

# **THE GENESIS OF UNLICENSED WIRELESS POLICY**

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### **Grazing on the Commons: The Emergence of Part 15**

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What follows is a somewhat impressionistic, highly biased<sup>1</sup> account of how unlicensed radio services moved from being a by-product of the ISM bands to a deliberate spectrum allocation, with clearly defined goals and objectives that could be achieved only by not subjecting the spectrum to licensing or auctions. Like sin itself, the deliberate un-licensing of spectrum began with an Apple.

#### **U-PCS:**

In early 1991, Apple Computer was developing the Newton as the first PDA (Apple invented the term) and was pioneering in the laptop segment of the computer market. Apple believed that wireless connectivity was essential to the success of both products.<sup>2</sup>

Accordingly, Apple petitioned the FCC to allocate 40 MHz of spectrum -1850-1890 MHz - out of the 1850-1990 MHz band being earmarked for new technologies, particularly PCS. Apple called its proposed new radio service Data-PCS and proposed that it would be devoted exclusively to local area, high

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<sup>1</sup> Biased because I represented Apple in the rulemaking proceedings that I describe here and also because I represent companies on the “net neutrality” side of today’s regulatory disputes.

<sup>2</sup> Explicit acknowledgement must be made for the contributions of Jim Lovette, who was the moving force behind Apple’s seminal effort.

speed data communications to support collaborative computing and spontaneous networking among laptops and PDAs. Data-PCS would, in the words of the Petition:

- be accessible to users of personal computers without imposition of licensing obligations, network connection fees, or air-time charges;
- be open to any computer manufacturer's products and any network access and usage scheme that complies with the regulatory requirements; and
- be regulated in a manner that assures non-discriminatory access to frequencies and encourages innovation in the evolution of technologies and services.

To accomplish this, we urged the FCC to model the Data-PCS regulatory scheme on Part 15 of the Rules.

“Rather than licensing common carriers to provide service to users, public interest goals best can be achieved in a Part 15-type framework, with software-denominated “networks ...”

Despite the fact that this is still a valid objective, the Apple Petition reveals its age in that there is no reference to the Internet and no confidence in the 2.4 GHz unlicensed band as a home for local area networks, such as the WiFi networks that abound today.

We made remarkable progress and Apple's proposal was included in the Commission's PCS NPRM. Thus, deliberately allocating unlicensed spectrum for a public good entered the FCC's policy agenda. In the fall of 1993, the FCC created a 40 MHz allocation of unlicensed User-PCS in the 1890-1930 MHz band.

Manufacturers of wireless PBXs and cordless phones jumped on Apple's bandwagon and their need for unlicensed frequencies for voice shared the Commission's U-PCS proposal.

Ultimately, the Commission allocated only 20 MHz in the PCS bands - 1910-1930 MHz -with 1910-20 MHz devoted to asynchronous or data communications and 1920-30 MHz for isochronous or voice communications. The Commission said that they would add another 20 MHz to the U-PCS pot, but later managed only to find another 10 MHz for asynchronous at 2390-2400 MHz.

The Commission imposed an industry agreed-on etiquette for access to the band, which Apple helped create. But for Apple the trouble with U-PCS, began with the allocation itself. The band had a fair number of incumbent fixed microwave users. While the FCC required that the microwaves relocate - with compensation - to higher frequencies, there was no effective model for managing compensated relocation from an unlicensed band to be used for "nomadic" devices- there still isn't.

Laptop and PDA use is "nomadic" in that the device could pop up anywhere in the U.S.; therefore, all frequencies must be clear of all microwave incumbents before the first laptop or PDA could be sold. To the contrary, fixed isochronous switchboards and other devices are non-nomadic and could be "coordinated" with incumbent microwaves until the microwave users vacate the band.

The other problem was that UTAM (the Unlicensed PCS Ad Hoc Committee for 2 GHz Transition and Management), which was the FCC's chosen instrument to manage and pay for microwave relocation, but was effectively controlled by the wireless PBX/cordless phone isochronous players, who had very little interest in clearing frequencies for asynchronous. Because of the delays and costs inherent

in the band-clearing process and with no Newton product to link with, Apple lost interest in the band.

While a relatively uncluttered 10 MHz of spectrum was later made available for asynchronous, nomadic devices at 2390-2400 MHz, the steam had gone out of Data-PCS for Apple and other computer companies.

Ultimately, the 1915-20 MHz portion of the asynchronous U-PCS spectrum became one half of the PCS H-block for commercial AWS.

The irony here is that, while Apple's Data-PCS initiative failed, it represented a paradigm shift in the way the FCC treated unlicensed services.

#### **U-NII:**

While the Data-PCS/U-PCS drama was playing out, Apple saw in the 5 GHz band a much more plausible opportunity for broadband data communications. In the Clinton-Gore years, there was great buzz about creating and enhancing a National Information Infrastructure – “the information superhighway,” an interconnected network of networks that would meet the US's telecommunications needs for the 21<sup>st</sup> century.

Apple filed a petition for rulemaking in May 1995 seeking an allocation of 300 MHz in the 5 GHz range to serve as the unlicensed wireless component of the NII. Apple said that the NII Band would extend the reach of the NII by making high-bandwidth access and interaction throughout a limited geographic area both on a peer-to-peer, *ad hoc* basis and through wireless local area networks. Moreover, Apple said, it would provide for wireless, wide area “community networks” connecting communities, schools, and other groups underserved by existing and proposed telecommunications offerings.

Once again with surprising speed, in January 1997, the FCC created the Unlicensed-NII band of some 300 MHz - to be used for high-capacity wireless broadband. The U-NII band was created at 5.15-5.35 GHz and 5.725-5.825 GHz, which was the existing 5 GHz ISM band. Later the FCC added 5.47-5.725 to the U-NII mix. The problems that were encountered in the U-PCS band were avoided in the U-NII band. The U-NII band still holds great promise.

### **Additional unlicensed allocations:**

Since U-PCS, the FCC has identified additional spectrum resources for unlicensed use. For example:

- **mmWave** -The FCC made the 57-64 GHz band, commonly referred to as the millimeter wave band, available for use by unlicensed devices. There's 7 GHz of unlicensed spectrum just waiting for the state-of-the-art to catch up. The Data-PCS pitfall of incumbent relocation was avoided because there were no incumbents.
- **Ultra-wideband** - There's also ultra-wideband ("UWB") not really an allocation of unlicensed frequencies but a kind of underlay spread spectrum technology, covering a broad swath of spectrum several gigahertz wide, which is allocated to many commercial and federal government radio services. Again, this is really sharing rather than relocation of incumbent spectrum users, but a bloody battle nonetheless.
- Then there's TV "**white spaces**" - the FCC's proceeding to explore the possibility of permitting unlicensed devices to operate in the TV broadcasting bands. Here again, we're not talking about an separate unlicensed allocation but shared use of someone else's licensed spectrum.

### **Assessment:**

The U-PCS and U-NII band history is of great significance both to the emergence of Part 15-based unlicensed use of the spectrum and to larger spectrum management policy goals.

1. For the first time, frequencies were allocated *intentionally* for almost exclusive unlicensed use; for the first time, the FCC moved to require some semblance of homogeneous usage in these new unlicensed bands. It was also the first time that anyone had a hint of the full potential of the public benefits that could be realized from a relatively open and unstructured use of the spectrum.
2. Despite these positives, we also learned an important lesson about unlicensed – that it's virtually impossible to clear licensed spectrum for unlicensed uses. Therefore, it's probably better to auction such spectrum and find a place for unlicensed on shared spectrum – like UWB or white spaces. So while the U-PCS and U-NII allocation of spectrum bands for unlicensed was a break from the past, it probably was a break from the future as well.
3. Another defining element of the U-PCS and U-NII bands was that Silicon Valley found its way to the FCC's spectrum allocation process for the first time and did so in a major way. The new information economy needed spectrum and needed it in a manner that was open and unfettered by the business plans of telephone and cable TV companies. Silicon Valley companies are now old hat in the FCC's spectrum proceedings and for the most part still bring an open entry, pro-innovation agenda with them - just look at the 700 MHz auction and the white spaces proceeding
4. Similarly, the U-PCS and U-NII proceedings specifically promoted unlicensed spectrum as an antidote to spectrum auctions, which were perceived as a game for only the biggest, wealthiest players. Subsequent

history has proven that concern to be well founded and unlicensed remains the best antidote to the “unintended effects” of spectrum auctions.

### **And what of the future of our unlicensed spectrum commons?**

I remain optimistic, but have some concerns.

- First of all, if you are a carrier who has paid billions of dollars for your spectrum, it's natural for you to look askance at someone – even your local municipality – who is using free spectrum to compete with you. You have an incentive to put legal and other obstacles in their path.
- Second, problems exist among unlicensed users (wireless carriers aren't the only bad guys): if you are a company or a municipality or a port authority or a university who has invested in unlicensed spectrum to provide a WiFi services for a fee, you're not so sure you want someone using unlicensed spectrum to compete with you. Such players may try to use contractual rights, lawsuits, etc. to seek to limit additional entry to what has become “their” spectrum. If a “not-in-my-back-yard” dynamic takes over, the very essence of Part 15 is compromised. Vigilance is needed to fight Part 15 NIMBY.
- There are also unlicensed users who use their equipment's duty cycles and power levels to exercise *de facto* control of their corner of the spectrum commons; here too vigilance and rule adjustments by the FCC may be needed. Supporter of unfettered grazing rights that I am, it doesn't offend me to have the town permit grazing by sheep and cows, but forbid elephants.
- What is at stake in Part 15 is great because – despite some recent fanfare – it is getting more and more difficult to get an open and innovation-

friendly environment in operator-controlled broadband networks. If, as many say, that, in the future, the primary means of accessing the Internet will be through such networks, then it will be a constrained access indeed. If so, in the end, the future availability of unlicensed spectrum for experimentation, innovation and risk-taking in technologies and services will be what will sustain the Internet and our overall broadband development.