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

Dear Sir,

Qualcomm sincerely thanks the Telecom Regulatory Authority of India (TRAI) for the timely release of its consultation paper on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication dated 30th April 2026, and for inviting stakeholder input.

We have reviewed the responses from various stakeholders on this consultation paper. We appreciate those responses. We would like to provide our key observations and comments without pointing out any individual response so as to provide better understanding of overall concept of V2I, associated 3GPP standards and keeping global best practices in mind. Our counter comments are attached to this letter.

Once again, we would like to reiterate that as a nation, India must refuse to treat road fatalities as inevitable since every crash leaves a family shattered, and every loss is preventable with the right choices. In this regard, we highly appreciate the recent publication of the gazette notification by the DoT on delicensing of spectrum in 5.9 GHz band for V2V. However, as we proceed with adding V2I to this gazette for using same delicensed spectrum, some minor modifications will be required. The proposed amended gazette GSR. No. 466 (E) is attached in track changes.

Kindly contact me at jitendra@qti.qualcomm.com (mob: 9717171933) with any questions or if Qualcomm can be of further assistance.

Sincerely,

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Attachments:

- Attachment 1 - Counter Comments
- Attachment 2: Proposed amendments to V2V Gazette GSR. No. 466 (E)

Attachment - 1

COUNTER-COMMENTS TO TRAI CONSULTATION PAPER Regulatory Framework for Vehicle-to-Everything (V2X) Communication

1. Introduction

Qualcomm India Private Limited submits these counter-comments in response to stakeholder comments received on the TRAI Consultation Paper on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication. Qualcomm deeply appreciates DoT's Gazette Notification G.S.R. 466(E). dt. June 10, 2026, making OBU (V2V component of V2X) license-exempt in 5875–5905 MHz.

Our proposal reinforces and extends five inter-related positions:

- (i) The DoT OBU Gazette Notification of June 10, 2026, constitutes a decisive regulatory precedent mandating equivalent license-exempt treatment for RSUs in the same band;
- (ii) RSUs are 3GPP UE-class sidelink broadcast nodes — not eNBs or gNBs — and must not be regulated as cellular base stations;
- (iii) RSU to be permitted without assignment of radio frequency on non-interference, non-protection and non-exclusive basis, no spectrum charges, no auction, and no financial conditions are warranted for public-safety V2I infrastructure;
- (iv) A proportionate light-touch authorization framework — strictly for installation governance, not spectrum licensing — is sufficient and appropriate; and
- (v) A single, harmonized OOB limit — identical for OBU and RSU — consistent with the Inter-Ministerial Task Force on ITS Recommendation 7.3 (page 9) must be adopted for successful utilization of V2X system.

2. DoT Gazette Notification (G.S.R. 466(E), June 10, 2026): Binding Precedent & Recommended Amendment

The Department of Telecommunications (DoT) has notified the 'Use of On Board Unit for Cellular Vehicle-to-Everything Communication in the 5.9 GHz Band (Exemption from Licensing Requirements) Rules, 2026'. This notification exempts OBUs from all licensing requirements in the 5875–5905 MHz band on non-interference, non-protection, and non-exclusive terms, with technical parameters specified for V2V.

As confirmed in Qualcomm's primary submission and substantiated by 3GPP standards: RSUs operate in the same 5875–5905 MHz band, at identical EIRP limits (≤ 33 dBm), using the same 3GPP PC5 sidelink interface. The OBU notification therefore creates an unambiguous regulatory asymmetry if RSUs are treated differently. Any asymmetry will create policy imbalance and unequal treatment for identical radio.

Recommended amendment to Gazette (G.S.R. 466(E), June 10, 2026) — To include RSUs:

Add clause 4) 1 (c) and (d) as follows for RSUs

(c) the establishment, maintenance or working of Road Side Unit for the sole purpose of cellular vehicle-to-everything communication, which is operated as part of an intelligent transport system in the 5875-5905 MHz frequency band, shall be permitted without assignment of radio frequency, on non-interference, non-protection and non-exclusive basis; and

(d) no license shall be required for possession of such Road Side Unit by any person or its sale or hire by any dealer, however the deployment shall be only after authorization as prescribed by relevant competent authority "

Such an amendment would ensure regulatory symmetry between OBU and RSU.

TRAI is respectfully urged to treat the OBU Gazette Notification as a floor — not a ceiling — and extend equivalent license-exempt, zero-charge treatment to RSUs.

3. RSUs Are Not eNBs / gNBs: 3GPP Standards-Based Clarification

Some comments, by implication or analogy, appear to indicate similarity between RSU and IMT (cellular) base-station on account of their fixed infrastructure nature. This view is inconsistent with 3GPP specifications and must be corrected. It is a fundamental technical mischaracterization to classify an RSU as a cellular base station (eNB or gNB). Under 3GPP, an RSU is a sidelink broadcast/beacon node that adheres to UE radio requirements (TS 36.101) and UE conformance testing (TS 36.521-1) — not Base Station specifications (TS 36.104 / TS 36.141). Unlike an eNB/gNB, an RSU does not manage a cellular network, schedule subscriber traffic, or maintain RRC-connected states for mobility. It transmits autonomously in a shared spectrum environment (PC5 Mode 4), making base-station-style individual spectrum licensing technically inapplicable and globally unprecedented for ITS.

The following table summarizes the decisive 3GPP standards distinction between a RSU and a eNB/gNB:

3GPP Spec	RSU (Sidelink UE)	eNB / gNB (Base Station)
TS 36.101 / TS 38.101	UE Power Class — same as OBU; ≤33 dBm EIRP. No RSU-specific higher-power class exists in 3GPP.	Base Station Power Class (TS 36.104/38.104) — licensed, coordinated spectrum
TS 36.213	PC5 sidelink; autonomous resource selection (Mode 4); no UE scheduling by RSU	Downlink scheduling, PDCCH, PUSCH grant — requires individually coordinated spectrum
TS 36.331	Sidelink resource pool config; broadcast-only; no UE association; no RRC connection	RRC management, SIB broadcast, cell management — requires cell-licensed spectrum
TS 36.521-1	UE conformance testing (SEM, ACLR, power) — RSU tested as UE, not as BS	BS conformance: TS 36.141 / TS 38.141 — not applicable to RSU
Spectrum Mode	Shared, non-exclusive, non-protected — PC5 short-range safety beacon	Exclusively licensed, coordinated, protected — wide-area subscriber coverage

4. RSU being Public-Safety Infrastructure Cannot Bear Commercial Spectrum Costs

License-exempt operation, by its very nature, precludes individual spectrum assignment, provides equitable treatment — no entity is assigned a dedicated frequency, a geographic footprint, or an interference-protection right.

RSU should be permitted without assignment of radio frequency, on non-interference, non-protection and non-exclusive basis. There should be no spectrum charges, no auction, and no financial conditions required for public-safety V2I infrastructure because:

- **Spectrum Assignment Fragments Safety:** Non-exclusive sharing is technically mandated. V2X PC5 Mode 4 uses distributed congestion control and autonomous resource selection. Geographic exclusivity would impede multi-jurisdiction and emergency-services interoperability.
- **No Auction Basis:** The 5875–5905 MHz ITS band is designated in NFAP for road safety / ITS — not commercial mobile. The foundational justification for auctions (managing scarce, exclusively occupied spectrum) is entirely absent for a shared, non-exclusive safety band.
- **No SUC / AGR / Entry Fee:** Primary deployers are Central/State government agencies and NHA, operating as public-safety infrastructure providers, not commercial telecoms. AGR-linked levies, bank guarantees, net-worth thresholds, and entry fees are misaligned with this public-good model. DoT's own OBU Gazette confirms zero-cost treatment for the same band — applying charges only on RSUs would be internally inconsistent.
- **Global Unanimity:** CEPT/ECC Decision (08)01, ACMA ITS Class Licence 2017, FCC 47 CFR Part 95 Subpart L (OBU: §95.3205) and Part 90 Subpart M (RSU: §90.392), and Ofcom SRD framework — no jurisdiction auctions or charges ITS safety spectrum. Critically, FCC §90.392 and §95.3205 apply identical technical parameters to RSUs and OBUs respectively, confirming that regulatory parity between the two node types is both technically justified and internationally established. India must not be an outlier.

5. TRAI Q8(f): Harmonized OOB Limits — Adopting Task Force on ITS Recommendation 7.3

TRAI Question 8(f) asks *“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 OOB 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 OOB limits?”*

The answer is an unequivocal yes — and the adoption must be complete and unmodified from the Task Force on ITS recommendations.

5.1 Task Force Recommendation 7.3

As per Annexure 1 of TRAI consultation paper on the Regulatory Framework for Vehicle-to-Everything (V2X) Communication, the Inter-Ministerial Task Force on Intelligent Transportation Systems (chaired by TEC, DoT), provides at page 9, Recommendation 7.3, a detailed and technically grounded OOB table derived from 3GPP TS 36.101 (Band 47 / PC5 sidelink) and globally harmonized ITS emission frameworks.

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It is important to note that this recommendation was based on consensus achieved within the inter-ministerial body including representation from DoT, MoRTH, NHAI, TEC, TSDSI, ARAI, ICAT, SIAM, COAI, 5GAA, C-DAC, IDEMIA, etc. The following table from this recommendation provides a wholistic, multi-stakeholder perspective including all technical and implementation aspects. -

Task Force Recommendation 7.3 — OOB Table (applicable to both OBU and RSU):

Offset from end of occupied bandwidth	Reference value (average power)	Resolution bandwidth
± 0–1 MHz	–16 dBm	100 kHz
± 1–5 MHz	–13 dBm	1 MHz
± 5–30 MHz	–16 dBm	1 MHz
± 30 MHz and beyond	–28 dBm	1 MHz

5.2 FCC Precedent: Identical OOB/Spurious Parameters for OBU and RSU

The US FCC framework provides direct international precedent for regulatory parity between OBU and RSU on emission limits:

- FCC 47 CFR §95.3205 (OBU / Personal Radio Services, Subpart L) ¹
- FCC 47 CFR §90.392 (RSU / Private Land Mobile Radio Services, Subpart M) ²

Both FCC rules specify identical conducted power limits (≤ 33 dBm EIRP equivalent) and equivalent emission mask parameters — confirming that OBU and RSU are treated as technically symmetrical radiators under US law, irrespective of their physical installation context. These values in FCC rules are identical and consistent with the Task Force on ITS Recommendation 7.3 and 3GPP.

5.3 Update the Gazette Notification GSR 466(E) for Unwanted Emission Limits

To ensure adoption of RSUs, there will be a requirement to modify the Gazette Notification (G.S.R. 466(E)) to include a combined Unwanted Emission Limits encompassing both Out of Band and Spurious emission limits that would remain technically consistent with the Task Force on ITS Recommendation 7.3 OOB table and also with 3GPP TS 36.101 applicable at offsets $\geq \Delta f_{OOB}$ beyond the OOB region and within the immediate adjacent frequency ranges.

Proposed new sub-rule 4(2A):

"4(2A) In addition to the technical parameters specified in sub-rule (2), both On Board Units and Road Side Units shall comply with the following unwanted emission limits, measured as average power, for frequencies immediately outside the occupied channel bandwidth:

- ± 0–1 MHz offset: –16 dBm/100 kHz
- ± 1–5 MHz offset: –13 dBm/MHz
- ± 5–30 MHz offset: –16 dBm/MHz
- ± 30 MHz and beyond: –28 dBm/MHz."

¹ <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-95/subpart-L/subject-group-ECFR57eb1ae9b2d8a2a/section-95.3205>

² <https://www.ecfr.gov/current/title-47/chapter-I/subchapter-D/part-90/subpart-M/subject-group-ECFRfed6d6e3a427a6f/section-90.392>



6. Light-Touch Authorization for RSU Installation: M2M Guidelines Amendment

Qualcomm supports a lean, governance-focused authorization mechanism for RSU deployment — not a spectrum or telecom license, but a traceability and accountability framework:

- Amend DoT M2M Service Provider Registration Guidelines (No. 4-10/2015-NT, dated 08.02.2022) to create a "Road Safety Beacon (RSB) Provider" category tailored for V2I RSU deployments on license-exempt ITS spectrum.
- RSB registration to capture: RSU geo-coordinates, operator identity, ETA compliance attestation, and V2X security credential policy identifier.
- Registration shall expressly not confer any exclusive spectrum entitlement, geographic exclusivity, or interference protection. Operation remains fully shared, non-exclusive, and non-protected — consistent with the OBU Gazette Notification framework.
- Civil / structural approvals for mounting RSUs on road infrastructure to be obtained from the relevant road authority only (analogous to traffic signal installation), without any SACFA or WPC clearance requirement.
- No entry fee, no bank guarantee, no net-worth threshold, no AGR/SUC. Any nominal cost-recovery for online registration processing should be minimal and automated.

7. Summary

Issue	Stakeholder Comments / TRAI Question	Qualcomm Additional Comments
Spectrum assignment for RSUs	Some responses imply assignment-based authorization	No exclusive assignment necessary. License-exempt. Gazette (GSR 466 (E)) for V2V/OBU is the precedent. Amend this Gazette to include a similar treatment to RSUs with M2M authorization/registration caveat.
RSU as base station (BS) (eNB/gNB)	Fixed-infrastructure analogy used to justify BS-grade licensing	RSU = UE-class sidelink node per TS 36.101/36.521-1. BS specs (TS 36.104/36.141) do not apply.
Spectrum charges / SUC / AGR	Commercial spectrum-charge frameworks referenced	No SUC, no AGR, no entry fee, no bank guarantee. RSU (V2I) is Public-safety infrastructure.
Auction	Implicit in TRAI's framing of spectrum assignment questions	No auction. ITS band = shared safety spectrum, not a commercial mobile spectrum, No exclusivity necessary. License-exempt. OBU Gazette for V2V is the precedent.
Authorization Framework	Licensing Framework with exclusivity implied	Light-touch M2M 'Road Safety Beacon Provider' registration — governance only, no exclusivity, no fees / nominal fees to recover administrative costs.
Unwanted limits — Q8(f)	Question on unwanted limits for both OBU and RSU	Adopt Task Force Rec 7.3 table in full for both OBU and RSU. A similar adoption is also done by FCC. FCC §90.392 (RSU) and §95.3205 (OBU) prescribe identical parameters.

Attachment -2

Proposed Edits to the Gazette G.S.R. 466(E) to include both OBU and RSU

Use of On Board Unit for Cellular Vehicle-to-Everything Communication in the 5.9 GHz Band (Exemption from Licensing Requirements) Rules, 2026 — G.S.R. 466(E)

A.1 Short Title Amendment — Include RSU

Current text (Rule 1(1)):

"...the Use of On Board Unit for Cellular Vehicle-to-Everything Communication in the 5.9 GHz Band (Exemption from Licensing Requirements) Rules, 2026."

Proposed amended text:

"...the Use of On Board Unit and Road Side Unit for Cellular Vehicle-to-Everything Communication in the 5.9 GHz Band (Exemption from Licensing Requirements) Rules, 2026."

A.2 New Definition — Road Side Unit (Rule 3)

Proposed new sub-clause (3)(1)(h):

"(h) 'Road Side Unit' means a radio equipment (including its antenna), which is operated as part of an intelligent transport system established for the purpose of road transport, and is installed at a fixed roadside location — including road junctions, work zones, highway segments, or any other location on or alongside a road"

A.3 Exemption Clause — Add RSU (Rule 4(1))

Current text (Rule 4(1)(a) and 4(1)(b)):

"(a) the establishment, maintenance or working of On Board Unit installed on a vehicle... shall be permitted without assignment of radio frequency, on non-interference, non-protection and non-exclusive basis; and"

(b) no license shall be required for possession of such On Board Unit by any person or its sale or hire by any dealer; and

Proposed amended text — add new sub-clause 4(1)(c) and 4(1)(d):

(c) the establishment, maintenance or working of Road Side Unit for the sole purpose of cellular vehicle-to-everything communication, which is operated as part of an intelligent transport system in the 5875-5905 MHz frequency band, shall be permitted without assignment of radio frequency, on non-interference, non-protection and non-exclusive basis; and

(d) no license shall be required for possession of such Road Side Unit by any person or its sale or hire by any dealer, however the deployment shall be only after authorization as prescribed by relevant competent authority "

A.4 Technical Parameters Table — Two Amendments (Rule 4(2))

A.4.1 Modify Table

Current Table (OBU only):

Frequency band	Max PSD EIRP for in-band emissions	Max EIRP for in-band emissions	Out of band emissions (max PSD)
5875–5905 MHz	23 dBm/MHz	33 dBm	–30 dBm/MHz

Proposed amended Table (Add RSU and move out of band emission limit to a new sub-rule):

Equipment	Frequency band	Max PSD EIRP for in-band emissions	Max EIRP for in-band emissions
OBU	5875–5905 MHz	23 dBm/MHz	33 dBm
RSU	5875–5905 MHz	23 dBm/MHz	33 dBm

A.4.2 Add New Sub-Rule 4(2A): OOB Limits Consistent with Task Force Rec 7.3

Proposed new sub-rule 4(2A):

"4(2A) In addition to the technical parameters specified in sub-rule (2), both On Board Units and Road Side Units shall comply with the following unwanted emission limits, measured as average power, for frequencies immediately outside the occupied channel bandwidth:

- ± 0–1 MHz offset: –16 dBm/100 kHz
- ± 1–5 MHz offset: –13 dBm/MHz
- ± 5–30 MHz offset: –16 dBm/MHz
- ± 30 MHz and beyond: –28 dBm/MHz."

A.4.3 Rationale

- The Task Force Recommendation 7.3 OOB table was developed by an inter-ministerial body with full representation from DoT, MoRTH, NHAI, TEC, COAI, auto-industry, and standards bodies (ARAI, ICAT, 5GAA, etc.). Its technical basis is 3GPP TS 36.101 Band 47 / PC5 sidelink emission requirements. There is no technical justification for deviating from it.
- The proposed unwanted emission clause (Rule 4(2A)) introduces the technically correct OOB mask along with spurious limits from Task Force Rec 7.3, applicable to both OBU and RSU, ensuring regulatory symmetry.
- FCC §90.392 and §95.3205 both confirm that identical emission parameters apply to RSU and OBU respectively — providing international precedent for this harmonized approach.