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**General Technical Requirements of LTE-Based Vehicular
Communication
(English Translation)**

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1 Scope

This Standard specifies the overall service requirements, system architecture and basic functional requirements of LTE-based vehicular communication.

This Standard is applicable to LTE-based vehicular communication systems.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this document.

3GPP TS 23.246 Multimedia Broadcast/Multicast Service (MBMS) Architecture and Functional Description

3GPP TS 23.303 Proximity-Based Service (ProSe); Stage 2

3GPP TS 23.401 General Packet Radio Service (GPRS) Enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) Access
3GPP TS 23.468 Group Communication System Enablers for LTE (GCSE_LTE); Stage 2
3GPP TS 33.185 Security Aspect for LTE Support of V2X Services
3GPP TS 36.331 Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol Specification

3.1 Terms and Definitions

For the purpose of this document, the following terms and definitions apply.

3.1.1 Road side unit (RSU)

An entity that supports V2I services and may communicate with UE. The RSU may appear as an eNB or a stationary UE. When the RSU appears as a stationary UE, it may be in or out of the LTE network coverage.

3.2 Abbreviations

For the purpose of this document, the following abbreviations apply.

C-TEID. Common-Tunnel Endpoint Identifier;
EPS. Evolved Packet System;
E-UTRAN. Evolved UTRAN;
HPLMN. Home Public land Mobile Network;
L.MBMS. Local MBMS;
MBMS. Multimedia Broadcast/Multicast Service;
ME. Mobile Equipment;

4 Overview

Vehicle-to-Everything (V2X) applications include Vehicle-to-Vehicle (V2V) applications, Vehicle-to-Infrastructure (V2I) applications, Vehicle-to-Network (V2N) applications and Vehicle-to-Pedestrian (V2P) applications.

V2V application refers to the exchange of V2V application information between adjacent on-board UEs. The information exchange is based on the broadcast mode, and the direct

mode between UEs may be used, or information may be exchanged between UEs through infrastructure [such as road side unit (RSU), application server].

V2I application refers to the on-board UE sends V2I application information to the RSU or local application server; and the RSU or local application server sends the V2I application information to the on-board UE.

V2N application refers to communication between UE and application server through EPS network.

V2P application refers to the exchange of V2P application information between an on-board UE and a human-held UE. Information exchange may adopt the direct mode between UEs, or exchange information between UEs via infrastructure [such as road side unit (RSU), application server].

5.1 Basic requirements

Requirement 1. When the sending terminal is served by E-UTRAN that supports V2X, the message transmission shall be controlled by the 3GPP network.

Requirement 6.

5.2 Effective communication distance

Requirement 16. E-UTRA shall be able to provide sufficient effective communication distance to ensure that the driver has sufficient response time (for instance, 4s).

5.3 Movement speed

Requirement 17. Regardless of whether the Vehicle-to-Everything terminal uses the Vehicle-to-Everything communication service that is provided by E-UTRAN that supports V2X communication, the 3GPP system shall be able to support messages sending between vehicles at a maximum relative speed of 500km/h.

5.4 Communication delay

Requirement 19. For terminals that support vehicle-to-vehicle and vehicle-to-pedestrian communication, whether it is sent directly or forwarded by a road side unit,

E-UTRA (N) shall ensure that the maximum communication delay not exceed 100ms.

Requirement 20. Only for special use cases (such as collision detection), the maximum delay of sending V2V messages between E-UTRA (N) Vehicle-to-Everything terminals should not exceed 20ms.

5.5 Transmission reliability

Requirement 23. The E-UTRAN network shall not rely on application layer retransmission to provide highly reliable transmission.

5.6 Requirements for information security

Requirement 24. When the Vehicle-to-Everything terminal uses the service that is provided by E-UTRAN that supports V2X communication, the 3GPP network shall provide a method for the operator to authorize the Vehicle-to-Everything terminal to perform V2X communication.

5.7 Requirements for coverage

Requirement 30. V2X services shall be supported both with and without operator network coverage.

5.8 Requirements for message sending frequency

Requirement 31. E-UTRAN shall be able to support road side units and Vehicle-to-Everything terminals with a message sending frequency of up to 10Hz.

NOTE: The messages transmitted by V2X applications to 3GPP may be either periodic or triggered by specific events.

5.9 Requirements for message size

Requirement 32. Excluding security-related message units, for periodic messages, E-UTRAN shall be able to support a maximum of 50~300 bytes of messages that are transmitted between two UEs that support V2X applications.

6 Radio Communication System Architecture of LTE-

Based Vehicle-to-Everything

6.1.1 Overview

V2X communication has two mutually independent and complementary working modes; namely, V2X communication based on PC5 direct mode and V2X communication based on LTE-Uu. The working mode based on LTE-Uu may be unicast or MBMS. The UE may use these two working modes to receive and transmit, respectively. For example, A UE may use MBMS to receive V2X messages, but send

V2X messages without using LTE-Uu. A UE may also receive V2X messages through