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Enabling Digital Transformation: How Internet of Things Technologies Can Advance Geospatial Intelligence Missions

In recent modern times, the development of the internet itself was perhaps the first technical wave for groundbreaking innovation that altered the way we interact as a society. The next wave occurred with the expansion of smart phones and mobile devices. And now, the Internet of Things (IoT) is poised to disrupt our technology landscape and change the way people, businesses, and governments operate.

Internet of Things (IoT) technologies allow an internetworking of physical devices for machine to machine communication. Now, there is a more effective method for devices, objects, and "things" to communicate electronically with the world around them. This has been enabled by an increase in the number of connected devices, the continual exponential growth of data, increased bandwidth, shorter latency, and the huge increase of address space from IPv6.

What Are the Challenges for DoD and the Intelligence Community as IoT Connectivity Grows?

IoT undoubtedly increases the attack surface, and poses major security risks to critical infrastructure. As the number of IoT connected devices grows, it is crucial to ensure the security of national assets. This can be accomplished by hardening systems, improving design and engineering, incorporating advanced materials, and improving encryption for secure communications.

Current DoD and Intelligence Community cloud infrastructures, such as IC-ITE and C2S, are not sufficient to accommodate future volumes of data associated with IoT. That's why IoT functionality and computing power needs to be pushed to the tactical edge, rather than have IoT commands and processing brokered in the cloud.

How does IoT Advance the Geospatial Mission?

IoT device connectivity creates a digital fabric with an electronic nervous system with networks at the center. An extraordinary amount of data can be gathered through an IoT enabled GEOINT architecture. For DoD and Intelligence community, this represents a significant opportunity to use distributed sensors for data collection and initiating cyber and physical effects.

An IoT based GEOINT also allows for increased and persistent overhead collection, and a more comprehensive intelligence picture enhanced with machine-to-machine communication. This distributed approach enriches tipping and queuing or other forms of asset tasking, and has the potential to improve space resilience by eliminating the "single point of failure" associated with a single collection system.

What's Next?

Incorporating artificial intelligence (AI) and deep learning techniques into IoT technologies has the potential to enhance independent,

decentralized, and autonomous platforms. AI will enable IoT to create self-organized systems with collective behavior, which can have a significant impact on the geospatial tradecraft.

At Noblis, we are actively investing in these technologies to advance the geospatial intelligence mission. Our open architecture, testbed ecosystem consists of modeling and simulation, collection, exploitation, processing, and data analytics capabilities supported by our internal high performance computing infrastructure.

The research and simulations taking place in our ecosystem are set to solve some of the following challenges, among others:

Behavioral Based Simulation of Cyber Physical Effects in a Smart City
IoT sensors associated with systems, such as industrial control systems, electric grids, water

facilities, communication systems, and vehicles, present significant opportunities for data collection. By modeling the behavioral effects of a potential IoT disruption, an operator can understand the results of a disruption physical environment.

Overhead Drone Exploitation and Collection
By using commercial drone with a light weight, low signature physical payload, it is possible to detect vulnerabilities on a target facility's isolated, stand-alone network. This physical payload on the drone can then become a way to conduct vulnerability scanning and exploitation.

Building Infrastructure Exploitation of Voice and Video
Conducting vulnerability research on VTC systems can identify weaknesses in the firmware, and develop the tools necessary to exfiltrate the voice and video data in real time from target conference rooms.

To learn more about Noblis' geospatial intelligence capabilities and IoT research, contact:

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