

A large, light gray watermark of the IEEE logo is centered on the slide. It consists of a diamond shape with a stylized 'I' and 'E' inside, and a registered trademark symbol (®) to the right.

IEEE SCC41

Standards for Dynamic

Spectrum Access Networks

**IEICE Software & Cognitive Radio
Expo & Technical Conference**

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Tokyo, Japan

Joanna Guenin, SCC41 Chair

Abstract

This presentation will provide an overview of the standardization work in IEEE SCC41, including the scope, objectives, membership information, project acceptance criteria and working methods. The scope and status of current projects will also be discussed to provide an overall perspective on how SCC41's standardization work relate to the Dynamic Spectrum Access (DSA) and Cognitive Radio (CR) space. We will also review the drivers for DSA and CR including regulatory trends and standardization challenges to understand the future work that will be relevant to IEEE SCC41. Finally we will discuss what it takes for DSA and CR to succeed and the role that IEEE SCC41 standardization will play in it.

IEEE Standards Coordinating Committee 41

Dynamic Spectrum Access Networks

Scope

This Standards Coordinating Committee will develop standards related to *dynamic spectrum access networks*. The focus is on improved use of spectrum. New techniques and methods of dynamic spectrum access require managing interference, coordination of wireless technologies and include network management and information sharing.

Definitions of Dynamic Spectrum Access and Cognitive Radio

According to the P1900.1 Standard : -

Dynamic Spectrum Access is the real-time adjustment of Spectrum Utilization in response to changing circumstances and objectives.

Cognitive Radio is a type of Radio in which communication systems are aware of their environment and internal state and can make decisions about their radio operating behavior based on that information and predefined objectives.

Cognitive Radio and Dynamic Spectrum Access (DSA)

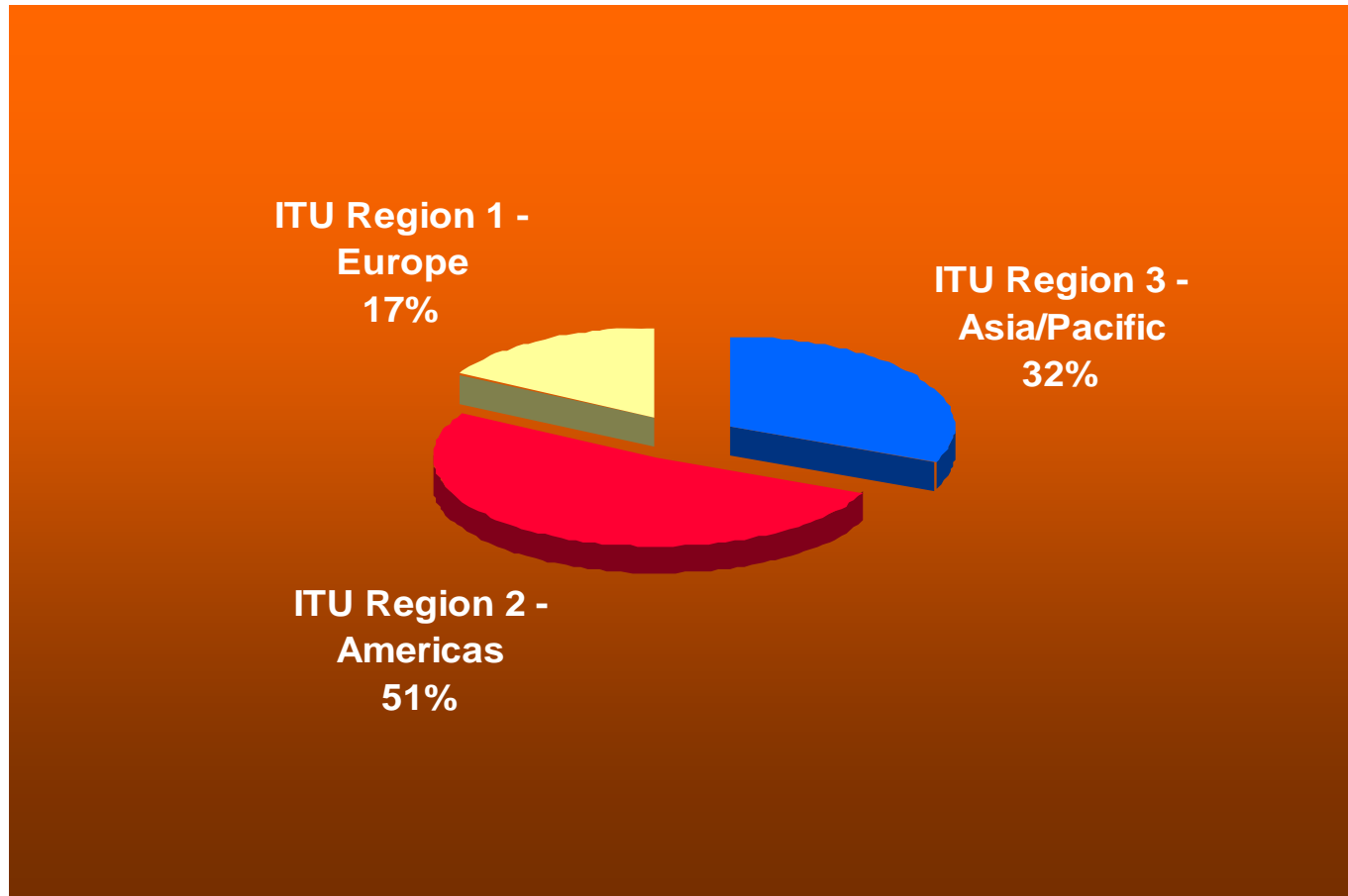
Preston Marshall, Program Manager of DARPA XG Program:

“The Primary Product of the XG Program is Not a New Radio, but a Set of Advanced Technologies for Dynamic Spectrum Access.”

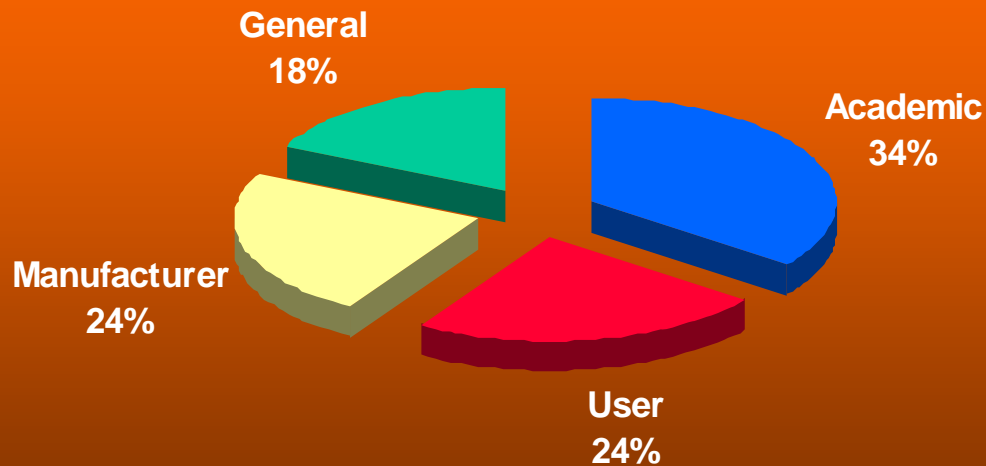
Wireless World Research Forum
27 October 2003



SCC41 Membership Composition by Region



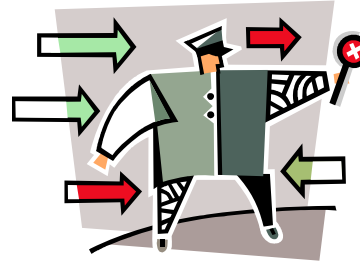
SCC41 Membership Composition by Interest Category



SCC41 Working Groups



1. Concepts & Terminologies



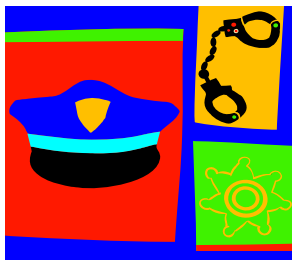
4. Cognitive Spectrum Management



2. Coexistence Best Practices



5. Policy Language for DSA



3. Conformance Assurance



6. Spectrum Sensing

SCC41 Working Groups

- **IEEE 1900.1: Standard Definitions and Concepts for Spectrum Management and Advanced Radio System Technologies**
- **IEEE 1900.2: Recommended Practice for Interference and Coexistence Analysis**
- **IEEE 1900.3: Standard for Assessing the Spectrum Access Behavior of Radio Systems Employing Dynamic Spectrum Access Methods**
- **IEEE 1900.4: Standard for Architectural building blocks enabling network-device distributed decision making for optimized radio resource usage in heterogeneous wireless access networks**
- **IEEE 1900.5: Standard on Policy Language and Policy Architectures for Managing Cognitive Radio for Dynamic Spectrum Access Applications**
- **IEEE 1900.6: Standard on interfaces and data structures for exchanging spectrum sensing information for dynamic spectrum access systems**

Status of SCC41 Working Groups

Project History & Status					
	1900.1	1900.2	1900.3	1900.4	1900.5
PAR Approved	03/04/05	03/20/05	12/05/07	12/06/06	03/28/08
Initial Ballot - Open	09/07/07	07/02/07			
Initial Ballot – Close	10/07/07	08/03/07			
1st Recirc – Close	04/17/08	10/24/07			
2nd Recirc - Close		01/01/08			
RevCom Submission	04/10/08	01/08/08			
SASB Approval	06/12/08	03/28/08			
Published	Scheduled - 10/20/08	7/29/08			

Meetings and Working Methods

- **Three General Meetings Per Year**
 - At least one of these meetings will be held in a non-US location
- **Committee or Working Group Meetings as Required**
 - Globally as appropriate
- **Conference Calls**
 - Globally as appropriate
- **Electronic Working Methods**
 - E-mail, reflectors, website.....

Membership Requirements

- **Must apply for membership through the IEEE-SA MyProject website**
- **Must meet “active participation” requirements in at least one working group as defined by the Chair of the working group**
- **Must attend two out of three general meetings**
- **Must vote on two out of three email ballots**

SCC41 Standards Project Acceptance Criteria

1. Broad market application

Each SCC41 (P1900 series) standard shall address a well defined problem or need, be commercially relevant, have applicability to multiple market segments if possible, and cater to an open market where many producers and consumers can benefit.

2. Consistency

Each SCC41 (P1900 series) standard shall be consistent with other SCC41 (P1900 series) standards in the series.

3. Distinct Identity

Each SCC41 (P1900 series) standard shall have a distinct identity and does not substantially overlap or duplicate the work in other existing industry standards.

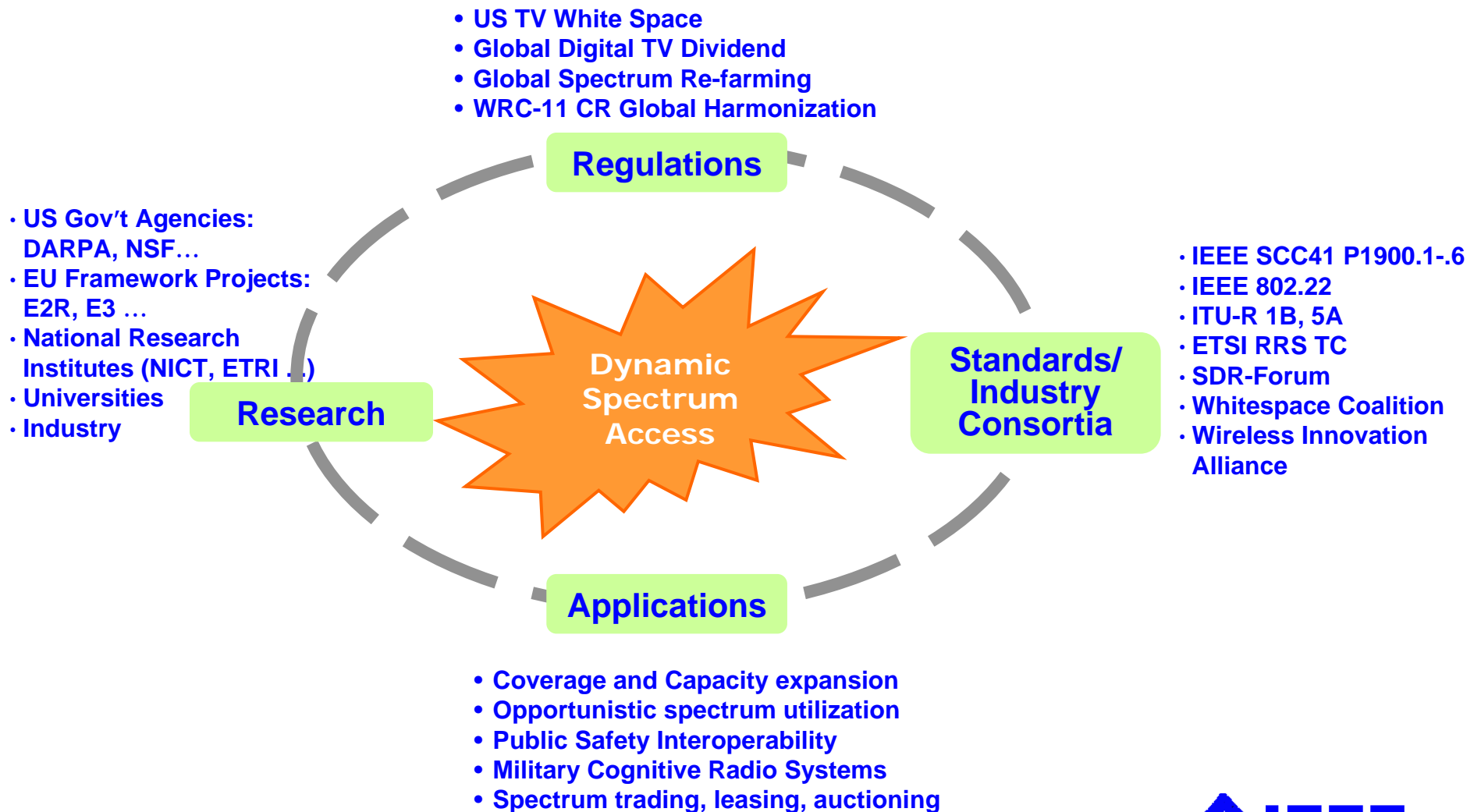
4. Achievable Scope

Each SCC41 (P1900 series) project shall have the potential to produce a mature draft within 18 months of PAR approval.

5. Balanced and committed participation

To uphold the IEEE-SA principle of open, balanced, consensus-based, inclusive participation, a project requesting approval shall be scrutinized for balance in the participants. This means that a diversity of stakeholders should be represented. Also, to ensure successful and timely completion of the standard, the project team shall demonstrate commitment to get the standard completed.

Understanding the Drivers for DSA



Global Regulatory Trends

- **Spectrum use is inefficient; Fixed licensing has yielded artificial scarcity**
- **Success of 802.11 - Allow more unlicensed use of spectrum**
- **Spectrum re-farming and other flexible usage schemes**
- **Exploitation of digital TV dividend**
- **Spectrum sharing test bed experiments**
- **Making spectrum usage rights tradable**
- **Establishing global approach to spectrum sharing - WRC-11**
- **Open access, Net neutrality**
- **Desire to maximize the value of spectrum to society, e.g. bridge the digital divide**
- **Look to technology innovation to increase access to spectrum**
- **Increasing availability of government (public sector) spectrum for commercial use**

Standards Challenges

- **Diversity in spectrum policies for each country/region**
- **Currently very research driven, industry lagging in participation**
- **Incumbents wanting to protect the spectrum they were allocated**
- **Trade-offs between consensus and innovation**
- **Spectrum regulations do not always translate well into standards**
- **Complexity inherent in software radios and many levels of coordination between proliferating radio standards**

Challenges for the Future of DSA

- **Need for new spectrum licensing models**
- **Regulations are often slowed by politics**
- **Need for innovative business models**
- **Time window for commercialization too far out for industry to invest in technology and standards**
- **The current process of Standards-Making is inefficient causing delays in meeting market needs**
- **Technologies still need to be proven to provide market advantage and protect incumbents**

What will it take for DSA to Succeed?

- **Regulators**

Adopt spectrum usage regimes that promote competition and innovation, support open markets, and maximize value to society

- **Industry**

Develop innovative Applications and Business Models that take advantage of the regulatory rules and technical innovations to create significant monetary rewards

- **Technology**

Continue research and technology investment to solve the hard problems such as protection of incumbents

- **Standards**

Build industry consensus to create timely global standards that serve the marketplace



Role of SCC41

- **Catalyst for stakeholders to come together to address the DSA market**
- **Driver of consensus on technical approaches**
- **Kinder, gentler but more efficient, effective place to do standards**
- **Contributor to DSA regulations and policies**

Future Work in SCC41

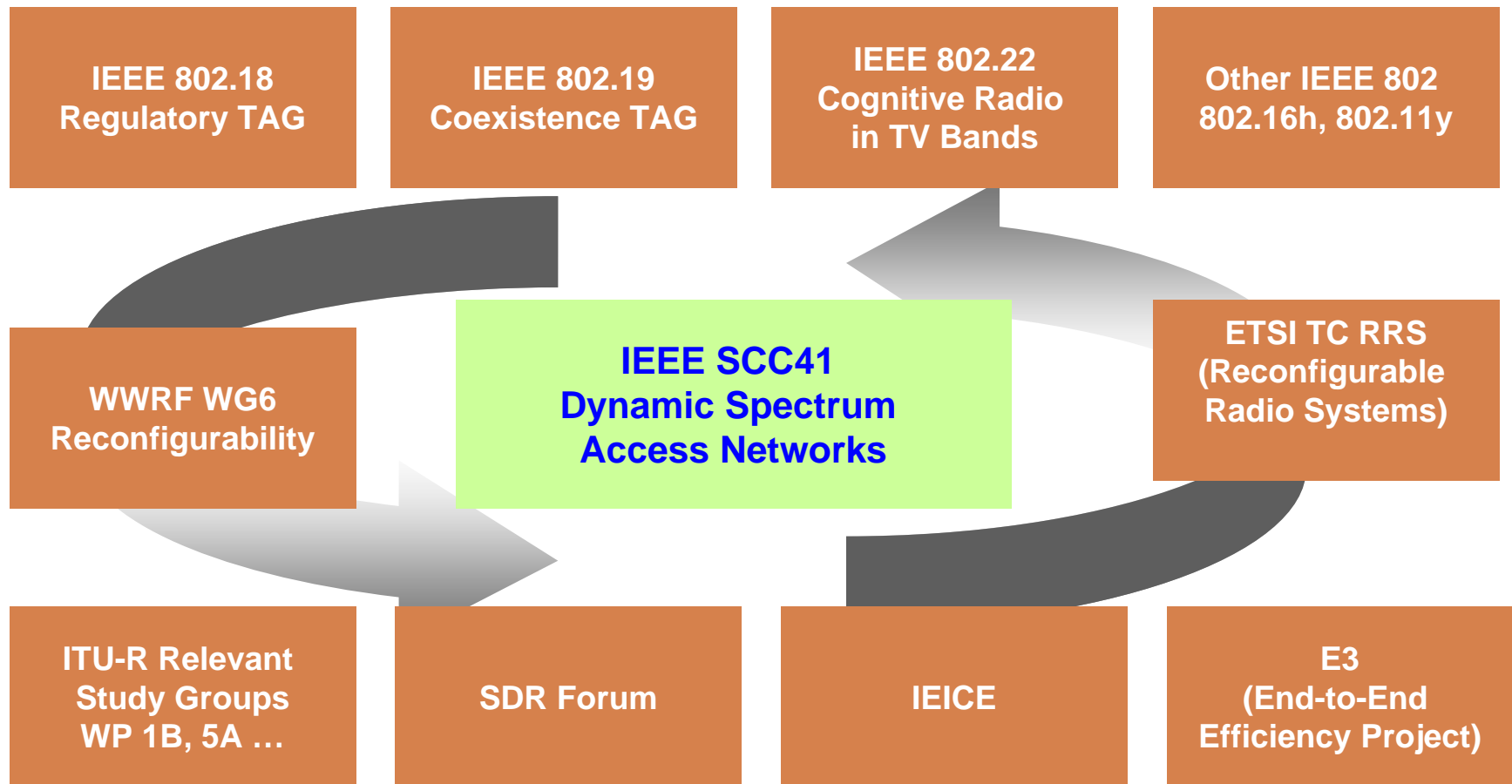
- Spectrum sensing and other DSA inputs
- Innovative sharing technologies
- Location and context technologies
- Cognitive learning and adapting
- Ad-hoc, multi-hop collaboration
- Collaborative Radio – Coverage and capacity extensions

- Knowledge management
- Policy automation
- Self-configuring, optimizing, healing technologies
- Plug and Play Optimization
- Autonomic interoperability

- Multibanding
- Cognitive Routing and prioritization
- Smart Antenna management
- Power Consumption Reduction

- Heterogeneous networks spectrum management
- Femto cells and spectrum management
- Cognitive MIMO
- Cellular Radio Resource Management
- Public Safety Interoperability
- Intersystem handoff and network resource allocation
- End-to-End Quality of Service
- Enhanced Security mechanisms
- Trust systems
- Assurance and conformance mechanisms

Potential Work Partners for SCC41



Summary

- **Dynamic Spectrum Access (DSA) is the key application for Cognitive Radio (CR)**
- **Regulations, Research, Applications and Standards are the critical drivers for DSA**
- **SCC41 has a top-down approach to DSA standardization**
- **SCC41 has a global mindset**
- **SCC41 wants to reach out to relevant research and standardization organizations**

SCC 41 Future Meetings

- **2008 Meetings**
 - Washington, DC
 - Tokyo, Japan
 - Chicago, IL
- **2009 Meetings**
 - Kings College, UK
 - IEEE HQ, Piscataway, NJ
 - San Diego, CA
- **2010 Meetings**
 - Washington, DC
 - Delft University of Technology, Amsterdam, Netherlands
 - Hawaii

For More Information

SCC41 Website

<http://www.scc41.org>

SCC41- The place to do World Class CR/DSA Standards!

Thank you for your attention!