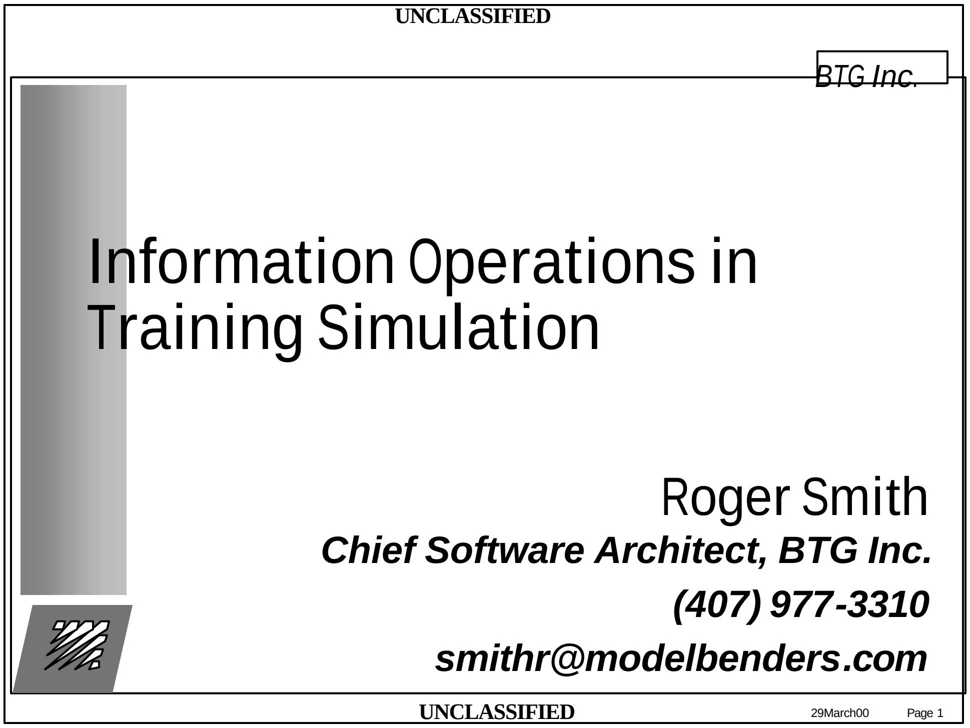

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Information Operations in Training Simulation

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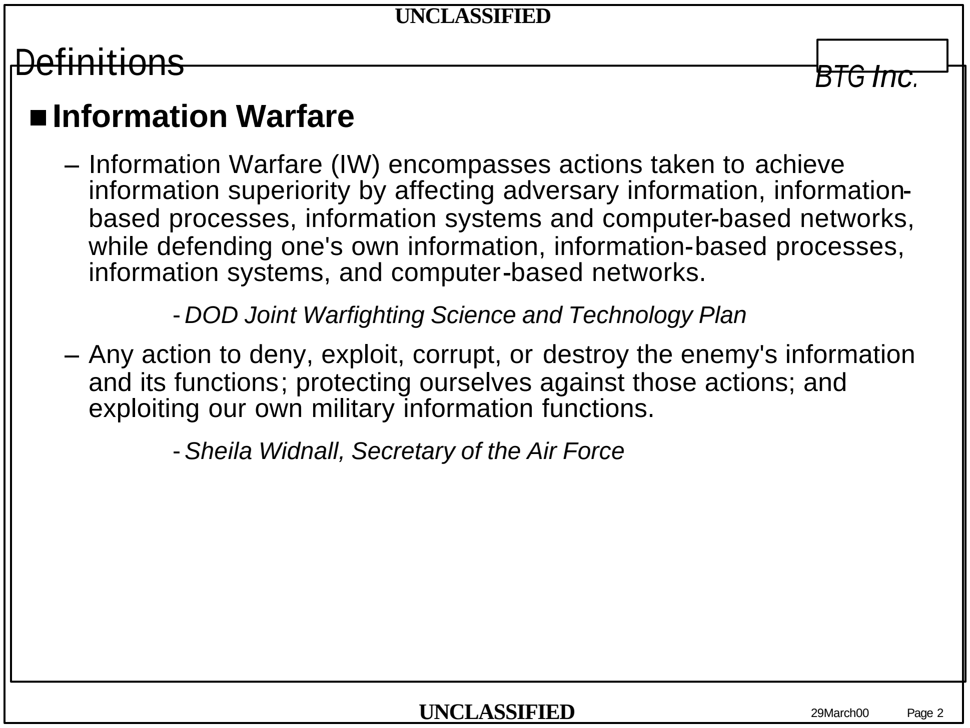

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Definitions

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- **Information Warfare**
  - Information Warfare (IW) encompasses actions taken to achieve information superiority by affecting adversary information, information-based processes, information systems and computer-based networks, while defending one's own information, information-based processes, information systems, and computer-based networks.

    - DOD Joint Warfighting Science and Technology Plan
  - Any action to deny, exploit, corrupt, or destroy the enemy's information and its functions; protecting ourselves against those actions; and exploiting our own military information functions.

    - Sheila Widnall, Secretary of the Air Force

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Information Operations Applications

BTG Inc.

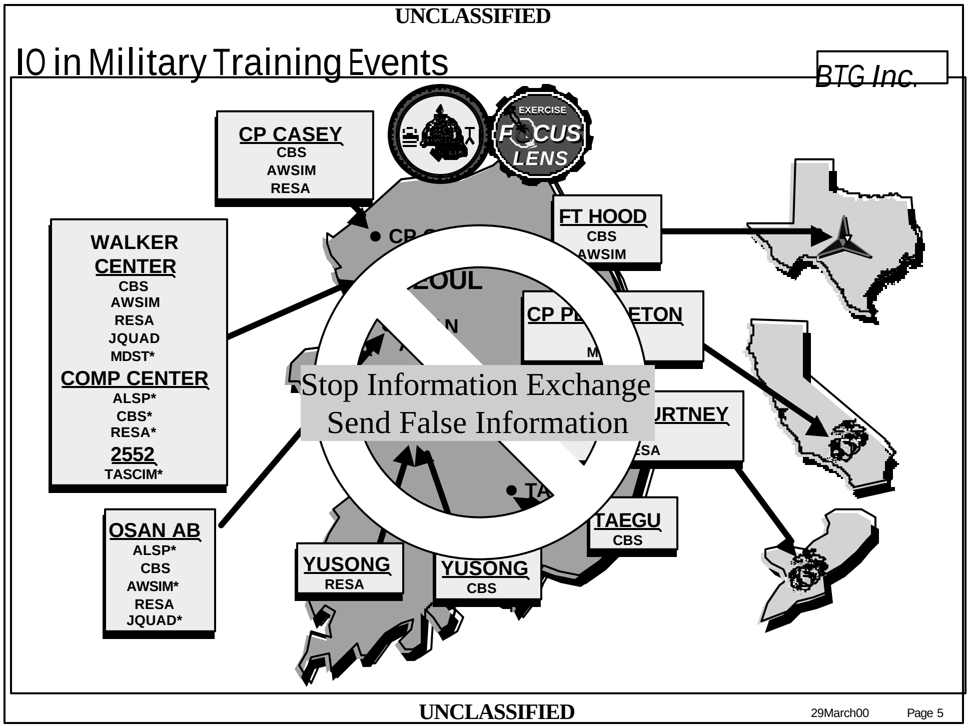
- **Classification**
  - Real IO is classified higher than Intelligence Information
- **Military Exercises**
  - Influence training audience perception of the battlefield through the intervention of controllers and role players
- **Simulation**
  - Influence training audience and CGF perception of the battlefield through explicit IO models and tools acting on combat models and tools
- **IO BDA**
  - Simulated objects identify and measure the impacts of IO operations on the battlefield
- **IO AAR**
  - Controllers identify and measure the impacts of IO operations on the battlefield

Simulation Applications of IO

BTG Inc.

- **Deny access to information**
- **Delay delivery or integration of information**
- **Deceive sender or recipient about information content**

Deny Delay Deceive



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IO in Military Training Events

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Stop Information Exchange
Send False Information

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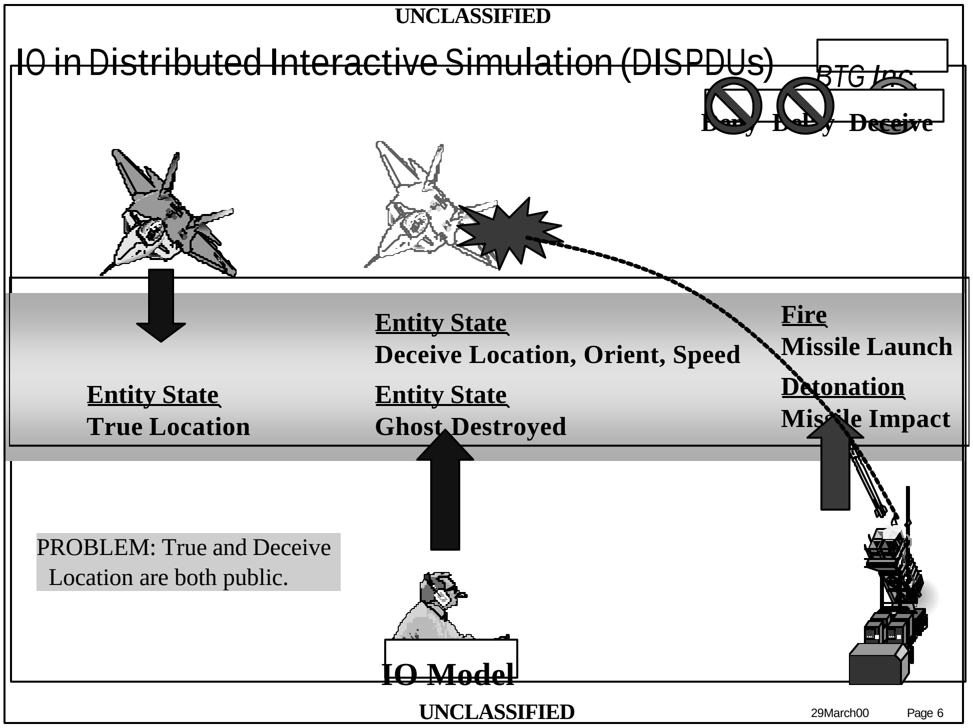

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IO in Distributed Interactive Simulation (DISPDUs)

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Entity State
True Location

Entity State
Deceive Location, Orient, Speed

Entity State
Ghost Destroyed

Fire
Missile Launch

Detonation
Missile Impact

PROBLEM: True and Deceive Location are both public.

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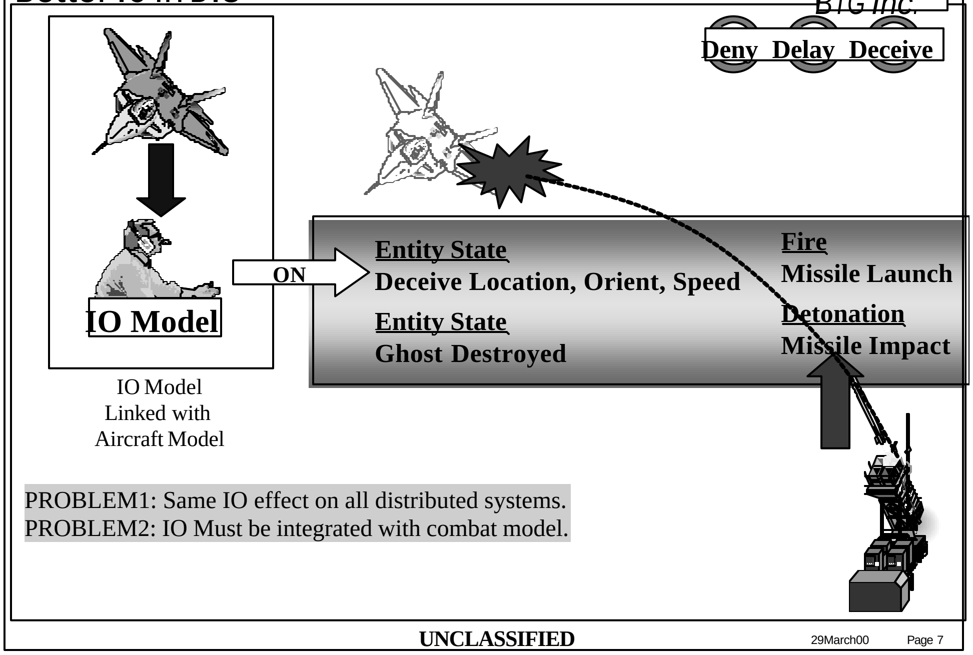
Better IO in DIS



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Deny Delay Deceive

IO Model

ON

Entity State
Deceive Location, Orient, Speed

Entity State
Ghost Destroyed

Fire
Missile Launch

Detonation
Missile Impact

IO Model
Linked with
Aircraft Model

PROBLEM1: Same IO effect on all distributed systems.
PROBLEM2: IO Must be integrated with combat model.

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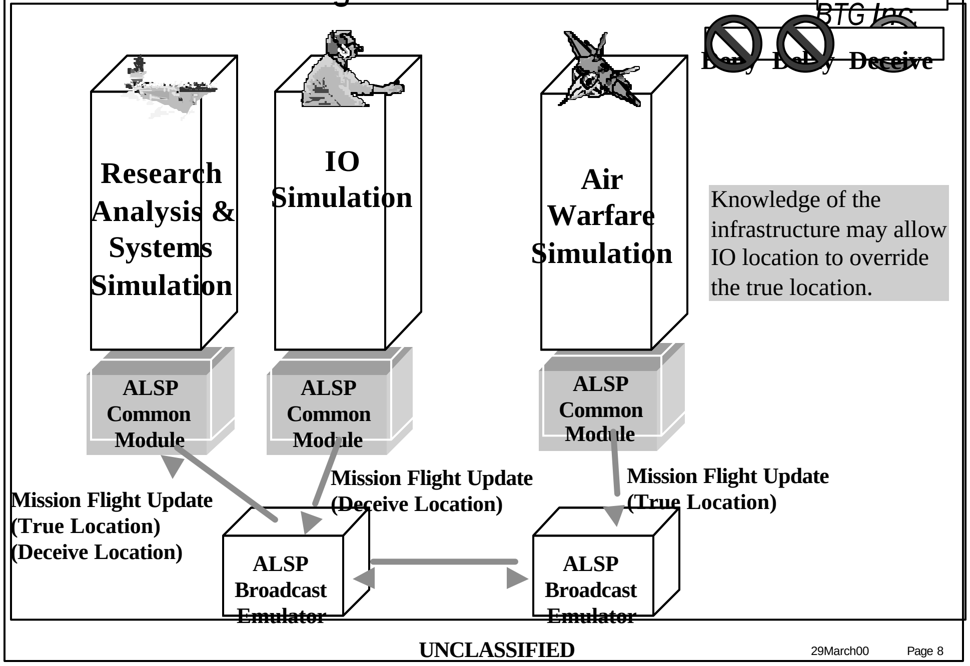
IO in the Joint Training Confederation: IO Federate



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Deny Delay Deceive

Research Analysis & Systems Simulation

IO Simulation

Air Warfare Simulation

Knowledge of the infrastructure may allow IO location to override the true location.

ALSP Common Module

ALSP Common Module

ALSP Common Module

Mission Flight Update
(True Location)
(Deceive Location)

Mission Flight Update
(Deceive Location)

Mission Flight Update
(True Location)

ALSP Broadcast Emulator

ALSP Broadcast Emulator

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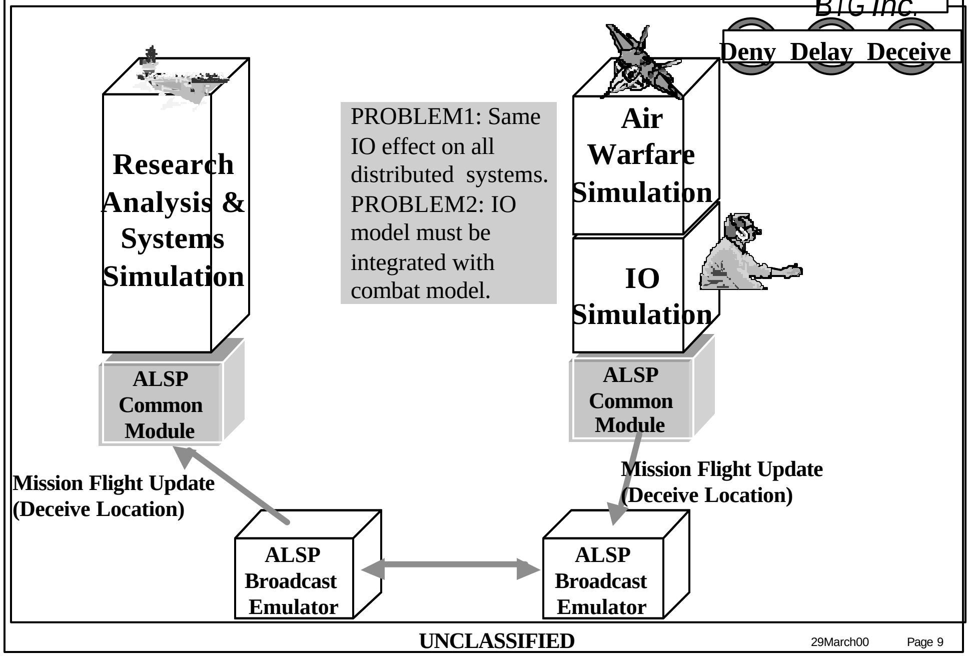
Improved IO in the JTC: Sender Side



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Deny Delay Deceive

PROBLEM1: Same IO effect on all distributed systems. PROBLEM2: IO model must be integrated with combat model.

Research Analysis & Systems Simulation

ALSP Common Module

Air Warfare Simulation

IO Simulation

ALSP Common Module

Mission Flight Update (Deceive Location)

Mission Flight Update (Deceive Location)

ALSP Broadcast Emulator

ALSP Broadcast Emulator

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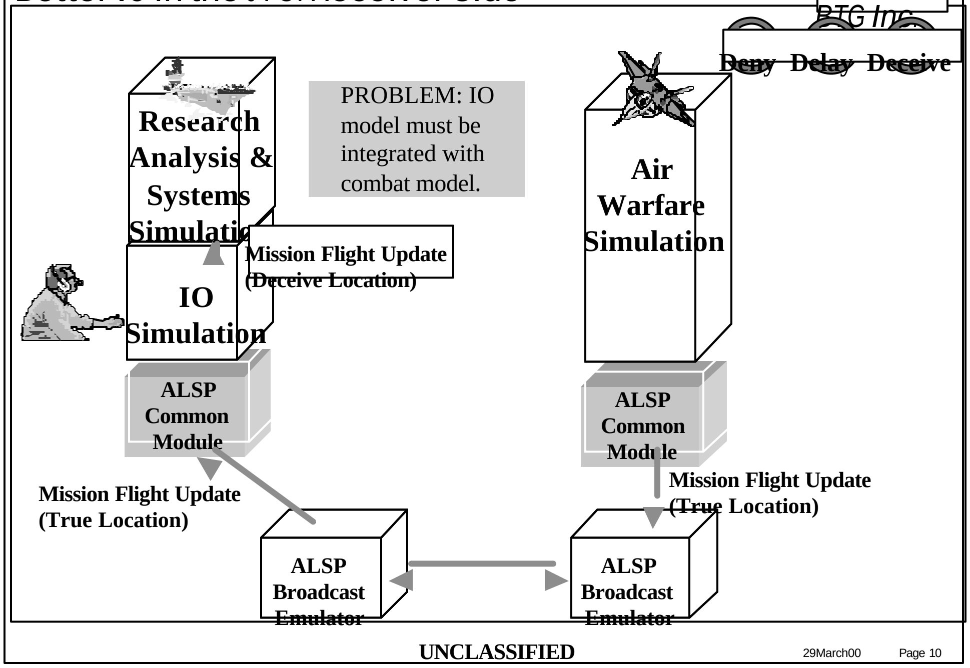
Better IO in the JTC: Receiver Side



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Deny Delay Deceive

PROBLEM: IO model must be integrated with combat model.

Research Analysis & Systems Simulation

Mission Flight Update (Deceive Location)

IO Simulation

ALSP Common Module

Air Warfare Simulation

ALSP Common Module

Mission Flight Update (True Location)

Mission Flight Update (True Location)

ALSP Broadcast Emulator

ALSP Broadcast Emulator

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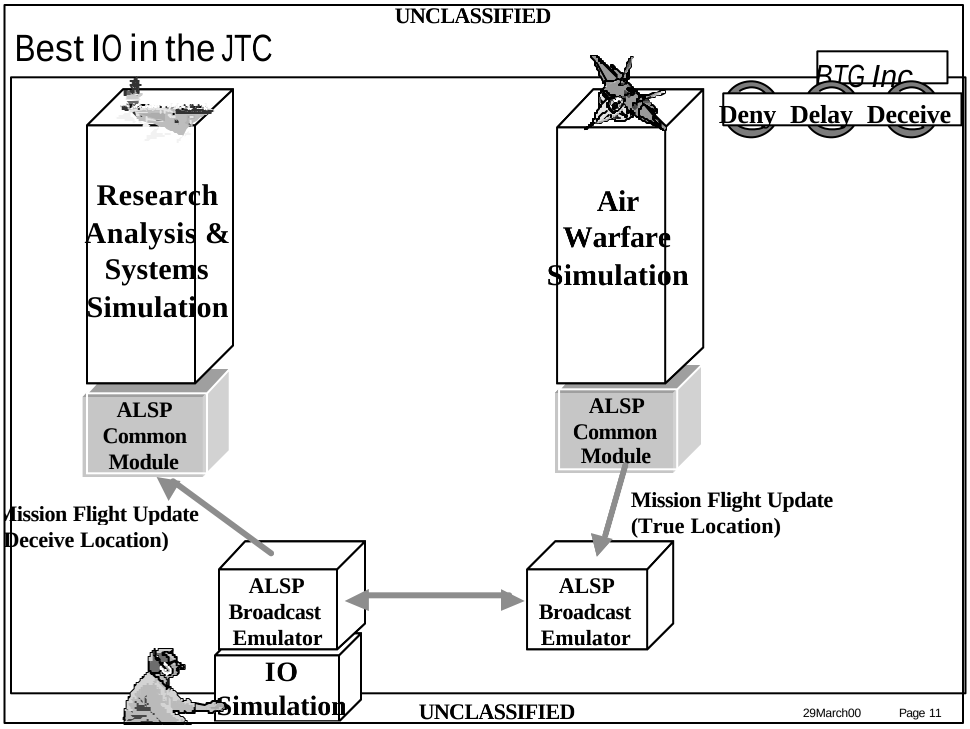

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Best IO in the JTC

BTG Inc

Deny Delay Deceive

Research Analysis & Systems Simulation

Air Warfare Simulation

ALSP Common Module

ALSP Common Module

ission Flight Update
Deceive Location)

Mission Flight Update
(True Location)

ALSP Broadcast Emulator

ALSP Broadcast Emulator

IO Simulation

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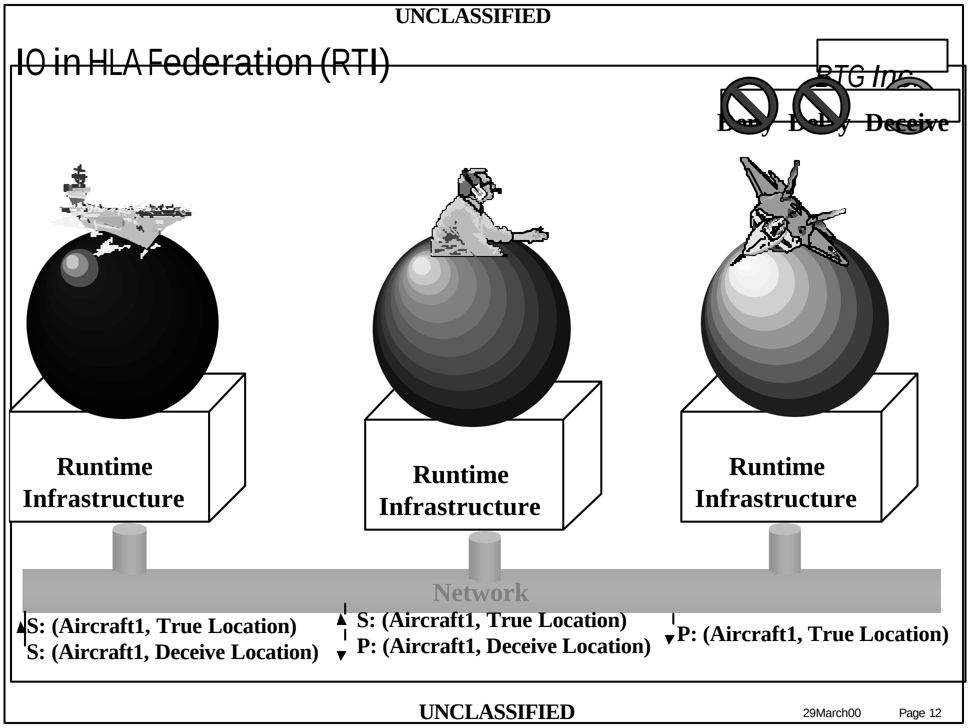

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IO in HLA Federation (RTI)

BTG Inc

Deny Delay Deceive

Runtime Infrastructure

Runtime Infrastructure

Runtime Infrastructure

Network

S: (Aircraft1, True Location)
S: (Aircraft1, Deceive Location)

S: (Aircraft1, True Location)
P: (Aircraft1, Deceive Location)

P: (Aircraft1, True Location)

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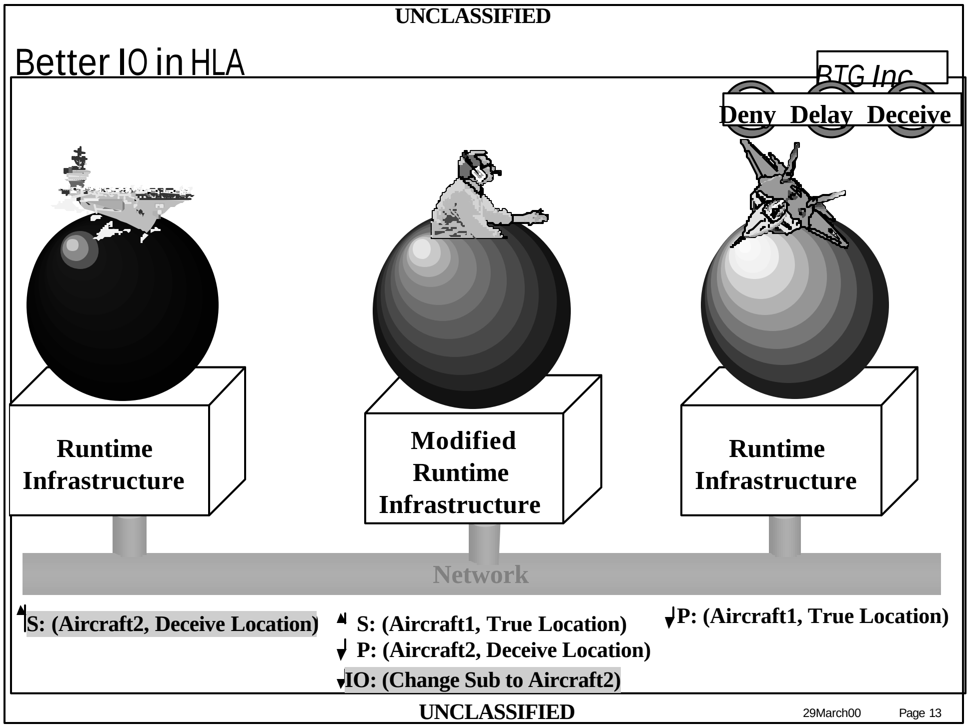

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Better IO in HLA

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Deny Delay Deceive

Runtime Infrastructure

Modified Runtime Infrastructure

Runtime Infrastructure

Network

S: (Aircraft2, Deceive Location)

S: (Aircraft1, True Location)
P: (Aircraft2, Deceive Location)
IO: (Change Sub to Aircraft2)

P: (Aircraft1, True Location)

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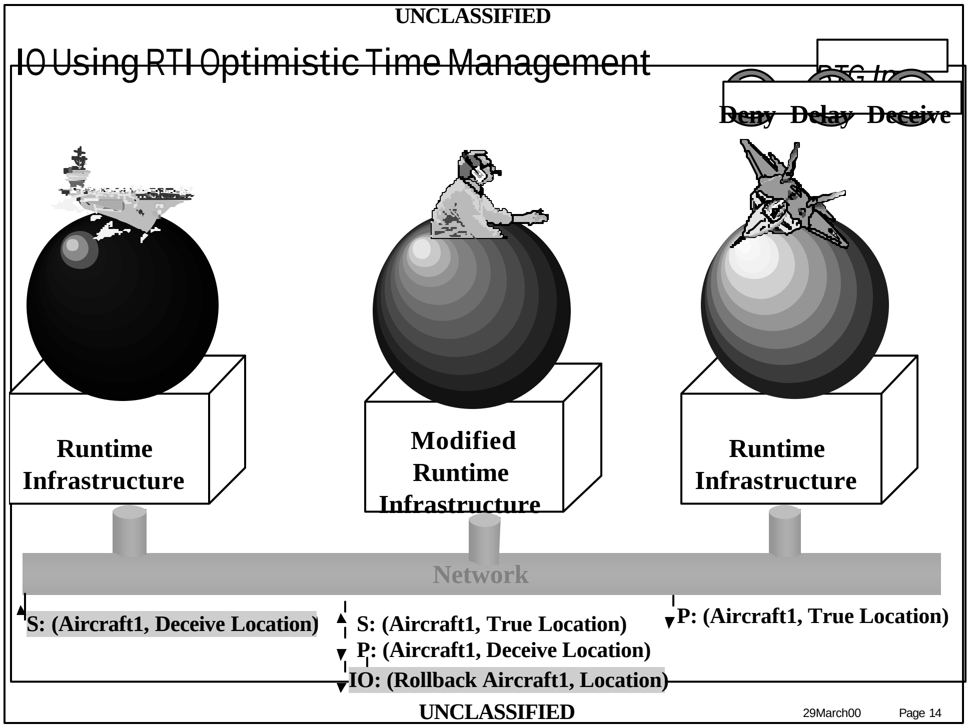

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IO Using RTI Optimistic Time Management

BTG Inc.

Deny Delay Deceive

Runtime Infrastructure

Modified Runtime Infrastructure

Runtime Infrastructure

Network

S: (Aircraft1, Deceive Location)

S: (Aircraft1, True Location)
P: (Aircraft1, Deceive Location)
IO: (Rollback Aircraft1, Location)

P: (Aircraft1, True Location)

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JSIMS IO Requirements

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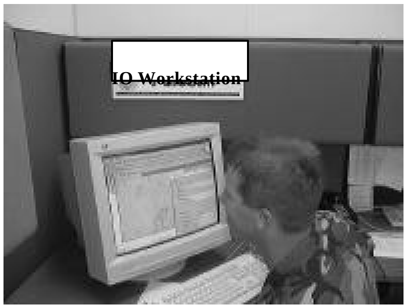
- JSIMS shall provide a means of automatically calculating the results of IO attacks.
- JSIMS shall model the effects of Information Operation against voice and non-voice communications.
- JSIMS shall provide a means of manually entering the results of Information Operations attacks.
- JSIMS shall model the effects of Information Operations attacks on information targets to include the effects on training audience C4I systems.
- JSIMS shall model deception operations.
- JSIMS shall model the effects of Computer Network Attack (CNA) and Computer Network Defense (CND).

JSIMS Information Environment

BTG Inc.

- JSIMS Workstations Publish Orders to Units
  - Use Public Interoperability Mechanism
- Simulated Units use “Communications Events” to Pass Information to Other Units
- SIGINT simulations intercept appropriate communications
- IO simulations publish deceptive communications
- IO simulations deceive the Simulation Engine
- IO simulations attack “Public Interoperability Mechanism”



IO in New JSIMS Architecture (RTI & Sim Engine)

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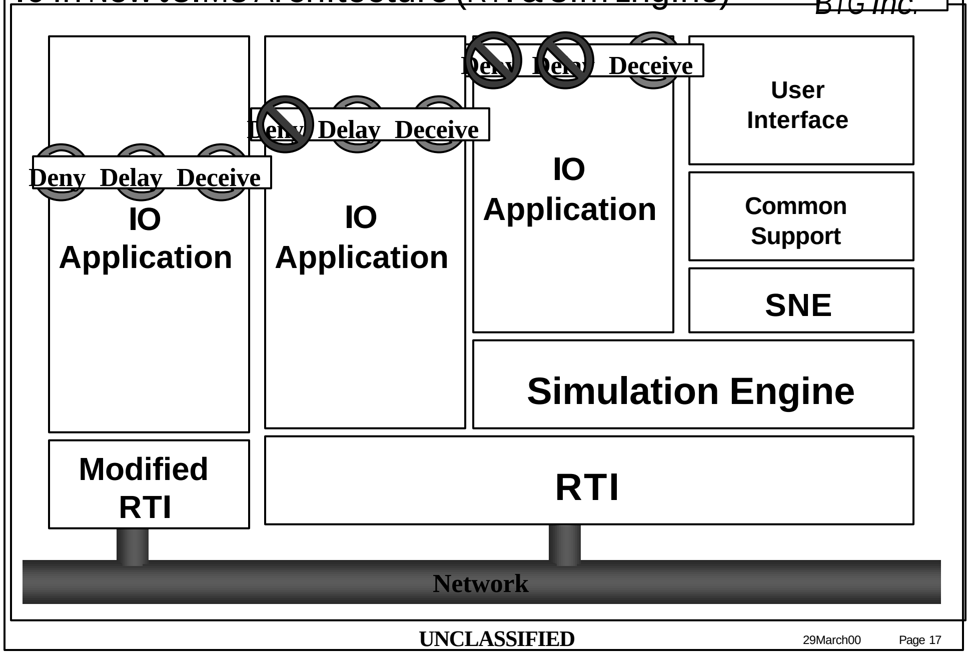

Deny Delay Deceive

IO Application

Deny Delay Deceive

IO Application

Deny Deny Deceive

IO Application

User Interface

Common Support

SNE

Simulation Engine

Modified RTI

RTI

Network

Summary

BTG Inc.

- IO in simulation is in its infancy
- Limited by customer emphasis on combat modeling rather than information modeling
- IO is encouraged by explicit communications and information exchange via a public interoperability mechanism (e.g. RTI or JSIMS Simulation Engine)
- Simulation IO should attack the Infrastructure of the federation just as real IO attacks the infrastructure of enemy organizations