

**On the utilization of market-based auction techniques for dynamic resource allocation in
distributed sensor network systems**

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Abstract

The rapid evolution of distributed sensor systems involving multiple heterogeneous sensors, the combination of mobile and stationary sensors, and dynamic information requirements presents a challenge for system resource utilization. On one hand, evolving standards and service oriented architecture concepts enables creation and use of multiple sensors and resources (including human reports). These technologies allow sensors and sources to be treated as web services that can join the network at any time. On the other hand, traditional methods for optimizing these dynamic resources (e.g., classic optimization methods) are not feasible when the information requirements are rapidly changing, when there are multiple consumers of the requested information, and when the resources may dynamically appear (or disappear) from availability. This paper describes the concept of using a market-based approach for resource allocation. In this approach, sensors and network communications resources are treated as *suppliers* and human users (and data fusion algorithms) are treated as *consumers*. Dynamic auction methods are used to seek to match the dynamic information needs of the consumers with the capabilities of the suppliers. The “value” of the information to consumers is based on quantities such as accuracy, level of specificity, timeliness, etc. The paper describes the overall approach and presents results of numerical simulations.