Chapter 1
Exploring Secure Computing for the Internet of Things, Internet of Everything, Web of Things, and Hyperconnectivity

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ABSTRACT

Secure computing is essential as environments continue to become intertwined and hyperconnected. As the Internet of Things (IoT), Web of Things (WoT), and the Internet of Everything (IoE) dominate the landscape of technological platforms, protection these complicated networks is important. The everyday person who wishes to have more devices that allow the ability to be connected needs to be aware of what threats they could be potentially exposing themselves to. Additionally, for the unknowing consumer of everyday products needs to be aware of what it means to have sensors, Radio Frequency IDentification (RFID), Bluetooth, and WiFi enabled products. This submission explores how Availability, Integrity, and Confidentiality (AIC) can be applied to IoT, WoT, and IoE with consideration for the application of these architectures in the defense sector.

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INTRODUCTION

The next era of computing will be outside of the traditional desktop (Gubbi, Buyya, Marusic, & Palaniwami, 2013). When you consider Bring Your Own Device (BYOD) as a radical step imagine using devices such as a refrigerator that contain an embedded computing device to track the quantity of groceries within. This embedded device would allow access to email, weather, and other devices that allow connectivity through WiFi, or some Application Programming Interface (API) to a web based application. Thus, the data collected would be weather, thermostat cooling patterns, foods purchased, the cost of items per month, average consumption, and more. This massive amount of data that can also be collected means there has to be the large place that this data is stored. At the moment organizations such as Cisco Systems and others are pushing for IoT, and IoT but none has a plan for ensuring Information Assurance (IA) posture is maintained during various modes of operation.

HYPERCONNECTIVITY

Hyperconnectivity is a growing trend that is driving cyber security experts to develop new security architectures for multiple platforms such as mobile devices, laptops, and even wearable displays (Dawson, Omar, Abramson, & Bessette, 2014). The futures of both national and international security rely on complex countermeasures to ensure that a proper security posture is maintained during this state of hyper-connectivity. To protect these systems from the exploitation of vulnerabilities, it is essential to understand current and future threats to include the instructions, laws, policies, mandates, and directives that drive their need to be secured. It is imperative to understand the potential security-related threats with the use of social media, mobile devices, virtual worlds, augmented reality, and mixed reality.

In an article published by Forbes, a contributor describes the concept of hyper-connectivity in six different scenarios (Ranadivé, 2013). These events range from energy to hospitality. In health-care there would be real time monitoring through wrist monitors that the medical staff could monitor to get instantaneous feeds on patients that are real time. They would be able to foresee problems before they occur or receive alerts during various events. Imagine a pregnant woman that is having early complications could be monitored first through a wristband that delivers real-time patient information wirelessly.

When discussing hyperconnectivity, it is necessary to examine systems of systems concepts. Systems of systems is a collection of systems tied together to create a more complex system (Popper, Bankes, Callaway, & DeLaurentis, 2004). When thinking about the possibilities of hyperconnectivity the Personal Area Network (PAN) is