Problem Statement

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

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

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
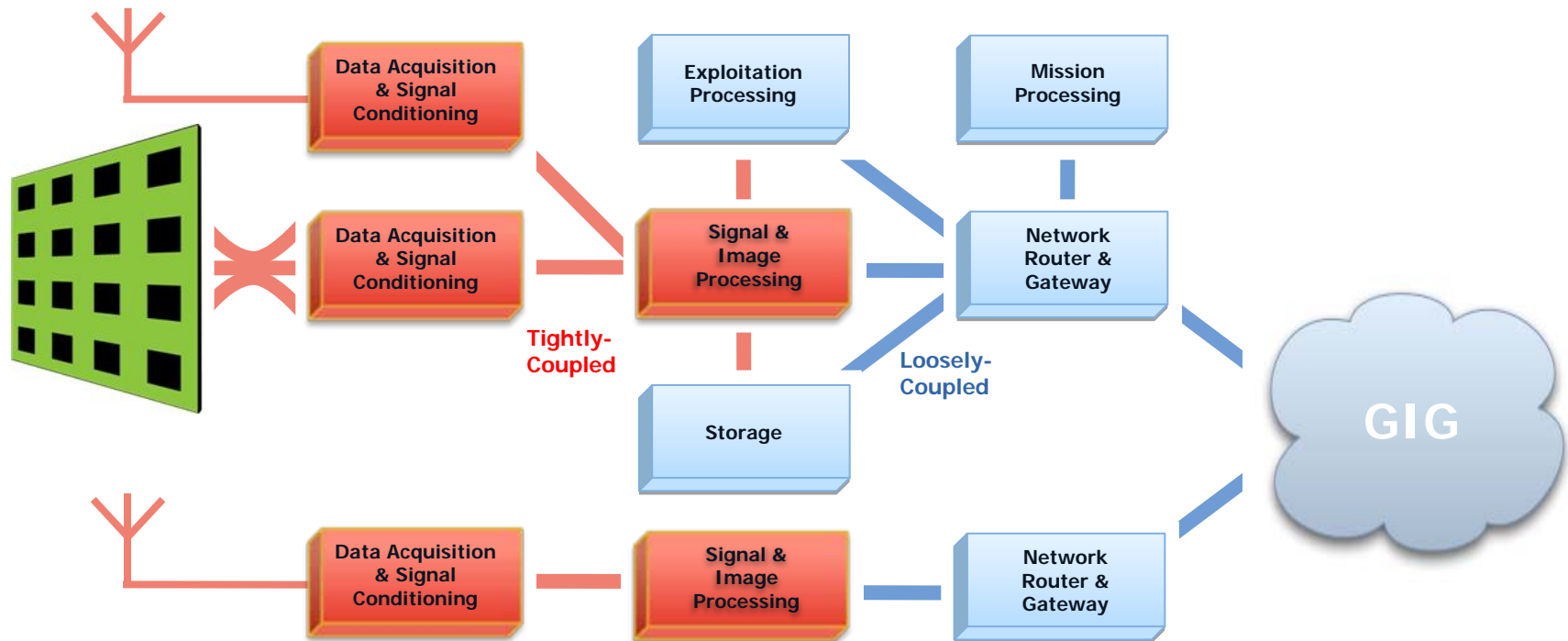
- **Integrated, optimized for low latency, high throughput, and SWaP**
- **Designed to deliver an "embedded" Quality-of-Service that supports the convergence of processing and net-centric capabilities**

Preliminary information, subject to change without notice.

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

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MERCURY
COMPUTER SYSTEMS

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

Preliminary information, subject to change without notice.

EoRIO 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**

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