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

Dear Sir,

Greetings from SIAM!

On behalf of the Society of Indian Automobile Manufacturers (SIAM), the apex industry body representing leading vehicle and vehicular engine manufacturers in India, we express our sincere gratitude to the Telecom Regulatory Authority of India (TRAI) for releasing this timely and forward-looking Consultation Paper on April 30, 2026.

SIAM highly appreciates TRAI's initiative to establish a robust regulatory framework for Vehicle-to-Everything (V2X) communication, which serves as a core enabler for Intelligent Transport Systems (ITS) to drastically improve road safety, maximize traffic efficiency, and reduce greenhouse gas emissions.

SIAM has actively participated in the policy formulation and technical deliberations regarding V2X deployment in India, including our past representations within the DoT Committee and the MoRTH Task Force. We strongly welcome the Department of Telecommunications' (DoT) in principle adoption of Cellular V2X (C-V2X) as the harmonized ITS technology for India, alongside the allocation of the 5.9 GHz band (5875-5925 MHz) for safety critical deployment.

To support the TRAI in finalizing its recommendations, SIAM has consolidated its detailed, itemized inputs and industry agreed responses to the specific issues raised for consultation. Our finalized industry feedback is attached herewith as **Annexure-1**.

We hope our consolidated inputs will assist the Authority in formulating a balanced, globally aligned, and safety-centric regulatory framework for V2X in India. We remain available for any further clarifications, technical discussions, or stakeholder discussions that TRAI may convene on this matter.

Looking forward to favourable considerations to our request made.

Best Regards,

Prashant K Banerjee

Attachment: Annexure-1: SIAM Consolidated Responses to TRAIConsultation Paper.

Response to TRAI’s V2x Consultation Paper

Contents

1. Executive Summary

The TRAI consultation paper presents a comprehensive framework for regulating Vehicle-to-Everything (V2X) communication in India, with primary focus on Vehicle-to-Infrastructure (V2I) systems requiring regulatory clarity due to integration with public infrastructure and safety-critical operations. India's growing mobility demand and road-safety challenges necessitate structured introduction of V2X technologies to support future automated mobility ecosystems.

The consultation evaluates global practices including LTE-V2X and NR-V2X standards, spectrum utilization in the 5.9 GHz band, and ITS architecture models from Europe, United States, China, and Australia. Central regulatory questions address whether V2I should constitute a new telecom service category, spectrum allocation methodology, RSU/OBU certification requirements, and India's PKI/security model adoption.

The framework proposes mandatory V2I authorization for safety-critical compliance, phased technology deployment starting with LTE-V2X (Rel-14/15) for near-term safety applications advancing to NR-V2X for automation, and establishment of national Security Credential Management System (SCMS) under CCA/MeitY with subordinate certification authorities for OEMs and RSU operators.

Financial framework evaluation recommends preferably eliminating spectrum charges given public-safety infrastructure designation, excluding safety-critical V2X operations from AGR calculations, and implementing nominal fixed annual fees independent of revenue or usage metrics.

The consultation consolidates 26 questions covering regulation, technology standards, security protocols, spectrum management, certification processes, and financial structures to guide stakeholder input on designing a safe, interoperable, standards-compliant, and economically viable V2I ecosystem scalable for India's automated mobility future.

2. TRAI Consultation Queries (Reference - TRAI consultation paper May 2026)

ID	Query from TRAI	SIAM Response
Q1	Whether there is a need to introduce an authorisation for vehicle-to-infrastructure (V2I) communication service under Section 3(1)(a) of the Telecommunications Act, 2023? If yes, please provide input with respect to the following aspects: (a) Eligibility conditions for the authorisation; (b) Period of validity of the authorisation and conditions for its renewal; (c) Service area of the authorisation;	Recommends introducing a light-weight administrative authorisation framework for V2I communication services under Section 3(1)(a) keeping in mind the safety-of-life aspect for these applications. This should be implemented in a phased manner, beginning with Vehicle-to-Vehicle (V2V) communication as the immediate priority, followed by structured progression to V2I. Such ensures India captures early safety benefits while establishing robust operational safeguards and data

	(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.	protocols. a) For eligibility, authorisation should be granted road operator entities (e.g., centre/state/city local bodies) and/or private entities authorized by the traffic management authority. b) The validity period of authorization should be ten years with regular checks. c) The service area should be similar in scope with the road operator's area of operation, but flexible enough to allow regional deployments such as smart highways or urban ITS corridors. This corridor-based approach will enable scalability. d) The scope of service must cover traffic management systems like smart signals and congestion alerts, road safety applications such as hazard warnings and emergency vehicle prioritization, and smart city integration including parking, tolling, and environmental monitoring. e) Technical condition should be compliance with 3GPP LTE-V2X and/or NR V2X standards (in future). f) The V2I applications are typically broadcast road safety beacons with the intention of improving road safety and traffic efficiency, and do not involve any unicast communication with end devices. With this, the authorization framework must be differentiated from traditionally communication-based authorizations. Therefore, from spectrum regulation perspective, there should not be any individual assignment per RSU and only a road operator level authorization with the requirement to maintain a database of all deployed RSUs.
Q2	In case your reply to Q1 is no, what should be the mechanism for enabling, facilitating and regulating vehicle-to-infrastructure (V2I) communication service in India? Kindly provide a detailed response with justification	NA
Q3	Any other suggestions relevant to the authorisation for vehicle to-infrastructure (V2I) communication	For V2I SIAM recommends that India should first build an evidence base through pilots and high-value deployments.

	service may be submitted with proper explanation and justification	
Q4	Whether a specific technology (such as LTE-based C-V2X, NR based C-V2X etc.) should be prescribed for the implementation of C-V2X in India? If yes, which technology should be adopted for the implementation of C-V2X? If no, in what manner, the issues related to inter-operability between different technologies should be addressed? Kindly provide a detailed response with justification	India should adopt a technology-neutral approach for C-V2X, focused towards interoperability through compliance with global 3GPP/ETSI standards, national testbeds, and middleware bridging LTE-V2X and NR-V2X. Safety messages should be prioritized across technologies, ensuring reliability while allowing smooth evolution. Given today's scenario where LTE-V2X is widely deployed. SIAM recommends LTE-V2X as well as NR-V2X should remain open . Further changes can be taken up factoring the following interoperability aspects in mind :- (i) Market penetration: a minimum OBU adoption/penetration (of say, 40% to 50% of new vehicles) or (ii) Full use case implementation: post full implementation of day 0, day 1, day 2 use cases (iii) Time tested: over a long time horizon (say ~10 years) of LTE-V2X adoption to ensure mass adoption by end users.
Q5	Whether there is a need to bring road-side units (RSUs) and onboard 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	No Automotive sector is a highly regulated industry where, CMVR-mandated AIS/IS standards are being complied for EMI/EMC/Safety, technical and security related requirements. Hence, it is not recommended to mandate MTCTE certification for OBUs (OEM fitted/ OEM authorized). Further, RSUs are not telecom equipment and primarily for broadcast road safety beacons.

Q6	To ensure inter-operability among different RSUs/ OBUs, whether there is a need to standardize the layered communication framework (stack) for higher layers (other than the access layer in which C-V2X will be used) of Intelligent Transportation System (ITS)? If yes, which standard for ITS stack and security should be adopted? Specifically, whether the ETSI standard for ITS stack and security, as recommended by the Task Force on Intelligent Transportation System for the use of 5.9 GHz (mentioned at para 3.5 of this consultation paper) should be adopted? If no, in what manner, inter-operability among different RSUs/ OBUs can be ensured? Kindly provide a detailed response with justification	Standardisation: To ensure nationwide interoperability of V2X communication, standard 3GPP C-V2X (PC5 sidelink) should be adopted as the access-layer technology, along with the standard ETSI TC ITS stack for upper layers. This approach is recommended in para 8.5 of the MoRTH ITS Task Force Final Report (Annexure-III of Consultation Paper dated 30.04.2026). ETSI ITS stack adoption will position India in line with global deployments, reducing risks of isolation. Interoperability Tests: For interoperability testing, CMVR authorised agencies like ARAI/ICAT/CIRT etc. may be authorised so that V2X equipment from different manufacturers works seamlessly together.
Q7	Whether there is a need for prescribing a security framework for ITS/ C-V2X in India? If yes, - a) What should be the security framework for ITS/ C- V2X? b) Which agency [such as Controller of Certifying Authorities (CCA), Ministry of Electronics & Information Technology (MeitY)] should implement the Public Key Infrastructure (PKI) framework for ITS/ C-V2X in India? c) How to ensure coexistence of V2X PKI certificates with the legacy PKI mechanism in India i.e. based on X.509, operated by Root Certifying Authority of India (RCAI)? Please provide a detailed response with justifications.	Yes, strongly recommends prescribing a dedicated security framework for ITS/C-V2X in India. 1. A security framework for ITS/C-V2X is vital following the PKI based security framework aligned with ETSI TS 102941.It will ensure encryption, authentication, and certificate trust for RSUs/OBUs. Mandate interoperability testing across vendors. Introduce certificate revocation mechanisms to maintain integrity. 2. CCA (Controller of Certifying Authorities), The Centre for Development of Advanced Computing (CDAC) may be entrusted with governing certificate nomenclature, structure, and deployment standards for ITS/C-V2X PKI. Given OEM existing SCMS certificate cloud infrastructure, the initial rollout could leverage this platform to ensure rapid deployment and operational readiness. As other OEMs join the ecosystem, OEM SCMS infrastructure can serve as a reference standard, subject to CDAC's review and endorsement, thereby ensuring consistency, interoperability, and

		regulatory compliance across the industry. 3. ITS PKI should coexist with India's X.509 PKI under RCAI. A dual-trust model will recognize ITS and legacy certificates. Cross-certification ensures interoperability without duplication, protecting legacy systems while enabling secure ITS deployments.
Q8	What should be the regulatory framework for the assignment of frequency spectrum to the entities holding the proposed V2I communication service authorisation? Specifically,- (a) Whether there is a need for partitioning the 30 MHz spectrum (5,875-5,905 MHz) for specific applications such as "safety applications" and "operational applications (non-safety applications)"? (b) In case more than one authorised entity has to operate in the same geographical area, what should be the mechanism for simultaneous use of the spectrum? Specifically, whether the spectrum should be divided amongst the authorised entities in an exclusive manner, or should the authorised entities utilize the spectrum in a shared manner? (c) If your response to part (b) is "in an exclusive manner", what should be the minimum quantity of spectrum to be assigned to each entity holding the proposed V2I communication service authorisation? If your response to part (b) is "in a shared manner", whether there is a need to prescribe a mechanism for interference management? (d) For interference management, whether there is a need to prescribe – (i) minimum directionality of road-side unit (RSU), or (ii) protection distance between the RSUs, or (iii) maximum antenna height for RSUs?	A balanced regulatory framework for spectrum assignment to V2I service authorization holders should prioritize safety, interoperability, and efficient utilization of the limited 30 MHz band (5,875–5,905 MHz). 1. Yes, Partitioning is recommended, with a dedicated 20 MHz reserved for safety applications & 10 MHz for operational applications (Eg: Congestion Reduction, Hazard Warning, Intersection Movement, Traffic Lights Awareness, Maps, SPAT, Dynamic Traffic Flow Optimization, Emergency Vehicle Alert, Lane Change/Merge Alert, Do not Pass Warning, Curve Speed Control, Realtime traffic alerts, Green Light Optimal Speed Advisory, Location Based Services, Parking, Toll and Challan Payments etc.) 2. In areas with multiple authorized entities, spectrum should be used in a shared manner rather than exclusive allocation, given the narrow band. Shared access, governed by common standards, avoids fragmentation and maximizes efficiency. 3. NA 4. For interference management, prescribing parameters like EIRP and out-of-band-emission limits will be sufficient. 5. Prior approval akin to SACFA clearance may not be necessary for RSUs, but their establishment should be regulated through a simplified registration and self-certification mechanism overseen by TRAI/DoT, ensuring compliance with EMI/EMC, safety, and security requirements without adding bureaucratic delays.

	If yes, what should be such parameter(s)? (e) Whether there is need to mandate a mechanism for obtaining prior approval (analogous to SACFA clearance) for the establishment of RSUs by the entities holding the proposed V2I communication service authorisation? If no, in what manner, the establishment of RSUs should be regulated? (f) For avoiding (i) interference between RSUs, (ii) interference between RSUs and OBUs, and (iii) interference between OBUs, whether the radiated power limits for OBUs and RSUs and OOBE limits, recommended by the Task Force on Intelligent Transportation System for the use of 5.9 GHz (mentioned at para 3.4 of this consultation paper) should be adopted? If no, what should be the radiated power limits for OBUs and RSUs and OOBE limits? (g) What should be the maximum period of assignment of spectrum to the entities holding the proposed V2I communication service authorisation? (h) Whether there is a need to prescribe roll-out obligations associated with the assignment of spectrum to the entities holding the proposed V2I communication service authorisation? (i) Whether there is a need to introduce a provision for the surrender of frequency spectrum? Kindly provide a detailed response with justification.	6. Radiated power limits for RSUs and OBUs, along with out-of-band emission (OOBE) limits recommended by the ITS Task Force, should be adopted to minimize interference between RSUs, OBUs, and other telecom systems 7. The maximum period of spectrum assignment should align with authorization validity—ten years—with renewal contingent on compliance with evolving standards and performance benchmarks. 8. Roll-out obligations should be encouraged and incentivized, requiring corridor-based deployments within defined timelines to ensure safety 9. Since the spectrum usage is in shared, non-exclusive manner, surrender of spectrum is implicit with the duration of authorization.
Q9	Whether there is a need for prescribing timelines for processing the applications for the assignment of spectrum to the entities holding the proposed V2I communication service authorisation? Kindly provide a detailed response with justification.	Yes, timelines should be prescribed for processing spectrum assignment applications to ensure predictability, transparency, and efficiency. A fixed period (e.g., 15-30 days) covering submission, technical scrutiny, compliance checks, and allocation will prevent delays, encourage investment, and align with global best practices. Conditional approvals may also be considered—for example, if an RSU implementation is expected while the approval process is still in progress, the authorization could be granted

		post-project-launch subject to compliance verification. This flexibility ensures that innovation and deployment are not stalled, while regulatory oversight remains intact. Overall, such measures accelerate V2I deployment while safeguarding accountability.
Q10	Whether there are any other suggestions related to assignment of spectrum to the entities holding the proposed V2I communication service authorisation? Please provide a detailed response with justification	NA
Q11	Any other issues/ suggestions relevant to the regulatory framework for V2X communication may be submitted with proper explanation and justification.	1. V2X deployment in India should be guided by a "problem-first approach" focusing on use cases where current technologies fall short—particularly in areas such as non-line-of-sight hazard detection, intersection safety, vulnerable road user protection, and real-time traffic coordination. V2X is also less mature for adoption by pedestrians and 2-Wheelers (major vulnerable road users). 2. Significant proportion of the use cases in Annexure-3 of the consultation paper are already being delivered or are in advanced stages of deployment through existing technologies such as Drive Assist, Navigation Platforms, Telematics Systems & FASTag infrastructure. 3. Accordingly, it is recommended to conduct market need assessment, Cost benefit analysis, field pilot trials & address the challenges in Technology adoption. Also, inclusion of C-V2X-based test cases in future BNCAP revisions may be reviewed suitably until the technology ecosystem matures and demonstrates clear incremental value proposition over existing solutions. This is also in spirit with the ITS task force recommendations. Please refer Annex for further details & explanation.

Q12	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.	No spectrum charges should be levied for V2I considering short-range of broadcast transmissions by RSU and safety of life application. From perspective of spectrum regulation, V2I must be treated license-exempt like European regulations that acknowledge the life-saving potential of ITS/V2X in ECC/DEC/ (08)01. However, if required a nominal amount sufficient to recover administrative costs from RSU vendors, consistent with the principles set out in the DoT Notification on M2M Service Authorisation (GSR dated 09.09.2025) may be considered.
Q13	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.	NA
Q14	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.	NA

Q15	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	NA
Q16	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.	NA
Q17	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	NA
Q18	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.	NA
Q19	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.	NA

Q20	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.	NA
Q21	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.	NA
Q22	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.	NA
Q23	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.	NA
Q24	What should be the applicable application processing fee for the proposed V2I communication service authorisation? Please provide detailed justification in support of your response.	NA
Q25	What should be the applicable rate of authorisation fee for proposed V2I communication service authorisation? Please provide detailed justification in support of your response.	NA
Q26	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.	NA

Annex (Refence to Question No # 11)

The Government of India's focus on V2X (Vehicle-to-Everything) technology represents an important step toward improving Connected Mobility, Traffic Efficiency & Ease of Driving.

To evaluate V2X (Vehicle-to-Everything) adoption in India, it must be analyzed through three lenses - Global Adoption Trends, India-specific Realities & Concrete Problem-Solution fit.

"As a nation we need to adopt a use-case-first approach (not technology-first)"

1. Global Adoption Trends

Experience from mature automotive markets such as the United States, Europe, China & Japan indicates that large-scale V2X deployment have faced significant Commercial, Regulatory & Ecosystem-related challenges.

Key Global Challenges :

S.No	Challenges	Global Experience
1	Technology	Prolonged debate on Technology choice : DSRC vs C-V2X & Interoperability issues
2	Regulation	Delays in spectrum allocation & lack of harmonized mandates (Stack, Security etc.)
3	Consumer Pull	Limited willingness to pay for V2X features compared with ADAS-based safety systems
4	Ecosystem	Extensive & complex collaboration between OEMs, Telcos, Infra authorities & Govts
5	Cost	Large scale investments for roadside units (RSUs), Telecom infra & Vehicle integration

Region	Summary	Details
Europe	Slow rollout for safety regulations ; Transitioning to E-NCAP added points for road condition detection using V2N	• Mixed DSRC & C-V2X transitions • Gradual transition being done to V2N2V based use-cases for EU-NCAP
US	Fragmented Approach for adoption	• Policy indecision slowed adoption • Industry shifting from DSRC - C-V2X
China	Government-led push for early adoption ; However need for V2X is decreasing due to self-driving boom	• Pilot zones (Beijing, Shanghai) • Integration with smart city infrastructure

"While V2X Technology has been around in major developed economies for the past 20 Years, the adoption trends have remained very low owing to limited demonstrations, issues around massive investment & limited spread of In-vehicle communication devices"

Considerations for India :

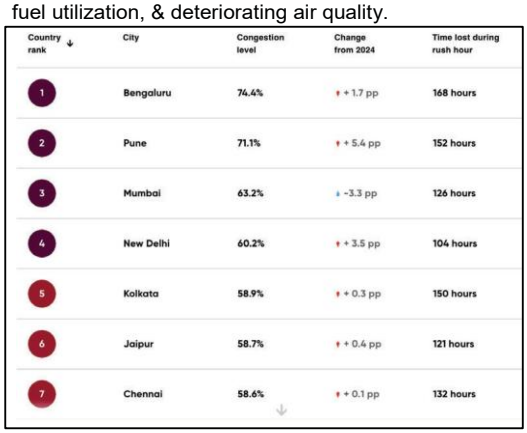
- Early Standardization & Technology roadmap
- Ensure Long-term regulatory clarity & Dedicated Spectrum Policy
- Focus initially on Congestion Improvement & Emergency Vehicle Prioritization use cases with visible benefits
- Establish a national multi-stakeholder implementation framework
- Prioritize phased deployment in high-impact corridors instead of nationwide rollout

2. Indian Market Scenario

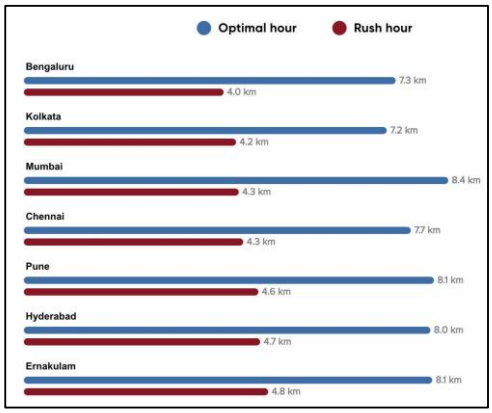
Traffic & Congestion

Traffic congestion continues to be a significant challenge for mobility in India, with the time spent on roads, fuel consumption, emissions, and pollution levels steadily increasing year on year.

This has resulted in considerable economic, environmental, and societal impacts, including productivity loss, inefficient fuel utilization, & deteriorating air quality.



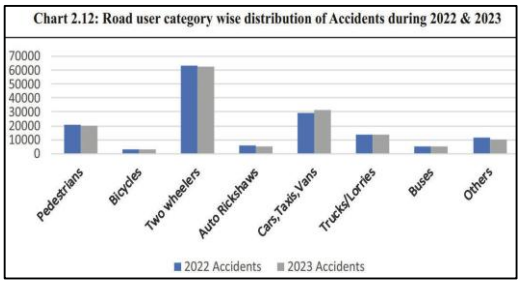
Country rank	City	Congestion level	Change from 2024	Time lost during rush hour
1	Bengaluru	74.4%	+ 1.7 pp	168 hours
2	Pune	71.1%	+ 5.4 pp	152 hours
3	Mumbai	63.2%	-3.3 pp	126 hours
4	New Delhi	60.2%	+ 3.5 pp	104 hours
5	Kolkata	58.9%	+ 0.3 pp	150 hours
6	Jaipur	58.7%	+ 0.4 pp	121 hours
7	Chennai	58.6%	+ 0.1 pp	132 hours

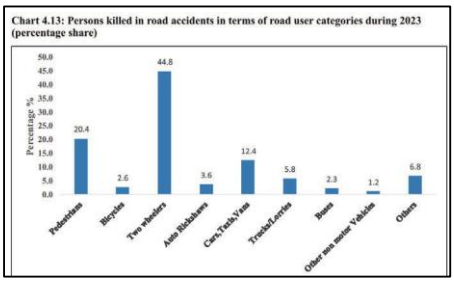


[Source: TOM TOM Traffic Index Data 2025]

Road Safety

Analysis of India's road accident data 2023 (1.73 lakh annual road fatalities) indicates that two-wheelers (44.8%) & pedestrians (20.4%) account for a very high share of accidents and fatalities.





[Source: MoRTH Report Road Accidents in India 2023, Page 85]

In this context, any future technology interventions, should be prioritized & evaluated based on their ability to specifically enhance the safety of such high-risk groups. A targeted, problem-first approach focusing on pedestrian safety, two-wheeler interaction, and non-line-of-sight hazard detection would deliver significantly higher impact compared to a broad-based deployment of use cases that are already being addressed through existing technologies.

Given India's unique mobility challenges, particularly:

- High congestion levels
- Significant contribution of VRUs to accident fatalities

The priority for any new Technology adoption should be aimed towards:

- **Focus on high-impact, differentiated use cases**
- **Adopt a phased deployment strategy**
- **Align policy and regulatory frameworks with ecosystem readiness**

3. Recommendations:

Analysis of the proposed use cases in Annexure 3 of the consultation paper indicates that a significant proportion of these use cases are already being delivered or are in advanced stages of deployment through existing technologies such as Drive Assist, Navigation Platforms, Telematics Systems & FASTag infrastructure.

- Use cases marked “O” can be excluded from CV2X scope as alternative Technology exists
- Use cases marked “I:)." can be prioritized for Day 0 Pilot (Mainly V2N)
- Use cases marked “X” can be prioritized for Day 1,2 Pilot based on result of Day 0 Pilot results (effectiveness)

S.No	Use-Cases	Can Solve using Existing Technology	Remarks
1	Emergency Electronic Brake light	O	Through Drive Assist (V2X not required)
2	Forward Collision Warning	O	Through Drive Assist (V2X not required)
3	Hit From Behind Warning	O	Through Drive Assist (V2X not required)
4	Intersection Movement Assist		Can be achieved via V2N2V
5	Queue Warning	O	Map, Navigation
6	Queue Warning (with Traffic Integration)		Can be achieved via I2N, V2N, V2I
7	Traffic Signal Priority for Emergency Vehicles		Can be achieved via I2N, V2N, V2I
8	Cooperative Collision Avoidance	X	Can be achieved via V2V
9	Do Not Pass Warning	X	Can be achieved via V2I
10	Dynamic Traffic Flow Optimization	X	Can be achieved via V2I
11	Hazardous Location, Notifications	O	Map, Navigation (V2X not required)
12	Parking, Toll & Challan Payments	O	Can be done via FASTAG (V2X not required)
13	Vulnerable Road User	X	Can be achieved via V2P
14	Cooperative Adaptive Cruise Control	X	Can be achieved via V2I, V2V
15	Autonomous Driving Support	O	Through Drive Assist (V2X not required)

- As a result, the incremental value of deploying V2X specifically for these use cases may be limited in the near term and does not justify immediate large-scale infrastructure investment.
- Instead, V2X deployment in India should be guided by a problem-first approach, focusing only on use cases where current technologies fall short—particularly in areas such as non-line-of-sight hazard detection, intersection safety, vulnerable road user protection, and real-time traffic coordination.
- In view of the above analysis, it is recommended that the inclusion of C-V2X-based test cases in future BNCAP revisions be deferred until the technology ecosystem matures and demonstrates clear incremental value over existing solutions.

“Adopt a phase wise Use Case backed, Technology deployment approach – based on market need assessment, field pilot trials & addressing the challenges in CV2X Technology adoption”