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650 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 - APE 7112B
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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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In the present document, modal verbs have the following meanings:

shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possible

cannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

will indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

1 Scope

The present document defines User Equipment (UE) policies that are used to configure the UE for aircraft-to-Everything (A2X) services in 5G System (5GS) based on the architectural requirements defined in 3GPP TS 23.256 [2].

The protocol aspects for A2X services in 5G System (5GS) are described in 3GPP TS 24 577 [3].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.256: "Support of Uncrewed Aerial Systems (UAS) connectivity, identification and tracking; Stage 2"

[3] 3GPP TS 24.577: "Aircraft-to-Everything (A2X) services in 5G System (5GS) protocol aspects; Stage 3"

[4] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[5] 3GPP TS 24.588: "Vehicle-to-Everything (V2X) services in 5G System (5GS); User Equipment (UE) policies; Stage 3".

[6] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

[7] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC) protocol specification".

[8] 3GPP TS 38.331: "NR; Radio Resource Control (RRC) protocol specification".

[9] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".

[10] 3GPP TS 23.003: "Numbering, addressing and identification".

3 Definitions of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

example: text used to clarify abstract rules by applying them literally.

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.256 [2] apply:

A2X communication

Direct C2 communication

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

<ABBREVIATION>	<Expansion>
A2X	Aircraft-to-everything
A2XP	A2X Policy
BRID	Broadcast remote ID
DDAA	Direct detect and avoid

4 Description of UE policy for A2X

4.1 Overview

The A2XP in 5GS include:

1) UE policies for A2X communication over PC5 (see clause 4.2);
2) UE policies for broadcast remote ID (BRID) over PC5 (see clause 4.3);
3) UE policies for direct detect and avoid (DDAA) over PC5 (see clause 4.4);
4) UE policies for direct C2 communication over PC5 (see clause 4.5); and
5) UE policies for A2X communication over Uu (see clause 4.6).

The A2XP can be delivered from the PCF to the UE. The UE policy delivery procedure is specified in 3GPP TS 24.501 [4].

4.2 UE policies for A2X communication over PC5

The UE policies for A2X communication over PC5 are defined in clause 5.2.3 of 3GPP TS 24.577 [3].

NOTE: The generic description of the UE policies for A2X communication over PC5 are specified in 3GPP TS 23.256 [2]

4.3 UE policies for broadcast remote ID (BRID) over PC5

NOTE: In this release of the specification, no specific UE policies for BRID over PC5 are defined.

4.4 UE policies for direct detect and avoid (DDAA) over PC5

The UE policies for DDAA over PC5 are defined in clause 5.2.5 of 3GPP TS 24.577 [3].

NOTE: The generic description of the UE policies for DDAA over PC5 are specified in 3GPP TS 23.256 [2].

4.5 UE policies for direct C2 communication over PC5

The UE policies for direct C2 communication over PC5 are defined in clause 5.2.6 of 3GPP TS 24.577 [3].

NOTE: The generic description of the UE policies for direct C2 communication over PC5 are specified in 3GPP TS 23.256 [2].

4.6 UE policies for A2X communication over Uu

The UE policies for A2X communication over Uu are defined in clause 5.2.4 of 3GPP TS 24.577 [3].

NOTE: The generic description of the UE policies for V2X communication over Uu are specified in 3GPP TS 23.256 [2].

5 Encoding of UE policies for A2X

5.1 Overview

The UE policies for A2X communication, BRID, DDAA, and direct C2 communication are provided to the UE in an A2X policy (A2XP) UE policy part using the UE policy delivery service as specified in 3GPP TS 24.501 [4] annex D.

5.2 Encoding of A2X policy (A2XP) UE policy part

5.2.1 General

The purpose of the A2XP is to indicate UE policies for A2X communication, BRID, DDAA, and direct C2 communication.

The A2XP is encoded as shown in figures 5.2.1.1 to 5.2.1.3 and table 5.2.1.1 according to the UE policy part top level format (see annex D of 3GPP TS 24.501 [4]).

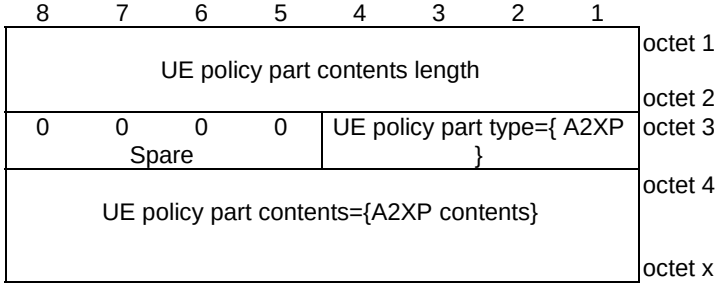


Figure 5.2.1.1: UE policy part when UE policy part type = {A2XP}

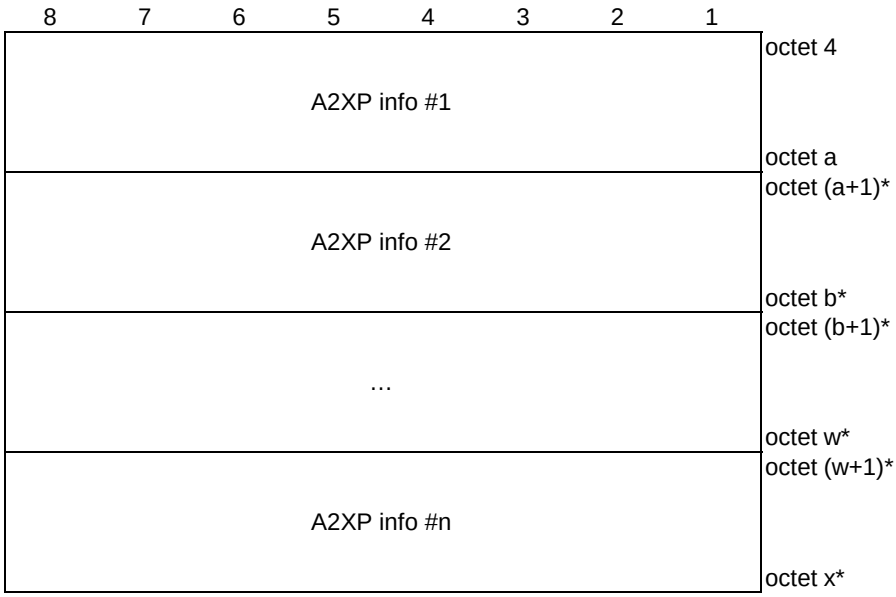


Figure 5.2.1.2: A2XP contents

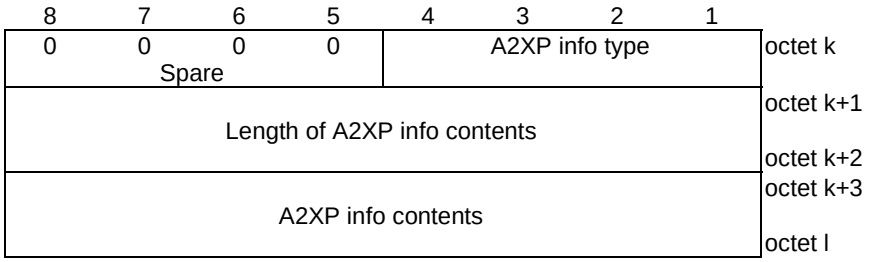


Figure 5.2.1.3: A2XP info

Table 5.2.1.1: A2XP information format

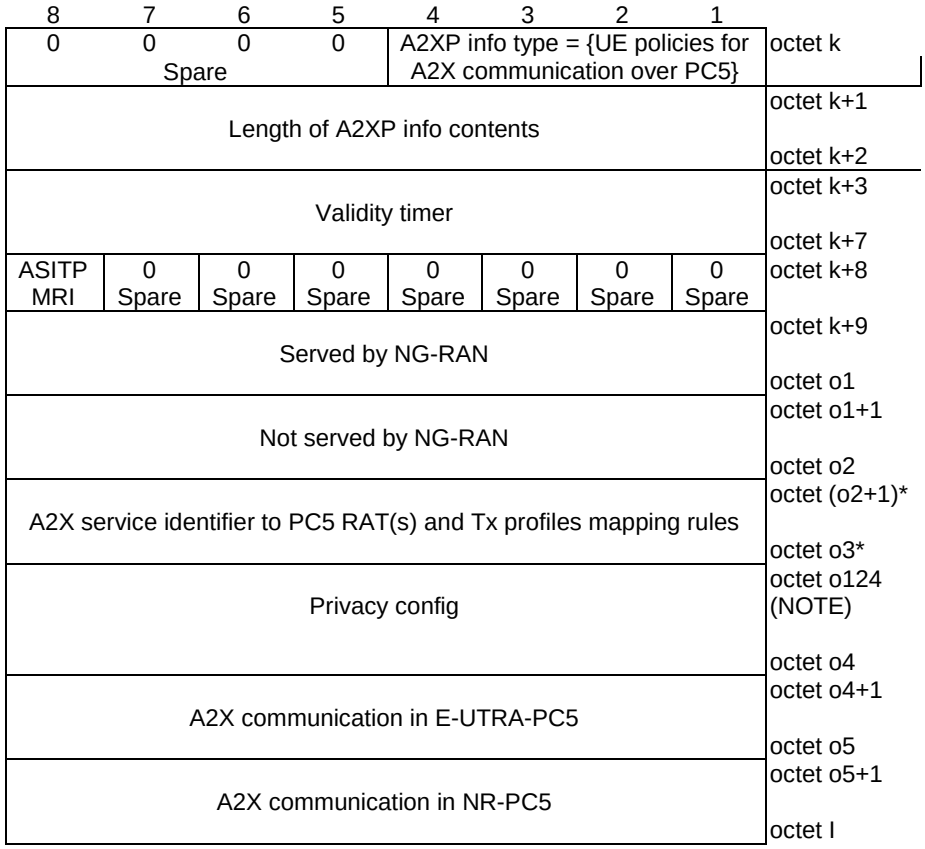
UE policy part type field is set to '0101' (=A2XP) as specified in 3GPP TS 24.501 [4] annex D. UE policy part contents length field indicate the length of the A2XP contents in octets. A2XP contents (octets 4 to x) A2XP contents consist of 1 or more A2XP info(s) (see figure 5.2.1.2). A2XP info type (bit 1 to 4 of octet k) shall be set according to the following: Bits **4 3 2 1** 0 0 0 1 UE policies for A2X communication over PC5 0 0 1 0 UE policies for BRID over PC5 0 0 1 1 UE policies for DDAA over PC5 0 1 0 0 UE policies for direct C2 communication over PC5 0 1 0 1 UE policies for A2X communication over Uu All other values are reserved. Bits 8 to 5 of octet k are spare and shall be encoded as zero. Length of A2XP info contents (octets k+1 to k+2) indicates the length of the A2XP info contents field. A2XP info contents (octets k+3 to l) can be UE policies for A2X communication over PC5 (see clause 5.3.1), UE policies for BRID over PC5 (see clause 5.4.1), UE policies for DDAA over PC5 (see clause 5.5.1) or UE policies for direct C2 communication over PC5 (see clause 5.6.1).

5.3 Encoding of UE policies for A2X communication over PC5

5.3.1 General

The UE policies for A2X communication over PC5 are coded as shown in figures 5.3.2.1 and table 5.3.2.1.

5.3.2 Information elements coding



NOTE: The field is placed immediately after the last present preceding field.

Figure 5.3.2.1: A2XP info = {UE policies for A2X communication over PC5}

Table 5.3.2.1: A2XP info = {UE policies for A2X communication over PC5}

A2XP info type (bit 1 to 4 of octet k) shall be set to "0001" (UE policies for A2X communication over PC5) Length of A2XP info contents (octets k+1 to k+2) indicates the length of A2XP info contents. Validity timer (octet k+3 to k+7): The validity timer field provides the expiration time of validity of the UE policies for A2X communication over PC5. The validity timer field is a binary coded representation of a UTC time, in seconds since midnight UTC of January 1, 1970 (not counting leap seconds). A2X service identifier to PC5 RAT(s) and Tx profiles mapping rules indicator (ASITPMRI) The ASITPMRI bit indicates presence of the A2X service identifier to PC5 RAT(s) and Tx profiles mapping rules field. Bit **8** 0 A2X service identifier to PC5 RAT(s) and Tx profiles mapping rules field is absent 1 A2X service identifier to PC5 RAT(s) and Tx profiles mapping rules field is present Served by NG-RAN (octet k+9 to o1): The served by NG-RAN field is coded according to figure 5.3.2.2 and table 5.3.2.2, and contains configuration parameters for A2X communication over PC5 when the UE is served by NG-RAN. Not served by NG-RAN (octet o1+1 to o2): The not served by NG-RAN field is coded according to figure 5.3.2.5 and table 5.3.2.5, and contains configuration parameters for A2X communication over PC5 when the UE is not served by NG-RAN. A2X service identifier to PC5 RAT(s) and Tx profiles mapping rules (octet o2+1 to o3): The A2X service identifier to PC5 RAT(s) and Tx profiles mapping rules field is coded according to figure 5.3.2.12 and table 5.3.2.12, and contains a list of A2X service identifier to PC5 RAT(s) and Tx profiles mapping rules. Privacy config (octet o124 to o4): The privacy config field is coded according to figure 5.3.2.11 and table 5.3.2.11, and contains configuration parameters for privacy configuration. A2X communication in E-UTRA-PC5 (octet o4+1 to o5): The A2X communication in E-UTRA-PC5 field is coded according to figure 5.3.2.20 and table 5.3.2.20, and contains configuration parameters for A2X communication in E-UTRA-PC5. A2X communication in NR-PC5 (octet o5+1 to l): The A2X communication in NR-PC5 field is coded according to figure 5.3.2.32 and table 5.3.2.32, and contains configuration parameters for A2X communication in NR-PC5. If the length of A2XP info contents field is bigger than indicated in figure 5.3.2.1, receiving entity shall ignore any superfluous octets located at the end of the A2XP info contents.

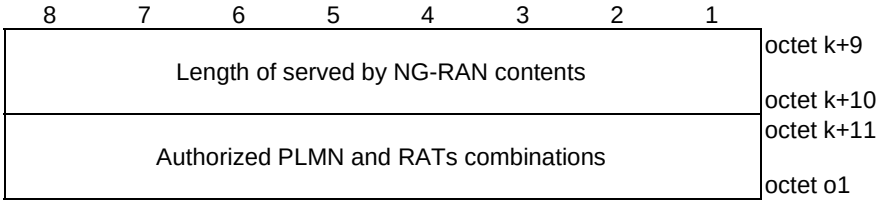


Figure 5.3.2.2: Served by NG-RAN

Table 5.3.2.2: Served by NG-RAN

Authorized PLMN and RATs combinations (octet k+11 to o1): The authorized PLMN and RATs combinations field is coded according to figure 5.3.2.3 and table 5.3.2.3. If the length of served by NG-RAN contents field is bigger than indicated in figure 5.3.2.2, receiving entity shall ignore any superfluous octets located at the end of the served by NG-RAN contents.

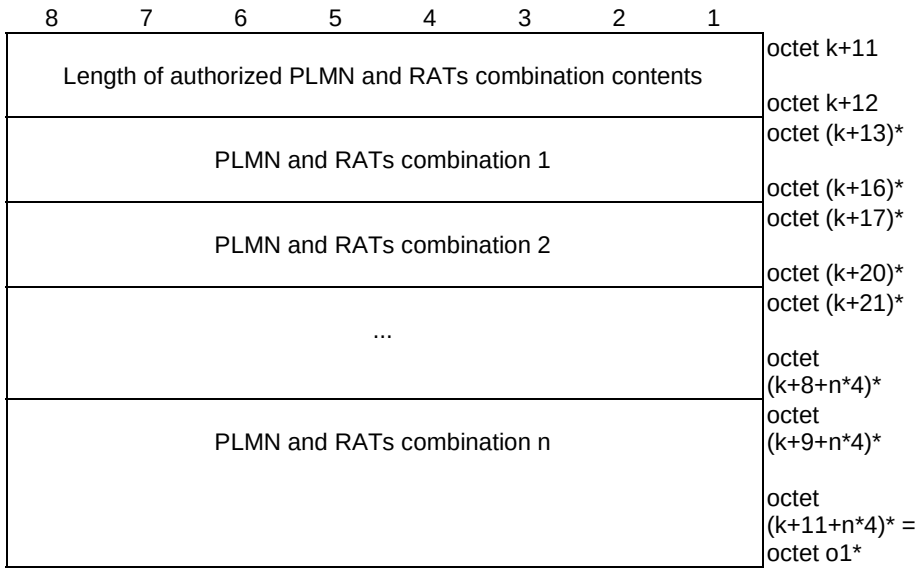


Figure 5.3.2.3: Authorized PLMN and RATs combination

Table 5.3.2.3: Authorized PLMN and RATs combination

Authorized PLMN and RATs combination: The authorized PLMN and RATs combination field is coded according to figure 5.3.2.4 and table 5.3.2.4.

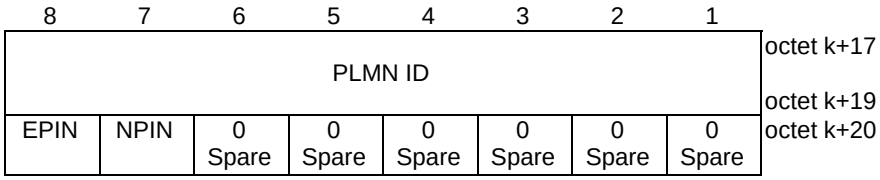


Figure 5.3.2.4: Authorized PLMN and RATs combination

Table 5.3.2.4: Authorized PLMN and RATs combination

PLMN ID: The PLMN ID field is coded according to figure 5.3.2.5 and table 5.3.2.5. E-UTRA-PC5 indicator when served by NG-RAN (EPIN): The EPIN bit indicates whether the UE is authorized to use A2X communication over E-UTRA-PC5 in the PLMN indicated by the PLMN ID field when served by NG-RAN. Bit **8** 0 Not authorized 1 Authorized NR-PC5 indicator when served by NG-RAN (NPIN): The NPIN bit indicates whether the UE is authorized to use A2X communication over NR-PC5 in the PLMN indicated by the PLMN ID field when served by NG-RAN. Bit **7** 0 Not authorized 1 Authorized

8	7	6	5	4	3	2	1	
MCC digit 2				MCC digit 1				octet k+17
MNC digit 3				MCC digit 3				octet k+18
MNC digit 2				MNC digit 1				octet k+19

Figure 5.3.2.5: PLMN ID

Table 5.3.2.5: PLMN ID

Mobile country code (MCC) (octet k+17, octet k+18 bit 1 to 4): The MCC field is coded as in ITU-T Recommendation E.212 [5], annex A. Mobile network code (MNC) (octet k+18 bit 5 to 8, octet k+19): The coding of MNC field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111".

8	7	6	5	4	3	2	1	
Length of not served by NG-RAN contents								octet o1+1 octet o1+2
EINN	NINN	0 Spare	0 Spare	0 Spare	0 Spare	0 Spare	ANNI	octet o1+3
E-UTRA radio parameters per altitude range per geographical area list								octet (o1+4)* octet o16*
NR radio parameters per altitude range per geographical area list								octet (o16+1)* octet o2*

Figure 5.3.2.6: Not served by NG-RAN

Table 5.3.2.6: Not served by NG-RAN

A2X communication over PC5 when not served by NG-RAN indicator (ANNI) (octet o1+3 bit 1): The ANNI bit indicates whether the UE is authorized to use A2X communication over PC5 when not served by NG-RAN. Bit **1** 0 Not authorized 1 Authorized E-UTRA-PC5 indicator when not served by NG-RAN (EINN) (octet o1+3 bit 8): The EINN bit indicates whether the UE is authorized to use A2X communication over E-UTRA-PC5 when not served by NG-RAN. Bit **8** 0 Not authorized 1 Authorized NR-PC5 indicator when not served by NG-RAN (NINN) (octet o1+3 bit 7): The NINN bit indicates whether the UE is authorized to use A2X communication over NR-PC5 when not served by NG-RAN. Bit **7** 0 Not authorized 1 Authorized E-UTRA radio parameters per altitude range per geographical area list (octet o1+4 to o16): If ENNI bit is set to "Authorized", the E-UTRA radio parameters per altitude range per geographical area list field is present otherwise the NR radio parameters per altitude range per geographical area list field is absent. It is coded according to figure 5.3.2.7 and table 5.3.2.7. NR radio parameters per altitude range per geographical area list (octet o16+1 to o2): If PNNI bit is set to "Authorized", the NR radio parameters per altitude range per geographical area list field is present otherwise the NR radio parameters per altitude range per geographical area list field is absent. It is coded according to figure 5.3.2.7 and table 5.3.2.7. If the length of not served by NG-RAN contents field is bigger than indicated in figure 5.3.2.6, receiving entity shall ignore any superfluous octets located at the end of the not served by NG-RAN contents.

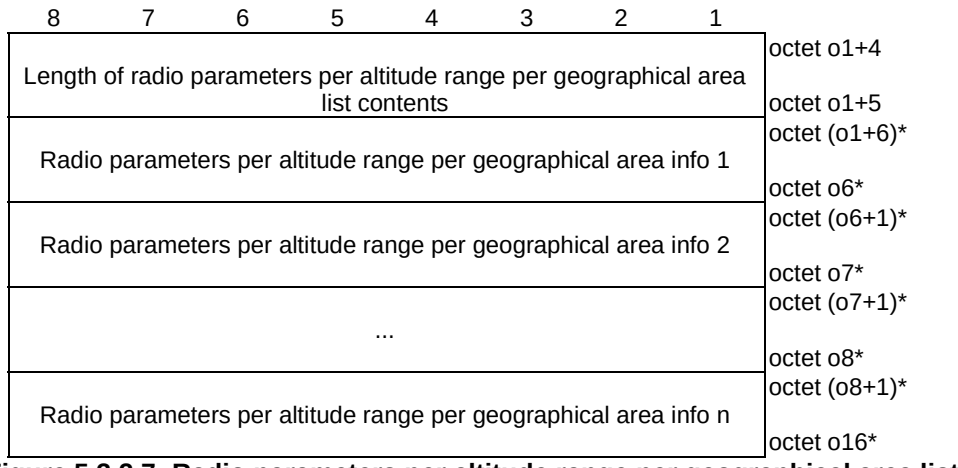


Figure 5.3.2.7: Radio parameters per altitude range per geographical area list

Table 5.3.2.7: Radio parameters per altitude range per geographical area list

Radio parameters per altitude range per geographical area info: The radio parameters per altitude range per geographical area info field is coded according to figure 5.3.2.8 and table 5.3.2.8.

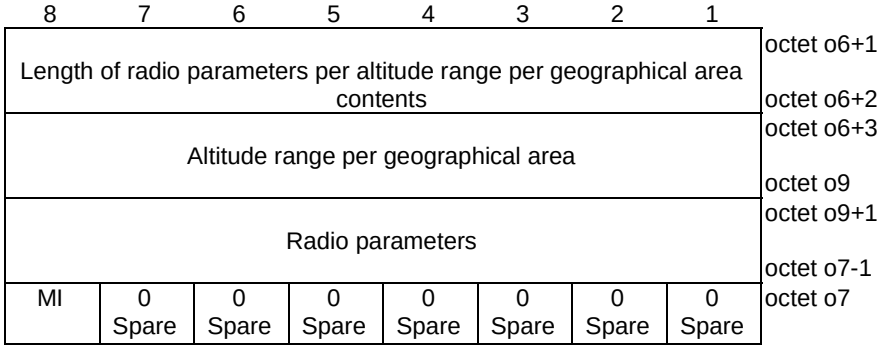


Figure 5.3.2.8: Radio parameters per altitude range per geographical area info

Table 5.3.2.8: Radio parameters per altitude range per geographical area info

Altitude range per geographical area (octet o6+3 to o9): The altitude range per geographical area field is coded according to figure 5.3.2.9 and table 5.3.2.9. Radio parameters (octet o9 to o7-1): The radio parameters field is coded according to figure 5.3.2.11 and table 5.3.2.11, applicable in the altitude range per geographical area indicated by the altitude range per geographical area field when not served by NG-RAN. Managed indicator (MI) (octet o7 bit 8): The managed indicator indicates how the radio parameters indicated in the radio parameters field in the altitude range per geographical area indicated by the altitude range per geographical area field are managed. Bit **8** 0 Non-operator managed 1 Operator managed If the length of radio parameters per altitude range per geographical area contents field is bigger than indicated in figure 5.3.2.8, receiving entity shall ignore any superfluous octets located at the end of the radio parameters per altitude range per geographical area contents.

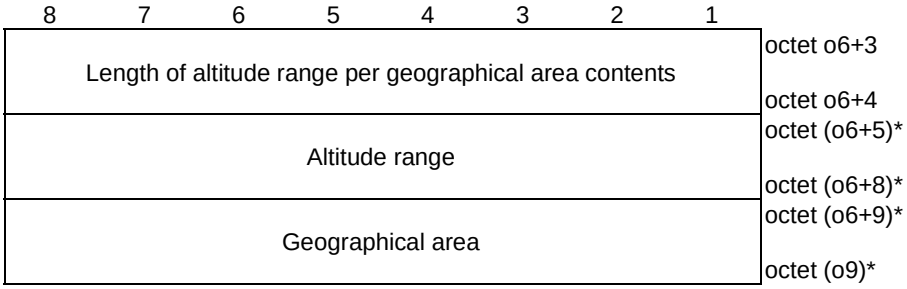


Figure 5.3.2.9: Altitude range per geographical area

Table 5.3.2.9: Altitude range per geographical area

Altitude range: The altitude range per coordinate field is coded according to figure 5.3.2.10 and table 5.3.2.10. Geographical area: The geographical area field is coded according to figure 5.3.2.11 and table 5.3.2.11.

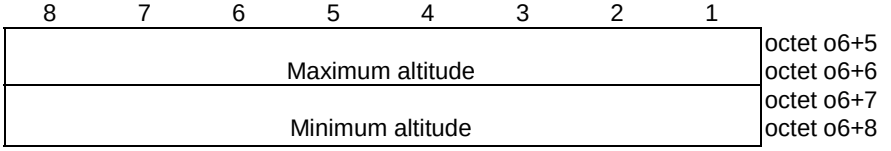


Figure 5.3.2.10: Altitude range

Table 5.3.2.10: Altitude range

Maximum altitude: The maximum altitude field is coded according to clause 6.3 of 3GPP TS 23.032 [7]. Minimum altitude: The minimum altitude field is coded according to clause 6.3 of 3GPP TS 23.032 [7].

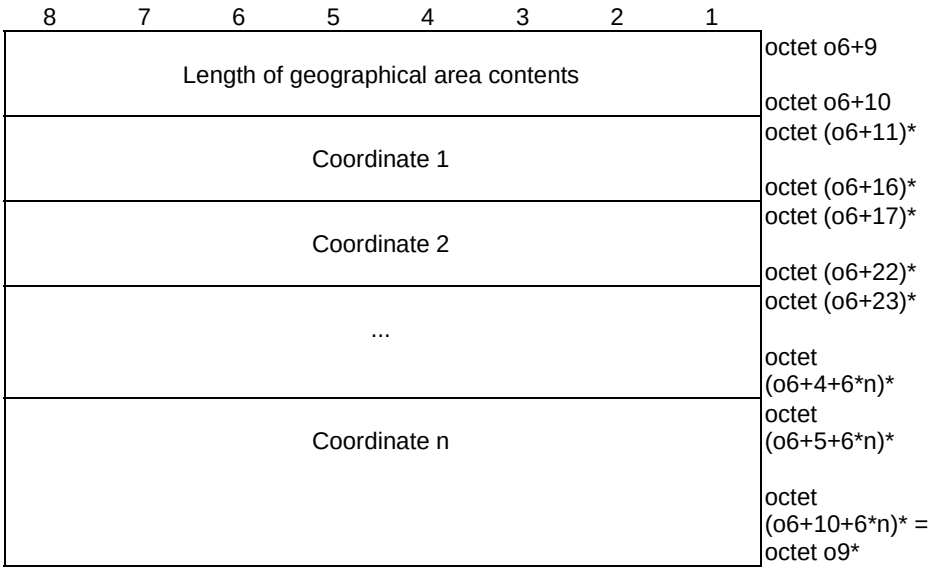


Figure 5.3.2.11: Geographical area

Table 5.3.2.11: Geographical area

Coordinate: The coordinate field is coded according to figure 5.3.2.12 and table 5.3.2.12.

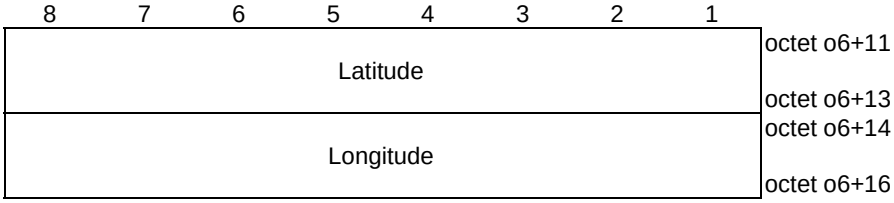


Figure 5.3.2.12: Coordinate area

Table 5.3.2.12: Coordinate area

Latitude: The latitude field is coded according to clause 6.1 of 3GPP TS 23.032 [7]. Longitude: The longitude field is coded according to clause 6.1 of 3GPP TS 23.032 [7].

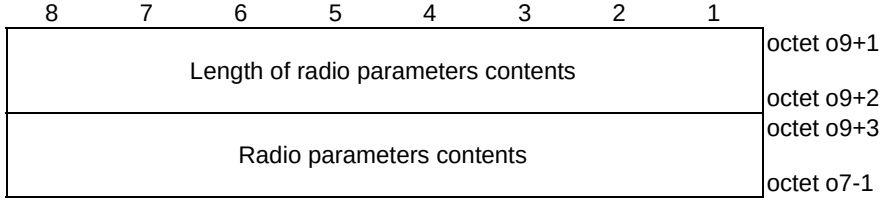


Figure 5.3.2.13: Radio parameters

Table 5.3.2.13: Radio parameters

Radio parameters contents: In E-UTRA radio parameters per altitude range per geographical area list, radio parameters are defined as *SL-V2X-Preconfiguration* in clause 9 of 3GPP TS 36.331 [7]. In NR radio parameters per altitude range per geographical area list, radio parameters are defined as *SL-PreconfigurationNR* in clause 9.3 of 3GPP TS 38.331 [8].

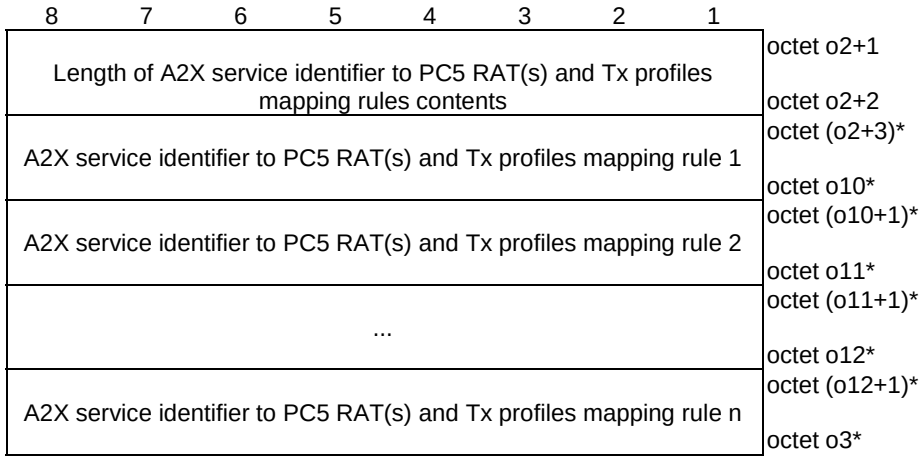
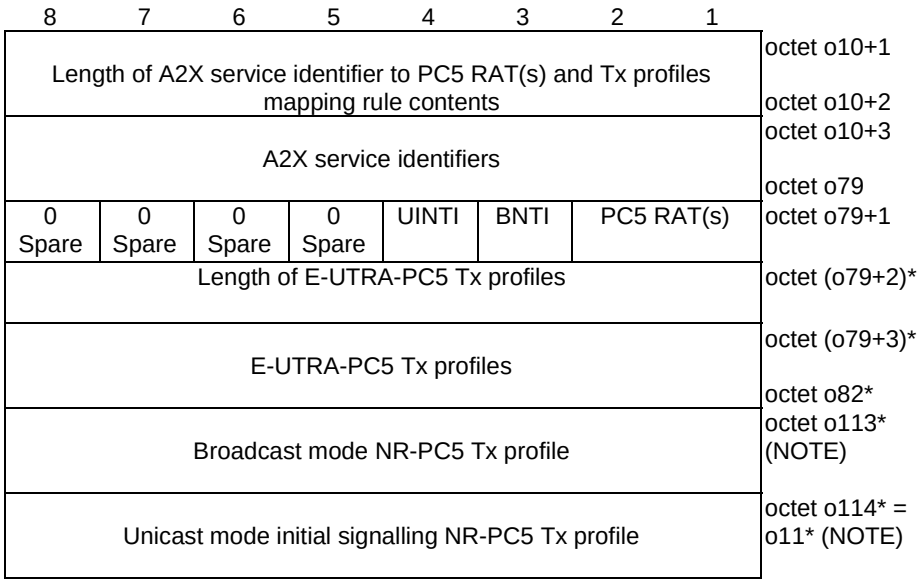


Figure 5.3.2.14: A2X service identifier to PC5 RAT(s) and Tx profiles mapping rules

Table 5.3.2.14: A2X service identifier to PC5 RAT(s) and Tx profiles mapping rules

A2X service identifier to PC5 RAT(s) and Tx profiles mapping rule: The A2X service identifier to PC5 RAT(s) and Tx profiles mapping rule field is coded according to figure 5.3.2.15 and table 5.3.2.15.



NOTE: The field is placed immediately after the last present preceding field.

Figure 5.3.2.15: A2X service identifier to PC5 RAT(s) and Tx profiles mapping rule

Table 5.3.2.15: A2X service identifier to PC5 RAT(s) and Tx profiles mapping rule

A2X service identifiers:
The A2X service identifiers field is coded according to figure 5.3.2.16 and table 5.3.2.16.

Unicast mode initial signalling NR-PC5 Tx profile indicator (UINTI)
The UINTI bit indicates presence of the unicast mode NR-PC5 Tx profile field.
Bit
4
0 unicast mode initial signalling NR-PC5 Tx profile field is absent
1 unicast mode initial signalling NR-PC5 Tx profile field is present

Broadcast mode NR-PC5 Tx profile indicator (BNTI)
The BGNTI bit indicates presence of the broadcast mode NR-PC5 Tx profile field.
Bit
3
0 broadcast mode NR-PC5 Tx profile field is absent
1 broadcast mode NR-PC5 Tx profile field is present

If the PC5 RAT field is set to "E-UTRA-PC5", then the BGNTI bit is set to "broadcast mode NR-PC5 Tx profile field is absent" and the UINTI bit is set to "unicast mode initial signalling NR-PC5 Tx profile field is absent". If the PC5 RAT field is set to "NR-PC5" or "Both E-UTRA-PC5 and NR-PC5", then the BNTI bit can be set to "broadcast mode NR-PC5 Tx profile field is absent" or "broadcast mode NR-PC5 Tx profile field is present", and the UINTI bit can be set to "unicast mode initial signalling NR-PC5 Tx profile field is absent" or "unicast mode initial signalling NR-PC5 Tx profile field is present".

PC5 RAT(s):
The PC5 RAT(s) field indicates the PC5 RAT(s) mapped to the A2X service identifiers.
Bits
2 1
0 0 E-UTRA-PC5
0 1 NR-PC5
1 0 Both E-UTRA-PC5 and NR-PC5
All other values are spare.

If the PC5 RAT field is set to "E-UTRA-PC5" or "Both E-UTRA-PC5 and NR-PC5", the length of E-UTRA-PC5 Tx profiles field and the E-UTRA-PC5 Tx profiles field are present otherwise the length of E-UTRA-PC5 Tx profiles field and the E-UTRA-PC5 Tx profiles field are absent. If the PC5 RAT field is set to a spare value, the receiving entity shall ignore the A2X service identifier to PC5 RAT(s) and Tx profiles mapping rule.

E-UTRA-PC5 Tx profiles:
The E-UTRA-PC5 Tx profiles field is coded as *v2x-TxProfileList* in clause 9.3.2 of 3GPP TS 36.331 [7].

Broadcast mode NR-PC5 Tx profile field:
The broadcast mode NR-PC5 Tx profile field indicates NR Tx profile corresponding to the NR-PC5 for broadcast mode V2X communication over PC5.
The broadcast mode NR-PC5 Tx profile field is coded as *SL-TxProfile-r17* in clause 9.3 of 3GPP TS 38.331 [8].

Unicast mode initial signalling NR-PC5 Tx profile field:
The unicast mode initial signalling NR-PC5 Tx profile field indicates NR Tx profile corresponding to transmitting and receiving initial signalling of the PC5 unicast link establishment.
The unicast mode initial signalling NR-PC5 Tx profile field is coded as *SL-TxProfile-r17* in clause 9.3 of 3GPP TS 38.331 [8].

If the length of A2X service identifier to PC5 RAT(s) and Tx profiles mapping rule contents field indicates a length bigger than indicated in figure 5.3.2.13, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier to PC5 RAT(s) and Tx profiles mapping rule contents.

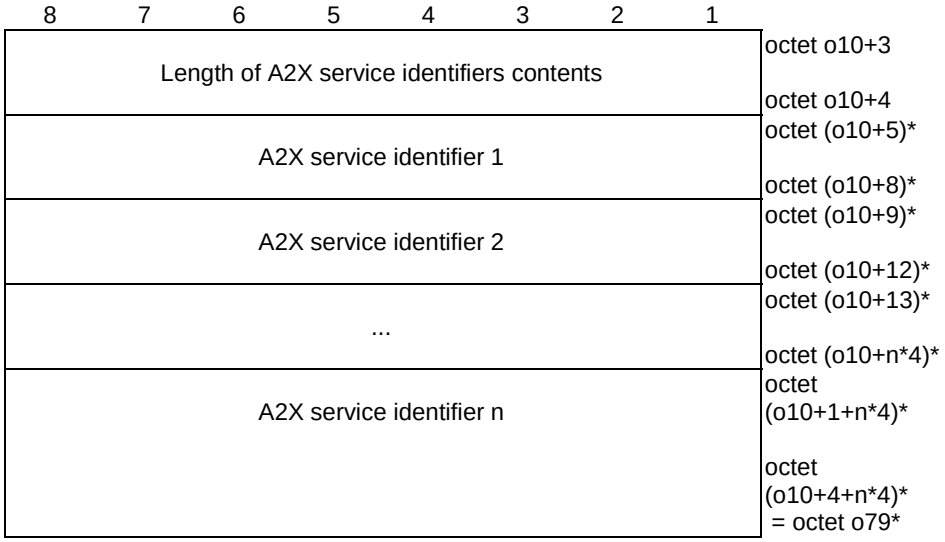


Figure 5.3.2.16: A2X service identifiers

Table 5.3.2.16: A2X service identifiers

A2X service identifier: The A2X service identifier field contains a binary coded A2X service identifier which indicates an application of A2X service (e.g., BRID, DDAA, Direct C2 communication, ground-based DAA for an area, or any other services using A2X communication). The format of A2X service identifier is out of scope of this specification.

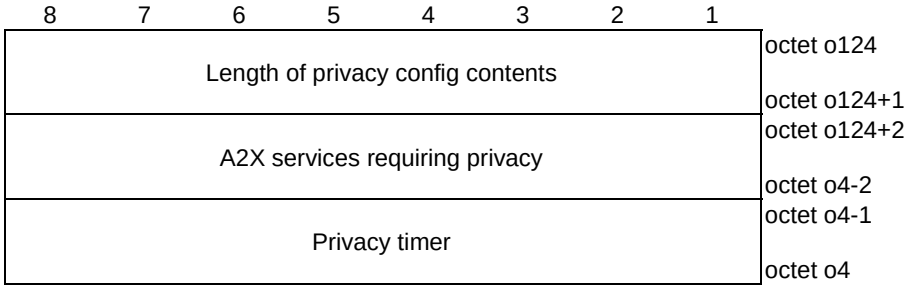


Figure 5.3.2.17: Privacy config

Table 5.3.2.17: Privacy config

A2X services requiring privacy (octet o2+3 to o4-2): The A2X applications requiring privacy field is coded according to figure 5.3.2.18 and table 5.3.2.18. Privacy timer (octet o4-1, octet o4): The privacy timer field contains binary encoded duration, in units of seconds, after which the UE shall change the source Layer-2 ID self-assigned by the UE while performing transmission of A2X communication over the PC5 when privacy is required. If the length of privacy config contents field is bigger than indicated in figure 5.3.2.17, receiving entity shall ignore any superfluous octets located at the end of the privacy config contents.

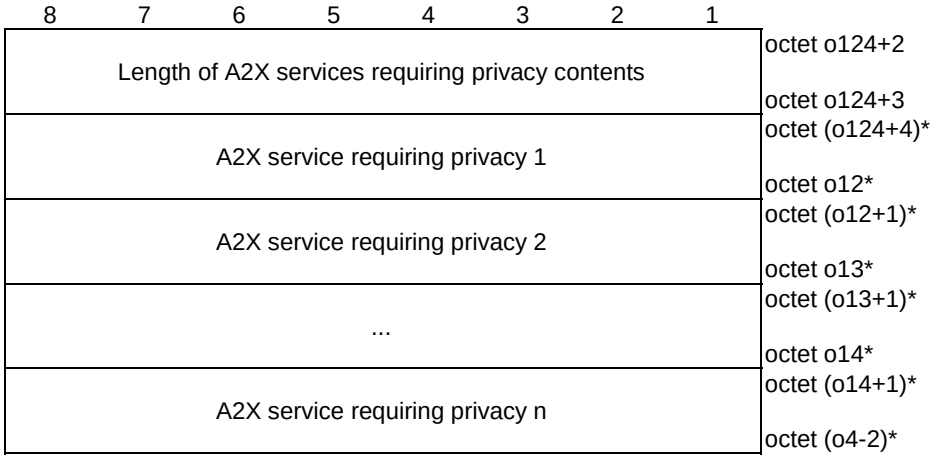


Figure 5.3.2.18: A2X services requiring privacy

Table 5.3.2.18: A2X services requiring privacy

A2X service requiring privacy: The A2X service requiring privacy field is coded according to figure 5.3.2.19 and table 5.3.2.19.

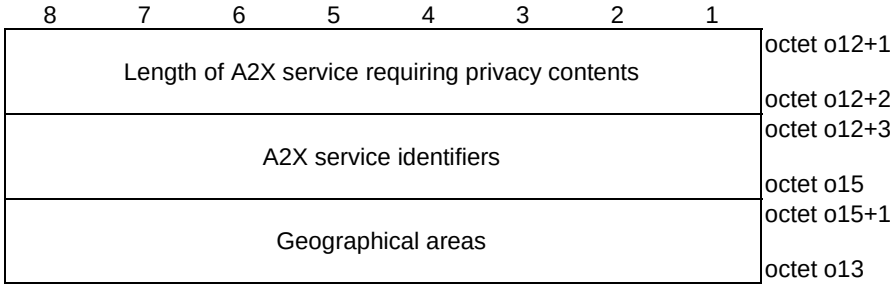
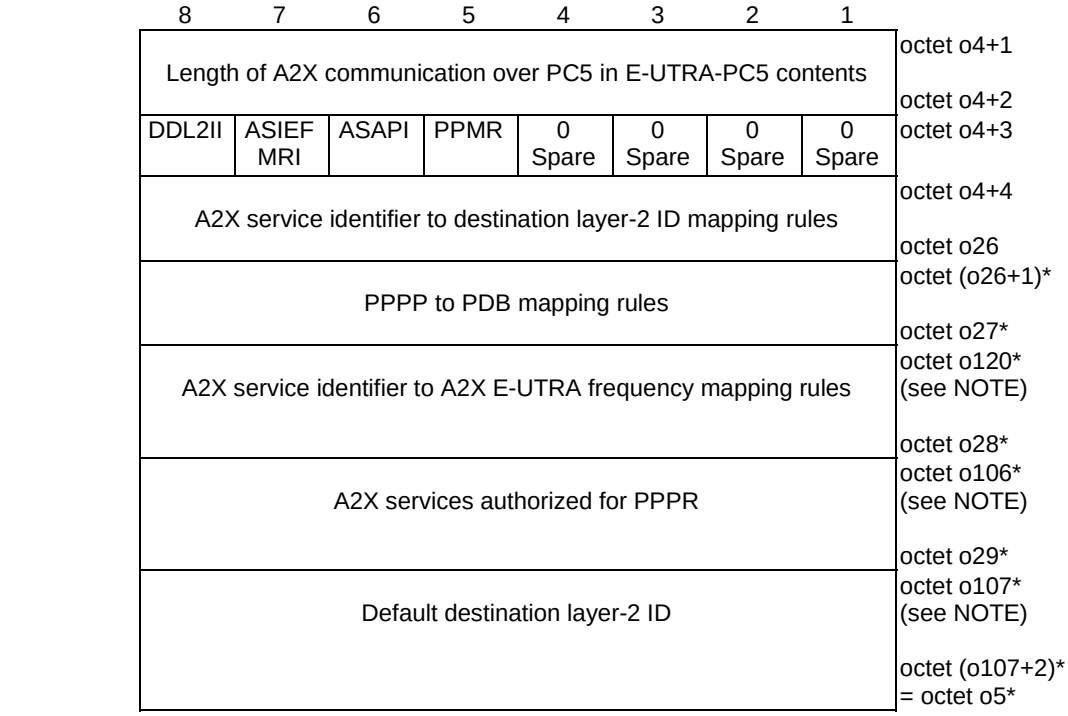


Figure 5.3.2.19: A2X service requiring privacy

Table 5.3.2.19: A2X service requiring privacy

A2X service identifiers (octet o12+3 to o15): The A2X service identifiers field is coded according to figure 5.3.2.14 and table 5.3.2.14. Geographical areas (octet o15+1 to o13): The geographical areas field is coded according to figure 5.3.2.11 and table 5.3.2.11. If the length of A2X service requiring privacy contents field is bigger than indicated in figure 5.3.2.19, receiving entity shall ignore any superfluous octets located at the end of the A2X service requiring privacy contents.



NOTE: The field is placed immediately after the last present preceding field.

Figure 5.3.2.20: A2X communication over PC5 in E-UTRA-PC5

Table 5.3.2.20: A2X communication over PC5 in E-UTRA-PC5

Default destination layer-2 ID indicator (DDL2II):
The DDL2II bit indicates presence of the default destination layer-2 ID field.
Bit
8
0 Default destination layer-2 ID field is absent
1 Default destination layer-2 ID field is present

A2X service identifier to A2X E-UTRA frequency mapping rules indicator (ASIEFMRI):
The ASIEFMRI bit indicates presence of the A2X service identifier to A2X E-UTRA frequency mapping rules field.
Bit
7
0 A2X service identifier to A2X E-UTRA frequency mapping rules field is absent
1 A2X service identifier to A2X E-UTRA frequency mapping rules field is present

A2X services authorized for PPPR indicator (ASAPI):
The ASAPI bit indicates presence of the A2X services authorized for PPPR field.
Bit
6
0 A2X services authorized for PPPR field is absent
1 A2X services authorized for PPPR field is present

PPPP to PDB mapping rules indicator (PPMRI):
The PPMRI bit indicates presence of the PPPP to PDB mapping rules field.
Bit
5
0 PPPP to PDB mapping rules field is absent
1 PPPP to PDB mapping rules field is present

A2X service identifier to destination layer-2 ID mapping rules:
The A2X service identifier to destination layer-2 ID mapping rules field is coded according to figure 5.3.2.21 and table 5.3.2.21.

PPPP to PDB mapping rules:
The PPPP to PDB mapping rules field is coded according to figure 5.3.2.23 and table 5.3.2.23.

A2X service identifier to A2X E-UTRA frequency mapping rules:
The A2X service identifier to A2X E-UTRA frequency mapping rules field is coded according to figure 5.3.2.25 and table 5.3.2.25.

A2X services authorized for PPPR:
The A2X services authorized for PPPR field is coded according to figure 5.3.2.29 and table 5.3.2.29.

Default destination layer-2 ID:
The default destination layer-2 ID field is a binary coded layer 2 identifier.

If the length of A2X communication over PC5 in E-UTRA-PC5 contents field indicates a length bigger than indicated in figure 5.3.2.19, receiving entity shall ignore any superfluous octets located at the end of the A2X communication over PC5 in E-UTRA-PC5contents.

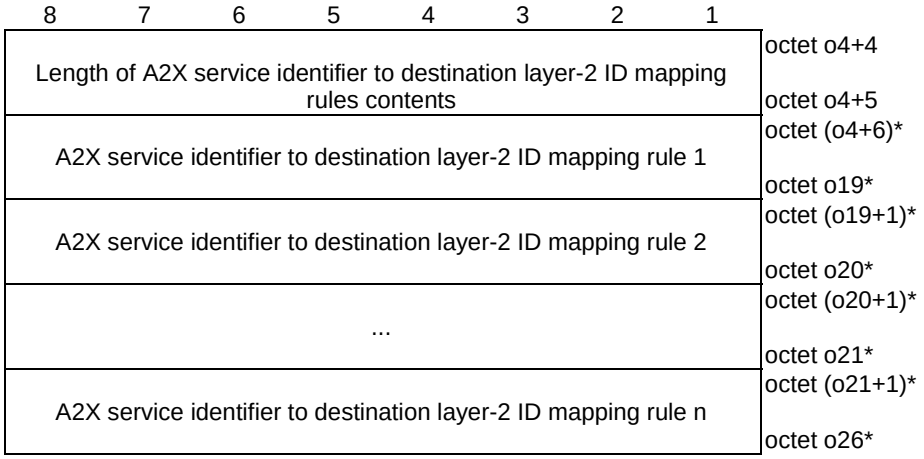


Figure 5.3.2.21: A2X service identifier to destination layer-2 ID mapping rules

Table 5.3.2.21: A2X service identifier to destination layer-2 ID mapping rules

A2X service identifier to destination layer-2 ID mapping rule: The A2X service identifier to destination layer-2 ID mapping rule field is coded according to figure 5.3.2.22 and table 5.3.2.22.

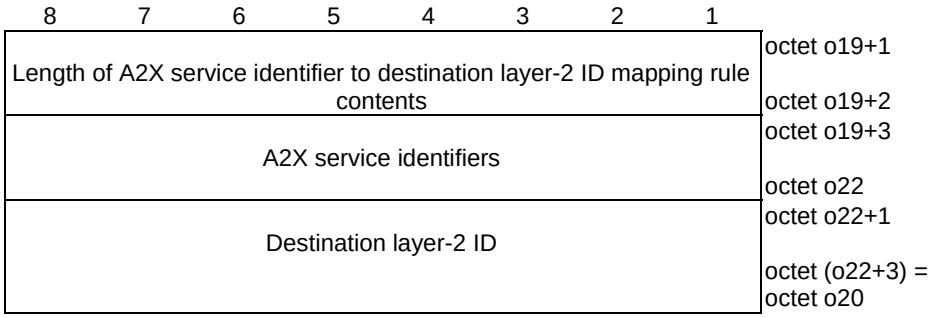


Figure 5.3.2.22: A2X service identifier to destination layer-2 ID mapping rule

Table 5.3.2.22: A2X service identifier to destination layer-2 ID mapping rule

A2X service identifiers: The A2X service identifiers field is coded according to figure 5.3.2.14 and table 5.3.2.14. Destination layer-2 ID: The destination layer-2 ID field is a binary coded layer 2 identifier. If the length of A2X service identifier to destination layer-2 ID mapping rule contents field indicates a length bigger than indicated in figure 5.3.2.21, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier to destination layer-2 ID mapping rule contents.

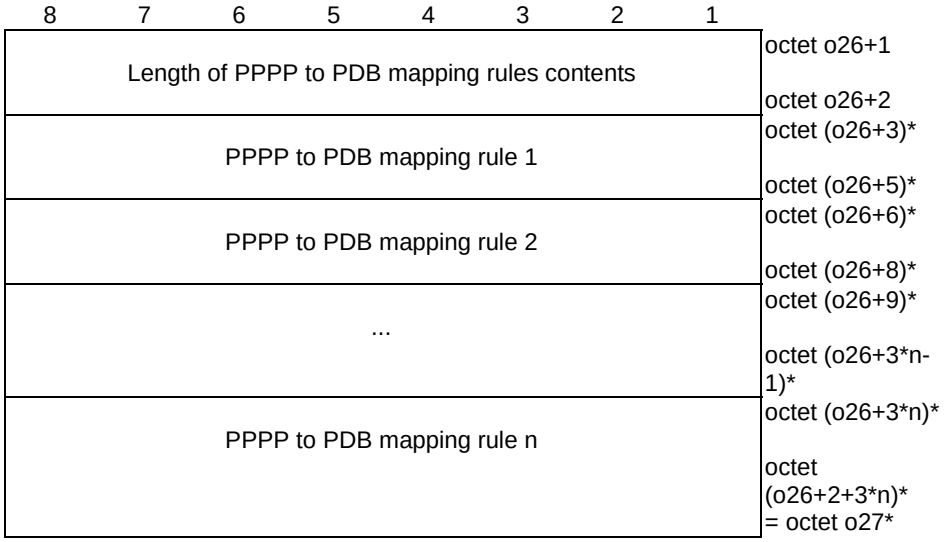


Figure 5.3.2.23: PPPP to PDB mapping rules

Table 5.3.2.23: PPPP to PDB mapping rules

PPPP to PDB mapping rule: The PPPP to PDB mapping rule field is coded according to figure 5.3.2.24 and table 5.3.2.24.

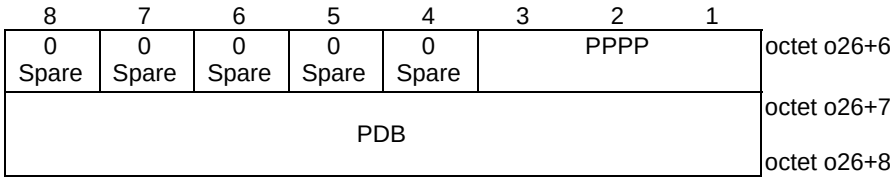


Figure 5.3.2.24: PPPP to PDB mapping rule

Table 5.3.2.24: PPPP to PDB mapping rule

ProSe per-packet priority (PPPP): The PPPP field is a ProSe per-packet priority value. Bits **3 2 1** 0 0 0 PPPP value 1 0 0 1 PPPP value 2 0 1 0 PPPP value 3 0 1 1 PPPP value 4 1 0 0 PPPP value 5 1 0 1 PPPP value 6 1 1 0 PPPP value 7 1 1 1 PPPP value 8 Packet delay budget (PDB): The PDB field indicates binary encoded the packet delay budget value in miliseconds to which the ProSe per-packet priority value indicated by the PPPP field is mapped.

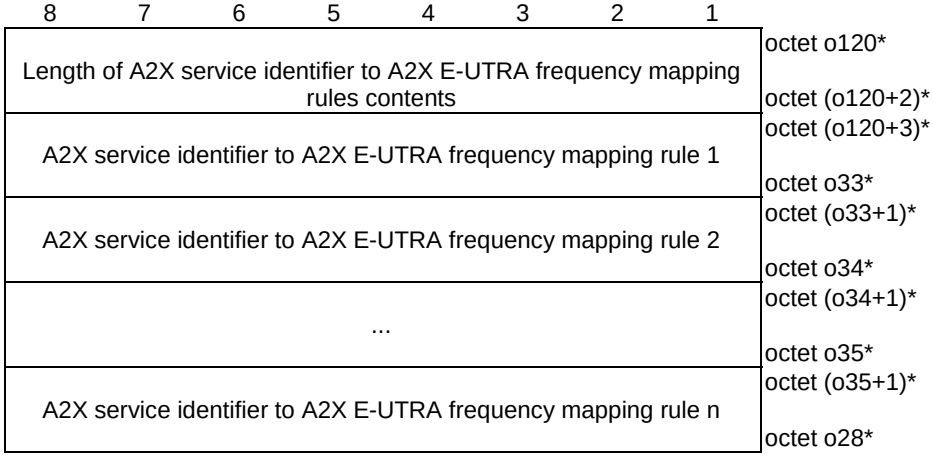


Figure 5.3.2.25: A2X service identifier to A2X E-UTRA frequency mapping rules

Table 5.3.2.25: A2X service identifier to A2X E-UTRA frequency mapping rules

A2X service identifier to A2X E-UTRA frequency mapping rule: The A2X service identifier to A2X E-UTRA frequency mapping rule is coded according to figure 5.3.2.26 and table 5.3.2.26.

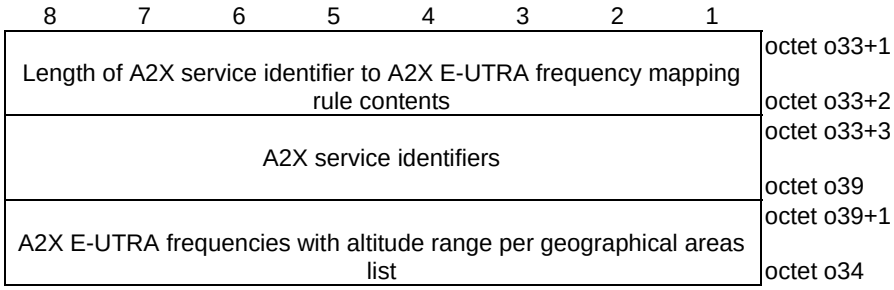


Figure 5.3.2.26: A2X service identifier to A2X E-UTRA frequency mapping rule

Table 5.3.2.26: A2X service identifier to A2X E-UTRA frequency mapping rule

A2X service identifiers: The A2X service identifiers field is coded according to figure 5.3.2.14 and table 5.3.2.14. A2X E-UTRA frequencies with altitude range per geographical areas list: The A2X E-UTRA frequencies with altitude range per geographical areas list field is coded according to figure 5.3.2.27 and table 5.3.2.27. If the length of A2X service identifier to A2X E-UTRA frequency mapping rule contents field indicates a length bigger than indicated in figure 5.3.2.26, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier to A2X E-UTRA frequency mapping rule contents.

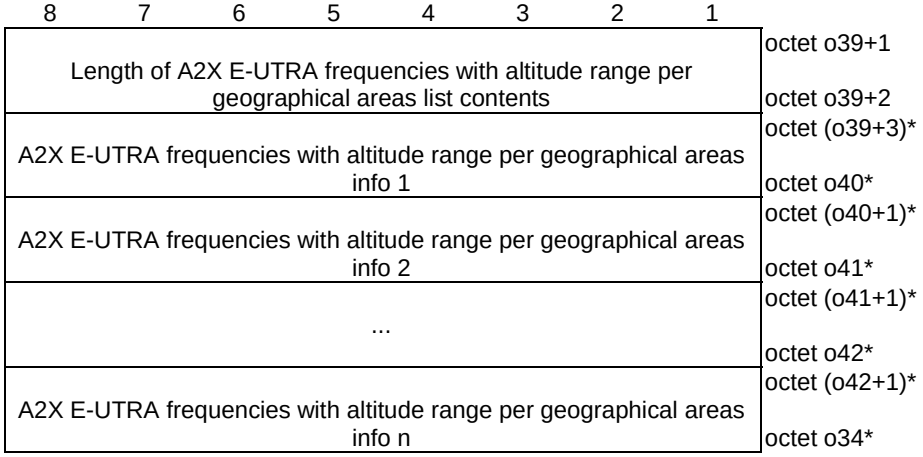


Figure 5.3.2.27: A2X E-UTRA frequencies with altitude range per geographical areas list

Table 5.3.2.27: A2X E-UTRA frequencies with geographical areas list

A2X E-UTRA frequencies with altitude range per geographical areas info: The A2X E-UTRA frequencies with altitude range per geographical areas info field is coded according to figure 5.3.2.28 and table 5.3.2.28.

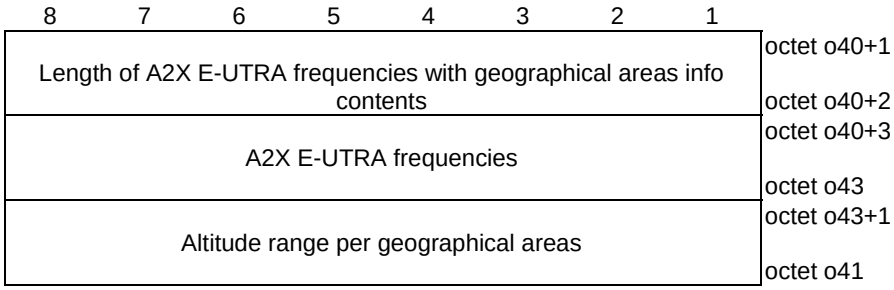


Figure 5.3.2.28: A2X E-UTRA frequencies with altitude range per geographical areas info

Table 5.3.2.28: A2X E-UTRA frequencies with altitude range per geographical areas info

A2X E-UTRA frequencies: The A2X E-UTRA frequencies field is coded according to figure 5.3.2.29 and table 5.3.2.29. Altitude range per geographical areas: The altitude range per geographical areas field is coded according to figure 5.3.2.9 and table 5.3.2.9. If the length of A2X E-UTRA frequencies with altitude range per geographical areas info contents field indicates a length bigger than indicated in figure 5.3.2.28, receiving entity shall ignore any superfluous octets located at the end of the A2X E-UTRA frequencies with altitude range per geographical areas info contents.

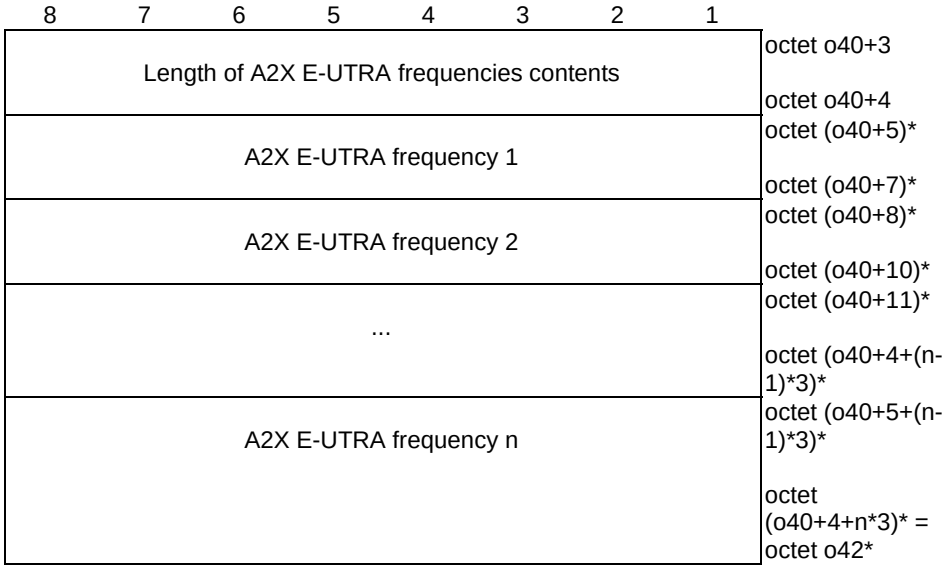


Figure 5.3.2.29: A2X E-UTRA frequencies

Table 5.3.2.29: A2X E-UTRA frequencies

A2X E-UTRA frequency: A2X E-UTRA frequency is coded according to the EARFCN value defined in 3GPP TS 36.101 [xx].

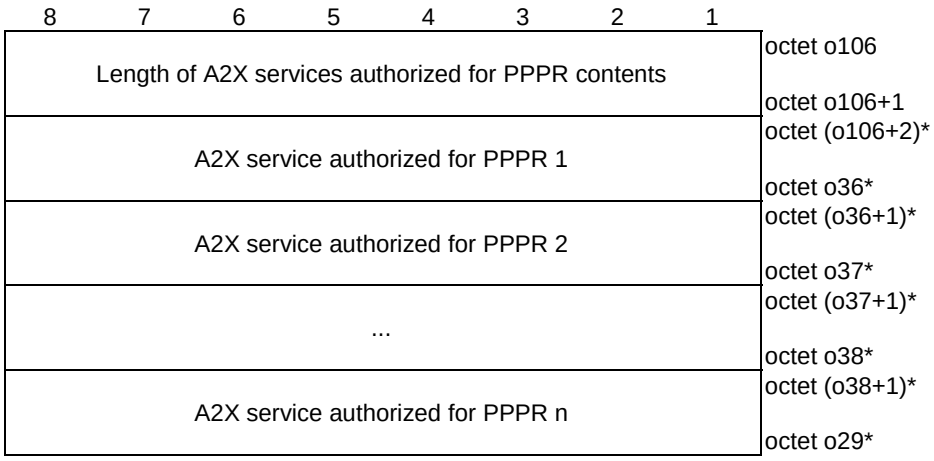


Figure 5.3.2.30: A2X services authorized for PPPR

Table 5.3.2.30: A2X services authorized for PPPR

A2X service authorized for PPPR: The A2X services authorized for PPPR field is coded according to figure 5.3.2.31 and table 5.3.2.31.

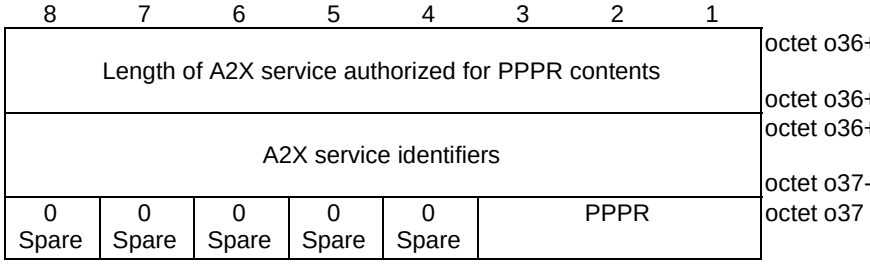


Figure 5.3.2.31: A2X service authorized for PPPR

Table 5.3.2.31: A2X service authorized for PPPR

A2X service identifiers: The A2X service identifiers field is coded according to figure 5.3.2.14 and table 5.3.2.14. ProSe per-packet reliability (PPPR): The PPPR field is a ProSe per-packet reliability value. Bits **3 2 1** 0 0 0 PPPR value 1 0 0 1 PPPR value 2 0 1 0 PPPR value 3 0 1 1 PPPR value 4 1 0 0 PPPR value 5 1 0 1 PPPR value 6 1 1 0 PPPR value 7 1 1 1 PPPR value 8 If the length of A2X service authorized for PPPR contents field indicates a length bigger than indicated in figure 5.3.2.31, receiving entity shall ignore any superfluous octets located at the end of the A2X service authorized for PPPR contents.

8	7	6	5	4	3	2	1	
Length of A2X communication over PC5 in NR-PC5 contents								octet o5+1 octet o5+2
DDL2I BI	ASINF MRI	PDBUI	0 Spare	0 Spare	0 Spare	0 Spare	0 Spare	octet o5+3
A2X service identifier to A2X NR frequency mapping rules								octet (o5+4)* octet o45*
A2X service identifier to destination layer-2 ID for broadcast mapping rules								octet o108 (see NOTE) octet o46
A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rules								octet o46+1 octet o48
A2X service identifier to PC5 QoS parameters mapping rules								octet o48+1 octet o49
AS configuration								octet o49+1 octet o50
Default destination layer-2 ID for broadcast								octet (o50+1)* octet (o50+3)*
NR-PC5 unicast security policies								octet o93 (see NOTE) octet o84
A2X service identifier to default mode of communication mapping rules								octet (o84+1) octet o85
PC5 DRX configuration for broadcast and unicast initial signalling								octet (o85+1)* octet o123* = octet l

NOTE: The field is placed immediately after the last present preceding field.

Figure 5.3.2.32: A2X communication over PC5 in NR-PC5

Table 5.3.2.32: A2X communication over PC5 in NR-PC5

Default destination layer-2 ID for broadcast indicator (DDL2IBI):
The DDL2IBI bit indicates presence of the default destination layer-2 ID for broadcast field.
Bit
8
0 Default destination layer-2 ID for broadcast field is absent
1 Default destination layer-2 ID for broadcast field is present

A2X service identifier to A2X NR frequency mapping rules indicator (ASINFMRI):
The ASINFMRI bit indicates presence of the A2X service identifier to A2X NR frequency mapping rules field.
Bit
7
0 A2X service identifier to A2X NR frequency mapping rules field is absent
1 A2X service identifier to A2X NR frequency mapping rules field is present

PC5 DRX configuration for broadcast and unicast initial signalling indicator (PDBUI):
The PDBUI bit indicates presence of the PC5 DRX configuration for broadcast and unicast initial signalling field.
Bit
6
0 PC5 DRX configuration for broadcast and unicast initial signalling field is absent
1 PC5 DRX configuration for broadcast and unicast initial signalling field is present

A2X service identifier to A2X NR frequency mapping rules:
The A2X service identifier to A2X NR frequency mapping rules field is coded according to figure 5.3.2.33 and table 5.3.2.33.

A2X service identifier to destination layer-2 ID for broadcast mapping rules:
The A2X service identifier to destination layer-2 ID for broadcast mapping rules field is coded according to figure 5.3.2.37 and table 5.3.2.37.

A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rules:
The A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rules field is coded according to figure 5.3.2.41 and table 5.3.2.41.

A2X service identifier to PC5 QoS parameters mapping rules:
The A2X service identifier to PC5 QoS parameters mapping rules field is coded according to figure 5.3.2.43 and table 5.3.2.43.

AS configuration:
The AS configuration field is coded according to figure 5.3.2.46a and table 5.3.2.46a.

Default destination layer-2 ID for broadcast:
The default destination layer-2 ID for broadcast field is a binary coded layer 2 identifier.

NR-PC5 unicast security policies:
The NR-PC5 unicast security policies field is coded according to figure 5.3.2.50 and table 5.3.2.50.

A2X service identifier to default mode of communication mapping rules:
The A2X service identifier to default mode of communication mapping rules is coded according to figure 5.3.2.53 and table 5.3.2.53.

PC5 DRX configuration for broadcast and unicast initial signalling.
The PC5 DRX configuration for broadcast and unicast initial signalling field indicates the PC5 DRX configuration for broadcast and unicast initial signalling when not served by E-UTRA and not served by NR, and is coded according to figure 5.3.2.55 and table 5.3.2.55.

If the length of A2X communication over PC5 in NR-PC5 contents field indicates a length bigger than indicated in figure 5.3.2.31, receiving entity shall ignore any superfluous octets located at the end of the A2X communication over PC5 in NR-PC5 contents.

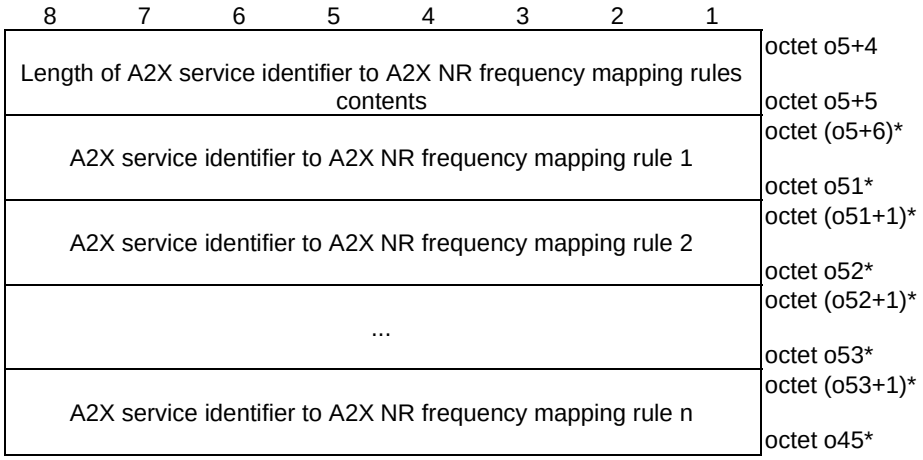


Figure 5.3.2.33: A2X service identifier to A2X NR frequency mapping rules

Table 5.3.2.33: A2X service identifier to A2X NR frequency mapping rules

A2X service identifier to A2X NR frequency mapping rule: The A2X service identifier to A2X NR frequency mapping rule is coded according to figure 5.3.2.34 and table 5.3.2.34.

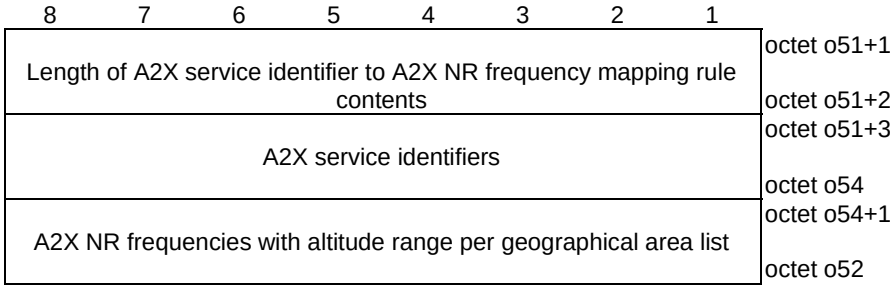


Figure 5.3.2.34: A2X service identifier to A2X NR frequency mapping rule

Table 5.3.2.34: A2X service identifier to A2X NR frequency mapping rule

A2X service identifiers: The A2X service identifiers field is coded according to figure 5.3.2.14 and table 5.3.2.14. A2X NR frequencies with altitude range per geographical areas list: The A2X NR frequencies with altitude range per geographical areas list field is coded according to figure 5.3.2.35 and table 5.3.2.35. If the length of A2X service identifier to A2X NR frequency mapping rule contents field indicates a length bigger than indicated in figure 5.3.2.34, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier to A2X NR frequency mapping rule contents.

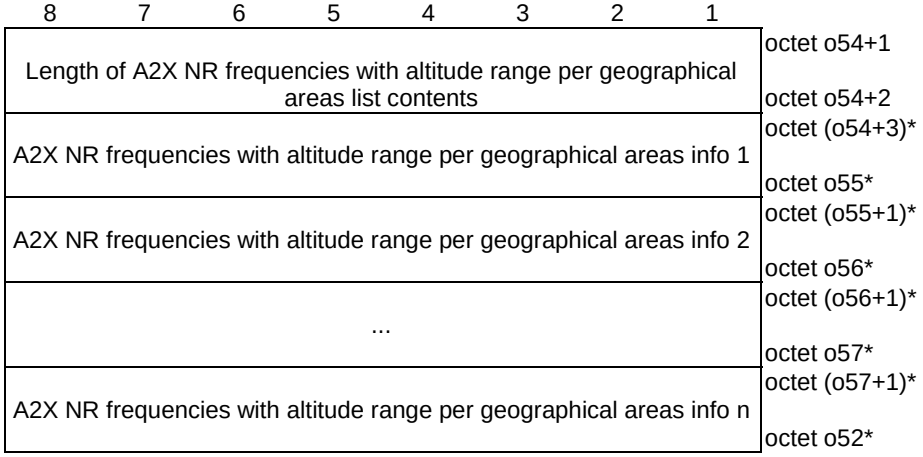


Figure 5.3.2.35: A2X NR frequencies with altitude range per geographical areas list

Table 5.3.2.35: A2X NR frequencies with altitude range per geographical areas list

A2X NR frequencies with altitude range per geographical areas info: The A2X NR frequencies with altitude range per geographical areas info field is coded according to figure 5.3.2.36 and table 5.3.2.36.

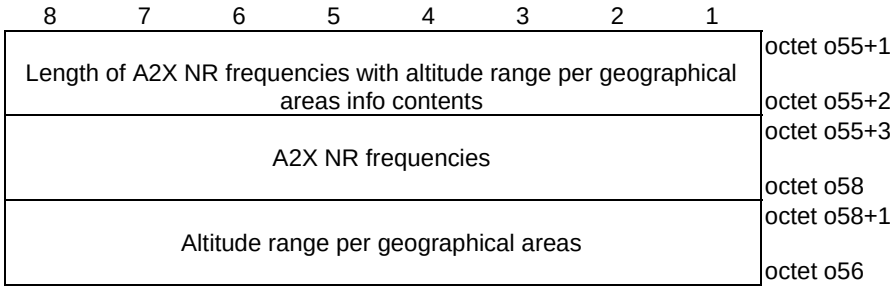


Figure 5.3.2.36: A2X NR frequencies with altitude range per geographical areas info

Table 5.3.2.36: A2X NR frequencies with altitude range per geographical areas info

A2X NR frequencies: The A2X NR frequencies field is coded according to figure 5.3.2.37 and table 5.3.2.37. Altitude range per geographical areas: The geographical areas field is coded according to figure 5.3.2.9 and table 5.3.2.9. If the length of A2X NR frequencies with altitude range per geographical areas info contents field indicates a length bigger than indicated in figure 5.3.2.36, receiving entity shall ignore any superfluous octets located at the end of the A2X NR frequencies with altitude range per geographical areas info contents.

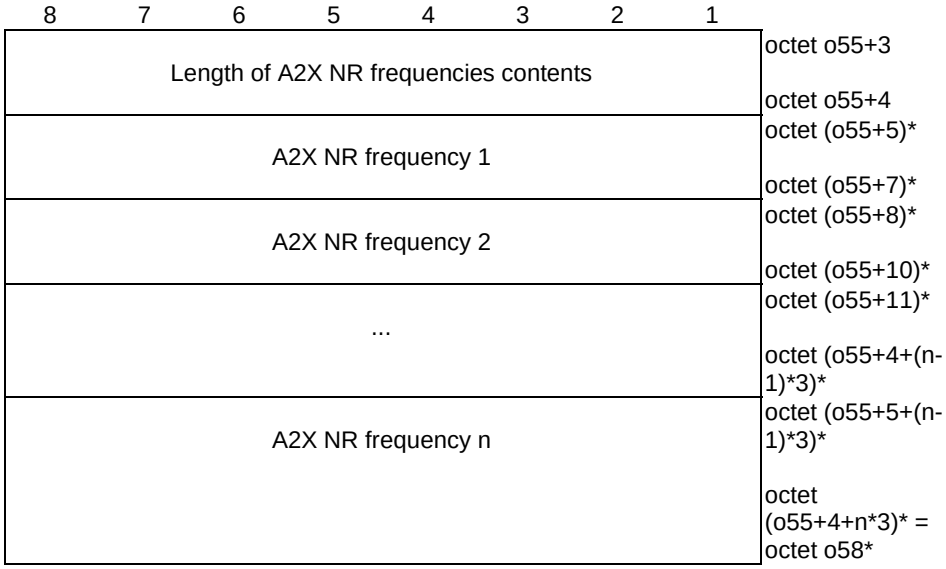


Figure 5.3.2.37: A2X NR frequencies

Table 5.3.2.37: A2X NR frequencies

A2X NR frequency: A2X NR frequency is coded according to the NR-ARFCN value defined in 3GPP TS 38.101-1 [14] and 3GPP TS 38.101-2 [15].

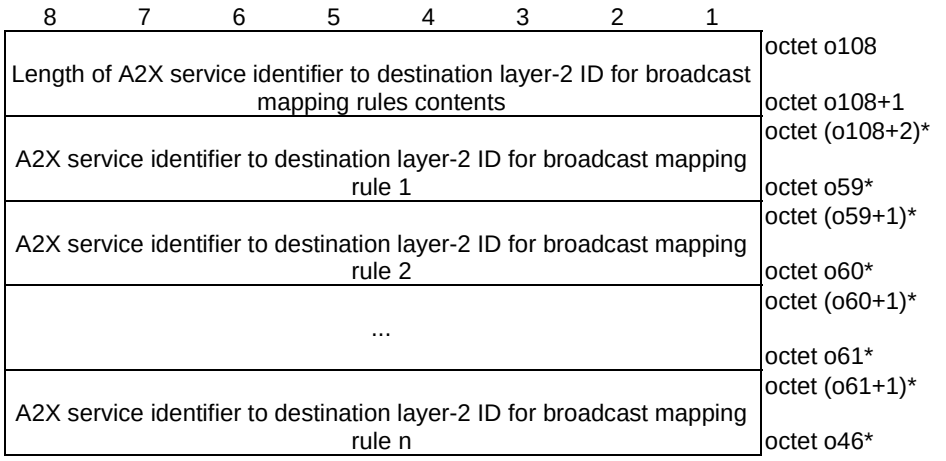


Figure 5.3.2.38: A2X service identifier to destination layer-2 ID for broadcast mapping rules

Table 5.3.2.38: A2X service identifier to destination layer-2 ID for broadcast mapping rules

A2X service identifier to destination layer-2 ID for broadcast mapping rule: The A2X service identifier to destination layer-2 ID for broadcast mapping rule field is coded according to figure 5.3.2.39 and table 5.3.2.39.

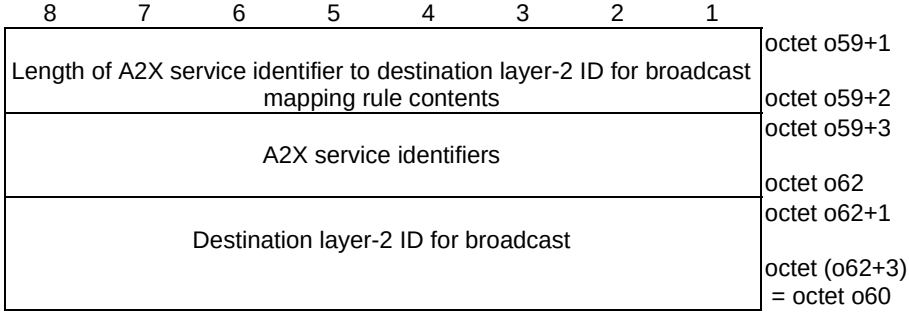


Figure 5.3.2.39: A2X service identifier to destination layer-2 ID for broadcast mapping rule

Table 5.3.2.39: A2X service identifier to destination layer-2 ID for broadcast mapping rule

A2X service identifiers: The A2X service identifiers field is coded according to figure 5.3.2.14 and table 5.3.2.14. Destination layer-2 ID for broadcast: The destination layer-2 ID for broadcast field is a binary coded layer 2 identifier. If the length of A2X service identifier to destination layer-2 ID for broadcast mapping rule contents field indicates a length bigger than indicated in figure 5.3.2.39, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier to destination layer-2 ID for broadcast mapping rule contents.

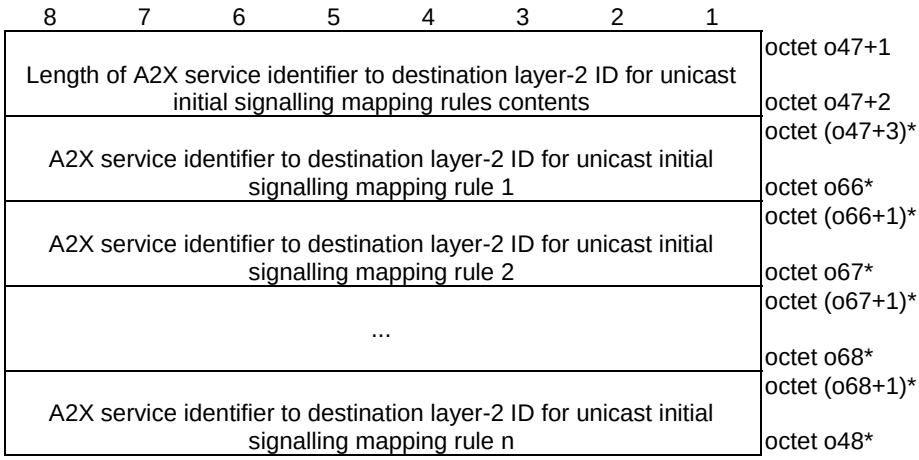


Figure 5.3.2.40: A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rules

Table 5.3.2.40: A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rules

A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rule: The A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rule field is coded according to figure 5.3.2.41 and table 5.3.2.41.

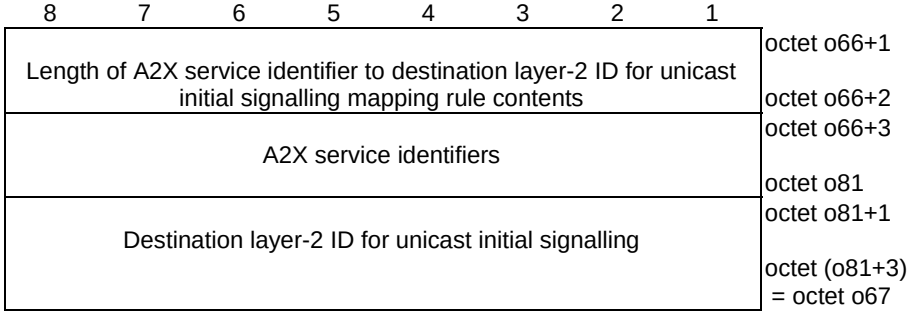


Figure 5.3.2.41: A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rule

Table 5.3.2.41: A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rule

A2X service identifiers: The A2X service identifiers field is coded according to figure 5.3.2.14 and table 5.3.2.14. Destination layer-2 ID for unicast initial signalling: The destination layer-2 ID for unicast initial signalling field is a binary coded layer 2 identifier. If the length of A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rule contents field indicates a length bigger than indicated in figure 5.3.2.41, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier to destination layer-2 ID for unicast initial signalling mapping rule contents.

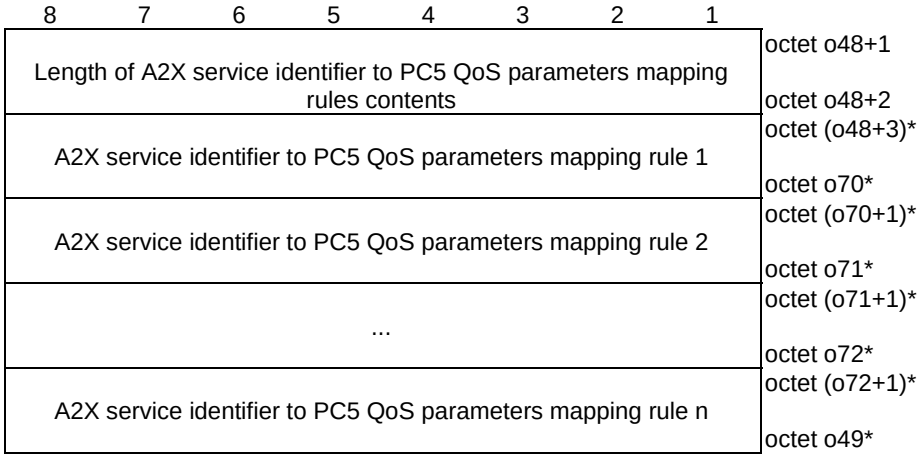
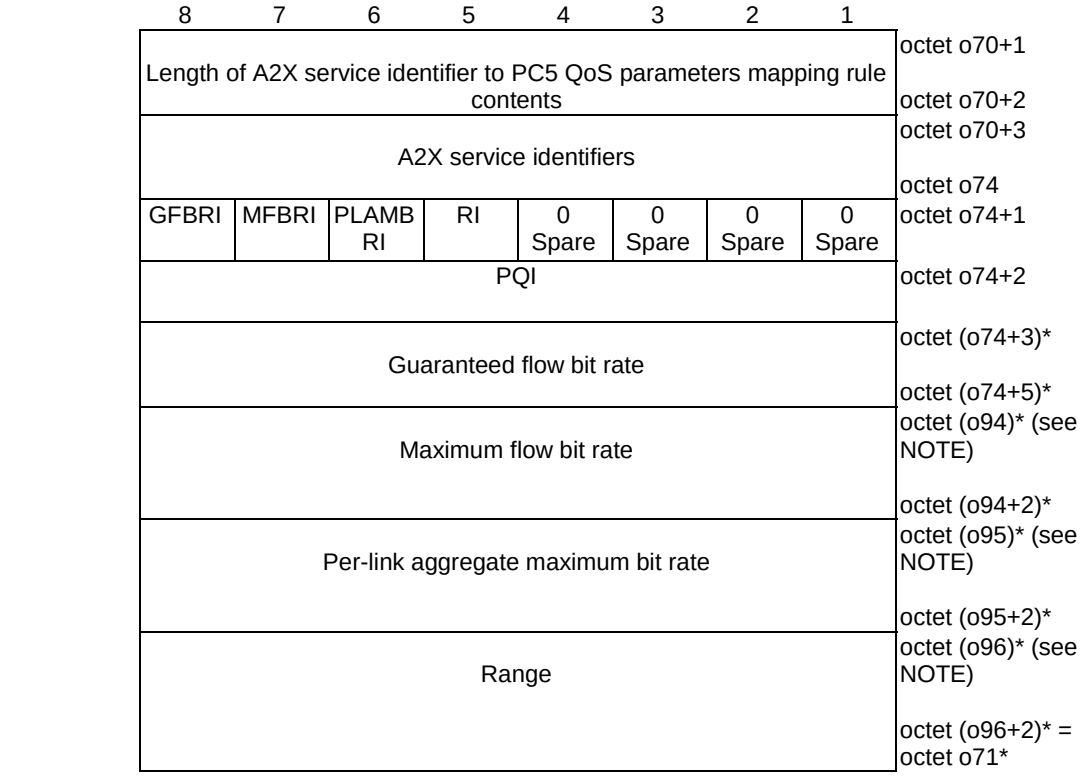


Figure 5.3.2.42: A2X service identifier to PC5 QoS parameters mapping rules

Table 5.3.2.42: A2X service identifier to PC5 QoS parameters mapping rules

A2X service identifier to PC5 QoS parameters mapping rule: The A2X service identifier to PC5 QoS parameters mapping rule field is coded according to figure 5.3.2.43 and table 5.3.2.43.



NOTE: The field is placed immediately after the last present preceding field.

Figure 5.3.2.43: A2X service identifier to PC5 QoS parameters mapping rule

Table 5.3.2.43: A2X service identifier to PC5 QoS parameters mapping rule

A2X service identifiers:
The A2X service identifiers field is coded according to figure 5.3.2.14 and table 5.3.2.14.

Guaranteed flow bit rate indicator (GFBRI):
The GFBRI bit indicates presence of guaranteed flow bit rate field.
Bit
8
0 Guaranteed flow bit rate field is absent
1 Guaranteed flow bit rate field is present

Maximum flow bit rate indicator (MFBRI):
The MFBRI bit indicates presence of maximum flow bit rate field.
Bit
7
0 Maximum flow bit rate field is absent
1 Maximum flow bit rate field is present

Per-link aggregate maximum bit rate indicator (PLAMBRI):
The PLAMBRI bit indicates presence of per-link aggregate maximum bit rate field.
Bit
6
0 Per-link aggregate maximum bit rate field is absent
1 Per-link aggregate maximum bit rate field is present

Range indicator (RI):
The RI bit indicates presence of range field.
Bit
5
0 Range field is absent
1 Range field is present

PQI:
Bits
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0 Reserved
0 0 0 0 0 0 0 1
to Spare
0 0 0 1 0 1 0 0
0 0 0 1 0 1 0 1 PQI 21
0 0 0 1 0 1 1 0 PQI 22
0 0 0 1 0 1 1 1 PQI 23
0 0 0 1 1 0 0 0
to Spare
0 0 1 1 0 1 1 0
0 0 1 1 0 1 1 1 PQI 55
0 0 1 1 1 0 0 0 PQI 56
0 0 1 1 1 0 0 1 PQI 57
0 0 1 1 1 0 1 0 PQI 58
0 0 1 1 1 0 1 1 PQI 59
0 0 1 1 1 1 0 0
to Spare
0 1 0 1 1 0 0 1
0 1 0 1 1 0 1 0 PQI 90
0 1 0 1 1 0 1 1 PQI 91
0 1 0 1 1 1 0 0
to Spare
0 1 1 1 1 1 1 1
1 0 0 0 0 0 0 0
to Operator-specific PQIs
1 1 1 1 1 1 1 0
1 1 1 1 1 1 1 1 Reserved

If the UE receives a PQI value (excluding the reserved PQI values) that it does not understand, the UE shall choose a PQI value from the set of PQI values defined in this version of the protocol (see 3GPP TS 23.287 [2]) and associated with:

- GBR resource type, if the A2X service identifier to PC5 QoS parameters mapping rule includes the guaranteed flow bit rate field; and
- non-GBR resource type, if the A2X service identifier to PC5 QoS parameters mapping rule does not include the guaranteed flow bit rate field.

The UE shall use this chosen PQI value for internal operations only. The UE shall use the received PQI value in subsequent A2X communication over PC5 signalling procedures.

Guaranteed flow bit rate:
The guaranteed flow bit rate field indicates guaranteed flow bit rate for both sending and receiving and contains one octet indicating the unit of the guaranteed flow bit rate followed by two octets containing the value of the guaranteed flow bit rate.

Unit of the guaranteed flow bit rate:

Bits **8 7 6 5 4 3 2 1**	
0 0 0 0 0 0 0 0	value is not used
0 0 0 0 0 0 0 1	value is incremented in multiples of 1 Kbps
0 0 0 0 0 0 1 0	value is incremented in multiples of 4 Kbps
0 0 0 0 0 0 1 1	value is incremented in multiples of 16 Kbps
0 0 0 0 0 1 0 0	value is incremented in multiples of 64 Kbps
0 0 0 0 0 1 0 1	value is incremented in multiples of 256 Kbps
0 0 0 0 0 1 1 0	value is incremented in multiples of 1 Mbps
0 0 0 0 0 1 1 1	value is incremented in multiples of 4 Mbps
0 0 0 0 1 0 0 0	value is incremented in multiples of 16 Mbps
0 0 0 0 1 0 0 1	value is incremented in multiples of 64 Mbps
0 0 0 0 1 0 1 0	value is incremented in multiples of 256 Mbps
0 0 0 0 1 0 1 1	value is incremented in multiples of 1 Gbps
0 0 0 0 1 1 0 0	value is incremented in multiples of 4 Gbps
0 0 0 0 1 1 0 1	value is incremented in multiples of 16 Gbps
0 0 0 0 1 1 1 0	value is incremented in multiples of 64 Gbps
0 0 0 0 1 1 1 1	value is incremented in multiples of 256 Gbps
0 0 0 1 0 0 0 0	value is incremented in multiples of 1 Tbps
0 0 0 1 0 0 0 1	value is incremented in multiples of 4 Tbps
0 0 0 1 0 0 1 0	value is incremented in multiples of 16 Tbps
0 0 0 1 0 0 1 1	value is incremented in multiples of 64 Tbps
0 0 0 1 0 1 0 0	value is incremented in multiples of 256 Tbps
0 0 0 1 0 1 0 1	value is incremented in multiples of 1 Pbps
0 0 0 1 0 1 1 0	value is incremented in multiples of 4 Pbps
0 0 0 1 0 1 1 1	value is incremented in multiples of 16 Pbps
0 0 0 1 1 0 0 0	value is incremented in multiples of 64 Pbps
0 0 0 1 1 0 0 1	value is incremented in multiples of 256 Pbps

Other values shall be interpreted as multiples of 256 Pbps in this version of the protocol.

Value of the guaranteed flow bit rate is binary coded value of the guaranteed flow bit rate in units defined by the unit of the guaranteed flow bit rate.

Maximum flow bit rate:
The maximum flow bit rate field indicates maximum flow bit rate for both sending and receiving and contains one octet indicating the unit of the maximum flow bit rate followed by two octets containing the value of the maximum flow bit rate.

Unit of the maximum flow bit rate:

Bits **8 7 6 5 4 3 2 1**	
0 0 0 0 0 0 0 0	value is not used
0 0 0 0 0 0 0 1	value is incremented in multiples of 1 Kbps
0 0 0 0 0 0 1 0	value is incremented in multiples of 4 Kbps
0 0 0 0 0 0 1 1	value is incremented in multiples of 16 Kbps
0 0 0 0 0 1 0 0	value is incremented in multiples of 64 Kbps
0 0 0 0 0 1 0 1	value is incremented in multiples of 256 Kbps
0 0 0 0 0 1 1 0	value is incremented in multiples of 1 Mbps
0 0 0 0 0 1 1 1	value is incremented in multiples of 4 Mbps
0 0 0 0 1 0 0 0	value is incremented in multiples of 16 Mbps
0 0 0 0 1 0 0 1	value is incremented in multiples of 64 Mbps
0 0 0 0 1 0 1 0	value is incremented in multiples of 256 Mbps
0 0 0 0 1 0 1 1	value is incremented in multiples of 1 Gbps
0 0 0 0 1 1 0 0	value is incremented in multiples of 4 Gbps
0 0 0 0 1 1 0 1	value is incremented in multiples of 16 Gbps
0 0 0 0 1 1 1 0	value is incremented in multiples of 64 Gbps
0 0 0 0 1 1 1 1	value is incremented in multiples of 256 Gbps
0 0 0 1 0 0 0 0	value is incremented in multiples of 1 Tbps
0 0 0 1 0 0 0 1	value is incremented in multiples of 4 Tbps
0 0 0 1 0 0 1 0	value is incremented in multiples of 16 Tbps
0 0 0 1 0 0 1 1	value is incremented in multiples of 64 Tbps
0 0 0 1 0 1 0 0	value is incremented in multiples of 256 Tbps
0 0 0 1 0 1 0 1	value is incremented in multiples of 1 Pbps
0 0 0 1 0 1 1 0	value is incremented in multiples of 4 Pbps
0 0 0 1 0 1 1 1	value is incremented in multiples of 16 Pbps
0 0 0 1 1 0 0 0	value is incremented in multiples of 64 Pbps
0 0 0 1 1 0 0 1	value is incremented in multiples of 256 Pbps

Other values shall be interpreted as multiples of 256 Pbps in this version of the protocol.

Value of the maximum flow bit rate is binary coded value of the maximum flow bit rate in units defined by the unit of the maximum flow bit rate.

Per-link aggregate maximum bit rate:
The per-link aggregate maximum bit rate field indicates per-link aggregate maximum bit rate for both sending and receiving and contains one octet indicating the unit of the per-link aggregate maximum bit rate followed by two octets containing the value of the per-link aggregate maximum bit rate.

Unit of the per-link aggregate maximum bit rate:
Bits
8 7 6 5 4 3 2 1

0 0 0 0 0 0 0 0	value is not used
0 0 0 0 0 0 0 1	value is incremented in multiples of 1 Kbps
0 0 0 0 0 0 1 0	value is incremented in multiples of 4 Kbps
0 0 0 0 0 0 1 1	value is incremented in multiples of 16 Kbps
0 0 0 0 0 1 0 0	value is incremented in multiples of 64 Kbps
0 0 0 0 0 1 0 1	value is incremented in multiples of 256 Kbps
0 0 0 0 0 1 1 0	value is incremented in multiples of 1 Mbps
0 0 0 0 0 1 1 1	value is incremented in multiples of 4 Mbps
0 0 0 0 1 0 0 0	value is incremented in multiples of 16 Mbps
0 0 0 0 1 0 0 1	value is incremented in multiples of 64 Mbps
0 0 0 0 1 0 1 0	value is incremented in multiples of 256 Mbps
0 0 0 0 1 0 1 1	value is incremented in multiples of 1 Gbps
0 0 0 0 1 1 0 0	value is incremented in multiples of 4 Gbps
0 0 0 0 1 1 0 1	value is incremented in multiples of 16 Gbps
0 0 0 0 1 1 1 0	value is incremented in multiples of 64 Gbps
0 0 0 0 1 1 1 1	value is incremented in multiples of 256 Gbps
0 0 0 1 0 0 0 0	value is incremented in multiples of 1 Tbps
0 0 0 1 0 0 0 1	value is incremented in multiples of 4 Tbps
0 0 0 1 0 0 1 0	value is incremented in multiples of 16 Tbps
0 0 0 1 0 0 1 1	value is incremented in multiples of 64 Tbps
0 0 0 1 0 1 0 0	value is incremented in multiples of 256 Tbps
0 0 0 1 0 1 0 1	value is incremented in multiples of 1 Pbps
0 0 0 1 0 1 1 0	value is incremented in multiples of 4 Pbps
0 0 0 1 0 1 1 1	value is incremented in multiples of 16 Pbps
0 0 0 1 1 0 0 0	value is incremented in multiples of 64 Pbps
0 0 0 1 1 0 0 1	value is incremented in multiples of 256 Pbps

Other values shall be interpreted as multiples of 256 Pbps in this version of the protocol.

Value of the per-link aggregate maximum bit rate is binary coded value of the per-link aggregate maximum bit rate in units defined by the unit of the per-link aggregate maximum bit rate.

Range
The range field indicates a binary encoded value of the range in meters.

If the length of A2X service identifier to PC5 QoS parameters mapping rule contents field indicates a length bigger than indicated in figure 5.3.2.43, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier to PC5 QoS parameters mapping rule contents.

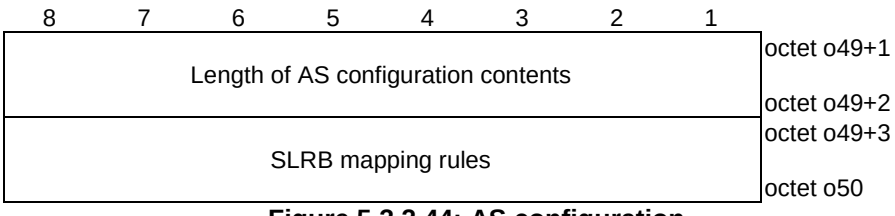


Figure 5.3.2.44: AS configuration

Table 5.3.2.44: AS configuration

SLRB mapping rules: The SLRB mapping rules field is coded according to figure 5.3.2.45 and table 5.3.2.45. If the length of AS configuration contents field indicates a length bigger than indicated in figure 5.3.2.44, receiving entity shall ignore any superfluous octets located at the end of the AS configuration contents.

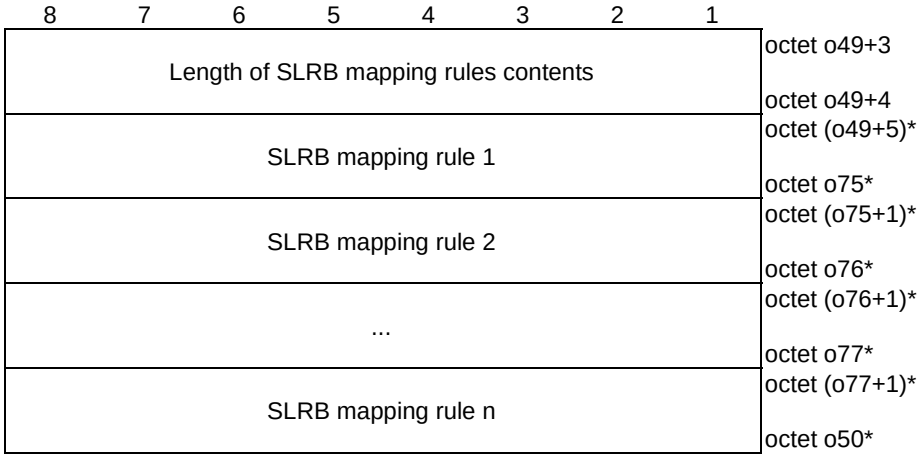


Figure 5.3.2.45: SLRB mapping rules

Table 5.3.2.45: SLRB mapping rules

SLRB mapping rule: The SLRB mapping rule field is coded according to figure 5.3.2.46 and table 5.3.2.46.

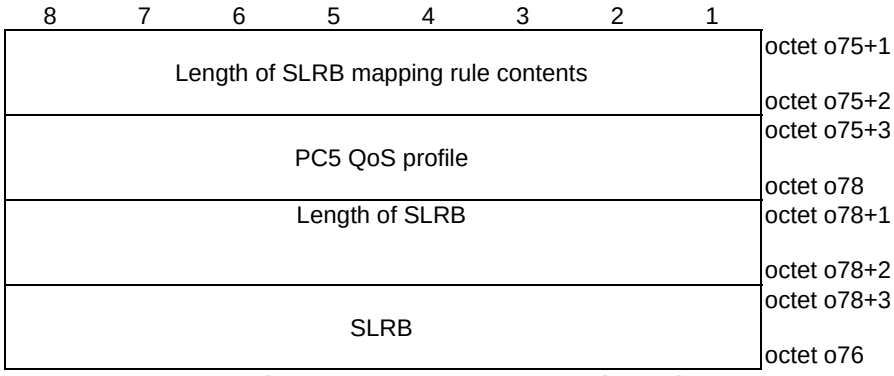
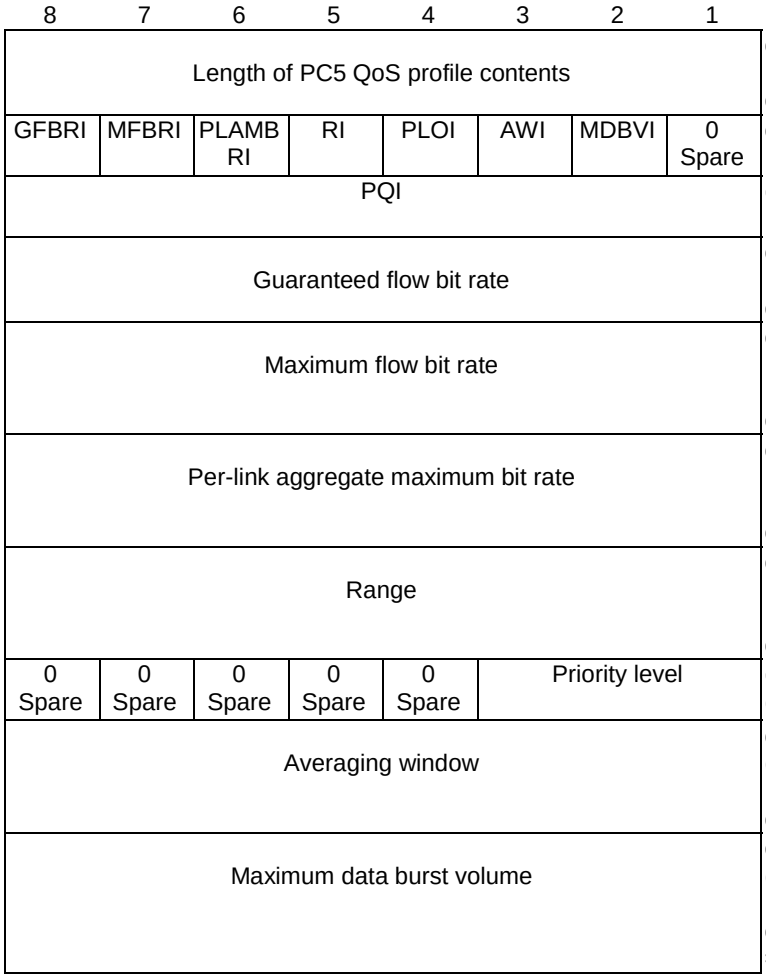


Figure 5.3.2.46: SLRB mapping rule

Table 5.3.2.46: SLRB mapping rule

PC5 QoS profile: The PC5 QoS profile field is coded according to figure 5.3.2.47 and table 5.3.2.47. SLRB SLRB is defined as *SL-PreconfigurationNR* in clause 9.3 of 3GPP TS 38.331 [8]. If the length of SLRB mapping rule contents field indicates a length bigger than indicated in figure 5.3.2.46, receiving entity shall ignore any superfluous octets located at the end of the SLRB mapping rule contents.



NOTE: The field is placed immediately after the last present preceding field.

Figure 5.3.2.47:PC5 QoS profile

Table 5.3.2.47:PC5 QoS profile

Guaranteed flow bit rate indicator (GFBRI):
The GFBRI bit indicates presence of guaranteed flow bit rate field.
Bit
8
0 Guaranteed flow bit rate field is absent
1 Guaranteed flow bit rate field is present

Maximum flow bit rate indicator (MFBRI):
The MFBRI bit indicates presence of maximum flow bit rate field.
Bit
7
0 Maximum flow bit rate field is absent
1 Maximum flow bit rate field is present

Per-link aggregate maximum bit rate indicator (PLAMBRI):
The PLAMBRI bit indicates presence of per-link aggregate maximum bit rate field.
Bit
6
0 Per-link aggregate maximum bit rate field is absent
1 Per-link aggregate maximum bit rate field is present

Range indicator (RI):
The RI bit indicates presence of range field.
Bit
5
0 Range field is absent
1 Range field is present

Priority level octet indicator (OPLI):
The OPLI bit indicates presence of the octet of the priority level field.
Bit
4
0 The octet of the priority level is absent
1 The octet of the priority level is present

Averaging window indicator (AWI):
The AWI bit indicates presence of averaging window field.
Bit
3
0 Averaging window field is absent
1 Averaging window field is present

Maximum data burst volume indicator (MDBVI):
The MDBVI bit indicates presence of maximum data burst volume field.
Bit
2
0 Maximum data burst volume field is absent
1 Maximum data burst volume field is present

PQI:
Bits
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0 Reserved
0 0 0 0 0 0 0 1
to Spare
0 0 0 1 0 1 0 0
0 0 0 1 0 1 0 1 PQI 21
0 0 0 1 0 1 1 0 PQI 22
0 0 0 1 0 1 1 1 PQI 23
0 0 0 1 1 0 0 0
to Spare
0 0 1 1 0 1 1 0
0 0 1 1 0 1 1 1 PQI 55
0 0 1 1 1 0 0 0 PQI 56
0 0 1 1 1 0 0 1 PQI 57
0 0 1 1 1 0 1 0 PQI 58
0 0 1 1 1 0 1 1 PQI 59
0 0 1 1 1 1 0 0
to Spare
0 1 0 1 1 0 0 1
0 1 0 1 1 0 1 0 PQI 90
0 1 0 1 1 0 1 1 PQI 91
0 1 0 1 1 1 0 0
to Spare
0 1 1 1 1 1 1 1
1 0 0 0 0 0 0 0
to Operator-specific PQIs
1 1 1 1 1 1 1 0
1 1 1 1 1 1 1 1 Reserved

If the UE receives a PQI value (excluding the reserved PQI values) that it does not understand, the UE shall choose a PQI value from the set of PQI values defined in this version of the protocol (see 3GPP TS 23.287 [2]) and associated with:

- GBR resource type, if the PC5 QoS profile includes the guaranteed flow bit rate field; and
- non-GBR resource type, if the PC5 QoS profile does not include the guaranteed flow bit rate field.

The UE shall use this chosen PQI value for internal operations only. The UE shall use the received PQI value in subsequent A2X communication over PC5 signalling procedures.

Guaranteed flow bit rate:
The guaranteed flow bit rate field indicates guaranteed flow bit rate for both sending and receiving and contains one octet indicating the unit of the guaranteed flow bit rate followed by two octets containing the value of the guaranteed flow bit rate.

Unit of the guaranteed flow bit rate:

Bits **8 7 6 5 4 3 2 1**	
0 0 0 0 0 0 0 0	value is not used
0 0 0 0 0 0 0 1	value is incremented in multiples of 1 Kbps
0 0 0 0 0 0 1 0	value is incremented in multiples of 4 Kbps
0 0 0 0 0 0 1 1	value is incremented in multiples of 16 Kbps
0 0 0 0 0 1 0 0	value is incremented in multiples of 64 Kbps
0 0 0 0 0 1 0 1	value is incremented in multiples of 256 Kbps
0 0 0 0 0 1 1 0	value is incremented in multiples of 1 Mbps
0 0 0 0 0 1 1 1	value is incremented in multiples of 4 Mbps
0 0 0 0 1 0 0 0	value is incremented in multiples of 16 Mbps
0 0 0 0 1 0 0 1	value is incremented in multiples of 64 Mbps
0 0 0 0 1 0 1 0	value is incremented in multiples of 256 Mbps
0 0 0 0 1 0 1 1	value is incremented in multiples of 1 Gbps
0 0 0 0 1 1 0 0	value is incremented in multiples of 4 Gbps
0 0 0 0 1 1 0 1	value is incremented in multiples of 16 Gbps
0 0 0 0 1 1 1 0	value is incremented in multiples of 64 Gbps
0 0 0 0 1 1 1 1	value is incremented in multiples of 256 Gbps
0 0 0 1 0 0 0 0	value is incremented in multiples of 1 Tbps
0 0 0 1 0 0 0 1	value is incremented in multiples of 4 Tbps
0 0 0 1 0 0 1 0	value is incremented in multiples of 16 Tbps
0 0 0 1 0 0 1 1	value is incremented in multiples of 64 Tbps
0 0 0 1 0 1 0 0	value is incremented in multiples of 256 Tbps
0 0 0 1 0 1 0 1	value is incremented in multiples of 1 Pbps
0 0 0 1 0 1 1 0	value is incremented in multiples of 4 Pbps
0 0 0 1 0 1 1 1	value is incremented in multiples of 16 Pbps
0 0 0 1 1 0 0 0	value is incremented in multiples of 64 Pbps
0 0 0 1 1 0 0 1	value is incremented in multiples of 256 Pbps

Other values shall be interpreted as multiples of 256 Pbps in this version of the protocol.

Value of the guaranteed flow bit rate is binary coded value of the guaranteed flow bit rate in units defined by the unit of the guaranteed flow bit rate.

Maximum flow bit rate:
The maximum flow bit rate field indicates maximum flow bit rate for both sending and receiving and contains one octet indicating the unit of the maximum flow bit rate followed by two octets containing the value of the maximum flow bit rate.

Unit of the maximum flow bit rate:

Bits **8 7 6 5 4 3 2 1**	
0 0 0 0 0 0 0 0	value is not used
0 0 0 0 0 0 0 1	value is incremented in multiples of 1 Kbps
0 0 0 0 0 0 1 0	value is incremented in multiples of 4 Kbps
0 0 0 0 0 0 1 1	value is incremented in multiples of 16 Kbps
0 0 0 0 0 1 0 0	value is incremented in multiples of 64 Kbps
0 0 0 0 0 1 0 1	value is incremented in multiples of 256 Kbps
0 0 0 0 0 1 1 0	value is incremented in multiples of 1 Mbps
0 0 0 0 0 1 1 1	value is incremented in multiples of 4 Mbps
0 0 0 0 1 0 0 0	value is incremented in multiples of 16 Mbps
0 0 0 0 1 0 0 1	value is incremented in multiples of 64 Mbps
0 0 0 0 1 0 1 0	value is incremented in multiples of 256 Mbps
0 0 0 0 1 0 1 1	value is incremented in multiples of 1 Gbps
0 0 0 0 1 1 0 0	value is incremented in multiples of 4 Gbps
0 0 0 0 1 1 0 1	value is incremented in multiples of 16 Gbps
0 0 0 0 1 1 1 0	value is incremented in multiples of 64 Gbps
0 0 0 0 1 1 1 1	value is incremented in multiples of 256 Gbps
0 0 0 1 0 0 0 0	value is incremented in multiples of 1 Tbps
0 0 0 1 0 0 0 1	value is incremented in multiples of 4 Tbps
0 0 0 1 0 0 1 0	value is incremented in multiples of 16 Tbps
0 0 0 1 0 0 1 1	value is incremented in multiples of 64 Tbps
0 0 0 1 0 1 0 0	value is incremented in multiples of 256 Tbps
0 0 0 1 0 1 0 1	value is incremented in multiples of 1 Pbps
0 0 0 1 0 1 1 0	value is incremented in multiples of 4 Pbps
0 0 0 1 0 1 1 1	value is incremented in multiples of 16 Pbps
0 0 0 1 1 0 0 0	value is incremented in multiples of 64 Pbps
0 0 0 1 1 0 0 1	value is incremented in multiples of 256 Pbps

Other values shall be interpreted as multiples of 256 Pbps in this version of the protocol.

Value of the maximum flow bit rate is binary coded value of the maximum flow bit rate in units defined by the unit of the maximum flow bit rate.

Per-link aggregate maximum bit rate:
The per-link aggregate maximum bit rate field indicates per-link aggregate maximum bit rate for both sending and receiving and contains one octet indicating the unit of the per-link aggregate maximum bit rate followed by two octets containing the value of the per-link aggregate maximum bit rate.

Unit of the per-link aggregate maximum bit rate:
Bits
8 7 6 5 4 3 2 1

0 0 0 0 0 0 0 0	value is not used
0 0 0 0 0 0 0 1	value is incremented in multiples of 1 Kbps
0 0 0 0 0 0 1 0	value is incremented in multiples of 4 Kbps
0 0 0 0 0 0 1 1	value is incremented in multiples of 16 Kbps
0 0 0 0 0 1 0 0	value is incremented in multiples of 64 Kbps
0 0 0 0 0 1 0 1	value is incremented in multiples of 256 Kbps
0 0 0 0 0 1 1 0	value is incremented in multiples of 1 Mbps
0 0 0 0 0 1 1 1	value is incremented in multiples of 4 Mbps
0 0 0 0 1 0 0 0	value is incremented in multiples of 16 Mbps
0 0 0 0 1 0 0 1	value is incremented in multiples of 64 Mbps
0 0 0 0 1 0 1 0	value is incremented in multiples of 256 Mbps
0 0 0 0 1 0 1 1	value is incremented in multiples of 1 Gbps
0 0 0 0 1 1 0 0	value is incremented in multiples of 4 Gbps
0 0 0 0 1 1 0 1	value is incremented in multiples of 16 Gbps
0 0 0 0 1 1 1 0	value is incremented in multiples of 64 Gbps
0 0 0 0 1 1 1 1	value is incremented in multiples of 256 Gbps
0 0 0 1 0 0 0 0	value is incremented in multiples of 1 Tbps
0 0 0 1 0 0 0 1	value is incremented in multiples of 4 Tbps
0 0 0 1 0 0 1 0	value is incremented in multiples of 16 Tbps
0 0 0 1 0 0 1 1	value is incremented in multiples of 64 Tbps
0 0 0 1 0 1 0 0	value is incremented in multiples of 256 Tbps
0 0 0 1 0 1 0 1	value is incremented in multiples of 1 Pbps
0 0 0 1 0 1 1 0	value is incremented in multiples of 4 Pbps
0 0 0 1 0 1 1 1	value is incremented in multiples of 16 Pbps
0 0 0 1 1 0 0 0	value is incremented in multiples of 64 Pbps
0 0 0 1 1 0 0 1	value is incremented in multiples of 256 Pbps

Other values shall be interpreted as multiples of 256 Pbps in this version of the protocol.

Value of the per-link aggregate maximum bit rate is binary coded value of the per-link aggregate maximum bit rate in units defined by the unit of the per-link aggregate maximum bit rate.

Range:
The range field indicates a binary encoded value of the range in meters.

Priority level:
The Priority level field contains a ProSe per-packet priority value.
Bits
3 2 1

0 0 0	PPPP value 1
0 0 1	PPPP value 2
0 1 0	PPPP value 3
0 1 1	PPPP value 4
1 0 0	PPPP value 5
1 0 1	PPPP value 6
1 1 0	PPPP value 7
1 1 1	PPPP value 8

Averaging window:
The averaging window field indicates a binary representation of the averaging window for both sending and receiving in milliseconds.

Maximum data burst volume:
The maximum data burst volume field indicates a binary representation of the maximum data burst volume for both sending and receiving in octets.

If the length of PC5 QoS profile contents field indicates a length bigger than indicated in figure 5.3.2.47, receiving entity shall ignore any superfluous octets located at the end of the PC5 QoS profile contents.

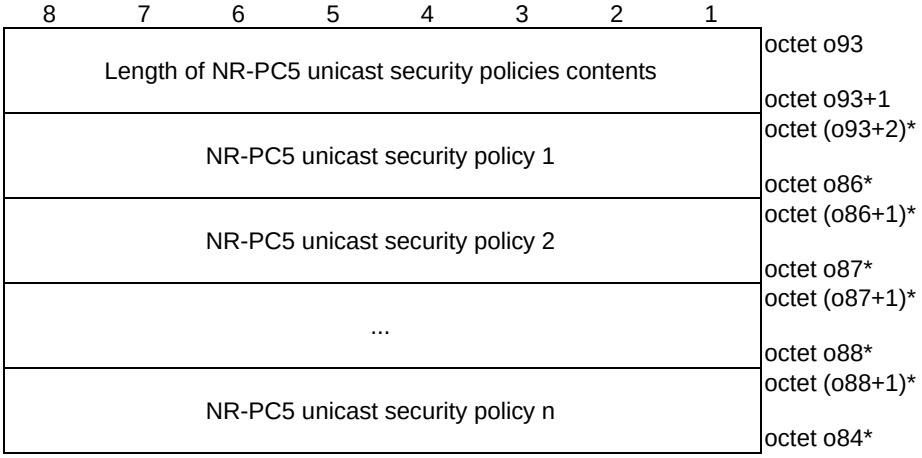


Figure 5.3.2.48: NR-PC5 unicast security policies

Table 5.3.2.48: NR-PC5 unicast security policies

NR-PC5 unicast security policy:
The NR-PC5 unicast security policy field is coded according to figure 5.3.2.49 and table 5.3.2.49.

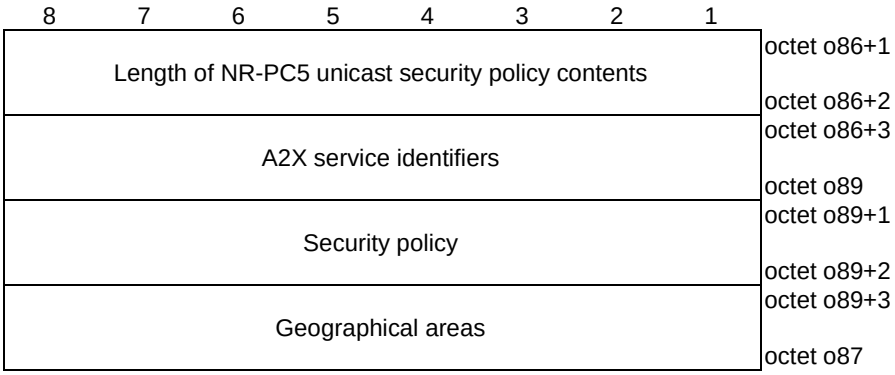


Figure 5.3.2.49: NR-PC5 unicast security policy

Table 5.3.2.49: NR-PC5 unicast security policy

A2X service identifiers:
The A2X service identifiers field is coded according to figure 5.3.2.14 and table 5.3.2.14.

Security policy:
The security policy field is coded according to figure 5.3.2.50 and table 5.3.2.50

Geographical areas:
The geographical areas field is coded according to figure 5.3.2.11 and table 5.3.2.11.

If the length of NR-PC5 unicast security policy contents field indicates a length bigger than indicated in figure 5.3.2.49, the receiving entity shall ignore any superfluous octets located at the end of the NR-PC5 unicast security policy contents.

8	7	6	5	4	3	2	1	
0 spare	Signalling ciphering policy			0 spare	Signalling integrity protection policy			octet o89+1
0 spare	User plane ciphering policy			0 spare	User plane integrity protection policy			octet o89+2

Figure 5.3.2.50: Security policy

Table 5.3.2.50: Security policy

Signalling integrity protection policy (octet o89+1, bit 1 to 3):

Bits 3	2	1	
0	0	0	Signalling integrity protection not needed
0	0	1	Signalling integrity protection preferred
0	1	0	Signalling integrity protection required
0	1	1	
	to		Spare
1	1	0	
1	1	1	Reserved

If the UE receives a signalling integrity protection policy value that the UE does not understand, the UE shall interpret the value as 010 "Signalling integrity protection required".

Signalling ciphering policy (octet o89+1, bit 5 to 7):

Bits 7	6	5	
0	0	0	Signalling ciphering not needed
0	0	1	Signalling ciphering preferred
0	1	0	Signalling ciphering required
0	1	1	
	to		Spare
1	1	0	
1	1	1	Reserved

If the UE receives a signalling ciphering policy value that the UE does not understand, the UE shall interpret the value as 010 "Signalling ciphering required".

Bit 4 and 8 of octet o89+1 are spare and shall be coded as zero.

User plane integrity protection policy (octet o89+2, bit 1 to 3):

Bits 3	2	1	
0	0	0	User plane integrity protection not needed
0	0	1	User plane integrity protection preferred
0	1	0	User plane integrity protection required
0	1	1	
	to		Spare
1	1	0	
1	1	1	Reserved

If the UE receives a user plane integrity protection policy value that the UE does not understand, the UE shall interpret the value as 010 "User plane integrity protection required".

User plane ciphering policy (octet o89+2, bit 5 to 7):

Bits 7	6	5	
0	0	0	User plane ciphering not needed
0	0	1	User plane ciphering preferred
0	1	0	User plane ciphering required
0	1	1	
	to		Spare
1	1	0	
1	1	1	Reserved

If the UE receives a user plane ciphering policy value that the UE does not understand, the UE shall interpret the value as 010 "User plane ciphering required".

Bit 4 and 8 of octet o89+2 are spare and shall be coded as zero.

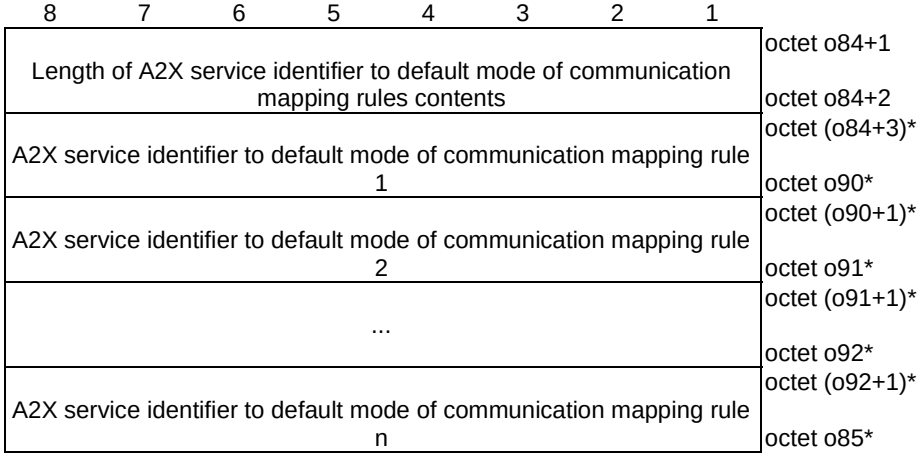


Figure 5.3.2.51: A2X service identifier to default mode of communication mapping rules

Table 5.3.2.51: A2X service identifier to default mode of communication mapping rules

A2X service identifier to default mode of communication mapping rule: The A2X service identifier to default mode of communication mapping rule field is coded according to figure 5.3.2.52 and table 5.3.2.52.

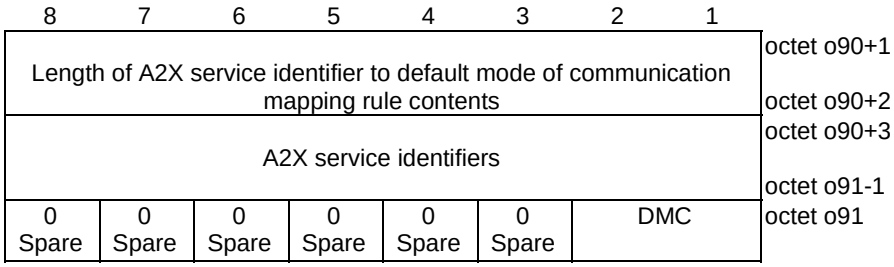


Figure 5.3.2.52: A2X service identifier to default mode of communication mapping rule

Table 5.3.2.52: A2X service identifier to default mode of communication mapping rule

A2X service identifiers: The A2X service identifiers field is coded according to figure 5.3.2.14 and table 5.3.2.14. Default mode of communication (DMC): The DMC field indicates the default mode of communication. Bits **2 1** 0 0 unicast 0 1 spare 1 0 broadcast 1 1 spare If the DMC field is set to a spare value, the receiving entity shall ignore the A2X service identifier to default mode of communication mapping rule. If the length of A2X service identifier to default mode of communication mapping rule contents field indicates a length bigger than indicated in figure 5.3.2.52, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier to default mode of communication mapping rule contents.

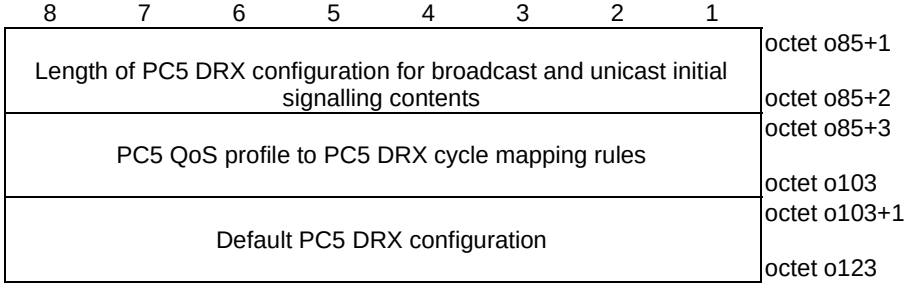


Figure 5.3.2.53: PC5 DRX configuration for broadcast and unicast initial signalling

Table 5.3.2.53: PC5 DRX configuration for broadcast and unicast initial signalling

PC5 QoS profile to PC5 DRX cycle mapping rules: The PC5 QoS profile to PC5 DRX cycle mapping rules field is coded according to figure 5.3.2.54 and table 5.3.2.54. Default PC5 DRX configuration: The default PC5 DRX configuration field is coded according to figure 5.3.2.56 and table 5.3.2.56. If the length of PC5 DRX configuration for broadcast and unicast initial signalling contents field indicates a length bigger than indicated in figure 5.3.2.53, receiving entity shall ignore any superfluous octets located at the end of the PC5 DRX configuration for broadcast contents and unicast initial signalling.

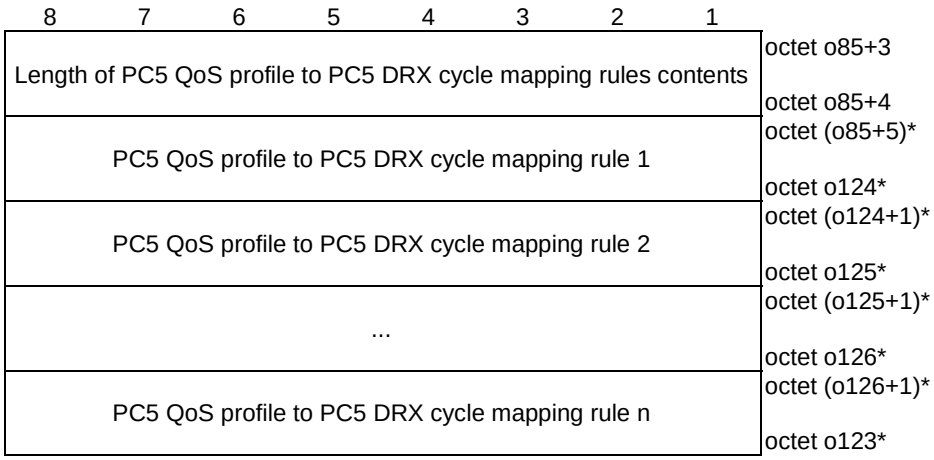


Figure 5.3.2.54: PC5 QoS profile to PC5 DRX cycle mapping rules

Table 5.3.2.54: PC5 QoS profile to PC5 DRX cycle mapping rules

PC5 QoS profile to PC5 DRX cycle mapping rule: The PC5 QoS profile to PC5 DRX cycle mapping rule field is coded according to figure 5.3.2.55 and table 5.3.2.55.

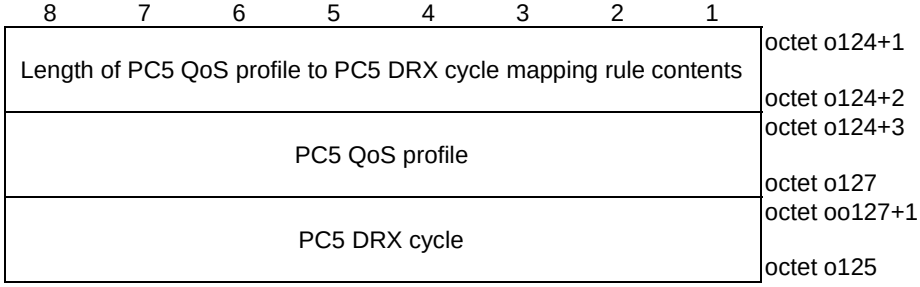


Figure 5.3.2.55: PC5 QoS profile to PC5 DRX cycle mapping rule

Table 5.3.2.55: PC5 QoS profile to PC5 DRX cycle mapping rule

PC5 QoS profile: The PC5 QoS profile field is coded according to figure 5.3.2.47 and table 5.3.2.47. PC5 DRX cycle The PC5 DRX cycle field is coded as *sl-DRX-GC-BC-Cycle-r17* in clause 6.3.5 of 3GPP TS 38.331 [8]. If the length of PC5 QoS profile to PC5 DRX cycle mapping rule contents field indicates a length bigger than indicated in figure 5.3.2.55, receiving entity shall ignore any superfluous octets located at the end of the PC5 QoS profile to PC5 DRX cycle mapping rule contents.

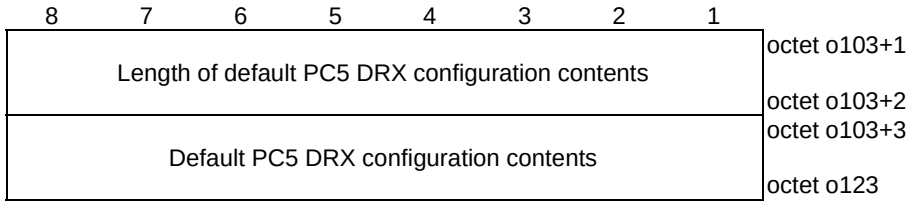


Figure 5.3.2.56: Default PC5 DRX configuration

Table 5.3.2.56: Default PC5 DRX configuration

Default PC5 DRX configuration contents: The default PC5 DRX configuration field is coded as *sl-DefaultDRX-GC-BC-r17* in clause 6.3.5 of 3GPP TS 38.331 [8].

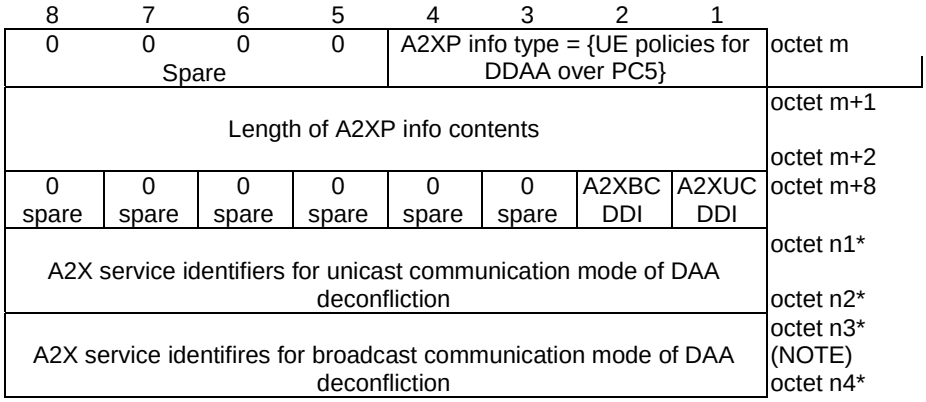
5.4 Encoding of UE policies for Broadcast Remote ID (BRID) over PC5

5.5 Encoding of UE policies for direct detect and avoid (DDAA) over PC5

5.5.1 General

The UE policies for DDAA over PC5 are coded as shown in figures 5.5.2.1 and table 5.5.2.1. The validity time of the UE policies for DDAA over PC5 is subject to the validity timer of the UE policies for A2X communication over PC5 as specified in clause 5.3.

5.5.2 Information elements coding



NOTE: The field is placed immediately after the last present preceding field.

Figure 5.5.2.1: A2XP info = {UE policies for DDAA over PC5}

Table 5.5.2.1: A2XP info = {UE policies for DDAA over PC5

A2XP info type (bit 1 to 4 of octet m) shall be set to "0011" (UE policies for DDAA over PC5) Length of A2XP info contents (octets m+1 to m+2) indicates the length of A2XP info contents. A2X service identifiers for unicast communication mode of DAA deconfliction indicator (A2XUCDDI) The A2XUCDDI bit indicates presence of the A2X service identifiers for unicast communication mode of DAA deconfliction field. Bit **1** 0 A2X service identifiers for unicast communication mode of DAA deconfliction is absent 1 A2X service identifiers for unicast communication mode of DAA deconfliction is present A2X service identifiers for broadcast communication mode of DAA deconfliction indicator (A2XBCDDI) The A2XBCDDI bit indicates presence of the A2X service identifiers for broadcast communication mode of DAA deconfliction field. Bit **1** 0 A2X service identifiers for broadcast communication mode of DAA deconfliction is absent 1 A2X service identifiers for broadcast communication mode of DAA deconfliction is present A2X service identifiers for unicast communication mode of DAA deconfliction: This field is coded according to figure 5.3.2.14 and table 5.3.2.14. If A2XUCDDI is set to 0, this field shall not be included in the UE policies for DDAA over PC5. A2X service identifiers for broadcast communication mode of DAA deconfliction: This field is coded according to figure 5.3.2.14 and table 5.3.2.14. If A2XBCDDI is set to 0, this field shall not be included in the UE policies for DDAA over PC5. If the length of A2XP info contents field is bigger than indicated in figure 5.5.2.1, receiving entity shall ignore any superfluous octets located at the end of the A2XP info contents.

5.6 Encoding of UE policies for direct C2 communication over PC5

5.6.1 General

The UE policies for direct C2 communication over PC5 are coded as shown in figures 5.6.2.1 and table 5.6.2.1.

5.6.2 Information elements coding

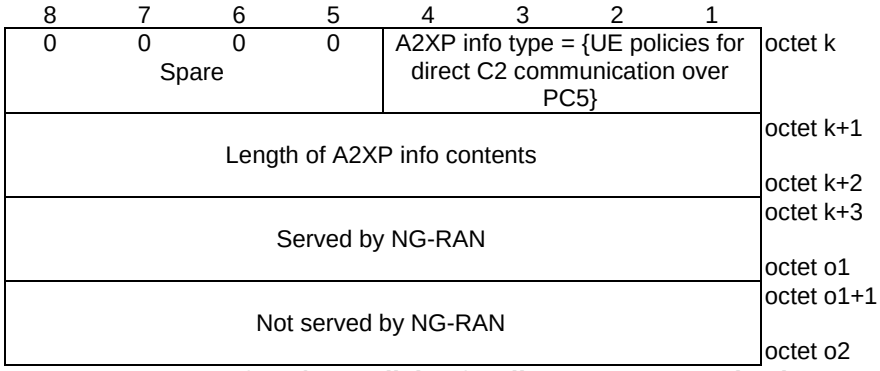


Figure 5.6.2.1: A2XP Info = {UE policies for direct C2 communication over PC5}

Table 5.6.2.1: A2XP Info = {UE policies for direct C2 communication over PC5}

A2XP info type (bit 1 to 4 of octet k) shall be set to "0100" (UE policies for direct C2 communication over PC5) Length of Length of A2XP info contents (octets k+1 to k+2) indicates the length of A2XP info contents. Served by NG-RAN (octet k+3 to o1) The served by NR field is coded according to figure 5.6.2.2 and table 5.6.2.2, and contains configuration parameters for direct C2 communication over PC5 when the UE is served by NG-RAN. (NOTE) Not served by NG-RAN (octet o1+1 to o2) The not served by NR field is coded according to figure 5.6.2.6 and table 5.6.2.6, and contains configuration parameters for direct C2 communication over PC5 when the UE is not served by NG-RAN. (NOTE) NOTE: In this release of specification, only NR-PC5 is supported for direct C2 communication.

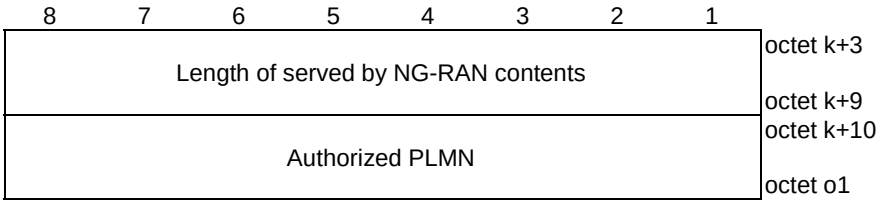


Figure 5.6.2.2: Served by NG-RAN

Table 5.6.2.2: Served by NG-RAN

Authorized PLMN (octet k+10 to o1): The authorized PLMN field is coded according to figure 5.6.2.3 and table 5.6.2.3. If the length of served by NG-RAN contents field indicates a length bigger than indicated in figure 5.6.2.2, receiving entity shall ignore any superfluous octets located at the end of the served by NG-RAN contents.

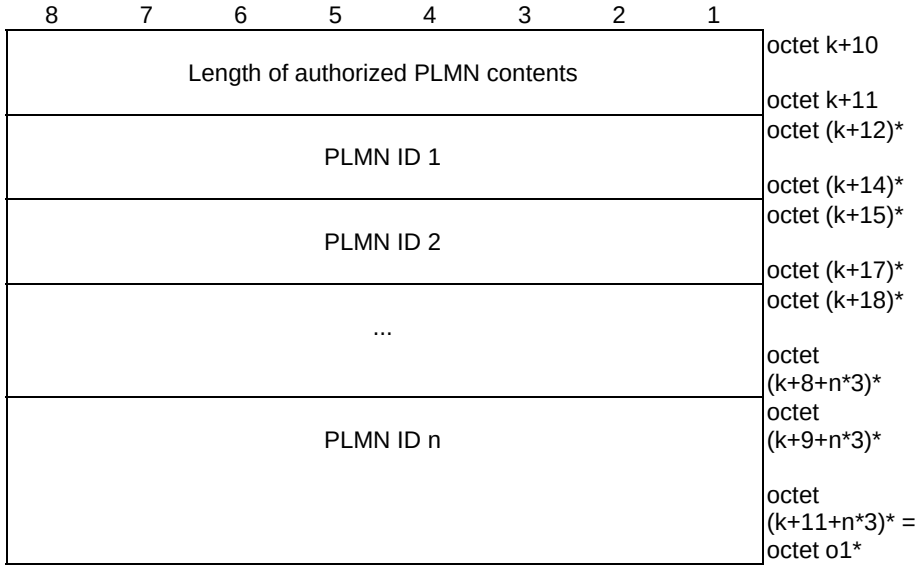


Figure 5.6.2.3: Authorized PLMN

Table 5.6.2.3: Authorized PLMN

PLMN ID: The PLMN ID field is coded according to figure 5.6.2.4 and table 5.6.2.4.

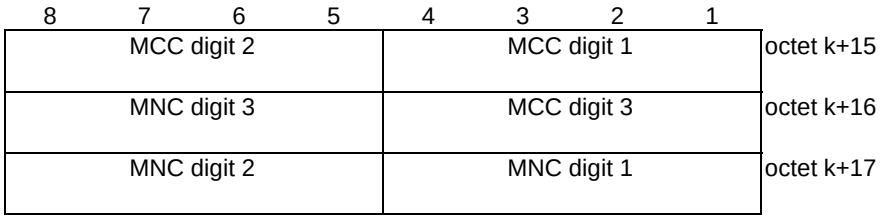


Figure 5.6.2.4: PLMN ID

Table 5.6.2.4: PLMN ID

Mobile country code (MCC) (octet k+15, octet k+16 bit 1 to 4): The MCC field is coded as in ITU-T Recommendation E.212 [5], annex A. Mobile network code (MNC) (octet k+16 bit 5 to 8, octet k+17): The coding of MNC field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111".

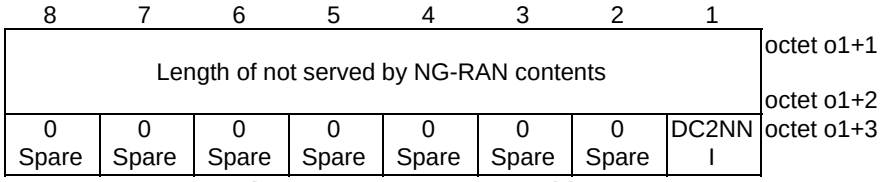


Figure 5.6.2.5: Not served by NG-RAN

Table 5.6.2.5: Not served by NG-RAN

Direct C2 communication when not served by NG-RAN indicator (DC2NNI) (octet o1+3 bit 1): The DC2NNI bit indicates whether the UE is authorized to use direct C2 communication when not served by NG-RAN. Bit **1** 0 Not authorized 1 Authorized If the length of not served by NG-RAN contents field is bigger than indicated in figure 5.6.2.5, receiving entity shall ignore any superfluous octets located at the end of the not served by NG-RAN contents.

5.7 Encoding of UE policies for A2X communication over Uu

5.7.1 General

The UE policies for A2X communication over Uu are coded as shown in figures 5.7.2.1 and table 5.7.2.1.

5.7.2 Information elements coding

8	7	6	5	4	3	2	1	
0	0	0	0	A2XP info type = {UE policies for A2X communication over Uu}				octet k
Spare								
Length of A2XP info contents								octet k+1 octet k+2
Validity timer								octet k+3 octet k+7
APSPI	PII	0 Spare	0 Spare	0 Spare	0 Spare	0 Spare	0 Spare	octet (k+8)*
A2X service identifier to PDU session parameters mapping rules								octet (k+9)* octet o1*
PLMN infos								octet o29* (see NOTE) octet l*

NOTE: The field is placed immediately after the last present preceding field.

Figure 5.7.2.1: A2XP Info = {UE policies for A2X communication over Uu}

Editor's note: Encoding of parameters for A2X communication via MBS is FFS.

Table 5.7.2.1: A2XP Info = {UE policies for A2X communication over Uu}

A2XP info type (bit 1 to 4 of octet k) shall be set to "0010" (UE policies for A2X communication over Uu) Length of A2XP info contents (octets k+1 to k+2) indicates the length of A2XP info contents. Validity timer The validity timer field provides the expiration time of validity of the UE policies for A2X communication over Uu. The validity timer field is a binary coded representation of a UTC time, in seconds since midnight UTC of January 1, 1970 (not counting leap seconds). A2X service identifier to PDU session parameters mapping rules indicator (APSPI) The APSPI bit indicates presence of the A2X service identifier to PDU session parameters mapping rules field. Bit 8 0 A2X service identifier to PDU session parameters mapping rules field is absent 1 A2X service identifier to PDU session parameters mapping rules field is present PLMN infos indicator (APII) The PII bit indicates presence of the PLMN infos field. Bit 7 0 PLMN infos field is absent 1 PLMN infos field is present A2X service identifier to PDU session parameters mapping rules The A2X service identifier to PDU session parameters mapping rules field is coded according to figure 5.7.2.17 and table 5.7.2.17. PLMN infos The PLMN infos field is coded according to the figure 5.7.2.2 and table 5.7.2.2 and contains a list of PLMNs in which the UE is configured to use A2X communication over Uu. If the length of A2XP info contents field indicates a length bigger than indicated in figure 5.7.2.1, receiving entity shall ignore any superfluous octets located at the end of the A2XP info contents.

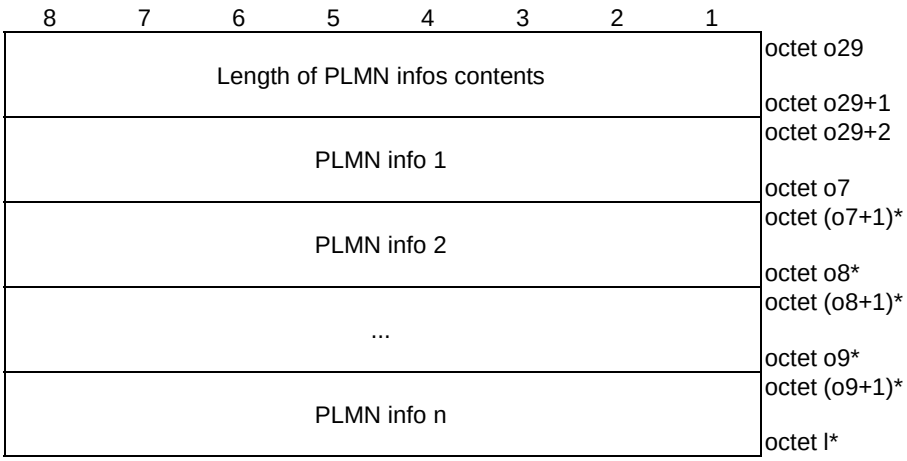
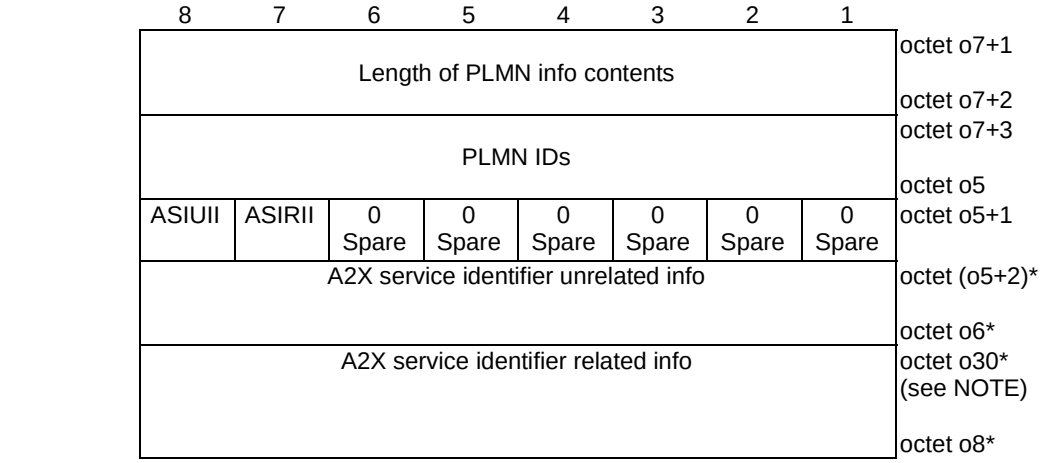


Figure 5.7.2.2: PLMN infos

Table 5.7.2.2: PLMN infos

PLMN info The PLMN info field is coded according to figure 5.7.2.3 and table 5.7.2.3.



NOTE: The field is placed immediately after the last present preceding field.

Figure 5.7.2.3: PLMN info

Table 5.7.2.3: PLMN info

PLMN IDs The PLMN IDs field is coded according to figure 5.7.2.4 and table 5.7.2.4. A2X service identifier unrelated info indicator (ASIUII) The VSIUII bit indicates presence of the A2X service identifier unrelated info field. Bit **8** 0 A2X service identifier unrelated info field is absent 1 A2X service identifier unrelated info field is present A2X service identifier related info indicator (ASIRII) The VSIRII bit indicates presence of the A2X service identifier related info field. Bit **7** 0 A2X service identifier related info field is absent 1 A2X service identifier related info field is present A2X service identifier unrelated info The A2X service identifier unrelated info field is coded according to figure 5.7.2.6 and table 5.7.2.6, and contains information for A2X services not identified by A2X service identifiers, applicable in a PLMN indicated in the PLMN IDs field. A2X service identifier related info The A2X service identifier related info field is coded according to figure 5.7.2.9 and table 5.7.2.9, and contains information for A2X services identified by A2X service identifiers, applicable in a PLMN indicated in the PLMN IDs field. If the length of PLMN info contents field indicates a length bigger than indicated in figure 5.7.2.3, receiving entity shall ignore any superfluous octets located at the end of the PLMN info contents.

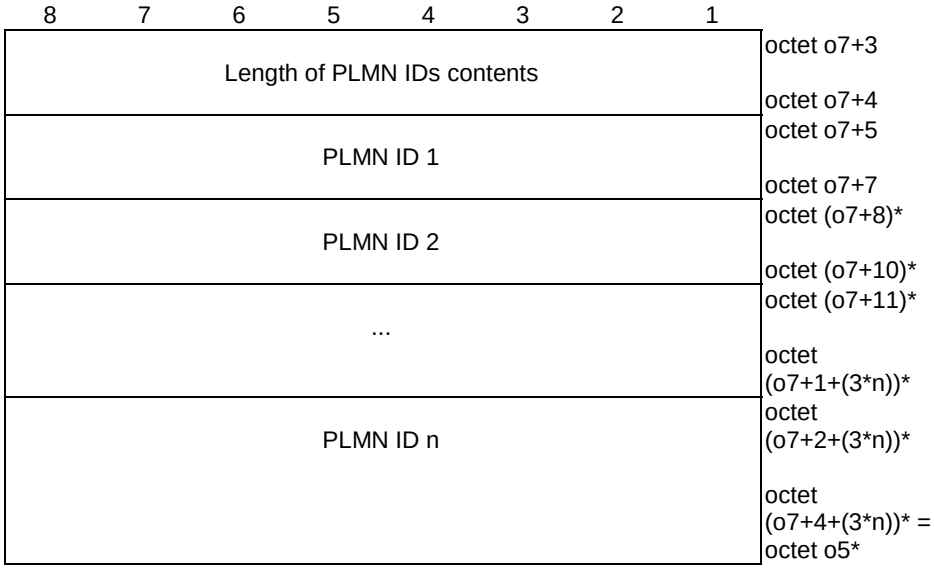


Figure 5.7.2.4: PLMN IDs

Table 5.7.2.4: PLMN IDs

PLMN ID The PLMN ID field is coded according to figure 5.7.2.5 and table 5.7.2.5.

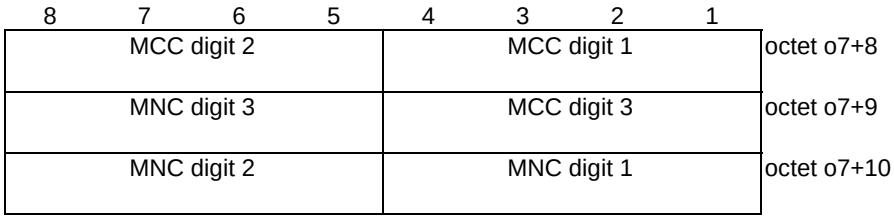


Figure 5.7.2.5: PLMN ID

Table 5.7.2.5: PLMN ID

Mobile country code (MCC) The MCC field is coded as in ITU-T Recommendation E.212 [6], annex A. Mobile network code (MNC) The coding of MNC field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111".

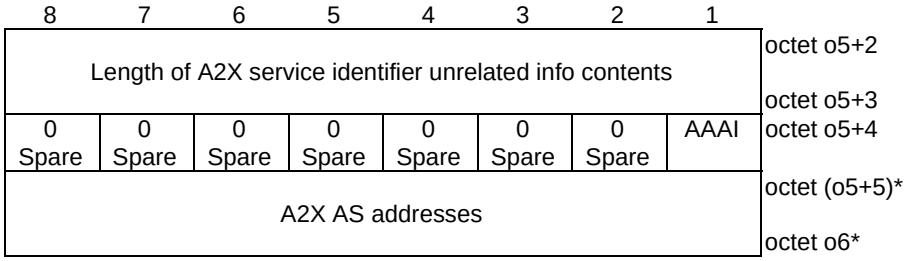


Figure 5.7.2.6: A2X service identifier unrelated info

Table 5.7.2.6: A2X service identifier unrelated info

A2X AS address indicator (AAAI) The VAAI bit indicates presence of the A2X AS address field. Bit **1** 0 A2X AS address field is absent 1 A2X AS address field is present A2X AS addresses The A2X AS addresses field is coded according to figure 5.7.2.7 and table 5.7.2.7. If the length of A2X service identifier unrelated info contents field indicates a length bigger than indicated in figure 5.7.2.6, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier unrelated info contents.

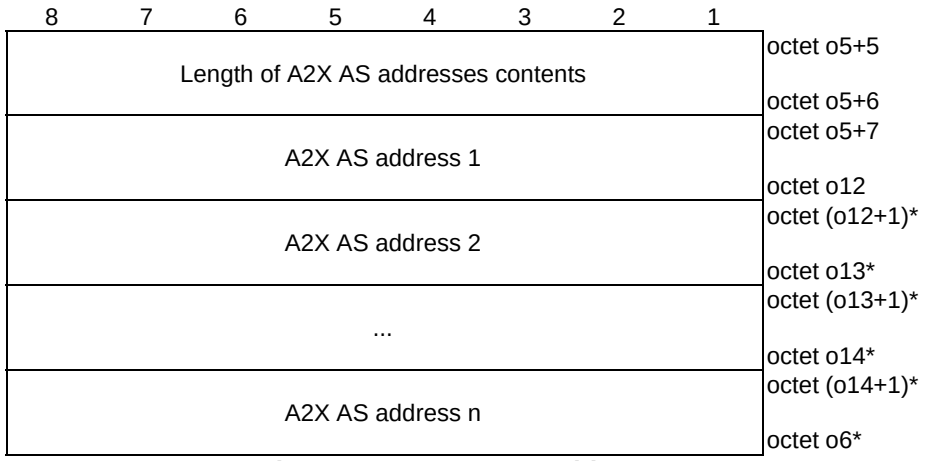
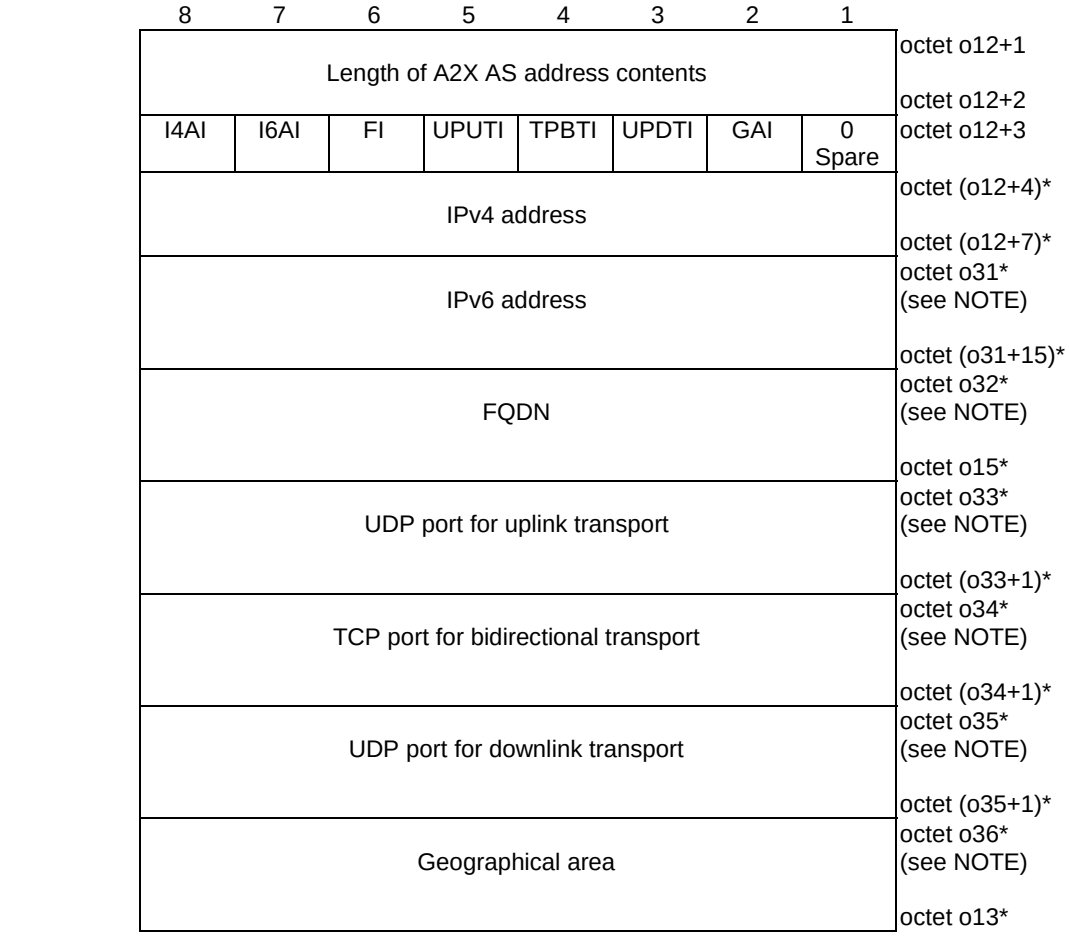


Figure 5.7.2.7: A2X AS addresses

Table 5.7.2.7: A2X AS addresses

A2X AS address The A2X AS address field is coded according to figure 5.7.2.8 and table 5.7.2.8.



NOTE: The field is placed immediately after the last present preceding field.

Figure 5.7.2.8: A2X AS address

Table 5.7.2.8: A2X AS address

IPv4 Address Indicator (I4AI)
The I4AI bit indicates presence of the IPv4 address field.
Bit
8
0 IPv4 address field is absent
1 IPv4 address field is present

IPv6 Address Indicator (I6AI)
The I6AI bit indicates presence of the IPv6 address field.
Bit
7
0 IPv6 address field is absent
1 IPv6 address field is present

FQDN Indicator (FI)
The FI bit indicates presence of the FQDN field.
Bit
6
0 FQDN field is absent
1 FQDN field is present

UDP Port for Uplink Transport Indicator (UPUTI)
The UPUI bit indicates presence of the UDP port for uplink transport field.
Bit
5
0 UDP port for uplink transport field is absent
1 UDP port for uplink transport field is present

TCP Port for Bidirectional Transport Indicator (TPBTI)
The TPBTI bit indicates presence of the TCP port for bidirectional transport field.
Bit
4
0 TCP port for bidirectional transport field is absent
1 TCP port for bidirectional transport field is present

UDP Port for Downlink Transport Indicator (UPUTI)
The UPUTI bit indicates presence of the UDP port for downlink transport field.
Bit
3
0 UDP port for downlink transport field is absent
1 UDP port for downlink transport field is present

Geographical Area Indicator (GAI)
The GAI bit indicates presence of the geographical area field.
Bit
2
0 geographical area field is absent
1 geographical area field is present

IPv4 address (NOTE 2)
The IPv4 address field contains an IPv4 address of an A2X application server.

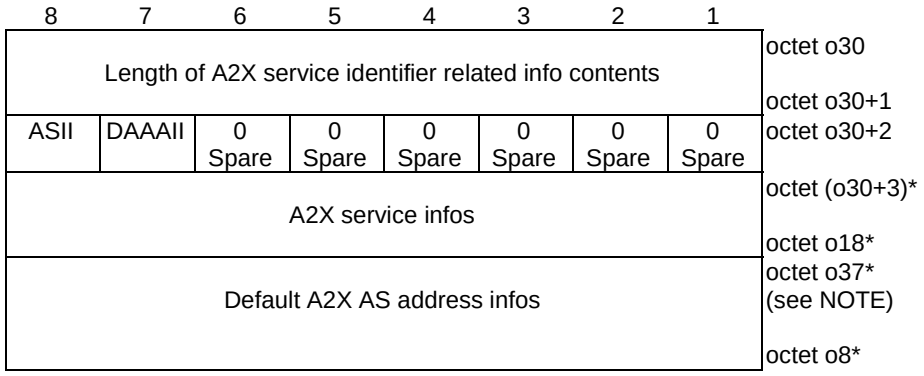
IPv6 address (NOTE 2)
The IPv6 address field contains an IPv6 address of an A2X application server.

FQDN (NOTE 2)
The FQDN field contains an FQDN of an A2X application server. The first octet of the FQDN field indicates length of the FQDN and the remaining octets of the FQDN field contain the FQDN.

UDP port for uplink transport (NOTE 1)
The UDP port for uplink transport field indicates binary coded UDP port to be used for uplink transport.

TCP port for bidirectional transport (NOTE 1)
The TCP port for bidirectional transport field indicates binary coded TCP port to be used for bidirectional transport.

UDP port for downlink transport (NOTE 1) The UDP port for downlink transport field indicates binary coded UDP port to be used for downlink transport. Geographical area The Geographical area field is coded according to figure 5.7.2.15 and table 5.7.2.15, and contains a list of points of a polygon. If the length of A2X AS address contents field indicates a length bigger than indicated in figure 5.7.2.8, receiving entity shall ignore any superfluous octets located at the end of the A2X AS address contents.
NOTE 1: The UDP port for uplink transport field, the TCP port for bidirectional transport field, and the UDP port for downlink transport field are absent when the A2X AS address is present in the A2X service identifier unrelated info. NOTE 2: One of the IPv4 address field, the IPv6 address field or the FQDN field is present.



NOTE: The field is placed immediately after the last present preceding field.

Figure 5.7.2.9: A2X service identifier related info

Table 5.7.2.9: A2X service identifier related info

A2X service infos indicator (ASII) The VSII bit indicates presence of the A2X service infos field. Bit **8** 0 A2X service infos field is absent 1 A2X service infos field is present Default A2X AS address infos indicator (DAAAII) The AVSII bit indicates presence of the default A2X AS address infos field. Bit **7** 0 Default A2X AS address infos field is absent 1 Default A2X AS address infos field is present A2X service infos The A2X service infos field is coded according to figure 5.7.2.10 and table 5.7.2.10 and indicates a list of A2X service identifier to A2X application server address mapping rules. Default A2X AS address infos The default A2X AS address infos field is coded according to figure 5.7.2.13 and table 5.7.2.13 and indicates default A2X application server addresses for the unicast A2X communication over Uu. If the length of A2X service identifier related info contents field indicates a length bigger than indicated in figure 5.7.2.9, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier related info contents.

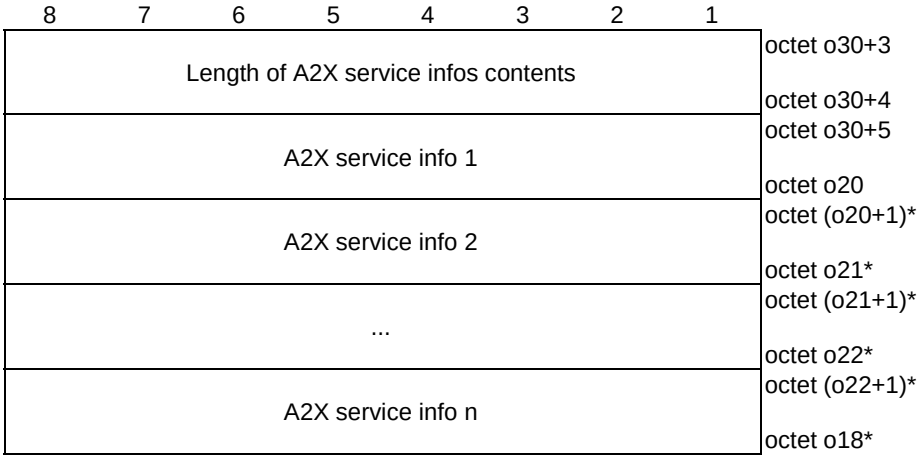


Figure 5.7.2.10: A2X service infos

Table 5.7.2.10: A2X service infos

A2X service info The A2X service info field is coded according to figure 5.7.2.11 and table 5.7.2.11.

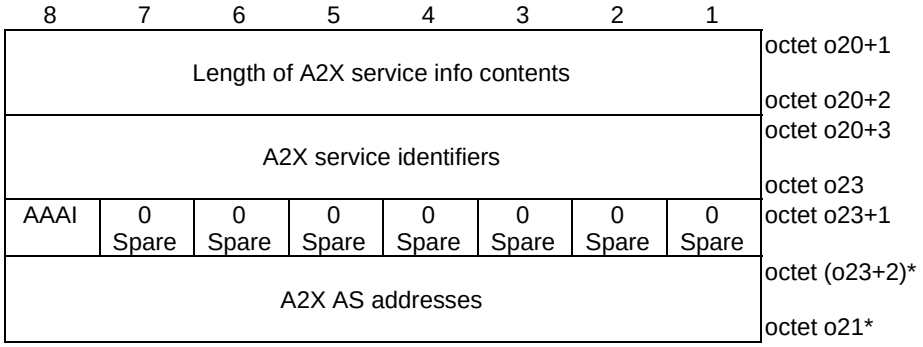


Figure 5.7.2.11: A2X service info

Table 5.7.2.11: A2X service info

A2X service identifiers The A2X service identifiers field is coded according to figure 5.7.2.12 and table 5.7.2.12 and indicates a list of A2X service identifier. A2X AS addresses indicator (AAAI) The AVSII bit indicates presence of the A2X AS addresses field. Bit **8** 0 A2X AS addresses field is absent 1 A2X AS addresses field is present A2X AS addresses The A2X AS addresses field is coded according to figure 5.7.2.7 and table 5.7.2.7 and indicates A2X application server addresses for A2X services identified by the A2X service identifiers indicated in the A2X service identifiers field. If the length of A2X service info contents field indicates a length bigger than indicated in figure 5.7.2.11, receiving entity shall ignore any superfluous octets located at the end of the A2X service info contents.

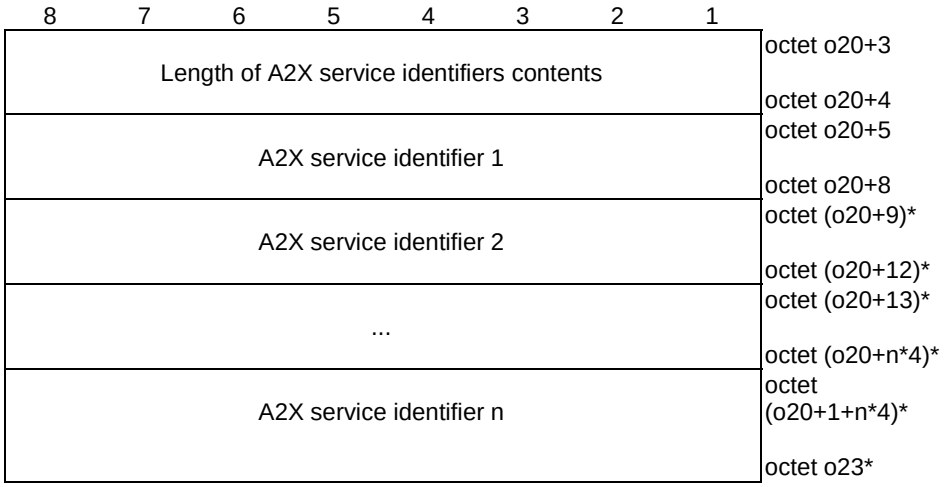


Figure 5.7.2.12: A2X service identifiers

Table 5.7.2.12: A2X service identifiers

A2X service identifier The A2X service identifier field contains a binary coded A2X service identifier.

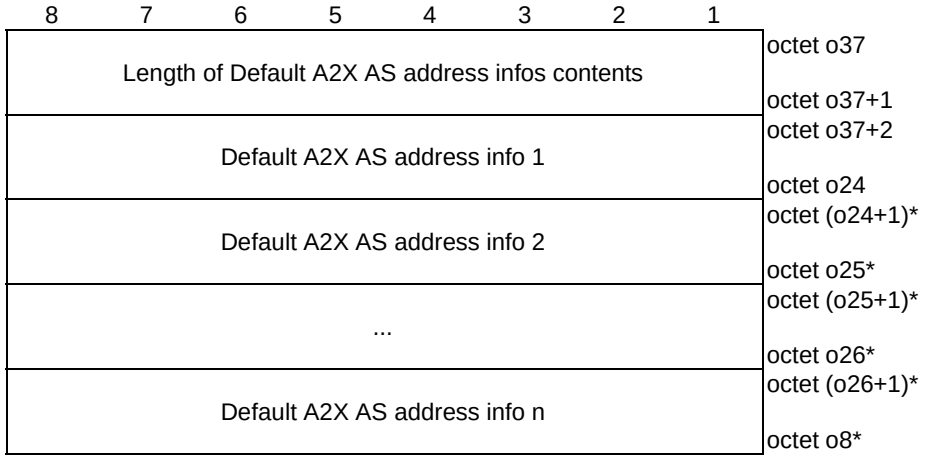
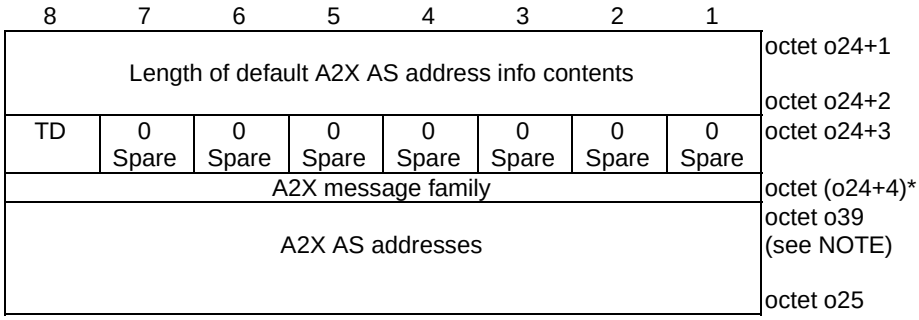


Figure 5.7.2.13: Default A2X AS address infos

Table 5.7.2.13: Default A2X AS address infos

Default A2X AS address info The default A2X AS address info field is coded according to figure 5.7.2.14 and table 5.7.2.14.



NOTE: The field is placed immediately after the last present preceding field.

Figure 5.7.2.14: Default A2X AS address info

Table 5.7.2.14: Default A2X AS address info

Type of Data (TD) The type of data bit indicates type of data. Bit **8** 0 non-IP 1 IP If the type of data bit is set to "non-IP", then the A2X message family field is present otherwise the A2X message family field is absent. A2X message family (NOTE) Bits 8 7 6 5 4 3 2 1 0 0 0 0 0 0 0 0 Reserved All other values are spare. A2X AS addresses The A2X AS addresses field is coded according to figure 5.7.2.7 and table 5.7.2.7 and indicates A2X application server addresses for type of data identified by the TD bit and the A2X message family (if the type of data is non-IP). If the length of default A2X AS address info contents field indicates a length bigger than indicated in figure 5.7.2.14, receiving entity shall ignore any superfluous octets located at the end of the default A2X AS address info contents. NOTE: In this release of the specification, no specific standard application for A2X message family is available.

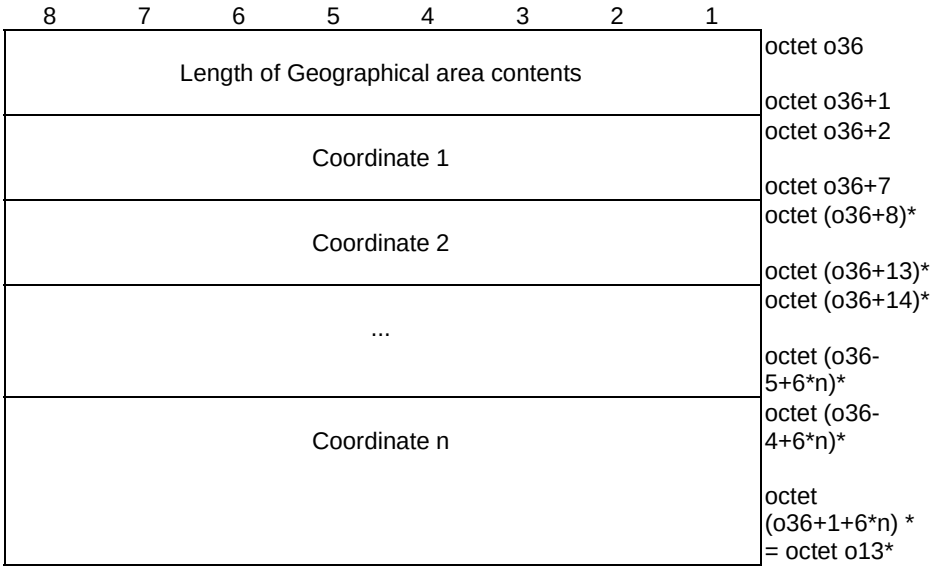


Figure 5.7.2.15: Geographical area

Table 5.7.2.15: Geographical area

Coordinate The coordinate field is coded according to figure 5.7.2.16 and table 5.7.2.16.

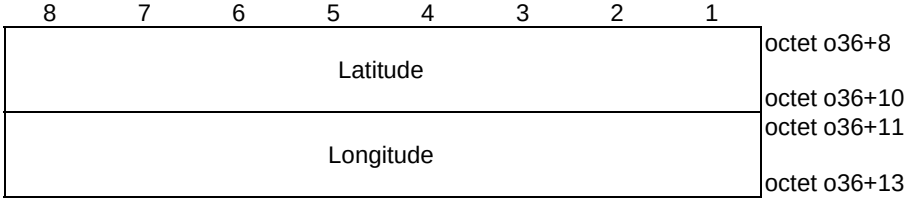


Figure 5.7.2.16: Coordinate area

Table 5.7.2.16: Coordinate area

Latitude The latitude field is coded according to clause 6.1 of 3GPP TS 23.032 [7]. Longitude The longitude field is coded according to clause 6.1 of 3GPP TS 23.032 [7].

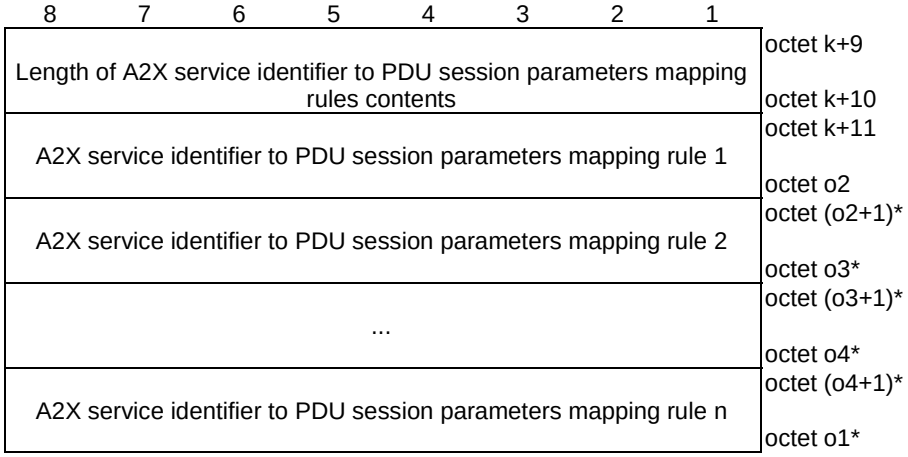


Figure 5.7.2.17: A2X service identifier to PDU session parameters mapping rules

Table 5.7.2.17: A2X service identifier to PDU session parameters mapping rules

A2X service identifier to PDU session parameters mapping rule The A2X service identifier to PDU session parameters mapping rule field is coded according to figure 5.7.2.18 and table 5.7.2.18.

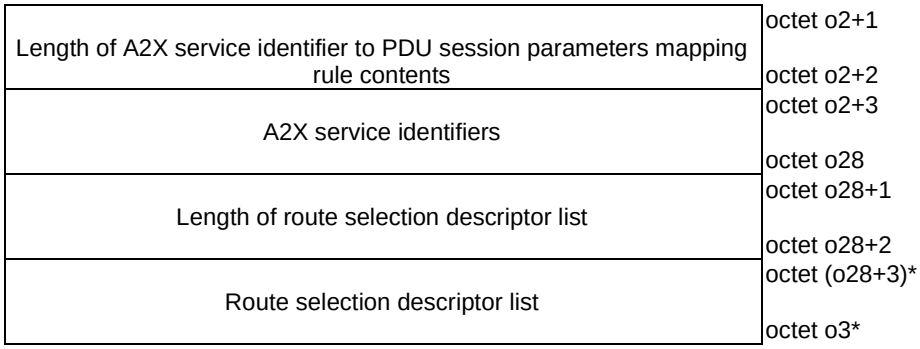


Figure 5.7.2.18: A2X service identifier to PDU session parameters mapping rule

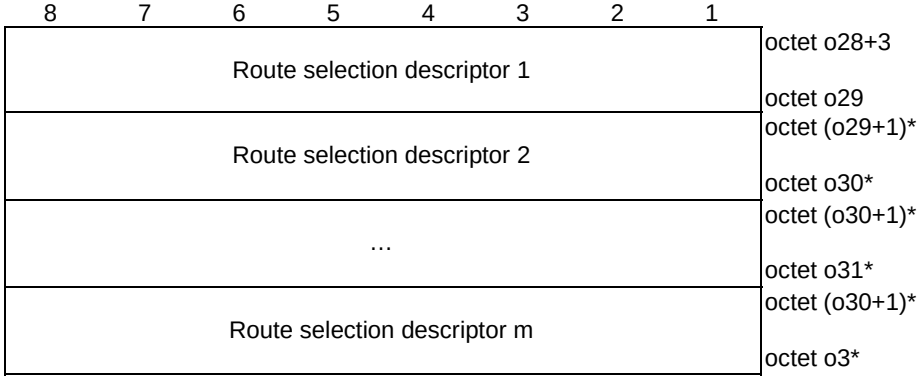


Figure 5.7.2.19: Route selection descriptor list

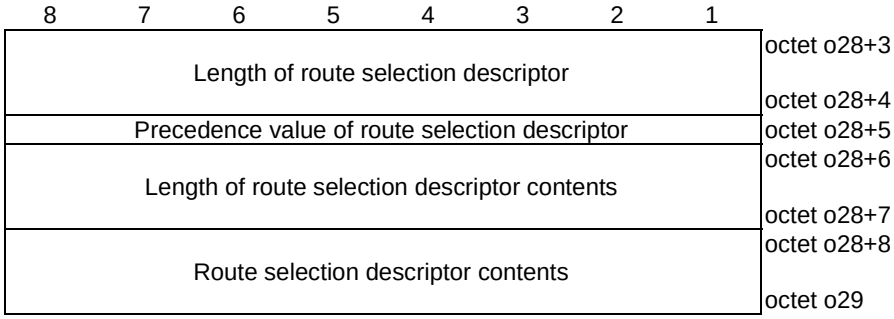


Figure 5.7.2.20: Route selection descriptor

Table 5.7.2.18: A2X service identifier to PDU session parameters mapping rule

A2X service identifiers
The A2X service identifiers field is coded according to figure 5.7.2.12 and table 5.7.2.12 and indicates a list of A2X service identifier.

Route selection descriptor contents (octets o28+8 to o29)
The route selection descriptor contents field is of variable size and contains a variable number (at least one) of route selection descriptor components. Each route selection descriptor component shall be encoded as a sequence of a one octet route selection descriptor component type identifier and a route selection descriptor component value field. The route selection descriptor component type identifier shall be transmitted first.

Route selection descriptor component type identifier
Bits
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 1 SSC mode type
0 0 0 0 0 0 1 0 S-NSSAI type
0 0 0 0 0 1 0 0 DNN type
0 0 0 0 1 0 0 0 PDU session type type
0 0 0 1 0 0 0 0 Transport layer protocol type
All other values are spare. If received, they shall be ignored.

For "SSC mode type", the route selection descriptor component value field shall be encoded as a one octet SSC mode field. The bits 8 through 4 of the octet shall be spare, and the bits 3 through 1 shall be encoded as the value part of the SSC mode information element defined in clause 9.11.4.16 of 3GPP TS 24.501 [4]. The "SSC mode type" route selection descriptor component shall not appear more than once in the route selection descriptor.

For "S-NSSAI type", the route selection descriptor component value field shall be encoded as a sequence of a one octet S-NSSAI length field and an S-NSSAI value field of a variable size. The S-NSSAI value shall be encoded as the value part of the S-NSSAI information element defined in clause 9.11.2.8 of 3GPP TS 24.501 [4].

For "DNN type", the route selection descriptor component value field shall be encoded as a sequence of a one octet DNN length field and a DNN value field of a variable size. The DNN value contains an APN as defined in 3GPP TS 23.003 [10].

For "PDU session type type", the route selection descriptor component value field shall be encoded as a one octet PDU session type field. The bits 8 through 4 of the octet shall be spare, and the bits 3 through 1 shall be encoded as the value part of the PDU session type information element defined in clause 9.11.4.11 of 3GPP TS 24.501 [4]. The "PDU session type type" route selection descriptor component shall not appear more than once in the route selection descriptor.

For "Transport layer protocol type", the route selection descriptor component value field shall be encoded as:
Bits
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 1 UDP
0 0 0 0 0 0 1 0 TCP
All other values are spared.

The "Transport layer protocol type" route selection descriptor component appears only when the "PDU session type type" appears and the PDU session type value is set to "IPv4", "IPv6" or "IPv4v6". It shall not appear more than once in the route selection descriptor.

If the length of A2X service identifier to PDU session parameters mapping rule contents field indicates a length bigger than indicated in figure 5.7.2.18, receiving entity shall ignore any superfluous octets located at the end of the A2X service identifier to PDU session parameters mapping rule contents.

Annex A (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2023-04	CT1#141e	C1-232212	-	-	-	TS skeleton from Rapporteur	0.0.0
2023-04	CT1#141e	C1-232777	-	-	-	TS 24.578 scope, reference, and general section	0.1.0
2023-05	CT1#142	C1-233216		-	-	Pseudo-CR on encoding of A2XP UE policy part	0.2.0
2023-05	CT1#142	C1-233941		-	-	Pseudo-CR on encoding of UE policies for direct C2 communication over PC5	0.2.0
2023-05	CT1#142	C1-234213		-	-	Pseudo-CR on encoding of UE policies for A2X communication over PC5	0.2.0
2023-05	-	-		-	-	Editorial correction and reference numbering by Rapporteur	0.2.0
2023-08	CT1#143	C1-235397		-	-	Pseudo-CR on encoding of altitude range per geographical area	0.3.0
2023-08	CT1#143	C1-236088		-	-	Pseudo-CR on DDAA policy encoding	0.3.0
2023-08	-	-		-	-	Correction of terminology by Rapporteur	0.3.0
2023-10	CT1#144	C1-238185		-	-	Pseudo-CR on general description for UE policies for A2X	0.4.0
2023-10	CT1#144	C1-238187		-	-	Encoding of UE policies for A2X communication over PC5	0.4.0
2023-10	CT1#144	C1-238188		-	-	Encoding of UE policies for A2X communication over Uu	0.4.0
2023-10	-	-		-	-	Numbering by Rapporteur	0.4.0
2023-11	CT1#145	C1-239442	-	-	-	Pseudo-CR on resolution of ENs	0.5.0
2023-11	CT1#145	C1-239446	-	-	-	UE policies for A2X communication over Uu	0.5.0
2023-11			-	-	-	Editorial corrections by Rapporteur	0.5.0
2023-12						Version 1.0.0 is created	1.0.0
2024-03			-	-	-	Editorial corrections by Rapporteur	2.0.0
2024-03	CT#103	CP-240259				Presentation to TSG CT for approval	2.0.0
2024-03	CT#103					Approved in CT#103	18.0.0

History

Document history		
V18.0.0	May 2024	Publication