John Santhoff
CTO/CEO
jsanthoff@pulselink.net

Steve Moore JD., Ph.D.
Director of Intellectual Property
smoore@pulselink.net

1969 Kellogg Avenue
Carlsbad, CA 92008
Ph. (760) 607-0844
Fax: (760) 760-607-0861

Pulse~LINK™

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The Vision

An Integrated Inexpensive Chipset Solution Delivering:

- ✓ Up to Gigabit New Data capacity over existing wired infrastructures.
- ✓ Up to Gigabit mobile wireless data networking.
- ✓ Content Security and QoS.

Presentation Outline

- Related FCC Dockets
- The need for a Common Signaling Mode (CSM)
- Features, Benefits, and Future Uses of a CSM
- A Roadmap for a CSM in Unlicensed Devices
- Conclusion

Related Dockets

This presentation relates to the following dockets.
Appropriate copies will be filed in each.

- ET 98-153 Ultra-Wideband
- ET 03-108 Cognitive Radio
- ET 04-151 3650-3700 MHz band
- ET 02-380 Additional spectrum for Unlicensed Devices (3GHz)
- CC 98-146 Advanced Telecommunications to all Americans.
- ET 03-237 Interference Temperature
- ET 00-47 Software Definable Radios
- ET 03-122 UNII Devices in the 5GHz band

The Need for a Common Signaling Mode (CSM)

- Historically Unlicensed Spectrum has been a open to all.
  - 2.4 GHz Unlicensed band has multiple competing technologies
  - 802.11, Bluetooth, cordless phones, etc… all compete for spectrum
  - The potential for interference between these devices is real.
- New devices are being developed that will be able to utilize spectrum more efficiently
  - Cognitive Radios will sense their surrounding RF environment prior to transmission.
  - Software Definable Radios will have the ability to adapt to under utilized bands.
  - Ultra-Wideband devices will overlay signals into occupied bands.
- Dissimilar technologies can be designed to cooperate with one another.
  - UWB devices can coexist with licensed services in the same frequency band more efficiently.
  - Employing a CSM devices may take advantage of disparate technologies.
- Hybrid or Multi-Mode Devices are under development that will need to share data between technologies.
  - "In the near future, it will be commonplace for cell phones to incorporate a variety of interfaces to Bluetooth, UWB, 802.11, GPS, and even TV." Texas Instruments
  - These devices would need to share data not just at the logical level but at the spectrum level as well.

The Need for a Common Signaling Mode (CSM)

- A number of Dockets address issues that a CSM can perform.
  - Cognitive Radios (ET-03-108) could pass information on the RF environment to any enabled device through a CSM.
  - Local Interference Temperature (ET-237) calculations can be shared through a CSM.
  - Software Definable Radios (ET-0047) can communicate with network access points through a CSM.
  - A device can exchange transmit power settings (ET 03-122) across a CSM allowing for greater ranges in rural environments.
  - Devices can use a CSM to notify each other to vacate a frequency channel (ET-03-122) when necessary.
  - A CSM can allow disparate UWB (ET 98-153) implementations to coexist.
  - The CSM provides a method for device identification signaling (ET 04-151, ET 02-380, ET 98-237).
  - By providing a mechanism for ensured interoperability, a CSM promotes the development of new advanced communications technologies (FCC 98-146)

The Need for a Common Signaling Mode (CSM)

- A CSM Furthers a Number of the Commissions Objectives as defined by the Strategic Plan FY 2003-2008.
  - A CSM can assist in the transition to a Market-Oriented Allocation by providing a standard mechanism for dynamic re-use of spectrum in the secondary market.
  - A CSM with a “shut-down” feature assists the vigorous protection of public safety spectrum uses.
  - A CSM provides a standard mechanism for automated secondary market licensure, promoting efficient use of spectrum
  - A CSM can guarantee interoperability for better public safety and commercial purposes.
  - A CSM can allow dissimilar UWB (ET 98-153) implementations to coexist.

The Need for a Common Signaling Mode (CSM)

- Unlicensed Spectrum without a CSM
  - Inefficient Use of Spectrum
  - Limited Scalability
  - No guaranteed Quality of Service (QOS)
  - Commercial Viability of new Technology is Questionable.
- Unlicensed Spectrum with a CSM
  - Maximizes the Efficient Use of Spectrum
  - Maximizes Scalability
  - Enables QOS guarantee
  - Maximizes Commercial Viability Since Interoperability, Scalability, and Guaranteed QOS Allow Consumers to be Confident in New Technologies

Features, Benefits, and Future Uses of a CSM

- The uses of a CSM are Many, Some may include:

  - A Beacon Timing Channel.
  - A Beacon Ranging Channel.
  - A Low-Bandwidth communications link for low-bandwidth devices.
  - A power conservation functionality for mobile devices.
  - A dynamic node-to-node power transmit/receive power control.
  - Network status/health/control information.
  - A low-bandwidth Over-the-Air-Reprogramming link.
  - A low-bandwidth Over-the-Air-Rekeying.
  - CSM could be utilized for through-wall imaging systems.
  - It could be utilized for area security systems.
  - The CSM could also enable a "Shut Down" Protocol.
  - The CSM could serve as the PHY layer for sensor networks.
  - The CSM could be used in a Mesh Network for routing updates.
  - Allows for new regulatory changes to be implemented without device replacement as a software update.

A Roadmap for a CSM in Unlicensed Devices

- The Commission Should Adopt a Multi-Tiered Deployment Strategy for CSM.
  - Ultra-Wideband Physical Layer Standards Still In Progress
  - Cognitive Radio Technologies Should Employ a CSM
  - Software Definable Radio Technologies Should Have a CSM
  - New Emerging Technologies Should be Designed Up Front With A CSM
- Second Tier Should Require all Devices to Implement a CSM.
  - Can be a Common RF Channel Similar to NPRM 04-151
  - Removes Interoperability Concerns From the Consumers.
  - Similar to the “Plug and Play” Concept

Conclusion

- A CSM resolves many regulatory issues currently being addressed by the Commission.
- A CSM for wireless communications devices is in the public's interest.
- A CSM provides a standard mechanism for future spectrum management.
- A CSM provides for stability to industry which will further the development of Advanced Telecommunications Services.
- A CSM removes interoperability concerns from consumers allowing for increased commercial viability.
- The Commission should mandate a CSM for UWB and all future unlicensed allocations.
- The CSM can be extended to legacy unlicensed systems over time.