

# *Why Unlicensed Use of the White Space in the TV Bands Will Not Cause Interference to the DTV Viewers*

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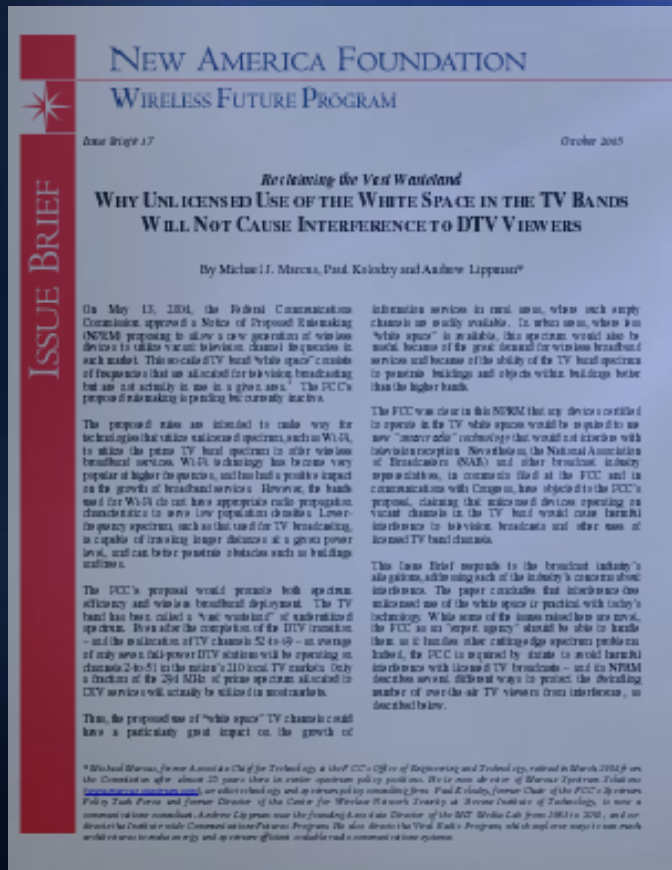
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# *Outline*

- ⊕ Background
- ⊕ FCC Proposal
- ⊕ Broadcaster Concerns
- ⊕ Proponents Response

# Background



- ⊕ On 5/13/2004 FCC issued a proposal for unlicensed use of TV whitespace for Wi-Fi-like services
- ⊕ This presentation is based on the New America Foundation's response to broadcast industry concerns
- ⊕ Whole record is available at [http://gulfoss2.fcc.gov/cgi-bin/websql/prod/ecfs/comsrch\\_v2.hts?ws\\_mode=retrieve\\_list&id\\_proceeding=04-186](http://gulfoss2.fcc.gov/cgi-bin/websql/prod/ecfs/comsrch_v2.hts?ws_mode=retrieve_list&id_proceeding=04-186)
- ⊕ We have "notice & comment" in order to fine tune proposals

[http://www.newamerica.net/Download\\_Docs/pdfs/Doc\\_File\\_2635\\_1.pdf](http://www.newamerica.net/Download_Docs/pdfs/Doc_File_2635_1.pdf)

# FCC 5/04 Proposal

- ⊕ NPRM in Docket 04-186 proposes sharing of TV spectrum under one or more of three stated alternatives
  - ⊕ **"Listen-Before-Talk" (LBT)**: Sensing the presence of TV signals by the unlicensed device in order to select channels not in use.
  - ⊕ **"Geolocation/Database"**: Location sensing and consultation with broadcast database.
  - ⊕ **"Local Beacon"**: Reception of a locally transmitted signal that identifies which TV channels may be used in the local area for unlicensed use.
- ⊕ 0 dBw fixed limit; -10 dBw mobile

*“Problems worthy of attack,  
Prove their worth by hitting back” - Piet Hein*

- ⊕ Not surprisingly, this proposal has been extremely controversial
  - ⊕ In some ways, a struggle between the “new economy” and the “old economy”
  - ⊕ This presentation follows the structure of concerns expressed by broadcast interests in a letter to Sen. Stevens, on file at FCC, and a later web-based video
  - ⊕ Broadcast interests have yet to reply in FCC docket file

# *Concerns Expressed in Letter to Sen. Stevens*

## ⊕ Basic Alternatives' Problems

- ⊕ LBT Alternative
- ⊕ Geolocation/Database Alternative
- ⊕ Local Beacon Alternative

## ⊕ Other Issues

- ⊕ Channel Availability
- ⊕ "Interference to 73 Million TV Sets"
- ⊕ DTV Disruption Issue
- ⊕ Public Safety Interference

- ⊕ Newsgathering and Sports Programming Production
- ⊕ Interference with "Theaters, Churches, and School Events"
- ⊕ Will the Proposal "Permanently Chill Investment" in Spectrum?
- ⊕ Interference to Cable Services

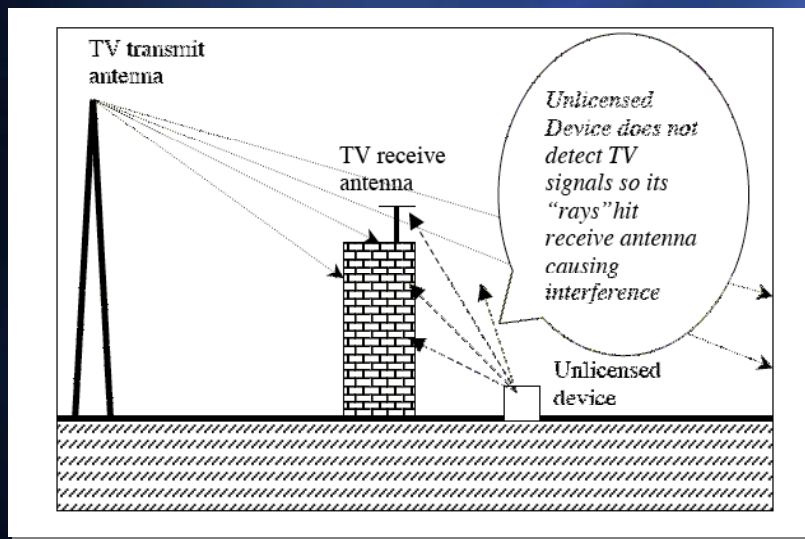
- ⊕ *Cable Headend and Translators*

- ⊕ *Wiring Issue*

- ⊕ "Eglin AFB Incident"

- ⊕ "Your Neighbor's Static"

# LBT Issue: Hidden Node Problem



- ⊕ Broadcasts raise the well known hidden node problem, but ignore potential of cyclostationary detectors
- ⊕ Cyclostationary or feature detectors can be 30-40 dB more sensitive than normal receivers
- ⊕ Rather than demodulating 20 MB/s, just estimate presence of a specified format

# ***Geolocation/Database Alternative: Need to Keep FCC Data Up to Date***

- ⊕ Broadcasters point out, correctly, that present FCC databases are not timely and have excessive error rate
  - ⊕ 2009 DTV deadline will significantly slow changes afterwards
  - ⊕ FCC uses archaic techniques for DB upkeep
    - ⊕ Inappropriate for a \$~10<sup>10</sup> resource
    - FCC should upgrade its DB system by 2009



## ***Local Beacon Alternative: Control Signal Rules Can Avoid False Positives***

- ⊕ Broadcasters correctly point out that FCC proposal was not clear on what type of beacons could be used
  - ⊕ A beacon with a range greater than validity of its signal, e.g. MF broadcast, could lead to interference
  - Modify proposal to require that the x% confidence limit of the propagation of the beacon signal is within its area of validity

# “Interference to 73 Million TV Sets”/ “Your Neighbor’s Static”



<http://www.mstv.org/static.html>

- ⊕ Less than 15% of American households rely on over-the-air TV reception
  - ⊕ Laboratory test report alleging desensitization does not contain adequate details to reproduce experiment
  - ⊕ Unconfirmed verbal discussions with broadcasting sources indicate signals used were UWB signals permitted by loophole in proposal
- Final rules should have a peak power limit, as is usual in such rules, to prevent desensitization

# *Some Simpler Issues*

## ⊕ DTV Disruption Issue

- ⊕ Now moot since adoption of 2009 transition

## ⊕ Public safety interference

- ⊕ Public safety shares TV channels 14-20 in some cities
- ⊕ → Avoid use of these channels under the LBT option

# *Wireless Microphone Issues: 1*

- ⊕ Broadcasters and some allied groups have right under Part 74 to use vacant TV channels for wireless microphones
- ⊕ Aggressive unethical marketing by certain manufacturers and lax FCC enforcement have resulted in use of such equipment in schools, theatres, and churches
- ⊕ This policy is anachronistic
  - ⊕ When first adopted, spectrum was not as valued and there were no other options for using “whitespace”

## *Wireless Microphone Issues: 2*

- ⊕ Cognitive radio technology permits more efficient utilization of whitespace
  - ⊕ General policies today require commercial entities - such as broadcasters - to use marketplace for their spectrum needs
- 3G industry would be glad to meet broadcasters needs for high quality mobile audio

# *Interference to Cable Services*

## ⊕ Cable Headend and Translators

- ⊕ Some cable headends and translators have remote high gain antennas receiving very weak signals
  - ⊕ Very difficult hidden node problem
  - ⊕ At present, no reliable database on these sites
- New DB is needed for many reasons
- Forbid LBT for rural base stations

# *Interference to Cable Services*

## ⊕ Wiring Issue

- ⊕ Laboratory tests sponsored by broadcasters showed that poor quality indoor cabling with unterminated outlets could allow ingress of unlicensed signals from high gain antennas to CATV cabling - 1m
  - Cable used in test (RG-59) not used by CATV industry and not sold at large retail chains
  - Terminators are cheap if needed

# Conclusions

- ⊕ Cognitive radio creates new opportunities to improve spectrum efficiency
- ⊕ FCC comment process is intended to improve quality of proposals by interaction with affected parties
- ⊕ Urge FCC to act on the record of Docket 04-186 and make underutilized spectrum available with new technology



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Thanks for Listening

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