Assistant Secretary of Defense for Networks and Information Integration/DoD Chief Information Officer

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Deputy to the ASD(NII)/DoD CIO
Enterprise Wide System Engineering
GIG EW SE Mission

Ensure the GIG meets the End-to-End
interoperability and performance requirements
needed to support DoD business, intelligence,
enterprise information environment and war
fighting operations.
Global Information Grid EW SE Environment spans across...

- The entire Federal Government
- Multiple programs and statutory authorities
- Many technical domains
GIG EW SE Challenge - Ensure technical integrity, interoperability, and performance across the GIG

Packet Level End-to-End (E2E) Models

- Broad range of users consistent with 1-4-2-1 Ops scenario
- Legacy and future services with clear definitions of service functions
- Current & Legacy transport - Broad range of end-to-end paths
- 100+ use cases define

Significant E2E Performance Reduction

- Summary Comparison
- 2MB File; Ingress Link Speed=1Mbps (25% load)
- Average Transfer Time (seconds)

<table>
<thead>
<tr>
<th></th>
<th>Low Loss</th>
<th>High Loss</th>
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<tbody>
<tr>
<td>Terrestrial</td>
<td>Low Latency</td>
<td>Low Latency</td>
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<tr>
<td>Wireless</td>
<td>High Latency</td>
<td>High Latency</td>
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<tr>
<td>Satellite</td>
<td>Low Latency</td>
<td>High Latency</td>
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<tr>
<td>End-to-End</td>
<td>Low Loss</td>
<td>High Loss</td>
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</tbody>
</table>

- Little motivation for segments to implement solutions
- 6x increase in E2E transfer time
- E2E solutions are available

Individual network / program solutions DO NOT ensure E2E performance
EW SE Approach - Lead a community effort to enable a portfolio decision process to:

- Provide **EW SE services needed to oversee** GIG evolution
- Maintain a GIG enterprise-wide coherent technical and operational baseline to insure interoperability
- Establish GIG enterprise-wide analysis capabilities for E2E Performance Assessment
- Oversee GIG enterprise-wide experiments & federated emulation/test
- Establish a GIG compliance management program
Maintain a GIG EW coherent operational and technical baseline

Align documentation framework for Program Managers

- GIG description documentation is unclear
- Test plans difficult to develop
- Weak linkage to operational needs
- Business and Intelligence mission areas not currently included
- ~7000 pages of conflicting guidance
New Coherent operational/technical baseline improves stability and raises confidence in guidance

Revised framework will provide structure and traceability similar to that of a document tree
New Baseline feeds directly into established oversight and decision processes
End-to-End Performance - why is it so complicated?

1. COTM User Queries Portal
2. Portal Queries Discovery Service
3. Federated Search
4. Returns Search Results
5. COTM User Requests File
6. COTH User Sends File

COTM User Needs ISR Data

Wireless

In-Theater Homed Portal

Portal

Terrestrial Wired

Satellite

CONUS Services

IA

Discovery

3. Authenticates User ID

UGS

JSTARs

AWACs

X000

U-2

UAV1

UAV2

UAV3

ARL

EP-3

P-3

GOB

IMOM

TEOB

5-D

City Maps

ONC

JOG

TIBS

VIDEO

TADIL

WX

ATO

DIODE

GCCS
GIG performance questions across the community

▶ End-User
  • Which applications can I successfully use over the GIG?
  • What performance can I expect on GIG?
  • Which technologies should I employ?
  • What are the impacts of different operating conditions?

▶ Transport Developer
  • What service and applications must I support?
  • Is the E2E performance acceptable?
  • What are inter-segment interface impacts?
  • What are the E2E impacts of segment performance trades?

▶ Application & Services Developer
  • How will my application perform across the GIG?
  • Is the E2E performance acceptable?
  • What are acceptable service architectures?
  • What are the E2E impacts of protocol and messaging trades?

▶ Operator
  • Where should servers be deployed?
  • What are acceptable operating loads?
  • What SLA performance do I need?
Performance Assessment Framework highlights critical problems to guide end-to-end trades and implementation

Composite Network Performance

Application & Service Messaging

Event Description / Stage / # Transaction Passes

<table>
<thead>
<tr>
<th>Event Description / Stage / # Transaction Passes</th>
<th>User Type 1</th>
<th>Collaboration</th>
<th>IA Security</th>
<th>Person Discovery</th>
<th>User Type 2</th>
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<tbody>
<tr>
<td>Message Service</td>
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<td>Validate Credential and Authorization</td>
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<td>Request User/Entity Role</td>
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<tr>
<td>Request User/Entity Role</td>
<td>Initiate User 1</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Determine Access Privileges</td>
<td>Initiate User 1</td>
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<tr>
<td>Validate and Authorize</td>
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<td>Return Device Information</td>
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<tr>
<td>Message Commit</td>
<td>Initiate User 2</td>
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</tbody>
</table>

Network 1  Network 2  Network 3

Access Links

Inter-connect Nodes

GIG User

Services
Global Information Grid analysis, emulation and test in the acquisition lifecycle

Phase A ($)
- Determination of Mission Need
- Concept and Preliminary Architecture Definition
- Loading Model For System Trades & Requirements
- Performance Model For Engineering Design Decisions
- IP DB Model

Phase B ($$)
- Acquisition Decision
- Prototype Development
- Demonstration and Validation of Architecture
- Performance Evaluation Model For Problem ID & Resolution

Phase C ($$$$$)
- Mission Model Operational Planning
- Loading Model For Planning
- Performance Model For Integration
- Engineering & Manufacturing Development
- Production, I&T, Deployment
- Operations and Support
- Global Information Grid analysis, emulation and test in the acquisition lifecycle
Summary - EW SE provides the Technical Framework for DOD’s GIG Business Process Improvement

1. DoDD 5144.1 provides DoD CIO authority and responsibilities for defining and implementing GIG

2. GIG Policy must support existing decision processes (Requirements Generation, Acquisition, Budget and Operations) beyond-GIG

3. GIG Policy establishes authority for EW SE processes and GIG Technical Baseline development and establishes authority for GIG program compliance with Technical Baseline
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