

construction requirements should be specifically targeted towards construction in rural areas or otherwise include a rural component.

D. Relaxed Power Limits

1. Background

39. In the following sections, we propose modifications to our regulations governing power limits and technical specifications for operations in rural areas. In its report, the Spectrum Policy Task Force recommended that in less congested areas (*i.e.*, rural areas) spectrum users should be permitted to operate at higher power levels so long as they do not cause interference and do not receive additional interference protection. Similarly, in the *Rural NOI* we observed that technical and operational rules throughout the spectrum-based services are necessary to facilitate efficient use of the radio spectrum while minimizing the potential for interference among licensees. We sought comment on the degree of flexibility that these regulations afford to providers of spectrum-based services in rural areas.

2. Discussion

a. Part 15 Unlicensed Devices and Systems

40. Unlicensed devices are permitted to operate under Part 15 of our rules at very low power levels. One of the more significant developments in the use of unlicensed devices is the emergence of wireless Internet service providers or "WISPs." Using unlicensed devices, WISPs around the country are beginning to provide an alternative high-speed connection to cable or DSL services. In addition to providing competition to cable and DSL, the record reflects that WISPs have taken root in many rural areas where these services have been slow to arrive.

41. We remain committed to exploring more flexible spectrum policies for rural areas to help foster, where possible, a viable last mile solution for delivering Internet services, other data applications, or even video and voice services to underserved or isolated communities. The record in the *Rural NOI* identifies legitimate issues under our Part 15 policies, such as interference with other Part 15 devices and how to design a framework that reasonably ensures that Part 15 devices operate using different parameters in different locations or under differing RF conditions. Cognitive radio technologies, which permit radio systems to modify their performance in response to such external information, would appear to hold great promise in

resolving such issues. In this connection, we plan to initiate a proceeding shortly to consider how to leverage these technologies to permit more intensive use of spectrum in a number of situations, including possible rule changes that would permit greater use of spectrum in rural areas. In this proceeding, we plan to invite comment on any specific factors that may need to be considered to allow cognitive radios to operate with higher power in rural America. This impending proceeding also will address power limits for the operation of "dumb" or "non-cognitive radio" unlicensed devices in rural areas.

b. Licensed Services

42. Two commenters responding to the *Rural NOI* address the issue of whether we should modify our regulations to permit increased power levels in the context of mobile voice systems. South Dakota Telecommunications Association (SDTA) points out that higher power levels could reduce the number of transmitters required to connect stretches of roadways between small rural towns and to serve ranches and farms beyond the highways, but cautions that while it may be feasible to increase power and still safeguard urban and suburban operations, such safeguards must include "clear-cut interference definitions and protections." CTIA, however, argues that an increase in base station power levels would not improve matters unless mobile station (*i.e.*, handset) power levels are increased as well. CTIA contends that it is unlikely that handset manufacturers would make special "high power" handsets for rural areas.

43. Increasing the range of radio systems is one means of making it more economical to provide spectrum-based radio services in rural areas by potentially lowering infrastructure costs. One way to increase the range of radio systems is by increasing power levels. While there may be challenges in implementing increased power levels for cellular-like mobile systems, we would like to further investigate whether power increases may be beneficial for other mobile or fixed services. In doing so, we must consider increasing power levels in rural areas in the context of base/mobile systems, point-to-point systems, and point-to-multipoint systems. Base/mobile systems (*e.g.*, cellular, PCS, SMR, private land mobile) consist of a base station antenna intended to provide coverage over a specific area, and the mobile units that communicate with the base station. The base station operates at a sufficient power level to cover the

desired area, while the battery-powered mobile units operate at relatively low power. The ability of the base station to reach a mobile unit is limited by, among other things, transmitter power, the propagation characteristics of the frequency band, antenna directionality (gain), antenna height, terrain, clutter, man-made obstructions, and the sensitivity of the mobile unit receiver. As stated above, there are challenges related to increasing power levels. First, increasing the base station power may cause unacceptable levels of interference to nearby systems. Second, simply guaranteeing that a mobile unit can "hear" the base station, however, is not sufficient for two-way communications. The low power mobile unit, which is likely located close to ground level, must also be able to return a signal to the base station antenna, *i.e.*, the base station must be able to "hear" the mobile unit. One can observe that, at the fringe of the base station coverage area, the most significant limiting factors to two-way transmissions are the power level and the location of the mobile unit. Thus, merely increasing the base station power level may not improve the communications range unless the mobile unit is capable of returning a signal to the base station antenna.

44. It is instructive to provide examples of the likely results of increasing base station power for specific types of base/mobile systems. Because received signal levels decrease exponentially as the receiver moves farther from the transmitter, we would expect that relatively large increases in power would yield only small increases in communications range. In the case of a rural 800 MHz cellular system, we found that increasing the base station power by 10 percent (500 W ERP to 550 W ERP) and 20 percent (500 W ERP to 600 W ERP) increased the base station range by 1.5 km (0.93 mi) and 3 km (1.86 mi) respectively. We note, however, that our calculations show that a typical 0.5 W ERP mobile unit would not have sufficient range to reach the base station from the edge of the base station coverage area regardless of whether the base station power is 500 (maximum under the rules today), 550, or 600 W ERP. Similarly, in the case of a rural 1,900 MHz PCS system, we found that increasing the base station power by 10 percent (1,640 W EIRP to 1,804 W EIRP) and 20 percent (1,640 W EIRP to 1,968 W EIRP) increased the base station range by 1 km (0.62 mi) and 2 km (1.24 mi) respectively. We note, however, that our calculations show that a typical 0.8 W EIRP mobile unit