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Notes for presentation at NAF panel discussion, 20 Sep 06

Thanks and Disclaimer

- Before I begin, you should know that I used to work for Microsoft on spectrum policy, and that they continue to support my work in this area. The views you are about to hear are my own, but I believe Microsoft largely shares them.

Crucial moment

- Test of whether the nation is serious about spectrum reform
- People across the political spectrum agree that the current system is inefficient, unproductive, unfair
- Broadcasting is a poster child: both unlicensed and spectrum-as-property advocates agree it's egregious
- We need to unlock the massive social value that's lying fallow in the broadcasting bands

Outline of argument

1. There are usable gaps in broadcast spectrum (Kolodzy)
2. There are many productive uses (rest of panel)
3. Unlicensed is the best approach (De Vries)

Productive Uses

- Look at unlicensed today to get flavor: 900 MHz cordless phones, 2.4 GHz wireless networks, 5 GHz cheap point-to-point microwave links, enterprise wVOIP)
- Hundreds of manufacturers, rapid tech development
    - To $2.5 billion market in 2005 from a standing start in 2000 (1st standards ratified); now 100 million chipset/year, 45 million in mobile PCs
    - network throughput speed increased almost fivefold: 11 Mbps for 802.11b to 54 Mbps for 802.11g and 80.2.11a
    - draft 802.11n: 540 Mbps
- Stimulates innovation, entrepreneurship: plug in Wi-Fi and just get going - phone headsets, cameras, "Internet radios", in-home video distro, Nabaztag rabbit

New businesses and services

- 40,000 US hotspots; w/wide, # hotspots grew 87% from Jan 2005 to Jan 2006
- metro meshes (2005): 38 city and regional networks (**more from Jonathan Baltuch**, St. Cloud, FL: Benefits of rocket fuel for muni & public safety networks)
- Benefits for small business (**more from Roger Cochetti/**CompTIA)
- thousands of unlicensed WISPs, generally entrepreneurial small businesses - rural broadband and access for small telcos/WISPs (**more from Brian O'Hara/**NTCA)
- Benefits for education (**more from Wendy Wiggen/**EDUCAUSE)

Unlicensed is the best approach here

Smart radio technology manages interference without dividing up and selling spectrum (1 minute)

- Then: exclusive licenses to manage interference between users
- Now: Wi-Fi demonstrates can have many concurrent users ex spread-spectrum modulation, power control and channel access protocols

Unlicensed spectrum is not only for short range

- Already operate beyond property lines
- Success of metro networks, WISPs

Leverage benefits of Wi-Fi -> "Wi-Fi Plus"

- Longer range at same power, less battery consumption for same range
- Build on existing technology investments -> cheap, quick deployment
- WISPs can reach more customers
- Hotspots have bigger footprint
- Metro meshes cheaper, faster start-up (less infrastructure)
- user-deployed meshes

Importance of channel sensing

- FCC NPRM identified three methods for avoiding interference: beacons, geo-location, channel sensing

- Channel sensing – "cognitive radio" – critical because allows operation without dependence on others setting up beacon or building database
- Essence of success of Wi-Fi, and Internet: users at edge of network can operate and innovate with minimal dependency on center of network, which by necessity (capex, security, reliability) moves more slowly

Regulatory insurance – importance of mixed regime

- "Spectrum-title" and unlicensed allocations have complementary strengths and weaknesses (cf. table)
    - Exclusive use licensed: central control, protection from interference, high cost for 3rd party access, market in licenses & devices
    - Unlicensed: decentralized control, no protection from interference, low cost for 3rd party access, market in devices
- Economics can't pick between them - apples and oranges: there exists no economic analysis that compares social surplus of licensed and unlicensed on equal footing
- combination better than each on its own – cf. parks: in Dallas, homes facing one of 14 parks were found to be worth 22% more than homes more than one-half miles away
- already have licensed slated for 700-800 MHz band; unlicensed in white spaces a good complement.

Problems with "spectrum-title"

- Spectrum may not be scarce enough to justify the overheads of creating a market to allocate it: no-one can predict scarcity (tech vs. usage)
- Coase re-allocation assumes low transaction and coordination costs; costs of finding suitable spectrum, negotiating for access, and policing and enforcement with respect to interference cannot be neglected, particularly in socially important applications with low user density such as rural or disadvantaged urban areas
- It is difficult to define spectrum property rights, more so in the white spaces – have to deal with interference with broadcasters

Unlicensed as a hedge

- Hedge against non-scarcity: if abundant, ready access bypassing licensees acting in concert – faster than anti-trust
- Hedge against lock-in: if unlicensed turns out to be best value, hard to get back there from exclusive property-like licenses

- Hedge against government greed: moral hazard of slowing down auctions – if spectrum gets too scarce/expensive, entrepreneurs can pay price of interference and operate in unlicensed

Conclusion

- Massive opportunity for unleashing social value
- mixed licensed/unlicensed spectrum ecosystem facilitates more innovation, lowers barriers to competitive entry and provides low-transaction-cost access
- already have licensed in 700 MHz; free up white spaces for unlicensed
- FCC have made a start – stay the course