DataCast
S1MME OHDR

Version 17.6.2.1
Rev. 003 / 2019-09-30

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Contents

What's New

DataCast 17.6.2.1 enhancements include the following features.

Feature ID	Description	Section
F-09890	5G Option 3x IPI Support for gNB and Modify Bearer KPIs	Updated section 6.7.8.3.2.5 "TekIE UserTunnel (0xA006) Format".

Revision History

The revision history shows the documentation updates for this release. These updates include new features and changes to existing features. They also include changes resulting from documentation requests and issues.

Date	Revision	Reference	Summary
2019/06/28	001		See What's New.
2019/06/28	001	DC-9074	Update sections about LcsAP protocol.
2019/06/28	001	DC-9398	OHDR specification guides missing compliance information about ISNG probes
2019/06/28	001	PUB-3240	Need to update S1MME OHDR Document after F-09676 Rel 15 update. See 4.7.3.1.5.2 Encoding.
2019/08/09	002	PUB-3272	Correct Rev History in S1MME OHDR Document. Corrected referenced FID for PUB-3240 entry.
2019/09/30	003		See What's New.

1 Introduction

1.1 Confidentiality Restrictions

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1.2 Disclaimer

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1.3 Purpose

The purpose of this document is to describe the OHDR format for Binary Streaming and Binary and ASCII file output. NETSCOUT created this document for the development of an OHDR receiver in a third part application.

1.4 Content

Structures and parameters described in this document are related to Application Protocol for the interface S1MME.

1.5 Scope

The OHDR parameters described in this document are limited to DataCast. The ASCII and Binary outputs described in this document are limited to the OHDR receiver software developed by NETSCOUT.

1.6 Definitions

Listed below are common definitions for this guide.

xDR	Generic term to indicate Data Records generated by SpIprobes and G10, GeoBlade, ISNG Geo probes
DR	Data Record. Within this document the term refers to components of a OHDR, resulting from the transformation of individual xDRs
HDR	Hybrid Data Record
OHDR	Output Hybrid Data Record. Output format generated by DataCast by processing xDRs
Blob	Blob is a chunk of binary data a receiver obtains on a TCP/IP socket from a DataCast server.
DNS	Domain Name System
LAC	Location Area Code
RAC	Routing Area Code
SAC	Service Area Code
RAT	Radio Access Technology
NSAPI	Network Service Access Point Identifier
IMSI	International Mobile Subscriber Identity
TMSI	Temporary Mobile Subscriber Identity
P-TMSI	Packet TMSI
IMEI	International Mobile Equipment Identity
MSISDN	Mobile Subscriber ISDN Number (ISDN: Integrated Services Digital Network)
MCC	Mobile Country Code
MNC	Mobile Network Code
BSC	Base Station Controller
RNC	Radio Network Controller
GSN	GPRS Support Node
SGSN	Serving GSN

GGSN	Gateway GSN
APN	Access Point Name
HVA	High Value Account
LTE	Long Term Evolution
IE	Information Element
PLMN	Public Land Mobile Network

1.7 Reference

Please refer to the "NETSCOUT System Compliance Document" to get all the reference to supported 3GPP Technical Specification for S1AP Interface and related protocols.

2 Defining the DataCast Mediation Platform

The DataCast Mediation platform leverages signaling as a common denominator for hybrid network services, elements, and technologies for the most efficient and flexible process for data collection and distribution. With DataCast, disparate data fields are intelligently combined to raise the level of readily available information and expand mediation beyond legacy billing mediation constraints.

In general, DataCast provides the following capabilities:

- Filtering of data records for specific application needs
- Correlation of data records
- Serves as a single feed to multiple applications

The DataCast system's filtering capabilities enhance the bandwidth efficiency on Local and Wide Area Networks (LAN/WAN) by alleviating the production of duplicated and customized data records from each network information source.

The DR Correlation component within DataCast is responsible for correlating the call records for the same call. This feature allows the system administrator to place the correlated data records in the same OHDR.
DR Correlation works with the Programmable OHDR output process which allows for specific parameters taken from each correlated data record to be included within the OHDR. DataCast supports Multi-Leg and Multi-Protocol correlation.

DataCast serves as a single source for processing, correlating, transforming, and transmitting hybrid network data records into OHDRs. DataCast receives Programmable Detail records (xDRs) from the Probes, filters and correlates these input data records and generates OHDRs. An OHDR contains content from one or more xDRs plus additional information. After correlating the xDR into an OHDR, DataCast then broadcasts the OHDRs to multiple applications for business intelligence, planning, and service management (Figure 1 - DataCast Distribution)
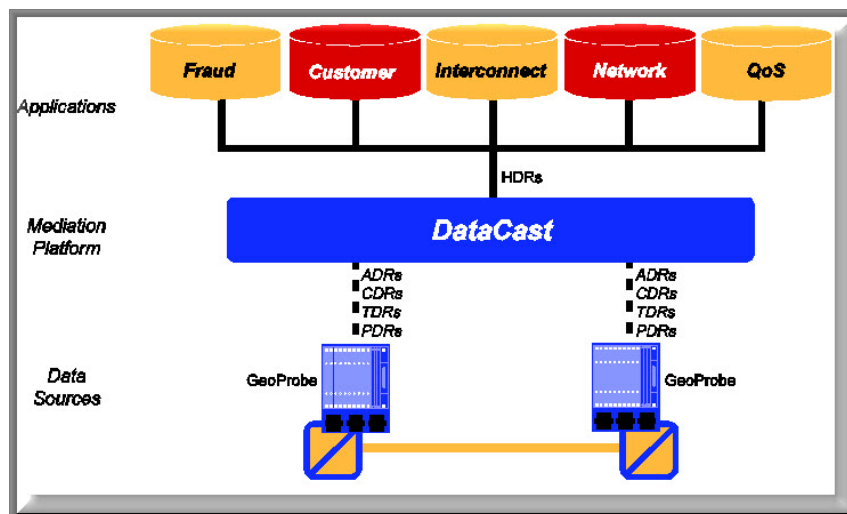
Figure 1 - DataCast Distribution

System administrators can use this flexible feature to combine the DataCast filtering capabilities in different ways to provide targeted OHDRs to any downstream application. The information that DataCast generates is mission critical for a variety of applications including:

- Fraud Management

- Customer Management

- Interconnection Management

- Network Service Management

- Quality of Service Management

NOTE: DataCast uses the Sun server family and is independent from the GeoProbe and IrisView servers.

3 Working with Binary OHDR Output – TCP/IP Streaming

The DataCast Transmitter component operates as a TCP client and sends the Binary Large Object (BLOB) directly onto the Third Party server which is received instantaneously. The BLOB is used to transmit, encode, and decode data records. There is no special handshake required to activate this.

3.1 BLOB Structure

- The data record is encoded in a BLOB. A BLOB may contain correlated data records and therefore may carry more than one data record; each data record is **word aligned**. The following characteristics apply to a BLOB:

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  - When one single data record is packed into the BLOB, there might be instances where all three different categories of data (word size, short size, or miscellaneous) are to be blobbed or only one category has to be blobbed. Refer to section 4.2 Header.

  - The number of element-id masks present in the blob is directly dependent on the number of different categories packed into the BLOB.

  - For a DR count that is greater than the value 0, you must read each record according to its specification and move on to the next record. For the purpose of this document, if the DR count is greater than the value 0, one or more data records are present.

The Fields of the OHDR are divided into the following categories based on their sizes (see Figure 2 - Blob Structure).
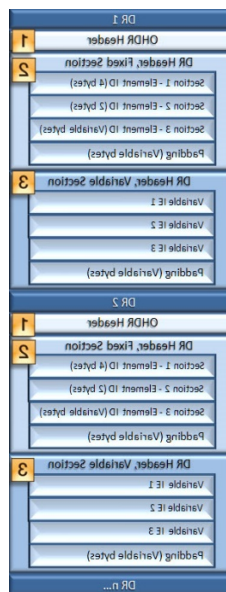
Figure 2 - Blob Structure

Blob Structure	Description	Section Reference
1	Defines OHDR Header parameters and size, OHDR Header in this context is common to the Fixed and Variable sections of the data records within the Blob	4.2

2	Defines DR Header parameters and size, common to fixed and variable section of the data records within the Blob.
	
	• Also defines the Fixed Section of the Data Records, this section include fields that are always present in the DR but changes per DR type. Apply separate element id mask to each category in the fixed section to indicate the different individual parameters based on the user's choice.
	
	  • Section 1, Element ID contains four bytes in length; Pack all the 4 bytes **word**-sized parameters together at the beginning
	  • Section 2 Element ID contains two bytes in length, Pack all the 2 byte **short**-sized parameters to follow
	  • Section 3 Element Id is variable in length and can be any length other than four or two bytes. Pack all the **miscellaneous**-sized parameters at the end
		4.5

3	• Defines the Variable Section of the Data Record. Variable section contains information that can be present in the OHDR if the probes have been programmed to include it as an output to the xDRs.	4.6

4 S1MME xDR structures

The S1MME Control Plane structure of the S1MME xDR supports two sessions:

- A Session Level Information Element – A Session Level IE for each session.

- Multiple Transaction Level Information Elements – A Transaction Level IE for each transaction that occurs during the session.

Refer to the following sections:

4.6.3.1 S1MME TekIE S1AP TransStats

4.6.3.2 S1MME TekIE SGs Session

NOTE: S1MME xDR are produced exclusively by G10, GeoBlade, ISNG Geo Probe

Each field description will include also the indication of which Release the parameter was first supported in DataCast. Release will indicate also SP in case of back patches.

For Fixed length parameters it will be indicated the default value if the data is unavailable from the probe. Variable length parameters and IEs are not sent when data is unavailable from the probe.

4.1 Directory

The following table summarizes the structure of the DR and provides a direct link to the relevant DR section in the document.

Section	Section	Description	Encoding
OHDR	Header	4.3	4.4
DR	Header	4.5.1.1	4.5.1.2
DR	Header Word Fields	4.5.2.1	4.5.2.2
DR	Header Short Fields	4.5.3.1	4.5.3.2
DR	Header Variable Fields	4.5.4.1	4.5.4.2
DR	Variable Fields Header	4.6.1.1	4.6.1.2
DR	Variable Fields Fields	4.6.2.1	4.6.2.2

4.2 Header

For the purpose of this document, bit positions are based on the digit one, not the digit zero. Bits one through eight in this document are identical to bits zero through seven in an environment that is based on the digit zero. The following table is an example of the OHDR header.

4.3 OHDR Header Field Description

Parameter	Description
Length of Data Blob	The length is not inclusive of this field.
Message Type	In the case of a data record, the value is 130.
Data Type	This value defines the application ID from the OHDR.format and Transmitter.
Format Type	This value defines the FormatID from the OHDR.format and Transmitter.
[Version (4 most sign. bits) – Spare (4 least sign. bits)]	Indicates the version of the data type (HDR). The maximum value of the version number is assumed to be 15
DrCount	This value defines the total number of DRs. If the value is zero, no data sections appear.
<Internal>	
Reserved	This parameter is reserved for future use.

4.4 OHDR Header Field Encoding

ParameterName	Structured/Field	Size	Unit	Encode Type	Values/Notes
LengthOfDataBlob	No	4	byte	Integer	0-Max Unsigned Int
MessageType	No	1	byte	Integer	130
DataType	No	1	byte	Integer	0x00 to 0xff
FormatType	No	1	byte	Integer	0x00 to 0xff
Version	Yes				
	Version	*4*	*Bit*	*Integer (bits 5-8)*	0x0 to 0xf
	Spare	*4*	*Bit*	*Integer (bits 1-4)*	0x0
DrCount	No	1	byte	Integer	0x00000000 to 0xffffffff
Internal	No	1	byte	N/D	N/D
Reserved	No	2	byte	N/D	N/D

4.5 DR Header, Fixed section

4.5.1   Header Section

From each parameter in the Fields sections it will be possible to know whether it can be extracted due to additional components or not.

There can be the following cases:

1) A parameter can be extracted from the xDR only from Iris Mediation Device or Iris Xdr Decoder Components (default).

2) A parameter can be extracted as in case 1 or due to additional component(-s) that must be configured in DataCast ("Component optional").

For a description of components refer to DataCast OHDR Components Guide.

4.5.1.1 Field Description

ParameterName	Description
TotalLengthOfDr	This field indicates the length of this DR. The length unit is in number of 4 byte words. The length indicated also includes the size of this field and any word padding at the end of the DR.
BitMask	It describes various information about the current fixed session format
	DrType version, current is 7
	Number of ElementIDs used in the next Fixed Sections (up to three sections as described below)
	Reserved for Future use
Reserved	Reserved for Future use
DrType	DR type value for S1MME DR
DrInterface	Reserved field
TotalLengthElemIdSection	This field indicates the length of the entire Element ID section. This value is exclusive of the size of this field, but is inclusive of the padding bytes for the Element ID. The length unit shall be in number of (4 byte) words.

4.5.1.2 Field Encoding

ParameterName	Structured/Field	Size	Unit	Encode Type	Range/Values
TotalLengthOfDr	No	2	byte	Integer	0 to 65.535
BitMask	Yes				
	DrType	*3*	*bit*	*binary bit mask (bits 1-3)*	*7*
	NumOfElemID	*3*	*bit*	*binary bit mask (bits 4-6)*	*0 to 7*
	Reserved	*2*	*bit*	*binary bit mask (bits 7-8)*	*0*
Reserved	No	1	byte	binary bit mask	*N/A*
DrType	No	1	byte	Integer	*9*
DrInterface	No	1	byte	Integer	*0*
TotalLengthElemIdSection	No	2	byte	Integer	*0 to 255*

4.5.2   Word-Fields Section

4.5.2.1 Description

ParameterName	ID	Geo	G10, GeoBlade, ISNG Geo	ElemntID Mask1	Struct/Field	Description
ElementIDMask1	N/D				Yes	This value is the Bitmask for all elements in Section 1.
					BytesFormat	Three most significant bits (32–30) indicate the number of bytes within the parameters from this section. The following values are: 000: Word size (4 bytes)
					ParameterFlag	Least significant bits (29–0) indicate the presence in the section of each possible ElementId for this section
Sequence Number	8193		✓	0x00000001	No	The value is an ID defined by the probe and incremented by one each time a new call starts. If ID > 4,294,967,295 this field will be zero (see Parameters 32917, 32918). Release: 12.1 and earlier
Start Time (secs)	8194		✓	0x00000002	No	The value expresses in second the Unix Time counter of seconds since 1.1.1970 of the call starting based on the first message of the call. Release: 12.1 and earlier
Start Time (micro secs)	8195		✓	0x00000004	No	The value expresses in microseconds the fractional part of the Start Time. Release: 12.1 and earlier
End Time (secs)	8196		✓	0x00000008	No	The value expresses in second the Unix Time counter of seconds since 1.1.1970 of the call ending based on the last message of the call. Release: 12.1 and earlier
End Time (micro secs)	8197		✓	0x00000010	No	The value expresses in microseconds the fractional part of the End Time. Release: 12.1 and earlier
CallType	8198		✓	0x00000020	No	This field identifies the session_type as defined by the G10, GeoBlade probe. Release: 12.1 and earlier

ParameterName	ID	Geo	G10, GeoBlade, ISNG Geo	ElemntID Mask1	Struct/Field	Description
SessionStatus	8199		✓	0x00000040	No	Status of the session record. The default value when data is unavailable is 0x7FFFFFFF Release: 12.1 and earlier
Num Pgn Req on This eNodeB	8200		✓	0x00000080	No	Total number of PagingRequests received for the association in the responding eNodeB for tracked S1Ap Context Release: 12.1 and earlier
Num Pgn Req on All eNodeB	8201		✓	0x00000100	No	Total number of PagingRequests received for all associations in the tracked S1Ap Context Release: 12.1 and earlier
Extended Sequence Number Low	8202		✓	0x00000200	No	The value is the least significant part of an ID (8 bytes long) defined by the probe Release: 12.1 and earlier
Extended Sequence Number High	8203		✓	0x00000400	No	The value is the most significant part of an ID (8 bytes long) defined by the probe Release: 12.1 and earlier
BladeId	8204		✓	0x00000800	No	BladeId from probe Release: 12.1 and earlier
PagingResponse Time (secs)	8205		✓	0x00001000	No	The value expresses in second the Unix Time counter of seconds since 1.1.1970 of the PagingResponse Message. Release: 12.2
PagingResponse Time (micro secs)	8206		✓	0x00002000	No	The value expresses in microseconds the fractional part of the PagingResponse Time. Release: 12.2
LinkId	8207		✓	0x00004000	No	ID of one of the links from where the PDUs for this session were seen. Release: 13.1
CS FallBack Indicator	8208		✓	0x00008000	No	This field indicates that a fallback to the CS domain is needed Release: 13.1

ParameterName	ID	Geo	G10, GeoBlade, ISNG Geo	ElemntID Mask1	Struct/Field	Description
Source Node Id	8209		✓	0x00010000	No	This field contains the node Id related to parameter 10241(Source Ip Address). Release: 13.2.2
Destination Node Id	8210		✓	0x00020000	No	This field contains the node Id related to parameter 10242 (Destination Ip Address). Release: 13.2.2
SessionStatusExt	8211		✓	0x00040000	No	Extended status of the session record. The default value when data is unavailable is 0xFFFFFFFF Release: 14.2.0
MME UE S1AP ID	8212		✓	0x00080000	No	This field is present if the Element ID Mask 1 bit location 20 is set. **Detailed Description** S1AP ID of MME UE. Release: 15.3
ENODE-B UE S1AP ID	8213		✓	0x00100000	No	This field is present if the Element ID Mask 1 bit location 21 is set. **Detailed Description** S1AP ID of ENODE-B UE. Release: 15.3

4.5.2.2 Encoding

ParameterName	Struct/Field	Size	Unit	Encode Type	*Values*
ElementIDMask1	*BytesFormat*	3	Bit (32-30)	binary bit mask	*Bit 1 000# #### #### ####* *Bit16 #### #### #### ####*
	ParameterFlag	29	Bit (29-1)	binary bit mask	*Bit 1 ###0 0000 0000 0000* *Bit16 0000 0000 0000 0000* *to* *Bit 1 ###1 1111 1111 1111* *Bit16 1111 1111 1111 1111*
Sequence Number	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0xFFFFFFFF.

ParameterName	Struct/Field	Size	Unit	Encode Type	*Values*
Start Time (secs)	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0x00000000.
Start Time (micro secs)	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0x00000000.
End Time (secs)	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0x00000000.
End Time (micro secs)	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0x00000000.
CallType	No	4	byte	Enum	*CallType Values* The default value when data is unavailable is 0xFFFF.
SessionStatus	No	4	byte	Enum	*SessionStatus Values* The default value when data is unavailable is 0x7FFFFFFF.
Num Pgn Req on This eNodeB	No	4	byte	Enum	*NumPgnReqOnThisENodeB Values*
Num Pgn Req on All eNodeB	No	4	Byte	Enum	*NumPgnReqOnAllENodeB Values*
Extended Sequence Number Low	No	4	byte	Integer	*0 to 4,294,967,295* When data is unavailable this value and Param. 8203 value are populated with 0xFFFFFFFF.
Extended Sequence Number High	No	4	byte	Integer	*0 to 4,294,967,295* When data is unavailable this value and Param. 8202 value are populated with 0xFFFFFFFF.
BladeId	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0x00000000
PagingResponse Time (secs)	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0x00000000
PagingResponse Time (micro secs)	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0x00000000
LinkId	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0x00000000
CS FallBack Indicator	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0xFFFFFFFF
Source Node Id	No	4	byte	Integer	*1 to 4,294,967,295* The default value when data is unavailable is 0xFFFFFFFF

ParameterName	Struct/Field	Size	Unit	Encode Type	Values
Destination Node Id	No	4	byte	Integer	*1 to 4,294,967,295* The default value when data is unavailable is 0xFFFFFFFF
SessionStatusExt	No	4	byte	Enum	Session Status: Extended The default value when data is unavailable is 0xFFFFFFFF.
MME UE S1AP ID	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0xFFFFFFFF
ENODE-B UE S1AP ID	No	4	byte	Integer	*0 to 4,294,967,295* The default value when data is unavailable is 0xFFFFFFFF

4.5.3 Short-Fields Section

4.5.3.1 Description

ParameterName	ID	Geo	G10, GeoBlade, ISNG Geo	ElemntID Mask2	Structured/Field	Description
ElementIDMask2	N/D				Yes	This value is the Bitmask for all elements in Section 2.
					BytesFormat	Three most significant bits (32–30) indicate the number of bytes within the parameters from this section. The following values are: 001: Short size (2 bytes)
					ParameterFlag	Least significant bits (29–0) indicate the presence in the section of each possible ElementId for this section
EquipmentId	9217		✓	0x20000001	No	The value is the ID of the GeoProbe that created the call record,unique in the system. Release: 12.1 and earlier
ProcessorId	9218		✓	0x20000002	No	The value is the ID of the processing unit that created the call record, unique in the system. Release: 12.1 and earlier

ParameterName	ID	Geo	G10, GeoBlade, ISNG Geo	ElemntID Mask2	Structured/Field	Description
XDR Option	9219		✓	0x20000004	No	This field contains the xDr Option value possible values are: 0: Delivered DR upon call closure 1: Periodically delivered DR Release: 12.1 and earlier
Application Protocol	9220		✓	0x20000008	No	A unique value as defined by the G10, GeoBlade, ISNG Geo probe. 256: S1AP 268: SGs Release: 12.1 and earlier
Source Port Number	9221		✓	0x20000010	No	This field contains the port ort number of the node that initiated the session/transaction. Release: 12.1 and earlier
Destination Port Number	9222		✓	0x20000020	No	This field contains the port ort number of the node that terminated the session/transaction. Release: 12.1 and earlier
Is Pgn Res received	9223		✓	0x20000040	No	Set on First PagingResponse received for the tracked S1Ap Session That indicates a ServiceRequest has been received Release: 12.1 and earlier
Source Node Type	9224		✓	0x20000080	No	This field contains the node type related to parameter 10241 (Source Ip Address). Release: 13.2.2
Destination Node Type	9225		✓	0x20000100	No	This field contains the node type related to parameter 10242 (Destination Ip Address). Release: 13.2.2

4.5.3.2 Encoding

ParameterName	ID	Structured/ Field	Size	Unit	Encode Type	Values

ElementIDMask2	N/D	*BytesFormat*	3	Bit (32-30)	binary bit mask	*Bit 1 001# #### #### ####* *Bit16 #### #### #### ####*
		ParameterFlag	29	Bit (29-1)	binary bit mask	*Bit 1 ###0 0000 0000 0000* *Bit16 0000 0000 0000 0000* *to* *Bit 1 ###1 1111 1111 1111* *Bit16 1111 1111 1111 1111*
EquipmentId	9217	No	2	Byte	Integer	*0 to 65.535* 0xFFFF *on data Unavailable*
ProcessorId	9218	No	2	byte	Integer	*0 to 65.535* 0xFFFF *on data Unavailable*
XDR Option	9219	No	2	byte	Enum	*XDR Option Values* 0xFFFF *on data Unavailable*
Application Protocol	9220	No	2	byte	Enum	*Application Protocol Values* 0xFFFF *on data Unavailable*
Source Port Number	9221	No	2	byte	Integer	*0 to 65.535* 0xFFFF *on data Unavailable*
Destination Port Number	9222	No	2	byte	Integer	*0 to 65.535* 0xFFFF *on data Unavailable*
Is Pgn Res received	9223	No	2	byte	Enum	*IsPagingResponseReceived Values* 0xFFFF *on data Unavailable*
Source Node Type	9224	No	2	byte	Enum	*Node Type Values* 0xFFFF *on data Unavailable*
Destination Node Type	9225	No	2	byte	Enum	*Node Type Values* 0xFFFF *on data Unavailable*

4.5.4   Variable-Fields Section

4.5.4.1 Description

ParameterName	ID	Geo	G10, GeoBlade, ISNG Geo	ElemntID Mask3	Structured/ Field	Description

ElementIDMask3	N/D				Yes	This value is the Bitmask for all elements in Section 3.
					BytesFormat	Three most significant bits (32–30) indicate the number of bytes within the parameters from this section. The following values are: 010: Misc sizes (anything other than 4 or 2 bytes)
					ParameterFlag	Least significant bits (29–0) indicate the presence in the section of each possible ElementId for this section
Source Ip Address	10241		✓	0x40000001	yes	IP address of the node that initiated the session/transaction. Release: 12.1 and earlier
					Length	Length of the field
					Value	Value of the field
Destination Ip Address	10242		✓	0x40000002	yes	IP of the node that terminated the session/transaction. Release: 12.1 and earlier
					Length	Length of the field
					Value	Value of the field
IMSI	10243		✓	0x40000004	yes	This field contains the International Mobile Subscriber Identity). This includes the MCC (Mobile Country Code) + MNC (Mobile Network Code) + MSIN (Mobile Station Identity Number) and uniquely identifies a subscriber. Release: 12.1 and earlier
					Length	Length of the field
					Value	Value of the field
GUTI	10244		✓	0x40000008	yes	This field contains the Global Unique Temporary ID that is allocated by the MME. Release: 12.1 and earlier
					Length	Length of the field

					Value	Value of the field
APN	10245		✓	0x40000010	yes	This field contains the Access Point Name value. Release: 12.1 and earlier
					Length	Length of the field
					Value	Value of the field
IMEI	10246		✓	0x40000020	yes	This field contains the International Mobile Equipment Identifier. This identity uniquely identifies the mobile equipment. Component optional: IMSI_Component. Release: 12.1 and earlier
					Length	Length of the field
					Value	Value of the field
IMEISV	10247		✓	0x40000040	yes	This field contains the International Mobile station Equipment Identity and Software Version Number. This identity uniquely identifies the mobile equipment. Component optional: IMSI_Component. Release: 12.1 and earlier
					Length	Length of the field
					Value	Value of the field
TAC	10248		✓	0x40000080	yes	This field contains the Tracking Area Code and is used to group cells into a logical registration area. Release: 12.1 and earlier
					Length	Length of the field
					Value	Value of the field

CellId	10249		✓		0x40000100	yes	This field contains the Cell Identity. Release: 12.1 and earlier
						Length	Length of the field
						Value	Value of the field
eNodeB IP	10250		✓		0x40000200	yes	This field contains the eNodeB Identity IP address from the network that the eNodeB is a member of. Release: 12.1 and earlier
						Length	Length of the field
						Value	Value of the field
MME IP	10251		✓		0x40000400	yes	This field contains the Mobility Management Entity IP address. Release: 12.1 and earlier
						Length	Length of the field
						Value	Value of the field
SGs TMSI	10252		✓		0x40000800	yes	This field contains the TMSI in case of SGs Interface Release: 12.1 and earlier
						Length	Length of the field
						Value	Value of the field
Registered LAI	10253		✓		0x4001000	yes	This field contains the Registered LAI (Location Area Identifier). This includes the PLMN Identity + LAC (Location Area Code) as described in 3GPP TS 36.413 v10. Release: 13.1
						Length	Length of the field
						Value	Value of the field

PLMN Identity	10254			✓	0x4002000	yes	This field contains the PLMN Identity associated to ECGI. The field structure is described in 3GPP TS 36.413 v10. Release: 12.2_SP6
						Length	Length of the field
						Value	Value of the field
MSISDN	10255			✓	0x4004000	yes	This field contains the Mobile Subscriber ISDN Number. Release: 12.2_SP19
						Length	Length of the field
						Value	Value of the field
Last ECGI	10256			✓	0x4008000	yes	The format of the field includes the first byte indicating the length of the field, and is followed by the actual contents. Total bytes of actual field contents are equal to the first byte value (array of BINARY bytes). This field is present only for F-04260, just for the customer Starhub. DataCast Internal use only, it will use GTPV2 format, not same with standard S1AP format. Detailed description: This field provides the Last ECGI. For Probe don't provided last ECGI for S1MME Drs, then DataCast need to recreate the ECGI through the PLMN Identity (from S1apSessionSpecific) and cell ID pair (tracked from S1apTransactionSpecific). See 7.20 for the format and the limitation. Release: 16.1.0
						Length	Length of the field
						Value	Value of the field
Padding	N/D					No	Ensures that the length of the entire Element ID section ends on a four-byte boundary

4.5.4.2 Encoding

ParameterName	ID	Structured/Field	Size	Unit	Encode Type	Values
ElementIDMask3	N/D	*BytesFormat*	3	Bit 32-30	binary bit mask	`Bit 1 010# #### #### ####` `Bit16 #### #### #### ####`

		ParameterFlag	29	Bit 29-1	binary bit mask	`Bit 1 ###0 0000 0000 0000`
						`Bit16 0000 0000 0000 0000`
						`to`
						`Bit 1 ###1 1111 1111 1111`
						`Bit16 1111 1111 1111 1111`

Source Ip Address	10241	*Length*	1	byte	Integer	`0 to 255`
		Value	Variable	byte	char vector	`Depending on the field content`
Destination Ip Address	10242	*Length*	1	byte	Integer	`0 to 255`
		Value	Variable	byte	char vector	`Depending on the field content`
IMSI	10243	*Length*	1	byte	Integer	`0 to 255`
		Value	Variable	byte	digit ('0'-'9') vector	`Depending on the field content`
GUTI	10244	*Length*	1	byte	Integer	`0 to 255`
		Value	Variable	byte	char vector	`Depending on the field content`
APN	10245	*Length*	1	byte	Integer	`0 to 255`
		Value	Variable	byte	ascii vector	`Depending on the field content`
IMEI	10246	*Length*	1	byte	Integer	`0 to 255`
		Value	Variable	byte	Digit ('0'-'9') vector	`Depending on the field content`
IMEISV	10247	*Length*	1	byte	Integer	`0 to 255`

ParameterName	ID	Structured/Field	Size	Unit	Encode Type	Values
		Value	Variable	byte	digit ('0'-'9') vector	Depending on the field content
TAC	10248	*Length*	1	byte	Integer	0 to 255
		Value	Variable	byte	char vector	Depending on the field content
CellId	10249	*Length*	1	byte	Integer	0 to 255
		Value	Variable	byte	char vector	Depending on the field content
eNodeB IP	10250	*Length*	1	byte	Integer	0 to 255
		Value	Variable	byte	char vector	Depending on the field content
MME IP	10251	*Length*	1	byte	Integer	0 to 255
		Value	Variable	byte	char vector	Depending on the field content
SGs TMSI	10252	*Length*	1	byte	Integer	0 to 255
		Value	Variable	byte	ext digit ('0'-'9','A'-'F') vector	Depending on the field content
Registered LAI	10253	*Length*	1	byte	Integer	0 to 255
		Value	Variable	byte	bytes vector	Depending on the field content
PLMN Identity	10254	*Length*	1	byte	Integer	0 to 255
		Value	Variable	byte	bytes vector	Depending on the field content
MSISDN	10255	*Length*	1	byte	Integer	0 to 255
		Value	Variable	byte	bytes vector	Depending on the field content
Last ECGI	10256	*Length*	1	byte	Integer	0 to 255

ParameterName	ID	Structured/Field	Size	Unit	Encode Type	Values
		Value	Variable	byte	bytes vector	Depending on the field content
Padding	N/D	yes	M	byte	bytes vector	Depending on the previous fields content M = 0 to 3

4.6 DR Header, Variable Section

4.6.1   Header Section

4.6.1.1 Description

ParameterName	Description
Length of variable section	This value is defined by the length of the entire variable section. The length is inclusive of this field. The length unit shall be in number of (4 byte) words.
Number Of Var Fields	This value is defined by the total number of variable fields present.
FormatId	Reserved
Variable Fields	See Section 4.6 DR Header, Variable Section for more information about the Variable Fields (IEs) format.
Padding	If padding is needed for word alignment, this value is defined to end on a four-byte boundary.

4.6.1.2 Encoding

ParameterName	Size	Unit	Encode Type	*Values*
Length of variable section	2	byte	Integer	0 to 65535
Number Of Var Fields	2	byte	Integer	0 to 65535
FormatId	2	byte	Integer	0
Variable Fields	Variable	byte	Byte vector	Depending on the field content
Padding	Variable	byte	Byte vector	Depending on the field content

4.6.2   S1MME DR Variable Fields

The S1MME variable field DR structure might have zero or more variable fields in the variable field content of the data record based on user configuration choices.

4.6.2.1 Description

ParameterName	Structured/Field	Description
DataID	No	Unique Identifier for this Data Field
Bitmask	Yes	
	Tekle Presence	This field indicates if the current Variable Fields is formatted as TekIE. 1 means TekIE Note for S1MME the only format supported is TekIE
	Reserved	*Reserved*
LengthDataField	No	Length of DataField in number of bytes
DataField	Yes	DataField information depending on the following Information Element(s) as indicated by presence bitmask This size is equal to the value in the Length of Data Field parameter. The content of this field is reserved.
Optional Part	No	This field is populated based on the Bitmask value (1-7). If no bits are turned on this field is not populated.
TekIe Part	Yes	This field is populated based on the status of Bit 8 in Bitmask. If Bit 8 is turned ON the value is presented.

4.6.2.2 Encoding

ParameterName	Structured/Field	Size	Unit	Encode Type	Values
DataID	No	2	byte	Integer	As from "OHDR Format File" and Format to be used
Bitmask	Yes				
	Tekle Presence	1	Bit (bit 8)	bit mask	0 - 1
	Reserved	7	Bit (bit 7-1)	bit mask	0000000

LengthDataField	No	1	byte	Integer	Depending on the field content
DataField	Yes	Variable	byte	byte vector	Depending on the field content
Optional Part	N/A	Variable	byte	byte vector	Depending on the field content
TekIe Part	Yes	Variable	byte	byte vector	Depending on the field content

4.6.3   TekIEPart Variable Field

The S1MME variable field currently supports the following TekIE:

DataId	Name	Reference
0xA003	S1MME TekIE S1AP TransStats	4.6.3.1
0xA004	S1MME TekIE SGs Session Specific	4.6.3.2
0xA005	S1MME TekIE LCsAP TransStats	4.6.3.3
0xA006	S1MME TekIE S1AP MutiApn	4.6.3.4
0xA007	S1MME TekIE S1AP MutiMsip	4.6.3.5

4.6.3.1   S1MME TekIE S1AP TransStats (0xA003)

S1MME TekIE S1AP TransStats (IE) content is defined by the following table.

4.6.3.1.1   **TekIE Header**

4.6.3.1.1.1   *Description*

Parameter	Description
TotalLength TekIe	The field represents the length of the TekBitmask and TekIEContents
TekIeBitMask	The bitmask field represents the default status of the Bit Options: Bits = 0 option OFF Bits = 1 option ON
S1MME TekIE TransStats	The field varies depending on the bit values in TekIeBitMask field.

4.6.3.1.1.2 *Encoding*

Structured/ Field	Structured/ SubField	Size	Unit	Encode Type	*Values*	Description
TotalLength TekIe	No	2	byte	Integer	*Depending on the field content*	Length of TekIeBitMask and TekIeContents, not inclusive this length
TekIeBitMask	No	4	byte	bit mask	*0x00000000 to 0xffffffff*	The bitmask field indicates the presence of Info fields transported by S1MME TekIE TransStats Please refer to 4.6.3.1.1.3 TekIeBitMask for a full list of supported Fields for this TekIE
S1MME TekIE TransStats	Yes	Variable	byte	byte vector	S1MME TekIE TransStats Content	This Field reports information about the S1MME transaction related to the current DR

4.6.3.1.1.3 *TekIeBitMask*
The following table lists the current Optional Fields available for this TekIe

Bit Position	Field
1	TransactionStatsInfo
2	UeAggregatedMBR
3	APNAggregatedMBR
4	eRABInfo
5	HandoverType
6	TargetId
7	EpsAttachType
8	EpsUpdateType
9	Procedure Type Info
10	Qcl
11	GUTI Info
12	Latest Cell ID Info
13	GbrQosInfo
14	ContainerId

15	VoDomPrefUeUsage
16-32	Reserved for Future Use

4.6.3.1.2   TekIE Content

4.6.3.1.2.1   *Description*
For a full description of the parameters in this TekIe please refer to the corresponding section for each.

Field	Structured	TekIEBitMask	Description
TransactionStatsInfo	Yes	0x000000001	Bit Mask to specify the presence of the associated subfields for TransactionStatsInfo
UeAggregatedMBR	Yes	0x000000002	This Field reports information about UE Aggregate MBR as from network information Refer to 3GPP TS
APNAggregatedMBR	Yes	0x000000004	This Field reports information about APN Aggregate MBR as from network information Refer to 3GPP TS
eRABInfo	Yes	0x000000008	This IE defines the QoS to be applied to an E-RAB.
HandoverType	Yes	0x000000010	This Field reports information about UE Handover
TargetId	Yes	0x000000020	This field contains information related to the Handover associated to the transaction.
EPSAttachType	Yes	0x000000040	This Field reports information about EPS Attach procedure
EPSUpdateType	Yes	0x000000080	This Field reports information about EPS Update procedure
Procedure Type Info Format - S1MME TekIE S1AP TransStats	Yes	0x000000100	This Field reports information about the current Procedure
Qci Format - S1MME TekIE S1AP TransStats	Yes	0x000000200	This Field reports information about current Qci (Quality Class Identifier)
GutiInfo - S1MME TekIE S1AP TransStats	Yes	0x000000400	This Field reports information about current GUTI Info identifier
Latest Cell ID Info	Yes	0x000000800	This Field reports information about Latest cell ID
GbrQosInfo	Yes	0x000001000	This Field reports information about GBR Qos
ContainerId	Yes	0x000002000	This Field reports information about ContainerId
VoDomPrefUeUsage	Yes	0x000004000	This Field reports information about Voice Domain Preference and UE Usage Setting

4.6.3.1.2.2 *Encoding*

Field	Structured	Size	Unit	Encode Type	*Values*
TransactionStatsInfo	Yes	variable	Byte	Byte vector	*Depending on the field content*
UeAggregatedMBR	Yes	9	byte	byte vector	*Depending on the field content*
APNAggregatedMBR	Yes	Variable	byte	byte vector	*Depending on the field content*
eRABInfo	Yes	Variable	byte	byte vector	*Depending on the field content*
HandoverType	Yes	3	byte	byte vector	*Depending on the field content*
TargetId	Yes	Variable	byte	byte vector	*Depending on the field content*
EPSAttachType	Yes	5	byte	byte vector	*Depending on the field content*
EPSUpdateType	Yes	5	byte	byte vector	*Depending on the field content*
Procedure Type Info Format - S1MME TekIE S1AP TransStats	Yes	5	byte	byte vector	*Depending on the field content*
Qci *Format* - S1MME TekIE S1AP TransStats	Yes	5	byte	byte vector	*Depending on the field content*
GutiInfo - S1MME TekIE S1AP TransStats	Yes	Variable	byte	byte vector	*Depending on the field content*
Latest Cell ID Info	Yes	Variable	byte	byte vector	*Depending on the field content*
GbrQosInfo	Yes	Variable	byte	byte vector	*Depending on the field content*
ContainerId	Yes	Variable	byte	byte vector	*Depending on the field content*
VoDomPrefUeUsage	Yes	Variable	byte	byte vector	*Depending on the field content*

4.6.3.1.3 **TransactionStatsInfo Format – S1MME TekIE S1AP TransStats**

This TekIE is described by a common TekIE (TransactionStatsInfo Format – Common 4.6.3.2.5) containing information on the current Transaction.

4.6.3.1.3.1 *Description*
For the description please refer to section 4.6.3.2.5.1.1 Description

4.6.3.1.3.2   *Encoding*
For the encoding please refer to section 4.6.3.2.5.2 Encoding

4.6.3.1.4   **UeAggregatedMBR Format – S1MME TekIE S1AP TransStats**

4.6.3.1.4.1   *Description*

Structured/ Field	Structured/ SubField	Description	UeAggregatedMBR BitMask
UeAggregatedMBR	Yes	This Field reports information about UE Aggregate MBR as from network information Refer to 3GPP TS	
	UeAggregatedMBRBitMask	Bit Mask to specify the presence of the associated subfields for UeAggregatedMBR	
	MaxBitRate DownLink	This Field reports the aggregated MaxBitRate in Downlink direction Release: 12.1 and earlier	0x01
	MaxBitRate UpLink	This Field reports the aggregated MaxBitRate in Uplink direction Release: 12.1 and earlier	0x02

4.6.3.1.4.2   *Encoding*

Structured/ Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
UeAggregatedMBRBitMask	No	1	byte	bit mask	0x00 to 0xff
MaxBitRate DownLink	No	4	byte	Integer	UEAggregatedMBR Values
MaxBitRate UpLink	No	4	byte	Integer	UEAggregatedMBR Values

4.6.3.1.5 **APNAggregatedMBR Format – S1MME TekIE S1AP TransStats**

4.6.3.1.5.1 *Description*

Structured/ Field	Structured/ SubField	Description	APNAggregatedMBR BitMask
APNAggregatedMBR	Yes	This Field reports information about APN Aggregate MBR as from network information Refer to 3GPP TS	
	APNAggregatedMBRBitMask	Bit Mask to specify the presence of the associated subfields for APNAggregatedMBR	
	APNAggregatedMBRLength	Length of APNAggragatedMBR Content listed in APNAggregatedMBRList Release: 12.1 and earlier	0x01
	APNAggregatedMBRContent	This Field reports the DL and UL APN MBR. Release: 12.1 and earlier	0x01

4.6.3.1.5.2 *Encoding*

Structured/ Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
APNAggregatedMBRBitMask	No	1	byte	bit mask	0x00 to 0xff
APNAggregatedMBRLength	No	1	byte	Integer	*1 to 255*
APNAggregatedMBRContent	Yes	Variable	byte	byte vector	DL and UL APN MBR. This field reports the content of the APN-AMBR IE including octet 1 (Identifier) and octet 2 (length) See 3GPP TS 24.301 V15.4.0(2009-18) Section 9.9.4.2 for details

4.6.3.1.6 **eRABInfo Format - S1MME TekIE S1AP TransStats**

4.6.3.1.6.1 *Description*

Structured/ Field	Structured/ SubField	Description	Field BitMask
eRABInfo	Yes	This IE defines the QoS to be applied to an E-RAB.	
	eRABInfoCount	Counter to specify the number of eRAB Info described in this field Release: 12.1 and earlier	0x01
	eRABInfoIteration	List eRAB Info described in this field Repeated eRABInfoCount times it contains information for a single eRAB Release: 12.1 and earlier	0x01

Structured/ Field	Structured/ SubField	Description	Field BitMask
eRABInfoIteration	Yes	It contains information for a single eRAB	
	eRABInfoBitMask	Bit Mask to specify the presence of the associated subfields for eRABInfo	
	eRABInfoContent	This field contains information on a single eRAB currently active in the session Release: 12.1 and earlier	0x01

NOTE: Only S1AP transactions can contain eRABInfo. To properly decode eRABInfo CauseType it is not necessary referring to protocol Id.

4.6.3.1.6.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
eRABInfo	Yes	Variable	byte	byte vector	*Depending on the field content*
	eRABInfoCount	1	byte	Integer	1 - 255
	eRABInfoIteration	variable	byte	Byte vector	Depending on Info List Repeated eRABInfoCount times

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
eRABInfoIteration	eRABInfoBitMask	1	byte	bit mask	0x00 to 0xff
	eRABInfoContent	Max 42	byte	byte vector	Single eRABInfo Values

4.6.3.1.7 **Single eRabInfo**

4.6.3.1.7.1 *Description*

Field	Struct	Description	Comments	eRABInfo BitMask
Status	No	It contains the status of the current Transaction the eRABInfo refers to Release: 12.1 and earlier		0x01
eRABId ID	No	eRAB Id Release: 12.1 and earlier		0x02
QCI	No	QoS Class Identifier Release: 12.1 and earlier	Please refer to 3GPP TS 36.444	0x04

Field	Struct	Description	Comments	eRABInfo BitMask
AllocRetentionPriorityLevel	Yes	This IE specifies the relative importance compared to other E-RABs for allocation and retention of the E-UTRAN Radio Access Bearer Release: 12.1 and earlier	Refer to 3GPP TS 23.401, Clause 4.7.3	0x08
	PriorityLevel	This IE should be understood as "priority of allocation and retention"		0x08
	PreemptionCapability	This IE indicates the pre-emption capability of the request on other E-RABs		0x08
	PreemptionVulnerable	This IE indicates the vulnerability of the E-RAB to preemption of other E-RABs.		0x08
GBRQoS	Yes	This IE indicates the maximum and guaranteed bit rates of a GBR bearer for downlink and uplink. Release: 12.1 and earlier	Please refer to 3GPP TS 36.444	0x10
	eRabMbrDownLink	This IE indicates the maximum downlink E-RAB Bit Rate (i.e. from the EPC to E-UTRAN) for this bearer. The unit is: bit/s Release: 12.1 and earlier		0x10
	eRabMbrUpLink	This IE indicates the maximum uplink E-RAB Bit Rate (i.e. from the E-UTRAN to the EPC) for this bearer. The unit is: bit/s Release: 12.1 and earlier		0x10
	eRabGbrDownLink	This IE indicates the downlink guaranteed E-RAB Bit Rate (provided that there is data to deliver) from the EPC to the E-UTRAN for this bearer. The unit is: bit/s Release: 12.1 and earlier		0x10

Field	Struct	Description	Comments	eRABInfo BitMask
	eRabGbrUpLink	This IE indicates the uplink guaranteed E-RAB Bit Rate (provided that there is data to deliver) from the E-UTRAN to the EPC for this bearer. The unit is: bit/s Release: 12.1 and earlier		0x10
Cause	Yes	The purpose of the Cause IE is to indicate the reason for a particular event for the S1AP protocol. Release: 12.1 and earlier		0x20
	Type	Cause Type		0x20
	Value	CauseValue		0x20

4.6.3.1.7.2   Encoding

Structured/Field	Structured/ SubField	Size	Unit	Encoding
Status	No	2	byte	Status
eRABId	No	4	byte	INTEGER (0..15, ...)
QCI	No	4	byte	QCI
AllocRetentionPriorityLevel	PriorityLevel	4	byte	Priority Level
	PreemptionCapability	2	byte	Preemption Capability Enum
	PreemptionVulnerable	2	byte	Preemption Vulnearable Enum
GBRQoS	eRabMbrDownLink	4	byte	That's MBR/GBR in kilo bits/sec INTEGER (0..10,000,000)

	eRabMbrUpLink	4	byte	That's MBR/GBR in kilo bits/sec INTEGER (0..10,000,000)
	eRabGbrDownLink	4	byte	That's MBR/GBR in kilo bits/sec INTEGER (0..10,000,000)
	eRabGbrUpLink	4	byte	That's MBR/GBR in kilo bits/sec INTEGER (0..10,000,000)
Cause	Type	4	byte	Response Code Type
	Value	4	byte	Response Cause Values

4.6.3.1.8   HandoverType Format - S1MME TekIE S1AP TransStats

4.6.3.1.8.1   *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
HandoverType	Yes	This Field reports information about UE Handover Release: 12.1 and earlier	
	HandoverTypeBitMask	Bit Mask to specify the presence of the associated subfields for HandoverTypeBitMask	
	HandoverType	This field contains the HandoverType for the current Transaction	0x01

4.6.3.1.8.2   *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	Values
HandoverTypeBitMask	No	1	byte	bit mask	0x00 to 0xff
HandoverType	No	2	byte	Enum	HandoverType Values

4.6.3.1.9   TargetId Format - S1MME TekIE S1AP TransStats

4.6.3.1.9.1   *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
TargetId	Yes	This Field reports information about Handover TargetId Release: 12.1 and earlier	
	TargetIdBitMask	Bit Mask to specify the presence of the associated subfields for TargetId	
	TargetIdContent	This field contains information related to the Handover associated to the transaction. HandoweInfoBitMask indicates the presence of the information provided with	0x01

4.6.3.1.9.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
TargetIdBitMask	No	2	byte	bit mask	0x0000 to 0xffff
TargetIdContent	Yes	Variable	byte	byte vector	TargetIdContent Encoding

4.6.3.1.10 **TargetIdContent**

4.6.3.1.10.1 *Description*

Field	Struct/Field	Description	BitMask
eNB Global PLMN Identity	Yes	It contains the identifier as MCC + MNC Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0001
eNB Global Macro eNBId	No	Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0002
eNB Global Home eNBId	No	Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0004
eNB SelectedTAI PLMN Identity	Yes	Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0008
eNB SelectedTAI TAC	Yes	Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0010
RNC LAI PLMN Identity	Yes	Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0020

RNC LAI TAC	Yes	Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0040
RNC RAC	No	Routing Area within a Location Area Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0080
RNC ID	No	RNC Id Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0100
RNC eRNC ID	No	RNC enhanced RNC Id Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0200
CGI PLMN Identity	Yes	Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0400
CGI LAC	Yes	Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x0800
CGI CI	Yes	Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x1000
CGI RAC	No	Refer to *3GPP TS 36.413* Release: 12.1 and earlier	0x2000

4.6.3.1.10.2   *Encoding*

Field	Struct/Field	Size	Unit	Encoding
eNB Global PLMN Identity	*Length*	1	byte	Integer
	Content	variable	byte	TBCD-STRING
eNB Global Macro eNBId	*No*	4	byte	BIT-STRING(20)
eNB Global Home eNBId	*No*	4	byte	BIT-STRING(28)
eNB SelectedTAI PLMN Identity	*Length*	1	byte	Integer
	Content	variable	byte	TBCD-STRING

Field	Struct/Field	Size	Unit	Encoding
eNB SelectedTAI TAC	*Length*	1	byte	Integer
	Content	variable	byte	TBCD-STRING
RNC LAI PLMN Identity	*Length*	1	byte	Integer
	Content	variable	byte	TBCD-STRING
RNC LAI TAC	*Length*	1	byte	Integer
	Content	variable	byte	TBCD-STRING
RNC RAC	No	1	byte	Integer
RNC ID	No	4	byte	Integer
RNC eRNC ID	No	4	byte	Integer
CGI PLMN Identity	*Length*	1	byte	Integer
	Content	variable	byte	TBCD-STRING
CGI LAC	*Length*	1	byte	Integer
	Content	variable	byte	TBCD-STRING
CGI CI	*Length*	1	byte	Integer
	Content	variable	byte	TBCD-STRING
CGI RAC	No	1	byte	OCTET-STRING

4.6.3.1.11 EpsAttachType Format - S1MME TekIE S1AP TransStats

4.6.3.1.11.1 *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
EPSAttachType	Yes		
	EPSAttachTypeBitMask	Bit Mask to specify the presence of the associated subfields for EPSAttachType	
	EPSAttachType	This Field reports information about EPS Attach procedure Release: 12.1 and earlier	0x01

4.6.3.1.11.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
EPSAttachTypeBitMask	No	1	byte	bit mask	`0x00 to 0xff`
EPSAttachType	No	4	byte	Enum	`EPSAttachType Values`

4.6.3.1.12 EpsUpdateType Format - S1MME TekIE S1AP TransStats

4.6.3.1.12.1 *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
EPSUpdateType	Yes		
	EPSUpdateTypeBitMask	Bit Mask to specify the presence of the associated subfields for EPSUpdateType	
	EPSUpdateType	This Field reports information about EPS Update procedure Release: 12.1 and earlier	0x01

4.6.3.1.12.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	Values
EPSUpdateTypeBitMask	No	1	byte	bit mask	0x00 to 0xff
EPSUpdateType	No	4	byte	Enum	EPSUpdateType Values

4.6.3.1.13 Procedure Type Info Format - S1MME TekIE S1AP TransStats

4.6.3.1.13.1 *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
ProcedureTypeInfo	Yes	The parameter reports information of Procedure Type Info based on the current procedure	
	ProcedureTypeInfo BitMask	Bit Mask to specify the presence of the associated subfields for Procedure Type Info	
	ProcedureTypeInfo	This Field reports the Procedure Type Info Release: 12.1 and earlier	0x01

4.6.3.1.13.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	Values
ProcedureTypeInfo BitMask	No	1	byte	bit mask	0x00 to 0xff
ProcedureTypeInfo	No	4	byte	Enum	Procedure Type Info Values

4.6.3.1.14 **Qci Format - S1MME TekIE S1AP TransStats**

4.6.3.1.14.1 *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
Qci Format	Yes	The parameter reports the current Quality Class Identifier	
	Qci Format BitMask	Bit Mask to specify the presence of the associated subfields for Qci information	
	Qci Format	This Field reports the QCI information Release: 12.1 and earlier	0x01

4.6.3.1.14.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
Qci Format BitMask	No	1	byte	bit mask	0x00 to 0xff
Qci Format	No	4	Integer	Enum	*Qci Format Values*

The parameter is related to the following NAS transactions:

- Default EPS Bearer Context Activation Setup

- Dedicated EPS Bearer Context Activation Setup

- EPS Bearer Context Modification - MME initiated

- UE Requested Bearer Resource Allocation

- UE Requested Bearer Resource Modification

4.6.3.1.15 GutiInfo - S1MME TekIE S1AP TransStats

4.6.3.1.15.1 *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
Guti Info	Yes	The parameter reports the current Guti Info Identifier	
	Guti Info BitMask	Bit Mask to specify the presence of the associated subfields for Guti information	
	NewGuti Info	This Field reports the Guti information for new Tracking Area Release: 12.2	0x01
	OldGuti Info	This Field reports the Guti information for old Tracking Area Release: 12.2	0x02

4.6.3.1.15.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
Bitmask	No	2	byte	bit mask	0x0000 to 0xffff
NewGuti Info	Yes	variable	byte	Byte vector	GutiInfoContent
OldGuti Info	Yes	variable	byte	Byte vector	GutiInfoContent

NewGuti is the GUTI parameter contained in the TRACKING AREA UPDATE ACCEPT message.

OldGuti is the Old GUTI parameter contained in the TRACKING AREA UPDATE REQUEST message.

4.6.3.1.15.3 *GutiInfoContent*

4.6.3.1.15.3.1 *Description*

Structured/ Field	Structured/ SubField	Description
GutiInfoContent	Yes	The parameter reports Guti Info Identifier.
	Length	Length of Guti information
	Guti	This Field reports the Guti information for a specific Tracking Area Release: 12.2

4.6.3.1.15.3.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
Length	No	1	Byte	Integer	*0 to 255*
Guti	No	variable	Byte	Byte vector	GUTI stands for "Globally Unique Temporary Identity", spec is: 3GPP TS 23.003

4.6.3.1.16 **Latest Cell ID Info Format - S1MME TekIE S1AP TransStats**

4.6.3.1.16.1 *Description:*

Structured/ Field	Structured/ SubField	Description	BitMask
Latest Cell ID Info Format	Yes	The parameter reports the Latest Cell ID information	
	Latest Cell ID Info Format BitMask	Bit Mask to specify the presence of the Latest Cell ID information	
	Latest Cell ID Info Format	This Field reports the Latest Cell ID information Release: 14.1 and earlier	0x01

4.6.3.1.16.2 *Encoding:*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
Bitmask	No	2	byte	bit mask	0x0000 to 0xffff
LatestCellIdInfo length	Yes	1	byte	integer	LatestCellIdInfo length
LatestCellIdInfo	Yes	variable	byte	Byte vector	LatestCellIdInfo Content

4.6.3.1.17 **GbrQosInfo Format - S1MME TekIE S1AP TransStats**

4.6.3.1.17.1 *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
GbrQosInfo Format	Yes	The parameter reports the GbrQosInfo information	
	GbrQosInfo Format BitMask	Bit Mask to specify the presence of the GbrQosInfo information	
	ErabMBRDownLink Format	This Field reports the ErabMBRDownLink information	0x01
	ErabMBRUpLink Format	This Field reports the ErabMBRUpLink information	0x02
	ErabGBRDownLink Format	This Field reports the ErabGBRDownLink information	0x04
	ErabGBRUpLink Format	This Field reports the ErabGBRUpLink information	0x08

4.6.3.1.17.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
Bitmask	No	4	byte	bit mask	0x0000 to 0xffff
ErabMBRDownLink	Yes	4	byte	Byte vector	ErabMBRDownLink Content
ErabMBRUpLink	Yes	4	byte	Byte vector	ErabMBRUpLink Content
ErabGBRDownLink	Yes	4	byte	Byte vector	ErabGBRDownLink Content
ErabGBRUpLink	Yes	4	byte	Byte vector	ErabGBRUpLink Content

4.6.3.1.18 **ContainerId Format - S1MME TekIE S1AP TransStats**

4.6.3.1.18.1 *Description*

Structured/ Field	Structured/ SubField	Description	Field BitMask
ContainerInfo	Yes	This IE defines the ContainerId info.	
	ContainerInfoCount	Counter to specify the number of ContainerId Info described in this field	0x01
	ContainerInfoIteration	List ContainerId Info described in this field Repeated ContainerInfoCount times it contains information for a single ContainerId	0x01

Structured/ Field	Structured/ SubField	Description	Field BitMask
ContainerInfoIteration	Yes	It contains information for a single ContainerId	
	conInfoBitMask	Bit Mask to specify the presence of the associated subfields for ContainerInfo	
	direction	This field indicates container direction, it could be 0(MS to network direction) or 1(network to MS direction)	0x01
	ID	This field indicates container ID, it could be 0(MS to network direction) or 1(network to MS direction)	0x02

4.6.3.1.18.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
ContainerInfo	Yes	Variable	byte	byte vector	*Depending on the field content*
	ContainerInfoCount	1	byte	Integer	1 - 255
	ContainerInfoIteration	variable	byte	Byte vector	Depending on Info List Repeated ContainerInfoCount times

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
ContainerInfoIteration	ContainerInfoBitMask	1	byte	bit mask	0x00 to 0xff
	direction	1	byte	integer	0 or 1
	ID	4	byte	integer	Integer value

4.6.3.1.19 **VoDomPrefUeUsage Format - S1MME TekIE S1AP TransStats**

4.6.3.1.19.1 *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
VoDomPrefUeUsage	Yes	This IE defines the Voice Domain Preference and UE Usage Setting info.	
	VoiceDUeUBitMask	Bit Mask to specify the presence of the associated subfields for VoDomPrefUeUsage	
	VoiceDUeU	This Field reports information about VoDomPrefUeUsage	0x01

4.6.3.1.19.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
VoiceDUeUBitMask	No	1	byte	bit mask	0x00 to 0xff
VoiceDUeU	No	4	byte	Unsigned int value	

4.6.3.2 S1MME TekIE SGs Session (0xA004)

S1MME TekIE SGs Session Specific (IE) content is defined by the following table.

4.6.3.2.1 **TekIE Header**

4.6.3.2.1.1 *Description*

Parameter	Description
Total Length of TekIEContents	The field represents the length of the TekBitmask and TekIEContents
TekBitmask	The bitmask field represents the default status of the Bit Options: Bits = 0 option Off Bits = 1 option ON
S1MME SGsSession TekIEContents	The field varies depending on the bit value for bits 1-8.

4.6.3.2.1.2   *Encoding*

Structured/ Field	Structured/ SubField	Size	Unit	Encode Type	*Values*	Description
TotalLength TekIe	No	2	byte	Integer	*Depending on the field content*	Length of TekIeBitMask and TekIeContents, not inclusive this length
TekIeBitMask	No	4	byte	bit mask	`0x00000000 to 0xffffffff`	The bitmask field indicates the presence of Info fields transported by S1MME TekIE TransStats Please refer to 4.6.3.2.1.3 TekIeBitMask for a full list of supported Fields for this TekIE
S1MME TekIE SGs Session	Yes	Variable	byte	byte vector	S1MME TekIE SGs Session Content	This Field reports information about the S1MME SGs Session Specific related to the current DR

4.6.3.2.1.3   *TekIeBitMask*

Bit Position	Field
1	TransactionStatsInfo
2	SGS Session Specific Info
3-32	Reserved for Future Use

4.6.3.2.2   **TekIE Content**

4.6.3.2.2.1   *Description*

For a full description of the parameters in this TekIe please refer to the corresponding section for each.

Structured/ Field	Structured/ SubField	TekIEBitMask	Description
TransactionStatsInfo	Yes	0x00000001	Detailed description: This Field reports information about the specific Transaction
SGsSessionSpecific	Yes	0x00000002	Detailed description: This Field reports information about the specific SGs Session

4.6.3.2.2.2   *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
TransactionStatsInfo	Yes	variable	Byte	Byte vector	Depending on the content
SGsSessionSpecific	Yes	variable	byte	byte vector	Depending on the field content

4.6.3.2.3 **TransactionStatsInfo Format – S1MME TekIE SGs Session**

This TekIE is described by a common TekIE (TransactionStatsInfo Format – Common 4.6.3.2.5)containing information on the current Transaction.

4.6.3.2.3.1 *Description*
For the description please refer to section 4.6.3.2.5.1.1 Description

4.6.3.2.3.2 *Encoding*
For the encoding please refer to section 4.6.3.2.5.2 Encoding

4.6.3.2.4 **SGsSessionSpecific Format – S1MME TekIE SGs Session**

4.6.3.2.4.1 *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
SGsSessionSpecificInfo	Yes	This Field reports information about Current SGs Session	
	SGsSessionSpecificBitMask	Bit Mask to specify the presence of the associated subfields for SGsSessionSpecific	
	OldLAI	This Field reports information about the Old Location Area Identify LAI Release: 12.1 and earlier	0x01
	NewLAI	This Field reports information about the New Location Area Identify Release: 12.1 and earlier	0x02
	TAI	This Field reports information about the Trace Area Identify Release: 12.1 and earlier	0x04
	ECGI	This Field reports information about the E-Utran CGI Release: 12.1 and earlier	0x08

	UpdateType	This Field reports information about Type of UpdateIE
		
		This is to indicate to the VLR whether an IMSI attach or a normal location update has been performed by the UE
		
		Possible values:
		    1 - IMSI attach
		    2 - Normal location update
		
		Release: 12.1 and earlier
			0x10

4.6.3.2.4.2   *Encoding*

Structured/Field	Structured/SubField	Size	Unit	Encode Type	*Values*
SGsSessionSpecificBitMask	No	2	byte	bit mask	0x0000 to 0xffff
OldLaiIfno	Yes	variable	byte	Byte vector	Depending on the content See LAI Info Encoding
NewLaiInfo	Yes	variable	byte	Byte vector	Depending on the content See LAI Info Encoding
TaiInfo	Yes	variable	byte	Byte vector	Depending on the content See TAI Info Encoding
EcgiInfo	Yes	variable	byte	Byte vector	Depending on the content See ECGI Info Encoding
UpdateTypeInfo	No	4	byte	Integer	According to the specific transaction

4.6.3.2.4.2.1   *LAI Info Encoding*

Structured/Field	Structured/SubField	Size	Unit	Encode Type	*Values*
LaiInfo	*LaiInfo Length*	1	byte	byte vector	Length of Field
	LaiInfo Value	variable	byte	byte vector	LAI is composed by MCC, MNC and LAC

4.6.3.2.4.2.2   *TAI Info Encoding*

Structured/Field	Structured/SubField	Size	Unit	Encode Type	*Values*
TaiInfo	*TaiInfo Length*	1	byte	byte vector	Length of Field
	TaiInfo Value	variable	byte	byte vector	TAI is composed by MCC, MNC and TAC

4.6.3.2.4.2.3 *ECGI Info Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	Values
EcgiInfo	*EcgiInfo Length*	1	byte	byte vector	Length of Field
	EcgiInfo Value	variable	byte	byte vector	ECGI is composed by MCC, MNC and ECI

4.6.3.2.5 **TransactionStatsInfo Format – Common**

4.6.3.2.5.1.1 *Description*

Structured/ Field	Structured/ SubField	Description	TransStatsIno BitMask
TransactionStatsInfo	Yes	This Field reports information about Current Transaction	
	TransStatsInfoBitMask	Bit Mask to specify the presence of the associated subfields for TransactionStatsInfo	
	TransactionType	This Field reports information about the S1MME transaction related to the current DR Release: 12.1 and earlier	0x01
	StartTime	StartTime of the current transaction, as it is TimeStamp of first PDU 4 bytes (most) for secs 4 bytes (least) for microsecs Release: 12.1 and earlier	0x02
	EndTime	EndTime of the current transaction, as it is TimeStamp of last PDU 4 bytes Integer (most) for secs 4 bytes Integer (least) for microsecs Release: 12.1 and earlier	0x04
	CauseCodes	That's a list of the CauseValues tracked by probe Calltrace for the current transaction Release: 12.1 and earlier	0x08
	TransactionStatusBits	It describes the status of the current Transaction as from CallTrace StateMachine Release: 12.1 and earlier	0x10
	TransactionDirection	TIt describes the network direction of the current Transaction Release: 12.1 and earlier	0x20

	ProtocolId	It describes the upper layer protocol this S1MME transaction is referred to Release: 12.1 and earlier	0x40
	RatType	This field contains a new RAT type for eNodeB Node.	0x80

4.6.3.2.5.2 *Encoding*

Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
TransStatsInoBitMask	No	1	byte	bit mask	0x00 to 0xff
TransactionType	No	4	byte	Enum	TransactionType Values
StartTime	No	8	byte	Integer	*0 to 4,294,967,295*
EndTime	No	8	byte	Integer	*0 to 4,294,967,295*
CauseCode	Yes	Variable	byte	byte vector	CauseCodes Format – Common
TransactionStatusBit	No	4	byte	bit mask	TransactionStatusBit Values
TransactionDirection	No	1	byte	Enum	TransactionDirection Values
ProtocolId	No	4	byte	Enum	ProtocolId Values
RatType	No	1	byte	Integer	*0 to 3*

4.6.3.2.6 **CauseCodes Format – Common**

4.6.3.2.6.1 *Description*
This field is common to many TekIE.

It describes the list of CauseCodes as tracked by the application monitoring the Current Transaction.

Field	SubField	*Values*
CauseCodes	Yes	
	CauseCodesCount	This field indicates how many CauseCode are listed in the following
	CauseCodeList	CauseCodeList Encoding list contains all the CauseCodes tracked during the Current Transaction Release: 12.1 and earlier

4.6.3.2.6.2 *Encoding*

Field	Structured	Size	Unit	Encode Type	*Values*
CauseCodesCount	No	1	byte	integer	1 to 255
CauseCodeList	Yes	variable	byte	Byte vector	CauseCodeList Encoding

4.6.3.2.6.2.1 *CauseCodeList Encoding*

Field	SubField	Size	Unit	Encode Type	*Values*
CauseCodesList	CauseType	2	byte	enum	Cause Type Values Depending on transaction protocol id. In case of eRABInfo
	CauseCode	2	byte	enum	Cause Codes Values Depending on the transaction protocol id Repeated CauseCodesCount times

4.6.3.3 S1MME TekIE LCsAP TransStats (0xA005)

S1MME TekIE LCsAP TransStats (IE) content is defined by the following table.

4.6.3.3.1 **TekIE Header**

4.6.3.3.1.1 *Description*

Parameter	Description
Total Length of TekIEContents	The field represents the length of the TekBitmask and TekIEContents
TekBitmask	The bitmask field represents the default status of the Bit Options: Bits = 0 option Off Bits = 1 option ON
S1MME LCsAP TransStats TekIEContents	The field varies depending on the bit value for bits 1-2.

4.6.3.3.1.2   *Encoding*

Structured/ Field	Structured/ SubField	Size	Unit	Encode Type	*Values*	Description
TotalLength TekIe	No	2	byte	Integer	*Depending on the field content*	Length of TekIeBitMask and TekIeContents, not inclusive this length
TekIeBitMask	No	4	byte	bit mask	0x00000000 to 0xffffffff	The bitmask field indicates the presence of Info fields transported by S1MME TekIE TransStats Please refer to 4.6.3.3.1.3 TekIeBitMask for a full list of supported Fields for this TekIE
S1MME TekIE SGs Session	Yes	Variable	byte	byte vector	S1MME TekIE LCsAP TransStats content	This Field reports information about the S1MME SGs Session Specific related to the current DR

4.6.3.3.1.3   *TekIeBitMask*

Bit Position	Field
1	TransactionStatsInfo
2	LCsAPInfo
3-32	Reserved for Future Use

4.6.3.3.2   **TekIE Content**

4.6.3.3.2.1   *Description*
For a full description of the parameters in this TekIe please refer to the corresponding section for each.

Structured/ Field	Structured/ SubField	TekIEBitMask	Description
TransactionStatsInfo	Yes	0x00000001	Detailed description: This Field reports information about the specific Transaction
LCsAPInfo	Yes	0x00000002	Detailed description: This Field reports information about the specific LCsAP Info

4.6.3.3.2.2   *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
TransactionStatsInfo	Yes	variable	Byte	Byte vector	Depending on the content
LCsAPInfo	Yes	variable	byte	byte vector	Depending on the field content

4.6.3.3.3 TransactionStatsInfo Format – S1MME TekIE LCsAP TransStats

4.6.3.3.3.1 *Description*
For the description please refer to section 4.6.3.2.5.1.1 Description

4.6.3.3.3.2 *Encoding*
For the encoding please refer to section 4.6.3.2.5.2 Encoding

4.6.3.3.4 LCsAPInfo Format – S1MME TekIE LCsAP TransStats

4.6.3.3.4.1 *Description*

Structured/ Field	Structured/ SubField	Description	BitMask
LCsAPInfo	Yes	This Field reports information about Current LCsAPInfo	
	LCsAPInfoBitMask	Bit Mask to specify the presence of the associated subfields for LCsAPInfo	
	ECGI	Release: 14.2 and later	0x01
	Global eNodeB ID.plmnIdentity	Release: 14.2 and later	0x02
	Global eNodeB ID.macroEnbId	Release: 14.2 and later	0x02
	Global eNodeB ID.homeEnbId	Release: 14.2 and later	0x02
	E-SMLC ID	Release: 14.2 and later	0x04
	Altitude of Direction.direction	Release: 14.2 and later	0x08
	Altitude of Direction.altitude	Release: 14.2 and later	0x08
	Count of Geographical Coordinates instances	Release: 14.2 and later	0x10
	Geographical Coordinates instances	Release: 14.2 and later	0x10

4.6.3.3.4.2 *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
LCsAPInfo BitMask	No	4	byte	bit mask	0x00000000 to 0xffffffff
ECGI	No	Variable	byte	Byte vector	
Global eNodeB ID.plmnIdentity	No	Variable	byte	Byte vector	
Global eNodeB ID.macroEnbId	No	4	byte	Integer	
Global eNodeB ID.homeEnbId	No	4	byte	Integer	
E-SMLC ID	No	variable	byte	Byte vector	
Altitude of Direction.direction	No	4	byte	Integer	
Altitude of Direction.altitude	No	4	byte	Integer	
Count of Geographical Coordinates instances	No	1	byte	Integer	
Geographical Coordinates instances	Yes	variable	byte	Integer	Depending on the content See Geographical Coordinates Encoding

4.6.3.3.4.2.1 *Geographical Coordinates Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
Geographical Coordinates	LatitudeSign	1	byte	Integer	
	LatDegree	4	byte	byte vector	
	LonDegree	4	byte	byte vector	

4.6.3.4 S1MME TekIE S1AP MutiApn (0xA006)

S1MME TekIE S1AP MutiApn (IE) content is defined by the following table.

4.6.3.4.1 TekIE Header

4.6.3.4.1.1 Description

Parameter	Description
TotalLength TekIe	The field represents the length of the TekBitmask and TekIEContents
TekIeBitMask	The bitmask field represents the default status of the Bit Options: Bits = 0 option OFF Bits = 1 option ON
S1MME TekIE MutiApn	The field varies depending on the bit values in TekIeBitMask field.

4.6.3.4.1.2 Encoding

Structured/ Field	Structured/ SubField	Size	Unit	Encode Type	Values	Description
TotalLength TekIe	No	2	byte	Integer	Depending on the field content	Length of TekIeBitMask and TekIeContents, not inclusive this length
TekIeBitMask	No	4	byte	bit mask	0x00000000 to 0xffffffff	The bitmask field indicates the presence of Info fields transported by S1MME TekIE MutiApn Please refer to 4.6.3.4.1.3 TekIeBitMaskfor a full list of supported Fields for this TekIE
S1MME TekIE MutiApn	Yes	Variable	byte	byte vector	S1MME TekIE MutiApn Content	This Field reports information about the S1MME mutiapn related to the current DR

4.6.3.4.1.3 TekIeBitMask
The following table lists the current Optional Fields available for this TekIe

Bit Position	Field
1	MutiApn
2-32	Reserved for Future Use

4.6.3.4.2 **TekIE Content**

4.6.3.4.2.1 *Description*

For a full description of the parameters in this TekIe please refer to the corresponding section for each.

Field	Structured	TekIEBitMask	Description
MutiApn	Yes	0x000000001	This IE defines the Apn Name List.

4.6.3.4.2.2 *Encoding*

Field	Structured	Size	Unit	Encode Type	*Values*
MutiApn	Yes	Variable	byte	byte vector	*Depending on the field content*

4.6.3.4.3 **MutiApn Format - S1MME TekIE S1AP MutiApn**

4.6.3.4.3.1 *Descriptio*

4.6.3.4.3.2 *n*

Structured/ Field	Structured/ SubField	Description	Field BitMask
MutiApn	Yes	This IE defines the Apn Name List.	
	MutiApnCount	Counter to specify the number of Apn Name described in this field	0x01
	MutiApnIteration	List Apn Name described in this field Repeated MutiApnCount times it contains information for a single Apn	0x01

Structured/ Field	Structured/ SubField	Description	Field BitMask
MutiApnIteration	Yes	It contains information for a single Apn	
	ApnBitMask	Bit Mask to specify the presence of the associated subfields for Apn	
	ApnNameContent	This field contains information on a single apn	0x01

4.6.3.4.3.3   *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
MutiApn	Yes	Variable	byte	byte vector	*Depending on the field content*
	MutiApnCount	1	byte	Integer	1 - 255
	MutiApnIteration	variable	byte	Byte vector	Depending on Info List Repeated MutiApnCount times

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
MutiApnIteration	ApnBitMask	2	byte	bit mask	0x0000 to 0xffff
	ApnNameContent	Max 255	byte	byte vector	Single ApnName Values

4.6.3.4.4   **Single ApnNameContent**

4.6.3.4.4.1   *Description*

Field	Struct	Description	Comments	BitMask
ApnNameContent	Yes	It contains the apn name		0x01

4.6.3.4.4.2   *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encoding
ApnNameContent	Yes	Max 255	byte	first byte is the length of the Apn name, then the name bytes.

4.6.3.5 S1MME TekIE S1AP MutiMsip (0xA007)

S1MME TekIE S1AP MutiMsip (IE) content is defined by the following table.

4.6.3.5.1 TekIE Header

4.6.3.5.1.1 *Description*

Parameter	Description
TotalLength TekIe	The field represents the length of the TekBitmask and TekIEContents
TekIeBitMask	The bitmask field represents the default status of the Bit Options: Bits = 0 option OFF Bits = 1 option ON
S1MME TekIE MutiMsip	The field varies depending on the bit values in TekIeBitMask field.

4.6.3.5.1.2 *Encoding*

Structured/ Field	Structured/ SubField	Size	Unit	Encode Type	Values	Description
TotalLength TekIe	No	2	byte	Integer	*Depending on the field content*	Length of TekIeBitMask and TekIeContents, not inclusive this length
TekIeBitMask	No	4	byte	bit mask	*0x00000000 to 0xffffffff*	The bitmask field indicates the presence of Info fields transported by S1MME TekIE MutiMsip. Please refer to 4.6.3.5.1.3 TekIeBitMaskfor a full list of supported Fields for this TekIE
S1MME TekIE MutiMsip	Yes	Variable	byte	byte vector	S1MME TekIE MutiMsip	This Field reports information about the S1MME mutimsip related to the current DR

4.6.3.5.1.3 *TekIeBitMask*
The following table lists the current Optional Fields available for this TekIe

Bit Position	Field
1	MutiMsip
2-32	Reserved for Future Use

4.6.3.5.2 **TekIE Content**

4.6.3.5.2.1 *Description*

For a full description of the parameters in this TekIe please refer to the corresponding section for each.

Field	Structured	TekIEBitMask	Description
MutiMsip	Yes	0x000000001	This IE defines the Msip List.

4.6.3.5.2.2 *Encoding*

Field	Structured	Size	Unit	Encode Type	*Values*
MutiMsip	Yes	Variable	byte	byte vector	*Depending on the field content*

4.6.3.5.3 **MutiMsip Format - S1MME TekIE S1AP MutiMsip**

4.6.3.5.3.1 *Description*

Structured/ Field	Structured/ SubField	Description	Field BitMask
MutiMsip	Yes	This IE defines the Msip List.	
	MutiMsipCount	Counter to specify the number of Msip described in this field	0x01
	MutiMsipIteration	List Msip described in this field Repeated MutiMsipCount times it contains information for a single Msip	0x01

Structured/ Field	Structured/ SubField	Description	Field BitMask
MutiMsipIteration	Yes	It contains information for a single Msip	
	MsipBitMask	Bit Mask to specify the presence of the associated subfields for Msip	
	Msip	This field contains information on a single Msip	0x01

4.6.3.5.3.2   *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
MutiMsip	Yes	Variable	byte	byte vector	*Depending on the field content*
	MutiMsipCount	1	byte	Integer	1 - 255
	MutiMsipIteration	variable	byte	Byte vector	Depending on Info List Repeated MutiMsipCount times

Structured/Field	Structured/ SubField	Size	Unit	Encode Type	*Values*
MutiMsipIteration	MsipBitMask	2	byte	bit mask	0x0000 to 0xffff
	Msip	Max 255	byte	byte vector	Single Msip

4.6.3.5.4   **Single Msip**

4.6.3.5.4.1   *Description*

Field	Struct	Description	Comments	BitMask
Msip	Yes	It contains the Msip		0x01

4.6.3.5.4.2   *Encoding*

Structured/Field	Structured/ SubField	Size	Unit	Encoding
Msip	Yes	Max 255	byte	first byte is the length of the Msip, then the Msip bytes.

5 ASCII OHDR Output – File Based

In case a DataCast data record feed needs to be delivered in file format instead of as TCP data stream, the Data Record Receiver (drRcvr) standalone application is deployed. In this instance, the drRcvr is set up to receive OHDRs in Binary format and records them in a Binary or ASCII file depending on the defined configuration parameters.

This section details the command usage and configuration parameters use to implement an ASCII HDR output.

5.1 Command Usage

The following text displays the command usage for DataCast ASCII OHDR output:

drRcvr [-hdr_port <value>] [-output_dir <value>] [-timeout_interval <value>] [-write_binary <value>]

5.1.1   Configuration Parameters

The following table displays the configuration parameters for the OHDR ASCII format.

Parameter	Name	Default Value	Possible Values	Description
Hdr Port Number—TCP/IP Listening port resource number	hdr_port	9171	Any available port resource number of the machine.	This parameter describes a port number, which is used to accept connections from the DataCast servers.
Output Directory Path— output directory path name	output_dir	$HOME/ dr	output directory path name, path can contain environment variable	The path where the received data to be stored.
Timeout Interval—timer for generating log and statistics data.	timeout_interval	300	300, 600, 900, 1200, and 3600	This parameter is defined by the seconds of the timer.
Write Binary	write_binary	no	yes and no	You use this parameter only for the received HDRs that are dumped in either binary format or ASCII format.

5.1.2   ASCII Output Format Structure

The drRcvr decodes the OHDR and records it in the ASCII format associating the data record syntax tag to the relevant ASCII parameter value.   In the following example,

The information in upper case letters appears as it is in the data record

The information in lower case letters is replaced by the actual content of the HDR, DR, First Section, and Second Section of the data record

The general ASCII syntax of the drRcvr appears below:

BEGIN_HDR_CONTENT|hdr_header|

BEGIN_DR_CONTENT|dr_name;

BEGIN_DR_FIRST_SECTION;fixed_section_data;END_DR_FIRST_SECTION;

BEGIN_DR_SECOND_SECTION;variable_section_data;END_DR_SECOND_SECTION;

END_DR_CONTENT|

END_HDR_CONTENT

The first section of the ASCII syntax corresponds to the fixed section of the data record and it is coded as a list of couples (tag values) that are separated by a comma.

The second section of the ASCII syntax corresponds to the variable section of the data record.

NOTE: After tag or label END_HDR_CONTENT there is a single space character followed by a single newline character (both not shown in above example).

6 ASCII Formats

6.1 FIRST_SECTION – ASCII format

The following table displays the Parameters that can be present in the first section of an ASCII format represented by the corresponding Field Identifier. The Parameter IDs of the parameters that can be present in the first section of an ASCII format are provided in section **4.5** under column "Parameter Id Used only in ASCII decoding". Additional details can be provided on each parameter to indicate decimal value and types. See section **4.6** for more information on the parameters.

6.1.1 FIRST_SECTION - Example

BEGIN_HDR_CONTENT|24;0;2;1;0|BEGIN_DR_CONTENT|S1MME_INTERFACE;BEGIN_DR_FIRST_SECTIO
N;8193:0;8194:1336391147;8195:557028;8196:1336392947;8197:873360;8198:1;8199:32;8200:4294967295;82
01:4294967295;8202:1293942808;8203:64051;8204:17;9217:4098;9218:3;9219:0;9220:256;9221:36412;9222:36
412;9223:65535;10241:4,16 2c 42 4d;10242:4,16 2c 42 58;10243:15,311280001001058;10248:2,00
01;10249:4,00 00 b3 b3;END_DR_FIRST_SECTION;BEGIN_DR_SECOND_SECTION;3;0;40963,[00 00 00
01],[00 00 00 01 7f 00 00 00 01 4f a7 b5 eb 00 08 7f e4 4f a7 b5 eb 00 08 7f e4 01 00 10 00 03 00 00 00 00 00 00
00 8e 3c];40963,[00 00 00 06],[00 00 00 41 77 00 00 00 06 4f a7 b5 eb 00 08 7f e4 4f a7 b5 fa 00 0d 57 ae 00 00
00 04 00 00 00 ee 4b 01 00 00 00 01];40963,[00 00 00 23],[00 00 00 01 77 00 00 00 23 4f a7 b5 eb 00 08 7f e4 4f
a7 b5 fa 00 0d 58 74 00 00 00 04 00 00 00 ee
4b];END_DR_SECOND_SECTION;END_DR_CONTENT|END_HDR_CONTENT

Here are two examples of how such format should be decoded:

Field Identifier	Represents
9220:256	Application Protocol = S1AP
9220	Identifier Application Protocol
256	S1AP

Field Identifier	Represents
10243:15,311280001001058	IMSI = 311280001001058
10243	Identifier IMSI
15	IMSI length
311280001001058	IMSI value

6.1.2   SECOND_SECTION – ASCII format

The second section (variable part) follows the same structure defined in DR Header, Variable Section. In the ASCII format its generic structure is:

BEGIN_DR_SECOND_SECTION;   (NOTE: Stat section for Variable Part parameter)

Numbers of IEs

Format Id used by Probe

IE description as:

Data Id, [Value of Parameter], [Tek IE content];

END_DR_SECOND_SECTION;

6.1.3   SECOND_SECTION – Example

Variable Part in the Example:

BEGIN_DR_SECOND_SECTION;

3;

0;

40963,[00 00 00 01],[00 00 00 01 7f 00 00 00 01 4f a7 b5 eb 00 08 7f e4 4f a7 b5 eb 00 08 7f e4 01 00 10 00 03 00 00 00 00 00 00 00 8e 3c];

40963,[00 00 00 06],[00 00 00 41 77 00 00 00 06 4f a7 b5 eb 00 08 7f e4 4f a7 b5 fa 00 0d 57 ae 00 00 00 04 00 00 00 ee 4b 01 00 00 00 01];

40963,[00 00 00 23],[00 00 00 01 77 00 00 00 23 4f a7 b5 eb 00 08 7f e4 4f a7 b5 fa 00 0d 58 74 00 00 00 04 00 00 00 ee 4b];

END_DR_SECOND_SECTION;

NOTE: Where all fields are decimal but the value of the parameter is a list of bytes in hexadecimal format.

7 Parameters Values

This appendix contains detailed information regarding OHDR parameter values.

7.1 Decoding Status Bits

In data records, status events are aggregated into one hex value that must be converted to binary and decoded to interpret the status events that occurred during the call or transaction. For example, assume the statusBits value in the Fixed Part of a data record shows a hex value of 0x29c. The following graphic shows an example of hex to binary conversion.
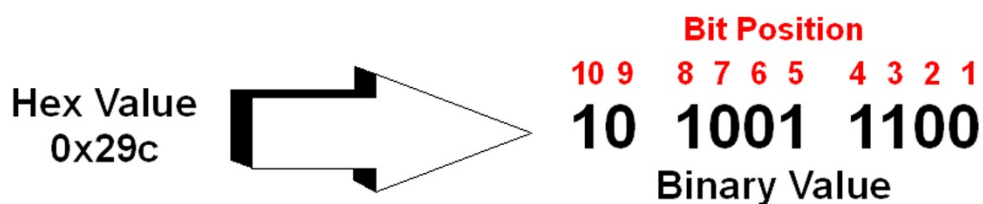
Once you convert the hex value to a binary value, you can read the bits from right to left. The bit number at the farthest right position is Bit 1; Bit 2 is the next bit at the left, continuing until all bits are counted as shown in graphic above. Each bit containing a "1" can be mapped to a status value using the status bit tables in this guide. In the graphic above, bits 3, 4, 5, 8, and 10 each represent a different status event that occurred during the call or transaction (not necessarily in chronological order).

7.2 xDR Option

Type: Enum

XDR generation reason/model
Set via OEM GUI interface when configuring DR Profile

Value	Description
0	Closure Xdr when call closes
1	Periodic Xdr periodically during call
2	Change Xdr delivered when important fields change

7.3

7.4 Session Status

The Session Status field is a bit mask. The bit values are listed below. They are divided in two distinct sets one of common values and one of specific values depending on the "Application Protocol" reported in 4.5.3 Short-Fields Section.

7.4.1   Session Status: Common

Session Status Bit Position	Status Name
0	None
1	Error SU
2	Sequence Error
3	Retransmission
4	Incomplete
5	Session Timed out
6	Truncated
7	Forced Closure
8	Failed

7.4.2   Session Status: S1AP

Protocol Type	Session Status Bit Position	Status Name
S1AP	9	Eps Imsi Attach
S1AP	10	Eps Imsi Detach
S1AP	11	Mo CSFB
S1AP	12	MT CSFB
S1AP	13	CSFB Emergency
S1AP	14	TALA Imsi Attach
S1AP	15	SMS Only
S1AP	16	EpsEmergencyAttach

7.4.3   Session Status: SGSAP

Protocol Type	Session Status Bit Position	Status Name
SGsAP	9	**CS Call Indicator**
SGsAP	10	SMS Call Indicator

7.4.4   Session Status: LCsAP

Protocol Type	Session Status Bit Position	Status Name
LCsAP	9	Location Service Abort
LCsAP	10	Location Service Reset

7.4.5   Session Status: Extended

Session Status Bit Position	Status Name
0	Idle TimedOut

7.5 Call Types

The CallType depends on the "Application Protocol" reported in reported in 4.5.3 Short-Fields Section.

7.5.1   Call Types: S1AP

Protocol Type	CallType Value	CallType Name
S1AP	1	UE Session
S1AP	2	S1 Management Session
S1AP	3	Paging
S1AP	4	Handover

7.5.2   Call Types: SGsAP

Protocol Type	CallType Value	CallType Name
SGsAP	1	MO Session
SGsAP	2	MT Session
SGsAP	3	Location Update Session
SGsAP	4	Detach Session
SGsAP	5	NonEPS Alert Session
SGsAP	6	Management Session
SGsAP	7	UE Activity Indication
SGsAP	8	MM Info Session

7.5.3 Call Types: LCsAP

Protocol Type	CallType Value	CallType Name
LCsAP	1	Location Service Session

7.6 Protocol Id

Type: Enum

Protocol Id	Protocol Name
36412	S1AP
61003	EPSNAS
29118	SGsAP
9082	LCsAP
61078	LPP
61079	LPPa

7.7 Application Id

Type: Enum
This is primarily for Iris Server.
It does not deal with same application ids with different interpretation of underlying protocols.

Id	Application Name
0	Unknown
1	ANSI_ISUP
2	ITU_ISUP
5	GSM_MAP
9	Tollfree
21	GTP_C
204	XCAP
218	Rtsp
221	Diameter
224	DSS1
230	RTP
233	H248
236	H323_CS
237	MGCP
251	SIP
253	DNS
254	DHCP
255	Radius

256	S1AP
257	GTP_C2
258	X2AP
259	PMIPV6
260	A11
261	T38
262	CNAM
263	LNP
264	UserPlane
265	ISAIC
266	IPFlow
267	MSRP
268	SGsAP
282	SLs (LCsAP)

7.8 Paging Requests Counters

7.8.1   IsPagingResReceived

Set on First PagingResponse received for the tracked S1Ap Session
That indicates a ServiceRequest has been received

Value	Description
0xFFFF	Default - No Info from Probe
1	Paging Response Received
0	Paging Response NOT Received

7.8.2   NumPgnReqOnThisENodeB

Total number of PagingRequests received for the association in the responding eNodeB for tracked S1Ap Context

Value	Description
0xFFFFFFFF	Default - No Info from Probe
0	No Paging Requests Received
N	N Paging Requests Received

7.8.3   NumPgnReqOnAllENodeB

Total number of PagingRequests received for a all associations in the tracked S1Ap Context

Value	Description
0xFFFFFFFF	Default - No Info from Probe
0	No Paging Requests Received
N	N Paging Requests Received

7.9 Transaction

7.9.1   Transaction Type

Type: Enum Protocol Type	Transaction Value	Transaction Name
S1AP	1	Initial UE Setup
S1AP	2	Downlink NAS Transport
S1AP	3	Uplink NAS Transport
S1AP	4	NAS Non-Delivery
S1AP	5	Initial UE Context Setup
S1AP	6	UE Context Modification
S1AP	7	E-RAB Setup
S1AP	8	E-RAB Modify
S1AP	9	E-RAB Release Indication
S1AP	10	E-RAB Release
S1AP	11	UE Context Release Request
S1AP	12	UE Context Release
S1AP	13	Downlink CDMA2000 Tunneling
S1AP	14	Uplink CDMA2000 Tunneling
S1AP	15	Handover Notification
S1AP	16	Handover Preparation
S1AP	17	Handover Resource Allocation
S1AP	18	Handover Cancellation
S1AP	19	Path Switch Request
S1AP	20	eNB Status Transfer
S1AP	21	MME Status Transfer
S1AP	22	UE Capability Info
S1AP	23	S1 Setup
S1AP	24	Reset
S1AP	25	Error Indication
S1AP	26	eNB Config Update
S1AP	27	MME Config Update
S1AP	28	Overload Start
S1AP	29	Overload Stop
S1AP	30	Write-Replace Warning
S1AP	31	eNB Direct Info Transfer
S1AP	32	MME Direct Info Transfer
S1AP	33	eNB Config Transfer
S1AP	34	MME Config Transfer
S1AP	35	Location Reporting Control
S1AP	36	Location Reporting Failure
S1AP	37	Location Report
S1AP	38	Trace Start

Type: Enum Protocol Type	Transaction Value	Transaction Name
S1AP	39	Trace Failure
S1AP	40	Deactivate Trace
S1AP	41	Cell Traffic Trace
S1AP	42	UE Paging
EPSNAS	1	EMM GUTI Reallocation
EPSNAS	2	EMM Authentication
EPSNAS	3	EMM Security Mode Control
EPSNAS	4	EMM Identification
EPSNAS	5	EMM Information
EPSNAS	6	Attach
EPSNAS	7	Detach
EPSNAS	8	Tracking Area Update
EPSNAS	9	Service Request
EPSNAS	10	EMM Paging
EPSNAS	11	Transport NAS Message
EPSNAS	12	EMM Status
EPSNAS	13	Extended Service Request
EPSNAS	30	Activate Default EPS Bearer Context
EPSNAS	31	Activate Dedicated EPS Bearer Context
EPSNAS	32	Modify EPS Bearer Context
EPSNAS	33	Deactivate EPS Bearer Context
EPSNAS	34	ESM Information
EPSNAS	35	PDN Connectivity
EPSNAS	36	PDN Disconnect
EPSNAS	37	Bearer Resource Allocation
EPSNAS	38	Bearer Resource Modification
EPSNAS	39	ESM Status
SGsAP	1	LocationUpdate
SGsAP	2	DownLinkData
SGsAP	3	UpLinkData
SGsAP	4	MMInfoRequest
SGsAP	5	ReleaseRequest
SGsAP	6	Paging
SGsAP	7	EPSDetach
SGsAP	8	IMSIDetach
SGsAP	9	Alert
SGsAP	10	Reset
SGsAP	11	Status
SGsAP	13	UEActivityIndication
LCsAP	1	LocationServiceRequest
LCsAP	2	LocationInfoExchangeConnection

Type: Enum Protocol Type	Transaction Value	Transaction Name
LCsAP	3	LocationInfoExchangeConnectionless
LCsAP	4	LocationAbort
LCsAP	5	Reset

7.9.2 Transaction Direction

Type: Enum

Direction Value	Direction Name
0	UE initiated
1	Network Initiated

7.9.3 Transaction Status Bits Values

All bits not documented here are reserved

7.9.3.1 Common Values

Status Bit	Status Bit Description
0x0000	Normal
0x0001	Retransmission
0x0002	Out of sequence
0x0004	Procedure timeout
0x0008	Incomplete
0x0010	Failed response
0x0020	Reserved for Future Use
0x0040	Reserved for Future Use
0x0080	Reserved for Future Use

7.9.3.2 SGs Transaction Status Bits Values

Status Bit	Status Bit Description
0x0100	SGsAP CS Call
0x0200	SGsAP PS Call

7.10 UE Aggregated Values MBR

Field	Description
UEAgg MBR in Downlink	DL data rate in kilo bits/sec Refer to 3GPP TS 36.413 sections 9.2.1.19 and 9.2.1.20
UEAgg MBR in Uplink	UL data rate in kilo bits/sec Refer to 3GPP TS 36.413 sections 9.2.1.19 and 9.2.1.20

7.11 eRab Status

Value	Description
1	Setup
2	Modify
3	Release
4	Switch
5	Failed

7.12 QCI

Value	Description
1	Conversational Voice
2	Conversational Video - Live Streaming
3	Realtime Gaming
4	Non conversational video - Buffered Streaming
5	IMS Signalling
6	Video (Buffered Streaming)
7	Voice, Video (Live Streaming), Interactive Gaming
8	Video (Buffered Streaming), TCP(www, email, ftp, etc)
9	Video (Buffered Streaming), TCP(www, email, ftp, etc)

7.13 Priority Level

Value	Description
15	No Priority
0	Logical error
1	Highest Priority
14	Lowest Priority

7.14 Preemption

7.14.1 Capability

Value	Description
0	No Trigger Preemption
1	Trigger Preemption

7.14.2 Vulnerable

Value	Description
0	Not Preemptable
1	Preemptable

7.15 Handover Types

Type: Enum

Handover Type	Handover Type Name
0	Intra LTE
1	LTE to UTRAN
2	LTE to GERAN
3	UTRAN to LTE
4	GERAN to LTE

7.16 Eps Types

7.16.1 Eps Attach Type

Type: Enum

Attach Type	Attach Type Name
1	EPS Attach
2	Combined EPS/IMSI attach
6	EPS emergency attach
7	Reserved

7.16.2 Eps Update Type

Type: Enum

Update Type	Update Type Name
0	TA updated
1	Combined TA/LA updated
2	Combined TA/LA updating with IMSI attach
3	Periodic updating
4	Unused; shall be interpreted as TA updating if received by the network
5	Unused; shall be interpreted as TA updating if received by the network

7.17 Cause Type

Type: Enum

Cause Type	Protocol	Cause Type Name
1	S1AP	Radio Network Layer Cause
2	S1AP	Transport Layer Cause
3	S1AP	NAS Layer Cause
4	S1AP	Protocol Layer Cause
5	S1AP	Miscellaneous Cause
16	S1AP	RRC Establishment Cause
1	EPSNAS	EMM Cause
2	EPSNAS	ESM Cause
3	EPSNAS	Miscellaneous Cause
8	SGsAP	SGs Cause
15	SGsAP	Reject Cause
1	LCsAP	Radio Network Layer Cause
2	LCsAP	Transport Layer Cause
3	LCsAP	Protocol Cause
4	LCsAP	Misc Cause
20	LCsAP	ReturnError Cause

7.18 Cause Value

7.18.1 EPS NAS EMM Cause

Type: Enum

Cause Value	Cause Description
2	IMSI unknown in HSS
3	Illegal UE
5	IMEI not accepted
6	Illegal ME
7	EPS services not allowed
8	EPS services and non-EPS services not allowed
9	UE identity cannot be derived by the network.
10	Implicitly detached
11	PLMN not allowed
12	Tracking area not allowed
13	Roaming not allowed in this tracking area
14	EPS services not allowed in this PLMN
15	No suitable cells in tracking area
16	MSC temporarily not reachable
17	Network failure
18	CS domain not available

Cause Value	Cause Description
19	ESM failure
20	MAC failure
21	Synch failure
22	Congestion
23	UE security capabilities mismatch
24	Security mode rejected, unspecified
25	Not authorized for this CSG
26	Non-EPS authentication unacceptable
39	CS domain temporarily not available
40	No EPS bearer context activated
95	Semantically incorrect message
96	Invalid mandatory information
97	Message type Non-Existent or not implemented
98	Message type not compatible with protocol state
99	Information element Non-Existent or not implemented
100	Conditional IE Error
101	Message not compatible with protocol state
111	Protocol error, unspecified

7.18.2 EPS NAS ESM Cause

Type: Enum

Cause Value	Cause Description
8	Operator determined barring
26	Insufficient resources
27	Unknown or missing Access Point Name
28	Unknown PDN Type
29	User Authentication Failed
30	Request Rejected by Serving GW or PDN GW
31	Request Rejected , Unspecified
32	Serving Option Not Supported
33	Requested Service Option Not Subscribed
34	Service Option Temporarily Out of Order
35	PTI Already in Use
36	Regular Deactivation
37	EPS QoS Not Accepted
38	Network Failure
39	Reactivation requested
41	Semantic Error in the TFT Operation
42	Syntactical Error in the TFT Operation
43	Invalid EPS Bearer Identity

Cause Value	Cause Description
44	Semantic Errors in Packet Filter(s)
45	Syntactical Error in Packet Filter(s)
46	EPS Bearer Context Without TFT Already Activated
47	PTI Mismatch
49	Last PDN Disconnection Not Allowed
50	PDN Type IPv4 Only Allowed
51	PDN Type IPv6 Only Allowed
52	Single Address Bearers Only Allowed
53	ESM Information Not Received
54	PDN Connection Does Not Exist
55	Multiple PDN Connections For APN Not Allowed
56	Collision With Network Initiated Request
59	Unsupported QCI Value
81	Invalid PTI Value
95	Semantically Incorrect Message
96	Invalid Mandatory Information
97	Message type Non-Existent or not implemented
98	Message type not compatible with protocol state
99	Information element Non-Existent or not implemented
100	Conditional IE Error
101	Message not compatible with protocol state
111	Protocol error, unspecified
112	APN Restriction Value Incompatible With Active EPS Bearer Context

7.18.3   EPS NAS ESM Miscellaneous Cause

Type: Enum

Cause Value	Cause Description
1	S1AP Error

7.18.4   S1AP Radio Network Layer Cause

Type: Enum

Cause Value	Cause Description
0	Unspecified
1	TX2RELOCOverall Expiry
2	Successful Handover
3	Release due to E-UTRAN generated reason
4	Handover Cancelled
5	Partial Handover
6	Handover Failure In Target EPC/eNB Or Target System

Cause Value	Cause Description
7	Handover Target not allowed
8	TS1RELOCoverall Expiry
9	TS1RELOCprep Expiry
10	Cell not available
11	Unknown Target ID
12	No radio resources available in target cell
13	Unknown or already allocated MME UE S1AP ID
14	Unknown or already allocated Enb UE S1AP ID
15	Unknown or inconsistent pair of UE S1AP ID
16	Handover Desirable for Radio Reasons
17	Time Critical Handover
18	Resource Optimisation Handover
19	Reduce Load in Serving Cell
20	User Inactivity
21	Radio Connection With UE Lost
22	Load Balancing TAU Required
23	CS Fallback triggered
24	UE Not Available for PS Service
25	Radio resources not available
27	Invalid QoS combination
28	Inter-RAT Redirection
26	Failure in the Radio Interface Procedure
29	Interaction with other procedure
30	Unknown E-RAB ID
31	Multiple E-RAB ID Instances
32	Encryption and/or integrity protection algorithms not supported
33	S1 Intra system Handover triggered
34	S1 Inter system Handover triggered
35	X2 Handover triggered
36	Redirection towards 1xRTT
37	Not supported QCI Value
38	Invalid CSG Id

7.18.5   S1AP Transport Layer Cause

Type: Enum

Cause Value	Cause Description
0	Transport Resource Unavailable
1	Unspecified

7.18.6   S1AP NAS Layer Cause

Type: Enum

Cause Value	Cause Description
0	Normal Release
1	Authenication Failure
2	Detach
3	Unspecified
4	CSG Subscription Expiry

7.18.7   S1AP Protocol Layer Cause

Type: Enum

Cause Value	Cause Description
0	Transfer Syntax Error
1	Abstract Syntax Error (Reject)
2	Abstract Syntax Error (Ignore And Notify)
3	Message Not Compatible With Receiver State
4	Semantic Error
5	Abstract Syntax Error (Falsely Constructed Message)
6	Unspecified

7.18.8   S1AP Miscellaneus Cause

Type: Enum

Cause Value	Cause Description
0	Control Processing Overload
1	Not Enough User Plane Processing Resources Available
2	Hardware Failure
3	O&M Intervention
4	Unspecified Failure
5	Unknown PLMN

7.18.9 S1AP RRC Establishment Cause

Type: Enum

Cause Value	Cause Description
0	Emergency
1	High priority access
2	MT Access
3	MO Signalling
4	MO Data

7.18.10 SGsAP SGs Cause

Type: Enum

Cause Value	Cause Description
0	Unspecified
1	IMSI Detached for EPS Services
2	IMSI Detached for EPS/Non-EPS Services
3	IMSI Unknown
4	IMSI Detached for Non-EPS Services
5	IMSI Implicitly Detached for Non-EPS Services
6	UE Unreachable
7	Msg Not Compatible w/ Protocol State
8	Missing Mandatory Information Element
9	Invalid Mandatory Information
10	Conditional Information Element Error
11	Semantically Incorrect Message
12	Message Unknown
13	Mobile Terminating CS Fallback Call Rejected by User

7.18.11 SGsAP Reject Cause

Type: Enum

Cause Value	Cause Description
2	IMSI unknown in HLR
3	Illegal MS
4	IMSI unknown in VLR
5	IMEI not accepted
6	Illegal ME
11	PLMN not allowed
12	Location Area not allowed
13	Roaming not allowed in this location area
15	No Suitable Cells In Location Area

Cause Value	Cause Description
17	Network failure
20	MAC failure
21	Synch failure
22	Congestion
23	GSM authentication unacceptable
25	Not authorized for this CSG
32	Service option not supported
33	Requested service option not subscribed
34	Service option temporarily out of order
38	Call cannot be identified
48 to 63	Retry upon entry into a new cell
95	Semantically incorrect message
96	Invalid mandatory information
97	Message type non-existent or not implemented
98	Message type not compatible with the protocol state
99	Information element non-existent or not implemented
100	Conditional IE error
101	Message not compatible with the protocol state
111	Protocol error, unspecified

7.18.12 LCsAP Radio Network Layer Cause

Type: Enum

Cause Value	Cause Description
0	Unspecified

7.18.13 LCsAP Transport Layer Cause

Type: Enum

Cause Value	Cause Description
0	Tranport Resource Unavailable
1	Unspecified

7.18.14 LCsAP Protocol Cause

Type: Enum

Cause Value	Cause Description
0	Transfer Syntax Error
1	Abstract Syntax Error Reject
2	Abstract Syntax Error Ignore And Notify
3	Message Not Compatible With Receiver State
4	Semantic Error
5	Unspecified
6	Abstract Syntax Error

7.18.15 LCsAP Misc Cause

Type: Enum

Cause Value	Cause Description
0	Processing Overload
1	Hardware Failure
2	O And M Intervention
3	Unspecified

7.18.16 LCsAP ReturnError Cause

Type: Enum

Cause Value	Cause Description
0	System Failure
1	Protocol Error
2	Destination Unknown
3	Destination Unreachable
4	Congestion

7.19 Procedure Type Info

Type: Enum
Content of Procedure Type Info is based on the current transaction:

- For the transaction value=35: "Requested PDN Connectivity" the candidate values are:

```
Bits
3  2  1
0  0  1      initial request
0  1  0      Handover
0  1  1      Unused. If received, the network shall interpret this as "initial request".
1  0  0      emergency

All other values are reserved.
```

- For the transaction value=13: "Extended Service Request" the candidate values are:

```
Bits
4  3  2  1
0  0  0  0   mobile originating CS fallback or 1xCS fallback
0  0  0  1   mobile terminating CS fallback or 1xCS fallback
0  0  1  0   mobile originating CS fallback emergency call or 1xCS fallback
             emergency call
0  0  1  1   unused; shall be interpreted as "mobile originating CS fallback or 1xCS
             fallback", if received by the network
0  1  0  0   unused; shall be interpreted as "mobile originating CS fallback or 1xCS
             fallback", if received by the network
1  0  0  0   packet services via S1
1  0  0  1   unused; shall be interpreted as "packet services via S1", if received by
             the network
1  0  1  0   unused; shall be interpreted as "packet services via S1", if received by
             the network
1  0  1  1   unused; shall be interpreted as "packet services via S1", if received by
             the network

All other values are reserved.
```

- For the transaction value=7: "Detach And Combined Detach" the candidate values are:

In the UE to network direction:
Bits
3 2 1
0 0 1   EPS detach
0 1 0   IMSI detach
0 1 1   combined EPS/IMSI detach
1 1 0   reserved
1 1 1   reserved

All other values are interpreted as "combined EPS/IMSI detach" in this version of the protocol.

In the network to UE direction:
Bits
3 2 1
0 0 1   re-attach required
0 1 0   re-attach not required
0 1 1   IMSI detach
1 1 0   reserved
1 1 1   reserved

All other values are interpreted as "re-attach not required" in this version of the protocol.

Switch off (octet 1)

In the UE to network direction:
Bit
4
0   normal detach
1   switch off

In the network to UE direction bit 4 is spare. The network shall set this bit to zero.

7.20 Node Type

Node Type possible values are, as defined by G10, GeoBlade, ISNG Geo:

Type: Enum

Node Name	NodeTypeId
UNKNOWN	0
IT_SERVER	1
IP_NODE	2
DNS	3
GGSN	4
SGSN	5
MME	6
ENODEB	7

Node Name	NodeTypeId
MGW	8
HSS	9
SGW	10
PDN_GW	11
EIR	12
RNC	13
NODEB	14
MGC	15
SBC	16
SIP_EP	17
SIP_P	18
SIP_R	19
P_CSCF	20
I_CSCF	21
S_CSCF	22
AS	23
AAA	24
AF	25
PCEF	26
PCRF	27
BBERF	28
MMS	29
HSGW	30
EPCF	31
GENERIC_ON_DEMAND	32
CDF	33
OCS	34
SCP	35

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Node Name	NodeTypeId
SSP	36
STP	37
STP_SSP	38
MSC	39
BSC	40
BSS	41
GSN_NETWORK	42
THREEG_MSC	43
HNB_GW	44
ISDN	45
IP_CLOUD	46
SIGTRAN_NODE	47
TRANSPARENT_NETWORK	48
PDF	49
MSRP	50
TPF	51
CRF	52
CTF	53
OCF	54
MRFC	55
MRFP	56
MRF	57
SPGW	58
DRA	59
EPDG	60
UDR	61
SONUS_GSX	63

7.21 ECGI Format

E-UTRAN Cell Global Identifier format

Bits								
Octets	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
e	MCC digit 2				MCC digit 1			
e+1	MNC digit 3				MCC digit 3			
e+2	MNC digit 2				MNC digit 1			
e+3	Spare				ECI			
e+4 to e+6	ECI (E-UTRAN Cell Identifier)							

DataCast will filled the "Spare" bits with zero that maybe not what it should be. But according to discussed with PLM, TP don't care these bits.

This field is present only for F-04260, just for the customer Starhub.

DataCast Internal use only, to be have same format with SIP OHDR, it will use GTPV2 format, not same with standard S1AP format.