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# *Vehicular Instrumentation into the 21st Century*

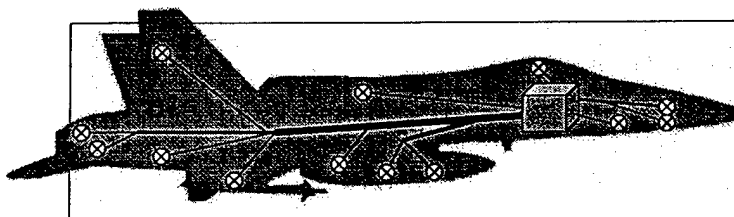
Dan Skelley

Deputy Director, Test Article  
Preparation, US Navy

16 Jun 99

*NexGenBus*

## *Instrumentation System Topologies* Centralized Data Systems



⊗  $n$  Transducers/Avionics taps

≡ Varying sizes of wire bundles



Instrumentation System Unit

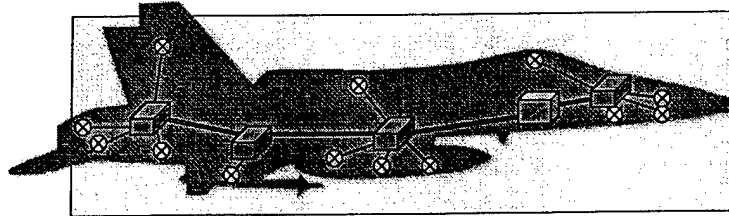
Interface to data signals  
Formatted data output to:  
Recorders, Transmitters, Etc

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## *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

## *Current System Limitations*

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

## *DoD Policy Trends*

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

## *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

## *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

## *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.