Chapter 18
Patterns of Tactical Networking Services

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ABSTRACT

The Cloud Computing services are making their way to the world of tactical networking. According to CDR James Mills (Mills, 2011) the new area of tactical networking, named cloudlets, is shaping up:

“Cloudlets are small, portable appliance-like devices akin to a “data center in a box” and include an embedded compute cluster, wireless access point and battery or alternate source power (e.g., solar, wind, etc.). Cloudlets offer the benefit of offloading computation from mobile devices, reduce latency of mobile devices by being in close proximity to the user’s device, and offload data relay costs to the larger cloud/network from the mobile device.”

This chapter describes findings and prototypes of emerging tactical networking services, which were identifiable based on unique experimental studies of tactical networking. The described findings would be helpful in structuring tactical cloud services for the variety manned-unmanned sensor networking applications.

EXPERIMENTAL STUDIES OF EMERGING TACTICAL NETWORKING SERVICES

Beginning in 2002, a team of Naval Postgraduate School researchers together with sponsors from the United States Special Operations Command (USSOCOM), and later joined by the Office of the Secretary of Defense (OSD) and the Department of Homeland Security (DHS) S&T Programs, started a new interagency experimentation program, which is now collectively known as the Tactical Network Testbed (TNT) Experiments (Bordetsky and Netzer, 2010).

In the core of TNT experimentation is a unique testbed, which enables sustainability and evolution of the experimentation process. It provides the adaptation and integration processes between people, networks, sensors, and unmanned systems. It enables plug-and-play tactical-on-the-move sensor-unmanned systems networking capabilities (Bordetsky and Bourakov, 2006) combined with
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global reach back to remote expert/command sites and augmentation by rapid integration of applied research services.

The TNT interagency experimentation program has two major venues. The first one involves quarterly field experiments with USSOCOM, in which NPS researchers and students as well as participants from other universities, government organizations, and industry investigate various topics related to tactical networking with sensors and unmanned systems as well as collaboration between geographically distributed units with focus on high value target (HVT) tracking and surveillance missions (Figure 1).

The second venue involves Maritime Interdiction Operation (MIO) experiments with Lawrence Livermore National Laboratory, USCG and First Responders (San Francisco Bay, New York/New Jersey), and is supported by Homeland Defense (HLD) and HLS S&T Programs and Department of Energy (DoE) agencies. These experiments are conducted twice a year and are also supported by overseas partners from Sweden, Germany, Greece, and Singapore. This series of experiments is being conducted to test the technical and operational challenges of searching large cargo vessels and interdicting small craft possessing nuclear radiation threats. One goal is to test the applicability of using a wireless network for data sharing during an MIO scenario to facilitate “reach back” (a current technologically challenging operational gap) to experts for radiation source analysis and biometric data analysis (Figure 2).

From the scholarly stand point (Alberts and Hayes, 2007), the TNT testbed represents a unique field model for learning complex relationships between man and machine in the emerging environment of tactical networking and collaboration.

Figure 1. Typical cluster of tactical ad hoc mobile networking services
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