The Benefits of "Light Licensing" for E-Band Wireless Systems

By Jonathan Wells, PhD

The 71-76 and 81-86 GHz bands (widely known as "e-band") are permitted worldwide for ultra high capacity point-to-point communications. Wireless regulators in the USA, UK and many other countries have introduced "light licensing" schemes for managing this band. These innovative licenses retain the benefits of full interference protection that a wireless license guarantees, but can be applied for in minutes and at costs of a few tens of dollars per year. This is significantly faster and cheaper than traditional licensing, making e-band an attractive alternative to existing licensed wireless technologies.

The "Light Licensing" Principle

Systems operating at the e-band frequencies have two unique characteristics not experienced by conventional lower frequency devices. Firstly, the high operational frequencies of e-band systems make antennas highly directional, meaning systems communicate via highly focused "pencil beam" transmissions. Secondly, the 71-76 and 81-86 GHz frequency bands are configured as two single channels, meaning traditional frequency planning does not need to be considered. Together, these two unique properties of e-band systems enable operators to realize networks with a high degree of frequency reuse, even configuring links close to one another without interference concerns.

The national wireless link regulators and administrators in many countries have recognized that these characteristics vastly simplify the licensing process. With no frequency coordination and much simplified interference analysis, the burdensome traditional link licensing schemes are not necessary. Innovative streamlined processes have been introduced that enable links to be applied for in real time, and interference analysis and link approval to be realized in minutes. Because administration is vastly reduced, the cost of such "light licenses" has been dramatically reduced, encouraging adoption of competitive high data rate services at the e-band frequencies.

It is important to note that despite the name "light licensing" the possession of such a license still gives the link operator the same full benefits of a traditional link license, including link registration, "first come first served" rights, and full interference protection.

E-Band "Light Licensing" in the USA

The e-band "light licensing" scheme implemented by the FCC in 2005, enables links to be registered for just $75 in a few minutes over the Internet.

To be able to apply for individual e-band link licenses, the applicant needs to first file to be a nationwide licensee with the FCC. This application takes one or two weeks, and carries a $645 filing fee. Once approved and issued a call-sign, the licensee can register for any number of individual e-band link in the USA and its territories.

Application for an e-band license is via the website of one of three database managers. The FCC has selected Comsearch, Micronet Communications and Frequency Finder[1] as managers of the link registration process and custodians of a central e-band link database. Registration involves simply logging onto any one of the three database manager's websites, entering the user's call sign, and inputting a few technical link parameters including longitude, latitude and height of each end site, antenna size, transmission power and some additional standard wireless equipment parameters.

A four step analysis is then undertaken. First the database manager assigns a time and date stamp to the application, to resolve any future time-based conflicts. Secondly, an automated interference analysis is conducted against other closely located links to identify any possible interferers. After this, a check is made to ensure the link does not violate any of three specific FCC-imposed rules; risk of international cross-border transmission, proximity to radio astronomy quiet zones or violation of special antenna rules. Finally, system parameters are passed to the NTIA for final interference analysis against undisclosed military and government links in the area. Assuming no problems are encountered, this completely automated procedure takes about 15 seconds.

After successful analysis of the proposed link, the user is advised that link registration is complete and electronic payment for the license is requested. Given there are competing database managers, processing fees are kept low. Currently, individual link registrations are $75 for the duration of the license up to 10 years.

If there is an issue with the license application, the user is advised of the problem and is requested to manually file a registration with the FCC. This further process could take several weeks, but does not incur any additional FCC fees.

E-Band "Light Licensing" in the UK

In the UK, the 71-76 / 81-86 GHz bands are available under a similar "light licensed" process, with point to point fixed wireless licenses obtained rapidly and at a low cost – currently £50 per year.

[1] See www.comsearch.com, www.micronetcommunications.com and www.mmradioforms.com.

Currently, Ofcom administers the e-band frequencies under an interim manual licensing and link registration processes. The basic process is similar to that in the USA. First the applicant has to apply to Ofcom to become a nationwide licensee. After approval, the licensee can apply for any number of individual link licenses. A form containing equipment parameters and site information is submitted to Ofcom for each individual link. The annual cost per e-band license is £50 per year, and link licenses are approved within 7 days of receipt. Ofcom updates the e-band database on its website every week. Ofcom is developing a permanent web-based tool to automate this entire process.

Besides the currently manual process, the main difference between the UK and US systems is that the UK licensing process does not perform an interference analysis. Ofcom believe that the highly directional pencil beams transmissions make the risk of interference small, and so requires links to be self-coordinated by the applicants. A process is established whereby links are time and date stamped, and in the unlikely event that interference were to occur, priority is given to the first link installed and the most recent link is required to be reconfigured or modified to eliminate the interference.

Summary

The e-band frequencies are permitted worldwide for ultra high capacity point-to-point communications. Wireless regulators in the USA and UK have moved early to offer innovative, streamlined "light licensing" schemes that provide the registration, coordination and interference protection benefits that a wireless license guarantees, but at a cost and application time significantly lower than traditional wireless licensing. Many other countries are following the US and UK lead and introducing similar licensing schemes for their countries, to enable high-capacity cost-effective e-band wireless communications within their countries.

About E-Band Communications

E-Band Communications Corporation was established to provide multi-gigabit capacity wireless communication systems based on e-band millimeter-wave radio technology. E-Band Communication's systems solve last mile access bottleneck problems – connecting enterprises to fiber networks, and enabling backhaul of mobile (3G/4G) and fixed wireless (WiFi, WiMax) networks. More information can be found at www.e-band.com or by calling +1 858 790 7202.

E-Band Communications is an approved nationwide licensee for e-band links, and so can assist and even register links on behalf of its customers.