Role of Multi-stakeholder Groups in Advanced Spectrum Sharing

Dale N. Hatfield
Senior Fellow
Silicon Flatirons Center for Law, Technology and Entrepreneurship
University of Colorado at Boulder
and
Executive Director
Broadband Internet Technical Advisory Group
at
International Symposium on Advance Radio Technology
Boulder, CO
July 25-26, 2012

University of Colorado Boulder

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Introduction

- Purpose:
  - Identify and perhaps clarify enforcement issues and the potential role of multi-stakeholder (MSH) organizations in a vastly different environment of dynamic spectrum access
- Outline
  - Reflections on interference mitigation and enforcement in the traditional or historical static environment
  - Challenges and opportunities in interference management and enforcement in a more dynamic environment of extensive spectrum sharing
  - Role of MSH organizations in enforcement and, more generally, interference management in meeting the challenges associated with the new environment
  - Concluding comments

Reflections

- Characteristics of the Environment
  - Limited modulation formats
  - Single or limited number of (often narrowband) channels
  - Static rather than dynamic assignment techniques
  - High power/high antenna height sites
  - Noise limited systems
  - Licensed stations/transmitters
  - Licensed operators/technicians
  - Unique identification (call letters)
  - Equipment certification
  - Signals often in the clear or easily decipherable

Reflections

- Enforcement in the Old Environment
  - Tools
  - Methods
  - Incentives
- Emergence of Voluntary Organizations
  - Frequency coordinators
  - Site managers
  - Official observers (amateur radio service)
- Conclusions

New Environment

- Characteristics of the Environment
  - Virtually unlimited modulation formats/waveforms
  - Multiple broadband channels scattered over a wide range
  - Dynamic rather than static access
  - Low power/low antenna height sites
  - Interference limited systems
  - Increase in unlicensed or licensed by rule stations/transmitters
  - Minimal licensing of operators/technicians
  - Limited unique identifiers (e.g., no call letters)
  - Equipment certification
  - Signals often encrypted or not easily decipherable
  - Underlay devices/networks
  - Intentional interferers (jammers)

Role of MSH Organizations

- MSH Organizations*
  - Description
    - Do not operate under or pursuant to formal government authority
    - Authority generally derives from “the consent of those who choose to be governed”
    - Power derives from (a) respect for their processes (e.g., openness, fairness, inclusiveness, transparency and flexibility) and (b) the quality of their outputs (e.g., standards, “best-practices” recommendations, codes of conduct)
  - Examples
    - Much of the governance of the Internet is carried out by such organizations (e.g., Internet Society including the IETF and the Internet Architecture Board, W3C, NANOG)
    - IEEE (e.g., P1900 and 802 series of standards)
    - Broadband Internet Technical Advisory Group
  - Observations

Draws upon Joe Waz and Phil Weiser, *Internet Governance: The Role of Multistakeholder Organizations, 2011*

Role of MSH Organizations

- Role in Designing Sharing Arrangements:
  - Clearly MSH Organizations (albeit some with more formal ties to government) can and indeed already are playing an important role in designing sharing arrangements
- Potential Role in Enforcement
  - MSH Organizations can also play a key role by:
    - (a) designing in tools that allow, for example, devices to be prohibited in advance from transmitting in an unauthorized manner, time or location or “misbehaving” devices to be shut off automatically
    - (b) more speculatively, actually operate on a multistakeholder basis an organization for collecting longer term information on the interference environment (e.g., an Interference Clearinghouse as proposed by Dan Stancil in the CSMAC Unlicensed Subcommittee)

Concluding Comments

- Personally convinced that MSH Organizations based heavily upon the engineering ethos can play a key role in ensuring the success of spectrum sharing that is so vital to the Nation's long term economic and social wellbeing and to homeland security and national defense
- Of course government is still needed, among other things, to address normative issues and to step in where the incentives for cooperation are inadequate
- Still have some personal concerns that a very dynamic spectrum sharing environment coupled with receiver inadequacies, vastly increased numbers of transmitters in close proximity, interference from unintended radiators (such as switching power supplies), and intentional interferers may lead to potentially dramatic increases in the noise floor