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Satellite Earth Stations and Systems (SES);
Family SL Satellite Radio Interface (Release 1);
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Sub-part 7: NAS Layer Interface Extensions
for MBMS Services

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Contents

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

The present document is part 3, sub-part 7 of a multi-part deliverable. Full details of the entire series can be found in ETSI TS 102 744-1-1 [6].

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

This multi-part deliverable (Release 1) defines a satellite radio interface that provides UMTS services to users of mobile terminals via geostationary (GEO) satellites in the frequency range 1 518,000 MHz to 1 559,000 MHz (downlink) and 1 626,500 MHz to 1 660,500 MHz and 1 668,000 MHz to 1 675,000 MHz (uplink).

1 Scope

The present document defines the extension to the Non-Access Stratum (NAS) Layer peer-to-peer interface (defined in ETSI TS 124 007 [1] and ETSI TS 124 008 [2]) of the Family SL satellite radio interface between the Radio Network Controller (RNC) and the User Equipment (UE) used in the satellite network, that is required in order to support MBMS services.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 124 007: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Mobile radio interface signalling layer 3; General Aspects (3GPP TS 24.007 Release 4)".

[2] ETSI TS 124 008: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Mobile radio interface Layer 3 specification; Core network protocols; Stage 3 (3GPP TS 24.008 Release 4)".

[3] ETSI TS 123 003: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); Numbering, Addressing and Identification (3GPP TS 23.003 Release 4)".

[4] IETF RFC 1661 (1994): "The Point-to-Point Protocol (PPP)".

[5] IETF RFC 1332 (1992): "The PPP Internet Protocol Control Protocol (IPCP)".

[6] ETSI TS 102 744-1-1: "Satellite Earth Stations and Systems (SES); Family SL Satellite Radio Interface (Release 1); Part 1: General Specifications; Sub-part 1: Services and Architectures".

[7] ETSI TS 102 744-1-4: "Satellite Earth Stations and Systems (SES); Family SL Satellite Radio Interface (Release 1); Part 1: General Specifications; Sub-part 4: Applicable External Specifications, Symbols and Abbreviations".

[8] ETSI TS 102 744-3-1: "Satellite Earth Stations and Systems (SES); Family SL Satellite Radio Interface (Release 1); Part 3: Control Plane and User Plane Specifications; Sub-part 1: Bearer Control Layer Interface".

[9] ETSI TS 102 744-3-5: "Satellite Earth Stations and Systems (SES); Family SL Satellite Radio Interface (Release 1); Part 3: Control Plane and User Plane Specifications; Sub-part 5: Adaptation Layer Interface".

[10] ETSI TS 102 744-3-6: "Satellite Earth Stations and Systems (SES); Family SL Satellite Radio Interface (Release 1); Part 3: Control Plane and User Plane Specifications; Sub-part 6: Adaptation Layer Operation".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] 3GPP TR 29.846: "3rd Generation Partnership Project (3GPP); Technical Specification Group Core Networks; Multimedia Broadcast/Multicast Service (MBMS); CN1 procedure description (Release 4)".

3 Symbols and abbreviations

3.1 Symbols

For the purposes of the present document, the symbols in clause 3 of ETSI TS 102 744-1-4 [7] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations in clause 3 of ETSI TS 102 744-1-4 [7] apply.

4 Introduction

4.1 Non-Access Stratum Layer

The Non-Access Stratum (NAS) Layer provides support to the Internet Protocol (IP) Layer via the User Plane Handler (UPH), and uses the services provided by the Adaptation Layer (AL).

The IP Layer provides support to routing protocols, such as the Internet Group Management Protocol (IGMP) used by IPv4 systems to report their IP multicast group memberships to neighbouring multicast routers. The IGMP protocol (or PIM-SM) is used to trigger the supported multicast services. Session management (SM) messages are used to instantiate the MBMS contexts. The Adaptation Layer interface and operation is described in ETSI TS 102 744-3-5 [9] and ETSI TS 102 744-3-6 [10] respectively.

The present document defines the extension to the NAS Layer peer-to-peer interface (defined in ETSI TS 124 007 [1] and ETSI TS 124 008 [2]) between the RNC and the UE that is required in order to support MBMS services, as shown in Figure 4.1.

All of the messages defined in the present document to replace functionality in 3GPP are Session Management messages. All other messages not specified in the present document but that appear in 3GPP Release 4 should still be supported.

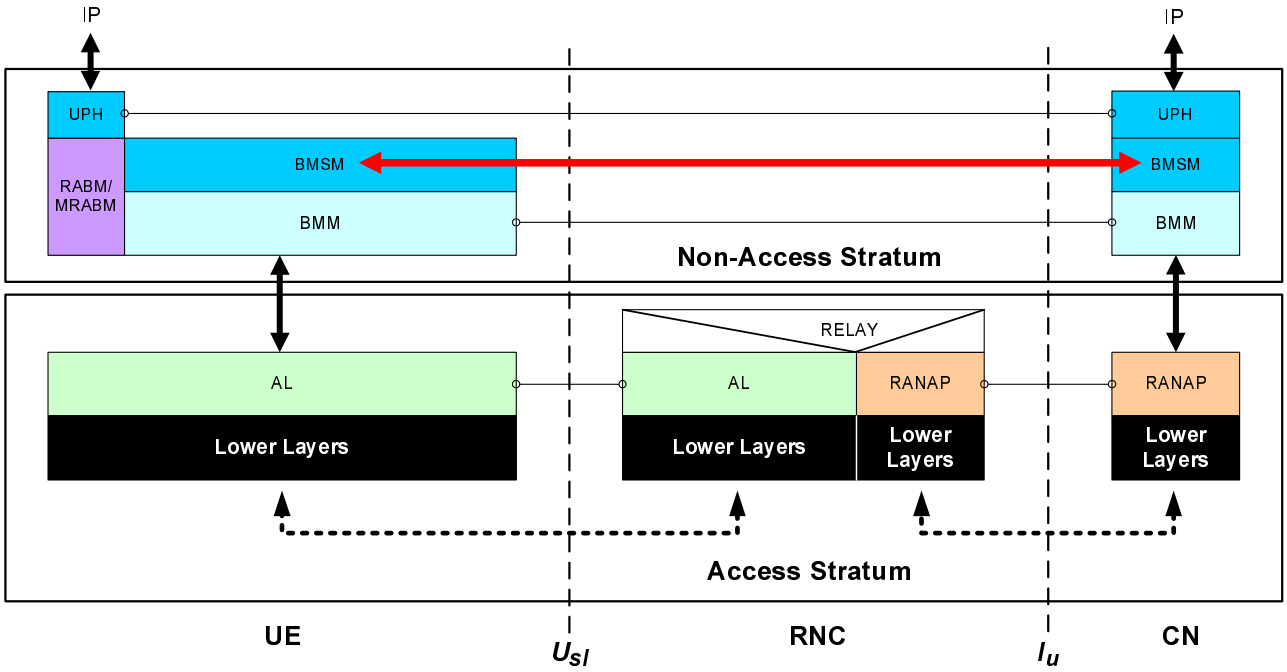

Figure 4.1: Satellite Network Higher Layers (NAS and IP)

The NAS Layer is responsible for the following:

- **Multicast Radio Access Bearer Manager (MRABM):** is responsible for controlling establishment, modification and termination of Access Stratum Unicast Radio Access Bearers (RABs) and Multicast Radio Access Bearers (MRABs) on the Iu-Broadcast Multicast (BM) interface towards the RAN.

- **Broadcast/Multicast Mobility Management (BMM):** is responsible for mobility management for a UE which is operating with the BM domain. The BMM entity replicates the functionality of the GPRS Mobility Management (GMM) entity towards the Broadcast Multicast Service Node (BMSN).

- **Broadcast/Multicast Session Management (BMSM):** is responsible in the for NAS signalling towards the BM domain, replicating the functionality of the Session Management (SM) entity for establishing and maintaining the Radio Access Bearer (RAB) endpoints for BM domain traffic handling. Within the BMSM entity, the state of each Packet Data Protocol (PDP) Context, and the association with activated MBMS Contexts is maintained.

It should be noted that the BMSM entity is the only entity for which a modification to the associated Packet Switched domain NAS Layer behaviour and peer-peer interface is required, the extensions to this interface being specified within the present document.

4.2 Conventions used in the present document

4.2.1 Presentation

The following conventions are applied throughout the present document:

- In the ASN.1, variable names are always in lower case letters with hyphenation used to improve readability (e.g. message-type). Data Types in the ASN.1 always start with an upper case letter and may contain additional upper case letters to improve readability (e.g. MessageType).

- In the explanatory text these variables are referred to in italics (.e.g. *message-type)* while Data Types are shown in Helvetica typeface (e.g. BCnPDU).

The layout of the data structures defined in the ASN.1 is also shown in a graphical representation. In general, the variable names are presented in the same way they are presented in the ASN.1, with the following exceptions:

- insufficient space does not allow the complete variable name to be presented and is therefore abbreviated;
- only one particular value can be assigned to a variable in the particular structure that is presented. In this case the variable is replaced by the appropriate numerical value;
- additional information may be added in brackets for explanatory reasons.

4.2.2 "Reserved" Fields and Values

Fields shown as Reserved BITSTRING (..) in the ASN.1 structures shall be set to zero by the sender and shall be ignored by the receiver.

Values not allocated in distinguished value lists shall not be used by the sender and shall be ignored by the receiver.

NOTE: Distinguished Value Lists of type Integer are being used instead of the ENUMERATED data type, where the allocated number range is larger than the number of items to be enumerated.

4.2.3 Boolean Variables

BOOLEAN variables shall be encoded as follows:

```
TRUE    ::= 1
FALSE   ::= 0
```

4.2.4 ASN.1 Encoding Rules

The ASN.1 presentation provided in the present document for this interface specification is normative. The encoding rules used for this interface specification are provided in clause 4.4.4 of ETSI TS 102 744-3-1 [8].

5 NAS Layer Interface

5.1 NAS layer use of AL service access points

Protocol entities in the NAS Layer use message transport services provided by the Adaptation Layer to communicate with their peers through two Service Access Points (SAPs):

- MMAL-SAP: MM to Adaptation Layer Service Access Point (CS domain)
- GMMAL-SAP: GMM to Adaptation Layer Service Access Point (PS domain)
- BMMAL-SAP: BMM to Adaptation Layer Service Access Point (BM domain)

These service access points are described in more detail in ETSI TS 102 744-3-6 [10].

5.2 NAS Layer MBMS Service Management Messages

The NAS Layer MBMS Service Management messages shown in Table 5.1 are supported between the UE and BMSN. The interfaces between the UE and the BMSN are shown in Figure 7.1 in ETSI TS 102 744-1-1 [6].

Table 5.1: Multicast NAS messages

NAS Message	Direction	Key Parameters
Activate_PDPContext_Request	UE→BMSN	TI, Requested NSAPI, Requested QoS, Requested PDPAddress, APN, Protocol Config Options
Activate_PDPContext_Accept	UE←BMSN	TI, Negotiated QoS, PDPAddress, Protocol Config Options
Activate_PDPContext_Reject	UE←BMSN	TI, SMCause
Deactivate_PDPContext_Request	UE→BMSN UE←BMSN	TI, SMCause
Deactivate_PDPContext_Accept	UE←BMSN UE→BMSN	TI
Request_MBMSContext_Activation	UE←BMSN	TI, Linked NSAPI, Offered MulticastAddress, APN, TFT, TMGI
Request_MBMSContext_Activation_ Reject	UE→BMSN	TI, SMCause
Activate_MBMSContext_Request	UE→BMSN	TI, Requested MBMS NSAPI, Supported MBMS Bearer Capabilities, Requested Multicast address, APN, Linked TI, TMGI, MBMS Protocol Config Options
Activate_MBMSContext_Accept	UE←BMSN	TI, TMGI
Activate_MBMSContext_Reject	UE←BMSN	TI, SMCause
Activate_SecPDPContext_Request	UE→BMSN	TI, Requested NSAPI, Requested QoS, Linked TI, TFT, Protocol Config Options
Activate_SecPDPContext_ Accept	UE←BMSN	TI, Negotiated QoS, Protocol Config Options
Activate_SecPDPContext_ Reject	UE←BMSN	TI, SMCause

6 NAS Layer Protocol Data Units

6.1 General NAS PDU Structure

6.1.0 General

The following sections define the format of the Protocol Data Units (PDUs) which are used by the NAS Layer to signal its peer (NAS-PDUs). The proposed format is similar to the 3GPP L3 messages as defined in ETSI TS 124 007 [1]. This means that the message consists of the following parts:

- protocol discriminator;
- transaction identifier;
- message type;
- other information elements, as required.

The general NAS message format is shown in Figure 6.1.

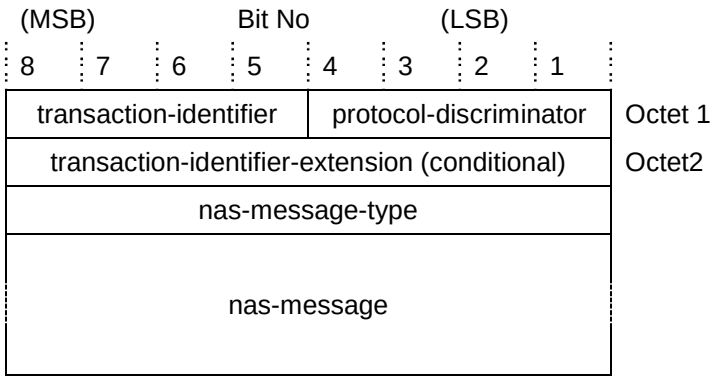

Figure 6.1: General NAS PDU format

The general format of a NAS PDU can be considered as follows:

```
NasPDU ::= SEQUENCE {
    nas-header NasHeader,
    nas-message-type NasMessageType,
    nas-message NasMessage
}
```

Where the NAS Header consists of the following:

```
NasHeader::= SEQUENCE {
    transaction-identifier TransactionIdentifier,
    protocol-discriminator ProtocolDiscriminator,
    transaction-identifier-extension TIE OPTIONAL
}
```

6.1.1 NAS PDU Header Common Elements

6.1.1.1 TransactionIdentifier (TI)

The transaction identifier and its use are defined in ETSI TS 124 007 [1].

The TI is defined in ETSI TS 124 007 [1] to half an octet in length, with an option to extend the TI to one and half octet. The structure of TI is as shown in Figure 6.2.

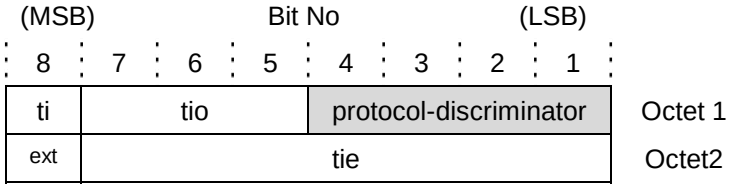

Figure 6.2: Transaction Identifier format

Two identical TI values may be used when each value pertains to a transaction initiated by the different sides of the interface. In this case the TI flag shall avoid ambiguity. The transaction identifier flag can take the values "0" or "1". The TI flag is used to identify which side of the interface initiated the transaction. A message has a TI flag set to "0" when it belongs to transaction initiated by its sender, and to "1" otherwise. Hence the TI flag identifies who allocated the TI value for this transaction and the only purpose of the TI flag is to resolve simultaneous attempts to allocate the same TI value.

The TIE shall not be used unless TI values of 7 or greater are needed.

The transaction-identifier parameter is of type TransactionIdentifier which is defined as follows:

```
TransactionIdentifier ::=
    SEQUENCE {
        ti  TI,
        tio TIO
    }
TI ::=  BOOLEAN;
    --FALSE if transaction initiated by its sender,TRUE otherwise
TIO ::= INTEGER(0..7);
    --If TIO(7), the TI value is given by the TIE in octet 2
```

The extended transaction identifier parameter is of type TIE, is only present if TIO has value 7, and is defined as follows:

```
TIE ::= INTEGER(0..127);
    -- TIE(0-6) Reserved
```

6.1.1.2 ProtocolDiscriminator

The Protocol Discriminator (PD) and its use are defined in ETSI TS 124 007 [1]. Normally the PD is half octet length with all values reserved. All NAS messages towards the BM domain shall utilize a half-octet long PD, adopting the binary value of '1010', representing GPRS Session Management messages.

The protocol-discriminator parameter is of type ProtocolDiscriminator which is defined as follows:

```
ProtocolDiscriminator ::=
    INTEGER {
        Session Management (10)
    } (0..15)
```

6.1.1.3 NasMessageType

The message type Information Element (IE) and its use are defined in ETSI TS 124 007 [1]. The values used towards the BM domain are as specified for GPRS Session Management and are shown in Table 6.1.

Table 6.1: Multicast message type values relevant to the BM domain

Bits 8	7	6	5	4	3	2	1	
0	1	-	-	-	-	-	-	Session management messages
0	1	0	0	0	0	0	1	Activate PDP context request
0	1	0	0	0	0	1	0	Activate PDP context accept
0	1	0	0	0	0	1	1	Activate PDP context reject
0	1	0	0	0	1	1	0	Deactivate PDP context request
0	1	0	0	0	1	1	1	Deactivate PDP context accept
0	1	0	0	1	1	0	1	Activate secondary PDP context request
0	1	0	0	1	1	1	0	Activate secondary PDP context accept
0	1	0	0	1	1	1	1	Activate secondary PDP context reject
0	1	0	1	0	1	1	0	Activate MBMS Context Request
0	1	0	1	0	1	1	1	Activate MBMS Context Accept
0	1	0	1	1	0	0	0	Activate MBMS Context Reject
0	1	0	1	1	0	0	1	Request MBMS Context Activation
0	1	0	1	1	0	1	0	Request MBMS Context Activation Reject

```
NasMessageType ::=
    INTEGER {
        ActivatePDPContextRequest (65),
        ActivatePDPContextAccept (66),
        ActivatePDPContextReject (67),
        DeactivatePDPContextRequest (70),
        DeactivatePDPContextAccept (71),
        ActivateSecondaryPDPContextRequest (77),
        ActivateSecondaryPDPContextAccept (78),
        ActivateSecondaryPDPContextReject (79),
        ActivateMBMSContextRequest (86),
        ActivateMBMSContextAccept (87),
        ActivateMBMSContextReject (88),
        RequestMBMSContextActivation (89),
        RequestMBMSContextActivationReject (90),
    } (0..255)
```

6.2 Format of standard information elements

Standard IE and its use are defined in ETSI TS 124 007 [1] and may have the following parts, in that order:

- an information element identifier (IEI) ;
- a length indicator (LI);
- a value part.

A standard IE has one of the formats shown in Table 6.2.

Table 6.2: Formats of information elements

Format	Meaning	IEI present	LI present	Value part present
T	Type only	yes	No	no
V	Value only	no	No	yes
TV	Type and Value	yes	No	yes
LV	Length and Value	no	Yes	yes
TLV	Type, Length and Value	yes	Yes	yes

6.3 NAS MBMS Service Management Messages

NAS PDUs containing NAS messages transferred in the UE-BMSN direction are carried within a UplinkDirectTransfer Adaptation Layer (AL) messages, while NAS PDUs transferred in the BMSN-UE direction are carried within DownlinkDirectTransfer AL messages (see ETSI TS 102 744-3-5 [9]). The NAS messages are passed transparently through the RNC.

```
NASMessage ::=  CHOICE {
    empty-sig   NULL,
    activate-pdp-context-request ActivatePDPContextRequest,
    activate-pdp-context-accept ActivatePDPContextAccept,
    activate-pdp-context-reject ActivatePDPContextReject,
    deactivate-pdp-context-request DeactivatePDPContextRequest,
    deactivate-pdp-context-accept DeactivatePDPContextAccept
    activate-sec-context-request ActivateSecondaryContextRequest,
    activate-sec-context-accept ActivateSecondaryContextAccept,
    activate-sec-context-reject ActivateSecondaryContextReject,
    activate-mbms-context-request ActivateMBMSContextRequest,
    activate-mbms-context-accept ActivateMBMSContextAccept,
    activate-mbms-context-reject ActivateMBMSContextReject,
    request-mbms-context-activate RequestMBMSContextActivate,
    request-mbms-context-reject RequestMBMSContextReject
    }
```

6.3.1 ActivatePDPContextRequest

6.3.1.0 General

The ActivatePDPContextRequest NAS message is used by the UE to access services within the BM domain as referenced by the Access Point Name (APN).

If the UE is GPRS Attached, the UE transmits an ActivatePDPContextRequest(NSAPI, APN) NAS message to the RAN encapsulated in an UplinkDirectTransfer AL message towards the BM-domain. The RAN identifies that this NAS message contains a message for the multicast domain and forwards the ActivatePDPContextRequest(NSAPI, APN) to the BMSN via the Iu interface using a InitialDirectTransfer (specifying the International Mobile Subscriber Identity (IMSI) of the UE).

The format of an ActivatePDPContextRequest is as shown in Table 6.3.

Table 6.3: ActivatePDPContextRequest message content

IEI	Information Element	Type/	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Activate PDP Context Request	Message type	M	V	1
	NSAPI	NSAPI	M	V	1
	Requested LLC SAPI	LLC Service Access Point ID	M	V	1
	Requested QoS	Quality of Service	M	LV	12
	Requested PDP address	Packet data protocol address	M	LV	3 - 19
28	Requested Access point name	Access point name	O	TLV	3 - 102
27	Protocol configuration options	Protocol configuration options	O	TLV	3 - 253

The definition of ActivatePDPContextRequest is as follows:

```
ActivatePDPContextRequest ::= SEQUENCE {
        nas-header NasHeader,
        nas-message-type NasMessageType,
        nsapi NSAPI,
        request-llc-sapi RequestLLCSAPI,
        requested-quality-of-service QualityOfService,
        requested-pdp-address PDPAddress,
        requested-apn APN OPTIONAL,
        protocol-configuration-options
            ProtocolConfigurationOptions OPTIONAL
}
```

When operating with (this version of) the BM domain, requested-apn information element shall be present, while the protocol-configuration-options information element may be present (potential support for future features). The structure of ActivatePDPContextRequest is as shown in Figure 6.3.

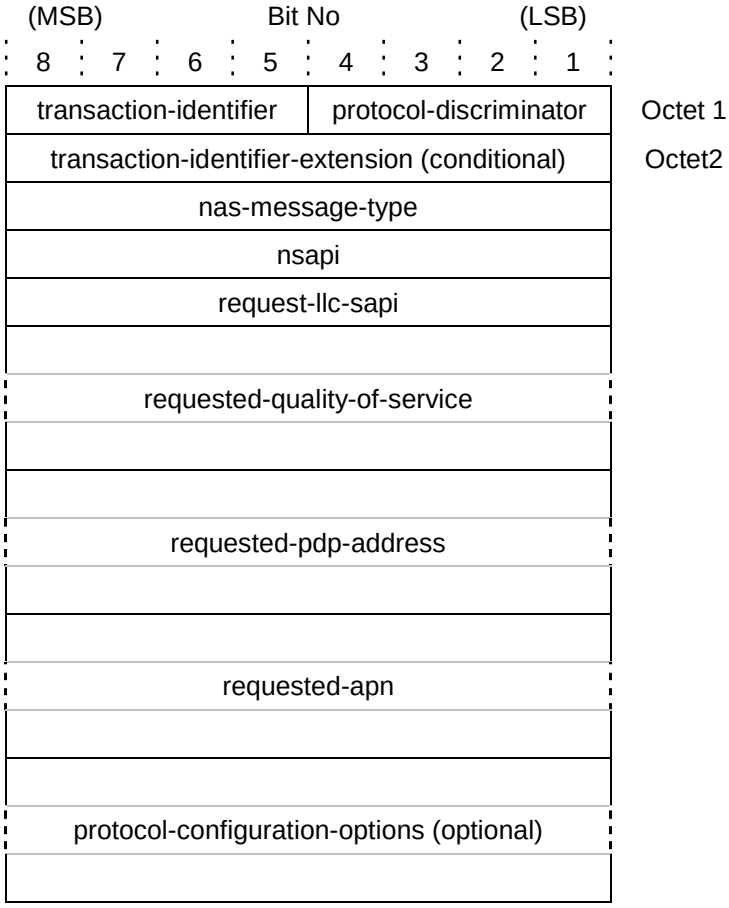

Figure 6.3: ActivatePDPContextRequest format

6.3.1.1 nsapi (Network Service Access Point Identifier)

The nsapi information element is an UE-allocated reference called the Network Service Access Point Identifier. Values in the range 0..15 identify a PDP Context endpoint within the scope of a UE.

The nsapi parameter is of type NSAPI which is defined in clause 7.2.

6.3.1.2 requested-llcsapi

The requested-llcsapi is of type LLCSAPI as defined in clause 7.3. This information element is not used by the BM domain of the Core Network (CN) but is left in the definition to be consistent with 3GPP. Default value '00000000'B (requested-llcsapi not assigned).

6.3.1.3 requested-pdp-address (PDPAddress)

The requested-pdp-address is used to request an IP address to utilized for this PDP context, and is of type PDPAddress as defined in clause 7.5.

6.3.1.4 apn (Access Point Name)

Access Point Name value is used to reference an external network domain and is defined in ETSI TS 123 003 [3]. The apn parameter is of type APN which is defined in clause 7.1.

6.3.1.5 requested-qos (QualityOfService)

The requested-qos parameter is of type QualityOfService as specified in clause 7.6, and is used to define the requested quality of service characteristics of the PDP Context.

6.3.2 ActivatePDPContextAccept

6.3.2.0 General

The ActivatePDPContextAccept NAS message is used by the BMSN to accept an ActivatePDPContextRequest from a UE. When the BMSN receives that the Radio Access Bearer has been established successfully then the BMSN sends this message to the UE via the RAN.

The format of an ActivatePDPContextAccept is as shown in Table 6.4.

Table 6.4: ActivatePDPContextAccept message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Activate PDP Context Accept	Message type	M	V	1
	Negotiated LLC SAPI	LLC service access point identifier	M	V	1
	Negotiated QoS	Quality of Service	M	LV	12
	Radio priority	Radio priority	M	V	0,5
	Spare half octet	Spare half octet	M	V	0,5
2B	PDP Address	Packet Data Protocol Address	O	TLV	4 - 20
27	Protocol configuration options	Protocol configuration options	O	TLV	3 - 253
34	Packet Flow Identifier	Packet Flow Identifier	O	TLV	3

The definition of ActivatePDPContextAccept is as follows:

```
ActivatePDPContextAccept ::= SEQUENCE {
    nas-header NasHeader,
    nas-message-type NasMessageType,
    negotiated-llc-sapi LLCSAPI,
    negotiated-quality-of-service QualityOfService,
    radio-priority RadioPriority,
    pdp-address PDPAddress OPTIONAL,
    protocol-configuration-options ProtocolConfigurationOptions
        (OPTIONAL),
    packet-flow-id PacketFlowId OPTIONAL
}
```

For operation with the BM domain, pdp-address shall always be present, protocol-configuration-options may be present, packet-flow-id shall not be present. The structure is as shown in Figure 6.4.

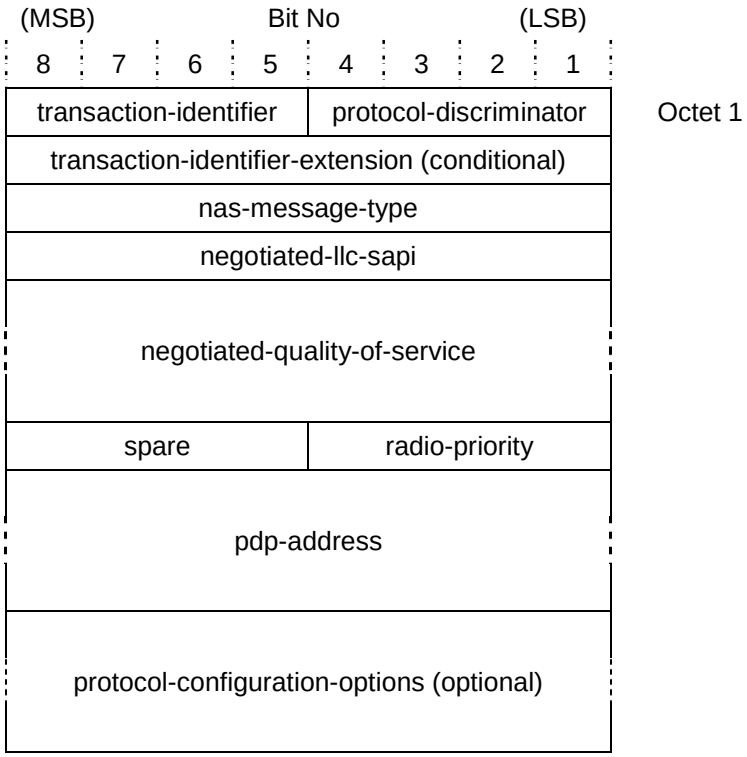

Figure 6.4: ActivatePDPContextAccept format (as presented to BM domain)

6.3.2.1 negotiated-llc-sapi

The negotiated-llcsapi parameter is of type LLCSAPI as defined in clause 7.3. It is not currently used by the BM domain of the CN but is left in the definition to be consistent with 3GPP. Default value '00000000'B (negotiated-llcsapi not assigned).

6.3.3 ActivatePDPContextReject

6.3.3.0 General

The ActivatePDPContextReject NAS message is used by the BMSN to reject an ActivatePDPContextRequest from a UE. If the UE is not provisioned in the Broadcast Multicast Service Centre (BMSC) database it will reject the service.

The format of an ActivatePDPContextReject is as shown in Table 6.5.

Table 6.5: ActivatePDPContextReject message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Activate PDP Context Reject	Message type	M	V	1
	SM cause	SM Cause	M	V	1
27	Protocol configuration options	Protocol configuration options	O	TLV	3 - 253

The definition of ActivatePDPContextReject is as follows:

```
ActivatePDPContextReject ::= SEQUENCE {
        nas-header NasHeader
        nas-message-type NasMessageType,
        sm-cause SMCause,
        protocol-configuration-options
            ProtocolConfigurationOptions OPTIONAL
    }
```

For operation with this version of the BM domain, protocol-configuration-options shall not be present, and therefore the format of the `ActivatePDPContextReject` shall be as shown in Figure 6.5.

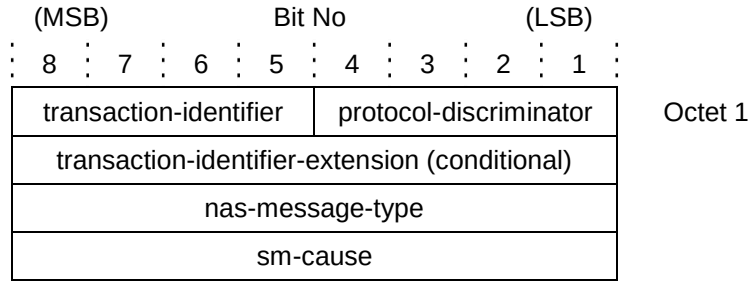

Figure 6.5: ActivatePDPContextReject format (from BM domain)

6.3.3.1 SMCause

The Information Element sm-cause is of type SMCause, the values of which are defined in clause 7.14, and are similar to those described in 3GPP TR 29.846 [i.1], clause 5.5.1.

6.3.4 ActivateSecondaryContextRequest

6.3.4.0 General

The ActivateSecondaryContextRequest NAS message is used by the UE to establish PDP contexts with specific QoS requirements to carry specific application traffic via the BM domain. A Primary PDP context shall be in existence, and active on the UE interface via which the Secondary PDP context is to be activated.

The format of an ActivateSecondaryContextRequest is as shown in Table 6.6.

Table 6.6: ActivateSecondaryContextRequest message content

IEI	Information Element	Type/	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Activate Secondary Context Request	Message type	M	V	1
	NSAPI	NSAPI	M	V	1
	Requested LLC SAPI	LLC Service Access Point Id	M	V	1
	Requested QoS	Quality of Service	M	LV	12
	Linked TI	Linked TI	M	LV	2 - 3
36	Traffic Flow Template	Traffic Flow Template	O	TLV	3 - 257
27	Protocol configuration options	Protocol configuration options	O	TLV	3 - 253

The definition of ActivateSecondaryContextRequest is as follows:

```
ActivateSecondaryContextRequest ::= SEQUENCE {
        nas-header NasHeader,
        nas-message-type NasMessageType,
        nsapi NSAPI,
        request-llc-sapi RequestLLCSAPI,
        requested-quality-of-service QualityOfService,
        linked-ti LinkedTi,
        traffic-flow-template TFT OPTIONAL,
        protocol-configuration-options
            ProtocolConfigurationOptions OPTIONAL
}
```

When operating with (this version of) the BM domain, the traffic-flow-template information element shall be present, while the protocol-configuration-options information element may be present (potential support for future features). The structure is as shown in Figure 6.6.

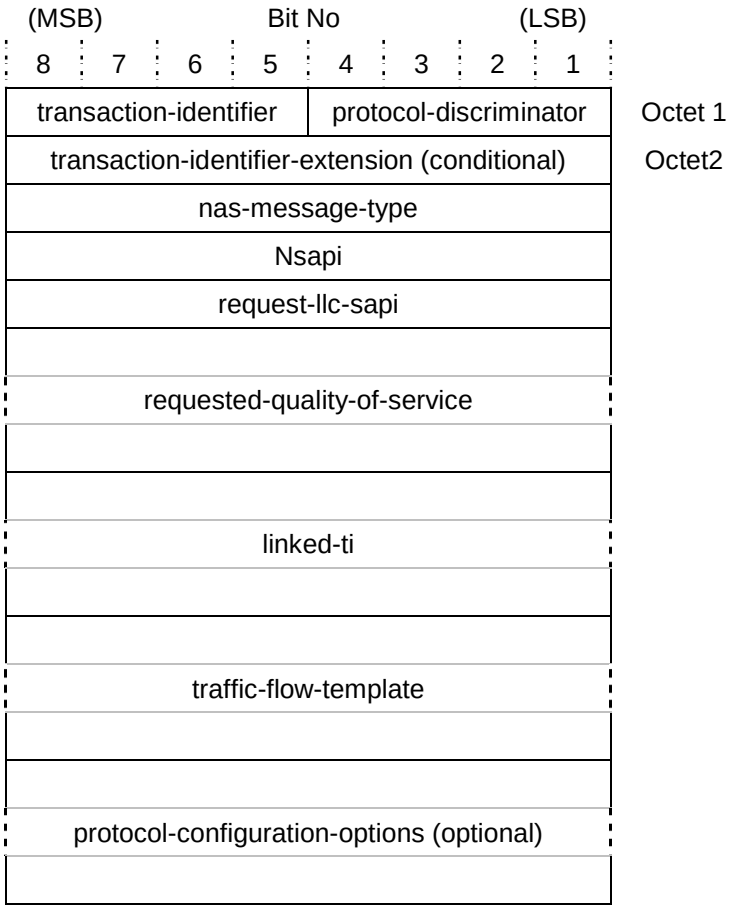

Figure 6.6: ActivatePDPContextRequest format

6.3.4.1 nsapi (Network Service Access Point Identifier)

The nsapi information element is an UE-allocated reference called the Network Service Access Point Identifier. Values in the range 0..15 identify a PDP Context endpoint within the scope of a UE.

The nsapi parameter is of type NSAPI which is defined in clause 7.2.

6.3.4.2 requested-llcsapi

The requested-llcsapi is of type LLCSAPI as defined in clause 7.3. This information element is not used by the BM domain of the CN but is left in the definition to be consistent with 3GPP. Default value '00000000'B (requested-llcsapi not assigned).

6.3.4.3 linked-ti (Linked TI)

The linked-ti is used to reference the Primary PDP context with which this Secondary PDP context is associated.

6.3.4.4 traffic-flow-template (TFT)

The traffic-flow-template (TFT) information element contains a description of the traffic to be carried via this secondary PDP context.

6.3.4.5 requested-qos (QualityOfService)

The requested-qos parameter is of type QualityOfService as specified in clause 7.6, and is used to define the requested quality of service characteristics of the PDP Context.

6.3.5 ActivateSecondaryContextAccept

The ActivateSecondaryContextAccept NAS message is used by the BMSN to accept an ActivateSecondaryContextRequest from a UE. When the BMSN receives that the Radio Access Bearer has been established successfully then the BMSN sends this message to the UE via the RAN.

The format of an ActivateSecondaryContextAccept is as shown in Table 6.7.

Table 6.7: ActivateSecondaryContextAccept message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Activate PDP Context Accept	Message type	M	V	1
	Negotiated LLC SAPI	LLC service access point identifier	M	V	1
	Negotiated QoS	Quality of Service	M	LV	12
	Radio priority	Radio priority	M	V	0,5
	Spare half octet	Spare half octet	M	V	0,5
27	Protocol configuration options	Protocol configuration options	O	TLV	3 - 253
34	Packet Flow Identifier	Packet Flow Identifier	O	TLV	3

The definition of ActivateSecondaryContextAccept is as follows:

```
ActivateSecondaryContextAccept ::= SEQUENCE {
    nas-header NasHeader,
    nas-message-type NasMessageType,
    negotiated-llc-sapi LLCSAPI,
    negotiated-quality-of-service QualityOfService,
    radio-priority RadioPriority,
    protocol-configuration-options ProtocolConfigurationOptions
        (OPTIONAL),
    packet-flow-id PacketFlowId OPTIONAL
}
```

For operation with the BM domain, protocol-configuration-options may be present, while packet-flow-id shall not be present. The structure is as shown in Figure 6.7.

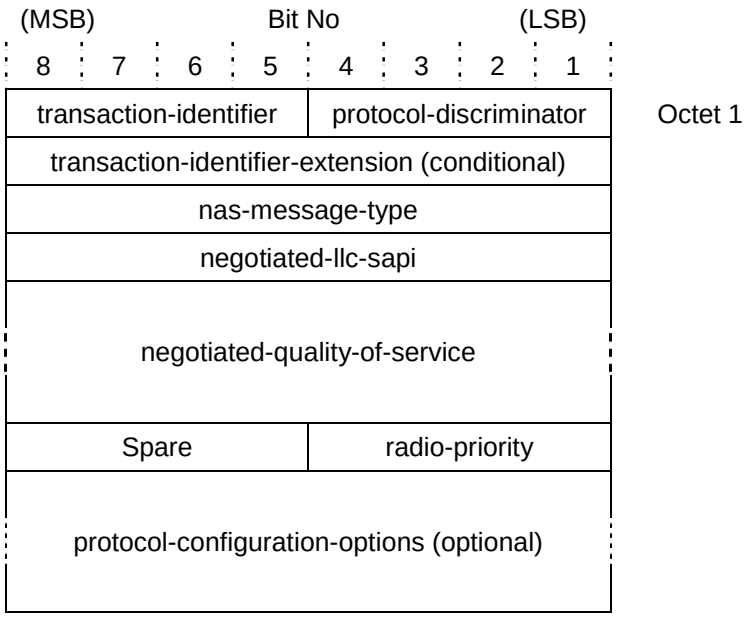

Figure 6.7: ActivateSecondaryContextAccept format (as presented by BM domain)

6.3.6 ActivateSecondaryContextReject

6.3.6.0 General

The ActivateSecondaryContextReject NAS message is used by the BMSN to reject an ActivateSecondaryContextRequest from a UE. If the UE is not provisioned in the BMSC database it will reject the service.

The format of an ActivateSecondaryContextReject is as shown in Table 6.8.

Table 6.8: ActivateSecondaryContextReject message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Activate PDP Context Reject	Message type	M	V	1
	SM cause	SM Cause	M	V	1
27	Protocol configuration options	Protocol configuration options	O	TLV	3 - 253

The definition of ActivateSecondaryContextReject is as follows:

```
ActivateSecondaryContextReject ::= SEQUENCE {
        nas-header NasHeader
        nas-message-type NasMessageType,
        sm-cause SMCause,
        protocol-configuration-options
            ProtocolConfigurationOptions OPTIONAL
    }
```

For operation with this version of the BM domain, protocol-configuration-options shall not be present, and therefore the format of the `ActivateSecondaryContextReject` shall be as shown in Figure 6.8.

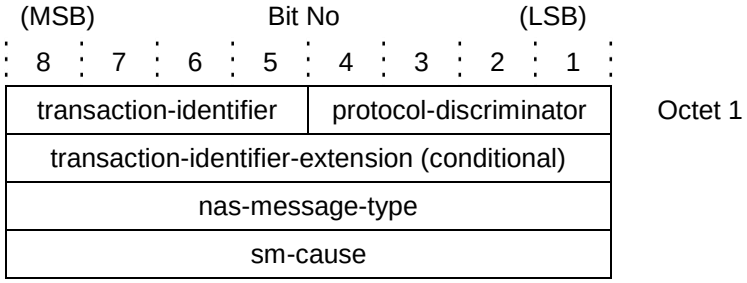

Figure 6.8: ActivateSecondaryContextReject format (from BM domain)

6.3.6.1 SMCause

The Information Element sm-cause is of type SMCause, the values of which are defined in clause 7.14, and are similar to those described in 3GPP TR 29.846 [i.1], clause 5.5.1.

6.3.7 DeactivatePDPContextRequest

6.3.7.0 General

The DeactivatePDPContextRequest NAS message is used by the UE to deactivate either a specific secondary PDP context or MBMS context, or the Primary PDP context and all associated secondary PDP context and MBMS contexts (this will release the association between the UE and a specific APN). This NAS message is used by the BMSC to delete a PDP context or MBMS Context. Such an event could occur due a provisioning exception event, such as identification of fraudulent activities, or subscription expiry.

The format of a DeactivatePDPContextRequest is as shown in Table 6.9.

Table 6.9: DeactivatePDPContextRequest message content

IEI	Information Element	Type/	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Deactivate PDP Context Request	Message type	M	V	1
	SM Cause	SM Cause	M	V	1
9	Tear down indicator	Tear down indicator	O	TV	1

The definition of DeactivatePDPContextRequest is as follows:

```
DeactivatePDPContextRequest ::= SEQUENCE {
    nas-header NasHeader,
    nas-message-type NasMessageType,
    sm-cause SMCause,
    tear-down-indicator TeadDownIndicator (OPTIONAL)
    }
```

The structure of DeactivatePDPContextRequest is as shown in Figure 6.9.

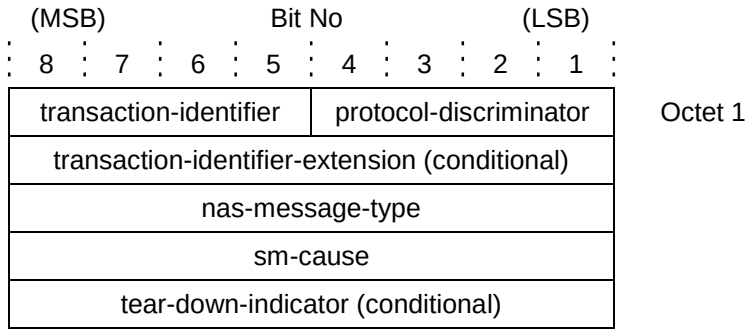

Figure 6.9: DeactivatePDPContextRequest format

6.3.7.1 tear-down-indicator

The tear-down-indicator information element is of type TearDownIndicator as defined in clause 7.8. It shall be included and set to TRUE when the PDP context being released is a Primary PDP context (in which case all secondary PDP contexts and MBMS contexts shall be deleted). It shall not be included when the PDP context being released is a secondary PDP context or MBMS context.

6.3.8 DeactivatePDPContextAccept

The DeactivatePDPContextAccept NAS message is used by the BMSN to accept a DeactivatePDPContextRequest. When the UE receives the message from the BMSN it deletes the PDP Context and signals the change of state towards any external interface.

The format of a DeactivatePDPContextAccept is as shown in Table 6.10.

Table 6.10: DeactivatePDPContextAccept message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Deactivate PDP Context Accept	Message type	M	V	1

The definition of DeactivatePDPContextAccept is as follows:

```
DeactivatePDPContextAccept :: SEQUENCE {
        nas-header NasHeader,
```

```
        nas-message-type NasMessageType
    }
```

The format of the DeactivatePDPContextAccept when operating with the BM domain shall be as shown in Figure 6.10.

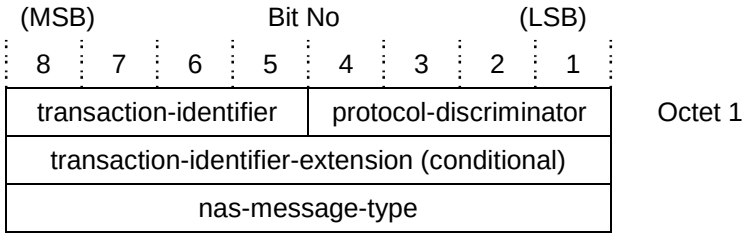

Figure 6.10: DeactivatePDPContextAccept format

6.4 ActivateMBMSContextRequest

The ActivateMBMSContextRequest is used by the UE to request the activation of a MBMS service. The format of ActivateMBMSContextRequest is as shown in Table 6.11.

Table 6.11: ActivateMBMSContextRequest message content

IEI	Information Element	Type/	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Activate MBMS Context Request	Message type	M	V	1
	Requested MBMS NSAPI	Enhanced NSAPI	M	V	1
	Requested LLC SAPI	LLC SAPI	M	V	1
	Supported MBMS bearer capabilities	MBMS bearer capabilities	M	LV	2 - 3
	Requested multicast address	PDP Address	M	LV	3 - 19
	Access Point Name	APN	M	LV	2 - 101
	TMGI	TMGI	M	LV	4 - 7
	Linked TI	Linked TI	M	LV	2 - 3
35	MBMS protocol configuration options	MBMS Protocol configuration options	O	TLV	3 - 253

The Requested Multicast Address field in this message shall be the copy of the Offered Multicast Address field present in the Request_MBMSContext_Activation message received from the Core Network.

The TMGI field has been added and is a departure from ETSI TS 124 008 [2]. The UE shall copy the TMGI value which has been offered by the Core Network in the Request_MBMSContext_Activation message.

The Linked-TI field has been added, this being a departure from ETSI TS 124 008 [2]. The UE shall use this to provide a reference to the primary PDP context with which this MBMS PDP context will be associated.

Note that this message is initiated by the Mobile Terminal, based on a request from the Core Network.

The definition of ActivateMBMSContextRequest is as follows:

```
ActivateMBMSContextRequest ::= SEQUENCE {
    nas-header NasHeader,
    nas-message-type NasMessageType,
    enhanced-nsapi NSAPI,
    requested-llcsapi LLCSAPI,
    mbms-bearer-capabilities MBMSBearerCapabilites,
    requested-multicast-address PDPAddress,
    access-point-name APN,
    temporary-multicast-group-id TMGI,
    linked-ti   LinkedTI,
    mbms-protocol-config-options MBMSProtocolConfigurationOptions
        (OPTIONAL),
}
```

The structure of ActivateMBMSContextRequest is as shown in Figure 6.11.

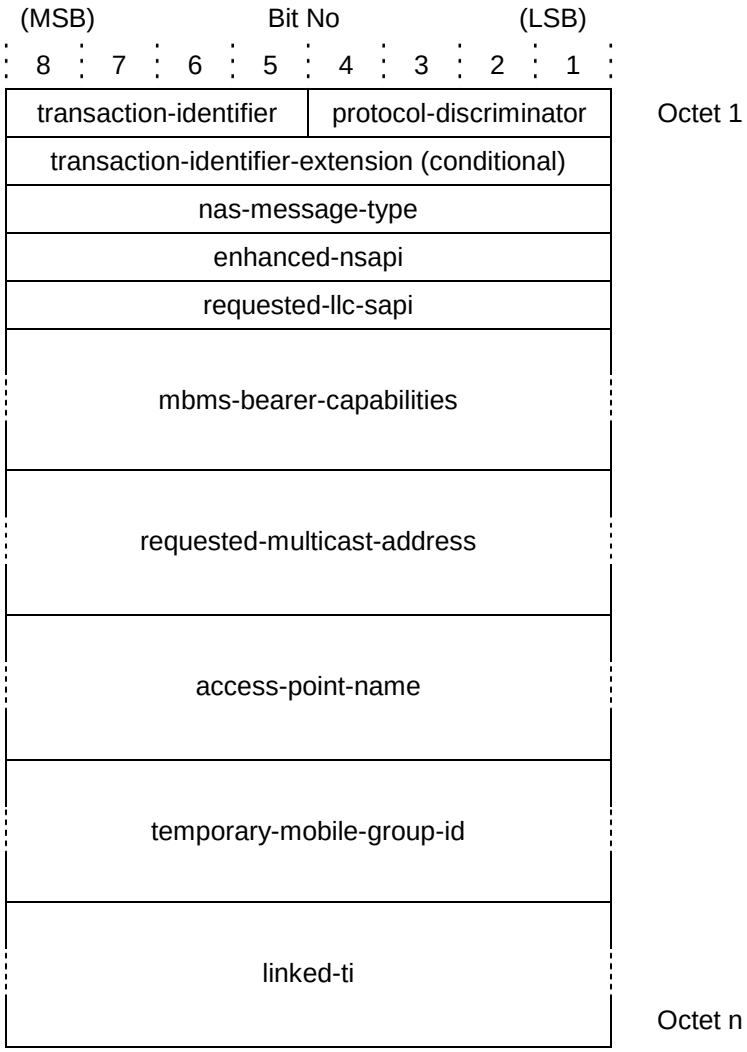

Figure 6.11: ActivateMBMSContextRequest format

6.5 ActivateMBMSContextAccept

The format of ActivateMBMSContextAccept is as shown in Table 6.12.

Table 6.12: ActivateMBMSContextAccept message content

IEI	Information Element	Type/	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Activate MBMS Context Accept	Message type	M	V	1
	TMGI	Temporary Mobile Group Id	M	LV	4 - 7
	Negotiated LLC SAPI	LLC SAPI	M	V	1
35	MBMS Protocol configuration options	Protocol configuration options	O	TLV	3 - 253
36	TFT	TFT	O	TLV	3 - 257

The definition of ActivateMBMSContextAccept is as follows:

```
ActivateMBMSContextAccept ::= SEQUENCE {
    nas-header NasHeader,
    nas-message-type NasMessageType,
    temporary-multicast-group-id TMGI,
```

```
    negotiated-llcsapi LLCSAPI,
    mbms-protocol-config-options MBMSProtocolConfigurationOptions
        (OPTIONAL),
    tft TrafficFilterTemplate OPTIONAL
}
```

The tft shall always be present for MBMS services via the BM domain The structure of ActivateMBMSContextAccept is as shown in Figure 6.12.

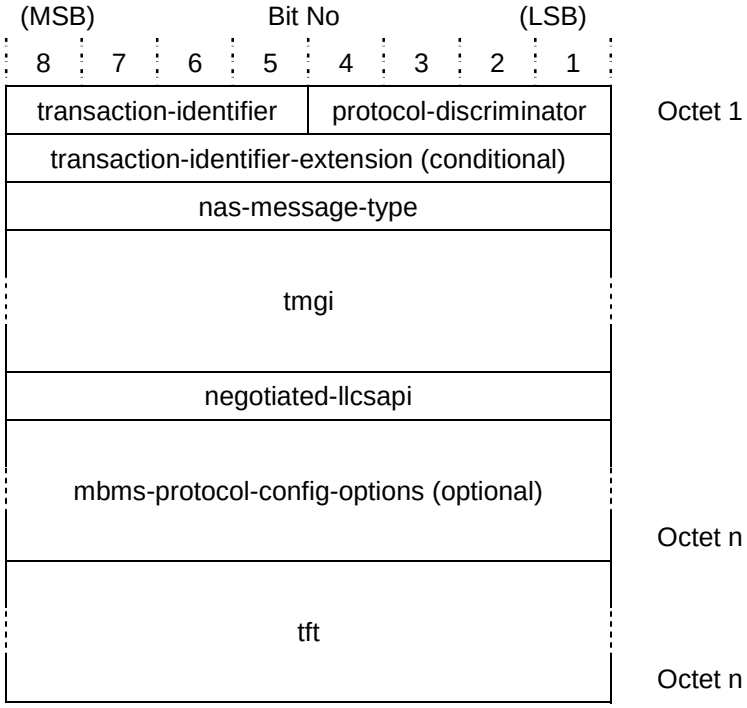

Figure 6.12: ActivateMBMSContextAccept format

6.6 ActivateMBMSContextReject

The format of ActivateMBMSContextReject is as shown in Table 6.13.

Table 6.13: ActivateMBMSContextReject message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Activate MBMS Context Reject	Message type	M	V	1
	SM cause	SM Cause	M	V	1
35	MBMS Protocol configuration options	Protocol configuration options	O	TLV	3 - 253

The definition of ActivateMBMSContextReject is as follows:

```
ActivateMBMSContextReject ::= SEQUENCE {
    nas-header NasHeader,
    nas-message-type NasMessageType,
    sm-cause SMCause,
    mbms-protocol-config-options MBMSProtocolConfigurationOptions
        (OPTIONAL)
}
```

When operating with the BM domain, the mbms-protocol-configuration-options information element shall not be present. The structure of ActivateMBMSContextReject is as shown in Figure 6.13.

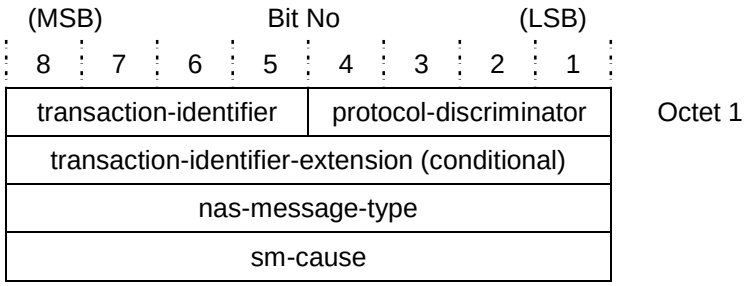

Figure 6.13: ActivateMBMSContextReject format

6.7 RequestMBMSContextActivation

The format of RequestMBMSContextActivation is as shown in Table 6.14.

Table 6.14: RequestMBMSContextActivation message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Request MBMS Context Activation	Message type	M	V	1
	Linked NSAPI	NSAPI	M	V	1
	Offered Multicast Address	PDP Address	M	LV	3 - 19
	Access Point Name	APN	M	LV	2 - 101
	Temporary Mobile Group Id	TMGI	M	LV	4 - 7
35	MBMS Protocol configuration options	MBMS Protocol configuration options	O	TLV	3 - 253

The definition of RequestMBMSContextActivation is as follows:

```
RequestMBMSContextActivation ::= SEQUENCE {
    nas-header NasHeader,
    nas-message-type NasMessageType,
    linked-nsapi NSAPI,
    offered-multicast-address PDPAddress,
    access-point-name APN,
    temporary-multicast-group-id TMGI,
    mbms-protocol-config-options MBMSProtocolConfigurationOptions
        (OPTIONAL)
}
```

For operation with the current version of the BM domain, the mbms-protocol-configuration-options information element shall not be present, while the tft information element shall be present. The structure of RequestMBMSContextActivation is as shown in Figure 6.14.

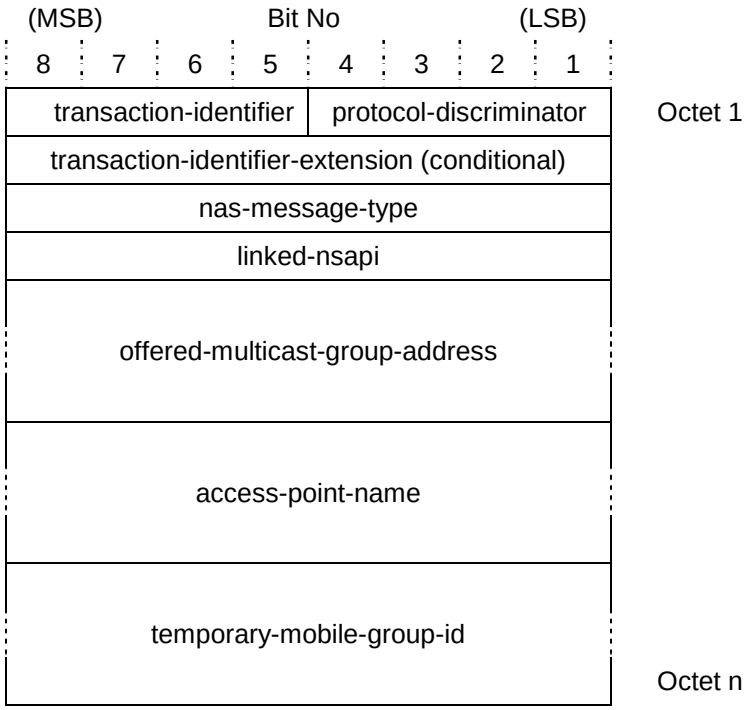

Figure 6.14: RequestMBMSContextActivation format

Note that this message is a departure from ETSI TS 124 008 [2] as the TMGI has been added as a mandatory field.

Conditions on which the TFT IE is present are explained in clause 7.10.

6.8 RequestMBMSContextActivationReject

The format of RequestMBMSContextActivationReject is as shown in Table 6.15.

Table 6.15: RequestMBMSContextActivationReject message content

IEI	Information Element	Type/Reference	Presence	Format	Length
	Protocol discriminator	Protocol discriminator	M	V	0,5
	Transaction identifier	Transaction identifier	M	V	0,5 - 1,5
	Request MBMS Context Act Reject	Message type	M	V	1
	SM cause	SM Cause	M	V	1

The definition of RequestMBMSContextActivationReject is as follows:

```
RequestMBMSContextActivationReject ::= SEQUENCE {
    nas-header NasHeader,
    nas-message-type NasMessageType,
    smcause SmCause
}
```

The structure of RequestMBMSContextActivationReject is as shown in Figure 6.15.

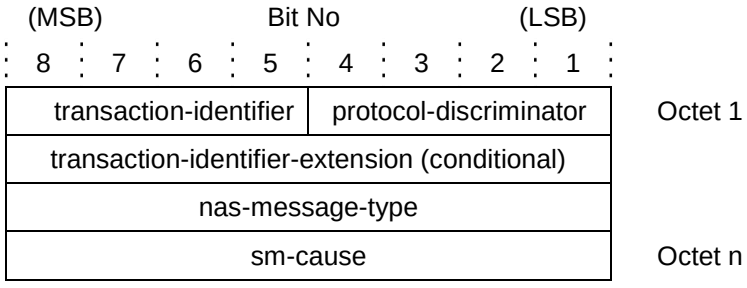

Figure 6.15: RequestMBMSContext ActivationReject format

7 Information Elements Coding

7.1 Access Point Name

Access Point Name value is defined in ETSI TS 123 003 [3]. For MBMS and PDP Contexts supported by the BM domain it is considered to reference a specific external IP administrative domain. Although the IE is shown as Optional in the MBMS and PDP Context Activation Request messages, it shall always be included for communication with the BM domain.

```
APN ::= OCTET STRING (SIZE (0..255))
```

7.2 Network service access point identifier (NSAPI)

The Network service access point identifier value identifies PDP Context or MBMS Context endpoint within the scope of an UE. It is allocated by the UE and is based upon the definition in ETSI TS 124 008 [2], clause 10.5.6.2.

The UE should allocate the NSAPI in a sequential order for each subsequent PDP Context, thereby minimizing the possibility of race conditions in signalling.

```
NSAPI ::= INTEGER (0..255)
-- values in range 0..15 correspond to PDP contexts
-- values in range 128..254 correspond to MBMS contexts
```

7.3 LLC SAPI

Logical Link Control (LLC) Service Access Point Identifier (SAPI) is defined in ETSI TS 124 008 [2]. It is a legacy IE and therefore not used in Multicast. Nevertheless, it is kept in the definition to be consistent with 3GPP. The default value should be '00000000'B (LLC SAPI not assigned).

```
LLCSAPI::= INTEGER (0..255); -- set to zero
```

7.4 Protocol configuration options

7.4.0 General

This optional Information Element is used to transfer external protocol options associated with a PDP Context Activation. It is defined in ETSI TS 124 008 [2], clause 10.5.6.3.

```
ProtocolConfigurationOptions ::= SEQUENCE {
    protocol-config-options-iei InformationElementIdentifier,
    protocol-config-options-length INTEGER (SIZE 0..255),
    configuration-protocol ConfigurationProtocol,
    configuration-protocol-option-list SEQUENCE OF
        ConfigurationProtocolOption
}

ConfigurationProtocol ::= INTEGER {
    ppp-for-use-with-ip (0)
}

ConfigurationProtocolOption ::= SEQUENCE {
    configuration-protocol-id ConfigurationProtocolId,
    configuration-protocol-length INTEGER (SIZE 0..255),
    configuration-protocol-content ConfigurationProtocolContent
}

ConfigurationProtocolId ::= INTEGER {
    p-cscf (0001), -- not supported
    im-cn-subsystem-flag (0002), -- not supported
    dns-address (0003), -- not supported
    policy-rejection-code (0004), -- not supported
    selected-bearer-control-mode (0005), -- not supported
    preferred-bearer-control-mode (0006), -- not supported
    ipv4-gateway-and-address (0016) –- supported by BM domain
    ipv4-dns-addresses (0017) –- supported by BM domain
```

```
    ppp-lcp (C021) -- not supported by BM domain
    ppp-pap (C023) -- not supported by BM domain
    ppp-chap (C023) -- not supported by BM domain
    ppp-ipcp (8021) --supported by BM domain
} SIZE (0..65535)
```

This Information Element may be used in the case where the Mobile Terminal acts as a bridge and allocates a static IP addresses to external TEs. Two possible implementations of the UE are supported by the BM domain:

1) UE provides Address Resolution Protocol (ARP) proxy functionality

2) UE provides Point-to-Point Protocol (PPP) functionality

7.4.1 UE supporting ARP proxy functionality

For the case of i) above, the UE needs to be aware of both the Gateway address and subnet mask that should be used for the APN to allow correct configuration of the ARP proxy functionality, and also the Domain Name System (DNS) addresses that should be used. For this case, the UE shall not send PPP information, but shall instead use the following protocol configuration option IEs in an Activate PDP Context Request to request the gateway address , subnet and IPv4 DNS addresses (note that 3GPP specifies Configuration Protocol value = 6 as supporting IPv6 DNS addresses only). As such, two new Container Identifiers are defined:

0x10 IPv4 APN-gateway address and APN-sub-net mask

0x11 IPv4 DNS address list

The IPv4 gateway address and sub-network mask information element consists of two four-octet fields. The first of these four-octet fields provides the Gateway address. The second of these four octet fields provides the sub-network mask.

```
ConfigurationProtocolContent ::= CHOICE {
    ppp-packet PPP, -- limited support in BM domain
    apn-gateway-address-and-subnet ApnGatewayAddressAndSubnet,
    ipv4-dns IPv4DNS
    }

ApnGatewayAddressAndSubnet ::= SEQUENCE {
    apn-gateway-address OCTET STRING (SIZE (4)),
    apn-subnet-mask OCTET STRING (SIZE (4))
    }

IPv4DNS ::= SEQUENCE (SIZE 1..4) OF {
    ipv4-dns-address OCTET STRING (SIZE (4))
    }
```

7.4.2 UE Supporting PPP (or PPPoE) interface

When the UE supports a PPP (or PPPoE) interface, the information in the Configuration Protocol Content shall be as specified in PPP (RFC 1661 [4]).

Only the Internet Protocol Control Protocol (IPCP) (RFC 1332 [5]), with protocol ID 8021, shall be supported by the BM domain for the trial configuration, although other options may be implemented in future.

The BM domain shall send a Configure-Reject for any option not supported.

For Dynamic Address allocation, it is expected that the UE shall send a Protocol Configuration Option which contains a Configure-Request. The construct presented in clause B is provided as an example.

7.5 Packet Data Protocol Address

7.5.0 General

This information element, defined in ETSI TS 124 008 [2], clause 10.5.6.4, is used to identify the address associated to a primary PDP Context and also to identify the IP Multicast address (or addresses) allocated to a MBMS Context when used in the to-mobile direction. Note that when present in *Request MBMS Context Activation* and *Activate MBMS Context Request*, this IE represents the Multicast Group address (Class D address) of the MBMS Service to be delivered through the MBMS Context.

```
PDPAddess::= SEQUENCE {
    pdp-type-organisation PDPTypeOrganisation,
    pdp-type-number PDPTypeNumber,
    pdp-address-info PDPAddressInfo (OPTIONAL)
}
```

7.5.1 pdp-type-organisation

The pdp-type-organisation is used to specify the type of address, and is of type PDPTypeOrganisation:

```
PDPTypeOrganisation::= INTEGER {
    etsi-allocated-address (0),
    ietf-allocated-address (1),
    empty (15)
} (SIZE (0..255)) -- the value shall always be set to 1 for BM domain operation
```

7.5.2 pdp-type-number

The pdp-type-number is used to specify the type of address, and is of type PDPTypeNumber:

```
PDPTypeNumber::= INTEGER {
    ipv4-address-type (33),
    ipv6-address=type (87),
    ipv4-address-and-range-type (161)
    } (SIZE (0..255)
```

7.5.3 PDPAddressInfo

The pdp-address-info is used to carry the IP address to be allocated to the PDP context (this is interpreted as a request if carried in an Activate PDP Context Request and an allocation if carried in an Activate PDP Context Accept). If a range of addresses are being allocated (either for the PDP address or for an Multimedia Broadcast Multicast Service (MBMS) address), then an IPv4 sub-net-mask is also included. Note that this field may be absent from an Activate PDP Context Request if a dynamic address is sufficient. The field is always present in a PDP Context Activation Accept. The value is of type PDPAddressInfo:

```
PDPAddressInfo::= CHOICE{
    ipv4-address OCTET STRING (SIZE (4)),
    ipv6-address OCTET STRING (SIZE (16)) ,
    ipv4-address-and-range SEQUENCE {
        ipv4-address OCTET STRING (SIZE (4)),
        ipv4-subnet-mask OCTET STRING (SIZE (4))
    }
}
```

7.6 Quality of Service

This information element is defined in ETSI TS 124 008 [2], clause 10.5.6.5.

```
QualityOfService ::= SEQUENCE {
    qos-iei InformationElementIdentifier,
    qos-length INTEGER (SIZE 0..255),
    spare-2bits BIT STRING (SIZE (2)),
    delay-class DelayClass,
    reliability-class ReliabilityClass,
    peak-throughput PeakThroughput,
    spare-1bit BIT STRING (SIZE (1)),
    precedence-class PrecedenceClass,
```

```
    spare-3bits1 BIT STRING (SIZE (3)),
    mean-throughput MeanThroughput,
    traffic-class TrafficClass,
    delivery-order DeliveryOrder,
    delivery-erroneous-sdu DeliveryOfErroneousSDU,
    maximum-sdu-size MaximumSDUSize,
    maximum-bitrate-uplink Bitrate,
    maximum-bitrate-downlink Bitrate,
    residual-ber ResidualBER,
    sdu-error-ratio SDUErrorRatio,
    transfer-delay TransferDelay,
    traffic-handling-priority TrafficHandlingPriority,
    guaranteed-bitrate-uplink Bitrate,
    guaranteed-bitrate-downlink Bitrate,
    source-descr INTEGER (SIZE 0..255) OPTIONAL, -- not supported
    extended-bitrate OCTET STRING (SIZE (4)) OPTIONAL
        -- not supported for BM domain
}

DelayClass ::= INTEGER {
    subscribed-delay-class (0),
    delay-class-1 (1),
    delay-class-2 (2),
    delay-class-3 (3),
    delay-class-4-best-effort (4)
} (SIZE 0..7) -- not used

ReliabilityClass ::= INTEGER {
    subscribed-reliability-class (0),
    acknowledged-llc-and-rlc-protected (2),
    acknowledged-rlc-protected (3),
    unacknowledged-protected (4),
    unacknowledged-unprotected (5)
}(SIZE 0..7) -- not used

PeakThroughput ::= INTEGER {
    subscribed-throughput (0),
    1000-octet—per-sec (1),
    2000-octet—per-sec (2),
    4000-octet—per-sec (3),
    8000-octet—per-sec (4),
    16000-octet—per-sec (5),
    32000-octet—per-sec (6),
    64000-octet—per-sec (7),
    128000-octet—per-sec (8),
    256000-octet—per-sec (9)
} (SIZE 0..15) -- not used

MeanThroughput ::= INTEGER {
    subscribed-mean-throughput (0),
    octet-per-hour-100 (1),
    octet-per-hour-200 (2),
    octet-per-hour-500 (3),
    octet-per-hour-1000 (4),
    octet-per-hour-2000 (5),
    octet-per-hour-5000 (6),
    octet-per-hour-10000 (7),
    octet-per-hour-20000 (8),
    octet-per-hour-50000 (9),
    octet-per-hour-100000 (10),
    octet-per-hour-200000 (11),
    octet-per-hour-500000 (12),
    octet-per-hour-1000000 (13),
    octet-per-hour-2000000 (14),
    octet-per-hour-5000000 (15),
    octet-per-hour-10000000 (16),
    octet-per-hour-20000000 (17),
    octet-per-hour-50000000 (18),
    octet-per-hour-best-effort (30)
} (SIZE 0..31) -- not used

TrafficClass ::= INTEGER {
    subscribed-traffic-class (0),
    conversational-class (1),
    streaming-class (2),
    interactive-class (3),
    background-class (4)
} (SIZE 0..7) -- not used
```

```
DeliveryOrder ::= INTEGER {
    subscribed-delivery-order (0),
    with-delivery-order (1),
    without-delivery-order (2)
} (SIZE 0..3) -- not used

DeliveryOfErroneousSDU ::= INTEGER {
    subscribed-delivery-of-erroneous-sdu (0),
    erroneous-sdu-delivered (1),
    erroneous-sdu-not-delivered (2)
} (SIZE 0..3) -- not used

MaximumSDUSize ::= INTEGER (SIZE 0..255) -- not used
BitRate ::= INTEGER (SIZE 0..255) -– encoded as follows…

-- The BitRate parameter type is encoded as follows
-- 8 7 6 5 4 3 2 1
-- 0 0 0 0 0 0 0 1 The maximum bit rate is binary coded in 8 bits, using a granularity of 1 kbps
-- 0 0 1 1 1 1 1 1 giving a range of values from 1 kbps to 63 kbps in 1 kbps increments.
-- 0 1 0 0 0 0 0 0 The maximum bit rate is 64 kbps + ((the binary coded value in 8 bits –01000000) *
8 kbps)
-- 0 1 1 1 1 1 1 1 giving a range of values from 64 kbps to 568 kbps in 8 kbps increments.
-- 1 0 0 0 0 0 0 0 The maximum bit rate is 576 kbps + ((the binary coded value in 8 bits –10000000)
* 64 kbps)
-- 1 1 1 1 1 1 1 0 giving a range of values from 576 kbps to 8 640 kbps in 64 kbps increments.
-- 1 1 1 1 1 1 1 1 0 kbps

ResidualBER ::= INTEGER (SIZE 0..15) -- not used

SDUErrorRatio ::= INTEGER (SIZE 0..15) -- not used

TransferDelay ::= INTEGER (SIZE 0..63) -- not used

TrafficHandlingPriority ::= INTEGER {
    subscribed-traffic-handling-priority (0),
    traffic-handling-priority-level-1 (1),
    traffic-handling-priority-level-2 (2),
    traffic-handling-priority-level-3 (3)
} INTEGER (SIZE 0..3)
    -- only used for interactive class traffic
    -- not currently used
```

7.7 Linked TI

This Information Element is defined in ETSI TS 124 008 [2], clause 10.5.6.7.

```
LinkedTI::= SEQUENCE{
    linkedti-iei InformationElementIdentifier,
    linkedti-length INTEGER (SIZE 0..255),
    extended-ti-flag BOOLEAN,
    short-linked-ti SEQUENCE {
        short-linked-ti INTEGER (SIZE 0..7),
        spare BIT STRING (SIZE (3))
    }
    extended-linked-ti  INTEGER (SIZE 0..255) OPTIONAL
}
```

If the Primary PDP context has a TI that is in the range 0..7, then the extended-linked-ti field shall not be present.

7.8 Tear Down Indicator

This Information Element is defined in ETSI TS 124 008 [2], clause 10.5.6.10.

```
TeardownIndicator::= SEQUENCE{
    teardown-iei ShortInformationElementIdentifier,
    spare BIT STRING (SIZE (3)),
    teardown-indicator BOOLEAN
}
```

For operation with the BM domain, this single-octet information element shall always be present, and the teardown-indicator value set to TRUE if the PDP context being deleted is the Primary PDP context, and FALSE if the PDP context being released is a Secondary PDP context or MBMS context.

7.9 Packet Flow Identifier

This Information Element is defined in ETSI TS 124 008 [2], clause 10.5.6.11.

This information element is not used towards the BM domain.

7.10 Traffic Flow Template

This Information Element is defined in ETSI TS 124 008 [2], clause 10.5.6.12. Traffic Flow Template IEI value is 36.

```
TrafficFilterTemplate ::= SEQUENCE {
    tft-iei InformationElementIdentifier,
    tft-length INTEGER (SIZE 0..255),
    tft-operationcode {
        spare (0),
        create-new-tft (1),
        delete-existing-tft (2),
        add-filters-to-existing-tft (3),
        replace-filters-in-existing-tft (4),
        delete-filters-from-existing-tft (5),
        no-tft-operation (6),
        reserved (7),
    } INTEGER (SIZE 0..7),
    parameters-list-included BOOLEAN,
    number-of-packet-filters INTEGER (SIZE 1..16),
    new-packet-filters SEQUENCE (SIZE 1..16) OF
        PacketFilter OPTIONAL,
    deleted-packet-filters SEQUENCE (SIZE 1..16) OF
        PacketFilterIdAndDirection OPTIONAL,
    filter-parameters SEQUENCE OF TftParameters OPTIONAL
}
```

Note that `new-packet-filters` is only included if `tft-operationcode` has the value of either `create-new-tft (1), add-filters-to-existing-tft (3),` or `replace-filters-in-existing-tft (4)`.

Note that `deleted-packet-filters` is only included if `tft-operationcode` has the value of `delete-filters-from-existing-tft (1).`

Each Packet Filter is of variable length and has the structure:

```
PacketFilter ::= SEQUENCE {
    packet-filter-id-and-direction PacketFilterIdAndDirection,
    packet-filter-evaluation-precedence
        PacketFilterEvaluationPrecedence,
    packet-filter-length INTEGER (SIZE 0..255),
    packet-filter-contents SEQUENCE (SIZE 1..8) OF
        PacketFilterComponent
}

PacketFilterIdAndDirection ::= SEQUENCE {
    spare BIT STRING (SIZE (2)),
    direction {
        pre-rel7-tft (0),
        downlink-only (1),
        uplink-only (2),
        bidirectional (3)
    }
    packet-filter-id PacketFilterId
}

PacketFilterId ::= INTEGER (SIZE 1..16)

PacketFilterEvaluationPrecedence ::= INTEGER (SIZE 0..255)

PacketFilterComponent ::= SEQUENCE {
    packet-filter-component-type {
        ipv4-remote-address-type (16),
        ipv6-remote-address-type (32),
        protocol-id-or-next-header-type (48),
        single-local-port-type (64),
        local-port-range-type (65),
        single-remote-port-type (80),
        remote-port-range-type (81),
        secure-parameter-index-type (96),
```

```
        tos-traffic-class-type (112),
        flow-label-type (128)
    }
    packet-filter-component-value PacketFilterCompoentValue
}

PacketFilterComponentValue ::= CHOICE {
    ipv4 IPv4AddressAndSubnetMask,
    ipv6 IPv6AddressAndSubnetMask,
    protocol-id-or-next-header ProtocolIdOrNextHeader,
    single-local-port PortValue,
    local-port-range PortRange,
    single-remote-port PortValue,
    remote-port-range PortRange,
    secure-parameter-index SecureParameterIndex,
    tos-traffic-class ToSTrafficClass,
    flow-label FlowLabel
}

IPv4AddressAndSubnetMask ::= SEQUENCE {
    ipv4-address OCTET STRING (SIZE (4)),
    ipv4-subnet-mask OCTET STRING (SIZE (4))
}

IPv6AddressAndSubnetMask ::= SEQUENCE {
    ipv6-address OCTET STRING (SIZE (16)),
    ipv6-subnet-mask OCTET STRING (SIZE (16))
}

ProtocolIdOrNextHeader ::= INTEGER (SIZE 0..255)
    -- encoded as ProtocolId for IPv4
    -- encoded as NextHeader for IPv6

PortValue ::= INTEGER (SIZE 0..65535)

PortRange ::= SEQUENCE {
    port-range-low-limit INTEGER (SIZE 0..65535),
    port-range-high-limit INTEGER (SIZE 0..65535)
}

SecureParameterIndex::= OCTET STRING (SIZE (4))

ToSTrafficClass ::= SEQUENCE {
    traffic-class INTEGER (SIZE 0..255),
    traffic-class-mask BIT STRING (SIZE (8))
}

FlowLabel ::= SEQUENCE {
    spare BIT STRING (SIZE (4)),
    flow-label-value BIT STRING (SIZE (20))
}
```

where, for each of the information elements in the Packet Filter:

- a packet filter identifier and direction (1 octet):

  The least significant 4 bits of the octet are used to identify the packet filter. Hence, a maximum of 16 different packet filters can be defined per Traffic Flow Template.

  The packet filter direction is used to indicate in which direction the filter applies. Bits 5 and 6 are used with the following values:

  - 00 - pre Release 7 TFT filter;
  - 01 - downlink direction only (from network to Mobile Terminal);
  - 10 - uplink direction only (from Mobile Terminal to network);
  - 11 - bi-directional

  Values 01, 10 and 11 are valid for Secondary PDP contexts and MBMS PDP contexts handled by the BM domain (and are not valid towards the PS domain), value 00 is only valid towards the PS domain (and is not valid towards the BM domain).

  Bits 7 and 8 are spare bits.

- a packet filter evaluation precedence (1 octet) used to specify the precedence for the packet filter;
- the length of the packet filter contents (1 octet);
- the packet filter contents itself (variable number of octets).

In each Packet Filter, there shall not be more than one occurrence of each packet filter component type. These component type identifiers are listed in Table 7.1.

Table 7.1: Packet Filter Component Type identifiers

Bits								
8	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
0	0	0	1	0	0	0	0	IPv4 remote address type
0	0	1	0	0	0	0	0	IPv6 remote address type
0	0	1	1	0	0	0	0	Protocol identifier/ Next header type
0	1	0	0	0	0	0	0	Single local port type
0	1	0	0	0	0	0	1	Local port range type
0	1	0	1	0	0	0	0	Single remote port type
0	1	0	1	0	0	0	1	Remote port range type
0	1	1	0	0	0	0	0	Security parameter index type
0	1	1	1	0	0	0	0	Type of service/ Traffic class type
1	0	0	0	0	0	0	0	Flow label type

Note that all other values are reserved.

The term *local* refers to the Mobile Terminal and the term *remote* refers to an external network entity.

As such, when the filter applies to the Downlink direction (rules apply in the Core Network), the remote address is either an IPv4 address of a multicast source (this is typical of a Source Specific Multicast service) or a "wild card" IPv4 address (this is typical of an Any Source Multicast service). In the latter, the value of the source is 0.0.0.0 and the mask is 0.0.0.0.

NOTE: The IPv4 remote address type is a sequence of 4 octets for the IP address and 4 octets for the address mask. Therefore, in Single Segment Message (ssm) mode, if all sources specified are in the same subnet, there is no need to have a traffic filter per source address (limited to 16).

It has to be noted that the "destination" address is derived from the PDP Address field used in the PDP Context or MBMS Context message. In the case of a PDP Context, the destination is the Mobile Terminal PDP address; in the case of an MBMS Context, the destination is a Multicast group address.

When the filter applies to the Uplink direction (rules apply in the Mobile Terminal), the remote address is either an IPv4 address of a server (i.e. a media server) or a multicast group address in the case of native multicast from the mobile domain.

The TFT IE will be present in an Activate MBMS Context Accept for any bi-directional MBMS Service, and for also when the Multicast Group Address itself represents insufficient information to allow the decompressor state in the UE to be defined for uni-directional downlink MBMS Services.

7.11 TMGI

This Information Element is defined in ETSI TS 124 008 [2], clause 10.5.6.13. 3GPP allows the coding of this information element to be of variable length, to allow the inclusion of the Mobile Country Code (MCC) and Mobile Network Code (MNC) fields. This coding is not necessary for operation with the BM domain, and the short form of the information element shall be utilized for BM domain operation.

```
TMGI ::= SEQUENCE{
    tmgi-iei InformationElementIdentifier,
    iei-len INTEGER (SIZE 0..255),
    mbms-service-id OCTET STRING (SIZE (3)),
    mcc-and-mnc OCTET STRING (SIZE (2..3)) OPTIONAL
}
```

7.12 MBMS Bearer capabilities

The purpose of the *MBMS bearer capabilities* information element is to indicate the maximum bit rate for downlink supported by the MS for an MBMS context.

NOTE: The information element indicates the static physical capabilities of the MS, independent of the radio access (UMTS Terrestrial Radio Access Network (UTRAN) or GSM/EDGE Radio Access Network (GERAN)), the radio conditions, or other CS or PS services possibly activated by the MS.

The *MBMS bearer capabilities* is a type 4 information element with a maximum length of 4 octets.

The *MBMS bearer capabilities* information element is coded according to Figure 10.5.155 and Table 10.5.169 in ETSI TS 124 008 [2].

This Information Element is defined in ETSI TS 124 008 [2], clause 10.5.6.14, and as follows:

```
MBMSBearerCapabilities::= SEQUENCE{
    mbms-bearer-capabilities-iei InformationElementIdentifier,
    iei-len INTEGER (SIZE 0..255),
    maximum-bitrate-downlink BitRate
}
```

The structure is as shown in Figure 7.1.

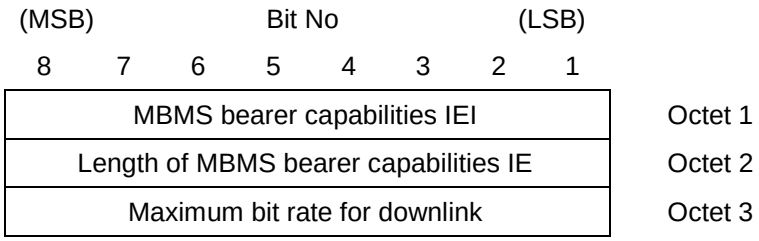

Figure 7.1 (Figure 10.5.155 in ETSI TS 124 008 [2]): *MBMS bearer capabilities* information element

The maximum-bitrate-downlink value shall be encoded as for the BitRate parameter in a QoS information element (see ETSI TS 124 008 [2], clause 10.5.6.5 (QoS), as shown in Figure 7.2.

Maximum bit rate for downlink:
Bits
8 7 6 5 4 3 2 1
In MS to network direction:
0 0 0 0 0 0 0 0 Subscribed maximum bit rate for uplink
In network to MS direction:
0 0 0 0 0 0 0 0 Reserved
In MS to network direction and in network to MS direction:
0 0 0 0 0 0 0 1 The maximum bit rate is binary coded in 8 bits, using a granularity of 1 kbps
0 0 1 1 1 1 1 1 giving a range of values from 1 kbps to 63 kbps in 1 kbps increments.

0 1 0 0 0 0 0 0 The maximum bit rate is 64 kbps + ((the binary coded value in 8 bits -01000000) * 8 kbps)
0 1 1 1 1 1 1 1 giving a range of values from 64 kbps to 568 kbps in 8 kbps increments.
1 0 0 0 0 0 0 0 The maximum bit rate is 576 kbps + ((the binary coded value in 8 bits -10000000) * 64 kbps)
1 1 1 1 1 1 1 0 giving a range of values from 576 kbps to 8 640 kbps in 64 kbps increments.
1 1 1 1 1 1 1 1 0 kbps

If the sending entity wants to indicate a Maximum bit rate for uplink higher than 8 640 kbps, it shall set octet 8 to "11111110", i.e. 8 640 kbps, and shall encode the value for the Maximum bit rate in octet 17.

Figure 7.2: Encoding for maximum-bitrate-downlink value (from ETSI TS 124 008 [2], clause 10.5.6.5)

The implication for the satellite network however, is that the extended bit rate field (octet 4, not shown above) is never required, as the maximum downlink bit rate that can be supported is always less than 512 kbit/s.

The value indicated by the UE shall be class dependent, with values for the first octet as shown in Table 7.2.

Table 7.2: Indicated MaximumBitrateDownlink parameter per mobile terminal class

UE Class	Maximum Bitrate Downlink	MaximumBitrateDownlink field encoding
Class 1	448 kbit/s	1110000
Class 2	384 kbit/s	1101000
Class 3	160 kbit/s	1001100
Class 6	320 kbit/s	1100000
Class 7	224 kbit/s	1010100
Class 8	432 kbit/s	1101110
Class 9	288 kbit/s	1011100
Class 10	256 kbit/s	1011000
Class 11	192 kbit/s	1010000

7.13 MBMS protocol configuration options

This Information Element is defined in ETSI TS 124 008 [2], clause 10.5.6.15, however this is currently shown as a string for transparent handling by the RAN for future MBMS specification. The approach here is to adopt the same container-approach as for Protocol Configuration Options.

```
MBMSProtocolConfigurationOptions ::= SEQUENCE {
    mbms-protocol-config-options-iei
        InformationElementIdentifier,
    mbms-protocol-config-options-length INTEGER (SIZE 0..255),
    mbms-configuration-protocol MbmsConfigurationProtocol,
    mbms-configuration-protocol-option-list SEQUENCE OF
        MbmsConfigurationProtocolOption
}

MbmsConfigurationProtocol ::= INTEGER {
    satn-mbms (0)
}

MbmsConfigurationProtocolOption ::= SEQUENCE {
    mbms-configuration-protocol-id MbmsConfigurationProtocolId,
    mbms-configuration-protocol-length INTEGER (SIZE 0..255),
    mbms-configuration-protocol-content
        MbmsConfigurationProtocolContent
}

MbmsConfigurationProtocolId ::= INTEGER {
    tft-state-compression (0001)
} SIZE (0..65535)
```

This Information Element is used to specify whether the entity supports TFT-based state compression, and a new Container Identifier is defined:

0001 TFT State Compression

The TFT State Compression information element consists of a single-octet field.

```
MbmsConfigurationProtocolContent ::= CHOICE {
    tft-sts-compression-capability TftStateCompression
    mbms-other-options MbmsOtherOptions,
    }

TftStateCompression ::= INTEGER {
    tft-compression-not-supported (0),
    tft-compression-supported (1)
    } SIZE (0..255)

MbmsOtherOptions ::= OCTET STRING (SIZE (0..255))
```

Note, the CHOICE is determined by the value of the MBMS Configuration Protocol ID, for which the only value currently defined is "0001 TFT State Compression". The MbmsOtherOptions is simply a placeholder for other MBMS Configuration Protocol Content information that may be supported in future, and are not interpreted by this version of the protocol stack.

7.14 SM Cause

The SM cause values are similar to those described in 3GPPP TR 29.846 [i.1], clause 5.5.1, and are shown in Table 7.3.

Table 7.3: SMCause information element values

Bits								
8	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
0	0	0	0	1	0	0	0	Operator Determined Barring
0	0	0	1	1	0	0	0	MBMS bearer capabilities insufficient for the service
0	0	0	1	1	0	1	0	Insufficient resources
0	0	0	1	1	0	1	1	Missing or unknown APN
0	0	0	1	1	1	1	1	Activation rejected, unspecified
0	0	1	0	0	0	0	0	Service option not supported
0	0	1	0	0	0	0	1	Requested service option not subscribed
0	0	1	0	0	0	1	0	Service option temporarily out of order
0	0	1	0	0	0	1	1	NSAPI already used (not sent)
0	0	1	0	0	1	0	0	Regular deactivation
0	0	1	0	0	1	0	1	QoS not accepted
0	0	1	0	0	1	1	0	Network failure
0	0	1	0	0	1	1	1	Reactivation required
0	0	1	0	1	0	0	0	Feature not supported
0	0	1	0	1	0	0	1	Semantic error in the TFT operation
0	0	1	0	1	0	1	0	Syntactical error in the TFT operation
0	0	1	0	1	1	1	1	Multicast group membership time-out
0	0	1	0	1	1	0	0	Semantic errors in packet filter(s)
0	0	1	0	1	1	0	1	Syntactical errors in packet filter(s)
0	1	0	1	0	0	0	1	Invalid transaction identifier value
0	1	0	1	1	1	1	1	Semantically incorrect message
0	1	1	0	0	0	0	0	Invalid mandatory information
0	1	1	0	0	0	0	1	Message type non-existent or not implemented
0	1	1	0	0	0	1	0	Message type not compatible with the protocol state
0	1	1	0	0	0	1	1	Information element non-existent or not implemented
0	1	1	0	0	1	0	0	Conditional IE error
0	1	1	0	0	1	0	1	Message not compatible with the protocol state
0	1	1	0	1	1	1	1	Protocol error, unspecified

Annex A (normative): ASN.1

This annex collates the data structures in ASN.1 notation from the present document in alphabetical order, in a format that may be used in a program code compiler.

The code is reproduced in a text file that is contained in archive ts_1027440307v010101p0.zip which accompanies the present document.

Annex B (informative): Example Configure-Request for Dynamic Address allocation

For the Dynamic Address allocation referred to in clause 7.4.2, it is expected that the UE sends a Protocol Configuration Option which contains a Configure-Request having the following construct as an example (note that as the Terminal Equipment (TE) was a Windows machine, WINS server addresses are requested):

Protocol configuration options
- Length : 0x26 (38)
- Configuration protocol : 0x00 (PPP for use with IP PDP Type)
- Spare
- Extension Bit : 0x01
- Protocol ID
  - Protocol ID : 0x8021 (IPCP)
  - Length : 34
  - PPP IP Control Protocol
    - Code: Configuration Request (0x01)
    - Identifier: 0x01
    - Length: 34
    - Options: (30 bytes)
      - IP address: 0.0.0.0
      - Primary DNS server IP address: 0.0.0.0
      - Primary WINS server IP address: 0.0.0.0
      - Secondary DNS server IP address: 0.0.0.0
      - Secondary WINS server IP address: 0.0.0.0

with a hex representation as follows:

```
0000  27 26 80 80 21 22 01 01 00 22 03 06 00 00 00 00
0010  81 06 00 00 00 00 82 06 00 00 00 00 83 06 00 00
0020  00 00 84 06 00 00 00 00
```

For static IP address allocation, the UE populates the IP Address in the IPCP packet with the requested PDP Address to be allocated to the TE.

Upon receipt of a PDP Context Activation Request containing the PPP IPCP options, the BMSN sends a Configure Nak for this PPP packet, changing the PDP Address and DNS address to the values specified by the BMSC. The BMSN sends a PPP IPCP Configure Request specifying the APN Gateway address. If WINS server addresses are requested, then a Configure Reject is sent. The corresponding response to the above example, for inclusion in the PDP Context Activation Accept is as follows:

Protocol configuration options
- Length : 0x3a (58)
- Configuration protocol : 0x00 (PPP for use with IP PDP Type)
- Spare
- Extension Bit : 0x01
- Protocol ID
  - Protocol ID : 0x8021 (IPCP)
  - Length : 10
  - PPP IP Control Protocol
    - Code: Configuration Request (0x01)
    - Identifier: 0x01
    - Length: 10
    - Options: (6 bytes)
      - IP address: 10.2.0.1
- Protocol ID
  - Protocol ID : 0x8021 (IPCP)
  - Length : 22
  - PPP IP Control Protocol
    - Code: Configuration Nak (0x03)
    - Identifier: 0x01

Length: 22
Options: (18 bytes)
IP address: 10.2.0.10
Primary DNS server IP address: 10.0.14.2
Secondary DNS server IP address: 10.10.1.5
Protocol ID
Protocol ID : 0x8021 (IPCP)
Length : 16
PPP IP Control Protocol
Code: Configuration Reject (0x04)
Identifier: 0x01
Length: 16
Options: (12 bytes)
Primary WINS server IP address: 0.0.0.0
Secondary WINS server IP address: 0.0.0.0

with a corresponding hex representation as follows:

```
0000  27 3a 80 80 21 0a 01 01 00 0a 03 06 0a 02 00 01
0010  80 21 16 03 01 00 16 03 06 0a 02 00 0a 81 06 0a
0020  00 0e 02 83 06 0a 0a 01 05 80 21 10 04 01 00 10
0030  82 06 00 00 00 00 84 06 00 00 00 00
```

In this case the PDP address and DNS Server addresses should replace the appropriate octets in the example.

History

Document history		
V1.1.1	October 2015	Publication