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The new 700 Club

700 MHz: Chopped, Channeled, On The Block

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In case you just got back from a vacation in Timbuktu, we are happy to inform you that the much-ballyhooed 700 MHz auction rules took a big step toward their final form last month.

It's been said that a camel is a horse built by a committee. If that's true, the 700 MHz rules are a herd of camels. The subject of intense lobbying by some of the biggest corporations in America, these rules seem to have been calculated to disappoint almost everyone. But by giving everyone only about 35% of what they asked for, the FCC may have made the spectrum sufficiently unattractive to prospective bidders to dampen enthusiasm considerably. Interestingly, the ostensible biggest winner, public safety users, may end up as the biggest loser. Let's look at some of the highlights with our usual jaundiced eye.

Smaller carriers had urged the FCC to restructure the geographic size of the areas to be licensed because, as originally proposed, the license territories were so vast as to be affordable only by the hugest companies. The FCC sort of complied by making one additional paired (2 x 6 Mhz) CMA-sized block available right next to another CMA-sized block which had been auctioned several years ago. But this is the *only* CMA-sized block they authorized.

They also authorized one paired (2 x 6 MHz) and one unpaired (6 MHz) block in EA size. (There are about three EAs to a state.) This development should have pleased small carriers, except that the FCC then went on to encumber the large territorial blocks so much

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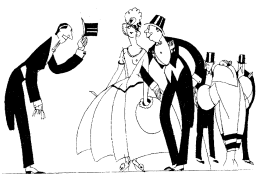
Paging Emily Post

Herding Cats: FCC Mulls Unlicensed "Etiquette"



By Mitchell Lazarus
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Quixotically seeking order amid intractable chaos, the FCC has proposed a "spectrum etiquette" in certain bands heavily used for unlicensed communications. The term "etiquette" here has little to do with picking the right fork (see related article on Page 2), but rather is similar to its near-synonym "protocol" in telecommunications. Both words refer to pre-arranged steps for setting up a communications link, although an etiquette tends to be less interactive.

The FCC permits unlicensed operation at nearly all frequencies, mostly at very low power. Three bands, however, are earmarked for the relatively high power of one watt: 902-928 MHz, 2400-2483.5 MHz, and 5725–5850 MHz. The first two are congested and getting worse. Collectively these house most of Wi-Fi, all of Bluetooth, ZigBee, other industrial controls, active RFID, meter-reading equipment, wireless Internet access, amateur radio, and various other licensed services, not to mention countless consumer goods: microwave ovens, cordless phones, nursery monitors, wireless audio gear, and much more. A typical home might have half a dozen or more unlicensed devices in these two bands.

The Teeming Millions

The FCC regulates unlicensed devices mostly on their overall properties, as by setting maximum power and minimum bandwidth. With exceptions, the rules are silent on the details of operation. Yet, despite the near-lawless environment and vast numbers of users, unlicensed communications work pretty well. Manu-

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Paging Emily Post, Part Deux

Spectrum Etiquette Hath Charms to Soothe the Savage, er, Bosom

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As reported elsewhere in this issue (*see* article on Page 1), the FCC is considering applying "spectrum etiquette" rules to the 900 MHz band and possibly other unlicensed spectrum. Somehow the notion of spectrum etiquette calls to mind images of white-gloved spectrum users placing doilies under their equipment racks and bowing and curtsying to each other before initiating transmissions. "Please, my good sir, after you." "Tut, tut. I wouldn't dream of it. After *you*." "No, no, after *you*!" And so on.

Given the usual smashmouth, rough and tumble, elbow-in-the-kidney atmosphere of the electromagnetic school yard, this call for genteel civility is both slightly comic and very welcome. It's not simply a matter of the FCC proposing to rap our knuckles with a ruler while telling us to sit up straight. As our maiden aunts would have taught us if any of us still had maiden aunts, etiquette is just a formalized protocol for dealing with other people respectfully, thoughtfully and graciously. Depending on whether you take a dim Hobbesian or glowing Rousseauian view of human nature, etiquette either restrains our usual savage, selfish and brutish impulses or reflects our fundamental kindness and cooperativeness toward other living creatures. Normal day-to-day human interactions are at once simplified, softened and expedited by the quaint expedients of please, thank you, you're welcome, and after you.

Cellular carriers found in the 1990's that when the FCC permitted service areas to extend over license boundaries into adjacent territories, the expected chaos did not occur. Instead, neighboring carriers found that they had to cooperate and coordinate with each other to avoid mutually harmful interference. Self-interest led to what looked suspiciously like actual consideration for others. So maybe there is something to be said for plain old politeness as a device for sharing a common resource fairly among competing users without the FCC having to referee the interactions.

And thank you so much for your kind attention.

It's already Fall, 2007 -
Do you know where your proceedings are?

Due dates for filings in FCC proceedings are subject to last-minute change. Call us any time for current information.

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Roamers of the world, unite!

Section 214 Certificate Needed For International Roaming

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This summer, in a rather unheralded order, the FCC wrapped up a proceeding it had initiated in March of 2004 to consider reforms of the rules governing some aspects of international communications. The world of mobile communications used to be almost entirely a domestic affair, but increasingly U.S. carriers must be aware of the arcane rules applicable to international communications. Of most significance to CMRS carriers was the FCC's determination that roaming is a "telecommunications service" which, under certain circumstances, requires prior FCC authorization before it can be engaged in.

Many customers these days take their cell phones with them when they go to foreign countries, and, though the roaming fees can be quite steep (something the European Union has been trying to rectify), these customers have usually been able to place phone calls without regulatory alarms sounding. Roaming has historically fallen into a regulatory limbo, since some people view it as a mere billing arrangement, others as a telecom service provided by the foreign carrier, and others as a telecom service provided by the home carrier. So it's been unclear whether any authorization at all was necessary to provide roaming or, if so, who had to obtain it.

The FCC has now come down squarely in camp Number Three. Under the ruling in Docket 04-47, the provision of roaming to a U.S. carrier's customer abroad is actually a service provided by the home carrier. Because CMRS (and other) carriers must have a so-called "Section 214 certificate" in order to provide international telecommunications services, CMRS carriers must have such a certificate if they permit their customers to roam internationally.

Given the previously prevailing confusion about this issue, many CMRS carriers had not bothered to ob-

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FCC Pans M2Z Plans

No-Cost National Net Nixed

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The FCC took the air out of a proposal that had been gaining steam for nearly 16 months on August 31, issuing an *Order* dismissing M2Z's applications to provide free, nationwide wireless service and denying its petitions for forbearance associated with two of the applications. The Commission simultaneously rejected a similar proposal from NetFreeUS.

M2Z, a startup fronted by former Wireless Bureau Chief John Muleta, boasted $500 million in financial commitments to build a nationwide wireless "free, family-friendly" broadband network in the 2155-2175 MHz band. The company sought an exclusive 15-year license to construct its network outside the parameters of the Commission's regular rulemaking process. In exchange, M2Z would deposit a portion of its revenues into the U.S. Treasury.

The proposed network was to include a reception device that would filter out material deemed to be pornographic, obscene or indecent. The baseline speed for service would be three megabits per second.

The M2Z plan would give users the capability to upgrade to a premium service which would allow users to dispense with the otherwise mandatory content filters, and would support faster speeds (the proposal did not indicate how much these plans would cost).

The Commission dismissed M2Z's applications, stating that they were not in the public interest. While a nationwide, free wireless network would be a tremendous benefit to the country, the Commission did not feel it was appropriate to grant forbearance from the Commission's competitive bidding requirements. The Commission also expressed reservations about the slow speed that M2Z proposed to offer in its free service, and construction benchmarks which the Commission deemed not "particularly aggressive."

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U-Turn for U-Verse

Court: AT&T IPTV is "Cable Service"

Contrary State PUC Holding Reversed

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In recent years, as competition has increased between traditional cable TV operators and newer telephone company providers of video service, one important regulatory issue that has arisen is whether Internet protocol multichannel video services (IPTV) constitute "cable services" under federal law, and thus are subject to a panoply of federal, state and local regulation of cable services. Recently, the Federal District Court of Connecticut ruled that AT&T's IPTV "U-verse" video service is indeed a "cable service" and thus subject to cable regulatory requirements. While this decision does not directly apply anywhere outside of Connecticut, it may be persuasive on other courts and/or public utility commissions that are grappling with the issue of whether IPTV systems are "cable" systems for the purposes of cable regulations.

Do Internet protocol multichannel video services (IPTV) constitute "cable services" under federal law? One court says "yes".

The case arose after the Connecticut Department of Public Utilities ruled that U-verse is *not* a cable system. A cable operator association sought review of that decision in federal court.

The Court's analysis is strictly driven by the definition of "cable service" in the Communications Act, and the legislative history surrounding that statutory language. The Act defines "cable service" to be "(A) the one-way transmission to subscribers of (i) video programming, or (ii) other program service, and (B) subscriber interaction, if any, which is required for the selection or use of such video programming or other programming service."

AT&T's core argument was that U-Verse involves so much subscriber interaction that it is fundamentally a two-way technology, as opposed to the one-way technology contemplated in the statute's definition of cable service. AT&T made much of the fact that there is constant dynamic interaction between the subscriber's box and the AT&T network, even just in changing channels (*i.e.*, that an individual stream of programming is sent each time the subscriber changes the channel and signals are sent upstream from the set top box, rather than mere selection from all of the programming which is sent downstream at the same time in a traditional cable technology).

The Court disposed of this argument by showing that the key issue under the Act is whether the *video* streaming is one-way or two-way, since the definition in the Act refers to "the one-way transmission to subscribers of video programming…." AT&T conceded that the video flow in U-verse is only one-way, downstream to the subscriber. The Court then pointed to extensive legislative history which shows that Congress contemplated the possibility of extensive subscriber interaction and selection of programming being sent upstream, even within a service that meets the definition of cable service.

The Court noted that the subscriber interaction in U-verse is limited to: (1) turning the set top box "off" or "on"; (2) selecting from tiers of programming controlled by AT&T and made available to all subscribers of those tiers; or (3) selecting from a list of pay-per-view or video-on-demand programming controlled by AT&T. All of this appears to be "required for selection or use of the programming" as contemplated in the Act, and consistent with examples set forth in the legislative history, and is no different than operations on traditional cable systems. None of this functionality involves the subscriber either sending video upstream, or modifying or selecting video in a way that is unique vs. other subscribers.

The Court rejected AT&T's argument that U-Verse is

(Continued on page 5)

No BSS Interference?

ISO: 17/24 GHz Interference Protection Details

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The Commission has released a Further Notice of Proposed Rulemaking (FNPRM) to address technical issues related to potential interference unique to the "reverse band" operating environment in the 17/24 GHz Broadcasting-Satellite Service (BSS). Earlier in this proceeding, the Commission sought comment on what measures were needed to address issues concerning reverse band operations. The Commission's concerns included space-path interference between Direct Broadcast Satellite (DBS) and 17/24 GHz BSS satellites (space-path interference) and ground-path interference from DBS feeder links to 17/24 GHz BSS subscribers (ground-path interference). The Commission determined that the record generated on these issues was insufficient for the Commission to develop interference mitigation requirements. While the parties proposed general approaches, the Commission now seeks additional information to derive specific requirements.

Ground-path interference will occur when the signals from transmitting DBS feeder link earth stations operating in the 17.3-17.7 GHz band are detected at the receiving earth stations of 17/24 GHz BSS subscribers. Areas surrounding DBS feeder uplink stations will experience the worst ground-path interference. 17/24 GHz BSS operators who co-locate telemetry, tracking and command (TT&C) earth stations with the TT&C earth stations of DBS operators may have difficulty receiving the downlinked telemetry signal from the 17/24 GHz BSS space station.

The Commission recognizes that, while there currently are relatively few DBS feeder link and TT&C earth stations, DBS feeder link earth stations transmitting in the Earth-to-space direction may increasingly be located in more developed areas, raising the specter of increased interference into 17/24 GHz BSS subscriber antennas. The Commission also anticipates that future entrants, such as "tweener" short-spaced DBS systems

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***(U-Verse** - Continued from page 4)*

an unregulated information service under the FCC's 2002 *Cable Modem Order*. The Court noted that the subscriber interactivity of U-verse is not at the "high level" of interactivity contemplated by the FCC in that *Order*: U-verse subscriber selection from a menu of programming pre-selected by AT&T is not the same as individually-tailored searches on the Internet available in a cable-modem service.

The Court also rejected AT&T's argument that U-verse is "indistinguishable" from the Free World Dial Up VOIP service that the FCC ruled to be an information service in 2004. The Court ruled that AT&T's mere use of Internet protocol to deliver packets of video does not bring it under the Free World Dial Up holding, which required the information service to be useable to transmit, store and acquire information on a two-way basis over the Internet.

Having held that "U-verse" is a "cable service" under the Communications Act, the Court easily proceeded to hold that AT&T is acting as a "cable operator" when it offers U-Verse.

In sum, AT&T's claim – that the subscriber interactivity involved in U-verse is so radically new that it cannot be considered a cable service under federal law – appears to be more hype than reality at this point. However, U-verse may evolve with additional levels of interactivity, and different IPTV systems may be able to make such a claim, now or in the future. A successful claim would probably require a showing that the subscriber can use the system to transmit video upstream, and/or to manipulate the video received downstream (perhaps real-time changing of camera angles in sports programming, or obtaining video on the Internet). Nevertheless, we believe that courts and PUCs will likely continue to look at such claims with a bit of skepticism, at least until the facts match the hype.

***(700 MHz** -Continued from page 1)*
that the big carriers may find the CMA blocks much more attractive objects of desire than they otherwise would have.

The FCC did this by creating a huge block of 22 MHz (2 x 11) and allotting it to REAGs – vast areas that cover seven or eight states each, plus assorted territorial regions. These blocks would normally have been most highly coveted by the Verizons and AT&T's of the world because they are in the small club of folks who can afford a few billion dollars to purchase them. Unfortunately, the FCC did two things to dampen their appeal.

If you're going to pay a few billion dollars for a license, you want to be pretty happy with what you get for your money.

First, it imposed an "open access" requirement on this one block, as requested by newcomer Google. This runs contrary to everything that common carriers hold dear – their God-given right to control who and what gets onto their networks. Open access translates directly into less revenue for carriers from equipment and content deals. In addition, the FCC imposed strict "use or lose" build-out requirements which would entail the construction of facilities in non-urban parts of the REAGs on a timetable not necessarily of the licensee's own choosing. If you're going to pay a few billion dollars for a license, you want to be pretty happy with what you get for your money – not vaguely ambivalent.

The remaining 10 MHz was allotted by the FCC to a nationwide license which would operate in conjunction with the adjacent public safety band. This arose out of a proposal by former FCC Chairman Reed Hundt's and former NTIA Director Janice Obuchowski's company, Frontline, to piggyback a nationwide commercial operation on the national public safety infrastructure. The mutated, Frankenstein version of the proposal which emerged from the FCC, however, requires that this nationwide licensee: (a) pay for the relocation of all existing narrowband public safety users in the band (up to $10 million); (b) build out almost the entire national public safety network in seven years; (c) give priority access to its own spectrum to public safety people in emergency situations while getting secondary access to the public safety spectrum at other times; and (d) pay at least $1.33 billion for this privilege. It also has to pay the $1.33 billion with no assurance that it will be able to negotiate a satisfactory sharing agreement with the public safety licensee, something it must do in order to avoid forfeiture of the money. Talk about a weak negotiating position! It is difficult to imagine anyone considering this license a viable risk.

Combinatorial or package bidding will be permitted on the big 22 MHz. This was done to permit Google or some other billionaire to be able to buy the entire nationwide set of licenses. In package bidding, you bid on a whole set of licenses together. If your bid for the whole set is larger than the total of the high bids for individual licenses in the set, then you get all the licenses. This feature lets someone who must have a certain group of licenses in order to go into business bid on that group without the fear of being stuck with a useless subset. Again, the FCC seems to have bent over backwards to accommodate Google as a new entrant. Some observers are concerned that package bidding is too complicated for the Commission's system to handle, so the FCC actually authorized the staff to go without package bidding if they can't figure out how to make it work by the auction date.

Another quirk to this auction is anonymous bidding. Until recently, the FCC believed that the auction process worked best when it worked transparently – with all bidders knowing who they were bidding against. Now the Commission seems to believe that open bidding somehow dampens bids or permits collusion, so it is keeping the identity of bidders secret until after the auction is over. The problem is that the anti-collusion rules prohibit certain contacts between bidders in the auction – if you don't know who the other bidders are, how do you know who not to talk to? The Order suggests that bidders will be told in some way who the other bidders for the licenses are so that they can comply with the rule, but if that's the case, then what's the point of the initial secrecy?

On the surface, the public safety community should be elated since the Order provides for: (i) a broadband allocation in the 24 MHz band allotted to public

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Honey, I Shrunk the Antenna

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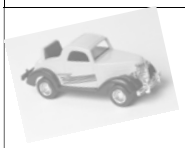
The FCC has changed the rules for 10.7-11.7 GHz fixed microwave antennas, allowing service providers to install dishes that are only two feet in diameter, instead of the mostly four-foot units heretofore required.

The band in question is well suited to "backhaul" of wireless services – *i.e.*, the delivery of signals to and from the familiar cell towers dotting the landscape. As the wireless phone companies roll out mobile broadband and other data-hungry services, they need more capacity – not only from tower to customer, usually carried on auctioned spectrum, but also from their own distribution facilities to the towers. Some of that traffic moves over fiber, but microwave is easier to install at many locations. Until now, FCC rules required large antennas at both ends of the link. Some towers and rooftop mountings cannot accommodate the weight and wind-induced forces. Big antennas are expensive. And many zoning authorities try to ban them as being unsightly.

FiberTower Corporation, a leading backhaul provider, went to the FCC three years ago with a proposed rule change to make two-foot dishes lawful. The smaller units have one disadvantage: a somewhat wider beam of radio energy, potentially causing interference to other users off to the sides. But FiberTower proposed an ancillary rule adjustment to ensure no one else in the band would suffer harm.

Opposition came mostly from the satellite industry, which has limited use of the same frequencies. Satellite operators feared that allowing smaller microwave antennas would increase their numbers, which they argued might cause interference to satellite earth stations. Just days before the FCC decision, FiberTower and the leading satellite opponent agreed on language to address the issue, which the FCC duly adopted. Other satellite opponents, some of whom wanted the FCC to set aside segments of the band exclusively for their own use, made no headway.

The proceeding is one more example of the FCC's gradual relaxation of its technical requirements, which overall has helped to reduce the cost and promote the spread of telecommunications services.



***(700 MHz** - Continued from page 6)*

safety; (ii) a single, nationwide license owned by a non-profit entity governed by the major public safety organizations; (iii) build-out of the national public safety network by the commercial licensee of the adjacent commercial block; (iv) relocation of existing public safety narrowband users by the adjacent commercial licensee; and (v) emergency access to an additional 10 MHz of spectrum owned by the adjacent commercial licensee.

This sounds great – public safety gets a multi-billion dollar network managed solely by them but built entirely at the expense of someone else. As suggested above, however, it may be that the FCC has been *too* generous to public safety. The enormous obligations incurred by the hapless adjacent channel commercial licensee and the uncertain rewards may make that license a rather scary proposition.

The checkered result of the FCC's decision-making process here has made the auction process both complicated and uneven, since different spectrum blocks have been cut and tailored to the needs of different industry proponents – but in a way that is unsatisfactory to the proponent supposedly being served. This will almost certainly diminish the prospective returns from the auction as it has dampened the enthusiasm of many participants. Given the enormous promise and potential of this desirable and newly virgin spectrum, this outcome must be viewed as a disappointment.

Minimum Miscues, Maximum Mulcts

Paperwork Police Tighten Screws On CPNI Compliance

$100G fines for minor mistakes

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A small Texas paging company and a rural Iowa local exchange carrier found themselves the targets of proposed $100,000 FCC fines. The FCC wants to fine the companies for failing to maintain CPNI paperwork. Although AT&T and Alltel faced similar $100,000 fines last year, the FCC's decision to target small companies may herald a new era of zero tolerance enforcement.

CPNI (short for Customer Proprietary Network Information) is information related to the quantity, type, destination, location, amount of use and configuration of service. The issue of protecting CPNI has been topical lately with Congress and the media investigating the potential for privacy abuses of CPNI. The recent FCC inquiries are the agency's reaction to the topic.

Although there typically are not annual or periodic audits of CPNI protections, the FCC still could – at any time – require you to prove that you have been following the rules This self-audit technique by the FCC places the burden of proper operations upon the carriers.

The FCC requires telecommunications carriers to sign a certificate every year regarding CPNI protections employed by the carriers. On an annual basis, an officer of the company must sign a compliance certificate declaring personal knowledge of the company's adequate operating procedures to protect CPNI. The company must also have a statement which details the company's operating procedures and how it ensures compliance with CPNI protection rules.

In December, 2006, and January, 2007, the FCC sent inquiries to several carriers inquiring about protective measures for CPNI. One of the requests that the FCC made was for each carrier to provide copies of the last five years' of CPNI annual compliance certificates. The Texas paging company sent in certificates from the past five years. The FCC determined that the certificates lacked specific reference to an officer having personal knowledge of the CPNI protection procedures. The FCC wants to fine the carrier $100,000 for leaving that reference out of the certificate. Although there is no dispute that the carrier was signing certificates annually, five years later the FCC wants to fine the station for missing a phrase in the certificate.

The Iowa telephone company responded to the FCC's inquiry by submitting a certificate for the previous year and a statement that it did not prepare certificates for four years. In turn, the FCC sent the phone company a $100,000 fine for failing to prepare and sign annual certificates.

Readers are reminded that although there typically are not annual or periodic audits of CPNI protections, the FCC still could – *at any time* – require you to prove that you have been following the rules. This self-audit technique by the FCC places the burden of proper operations upon the carriers. Any further action by the FCC likely would be based upon a carrier's own response. Readers should ensure that their operations comply with FCC requirements both as responsible carriers and in light of the enhanced enforcement actions by the FCC.

(**Roamers of the World** - *Continued from page 3)*
tain such a certificate, but they would be wise to do so now if they permit their customers to roam abroad. The process of obtaining a certificate is relatively painless (except for the $825 FCC fee) and is typically granted routinely in a few weeks. On the positive side, the FCC hinted that in the future it plans to streamline Section 214 certification for CMRS carriers so that at some point it may not be necessary to file for and obtain a company-specific certificate.

On the positive side, the FCC hinted that in the future it plans to streamline Section 214 certification for CMRS carriers at some point.

The FCC also cleared up several other nagging questions which arise in the context of system sales. For one, the FCC confirmed that the sale of an international customer base will be treated as the assignment of Section 214 assets rather than a discontinuation of service by the original carrier. This means that a small additional layer of regulatory review will be required of CMRS carriers who dutifully obtain a Section 214 certificate and then later sell their system and its customer base. The customers are now "international" customers, so the sale requires Section 214 review as well as the ordinary review applicable to a CMRS license sale.

Second, the FCC reduced the notice time for actual discontinuance of international service from 60 days to 30.

Third, they clarified that reductions of ownership interests in a Section 214-certificated entity from above 50% to below 50% constitute a transfer of control which might require prior FCC approval.

And finally, they confirmed that subsidiaries of a parent company with a Section 214 certificate can rely on the parent's certificate, but only so long as the sub is wholly-owned by the parent.

The FCC's order is also significant for our foreign friends: if U.S. CMRS customers are roaming when they are abroad, then foreign carriers' customers are also roaming when they are here. That means that foreign carriers really should have their own Section 214 authorizations from the FCC to permit their customers to roam here. We wonder how many of them have signed up.

(**17/24 GHz Interference** - *Continued from page 5)*
and non-U.S. DBS satellites serving the U.S. market, could result in a proliferation of feeder link earth stations at multiple locations within the U.S.

In response to comments from DirecTV and EchoStar, the Commission tentatively concluded that existing DBS feeder link earth stations should not be subject to new interference-mitigation requirements imposed as a result of this proceeding. Therefore, the Commission will establish a protection zone within which 17/24 GHz BSS receiving earth stations will not be able to claim protection from existing DBS feeder uplink transmissions.

The Commission also invited comment on the methodology to be used within the proposed zone to coordinate DBS feeder links and 17/24 GHz BSS earth stations. Comments on the FNPRM are due on or before November 5, 2007, and reply comments are due on or before December 5, 2007.

(M2Z **Proposal** - *Continued from page 3)*

Accordingly, the Commission announced plans to issue a Notice of Proposed Rulemaking in the near future, "rather than through forbearance petitions seeking exclusive use for a single entity filed by M2Z and Net FreeUS," said Chairman Kevin Martin in a separate statement. Martin indicated that similar proposals for the use of the spectrum should be considered, as should offering the spectrum in a traditional auction, or opening up the band to unlicensed use.

"Each of these proposals has merit, and consideration of either would be inappropriately foreclosed by granting forbearance in this instance," Martin said.

At press time, the NPRM had not been issued, but it was expected to be issued imminently. In the meantime, M2Z has appealed the rejection of its proposal to the U.S. Court of Appeals for the D.C. Circuit.

(**Unlicensed Etiquette** - *Continued from page 1)*
facturers usually throttle back the power to far less than the rules allow, mainly to extend battery life; but as a side benefit, this practice also limits potential interference to a small area. Another way to save the battery is by keeping transmissions short, and this likewise cuts down interference. Some unlicensed technologies, including Wi-Fi, automatically shift their communications to less crowded parts of the band, enabling multiple users to work around each others' signals and operate successfully even when close together.

Relatively few users, primarily the wireless Internet service providers (WISPs), exploit the maximum permitted power, and also transmit continuously. The WISPs are mostly small companies that deliver broadband Internet to homes and businesses, particularly in areas beyond the reach of DSL and cable. In the past they have received encouragement from the FCC, which favors widespread, competitive broadband services.

The newly proposed spectrum etiquette is meant to help protect some unlicensed users – those that interfere less – by reining in some of the applications likely to cause them harm.

The WISPs generally use directional antennas that focus the transmitter power into a narrow beam, enabling them to reach distant customers. But the resulting high energy can affect other unlicensed devices in the antenna path, sometimes miles away. Similar problems can arise from Wi-Fi access points, especially the higher-powered units installed in some public outdoor areas. Being non-directional, these affect other devices in all directions, although over a smaller radius.

As WISP operations have expanded in recent years, other unlicensed users have increasingly experienced interference. Today the most popular WISP transmitters occupy 1/3 or less of the band. But nothing in the rules prevents a single user from taking up all of the frequencies across the entire band. That would effectively close off the band to others across a large area.

An unlicensed user suffering interference, regardless of its origin, has little recourse. The label on every cordless phone and Wi-Fi laptop says it all: "This device must accept any interference received, including interference that may cause undesired operation." Anyone complaining to the FCC will get a polite response, but no help.

Despite that rule, the newly proposed spectrum etiquette is meant to help protect some unlicensed users – those that interfere less – by reining in some of the applications likely to cause them harm. At the same time, of course, those measures will cause harm to whatever applications they restrict. Finding the right balance will not be easy.

Questions to Ponder

The FCC's inquiry begins with three overarching questions. First: is an etiquette necessary? Second: if so, to what bands should it apply? The FCC's first thought is to impose an etiquette, if at all, only at 902-928 MHz. This is the favorite band of the WISPs, as these frequencies can penetrate most buildings and some terrain. The band is also home to a lot of RFID and control equipment used for pipelines, electrical utilities, railroads, and other safety-conscious industries. But the FCC is also open to requiring an etiquette for 2400-2483.5 and 5725–5850 MHz. Third, asks the FCC: what kinds of signals should be subject to an etiquette? Most high-powered unlicensed signals are of three types: frequency hopping, direct sequence, or what the FCC confusingly calls "digital modulation," which includes the OFDM waveforms used for high-speed Wi-Fi. The FCC is inclined to exempt frequency-hopping transmitters from an etiquette, considering that the rules already prohibit their spending more than a small fraction of time on any one frequency.

In case it decides to go forward, the FCC has listed several ways in which it might implement an etiquette. Any or all of these could turn up in the final rules.

The most controversial element would limit the "duty cycle" – the percentage "on" time – for higher-powered units. Other users' transmissions could then get through during the "off" periods. As one example, the FCC posits that a transmitter operating at 1 watt (the maximum) might be allowed to run only 10% of the time. A unit at or below 1 milliwatt (1/1000 watt) might permitted to operate continuously. In between, the percentage would scale upward for lower powers, according to some formula. All percentages would be averaged over 0.4 seconds, a number that already figures prominently in the technical rules.

(Continued on page 11)

(***Unlicensed Etiquette*** *- Continued from page 10)*

No form of this proposal is likely to sit well with the WISPs, as it would drastically cut the data speed they can deliver to subscribers. It would also impair devices such as the now-ubiquitous Wi-Fi access points. Because these typically operate at a few tens of milliwatts, the proposed etiquette would silence them for some fraction of every 0.4 seconds. This may not be noticeable in a home network. But in an office or coffee shop, where an overworked access point might download simultaneously to numerous laptops, a restriction on duty cycle would result in longer waits for email and web pages.

If the FCC does limit duty cycle, further questions arise. Should a transmitter be allowed to vary its power and duty cycle, so long as the two collectively comply? (Sure.) Should several high-powered units, each on a limited duty cycle, be allowed to synchronize their transmissions? Perhaps not. This would enable unit *A* to transmit during the required quiet times for units *B-J*, and so on for *B* and the others. A user could bypass the rule simply by collocating multiple transmitters.

Another proposal would require an unlicensed device to have "listen-before-talk" capability, so as to avoid stepping on other users' transmissions. Wi-Fi transmitters already have this feature, but they use it for selfish purposes, to help ensure that the sender's transmissions get through. The proposal would require a more altruistic implementation, to avoid interrupting other people's communications. The idea is not new. The FCC requires listen-before-talk in unlicensed radios using parts of the 5 GHz U-NII band, to protect the federal radars left behind when the band was reallocated to private use.

Surprisingly omitted from the FCC's proposals is "automatic power control," which continuously adjusts transmitter power to the minimum needed for communication. The technology has long been standard in cell phones, both to extend battery life and to let providers adjust cell sizes as needed, and is also required in the U-NII band. Automatic power control has the unique advantage of minimizing interference to others without any impairment of the device's own performance, and it extends battery life to boot. The chief downside is a more complex circuit design, which translates to higher costs for the device.

Get Involved

Proceedings on the unlicensed rules tend to be controversial. The vast diversity of users and manufacturers lead to widely divergent interests. The licensed users in the bands, particularly the amateur radio community, tend to have strong views as well. If the past is any guide, the FCC is likely to receive thousands of strongly-worded comments, all advocating inconsistent positions, each one predicting the downfall of Western civilization if the FCC fails to follow the author's advice. The folks at the FCC will try very hard to reach a workable result. But the quality of their ultimate decision depends on the quality of the information they receive. Those with an interest in these bands who fail to speak up have no right to complain about the outcome.

To participate, browse to the link below and enter "03-201" (without the quotation marks) in the Proceeding field. Or call us.

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Comments are due on October 15, 2007, and reply comments on November 14, 2007.

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