

**MEMORANDUM**

February 8, 2012

To: Jyun-Cheng Chen, FCC Office of Engineering and Technology

From: Paul J. Sinderbrand

Re: FCC ID MXF-WIXS-168; Form 731 Confirmation # EA594505

This memorandum has been prepared at the request of Gemtek Technology Co., Ltd. (“Gemtek”) to address concerns as to whether the above-referenced device complies with the Commission’s Part 27 Rules governing 2.3 GHz band Wireless Communications Service (“WCS”) fixed customer premises equipment (“CPE”). Specifically, it has been suggested that because the automatic transmit power control (“ATPC”) incorporated within Gemtek’s fixed WCS CPE does not include a mechanism for maintaining the average EIRP above 2 watts per 5 megahertz at all times, the device (which incorporates an outdoor antenna) violates Section 27.50(a)(2). While we appreciate that Section 27.50(a)(2) is not a model of clarity, for the reasons set forth below, the staff can and should interpret Section 27.50(a)(2) consistent with the Commission’s intent to authorize WCS CPE that incorporates an outdoor antenna when such CPE is capable of transmitting with an average EIRP in excess of 2 watts per 5 megahertz, complies with the stringent out-of-band emission limits of Section 27.53(a)(2), and incorporates ATPC.

There is no dispute regarding the following facts concerning Gemtek’s fixed WCS CPE:

- It is capable of operating with a maximum power in excess of 2 watts average EIRP within any 5 megahertz of authorized bandwidth.
- It complies with the stringent out-of-band emission limit set forth in Section 27.53(a)(2), which is applicable to fixed WCS CPE devices that can operate in excess of 2 watts average EIRP per 5 megahertz.
- It is equipped with ATPC, which Section 27.50(a)(2) of the Rules mandates to assure that the fixed WCS CPE will “operate with the minimum power necessary for successful communications.”

Memorandum to Jyun-Cheng Chen  
Page 2

The dispute, as we understand it, is over whether fixed WCS CPE that employs an outdoor antenna must compromise the effectiveness of ATPC by maintaining the average EIRP above 2 watts per 5 megahertz, even where such power is in excess of that necessary for successful communications. Interpreting Section 27.50(a)(2) to require that ATPC be overridden and EIRP artificially maintained above 2 watts per 5 megahertz is impossible to square with the objective of Section 27.50(a)(2) – it would increase the very risk of interference to Satellite Digital Audio Radio Service (“SDARS”) subscribers that the Commission sought to minimize when adopting the ATPC requirement. The better course is to interpret Section 27.50(a)(2) as the Commission clearly intended – outdoor antennas are permissible when connected to WCS CPE that is capable of operating in excess of 2 watts average EIRP per 5 megahertz, that complies with the out-of-band emission limits of Section 27.53(a)(2) and that incorporates ATPC to keep transmit power to the minimum necessary for successful communications.

The Commission rules applicable to this matter were adopted in the 2010 *Report and Order* in WT Docket No. 07-293 (the “*WCS/SDARS Report and Order*”).<sup>1</sup> Throughout that document, the Commission recognized that ATPC is an important part of a complex regulatory regime designed to reduce the risk of interference from WCS to SDARS.<sup>2</sup> Paragraph 140 of the *WCS/SDARS Report and Order* is particularly instructive. While in one sentence it provides that “we decide that we should adopt [a] 20 watts peak EIRP for WCS fixed CPE devices,” in the very next sentence the Commission concludes that “WCS CPE devices should also employ ATPC, so the transmitted power is limited to the maximum necessary for successful communications.”<sup>3</sup> *Nowhere in the WCS/SDARS Report and Order, and nowhere in the result Commission Rules, is there even the slightest suggestion that Gemtek can or should limit the effectiveness of ATPC so that the average EIRP of fixed outdoor WCS CPE remains above 2 watts per 5 megahertz at all times. And therein lies the problem – were Gemtek to design its CPE with an ATPC override that maintains average EIRP above 2 watts per 5 megahertz at all times, the device would violate the unambiguous mandate of Section 27.50(a)(2) that fixed WCS CPE be designed to “operate with the minimum power necessary for successful communications.”*

Yet, it would be inconsistent with the Commission’s objectives in adopting the *WCS/SDARS Report and Order* to conclude that since ATPC can result in operations with an average EIRP of 2 watts or less per 5 megahertz, outdoor antennas should not be permitted. In the *WCS/SDARS Report and Order*, the Commission unequivocally recognized that “continuing to allow WCS fixed CPE devices to use up to 20 W per 5-megahertz peak EIRP will enhance the provision and quality of service in rural areas, where subscribers are often located significant

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<sup>1</sup> Amendment of Part 27 of the Commission’s Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band, *Report and Order and Second Report and Order*, 25 FCC Rcd 11710 (2010) [“*WCS/SDARS Report and Order*”].

<sup>2</sup> See, e.g., *id.* at 111712-13 n. 5; *id.* at 11744.

<sup>3</sup> *Id.* at 11768.

Memorandum to Jyun-Cheng Chen  
Page 3

distances from WCS licensees' serving base stations."<sup>4</sup> Not surprisingly, the Commission has acknowledged that fixed wireless often depends on the use of outdoor CPE antennas to effectively serve rural areas.<sup>5</sup> Indeed, the very fixed WCS CPE cited by the Commission in the *WCS/SDARS Report and Order* as being so beneficial to consumers – the Soma Networks Inc. SomaPort subscriber device (FCC Identifier AEZ-CPE-310-230) – utilizes an outdoor antenna.<sup>6</sup> When read in context, it is clear the *WCS/SDARS Report and Order* did not intend to ban all fixed WCS CPE connected to outdoor antennas. Yet, that is what will occur unless Section 27.50(a)(2) is interpreted as Gemtek suggests, since no manufacturer can assure that the WCS CPE connected to an outdoor antenna will always transmit with an average EIRP in excess of 2 watts per 5 megahertz while at the same time meeting the requirement to never transmit at more power than necessary.

The only logical interpretation of Section 27.50(a)(2) is that the Commission intended to authorize any WCS CPE that incorporates an outdoor antenna, so long as it is capable of operating with an average EIRP in excess of 2 watts per 5 megahertz, complies with the more stringent 27.53(a)(2) spectral mask, and incorporates ATPC. The alternative -- interpreting Section 27.50(a)(2) to require manufacturers to cripple ATPC so that average EIRP always exceeds 2 watts per 5 megahertz, makes no sense. Such a "solution" would undermine the primary objective of the *WCS/SDARS Report and Order* by creating an operating environment that poses an unnecessary threat of interference to SDARS subscribers. While the Commission has stated that its objective is not to provide absolute interference protection to SDARS, ATPC is an effective mechanism for mitigating interference without jeopardizing the viability of WCS. Requiring fixed WCS CPE connected to an outdoor antenna to transmit in excess of the power levels necessary to maintain effective communications certainly does no favor to SDARS subscribers or others in adjacent spectrum.

Nor would it do any favors to WCS licensees. As the Commission is aware, "ATPC is a feature of a digital microwave radio link that adjusts the transmitter output power based on the

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<sup>4</sup> *Id.* at 11768 n. 334.

<sup>5</sup> For example, the Commission's OBI Technical Paper No. 1, *The Broadband Availability Gap*, acknowledges the critical role that fixed wireless deployments can play in meeting America's broadband availability gap, and recognizes that the economics of fixed wireless service are driven in large part by the use of outdoor antennas that employ gain and are mounted at a favorable location to reach consumers that otherwise could not be served. *See, e.g. The Broadband Availability Gap*, OBI Technical Paper No. 1, at 66 (citing as benefits of fixed CPE "[u]sing large high-gain antennas along with external mounting to decrease building loss and further improve both upstream and downstream data rate and/or increase the coverage area" and "[p]lacing the antenna in a favorable location to achieve line-of-sight or near line-of-sight to reduce path loss"); *id.* at 72 ("Using fixed CPE with directional antennas can result in more than a 75% improvement in spectral efficiency over CPE with omni-directional antennas. More significant is the gain in data rates at the cell edge.")

<sup>6</sup> *See WCS/SDARS Report and Order*, 25 FCC Rcd. at 11768 n. 334.

Memorandum to Jyun-Cheng Chen  
Page 4

varying signal level at the receiver.”<sup>7</sup> ATPC serves many purposes, but protection against intra-system interference is critical.<sup>8</sup> Modern communications systems incorporate ATPC to assure that the signal level from every subscriber is equivalent at the base station receiver, thus avoiding one subscriber’s transmissions from overpowering the others. Were the Commission to require a minimum average EIRP of 2 watts per 5 MHz, the system would have to be designed so that the power of all CPE connected to a base station sector would increase whenever the ATPC is overridden for even one CPE in the sector. The result – more interference within the system, not to mention more potential interference to SDARS subscribers. And, to avoid intra-system interference, control over the transmit power of WCS CPE would have to be transferred from the CPE to the network – something that none of the currently-available standards-based technologies support. Thus, the net result of imposing a 2 watt per 5 megahertz floor on WCS CPE that incorporates an outside antenna is to increase the risk of interference to SDARS, preclude the use of standards-based technologies in the 2.3 GHz band, and increase the costs associated with providing fixed services using WCS. There is nothing in the *WCS/SDARS Report and Order* which suggests the Commission sought that result.

For these reasons, Gemtek respectfully submits that the staff should authorize the WCS CPE at issue, implementing the Commission’s intent to authorize WCS CPE that incorporates an outdoor antenna when such CPE is capable of transmitting with an average EIRP in excess of 2 watts per 5 megahertz, complies with the stringent out-of-band emission limits of Section 27.53(a)(2), and incorporates ATPC.

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<sup>7</sup> *Id.* at 11712-13 n. 5. *See also id.* at 11744.

<sup>8</sup> *See id.* at 11714.