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Vehicular Instrumentation into the 21st Century

Dan Skelley
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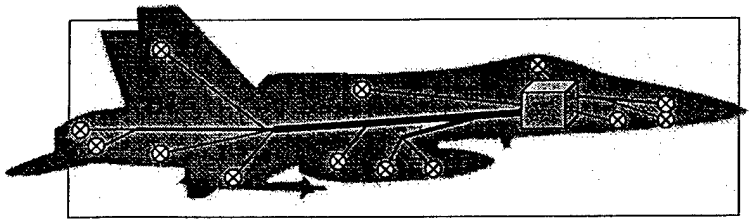
16 Jun 99

NexGenBus

Instrumentation System Topologies

Centralized Data Systems



⊗ *n* Transducers/Avionics taps

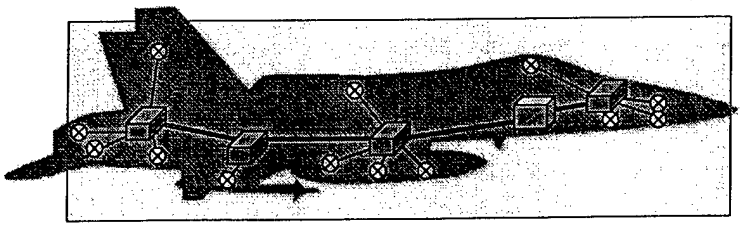
Varying sizes of wire bundles

Instrumentation System Unit
Interface to data signals
Formatted data output to:
Recorders, Transmitters, Etc

NexGenBus

Instrumentation System Topologies

Distributed Data Systems



⊗ *n* Transducers/Avionics taps

Varying sizes of wire bundles

Communications Bus

Instrumentation Control Unit
Formatted data output to:
Recorders, Transmitters, Etc

Transducer Interface Units
Interface data signals onto the bus at the request of the control unit

NexGenBus

Current System Limitations

- Unable to meet data rate requirements
- Aging technology
- Closed architecture
- Network incompatibilities

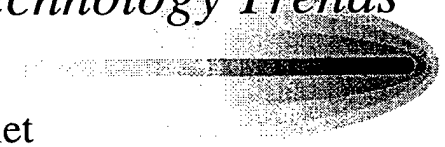
NexGenBus

DoD Policy Trends

- Acquisition Reform
- Decreasing budgets
- Shorter cycle times
- Open architecture and COTS

NexGenBus

Commercial Technology Trends



- Growth of the Internet
- Proliferation of PC and LAN technology
  - Price/performance ratios are plummeting
- Data packets are the universal data structure

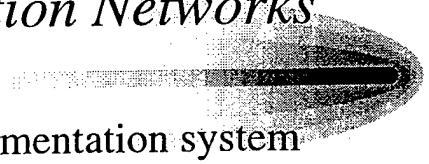
NexGenBus

Future Instr. Systems Must:

- Have open architecture
- Utilize COTS hardware/software
- Easily interface with global network infrastructure
- Leverage commercial standards
- Meet exponential growth in data requirements
- Easily incorporate leading edge technology

NexGenBus

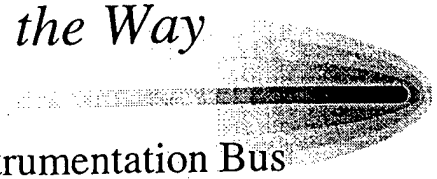
Data Acquisition Networks



- Network based instrumentation system
- Data is formatted and moved in packets
- Compatible with network infrastructure
- Open architecture based on Commercial standards

NexGenBus

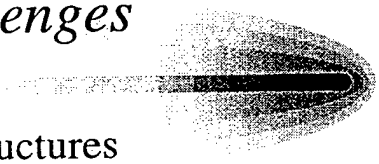
Leading the Way



- Next Generation Instrumentation Bus
  - Vehicular Data Acquisition Network
  - High Speed
  - Comforms to OSI Communications Model to facilitate technology insertion
- Air Force SBIR AF99-302
  - Fibre Channel bridge to legacy instrumentation standards
  - Demonstrate CAIS to Fibre Channel bridge

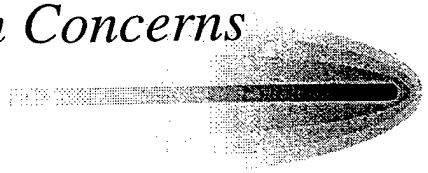
NexGenBus

The Challenges



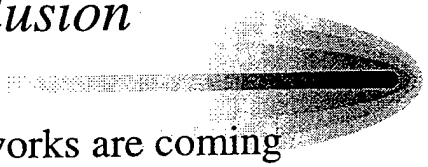
- Non-standard packet structures
- Leading industry
- Bandwidth concerns (RF and recorder)

Bandwidth Concerns



- RF Bandwidth
  - Reduced RF spectrum available
  - Data requirements keep increasing
- Recorder Bandwidth
  - NexGenBus will have a data rate of 800 Mbps
  - Large recorders are currently at 240 / 107 Mbps
  - Smaller formats are trying to achieve 32 Mbps

Conclusion



- Data acquisition networks are coming
- Challenges are being addressed
- A new era in instrumentation affordability, capability, and complexity will be born.