

transition of television from analog to digital service? For example, as part of the transition process, television stations may be switching channels and modifying their service area. How can we ensure that unlicensed operation does not cause interference when stations make such changes or when new DTV stations commence operation?

- How would new unlicensed devices affect the ability of broadcasters to provide ancillary services such as data after the digital transition?

8. The part 15 rules require unlicensed transmitters to meet technical requirements to ensure that they will not cause interference to authorized users. The types of requirements that must be met typically include in-band and out-of-band power or field strength limits, and may include other requirements such as bandwidth, power spectral density, frequency stability, and antenna gain. As noted above, there are several authorized users of the TV bands that must be protected from interference from unlicensed devices. Analog and digital TV stations must be protected from interference. Low power TV and TV translator stations have defined protected service contours. Low power auxiliary stations such as wireless microphones and wireless assist video devices on TV channels do not have defined protected contours, but unlicensed devices are not permitted to cause interference to them. PLMRS and CMRS base stations are assigned within 50 miles of the center of the cities where they are permitted to operate in the 470–512 MHz band, and mobile units must be operated within 30 miles of their associated base station or stations. In addition to these authorized users, unlicensed medical telemetry transmitters are permitted to operate on channels 7–46, although the Commission has allocated bands where such transmitters can operate with protection from interference. The Commission seek comment on the following questions concerning the necessary technical requirements for unlicensed transmitters to prevent interference to TV reception and other authorized services within the TV bands.

- What power and/or field strength limits are necessary for unlicensed transmitters within the TV bands to prevent interference to TV reception? Could unlicensed devices operate in TV bands with a power greater than the 1 watt maximum permitted for part 15 devices in the ISM bands or power greater than the general part 15 limit?

- What separation distances or D/U ratios should be established between unlicensed devices and the service of

analog, digital, Class A and low power TV and TV translator stations? What assumptions should be used to determine these protection criteria? Should TV stations be protected only within their grade B or noise limited service contours, or should unlicensed devices be required to protect TV reception from interference regardless of the received TV signal strength? Is protection necessary only for co-channel and adjacent channel stations? What special requirements, if any, are necessary to protect TV reception in areas where a station's signal is weak? Would minimum performance standards for receivers facilitate the sharing of TV spectrum with unlicensed devices?

- What technical requirements are necessary to protect other operations in the TV bands, including the PLMRS and CMRS in the areas where they operate on TV channels and low power auxiliary stations such as wireless microphones and wireless assist video devices? Could technical requirements be developed that would allow unlicensed devices to co-exist with new licensed services on former TV channels 52–69? Should unlicensed transmitters be required to protect unlicensed medical telemetry transmitters operating on TV channels 7–46 from interference?

- What requirements, if any, are necessary to prevent interference to coaxial cable or other multi-channel video service providers using the TV bands or to prevent interference to TVs, VCRs and set-top boxes caused by direct pickup of signals from unlicensed devices?
- Should any antenna requirements be imposed? Can technologies such as “smart antennas”, which automatically change their directivity as necessary, assist unlicensed devices in sharing the TV bands? Should unlicensed devices be required to use an integrated transmitting antenna and be prevented from using external amplifiers and antennas?

9. In addition to meeting power and/or field strength limits, we believe that an unlicensed device operating in the TV band should have certain capabilities to avoid causing interference to licensed services. Specifically, an unlicensed device should be able to identify unused frequency bands before it can transmit. One possible approach would be for a device to monitor portions of the spectrum where it could operate, identify a frequency band that is not being used, and then transmit in the frequency band identified. A device should also have to be able to avoid tying up a frequency in the event a

licensed user wishes to commence transmissions. We seek comment on the following questions concerning the capabilities that unlicensed devices operating in the TV broadcast bands should have.

- What are the specific capabilities that an unlicensed transmitter should have to successfully share spectrum with licensed operations in the TV broadcast band without interference? Are there transmission protocols that could enable efficient sharing of spectrum?

- Could GPS or other location techniques be incorporated into an unlicensed device so it could determine its precise location and identify licensed users in its vicinity by accessing a database? Would such an approach be reliable, and could it be combined with other methods to prevent interference to licensed services? What specific methods could be used to protect low power auxiliary stations such as wireless microphones that are not listed in a database?

- Once an unlicensed device commences transmissions on an open frequency, how can it ensure that interference will not be caused to a licensed user of that frequency who wishes to commence transmissions? Is there a mechanism that can avoid such “collisions” or mitigate their effect? For example, should these devices have limited “duty cycles” in a given frequency band?

- Is frequency agile equipment, as well as the protocols to enable efficient frequency sharing, feasible in the near-term?

- How could the Commission enforce any rules that may be adopted for unlicensed devices to ensure that such devices do not cause interference to authorized users of the TV bands?

- Is it necessary to establish any standards to allow sharing between unlicensed users of the TV bands? If so, how do we arrive at standards and what process should be put in place to make certain that the standards remain current and support innovation?

Unlicensed Operation in the 3650–3700 MHz Band

10. Another possible candidate band we have identified for expanded unlicensed operation is the 3650–3700 MHz band (“3650 MHz band”). The 3600–3700 MHz band was previously allocated for use by the Federal Government on a primary basis for radiolocation services, and for non-government use in the Fixed Satellite Service (FSS), limited to space-to-Earth transmissions in international inter-continental systems.” Pursuant to the