

FHH Telecom Law

Current Issues in Telecommunications Law and Regulation

January 2004



Are Radios Getting Smarter?

Mitchell Lazarus
703-812-0440
lazarus@fhhlaw.com

The FCC ratcheted radio technology another notch forward by adopting a Notice of Proposed Rule-making on "cognitive radios." These are a step beyond software-defined radios, which the FCC first authorized just two years ago. The proceeding is one of several recent efforts by the FCC to anticipate and encourage emerging technological capabilities.

Where a conventional hardware-based radio is typically limited to only one frequency band, power, modulation, etc., a software-defined radio can alter those parameters just by running different software. For example, with appropriate prior authorization, a police officer might instantly convert a software-defined cell phone to a public safety walkie-talkie, and then back again. A cognitive radio takes the concept one step farther: a software-defined radio capable of making its own decisions on which operating characteristics to adopt, based on its location, or on signals it detects in the vicinity, or even on the time of day. The officer's cell phone might switch to walkie-talkie mode automatically when it detects an incoming message from the officer's dispatcher, but only while located in that dispatcher's operating area. Or a pair of "smart" walkie-talkies might collaborate to find a channel free of interference for both of them. (Ordinary Wi-Fi devices already have a limited form of this capability.) Or an overloaded PCS base station might detect underused public safety capacity in the vicinity and lease that spectrum on the fly, handing out new channel assignments in real time to the handsets it serves -- and then relinquishing the spectrum instantly when a public safety emergency arises.

The NPRM seeks comment on several possible applications of cognitive radios, including

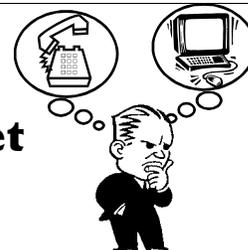
- ☎ increasing use of vacant spectrum in "white spaces";

(Continued on page 6)

Deregulating bit by bit

FCC Readies for Voice over Internet

Paul J. Feldman
703-812-0403
feldman@fhhlaw.com

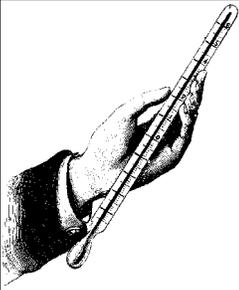


Voice-Over-Internet-Protocol, or VoIP, promises enormous changes in how Americans use telephone service. On legacy "circuit-switched" telephone technology, every phone call travels on its own pair of wires, or its own dedicated slice of a shared fiber-optic facility. A VoIP call, in contrast, sends each speaker's voice as packets of data intermingled over the Internet, like pieces of email or web page images. VoIP calls can be less expensive than conventional phone calls because Internet protocols can pack more much traffic onto a line than a circuit-switched network can.

As VoIP call quality improves and equipment prices fall, Washington regulators must soon face the question whether to treat VoIP like Internet service, which is largely unregulated, or like telephone service, which is subject to regulation on a host of specific issues, including nondiscriminatory service, 911, and access for the disabled, along with national security concerns, including law enforcement access to digital calls (often called "CALEA," after the governing statute). Also at issue are the "access charges" long distance companies must pay to conventional local telephone companies for connecting to the end user, as well as contributions by telephone companies to federal and state funds designed to promote universal access to phone service.

A recent FCC open forum on VoIP gives the best insight so far into the agency's thinking. Chairman Powell showed his cards most plainly, stating that "no regulator, either federal or state, should tread into this area without an absolutely compelling justification for doing so." While Powell made clear he sees a need to address consumer issues such as 911, universal service, and service for the disabled, and national security issues such as CALEA, he maintains that should be possible without broader telephone regulation, which could impose hun-

(Continued on page 6)



INTERFERENCE TEMPERATURE PROCEEDING HEATS UP

Mitchell Lazarus
703-812-0440
lazarus@fhhlaw.com

The FCC issued a combined Notice of Inquiry and Notice of Proposed Rulemaking to explore the concept of "interference temperature" as a way to let unlicensed transmitters share licensed bands without causing harmful interference. Rather than merely regulate transmitter power at fixed levels, as in the past, this new scheme would govern transmitter power on a variable basis calculated to limit the energy at victim receivers, where the interference actually occurs.

Interference temperature is defined as the power created in a receiver by undesired emitters plus noise, expressed in units of degrees Kelvin. Conversion details for the cognoscenti:

$$\text{interference temperature} = (I+N \text{ in watts}) / (\text{bandwidth in Hertz}) / (\text{Boltzman's constant}).$$

(Skeptics might argue that expressing power in temperature units, rather than more conventionally in watts, contributes little to the analysis.)

The NOI outlines a long-term plan that so far consists mostly of variables and unknowns. The basic idea is to measure the "background" interference temperature due to noise and unintentional emitters in the vicinity, add in the temperature due to the proposed transmission, and check whether the total is within some predetermined, non-interfering limit. If so, then the transmission can go forward without causing harmful interference. At least two elements of the scheme promise to be controversial. One is the matter of specifying the limits, which must be low enough to protect against interference, yet high enough to permit useful unlicensed communications. The other is finding the right location to measure the interference temperature. Ideally this should be done at the antennas of the victim receivers, with the results somehow communicated to the unlicensed transmitters -- but that could be difficult to arrange in practice. Even better (if feasible) would be a coordinated system that dynamically allocates unused "interference temperature capacity" among a population of unlicensed transmitters over a wide area.

The NPRM portion of the document lays out a less ambitious plan that might be implemented in the short term. It entails a simplified form of the interference temperature concept in two specific bands: 6525-6700 MHz and 12.75-13.25 GHz (excluding 13.15-13.2125 GHz). Both bands are allocated jointly for satellite uplinks and fixed microwave point-to-point communications. The FCC suggests starting with these bands on the grounds that (1) the satellite receivers in orbit are a long way from any interfering transmitters, and (2) the fixed microwave receivers potentially subject to interference tend to operate at isolated, known locations, use highly directional antennas well off the ground, and generally tolerate interference well. The NPRM suggests that interference temperature limits be based on a signal-to-interference ratios of 30-50 dB, and estimates this could yield unlicensed EIRPs in the 30-36 dBm range. These power levels are

(Continued on page 4)

Fletcher, Heald & Hildreth

A Professional Limited
Liability Company

1300 N. 17th Street - 11th Floor
Arlington, Virginia 22209
Tel: (703) 812-0400
Fax: (703) 812-0486
E-Mail: editor@fhhlaw.com
Web Site: fhhlaw.com

Editor

Mitchell Lazarus

Design

Harry F. Cole

Contributing Writers

Donald J. Evans, Paul J. Feldman,
Michael Richards and Liliana E. Ward

FHH Telecom Law is intended to provide general information and does not constitute legal advice or solicitation of clients. Fletcher, Heald & Hildreth, P.L.C. may represent clients in proceedings described here.

Copyright © 2004 Fletcher, Heald & Hildreth, P.L.C.
Copying is permitted for internal distribution.
All other rights reserved.

Court finds some price discrimination "reasonable"

D.C. Circuit Lets Carriers Discriminate

Donald J. Evans
703-812-0430
evans@fhhlaw.com

In a significant New Year's gift to common carriers, the U.S. Court of Appeals for the D.C. Circuit greatly limited the application of the non-discrimination provisions of the Communications Act to non-dominant common carriers.

Orloff v. FCC arose when a customer complained that Verizon Wireless had offered special deals to new customers it had not offered to existing customers (like her) who were otherwise similarly situated. She argued that this is the essence of unreasonable discrimination prohibited by Section 202 of the Act and under principles of common carrier law dating back to the 19th century. The FCC had conceded the discrimination but ruled it was not "unreasonable" in a competitive market. The court then upheld this determination on the grounds



that the carrier was not dominant, no tariffs had been filed, and the discrimination had the effect of benefiting consumers. It distinguished a long history of contrary case law involving competing long distance carriers by saying those were dominant (although they were not) and that they had filed tariffs (which should be irrelevant to the discrimination analysis). Since virtually all interstate and most international common carrier activity now proceeds on a non-dominant, non-tariffed basis, the decision may open the way to a broad range of discriminatory activity. Section 202, in place since 1934 to prevent common carriers from offering under-the-table preferences to favored customers, has been effectively read out of the statute for all but local wireline carriers.

Vast New Plain of Unlicensed Spectrum Opened for Grazing

Donald J. Evans
703-812-0430
evans@fhhlaw.com



The FCC has thrown open 255 MHz of additional spectrum in the 5 GHz band for use by unlicensed devices. The huge increase will permit expanded operations by Unlicensed National Information Infrastructure (U-NII) users such as wireless Internet service providers (especially in rural areas), last mile broadband providers, and soon, laptop users in coffee shops. The allocation also harmonizes the U.S. allocation with usage elsewhere in the world, enabling manufacturers to develop the same products for domestic use and world-wide distribution.

The spectrum comes with a catch, though, in the form of two technical obligations never before imposed on unlicensed devices. One is dynamic frequency selection, a "listen-before-talk" feature that enables the device to make sure a channel is vacant before transmitting on it. The Defense Department, former occupant of the band, left a few radars behind when it handed over the keys to the FCC, and asked for this provision to protect them. The other requirement is automatic transmit power con-

trol. Long used in sophisticated licensed equipment, this arrangement entails continuous sharing of data between the transmitter and receiver on received signal strength, so as to keep the transmitter power at the minimum needed for reliable communication. Both dynamic frequency selection and automatic power control will also be imposed on new systems in some of the U-NII frequencies already in use, after a transition period.

It's January—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.

FCC Shifts Out of Neutral, Drives Toward Smart Highways

Michael Richards
703-812-0456
richards@fhhlaw.com

In this era of road rage, we often complain that other motorists have stopped thinking behind the wheel. The FCC and the U.S. Department of Transportation see an antidote: if drivers are acting stupider, then make highways smarter. The FCC is involved because "smart highways" will be equipped with radio devices that can sense trouble and send out alerts to help drivers avoid or prepare for problems ahead -- congestion, a vehicle approaching too closely, work zones, or upcoming weather dangers. As a first step, the FCC has adopted service and licensing rules for Dedicated Short-Range Communications (DSRC) systems at 5.850-5.925 GHz for use in the Intelligent Transportation Systems (ITS) Radio Service.



Although the DSRC band is set aside primarily for public safety applications, the FCC believes sharing it with limited non-public safety uses will benefit public safety. The same frequencies and transponders can be used for other transportation-related purposes, such as electronic toll collection, paying for fast food and gas, or parking fees. The FCC hopes the existence of large commercial markets will help to stimulate the availability of more sophisticated and less expensive equipment for public safety applications, resulting in more intensive use and the development of innovative services.

Any public safety or non-public safety user may apply for a DSRC license on any channel. To further

interoperability, the FCC adopted the technical standard developed by the American Society for Testing and Materials (ASTM) and the Federal Highway Administration.

Each applicant will receive a non-exclusive geographic-area license authorizing operation on 70 MHz of the band. Road-side units (RSUs) must be registered by site and band segment. At press time the FCC had not disclosed the regulatory treatment of on-board units (OBUs), but we expect they will be either licensed by rule or unlicensed. We also await word on rules concerning communications between RSUs and unaffiliated OBUs, and on details of coordination with the National Telecommunications and Information Administration to avoid interference with government operations in the band. The FCC put off a decision on coordination with satellite communications, hoping the industries can work out their own agreement.

Smart highways and cars equipped to benefit from them are at least five to ten years away. In the meantime, the Transportation Department is testing an ITS system at an intersection in McLean, Virginia. Sensors there can warn drivers that another vehicle is approaching, potentially heading off a collision. Now, if only an ITS developer can find a way to alter the brain waves of rage-prone drivers so they calm down, and politely share the road.



(Continued from page 2)

relatively high for unlicensed devices generally, although comparable to those allowed for spread spectrum and U-NII transmitters.

The NPRM seems to contemplate measuring the interference temperature at the unlicensed transmitter, and using that value as an estimate for the "ambient" interference temperature seen by the fixed microwave receiver. It proposes that unli-

censed transmitters in these bands be equipped with transmit power control (TPC), which continuously adjusts power to the minimum needed for successful communication, and also dynamic frequency selection (DFS), which automatically switches to channels least likely to cause interference. The FCC likens the combination of TPC and DFS to performing frequency coordination on the fly.

Comment and reply dates had not been published at press time.

Coordination Compromise Proposed for Satellite and Fixed Service



Mitchell Lazarus
703-812-0440
lazarus@fhhlaw.com

The FCC has proposed to adopt an industry-negotiated compromise on frequency coordination between fixed service users and NGSO satellite providers.

Since the 1960s, the FCC has presided over a fractious relationship between satellite earth stations and fixed microwave users that share certain frequency bands on a co-primary basis. Any new installation by either service must avoid causing interference to, and must accept interference from, pre-existing facilities of both services. The FCC requires new applications to be "frequency coordinated" against a database of facilities already in place to check the likelihood of interference. That seems simple enough in principle, but the details of the coordination process have been a source of continuing friction. Of particular concern to fixed microwave users is the fact that each earth station takes up a wide range of frequencies for many miles around, often blocking expansion of overloaded microwave facilities.

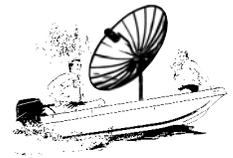
Frequency coordination is hard enough in the vicinity of earth stations for geostationary satellites -- those that stay put in the sky. A company called SkyBridge complicated the picture in 1997 when it proposed a non-geostationary (NGSO) system whose satellites move across the sky. Skybridge needs large "gateway" earth stations for connecting its satellites to terrestrial networks, and proposed having those share a frequency band with fixed microwave users. Because the earth stations move while in operation to track satellites across the sky, they make frequency coordination far more difficult. In particular, they threaten serious limitations on fixed microwave expansion. The stage was set for yet another intractable conflict.

But in 1999 the Fixed Wireless Communications Coalition (FWCC), representing fixed microwave users, and the SkyBridge proponents were able to negotiate a resolution. They agreed to identify fixed microwave "growth zones," defined as counties having certain lev-

(Continued on page 8)

Earth Station Vessels Raise Anchor

Liliana E. Ward
703-812-0432
ward@fhhlaw.com



The FCC has proposed new rules for ship-mounted earth stations that provide a range of satellite services, including broadband services. These rules will implement results of the 2003 World Radiocommunications Conference and seek to establish a new framework for the licensing of earth stations on vessels (ESVs) in the United States.

ESVs currently may operate only under special temporary authority. With growing demand for broadband services on cruise ships and government, cargo, and other vessels, ESV providers want permanent rules. But the C-band frequencies on which some ESVs transmit are also used for fixed point-to-point microwave communications. Those operators carefully site their installations to avoid interference from conventional fixed satellite earth stations, but fear they cannot avoid interference from earth stations that steam up and down the coast. For that reason fixed service providers have generally opposed any expansion of ESV authority in C-band.

The ESV providers and microwave users cannot even agree on whether ESV interference actually occurs. ESV proponents insist they have seen no documented reports of interference. Microwave users counter that ESV providers have refused to disclose basic information about ship frequencies and routes, thus making it impossible to document whether a given interference incident was due to an ESV.

The FCC now seeks to provide "regulatory certainty" to both the fixed service and ESV operators. It requests comment on rules and procedures to license ESV networks for operation in the C-band and Ku-band to deliver Internet services, data transmission, video, and voice connections to ships at sea and in port for both passengers and ship operators. The proposals also seek to ensure protection from harmful interference to incumbent fixed services, and include measures for prompt resolution of any interference complaints that may arise.

The ESV licensing procedure proposed for the Ku-band would permit blanket licensing of an ESV network similar to that currently allowed for very small aperture terminals

(Continued on page 8)





(Continued from page 1)

-  increasing opportunities for unlicensed operation without interference to licensed services;
-  helping licensed services make best use of their own spectrum;
-  facilitating spectrum leases to promote secondary spectrum markets;
-  allowing public safety entities to instantly reclaim leased-out spectrum when needed;
-  improving interoperability among the multiple radio systems used by public safety agencies;
-  using higher transmitter powers in rural and underserved areas;
-  facilitating radio-based networks; and
-  promoting real-time frequency coordination with non-geosynchronous (NGSO) satellites.

Some of the capabilities the FCC discusses for cognitive radios are:

-  dynamic frequency selection, which allows a transmitter to choose an operating frequency based on signals from other transmitters in the vicinity;

-  adaptive modulation that can modify transmission characteristics and waveforms in real time to make best use of spectrum;
-  "heteromorphic" waveforms, which can allow signals on the same frequency to co-exist without interference;
-  automatic transmit power control to keep emitted power to the minimum needed for reliable communications; and
-  location determination (as with GPS) to select appropriate power and frequency for that location.

The NPRM also proposes changes to the equipment authorization rules for software-defined radios, including a requirement for applicants to identify a software-defined radio as such so as to trigger obligations pertaining to software security. And it seeks comment on new types of certification testing requirements needed to evaluate cognitive radios against the rules governing their multiple modes of operation.

Separately, the NPRM proposes to certify Part 15 unlicensed radios on frequency bands not authorized in the United States, if the radio is capable of determining its country of operation and selecting frequencies appropriate to that country.

Comments are due 75 days after publication in the Federal Register, which had not occurred at press time.



(Continued from page 1)

dreds of other rules on VoIP providers, including access charges. But the Chairman also noted it may be difficult to regulate VoIP in any event, due both to the malleability of VoIP services and the ability of service providers to move off shore, as have providers of spam and Internet gambling.

Commissioner Copps wants the FCC to act quickly, before VoIP has a broader impact on the network. He suggested VoIP is no longer a nascent technology, and thus perhaps less needy of protection. Indeed, we should anticipate questions regarding the definition of a "nascent service" for this purpose arising in the upcoming VoIP rulemaking proceeding. Only Commissioner

Adelstein explicitly called for regulating VoIP as "telecommunications" -- *i.e.*, on the same footing as telephone service. He expressed particular concern with regulatory arbitrage and the universal service fund, asserting that the FCC must determine how underlying carriers are compensated for carrying third parties' traffic. Many VoIP providers use the conventional telephone network, he said, and "we cannot afford to let the rise of VoIP undercut the very networks that carry it." Commissioner Abernathy favors a "light touch" in regulating VoIP for the present, although she shares the concern that VoIP providers both use the conventional network and undercut traditional carriers' incentive to invest in it. But for now, at least, the Chairman appears to have majority support for minimal regulation.

(Continued on page 7)

FCC Locates Cry For Help, Expands E-911 Rules

Donald J. Evans
703-812-0430
evans@fhhlaw.com



The FCC has taken yet another step in its ongoing quest to improve 911 service for as many Americans as possible. The current activity centers on "Enhanced 911," or "E-911." The "E" denotes the system's capability to report the location of a wireless handset dialing 911 so as to dispatch help even to a caller unable to speak.

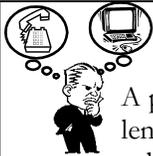
E-911 obligations already extend to all land-line phone carriers and commercial wireless carriers, including cellular and PCS providers.

Now the FCC has added several new categories to those that must provide E-911: automotive "telematics" providers (such as OnStar) if they offer telephone service over the system; resellers of cellular and PCS service (to the extent the underlying network carrier complies with its own E-911 obligations); and mobile satellite carriers,

though these need only answer 911 calls and route them to an appropriate 911 operator.

The FCC punted on E-911 questions relating to multi-line telephone systems and VoIP calls

The FCC punted on the question whether to require multi-line telephone systems (such as common office PBXs) to be capable of locating the particular desktop that places a 911 call. The FCC left that issue to the states, suggesting they follow model legislation drafted by the major public safety stakeholders -- but it also sought further comment, so it could move quickly if the states fail to act. The FCC put aside for now the fast-approaching issue of how or whether to make voice-over-Internet calls capable of E-911. And it asked for comment on when it should require a mobile satellite carrier with an ancillary ground-based network to comply with the normal E-911 rules for its terrestrial operations.



(Continued from page 6)

A panelist at the forum, Kevin Werbach, challenged the common view that VoIP is merely a substitute for traditional telephony. He noted that Yahoo's Instant Messaging Service has a VoIP component, as does the popular Internet gaming service X-Box and the "push-to-talk" components of non-NexTel wireless services. Werbach also claims the growth of VoIP will shift billing models from those based on time and distance, as now, to new forms based on bandwidth and services provided. Jeff Pulver, the CEO of VoIP provider Pulver.com, observed that local telephone companies can use VoIP to avoid the networks of the long-distance carriers. A panelist from UBS Investment Research argued there is not much need for investment in the traditional network anymore, and that carrier investment is primarily in new technologies.

Michael Gallagher, awaiting confirmation as Administrator of the National Telecommunications and Information Administration, asked the FCC to address VoIP quickly to minimize regulatory arbitrage, so that it does not become a "red light district" or "grey market" of telecom. State regulators variously called for a hands-off approach, technology-neutral regulation, and different regulatory structures for different situations. Commissioner Charles Davidson of the Florida PSC noted a distinction between

VoIP service to end users and VoIP as transport, pointing out the two may need different policies. Prof. Vanderheiden of the University of Wisconsin explained that access for the disabled requires government mandates because it is never addressed by market forces. He gave numerous examples of how VoIP services could benefit people with disabilities.

Three petitions now before the FCC seek rulings on how different aspects of VoIP should be regulated. Some or all of these may be wrapped into a broader rulemaking the Chairman has promised to launch early this year, while others may be decided at the announcement of the rulemaking. Whatever the FCC's decisions, it is clear the growth of VoIP will have a major impact on telecommunications technology, services, and economic structure.

FHH TELECOM LAW AVAILABLE BY EMAIL!

FHH Telecom Law is available via email. If interested, please let us know by email addressed to office@fhhlaw.com. Same great content, much less paper. Interested in back issues? Visit our website at www.fhhlaw.com.

Fletcher, Heald & Hildreth, P.L.C.
11th Floor
1300 North 17th Street
Arlington, Virginia 22209

First Class

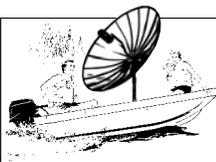


(Continued from page 5)

els of fixed microwave activity in the shared band. NGSO gateway earth stations locating in those zones agree to accept restrictions that permit fixed microwave expansion, if needed. In exchange, earth stations outside the growth zones have considerably more flexibility, and fixed microwave operators must accept more stringent limitations.

The two groups submitted their agreed-upon compromise to the FCC in December 1999. The FCC promptly published the proposal for public comment, which was generally favorable. Now the FCC has issued a formal Notice of Proposed Rulemaking aimed at incorporating the FWCC/SkyBridge into its rules, with only minor modifications. There is no explanation for the four-year delay.

Comment and reply due dates had not been published at press time.



(Continued from page 5)

(VSATs) in the same band. ESV operations in the C-band would be restricted to vessels of 300 gross tons or larger, and would be on a "non-harmful-interference" basis with other services. That is, ESVs may neither claim interference protection nor impose constraints on other services, including fixed microwave.

The FCC proposes two basic licensing schemes for C-band. In the "non-coordinated approach," ESV operations within 300 km of the coast would not have to coordinate operations in advance, but must provide fixed microwave operators with real-time tracking of vessel locations, frequencies, bandwidths, satellites, itineraries, and points of contact. Under the "coordinated approach," an ESV operator would be permitted to coordinate a maximum of 36 MHz in each direction on each of two satellites. The ESV operator would then have to maintain tracking data for 90 days and make it available to the FCC or the frequency coordinator within 72 hours.

Comment and reply dates had not been published at press time.