



The Challenge of Sharing Spectrum and How To Embrace It



SDR '10 Wireless Innovation Conference
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+ It's not a problem until it's a crisis

- November 30 FCC Meeting
- SDR Value Proposition
- Public Policy Impact on SDR/Cognitive Radio
- Opportunities and Challenges



November 30 FCC Meeting

- TV Spectrum Innovation NPRM
- Experimental Licensing NPRM
- Opportunistic Use/Dynamic Spectrum NOI



Value Proposition for SDR

- SDR value proposition increases with spectrum scarcity

In geographies or in areas of the RF spectrum with little competition, there is less need for SDR.

Lower bands have greater need for SDR, upper bands less

But satellite and flight test telemetry bands contain signals that are too weak for SDR.

- SDR is further legitimized by security requirements and serves Ultra-wideband devices very well.

Interest in UWB may be questionable but the need for secure communications is not going anywhere.

+ Value Proposition for SDR (cont'd)

- Increased efficiency creates secondary markets for licensed spectrum.
Verizon in 700 MHz
- Cheaper to replace the software than the hardware.
This is particularly true for satellite systems.
- Third Party Development of Software –
Shared Spectrum Corporation et al.

+ Public Policy Impact on SDR

- 2002 ET 02-135 created the excitement around SDR
Chairman Powell was an early and enthusiastic supporter.
- Chairman Martin had other priorities and SDR languished.
- The 2009 NOI on Spectrum Innovation gave scant mention to SDR per se. It raised the notion of the Interference Temperature Metric and encouraged Cognitive Radio as an idea but did not appear to look to SDR/CR as a solution to spectrum scarcity.
- The 2010 National Broadband Plan focused on identifying new blocks of spectrum for mobile broadband and mentions SDR only in terms of extending geo-location databases beyond Unlicensed TV Bands to other frequencies.



Public Policy Impact on SDR

- Chairman Genachowski seems more interested in vacating large blocks of spectrum than in squeezing new efficiencies from densely used spectrum.
- Wireless carriers are asking the FCC for large chunks of 10-20 contiguous MHz of spectrum, “in order to compete with FiOS.”
- NOI on Opportunistic Use of Spectrum
- Part 15 Devices are supposed to be cheap and ubiquitous. SDR devices are relatively expensive.
- SDR studies have assumed an SDR world. Reality is messier.

Opportunities and Challenges

- Challenges –
- The supply and demand curve for SDR does not yet look fully favorable.
- Verizon (Dick Lynch) 12/2/10 – “Complex SDR is not yet practical for the near future.” “It is a technology that I would call ‘not yet assured’.”
- In an environment where the dominant approach to spectrum scarcity, from government and from the private sector, is to free up new blocks, scarcity decreases. So the necessity for SDR wanes.
- Transaction Costs and Competition Concerns continue to obstruct development of Secondary Markets. It just doesn’t seem to be happening right now. (FCC Dynamic Spectrum NOI 11/30/10 para 39)
- The spectrum “have-nots” don’t have the money to make development of a secondary market worthwhile for the incumbents.



Opportunities and Challenges

- Opportunities
- 2GHz Lightsquared (SkyTerra)
- Even in absence of strong demand, FCC seems willing to promote secondary markets.
- Finding ways to lower Transaction Costs and Address Competition Complaints may increase access to secondary markets
- Satellites have used sale of preemptible capacity as a secondary market for years.



Dynamic Spectrum Notice of Inquiry

FCC ET 10-237

- This is a challenge to the SDR industry to step up, do the testing, and show that SDR works for mobile broadband.
- FCC loves new technology and will respond with better rules that they produced for UWB, if SDR responds to the challenge
- NOI seems to admit that Secondary Markets have not yet taken off, since their introduction in 2003.
- Make it affordable and reliable and the markets will bloom.
- Pick the right bands. Stay clear of satellite bands where the signals are weak and pervasive.