE-ID ::= 50
id-ShortMAC-I	ProtocolIE-ID ::= 51
id-SourceCellECGI	ProtocolIE-ID ::= 52
id-FailureCellECGI	ProtocolIE-ID ::= 53
id-HandoverReportType	ProtocolIE-ID ::= 54
id-PRACH-Configuration	ProtocolIE-ID ::= 55
id-MBSFN-Subframe-Info	ProtocolIE-ID ::= 56
id-ServedCellsToActivate	ProtocolIE-ID ::= 57
id-ActivatedCellList	ProtocolIE-ID ::= 58
id-DeactivationIndication	ProtocolIE-ID ::= 59
id-UE-RLF-Report-Container	ProtocolIE-ID ::= 60

END

## 9.3.8 Container definitions

```
-- *****
--
-- Container definitions
--
-- *****

X2AP-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
eps-Access (21) modules (3) x2ap (2) version1 (1) x2ap-Containers (5) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- *****
--
-- IE parameter types from other modules.
--
-- *****

IMPORTS
    maxPrivateIEs,
    maxProtocolExtensions,
    maxProtocolIEs,
    Criticality,
    Presence,
    PrivateIE-ID,
    ProtocolIE-ID
```

```

FROM X2AP-CommonDataTypes;

-- *****
--
-- Class Definition for Protocol IEs
--
-- *****

X2AP-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
--
-- *****

X2AP-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
}

-- *****
--
-- Class Definition for Protocol Extensions
--
-- *****

X2AP-PROTOCOL-EXTENSION ::= CLASS {
    &id          ProtocolIE-ID          UNIQUE,
    &criticality Criticality,
    &Extension,

```

```

        &presence          Presence
    }
    WITH SYNTAX {
        ID                  &id
        CRITICALITY        &criticality
        EXTENSION           &Extension
        PRESENCE            &presence
    }

-- *****
--
-- Class Definition for Private IEs
--
-- *****

X2AP-PRIVATE-IES ::= CLASS {
    &id                    PrivateIE-ID,
    &criticality            Criticality,
    &Value,
    &presence              Presence
}
WITH SYNTAX {
    ID                    &id
    CRITICALITY            &criticality
    TYPE                  &Value
    PRESENCE              &presence
}

-- *****
--
-- Container for Protocol IEs
--
-- *****

ProtocolIE-Container {X2AP-PROTOCOL-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Single-Container {X2AP-PROTOCOL-IES : IEsSetParam} ::=
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Field {X2AP-PROTOCOL-IES : IEsSetParam} ::= SEQUENCE {
    id                    X2AP-PROTOCOL-IES.&id                ({{IEsSetParam}}),
    criticality            X2AP-PROTOCOL-IES.&criticality        ({{IEsSetParam}}{@id}),
    value                  X2AP-PROTOCOL-IES.&Value              ({{IEsSetParam}}{@id})
}

-- *****
--
-- Container for Protocol IE Pairs
--
-- *****

ProtocolIE-ContainerPair {X2AP-PROTOCOL-IES-PAIR : IEsSetParam} ::=

```

```

SEQUENCE (SIZE (0..maxProtocolIEs)) OF
  ProtocolIE-FieldPair {{IEsSetParam}}

ProtocolIE-FieldPair {X2AP-PROTOCOL-IES-PAIR : IEsSetParam} ::= SEQUENCE {
  id                X2AP-PROTOCOL-IES-PAIR.&id                ({IEsSetParam}),
  firstCriticality  X2AP-PROTOCOL-IES-PAIR.&firstCriticality  ({IEsSetParam}@id),
  firstValue        X2AP-PROTOCOL-IES-PAIR.&FirstValue        ({IEsSetParam}@id),
  secondCriticality X2AP-PROTOCOL-IES-PAIR.&secondCriticality  ({IEsSetParam}@id),
  secondValue       X2AP-PROTOCOL-IES-PAIR.&SecondValue       ({IEsSetParam}@id)
}

-- *****
--
-- Container Lists for Protocol IE Containers
--
-- *****

ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, X2AP-PROTOCOL-IES : IEsSetParam} ::=
  SEQUENCE (SIZE (lowerBound..upperBound)) OF
  ProtocolIE-Container {{IEsSetParam}}

ProtocolIE-ContainerPairList {INTEGER : lowerBound, INTEGER : upperBound, X2AP-PROTOCOL-IES-PAIR : IEsSetParam} ::=
  SEQUENCE (SIZE (lowerBound..upperBound)) OF
  ProtocolIE-ContainerPair {{IEsSetParam}}

-- *****
--
-- Container for Protocol Extensions
--
-- *****

ProtocolExtensionContainer {X2AP-PROTOCOL-EXTENSION : ExtensionSetParam} ::=
  SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
  ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField {X2AP-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {
  id                X2AP-PROTOCOL-EXTENSION.&id                ({ExtensionSetParam}),
  criticality        X2AP-PROTOCOL-EXTENSION.&criticality        ({ExtensionSetParam}@id),
  extensionValue     X2AP-PROTOCOL-EXTENSION.&Extension         ({ExtensionSetParam}@id)
}

-- *****
--
-- Container for Private IEs
--
-- *****

PrivateIE-Container {X2AP-PRIVATE-IES : IEsSetParam} ::=
  SEQUENCE (SIZE (1..maxPrivateIEs)) OF
  PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field {X2AP-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {
  id                X2AP-PRIVATE-IES.&id                ({IEsSetParam}),
  criticality        X2AP-PRIVATE-IES.&criticality        ({IEsSetParam}@id),

```

```
    value           X2AP-PRIVATE-IES.&Value      ({IEsSetParam}{@id})  
  }  
END
```

## 9.4 Message transfer syntax

X2AP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax as specified in ref. [5].

## 9.5 Timers

$T_{\text{RELOCprep}}$

- Specifies the maximum time for the Handover Preparation procedure in the source eNB.

$TX2_{\text{RELOCoverall}}$

- Specifies the maximum time for the protection of the overall handover procedure in the source eNB.

---

## 10 Handling of unknown, unforeseen and erroneous protocol data

Section 10 of [4] is applicable for the purposes of the present document.



---

## History

<b>Document history</b>		
V9.0.0	October 2009	Publication
V9.1.0	February 2010	Publication
V9.2.0	April 2010	Publication
V9.3.0	June 2010	Publication
V9.4.0	October 2010	Publication