

The Future of Cooperative Transportation

Jianming Ma, Ph.D., P.E., PMP®

Director of Traffic Management Section



1	Safety Benefits of Cooperative Transportation	3-4
2	Cooperative Transportation Technology Deployments in the U.S.	5-6
3	Changes to the Safety Spectrum	7-8
4	Moving Forward with Cooperative Transportation	9-12
5	Vehicle-to-Everything Communications Summit	13
6	Cooperative Transportation Data Framework	14
7	#EndTheStreakTX and Contact	15-16



- Potential to eliminate or mitigate the severity of up to 80% of all unimpaired light vehicle crashes (NHTSA).
- Cars and infrastructure can work together to increase efficiency
- The best Autonomous Vehicle is COOPERATIVE.
 - Redundancy input for autonomous systems
 - Works in some areas that autonomy does not



Cooperative Transportation Technologies Will Yield SAFETY



National Crisis: Traffic Fatality Trend is in the WRONG Direction

- Promise of Cooperative Transportation (or V2X) technology is SAFETY
- Cooperative Transportation is needed to move us toward our goal

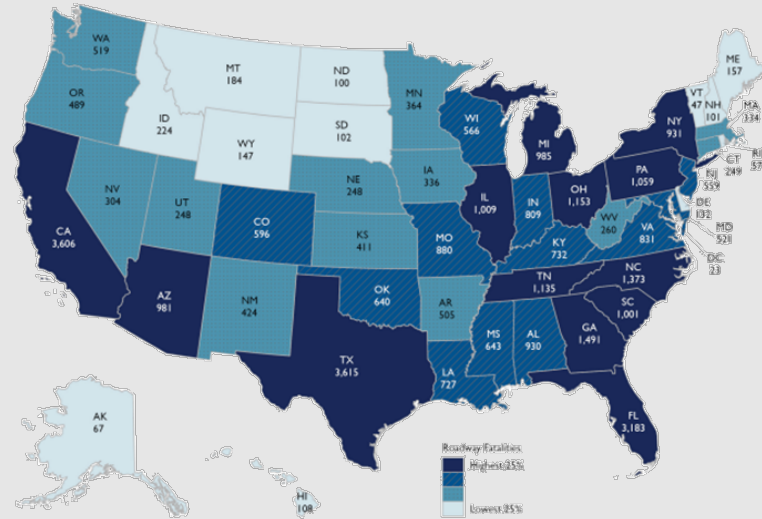


U.S. Department
of Transportation

National Roadway Safety Strategy

United States Department of Transportation | January 2022

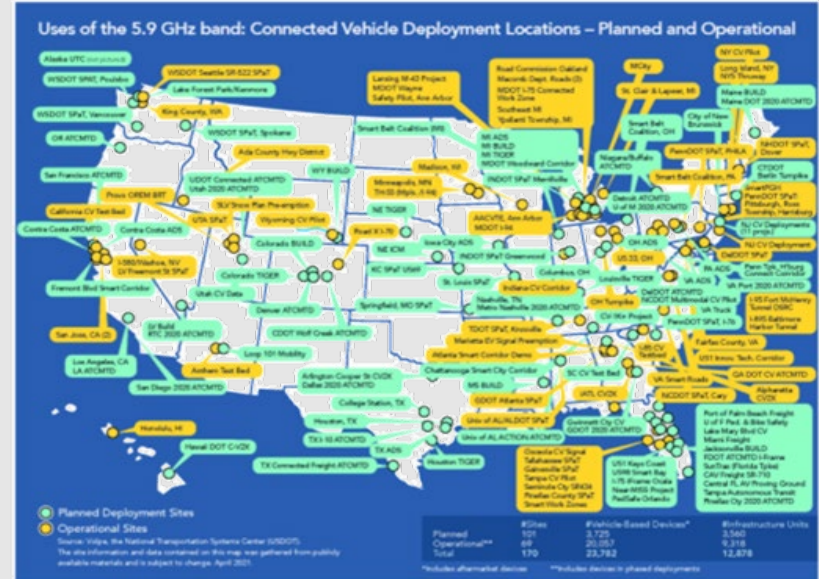
Roadway Fatalities by State, 2019



Cooperative Transportation Technology Deployments in the U.S.

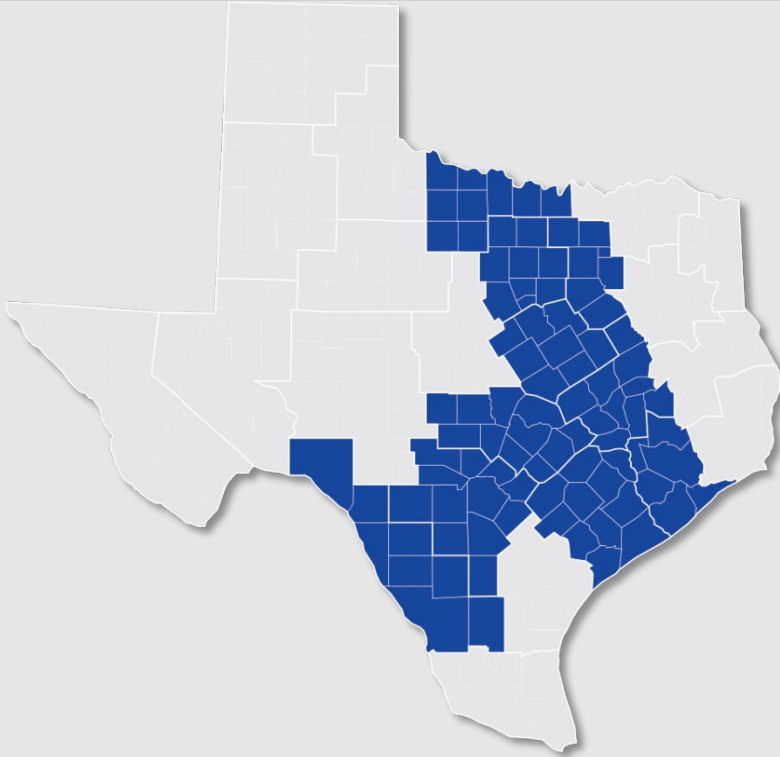


SPaT Challenge Sites



Deployment Sites (USDOT data)

Texas Connected Freight Corridors



Source: [Texas Connected Freight Corridors](#)



TIERS

01

Work Zone Warning



Queue Warning



Wrong-Way Drivers



Advanced Traveler Information System (ATIS)



02

Freight Signal Priority



Road Weather Warning



Truck Parking Availability



Bridge Height Warning



03

Emergency Electronic Brake Light



Pedestrian & Animal Warning



Eco-Dynamic Routing



Border Wait Times



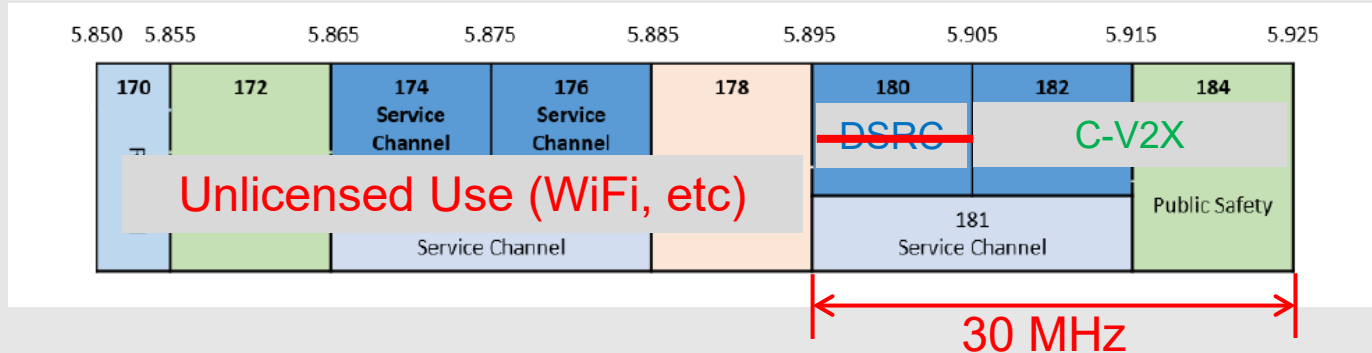
= Highlighted applications are prioritized for development

Changes to the Safety Spectrum



On May 3, 2021, FCC modified the spectrum:

- Give the lower 45MHz to unlicensed use (Wi-Fi)
- Formally allow C-V2X (LTE-V2X) into the spectrum
 - Previously allowed in the spectrum only through “experimental license”
- Move DSRC (temporarily) to upper 30MHz (by July 2022)
- Phase out DSRC entirely (by about mid 2024)





Many agencies have “paused” their V2X work

- Conversion of DSRC to Channel 180 takes resources, time, and is temporary
- Replacement of DSRC is costly – why take the risk?
- Want FCC certainty and/or OEM commitment

Some agencies have continued to operate and deploy

- Moved DSRC to Channel 180 / Planned replacement
- Deploying C-V2X
 - Advancing the learning curve
 - Verifying the capabilities of C-V2X



Regulatory Certainty

- It has been decided: we have 30 MHz & C-V2X
 - Legal action to retain 75 MHz was not successful
 - Note: C-V2X / LTE-V2X is NOT 5G
- Need Final Operating Rules - FCC 2nd Report & Order
 - Broadcast power limits everyone can live with
 - Permit process
- Need Waivers from the FCC to Operate in Near Term
 - Currently pending . . . And pending . . .

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 2, 15, 90 and 95

[ET Docket No. 19–138; FCC 20–164; FR ID 17510]

Use of the 5.850–5.925 GHz Band

AGENCY: Federal Communications Commission.

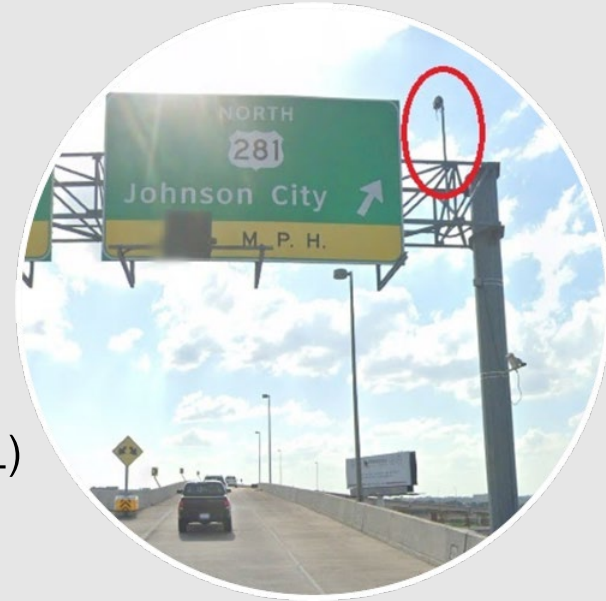
ACTION: Final rule.

SUMMARY: In this document, the Federal Communications Commission (Commission) adopts revised rules to repurpose the lower 45 megahertz of the 5.850–5.925 GHz band (5.9 GHz band) for the expansion of unlicensed mid-band spectrum operations, while retaining the upper 30 megahertz of spectrum in the 5.9 GHz band for intelligent transportation system (ITS) operations. Splitting the 5.9 GHz band between unlicensed and ITS uses is intended to optimize use of the spectrum resources in the 5.9 GHz band to fully and effectively serve the American people, providing access to additional spectrum for unlicensed use to help meet the growing demand for wireless broadband, while retaining spectrum for ITS use to meet current and future ITS needs within the transportation and vehicular-safety related ecosystem. The Commission modified the *First Report and Order* and



Trust in the System

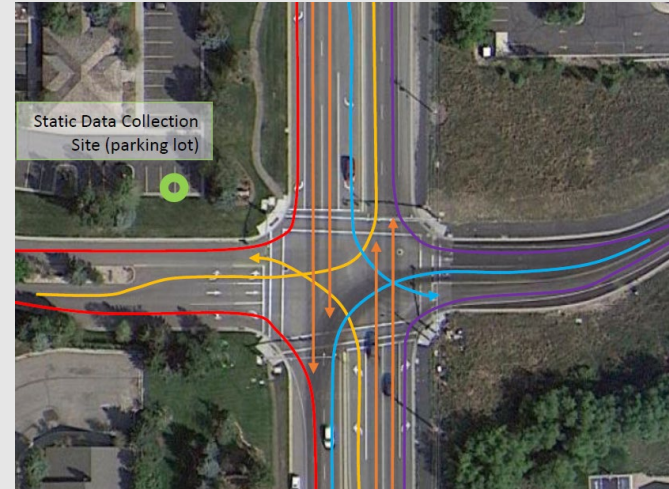
- Vehicles need our messages (MAP, SPaT, RTCM) to be:
 - accurate, consistent, reliable and secured
- How do we verify that this is the case?
- Start with existing, uniform guidance:
 - Connected Intersection Guidance – uniform deployment guidelines (USDOT / ITE CTI 4501 v01.01)
 - Roadside Unit Standard (USDOT / AASHTO / NEMA / SAE / ITE CTI 4001 v01.01)
 - MAP Guidance - uniform MAP creation guidelines (CV PFS)





Trust in the System

- Continue to develop and refine:
 - Verification process and test tools – (CV PFS / CAMP)
 - More work and more involvement needed
 - Tools to verify consistent broadcasts over time - (CV PFS / CAMP)
 - System for certificate distribution from a common trust chain (SCMS Manager)





OEM Commitment

- For V2X to be successful in saving lives, we need widespread IOO and OEM adoption
- We can't achieve Safety without V2X in production vehicles



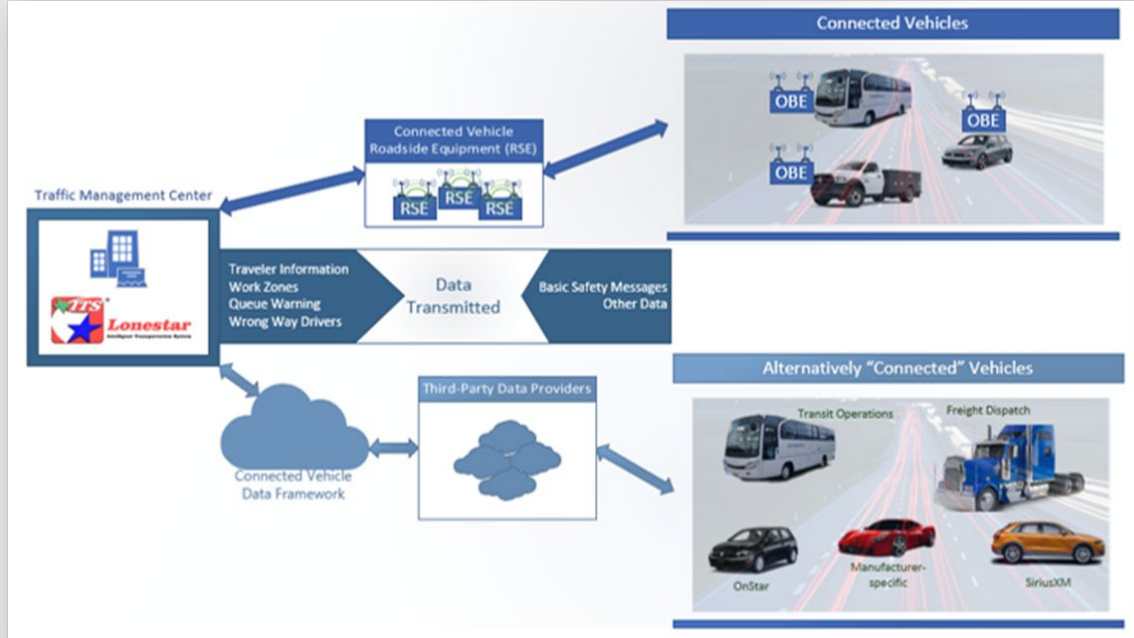


- We need to use what we have: 30 MHz and C-V2X
 - USDOT Testing of C-V2X indicates that the technology will meet our needs
 - More C-V2X testing is needed to work out some congestion and interference issues
- The FCC needs to establish regulatory certainty: waivers, operating rules, permanence
- The OEMs need to commit to deployment (which requires the above certainty)
- The USDOT needs to provide leadership and a national plan
 - USDOT committed to develop a national plan/ vision for an inter-operable system

Cooperative Transportation Data Framework



- Leverage third-party solutions to distribute and collect road vehicle data
- Supplement to traditional CV infrastructure
 - Support data distribution beyond equipped roadway





HELP #EndTheStreakTX

End the streak of daily deaths on Texas roadways.

[TxDOT.gov](https://www.txdot.gov) (Keyword: #EndTheStreakTX)



#EndTheStreakTX Toolkit





Jianming Ma, Ph.D., P.E., PMP®
Director, Traffic Management Section
Traffic Safety Division
Texas Department of Transportation

