
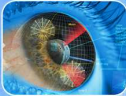


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Communications Analysis with Hybrid Operational Protocol Evaluation Tool

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Booz Allen Hamilton

Company Overview Booz | Allen | Hamilton


- Booz Allen Hamilton has been at the forefront of strategy and technology consulting for more than 90 years
- Providing a broad range of services in strategy, operations, organization and change, information technology, systems engineering, and program management, Booz Allen is committed to delivering results that endure
- Headquartered in McLean, Virginia, Booz Allen has 20,000 employees and generates annual revenue of approximately \$4 billion
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- Hybrid Operational Protocol Evaluation Tool (HOPE) helps users who build simulation models
 - Integrates and configures multiple simulation items and environmental parameters in one simulation system from one place
 - Evaluates network components:
 - protocols, devices, connections
 - Monitors operational parameters during scenario execution
 - Channel performance parameters
 - Distance and speed of nodes
 - Vehicle fuel and battery power, etc.
 - Estimates performance metrics of network components affected by
 - Mountain terrain, urban areas, clouds, etc.
 - Visualizes simulation results from multiple M&S environments representing node motion and communication activities in a mobile network on a designated terrain




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Challenges

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- Simulation models should run independently, in different simulation environments, even in different times
 - Qualnet, OPNET, MATLAB, etc.
- But be integrated into one simulation system
- Leveraging existing simulation models
- Easy integration of additional modules
- Communication system performance affected by terrain and weather conditions
- Statistics must be presented during scenario execution

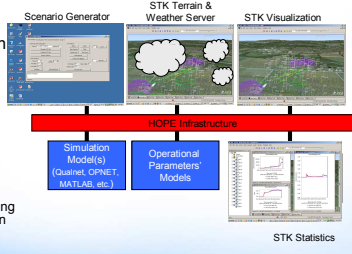



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Solution

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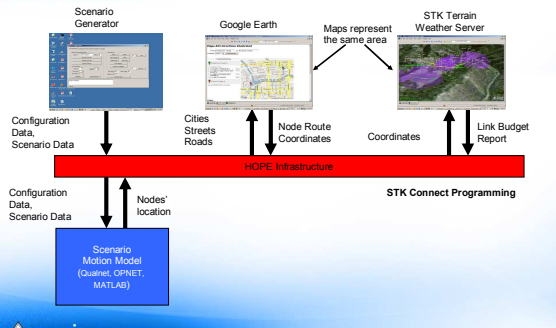

- Framework combines
 - Scenario Generation and Configuration
 - Simulation Environments
 - STK
 - As a Terrain & Weather Server for Link Budget
 - Visualization of the scenario execution
 - Shows statistics during scenario visualization
 - Easy interface between HOPE and STK (STK/Connect)

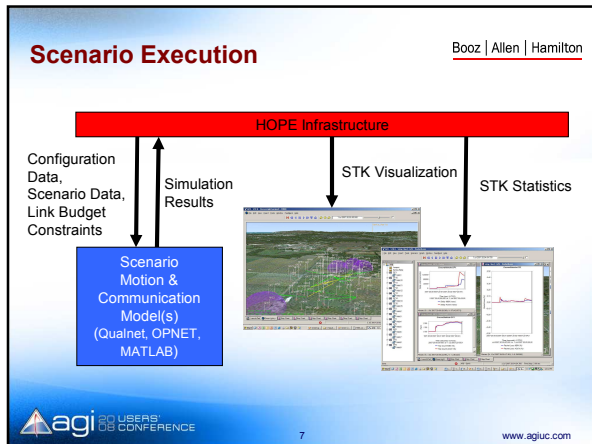
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Scenario Generation

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Results

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- Example: Artery Node routing protocol vs. AODV
- Analysis and evaluation of a network protocol not only against a baseline monitoring scenario parameters:
 - Network: throughput, delay, packet loss, hop count, etc.
 - Motion: distance, speed
 - Mission resources: fuel, battery power, etc.
- But also against terrain & weather factors
- Improved the process of protocol evaluation for a mission executed in a specific area
- Simplified the execution of otherwise complex simulation experiments
- Framework helps to predict pitfalls and flaws of the mission execution

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STK Benefits

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- Saves cost and time on physical model design used to for link budget report generation
- Improves the process of network component evaluation adding specific physical factors that affect communication
- Improves efficiency: visualizing key statistical operational parameters during scenario visualization

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Summary


- HOPE is designed to evaluate
 - Network components: protocols, devices, connections
 - Against baseline
 - Against terrain/climate factors
 - Mission scenarios, monitoring use of mission resources
 - Communication channels
 - Motion speed, safety, etc.
 - Fuel, battery power, food/water, etc.
- HOPE allows
 - Distributed simulation environments
 - OPNET, Qualnet, MATLAB, etc.
 - Library of auxiliary tools and simulation modules, etc.
 - E.g., fuel expense on flat and hilly terrains
 - Easy use of legacy simulation models
 - Performance reports are displayed during scenario execution
- Applying terrain & weather factors, HOPE provides important expertise for the protocol design and mission planning


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