Military Electronics: Improvements in Network Technology

Question: What types of improvements need to be made in network technology/architecture that can provide improved performance and capabilities in military applications?

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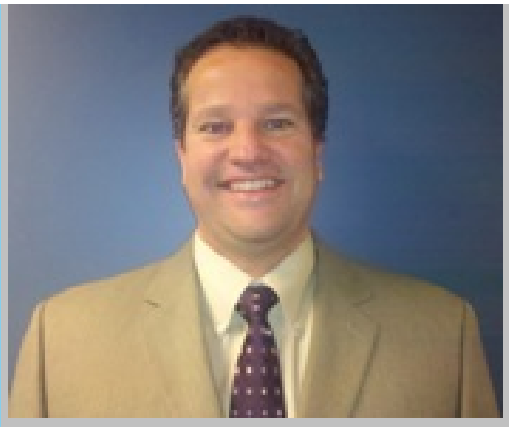
With the Department of Defense taking a more net-centric approach to communications, the focus is on the implementation of the Global Information Grid (GIG) project. Before the idea of GIG came along, the military used various technologies, such as fiber or copper-based terrestrial networks and Satcom, to communicate with each other depending on their needs. With the implementation of GIG, the military will have one architectural framework that will enable all networks, from NIPRNET to SIPRNET to even various tactical battlefield networks like WIN-T, to connect with each other for an effective communication system.

In order to successfully implement GIG, military networks need greater capacity, security and flexibility. For example, in a network like WIN-T,



By: John Thompson
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The biggest future opportunity for broadb
defense is the desire to deploy private 4G
networks. Commercial wireless broadban
technologies, such as WiMAX and LTE, ha
frogged the performance targets of gove
developed technologies designed to brin
broadband to the warfighter. Security co
these technologies have also matured, p
sufficient levels of encryption,
access/authentication controls and mana
platform security.

One of the top challenges faced by milita
defense agencies centers on the decision
whether or not to deploy a fixed or an ad
network. Commercial technologies are pr
designed with the assumption of fixed
infrastructure topologies, while military
environments and scenarios require rapi
deployable and mobile ad-hoc network
topologies. These capabilities may be
implemented on commercial platforms b
is little incentive for commercial markets
deploy such capabilities.

the following needs to happen in order to successfully meet the three GIG requirements (mentioned above):

- Implementation of Software Defined Radio (SDR)/Joint Tactical Radio System (JTRS) which supports multimode waveform platforms;
- Improving spectral efficiency of the waveforms through new technologies within SDR, such as adaptive coding and modulation, MIMO processing or smart antennas in battlefield radios;
- Use of IPv6 as the common transport layer protocol and intelligent routing protocols;
- Deployment of Mobile Adhoc Networks (MANET) to create self configuring networks to create Network On The Move (NOTM);
- Development of hardware and software platforms that can be used for multiple purposes while meeting the SWaP (Size, Weight and Power) considerations.

Today, semiconductor companies are helping GIG become a reality for the military by developing multicore digital signal processors (DSPs) that power SDR, new physical layer communication algorithms, novel networking protocols and supporting hardware.

Secondly, military customers must also c
the frequency band in which to operate b
choosing to operate in a dedicated licens
or opting for frequency agility offered by
unlicensed solutions. Frequency band sel
poses a challenge to defense and militar
agencies when deploying commercial
technology, especially for broadband acc
networks. Commercial markets have defi
spectrum developed through various indu
forums, such as 3GPP, WiMAX Forum and
The U.S. Department of Defense relies on
for domestic use, but the military primari
performs their missions outside of the na
borders where available spectrum is diffe
region and by country. This requires tech
that is frequency agile and resilient to
interference. Again, these capabilities ma
implemented on commercial platforms, b
is little incentive for commercial markets
deploy such capabilities.
Defense agencies may choose to continu
develop customized solutions to address
challenges, such as the JTRS and WIN-T
programs. However, they can also look a
to deploy the commercial technology
alternatives that require little or no modi
of these core technologies.
Technical evaluations of 4G commercial
technology are underway today in differe
places within the defense sector. Howeve
organization is providing industry with di
guidance on how they envision these
technologies being deployed and if any
modifications are required beyond comm
standards. Defense needs to speak to ind
with one voice in order to deploy comme
interoperable technology broadly, at the
possible cost and in the shortest amount
Deployment of 4G networks in defense w
significant strain on backhaul requiremen
generation TDD-based point-to-point and
to-multipoint backhaul will be critical to
providing the type of connectivity a soldi
needs to be their best when it matters.

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