

***A Heterogeneous Cognitive Radio
Testbed: An Industry-University
Collaboration
CAER
Wireless@VT***

SDR 11 Conference
November 30, 2011

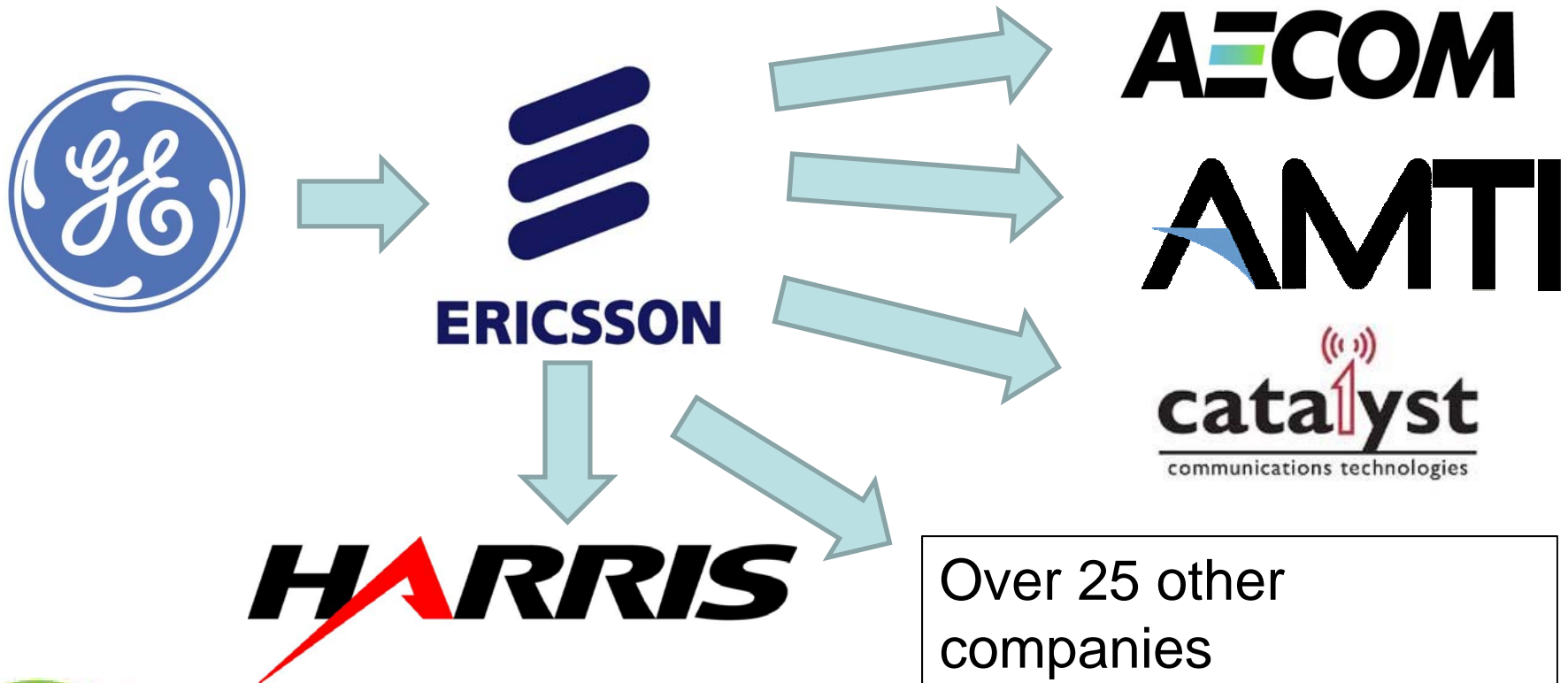


Economic Development Strategy

- Regional Assets
 - Wireless: Ericsson “Big Bang”
 - Diverse geography
- Opportunities
 - Wireless communications
 - Public safety
 - 4G LTE
 - Cognitive Radio
- Strategic Gaps
 - Lack of a research university presence in region



The Wireless “Big Bang” in Virginia’s Region 2000



CAER Vision: Research University environment here in Virginia's Region





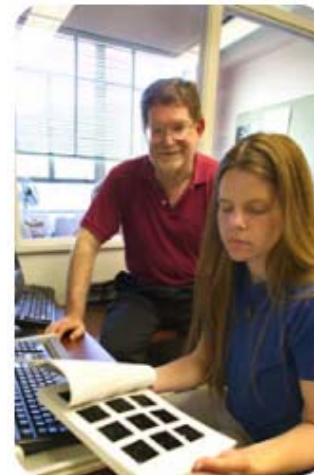
Master Research Agreements



A member of Virginia's Region 2000 Partnership

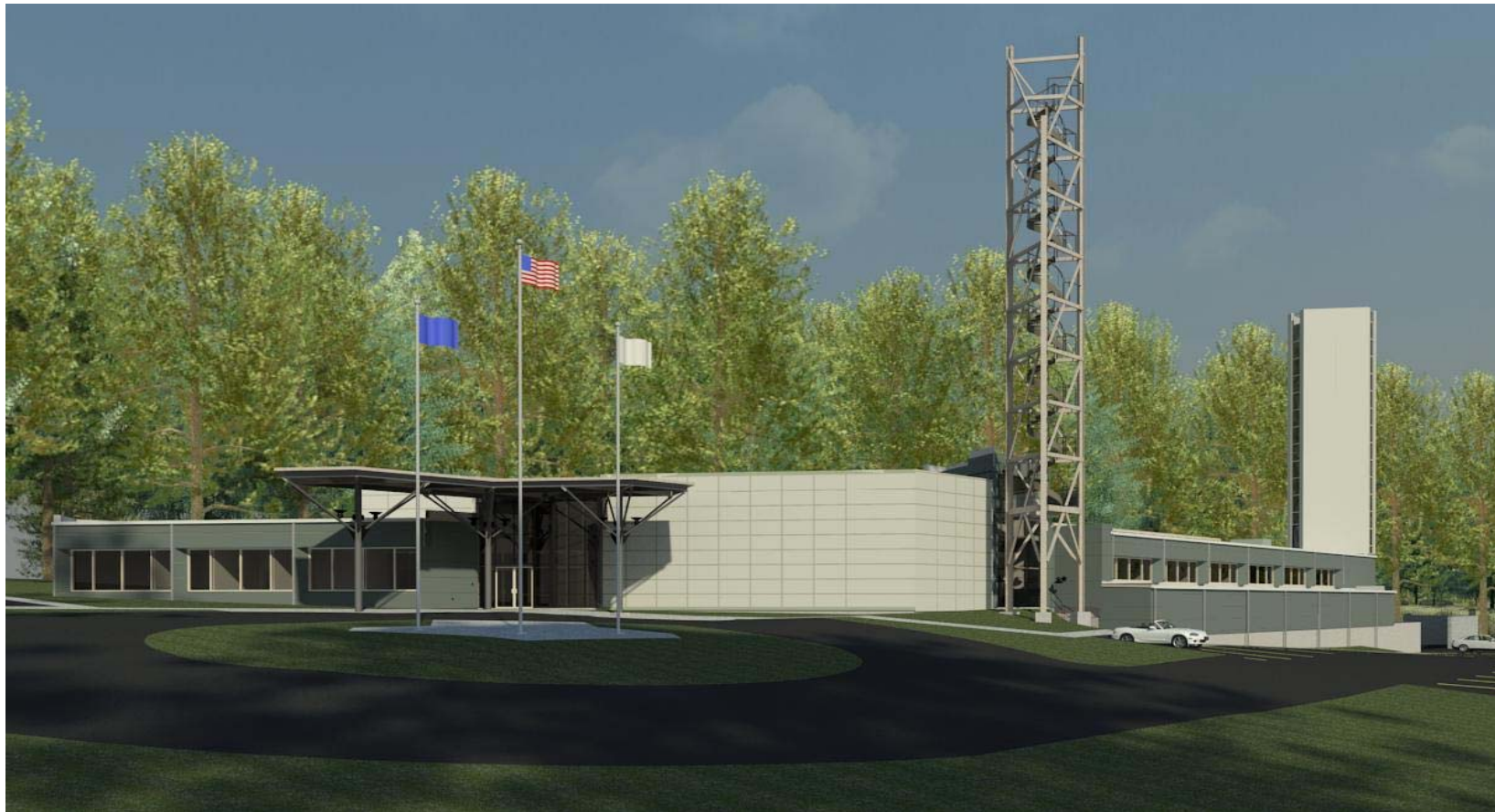
Wireless@Virginia
Tech

Develop a Strong STEM Educated Workforce



A member of Virginia's Region 2000 Partnership

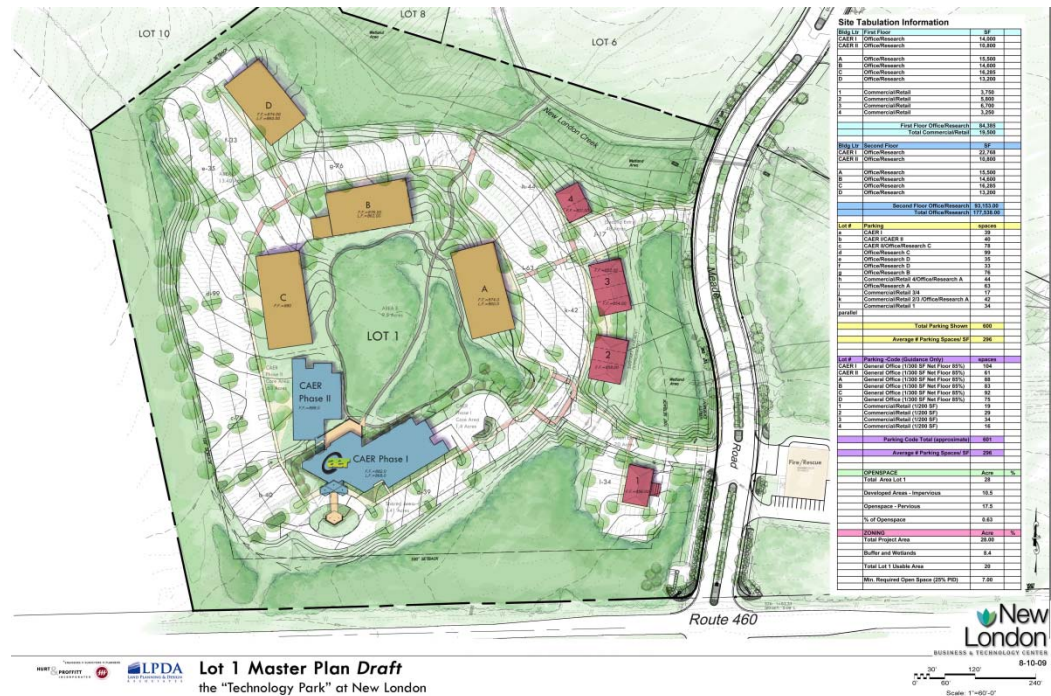
Provide Physical Infrastructure



A member of Virginia's Region 2000 Partnership

Overview

- The deployment and instrumentation of a mixed indoor/outdoor cognitive radio network testbed.
- Location:
 - The campus of the CAER, in Bedford County, VA.
 - Collaboration with Virginia Tech.
- Goal: A testbed for both industry and academia

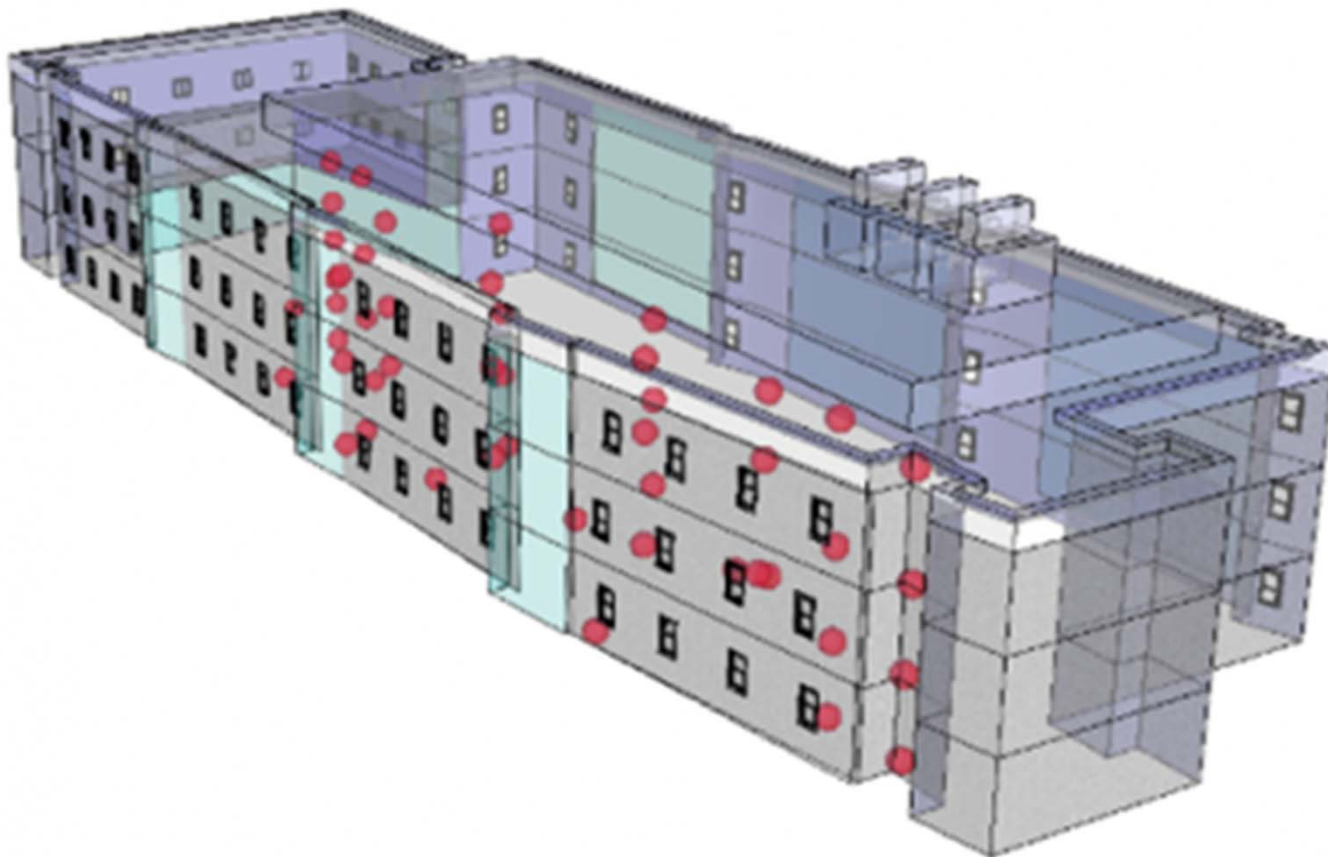


VT-CORNET – Cognitive Radio Network Testbed

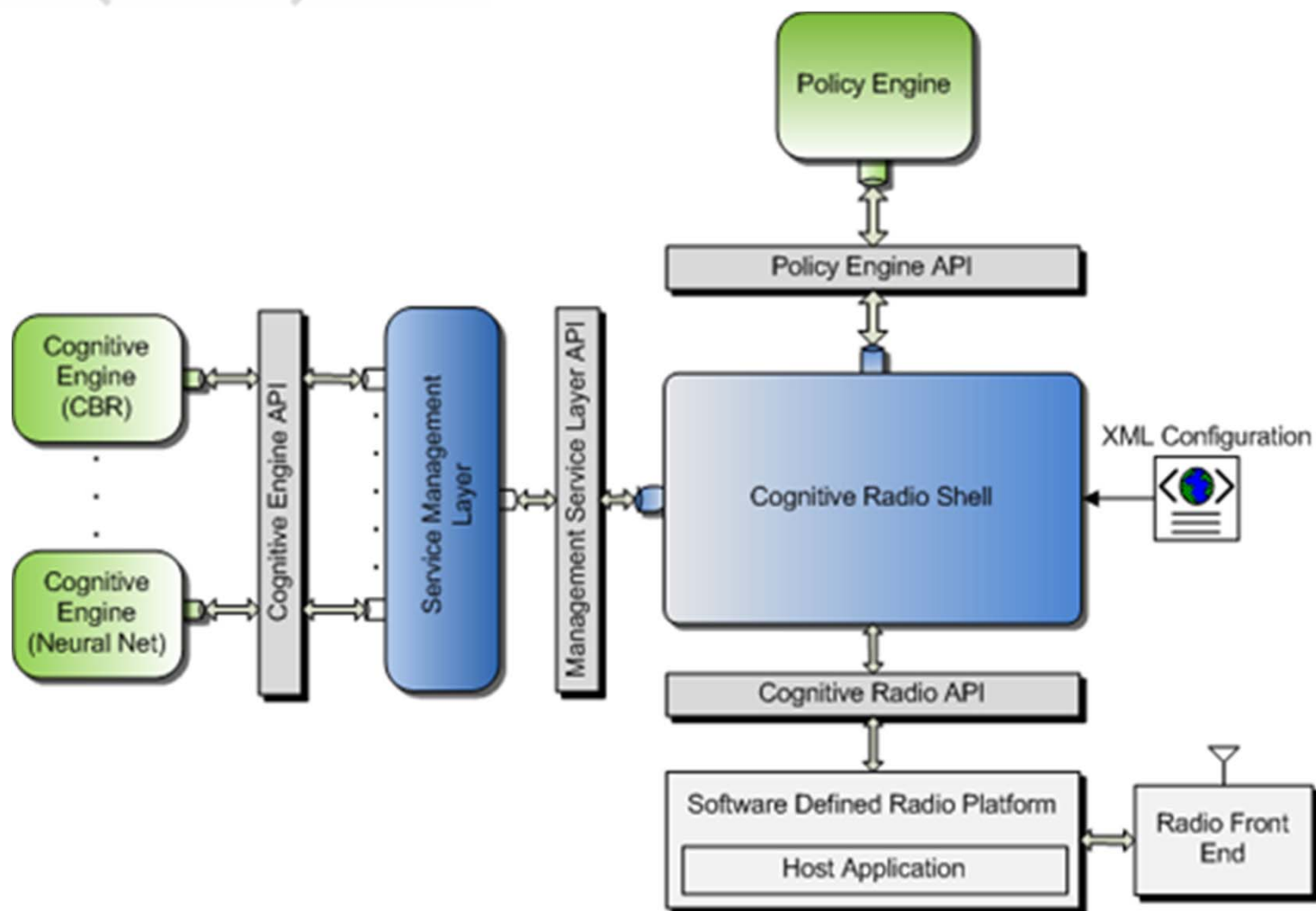
- Current testbed on VT campus
- 48 radio nodes spread over four floors
- Emphasis on cognitive engine design, self-organizing networking algorithms, and network security.
- Enable researchers to implement and test algorithms, protocols, applications, and hardware technologies within a realistic environment



VT-CORNET



A member of Virginia's Region 2000 Partnership



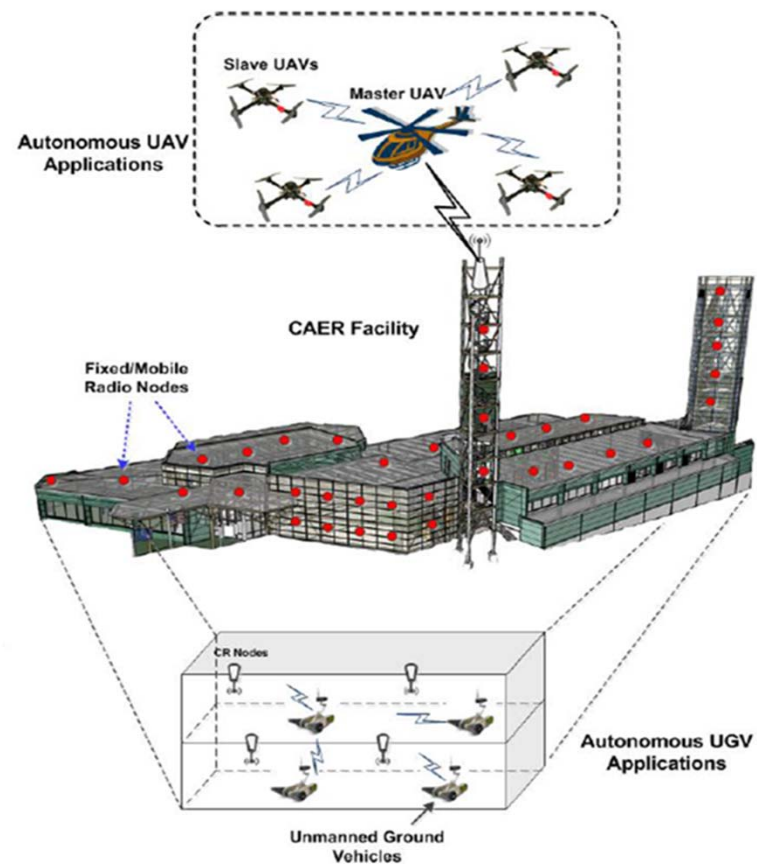
Current VT-CORNET Demos

- High Throughput (Video) DSA Application
 - Finds empty channels
 - Automatically reconnects/maintains connection
- Jamming Detection and Avoidance
 - Build upon the DSA application
 - More intelligent identification of interference
- Position location
 - Identifies the location of a mobile user



CAER Testbed Overview

- Heterogeneous
 - Indoor and outdoor nodes
 - Multiple hardware and software platforms
 - Mobile and fixed nodes



Research Activities to Be Enabled

- Wireless Distributed Computing
 - Will provide a diverse environment to test WDC
- Cognitive Adaptations at the Base Station
 - Use of open-source software that implement base station functionality such as OpenBTS to test new cellular protocols.
- Indoor Position Location
 - The testbed will enable indoor position location of the mobile nodes
- Diverse technical and geographic environment for Cognitive Radio Testing



Applications

- Radar coexistence with communications
- Heterogeneous indoor/outdoor networks
- Remote sensing networks
- Wireless broadband for rural areas
- Femtocells
- Communications for the Smart Grid
- Public safety solutions



Economic Development Opportunities

- Virginia's Center for Innovative Technology (www.cit.org)
 - Commonwealth Research Commercialization Fund (CRCF)
- Virginia Tobacco Commission
 - Commercialization/R&D Fund



Potential Funding Sources



Academia & Industry Partners

- Will be made remotely accessible to all partners



- WICAT partners
 - UVA, NYU-Poly, Auburn University, and University of Texas at Austin
- Industry Partners
 - Harris Corporation (Lynchburg, VA)
 - AECOM (Forest, VA)
 - Catalyst Communications Technologies (Forest, VA)
 - AMTI (Lynchburg, VA)



Proposed Hardware

- USRP N2xx (30x)
- USRP E1xx (10x)
- WARP Radios (5x)
- In house developed CR platform (5x)
- Wolverine Unmanned Aerial Vehicle (UAV) (1x)
- Quadrocopter UVA (4x)
- VT Unmanned Ground Vehicles (5x)
- Other:
 - Spectrum analyzers, oscilloscope, waveform generators, misc RF accessories, server equipment, etc



Wireless @ Virginia
Tech

Industry, Faculty, Graduate Students and Undergraduates



A member of Virginia's Region 2000 Partnership



www.caer.us
Follow us on Twitter @caerregion2000
Facebook Page – Center for Advanced Engineering
and Research
(434)477-5060
bbailey@caer.us



A member of Virginia's Region 2000 Partnership