



**5G;
Architecture enhancements for 5G System (5GS)
to support Vehicle-to-Everything (V2X) services
(3GPP TS 23.287 version 17.5.0 Release 17)**

[ETSI TS 123 287 V17.5.0 \(2023-01\)](https://standards.iteh.ai/catalog/standards/sist/0a970453-f8ca-4b0a-8065-ee3df11d9b2d/etsi-ts-123-287-v17-5-0-2023-01)

<https://standards.iteh.ai/catalog/standards/sist/0a970453-f8ca-4b0a-8065-ee3df11d9b2d/etsi-ts-123-287-v17-5-0-2023-01>



ReferenceRTS/TSGS-0223287vh50

Keywords5G

ETSI

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
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from:

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

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

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

<https://standards-portal.etsi.org/People/CommitteeSupportStaff.aspx>

If you find a security vulnerability in the present document, please report it through our

Coordinated Vulnerability Disclosure Program:

<https://www.etsi.org/standards/coordinated-vulnerability-disclosure>

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

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

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

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

© ETSI 2023.
All rights reserved.

Intellectual Property Rights

Essential patents

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

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

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Legal Notice

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

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document **"shall"**, **"shall not"**, **"should"**, **"should not"**, **"may"**, **"need not"**, **"will"**, **"will not"**, **"can"** and **"cannot"** are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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

Contents

Intellectual Property Rights	2
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	6
1 Scope	7
2 References	7
3 Definitions and abbreviations.....	8
3.1 Definitions	8
3.2 Abbreviations	9
4 Architecture model and concepts	10
4.1 General concept.....	10
4.2 Architectural reference model	10
4.2.1 PC5 and Uu based V2X architecture reference model.....	10
4.2.1.1 Non-roaming 5G System architecture for V2X communication over PC5 and Uu reference points	10
4.2.1.2 Roaming 5G System architecture for V2X communication over PC5 and Uu reference points	11
4.2.1.3 Inter-PLMN 5G System architecture for V2X communication over PC5 reference point.....	12
4.2.2 AF-based service parameter provisioning for V2X communications	12
4.2.3 Reference points	12
4.2.4 Service-based interfaces	13
4.3 Architecture reference model for interworking with EPS V2X.....	13
4.4 Functional entities	14
4.4.1 UE	14
4.4.2 PCF	15
4.4.3 V2X Application Server	15
4.4.4 AMF.....	15
4.4.5 UDM.....	15
4.4.6 UDR.....	16
4.4.7 NRF	16
4.4.8 NEF.....	16
5 High level functionality and features	16
5.1 Authorization and Provisioning for V2X communications	16
5.1.1 General.....	16
5.1.2 Authorization and Provisioning for V2X communications over PC5 reference point.....	17
5.1.2.1 Policy/Parameter provisioning	17
5.1.2.2 Principles for applying parameters for V2X communications over PC5 reference point	18
5.1.3 Authorization and provisioning for V2X communications over Uu reference point	20
5.1.3.1 Policy/Parameter provisioning	20
5.2 V2X communication	20
5.2.1 V2X communication over PC5 reference point.....	20
5.2.1.1 General	20
5.2.1.2 Broadcast mode communication over PC5 reference point	21
5.2.1.3 Groupcast mode communication over PC5 reference point.....	21
5.2.1.4 Unicast mode communication over PC5 reference point	22
5.2.1.5 IP address allocation	23
5.2.2 V2X communication over Uu reference point	23
5.2.2.1 V2X communication via unicast	23
5.2.3 V2X communication over PC5 or Uu reference point.....	24
5.2.3.1 General	24
5.3 V2X Application Server discovery.....	24
5.3.1 General.....	24
5.3.2 Multiple V2X Application Server and Localized V2X Application Server discovery and routing.....	25
5.4 QoS handling for V2X communication.....	25
5.4.1 QoS handling for V2X communication over PC5 reference point	25

5.4.1.1	QoS model.....	25
5.4.1.1.1	General overview.....	25
5.4.1.1.2	Deriving PC5 QoS parameters and assigning PFI for PC5 QoS Flow	27
5.4.1.1.3	Handling of PC5 QoS Flows based on PC5 QoS Rules	27
5.4.1.1.4	PC5 Packet Filter Set.....	29
5.4.1.2	QoS handling for broadcast mode V2X communication over PC5 reference point.....	29
5.4.1.3	QoS handling for groupcast mode V2X communication over PC5 reference point.....	30
5.4.1.4	QoS handling for unicast mode V2X communication over PC5 reference point.....	30
5.4.2	PC5 QoS parameters.....	30
5.4.2.1	PQI	30
5.4.2.2	PC5 Flow Bit Rates	30
5.4.2.3	PC5 Link Aggregated Bit Rates	31
5.4.2.4	Range	31
5.4.2.5	Default Values.....	31
5.4.3	PC5 QoS characteristics.....	31
5.4.3.1	General	31
5.4.3.2	Resource Type.....	31
5.4.3.3	Priority Level	32
5.4.3.4	Packet Delay Budget	32
5.4.3.5	Packet Error Rate	32
5.4.3.6	Averaging Window	32
5.4.3.7	Maximum Data Burst Volume	32
5.4.4	Standardized PQI to QoS characteristics mapping	32
5.4.5	QoS handling for V2X communication over Uu reference point	34
5.4.5.1	General	34
5.4.5.2	Notification on QoS Sustainability Analytics to the V2X Application Server.....	34
5.4.5.2.1	General	34
5.4.5.2.2	Functional description	34
5.4.5.3	QoS Change based on Extended NG-RAN Notification to support Alternative Service Requirements	34
5.5	Subscription to V2X services	35
5.6	Identifiers	35
5.6.1	Identifiers for V2X communication over PC5 reference point	35
5.6.1.1	General	35
5.6.1.2	Identifiers for broadcast mode V2X communication over PC5 reference point	36
5.6.1.3	Identifiers for groupcast mode V2X communication over PC5 reference point	36
5.6.1.4	Identifiers for unicast mode V2X communication over PC5 reference point	36
5.7	Support for V2X communication for UEs in limited service state.....	37
5.8	Interworking between EPS V2X and 5GS V2X.....	37
5.8.1	V2X Policy and parameter provisioning.....	37
5.8.2	PC5 Operation	37
5.8.3	Mobility between EPS and 5GS over Uu.....	37
5.9	Support of QoS aware NR PC5 power efficiency for pedestrian UEs.....	38
6	Functional description and information flows.....	39
6.1	Control and user plane stacks	39
6.1.1	User plane for NR PC5 reference point supporting V2X services.....	39
6.1.2	Control plane for NR PC5 reference point supporting V2X services	39
6.2	Procedures for Service Authorization and Provisioning to UE	40
6.2.1	General.....	40
6.2.2	PCF based Service Authorization and Provisioning to UE.....	40
6.2.3	PCF discovery.....	41
6.2.4	Procedure for UE triggered V2X Policy provisioning	41
6.2.5	AF-based service parameter provisioning for V2X communications over control plane	42
6.3	Procedures for V2X communication over PC5 reference point	42
6.3.1	Broadcast mode V2X communication over PC5 reference point	42
6.3.2	Groupcast mode V2X communication over PC5 reference point.....	43
6.3.3	Unicast mode V2X communication over PC5 reference point	44
6.3.3.1	Layer-2 link establishment over PC5 reference point	44
6.3.3.2	Link identifier update for a unicast link	48
6.3.3.3	Layer-2 link release over PC5 reference point.....	49
6.3.3.4	Layer-2 link modification for a unicast link.....	49

6.3.3.5	Layer-2 link maintenance over PC5 reference point	50
6.4	Procedures for V2X communication over Uu reference point	51
6.4.1	Procedure for notification on QoS Sustainability Analytics to the V2X Application Server	51
6.5	Procedures for Service Authorization to NG-RAN for V2X communications over PC5 reference point.....	53
6.5.1	General.....	53
6.5.2	Registration procedure.....	53
6.5.3	Service Request procedure.....	53
6.5.4	N2 Handover procedure.....	54
6.5.5	Xn Handover procedure.....	54
6.5.6	Subscriber Data Update Notification to AMF	54
6.5.7	Delivery of PC5 QoS parameters to NG-RAN	54
6.5.8	PC5 Capability for V2X indication and V2X related information per PC5 RAT	55
Annex A (informative):	Application Function influence based edge computing for V2X services	56
Annex B (informative):	Road Side Unit (RSU) implementation options.....	57
Annex C (informative):	Change history	58
History		61

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ETSI TS 123 287 V17.5.0 (2023-01)

<https://standards.iteh.ai/catalog/standards/sist/0a970453-f8ca-4b0a-8065-ee3df11d9b2d/etsi-ts-123-287-v17-5-0-2023-01>

Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ETSI TS 123 287 V17.5.0 (2023-01)

<https://standards.iteh.ai/catalog/standards/sist/0a970453-f8ca-4b0a-8065-ee3df11d9b2d/etsi-ts-123-287-v17-5-0-2023-01>

1 Scope

The present document specifies architecture enhancements to the 5G System to facilitate vehicular communications for Vehicle-to-Everything (V2X) services, over the following reference points, based on service requirements defined in TS 22.185 [2] and TS 22.186 [3]:

- PC5 reference point: NR PC5 RAT, LTE PC5 RAT.
- Uu reference point: NR, E-UTRA.

This specification also covers interworking with EPS.

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; Stage 1".
- [3] 3GPP TS 22.186: "Enhancement of 3GPP support for V2X scenarios; Stage 1".
- [4] ISO 17419:2018: "Intelligent transport systems - Cooperative systems - Globally unique identification".
- [5] IEEE Std 1609.12-2016: "IEEE Standard for Wireless Access in Vehicular Environments (WAVE) - Identifier Allocations".
- [6] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".
- [7] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".
- [8] 3GPP TS 23.285: "Architecture enhancements for V2X services".
- [9] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".
- [10] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".
- [11] 3GPP TS 38.300: "NR; NR and NG-RAN Overall Description; Stage 2".
- [12] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in Idle mode and RRC Inactive state".
- [13] 3GPP TS 23.122: "Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode".
- [14] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".
- [15] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); protocol specification".
- [16] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".

- [17] 3GPP TS 23.303: "Proximity-based Services (ProSe); Stage 2".
- [18] IEEE Std 1609.3-2010: "IEEE Standard for Wireless Access in Vehicular Environments (WAVE) - Networking Services".
- [19] ISO 29281-1:2013: "Intelligent Transport Systems - Communications access for land mobiles (CALM) - Non-IP networking - Part 1: Fast networking & transport layer protocol (FNTTP)".
- [20] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".
- [21] IETF RFC 4862: "IPv6 Stateless Address Autoconfiguration".
- [22] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".
- [23] 3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".
- [24] 3GPP TS 24.587: "Vehicle-to-Everything (V2X) services in 5G System (5GS); Stage 3".
- [25] 3GPP TS 37.340: "Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Multi-connectivity; Stage 2".
- [26] 3GPP TS 33.536: "Security aspects of 3GPP support for advanced Vehicle-to-Everything (V2X) services".
- [27] CCSA YD/T 3707-2020: "Technical requirements of network layer of LTE-based vehicular communication".

3 Definitions and abbreviations

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].

Application Layer connection-less group: An application layer group without group formation in the V2X application layer, e.g., sensor sharing.

Application Layer ID: An identifier identifying an entity, e.g. a vehicle, a pedestrian, an RSU within the context of a specific V2X application. The format of this identifier is outside the scope of 3GPP.

NOTE 1: The Application Layer ID could be e.g. Station ID or Vehicle ID defined by other SDOs e.g. ETSI, Society of Automotive Engineers (SAE), etc.

NOTE 2: The usage of Application Layer ID, e.g. one Application Layer ID is associated with one V2X application, one Application Layer ID is associated with more than one V2X applications, or one Application Layer ID is used for all V2X applications in the UE, is up to application layer implementation.

Application Layer managed group: An application layer group with group formation and management in the V2X application layer, e.g., platooning, cooperative adaptive cruise control.

Groupcast mode communication: It refers to V2X communication over PC5 reference point within a group of UEs where any UE in the group can act as transmitting UE and the rest act as receiving UEs. See also TS 38.300 [11] for more information. The "group" here refers to Application Layer managed group or Application Layer connection-less group.

Member ID: An identifier uniquely identifying a member in the Application Layer managed group and that is managed by the V2X application layer.

Mode of communication: Mode of communication to be used by the UE over PC5 reference point i.e. broadcast mode (LTE PC5 and NR PC5), groupcast mode (NR PC5) or unicast mode (NR PC5).

NR Tx Profile: The transmission mechanism or format to be used by the UE over NR PC5 RAT (e.g. PC5 DRX support or not), see TS 38.300 [11] and TS 38.331 [15].

V2X application: An application using one or more V2X services e.g. an active safety application in a vehicle, using V2X services such as emergency warning and vehicle to vehicle safety and awareness. A V2X application may operate towards a V2X Application Server.

V2X communication: A communication to support Vehicle-to-Everything (V2X) services leveraging Uu and / or PC5 reference points. V2X services are realized by various types of V2X applications, i.e. Vehicle-to-Vehicle (V2V), Vehicle-to-Pedestrian (V2P), Vehicle-to-Infrastructure (V2I) and Vehicle-to-Network (V2N).

V2X message: A dedicated messaging type of V2X service, for example ITS messages.

V2X service: A data service, offered to V2X applications and optionally V2X Application Servers. A V2X service belongs to one V2X service type. It may include message or other data delivery, as defined in TS 22.185 [2] and TS 22.186 [3]. A V2X service can be associated with one or more V2X applications, and a V2X application can be associated with one or more V2X services.

V2X service type: A type of V2X service, which is identified by e.g. ITS-AID (ITS Application Identifier), PSID (Provider Service Identifier) or AID (Application Identifier).

For the purposes of the present document, the following terms and definitions given in ISO 17419:2018 [4] 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 [5] apply:

Provider Service Identifier

For the purposes of the present document, the following term and definition given in CCSA YD/T 3707-2020 [27] applies:

Application Identifier

For the purposes of the present document, the following term and definition given in TS 23.285 [8] apply:

Tx Profile

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].

AF	Application Function
AID	Application Identifier
AS layer	Access Stratum layer
ITS	Intelligent Transport Systems
ITS-AID	ITS Application Identifier
PFI	PC5 QoS Flow Identifier
PQI	PC5 5QI
PSID	Provider Service Identifier
RSU	Road Side Unit
V2I	Vehicle-to-Infrastructure
V2N	Vehicle-to-Network
V2P	Vehicle-to-Pedestrian
V2V	Vehicle-to-Vehicle
V2X	Vehicle-to-Everything

4 Architecture model and concepts

4.1 General concept

There are two modes of operation for V2X communication, namely V2X communication over PC5 reference point and V2X communication over Uu reference point. These two operation modes may be used by a UE independently for transmission and reception.

V2X communications over PC5 reference point are supported by LTE and/or NR.

V2X communications over Uu reference point are supported by E-UTRA connected to 5GC and/or NR connected to 5GC. In this release, V2X communication over Uu reference point is only unicast.

An RSU is not an architectural entity, but an implementation option. This is achieved by collocating a V2X application logic/server with some entities of the 3GPP system, as shown in examples in Annex B.

4.2 Architectural reference model

4.2.1 PC5 and Uu based V2X architecture reference model

4.2.1.1 Non-roaming 5G System architecture for V2X communication over PC5 and Uu reference points

Figure 4.2.1.1-1 shows the high level view of the non-roaming 5G System architecture for V2X communication over PC5 and Uu reference points.

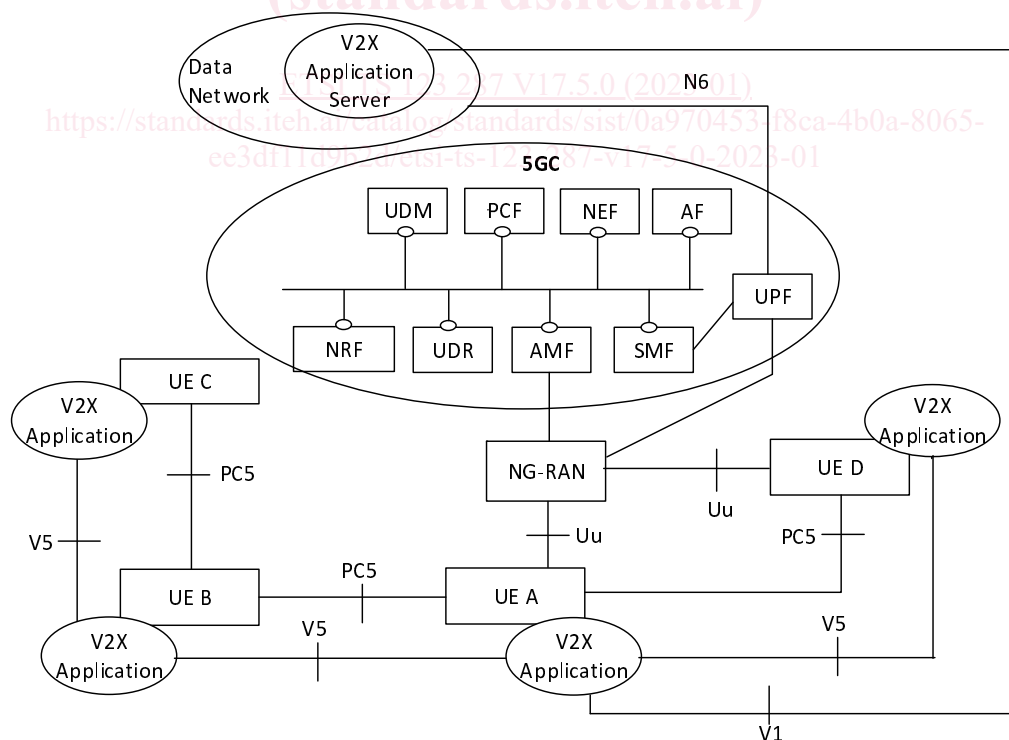


Figure 4.2.1.1-1: Non-roaming 5G System architecture for V2X communication over PC5 and Uu reference points

4.2.1.3 Inter-PLMN 5G System architecture for V2X communication over PC5 reference point

In the case of inter-PLMN V2X communication over PC5 reference point, the PC5 parameters need to be configured in a consistent way among the UEs within a certain region. The architecture for the Inter-PLMN PC5 case is similar to the one defined in clause 4.2.1.1.

4.2.2 AF-based service parameter provisioning for V2X communications

The 5G System provides NEF services to enable communication between NFs in the PLMN and V2X Application Server. Figure 4.2.2-1 shows the high level view of AF-based service parameter provisioning for V2X communications. The V2X Application Server may provide V2X service parameters to the PLMN via NEF. The NEF stores the V2X service parameters in the UDR.

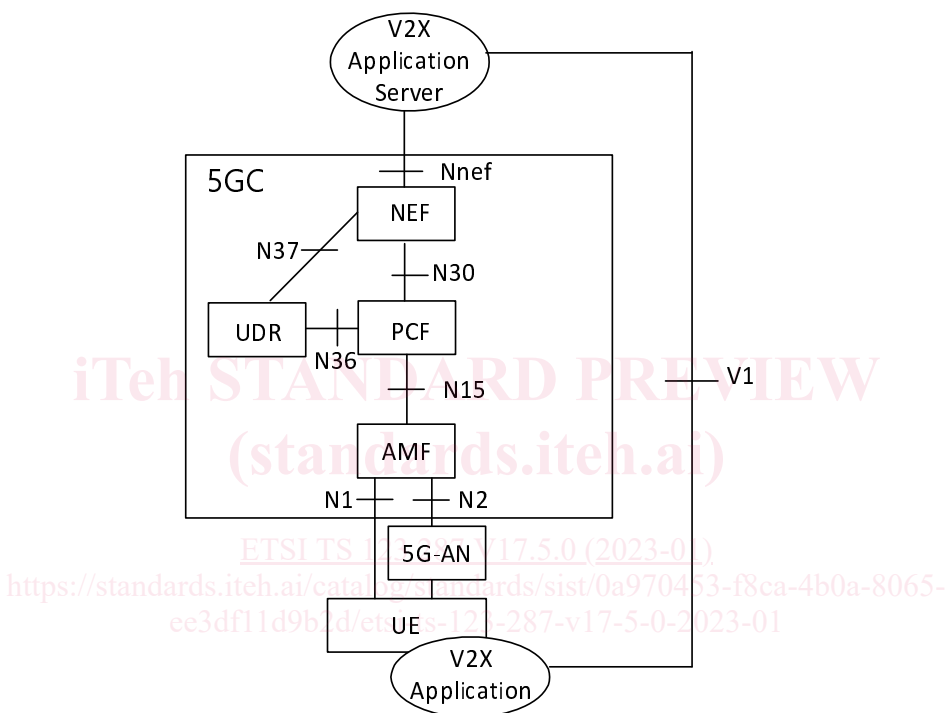


Figure 4.2.2-1: 5G System architecture for AF-based service parameter provisioning for V2X communications

4.2.3 Reference points

- V1:** The reference point between the V2X applications in the UE and in the V2X Application Server. This reference point is out of scope of this specification.
- V5:** The reference point between the V2X applications in the UEs. This reference point is not specified in this release of the specification.
- PC5:** The reference point between the UEs, and it includes the LTE based PC5 and/or NR based PC5.
- N1:** In addition to the relevant functions defined in TS 23.501 [6] for N1, in the case of V2X Service it is also used to convey the V2X policy and parameters (including service authorization) from AMF to UE and to convey the UE's V2X Capability and PC5 Capability for V2X information from UE to AMF.
- N2:** In addition to the relevant functions defined in TS 23.501 [6] for N2, in the case of V2X Service it is also used to convey the V2X policy and parameters (including service authorization) from AMF to NG-RAN.
- Uu:** The reference point between the UE and the NG-RAN.

4.2.4 Service-based interfaces

- Nudm:** In addition to the relevant services defined in TS 23.501 [6] for Nudm, in the case of V2X Service, services provided by UDM are used to get V2X Service related subscription information to AMF during Initial registration procedure or UE Configuration Update (UCU) procedure to inform AMF subscription information has changed.
- Npcf:** In addition to the relevant services defined in TS 23.501 [6] for Npcf, in the case of V2X Service, services provided by H-PCF are used to provide V2X Service related parameters to V-PCF for UE and NG-RAN in the roaming case.
- Nudr:** In addition to the relevant services defined in TS 23.501 [6] for Nudr, in the case of V2X Service, services provided by UDR are used to notify the PCF and the UDM of the update of the V2X Service related information.
- Nnef:** In addition to the relevant services defined in TS 23.501 [6] for Nnef, in the case of V2X Service, services provided by NEF are used by the V2X Application Server to update V2X Service related information of 5GC.
- Namf:** In addition to the relevant services defined in TS 23.501 [6] for Namf, in the case of V2X Service, services provided by AMF are consumed by PCF to provide the V2X Service related parameters for the UE and the NG-RAN to AMF, and to enable the AMF create or update UE context related to V2X service.
- Nnrf:** In addition to the relevant services defined in TS 23.501 [6] for Nnrf, in the case of V2X Service, services provided by NRF are used to discover the PCF that supports V2X.

4.3 Architecture reference model for interworking with EPS V2X

The interworking between 5GS V2X and EPS V2X does not require any new interface between 5GS V2X and EPS V2X architectures and does not impact existing network function entities in EPC and 5GC. Figure 4.3-1 shows one of the architecture reference models.

[ETSI TS 123 287 V17.5.0 \(2023-01\)](https://standards.iteh.ai/catalog/standards/sist/0a970453-f8ca-4b0a-8065-ee3df11d9b2d/etsi-ts-123-287-v17-5-0-2023-01)

<https://standards.iteh.ai/catalog/standards/sist/0a970453-f8ca-4b0a-8065-ee3df11d9b2d/etsi-ts-123-287-v17-5-0-2023-01>

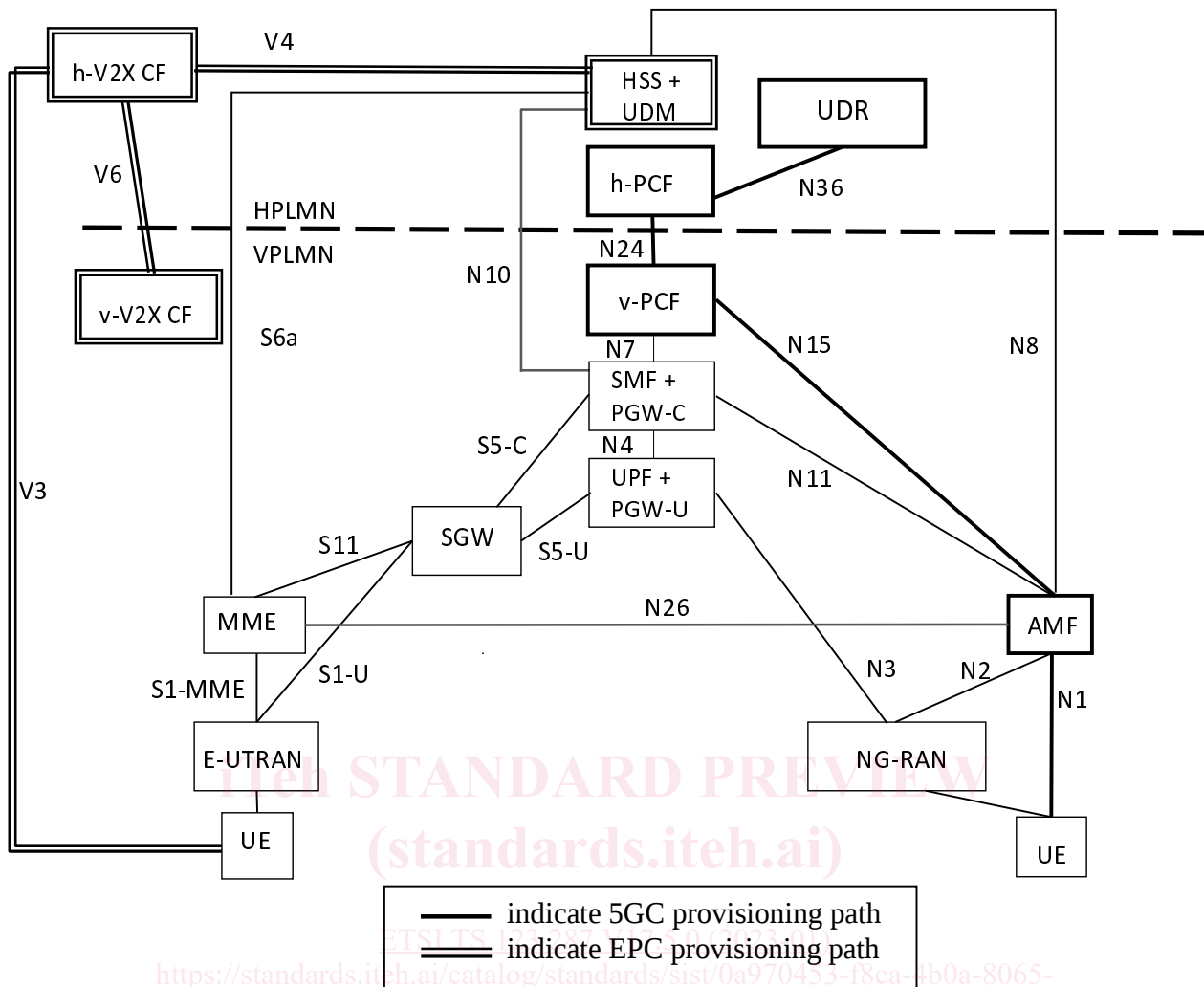


Figure 4.3-1: Architecture for interworking with EPS V2X, Local breakout roaming

4.4 Functional entities

4.4.1 UE

In addition to the functions defined in TS 23.501 [6], the UE may support the following functions:

- Report the V2X Capability and PC5 Capability for V2X to 5GC over N1 reference point.
- Indicate V2X Policy Provisioning Request in UE Policy Container for UE triggered V2X Policy provisioning.
- Receive the V2X parameters from 5GC over N1 reference point.
- Procedures for V2X communication over PC5 reference point.
- Configuration of parameters for V2X communication (e.g., destination Layer-2 IDs, radio resource parameters, V2X Application Server address information, mapping between V2X service types and V2X frequencies, see clause 5.1). These parameters can be pre-configured in the UE, or, if in coverage, provisioned or updated by signalling over the N1 reference point from the PCF in the HPLMN or over V1 reference point from the V2X Application Server.