**SA WG2 Meeting #S2-140E S2-2006196**

**Aug 19 – Sep 01, 2020, Elbonia (revision of S2-2005208)**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **23.285** | **CR** | **0063** | **rev** | **1** | **Current version:** | **16.3.0** |  |
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| *For* ***HE******LP*** *on using this form: comprehensive instructions can be found at http://www.3gpp.org/Change-Requests.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Introducing new V2X service type |
|  |  |
| ***Source to WG:*** | CATT, CAICT, China Mobile, Huawei, HiSilicon, ZTE, Qualcomm Incorporated |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | TEI14, V2XARC |  | ***Date:*** | 2020-08-04 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP TR 21.900. | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | A new ITS standard CCSA YD/T 3707-2020: "Technical requirements of network layer of LTE-based vehicular communication" was publised by CCSA (China Communications Standards Association) recently, which defines a new type of V2X service that needs to be supported by 3GPP defined V2X communication.It was already approved in CT1 (see CP-201354) the CCSA YD/T 3707-2020 was added as a new V2X message family for LTE V2X. |
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| ***Summary of change:*** | Adding new ITS standard CCSA YD/T 3707-2020: "Technical requirements of network layer of LTE-based vehicular communication" as new type of V2X service for LTE V2X into TS 23.285. |
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| ***Consequences if not approved:*** | Lack of support on new ITS standard for LTE V2X. |
|  |  |
| ***Clauses affected:*** | 2, 3.1, 3.2, 4.4.1.1.2, 4.4.1.2.2, 4.4.3.2, 4.4.3.3, 4.4.5.1, 4.4.7.3, 5.1.1, 5.3 |
| ***“*** |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | The changes are applicable also to the earlier releases. |
|  |  |
| ***This CR's revision history:*** |  |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1st Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

# 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 22.185: "Service requirements for V2X services".

[3] ISO 17419:2018: "Intelligent transport systems - Cooperative systems - Globally unique identification".

[4] IEEE Std 1609.12-2016: "IEEE Standard for Wireless Access in Vehicular Environments (WAVE) - Identifier Allocations".

[5] 3GPP TS 23.303: "Proximity-based Services (ProSe); Stage 2".

[6] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[7] 3GPP TS 23.468: "Group Communication System Enablers for LTE (GCSE\_LTE)".

[8] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[9] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[10] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".

[11] 3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

[12] 3GPP TS 23.203: "Policy and charging control architecture".

[13] IEEE Std 1609.3-2010: "IEEE Standard for Wireless Access in Vehicular Environments (WAVE) - Networking Services".

[14] ISO 29281-1:2013: "Intelligent Transport Systems - Communications access for land mobiles (CALM) - Non-IP networking - Part 1: Fast networking & transport layer protocol (FNTP)".

[15] 3GPP TS 29.272: "Evolved Packet System (EPS); Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol".

[16] ETSI TS 102 637‑2 V1.2.1: "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 2: Specification of Cooperative Awareness Basic Service".

[17] ETSI TS 102 637‑3 V1.1.1: "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 3: Specifications of Decentralized Environmental Notification Basic Service".

[18] 3GPP TS 32.277: "Proximity-based Services (ProSe) charging".

[19] Void.

[20] 3GPP TS 32.251: "Telecommunication management; Charging management; Packet Switched (PS) domain charging".

[21] 3GPP TS 32.273: "Telecommunication management; Charging management; Multimedia Broadcast and Multicast Service (MBMS) charging".

[22] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".

[23] 3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode".

[24] Void.

[25] 3GPP TS 33.185: "Security aspect for LTE support of V2X services".

[26] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".

[27] 3GPP TS 24.386: "User Equipment (UE) to V2X control function; protocol aspects; Stage 3".

[28] 3GPP TS 22.186: "Enhancement of 3GPP support for V2X scenarios; Stage 1".

[29] 3GPP TS 26.348: "Northbound Application Programming Interface (API) for Multimedia Broadcast/Multicast Service (MBMS) at the xMB reference point".

[30] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".

[31] 3GPP TS 23.167: "IP Multimedia Subsystem (IMS) emergency sessions".

[xx] CCSA YD/T 3707-2020: "Technical requirements of network layer of LTE-based vehicular communication".

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 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 TR 21.905 [1].

For the purposes of the present document, the following terms and definitions given in ISO 17419 [3] apply:

**Intelligent Transport Systems**

**ITS Application Identifier**

For the purposes of the present document, the following term and definition given in IEEE Std 1609.12-2016 [4] apply:

**Provider Service Identifier**

For the purposes of the present document, the following term and definition given in TS 22.185 [2] apply:

**Road Side Unit**

For the purposes of the present document, the following term and definition given in TS 23.303 [5] apply:

**Geographical Area**

For the purposes of the present document, the following term and definition given in CCSA YD/T 3707-2020 [xx] apply:

**Application Identifier**

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 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 TR 21.905 [1].

AID Application Identifier

C-TEID Common-Tunnel Endpoint IDentifier

ITS Intelligent Transport Systems

ITS-AID ITS Application Identifier

PSID Provider Service Identifier

RSU Road Side Unit

SIPTO@LN SIPTO at the Local Network

USD User Service Description

V2X Vehicle-to-Everything

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

##### 4.4.1.1.2 Policy/Parameter provisioning

The following information for V2X communications over PC5 reference point is provisioned to the UE:

1) Authorization policy:

- When the UE is "served by E-UTRAN":

- PLMNs in which the UE is authorized to perform V2X communications over PC5 reference point.

- When the UE is "not served by E-UTRAN":

- Indicates whether the UE is authorized to perform V2X communications over PC5 reference point when "not served by E-UTRAN".

2) Radio parameters for when the UE is "not served by E-UTRAN":

- Includes the radio parameters with Geographical Area(s) and an indication of whether they are "operator managed" or "non-operator managed. These radio parameters (e.g. frequency bands) are defined in TS 36.331 [9]. The UE uses the radio parameters to perform V2X communications over PC5 reference point when "not served by E-UTRAN" only if the UE can reliably locate itself in the corresponding Geographical Area. Otherwise, the UE is not authorized to transmit.

NOTE 1: Whether a frequency band is "operator managed" or "non-operator managed" in a given Geographical Area is defined by local regulations.

3) Policy/parameters:

- The mapping of Destination Layer-2 ID(s) and the V2X services, e.g. PSIDs, ITS-AIDs or AIDs of the V2X application.

NOTE 2: PLMN operators coordinate to make sure Destination Layer-2 ID(s) for different V2X services are configured in a consistent manner.

NOTE 3: To pre-configure a UE with the provisioning parameters, at least the "not served by E-UTRAN" parameters of 1) and 2), and the parameters of 3) need to be included.

- The mapping of ProSe Per-Packet Priority and packet delay budget for V2X communication (autonomous resources selection mode).

- The list of V2X services, e.g. PSIDs, ITS-AIDs or AIDs of the V2X applications, with Geographical Area(s) that require privacy support.

- The mapping of service types (e.g. PSIDs, ITS-AIDs or AIDs) to V2X frequencies (see TS 36.300 [10] for further information) with Geographical Area(s).

- The mapping of service types (e.g. PSIDs, ITS-AIDs or AIDs) to Tx Profiles (see TS 36.300 [10] for further information).

- The list of V2X services, e.g. PSIDs, ITS-AIDs or AIDs of the V2X applications, allowed to use a specific PPPR value.

Alternatively, the above parameters in 2) and 3) may be configured on the UE through the V1 reference point from the V2X Application Server. The V2X Control Function may also obtain these parameters through the V2 reference point from the V2X Application Server.

The parameters provisioned by the V2X Control Function take precedence over the configured parameters on the UE.

NOTE 4: The V2 reference point procedure is not specified in this Release.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

##### 4.4.1.2.2 Policy/Parameter provisioning

The following information may be configured in V2X Control Function and optionally provisioned to the UE for V2X communications over LTE-Uu reference point:

1) PLMNs in which the UE is authorized to use MBMS based V2X communication.

- Corresponding V2X USD(s) for receiving MBMS based V2X traffic in the PLMN. The V2X USD(s) may be obtained through the V2 reference point from the V2X Application Server.

NOTE: The V2 reference point procedure is not specified in this Release.

2) V2X Application Server address information.

- List of FQDNs or IP addresses of the V2X Application Servers, associated with served geographical area information and list of PLMNs that the configuration applies to.

3) V2X Application Sever discovery using MBMS.

- List of PLMNs and corresponding V2X Server USDs for receiving V2X Application Server information via MBMS.

4) Mapping of the V2X services, e.g. PSIDs, ITS-AIDs or AIDs of the V2X application to:

- V2X Application Server address (consisting of IP address/FQDN and UDP port) for unicast;

- V2X USD for MBMS.

Information of the V2X USD is described in clause 4.4.7.2 and information of the V2X Server USD is described in clause 4.4.7.3.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

#### 4.4.3.2 V2X message transmission/reception via unicast

The V2X communication via unicast over the LTE-Uu reference point supports roaming operations. Latency reduction for V2X message transfer via unicast may be achieved by using SIPTO@LN or SIPTO above RAN as defined in TS 23.401 [6].

NOTE 1: In case of SIPTO@LN with L-GW function collocated with an eNB, mobility is not supported.

For transport of IP based or non-IP based V2X messages using uplink unicast V2X communication in case of applications identified by e.g. PSID, ITS-AID or AID for the same applications as over PC5 reference point:

- V2X messages are transported over UDP/IP packets;

NOTE 2: UDP is selected since it has shorter latency due to no connection setup, and since IP multicast works with UDP only.

- the UE sends a V2X message over UDP/IP to a V2X Application Server address. The destined V2X Application Server address is derived from e.g. the PSID (or the ITS-AID, or the AID) and the UE configuration as described in clause 4.4.1.2.2; and

- the V2X Application Server receives the V2X message in a UDP/IP packet on a V2X Application Server address.

For transport of V2X messages:

- for applications different from the applications with e.g. PSID, ITS-AID or AID for PC5 reference point, or

- for configured applications with e.g. PSID, ITS-AID or AID sending IP based V2X messages,

existing unicast routing towards application server applies.

NOTE 3: In case V2X application uses TCP transport then existing unicast routing towards application server applies, i.e. no UDP encapsulation performed.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

#### 4.4.3.3 V2X message reception via MBMS

V2X messages can be broadcasted via MBMS in which the V2X Application Server transfers V2X messages via MBMS bearer service(s) as shown in Figure 4.2.2-1a.

For MBMS reception of V2X messages, V2X USD per PLMN for V2X services is required for the UE. The UE is provisioned with mapping of e.g. PSID (or ITS-AID, or AID) and V2X USD as described in clause 4.4.1.2.2.

To provide the UE with the V2X USD(s), the following ways may be used:

- Existing MBMS service announcement mechanisms specified in TS 23.246 [8] and TS 26.346 [11].

- Provisioning as described in clause 4.4.1.2.2, i.e. pre-configuration in the UE and/or configuration from V2X Control Function.

- Provisioning from the V2X Application Server via V1 reference point.

NOTE 1: The UE can receive the downlink broadcast from the PLMN other than Serving PLMN based on the V2X USD(s) obtained as described in this clause.

NOTE 2: The operator can configure multiple MBMS Service Areas for a specific V2X service. If any of these MBMS Service Areas overlap, the UE needs to be configured with different TMGIs for these overlapping MBMS Service Areas for this V2X service.

The V2X Application Server providing the V2X service identified by e.g. the PSID (or the ITS-AID, or the AID) sends the V2X message via UDP/IP transport using information provided in the V2X USD.

For latency improvements for MBMS, localized MBMS can be considered for localized routing of V2X messages destined to UEs. Some localized MBMS deployment options are described in Annex B.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

#### 4.4.5.1 QoS handling for V2X communication over PC5 reference point

Core Network, i.e. MME, provides the UE-PC5-AMBR based on subscription information to the eNB as part of the UE context information.

When PC5 is used for the transmission of V2X messages, the following principles are followed for both network scheduled operation mode and UE autonomous resources selection mode:

- ProSe Per-Packet Priority (PPPP) defined in clause 5.4.6.1 of TS 23.303 [5] applies to the V2X communication over PC5.

- ProSe Per-Packet Reliability (PPPR) applies to the V2X communication over PC5 as defined in TS 23.303 [5]. PPPR has a value range of 1 to 8, where the higher value represents the lower reliability requirement for that message. The UE may be configured with a list of V2X services, e.g. PSIDs, ITS-AIDs or AIDs allowed to use the specific PPPR value.

- The application layer sets the PPPP for each V2X message when passing it to lower layer for transmission.

- The application layer may set the PPPR for each V2X message when passing it to lower layer for transmission.

- The mapping of application layer V2X message priority to PPPP is configuration on the UE.

- The mapping of application layer V2X message reliability to PPPR is configuration on the UE.

- The setting of the PPPP value should reflect the latency required in both UE and eNB, i.e. the low PDB is mapped to the high priority PPPP value.

- The mapping between V2X service types and V2X frequencies is as defined in clause 4.3.2 and clause 4.4.1.1.2.

- The mapping of Destination Layer-2 ID(s) and the V2X services, e.g. PSIDs, ITS-AIDs or AIDs of the V2X application is as described in clause 4.4.1.1.2.

NOTE: The mapping of PPPP to packet delay budget is not specified in this specification.

When the network scheduled operation mode is used, following additional principles apply:

- UE provides priority information reflecting PPPP to the eNB for resources request.

- When the eNB receives a request for PC5 resource from a UE, the eNB can deduce the packet delay budget from the priority information reflecting PPPP from the UE.

- eNB can use the priority information reflecting PPPP for priority handling and UE-PC5-AMBR for capping the UE PC5 transmission in the resources management.

- UE may provide PPPR information reflecting reliability requirement described in TS 22.186 [28] to the eNB for resources request.

- UE provides Destination Layer-2 ID(s) of the V2X services to the eNB for resources requested as defined in TS 36.321 [26].

- When the eNB receives a request for PC5 resource from a UE, the eNB determines the V2X frequency(ies) in which the V2X service is to be scheduled as defined in TS 36.300 [10].

When the autonomous resources selection mode is used, following additional principle applies:

- The UE derives the packet delay budget of the V2X message from PPPP based on the provisioned mapping information described in clause 4.4.1.1.2.

- The UE derives the frequency in which a V2X service is to be transmitted, from the mapping between V2X service types and V2X frequencies as described in clause 4.4.1.1.2.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

#### 4.4.7.3 User Service Description for V2X Application Server Discovery (V2X Server USD)

The V2X Server USD is used to configure the UE for receiving local V2X Application Server information when it is provided over MBMS, as specified in clause 5.4.1.

The local Service Information contained in the broadcast is as described in clause 5.4.1.2, and should include similar information defined in clause 4.4.1.2.2.

NOTE: Stage 3 defines the format of the local Service information.

Table 4.4.7.3-1: Information for V2X Server USD

|  |  |
| --- | --- |
| Information element | Description |
| TMGI | TMGI information |
| List of service area identifier | A list of service area identifier for the applicable MBMS broadcast area. |
| Frequency | Identification of frequency if multi carrier support is provided |
| SDP information | SDP with IP multicast address and port number used for V2X Application Server discovery via MBMS.The content of the message carries the local Service Information and should include following information:- Mapping of the V2X services, e.g. PSIDs, ITS-AIDs or AIDs of the V2X application of a PSID, ITS-AID and AID to V2X Application Server address (consisting of IP address/FQDN and UDP port) for unicast, and V2X USD for V2X communication via MBMS. |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 5.1.1 User plane for PC5 reference point supporting V2X services

The PC5-U stack as defined in clause 5.1.2.1 of TS 23.303 [5] is used for the V2X communication over PC5 reference point. IP and Non-IP PDCP SDU types are supported for the V2X communication over PC5.

For IP PDCP SDU type, only IPv6 is supported. The IP address allocation and configuration are as defined in clause 4.5.1.

The Non-IP PDCP SDU contains a Non-IP Type header, which indicates the V2X message family used by the application layer, e.g. IEEE 1609 family's WSMP [13], ISO defined FNTP [14], CCSA defined DSMP [xx], etc.

NOTE: The Non-IP Type header and allowed values are defined in TS 24.386 [27].

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Next Change \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## 5.3 Procedure for V2X communication over PC5 reference point

To perform V2X communication over PC5 reference point, the UE is configured with the related information as described in clause 4.4.1.1.

The procedure for one-to-many ProSe Direct Communication transmission described in clause 5.4.2 of TS 23.303 [5] is applied to V2X communication over PC5 reference point with following differences:

- The source Layer-2 ID is set to the Layer-2 ID described in clause 4.5.1.

- A UE shall be configured with a set of Layer-2 ID corresponding to different type of services.

- A UE shall be configured with the mapping of services types to Tx Profiles as described in clause 4.4.1.1.2, and selects a Tx Profile to use based on the upper layer provided service type (e.g. PSID/ITS-AID/AID).

The procedure for one-to-many ProSe Direct Communication reception described in clause 5.4.3 of TS 23.303 [5] is applied to V2X communication over PC5 reference point.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* End of Changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*