Communications Research for Law Enforcement Responders

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Disclaimer

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• These words are not for quote or attribution
• These words are not necessarily the words of the U.S. Department of Justice
Mission

• Research, development and evaluation agency of the U.S. Department of Justice
  – Provides objective and independent knowledge and tools to reduce crime and promote justice
  – Focus is on the state and local level
NIJ Authority

- Crime Act of 1968
- Homeland Security Act of 2002
My Customers

• Federal, state, local and tribal criminal justice agencies
  – Nearly 20,000 law enforcement agencies
    • Nearly 4,700 sheriff’s departments
    • Nearly 850,000 sworn officers
  – 63 state corrections agencies
    • Nearly 3,000 jails
    • Over 1,000 prisons
    • 430,000 corrections officers
  – Over 400 crime laboratories
  – Courts, probation & parole, etc.
  – Public safety community at-large
• Policymakers, researchers, the American public
NIJ’s Role In Homeland Security

Combating Terrorism

Homeland Security

Critical Incidents

Criminal Justice
Technology Investments

- **Sago System ST-150** (remote weapons detection camera)
- **Avon Protection Systems** (law enforcement tactical respirator “NIJ 53”)
- **Virginia Tech Public Safety**
  - Cognitive Radio
- **Warwick Mills** (multi-hazard protective gloves)
- **VanguardAllen Digital Vanguard** (bomb robot)
- **Brijot Imaging System BIS-WDS** (remote weapons detection camera)
Standards and Testing
Policy and Practice
The National Institute of Justice

Communications Technology Research Program
Strategy

- Work with my customers to prioritize research requirements
- Award, competitively, independent projects to address these prioritized research requirements
- Accept proof of concept demonstration capabilities from researchers
- Port each research capability onto reference architecture
- Provide integrated capability to facilitate analysis
- Iterate and expand testing from bench to field to selected users for operational evaluation
- Integrate other R&D activities for operational evaluation
A subset of Public Safety RF Issues and Opportunities

- Security
- Multiband Radio
- Disaster Response
- Smartphone
- Datacasting
- Broadband Data
- Streaming Video
- Interoperability
- TV White Space
- Contraband Cell Phone
- Multiband Over the Air Programming/Rekeying
- 700 MHz
- 4.9 GHz
- 700/800 MHz Regional Frequency Planning
- Software Defined Radio
- Cognitive Radio
- P-25
Technology Working Group (TWGs)

- Group of 12-20 members representing mid-level practitioners of differing types of criminal justice organizations/agencies, different geographical regions, different job functions, etc.

- Homeland Security Act of 2002
  - OS&T mission includes serving as the national focal point for law enforcement technology.
  - To carry out its mission, OS&T shall establish and maintain advisory groups to assess law enforcement technology needs.
NIJ Competitively-funded Communications R&D

• Cognitive radios
  – To provide waveform recognition, reconfiguration, and interoperability

• Cognitive control of reconfigurable antennas
  – For enhanced coverage, interference mitigation, and power management

• Channel bonding across heterogeneous networks
  – For enhanced spectrum capacity and management
Integration Task

• These independent research efforts were conducted to develop and demonstrate reliable, affordable, flexible, and spectrally efficient public safety and criminal justice communications tools.

• The products of these independent activities provided proof of concept devices and associated software.

• Our next task is to work to integrate the delivered functionalities into a unified research architecture and prototype for further research and operational demonstration and evaluation.
Integration Status

• Establish an area for integration
• Deliver competitively awarded prototype functionalities
• Adopt a standards-based, open source near-term hardware architecture design
• Software integration has begun
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Technology Operational Evaluation Demonstration (TOED) Program
Technology Operational Evaluation Demonstration (TOED) Program

- Objective: Assess the operational impact of new communications technology
- Compare pre- and post-deployment metrics to derive quantitative results
- Impact on operations
- Business model

Interested in others’ experience in operational evaluation.
**ISSUE:**
Can a wireless broadband network operating in the licensed public safety band of 4.9 GHz bring value to the Brookline, MA Police Department?

**APPROACH:**
• Initial study of technology implementation and business model
• Analysis of organizational performance data before and after implementation

**RELEVANCE:**
• Identify quantitative impact on agency operations of broadband wireless data access—lessons learned for NPSBN
• Identify characteristics of business model

**NEXT STEPS:**
• Channel bonding evaluation
Managed Access for Contraband Cell Phone Mitigation (MS Dept. of Corrections)

ISSUE:
Unauthorized cell phone use in a corrections environment. One technology recently deployed in Mississippi is a managed access system connected with the commercial cellular network.

APPROACH:
- Initial study of technology implementation
- Analysis of organizational performance data before and after implementation

RELEVANCE:
- Identify quantitative impact on agency operations of managed access technology

NEXT STEPS:
- Evaluate alternative approaches
Over the Air Programming via Broadband (North Carolina State Highway Patrol)

ISSUE:
Can broadband networks be leveraged to provide a significant cost and time savings in reprogramming radios? What is the impact to operations?

APPROACH:
• Analyze current reprogramming time and cost
• Conduct evaluation based on current approaches and new approach using over-the-air capabilities (WiFi for evaluation)

RELEVANCE:
• Analyze time (and cost) impact on agency
• Analyze how approach maps to NPSBN

NEXT STEPS:
• Extend to federal and other responders (e.g., national Guard)
Contacts

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Questions?