

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

In the Matter of )  
 )  
REVELATION L.L.C. )  
 )  
Request for Clarification or Waiver of Section )  
101.111(c) of the Commission’s Rules to Permit )  
Licensing of Radio Frequency Identification )  
Systems )

MEMORANDUM OPINION AND ORDER

Adopted: October 15, 2001

Released: October 18, 2001

By the Chief, Public Safety and Private Wireless Division, Wireless Telecommunications Bureau:

I. INTRODUCTION

1. On September 14, 2000, Revelation L.L.C. (Revelation) filed a letter with the Commission, requesting either confirmation that its proposed radio frequency identification (RFID) operations are consistent with Section 101.111(c) of the Commission’s Rules,<sup>1</sup> or, in the alternative, a waiver of that rule.<sup>2</sup> For the reasons stated below, we find that the subject equipment does not comport with the Commission’s Rules and, in addition, we deny the waiver request.

II. BACKGROUND

2. Revelation’s equipment consists of multiple temporary fixed base stations (interrogators) and fixed and mobile passive transponders (tags). The base stations transmit a radio frequency (RF) signal, which is reflected by the tags back to the interrogator. Revelation seeks to use frequencies in the 900 MHz Multiple Address Systems (MAS) band,<sup>3</sup> because its system resembles the master station/remote station architecture of MAS systems licensed under Part 101 of the Commission’s Rules.<sup>4</sup> In addition, Revelation believes that the propagation characteristics of the 900 MHz band are the most technically suitable and cost-effective for its functional requirements.<sup>5</sup> Revelation states that its equipment detects, locates, identifies, sorts and counts various people and objects for the purpose of increasing safety and productivity while reducing costs. According to Revelation, potential uses of its equipment include

<sup>1</sup> See 47 C.F.R. § 101.111(c).

<sup>2</sup> Letter from counsel for Revelation, L.L.C. to D’wana R. Terry, Chief, Public Safety and Private Wireless Division (dated Sept. 14, 2000) (Letter).

<sup>3</sup> Revelation proposes to use 928.5 MHz, or some other frequency in the 900 to 930 MHz range. See Report by William N. Reining, P.E., at 1 (Sept. 5, 2000) (Engineering Report).

<sup>4</sup> See 47 C.F.R. § 101.3.

<sup>5</sup> See Letter at 2.

detecting and alerting air traffic personnel of misdirected airplanes and other vehicles on runways; detecting persons entering restricted areas; and operating gates, doors, toll booths, medicine dispensers, etc.<sup>6</sup>

### III. DISCUSSION

3. We first address Revelation's request for confirmation that its operations are consistent with Section 101.111(c) of the Commission's Rules. Section 101.111(c) of the Commission's Rules prohibits the emission of an unmodulated carrier on systems licensed under Part 101 of the Commission's Rules, except for test purposes as required for proper station and system maintenance.<sup>7</sup> Modulation is the process of changing some property of a carrier in accordance with the original source information.<sup>8</sup> When there is no change in the carrier, it is said to be an *unmodulated* carrier. Revelation argues that its proposed signal is not unmodulated,<sup>9</sup> but rather is characterized by high duty cycle On-Off Keying (OOK) and 0.1 Hz Amplitude Modulated (AM). We reject this characterization. An AM signal emission has two components: a carrier frequency plus the modulating frequency. This creates a bandwidth spanning the carrier frequency plus and minus the modulating frequency.<sup>10</sup> In the case of Revelation's signal, the emission would be composed of a 928,500,000 + 0.1 Hertz signal, and a 928,500,000 - 0.1 Hertz signal. Because 0.1 Hertz is negligible compared to 928,500,000 Hertz, this signal appears as a 928,500,000 continuous carrier, which cannot be discerned from the carrier plus or minus the information, thus rendering it as an unmodulated signal. Also, because this type of high duty cycle OOK results in the carrier being present from 99.979 to 99.998 percent of the time, this signal appears as an uninterrupted carrier. Consequently, we conclude such a signal is unmodulated and not allowed under Section 101.111(c). We therefore deny Revelation's request for a ruling that the Commission's Part 101 Rules permit its proposed operations.

4. In the alternative, to the extent that its system does not meet the requirements of Section 101.111(c), Revelation asks for a waiver of that rule. A petitioner may obtain a waiver of the Commission's Rules by demonstrating that (i) the underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and that a grant of the requested waiver would be in the public interest; or (ii) in view of unique or unusual factual circumstances of the instant case, application of the rule(s) would be inequitable, unduly burdensome, or contrary to the public interest, or the applicant has no reasonable alternative.<sup>11</sup> Based upon our review of the record, we conclude that Revelation has not demonstrated that grant of the requested waiver is warranted under the circumstances presented.

5. Revelation advances several arguments in support of its waiver request. First, Revelation argues that the underlying purpose of Section 101.111(c) would not be served here.<sup>12</sup> It contends that the

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<sup>6</sup> *Id.*

<sup>7</sup> 47 C.F.R. § 101.111(c).

<sup>8</sup> See Electronic Communications Systems, Wayne Tomasi, 1988 Prentice-Hall, Inc. at 2.

<sup>9</sup> See Engineering Report at 1.

<sup>10</sup> See Transmission Systems for Communications, Bell Telephone Laboratories, Fifth Edition at 94-95.

<sup>11</sup> See 47 C.F.R. § 1.925(b)(1).

<sup>12</sup> See Letter at 3.

Commission did not advance any specific reason when it adopted the prohibition now codified in Section 101.111(c).<sup>13</sup> Second, Revelation argues that the application of this rule provision to its proposed operations would be inequitable and unduly burdensome, and would leave it with no reasonable alternative.<sup>14</sup> More specifically, it argues that it would be unfair to apply the prohibition against unmodulated emissions to its proposed operations because no such prohibition applies to similar operations in the Part 90 Radiolocation Service and Location and Monitoring Service (LMS).<sup>15</sup> Further, Revelation states that its technology is incompatible with operations in other rule parts where its form of emission is permitted.<sup>16</sup>

6. We believe that one purpose of Section 101.111(c) of the Commission's Rules is to promote the efficient use of spectrum.<sup>17</sup> Given the fact that MAS frequencies are licensed on an exclusive basis to one licensee in a given area, it could be argued that this underlying purpose of the rule would not be served by its application in this case because only the licensee's operations would be affected.<sup>18</sup> On the other hand, we are concerned that Revelation has not provided any evidence that its system would provide the same amount of co-channel interference protection as is currently provided in the MAS rules.<sup>19</sup> Moreover, we are concerned about Revelation's statement that a 410 kHz guard band is necessary.<sup>20</sup> If such a guard band is needed between an MAS channel being used by Revelation and the next available channel that can be used, then we do not believe that such a system would be an efficient use of the MAS spectrum. Thus, based on the information available, we conclude that Revelation has not demonstrated that its proposal is consistent with the underlying purpose of Section 101.111(c).

7. We also conclude that Revelation has not shown unique or unusual circumstances that make application of the rule inequitable or unduly burdensome, or leave it with no reasonable alternative. Contrary to what Revelation states, other than as required for tests, continuous radiation of an unmodulated carrier is not permitted in the LMS, and is permitted in the Radiolocation Service only on certain frequencies on an as-needed basis.<sup>21</sup> Moreover, to the extent such operations are permitted, Revelation has

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<sup>13</sup> *Id.*

<sup>14</sup> *See id.* at 5.

<sup>15</sup> *See* 47 C.F.R. §§ 90.101 (Radiolocation Service), 90.350 (Location and Monitoring Service).

<sup>16</sup> Letter at 5.

<sup>17</sup> Unmodulated carriers generally do not convey information, and therefore are considered an inefficient use of spectrum.

<sup>18</sup> In cases where spectrum is licensed on an exclusive basis, the Commission tries, where possible, to afford licensees the technical flexibility to choose the technology that it believes best meets its communications requirements or the requirements of its customers. *See, e.g.,* Amendment of the Commission's Rules Regarding the 37.0-38.6 GHz and 3806-40.0 GHz Bands, *Report and Order and Second Notice of Proposed Rule Making*, ET Docket No. 95-183, 12 FCC Rcd 18600, 18631 ¶ 63 (1997).

<sup>19</sup> *See* 47 C.F.R. § 101.105(c)(3).

<sup>20</sup> *See* Engineering Report at 1. This statement implies that the closest adjacent channel assignment that can be made in an area where a Revelation system is operating is 410 kHz away. Under the current MAS rules, channels normally are available every 12.5 kHz. 47 C.F.R. § 101.147(b).

<sup>21</sup> *See* 47 C.F.R. §§ 90.103(c)(22), 90.403(f).

reasonable alternatives under the Commission's Rules. Though Revelation states generally that its technology is incompatible with operations in other rule parts where its form of emission would be permissible, it does not explain why propagation conditions in the RFID frequencies would render its system technically inoperable in these portions of the spectrum. Thus, based on the information before us, we find that Revelation has not presented a compelling showing that grant of its waiver request to operate in other than the assigned RFID bands is warranted.

#### IV. CONCLUSION AND ORDERING CLAUSES

8. We conclude that Revelation's contemplated operations are not consistent with Section 101.111(c) of the Commission's Rules, because it proposes to use an unmodulated signal. In addition, based on the record before us, we conclude that a waiver of the rule is not warranted. Revelation has not demonstrated that its proposed operations would be consistent with the underlying purpose of the MAS rules regarding protection from harmful interference. In addition, we believe that alternative frequencies are available for the operations proposed by Revelation.

9. Accordingly, IT IS ORDERED that, pursuant to Sections 4(i) and 309 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 309, and Sections 1.2 and 1.925(b)(3) of the Commission's Rules, 47 C.F.R. §§ 1.2, 1.925(b)(3), the request to clarify or waive Section 101.111(c) of Commission's Rules, 47 C.F.R. § 101.111(c), filed by Revelation L.L.C. on September 14, 2000 IS DENIED.

10. This action is taken under delegated authority pursuant to Sections 0.131 and 0.331 of the Commission's Rules, 47 C.F.R. §§ 0.131, 0.331.

FEDERAL COMMUNICATIONS COMMISSION

D'wana R. Terry  
Chief, Public Safety and Private Wireless Division  
Wireless Telecommunications Bureau