



**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**

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F-06921 Sophia Antipolis Cedex - FRANCE

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

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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 1 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**", "**may not**", "**need**", "**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 Bearer Control Layer (BCt) 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.

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

- [1] ETSI TS 125 331: "Universal Mobile Telecommunications System (UMTS); Radio Resource Control (RRC); Protocol specification (3GPP TS 25.331 Release 4)".
- [2] ETSI TS 123 003: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Numbering, addressing and identification (3GPP TS 23.003 Release 4)".
- [3] International Telegraph and Telephone Consultative Committee CCITT (now ITU-T) Red Book, Recommendation X.25.
- [4] 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)".
- [5] "Global Positioning System Standard Positioning Service Signal Specification", 2nd Edition, 2nd June 1995, GPS Navstar Joint Program Office.
- [6] 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".
- [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 102 744-2-1: "Satellite Earth Stations and Systems (SES); Family SL Satellite Radio Interface (Release 1); Part 2: Physical Layer Specifications; Sub-part 1: Physical Layer Interface".
- [9] ETSI TS 102 744-2-2: "Satellite Earth Stations and Systems (SES); Family SL Satellite Radio Interface (Release 1); Part 2: Physical Layer Specifications; Sub-part 2: Radio Transmission and Reception".
- [10] ETSI TS 102 744-3-2: "Satellite Earth Stations and Systems (SES); Family SL Satellite Radio Interface (Release 1); Part 3: Control Plane and User Plane Specifications; Sub-part 2: Bearer Control Layer Operation".
- [11] ETSI TS 102 744-3-3: "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".

- [12] 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".
- [13] 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".

2.2 Informative references

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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 Symbols and abbreviations

3.1 Symbols

For the purposes of the present document, the symbols given in ETSI TS 102 744-1-4 [7], clause 3.1 apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 102 744-1-4 [7], clause 3.2 apply.

4 Bearer Control Interface

4.1 Radio Interface Layering

As described in ETSI TS 102 744-1-3 [6], 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); and
- 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 Control Layer is responsible for controlling the access to the physical layer (channel resource) for each of the connections which are established. The present document defines the Bearer Control Layer (BCt) peer-to-peer interface between the Radio Network Controller (RNC) and the User Equipment (UE), as shown in Figure 4.1.

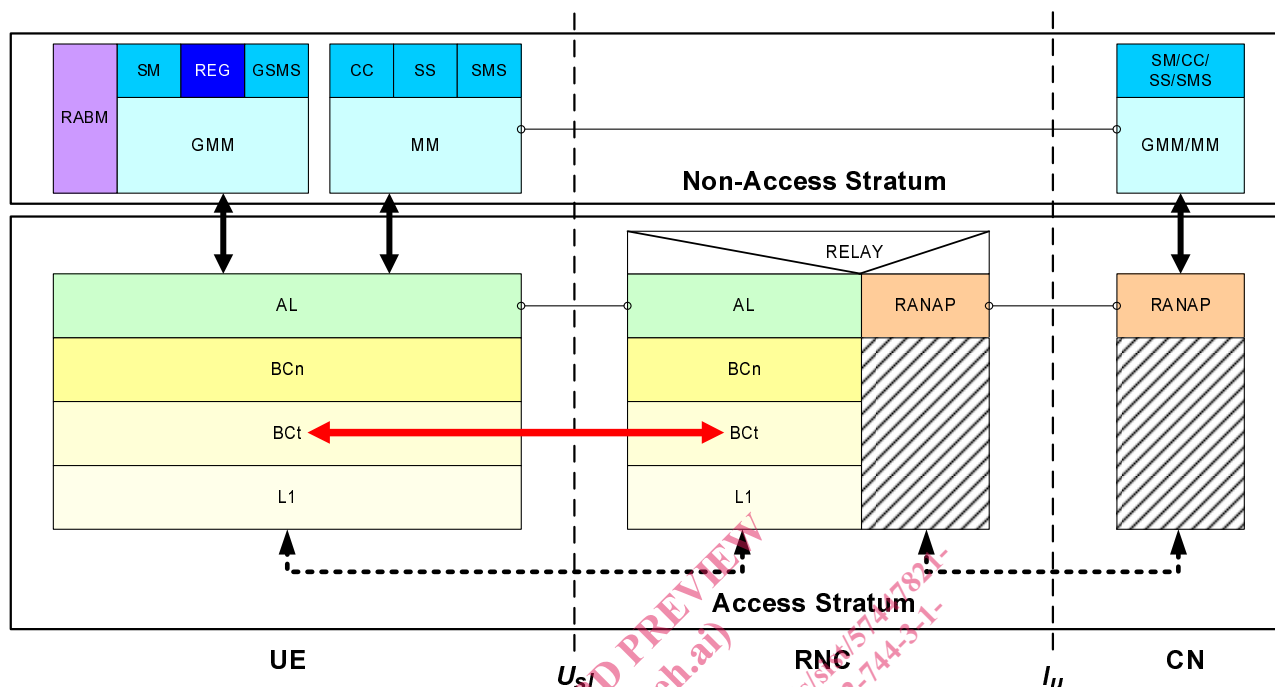


Figure 4.1: Control Plane Protocol Stack Layering with Bearer Control Layer peer-to-peer interface indicated

4.2 Bearer Control Layer

The Bearer Control Layer includes at least one Bearer Control process, which operates over and manages specific Bearer Types (physical layer specifications for the Shared Access Bearer). The detailed behaviour of the Bearer Control process, and the interface definitions for peer-peer communication of the Bearer Control processes are unique to the particular Bearer Control Type, although the Bearer Control Layer as a whole provides the following functionality:

- transfer of Bearer Connection PDUs and Common Signalling PDUs between RNC and UE using the available physical layer capabilities;
- link adaptation to compensate for mobile transmission characteristics as required;
- scheduling of transmissions to match mobile transceiver capabilities and mode of operation (for example sleep mode and multi-channel operation);
- connection admission control for the purposes of determining the available quality of service for a connection which has requested a certain capacity;
- management of satellite resources (by means of allocation and deallocation of physical bearers) in such a way as to keep the risk of failing to meet the quality of service agreed on a connection basis acceptably low whilst keeping overall bearer efficiencies high.

The Bearer Control Layer Protocol Data Unit (PDU) structure and peer-peer Bearer Control Layer Signalling Data Unit (SDU) definitions are described in the present document.

4.3 Conventions used in the present document

4.3.1 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.

4.3.2 "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 1: 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.

NOTE 2: It should be noted that UEs may only support a lower RI-Version than the one supported by the RNC (the RI-Version is defined in ETSI TS 102 744-3-5 [13], clause 6.1.2.2). In this case, it is likely that Broadcast SDUs/AVPs transmitted by the RNC contain values that are considered as "reserved" by those UEs.

4.3.3 Boolean Variables

BOOLEAN variables shall be encoded as follows:

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

4.3.4 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 non-standard, using a structured form of packed encoding that ensures efficient packing of each encoded BCtPDU while maintaining preservation of octet boundaries for key fields. The presence or absence of optional parameters is signalled using flags which are explicitly encoded into the ASN.1 specification, and the number of elements in a list is either explicitly encoded in an ASN.1 specified field, or implicit due to a defined constraint. The encoding is represented in diagrammatic form with examples shown for each BCtPDU. The diagrams represent the encoded data structures and are normative for all data structures specified in the present document.