

Benefit to the Warfighter

- WNaN is developing wireless nodes and adaptive network technologies that enable the nodes to self-form adaptive ad-hoc networks thus reducing by an order of magnitude the time required to plan and implement a wireless network.
- In combat environments, the communications capabilities provided by the WNaN network will provide superior throughput, robustness, scalability, and ease of use compared to current networks.
- WNaN technologies will provide the military with an affordable radio that supports communication to each person and device at the tactical level of command & control.

Significant Milestones

- 3QFY10: Demonstration Network of 50 WNaN Nodes Supporting Military Maneuvers at Ft. Devens
- 4QFY10: Demonstration of 100 Node Ad Hoc Network at Ft. Devens
- 1QFY11: Army Evaluation of Network of 60 - 100 WNaN Node Network with Experimental Force at Ft. Benning

Future Activities

The scalable design of WNaN enables increase in node densities and network capabilities while reducing size, weight, and cost.

- Integration of spectrum agility and spectrum sharing capabilities
- Support episodic connectivity by integrating Disruption Tolerant Networking techniques
- Support Content-Based Access - Address and search based on content
- Integration of novel front-end filtering designs in the wireless node
- Integration of MIMO for spectrum efficiency & dense urban operations

Department of Defense

Defense Advanced Research
Projects Agency

WNaN



Strategic Technology Office



Defense Advanced Research Projects Agency
Strategic Technology Office
3701 North Fairfax Drive
Arlington, VA 22203

DARPA Points of Contact :

Mr. Don Woodbury
DARPA STO, Director
(703) 526-4759
Donald.Woodbury@darpa.mil

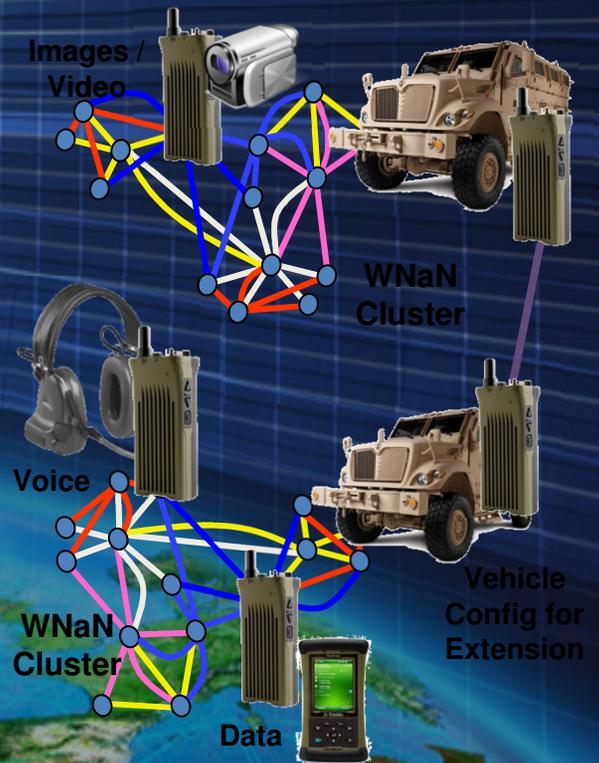
Bruce Fette, PhD
DARPA STO, Program Manager
(571) 218-4979
Bruce.Fette@darpa.mil

Performer Points of Contact :
Radio Node: Cobham (M/A-COM)
Dr. Jean-Pierre Lanteri
978-442-4677
Jeanpierre.Lanteri@cobhamdes.com

Network Development:
Raytheon BBN Technologies
Dr. Jason Redi
617-873-4236
redi@bbn.com

Wireless Network after Next (WNaN)

Self-Forming, Self-healing Adaptive
Wireless Network Node



Networked Connectivity
for Every Warfighter

Distribution Statement "A" (Approved for Public Release,
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Program Objectives

Goal: Exploit the "Cellular" Economy to Keep Military Communications Current and Relevant "Throw Away Radios"

Achieve:

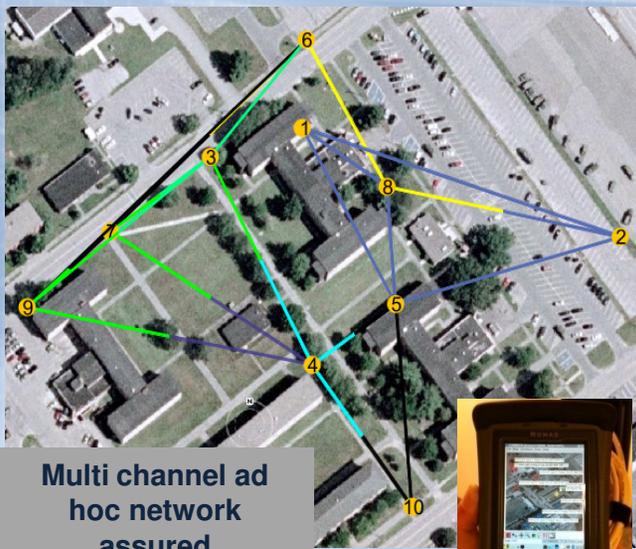
- Performance by Adaptive Networking and Augmentation of Range by Network Relay
- Affordability by Leveraging COTS Components and Adapting Spectrum Usage to Avoid Stressing RF Environments
- Scalability by Using Multiple Transceivers to Dynamically Create Multiple Physical Networks and by Implementing New Network Protocols
- Reliability through Multiple Simultaneous Network Connections and Multiple Transceivers in Each Node

Category	Performance
RF Channels per Node	4 independent RF transceivers per node
Frequency Range	900 MHz to 6 GHz with narrow band tuning over wideband range filter
RF Bandwidth	> 1MHz
Voice	Peer to peer, QoS Packetized Voice (push to talk)
Data Rate	> 1Mbps
Voice Call Groups	Participate 1 talk group, monitor 2
Encryption	AES 256 end to end
Dynamic Spectrum Access	Sense/detect usable spectrum Avoid interference Rendezvous network on open frequencies
Disruption Tolerant Networking	Bundle protocol Store and forward reliability
Reliability	2500 hours MTBF
Form Factor, Size, Weight	Handheld, ~7" (H) x 3.5" (w) x 2" (D), 2.5 Lbs battery included
Battery Performance	A minimum of 8 hours on a single charge, assuming 2% TX duty cycle at max power, and 98% Rx duty cycle
Power @ Antenna Port	1 Watt per transceiver / antenna

Reference: DARPA / Army MOA

Mission Utility

The DARPA WNaN program will provide densely deployed low-cost nodes that are jointly optimized with network operations. The network will adapt to changing conditions by adjusting the topology of the network and the operational mode of the nodes to reduce the demands on the nodes, particularly at the physical and link layers. By working around the limitations of the low-cost nodes that form the network, and by utilizing the rich interconnection fabric created by dense deployment, WNaN will provide reliable and highly-available battlefield communications at a low system cost.



Multi channel ad hoc network assured connectivity and reliability



SA Handheld Display

- Fully Adaptive
- Fully Autonomous
- Self-Forming and Self-Healing
- Robust

Situational Awareness to the Tactical Edge

System Operation

WNaN will provide robust networking across dense deployments of inexpensive wireless nodes with diverse paths and frequencies.



Operational Parameters:

- 900 MHz to 6 GHz frequency band with narrow band tuning over wideband range filter
- Adaptable up to 2 Mbps per physical channel
- 1 Watt per transceiver

System Configuration

WNaN has two complementary components:

- Low-cost, multi-channel, spectrum-agile, MIMO-capable wireless radio nodes built with inexpensive RF circuit technology
- Network with densely deployed low-cost wireless nodes and adaptive network layers that mitigates RF limitations by leveraging rich connection topologies.

When integrated together and deployed, these two components create a distributed, intelligent network entity.

The Wireless Node

- \$600 per node unit cost (large quantities)
- 4-channel per node
- 900 MHz to 6 GHz operating range
- Design uses COTS components
- Produce using commercial lines and processes