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Spectrum Sharing R&D at CERDEC S&TCD

July 2012

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US ARMY RDECOM CERDEC S&TCD

RDECOM

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## Increasing operational spectrum demand

- Voice/data communications
- Electronic Warfare (EW)
- Full Motion Video (FMV)

Regulatory considerations

- Spectrum is used by DoD, civilians, government agencies, other nations

"America's future competitiveness and global technology leadership depend, in part, upon the availability of additional spectrum."

Presidential Memorandum: Unleashing the Wireless Broadband Revolution (June 2010)
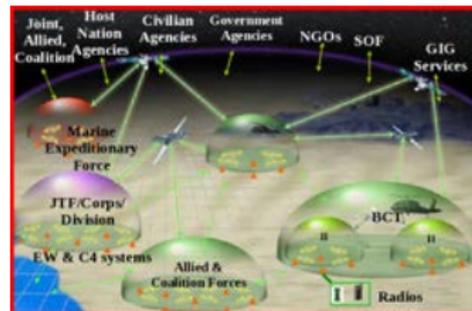
"To protect command and control systems, the joint force must develop systems, technologies, and Warfighting techniques to ensure continued freedom of action and access to space, cyberspace, and the electromagnetic spectrum when and where needed."

GEN Dempsey, JOAC 2012

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There are important considerations specific to military networks
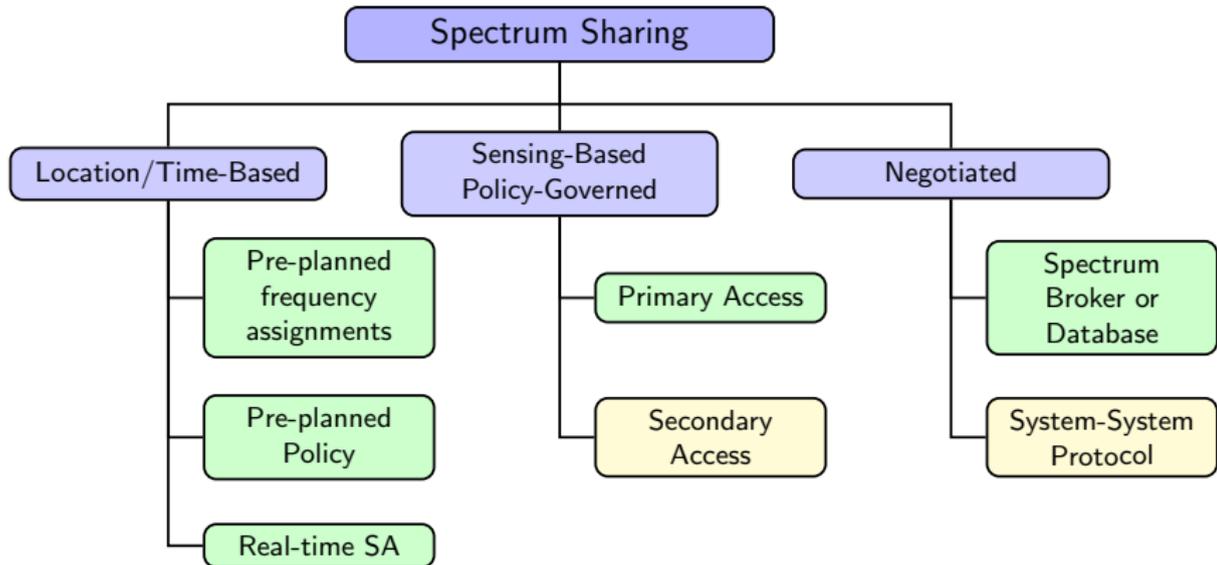
Expeditionary and mobile operations

- Mobile nodes
- Cannot assume fixed infrastructure
- Connectivity constraints
- Ability to operate in various host Nations

Heterogeneity

- Missions and locations
- Networks
- Incumbent systems
- Electromagnetic environment

Security considerations

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All spectrum sharing schemes require prior information and pre-planning

Spectrum Sharing

- Location/Time-Based
- Sensing-Based Policy-Governed
- Negotiated

Location/Time-Based:
- Pre-planned frequency assignments
- Pre-planned Policy
- Real-time SA

Sensing-Based Policy-Governed:
- Primary Access
- Secondary Access

Negotiated:
- Spectrum Broker or Database
- System-System Protocol

- Various combinations of these types are possible

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Electromagnetic Battle Manager (EMBM)

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> Helps manage complexities of spectrum management in the tactical battlespace

Description

- EMBM provides an integrated RF spectrum planning and management capability
- Models and simulates a planned mission's impact on the Electromagnetic Battlespace

System Elements

- Visualizer
- Spectrum Plan Adviser
- Communication Effects Simulators
- Spectrum Knowledge Repository

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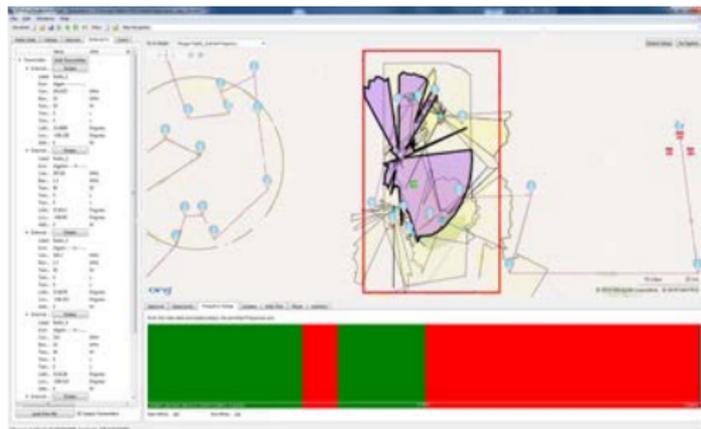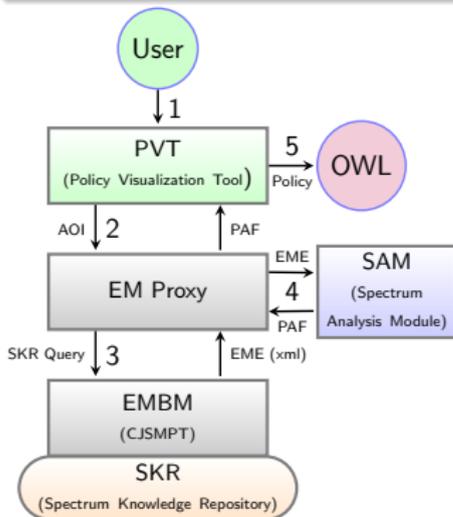
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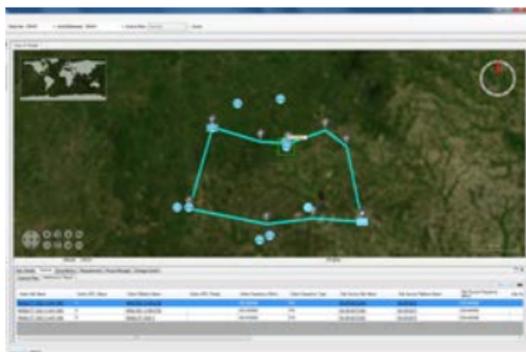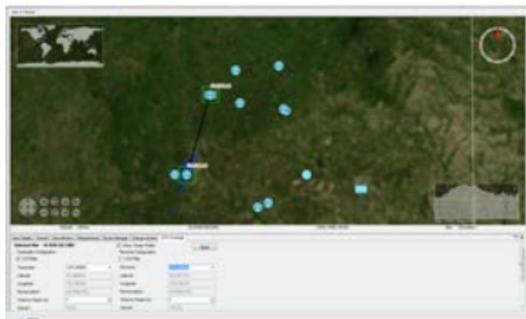
Helps user generate and validate Dynamic Spectrum Access (DSA) policies for policy-based DSA radio

Description

- Automate DSA policy management for the Soldier
- Enable deployment and operation of DSA-enabled radios

Approach

- Develop an automated DSA policy generation system
- Integrate spectrum analysis to develop coexistence policy parameters
  - Sensing thresholds, geospatial policies, etc.

User

↓1

PVT
(Policy Visualization Tool)

5
Policy → OWL

AOI ↓2   ↑ PAF

EM Proxy

EME → SAM
4   (Spectrum
PAF   Analysis Module)

SKR Query ↓3   ↑ EME (xml)

EMBM
(CJSMPT)

SKR
(Spectrum Knowledge Repository)

July 2012, Slide 6
Approved for public release; distribution is unlimited.

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Spectrum sharing among Army systems using near real-time resource control

Types of Sharing

- Among military MANET networks
- Between MANET networks and other missions
- Between MANET networks and base station/subscriber networks

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