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Networking and Fusion of Disparate Acoustic Sensors for Battlespace Applications

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A network of distributed acoustic sensor systems on the ground and/or in the air can be used effectively for autonomous and remote intelligence, surveillance, and reconnaissance (ISR) applications. However interoperability of disparate sensor systems is a major challenge for current coalition force applications. Specifically, a network of acoustic sensor nodes can exhibit heterogeneity in a variety of dimensions. At the sensor-level, the acoustic sensors can vary in their types (e.g., cardioid vs. omni-direction) and in their responsiveness to transient and continuous sources. At the node-level, the acoustic systems can vary in their array configuration, platform mobility, node reactiveness (e.g., timeliness of response), and information processing and output. At the network-level, the acoustic systems can vary in their communication protocols and access mediums. Current R&D efforts within the US-UK International Technology Alliance seek to develop a "sensor fabric" technology to seamlessly connect disparate systems for networked sensing applications. Results from a recent field experiment to detect and locate moving ground targets, weapon firings, and explosions via a network of disparate acoustic sensor systems and sensing platforms (e.g., PDA's, workstations, motes and unattended ground sensor systems) are presented.