

71-95 GHz Registration — ‘Light’ Licensing with Interference Protection

By Laura Fontaine

Gigabit data access is here. In last year’s rulemaking, the FCC allocated 12.9 gigahertz of spectrum in the 71-95 GHz range for high-quality multi-gigabit point-to-point communications. Calling the rulemaking a “creative solution to spectrum access, [that] will enable new companies to join and compete in the larger market for broadband services,” the FCC recognized that the 71-76 GHz, 81-86 GHz, and 92-95 GHz bands were undeveloped and should be made available for new uses. It’s also notable that these bands are the highest frequency bands yet licensed by the FCC.

The new bands are open to all types of users including commercial carriers, utilities, the federal government, public safety agencies, and other mission-critical applications. Possible uses for these bands include a fiber substitute for last-mile connectivity, local loop access, central office bypass, high-capacity backhaul, and local, metro, and wide-area network access. According to Cisco Systems, fiber connects only 5 percent of roughly 750,000 commercial buildings that will need fiber-speed access. The company further says that 75 percent are within a mile of a fiber access point.

Enter 71-95 GHz. Links in these bands operate at approximately a one-mile range and are characterized by their highly directional “pencil beams.” These characteristics allow for excellent frequency reuse since systems can be engineered to operate

in close proximity to one another without causing interference. Thus, the FCC adopted a non-exclusive nationwide licensing approach for these bands. The approach allows for an unlimited number of nationwide licenses. After obtaining a nationwide license, however, licensees must also register their individual point-to-point links.

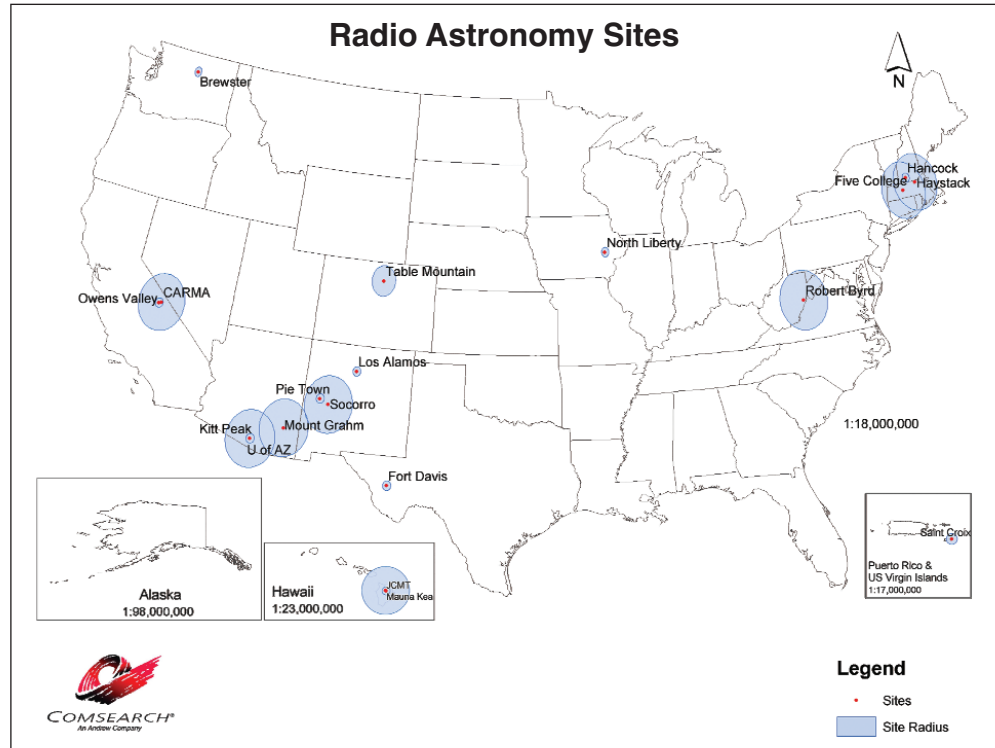
Rather than mandating a traditional coordination and licensing approach, the FCC defined a unique link registration process through a shared industry database. The registration process allows for “light” licensing, which is less burdensome and quicker than the typical FCC licensing process, providing for instant registration in most cases.

The Rulemaking

In September 2001, Loec Communications, after experimenting with

technology for these bands, filed a formal petition to the FCC requesting spectrum for licensed use in the 71-76 GHz and 81-86 GHz bands. The petition received strong support from the wireless community and in June 2003, the FCC issued a notice of proposed rulemaking (NPRM) that proposed designating the bands for unlicensed use. Nearly all responses to the NPRM strongly opposed the unlicensed designation in favor of a licensed approach, recognizing that the bands would be used for high-capacity, high-reliability, highly critical data links. An unlicensed scheme could potentially compromise these aims.

In November 2003, the FCC released a report and order (R&O) establishing service rules for use of the 71-76 GHz, 81-86 GHz, and 92-95 GHz bands on a shared basis with federal government operations. The



R&O also required all non-federal government links to be registered in a third-party (non-FCC) database on a first-in-time basis. The FCC outlined the responsibilities of a database manager and stated its intention to solicit proposals from interested parties through a public notice.

In March 2004, the FCC issued that public notice seeking proposals to develop and manage an independent database of site registrations by licensees, subsequently designating three database managers.

In February, the FCC ruled on a petition for reconsideration filed by the Wireless Communications Association International, Inc. (WCAI). WCAI provided a forum for industry-leading companies such as Cisco Systems, Comsearch, Gigabeam, Loea, Terabeam, etc. to “fine tune” the service rules to make the band more commercially viable. The petition underscored wide industry support for the announced rules, but made recommendations to change rules regarding interference with prior users, frequency channelization, power density, interference criteria, and authorization for conditional operation. Key elements of the ruling are:

- a requirement for upfront interference analysis with other commercial links to address interference concerns prior to operation;
- elimination of an eight 1.25-gigahertz channel plan and reduction of channel loading to 0.125 bps/Hz, allowing for simpler modulation schemes;
- reduction of the minimum antenna gain to 43 dBi and increase of the maximum beamwidth to 1.2 degrees, allowing for smaller antennas; and
- a power spectral density requirement of 150 mW/100 MHz to prevent high power in narrow bandwidths.

This much-anticipated decision acknowledged the need to address potential interference problems during the registration process rather than reacting to problems once the

link is operational. It also provided added flexibility in the design of the radios and antennas.

Database Managers

According to the rulemaking, the role of database managers is to develop and manage the link registration database; coordinate with federal government links through NTIA; determine if links are subject to FCC Form 601 filing requirements; provide access to the database to anyone at any time; and administer interference protection procedures based on first-in-time registration.

Possible uses for these bands [71-95 GHz] include a fiber substitute for last-mile connectivity; local loop access; central office bypass; high-capacity backhaul; and local, metro, and wide-area network access.

The three FCC-designated database managers administer the new link registration system. Each database manager develops and maintains its own registration database, and link information is shared among all three. The link data is available for querying and viewing by anyone through each database manager’s Web site, but is not included in the FCC’s ULS database.

The Database and the Process

The registration process is conducted online. The database provides upfront interference analysis with existing commercial systems as well as automatic coordination with federal government systems through

the NTIA. The process was developed to make link registration quick and easy. Prospective licensees first enter the technical parameters of their link. The registration system then conducts a quick yet detailed interference analysis and identifies potential interference conflicts. Licensees can make changes to their system as necessary to mitigate interference.

WCAI, through a working group made up of NTIA and the same companies involved in their reconsideration petition, created a Path Coordination Guide. The guide includes interference criteria and suggests procedures on how to handle interference calculations, considering the unique characteristics of the bands.

Once the link is submitted for registration, it is assigned a date/time stamp, which establishes first-in-time interference-protection rights. The system then performs three checks required by FCC Rule 101.1523(c):

1. *Environmental assessment* uses the licensees’ input indicating whether an environmental assessment per FCC Rule 1.1307 is necessary.
2. *International coordination* identifies any sites needing international coordination using FCC Rule 1.928(f) requirements for distance from the border, based on antenna pointing azimuth.
3. *Radio astronomy/quiet zones* identifies sites located within any of the radio astronomy or quiet zones listed in FCC Rule 1.924. There are 18 radio astronomy observatories located throughout the United States, each with a predefined protected radius. Only sites transmitting in the 81-86 GHz and 92-95 GHz bands require coordination with the observatories.

If any of these checks requires further analysis, licensees will need to file FCC Form 601, Schedule M in order to complete registration. There are no FCC fees associated with filing this form.

The system also determines if an

FAA Antenna Structure Registration (ASR) is required for any site, based on the antenna's height above ground level (or above the roof of the building) and proximity to airport runways.

Finally, the system automatically submits link parameters to the NTIA to analyze against existing federal government links in the area. The NTIA assessment results are returned immediately, and licensees receive either a green or a yellow light indicating whether the proposed link potentially interferes with federal government users, including radio astronomy observatories. A green light indicates the link has been successfully coordinated; if a yellow light is returned, the user must file FCC Form 601, kicking off a more detailed determination of whether there is a conflict. The NTIA and FCC conduct this analysis through an established process that could take several weeks to complete.

When all criteria are met, the

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registration is complete and the 12-month construction period begins.

Interference Mediation

If a licensee experiences interference, they should immediately contact a database manager. This is when the first-in-time registration comes into

play: Based upon the date/time stamp in the database, it is the responsibility of the later-filing licensee to immediately resolve any reported interference. The database manager will verify first-in-time dates and help the licensees work out a solution.

The FCC has broken new ground in allocating this spectrum. Not only is this the highest spectrum ever allocated, it offers the greatest bandwidth (up to five gigahertz), and includes a unique industry-managed device-registration regime. This streamlined licensing process will allow for quick-and-easy link analysis and registration while protecting existing links from interference. Indeed, gigabit data access is only a click away. ■

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