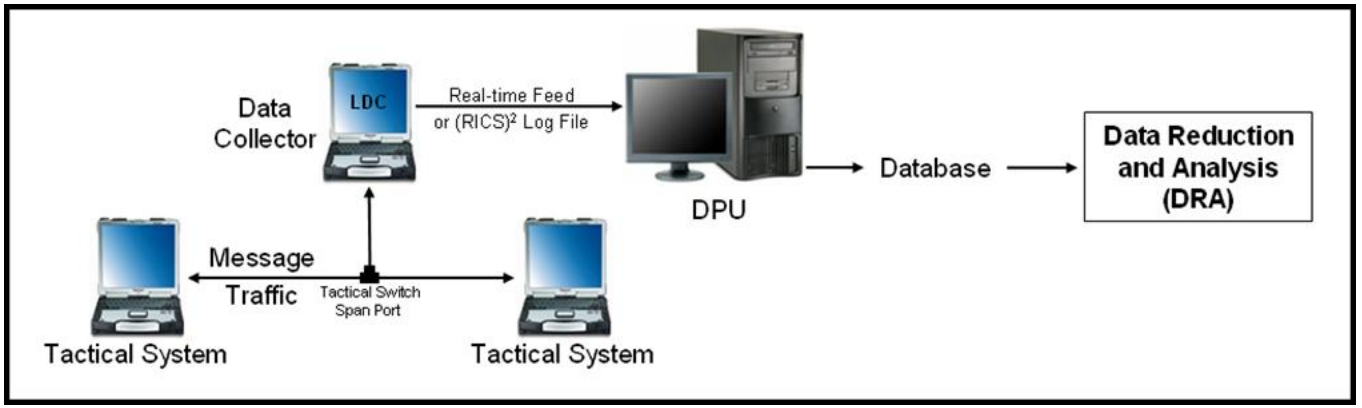
SOA Testing Tools

Army Testing in a Services Oriented Architecture (SOA) Environment

Michael Phillips
254-287-8258
ManTech International
Michael.Scott.Phillips@us.army.mil

Army Proven
Battle Ready

Instrumentation of the Past



- Testing Army computer systems before SOA
  - Collection
    - Attach to LAN and collect everything
    - Promiscuous non-intrusive methods
  - Reduction
    - Revolved around the parsing of formatted message traffic
      - Protocols
      - Message standards
  - Analysis
    - Metrics were essentially constant
      - Speed of Service
      - Message Completion Rate
      - Message Standards Compliance

Evolution of Instrumentation

- In the 2000s, changes in the Army Battle Command Systems drove changes in instrumentation methodologies
  - Joint Common Database (JCDB)
    - First attempt to maintain a common database by conducting database replication between information systems within a TOC
    - EPG developed new data collection methodologies
      - Data Collection Module (DCM) developed as an **Embedded Agent**
  - Army Information Server (AIS)
    - First Publish and Subscribe Service (PASS) architecture for intra-TOC exchanges
      - Fixed topic assignments for pub/sub (16 topics)
      - No advertising – subscribers had to poll to discover new topics
      - ABCS provided stove pipe comms for interoperability between TOCs
    - EPG developed new Stimulation, Data Collection, and Visualization tools
      - Bulk PASS as a **Surrogate Client** to publish and subscribe to the server
      - PASS Data Collector (PDC) as a **Surrogate Client** to capture encrypted exchanges
      - PASS Monitor as a **Custom Visualization Tool** for validation of transactions

Current Testing Environment

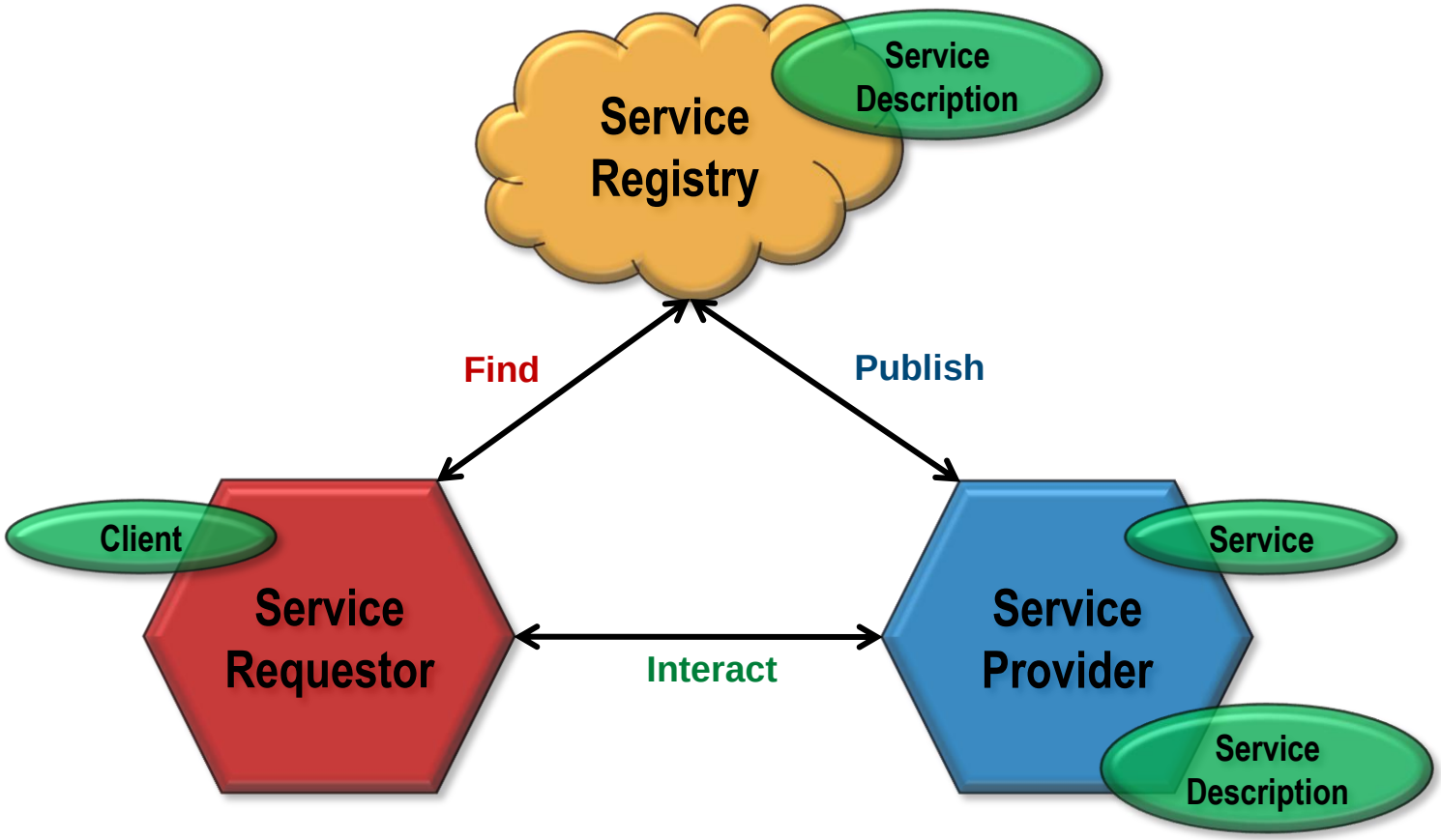
- Data Dissemination Service (DDS)
  - Replaces AIS
  - Introduces topic advertising (64 DDS advertising profiles)
  - Queries and dynamic subscriptions
  - Introduces Server-to-Server Peering
  - With DDS all LAN traffic is encrypted
- Instrumentation Requirements
  - Validate DDS server operation
  - Validate client publications against standards
  - Monitor JCR-DDS Interactions
- EPG Developed Solutions
  - Modify existing **Surrogate Clients**
    - Utilize DDS Client Interface (DCI)
    - Incorporate SDK from PM Battle Command
  - Modify existing **Embedded Agent**
  - Modify existing **Custom Visualization Tool**
  - Developed a method to **Decrypt Network Data**
  - Incorporate **Logs from the System Under Test (SUT)**

Soon, SOA will replace the majority of message exchanges

- DDS was the beginning of a move to Services Oriented Architecture

Intro to SOA

Service Oriented Architecture



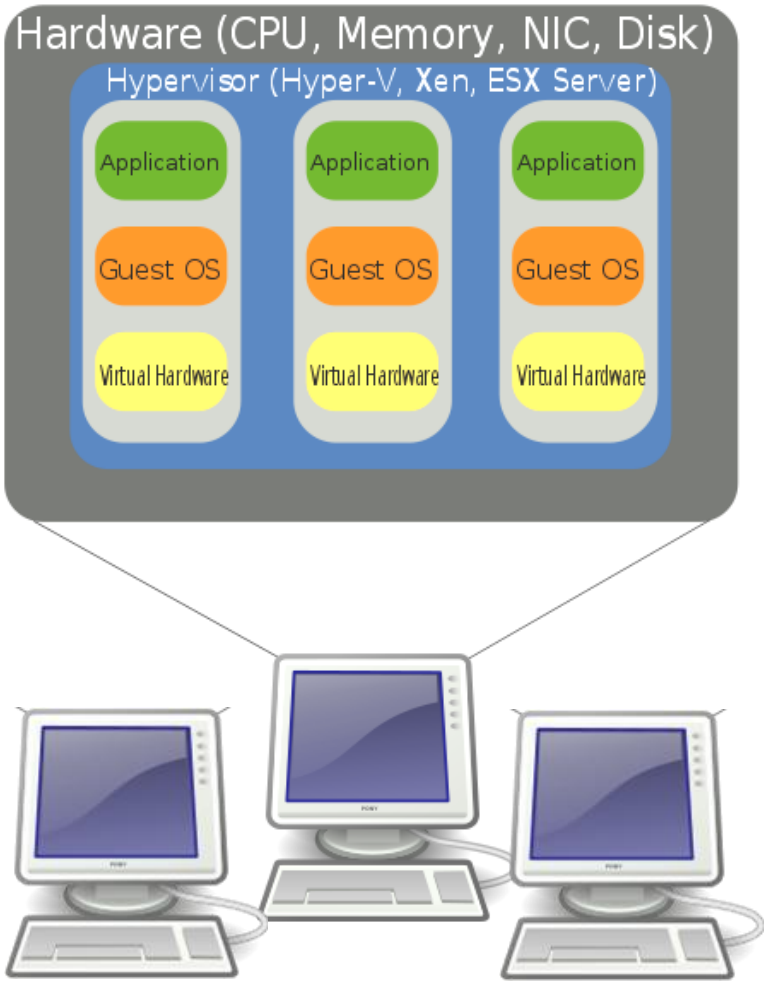
Impact of SOA

- SOA features will change current test paradigms
  - Encryption
    - Most LAN traffic will be encrypted
    - Listening promiscuously is no longer feasible
  - Thin Clients
    - Standalone applications gone, replaced by services
    - Most message-based communications obsolete

Intro to Virtualization

The intent of using virtual systems is to utilize increases in computer horsepower to reduce the number of physical systems necessary in an architecture.

It also allows systems to be easily interchanged while avoiding installation problems.



Intro to Virtualization Cont.

Application Software

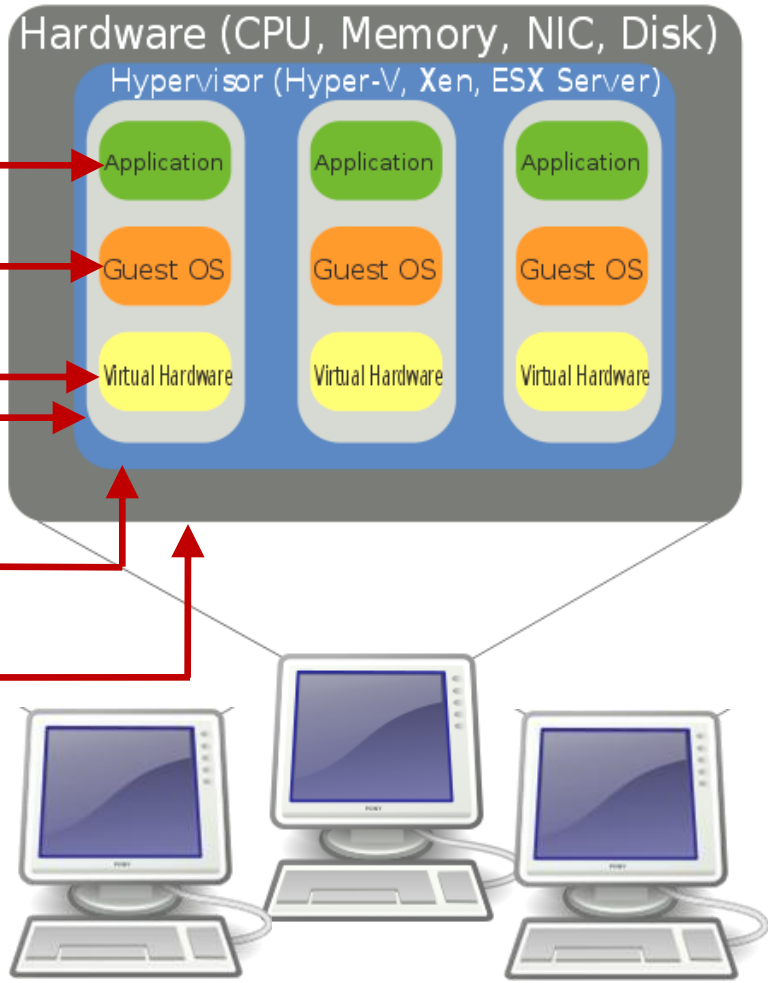
OS Installed on Virtual Hardware

Virtual Hardware

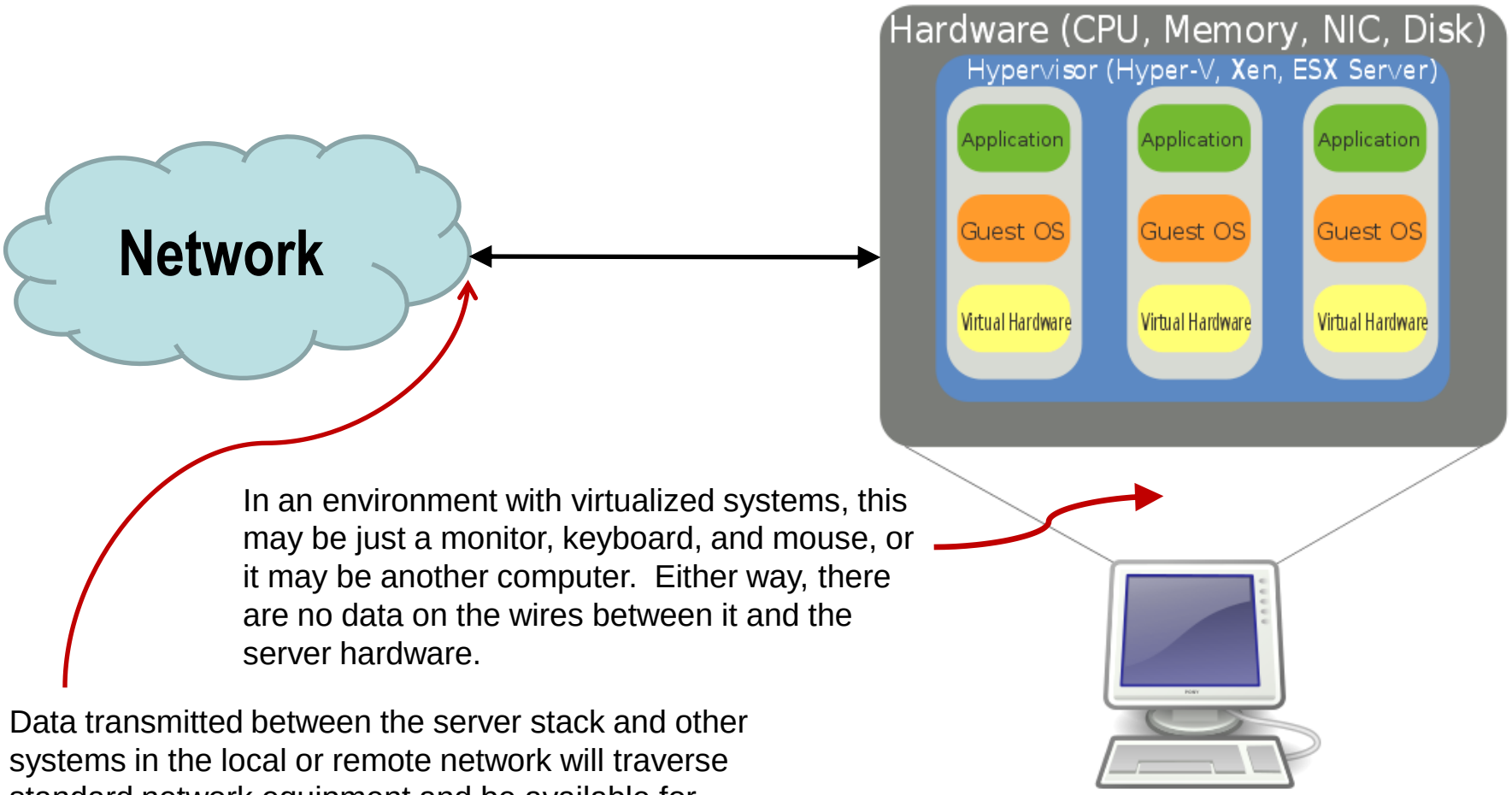
Virtual Machine

Hypervisor software (VMWare, etc.)

Real Server Hardware



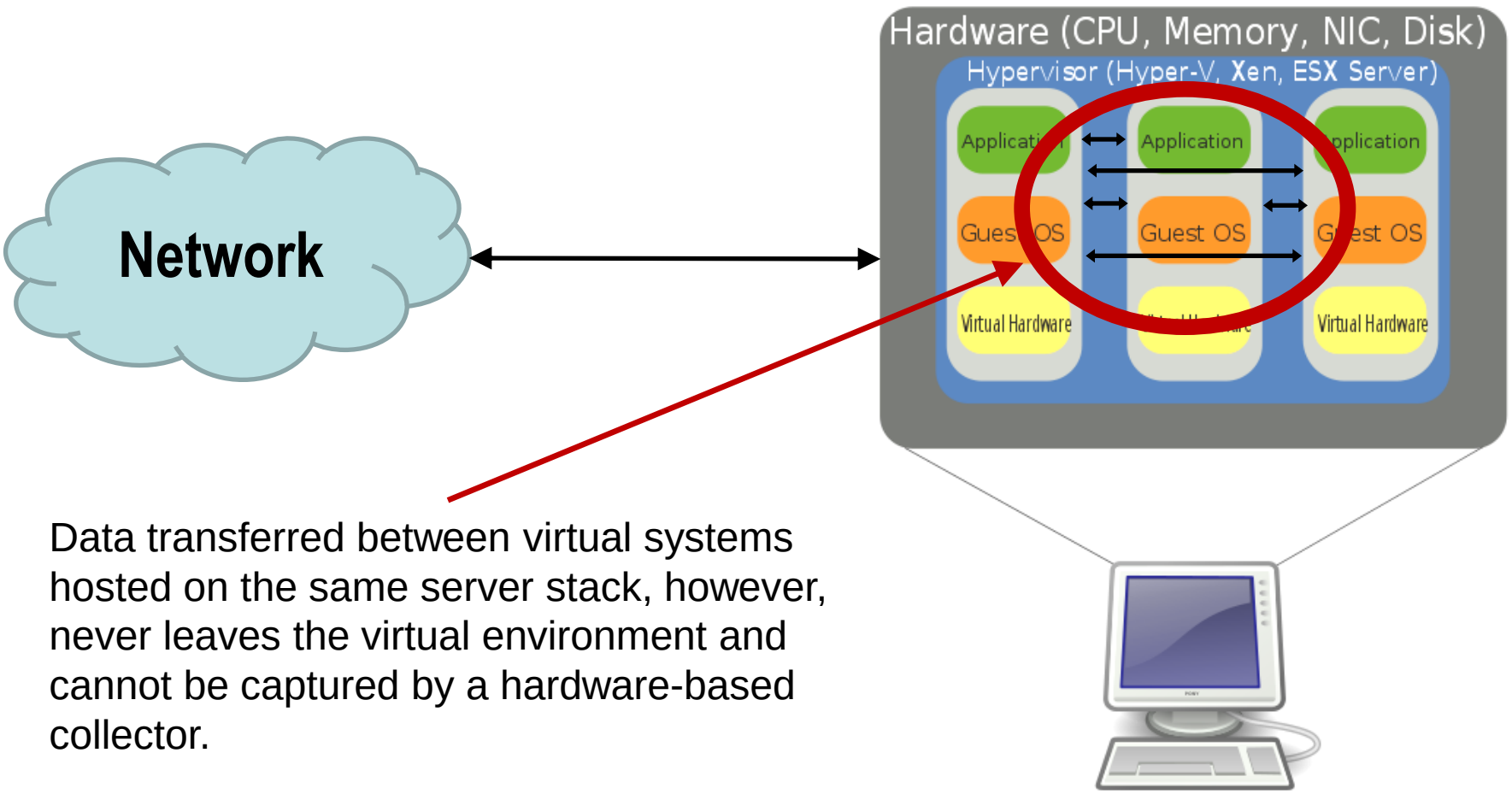
Impact of Virtualization



In an environment with virtualized systems, this may be just a monitor, keyboard, and mouse, or it may be another computer. Either way, there are no data on the wires between it and the server hardware.

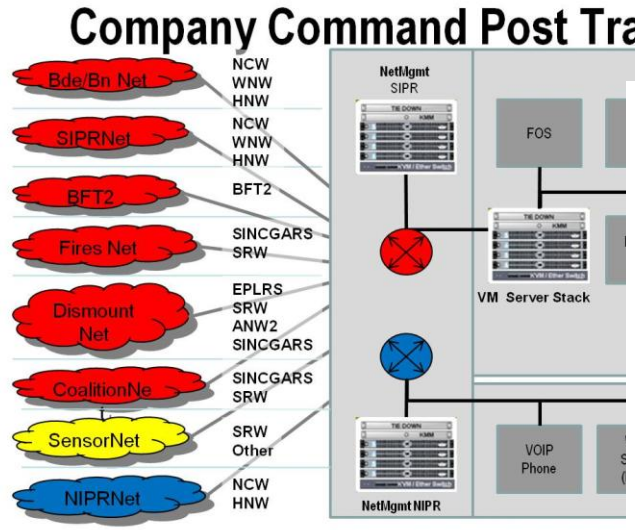
Data transmitted between the server stack and other systems in the local or remote network will traverse standard network equipment and be available for passive LAN collection at the switches.

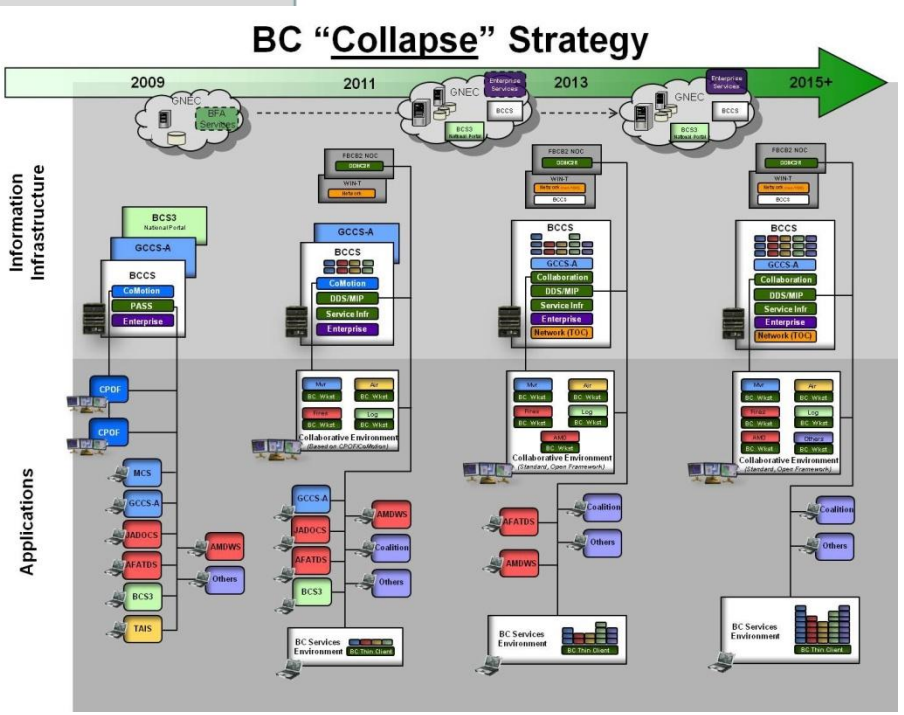
Impact of Virtualization



Data transferred between virtual systems hosted on the same server stack, however, never leaves the virtual environment and cannot be captured by a hardware-based collector.

The Future Army Architecture



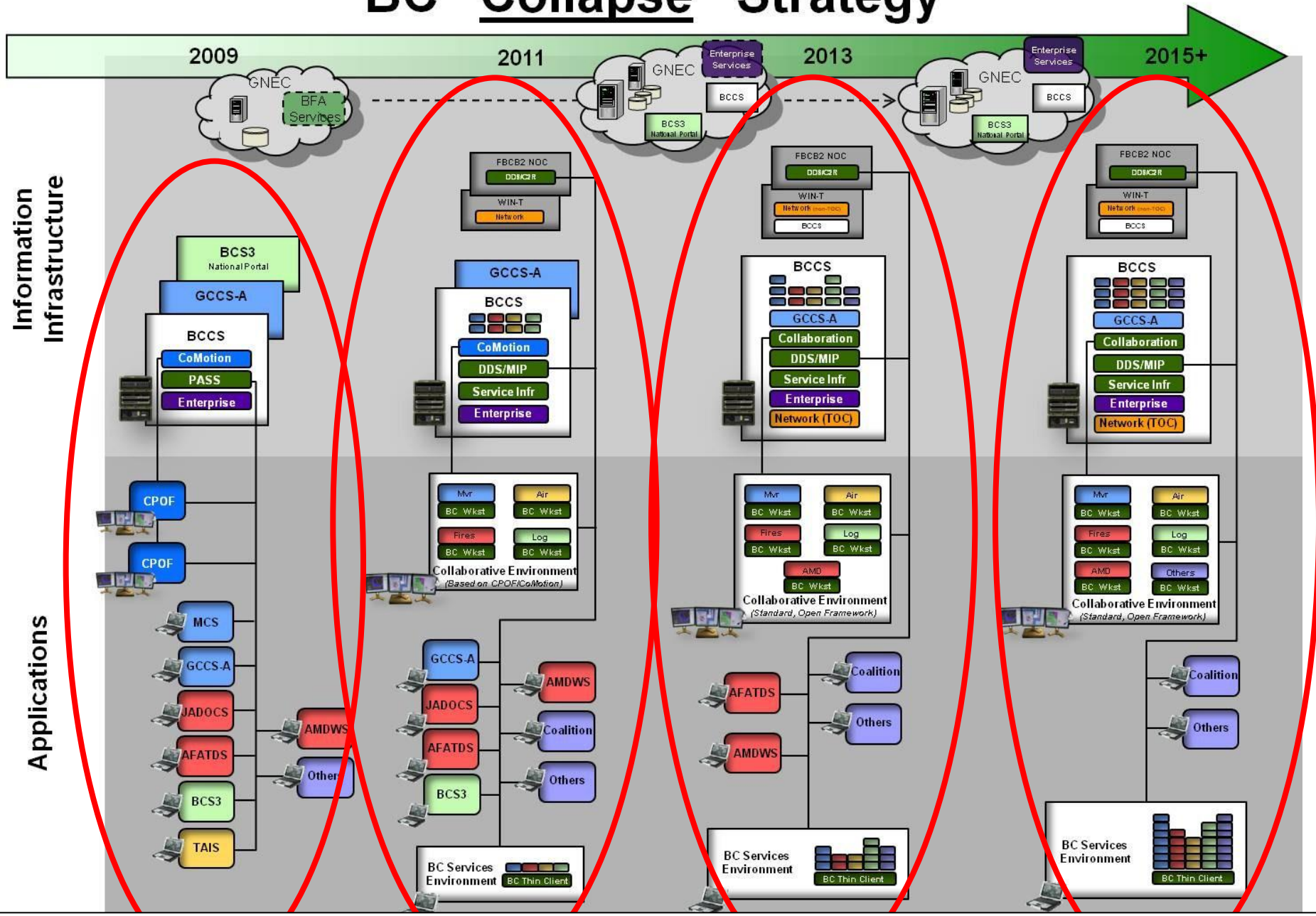


Existing instrumentation will not meet the Army's needs

These architectures will begin testing at the CTSF very soon

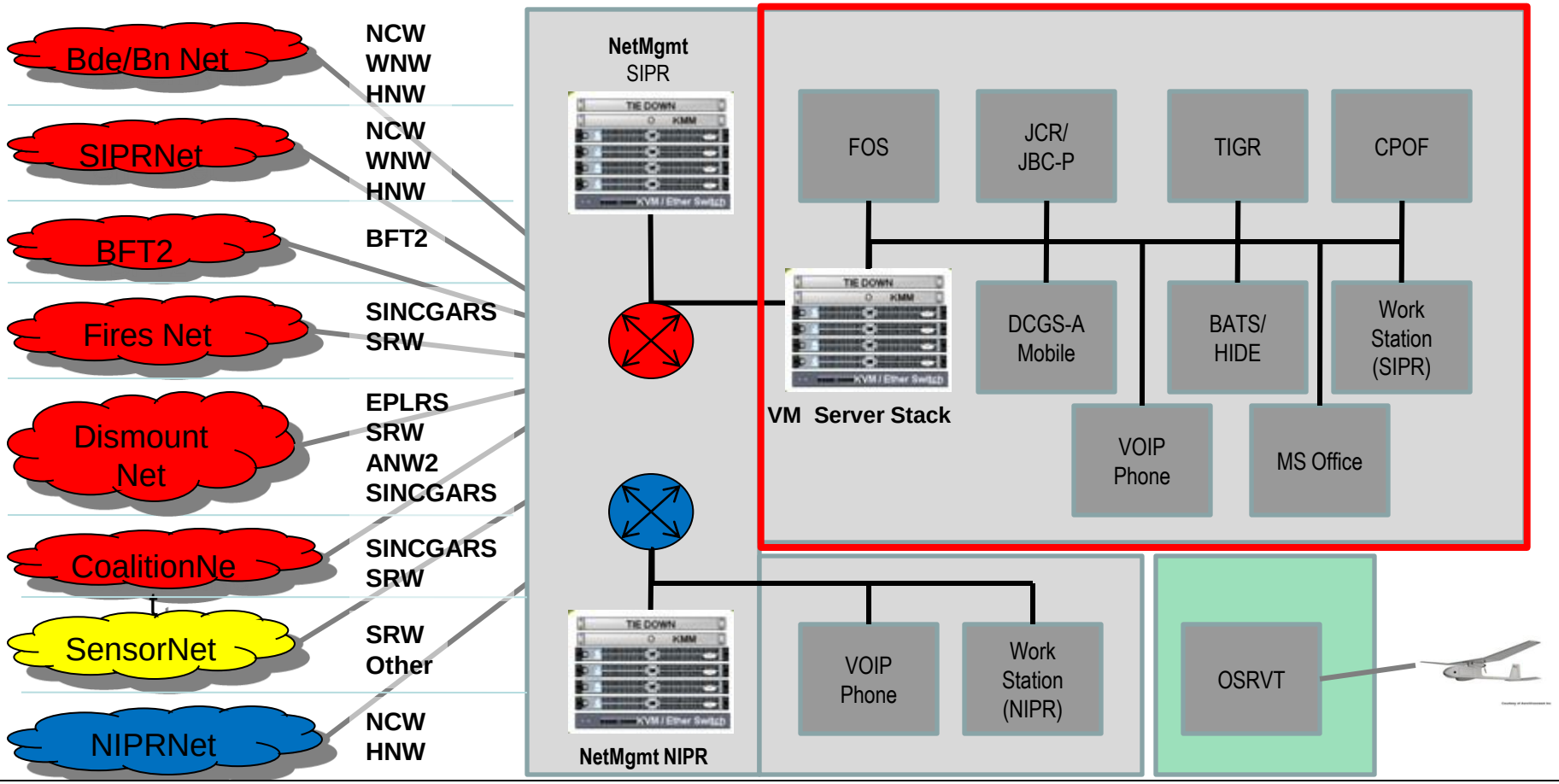
August 2011

BC "Collapse" Strategy



In Five Years, no more standalone applications in the TOC

BCTM Company Command Post



- Information Systems pushed down to the CO CP level.
  - Virtual systems within a single VM Server Stack.
- Black lines carry NO data.
  - Grey boxes in the picture represent only monitors and keyboards.
- Intra-TOC comms. will be invisible to hardware-based data collectors.

ATEC ToolKit

Testing these systems will require a multi-tool approach

Embedded Agents

Virtualized Data Collectors

Decrypt Network Data

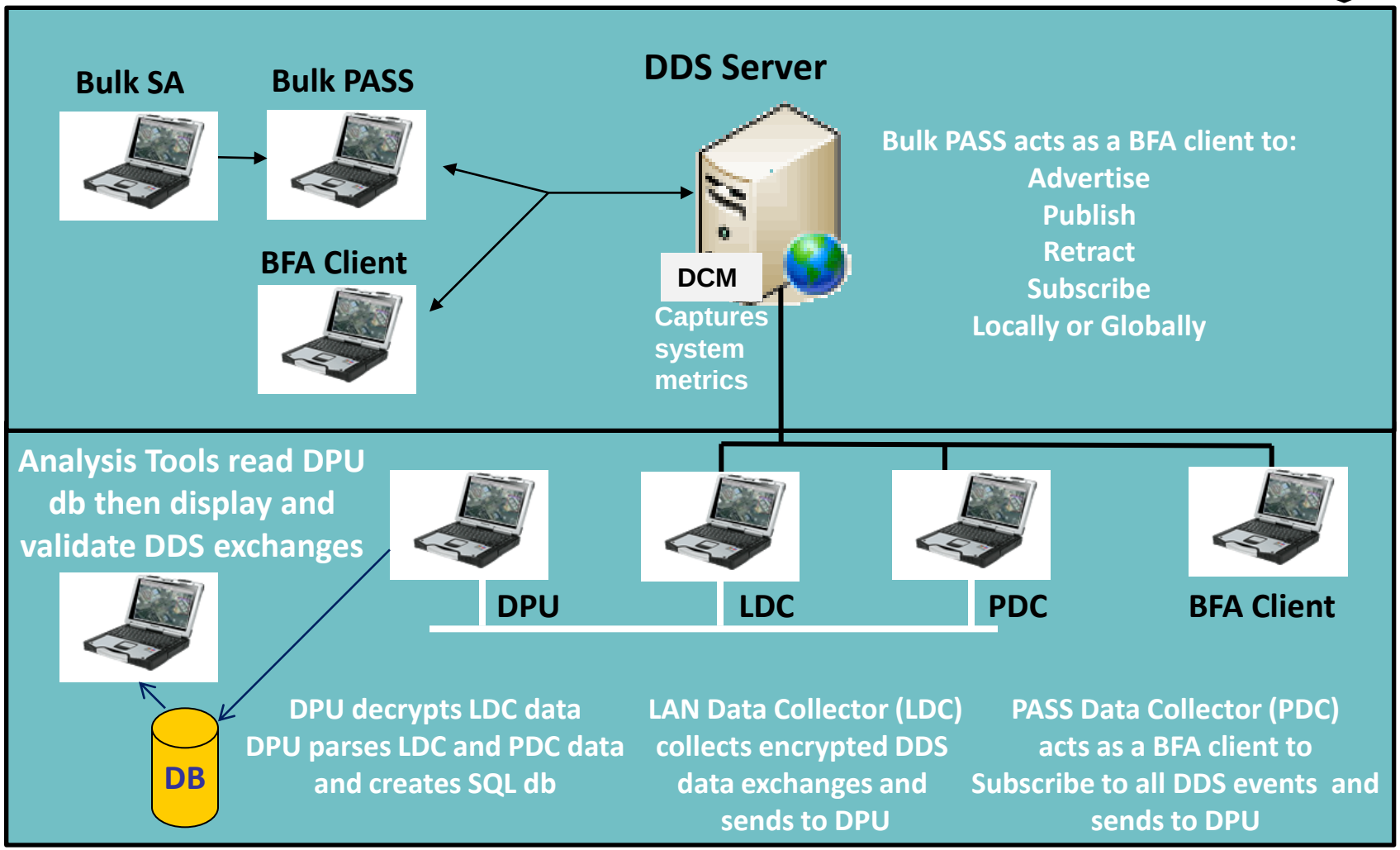
Custom Visualization Tools

System Under Test (SUT) Logs

COTS SOA Testing Tools

Surrogate Clients

EPG's SOA Tools



Bottom Line

- Current Instrumentation
  - Collection
    - Attach to LAN and collect everything
    - Promiscuous non-intrusive methods
  - Reduction
    - Revolved around converting raw data into something useable
      - Protocols
      - Message standards
  - Analysis
    - Metrics were essentially constant
      - Speed of Service
      - Message Completion Rate
      - Standards Compliance

Current Instrumentation will not work with SOA

- SOA-Compatible Instrumentation
  - Collection
    - LAN data important but not primary
      - Requires decryption
    - Active data collection methods
      - Surrogate Clients and Embedded Agents
      - Requires Cooperation with PMs
        - Early involvement in process
    - Flexibility Required
      - New methodologies
      - Custom solutions for each test
  - Reduction
    - Revolves around the big picture
      - Conformance
      - Data flow
      - Integration
  - Analysis
    - New Metrics will be developed
      - Yet to be determined
      - Likely to change rapidly