



The Case for an Adaptive Integration Framework

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GMU-AFCEA Symposium 2009: "Critical Issues in c4I"

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Topics



- Background
- Protocol Interworking
- Integration Framework
- Dynamic Resource Management/Quality of Service
- Conclusions and Future Work

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Background



- **Military Applications are Inherently Distributed**
 - Some but not all threads in these applications are real-time
 - Nodes in the network are mobile
 - Military networks are resource constrained
 - Information Sharing and Collaboration Initiatives
- **Users are Overwhelmed with Data**
 - Role or Attribute-Based Access Control (RBAC/ABAC)
 - Organizational Role
 - Communities of Interest

Background

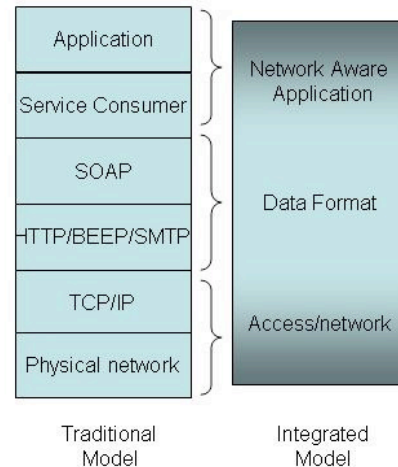


- **Service Oriented Middleware Technology and Products**
 - CORBA – some real-time services and implementations
 - J2EE – no real-time versions
 - Web 2.0 and Web 3.0
 - Others
- **Quality of Service**
 - GIG E2E QoS
 - Disconnected Intermittent Limited (DIL) Environments
 - QoS depends on underlying infrastructure

Protocol Interworking



- Traditional Model has well defined services
 - Applications assume a stable network environment
 - Complexity is pushed up the stack
- Integrated Model has less well defined boundaries
 - Applications adaptive to changing network environment
 - Dynamic Data format is mapped to network services available

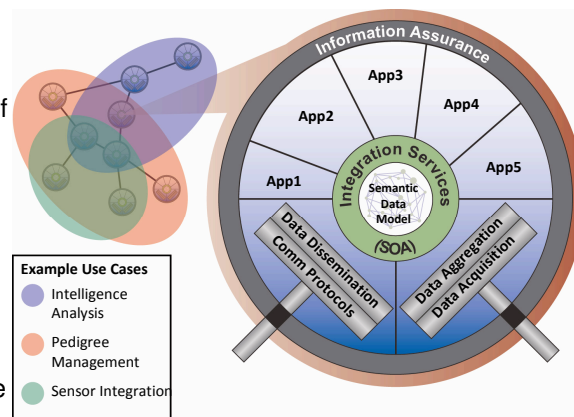


Adaptive Integration Framework

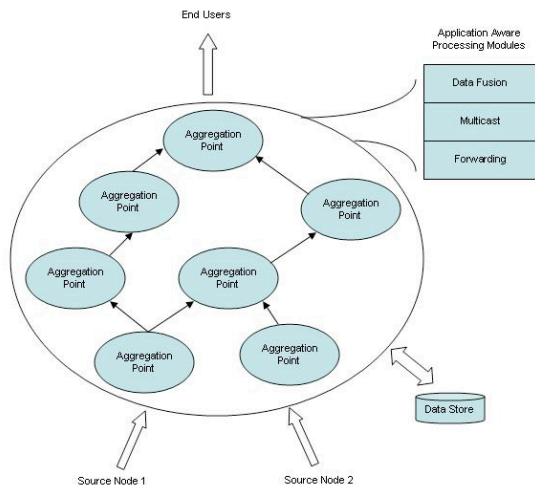


Network Characteristics

- Asynchronous operation in intermittent connectivity / limited bandwidth environments
- Operates through a loosely coupled set of Nodes
- Provides authentication, certification integrity, availability and confidentiality
- Provides and / or requests services based on node type and business rules
- Supports inter-nodal interaction through the Data Dissemination Layer (DDL)
- Integrates and processes data through the Data Aggregation Layer (DAL)
- Supports role based Situational Awareness



Aggregation



Network aware applications enabled by host level network services

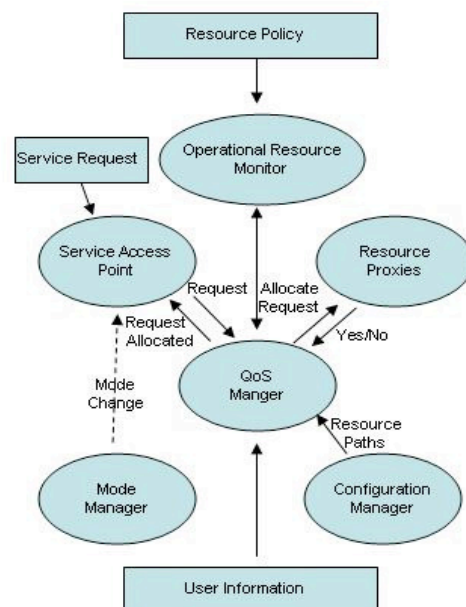
- Data aggregation
- Efficient dissemination via overlay networking (multicast for example)
- Content based routing/forwarding (policy based networking)

Quality Connector (QC) Framework



QC provides operational resource allocation

- Users or machine-to-machine
- Roles defined via registry service
- Includes infrastructure services (email, chat, data distribution)
- Use Information exchange requirements to allocated resources
- Define modes during system architecture process



Conclusions/Future Work



- Prototype of QC has been demonstrated in 800+ client network (Java implementation)
- Plan to explore network routing applications
- Expand QC to include network QoS: latency, jitter, fault tolerance, security...



Questions