Problem Statement

**ISR should do more “in the current conflicts while their outcomes may still be in doubt” – Sec. Gates**

<table>
<thead>
<tr>
<th>More Timely, More Accessible</th>
<th>Strategic Precision Targeting for use by a select few, to a Need for Tactical Precision Targeting for every warfighter</th>
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<tr>
<td></td>
<td>• Sensor data rates continue to outstrip available data link bandwidths, exacerbated by jamming</td>
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<td>• Ground-based exploitation cells introduce too much latency for time-sensitive targeting</td>
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<td>• Warfighters don’t believe they will get appropriate sensing support when they need it</td>
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<th>Persistent, Accurate Surveillance</th>
<th>Multiple platforms are needed for persistence</th>
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<td>• Single sensor platforms don’t collect adequate target information</td>
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<td>• Difficult targets in heavy clutter require interoperable platforms that can cooperatively find, classify and track targets (peer-to-peer)</td>
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<tr>
<th>Size, Weight, &amp; Power Efficient</th>
<th>Proliferation of sensors on platforms is begetting ever more costly tradeoffs in SWaP</th>
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Converged Sensor Network Architecture (CSNA)

A unique approach to sensor networking that brings together signal and image processing, information exploitation, and information management into a high-performance, most productive, and cost-effective embedded compute platform.

- Integrated, optimized for low latency, high throughput, and SWaP
- Designed to deliver an “embedded” Quality-of-Service that supports the convergence of processing and net-centric capabilities
Distributed Packet Processor for 10GE

- Implemented as a layered architecture that
  - Bridges physical layer protocols
  - Maps multiple logical layer protocols onto a bridge architecture

- PHY: automatic termination and throttling

- ROUTING: programmable field lookup, routing, and prioritization
  - Header translation and/or encapsulation
  - Traffic management
  - Software-based exception handling

- LOGICAL: end-to-end buffer management, timeouts for robust operation
  - Adjustable buffer watermarks per logical type (IP, …)
  - Timeout and failover
Ethernet-over-RapidIO (EoRIO) Wire Protocol

- **Encapsulate Layer 2 Ethernet frames in a RapidIO transaction**
  - Segmentation and reassembly as required
  - Buffer pools allocated in advance and managed using watermarks

- **Implemented across 3 different state machines**
  - Gateway Forwarding Engine
    - CRC check
    - MAC lookup to either valid endpoint or Gateway Exception Handler
    - Buffer Pool Manager for all mapped RapidIO endpoints
  - Gateway Exception Handler
    - Multicast packets and topology changes for high availability
  - EoRIO Endpoint Driver
    - Filters INGRESS packets to determine the type of transaction
EoRI O Failover

- RapidIO subsystem optimized to cleanly handle DMA timeouts and stale transactions

- Applications and/or policy managers register for error handling
  - API to test connections
  - API to failover connections to backup RapidIO subsystem

- RSTP topology changes interact with Gateway Exception Handler and induce a Gateway failover