



September 8, 2020

Mr. Ronald Repasi
Acting Chief, Office of Engineering and Technology
Federal Communications Commission
445 12th Street S.W.
Washington, DC 20554

Re: Use of the 5.850-5.925 GHz Band (ET Docket No. 19-138)

Dear Mr. Repasi:

On behalf of the National Telecommunications and Information Administration (NTIA), as described below please find enclosed additional information for purposes of supplementing the record in the above-referenced proceeding addressing the protection of federal incumbent operations in the 5.850-5.925 GHz (5.9 GHz) band.

Background

The Federal Communications Commission (FCC) released a Notice of Proposed Rulemaking to take a comprehensive look at the 5.9 GHz band rules and propose changes intended to allow for the highest and best use of the spectrum.¹ The 5.9 GHz band has been reserved for shared use by federal radiolocation systems and non-federal Dedicated Short Range Communications (DSRC). The Department of Defense (DOD) operates fixed and mobile radars for surveillance (including airborne surveillance), test range instrumentation, airborne transponders, and testing in support of the tracking and control of airborne vehicles. The National Aeronautics and Space Administration and the Department of Energy also operate radar systems in the 5.9 GHz band.² Non-federal DSRC operates as a service in the Intelligent Transportation System (ITS) designed to enable vehicle-related and safety communications.

¹ *Use of the 5.580-5.925 GHz Band*, ET Docket No. 19-138, Notice of Proposed Rulemaking, 34 FCC Red 12603 (2019) (*NPRM*).

² The DoD also uses aeronautical and maritime mobile systems in or adjacent to the 5.9 GHz band; however, protection is not required because these systems can only operate in this band on a Non-Interference Basis (NIB).

The *NPRM* specifically:

- proposes to repurpose the lower 45 megahertz of the band (5.850-5.895 GHz) for unlicensed operations to support high-throughput broadband applications;
- proposes that unlicensed device operations in the 5.850-5.895 GHz band be subject to all of the general Part 15 operational principles in the Unlicensed National Information Infrastructure (U-NII) rules;³
- proposes to adopt technical and operational rules (e.g., power levels, out-of-band emissions limits) similar to those that already apply in the adjacent 5.725-5.850 GHz (U-NII-3) band;
- proposes to continue to dedicate spectrum in the upper 30 megahertz of the 5.9 GHz band (5.895-5.925 GHz) to support ITS needs for transportation and vehicle safety-related communications;
- proposes to revise the current ITS rules for the 5.9 GHz band to permit Cellular Vehicle-to-Everything (C-V2X) operations in the upper 20 megahertz of the band (5.905-5.925 GHz);
- seeks comment on whether to retain the remaining 10 megahertz (5.895-5.905 GHz) for DSRC systems or whether this segment should be dedicated for C-V2X; and,
- proposes to retain the existing technical and coordination rules that currently apply to DSRC, to the extent that DSRC operations continue in the 5.895-5.905 GHz band.

ITS Systems Protecting Federal Incumbents⁴

The *NPRM* proposes that C-V2X equipment would have to comply with existing DSRC rules for protection of the primary 5.9 GHz band federal radiolocation service.⁵ The *NPRM* notes that DSRC roadside units (RSUs) are not protected from harmful interference caused by incumbent federal operations.⁶ The existing DSRC rules for the protection of the 5.9 GHz federal radars require that RSU installations within 75 kilometers of 59 specified federal radar locations must be coordinated with NTIA.⁷ The *NPRM* states that requiring C-V2X equipment

³ One of the primary operating conditions under Part 15 is that the operator must accept any interference that is received and must correct any interference it causes. Should harmful interference occur, the operator is required to immediately correct the interference problem, even if correction of the problem requires ceasing operation of the Part 15 system causing the interference. See 47 C.F.R. § 15.5.

⁴ See *NPRM*, paras. 47-48.

⁵ See *NPRM*, para. 47.

⁶ See *NPRM*, para. 47, citing 47 C.F.R. § 90.371(b).

⁷ See 47 C.F.R. § 90.371(b).

to coordinate installations within the 75-kilometer coordination zones represents “the most straightforward approach for enabling compatibility with federal operations.”⁸ The *NPRM* seeks comment on this proposal.

NTIA agrees with the Commission’s tentative conclusion that requiring ITS RSUs to coordinate installations within a coordination zone is the best approach to facilitate sharing with federal systems. Based upon NTIA analysis, we believe the coordination zones set forth in Section 90.371(b) of its Rules for DSRC RSUs can equally apply to C-V2X RSUs. In an effort to optimize unencumbered non-federal operations, NTIA also believes the list of coordination zones can be updated as reflected in the list shown in Table 1 of the Enclosure. This would decrease the number of sites from 59 to 30, and would specify the size of each site’s coordination zone, most of which have been reduced from the current 75 kilometers.⁹ NTIA may, under existing rules, authorize additional federal radiolocation services.¹⁰ NTIA requests that the rules be clarified to specifically recognize NTIA’s authority to amend, modify, or revoke existing assignments¹¹ that could affect the coordination zones listed in Table 1. Accordingly, we propose that Section 90.371(b) be revised as follows: “... of the locations listed in the table below, **to which NTIA may amend, modify, or revoke locations and associated parameters,** must be coordinated through the...”

NTIA also performed an analysis assessing the potential impact of C-V2X on-board units (OBUs) on federal operations. The NTIA analysis, based upon the Commission’s proposed rules for C-V2X OBUs, indicates that coordination of these devices would not be necessary to protect federal operations.

U-NII Devices Protecting Federal Incumbents¹²

Unlicensed devices in the 5.9 GHz band currently share spectrum with federal radar operations in the adjacent U-NII-3 band (5.725–5.850 GHz). The *NPRM* proposes to adopt the same technical rules (*e.g.*, radiated power, power spectral density, etc.) for 5.850-5.895 GHz (U-NII-4) unlicensed devices as currently applied to U-NII-3 unlicensed devices.¹³ The *NPRM* seeks comment on whether there are any mitigation measures, such as technical or operational conditions or constraints that it should consider for U-NII-4 operations to protect federal radars

⁸ See *NPRM*, para. 47.

⁹ The protection requirements contained herein are premised upon the power and out-of-band emission levels contemplated by the Commission. Any deviation from those parameters may result in a change to these requirements.

¹⁰ See 47 C.F.R. § 90.371(c).

¹¹ 47 U.S.C. § 902(b)(2)(A).

¹² See *NPRM*, paras. 53-57.

¹³ See *NPRM*, para. 57.

in the 5.9 GHz band.¹⁴

NTIA has determined that, to protect federal radiolocation systems, operation of U-NII-4 *outdoor* point-to-point (P2P) and point-to-multipoint (P2MP) devices would require the imposition of exclusion zones. The exclusion zones are set forth in Table 2 of the Enclosure. To enforce the exclusion zones, NTIA believes that interference mitigation techniques such as geofencing can be employed to protect federal radiolocation operations. NTIA wishes to emphasize the importance of ensuring that U-NII device operation is not permitted inside of these exclusion zones, especially in light of experience with U-NII devices in the 5 GHz band.¹⁵ NTIA requests that the new rules make clear that NTIA may authorize additional exclusion zones or modify the existing exclusion zones listed in Table 2 of the Enclosure as may be necessary to ensure protection of federal radiolocation services similar to that proposed above for the revised Section 90.371.

To reduce the potential for interference from *indoor* U-NII-4 devices, NTIA recommends that the rules help ensure the indoor devices are not deployed outdoors and that expedient and effective corrective measures be in place to eliminate interference should it occur, rather than imposing exclusion zones as a first measure to protect the federal systems.¹⁶ Examples of ways to ensure indoor use include having the power for AP devices supplied by a wired connection (not battery powered), having an integrated antenna, and not having a weatherized enclosure.¹⁷ Because it has proven difficult and time consuming to identify and mitigate interference from U-NII devices,¹⁸ the capability of having the U-NII-4 service providers remotely block the interfering device(s) from using certain channels and/or to reduce the operating power of the devices is an important corrective measure. Use of this capability will be imposed based on NTIA and FCC coordination, noting that one of the primary operating conditions under Part 15 is that the operator must correct whatever interference is caused *even if correction of the problem requires ceasing operation*.¹⁹ Service providers and operators should be expected to respond promptly to such FCC directives upon receipt.

¹⁴ See *id.*

¹⁵ See National Telecommunication and Information Administration Technical Report TR 20-544, *Lessons Learned from the Development and Deployment of 5 GHz Unlicensed National Information Infrastructure (U-NII) Dynamic Frequency Selection (DFS) Devices*, <https://www.ntia.doc.gov/report/2019/lessons-learned-development-and-deployment-5-ghz-unlicensed-national-information>. Section 8 describes interference to a federal radar from a U-NII device.

¹⁶ See *Unlicensed Use of the 6 GHz Band*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 3852 (2020), <https://docs.fcc.gov/public/attachments/FCC-20-51A1.pdf>.

¹⁷ See, e.g., 47 C.F.R. §§ 15.257, 15.403, and 15.517.

¹⁸ Interference from U-NII devices affected “essential safety systems” at Cape Canaveral and Patrick Air Force Base. See *Revision of Part 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, Memorandum Opinion and Order, FCC 16-24, 31 FCC Rcd 2317, 2319 n.10 (2016), citing Federal Communications Commission, Letter, 5 GHz Interference to Patrick Air Force Base, (March 10, 2015). See also FCC, Enforcement Bureau, Office of Field Director, Advisory Notice, 5 GHz Interference to Patrick Air Force Base and Cape Canaveral Air Force Station Tracking Radars (July 27, 2016) (enclosure).

¹⁹ See 47 C.F.R. § 15.5.

NTIA looks forward to the FCC's forthcoming actions in this important rulemaking proceeding. If you have any questions please contact me or Edward Drocella, Chief Spectrum Engineering and Analysis Division, Office of Spectrum Management at edrocella@ntia.gov or (202)-482-2608.

Sincerely,



Charles Cooper
Associate Administrator
Office of Spectrum Management

Enclosures

ENCLOSURE

This enclosure defines the coordination zones for ITS (C-V2X and DSRC) Road Side Units (Table 1) and the exclusion zones for Unlicensed National Information Infrastructure (U-NII)-4 outdoor point-to-point (P2P) and point-to-multipoint (P2MP) devices (Table 2). The zones for each federal location are characterized by a center point (latitude/longitude) and radius (to define a circular area) to facilitate the regulatory process of coordination/exclusion; however, for a few of the exclusion zones, a polygon is used if the circular area encompasses a significant amount of population that does not present a potential for interference. These few sites are identified in Table 2 with an annotation “(polygon)” next to the numeric entry in the radius column. The analysis conducted to calculate the zones is documented in a report to be posted to the NTIA webpage by late September 2020. The report also includes the polygons for the cases indicated in the table.²⁰

The center point for the zones was determined by the incumbent’s location for fixed incumbent systems, and by the centroid of the operational area of transportable incumbent systems. The radius was determined by selecting the largest of three distance separations required to mitigate potential interference to the federal incumbent operations: 1) distance based on statistical aggregate interference analysis; 2) distance based on worse-case single source interference analysis (for U-NII-4 only); or 3) distance based on empirical information identifying interference at that location. The single source analysis was used for the U-NII-4 radius calculation because of the uncertainty associated with the deployment locations, whereas the location of the ITS devices are better defined as they are deployed along the roads.

Table 1. ITS Roadside Unit Coordination Zone Distances

Location	Latitude	Longitude	Coordination Zone Radius (km)
	DD-MM-SS North	DD-MM-SS West	
Anclote, Florida	28-11-18	82-47-40	45
Cape Canaveral, Florida	28-28-54	80-34-35	47
Cape San Blas, Florida	29-40-31	85-20-48	47
Carabelle Field, Florida	29-50-38	84-39-46	36
Charleston, South Carolina	32-51-48	79-57-48	16
Edwards, California	34-56-43	117-54-50	53
Eglin, Florida	30-37-51	86-24-16	103
Fort Walton Beach, Florida	30-24-53	86-39-58	41
Kennedy Space Center, Florida	28-25-29	80-39-51	47
Key West, Florida	24-33-09	81-48-28	12
Kirtland AFB, New Mexico	34-59-51	106-28-54	15
Kokeepark, Hawaii	22-07-35	159-40-06	5
MacDill, Florida	27-50-37	82-30-04	47
NV Test Training Range, Nevada	37-18-27	116-10-24	186
Patuxent River, Maryland	38-16-55	76-25-12	6
Pearl Harbor, Hawaii	21-21-17	157-57-51	16
Pillar Point, California	37-29-52	122-29-59	36
Poker Flat, Alaska	65-07-36	147-29-21	13

²⁰ Geographic coordinates are referenced to the North American Datum of 1983 (NAD83).

Location	Latitude	Longitude	Coordination Zone Radius (km)
	DD-MM-SS North	DD-MM-SS West	
Port Canaveral, Florida	28-24-42	80-36-17	19
Port Hueneme, California	34-08-60	119-12-24	24
Point Mugu, California	34-07-17	119-09-1	18
Saddlebunch Keys, Florida	24-38-51	81-36-22	29
San Diego, California	32-43-00	117-11-00	11
San Nicolas Island, California	33-14-47	119-31-07	195
Tonopah Test Range, Nevada	37-44-00	116-43-00	2
Vandenberg, California	34-34-58	120-33-42	55
Venice, Florida	27-04-37	82-27-03	50
Wallops Island, Virginia	37-51-23	75-30-41	48
White Sands Missile Range, New Mexico	32-58-26	106-23-43	158
Yuma, Arizona	32-54-03	114-23-10	2

Table 2. U-NII-4 Exclusion Zone Distances

Location	Latitude	Longitude	Exclusion Zone Radius (km)
	DD-MM-SS North	DD-MM-SS West	
Anclote, Florida	28-11-18	82-47-40	54
Cape Canaveral, Florida	28-28-54	80-34-35	53
Cape San Blas, Florida	29-40-31	85-20-48	55
Carabelle Field, Florida	29-50-38	84-39-46	54
Charleston, South Carolina	32-51-48	79-57-48	55
Edwards, California	34-56-43	117-54-50	51
Eglin, Florida	30-37-51	86-24-16	116 (polygon)
Fort Walton Beach, Florida	30-24-53	86-39-58	56
Kennedy Space Center, Florida	28-25-29	80-39-51	98
Key West, Florida	24-33-09	81-48-28	54
Kirtland AFB, New Mexico	34-59-51	106-28-54	15 (polygon)
Kokeepark, Hawaii	22-07-35	159-40-06	49
MacDill, Florida	27-50-37	82-30-04	58
NV Test Training Range, Nevada	37-18-27	116-10-24	184
Patuxent River, Maryland	38-16-55	76-25-12	7
Pearl Harbor, Hawaii	21-21-17	157-57-51	55
Pillar Point, California	37-29-52	122-29-59	10
Poker Flat, Alaska	65-07-36	147-29-21	58
Port Canaveral, Florida	28-24-42	80-36-17	54
Port Hueneme, California	34-08-60	119-12-24	54
Point Mugu, California	34-07-17	119-09-01	81 (polygon)
Saddlebunch Keys, Florida	24-38-51	81-36-22	54
San Diego, California	32-43-00	117-11-00	54
San Nicolas Island, California	33-14-47	119-31-07	166 (polygon)

Location	Latitude	Longitude	Exclusion Zone Radius
	DD-MM-SS North	DD-MM-SS West	(km)
Tonopah Test Range, Nevada	37-44-00	116-43-00	48
Vandenberg, California	34-34-58	120-33-42	74
Venice, Florida	27-04-37	82-27-03	54
Wallops Island, Virginia	37-51-23	75-30-41	68
White Sands Missile Range, New Mexico	32-58-26	106-23-43	160 (polygon)
Yuma, Arizona	32-54-03	114-23-10	49



**Federal Communications Commission
Enforcement Bureau
Office of the Field Director
445 12th St, S.W.
Washington, D.C. 20554
July 27, 2016**



**ADVISORY NOTICE
5 GHz INTERFERENCE TO PATRICK AIR FORCE BASE
AND CAPE CANAVERAL AIR FORCE STATION TRACKING RADARS**

The Office of the Field Director, Enforcement Bureau, Federal Communications Commission (FCC) and the 45th Space Wing, Air Force Space Command, Space Communications Squadron, Frequency Control and Analysis have been investigating harmful interference to military radar operating in the 5 GHz frequency band¹ at Patrick Air Force Base and Cape Canaveral Air Force Station in Brevard County, Florida. The harmful interference affects essential safety systems and must be eliminated.

This notice sets forth the steps that must be taken to prevent harmful interference from occurring, reminds all Part 15 (unlicensed) operators that the 5 GHz band has been allocated to the Federal Radiolocation Service on a primary basis,² and that unlicensed operations must cease upon notification by the FCC that they are causing harmful interference to any authorized radio station.³

We have found that the harmful interference has generally been caused by some unlicensed wireless devices operating within the 5 GHz frequency band. This includes devices installed outdoors, at high elevations, within line-of-sight of the radar installations, and indoor operated devices. Various marine vessels moving through Port Canaveral that are communicating with land based wireless internet access points while docked and during transit also are causing harmful interference. These unlicensed operations have resulted in harmful interference to military radars.

In order to mitigate interference to military radars, operators and installers of all 5 GHz systems are strongly advised that they may not cause harmful interference to any authorized operations, including but not limited to emissions within the **5640-5800 MHz** range of frequencies (**Wi-Fi Channels 128-161**) in Brevard County, Florida.⁴ In general, unlicensed systems may not cause harmful interference and must

¹ For purposes of this Advisory, the "5 GHz band" is defined by U-NII-2C (5470-5725 MHz) and U-NII-3 bands (5725-5850 MHz).

² See 47 C.F.R. § 2.106 (Table of Frequency Allocations).

³ 47 C.F.R. § 15.5(b).

⁴ The 45th Space Wing, Air Force Space Command, Space Communications Squadron, Frequency Control and Analysis recommends that outdoor point-to-multipoint systems with antennas mounted less than 60 ft. above ground should take particular care to avoid causing interference to these channels within a radius of 35 km (22 miles)

(continued....)

cease operating immediately upon notification by the FCC, even if the systems are not operating on the above range of frequencies.⁵ Failure to do so will result in enforcement action, which may include monetary penalties and seizure of equipment. In addition, all systems must be made available for inspection by the FCC upon request.⁶

Please direct questions to the FCC Enforcement Bureau Region 2 Director at (678) 293-3194, Ronald.Ramage@fcc.gov. For questions concerning Patrick Air Force Base and Cape Canaveral Air Force Station, please call (321) 853-8426 (available 24/7).

(Cont. . .)—————

surrounding Cape Canaveral and Patrick Air Force Base radars (Radar (1): 28° 28' 42" North Latitude, 80° 40' 29" West Longitude; Radar (2): 28° 13' 34" North Latitude, 80° 35' 58" West Longitude; Radar (3): 28° 28' 54" North Latitude, 80° 34' 35" West Longitude; and Radar (4): 28° 25' 29" North Latitude, 80° 39' 51" West Longitude). For heights between 60 ft. and 100 ft. above ground, the distance will increase to 40 km (25 miles). For heights greater than 100 ft. above ground, the approximate line-of-sight distance in uniform terrain is the square root of the height in feet multiplied by 1.4. An additional 10 miles must be added to account for the radar line-of-sight. For example, 150 ft. above ground would yield 12.2 (square root of 150) times 1.4 which is 17, plus 10 for a total distance of 27 miles surrounding either location. This recommendation also applies to point-to-point systems with antenna main beams in the direction of the radars located at the sites noted above.

⁵ As mentioned above, under Section 15.5(b) of the Commission's rules (Rules), operation of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused and that interference must be accepted, and the operator of a radio frequency device shall be required to cease operating the device upon notification by a Commission representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected. 47 C.F.R. § 15.5(b).

⁶ Section 15.29(a) of the Rules states that any radio frequency equipment or device, together with any certificate, notice of registration, or any technical data required to be kept on file by the operator, supplier, or party responsible for the equipment or device's compliance must be made available for inspection by a Commission representative upon reasonable request. 47 C.F.R. § 15.29(a).