

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

<b>Promoting Spectrum Access for Wireless Microphone Operations</b>	)	<b>GN Docket No. 14-166</b>
	)	
	)	
<b>Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions</b>	)	<b>GN Docket No. 12-268</b>
	)	

**To: The Commission**

**REPLY COMMENTS OF ROBERT BOSCH, LLC**

Robert Bosch, LLC (“Bosch”), by counsel, hereby respectfully submits its reply comments in response to the Commission’s *Notice of Proposed Rulemaking* in the above-captioned proceeding.<sup>1</sup> The *Notice* seeks to address the long term spectrum needs of wireless microphone, wireless intercom and other low power auxiliary users who may be adversely affected by the Incentive Auction proceeding and the attendant displacement of wireless low power microphones and wireless intercoms from the UHF television bands. Indeed, the UHF frequency range is where most wireless microphone and wireless intercom operation occurs now. Due to past reallocation of the 700 MHz band, the anticipated Incentive Auction of the 600 MHz band, and the consequent repacking of the residual UHF television band between 470 MHz and 608 MHz, there is an imminent and critical shortage of available spectrum for wireless microphone and wireless intercom operation. Though the *Notice* in this proceeding focuses primarily on the ubiquitous operation of wireless microphones for broadcast electronic news

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<sup>1</sup> *Notice of Proposed Rulemaking*, FCC 14-145, 29 FCC Rcd. 12343, 79 Fed. Reg. 69387 and 69730 (released September 30, 2014) (the “*Notice*”). By *Order*, DA 14-1801 dated December 10, 2014, the Chief, Office of Engineering and Technology under delegated authority extended the comment date in this proceeding to February 4, 2015 and the reply comment date to February 25, 2015. Therefore, these reply comments are timely filed.

gathering and video and audio production purposes, the comments filed in this proceeding jointly by the Nuclear Energy Institute and Utilities Telecom Council (NEI/UTC) appropriately note the important role that the current generation of UHF wireless intercoms play in the day-to-day safe operation of the Nation's 100 nuclear power generating facilities. Those comments amply justify the need to preserve the entitlement of those nuclear facilities to continue to utilize the existing UHF wireless intercom technology as a component of these Critical Infrastructure industrial applications. The Commission has firmly determined and confirmed that the Bosch RTS Radiocom (formerly Telex) wireless intercoms, which have been used by the nuclear facilities for the past decade, have virtually no interference potential when deployed at a nuclear power generating facility in the manner that those facilities deploy them. For that reason, and because experience over the past ten years has validated the Commission's conclusion beyond any reasonable doubt, the Commission should confirm its prior decisions that assured that the nuclear power generating facilities could continue to use existing wireless intercom technology operating in the UHF television bands below 698 MHz without further restriction. For its reply comments in support of the arguments made by NEI/UTC in this proceeding, Bosch states as follows:

**I. Introduction and Background.**

1. Bosch is a member of the Bosch Group of companies. The Bosch Group is a leading global supplier of technology and services, including safety and security systems. Among Bosch's products marketed and used in the United States are wireless microphone and wireless intercom systems using channels in the UHF television band. These products are used in major sporting events including NFL football games for game operations, and in other contexts. Bosch wireless intercoms are used by nuclear power generating facilities as a critical tool in refueling

and other plant operations. Bosch produces wireless microphone and wireless intercom products under the brand names Electrovoice, RTS, Telex, and Radiocom.<sup>2</sup>

2. Bosch has previously participated in the Docket 12-268 proceeding addressing incentive auctions in the television broadcast band;<sup>3</sup> and it filed comments in response to the Commission's November 2, 2012 Public Notice<sup>4</sup> seeking comments in order to refresh the record with respect to the operation of wireless microphones and Low Power Auxiliary Service facilities (LPAS) in the television broadcast band. In those proceedings, Bosch principally requested that the Commission not retreat from the accommodation made theretofore for continued operation of wireless microphones (WMs), wireless intercoms (WIs) and LPAS systems in the television broadcast band made in the Commission's White Spaces proceeding.<sup>5</sup> Bosch noted at the time that the public relies heavily on the ability of broadcasters and video production companies to provide audio and video coverage of major news, sports and other events in real time; on the ability of those entities to orchestrate and conduct<sup>6</sup> sporting events and other entertainment productions; and as well on the ability of nuclear power facilities to safely and efficiently conduct refueling and other normal operations using uniquely suitable wireless

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<sup>2</sup> Bosch acquired Telex several years ago. The wireless intercom equipment used at all of the nuclear power facilities currently is marketed by Bosch as the "RTS Radiocom" product line. However, because NEI/UTC refers to the wireless intercoms in use as Telex products, that brand name will be used herein for consistency.

<sup>3</sup> See *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, GN Docket No. 12-268 (rel. Oct. 2, 2012) ("*Incentive Auctions NPRM*").

<sup>4</sup> See FCC Public Notice, *The Wireless Microphones Proceeding, Comment Deadlines Established*, DA 12-1763 (rel. Nov. 2, 2012). See also 77 Fed. Reg. 64446 (Oct. 22, 2012) ("Public Notice").

<sup>5</sup> *Unlicensed Operation in the TV Broadcast Bands*, ET Docket No. 04-186, *Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket No. 02-380, Second Memorandum Opinion and Order, 25 FCC Rcd 18661 (2010) (the White Spaces Docket). See also *Unlicensed Operation in the TV Broadcast Bands*, ET Docket No. 04-186, Third Memorandum Opinion and Order, 27 FCC Rcd 3692 (2012).

<sup>6</sup> For example, Bosch provides the wireless intercom systems used during televised NFL football games for coach-to-coach communications between and among the coaches on the field and the coaching staff in the "coach's box." This system is used pursuant to an LPAS Part 74 license held by the National Football League, which is eligible as a video producer. The system uses a series of UHF WM channels that are critical to the high noise environment and are relied upon by the football coaches for both teams during NFL games who cannot easily or safely return to the use of wired headsets during the games.

intercoms. Given these important functions, the Commission must protect ongoing WM, WI and LPAS operations, and especially the ongoing use of that equipment at nuclear power generating facilities. Bosch urged that there must be a reasonable period of time, certainly not less than fifteen years, if any transition is necessary, whether it be to different frequency bands or to other technologies for WM, WI and LPAS facilities *generally*. However, in the case of nuclear power facilities, *there is no reasonable substitute for the current generation of UHF wireless intercoms*, as will be discussed below.

3. In their joint comments, filed February 4, 2015, NEI/UTC, on behalf of the nation's 100 operating nuclear power plants, urged the Commission to confirm that the nuclear power plants may continue to operate wireless headsets as currently permitted, pursuant to the "NEI/UTC Waiver Letter Order"<sup>7</sup> as modified by the Commission in the *Second Report and Order* in WT Docket No. 08-166<sup>8</sup> (the "Waiver"). NEI/UTC also requested that the "Telex headsets" be included in the Commission's definition of "unlicensed wireless microphones" and that the plants be deemed eligible to use this equipment (as well as any future equipment that may be developed to meet this need), under the new Part 15 rules for these devices. Third, NEI/UTC urged that the Commission's proposed restrictions on the marketing and sale of wireless microphone equipment operating in the broadcast spectrum exempt WIs used by nuclear power facilities, so that the plants can continue to be supplied with such equipment, and continue to use it in a manner consistent with the Waiver, post-Incentive Auction and post-TV band repacking. Bosch supports the relief requested by NEI/UTC and suggests further that to do

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<sup>7</sup> See, the Letter from Julius Knapp, Chief, OET, FCC, and Ruth Milkman, Chief, WTB, FCC, to J. Jeffrey Craven, Esq. in response to *Request to Modify Condition on Waiver Granted in ET Docket No. 10-24*; 25 FCC Rcd. 13744 (OET and WTB 2010) ("NEI/UTC Waiver Letter Order")

<sup>8</sup> *Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band, et al.*, WT Docket Nos. 08-166 and 08-167, ET Docket No. 10-24, Second Report and Order, 29 FCC Rcd. 6103, 6112-6113 (rel. June 2, 2014) ("Second Report and Order").

otherwise would constitute an arbitrary reversal of heretofore consistent Commission policy without any reasoned justification therefor.

4. The Commission has for years permitted nuclear power facilities to utilize UHF wireless intercoms on an unlicensed basis, first by temporary waiver and then pursuant to a series of experimental licenses issued to each nuclear power facility. Since 2003 [and since 2007 pursuant to a cooperative agreement among the National Association of Broadcasters (NAB); the Society of Broadcast Engineers, Incorporated (SBE); the former Association for Maximum Service Television (MSTV); NEI and UTC], cooperative arrangements have been made for nuclear power facilities to use wireless intercom equipment for communication among personnel for various purposes, including refueling operations, plant “outages” and in other circumstances. In the April 9, 2007 cooperative agreement among NAB, MSTV, SBE, NEI and UTC that was filed with the Commission in Docket 05-345, those joint parties stated as follows:

...(N)uclear power plants (the “Plants”) use the Telex Equipment for communication among personnel during plant “outages” and in other circumstances, as expressly contemplated herein. NEI and UTC have represented that the Telex Equipment is presently the only equipment known by NEI and UTC to offer the requisite features and capabilities to allow plant workers to efficiently communicate and fulfill their obligations under the Nuclear Energy [Regulatory] Commission’s (“NRC”) “ALARA” standard. The ALARA standard requires NRC licensees to make every reasonable effort to maintain exposures to radiation as far below the NRC-established dose limits as is practical, consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to the benefits to the public health and safety, and other societal and socioeconomic considerations, in relation to the utilization of nuclear energy and licensed materials in the public interest. 10 C.F.R. § 20.1003 *et seq.* Although the Telex Equipment transmits on Part 74 frequencies for which the Plants are not eligible users, since early 2003 the Commission has issued a series of Special Temporary Authorizations (“STAs”) to permit the Plants’ continued use of the Telex Equipment over Part 74 frequencies in order to accommodate the nuclear industry’s efforts to limit plant worker exposure to radiation.

The Telex wireless intercom equipment is uniquely suited to the nuclear plant application, in large part because of the use of UHF spectrum. Nuclear power facilities need this equipment for reliable telecommunications. The nuclear facilities agreed to and have engaged in local frequency coordination with SBE frequency coordinators, and there were never any reported complaints of actual interference over the entire period 2003 to the present time. The 2007 consensus plan was based on the Commission's granting experimental licenses to each of the NRC-licensed nuclear plants. It permitted indoor operation of the Telex intercoms at up to 100 milliwatts without frequency coordination, due to the high attenuation of the containment vessels of the nuclear facilities and the resultant nominal interference potential.

5. In January of 2010 the Commission adopted a *Report and Order and Further Notice of Proposed Rulemaking* in Docket 10-24 addressing the use of low power auxiliary devices in the television bands.<sup>9</sup> In the Report and Order portion of that document, the Commission established a much more efficient method of permitting nuclear power facilities to continue to utilize the Telex WIs. The Commission granted a waiver of its rules to permit those devices to operate within the television bands on an unlicensed basis on frequencies below 698 MHz. In order to qualify for the waiver the WIs must meet a number of conditions. First, the transmitted power was limited to 50 mW. Second, the devices must maintain a specified separation distance from co-channel television transmitters; and third, the equipment must be certified to meet the Commission's Part 74 technical standards. These conditions were, in most cases, easily met. The Telex intercoms are used outdoors *very* infrequently (essentially only during refueling operations outdoors, during outages, or in any potentially hazardous circumstances such as during radiological material handling). Most of the time, they are used within the shielded environment

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<sup>9</sup> Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band, *Report and Order and Further Notice of Proposed Rulemaking*, FCC 10-16, 25 FCC Rcd 643 (2010).

of the power facility which precludes almost all RF egress from the containment vessel. The exceptionally low power used, and the rural or exurban location of most nuclear power facilities makes any interference to any user or proposed user of UHF television broadcast spectrum highly unlikely. The same would be true post-Incentive Auction and post-TV Band repacking.

6. However, in September of 2010, NEI's counsel wrote to the Commission requesting modifications to the conditions associated with the waiver established by the *Report and Order and Further Notice of Proposed Rulemaking* in Docket 10-24. He noted that nuclear power plants had clearly established that they have an ongoing need to use the Telex headset systems, and that a limited modification of the waiver was needed to protect plant workers from radiation and to preserve safe plant operations. He said that some nuclear plants were not able to meet the separation distance from television transmitters required by the waiver and that the 50 mW power level had proven somewhat inadequate for indoor operation of the wireless intercoms. There had not during the entire time, since 2003 been even one allegation of interference. The Wireless Telecommunications Bureau and the Office of Engineering and Technology responded favorably to the request to modify the waiver in October of 2010, noting the cooperative history, the absence of interference complaints, and the compelling need that had been shown for use of the Telex equipment by nuclear power generating facilities. The *NEI/UTC Waiver Letter Order* stated in part as follows:

Modifying the waiver conditions to allow use of Telex headsets inside nuclear power plants will serve the public interest by ensuring that personnel working inside these plants have essential equipment for critical communications (footnote omitted). In granting this modification of the waiver conditions we recognize that these devices employ relatively low power and nuclear power plants are physically separated from receivers that could potentially receive interference. The potential for interference will be further reduced by the fact that the modification that we are granting here will permit operation of the Telex headsets only inside of buildings at the nuclear power plants.

Accordingly, the Commission modified the Waiver such that the Telex wireless intercoms would be limited to a transmit power of 100 mW; they would be operated only within buildings; and they could be operated without regard to the television station co-channel separation distances specified in the waiver granted on January 10, 2010.

7. Finally, in June of 2014 in the *Second Report and Order* in WT Docket Nos. 08-166 and 08-167 and ET Docket 10-24, the Commission declined to expand Part 74 eligibility to include nuclear power plants, finding that such licensing was unnecessary because that *Second Report and Order* provided increased flexibility for nuclear facilities' use of Telex headsets by modifying the rule waiver to make the power limits uniform for both indoor and outdoor operations. The modified waiver enabled nuclear power plants to use their Telex equipment both indoors *and outdoors* at up to 100 milliwatts of power. The Commission held that it was also unnecessary to codify the waiver provisions because no further relief was needed in order to permit nuclear facilities to continue to use the headsets as they had been doing. Finally, the Commission specifically found (citing Bosch comments) that "operation of these devices outside at transmit levels up to 100 milliwatts would not interfere with other users in the TV bands because the locations of nuclear power plants are known, they generally are located in remote areas, and their Telex equipment operates at a relatively low power." 29 FCC Rcd. at 6112, ¶¶ 25, 26.

## **II. The Telex Headsets remain Uniquely Necessary for Nuclear Plant Use and the UHF Television Band is a Critical Component of the Benefits of this Technology for Critical Infrastructure Communications.**

8. There are several factors which justify the continued use of Telex headsets at nuclear power facilities, aside from the fact that the Commission essentially preserved the ability of those facilities to continue to use the WIs in an order released less than a year ago. The first and

most compelling of these is the virtual absence of interference potential. As NEI/UTC note at page 12 of their comments in this proceeding, the 61 sites where the 100 operating nuclear plants are located are principally rural areas, on sites ranging in size from 400 to 1,400 acres. Most of the use of the Telex equipment is in portions of the buildings that are underground and often adjacent to major equipment, including huge cooling tanks of water which, together, attenuate the 50 - 100 mW UHF emissions. In addition, the use of the Telex equipment is intermittent and periodic, concentrated during refueling outages when, among other maintenance and refurbishing activities, spent nuclear fuel is removed and replaced with fresh fuel. These outages usually last approximately 25-40 days, and most often occur only once every 18-24 months.

9. Actual field tests conducted in 2011 have established the extremely high attenuation of signals. As noted by NEI/UTC, the propagation studies at two nuclear plants confirmed that signals from Telex equipment used indoors drops to below the general maximum field strength for Part 15 intentional radiators ( $200 \mu\text{V/m}$ ) within 91.4 meters (300 feet) of the plant walls, and well within the security fencing around plant property. This empirical information, together with the absence of interference complaints, justifies the continued authority to operate the WIs on UHF frequencies up to 698 MHz without the least concern about interference to other services.

10. Nuclear power facilities have no reasonable alternative to the use of the Telex headsets. The WIs are used for two-way communications where a high degree of audio quality is necessary. The communications conducted using this equipment is in connection with, as NEI/UTC put it, “complex maintenance and repair operations as well (as) the movement of personnel and materiel at nuclear power plants.” NEI/UTC report that, in an exhaustive study, there were 37 different types of equipment evaluated in the effort to find an alternative to the Telex WIs that would suit the unique needs of the nuclear facilities and none was found. The

Commission acknowledged in the Waiver Modification Order that the use of the Telex headsets inside nuclear power plants serves “the public interest by ensuring that personnel working inside these plants have essential equipment for critical communications.”

11. Part of the reason for the need to continue the use of the Telex headsets is the UHF band propagation within buildings. In a recent proceeding involving a waiver to permit first responders’ use of UHF spectrum for a robotic video transmitter, the manufacturer of that device asserted, and the Commission accepted the argument that UHF spectrum was superior in terms of effectiveness for communications within structures than are higher frequency bands.<sup>10</sup> The use of the headsets within the containment vessels of nuclear power facilities in the UHF spectrum in particular is necessary due to the ability of the UHF spectrum to operate in that cluttered environment.<sup>11</sup> Additionally, as NEI/UTC note, the UHF operating range of the equipment enables the nuclear facilities to operate simultaneously with 2.4 GHz dosimeters that measure dose exposure and which must be worn by each worker simultaneously with the Telex equipment during outages and maintenance functions in areas with radiation. Finally, the audio fidelity from these WIs is necessary to overcome the high noise environment within the containment vessels.

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<sup>10</sup> See the *Order on Reconsideration*, DA 11-675, 26 Fed. Reg. 5895 (2011); and the studies submitted in WT Docket 08-63: ReconRobotics, “Empirical Study of the Effects of 434 MHz vs. 915 MHz Frequency Band on the Performance of the Recon Scout” at 8 (filed Nov. 3, 2008); and *National Institute Of Standards And Commerce, C.L. Holloway Et Al., Attenuation Of Radio Wave Signals Coupled Into Twelve Large Building Structures* 26, 27 (2008), available at [http://www.nist.gov/cgi-bin/get\\_pdf.cgi?pub\\_id=32854](http://www.nist.gov/cgi-bin/get_pdf.cgi?pub_id=32854) (comparing propagation results at 450 MHz (Table 20) with 900 MHz (Table 21)).

<sup>11</sup> As NEI/UTC put it: “Furthermore, operation of the Telex equipment in the VHF and UHF bands avoids “multipath” interference and “reflected signal” from the domed ceilings of the containment buildings. The domed ceilings often interfere with or weaken the functionality of systems operating on other frequencies. In this environment, these wireless headsets also enable outstanding coverage and audio clarity that blocks background noise unlike any other equipment tested by the Reactor Licensees.

### **III. Conclusion.**

12. It is readily apparent that the continued use of Bosch wireless intercom headsets, which have been used for more than a decade without even one complaint of interference to any authorized use of TV band spectrum, is necessary at nuclear power generating facilities. Use of these headsets is a critical component of managing worker safety through accurate, reliable communications, which, in turn allows efficiency in accomplishing tasks in high radiation areas for a critical infrastructure industry. NEI and UTC have confirmed that these headsets are uniquely suitable for this application and the Commission has established that there is virtually no interference potential. Given this, there is no need to revisit that which was refined less than one year ago, notwithstanding any action that the Commission may take in the future with respect to the rebanding of the UHF television bands in connection with the Incentive Auction. Use of the UHF spectrum on a continued basis is urgent and necessary.

Accordingly, for the reasons stated herein, Robert Bosch, LLC respectfully urges that the Commission confirm that nuclear power generating facilities may continue to operate UHF wireless headsets pursuant to the Waiver Letter Order, as modified by the Commission in the *Second Report and Order*, and that the UHF spectrum up to 698 can continue to be deployed for

this unique purpose, notwithstanding any action taken in the Incentive Auction proceeding or the TV band repacking process.

Respectfully submitted,

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