



An Analysis of the Feasibility and Applicability of IEEE 802.x Wireless Mesh Networks within the Global Information Grid

Eric J. Bach, Mark G. Fickel

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This thesis analyzes the feasibility, functionality, efficacy and usability of IEEE 802.x wireless mesh networks in multiple DoD contexts. Through multiple field and lab experiments and hardware investigations, an assessment is performed on the realistic implementation issues of wireless mesh networks and their possible applications. A detailed examination is conducted of the variable elements, operational constraints, and possible decision points for developing a usable, robust, self-organizing, wireless mesh network that can be leveraged for maximum usability and shared situational awareness in network-centric operations. The research investigates the suitability of currently available COTS hardware and software wireless mesh networking components for geographically distributed networks. Additionally, a product-line software architecture and a common data interchange XML vocabulary are proposed as the enabling technology elements to carry application layer mesh forward for integration of collaborative sensor-decision maker adaptive networks within the Global Information Grid. The thesis includes the design and implementation of the first Naval Postgraduate School testbed for tactical level mesh networking with unmanned vehicles, unattended sensors, and warrior networking nodes. This thesis also lays the groundwork for further research into lower OSI-layer routing protocols for DoD mesh networks, development of mesh-aware applications, as well as a GIG-wide mesh network architecture.

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