



Reference: TRAI CP Regulatory Framework for Vehicle-to-Everything (V2X) Communication
Date: 2026-06-04
MOAI-26.0035

04th June 2026

Shri Akhilesh Kumar Trivedi
Advisor (Networks, Spectrum and Licensing)
Telecom Regulatory Authority of India (TRAI)
4th, 5th, 6th & 7th Floor, Tower-F,
World Trade Centre, Nauroji Nagar,
New Delhi: 110029

Subject: Inputs to TRAI Consultation Paper on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication

Dear Sir

This is with reference to TRAI Consultation on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication dated 30th April 2026.

Please find enclosed Ericsson's submission as Annexure-1 on the matter for your consideration.

Regards

Vijeta Arya
Vice President
Head Government & Industry Relations India

Ericsson India Private Limited
Government and Industry Relations
7A, 3rd & 4th FLOOR DLF
Cybercity
Gurgaon-122002
India
Tel: +91 124 415 1001
Fax: +91 124 256 5420

VAT: 06AACCE4175D1ZY
Reg no:
U72200DL2010PTC204192

Registered Office:
4th Floor, Dhaka House,
18/17, W.E.A., Pusa Lane,
Korai Bagh, New Delhi 110 005
INDIA
www.ericsson.co.in

Inputs to Consultation Paper on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication

Preface

To avoid terminology misunderstandings here and for referenced documentation, please find below 5GAA definition:

Cellular-V2X (C-V2X) is an umbrella term which encapsulates all 3GPP V2X technologies, including both direct (PC5) and mobile network communications (Uu), unless otherwise stated. If only direct or only mobile network communications are addressed, then the terms 'direct' and 'mobile network' are used, respectively. Use of mobile network communications are often denoted V2N2X to emphasize the use of the network (N).

It should be noted that to many persons in the industry, the term C-V2X (or V2X) is understood as direct (short range) communication only.

The answers provided here leverage the existing cellular networks for infrastructure interactions (V2N2X). Telecom operators in the country already possess the spectrum resources, network infrastructure, operational expertise, and service management capabilities required to support C-V2X deployments. Such an approach minimizes investments and can give an immediate effect since modern vehicles are connected to the cellular network by default.

Furthermore, the answers follow the recommendations outlined in the 5GAA documentation and in other industry input for using V2N2X. See these references:

- 5GAA White paper :<https://5gaa.org/road-traffic-operation-in-a-digital-age-a-holistic-cross-stakeholder-approach/>
- 5GAA Tech report: <https://5gaa.org/vehicle-to-network-to-everything-v2n2x-communications-architecture-solution-blueprint-use-cases/>
- 5GAA position paper: <https://5gaa.org/v2n2x-security-privacy-and-data-quality/>
- 5GAA statement of intent: <https://5gaa.org/5gaa-statement-of-intent-how-industry-should-approach-the-subject-of-dataspaces/>
- BMW & Monotch white paper ' Paradigm Neutrality vs. Technology Neutrality' : <https://monotch.com/downloads/>

In the V2N2X model, road traffic information sharing is achieved using interconnected backend systems between trusted actors, the backend systems then interact with their cellular connected clients (vehicles/smartphones). The trust model for interconnected backend systems is based on an agreed Common Code of Conduct (CCoC). Contract frameworks govern data quality, operation and responsibilities. In a V2N2X model, point-to-point connections are used. I.e. actors know who they are communicating with, communication use standard IT state-of-the-art security, such as TLS, with mutual authentication with X509 certificates and 3GPP defined security mechanisms (instead of relying on a special purpose short-range (or direct) security paradigm).

In addition, it can be noted that most information related to infrastructure can be handled by modern cellular systems since latency is not critical for most practical use cases, and considering information can be delivered well in advance of its need. The latter is applicable also for event information using V2N2V (information from vehicle to vehicle via backend systems). Use of Mobile Network V2N2V is not recommended for V2V awareness messages, i.e. Cooperative Awareness messages (CAM) informing about position, speed, direction etc., broadcasted several times per second.

In this submission, Ericsson has focused the response on a select set of key questions that are most relevant from the organization's perspective as follows:

Inputs to Consultation Paper on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication

Q1. Whether there is a need to introduce an authorisation for vehicle-to-infrastructure (V2I) communication service under Section 3(1)(a) of the Telecommunications Act, 2023? If yes, please provide input with respect to the following aspects:

- (a) Eligibility conditions for the authorisation;
- (b) Period of validity of the authorisation and conditions for its renewal;
- (c) Service area of the authorisation;
- (d) Scope of service of the authorisation;
- (e) Technical, operating, security related conditions etc. of the authorisation;
- (f) Any other related aspect. Kindly provide a detailed response with justification.

Q2. In case your reply to Q1 is no, what should be the mechanism for enabling, facilitating and regulating vehicle-to-infrastructure (V2I) communication service in India? Kindly provide a detailed response with justification.

Q3. Any other suggestions relevant to the authorisation for vehicle-to-infrastructure (V2I) communication service may be submitted with proper explanation and justification.

Response for Q1, Q2 & Q3:

It is assumed that 'authorization' refers to the permission to operate short-range 5,9 GHz radio equipment for direct V2I, since for using mobile communication, standard compliant equipment, i.e. cellular modems and radio network equipment is used. Ericsson advocates the use of mobile network for V2I (i.e. V2N2I).

No additional, V2N2I-specific authorization is required for and within the cellular path itself. Cellular-connected vehicles (and backhaul-connected road-side units, using cellular modems) are already authenticated and authorized to the mobile network using standard 3GPP mechanisms.

In other words, V2N2I reuses existing cellular network access control. No new authorization step is required on the V2N2I leg beyond network access and usual application-layer security and policy controls.

In case of V2N2I, specific coordination agreements between the V2I authority and the connectivity providing mobile network operators can be useful to assure communication network availability and reliability.

However, if 'authorization' refers to something else, e.g. the ability to offer services, then it is important that potential legislation also considers and allow the use of mobile network communication.

Q4. Whether a specific technology (such as LTE-based C-V2X, NR-based C-V2X etc.) should be prescribed for the implementation of C-V2X in India? If yes, which technology should be adopted for the implementation of C-V2X? If no, in what manner, the issues related to interoperability between different technologies should be addressed? Kindly provide a detailed response with justification.

Inputs to Consultation Paper on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication

Response:

For the use of mobile network V2N2X (cellular networks (C-V2X), i.e. the 3GPP Uu interface), standard 4G/5G networks can be used. Interoperability of V2N-based ITS implementation is achieved at the application and ITS message levels, thanks to standard IP communication, independent from radio layer technologies.

Ericsson recognizes the complexity and the need of extra regulation effort on harmonizing short-range communication protocol from the radio layer up to the application layer and for both on-board units and the infrastructure (road-side units) to enable direct V2X. Therefore, Ericsson recommend using the Uu interface (mobile network V2N2X) for ITS implementation, where an ITS message protocol stack based on standard IP connection and cellular modem is used, there is no need for additional regulation at the radio layer.

Interoperability and performance requirements should demand:

- Interoperability at the service level using harmonized ITS message standards, independent from radio technologies (short-range and/or Uu).
- V2N information sharing system (<https://5gaa.org/road-traffic-operation-in-a-digital-age-a-holistic-cross-stakeholder-approach/>), to facilitate interoperability irrespective of the underlying radio technologies.

For direct V2X, Ericsson does not have a specific preference for any of the 3GPP technology variants for PC5 communication (e.g. LTE-based C-V2X or only NR-based C-V2X). Ericsson has not observed any significant market momentum in either of the short range technologies.

Q6. To ensure inter-operability among different RSUs/ OBUs, whether there is a need to standardize the layered communication framework (stack) for higher layers (other than the access layer in which C-V2X will be used) of Intelligent Transportation System (ITS)? If yes, which standard for ITS stack and security should be adopted? Specifically, whether the ETSI standard for ITS stack and security, as recommended by the Task Force on Intelligent Transportation System for the use of 5.9 GHz (mentioned at para 3.5 of this consultation paper) should be adopted? If no, in what manner, inter-operability among different RSUs/ OBUs can be ensured? Kindly provide a detailed response with justification.

Response:

Yes, there is a need to standardise the higher-layer ITS stack to ensure interoperability among different RSUs/OBUs from multiple vendors.

- Ericsson proposes to adopt globally recognized as well as widely adopted standard for the application-layer protocols, message sets, and information formats between vehicles, V2X application servers, and third-party providers to exchange complementary information with V2N-based ITS platform.
- If all V2V ecosystem players consent on using ETSI V2V then this will lead to an acceleration of the ITS rollout. We also recommend to not fragment the ecosystem by allowing multiple V2V application layer standards.

If pursuing direct V2X, the stack should apply consistently to all 5,9 GHz direct V2X communication paths (V2V, V2I and V2N), so that PC5 OBUs, RSUs and back-end systems can interoperate. To ensure interoperability among different OBUs/RSUs vendors and vehicles manufacturers, a common harmonized framework has to be adopted.

Inputs to Consultation Paper on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication

Q7. Whether there is a need for prescribing a security framework for ITS/ C-V2X in India? If yes,

(a) What should be the security framework for ITS/ C-V2X?

(b) Which agency [such as Controller of Certifying Authorities (CCA), Ministry of Electronics & Information Technology (MeitY)] should implement the Public Key Infrastructure (PKI) framework for ITS/ C-V2X in India?

(c) How to ensure coexistence of V2X PKI certificates with the legacy PKI mechanism in India i.e. based on X.509, operated by Root Certifying Authority of India (RCAI)?

Please provide a detailed response with justifications.

Response:

Direct V2X using 5.9 GHz short-range communication between vehicles (V2V) and between vehicles and road infrastructure (V2I) elements, e.g., traffic lights, require a high-degree of system and message standardization, including security and credential provisioning. A mobile network V2N2X based on long-range (Uu) solution would leverage existing security and authentication methods (using X.509 and TLS/DTLS) and could leverage backend-based message transcoding for interoperability at service-levels.

The demands on global standardization are very light with mobile network based long-range (Uu) solution and thereby facilitating a rapid deployment of corresponding vehicles services. The 5GAA position paper "V2N2X security, privacy, and data quality" (Link provided in Preface section) clarifies the default security and privacy protecting characteristics that cellular network communication inherits.

If the authority would decide to establish a dedicated IEEE 1609.2 or ETSI 103 097 security framework for direct ITS/C-V2X short-range communication, it is suggested that such a PKI framework leverages a common root-CA for the V2N-based ITS implementations via a V2N2X cloud-to-cloud integration structure, using standard TLS/DTLS security mechanisms with X.509 certificates. This would establish a common trust anchor point for all C-ITS service implementations.

Q8. What should be the regulatory framework for the assignment of frequency spectrum to the entities holding the proposed V2I communication service authorisation? Specifically,

(a) Whether there is a need for partitioning the 30 MHz spectrum (5,875-5,905 MHz) for specific applications such as "safety applications" and "operational applications (non-safety applications)"?

(b) In case more than one authorised entity has to operate in the same geographical area, what should be the mechanism for simultaneous use of the spectrum? Specifically, whether the spectrum should be divided amongst the authorised entities in an exclusive manner, or should the authorised entities utilize the spectrum in a shared manner?

(c) If your response to part (b) is "in an exclusive manner", what should be the minimum quantity of spectrum to be assigned to each entity holding the proposed V2I communication service authorisation? If your response to part (b) is "in a shared manner", whether there is a need to prescribe a mechanism for interference management?

(d) For interference management, whether there is a need to prescribe –

Inputs to Consultation Paper on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication

(i) minimum directionality of road-side unit (RSU), or

(ii) protection distance between the RSUs, or

(iii) maximum antenna height for RSUs? If yes, what should be such parameter(s)?

(e) Whether there is need to mandate a mechanism for obtaining prior approval (analogous to SACFA clearance) for the establishment of RSUs by the entities holding the proposed V2I communication service authorisation? If no, in what manner, the establishment of RSUs should be regulated?

(f) For avoiding (i) interference between RSUs, (ii) interference between RSUs and OBUs, and (iii) interference between OBUs, whether the radiated power limits for OBUs and RSUs and OOBE limits, recommended by the Task Force on Intelligent Transportation System for the use of 5.9 GHz (mentioned at para 3.4 of this consultation paper) should be adopted? If no, what should be the radiated power limits for OBUs and RSUs and OOBE limits?

(g) What should be the maximum period of assignment of spectrum to the entities holding the proposed V2I communication service authorisation?

(h) Whether there is a need to prescribe roll-out obligations associated with the assignment of spectrum to the entities holding the proposed V2I communication service authorisation?

(i) Whether there is a need to introduce a provision for the surrender of frequency spectrum? Kindly provide a detailed response with justification.

Q9. Whether there is a need for prescribing timelines for processing the applications for the assignment of spectrum to the entities holding the proposed V2I communication service authorisation? Kindly provide a detailed response with justification.

Q10. Whether there are any other suggestions related to assignment of spectrum to the entities holding the proposed V2I communication service authorisation? Please provide a detailed response with justification.

Response to Q8, Q9 & Q10:

Ericsson advocates the use of mobile network V2N2X for C-ITS information services, using existing cellular networks and its already deployed equipment in licensed spectrum, along with compliant IoT devices deployed in vehicles and corresponding devices to be deployed in roadside equipment. No need to allocate dedicated spectrum for V2X equipment if public mobile network technologies are applied.

Q11. Any other issues/suggestions relevant to the regulatory framework for V2X communication may be submitted with proper explanation and justification.

Response:

The 5,9 GHz direct short-range communication paradigm (C-V2X) demands massive upfront investments in dedicated roadside units and in vehicle onboard equipment. It requires near-universal penetration and coverage to generate meaningful societal benefit, faces 15+ year rollout timelines to critical mass, and creates intractable complexity in security, trust, and interoperability. In mixed or low-penetration scenarios, its value collapses to near zero.

Furthermore, such long deployment time embeds the risk that early deployment efforts become outdated and obsolete at the time when later deployments efforts materialize.

Annexure-1

Inputs to Consultation Paper on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication

Meanwhile, advances in cloud computing, AI, vehicle sensors, and ubiquitous cellular connectivity may have made many past short-range technology choices for classic C-ITS use cases obsolete, or made such use cases implementable through far more practical means.

There is a mega-trend across technology industries to rely more and more on cloud compute and AI capabilities, which, in the case of V2X, requires data to be published by vehicles and road infrastructure to centrally placed AI training platforms, allowing knowledge to be assembled in the cloud, subsequently used for providing informational assistance to vehicles for safety and efficiency purposes. This is analogous to how road navigation systems such as Google-Maps work today. This is also the main reason why direct short-range V2X systems based on only local knowledge are not widespread today despite having existed in standards for more than 20 years. In contrast, mobile network V2N2X is ramping up, based on widespread 4G/5G connectivity in modern vehicles along with the possibility to even use smartphones as an additional device participating in the V2X eco-system, with the prospect of providing increased safety also to vulnerable road users (VRUs) carrying just ordinary smartphones.