Suggested Technical Rules and Regulations
for the Use of Television White Spaces

Frequently Asked Questions

Question 1: How can regulators have confidence that incumbents will be protected?

Answer: The model rules discussed here were designed with the primary goal of protecting incumbents while enabling access to additional spectrum. The rules contain a number of mechanisms to ensure that devices do not interfere with incumbent operations: For example, in the case of client devices, they cannot communicate unless they receive permission from the master. Similarly, devices must shut down if they are required do so by either a database or the regulator. There are also requirements placed on the database administrators to ensure that database communications are secure. Moreover, practical experience has demonstrated that TV white spaces technology works without causing interference. The technology has been the subject of tens of pilots, and to DSA's knowledge, no cases of interference to incumbents were reported.

Question 2: In some countries, a database might not be able to connect to the Internet every week, as required by the rules. What happens if the database cannot connect to the Internet in that time frame?

Answer: The time validity requirements in the rules mirror the requirements proposed by the FCC. However, a regulator could easily choose to change the timescales set forth in the rules. So long as the time validity communicated by the database to the device is limited and a device is required to re-check the database when the time validity expires, incumbent operations should not be at risk. However, if the regulator chooses to extend the time validity of operations, it should nevertheless encourage the database to opportunistically contact the regulator as necessary. For example, even if the rules say that a database must check for new incumbent operations every seven days, we recommend that device do so every day, so that every time it contacts the regulator, it receives a new seven-day window for authorized operations. The same logic should apply to devices.

Question 3: Who performs database calculations?

Answer: Regulators have taken different positions on this question. The DSA believes that multiple entities should be able serve as database administrators and that those database administrators should perform database calculations. Regulators should have a role in certifying devices to ensure that they meet the requirements set forth in the rules. Otherwise, competition among database providers should prevail.

Question 4: In some jurisdictions or areas, there are extremely few incumbent broadcast operations. In such circumstances, why use a database or sensing at all? Why not just draw an exclusion zone around the key incumbents and allow operation everywhere else?

Answer: DSA favors the approach in the rules for three reasons: First, it provides flexibility. It may be the case that there is only one incumbent broadcaster in a city, but if another one is added, then either a database or a sensing device can protect the new incumbent rapidly. By contrast, relying on a change in regulations to do so would likely be a more cumbersome process. Moreover, relying on a database allows flexibility to accommodate future changes in spectrum allocations, including, for example, the digital television transition. Second, relying on a database or sensing allows jurisdictions to take advantage of economies of scale. Most localities will have a sufficient number of incumbents such that an automated method of protecting them will be needed. As a result, a regulatory approach that allows jurisdictions to tap into this global market is preferred. Third, it is likely that there will be more incumbents in urban, rather than rural markets. Excluding devices from urban markets decreases the incentive to invest in new and innovative technologies by limiting the number of potential users. Thus, rules or exclusion zones that limit the reach of devices into urban markets are likely to limit the potential of the technology and limits the benefits to be gained from deploying it.

Question 5: How does the digital television transition (DTV transition) affect the adoption of TV white spaces rules?

Answer: TV White Spaces use can be implemented before the DTV transition takes place and still preserve the ability to go forward with the transition. In many places, there is significant spectrum available right now, and significant spectrum will continue to be available even after the transition. Moreover, TV white spaces technology is specifically designed to adapt to changes in spectrum availability -- information regarding new incumbent users will either be incorporated in the database or sensed by the device, thereby ensuring seamless protection of incumbents.

Question 6: Why do the rules rely on terrain-based propagation models?

Answer: Point-to-point, detailed-terrain-based propagation models provide the most accurate depiction of broadcast signals as they are transmitted over land. Because these models are the most accurate, they enable the most effective protection of incumbent operations.

By contrast, the FCC's white spaces rules rely on the F(50,50) curves propagation model to protect incumbents. This model calculates a circular contour around each incumbent installation, regardless of the terrain in and around the transmitter location. This approach can lead to both over-protection and under-protection. Over-protection typically occurs because the

F(50,50) curves approach does not take into account the fact that broadcast signals cannot pass over mountainous territory.

Question 7: How does a database determine what channels are available for its use?

Answer: In general, a database takes information about incumbent operations, local terrain, position of a master device, the height of transmitting antenna and information regarding the device's emissions mask and uses this information to calculate the channels on which the device can operate and at what powers. For example, a device might communicate to the database that is in a particular location, using an antenna that is 10 meters above ground level, and give the classification of its mask under the ETSI certification. The database would already have information regarding incumbent operations in the vicinity and the maximum power levels that could be used in that location without interfering with the incumbents. The database would then communicate to the device what channels could be used based on the device's own characteristics. For example, if a device has significant out-of-band emissions, it might be restricted to fewer channels than a device that has superior performance. In this way, protection of incumbents is ensured even as device characteristics might vary. Devices that have the ability to modify their emissions profile may eventually be certified. In such cases, a database would provide absolute maximum power levels for each channel to the device, and the device would adjust its operations to fit beneath that ceiling.

However, devices that meet the certification processes already established by the FCC and by ETSI will likely follow the first course outlined above, wherein the device provides its emission information to the database, and the database calculates channel availability. Going forward, device manufacturers have an incentive to build devices that contain the latter capability in order to maximize the spectrum available to them. This will also benefit the ecosystem as a whole because it will allow improved spectrum utilization.

Question 8: How do these model rules compare to rules adopted in other jurisdictions (e.g., United States, United Kingdom, Singapore)?

These model rules adopt basic elements common to all jurisdictions that have adopted TV white spaces rules as of early 2015. For example, the rules propose a license-exempt framework and rely on geolocation databases, among other methods, to avoid interference to incumbents. Beyond that, the rules try to take the best learnings from each jurisdiction while avoiding features that are country-specific. For example, Ofcom's approach, which calculates protection of broadcasters based on the location of television receivers, rather than television transmitters, could not be used in most countries because most regulators do not maintain records regarding the placement of receivers. Similarly, in the United States, radio astronomy use is protected in broadcast channel 37, but that use of channel 37 is not common globally, so the model rules do not specifically account for it.