



**Satellite Earth Stations and Systems (SES);
Family SL Satellite Radio Interface (Release 1);
Part 3: Control Plane and User Plane Specifications;
Sub-part 3: Bearer Connection Layer Interface**

PREVIEW
https://standards.iteh.ai/catalog/standards/sist/c2112001-
bd09-42d2-9ec7-46d651121027/etsi-ts-102-744-3-3-
v1.1.1-201510

ReferenceDTS/SES-00299-3-3

Keywords

3GPP, GPRS, GSM, GSO, interface, MSS, radio,
satellite, TDM, TDMA, UMTS

ETSI650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2015.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	4
Foreword.....	4
Modal verbs terminology.....	4
Introduction	4
1 Scope	5
2 References	5
2.1 Normative references	5
2.2 Informative references.....	5
3 Abbreviations	5
4 Bearer Connection Interface.....	6
4.1 Radio Interface Layering.....	6
4.2 Bearer Connection Layer Responsibilities	6
4.3 Bearer Connection Layer Overview	7
4.3.0 General.....	7
4.3.1 Bearer Connection Layer PDUs.....	7
4.3.2 Bearer Connections.....	7
4.3.3 Ciphering	7
4.4 Conventions used in the present document	7
4.4.1 Presentation.....	7
4.4.2 "Reserved" Fields and Values.....	8
4.4.3 Boolean Variables.....	8
4.4.4 ASN.1 Encoding Rules	8
5 Connection Protocol Data Unit (PDU) structure.....	8
5.0 General	8
5.1 Bearer Connection PDU (BCnPDU)	8
5.1.0 General.....	8
5.1.1 RawDataPDU	9
5.1.2 InformationPDU	9
5.1.3 SupervisoryPDU	10
5.1.3.0 General	10
5.1.3.1 ReadyReceive.....	10
5.1.3.2 SelectiveReject.....	11
5.1.4 NumberedPDU	12
5.1.5 SubSegmentPDU	12
5.2 Parameters	13
5.2.1 BcnSegType.....	13
5.2.2 BconnData	14
5.2.2.0 General	14
5.2.2.1 PdcInfo.....	15
5.2.3 SequenceNum	15
5.2.4 PDULength.....	15
Annex A (normative): ASN.1	16
History	17

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

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 3 of a multi-part deliverable. Full details of the entire series can be found in ETSI TS 102 744-1-1 [i.1].

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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

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 Bearer Connection Layer (BCn) peer-to-peer interface of the Family SL satellite radio interface between the Radio Network Controller (RNC) and the User Equipment (UE) used in the satellite network.

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 102 744-1-3: "Satellite Earth Stations and Systems (SES); Family SL Satellite Radio Interface (Release 1); Part 1: General Specifications; Sub-part 3: Satellite Radio Interface Overview".
- [2] 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".
- [3] 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".
- [4] ETSI TS 102 744-3-4: "Satellite Earth Stations and Systems (SES); Family SL Satellite Radio Interface (Release 1); Part 3: Control Plane and User Plane Specifications; Sub-part 4: Bearer Connection 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] 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".

3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 102 744-1-4 [2], clause 3 apply.

4 Bearer Connection Interface

4.1 Radio Interface Layering

As described in ETSI TS 102 744-1-3 [1], the satellite communication protocol is considered as a number of communication layers, as follows:

- Adaptation Layer (AL);
- Bearer Connection Layer (BCn);
- Bearer Control Layer (BCt);
- Physical Layer (L1).

The satellite radio interface protocol stack is designed to seamlessly integrate with UMTS Non-Access Stratum entities, such as GPRS Mobility Management (GMM) and Mobility Management (MM), residing in the Core Network (CN) and in the upper layers of the User Equipment (UE).

The Bearer Connection Layer provides support to the Adaptation Layer, and uses the services provided by the Bearer Control Layer, as shown in Figure 4.1. The present document defines the Bearer Connection Layer peer-to-peer interface between the Radio Network Controller (RNC) and the UE, as shown in Figure 4.1.

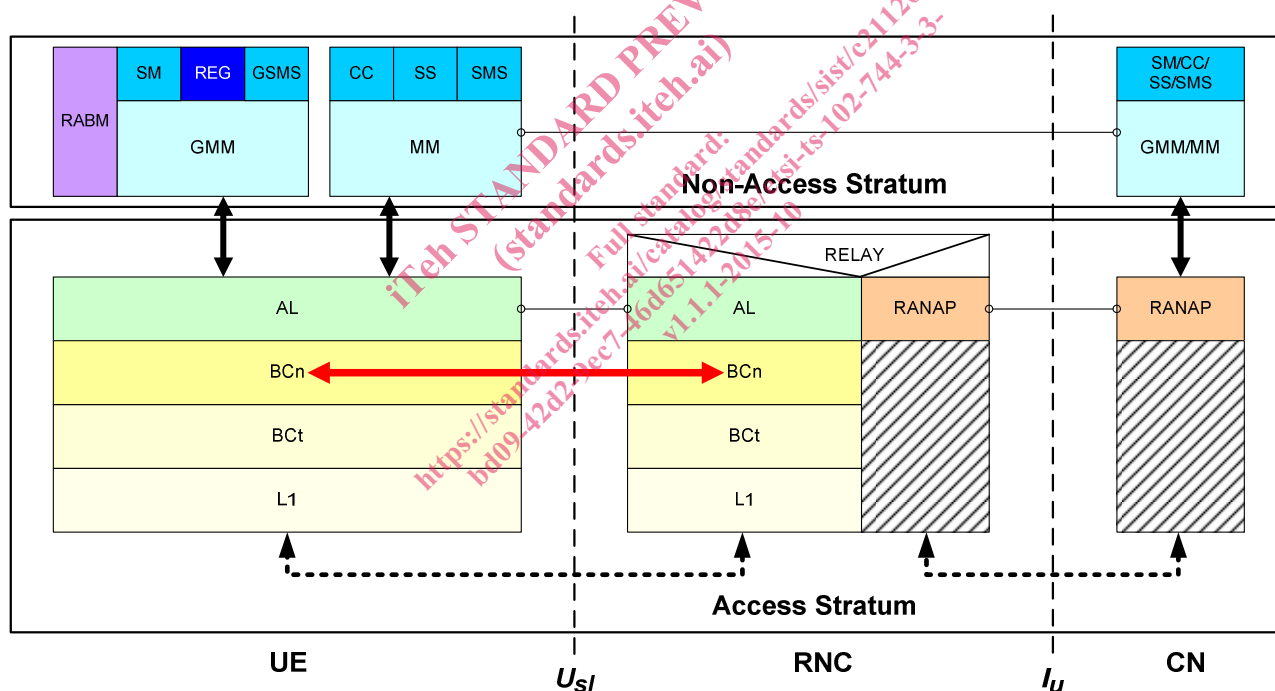


Figure 4.1: Control Plane Protocol Stack Layering (Bearer Connection Layer interface highlighted)

4.2 Bearer Connection Layer Responsibilities

The function of the satellite radio interface Bearer Connection Layer is to provide a number of different data transport services to upper layers. The Bearer Connection Layer is generic to the radio interface and is responsible for the following:

- Queuing;
- QoS Policing;
- QoS Monitoring;
- Segmentation and Re-assembly;

- Ciphering; and
- Selectable ARQ.

The functionality of the Bearer Connection Layer is therefore similar to that of the Radio Link Control (RLC) layer in UTRAN (UMTS Terrestrial Radio Access Network).

The Bearer Connection layer peer-peer interface definitions are described in the present document.

4.3 Bearer Connection Layer Overview

4.3.0 General

The Bearer Connection Layer performs peer-peer signalling via Bearer Connection Layer PDUs. The Bearer Connection Layer signalling mechanisms introduce an overhead on the layer above. This overhead is kept to a minimum.

4.3.1 Bearer Connection Layer PDUs

When registration is complete, and whenever a User Plane Connection is established, a Bearer Connection process is established which operates an HDLC-derived mechanism for support of the transfer of information between the RNC and the UE. This mechanism introduces an overhead to each User Plane Protocol Data Unit (PDU) or UE-Specific Signalling PDU transferred over the satellite. The overhead varies depending upon the number of segments required to transfer the payload, but is kept to a minimum where possible. When operating the ARQ protocol, the Bearer Connection process needs to signal to the peer to indicate the number of segments received/missing. This signalling is described within clause 5.1, Bearer Connection Layer PDU.

4.3.2 Bearer Connections

A Bearer Connection is a specific logical connection being handled by the Bearer Connection Layer, and this term is used to refer to the logical connection. Each Bearer Connection has an associated Bearer Connection ID, and has a single Bearer Connection process within the Bearer Connection Layer at both RNC and UE which handles the Bearer Connection. Note that for the case of a point-to-multi-point Bearer Connection, there is a single Bearer Connection process at the RNC and a single Bearer Connection process at each 'attached' UE.

4.3.3 Ciphering

For Bearer Connections operating in Acknowledged Mode (AM) or Unacknowledged Mode (UM), ciphering is also performed in the Bearer Connection Layer. Ciphering may be applied to the data segment of Information PDUs (see Figure 5.2) and Numbered PDUs (see Figure 5.6). A detailed description of how ciphering is performed in the Bearer Connection Layer can be found in ETSI TS 102 744-3-4 [4].

4.4 Conventions used in the present document

4.4.1 Presentation

The following conventions are applied throughout the present document:

- In the ASN.1 notation, variable names are always in lower case letters with hyphenation used to improve readability (e.g. `ret-bct-pdu-header`). 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. `ReturnBCtPDUHeader`).
- In the explanatory text, these variables are referred to in italics (e.g. *ret-bct-pdu-header*), 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 it 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.

4.4.2 "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.

4.4.3 Boolean Variables

BOOLEAN variables shall be encoded as follows:

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

4.4.4 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 4.3.4 of ETSI TS 102 744-3-1 [3].

5 Connection Protocol Data Unit (PDU) structure

5.0 General

The Upper Layer PDUs (such as Adaptation Layer Signalling PDUs, Packet Data Convergence Protocol (PDCP) PDUs, etc.) are segmented into a sequence of Bearer Connection Layer Protocol Data Units (BCnPDUs), if required. The length of each Bearer Connection Layer PDU depends on the physical bearer characteristics and is determined by the Bearer Control sub-layer and signalled across the interface between Bearer Connection and Bearer Control processes.

5.1 Bearer Connection PDU (BCnPDU)

5.1.0 General

The Bearer Connection PDU (BCnPDU) is passed to the Bearer Control Sub-Layer across the Bearer Connection Layer to Control Sub-Layer interface. This PDU may contain either *raw-data* or a *formatted-pdu*. This choice is implied when setting up the Bearer Connection.

A *formatted-pdu* may contain either an *ack-mode-pdu* (if operating in Acknowledged Mode), a Sub-Segment (*sseg-pdu*), or Numbered (*n-pdu*) frames. An *ack-mode-pdu* may contain either an Information (*i-pdu*) or a Supervisory (*s-pdu*) Frame. The type of content of a *formatted-pdu* is identified by either the first, first and second or first, second and third bits of the formatted PDU.

```
BCnPDU ::=
  CHOICE {
    raw-pdu
      RawDataPDU,
    formatted-pdu
      CHOICE {
        ack-mode-pdu
          CHOICE {
            i-pdu
              InformationPDU,
            s-pdu
              SupervisoryPDU,
            sseg-pdu
              SubSegmentPDU
          }
      }
  },
```



```

    n-pdu
    }
    }
}

```

5.1.1 RawDataPDU

This payload is used in the BCnPDU to carry user plane data when the Bearer Connection Process is operating in Transparent Mode (TM). Segmentation and reassembly and in-sequence delivery are not supported in this mode and would be the responsibility of the layers above. No overhead is added by the Bearer Connection Layer. The PDU has the following structure, with format as shown in Figure 5.1.

```

RawDataPDU ::=
    OCTET STRING

```

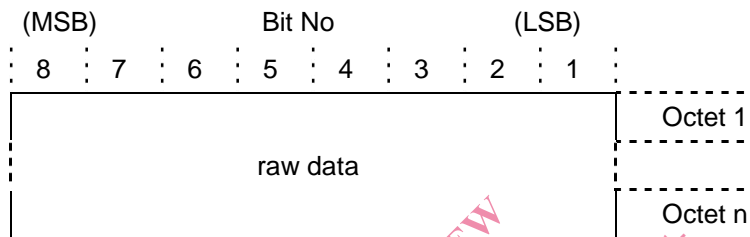


Figure 5.1: RawDataPDU Format

5.1.2 InformationPDU

This format is used to carry numbered data segments when the Bearer Connection process is operating in Acknowledged Mode (AM). The PDU has the following structure, with format as shown in Figure 5.2.

```

InformationPDU ::=
    SEQUENCE {
        i-flag
            BIT STRING (SIZE (1)), -- encode as '0'B
        pf
            BOOLEAN,
        ns
            SequenceNum,
        nr
            SequenceNum,
        s-type
            BCnSegType,
        data-seg
            BConnData OPTIONAL
    }

```

NOTE: If ciphering is applied then *data-seg* is of type OCTETSTRING.

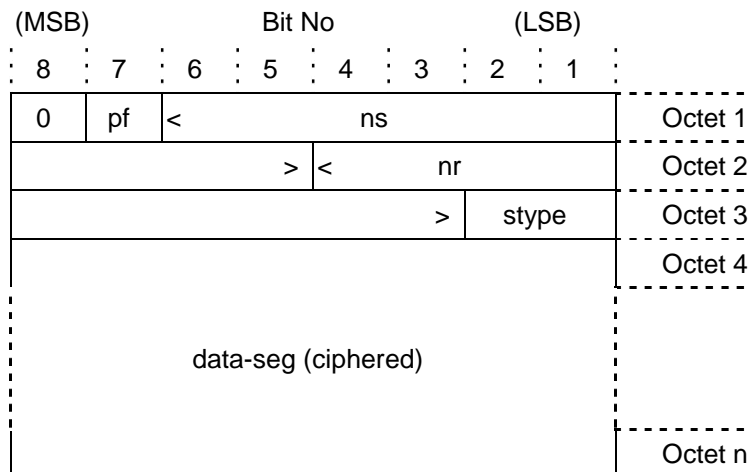


Figure 5.2: InformationPDU Format