

MILCOM 2017

MILITARY COMMUNICATIONS AND INNOVATION - PRIORITIES FOR THE MODERN WARFIGHT

A Data-Centric Battlefield: Leveraging Named Data Networks in Tactical Networks

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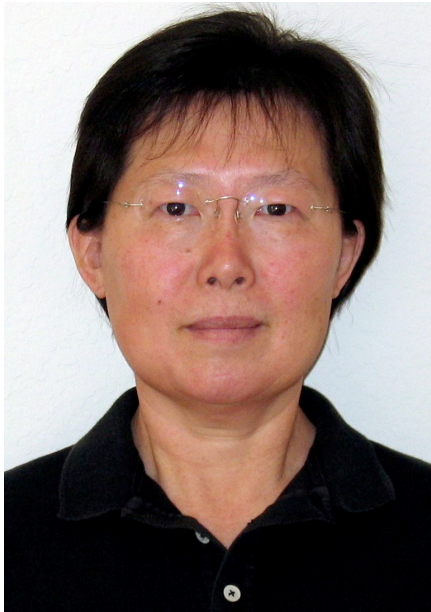
BALTIMORE, MD • OCTOBER 23–25, 2017

Tamer Refaei



- The MITRE Corporation (mrefaei@mitre.org)
- Principle Scientist
- Focusing on resilient networking for tactical networks
 - DTN, NDN, etc.
 - Robust mission-aware routing

Lixia Zhang



- Professor, UCLA Computer Science Department (lixia@cs.ucla.edu)
- Joined Internet research in 1981
- Research focuses
 - Network architecture
 - System security
 - Protocol designs for distributed systems

Alex Afanasyev



- Assistant Professor, Florida International University (aa@cs.fiu.edu)
- Research focuses
 - Information-Centric Networking, Named Data Networking architecture
 - System and network security, data-centric security
 - Internet of Things

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Challenges in Tactical Networks

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Tactical networks are too complex and lack resiliency

Senate, Army chief cast new doubt on future of Army's \$6 billion tactical IT network

May 29, 2017 4:53 am

The future of the long-running, multi-billion dollar system that the Army considers the "cornerstone" of its network modernization strategy is somewhat in question, with the service's top officer saying he's ordered a comprehensive review of whether the program will actually work, and a powerful senator declaring it a "debacle."

The \$6 billion Warfighter Information Network-Tactical (WIN-T) is the Army's program to securely move voice, video and data to, from and around the battlefield with a combination of land, airborne and satellite-based antennas, transceivers and computers. It's been in development since 2007, and the Army plans to spend \$420 million in 2018 alone to continue its gradual deployment to brigades and divisions.

But Gen. Mark Milley, the Army chief of staff, said in congressional testimony Thursday that he had directed a "rigorous and painful review" of WIN-T and other Army communication systems because of several concerns, including that the system is too "fragile" to survive a real-world battle.

"Frankly, my concern is these systems may or may not work in the conditions of combat that I envision in the future with the changing character of warfare because of issues with line of sight, electromagnetic spectrum, the inability to operate on the move, the inability to operate in large, dense complex urban areas or complex terrain. There's a whole series of other things," Milley said. "It is fragile. It is vulnerable. So, we're taking a very, very, very deep, hard and wide look."

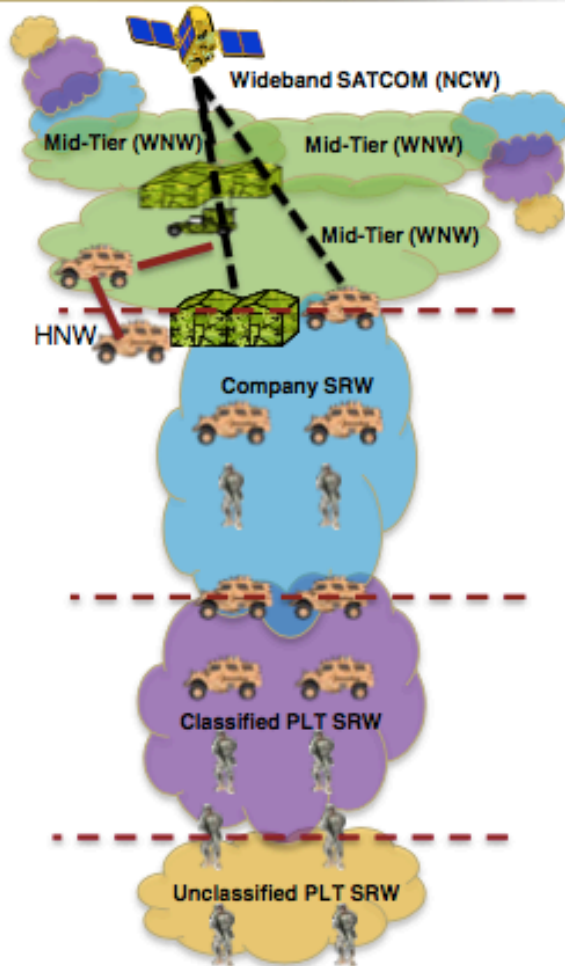
<https://federalnewsradio.com>

Army Battlefield Network Under Review: What's Next for WIN-T?

JUN 08, 2017

The Army is "taking a hard look" at its flagship tactical communications network after receiving more negative reviews from the field, said Chief of Staff Gen. Mark Milley. He listed several issues plaguing the Warfighter Information Network-Tactical, known as WIN-T: it is too complex to operate in combat conditions, it is not as transportable as it needs to be, and it is not completely secure from cyber intrusions.

<https://defensesystems.com>



- **Operational Complexity (OC)** – while the network is extremely complex, it should not be operationally complex nor should it be complex to use. The Tactical Internet (TI) is too complex (using manual and static methods) to configure. The TI needs control algorithms to be able to adapt to demands placed upon it by mission (e.g., mobility), by data dissemination (e.g., applications) and by policy for all deployment scales.
- **Limited Throughput to Tactical User (LT)** – given our current deployment engineering rule, our LTI platoon radio networks provide limited per-user throughput. This throughput limit needs to be increased.
- **RF Interference (RFI)** – systems within the Tactical Internet need better integration for improved SWAP and simplification of operation within the Tactical Internet. Robust waveforms must be maintained and improved to meet future jamming challenges and future LPI/LPD requirements in the presence of Blue EW and Red EW.
- **Non-Convergence on Tactical Internet (NC)**– the Army's prominent tactical applications require improved network services for full integration on our IP-based Tactical Internet.
- **Dis-contiguous Architecture (DA)** – the architecture has developed through multiple acquisitions.

SoS Challenges Characterized into These Broad Problem Areas

Several technologies considered to enhance communication in tactical networks

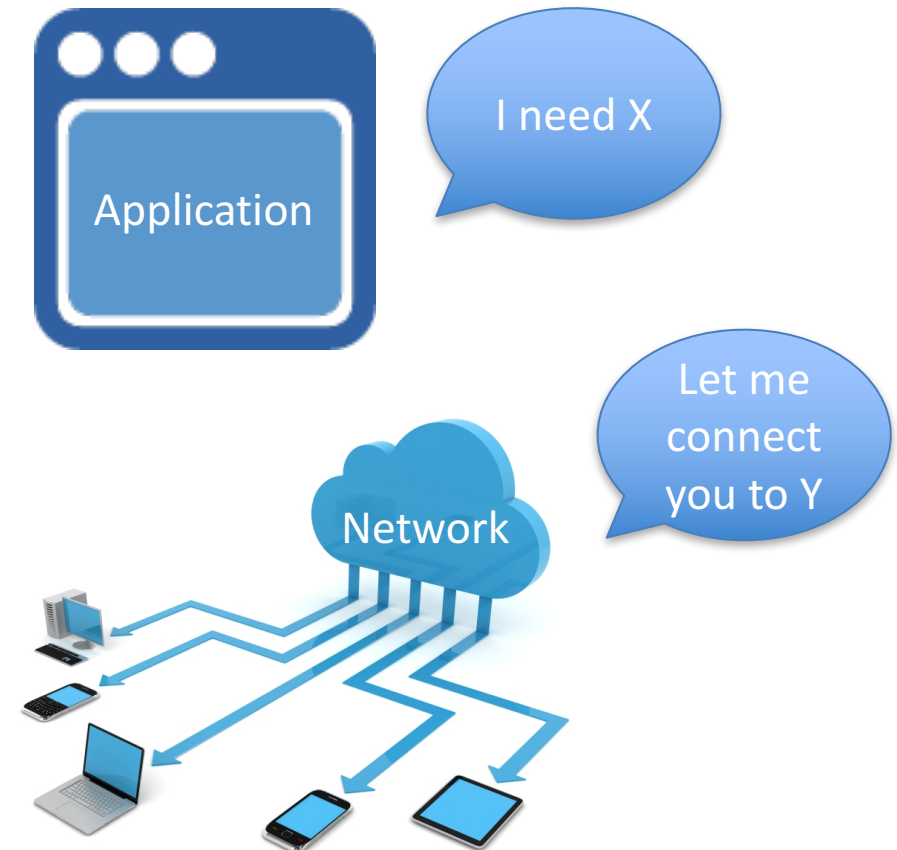


All avoid the fundamental problem

- Data-centric applications
- Host-centric network



Mismatched objectives



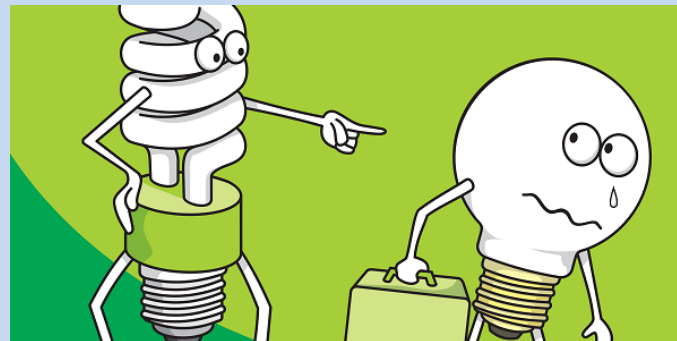
NDN addresses the core of the problem



Resilient

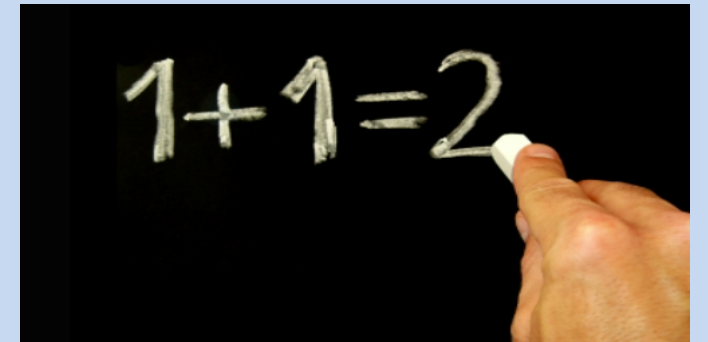


Efficient











Secure

Simple



Agenda

- Overview of NDN (60 mins)  
- NDN codebase (20 mins)  
- Break (10 mins)
- Evaluating NDN in a notional tactical network (40 mins)  
- NDN in IoT environments (30 mins)  
- Towards a data centric tactical network 