Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Review of the Commission's Rules Governing the 896-901/935-940 MHz Band	)	WT Docket No. 17-200
	)	
	)	
Realignment of the 896-901/935-940 MHz Band to Create a Private Enterprise Broadband Allocation	)	
	)	
	)	
Amendment of the Commission's Rules to Allow for Specialized Mobile Radio Services Over 900 MHz Business/Industrial Land Transportation Frequencies	)	

COMMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS

The Association of American Railroads ("AAR") hereby submits these comments in response to the Notice of Inquiry ("NOI") released by the Federal Communications Commission ("FCC" or "Commission") in the above-captioned proceeding. [1] The NOI seeks comment on the potential for modification to the operational rules and band configuration in the 896-901/935-940 MHz ("900 MHz") band.[2]

As explained below, railroads rely on spectrum in the 900 MHz band for mission-critical, safety-of-life train communications throughout the United States. Like other private licensees, railroads would benefit from the flexibility provided by allowing wider channels in this band. Rather than focusing exclusively on broadband, however, the FCC should consider the

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[1] *Review of the Commission's Rules Governing the 896-901/935-940 MHz Band; Realignment of the 896-901/935-940 MHz Band to Create a Private Enterprise Broadband Allocation; Amendment of the Commission's Rules to Allow for Specialized Mobile Radio Services Over 900 MHz Business/Industrial Land Transportation Frequencies*, Notice of Inquiry, 32 FCC Rcd 6421 (2017) ("*NOI*").

[2] *See id.* ¶ 1.

possibility of wideband channels (*e.g.*, those that are 50-500 kHz wide) for railroads and other mission-critical, safety-of-life users that would benefit from having additional flexibility in supporting a number of applications that do not necessarily require a broadband channel at this time.

Additionally, the FCC would need to address several important issues if it determines that railroads would need to be relocated from their current channels in the 900 MHz band as part of a reconfiguration to create a broadband service. In particular, the cost of relocation could total $100 million for railroad operations alone. Furthermore, a relocation would require revisiting the United States and Canada's cross-border arrangement and establishing strict technical requirements to prevent interference between dissimilar narrowband/wideband operations and broadband operations that are close in spectral and geographic proximity.

I. Vital Railroads Communications Depend on the 900 MHz Band.

AAR is a voluntary non-profit membership organization whose freight railroad members operate 82 percent of the line-haul mileage, employ 95 percent of the workers, and account for 97 percent of the freight revenues of all railroads in the United States.[3] AAR's members also include certain passenger railroads that operate intercity passenger trains and provide commuter rail service. Radio communications systems are a vital component of the railroad industry's operations, and much of the radio use by the rail industry is for safety-related purposes.

AAR holds a "ribbon" license in the 900 MHz band, which covers the geography within 70 miles on either side of most of the nation's railway tracks.[4] Through its members, AAR uses

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[3] Additional information on AAR is available at https://www.aar.org/.

[4] *See* FCC Call Sign WPSF894; *Petition of Association of American Railroads (AAR) for Modification of Licenses for Use in Advanced Train Control Systems and Positive Train Control Systems*, Order, 16 FCC Rcd 3078 ¶¶ 6, 9 (WTB 2001) ("*2001 Modification Order*").

the licensed, six paired frequencies on a nationwide basis for Advanced Train Control System ("ATCS") operations.[5] These frequencies have been licensed to AAR since 1988.[6] Half of these frequencies are either directly adjacent to or within 125 kHz of the Enterprise Wireless Alliance ("EWA") and Pacific Data Vision Inc. ("PDV") proposed Private Enterprise Broadband ("PEBB") allocation.[7] The remainder of these frequencies are only one megahertz away from the EWA and PDV proposed PEBB allocation.[8]

AAR member railroads operate over 10,000 transceivers on this 900 MHz band spectrum for train traffic control. Railroads use ATCS for critical direct control of wayside track switches and signals by the train traffic control centers. ATCS ensures proper train routing and speed, allowing railroads to operate more safely, efficiently, and economically.[9] Notably, railroads will continue to rely on ATCS once Positive Train Control ("PTC") systems are deployed. Some of the ATCS functions are not available via PTC, and not every railroad line is even required to have PTC.[10] The FCC must ensure that any new or relocated operations in the 900 MHz band adequately protect this vital railroad communications system, as well as the systems of other critical infrastructure industries.

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[5] The six frequency pairs are 896.8875/935.8875 MHz, 896.9375/935.9375 MHz, 896.9875/935.9875 MHz, 897.8875/9375 MHz, 897.9375/936.9375 MHz, and 897.9875/936.9875 MHz. *See 2001 Modification Oder* ¶ 2 n.2.

[6] *See id.* ¶ 3. The frequencies were converted into a single ribbon license in 2001. *See id.*

[7] *See NOI* ¶¶ 5-7.

[8] *See id.*

[9] *See, e.g., 2011 Modification Order* ¶ 2 (recognizing that ATCS "was designed to prevent train collisions, high speed accidents, and incursions into locations reserved for railway workers").

[10] *See, e.g.*, Federal Railroad Administration, *Positive Train Control (PTC) Information (R&D)*, https://www.fra.dot.gov/Page/P0152 (last visited Sept. 7, 2017) ("Lines requiring PTC are essentially Class I railroad main lines . . . that handle any poisonous-inhalation-hazardous (PIH) materials and any railroad main lines over which regularly scheduled intercity passenger or commuter rail services are provided.").

Railroads also operate both licensed and unlicensed devices in the 902-928 MHz band. For example, AAR maintains an industry-wide standard for the Automatic Equipment Identification ("AEI") system that enables both fixed and varying information to be encoded within electromagnetic "tags" mounted on individual rail cars, locomotives, containers, end-of-train devices, and other equipment. Railroads use such tags to track operations and power the AskRail app, a safety tool that provides first responders immediate access to accurate, timely data about what type of hazardous materials a rail car is carrying.[11] The FCC should be mindful that regulatory changes could negatively impact the AEI system or other railroad use in the 902-928 MHz band.

II. Railroads and Other Private Licensees Would Benefit from Wideband Channels.

The NOI discusses current narrowband (*e.g.*, less than 25 kHz) usage and proposals for broadband (*e.g.*, 3-5 MHz) usage.[12] But it misses the important middle ground of wideband channels, which can be defined as 50-500 kHz channels. Channel sizes in this range could be the most useful to many private radio users. Radio manufacturers are moving to wider channels; narrowband radios may eventually become obsolete.[13] For example, several narrowband radio

[11] *See, e.g.*, AskRail, *Introduction*, http://askrail.us/ (last visited Sept. 26, 2017).

[12] *See, e.g.*, *NOI* ¶¶ 17-18.

[13] Users must already offload higher bandwidth applications to less secure commercial cellular networks at times. *See, e.g.*, CalAmp, *Private Radio vs. Cellular*, http://bit.ly/2wse61l (last visited Sept. 14, 2017). This practice will become unsustainable as bandwidth needs increase for mission-critical applications.

manufacturers are already developing 50 kHz options.[14] And the 802.16s version of the WiMAX standard will support channel sizes of 100 kHz to 1250 kHz in steps of 50 kHz.[15]

The FCC should permit use of this newer wideband technology equipment in the proposed non-broadband allocations. Smaller entities would benefit from economies of scale and greater choice of equipment. One option to enable the use of this equipment would be to permit channel sizes of up to 500 kHz, although this would likely require a band reconfiguration due to the current configuration of alternating 125 kHz blocks for Specialized Mobile Radio ("SMR") and Business/Industrial/Land Transportation ("B/ILT") services. Another option, which might avoid the need for reconfiguration, would be to amend the rules to allow the grouping of channels up to 125 kHz. Where spectrum is available, licensees should be able to apply for and receive the additional frequencies to create wideband channels.

Although broadband may become a suitable solution for freight train operations at a later point, railroads and other mission-critical wireless users could currently benefit from the greater flexibility that wider channels permit. It is well known that wireless applications for consumers are increasing bandwidth needs in the commercial cellular industry, and the same is true for businesses and industrial land mobile users, including the railroads. The railroads' bandwidth needs are increasing rapidly as new, more data-intensive wireless applications to improve safety and efficiency are being developed. If wideband channels were available in the 900 MHz band, railroads would be able to use them in the future for such applications as:

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[14] *See, e.g.*, General Electric, *MDS Orbit Platform*, at 4, http://bit.ly/2vVMQsB (last visited Sept. 14, 2017); MiMOMax, NDL – Network Digital Link, at 2, http://bit.ly/2wrZv6d (last visited Sept. 14, 2017); XetaWave, Xeta9 Series 900 MHz, http://bit.ly/2y0Tf6B (last visited Sept. 14, 2017).

[15] *See* IEEE 802.16 Broadband Wireless Access Working Group, *IEEE 802.16s System Description Document*, at 6 (Jan. 19, 2017), http://bit.ly/2eXcfLH.

- *Advanced Defect Detection.* Developing technologies, such as thermal imaging, can allow railroads to detect train wheel defects much earlier and prevent derailments. These technologies require increased connectivity compared to any systems currently in use.

- *Increased Support for Rail Monitoring.* Railroads utilize a variety of monitoring applications, including rail integrity tests at least once a month in accordance with Federal Railroad Administration regulations.[16] New applications could allow railroads to monitor integrity on an ongoing basis.

- *Increased Oversight of Maintenance Activities.* Railroads use evolving systems to increase coordination and communications between the track maintenance and train operations personnel to avoid accidental collisions. However, in many rural areas, commercial cellular systems do not have adequate coverage to support these systems.

Narrowband channels cannot support these advanced applications and may eventually become obsolete. Wider channels and increased throughput are the general trends for all wireless users, including Part 90 licensees like the railroads.[17] The freight railroads operate on a smaller scale than commercial cellular operators, however, and would benefit from wideband capacity.[18] Future FCC policies for Part 90 bands should be flexible to support these trends.

Of course, even though the capacity levels offered by broadband are not needed, these new applications *could* nevertheless work on a broadband network. However, because the 900 MHz band is so small, proposals for broadband in this band necessarily assume sharing either of infrastructure (*e.g.*, buildout by one licensee that makes services available to private users) or of frequencies, as the FCC's 5 MHz proposal does not leave room for exclusive licensing anywhere in the band. This type of sharing is generally not acceptable for mission-critical, safety-of-life operations such as railroads. Railroads need to be able to control and be responsible for all aspects of their networks, including spectrum and infrastructure. Railroads also need their

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[16] *See* 49 C.F.R. § 213.237.

[17] See the above discussion of wideband channels' potential usefulness to private radio users.

[18] AAR and PDV have had discussions regarding a potential spectrum exchange transaction. There is no certainty that such discussions will result in a transaction.

networks to span rural, suburban, and urban areas. A third party "host" network operator may be slow to build out in certain areas, such as rural and suburban areas, especially if low demand does not make such efforts profitable. Moreover, railroads cannot risk delays in time-critical messages that can result from capacity constraints when sharing spectrum, such as with a 5x5 MHz licensee overlaying narrowband operations as proposed by the NOI.[19]

Apart from safety-related and critical infrastructure users like railroads, a broadband channel might work well for other users and could be accommodated in the 900 MHz Band subject to addressing the issues below in Section III. The FCC should strive to strike a balance between allowing users flexibility and limiting the potential for interference between dissimilar deployments. The FCC would also need to manage any transition from narrowband to wideband operations, and, due to interference concerns between dissimilar services, allowing broadband channels would complicate this transition.

III. The FCC Must Address Many Issues if it Proceeds with Broadband Proposals.

AAR sees three primary issues that would need to be addressed if the FCC proceeds with one of the pending broadband proposals.[20] First, if relocation were required, costs would be enormous. AAR estimates that it would cost $100 million to relocate railroad operations alone from the current 12.5 kHz channels and radios to other 12.5 kHz channels farther from the PEBB as part of an FCC-mandated transition that would need to be completed within a particular timeframe to accommodate the broadband licensee's deployment plans. Many railroad transceivers are designed to use only AAR's channels. These units would likely need to be replaced, as it usually is not economically feasible to modify them. Many railroads also use

[19] *See NOI* ¶¶ 32, 34.

[20] *See NOI* ¶¶ 12-16.

external filtering, which would require retuning or replacement. In addition, the migration process would be complex (especially on dense rail routes) because railroad communications cannot tolerate down time. Successfully completing this process may require a significant amount of temporary services and/or duplicate hardware to avoid downtime during the transition.

Second, the cross-border arrangement between the United States and Canada governing these frequencies may need to be revisited if rail operations are moved from the six ATCS channels.[21] The current arrangement identifies six specific channels (the ones currently licensed to AAR) for ATCS use and more generally reflects a balancing of interests between the two countries.[22] For example, the agreement relies on three different types of channels, three separate sharing zones, two protection zones, and two sector-specific, exclusive-use frequency allocations.[23] Special coordination procedures may suffice to accommodate a proposed channel reconfiguration, but identifying how best to accommodate the interests of the U.S. and Canadian administrations will require careful study.[24]

Third, if interference were to occur between dissimilar narrowband/wideband and broadband uses in close spectral and geographic proximity and technical solutions could not mitigate those impacts, railroad operations could need to be relocated to ensure adequate spectral and/or geographic separation, ideally as far away from the broadband allocation as possible. One way to do this, assuming the 900 MHz band is not large enough to accommodate a guard band,

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[21] *See* Arrangement U – Sharing arrangement between the Department of Industry of Canada and the Federal Communications Commission of the United States of America concerning the use of the frequency bands 896 to 901 MHz and 935 to 940 MHz along the Canada-United States border.

[22] *See id.*

[23] *See id.*

[24] Cross-border arrangements with Mexico differ from those with Canada. Mexico and the United States do not have a frequency-specific sharing arrangement for the 900 MHz spectrum at issue here and, based on an analysis of Mexico's licensing databases, Mexico has not authorized land-mobile radio licenses to use this band.

would be to implement a transition band similar to the FCC's relocation approach for public safety in the 800 MHz band.[25] That is, the transition band would be the spectrum closest to the broadband channel and could be used for non-mission-critical purposes, whereas the spectrum farthest from the broadband channel would be reserved for mission-critical users of the band. This could help ensure that mission-critical users have the most frequency separation between—and interference protection from—broadband operations in the band as possible.

In addition, the FCC would need to impose strict out-of-band emission ("OOBE") and power requirements on any broadband allocations that are adjacent to narrowband (or future wideband) safety-of-life allocations. Both OOBE and in-band power from adjacent broadband deployments can cause interference to mission-critical narrowband/wideband operations, especially given that most private radio deployments are noise-limited systems. Imposing coordination requirements on broadband licensees is not a preferred approach since this imposes a similar burden on mission-critical narrowband/wideband operators.

[25] *See, e.g., Improving Public Safety Communications in the 800 MHz Band et al.*, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969 ¶ 151 (2004). Although the new 800 MHz band plan included a guard band, this guard band was usable by less critical services. *See id.*

IV. Conclusion

AAR and its members support the Commission's efforts to improve spectrum flexibility, efficiency, and access in the 900 MHz band. To this end, we encourage the FCC to consider wideband channel options and, if it adopts one of the pending broadband proposals, to take appropriate steps to mitigate the potential for interference between narrowband/wideband and broadband uses in the band.

Respectfully submitted,

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