

Connected Vehicles and the FCC: How Agencies Are Responding

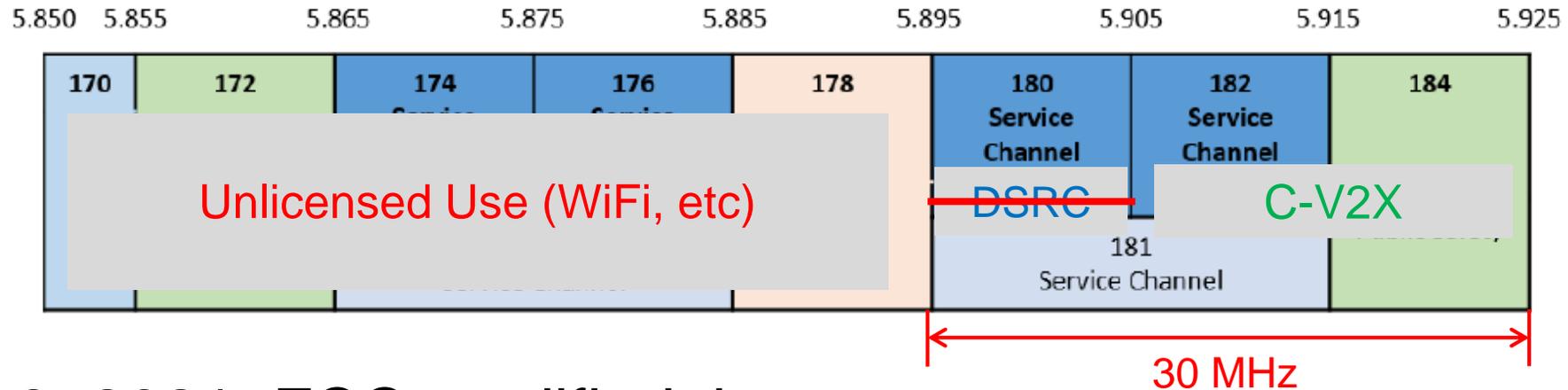
Blaine D. Leonard, P.E., D.GE., F.ASCE
Transportation Technology Engineer
Utah Department of Transportation

November 10, 2021



TRANSPORTATION TECHNOLOGY

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 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)



Status of the FCC Actions

First Report and Order (effective July 2021)

- Reduced spectrum, moved DSRC to upper 30, formalized C-V2X

Further Notice of Proposed Rulemaking (FNPRM) (May 2021)

- Comments and Responses received by FCC through July 2021
- Will result in Second Report and Order (summer 2022?)
- Will set sunset date for DSRC (likely mid-2024)
- Will clarify power levels (emissions), operating rules, licensing, etc.

Public Notices Issued (Aug 2021)

- Modified licensing / permitting process for C-V2X
- DSRC licenses are being granted again (for upper channels)



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



PUBLIC NOTICE

Federal Communications Commission
45 L Street NE
Washington, DC 20554

News Media Information 202-418-0500
Internet: www.fcc.gov
TTY: 888-835-5322

DA 21-962
Released: August 6, 2021

WIRELESS TELECOMMUNICATIONS BUREAU AND PUBLIC SAFETY AND
HOMELAND SECURITY BUREAU PROVIDE GUIDANCE FOR WAIVER PROCESS
TO PERMIT INTELLIGENT TRANSPORTATION SYSTEM LICENSEES TO USE C-
V2X TECHNOLOGY IN THE 5.895-5.925 GHZ BAND

ET Docket No. 19-138

By this *Public Notice*, the Wireless Telecommunications Bureau and the Public Safety and Homeland Security Bureau (Bureaus) provide guidance to intelligent transportation system (ITS) licensees seeking waivers of the Commission's rules to operate roadside units with cellular vehicle to

Challenges to the FCC Actions

Broad Transportation Community has consistently opposed actions

- 37 Comments filed on the FNPRM
- Over 30 opposed the spectrum reduction
- Concern over interference issues, reimbursement for incumbents, time frames

Three Petitions for Reconsideration of the First R&O were filed

- Alliance for Automotive Innovation, 5G Automotive Assoc, Amateur Radio Emer Network
- FCC will need to respond – no required timetable

Legal Appeal Seeking Judicial Review (June 2021 – DC Circuit Court)

- Filed by ITS America and AASHTO
- Seeks to reverse the decision to reallocate lower 45MHz



What Really is C-V2X (Cellular Vehicle to Everything)?

- The name says “cellular”, but this isn’t “cellular telematics”
 - C-V2X, like DSRC, is direct, device to device communication
 - C-V2X is based on 4G cellular standards (3GPP Release 14) – “LTE V2X”
 - C-V2X does not communicate through cell towers
 - Cellular telematics communicate through cell towers and charge a fee
 - Transmits on the 5.9GHz “safety spectrum” – uses only one channel
 - Is not compatible with DSRC
- C-V2X is not 5G
 - 5G is the next generation of paid-for cell communication
 - 3G... 4G... 5G... 6G...
- There will be a 5G C-V2X technology (5G NR) in a few years
 - Will be in a different spectrum; supplement, not replace today’s C-V2X

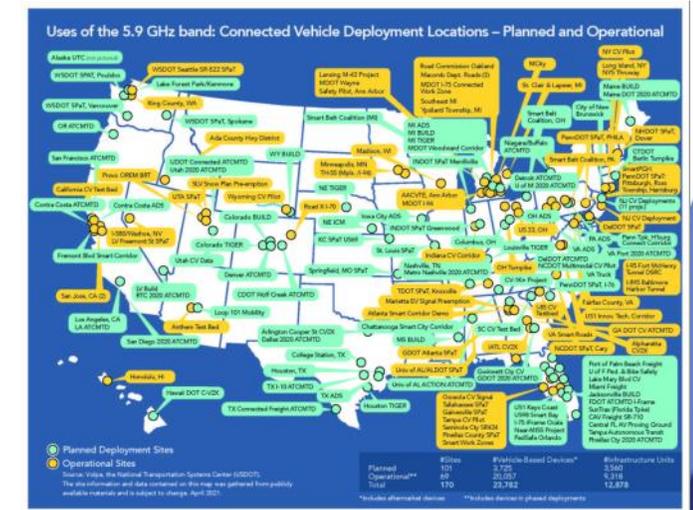


So – What Are We To Do??



Questions for Agencies with DSRC:

- Is my deployment short-term (experimental) or long-term (operational)?
- What is the useful life of my hardware?
- What are my near-term plans for additional deployment, expansion, and new applications?
- Is my agency an early adopter of technology?



Options for Transition

Option 1: Stay with DSRC for as long as possible

- Transition period lasts until about mid-2024 (uncertain yet)
- Allow other options to mature / develop – buy some time
- Hang on to a system that you have working
- Consider the timeline of an eventual transition
 - Procurement of new hardware – create spec, advertise, select (10 months)
 - Testing / Verification – hardware / software compatibility (6 months)
 - Order / Delivery of new hardware (4 + months) (consider current chip shortage)
 - Installation / Configuration / Integration / Verification (4 months)
- Funding Considerations
 - Source of funding
 - Budget cycle and timing



Options for Transition

Option 2: Transition from DSRC to C-V2X

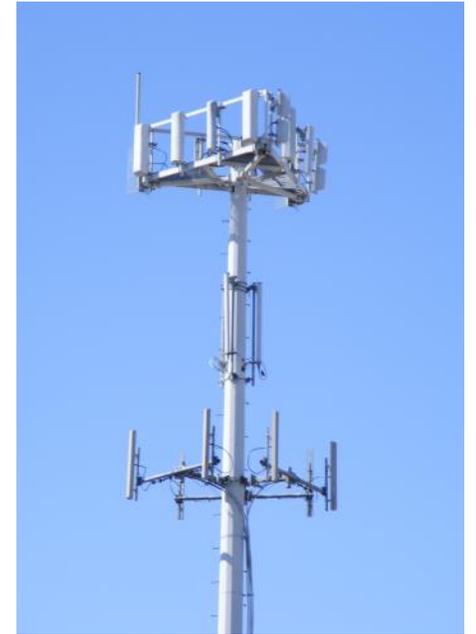
- Best direct substitute for DSRC is C-V2X
 - Low latency, direct communication
 - Operates in one 20MHz channel in the upper 30 MHz
 - Might not be able to fit all proposed applications into one channel – need to prioritize
- C-V2X standards & licensing processes are still evolving
 - Message sets (BSM, SPaT, MAP, TIM) will be the same
 - The physics of transmission are different – your applications will need to be modified
 - Applications that rely on multiple channels will need to be modified
- There are deployments in the U.S., but not large ones
- Again - Consider the timeline of a transition
 - Could be done gradually / incrementally over three years



Options for Transition

Option 3: Transition from DSRC to Cellular Network

- Can use 4G or 5G network
 - Will not provide low latency
 - Not appropriate today for safety applications
- Cellular service charges will apply
- In some locations or times, heavy traffic could hamper transmission
- Depends upon cellular coverage areas – out of our control



A Utah Example

Existing Deployments

- **DSRC**: 131 RSUs, 86 vehicles (from 2015)
 - Operational: TSP / Plow Preemption
- **C-V2X / DSRC Dual-mode**: 69 RSU, 35 vehicles
 - **In progress**: 130 RSU, 150 vehicles
 - Vehicle data, curve speed / weather applications

Constraints

- Need to keep the corridors active
- DSRC and C-V2X do not talk to each other
- Planning to add new corridors
- Adequate funding is not in place



A Utah Example

Start with DSRC Channel Modification

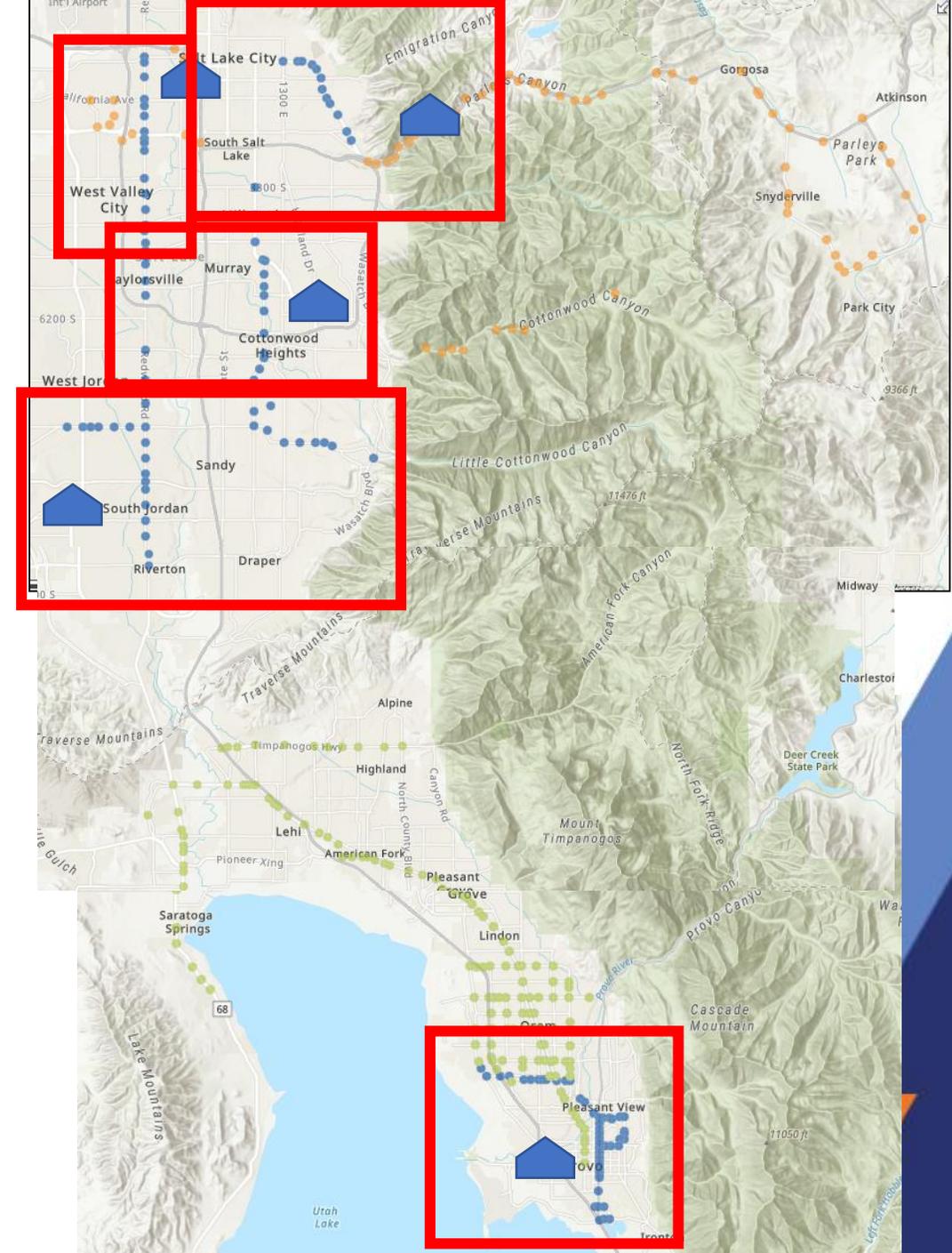
- Move to Channel 180 by July 2022

Early Steps (C-V2X Replacement)

- Procurement, Software Modification, Testing

Planning a multi-phase replacement

- Driven by funding availability (2-3 years)
 - Consider future expansions
 - Scheme is flexible, subject to change
- Prevent “isolation” of equipped vehicles
 - Organize based on maintenance shed coverage



Other Considerations

- There is no dedicated funding to replace our systems
 - FCC seeking comments about what should be reimbursed
 - Has downplayed the potential for reimbursing incumbent users
 - Bipartisan Infrastructure Bill (IIJA) designates some funding opportunities
 - Advanced Transportation Technologies and Innovative Mobility Deployment Grants
- There are concerns about interference from unlicensed WiFi
 - Many comments filed on these issues
 - If interference issue isn't solved, could hinder effective V2X communication
- Automakers have a similar transition to consider
 - Ford has announced intent to deploy C-V2X in many models in 2022
 - GM / Toyota have invested in DSRC



Other Considerations

- FCC will automatically transition existing DSRC licenses
 - Need to certify by July 2022 that you have vacated lower 45MHz
- C-V2X is relatively new, some aspects evolving, but available
 - Multiple vendors offer C-V2X
 - Several states have C-V2X deployments
 - OmniAir has started C-V2X certification efforts
- Can I run DSRC and C-V2X side-by-side?
 - Yes, while DSRC is allowed
 - Need to monitor for interference & coordinate with other users
 - Dual-mode RSUs are available – some operate simultaneously



C-V2X Licensing

- Prior to August 2021 – Experimental License
 - No longer valid
 - Permits requested under existing Exp. License being denied
- New Licensing Rules / Process will be Issued with 2nd R&O
- In the Interim – Follow the FCC’s Waiver Process
 - Described in Public Notice DA-21-962A1 issued August 6, 2021
 - Not a simple nor clear process
 - Introduces some risk



C-V2X Licensing – Waiver Process

- Regular “Section 1.925” Waiver Process
 - Prepare request for a waiver of the (DSRC) rules
 - Submit with application in FCC’s Universal Licensing System
- Streamlined Waiver:
 - FCC consideration will get “streamlined”
 - Same as above, but with these stipulations:
 - Certify no existing DSRC licensees – or – coordinate with them to prevent interference
 - Certify that C-V2X operations will comply with existing (DSRC) technical rules
 - Including power and out-of-band emissions limits
 - Certify that operations will be revised to comply with final rules
 - Certify that operations will be limited to transportation safety



C-V2X Equipment Certification

- Certification of C-V2X Equipment Must Be Obtained Prior to:
 - Marketing
 - Sale
 - Operation
- Vendor Needs Waiver for this Certification
 - Applicant “should make clear that the equipment would be authorized in accordance with . . . the waiver(s) that permit specified Part 90 ITS licensee(s) to operate C-V2X”, i.e., those that apply for streamlined permits (?)
 - Must be re-certified after new rules are issued



Conclusions

Agencies with deployments have several options in the near term

- DSRC must be modified by July 2022, abandoned by about mid-2024
- C-V2X is a viable – if not fully mature – direct communication alternative
- 4G / 5G cellular is an option for non-safety applications

Uncertainty exists and will continue

- How many applications can operate in less spectrum?
- Interference from adjacent unlicensed WiFi could hamper operations
- There is huge future value in connected vehicle communications
 - Agencies should be patient, not give up
 - Find a path forward and execute that plan



Some Useful Resources

- FCC Report and Order / Further Notice of Proposed Rulemaking
 - <https://www.federalregister.gov/documents/2021/05/03/2021-08801/use-of-the-5850-5925-ghz-band>
 - Can also search FCC site
- FCC Public Notice DA-21-962A1 & DA-21-963A1 – August 6, 2021
 - <https://www.fcc.gov/document/wtb-and-pshsb-provide-c-v2x-waiver-guidance-upper-59-ghz-band>
- Practical Considerations for Deployers of V2X Roadside Equipment
 - UDOT Transportation Technology website: <https://transportationtechnology.utah.gov/>
- NCHRP 23-10 “V2X Communications in the 5.9GHz Spectrum” – March 2020
- NCHRP 23-10 “Fact Sheet: Realignment of 5.9GHz” – Dec 2020
- NCHRP 23-10 “V2X Communications in the 5.9GHz Spectrum” – March 2021
 - Find these in NCHRP Web Only Document 310:
<https://www.trb.org/Publications/Blurbs/182571.aspx>





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