Application of Operating System Concepts to Coordination in Pervasive Sensing and Computing Systems

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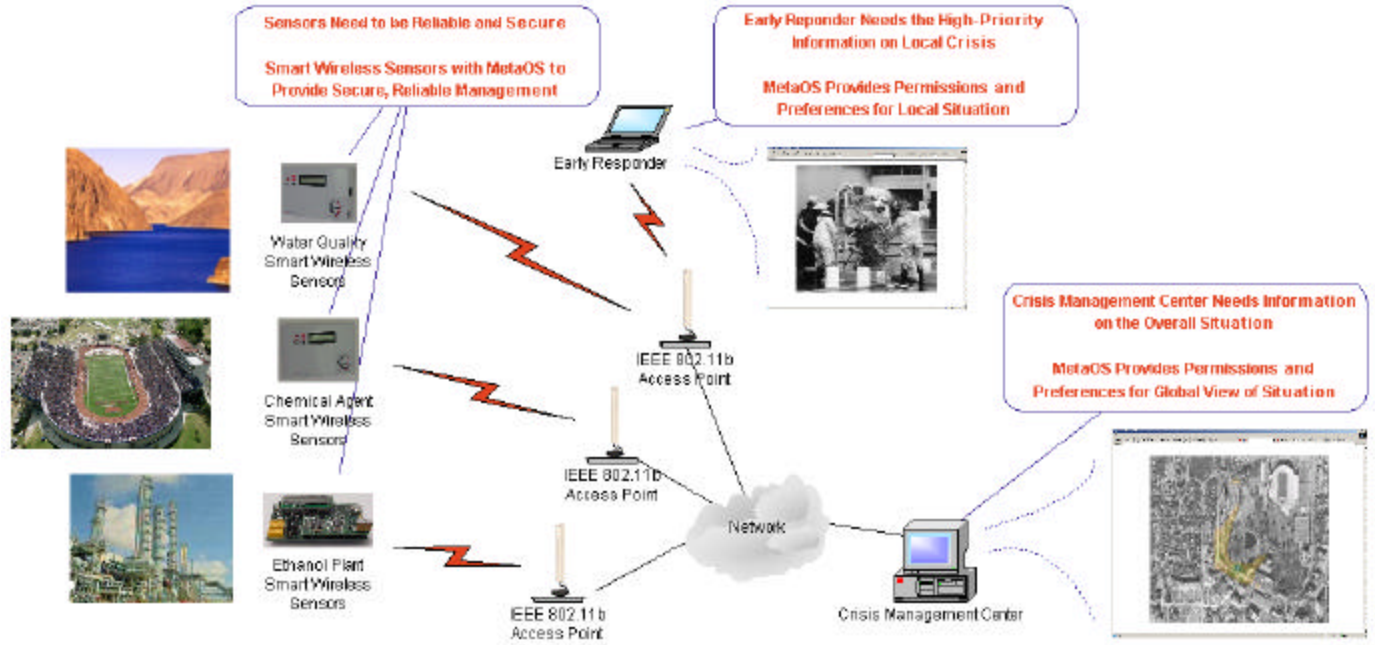
MetaOS Concept

- MetaOS developed by Ambient Computing to coordinate the function of smart, networked devices
  - Smart networked devices include processing capabilities and sensors
  - MetaOS provides support for preferences, location awareness, & security
- Objective is to ease deployment and use of systems in the many application areas that have heterogeneous devices, contain a non-trivial number of devices, and span multiple locations
- Architecture can facilitate rapid development and deployment of defense and homeland security applications
- Applies operating system approach to groups of distributed, network-embedded devices
  - Smart devices and standalone software is abstracted as resources and peripherals are in traditional operating systems
  - Supports easy deployment of new services by providing common way to integrate and coordinate devices as well as write applications
  - Permissions and user profiles handled as in traditional operating systems

Security and Homeland Defense

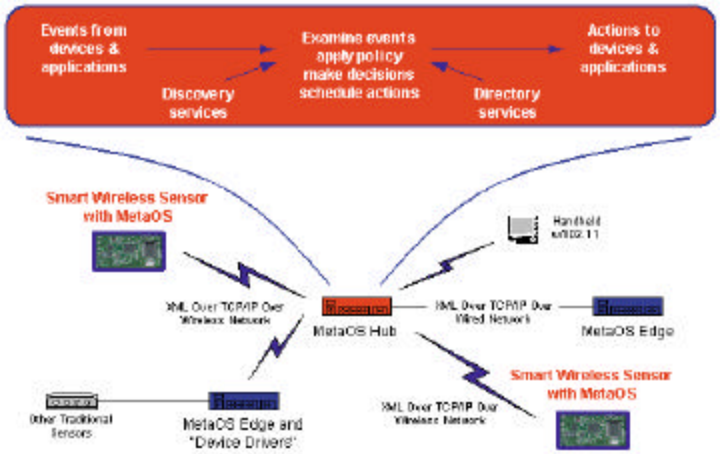
- MetaOS provides capability for sophisticated sensor network management
- Permissions, preferences, and location awareness support different processing and views
- Multiple levels of access to managed resources and intelligence information
- Operators in different locations can customize interface to be most effective
- Operators with different responsibilities can customize views for monitoring, investigation, management
- Allows rapid deployment of new sensor processing applications



Architecture & Infrastructure

- MetaOS architecture
  - Hub (kernel) manages domain, communicates with devices or programs via edge software (device drivers) using publish-subscribe approach
  - Hub, edge, and device are typically on different network-connected processors
  - XML messages used for various registration, notification, operation, and information tasks
  - Applications interact with system devices through hub through a standard interface
- Infrastructure
  - Smart wireless devices
    - Tightly integrates embedded & wireless, which qualitatively changes the ability to use networked intelligence by pushing down cost of deployment and use
    - Smart wireless devices allow for deployment of ubiquitous and low-cost sensing capabilities by using standard protocols and embedded chipsets to implement MetaOS-capable devices
  - Sensors and Processing
    - Sensors allow new inputs, processing gives intelligence

MetaOS Architecture



Smart Wireless Device