

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of )  
 )  
Amendment of Parts 2, and 15 of the )  
Commission's Rules to Permit Use of Radio ) ET Docket No. 94-124  
Frequencies Above 40 GHz for New Radio )  
Applications )  
 )

**THIRD MEMORANDUM OPINION AND ORDER**

**Adopted: May 8, 2000**

**Released: May 17, 2000**

By the Commission:

**INTRODUCTION**

1. By this action, the Commission denies the Petitions for Reconsideration filed by the National Radio Astronomy Observatory ("NRAO") and New England Digital Distribution, Inc., ("NEDD"). These petitions request reconsideration of the Commission's *Third Report and Order* ("*Third Order*") in this proceeding.<sup>1</sup> This action reaffirms the previous Commission decisions on the spurious emission limit for unlicensed vehicular radar devices operating in the 76-77 GHz band, and the coordination channel and transmitter identification requirements contained in the spectrum etiquette for unlicensed operation in the 59-64 GHz band.

**BACKGROUND**

2. In the *Third Order*, the Commission adopted a spurious emission limit of 1000 pW/cm<sup>2</sup> as measured at three meters for unlicensed vehicular radar devices operating in the 76-77 GHz band. This limit was adopted to protect radio astronomy operations in the 217-231 GHz band from potential interference created by the third harmonic of these unlicensed devices. In adopting this limit, the Commission rejected a more restrictive limit of 2 pW/cm<sup>2</sup> proposed by the National Academy of Sciences Committee on Radio Frequencies ("CORF"). The Commission found that CORF's proposed limit was too strict and instead concluded that the limit recommended by the National Telecommunications and Information Administration ("NTIA") of 1000 pW/cm<sup>2</sup> was sufficient to provide adequate protection to radio astronomy operations.<sup>2</sup>

3. In the *Third Order*, the Commission also adopted a spectrum etiquette for unlicensed operation in the 59-64 GHz band. The spectrum etiquette was developed by the Millimeter Wave Communications Working Group ("MWCWG").<sup>3</sup> The Commission proposed the spectrum etiquette in the *Fourth Notice of*

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<sup>1</sup> See *Third Report and Order* in ET Docket No. 94-124, 13 FCC Rcd 15074 (1998), adopted July 6, 1998.

<sup>2</sup> See letter of November 2, 1995, from Richard D. Parlow of NTIA to Richard D. Smith, Chief, Office of Engineering and Technology.

<sup>3</sup> See Public Notice, *Commission Receives Industry Proposal for Unlicensed Operation Above 40 GHz*, DA 97-288, released February 10, 1997; and *Memorandum Opinion and Order and Fourth Notice of Proposed Rule Making*, in ET Docket 94-124, 12 FCC Rcd 12212 (1997), at para. 24.

*Proposed Rule Making* ("Fourth Notice") in this proceeding.<sup>4</sup> No comments were filed expressing opposition to the spectrum etiquette. Accordingly, the Commission adopted the proposed spectrum etiquette in the *Third Order* finding that it offered the best plan to maximize the number of users and minimize the potential for interference in the 59-64 GHz band.

4. The NRAO filed a Petition for Reconsideration requesting a more stringent spurious emission limit of 2 pW/cm<sup>2</sup> rather than the limit of 1000 pW/cm<sup>2</sup> for vehicle radar systems operating in the 76-77 GHz band. NEDD filed a Petition for Reconsideration of the coordination channel and transmitter identification requirements of the spectrum etiquette for unlicensed operation in the 59-64 GHz band.<sup>5</sup>

#### EMISSION LIMITS ABOVE 200 GHZ

5. The NRAO requests a more stringent spurious emission limit of 2 pW/cm<sup>2</sup> as measured at three meters for unlicensed devices operating in the 76-77 GHz band. The NRAO petition provides no new information to support its request; it instead points to comments filed by the National Academy of Sciences Committee on Radio Frequencies ("CORF") earlier in this proceeding as the basis for its request.<sup>6</sup> NRAO alleges that, in the *Third Order*, the Commission did not adequately address the specific concerns or calculations set forth by CORF, nor did it explain the basis of its beliefs in rejecting CORF's proposed limits in favor of those recommended by the National Telecommunications and Information Administration ("NTIA").<sup>7</sup> NRAO believes that such a failure to address the key argument is arbitrary and capricious and does not constitute reasoned decision-making.<sup>8</sup>

6. In comments and reply comments to the *Second Notice of Proposed Rule Making*<sup>9</sup> in this proceeding, General Motors Corporation ("GM") and the American Automobile Manufacturers Association ("AAMA") indicated that adoption of a 2 pW/cm<sup>2</sup> limit for spurious emissions would deny the public the safety and associated benefits of unlicensed vehicular radar devices.<sup>10</sup> GM asserted that the more stringent limit would substantially increase the cost of the unlicensed vehicular radar devices, and could delay or interrupt the availability of vehicular radar systems in the market, contrary to the public interest.<sup>11</sup> GM

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<sup>4</sup> See *Memorandum Opinion and Order and Fourth Notice of Proposed Rule Making*, in ET Docket 94-124, 12 FCC Rcd 12212 (1997), at para. 24.

<sup>5</sup> Harmonix Corporation filed a Petition for Reconsideration concerning the portions of the spectrum etiquette but subsequently withdrew its Petition for Reconsideration.

<sup>6</sup> See Comments filed by CORF on May 28, 1996.

<sup>7</sup> See Petition for Reconsideration filed by NRAO at para 4.

<sup>8</sup> See Petition for Reconsideration filed by NRAO at para 4.

<sup>9</sup> See *First Report and Order and Second Notice of Proposed Rule Making* in ET Docket 94-124, 11 FCC Rcd 4481 (1995).

<sup>10</sup> See Reply Comments of GM, filed on June 27, 1996, at page 3. See also Reply Comments of AAMA, filed on June 26, 1996, at page 6.

<sup>11</sup> See Reply Comments of GM, filed on June 27, 1996, at pages 2-3.

further asserted that radio astronomy observatories currently have a coordination zone of 1 km to prevent interference due to spark plug emissions from automobiles.<sup>12</sup> AAMA stated that CORF's calculations assumed that the vehicular radar main beam was directed at the telescope, and it noted that this condition could only exist if vehicles were traveling on a road perpendicular to the site.<sup>13</sup>

7. The Commission did not address in detail the calculations and other supporting statements contained in CORF's comments. Instead the Commission stated that because emissions in the 76-77 GHz frequency range tend to be highly focused and directional while radio astronomy equipment discriminates against off-beam signals such as those from moving vehicles, it found that there would be little likelihood of interference to radio astronomy operations.<sup>14</sup>

8. Our review reveals that CORF essentially assumes that the vehicular radars will be within boresight of or targeted at the radio astronomy receive antenna and be capable of radiating a coherent and focused emission directly into a 0 dBi side lobe of a radio astronomy antenna without taking into account any attenuation from the atmosphere, intervening terrain, angular separation or elevation separation that may be present. In addition, we note that IEEE Vehicular Radar Standards Subcommittee document VRS-96-6 states that radio astronomy observatories typically have control over access to a distance of one kilometer from the telescopes to provide protection from interference caused by automobile spark plugs and other uncontrolled RFI sources.<sup>15</sup> It is unclear from reading the comments why CORF selected a distance of 250 meters as a distance beyond which radio astronomy operations are not able to restrict operation of RF devices. We are aware that the radio astronomy observatory at Kitt Peak, Arizona may have had a controlled distance of less than 1 kilometer due to the public access afforded the site. We also note that NRAO has announced that they will be closing the millimeter wave telescope at Kitt Peak on July 1, 2000.<sup>16</sup> The record in this proceeding has not made us aware of any other radio astronomy observatories that offer similar essential public access. We note that the IEEE standard implies that radio astronomy observatories do have control of areas surrounding their receive antennas. As a result there may be interference mitigation procedures, such as erecting a fence, that could be utilized to further minimize the potential for receiving any interference from the vehicular radars. We continue to agree with the comments filed earlier in this proceeding by GM and AAMA that the assumptions underlying CORF's calculations are unnecessarily conservative. Given the limited number of radio astronomy observatories and the potential benefit of these unlicensed devices we encourage the radio astronomy community and the automobile

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<sup>12</sup> See Comments of GM, filed on May 28, 1996, at page 6.

<sup>13</sup> See Comments of AAMA, filed on May 28, 1996, at page 3.

<sup>14</sup> See *Third Report and Order* in ET Docket 94-124, 13 FCC Rcd 15074 (1998), adopted July 6, 1998, at paragraph 13.

<sup>15</sup> See IEEE Vehicle Radar Standards Subcommittee document VRS-96-6 entitled "Vehicular Radar and Radio Astronomy", dated February 28, 1996. The document is available at the following web address: [http://www.its.bldrdoc.gov/~allen/IEEE\\_VRS/VRSDocs/doclist.html](http://www.its.bldrdoc.gov/~allen/IEEE_VRS/VRSDocs/doclist.html)

<sup>16</sup> See NRAO Press release entitled "National Radio Astronomy Observatory Announces Closure of Millimeter Wave Telescope, dated February 22, 2000. The press release is also available on the internet at <http://www.aoc.nrao.edu/pr/12meter.html>.

industry to work together to develop interference mitigation procedures.<sup>17</sup>

9. We also concur with GM and AAMA that adoption of CORF's proposed spurious emission limits would increase the cost of these devices and result in the delay or interruption of the availability of these beneficial devices to the public. Depriving the public of or eliminating the availability of these unlicensed devices, which will enhance the safety of travel of the public via motor vehicles would be contrary to the public interest.

10. We have carefully considered NRAO's petition for reconsideration and related comments and determine that the public interest will be best served by adopting rules that will permit the introduction of these unlicensed vehicular radar devices. We conclude that the public interest would best be served by maintaining the spurious emission level of 1000 pW/cm<sup>2</sup>, which provides adequate protection to radio astronomy observatories without being unreasonably restrictive for unlicensed vehicular radar devices. Accordingly, NRAO's petition for reconsideration is denied.

### SPECTRUM ETIQUETTE

11. In the *Third Order* the Commission adopted a spectrum etiquette for unlicensed operation in the 59-64 GHz band. Included in the spectrum etiquette is the reservation of the 59.0-59.05 GHz band as a designated coordination channel. In addition, the etiquette requires that any transmitter operating with a peak power equal to or greater than 0.1 mW in the 59.05-64 GHz band must transmit once every second a transmitter identification data block that contains the following: 1) the FCC identifier, which is programmed at the factory; 2) a manufacturer's serial number, also programmed at the factory; and 3) at least 24 bytes of user definable data.

12. In its petition, NEDD states that the requirement for a special coordination channel at 59.0-59.05 GHz will impose an unfair burden on developers of point to point systems and appears to violate the spirit of unencumbered commercial development.<sup>18</sup> NEDD further states that because there is no specific protocol or definition for the transmitter identification data block and no database for these identifiers, it appears that the MWCWG has proposed this etiquette to gain a tactical advantage over other innovators.<sup>19</sup> NEDD provides no new facts to support its assertions.

13. The Commission reserved 50 MHz of spectrum and named it a coordination channel. However, we believe that the 50 MHz of spectrum would be more aptly referred to as a reserve channel. The reserve channel was established in order to save a 50 MHz block of spectrum for use as a future test bed to determine techniques for mitigating or eliminating interference that may occur between different unlicensed transmitters operating in the 59-64 GHz band.<sup>20</sup> We believe that NEDD may have viewed the coordination channel as a requirement to utilize the 59.0-59.05 GHz band to coordinate the simultaneous operation of multiple unlicensed devices. As indicated in our rules, the 50 MHz of spectrum can only be utilized after

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<sup>17</sup> We note that the operating requirements for unlicensed devices contained in Section 15.5 of the Commission's rules provides incentive for both parties to work together to solve potential interference issues concerning unlicensed vehicular radar devices and radio astronomy operations.

<sup>18</sup> See Petition for Reconsideration filed by NEDD.

<sup>19</sup> *Id.*

<sup>20</sup> See 47 CFR § 15.255(d)

receiving approval under the experimental authorization provisions of Part 5 of the Commission's rules.<sup>21</sup> As a result, our rules do not require any operation in the 50 MHz of reserved spectrum.

14. In order to provide manufacturers with maximum flexibility in the design of unlicensed devices that operate in the 59-64 GHz band, no specific method of encoding the transmitter identification was included in the Commission's rules. In its opposition to the NEDD petition, the MWCWG notes that the Commission's rules require each application for equipment authorization to specify how interested parties can obtain sufficient information, at no cost, to enable them to detect fully and decode the transmitter identification information, which can be used to identify a source of interference.<sup>22</sup> MWCWG observes that this requirement simply provides manufacturers and operators with a tool to mitigate and resolve interference among unlicensed users of the 59-64 GHz band, without the intervention of the FCC.<sup>23</sup>

15. We agree with MWCWG's observation that the sharing and coordination benefits provided by the transmitter identification requirement outweigh any burden it imposes. We find that the transmitter identification requirement does not thwart or delay development or deployment of unlicensed devices. Nor does the rule provide any tactical advantage to any manufacturer because all manufacturers of unlicensed devices that operate in the 59-64 GHz band have to comply with the requirement. Accordingly, the petition for reconsideration filed by NEDD is denied.

#### ORDERING CLAUSES

16. In accordance with the above discussion and pursuant to the authority contained in Sections 4(i), 302, 303(e), 303(f), 303(g), 303(r), and 405 of the Communications Act of 1934, as amended, IT IS ORDERED that the Petitions for Reconsideration filed by National Radio Astronomy Observatory and New England Digital Distribution, Inc., ARE DENIED.

17. For further information regarding this Third Memorandum Opinion and Order in this proceeding, contact Rodney P. Conway, via phone at (202) 418-2904, via e-mail at rconway@fcc.gov, or via TTY (202) 418-2989, Office of Engineering and Technology.

FEDERAL COMMUNICATIONS COMMISSION

Magalie Roman Salas  
Secretary

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<sup>21</sup> See 47 CFR § 15.255(d) and accompanying note.

<sup>22</sup> See Opposition of Millimeter Wave Communications Working Group to Petition for Reconsideration dated February 22, 1999, at page 3.

<sup>23</sup> *Id.*