

Vehicle-to-Vehicle (V2V) Communication - A New Frontier in Road Safety in India

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Vehicle-to-Vehicle (V2V) Communication Latest News

- India records the highest number of road accident **fatalities** globally, far exceeding China and the United States.
- In this backdrop, the Government of India, through the Ministry of Road Transport and Highways (MoRTH), is planning to introduce Vehicle-to-Vehicle (V2V) communication technology as part of its broader road safety and Intelligent Transport Systems (ITS) initiative.
- The move aligns with India's commitment to reduce road deaths and improve traffic management through technology-driven solutions.

Road Accident in India

- **Calendar year 2023:** A total number of 4,80,583 road accidents have been reported by Police Departments of States and UTs in the country, claiming 1,72,890 lives and causing injuries to 4,62,825 persons.
- **2024 data given by MoRTH in Parliament:** The number of road accident fatalities in India rose 2.3% to over 1.77 lakh in 2024, resulting in the death of 485 persons every day.

- **Comparison with other countries:** As per the World Road Statistics 2024, the fatality rate per lakh population is 4.3 in China, and 12.76 in the United States of America, as compared to India, where it is 11.89.
- **International obligation:** The **Stockholm** Declaration on Road Safety, adopted at the 3rd Global Ministerial Conference on Road Safety (in 2020), sets a new global target to reduce road traffic deaths and injuries by 50% by 2030.

What is Vehicle-to-Vehicle (V2V) Technology

- V2V is a **wireless** communication system that allows vehicles to **exchange real-time data** such as speed, location, acceleration, braking patterns.
- It is a sub-set of Vehicle-to-Everything (V2X) technology and falls under the Intelligent Transport System (**ITS**) framework.
- The system is inspired by **aviation safety technology**, where aircraft continuously broadcast their position and speed to nearby aircraft and ground stations.

Institutional and Policy Developments in India

- 30 GHz radio frequency spectrum has been allocated by the Department of Telecommunications (**DoT**) under the National Frequency Allocation Plan.
- A Joint Task Force has been constituted between MoRTH and DoT.
- **Standards** are being developed in collaboration with Original Equipment Manufacturers (OEMs).
- V2V is identified as a key initiative under MoRTH's road safety programme.

Working of V2V

- **On-board unit (OBU):** Vehicles will be fitted with an OBU costing approximately ₹5,000–₹7,000. OBUs enable wireless data exchange between nearby vehicles within a 300-metre range.
- **Functional benefits:**
 - Alerts drivers about sudden braking by vehicles ahead; black spots and accident-prone zones; fog, obstacles, or parked vehicles; potential collision risks.
 - **Example:** If a vehicle brakes suddenly, surrounding vehicles receive an early warning, helping prevent pile-ups and crashes.

Phased Rollout Strategy

- **First phase:** Mandatory installation in new vehicles.
- **Second phase:** Retrofitting in older vehicles.
- **Spectrum cost:** It will be provided free of cost, reducing compliance burden on OEMs.
- **Targeted implementation:** Within the current year, post notification of standards.

Global Experiences with V2V Systems

- **United States:** Global leader in V2V research and regulation.

- **Europe:** Germany, France, UK integrating V2V in smart city and mobility projects.
- **Japan:** ITS Connect programme providing real-time traffic and emergency alerts.
- **China:** Major adopter with strong integration into smart mobility.
- **Pilot stages:** Like India, countries like the UAE, Saudi Arabia, Brazil, Mexico, etc., are in early pilot stages to roll out V2V communication systems.
- **Examples of V2V-enabled vehicles:** Volkswagen Golf 8, Cadillac models (USA).

Challenges and Concerns

- **Technological limitations:** Frequency bands may not support all vehicle categories uniformly. Risk of miscommunication or signal failure, potentially causing accidents.
- **Data privacy and surveillance:** Large-scale collection of data related to vehicle movement, driver behaviour, location tracking. Raises concerns under data protection and privacy frameworks.
- **Cybersecurity risks:** Vulnerability to cyberattacks. Possibility of system hijacking leading to large-scale security threats.
- **Regulatory gaps:** Need for robust legal and regulatory framework; clear standards on data ownership, liability, and accountability.

Way Forward

- **Comprehensive standards:** Formulation of comprehensive V2V standards aligned with global best practices.
- **Integration:** With India's Digital Public Infrastructure (DPI) and upcoming Data Protection laws.
- **Periodic audits:** To strengthen cybersecurity architecture.
- **Phased and inclusive adoption:** To cover commercial and private vehicles.
- **Capacity building:** Of enforcement agencies and public awareness campaigns.

Conclusion

- The introduction of Vehicle-to-Vehicle (V2V) communication technology marks a significant step towards **technology-enabled road safety governance** in India.
- While the initiative has the potential to substantially reduce road accidents and fatalities, its success will depend on effective implementation.
- If executed prudently, V2V can become a cornerstone of India's transition to smart, safe, and sustainable mobility, aligning with broader goals of **Vision Zero** and intelligent transport ecosystems.

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