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To,

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Subject: IAFI Comments/Suggestions on TRAI Consultation Paper regarding Regulatory Framework for Vehicle-to-Everything (V2X) Communication

Ref: TRAI Consultation Paper No. 08/2026 dated 30 April 2026

Dear Sir,

The ITU-APT Foundation of India (IAFI) sincerely thanks TRAI for issuing the Consultation Paper regarding the “Regulatory Framework for Vehicle-to-Everything (V2X) Communication” and for inviting comments/suggestions from stakeholders. The Consultation Paper solicited comments from stakeholders on the regulatory mechanism for Vehicle-to-Everything (V2X) communication.

Department of Telecommunications (DoT) vide a letter dated December 1, 2025, requested TRAI for providing the regulatory framework for Vehicle-to-Everything (V2X) communication, based on the in principle decisions taken by the Ministry of Road Transport and Highways (MoRTH) Task Force on V2X/ITS standards, as the DoT agreed fundamentally to provide technical and operational parameters especially on -

- a. Technology Standard to be adopted as the harmonized Intelligent Transport System (ITS) technology across India for the C-V2X (Cellular – Vehicle to Everything).
- b. Spectrum Allocation – as total of 30 MHz (5875–5905 MHz) is designated for the initial rollout of C-V2X. The adjacent 20 MHz (5905–5925 MHz) is kept in reserve to accommodate future ITS applications.
- c. Licensing Approach - as the On-Board Units (OBUs) will operate on a license-exempt basis and the Roadside Units (RSUs) will require formal authorization.

The DoT's in the letter to TRAI also referred several existing regulatory frameworks for the spectrum management and authorization:

- i. NFAP-2025: Footnote IND29 already provisions the 5875–5925 MHz frequency band for

- V2X/ITS under the Mobile service allocation, without precluding other allocated services.
- ii. Telecommunication Act, 2023: The First Schedule permits administrative frequency assignments specifically for the safety and operation of transport systems.
 - iii. Financial Framework: The existing DoT order of December 11, 2023, provides the baseline provisions for calculating spectrum charges.

Considering above, DoT requested TRAI for providing recommendations on -

1. The specific regulatory mechanisms required for Roadside Units (RSUs), encompassing spectrum assignment, authorization, and pricing.
2. Any other associated recommendations relevant to the successful implementation of the V2X ecosystem.

TRAI in turn released a Consultation Paper on 30 April, 2026, inviting stakeholder's comment. It includes five Chapters, first chapter provides an introduction and background information about the subject, Chapter II discusses V2X technologies and global perspective on the matter, Chapter III examines the issues related to the service authorisation framework and assignment of spectrum, Chapter IV discusses the issues related to spectrum charges and other financial conditions and Chapter V summarizes the issues for consultation.

As mentioned in the Annexure-I of the TRAI Consultation Paper that the inter-ministerial committee has already taken a regulatory decision to keep On-Board Units (OBUs), as licence-exempt, for rapid mass-market adoption, achieving safety impacts at scale, and ensuring interoperability. Similarly, authorization may be required for Roadside Units (RSUs) to ensure coordinated deployment and effective interference management.

IAFI has comprehensively examined the various issues raised in the Consultation Paper and, after detailed examination and due consultation with our industry partners, we forward our detailed comments and suggestions to TRAI for consideration.

IAFI would be happy to participate in any Open House Discussion (OHD) or meeting, should TRAI deem it necessary for further clarification on our submission. We look forward to collaborating with TRAI and remain available for any further discussions that may be required.

Warm Regards,

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Copy to: Secretary, TRAI

IAFI Comments/Suggestions on the TRAI Consultation Paper regarding Regulatory Framework for Vehicle-to-Everything (V2X) Communication

Executive Summary

Like any nation, India cannot afford to accept road deaths as an unavoidable cost of progress. Behind every crash is a devastated family, and a tragedy that could have been prevented through better technology and smarter regulations. To fix this, we need a disciplined, district-by-district rollout of Vehicle-to-Everything (V2X) communication networks, backed by strict, zero-tolerance enforcement.

A. The Vehicle-to-Everything (V2X) Ecosystem

V2X technology allows vehicles to communicate with each other, other road users, and roadside infrastructure to maximize safety and traffic efficiency. Integrating V2X with Big Data and Artificial Intelligence (AI) enables real-time data collection to mitigate traffic congestion and plan global driving routes. The ecosystem encompasses four primary types of communication:

1. **Vehicle-to-Vehicle (V2V):** Direct, short-range information exchange between proximal vehicles.
2. **Vehicle-to-Infrastructure (V2I):** Direct communication between a vehicle and roadway units (e.g., traffic signals).
3. **Vehicle-to-Pedestrian (V2P):** Direct communication between vehicles and devices carried by Vulnerable Road Users (VRUs), including pedestrians, cyclists, and motorcyclists.
4. **Vehicle-to-Network (V2N):** Long-range communication linking vehicles to cellular networks and cloud-based backend services (e.g., for real-time map updates).

B. Core Use Cases & Application Categories

Connected vehicle applications generally fall into three pillars: **Road Safety, Traffic Efficiency,** and **Infotainment/Convenience.**

1. V2V Use Cases

- **Control Loss Warning (CLW):** Automatically broadcasts alerts when a vehicle loses control due to mechanical failure or skidding.
- **Pre-crash Actions (PCA):** Activates in-vehicle countermeasures immediately prior to an unavoidable impact to minimize injury.
- **Vehicle Emergency Response (VER):** Transmits critical impact data from connected vehicles directly to emergency first responders.
- **Panic Button & Motorcycle Approaching Indication:** Alerts proximal traffic to emergency situations or nearby approaching motorcycles.

2. V2I Use Cases

- **Red Light & Stop Sign Violation Warnings:** Advises drivers on signal timings and intersection geometries to avoid collisions at crossings.
- **Curve Speed & Reduced Speed Zone Warnings:** Alerts drivers if they are approaching a bend too quickly or entering an altered roadway configuration (e.g., construction lane shifts).
- **Spot Weather Information Warning (SWIW):** Flags hazardous downstream conditions like fog, ice, or flash flooding.
- **Oversize Vehicle Warning (OVW):** Infrastructure measures an approaching vehicle's dimensions and triggers an alert if it exceeds road clearances.

3. V2P & V2N Use Cases

- **V2P:** Focuses strictly on protecting Vulnerable Road Users (VRUs) by flashing alerts to avoid imminent vehicle-to-pedestrian strikes.
- **V2N:** Services long-range data demands like fleet management, entertainment media streaming, and dynamic route orchestration.

C. V2X Communication Technologies

The global automotive landscape features two competing access-layer communication standards in the **5.9 GHz ITS band**:

1. **Dedicated Short Range Communication (DSRC):** Based on Wi-Fi-like **IEEE 802.11p** (WAVE/ITS-G5) frameworks. While it features low latency and a proven standalone architecture, it is constrained by a short operational range, high capital investments, and channel access delays.
2. **Cellular V2X (C-V2X):** Standardized by the **3GPP**, utilizing both direct sidelink (PC5 interface) for immediate proximity communication without network reliance, and the standard cellular interface (Uu) for cloud/network connectivity.

D. Evolution of 3GPP Specifications for C-V2X

C-V2X features a continuous, forward-compatible evolution path compared to the legacy DSRC standard:

- **Release 14:** Introduced the LTE PC5 sidelink interface for baseline broadcast-model direct communication.
- **Release 15:** Introduced Enhanced V2X (eV2X), supporting unicast/groupcast models for highly coordinated driving maneuvers.
- **Release 16:** Marked a significant leap by introducing **5G New Radio (NR) V2X**, unlocking ultra-reliable low-latency capabilities necessary for autonomous vehicle platooning.

- **Release 17 & 18:** Matured NR-V2X into a high-throughput, high-precision positioning platform, optimizing power efficiency and radar-like ranging capabilities for Advanced Driver Assistance Systems (ADAS).

E. Context of the Consultation and IAFI's Response

The deployment of this ecosystem relies on On-Board Units (OBUs) fitted inside vehicles and Roadside Units (RSUs) deployed along transportation pathways. To facilitate this rollout, the TRAI Consultation Paper comprises 26 questions divided across the following key areas:

- A. Questions 1 to 11: Pertain to issues related to the service authorization framework and the assignment of spectrum (Chapter III).
- B. Questions 12 to 26: Pertain to issues related to spectrum charges and other financial conditions (Chapter IV).

IAFI has comprehensively examined the Consultation Paper. Following due consultation with our industry partners, we are pleased to present our considered views and recommendations on the issues raised, as outlined below.

A. Issues related to the service authorisation framework and assignment of spectrum

Q-1. 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.**

IAFI Response:

IAFI does not recommend introducing a dedicated, individual authorisation for Vehicle-to-Infrastructure (V2I) communication services under Section 3(1)(a) of the Telecommunications Act, 2023. Instead, Roadside Units (RSUs) should be enabled through a General Authorisation / Class Licence / Licensed-by-Rule approach.

V2X safety messaging is inherently broadcast in nature, and the spectrum used is shared and non-exclusive. Therefore, an exclusive, geographically protected license is neither technically necessary nor administratively efficient.

IAFI strongly submits that V2I services and RSUs should be enabled through an exemption/implied-authorisation approach under the framework of the new Telecommunications Act, 2023:

- i. Section 3(3): To exempt the requirement of individual authorisation, as the rapid deployment of life-saving V2X technology is squarely in the public interest.
- ii. Section 4(6): To exempt the requirement of individual spectrum assignment, allowing specific ITS usages within harmonised frequencies and parameters.

This approach is firmly supported by international regulatory practices.

Reply of the sub-queries from (a) to (f):

a) Eligibility conditions for the authorisation: No individual eligibility criteria should be required. Any entity (government bodies, road concessionaires, auto manufacturers, or private operators) deploying RSUs that strictly comply with the harmonised technical specifications and equipment standards (e.g., TEC/WPC type approvals) should be inherently eligible under the general authorisation.

b) Period of validity of the authorisation and conditions for its renewal: The general authorisation/exemption should be perpetual, subject to the continued compliance of the equipment with prescribed technical parameters, to encourage long-term infrastructure investment.

c) Service area of the authorisation: Pan-India, a harmonised national footprint is critical for the seamless mobility and safety of connected vehicles across state borders.

d) Scope of service of the authorisation: The scope should be strictly limited to Intelligent Transport Systems (ITS), encompassing V2X safety messaging, traffic management, and road-safety applications, rather than general public telecommunication services.

e) Technical, operating, security related conditions etc. of the authorisation: Operations must be strictly subject to harmonised technical conditions (such as EIRP limits, duty cycles, and out-of-band emission limits) to ensure coexistence. Crucially, this general authorisation is without prejudice to shared access; it does not constitute an assignment of spectrum conferring exclusivity, nor does it grant interference protection from other primary users of the band.

f) Any other related aspect - To satisfy the statutory requirements of Sections 3(3) and 4(6) of the Telecommunications Act, 2023, the government should explicitly recognize that enabling V2I through this light-touch framework serves the paramount public interest of enhancing road safety, reducing traffic fatalities, and accelerating India's digital public infrastructure in the transport sector.

Q-2. 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.

IAFI Response:

In line with our response to Q1, IAFI submits that the mechanism for enabling, facilitating, and regulating Vehicle-to-Infrastructure (V2I) communication services should be a light-touch, “Licensed-by-Rule” or General Authorisation framework, entirely decoupled from traditional individual telecom station licensing.

To reduce ecosystem friction (administrative, regulatory, and financial hurdles) and accelerate the deployment of life-saving V2X infrastructure, the regulatory mechanism should treat RSUs as road safety infrastructure rather than telecommunication network elements.

IAFI proposes the following detailed mechanism for V2I regulation in India:

1. General Authorisation / Licensed-by-Rule: RSUs should be enabled under a Class Licence / General Authorisation framework. Under this mechanism, there should be no requirement for individual station licensing. Instead, the government should publish harmonised technical specifications (e.g., EIRP limits, operating frequencies) and security conditions. Any equipment complying with these published rules is automatically authorised to operate.

2. Governance Framework (Registration, Not Licensing): While individual licensing is unnecessary, a mechanism for accountability is required. This should be achieved through a simple Registration/Notification Registry. The registry will capture basic operator and site details purely for security governance, accountability, and the resolution of any localized interference issues.

It is critical that this registration process operates strictly as a notification mechanism. It must not act as a prior-permission step, a bottleneck for deployment, or a mechanism that confers exclusivity to the registrant.

3. Any physical deployment of RSUs will naturally require certain permissions; however, these must be strictly limited to civil approvals. Approvals for right-of-way, mounting on existing poles, and physical safety should be managed by the relevant Road Authorities (e.g., NHAI, municipal corporations). This process is analogous to the installation of traffic lights or signage and must not be conflated with, or framed as, a telecommunications or spectrum authorisation.

4. Eligibility for Deployment: Since V2I is fundamentally a transport safety service, eligibility to deploy and register RSUs should rest with Road Authorities, Road Operators, and their explicitly authorised system integrators. Treating RSUs as road infrastructure accurately aligns the technology with its primary stakeholders.

5. Legal and Spectrum Status: To ensure absolute clarity under the Telecommunications Act, 2023, the regulatory framework must explicitly state that this registration/notification mechanism:-

- i. Is expressly without prejudice to shared spectrum access.
- ii. Does not constitute an assignment of spectrum.
- iii. Confers zero exclusivity.
- iv. Does not grant the RSU operator any right to claim interference protection from other primary or co-primary users of the band.

Justification: Strict telecom licensing will severely delay the rollout of ITS infrastructure. A light-touch, registration-based model is far more effective. It ensures the government maintains security and oversight, while empowering road authorities to quickly deploy critical safety infrastructure without bureaucratic telecom bottlenecks.

Q-3. Any other suggestions relevant to the authorisation for vehicle-to-infrastructure (V2I) communication service may be submitted with proper explanation and justification.

IAFI Response:

IAFI submits the following additional suggestions to ensure the successful implementation of a light-touch, robust, and future-proof framework for Vehicle-to-Infrastructure (V2I) communication services:

1. Operationalizing the Light-Touch Registry: While we recommend a registration-based governance mechanism (as detailed in our response to Q-2), it is crucial that the data collected is strictly limited to what is necessary for security and interference management. The registry should mandate only the following parameters:

- Location Data: RSU geo-coordinates and specific road segments.
- Administrative Data: Operator contact details for emergency or interference resolution.
- Technical & Security Attestation: Identifiers for security credential policies and self-attestation of compliance with harmonised technical parameters (e.g., EIRP and Out-of-Band Emission limits).

2. Non-exclusive spectrum : Registration of an RSU shall not create any exclusive spectrum entitlement, nor shall it form the basis for any interference protection claims. The operation of V2I services must remain strictly on a shared, non-exclusive basis subject to compliance with the prescribed technical conditions.

3. Equipment Certification over Site Licensing: Rather than imposing site-by-site operational licenses, the regulator should establish a clear, standardized technical compliance test for the equipment itself. Mandatory equipment type-approval (e.g., via the Telecommunication Engineering Centre (TEC) or WPC Wing) ensures that all RSUs meet stringent technical and security standards before deployment. Once the equipment is certified, its deployment should not require individual licensing.

4. Unified Framework for Future-Proofing: Looking ahead, the scope of V2I will rapidly expand beyond basic safety messaging to include enhanced traffic safety services, autonomous driving support, and complex applications delivered from the cloud. To enable this future ecosystem, it is vital that India adopts a unified regulatory framework and aligns with globally harmonized common standards.

Q-4. 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 inter-operability between different technologies should be addressed? Kindly provide a detailed response with justification.

IAFI Response:

IAFI recommends a technology-neutral approach in the authorization framework. The regulator should avoid mandating a single specific technology, thereby preserving long-term innovation and market flexibility.

To ensure seamless, life-saving interoperability while allowing technological evolution, India should adopt a phased, backward-compatible implementation strategy:

- **Initial Deployments:** Leverage the engineering maturity of **LTE-V2X** for immediate, nationwide basic safety applications.
- **Advanced Deployments:** Permit and encourage **NR-V2X** for high-throughput, low-latency advanced use cases, ensuring coexistence through standards-based coordination mechanisms.

Detailed Justification

1. The Case for Technology Neutrality with Standardized Gating

Prescribing a single, static technology within a formal regulatory authorization can inadvertently paralyze an ecosystem. Cellular V2X (C-V2X) technology is evolving rapidly.

- Mandating only LTE-V2X would prevent India from natively adopting the advanced, ultra-reliable low-latency capabilities of 5G/6G NR-V2X in the future.
- Conversely, mandating only NR-V2X would delay deployment by years, as the hardware ecosystem is still maturing and carries a significantly higher cost burden.
- **Recommendation:** The authorization should remain technology-agnostic but specify adherence to internationally harmonized standards (e.g., 3GPP releases) to guarantee a minimum baseline of performance and security.

2. Immediate Deployment Focus: LTE-V2X for Basic Safety

From an engineering maturity, ecosystem availability, and cost-effectiveness perspective, **LTE-V2X (utilizing 3GPP Release 14/15 specifications)** is the most viable candidate for initial nationwide deployment.

- **Maturity & Scale:** LTE-V2X chipsets, Roadside Units (RSUs), and On-Board Units (OBUs) are commercially mature, field-tested globally, and ready for mass deployment.
- **Spectral Efficiency:** Basic V2I/V2V safety applications, have low data-rate requirements. Operating LTE-V2X on standard **20 MHz channels** provides more than sufficient capacity to handle these foundational safety messages over a wide geographic area.

3. Future-Proofing via NR-V2X for Advanced Use Cases

While LTE-V2X handles basic safety perfectly, advanced applications like automated cooperative driving, platooning, real-time high-definition map sharing, and sensor sharing require the high throughput and sub-millisecond latency of **NR-V2X (3GPP Release 16 and beyond)**.

- The authorization framework must explicitly permit NR-V2X operation within the designated Intelligent Transportation Systems (ITS) band.
- This allows automotive OEMs and highway authorities to execute trials, pilots, and localized early implementations of advanced features without needing to apply for a separate or modified authorization later.

Conclusion & Recommendation

India should maximize safety impacts immediately while leaving the door open for tomorrow's innovations, to ensure that any vendor's RSU can seamlessly communicate basic safety metrics with any vehicle's OBU, maintaining a secure, unified road-safety ecosystem.

At present, LTE-CV2X represents the most advanced and commercially viable ecosystem, supported by mature chipsets, strong collaboration with automotive manufacturers, and successful global deployments. To ensure seamless interaction between in-vehicle systems, roadside infrastructure, and communication networks, it is necessary to adopt clearly defined and standardised technological frameworks.

Introducing technology neutrality in the early stages could potentially fragment the device ecosystem and impede interoperability across manufacturers. This could delay the realization of safety and efficiency benefits expected from V2X technologies.

Q-5. Whether there is a need to bring road-side units (RSUs) and on-board units (OBUs) under the regime of Mandatory Testing Certification of Telecom Equipment (MTCTE)? If no, in what manner, Electromagnetic Interference (EMI), Electromagnetic Compatibility (EMC), safety, technical and security requirements prescribed by TEC/ DoT may be ensured? Kindly provide a detailed response with justification.

IAFI Response:

IAFI recommends a technology-flexible approach within the regulatory authorisation framework rather than strictly prescribing a single technology. However, to prevent fragmentation and ensure ecosystem readiness, the implementation roadmap should be guided by engineering maturity and globally harmonized standards.

Mandating a single technology via a rigid statutory mechanism risks locking India into a specific technological generation, thereby hindering long-term innovation. Instead, the regulatory framework should remain open, while industry-led standards bodies establish the exact deployment profiles.

IAFI proposes that the Government in coordination with bodies like the Telecommunication Engineering Centre (TEC) and the Automotive Research Association of India (ARAI), should establish standardized conformance profiles and compliance tests. Equipment must pass these rigorous interoperability and conformance tests before deployment, ensuring seamless ecosystem-wide communication without requiring site-by-site telecom licensing.

All Roadside Units deployed in India should undergo mandatory MTCTE certification to ensure compliance with safety and performance requirements. Certification should be aligned with internationally recognized standards such as 3GPP specifications and relevant ITS frameworks, including ETSI coexistence norms, to ensure reliable and interference-free functioning of safety-critical systems.

OBU's should be kept outside the MTCTE framework. OBU's are functionally analogous to mobile handsets in the telecommunications ecosystem. As end-user communication devices embedded within vehicles, OBU's should not be subjected to MTCTE requirements. Instead, compliance with applicable technical, safety, interoperability, and radio communication standards may be ensured through suitable automotive and equipment certification frameworks. Such an approach would avoid unnecessary regulatory burden, facilitate faster ecosystem adoption, and maintain consistency with existing telecom regulatory principles governing end-user devices.

Q-6. 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.

IAFI Response:

Yes, IAFI strongly submits that there is an absolute need to standardize the layered communication framework (stack) for the higher layers of the Intelligent Transportation System (ITS) above the

access layer. To ensure seamless, multi-vendor interoperability, IAFI recommends adopting the recommendations of the Task Force on ITS as the baseline, utilizing a harmonized framework of ETSI standards for upper layers/message-sets and IEEE standards for the security architecture.

Standardizing only the access (radio) layer is insufficient. Without standardizing the higher layers (facilities, networking, application protocols, and message sets), devices from different manufacturers might connect to the same radio network but will remain unable to interpret each other's data. A unified national ITS stack is vital to avoid fragmented deployments and ensure that safety broadcasts are universally decodable by any compliant receiver across India.

IAFI proposes the following specific framework for the Indian ITS stack and security architecture:

- A common ITS stack avoids fragmented deployments and ensures that safety broadcasts are universally decodable by compliant receivers.
- IAFI broadly agrees with the *Final Report and Recommendations of the Task Force on Intelligent Transportation System for the use of 5.9 GHz*.
- Maintain conformance profiles and plug-tests to validate multi-vendor interoperability across RSUs and ecosystems.
- Security should follow an internationally recognised V2X security framework (IEEE 1609.2 style) with clear certificate policies and misbehaviour reporting procedures, integrated with RSU registration for auditability.
- Agree with Final Report and Recommendation of Task Force on ITS
- Proposal - LTE-V2X for Radio Layer
- Proposal - ETSI TC ITS Rel.2 for support of 20 MHz for the message-set

- Proposal - IEEE 1609.2 based SCMS with support of multiple root CAs for implementation flexibility

Justification: Adopting the ETSI TC ITS Release 2 for upper layers ensures that India utilizes a highly mature, globally scaled message ecosystem capable of handling complex traffic safety scenarios. Pairing this with an IEEE 1609.2-based security structure provides the high-velocity, low-latency cryptographic performance required for real-time collision avoidance. By finalizing this specific hybrid framework, TRAI will provide the automobile industry and infrastructure developers with the regulatory certainty needed to manufacture and deploy inter-operable V2X systems at scale, ensuring a vehicle from any manufacturer can seamlessly communicate with any highway RSU in India.

Q-7. 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?

- **A national PKI framework for V2X consistent with the recommendation of Task Force on ITS is required.**

- **The framework should include: PKI governance (root-of-trust), certificate policy, enrolment/authorization credentials, revocation, and auditability via RSU registration.**

(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?

IAFI Response:

Security Framework for ITS/C-V2X in India

Core Position: Yes, prescribing a dedicated security framework for ITS/C-V2X in India is absolutely essential. Given the safety-critical nature of connected vehicular networks, a robust security architecture is vital to ensure data integrity, prevent unauthorized intrusion, and protect user privacy.

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

The security framework must center around a **National Public Key Infrastructure (PKI)** explicitly tailored for V2X communication, aligning with the recommendations of the national Task Force on ITS.

The framework should encompass the following structural elements:

- **PKI Governance:** Establishing a definitive national Root of Trust to anchor the ecosystem.
- **Certificate Policy (CP):** Defining strict, standardized operational rules and responsibilities for all participating entities.
- **Credential Management:** Outlining clear mechanisms for enrollment and authorization credentials to validate devices securely.
- **Revocation Mechanisms:** Ensuring fast, scalable processes to revoke certificates of compromised or rogue devices.
- **Auditability:** Enforcing mandatory Roadside Unit (RSU) registration to maintain transparency and traceability across the infrastructure.

(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?

The **Controller of Certifying Authorities (CCA) / Root Certifying Authority of India (RCAI)** under **MeitY** is best-suited to act as the central Root of Trust due to its existing regulatory mandate for digital signatures and certificates 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)?

- To ensure seamless operations without degrading the ultra-low latency performance required by C-V2X systems, the framework must isolate legacy processing from active vehicular components.
- Maintain a V2X-domain security architecture with defined interworking boundaries at policy/root level only, avoiding unnecessary coupling of end-device certificate processing; ensure governance is enforceable via certificate policy.
- Preferably have a national policy level recognition of IEEE 1609.2 based ITS Security Root CA
- Essential to have V2X Security certificates within the ITS-domain only based on V2X security. Interworking, if any, with X.509, to be limited only at Root CA level and not percolate to end-devices (OBUs and RSUs).

Q-8. What should be the regulatory framework for the assignment of frequency spectrum to the entities holding the proposed V2I communication service authorisation? Specifically,

IAFI Response

The regulatory framework for V2I/V2X spectrum should be designed to foster rapid deployment, total interoperability, and maximum road safety. It should favor a non-exclusive, shared, and registry-driven authorization model over legacy, exclusive telecom licensing mechanisms.

- (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)”?**

IAFI Response

There is **no need to partition** the 30 MHz spectrum band. The entire 5,875–5,905 MHz range should be harmonized uniformly across India and dedicated entirely to safety-critical applications. Splitting this limited bandwidth would introduce unnecessary spectral inefficiencies, whereas keeping the entire block intact ensures maximum throughput and ultra-low latency required for life-saving vehicular networks.

- (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?**

IAFI Response

Where multiple authorized entities operate within overlapping geographies, the spectrum must be utilized in a **shared and non-exclusive manner**.

- **Coexistence by Design** - V2X technologies are inherently engineered for dynamic, ad-hoc coexistence and packet-based sharing.
- **Avoid Artificial Scarcity** - Imposing geographical exclusivity would disrupt seamless vehicle-to-everything interoperability and create artificial spectrum scarcity.
- **Operational Management** - While spectrum access remains non-exclusive, the relevant competent authority (such as the highway or municipal traffic governance body) can retain operational control over which specific entities are permitted to install physical hardware along a given segment of the road network.

(c) If your response to part (b) is “in a shared manner”, whether there is a need to prescribe a mechanism for interference management?

IAFI Response

Yes, interference management is necessary, but it should be managed via a **registry-enabled, non-exclusive assignment framework** rather than traditional frequency coordination.

- **Technical Compliance Envelopes:** Authorization must be conditioned on strict adherence to predefined technical envelopes, including Equivalent Isotropically Radiated Power (EIRP) limits, Out-of-Band Emission (OOBE) boundaries, and standardized decentralized congestion control protocols.
- **Registry-Based Traceability:** A centralized Roadside Unit (RSU) registry should be utilized to maintain clear traceability of all active deployments, allowing for swift target-remedial action if an anomaly or harmful interference occurs.

(d) For interference management, whether there is a need to prescribe – (i) minimum directionality of RSU, or (ii) protection distance between the RSUs, or (iii) maximum antenna height for RSUs? If yes, what should be such parameter(s)?

IAFI Response

It is **not necessary** to prescribe rigid physical constraints, such as mandatory directionality, specific protection distances, or maximum antenna heights, as hard conditions within the spectrum authorization framework.

These parameters are core deployment-engineering choices that must remain flexible to accommodate varying intersection geometries, terrain types, and construction work-zones. Adherence to a standard EIRP/OOBE envelope is entirely sufficient for system coexistence. However, the centralized RSU registry may capture details like antenna type and height during registration for auditing purposes.

(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?

IAFI Response

No, a SACFA-analogous spectrum pre-clearance mechanism should **not** be mandated for RSUs under telecom or spectrum regulations. This would create significant bureaucratic bottlenecks and delay critical safety infrastructure rollouts.

- **Regulatory Approach:** RSUs should operate under a simplified Class License / General Authorization / Licensed-by-Rule mechanism.
- **Civil Approvals:** Any necessary site permissions should be confined strictly to standard Right-of-Way (RoW), civil structural safety, and power permissions managed by the respective road owner or traffic governing authority, closely mirroring the process for installing conventional traffic signals or electronic signage.

(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?

IAFI Response

Yes, the technical limits recommended by the national Task Force on Intelligent Transportation Systems should be fully adopted to maintain global and national alignment. Specifically:

- A maximum radiated power limit of **2W (33 dBm) EIRP** should be mandated for both On-Board Units (OBUs) and Roadside Units (RSUs).
- The corresponding **Out-of-Band Emission (OOBE) limits** agreed upon in Part 1 of the Task Force Recommendations should be strictly enforced to prevent adjacent-channel degradation.

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

IAFI Response

Because access to this band is shared and non-exclusive, the classical concept of a fixed "exclusive assignment period" does not apply. Instead, **RSU registration should be continuous**, remaining valid as long as the operator complies with the ongoing conditions of the authorization. To ensure database hygiene, a simple periodic update obligation should be instituted (e.g., every 5 years or immediately upon structural/technical changes to the deployment).

(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?

IAFI Response

Roll-out obligations should **not be tied to spectrum assignment** or managed through punitive telecom mandates.

Instead, India should leverage an incentive-driven strategy aligned with broader national and state road-safety frameworks. Rather than penalizing spectrum holders, state and national highway authorities should prioritize deploying RSUs at high-risk corridors, accident-prone blackspots, and critical urban intersections using public safety funding and transport infrastructure targets.

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

IAFI Response

The concept of **surrendering frequency spectrum does not arise** under a shared, non-exclusive authorization model. Because no entity holds exclusive rights to any portion of the 30 MHz block, there is no spectral asset to "return" to the government. When an authorized entity decides to terminate its V2I communication services, the process is handled simply by decommissioning the physical RSUs, updating the central registry to mark the nodes as inactive, and ceasing transmission.

Q-9. 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.

IAFI Response

Timelines for Processing Spectrum Assignment Applications

Core Position: Under the recommended regulatory model, traditional administrative timelines for individual spectrum assignment are **not applicable**. Since the spectrum should be managed via a Class License / General Authorization / Licensed-by-Rule framework, there is no requirement for individual, case-by-case spectrum clearance for each Roadside Unit (RSU). Instead, a real-time, automated registration system should be instituted to ensure that critical road-safety deployments face zero bureaucratic delays.

1. Inapplicability Under a Licensed-by-Rule Framework

In a shared, non-exclusive spectrum regime, the legacy process of submitting individual applications, undergoing protracted technical coordination, and waiting for standalone frequency

allocations is entirely bypassed. Because the technical parameters (EIRP and OOB limits) are pre-defined by the rule itself, any entity holding the valid V2I communication service authorization is automatically permitted to utilize the designated 30 MHz band, rendering conventional spectrum processing timelines obsolete.

2. Automated Online Registration and Instant Acknowledgement

To maintain ecosystem visibility without creating market entry barriers, the per-site spectrum assignment mechanism should be replaced by a streamlined, centralized online registry:

- **Instant Verification:** Authorized entities should register new RSU deployments via an online portal, which provides an automated, instantaneous acknowledgement upon submission.
- **Immediate Operations:** Receipt of this automated acknowledgement should serve as the immediate authority to activate and operate the RSU.
- **Exception Handling:** Strict, well-defined timelines should be prescribed *only* for flagged or anomalous cases (e.g., if data validation fails or a physical site location conflicts with cross-border coordination zones), which should be resolved within a maximum of 7 working days.

3. Strict Timelines for Retained Civil or Administrative Approvals

While spectrum-related delays are eliminated under a class licensing model, secondary approvals, such as Right-of-Way (RoW), structural safety clearances from municipal bodies, or power connections from road owners, can still bottleneck rollouts.

If any such external administrative permissions are retained, the regulatory framework must enforce a strict, fast-track window:

- **15 to 30 Working Days Limit:** All associated civil or localized road-authority approvals must be mandated to conclude within **15–30 working days**.
- **Deemed Approval:** To prevent life-saving public safety infrastructure from being delayed by administrative inertia, a clause for "deemed approval" should be triggered automatically if the competent local authority fails to respond within the stipulated timeframe.

Q-10. 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.

IAFI Response

Additional Suggestions for V2I Spectrum Assignment

Core Position: To ensure a successful nationwide rollout of Intelligent Transportation Systems (ITS), regulations must prevent market fragmentation and guarantee that the 5.9 GHz band remains shared. This requires two critical actions: legally defining the spectrum as non-exclusive, and establishing a mandatory national compliance standard.

1. Explicit Statutory Codification of Shared, Non-Exclusive Access

To avoid future legal ambiguities or commercial disputes, the spectrum regulation must overtly define the rights, and limitations, associated with V2I spectrum access.

- **No Property Rights over Spectrum:** The regulatory guidelines must explicitly state that access to the 5.875–5.905 MHz band for Roadside Units (RSUs) is strictly shared and non-exclusive.
- **Purpose of the RSU Registry:** It must be legally clarified that the centralized RSU registry serves solely as an administrative tool for network governance, security verification, harmful interference tracking, and operator accountability.
- **Prevention of Squatting:** Registration of an RSU at a specific geographic coordinate does not confer any "spectrum property rights," priority access, or exclusivity zone to that operator against subsequent authorized deployments. This prevents early deployers from hoarding or blocking public safety corridors.

2. Establishment of a Unified National Conformance and Testing Regime

Because V2X safety relies entirely on real-time, cross-brand communication (any vehicle must be able to talk to any roadside unit instantly), India cannot afford a fragmented technological landscape.

- **Three-Pillar Testing Framework:** The Department of Telecommunications (DoT) and the Telecommunication Engineering Centre (TEC), in coordination with the Ministry of Road Transport and Highways (MoRTH), should mandate a single national conformance regime spanning:
 1. **Radio Frequency (RF) Compliance:** Ensuring strict adherence to EIRP and OOB limits to eliminate hardware-level interference.
 2. **Protocol Interoperability:** Verifying that message sets (e.g., basic safety messages, emergency vehicle alerts) adhere strictly to identical standard protocols so that multi-vendor environments work seamlessly.
 3. **Security Architecture:** Confirming total alignment with the national IEEE 1609.2-based V2X PKI framework.

This unified testing regime must apply uniformly across India. Individual states, Union Territories, or Urban Local Bodies (ULBs) must be restricted from prescribing localized, competing technical standards. A vehicle manufactured or registered in one state must feature total interoperability when driving through an RSU network deployed by a completely different municipal agency in another state.

Spectrum constitutes a scarce and strategic national asset, and its allocation must be governed by a transparent, efficient, and well-defined regulatory framework towards ensuring the safety of life on roads and traffic management, both of which are non-commercial applications. As V2X applications rely on dedicated spectrum to enable safety-critical and intelligent transportation applications, it is imperative that such assignment ensures optimal utilization, robust regulatory oversight, interference protection, investment certainty, and the long-term sustainability of the ecosystem.

Q-11. Any other issues/suggestions relevant to the regulatory framework for V2X communication may be submitted with proper explanation and justification.

IAFI Response

Other Relevant Issues and Suggestions for the V2X Regulatory Framework

Core Position: India can avoid common deployment delays by adopting proven global standards for the Intelligent Transportation Systems (ITS) safety spectrum. The new regulations should focus on uniform technical rules, shared spectrum access, and a simple registration process for Roadside Units (RSUs), to speed up nationwide rollout, ensure equipment from different vendors works together seamlessly, and deliver immediate safety benefits.

1. The Case for a Light-Touch, High-Accountability Framework

To catalyze rapid investments from both public and private sectors (automotive OEMs, road authorities, and tech providers), the spectrum allocation mechanism must minimize regulatory friction while maintaining strict operational accountability.

- **Enabling Scale:** Traditional, heavy-handed telecom licensing models slow down infrastructure rollouts. A streamlined registry approach allows highway operators to deploy critical safety nodes on demand.
- **Guaranteeing Interoperability:** Standardizing technical baselines uniformly across the country ensures that vehicles moving across municipal or state boundaries enjoy continuous, uninterrupted V2X protection.

2. International Benchmarks & Regulatory Precedents

The proposed framework of shared, non-exclusive, and general authorization aligns entirely with the regulatory paths chosen by leading global telecom and transport authorities:

- **Europe (CEPT/ECC Decision (08)01):** The Electronic Communications Committee (ECC) explicitly designates the 5.9 GHz band for ITS under a General Authorization approach. This framework eliminates individual rights of use, allowing rapid cross-border deployment across Europe under standardized technical parameters.
- **Australia (ACMA Radiocommunications Class Licence 2017):** The Australian Communications and Media Authority manages ITS via a Class Licence model. It requires no individual applications and charges zero spectrum fees, relying entirely on end-user compliance with predefined technical rules to prevent interference.
- **United States (FCC 5.9 GHz Framework):** The Federal Communications Commission (FCC) maintains a dedicated 5.9 GHz safety segment utilizing a differentiated governance structure. It effectively segregates the regulatory treatment of mass-produced On-Board Units (OBUs) from infrastructure-bound Roadside Units (RSUs) to maximize spectrum efficiency.
- **United Kingdom (Ofcom SRD Principles):** Ofcom utilizes Short Range Device (SRD) licensing principles to grant license exemptions to low-power, low-interference-risk

equipment. V2X infrastructure fits precisely into this category, as localized, packet-based vehicle safety transmissions pose virtually zero risk to broader macroscopic networks.

Conclusion

By adopting these global standards, India can create a clear, affordable, and safe environment for C-V2X. This approach protects public safety and reduces the administrative burden on regulators. It also gives the automotive and transport industries the clear rules they need to plan their future technology investments.

B Issues Related to Spectrum Charges and Other Financial Conditions

Q-12. In view of the public welfare-oriented nature of V2X applications and the need to encourage the deployment of such infrastructure and services, should there be spectrum charges levied on spectrum assigned to the V2I communication service authorised entities under the proposed V2I communication service authorisation? Please provide detailed justification in support of your response.

IAFI Response

Spectrum Charges and Financial Conditions for V2I Communication

Core Position: No Spectrum Usage Charges (SUC) or recurring spectral fees should be levied on the spectrum assigned for V2I/V2X communication services. Because V2X applications are inherently public welfare-oriented and focused on road safety rather than commercial monetization, the regulatory framework must treat this spectrum as a public safety utility.

Detailed Justification

1. **Public Welfare and Life-Saving Nature of V2X** - Unlike commercial cellular networks (IMT) which are profit-driven and monetized via consumer data plans, V2X infrastructure is deployed exclusively to protect human lives, mitigate road accidents, optimize traffic flow, and reduce emergency response times.
2. **Incompatibility with Shared, Non-Exclusive Spectrum Access** - Traditionally, Spectrum Usage Charges are calculated based on exclusive spectral property rights or a percentage of Adjusted Gross Revenue (AGR).
 - **No Commercial Revenue Stream:** V2I communication service providers (such as highway authorities, municipal bodies, or public transit agencies) do not generate direct telecom revenue from transmitting vehicle safety messages.
 - **Shared Architecture:** Under the proposed Class License / Licensed-by-Rule framework, no entity owns the spectrum exclusively. Levying a legacy fee structure on an open, shared, packet-based ecosystem is administratively unfeasible and theoretically flawed.

3. Prevention of Economic Bottlenecks in Infrastructure Deployment

The deployment of Roadside Units (RSUs) requires substantial capital investment from road owners, Urban Local Bodies (ULBs), and automotive OEMs.

- If the government levies recurring spectrum charges per RSU or per MHz, it will significantly inflate the operational expenditure (OPEX) of smart-city and highway projects.
- Such financial barriers will directly disincentivize rapid, dense infrastructure rollouts, particularly in high-risk rural corridors or underfunded municipalities, creating dangerous gaps in the national safety network.

4. Alignment with Global Regulatory Precedents

Charging for safety-grade spectrum runs entirely counter to international best practices. Leading global regulators have systematically eliminated spectral fees for the 5.9 GHz ITS band to accelerate technology adoption:

- **Europe (CEPT/ECC):** Operates under a general authorization model that prioritizes social benefit over spectrum revenue, charging no individual site or usage fees.
- **Australia (ACMA):** Explicitly states in its *Radiocommunications Class Licence 2017* that no application or spectrum usage fees apply to ITS devices, relying purely on technical compliance.
- **United Kingdom (Ofcom):** Employs license-exemption principles for low-interference-risk, localized safety devices to completely bypass cost barriers.

Conclusion

To achieve maximum safety impact, rapid nationwide scalability, and seamless interoperability, India must treat the 5.9 GHz band as an open public resource. The regulatory framework should completely exempt V2I communication service authorized entities from any form of spectrum usage charges, keeping administrative and financial barriers at absolute zero.

Q-13. If answer to Q12 is affirmative, whether the spectrum charges for the V2I communication service authorised entities under the proposed V2I communication service authorisation should be determined based on the spectrum charging methodology prescribed by the Department of Telecommunications (DoT) vide its order dated 11.12.2023? If yes, then which of the radiocommunication services specified in the said order, should be taken as basis for calculation of spectrum Charges? Please provide detailed justification in support of your response.

IAFI Response

Applicability of DoT Spectrum Charging Order dated 11.12.2023

Core Position: The spectrum charging methodology prescribed by the Department of Telecommunications (DoT) vide its order dated 11.12.2023 is **completely inapplicable** to the proposed V2I communication authorization. Because the baseline positioning for Q-12 establishes

that no spectrum usage charges should be levied, applying an order designed for exclusive, captive, or commercial allocations to a shared, non-exclusive public safety band would be structurally and conceptually flawed.

1. Incompatibility of Exclusive Charging Frameworks with Shared Safety Bands

The DoT order dated 11.12.2023 (Order No. P-11014/34/2009-PP) provides a revised charging framework primarily tailored for **Captive Users** and specific radiocommunication assignments calculated on a per-frequency, per-location royalty or formula basis.

- **Misalignment of Regulatory Intent:** These legacy charging mechanisms are structurally designed for dedicated links (such as fixed point-to-point, land mobile networks, or captive wireless networks) where an individual licensee enjoys exclusive operational rights over a localized frequency spot.
- **Safety-of-Life Priority:** In stark contrast, C-V2X/ITS operates within a highly dynamic, shared, and packet-based ecosystem where thousands of moving transceivers (OBUs) and fixed nodes (RSUs) must co-exist seamlessly on the same 30 MHz block. Charging methodologies based on exclusive licensed services are completely inappropriate for applications focused primarily on public road safety and saving human lives.

2. Formula-Based Charging Fails for V2I

Applying the service categories from the December 11, 2023 order to V2I infrastructure will create immediate roadblocks to its deployment:

- **Per-Location Fees Make Large Networks Impossible:** V2I requires thousands of Roadside Units (RSUs) across highways and cities to keep drivers safe. If spectrum fees are charged per location, the sheer volume of devices required will make the project too expensive to build.
- **V2I Does Not Fit Legacy Categories:** V2X is a shared, safety-focused network. None of the older commercial or captive categories fit this model. Forcing V2I into these outdated categories will result in unfair, heavy fees that stop the technology from being adopted.

3. Recommended Alternative: Nominal Administrative Cost-Recovery Only

Instead of adopting any component of the 11.12.2023 spectrum charging order, the regulatory framework should completely decouple V2X safety spectrum from state revenue-generation models:

- **Registry Administration Fee:** At most, a nominal, flat administrative fee may be considered during initial onboarding. This fee must not be a "spectrum charge," but rather a light-touch fee calibrated strictly to cover the actual administrative costs of maintaining the central online RSU registry.
- **Funding Compliance Monitoring:** Any such nominal fee should be directed solely toward sustaining the digital registry platform, ensuring device traceability, and conducting field compliance monitoring to safeguard the 5.9 GHz safety loop from rogue, unauthenticated transmissions.

Q-14. If answer to Q12 is affirmative, whether the spectrum charges for the V2I communication service authorised entities under the proposed V2I communication service authorisation should be levied as a percentage of Adjusted Gross Revenue (AGR)? If yes, are there any specific operational/ non-operational revenue items that should be included in/ excluded from AGR for the purpose of determination of spectrum charges? Please provide your response with detailed justification.

IAFI Response

- Application of this spectrum band is for public good and safety of life. Charging, service providers for deploying V2I systems, will demotivate and discourage them from providing such services and the overall objective of reducing fatalities on roads gets defeated.
- RSU deployments are public infrastructure. The implementation agency in most cases would be a city / state / central government agency.
- AGR-linked charging may be conceptually misaligned and administratively burdensome.
- If any fee is levied, it should be a flat, nominal cost-recovery fee unrelated to revenues so as to ensure that implementation agencies are not demotivated and discouraged from such deployments towards safety of life on roads.

Nature of Implementing Agencies as Public Infrastructure Operators

Unlike commercial telecom operators, the primary entities deploying and maintaining V2I networks are public infrastructure cells and state machinery.

- **Government-Led Deployment:** In the vast majority of use cases, RSUs will be established, funded, and managed by local Urban Local Bodies (ULBs), smart city special purpose vehicles (SPVs), state road transport departments, or central entities like the National Highways Authority of India (NHAI).
- Levying a complex revenue-share or AGR tax on government entities utilizing public funding to secure road networks would simply shift public resources administratively from transport budgets to telecom collections, creating no real net national value.

Recommended Financial Approach: Flat, Revenue-Independent Fee

If the Authority feels a financial mechanism must be established to maintain regulatory discipline, it must remain entirely independent of revenue or usage scales:

- **Nominal Cost-Recovery Only:** The framework should instead feature a **flat, nominal registration fee** collected at the point of onboarding.
- **Sustaining the Ecosystem:** This fee should be sized exclusively to recover the basic administrative costs of operating the centralized online RSU registry and executing

localized field compliance monitoring, ensuring that financial barriers do not disrupt critical road-safety infrastructure.

Q-15. If response to questions 13 and 14 is negative, then what should be the appropriate methodology for determination of spectrum charges for the V2I communication service authorised entities under the proposed V2I communication service authorisation? Please provide detailed justification in support of your response.

IAFI Response

Appropriate Methodology for V2I Spectrum Charges

Core Position: If traditional formula-based charges (Q-13) and revenue-linked (AGR) mechanisms (Q-14) are rejected, the only appropriate methodology is to adopt a **nominal, flat administrative cost-recovery fee** tied directly to the onboarding process of the centralized RSU registry. The spectrum usage itself must remain entirely exempt from recurring or volume-based pricing to preserve the public-welfare nature of the C-V2X framework.

1. Structure of the Recommended Cost-Recovery Methodology

Instead of standard commercial valuation metrics, any financial layout under the V2I authorization framework must strictly follow a light-touch administrative model:

- **Flat Onboarding Fee:** A small, uniform administrative processing fee can be levied when an authorized entity uploads and registers a new Roadside Unit (RSU) node into the online database.
- **Decoupled from Spectral and Physical Metrics:** The fee must remain entirely independent of the amount of spectrum utilized (the full 30 MHz block should be uniformly available) and the geographic footprint or antenna height of the deployment.
- **Periodic Registry Validation Fee:** If ongoing lifecycle funding is required to sustain database architecture, a nominal, flat renewal fee can be mandated at fixed, long-term intervals (e.g., every 5 years) coinciding with standard data hygiene updates.

2. Detailed Justification for this Methodology:-

a. Focusing on Public Safety Over Profit:

- **No Commercial Profits:** Vehicle-to-Infrastructure (V2I) networks are not built to sell services or make money from consumers and businesses. Because there is no profit involved, it doesn't make sense to price this spectrum the way we price commercial mobile networks.
- **Putting Safety First:** India has a very high number of deadly road accidents. C-V2X technology helps prevent these crashes by stepping in when human drivers make mistakes. By charging only a small administrative fee, the government treats this spectrum as a life-saving public service rather than a way to generate revenue.

b. Alignment with Public Safety Realities and Externalities

- **Zero Commercial Commercialization:** Because V2I networks do not generate consumer retail revenue or commercial wholesale enterprise margins, pricing models reflecting market opportunity or commercial utility cannot logically apply.
- **Prioritizing Safety over Revenue:** India faces severe road-safety challenges, resulting in high annual traffic fatalities. C-V2X technology directly addresses these challenges by neutralizing human recognition and decision errors. A minimal administrative fee model treats spectrum as a life-saving public good rather than a state revenue-generation tool.

b. Aligning with Public Safety and Societal Impact

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C. Regulatory Ease and Minimal Bureaucratic Overhead

- **Bypassing Complex Audits:** Implementing a flat processing fee completely eliminates the need for the Department of Telecommunications (DoT) to build a sophisticated mechanism to audit non-telecom revenues or trace intricate geographical grid equations.
- **Ensuring Budget Predictability:** It gives ecosystem investors, including highway concessionaires under Public-Private Partnership (PPP) models, absolute long-term financial predictability regarding their regulatory compliance obligations.

d. Adherence to Global Best Practices

- **International Alignment:** This methodology directly mirrors successful international frameworks (such as Australia's ACMA compliance model and Europe's CEPT General Authorization layout). These frameworks intentionally choose not to extract spectral rents from connected vehicle systems, restricting collection strictly to what is required to run the automated registry and maintain cross-vendor interoperability.

Q-16. For spectrum assigned to the V2I communication service authorised entities under the proposed V2I communication service authorisation, what should be the appropriate payment terms for spectrum charges, if any? Please provide your response with detailed justification.

IAFI Response

Payment Terms for V2I Spectrum Charges

Core Position: Consistent with the positions detailed in Q-12, Q-13, and Q-14, it is strongly recommended that **no spectrum usage charges (SUC) be levied** on the 5.9 GHz safety band. Consequently, traditional telecom payment terms, such as large upfront spectrum payments, deferred annual installments, or revenue-share tracking, are **completely inapplicable** to this framework.

If a nominal, flat administrative fee is instituted solely for the maintenance of the centralized RSU registry (as proposed in Q-15), the payment terms must be designed for absolute simplicity, featuring a one-time, fully digital transaction with zero financial guarantees.

1. Recommended Payment Framework for Nominal Registry Fees

Should the Authority decide to implement a basic administrative cost-recovery fee, the payment terms must be structured to prevent administrative bottlenecks:

- **One-Time Upfront Registration Fee:** The fee should be payable as a single, flat amount strictly at the time of online registration for each Roadside Unit (RSU) node.
- **Fully Digital, Instant Settlement:** Payment must be handled entirely through an online, integrated digital payment gateway on the RSU registry portal (e.g., Bharatkosh or an equivalent unified government portal), ensuring instant verification and automated generation of the RSU operational certificate.
- **Exemption from Financial Guarantees:** Authorized V2I entities must be completely exempt from submitting Bank Guarantees (BGs), Performance Bank Guarantees (PBGs), or financial security deposits.

2. Detailed Justification

a. Preventing the Lockup of Public and Municipal Capital

Traditional telecom license and spectrum payment terms rely heavily on Bank Guarantees to protect state revenue against commercial default. However, since the primary deploying entities of V2X networks are government bodies (NHAI, State Road Transport Departments, and Urban Local Bodies) or public-private concessionaires, requiring BGs would serve no regulatory purpose. Instead, it would unnecessarily lock up vital public capital in banking instruments, capital that would otherwise be directly spent on purchasing life-saving physical RSU hardware and sensors.

b. Ensuring a Zero-Friction Operational Workflow

V2X deployment requires agility; highway operators must be able to scale up RSU nodes rapidly as new blackspots, construction work-zones, or smart intersections are developed.

- If payment terms involve recurring billing cycles, credit periods, or annual reconciliations, it will introduce a continuous administrative burden on both the Department of Telecommunications (DoT) and the transport authorities.
- A "pay-as-you-go" one-time digital registration fee ensures that once a node is registered and paid for, it requires zero further financial overhead throughout its operational lifecycle, allowing municipal engineers to focus entirely on traffic safety.

d. Alignment with Government Budgets

- Public safety projects rely on fixed government funds, unlike commercial networks that depend on quarterly profit forecasts. Therefore, a one-time, flat fee is the most practical

approach. It allows road authorities to easily include all regulatory costs in their initial upfront budget (CAPEX) without having to manage recurring charges.

Q-17. What are the potential sources of revenue, if any, for an V2I communication service authorised entity under the proposed V2I communication service authorisation? Please provide your response with detailed justification.

IAFI Response

Potential Sources of Revenue for V2I Communication Service Authorized Entities

Core Position: V2I communication services are fundamentally non-commercial, public-welfare functions focused on saving human lives, enhancing traffic efficiency, and enabling rapid emergency response. There are **no viable sources of direct revenue generation** from core V2I safety transmissions. The regulatory framework must treat V2I as a public safety utility rather than a commercial, revenue-linked enterprise.

Detailed Justification

1. The Non-Commercial, Public-Good Character of V2I Safety

The primary data broadcasted by Roadside Units (RSUs) consists of critical safety-of-life packets, such as Forward Collision Warnings (FCW), Emergency Electronic Brake Light (EEBL) indications, Intersection Movement Assist (IMA), and localized weather or road hazard alerts.

- **The Safety Network Effect:** For these safety systems to be effective, every single vehicle on the road must receive these alerts unconditionally.
- **No Paywalls for Public Safety:** Charging individual drivers or vehicle owners a subscription fee to receive life-saving collision alerts is socially, legally, and operationally unfeasible. Because the utility relies entirely on friction-free, universal broadcasts, the core service cannot be direct-monetized.

2. Nature of Implementing Agencies as Cost Centers

In the overwhelming majority of cases, V2I infrastructure will be deployed by public entities, such as:

- The National Highways Authority of India (NHAI)
- State Road Transport Corporations
- Urban Local Bodies (ULBs) and Smart City Special Purpose Vehicles (SPVs)
- Highway Concessionaires under Public-Private Partnership (PPP) frameworks

For these entities, V2I is an infrastructure investment aimed at lowering the economic and societal costs associated with road fatalities, gridlock, and infrastructure damage. It is handled as a **Capital and Operational Expenditure (CAPEX/OPEX) center**, not a profit-generating business unit.

Conclusion

Because V2I communication serves a strict public-good function with no direct consumer monetization model, the regulatory framework must explicitly decouple this authorization from any commercial revenue expectations. Financial models should assume a zero-revenue baseline, reinforcing the justification for an exemption from spectrum usage charges.

Q-18. What should be the definitions of Gross Revenue (GR), Applicable Gross Revenue (ApGR), and Adjusted Gross Revenue (AGR) for V2I communication service authorised entity under the proposed V2I communication service authorisation? Further, what should be the relevant items of revenue, exclusions and deductions and consequent definitions of GR, AGR and ApGR? Please provide your response with detailed justification.

Q-19. What revenue components should be included in, or excluded from, the computation of Gross Revenue (GR), Applicable Gross Revenue (ApGR) and Adjusted Gross Revenue (AGR) for the purpose of determining authorisation fees or spectrum charges for the proposed V2I communication service authorisation? Please provide your response with detailed justification.

Q-20. Whether revenue derived from safety-related V2X services under the proposed V2I communication service authorisation should be excluded from the computation of AGR, in view of their public interest and non-commercial nature? Please provide your response with detailed justification.

IAFI Response

Combined Response to Q-18, Q-19, and Q-20:

Framework for Gross Revenue (GR), Applicable Gross Revenue (ApGR), and Adjusted Gross Revenue (AGR)

Core Position: The definitions and computations of Gross Revenue (GR), Applicable Gross Revenue (ApGR), and Adjusted Gross Revenue (AGR) are **entirely not applicable** to entities holding the proposed V2I communication service authorization. Because V2X safety broadcasts are strictly public interest functions that generate zero commercial revenue, introducing any revenue-linked reporting or levy framework is fundamentally misaligned with the nature of this service.

1. Inapplicability of GR, ApGR, and AGR Frameworks (Justification for Q-18 & Q-19)

The Core Argument Traditional telecom revenue rules (like GR, ApGR, and AGR) were built for for-profit companies selling phone and internet plans. Applying these old rules to Vehicle-to-Infrastructure (V2I) providers doesn't make sense for three reasons:

- **V2I don't sell anything:** V2I networks just send automated safety messages between roads and vehicles. There are no subscriptions, retail customers, or profit motives involved.

- **V2I are public safety projects:** V2I is mostly run by government agencies (like highway authorities and smart cities). They rely on public safety budgets and do not make money from this technology.
- **It creates useless paperwork:** Forcing public engineers to use complex telecom accounting for non-profit safety systems would cause a massive bureaucratic headache for everyone (including the DoT) without generating a single rupee in revenue.

Forcing government-run V2I safety networks to use complex, for-profit telecom accounting rules creates massive paperwork with zero financial return, because V2I doesn't sell anything to consumers.

2. Complete Exclusion of Safety-Related V2X Services (Justification for Q-20)

The Core Argument: If the Authority decides to keep revenue tracking for other types of telecom authorizations, all safety-related V2X (Vehicle-to-Everything) services must be completely exempt. Here is why:

V2X serve the public good: Life-saving features like collision warnings, pedestrian alerts, and emergency vehicle signals are purely for public safety. Burdening them with taxes or audits punishes organizations for providing a social good.

Red tape delays safety: If carmakers or private highway operators face complex accounting or financial risks just for transmitting safety data, they will hesitate to roll out the technology. This directly hurts the national goal of reducing road fatalities.

Safety must stay separate from profit: Even if an operator makes money from side features (like smart parking or tolling), the core 5.9 GHz frequency used for critical safety alerts must remain strictly free from any revenue-based fees or charges.

Crucial, life-saving V2X safety alerts must be completely exempt from revenue taxes and audits; otherwise, the financial and administrative burden will delay their rollout and undermine national road safety goals.

Recommended Regulatory Alternative

Rather than adapting or defining GR, ApGR, and AGR for this sector, the government should institute a financial framework that matches the unique public-service nature of C-V2X technology:

- **Zero-Levy Regime:** Core authorization fees and spectrum charges should be set at zero, completely bypassing the need to compute GR, ApGR, or AGR.
- **Flat Administrative Model:** Any regulatory oversight costs should be recovered via a simple, flat, one-time online registration fee per RSU node, independent of any financial or operational revenue metrics. This ensures a clean, predictable, and rapidly scalable deployment environment focused entirely on protecting human life on Indian roads.

Q-21. What should be the appropriate entry fee for V2I communication service authorised entities under the proposed V2I communication service authorisation? Please provide detailed justification in support of your response.

IAFI Response

IAFI recommends that there should be **no entry fee** or, at most, a **nominal entry fee** strictly limited to recovering the administrative overhead costs of registration and keeping track of Roadside Units (RSUs).

Detailed Justification

1. V2I as an Essential Safety and Public Utility Infrastructure

Vehicle-to-Infrastructure (V2I) communication is not a traditional commercial telecom service (like cellular voice or data broadband) intended for revenue generation. Instead, it is a critical safety and traffic management framework designed to enable real-time collision avoidance, emergency vehicle prioritization, and hazard warnings. High entry fees would artificially elevate the cost of deployment, delaying the rollout of infrastructure that directly saves citizen lives on the road.

2. Encouraging Rapid Ecosystem Growth and RSU Deployment

For V2I to be effective, a ubiquitous network of Roadside Units (RSUs) must be deployed across extensive highway networks and urban intersections.

- High entry barriers will deter automotive OEMs, highway authorities (like NHAI), and third-party smart-city infrastructure providers from seeking authorization.
- A zero or nominal entry fee structure encourages a diverse mix of public and private entities to invest their capital directly into physical hardware and deployment rather than regulatory upfront costs.

3. Prevention of Double Taxation on Public Infrastructure

Many authorized V2I entities will be public sector units, municipal corporations, or government-concessioned highway developers. Imposing heavy entry fees on these entities essentially shifts public funds from infrastructure development back to the treasury, creating administrative friction without adding societal value.

4. Minimal Spectrum/Resource Scarcity Premium

Unlike commercial mobile services (IMT) that require exclusive, high-demand licensed spectrum bands requiring intensive monitoring, V2I generally operates on specific harmonized ITS bands (such as the 5.9 GHz band). The authorization is primarily an administrative mechanism to ensure interoperability, prevent mutual interference, and maintain a registry of active RSUs for security orchestration, rather than managing a scarce commercial asset.

5. Technical Cost-Structure of V2I Operators

V2I operators face significant operational expenses (OPEX) in backhaul connectivity, edge compute maintenance, and strict cybersecurity compliance (e.g., managing Public Key Infrastructure/PKI certificates for secure vehicle messaging). Relieving these entities of an upfront entry fee allows them to focus financial resources on maintaining high service availability and stringent security protocols.

Conclusion & Recommendation

To foster a resilient, safe, and rapidly deployable Intelligent Transportation System (ITS) ecosystem in India, the regulatory framework should treat V2I authorization as an **enabling mechanism** rather than a fiscal instrument.

Proposed Fee Structure:

- **Entry Fee:** ₹0 (Nil)
- **Administrative/Registration Fee:** A nominal, one-time flat fee (cost-recovery basis only) per entity or per block of RSUs registered, to cover the operational maintenance of the DoT/TRAI registry database.

Q-22. What should be the appropriate terms and conditions for bank guarantees for the proposed V2I communication service authorisation? Please provide detailed justification in support of your response.

IAFI Response

IAFI strongly recommends that **no Financial Bank Guarantees (FBG) or Performance Bank Guarantees (PBG) should be prescribed** for entities seeking the proposed V2I communication service authorization.

Detailed Justification

1. Nature of Spectrum Utilization: Shared and Non-Exclusive

Traditional bank guarantees in the telecom sector are designed to protect government revenue and ensure the optimal use of *exclusive, scarce, and commercially auctioned* spectrum blocks (such as IMT bands). In contrast, Vehicle-to-Infrastructure (V2I) communication operates on designated Intelligent Transportation Systems (ITS) bands (e.g., the 5.9 GHz band) under a **shared, non-exclusive deployment model**.

Because no single operator hoards or blocks this spectrum from others, there is no risk of hoarding or revenue loss that would warrant financial locking via bank guarantees.

2. Registry-Based Compliance Over Financial Risk Management

The primary objective of the V2I authorization framework is technical compliance, interoperability, and security orchestration (ensuring Roadside Units [RSUs] adhere to standard protocols and do not cause harmful interference).

- Enforcement is best managed through a **registry model** where non-compliant or malfunctioning RSUs can have their operational digital certificates revoked or suspended from the network.

3. Absence of Revenue-Sharing and Fiscal Risk to the Government

V2I services are primarily public safety, traffic management, and utility-driven applications, rather than consumer broadband or commercial telephony.

- Since these services do not operate on a commercial revenue-sharing model (Adjusted Gross Revenue/AGR) with the government, there is no deferred payment risk or license fee default risk.
- Consequently, the fundamental requirement for a Financial Bank Guarantee (FBG) to secure government dues does not exist.

4. Reducing Capital Lock-up to Accelerate Safety Infrastructure Deployment

Imposing bank guarantee mandates creates a severe entry barrier, particularly for highway authorities (like NHAI), municipal bodies, automotive OEMs, and tech startups.

- Bank guarantees require entities to freeze significant capital or credit lines with financial institutions, diverting critical funds away from procurement, hardware deployment, and maintenance of RSUs.
- Aligning with recent ease-of-doing-business reforms in the Indian telecom sector, which have progressively rationalized and removed bank guarantee requirements for various authorizations, V2I should be kept completely free of such financial burdens to encourage rapid nationwide rollout.

Conclusion & Recommendation

To ensure the rapid proliferation of life-saving V2I infrastructure without placing unnecessary financial stress on the ecosystem, IAFI recommends a clean exemption from bank guarantees.

Proposed Terms & Conditions:

- **Performance Bank Guarantee (PBG):** Nil (Replaced by technical audit, registry validation, and automated certificate revocation for non-compliance).
- **Financial Bank Guarantee (FBG):** Nil (As there are no recurring commercial license fees or spectrum usage charges to secure).

Q-23. What should be the applicable minimum equity and minimum net worth requirements for authorised entities under the proposed V2I communication service authorisation? Please provide detailed justification in support of your response.

IAFI Response

IAFI recommends that **no minimum equity or minimum net worth thresholds** should be prescribed for entities seeking V2I communication service authorization. Prohibitive financial eligibility criteria are unnecessary for a shared safety spectrum framework and would counterproductively exclude key stakeholders needed to build out the ecosystem.

Detailed Justification

1. Inclusion of Public Road Authorities and Municipal Bodies

Vehicle-to-Infrastructure (V2I) infrastructure will predominantly be deployed, owned, or facilitated by public entities such as the National Highways Authority of India (NHAI), state road development corporations, municipal bodies, and smart-city special purpose vehicles (SPVs).

- Many of these public sector or government-backed entities operate under unique capital structures that do not align with traditional commercial telecom corporate balance sheets.
- Imposing rigid minimum equity or net worth rules creates unnecessary legal and administrative roadblocks for the very public authorities responsible for road safety infrastructure.

2. Enabling Smaller Subcontractors and System Integrators

The physical rollout, integration, and maintenance of Roadside Units (RSUs) on highways and urban intersections will frequently be executed by MSMEs, specialized niche technology startups, and local engineering contractors.

- High net worth barriers would disqualify these agile, competent technical implementers from holding the authorization directly.
- This would force a reliance on massive commercial intermediaries, artificially driving up project costs and slowing down the deployment of life-saving traffic safety networks.

3. Misalignment with Shared, Non-Exclusive Spectrum Usage

Heavy financial entry barriers (like high net worth limits) are traditionally used in telecom licensing to ensure that an operator has the deep pockets required to build a massive nationwide cellular network and bid for multi-billion dollar exclusive spectrum blocks.

- Because V2I utilizes a **shared, non-exclusive safety spectrum** (such as the 5.9 GHz ITS band), there is no risk of financial insolvency causing a national waste of an exclusive radio resource.
- If a small V2I authorized entity faces financial difficulties, it does not lock up or impact the spectrum utility for other overlapping or adjacent users.

4. Shifting Focus to Competence, Security, and Accountability

Since V2I involves critical automotive safety functions and data exchange with moving vehicles, eligibility should be gated by technical capability and regulatory compliance rather than balance-sheet size. IAFI recommends that authorization criteria focus on:

- **Technical Competence:** Adherence to harmonized global ITS standards (e.g., C-V2X protocols) and certified hardware compliance.
- **Security & Accountability:** Ability to integrate with the national ITS security credential management system (SCMS) or Public Key Infrastructure (PKI) to guarantee secure, trustworthy vehicle-to-infrastructure messaging.
- **Operational Liability:** Clear legal accountability for the maintenance and operational uptime of the deployed RSUs.

Conclusion & Recommendation

To foster an inclusive, rapidly scalable, and safety-driven Intelligent Transportation System (ITS) ecosystem in India, financial net worth should not be used as a gatekeeping metric.

Proposed Eligibility Criteria:

- **Minimum Equity:** Nil
- **Minimum Net Worth:** Nil
- **Primary Gating Metrics:** Technical compliance certification of hardware, legal registration as an operating entity in India, and mandatory adherence to cyber-security/PKI frameworks.

Q-24. What should be the applicable application processing fee for the proposed V2I communication service authorisation? Please provide detailed justification in support of your response.

IAFI Response

IAFI recommends that there should be **no application processing fee**, or at most, a **nominal fee** strictly calculated on a cost-recovery basis for processing online registrations. To ensure a truly light-touch regulatory approach for this shared safety spectrum, any such nominal process must be fully digitalized and automated to the maximum extent possible.

Detailed Justification

1. Aligning with a Light-Touch Regulatory Framework

Vehicle-to-Infrastructure (V2I) communication serves a vital public safety and traffic management function, distinct from revenue-generating commercial telecom operations. High or administrative application fees act as a disincentive for rapid deployment. A zero or nominal fee structure reflects a progressive, "light-touch" regulatory environment that prioritizes public utility and safety over administrative revenue collection.

2. Encouraging Proliferation via Low Entry Friction

For an Intelligent Transportation System (ITS) to be effective, Roadside Units (RSUs) must be deployed across millions of kilometers of highways, rural roads, and urban intersections.

- The entities driving this deployment, including public road authorities, municipal corporations, automobile manufacturers (OEMs), and specialized sub-contractors, should face minimal friction.
- Eliminating or minimizing application fees reduces upfront administrative bottlenecks, allowing stakeholders to focus their financial and operational resources directly on hardware procurement and deployment.

3. Maximizing Efficiency through End-to-End Automation

If a nominal fee is introduced to cover basic administrative overhead, the underlying registry system should be fully automated (e.g., via a dedicated portal under the Saral Sanchar framework).

- **Instant Processing:** The application, technical compliance validation, and RSU registration should be processed instantly or via a self-certification model to prevent bureaucratic delays.
- **Cost Minimization:** By automating the workflow, the actual cost of processing an application drops significantly, thereby naturally justifying a minimal, nominal fee.

4. Consistency with Shared, Non-Exclusive Spectrum Models

Application fees for exclusive telecom licenses often account for extensive technical evaluation, cross-border coordination, and complex spectrum management workflows. Because V2I uses a **shared, non-exclusive safety spectrum** (such as the 5.9 GHz band), the technical validation is limited to verifying standard equipment compliance and logging device locations. The administrative effort required is minimal, and the processing fee should proportionally reflect this low complexity.

Conclusion & Recommendation

To foster a rapid, seamless, and frictionless rollout of critical road-safety infrastructure across India, the application processing fee should not serve as an entry barrier.

Proposed Fee Structure:

- **Application Processing Fee:** ₹0 (Nil) or a nominal, flat online processing fee (e.g., a token amount per application/bulk upload) purely to cover cloud infrastructure overhead.
- **Process Workflow:** 100% online, automated, self-certification basis with instant registration generation.

Q-25. What should be the applicable rate of authorisation fee for proposed V2I communication service authorisation? Please provide detailed justification in support of your response.

IAFI Response

IAFI recommends that the authorization fee for the proposed V2I communication service be set at **zero (Nil)**, or at most, a **nominal, flat annual fee** strictly designed for cost-recovery of registry database maintenance. Because V2I operates on a shared safety spectrum for public utility, it should be entirely exempted from the percentage-based revenue-sharing models (e.g., Adjusted Gross Revenue - AGR) typically applied to commercial telecom licenses.

Detailed Justification

1. Absence of a Commercial Revenue Model (AGR Inapplicability)

Traditional telecom authorization fees in India are calculated as a percentage of an operator's Adjusted Gross Revenue (AGR).

- Vehicle-to-Infrastructure (V2I) communication is fundamentally a non-commercial, public safety, and traffic management infrastructure.
- Roadside Units (RSUs) send critical data (such as collision warnings, weather alerts, and traffic signals) to vehicles without charging the end-user a subscription or usage fee. Since there is no direct commercial revenue stream generated from the transmission of these safety messages, an AGR-based authorization fee model is conceptually and practically inapplicable.

2. Preservation of Capital for Public Safety Deployment

Imposing recurring or high authorization fees would artificially inflate the operational expenditure (OPEX) for V2I stakeholders, such as the National Highways Authority of India (NHAI), municipal corporations, automotive OEMs, and road safety tech providers.

- Every rupee spent on regulatory authorization fees is a rupee diverted away from deploying more physical RSUs, upgrading sensor systems, and ensuring robust cyber-security.
- Keeping the authorization fee at zero or a nominal flat rate maximizes the resources available for expanding critical road-safety coverage.

3. Prevention of Multi-Layered Taxation on Public Utilities

A significant portion of V2I infrastructure will be funded by public taxes, infrastructure bonds, or government-concessioned public-private partnerships (PPPs) for smart cities and highways. Levying an authorization fee on these deployments amounts to an inefficient internal transfer of public funds, creating administrative overhead for both the regulator and the deploying authorities without generating true economic value.

4. Promotion of Light-Touch Regulation for Shared Spectrum

V2I services utilize specialized Intelligent Transportation Systems (ITS) bands (such as the 5.9 GHz band) on a **shared, non-exclusive basis**.

- High authorization fees are typically justified for exclusive spectrum bands to prevent spectrum hoarding and reflect the commercial value of a monopoly resource.
- In a shared spectrum ecosystem, the regulator's role is primarily administrative—ensuring device standards and maintaining a registry—rather than commercial resource allocation. Therefore, the fee should reflect a light-touch, automated cost-recovery model.

5. Fully Automated, Low-Cost Administrative Registry

If a nominal authorization fee is deemed absolutely necessary, it should be a low, flat annual maintenance fee processed through an automated online portal (e.g., Saral Sanchar). By leveraging automated self-certification and digital registry updates, the administrative cost incurred by the Department of Telecommunications (DoT) will remain negligible, which should naturally keep the fee nominal.

Conclusion & Recommendation

To encourage rapid, nationwide adoption of life-saving Intelligent Transportation Systems (ITS) without imposing fiscal friction, the authorization fee structure must remain purely supportive rather than revenue-driven.

Proposed Authorization Fee Structure:

- **Authorization Fee Rate:** 0% of AGR (Exempted from revenue-share model).
- **Alternative Structure (if required):** A nominal, flat annual administrative fee per entity (not per RSU) purely to cover the operational upkeep of the digital registration portal.

Q-26. Apart from the financial provisions discussed earlier, are there any other financial terms and conditions that should be made applicable for the proposed V2I communication service authorisation? Please provide detailed justification in support of your response.

IAFI Response

IAFI strongly recommends that **no additional financial terms and conditions** should be introduced for the proposed V2I communication service authorization. To ensure a predictable, low-friction environment for road-safety infrastructure, the framework should explicitly prohibit hidden commercial levies, mandate fee waivers for government safety programs/pilots, and tightly restrict any administrative charges to transparent, actual cost-recovery operations.

Detailed Justification

1. Prevention of Cumulative Financial Burden on a Safety Utility

Introducing miscellaneous financial conditions (such as recurring technology update fees, mandatory high-value insurance guarantees to the licensor, or localized municipal spectrum surcharges) will create an unpredictable cost structure for stakeholders. Because Vehicle-to-Infrastructure (V2I) networks are low-margin, high-capital public utility networks, any layered financial uncertainty will deter long-term investment by highway developers and automotive ecosystem players.

2. Mandatory Fee Waivers for Government Safety Initiatives and Pilots

To accelerate the adoption of Intelligent Transportation Systems (ITS) in India, the framework should include a provision for complete financial exemptions during critical evolutionary phases:

- **R&D and Pilot Programs:** Academic institutions, automotive OEMs, and tech startups conducting field trials for advanced safety applications (such as autonomous driving alignment or intersection collision avoidance) should be completely exempt from any administrative fees.
- **Public Road-Safety Programs:** Central or State government-led road safety deployments (e.g., electronic tolling integration, emergency vehicle alerting systems, and accident-prone zone mapping) should face zero financial friction.

3. Transparency and Restricting Fees to Actual Digital Cost-Recovery

If any administrative charges are introduced in the future for registry modifications (such as updating RSU geographic coordinates or certificate renewals), they must be governed by strict regulatory principles:

- **Cost-Benefit Linkage:** Fees must be strictly proportional to the actual computing or human resource cost incurred by the registry authority, rather than acting as general revenue generation for the government.
- **Pre-published Tariffs:** All potential administrative charges must be explicitly itemized and published upfront within the authorization terms to prevent ad-hoc or arbitrary escalation.

4. Exemption from Universal Service Obligation (USO) Fund / Digital Bharat Nidhi Levies

Commercial telecom access services are typically subject to mandatory percentage contributions toward the Digital Bharat Nidhi (formerly USO Fund) to support rural connectivity. Since V2I authorizations operate on a localized, non-commercial, shared safety spectrum and do not offer general consumer telecommunication access services, they must be explicitly excluded from any such macroeconomic telecom levies.

Conclusion & Recommendation

To maintain a streamlined, "light-touch" regulatory environment that prioritizes the preservation of human life through technology, the financial terms must remain closed and minimal.

Proposed Framework Guidelines:

- **Miscellaneous Levies/Charges:** Nil (Explicitly barred under the authorization terms).
- **Pilot/R&D Exemption:** 100% waiver on all administrative processes for authorized field trials and public safety pilots.
- **USO/Digital Bharat Nidhi Contribution:** Explicitly exempted.
