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Joint Integrated BMC4I
The Intermediate Control Station Concept

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Background Information

- All information in this presentation is unclassified.
- The purpose of this presentation is to discuss a new method of battlefield communications that would encompass the joint battlefield.
- The information presented here is meant to bring discussion to the methods and mentality of how tactical and operation communications are handled. It is also designed to show a fundamental change in how communications could be streamlined and simplified in a battle.

The Intermediate Control Station Concept

Modern tactical and operational communications systems do not suffer from a lack of information. Due to information exchange, the problem is actually one of too much information for the commander to have to deal with.

What is needed is a Joint BMC4I System that would allow various levels of the chain of command to weed out what they do not deem necessary for their portion of the battle. This is not just a system of “turning off” track types. It is a fundamental shift in information processing and reporting.

The Intermediate Control Station Concept

The Intermediate Control Station (ICS) Concept creates "nodes" of sensors with battle management logic and communications control through the system. Each node is capable of acting independently in case of battle damage or loss of communication with a higher ICS. It can be thought of as an object oriented approach to systems engineering.

Objects in the form of nodes create the system whereby the individual sensors, shooters and assets can be moved. Individual assets can be moved from one node to another as the commander sees fit. This system will provide the commander with the information that is required while keeping the remaining information at the lowest level.

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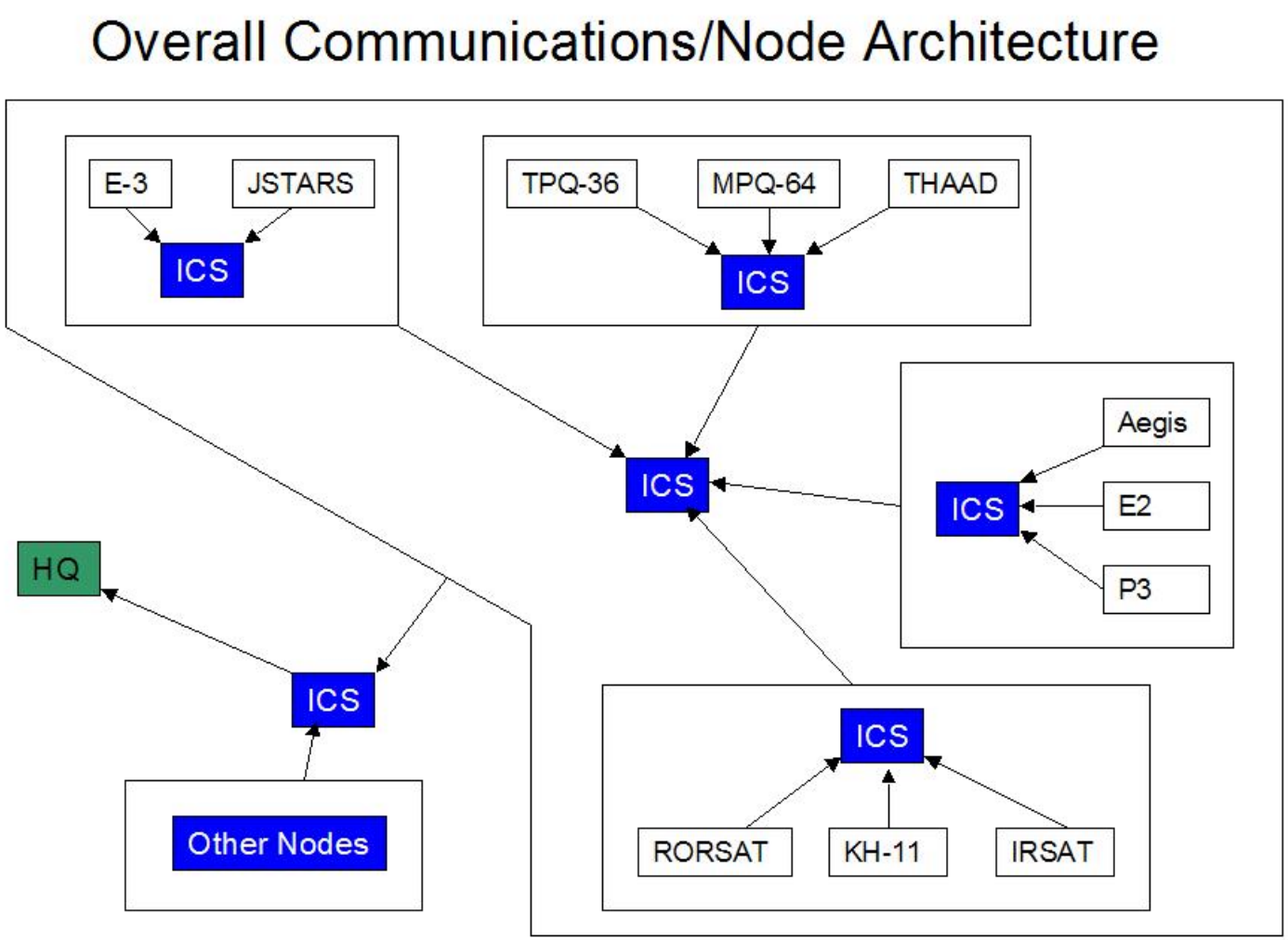
The Intermediate Control Station Concept



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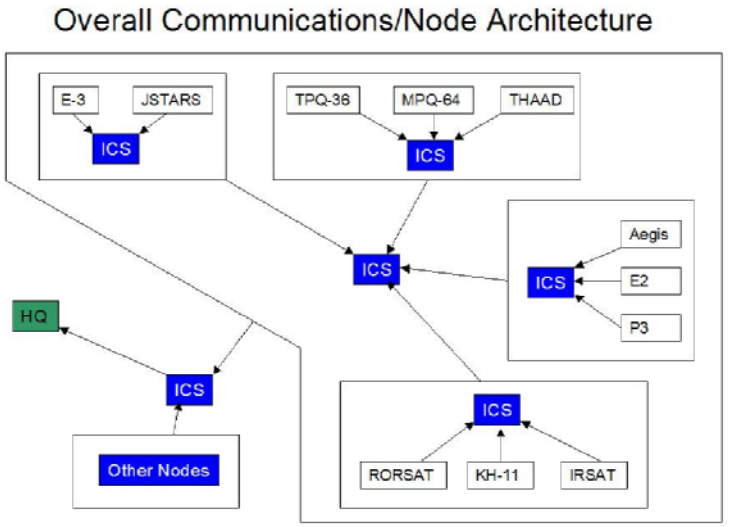
How does the ICS work?

Each lower level node contains all of the sensor information (radar, IR, any other source, HUMINT) for that particular node. The node can be set up by geographic area or by command structure.

Each higher level node requests the information from the lower level node. Only the information requested is passed. The commander may deem certain information necessary and does not want to cloud the picture with unnecessary data.



Fusion of the data is accomplished at the appropriate level.

Functions of the ICS

1. Coordinate track information from sensors in the ICS node.
2. Pass requested information to a higher ICS.
3. Fuse overlapping sensor data in its node or group of nodes, accomplished using measurement, rather than track data.
4. Break off a “node” should the system reach track saturation.
5. Act as an intermediary commander if necessary.
6. Assign shooters to nodes and pass shooters between nodes.
7. Contain the battle management algorithms necessary to move fire control and sensor data when ordered.
8. Continue the OPPLAN until directed by higher ICS/HQ.

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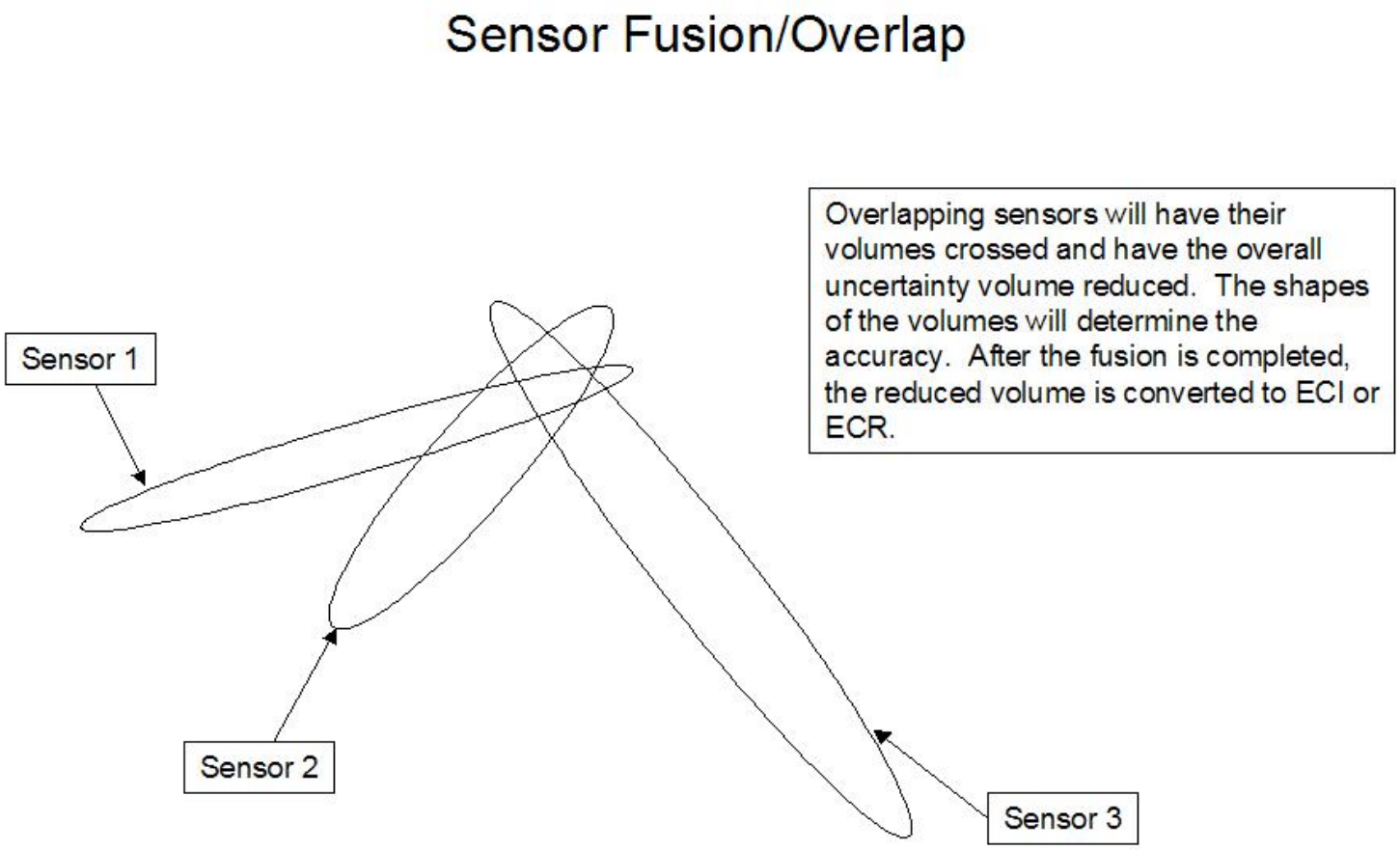
Sensor Fusion for the ICS



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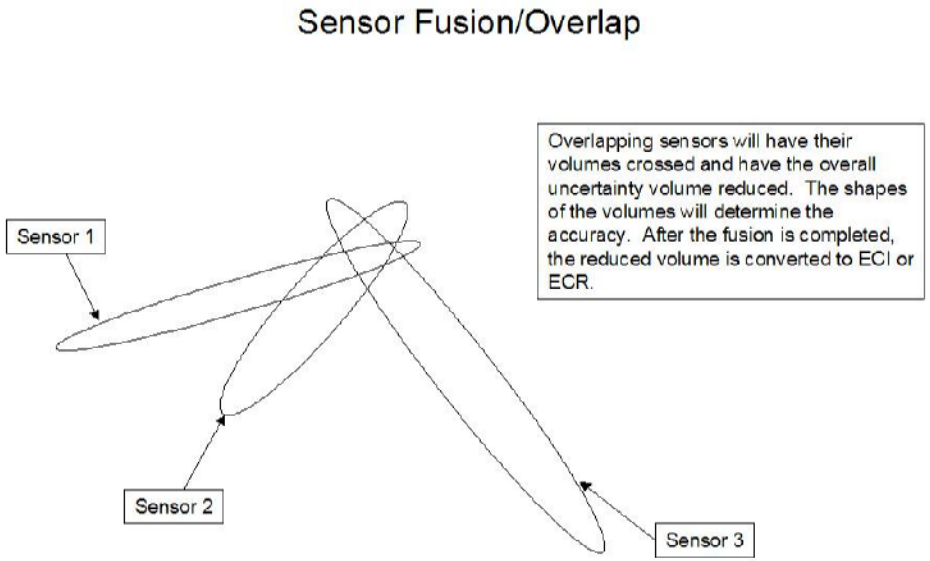
Sensor Fusion for ICS

Sensor fusion has been a primary concern at Raytheon for some time. Ongoing research and development of various methods of overlapping sensor fusion is still continuing.

At this time, the concept of using the disk shaped objects in ECR than the egg shaped objects of ECI. The ability of the system to fuse multiple sources such as ESM, elevation and azimuth from various active sensors and passive data will allow a more accurate location to be provided.

Concurrently, it is envisioned that the overlapping disks will be used. Measurement, rather than track data will be used to move targets up and down the chain. Overlapping volumes are kept and the rest of the uncertainty values are thrown out.



Communications for the ICS

Variations of the Huffman Algorithm will be used to compress the data and provide another sub-encryption to the method.

A detailed background providing for a 4 bit alphabet and are described in the research paper.

Continuing advances in data compression and satellite communications provides the necessary impetus for the ICS to work. However, the concept of only transmitting the data that is required by the higher ICS lowers the overall volume of message traffic and makes the system run faster.

Other Uses for the ICS

- Civilian Air Traffic Control
- Call for Close Air Support
- Call for Indirect Fire Support
- Geospatial Intelligence
- Analysis of Friendly Deployment Patterns

Continuing Evolution of the Concept

The following steps are continuing to ensure maturation of the concept:

- Complete Sensor Fusion Algorithms at the individual and multi-ICS levels
- Completion of Data Compression Algorithm based on information required by the commander
- Conduct experiments with bistatic communications possibilities
- Create a computer simulation of individual nodes to test the Battle Management Algorithm Development
- Ensure robustness in multiple combat situations

Questions

Questions?

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Cover Statement

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