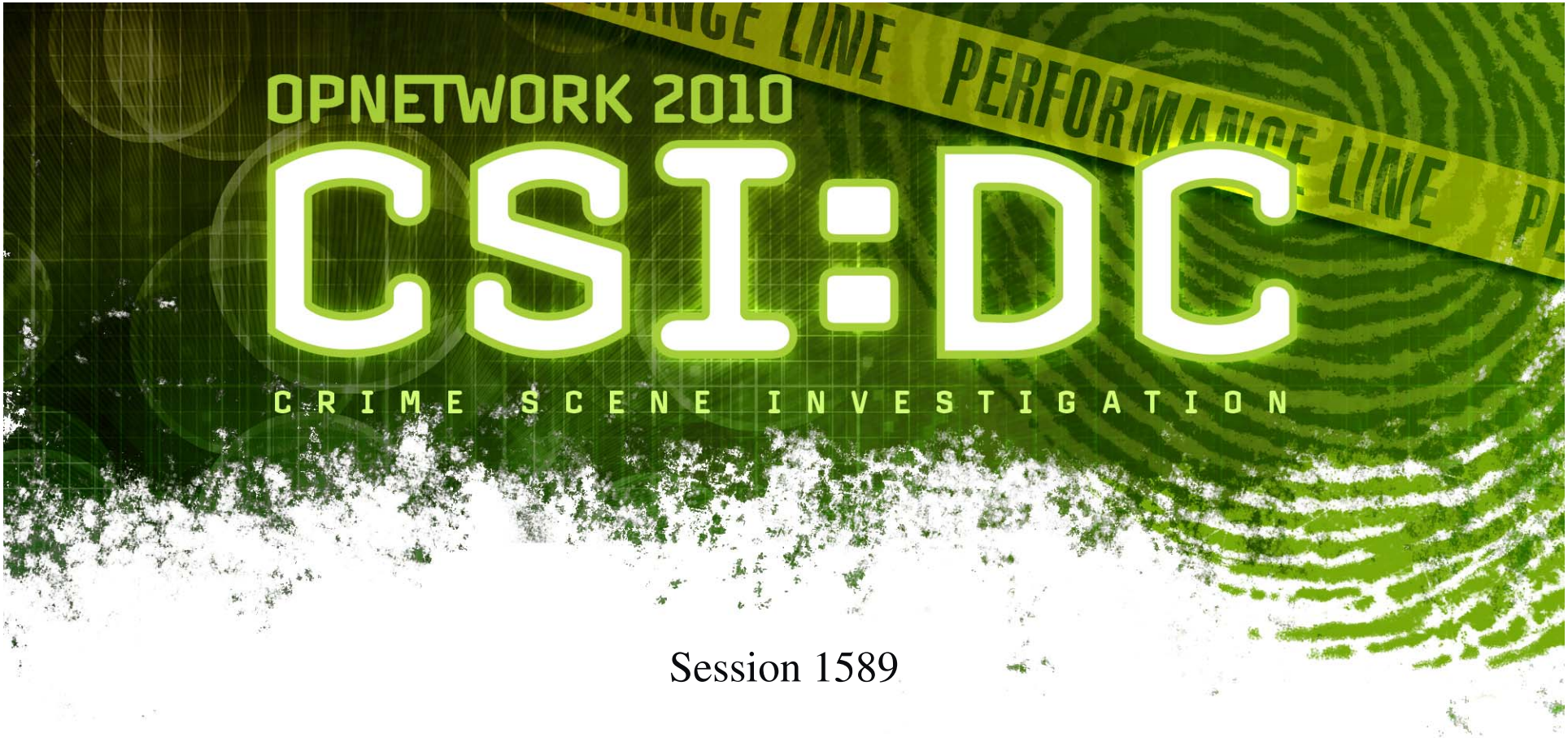

Session 1589

Introduction to Using the Joint Communication Simulation System (JCSS)

R&D Solutions for Commercial and Defense Networks

Agenda

- Introduction
- Unit Laydown
- Infrastructure Deployment
- Traffic Specification
- Capacity Planning
- Views and Briefing
- Conclusion

- 5 labs
- Assumes knowledge of OPNET Modeler® or OPNET IT Guru®
  - Project Editor
  - Running Discrete Event Simulation

OPNETWORK 2010
CSI:DC

JCSS

- **Joint Chiefs of Staff J6 Communications modeling and simulation tool**
  - **GOTS Product**
  - **Developed by OPNET Technologies**
  - **Based on OPNET IT Guru**
  - **Available to U.S. DoD personnel upon request at no cost**

- **Enable C4 planners and analysts to**
  - **Conduct high-level planning**
  - **Conduct end-to-end performance assessments**
  - **Model military and commercial communication systems**
  - **Share a common modeling environment**

Example Uses

- Utilized as a key component of the operational assessment of applications
  - MIP, VoIP, VTC, GCCS-COP
- Associated with major exercise support
  - USEUCOM's Combined Endeavor
  - MARFORPAC's Ulchi Focus Lens
- GIG Enterprise Wide System Engineering Support
  - BGP HPD Analysis
  - GIG QoS Analysis
- Utilized in communications studies
  - Joint Mobile Network Operations (JMNO)
  - Clean Earth Technology – EPLRS
- Utilized by the Missile Defense Agency to assess the C2BMC architecture
- Provided communications effects into federated wargames
  - NAVAIR MASE
  - VTUAV
  - VRForces
- Utilized by communication device models developers
  - SPAWAR San Diego and Charleston
  - Air Force Communications Agency
- Utilized in Schoolhouse courses
  - FA24 Signal officer training
  - Naval Postgraduate School
  - United States Military Academy at West Point
- Shipped as the M&S component of the Joint Network Management System (JNMS)
- Foreign Military Organizations
  - Sweden
  - Australia

JCSS Custom Capabilities

- **Military model library**
- **Military hierarchy**
  - **Organization**
  - **Operational Facility (OPFAC)**
- **Wireless communications**
  - **Configuration wizards**
  - **Line Of Sight (LOS) and terrain**
- **Information Exchange Requirement (IER)**
- **DoDAF integration**
- **Capacity Planner**
  - **Analytical simulation**
  - **Routes over military device models**

JCSS Military Models

- **Data**
  - **Workstation/Computer (SLIP/Ethernet), Cisco 2514, Cisco 4500, Cisco 7505, Cisco 7513, IP Cloud, ATM Cloud, FR Cloud, Accelerator 4000, IP Cisco switches, Hubs, Firewall, LAN, FoundryNetIron Switches, Multi-homed Server**
- **Tactical Voice, VTC and Circuit Switches**
  - **AN/TTC-39A(V)3, AN/TTC-39A(V)4, AN/TTC-39D, AN/TTC-39E (CDS), AN/TTC-42, AN/TTC-46 (LEN), AN/TTC-47 (NCS), AN/TTC-48(SEN), SB-3865, SMU, DNVT, DSVT, STU-III, Redcom HDX, Redcom IGX, SB-3865, DSS, CDS, MCU, VTC Terminal**
- **Satellites & Earth Terminals**
  - **AN/TSC-85B, AN/TSC-85C, AN/TSC-93B, AN/TSC-93C, AN/TSC-94A, AN/TSC-100A, AN/TSC-152, AN/USC-59, AN/USC-60A, AN/WSC-6(V)*, DSCS, CSCI, UHF Dama*, STEP, GBS, Generic Terminal & Space Segment, TCP Protocol Enhancing Proxy, UHF DAMA: w/SRAP, FDMA Satellite, TSSP, ETSSP, ETSSP3G (TDMA+FDMA), TSR-4 GBS, Joint IP Modem †**
- **Transmission Devices**
  - **AN/GRC-226, AN/GRC-239, AN/MRC-142, SRC-57, AN/TRC-170(V)2*, AN/TRC-170(V)3*, AN/TRC-173B, AN/TRC-175**
- **Encryption Devices**
  - **KG-82, KG-84, KG-84A, KG-84C, KG-94, KG-94A, KG-194, KG-194A, KIV-7, KIV-7HS, KIV-7HSB, KIV-19, KIV-19A, KG-75, KG-95-2, KG-175 (TACLANE), KY-57, Motorola NES, KG-235, KG-250, Red Eagle-1NE-100, KG-235 (Generic INE), KIV-19M, HAIPE**

- ***Model Developed by Service Organization (SPAWAR, AFCA)**
- **†Model new in JCSS 10.0**
- **JCSS maintains a Model Development Guide (MDG) to support custom model development while mitigating interoperability risks**
- **To contribute models to the JCSS program, email JCSS@disa.mil**
- **For more information on JCSS models, visit www.opnet.com/support/des_model_library/jcss_models.html**

JCSS Military Models

- **Multiplexers**
  - **AN/FCC-100(V)7, AN/FCC-100(V)9, IDNX-20, IDNX-90, Promina 100, Promina 200, Promina 400, Promina 800, Timeplex Link/2+*, SHM-1337**
- **Tactical Radios**
  - **SINCGARS, INC, EPLRS, HaveQuick, JTIDs*, AN/ARC-114*, AN/ARC-190*, AN/ARC-204*, AN/ARC-230*, Link 11, Generic UHF/VHF/HF Radios, Harris Megastar 155, Harris 7800rw †, Link 16* & JRE Gateway (SPAWAR), EPLRS Radio (HDR, CSMA, LDR needline support)**
- **Gateways**
  - **SCREAM, SHOUTip, Media Gateways, HAIPE Peer Discovery Model**
- **VoIP**
  - **SIP, H.323, H.323 Border Element, H.323 Gatekeeper, VoIP Phone, SIP Proxy Server, AS-SIP †**
- **ATM and Frame Relay**
  - **Alcatel 7270, Alcatel 7470, Alcatel 7750, Cabletron SS2200, Cabletron SS6000, Cabletron SS9000, Marconi PH6000, Marconi PH7000, Marconi PH8000, Omni Switches, FoundryNetIron Routers**

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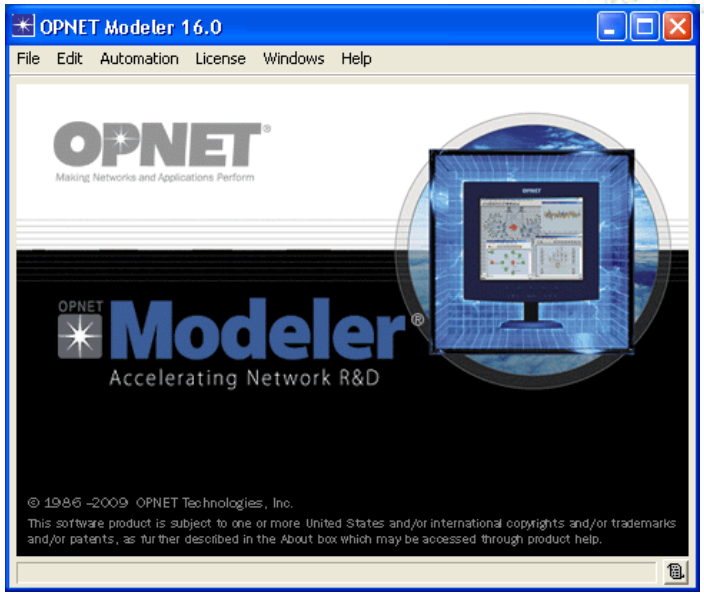
OPNET COTS Capabilities for JCSS

- **Included capabilities**
  - eXpress Data Import (XDI)
  - Terrain Modeling™ (TMM)
  - Standard model library
- **Capabilities which will NOT work:**
  - ACE™ / ACE Whiteboard Editors
- **Windows only, 32-bit and 64-bit**

- **Partial list of supported capabilities that require additional licenses**
  - Discrete Event Simulation (DES)
  - 3D Network Visualizer (3DNV™)
  - High-Level Architecture™ (HLA)
  - **NetDoctor®**
  - **NetMapper™**
  - Flow Analysis™ (Only COTS models)
  - VNE Server® Import
  - System in the Loop (SITL)
  - **TIREM™**
  - Wireless
  - **IPv6**
  - **Server Characterization Editor**
  - **Mainframe Characterization Editor**
  - **OPNET Development Kit™ (ODK)**

JCSS and OPNET Modeler

- **JCSS does not support editing node, link or process models**
  - **JCSS can use custom models**
  - **Use Modeler to create them**



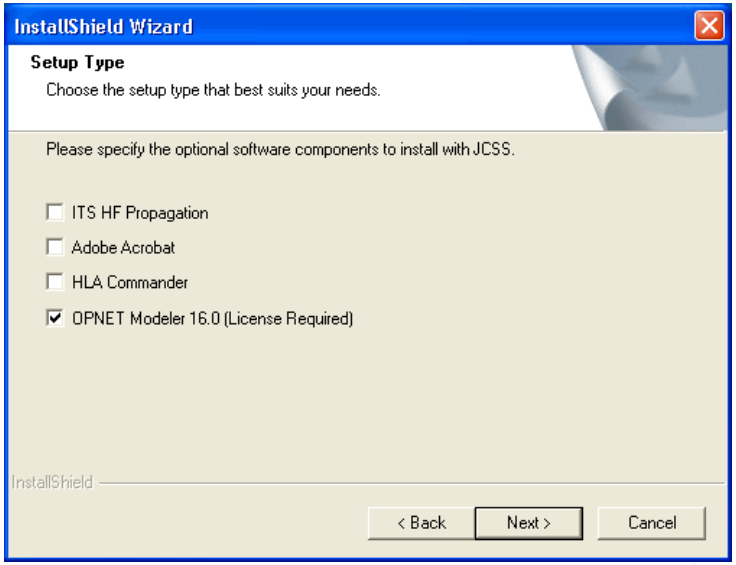
- **JCSS supports**
  - **Device Creator**
  - **Deriving models**

- **Session 1590 Modeling Tactical Military Communications Using JCSS**

JCSS Modeler Integration

- **Embedded Modeler installation**
  - **Installer option**
  - **Shares application and configuration files with JCSS**
  - **Guarantees version compatibility**
  - **Shortcut in the Start > All Programs > JCSS menu**
  - **Modeler license required**

- **Open models in Modeler from JCSS**
  - **Double-click in JCSS workspace**
    - **Node**
    - **Link**
    - **Demand**
    - **Path**
  - **Embedded Modeler starts and opens model**



Agenda

- Introduction
- Unit Laydown
- Infrastructure Deployment
- Traffic Specification
- Capacity Planning
- Views and Briefing
- Conclusion

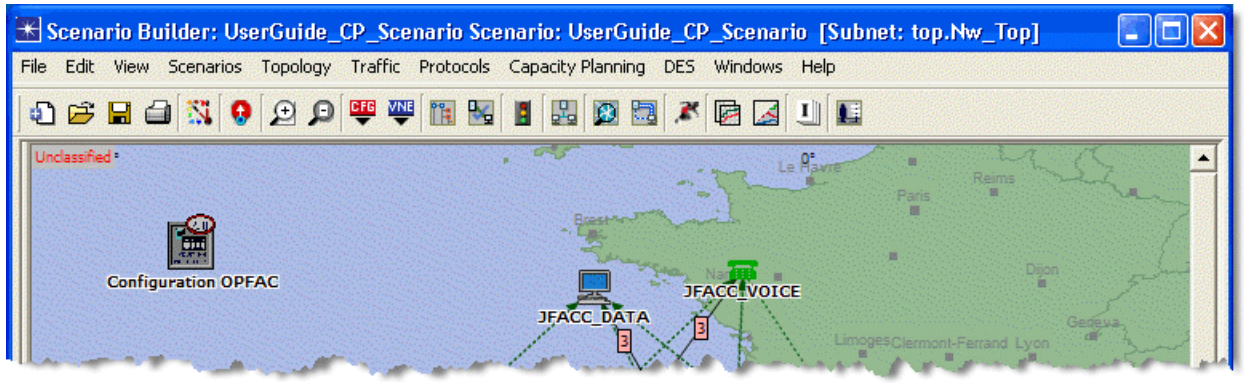
Signing In

- System Editor and Sign In dialog displayed at start
  - See disclaimer before using software
- Profiles
  - Not security privileges on machine
  - Used for tracking purposes in some features
  - Information stored in plaintext
  - Local Administrator
    - Default profile
    - Has special abilities
  - Create profiles for users
    - First and last name
    - Organization

OPNETWORK 2010
CSI:DC

Scenario Builder

- **Customized Project Editor**
  - **Main menu**
  - **Right-click menus**
  - **Wizards**
  - **Enhancements to standard features**
- **Scenarios not directly compatible with OPNET Modeler**
  - **JCSS adds custom data and hierarchy**
  - **Use import/export features**

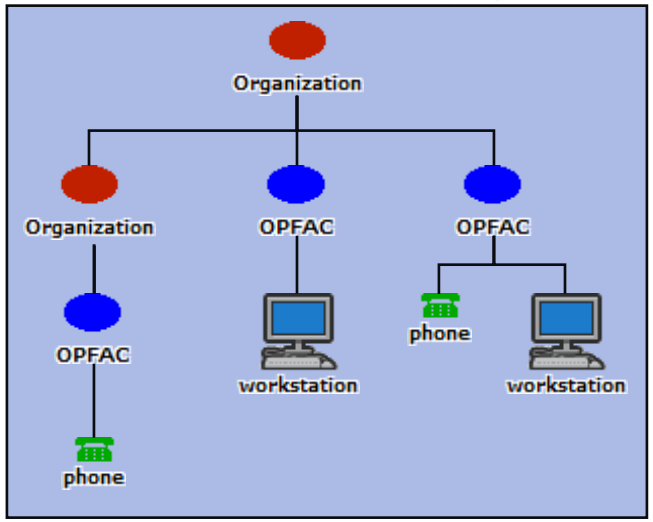


OPFACs and Organizations

- **Operational Facility (OPFAC)**
  - **Fundamental building block**
  - **Collection of communications devices that are located and move together**

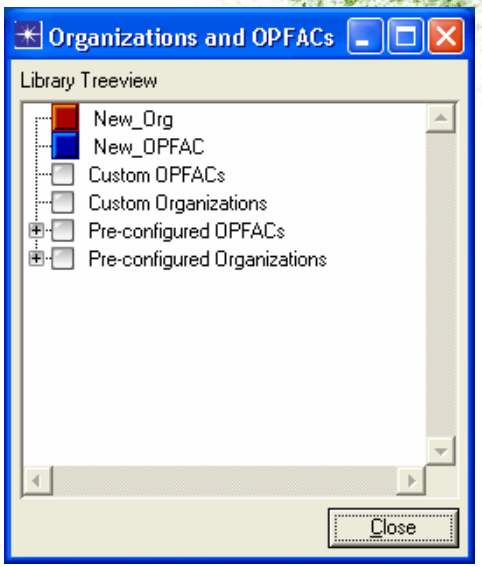
- **Organization**
  - **Hierarchy of military units**
  - **Contains OPFACs and other Organizations**
  - **May not contain devices**

- **Collectively called units**
- **Customized subnets**



Template OPFACs and Organizations

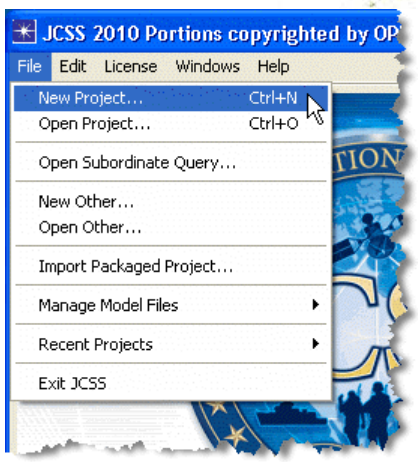
- **Reusable OPFACs and Organizations**
  - **Can be added to multiple projects and scenarios**
  - **Stored in files on disk**
  - **Available from Library Treeview**

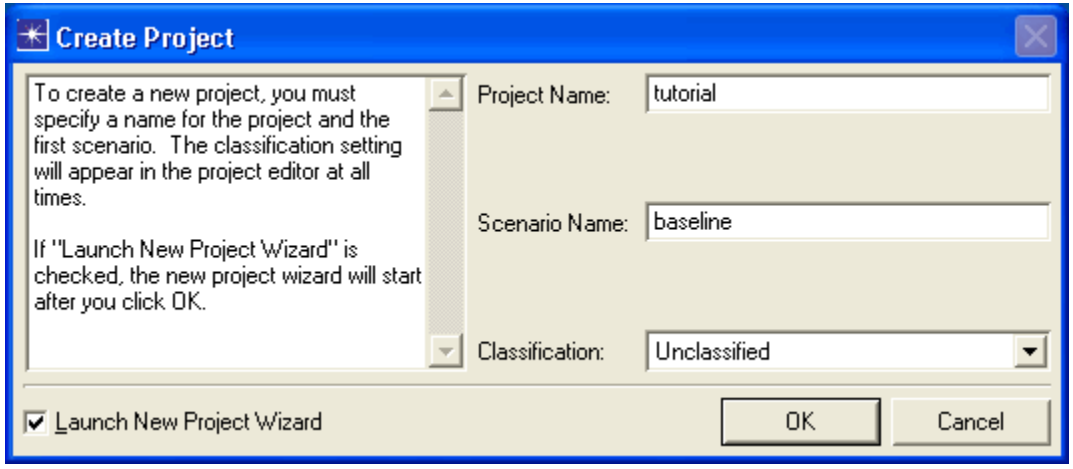


- **Create custom templates using right-click menus**
  - **Create Template OPFAC**
  - **Create Template Organization**

Creating a New Project

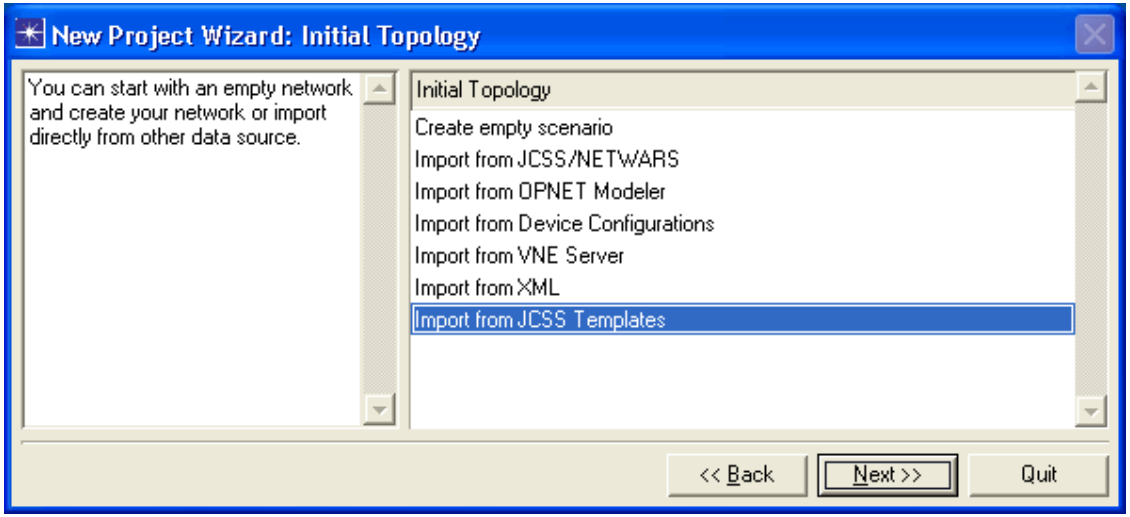
- **Classification**
  - **Not a security feature**
  - **Appears in the workspace at all times**
- **Launch New Project Wizard**





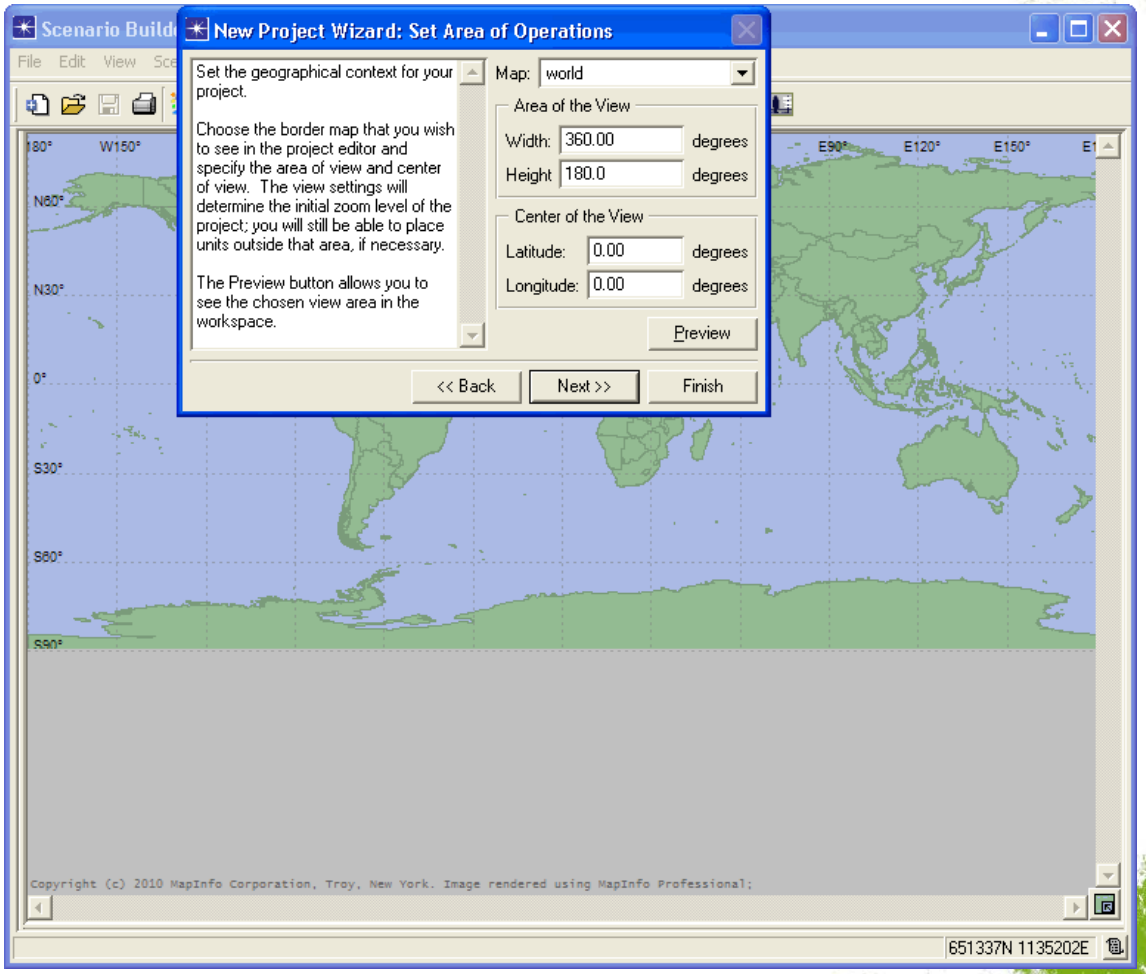
New Project Wizard

- **Imports**
  - **From various sources**
  - **Most can also be done in an existing scenario**
- **Import from JCSS Templates**
  - **Map View**
  - **Project Template**



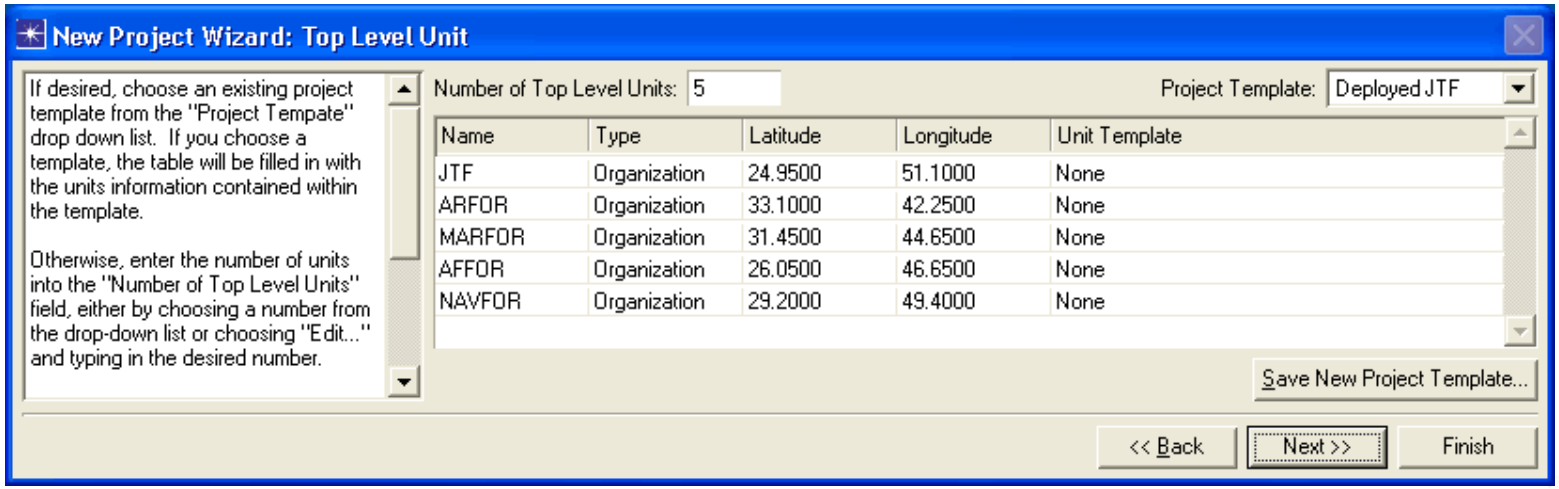
New Project Wizard: Set Area of Operations

- **Initial geographic focus**
- **Does not limit zooming**
- **Preview**



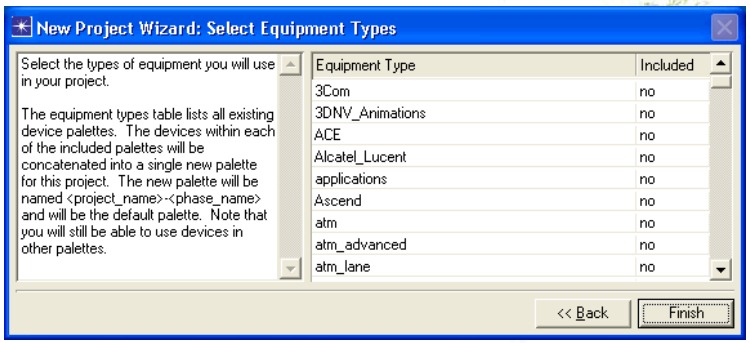
New Project Wizard: Top Level Units

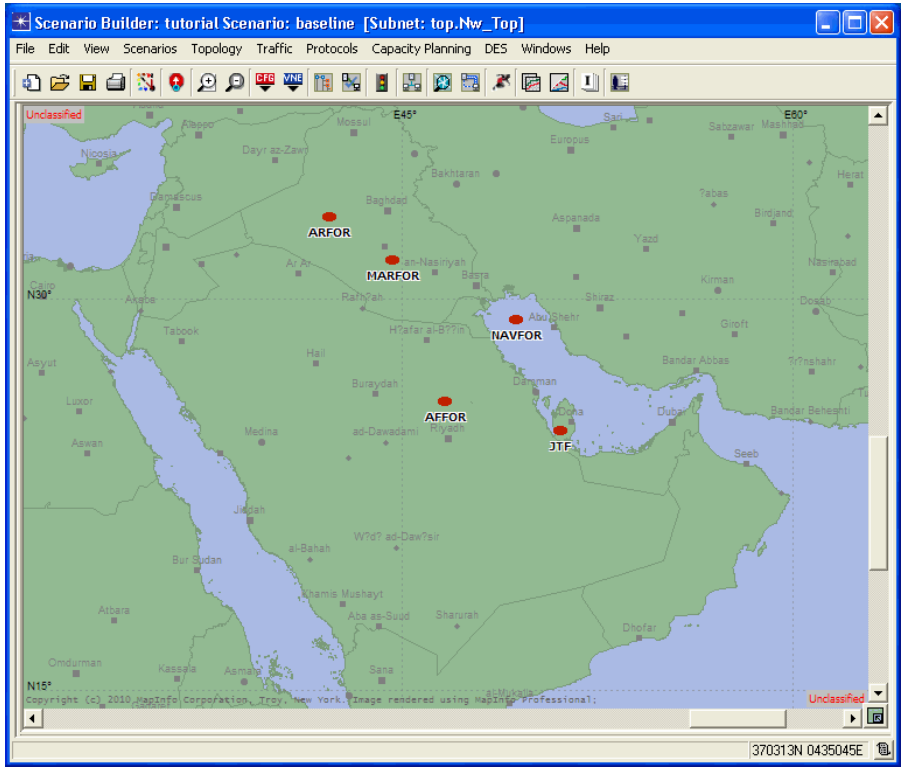
- **Add top-level OPFACs and Organizations to scenario**
  - **Name**
  - **Type**
  - **Location**
  - **Optional unit templates**
- **Save and reuse project templates**



New Project Wizard: Last Steps

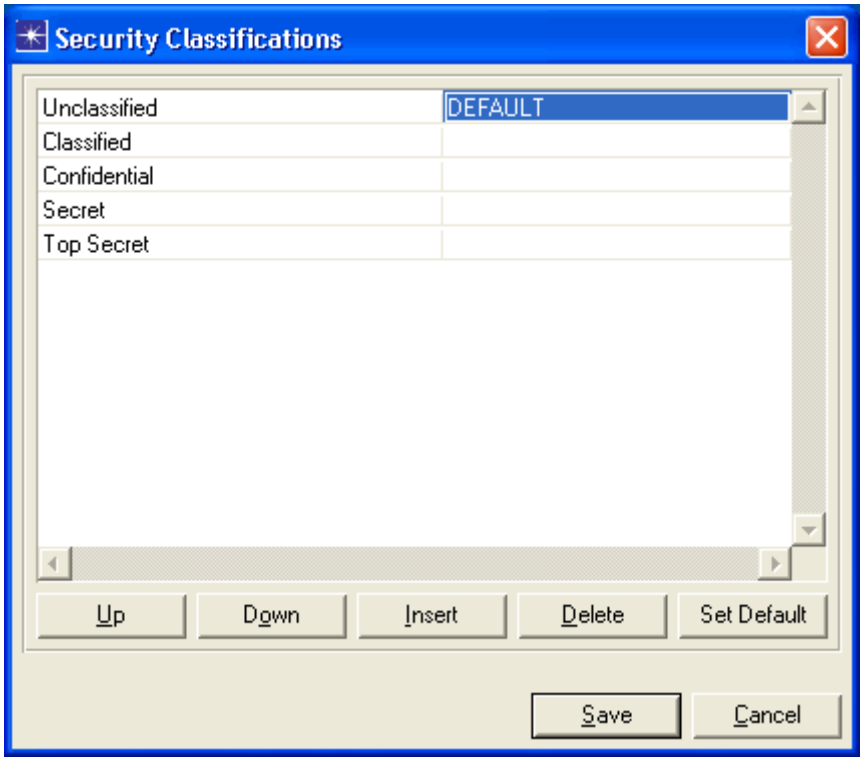
- **Configure a custom palette for the new project**
  - **Standard feature**
  - **Last step of all wizard workflows**
- **Final product**





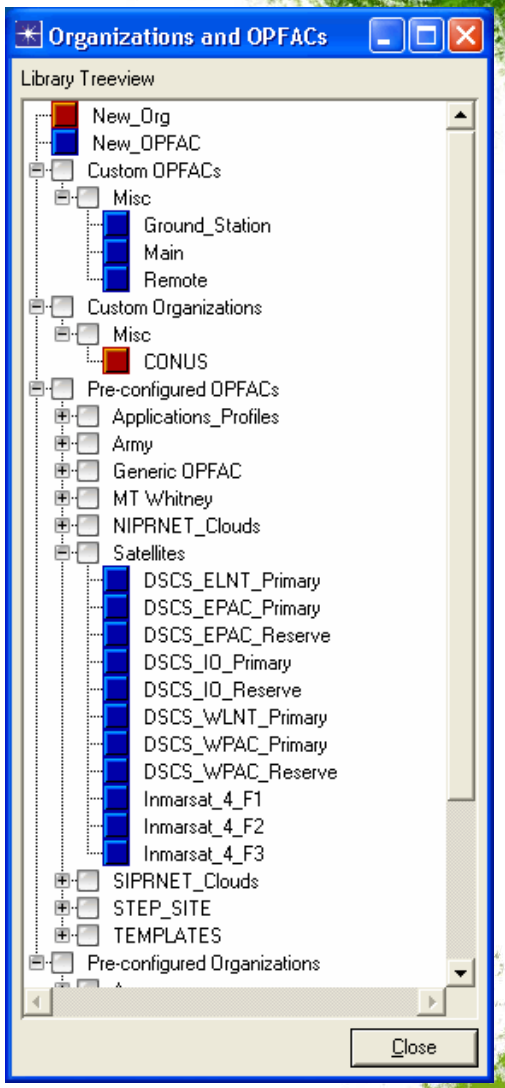
Security Classifications

- **Select Edit > Preferences > Security Classifications**
  - **Affects all uses of classification**
  - **Stored in an attribute definition model**



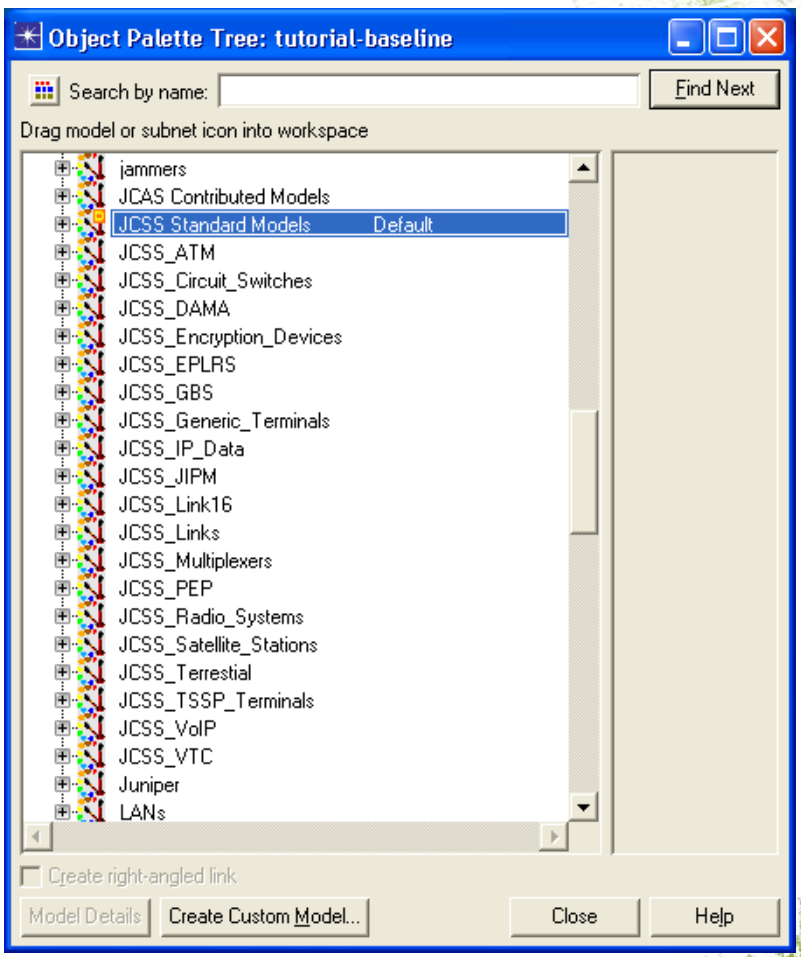
Library Treeview

- Select Topology > Open Library Treeview
- Drag-and-drop templates onto the workspace
- Categories
  - New_Org/New_OPFAC
    - Empty templates
    - Can also create from right-click menu of the workspace
  - Custom
    - User-created templates
  - Pre-configured
    - Only Local Administrator can modify
- Satellite constellation templates
  - Automatically created at correct location



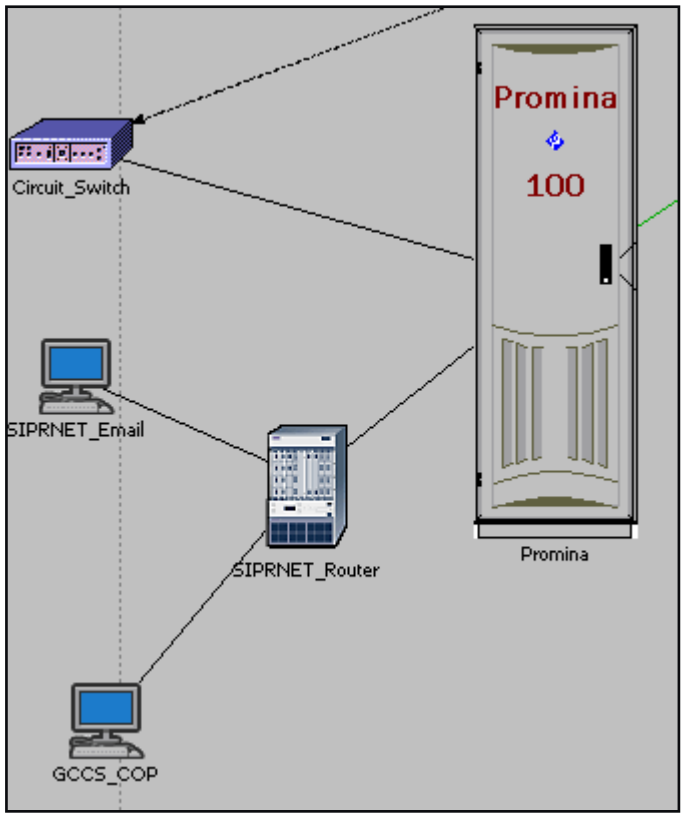
Object Palettes

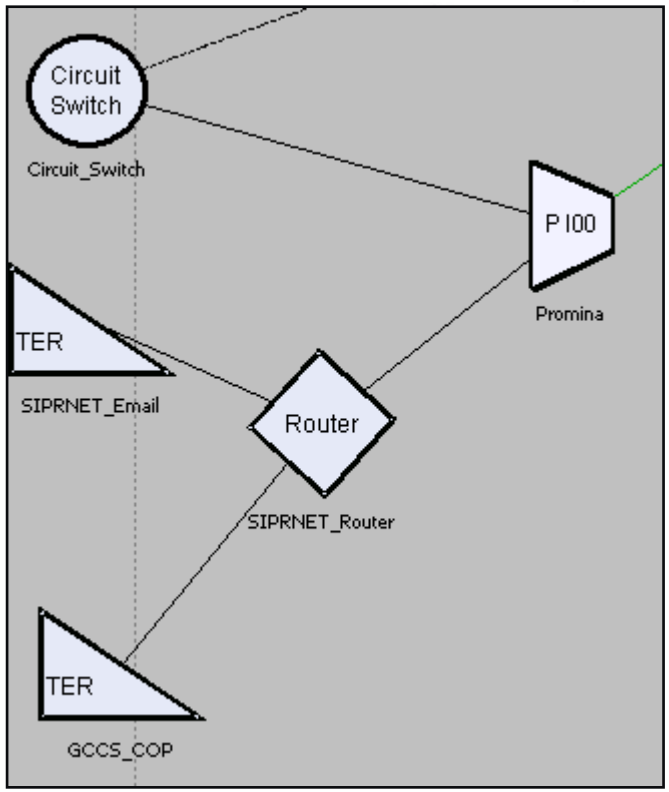
- Several custom JCSS palettes
- Automatic OPFAC creation
  - Drag a node into an Organization
  - OPFAC is automatically created to contain the node
  - OPFAC has same icon as node



MIL STD 2525 Icons

- **Joint symbols are default for JCSS devices**
  - **Joint_Symbols_for_Tactical_Comms_Systems icon database**

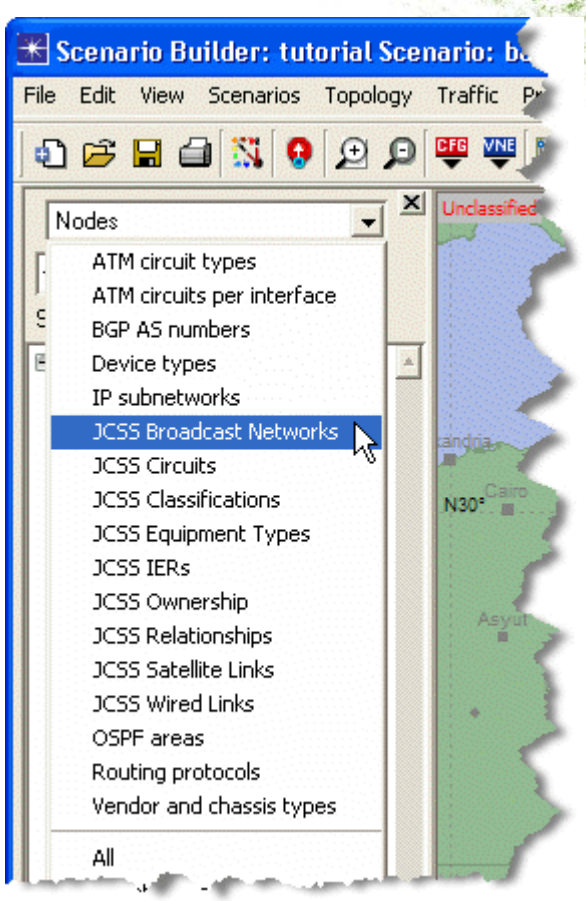




OPNETWORK 2010
CSI:DC

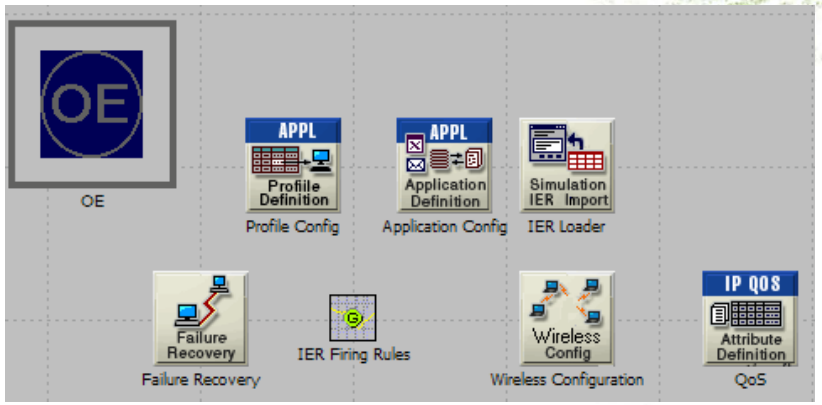
Network Browser Filters

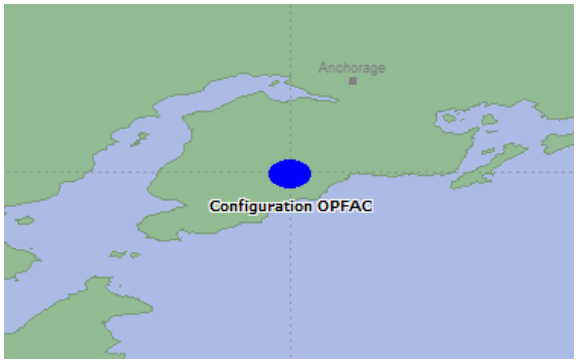
- **Filter by object type**
  - **Links**
  - **Circuits**
  - **IERs**
  - **Etc.**
- **Filter by device attribute**
  - **Security classification**
  - **Equipment type (phone, computer, etc.)**
  - **Etc.**



Configuration OPFAC

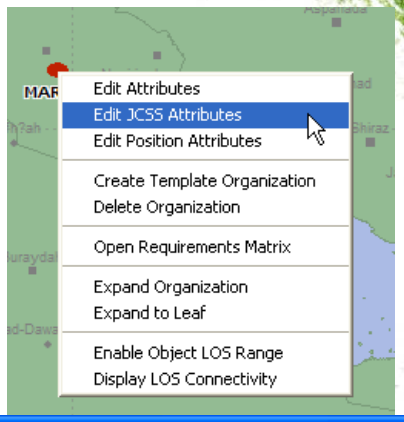
- **Contains most utility nodes**
  - **IER Firing Rules**
  - **IER Loader**
  - **Wireless Configuration**
  - **Failure Recovery**
  - **QoS**
  - **Profile Config**
  - **Application Config**
- **Always one per scenario**
  - **Automatically created with new scenarios**
  - **Default location in Alaska (60.00/-150.00)**
  - **Cannot delete**

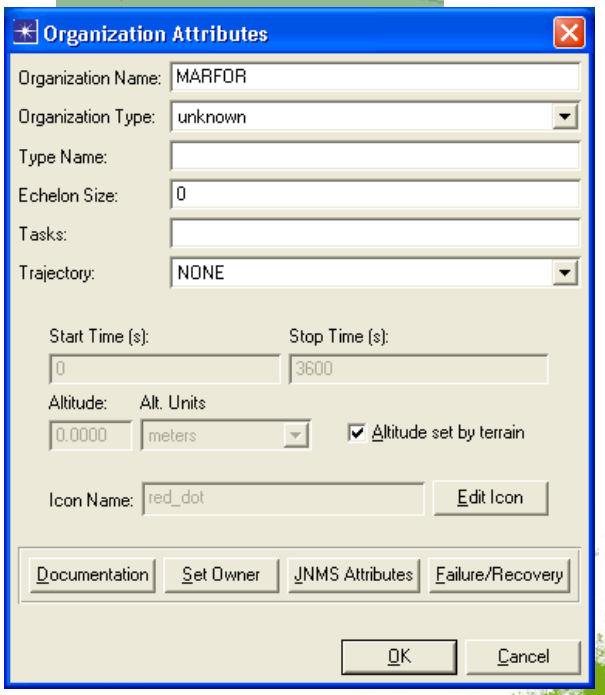




JCSS Attributes

- **Many objects have two attribute dialogs**
  - **Edit Attributes → OPNET standard dialog**
  - **Edit JCSS Attributes → JCSS custom dialog**
- **Some overlapping contents**
  - **Name**
  - **Icon**
  - **Etc.**
- **JCSS custom dialogs**
  - **Additional attributes**
  - **Additional usability features**





Topology Imports

- XDI
- VNE Server Import
- Modeler scenario
- JCSS scenario
- JCSS XML
  - Different than OPNET XML
  - Incorporates elements from All-DOD Core Architecture Data Model (All_CADM)
  - Export as well
- Tactical Network Analysis and Planning System (TNAPS)
  - Converts TNAPS to JCSS XML
  - Import XML as second step

Lab 1: Laying Down Units

- **New Project Wizard**
- **Template OPFACs**
- **Object Palette and Devices**

Agenda

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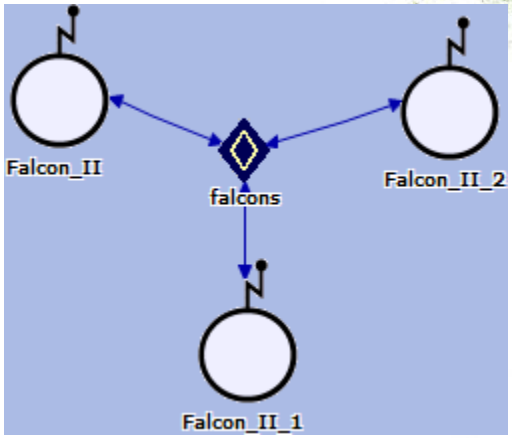
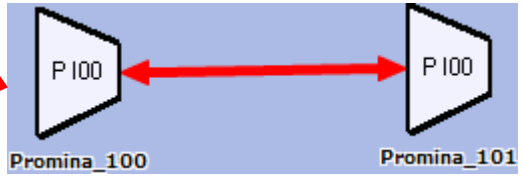
Infrastructure Types

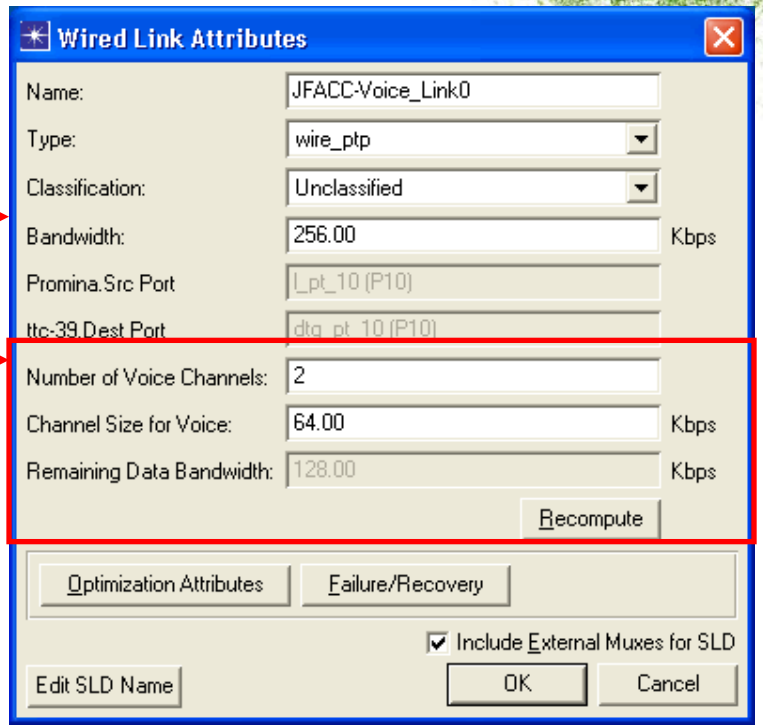
- **Wired Links**
- **Wireless Connections**
  - **Radio**
  - **Broadcast Network**
  - **Satellite**
    - **SHF**
    - **UHF**
    - **GBS**
  - **Unlike IT Guru/Modeler, wireless connections are drawn in the workspace**
- **Generic Circuits**
  - **Promina**
  - **TSSP**
  - **MUX**
  - **CTP, SCREAM, SHOUTip**





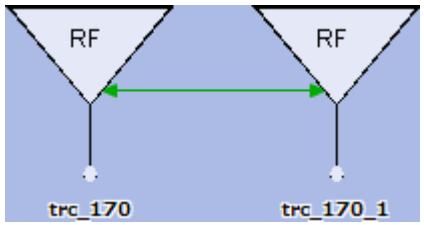
Wired Links

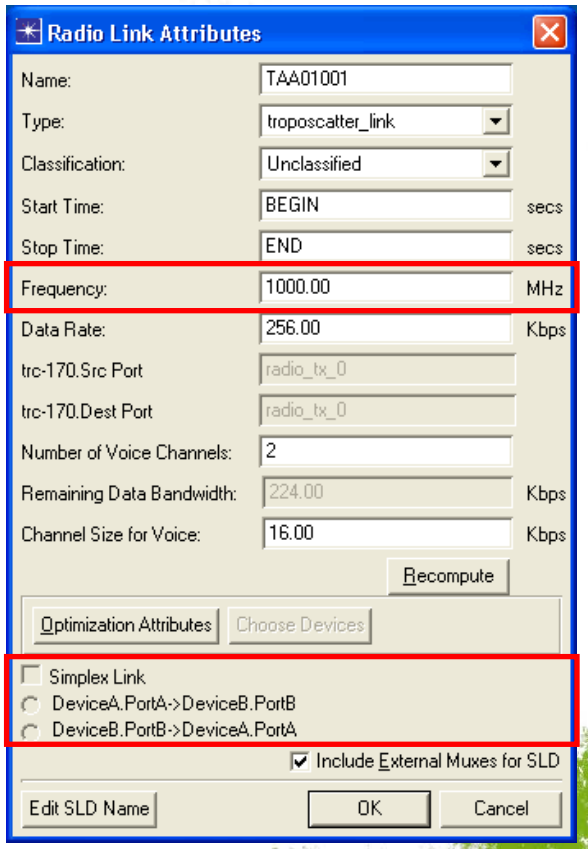
- **Connect devices in same or different OPFACs**
- **Simple attributes**
- **Channel Attributes**
  - **Partition bandwidth between voice and data**
  - **Only appear for circuit-switch links**
- **Other Attributes**
  - **Optimization Attributes – Capacity Planning**
  - **Failure/Recovery – Enable/disable link at scheduled times**



Radio Links

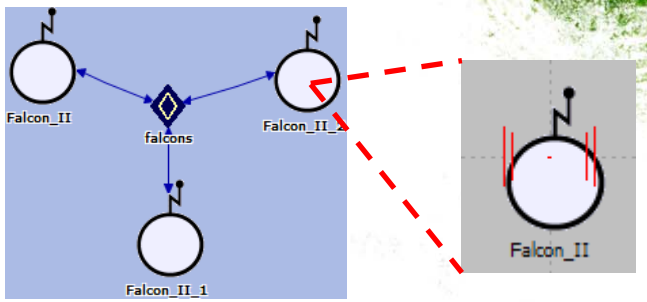
- **Connect terrestrial devices in different OPFACs**
- **Attributes similar to wired links except Frequency**
- **Simplex or duplex**
  - **Specify direction of simplex links**
  - **Redeploy to change simplex/duplex**

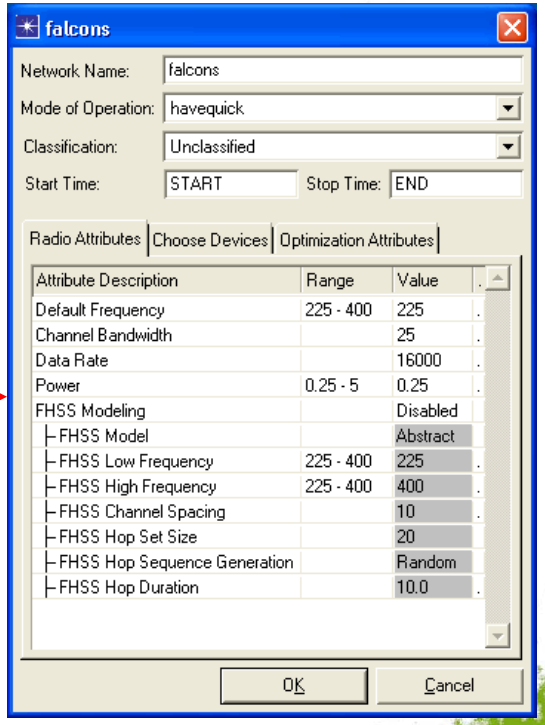




Broadcast Networks

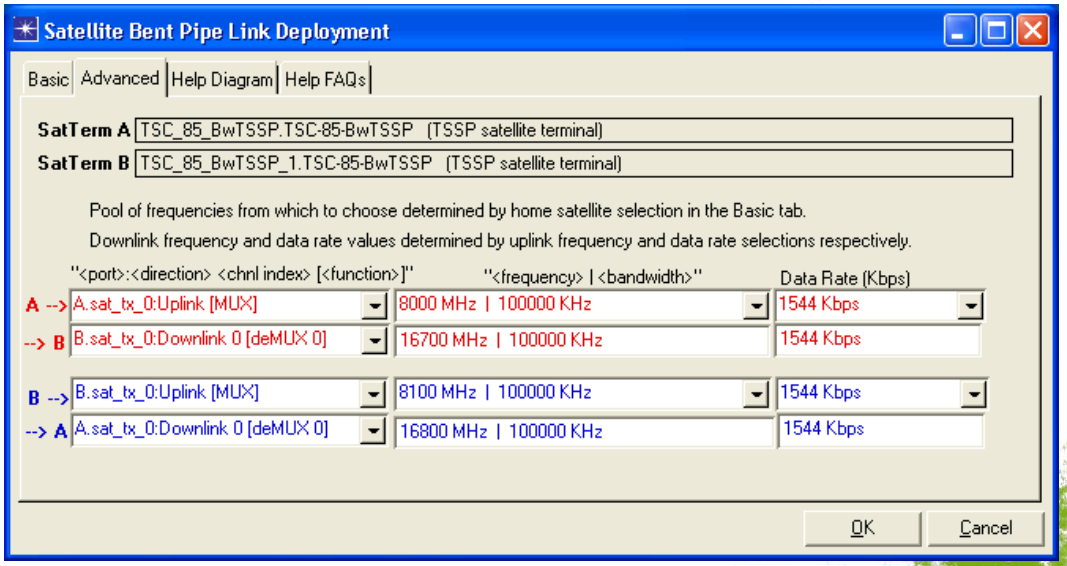
- **Connect radio system devices**
  - That share a frequency or frequency hop group
  - In different OPFACs
- **Workspace appearance**
  - Network depicted as a diamond
  - OPFACs connected by blue links
  - Radio system device marked by symbol
- **Create via Object Palette**
  - Deploy nw_broadcast_network node
  - Connect with nw_broadcast_network_attachment links
- **Create via the Broadcast Network Wizard**
  - Select OPFACs containing tactical radios
  - Choose the Topology > Deploy Broadcast Network menu or press Ctrl+Shift+B.
  - Define the broadcast network name and attributes
  - Select OK to create network





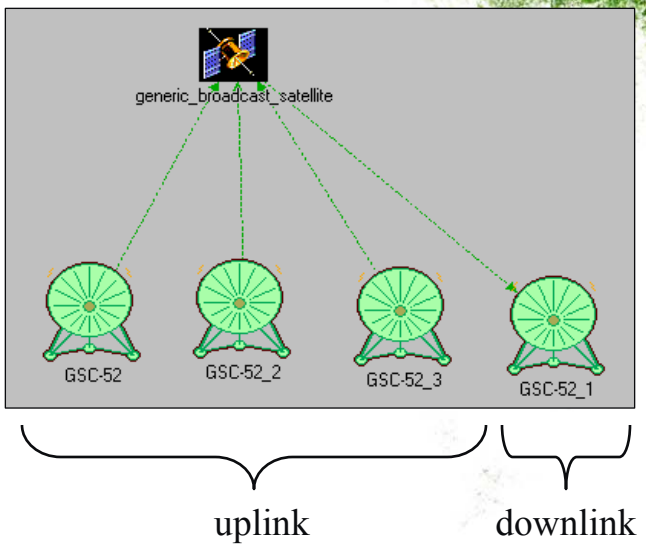
SHF Satellite Links

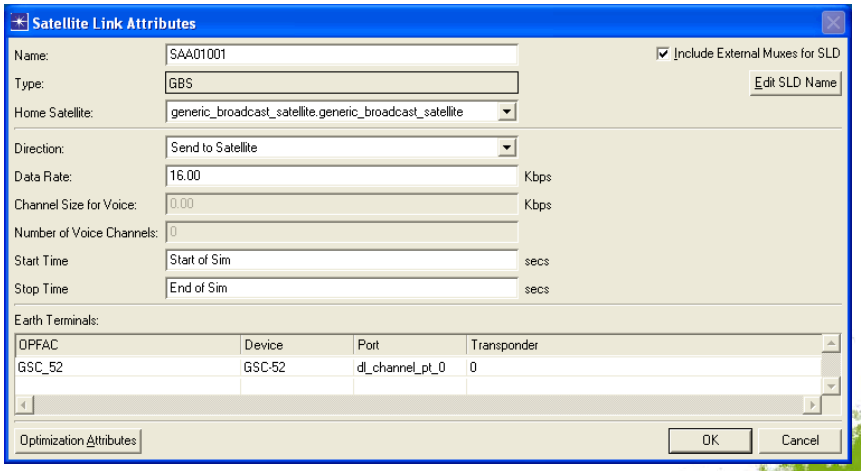
- **Bidirectional, bent-pipe link between two terminals**
  - **Various models available in the JCSS_Satellites palette**
  - **TSSP or ETSSP supported by many terminals**
    - **Determines available data rates**
  - **Generic SHF terminals**
    - **Do not support TSSP**
    - **Do not require circuit configuration**
- **Create via…**
  - **Link Deployment Wizard**
  - **Object Palette**
    - **Use satellite_tssp link**
    - **Connect OPFACs**



GBS Satellite & Terminal

- **Generic Broadcast Satellite**
  - **Simplex uplink to satellite, or**
  - **Simplex downlink to terminal**
  - **Each down-linked terminal receives every transmission through the satellite**
- **Deploy devices via Object Palette**
  - **gbs_earth_terminal**
  - **generic_broadcast_satellite**
- **Create link via Link Deployment Wizard**





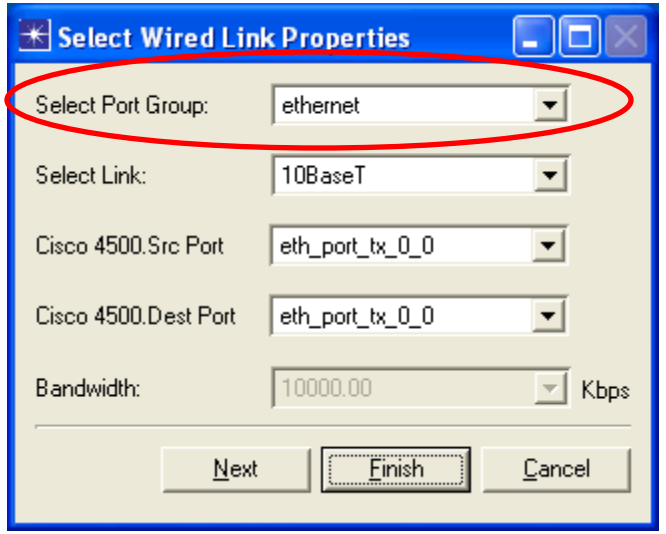
Deploying Links

- **Two approaches to deploy a link**
  - **Link Deployment Wizard**
  - **Palette**

- **Select OPFACs or devices but not Organizations when deploying**

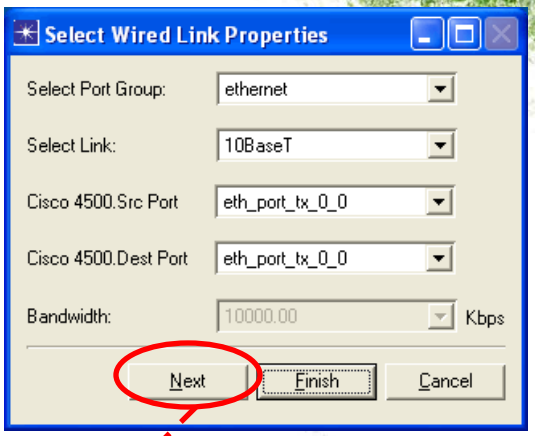
Deploying Links via Wizard

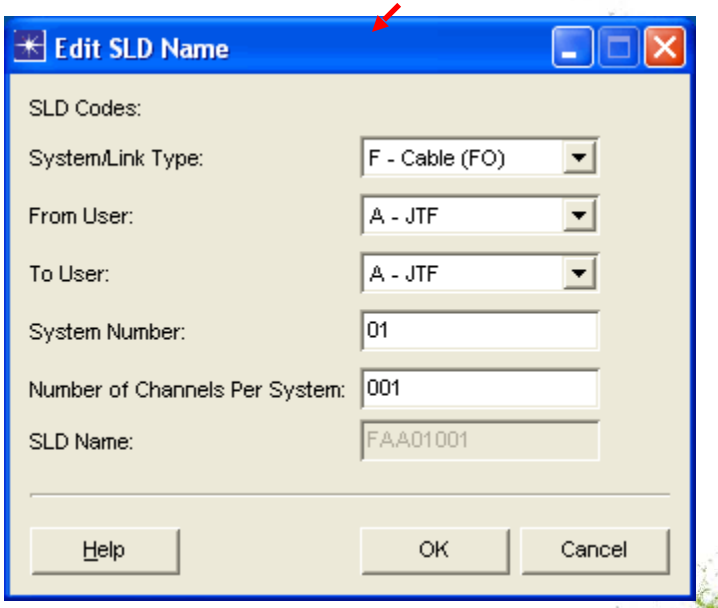
- **Select two OPFACs or devices**
- **Press Ctrl+L**
- **Choose devices if OPFACs contain more than one**
- **Select Port Group first**
- **Select link type and ports**



SLD Names

- **System Link Designator (SLD)**
  - **Naming convention specified by CJCSM 6231**
- **Automatically generated for link**
- **Select Next to modify SLD name in Link Deployment Wizard**
- **Modify SLD name later via Wire Link Attributes dialog**



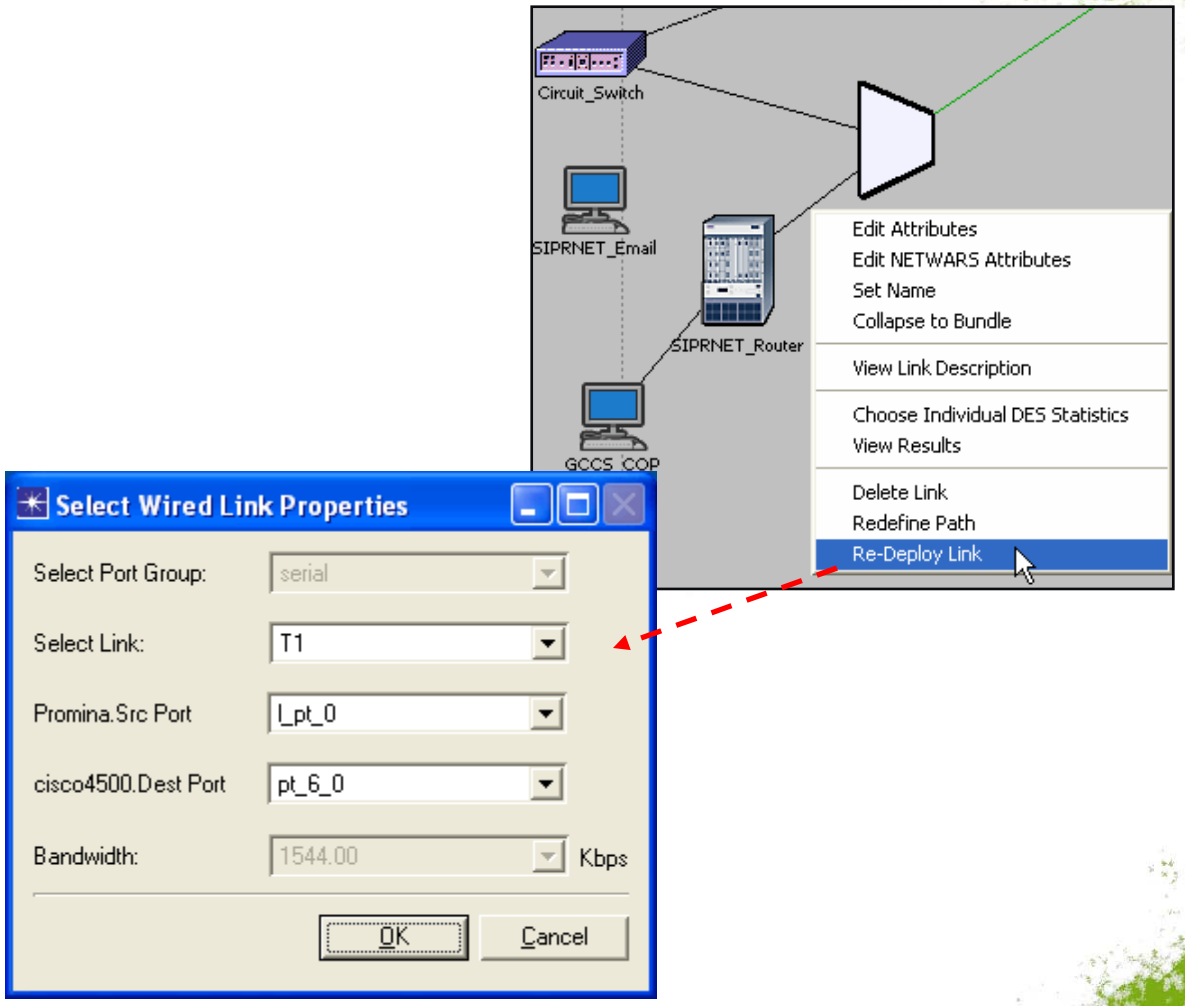


Deploying Links from Object Palette

- **Bypasses Link Deployment Wizard**
  - **Does not check port assignments and settings**
- **Drag link from palette**
- **Select OPFACs or devices in workspace**
  - **Choose devices if OPFACs contain more than one**

Redeploying Links

- **Choose Re-Deploy Link from right-click menu of link**
- **Modify**
  - **Type**
  - **Ports**
- **Quick and easy**

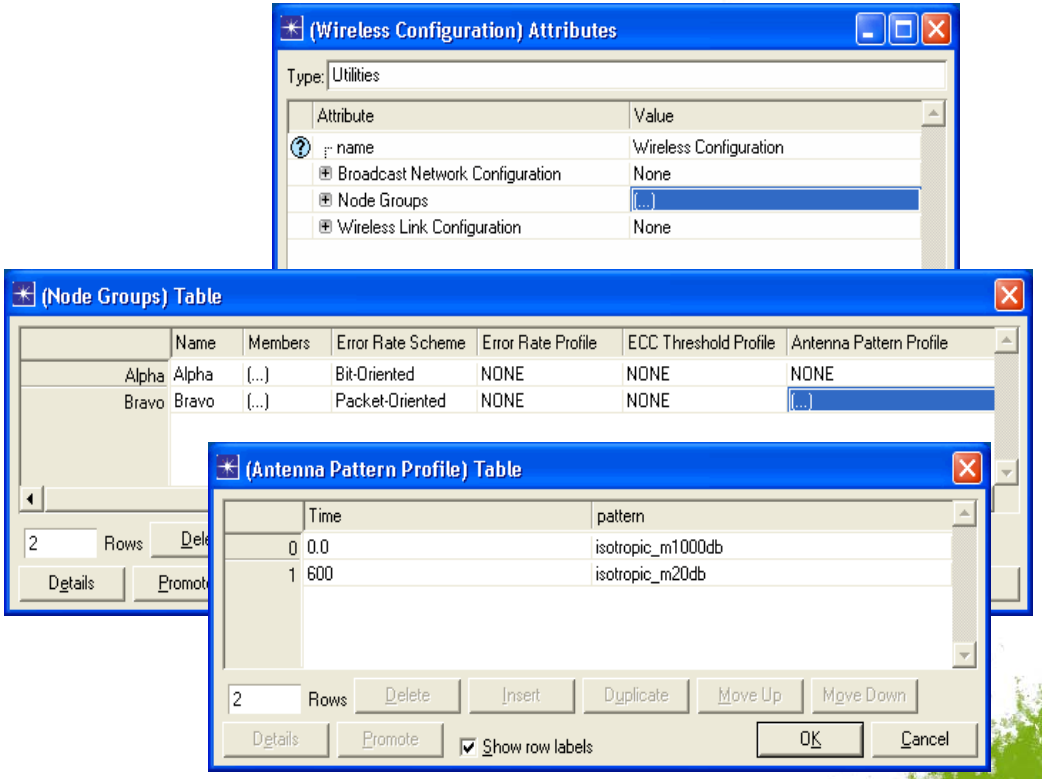


Wireless Configuration Utility Node

- **Found in Configuration OPFAC**

- **Timed failure/recovery for**
  - **Broadcast networks**
  - **Wireless links**

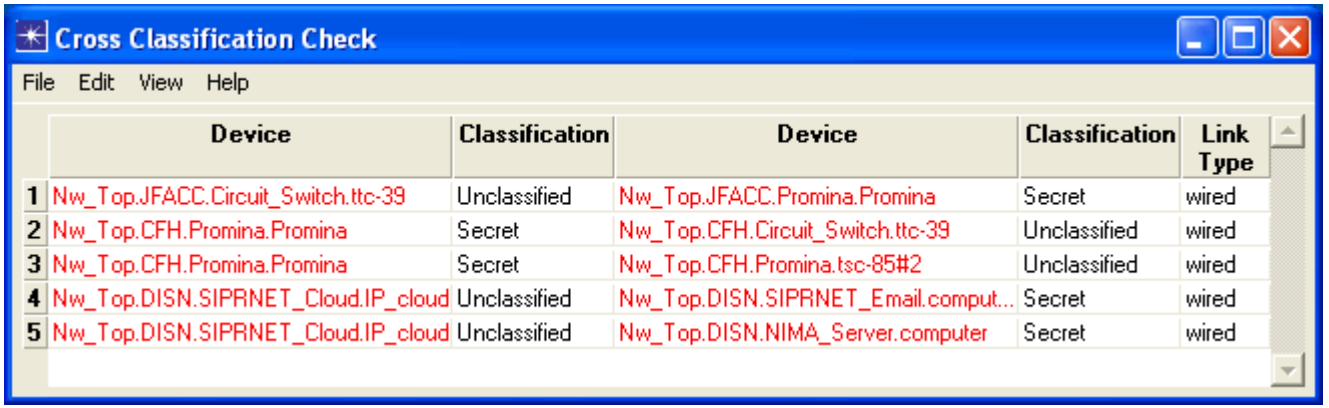
- **Pipeline stage configuration**
  - **BER**
  - **PER**
  - **ECC**
  - **Antenna patterns**



Cross Classification Check

- **Identifies connected devices with different security classifications**
  - **Standard OPNET devices are assumed Unclassified**
  - **Handles encryption devices specially**

- **Special verification test in JCSS**
  - **Runs concurrently with link consistency verification**
  - **Displays separate summary dialog**



	Device	Classification	Device	Classification	Link Type
1	Nw_Top.JFACC.Circuit_Switch.ttc-39	Unclassified	Nw_Top.JFACC.Promina.Promina	Secret	wired
2	Nw_Top.CFH.Promina.Promina	Secret	Nw_Top.CFH.Circuit_Switch.ttc-39	Unclassified	wired
3	Nw_Top.CFH.Promina.Promina	Secret	Nw_Top.CFH.Promina.tsc-85#2	Unclassified	wired
4	Nw_Top.DISN.SIPRNET_Cloud.IP_cloud	Unclassified	Nw_Top.DISN.SIPRNET_Email.comput...	Secret	wired
5	Nw_Top.DISN.SIPRNET_Cloud.IP_cloud	Unclassified	Nw_Top.DISN.NIMA_Server.computer	Secret	wired

Generic Circuit API

- **Allows different JCSS features to "understand" generic circuits**
- **Scenario Builder**
  - **Logical Views**
  - **Reports**
- **Discrete Event Simulation (DES)**
  - **Device Models**
  - **IP Auto Addressing**
- **Capacity Planner (CP)**
  - **Graph Creation**
  - **Routing Traffic**
- **Supported devices**
  - **Promina**
  - **N.E.T. SCREAM and SHOUTip**
  - **Juniper CTP**
  - **TSSP Satellites**
  - **Multiplexers**

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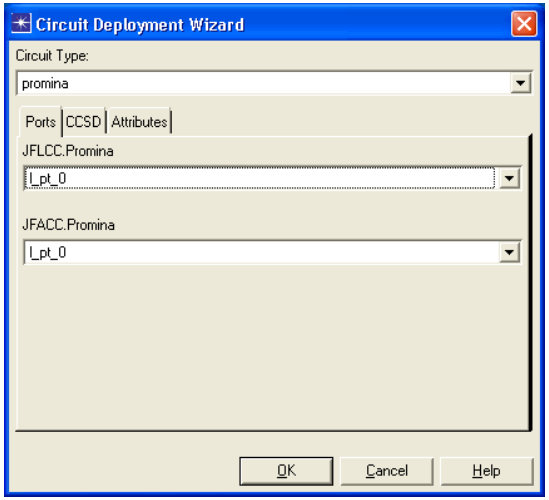
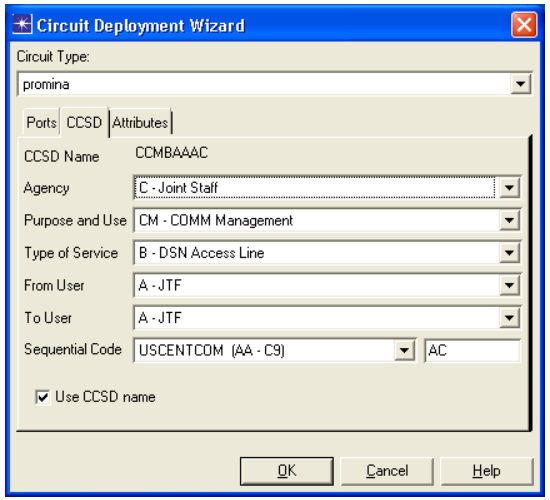
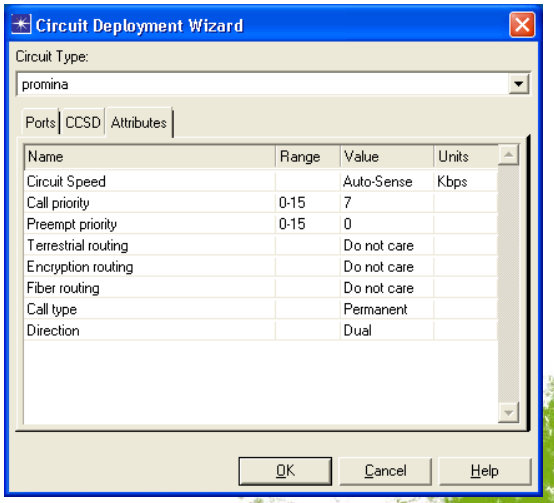
Circuit Deployment Wizard

- **Select two OPFACs**
- **Deploy a circuit using**
  - **Object palette**
  - **Topology > Deploy Circuit menu item**
- **Wizard defines the circuit based on**
  - **Circuit Configuration attributes of each device**
  - **Self-description machine type of each devices**
  - **Data Description XML file corresponding to the machine type**



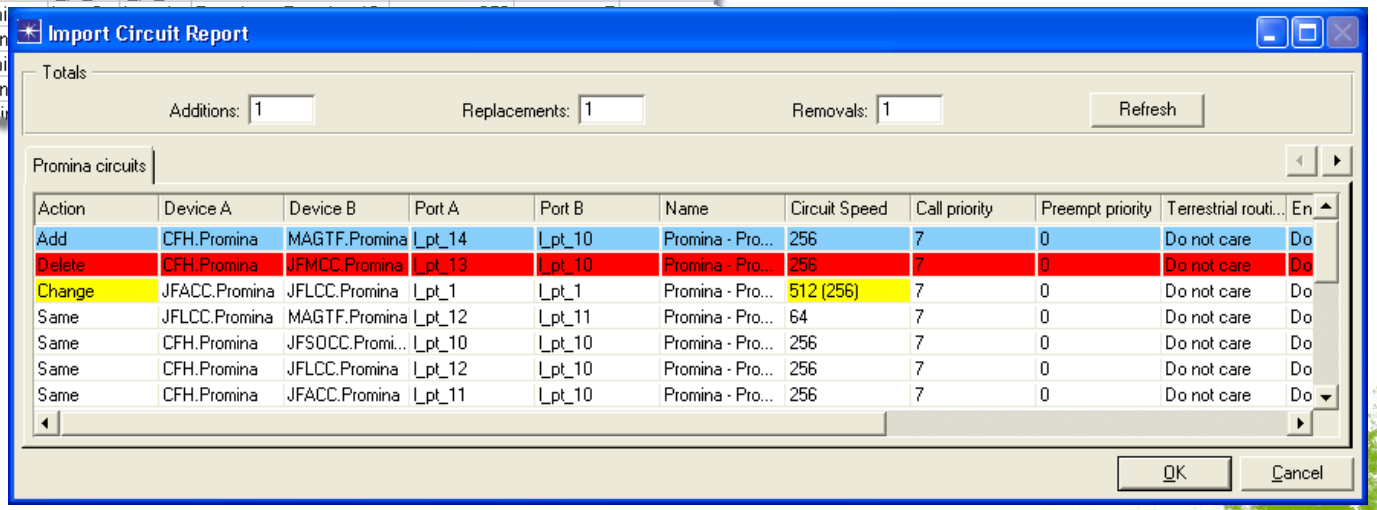




Circuit Import/Export

- **Available in Topology menu**
  - **Import > Circuits**
  - **Export > Circuits**
- **Text file**
  - **Excel-compatible, tab-delimited data**
  - **Groups circuits by device type**
  - **Extensible through Generic Circuit API**

	A	B	C	D	E	F	G	H
1	#Circuit export file for UserGuide_CP_Scenario-UserGuide_CP_Scenario							
2	#This file is tab-delimited and contains a separate section for each file type.							
3								
4	circuit_type	Promina						
5	#Device A	Device B	Port A	Port B	Name	Circuit Speed	Call priority	Preempt p
6	Nw_Top.CFH.Promina	Nw_Top.MAGTF.Promina	l_pt_14	l_pt_10	Promina - Promina 9	256	7	
7	Nw_Top.JFACC.Promina	Nw_Top.JFLCC.Promina	l_pt_1	l_pt_1	Promina - Promina 10	512	7	
8	Nw_Top.JFLCC.Promina	Nw_Top.MAGTF.Promina	l_pt_12	l_pt_11	Promina - Promina 16	64	7	
9	Nw_Top.CFH.Promina	Nw_Top.JFSOCC.Promina	l_pt_10	l_pt_10	Promina - Promina 5	256	7	
10	Nw_Top.CFH.Promina	Nw_Top.JFLCC.Promina	l_pt_12	l_pt_10	Promina - Promina 7	256	7	
11	Nw_Top.CFH.Promina	Nw_Top.JFACC.Promina	l_pt_11	l_pt_10	Promina - Promina 6	256	7	
12	Nw_Top.JFLCC.Promina	Nw_Top.MAGTF.Promi						
13	Nw_Top.JFACC.Promina	Nw_Top.JFLCC.Promin						
14	Nw_Top.CFH.Promina	Nw_Top.MAGTF.Promi						
15	Nw_Top.CFH.Promina	Nw_Top.JFLCC.Promin						
16	Nw_Top.CFH.Promina	Nw_Top.JFMCC.Promi						



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SLD and CCSD Reports

- **List all SLDs and CCSDs in scenario**
- **Hot-links to links and endpoints**

SLD Summary

File Edit View Help

	SLD	Endpoint A Name & Port	Endpoint B Name & Port	Link Type	Data Rate (Kbps)
1	FAA01001	NCTAMSPAC_Far_East.NCTAMSPAC_...	NCTAMSPAC_Far_East.DATA_Comm_...	wire_ptp	1152.000000
2	FAA02001	NCTAMSPAC_Far_East.NCTAMSPAC_...	NCTAMSPAC_Far_East.VOICE_Comm...	wire_ptp	256.000000
3	FAA03001	NCTAMSPAC_Far_East.NCTAMSPAC_...	NCTAMSPAC_Far_East.VTC_Comm_U...	PPP_DS1	1544.000000
4	FAA04001	NCTAMSPAC_Far_East.NCTAMSPAC_...	NCTAMSPAC_Far_East.DATA_Comm_...	wire_ptp	768.000000
5	FAA05001	NCTAMSPAC_Far_East.NCTAMSPAC_...	NCTAMSPAC_Far_East.VOICE_Comm...	wire_ptp	256.000000
6	FAA06001	NCTAMSPAC_Far_East.NCTAMSPAC_...	NCTAMSPAC_Far_East.VTC_Comm_U...	wire_ptp	128.000000
7	FAA10002	JTF_HQ.JTF.LWX_1.eth_port_tx_1_0	JTF_HQ.DATA_Command_HQ_2.Cisco...	100BaseT	100000.000000
8	FBB01001	NAVFOR.NAVFOR_Transmission.FCC_...	NAVFOR.DATA_Comm_Unit.Cisco 450...	wire_ptp	768.000000

CCSD Summary

File Edit View Help

	Name	Type	Source Subscriber	Destination Subscriber	Source Device & Port	Destination Device & Port	Data Rate (Kbps)	Direction
1	CCMBAABP	Multiplexer	NAVFOR.VTC_Comm...	NCTAMSPAC_Far_East....	NAVFOR.NAVFOR_Trans...	NCTAMSPAC_Far_East.NCTA...	128.000000	Dual
2	CCMBAABQ	Multiplexer	NAVFOR.DATA_Com...	NCTAMSPAC_Far_East....	NAVFOR.NAVFOR_Trans...	NCTAMSPAC_Far_East.NCTA...	768.000000	Dual
3	CCMBAABR	Multiplexer	NAVFOR.VOICE_Co...	NCTAMSPAC_Far_East....	NAVFOR.NAVFOR_Trans...	NCTAMSPAC_Far_East.NCTA...	256.000000	Dual
4	CCMBAAAA	Promina	ARFOR.ARFOR_Tran...	JTF_HQ.JTF.LWX	ARFOR.ARFOR_Transmis...	JTF_HQ.JTF.Promina-800.l_pt_0	256.000000	Dual
5	CCMBAAAB	Promina	ARFOR.ARFOR_Tran...	CAMP_HUMPHREYS.CA...	ARFOR.ARFOR_Transmis...	CAMP_HUMPHREYS.CAMP_H...	576.000000	Dual

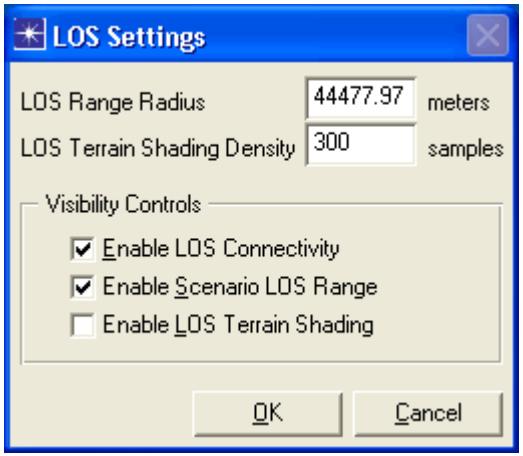
Other Wizards

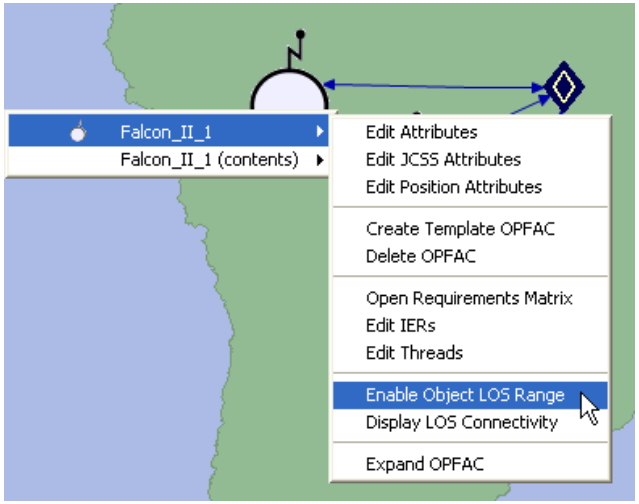
- **Cut-through Mechanism**
  - **Enabled/Disables all ports on selected devices to use the cut-through mechanism**
  - **Found in the Topology > Configuration Utilities > Cut-through menu**
- **UHF DAMA Wizard**
  - **Allows the user to properly configure the Service Plan file for UHF DAMA devices**
  - **Found in the Topology > Configuration Utilities > UHF DAMA SATCOM menu**
- **Link-16 Wizards**
  - **Allow the user to assign and clear Time Slot Blocks (TSBs) for Link-16 devices**
  - **Found in the Protocols > Link16 menu**
- **Refer to Session 1590 Modeling Tactical Military Communications Using JCSS for more information on these wizards**

Line of Sight (LOS)

- Requires terrain data
- Independent of device characteristics
- Longley-Rice propagation model

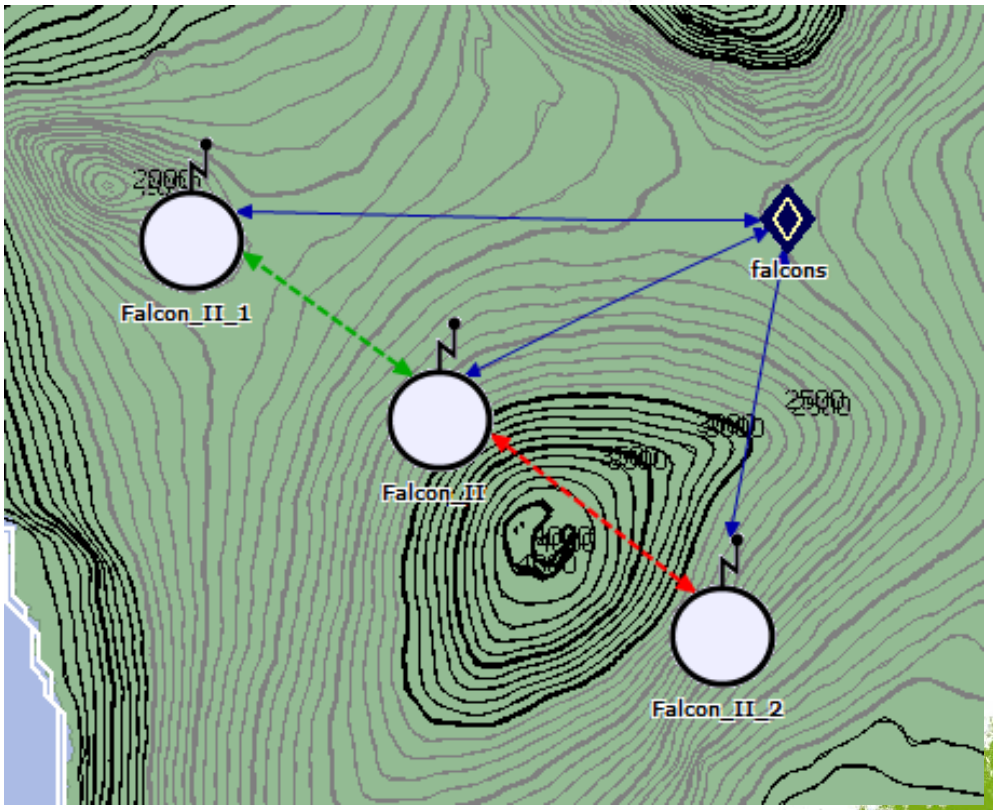
- To configure, select View > Show LOS > LOS Settings
- To enable, right-click menu of OPFAC or Organization





LOS Connectivity

- **Color-coded lines**
  - **Red – No connectivity**
  - **Green – Clear connections**



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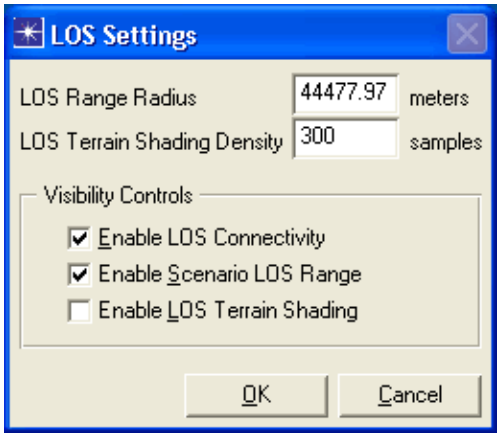
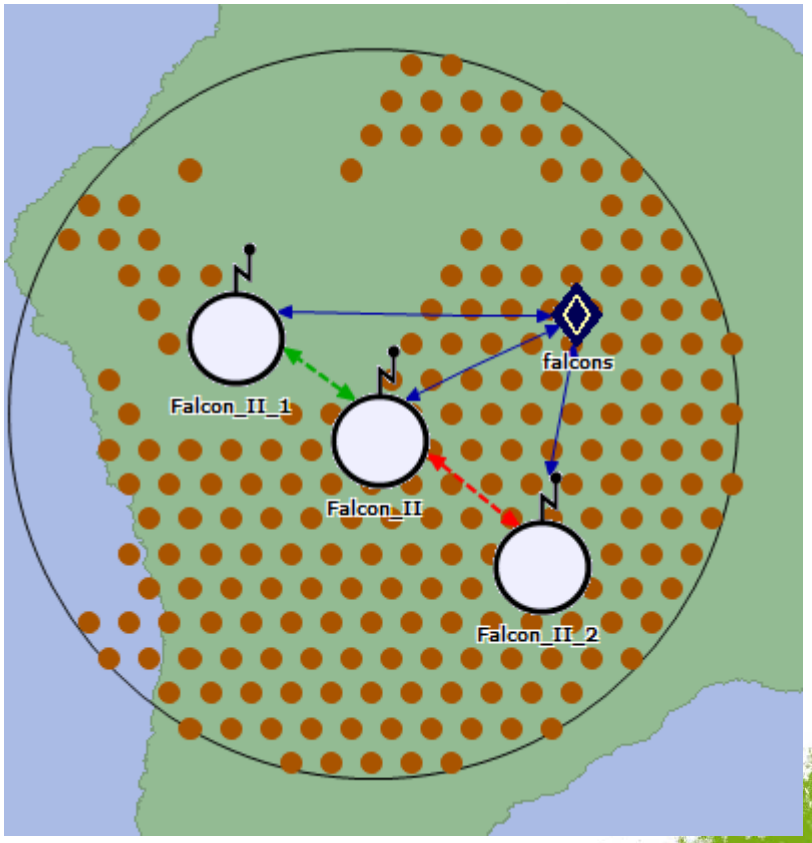
LOS Range and Terrain Shading

- **Range**
  - **Denoted by a circle of fixed radius**
  - **Simply indicates a distance**

- **Terrain Shading**
  - **Samples locations within the range**
  - **Dots indicate *no* LOS at the location**





Lab 2: Deploying Links

- **Link Deployment Wizard**
- **Broadcast Network Deployment Wizard**
- **Circuit Deployment Wizard**
- **LOS Connectivity**

Agenda

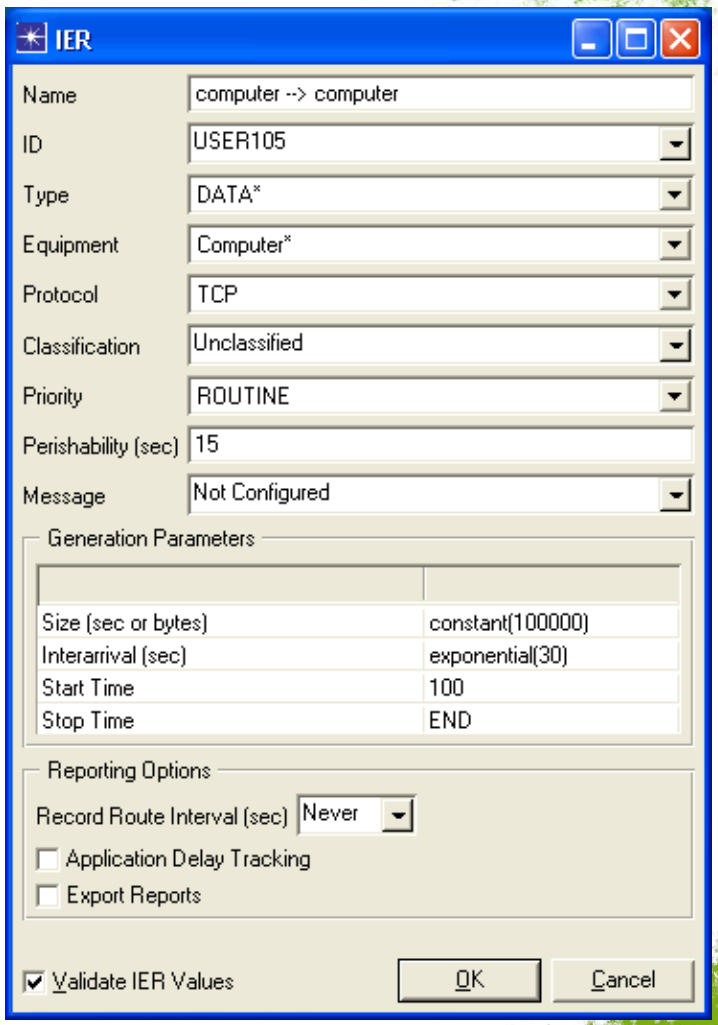
- Introduction
- Unit Laydown
- Infrastructure Deployment
- Traffic Specification
- Capacity Planning
- Views and Briefing
- Conclusion

Information Exchange Requirement (IER)

- **Military specific communications traffic**
  - **Regular position updates**
  - **Air support request**
  - **Etc.**
- **Modeled as a unidirectional demand**
  - **Based on All-DOD Core Architecture Data Model (All_CADM)**
  - **Demand can be used in Modeler**
  - **Configuration wizards only available in JCSS**
- **Defines a message or call that can be transmitted repeatedly**

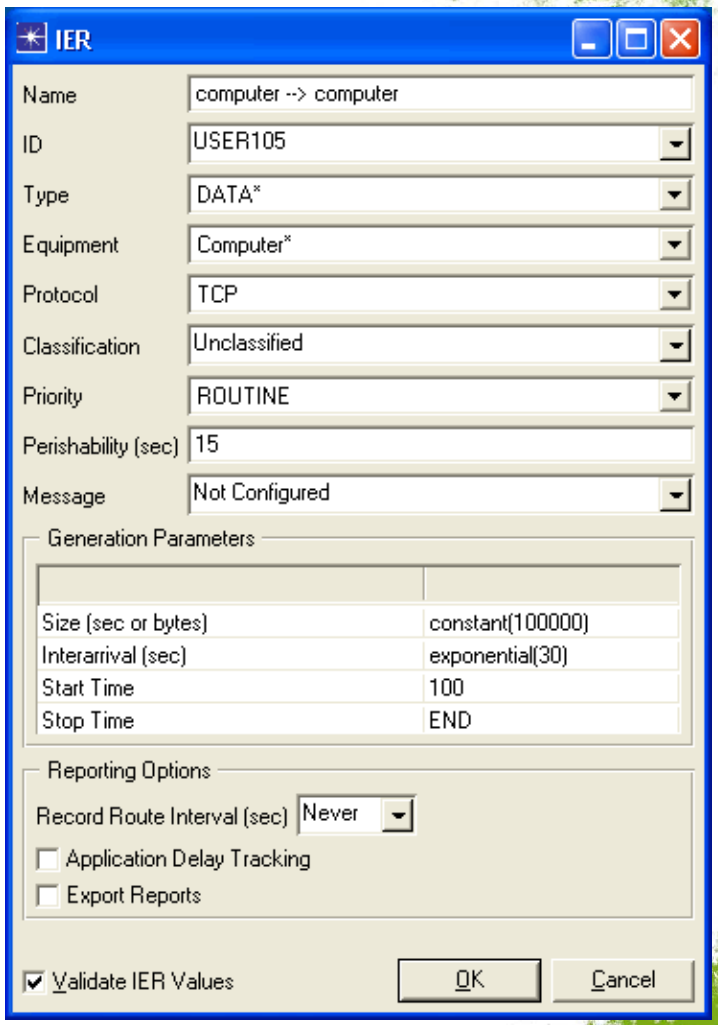
IER Attribute Dialog

- **Displayed by several features**
  - **Drag IER_demand from Object Palette**
  - **Traffic > IERs > Deploy IER**
  - **Traffic > IERs > Deploy IERs (Advanced)**
  - **Right-click menu of IER demand object**



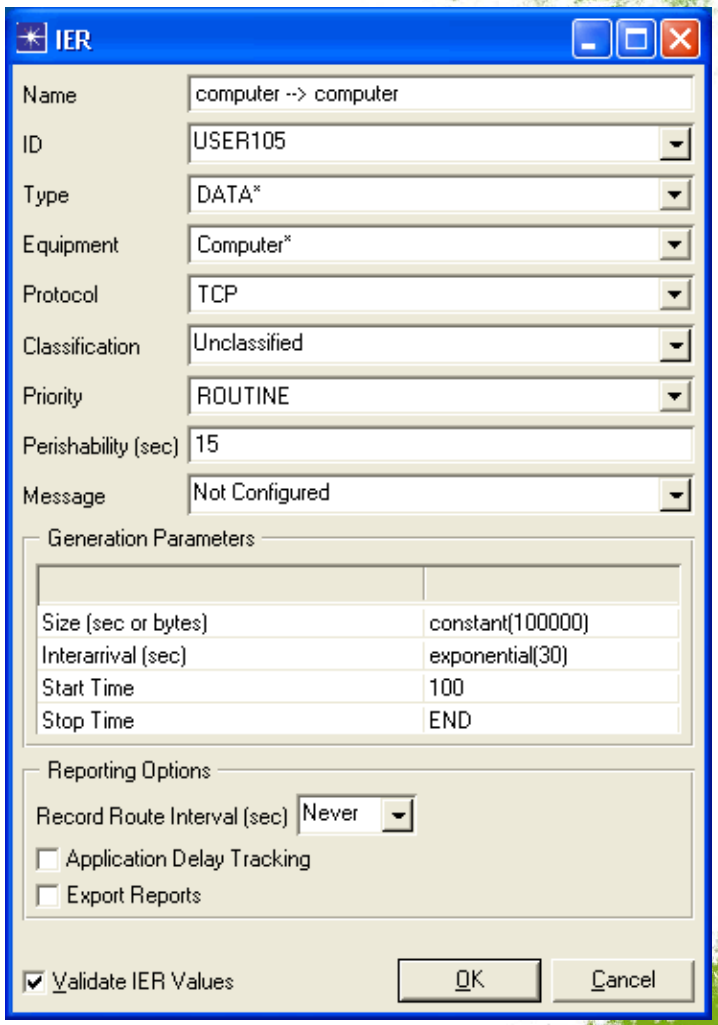
IER Attributes

- **Identify the IER**
  - **Name is default**
  - **ID may override name**
- **Specify communication requirements**
  - **Equipment – required transmission equipment type**
  - **Classification – minimum equipment classification**
- **Control simulation reporting**
  - **Record Route Interval**
  - **Application Delay Tracking**
  - **Reports**



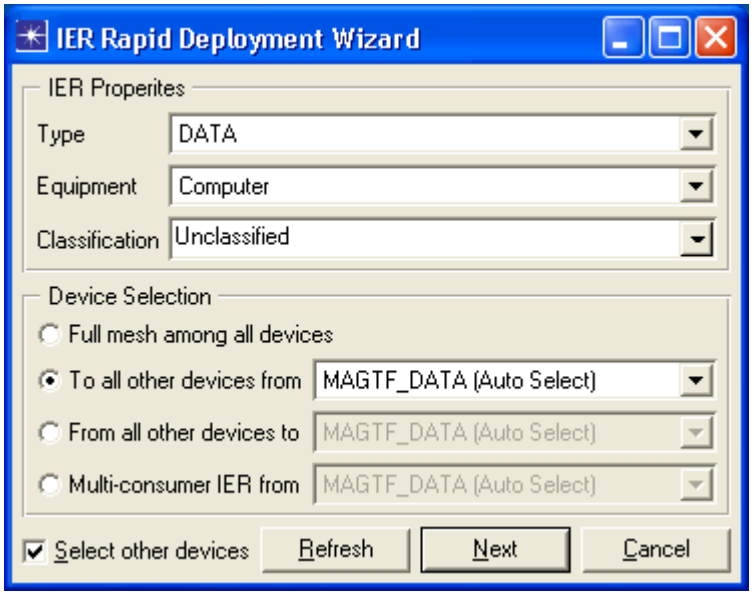
IER Attributes

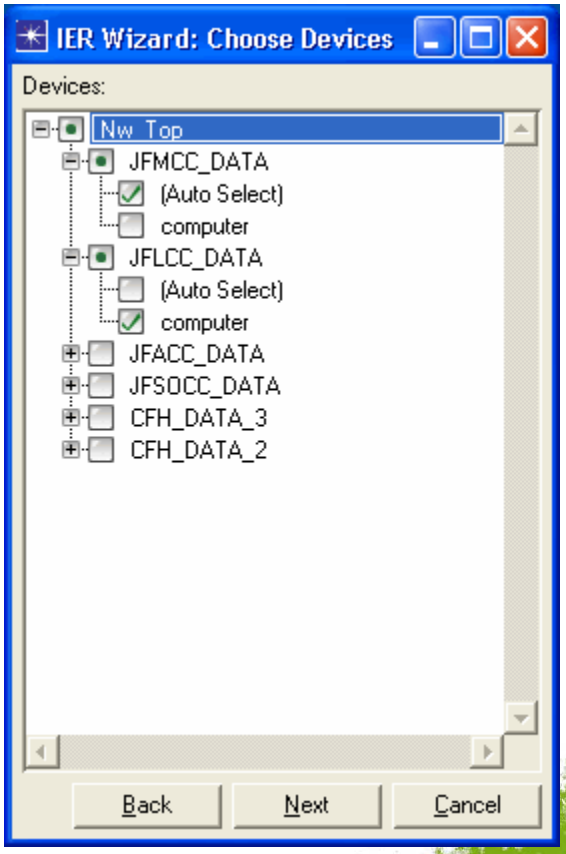
- **Specify traffic characteristics**
  - **Type**
  - **Protocol**
  - **Priority**
    - **Number of transmission retries**
    - **Wait time between each attempt**
  - **Perishability – useful lifetime of message**
  - **Size – data size or call duration**
  - **Interarrival – delay between message repetition**
  - **Start Time**
  - **Stop Time**



Advanced IER Wizard

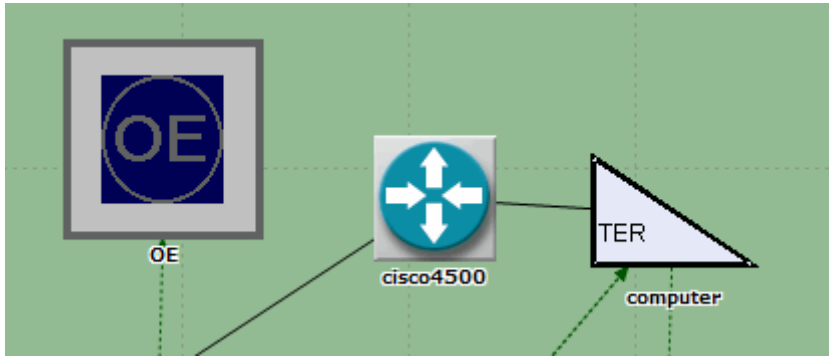
- **Create multiple IERs in various topologies, or**
- **Create a single IER with multiple consumers**
- **Control device choices**
  - **Filter by properties**
  - **Select specific devices**





Operational Element (OE)

- **Special device in each OPFAC**
- **Handles IER traffic and statistics**
- **Producer or consumer for IERs**
  - **Chooses comm. device during simulation**
  - **Depends on IER Firing Rules utility node**



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IER Firing Rules

- **Classification Order**
  - Ranks classification values
  - OE chooses device with same or higher classification

	Classification
0	Unclassified
1	Classified
2	Confidential
3	Secret
4	Top Secret

- **Decision Table**
  - Maps Traffic Type to Equipment
  - Equipment listed by decreasing preference

	Traffic Type	SE
0	DATA	(...)
1	VOICE	(...)
2	VTC	(...)

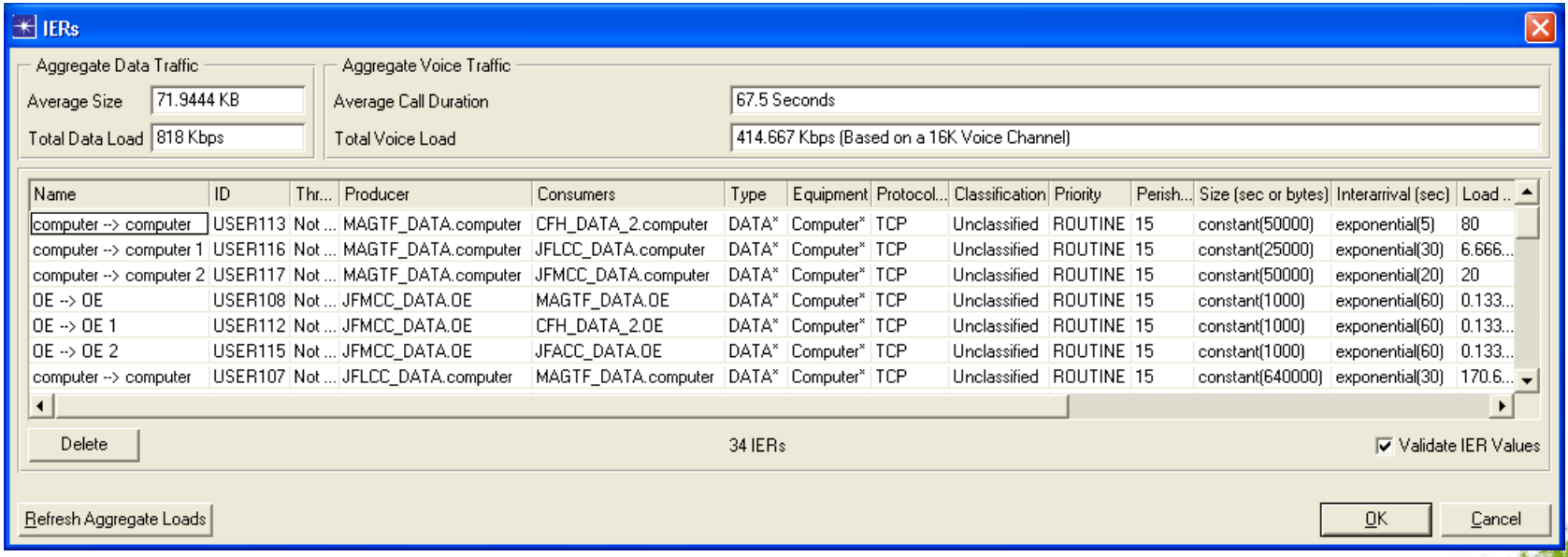
	Equipment Type
0	Computer
1	JTIDS

- **Priority Table**
  - IER priority determines transmission attempts
  - Number of retries
  - Wait time between retries

	Priority	Num Retries	Wait Time
0	ROUTINE	2	300
1	PRIORITY	4	60
2	IMMEDIATE	6	20
3	FLASH	12	5
4	FLASH OVERRIDE	30	2

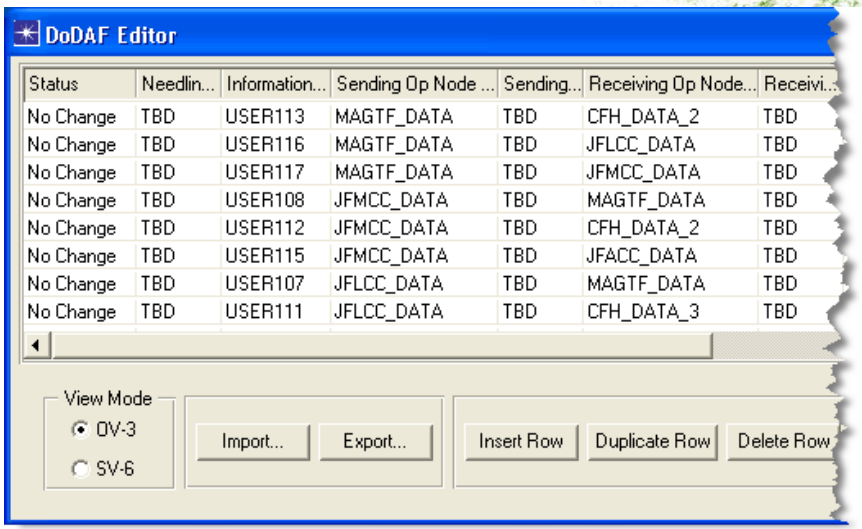
IER Table

- View all IERs in a scenario
- Edit attributes
- Cannot change producer and consumer
- Load calculations
  - Individual load for each IER
  - Aggregate loads for all IERs in table



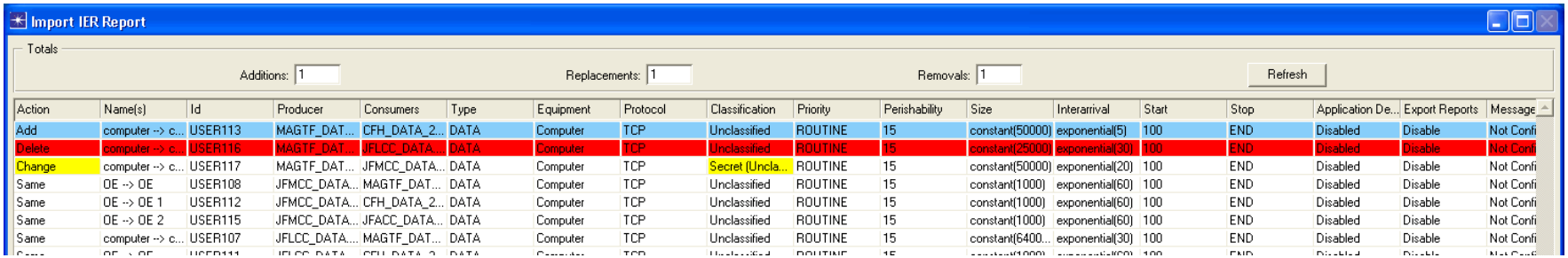
DoDAF Editor

- Import/export for DoDAF views
  - OV-3
  - SV-6
- File formats
  - Text
  - Metastorm ProVision
  - Telelogic System Architect
- Creates/includes IERs
  - Only some DoDAF fields map to IER attributes
  - Minimum required fields are Sending and Receiving Names
  - Values in unmapped fields
    - Retained if specified
    - Not used
- Automatically creates OPFACs and devices, if no match in network



IER Report

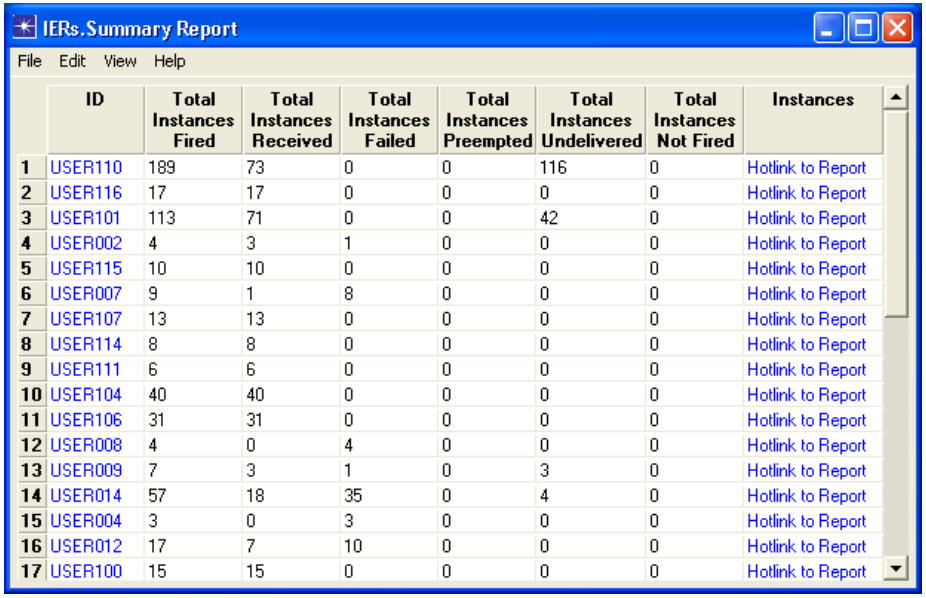
- **Roundtrip export/import for IERs**
  - **All IERs in scenario**
  - **Same data as the IER table**
  - **Excel-compatible, tab-delimited file**
- **In Traffic > IERs menu**
  - **Export IER Report**
  - **Import > From IER Report**



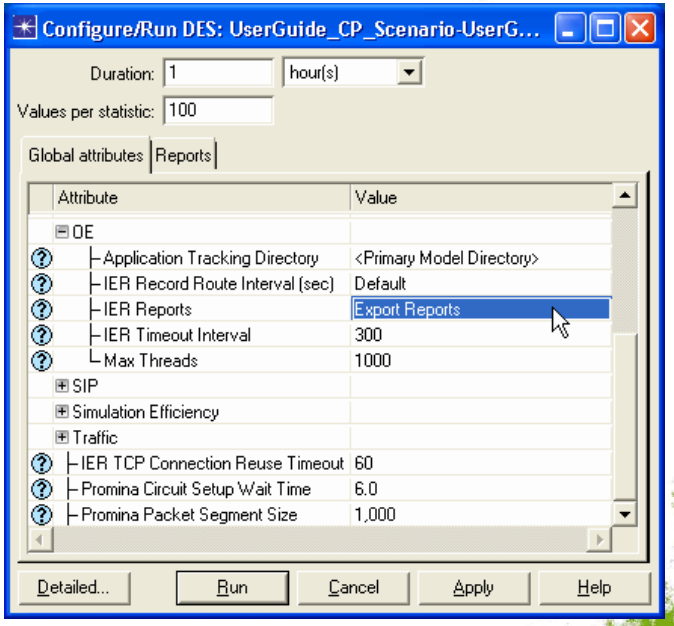
Action	Name(s)	Id	Producer	Consumers	Type	Equipment	Protocol	Classification	Priority	Perishability	Size	Interarrival	Start	Stop	Application De...	Export Reports	Message
Add	computer --> c...	USER113	MAGTF_DAT...	CFH_DATA_2...	DATA	Computer	TCP	Unclassified	ROUTINE	15	constant(50000)	exponential(5)	100	END	Disabled	Disable	Not Confi
Delete	computer --> c...	USER116	MAGTF_DAT...	JFLCC_DATA...	DATA	Computer	TCP	Unclassified	ROUTINE	15	constant(25000)	exponential(30)	100	END	Disabled	Disable	Not Confi
Change	computer --> c...	USER117	MAGTF_DAT...	JFMCC_DATA...	DATA	Computer	TCP	Secret (Uncla...	ROUTINE	15	constant(50000)	exponential(20)	100	END	Disabled	Disable	Not Confi
Same	OE --> OE	USER108	JFMCC_DATA...	MAGTF_DAT...	DATA	Computer	TCP	Unclassified	ROUTINE	15	constant(1000)	exponential(60)	100	END	Disabled	Disable	Not Confi
Same	OE --> OE 1	USER112	JFMCC_DATA...	CFH_DATA_2...	DATA	Computer	TCP	Unclassified	ROUTINE	15	constant(1000)	exponential(60)	100	END	Disabled	Disable	Not Confi
Same	OE --> OE 2	USER115	JFMCC_DATA...	JFACC_DATA...	DATA	Computer	TCP	Unclassified	ROUTINE	15	constant(1000)	exponential(60)	100	END	Disabled	Disable	Not Confi
Same	computer --> c...	USER107	JFLCC_DATA....	MAGTF_DAT...	DATA	Computer	TCP	Unclassified	ROUTINE	15	constant(6400...	exponential(30)	100	END	Disabled	Disable	Not Confi

IER DES Reports

- **Enable for IERs**
  - **Individually in IER attributes**
  - **Scenario-wide in DES configuration: OE.IER Reports**
- **View in DES Run Tables of Results Browser**
  - **IER instances**
  - **Summary Report**

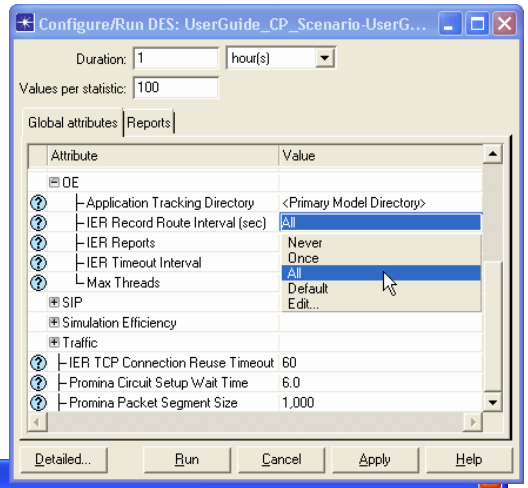


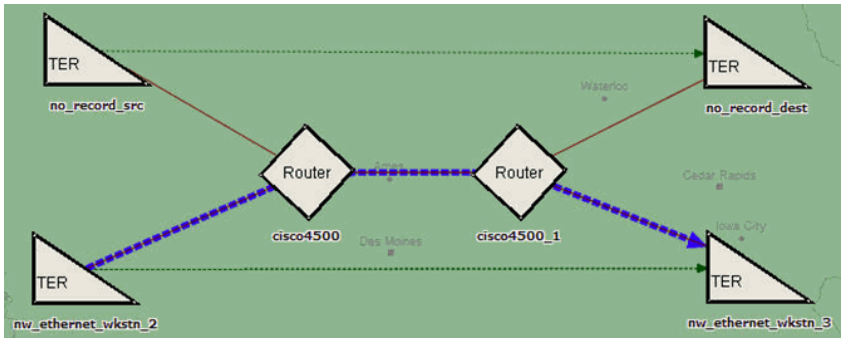
	ID	Total Instances Fired	Total Instances Received	Total Instances Failed	Total Instances Preempted	Total Instances Undelivered	Total Instances Not Fired	Instances
1	USER110	189	73	0	0	116	0	Hotlink to Report
2	USER116	17	17	0	0	0	0	Hotlink to Report
3	USER101	113	71	0	0	42	0	Hotlink to Report
4	USER002	4	3	1	0	0	0	Hotlink to Report
5	USER115	10	10	0	0	0	0	Hotlink to Report
6	USER007	9	1	8	0	0	0	Hotlink to Report
7	USER107	13	13	0	0	0	0	Hotlink to Report
8	USER114	8	8	0	0	0	0	Hotlink to Report
9	USER111	6	6	0	0	0	0	Hotlink to Report
10	USER104	40	40	0	0	0	0	Hotlink to Report
11	USER106	31	31	0	0	0	0	Hotlink to Report
12	USER008	4	0	4	0	0	0	Hotlink to Report
13	USER009	7	3	1	0	3	0	Hotlink to Report
14	USER014	57	18	35	0	4	0	Hotlink to Report
15	USER004	3	0	3	0	0	0	Hotlink to Report
16	USER012	17	7	10	0	0	0	Hotlink to Report
17	USER100	15	15	0	0	0	0	Hotlink to Report

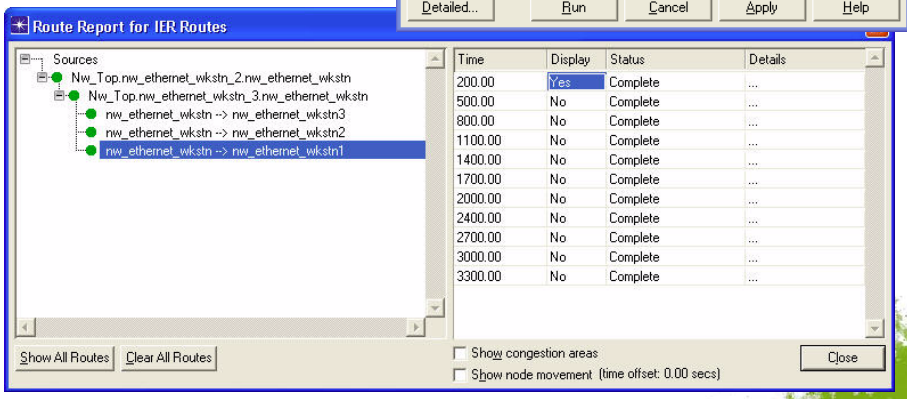


Record IER DES Routes

- **Enable for Data IERs**
  - **Individually in IER attributes**
  - **Scenario-wide in DES configuration: OE.IER Record Route Interval**
    - **Default – Use the individual IER settings**
- **Record routes**
  - **Once – First instance**
  - **All – Every instance**
  - **Numeric value – At given interval of seconds**
- **Select View > IERs > Display Recorded Routes**

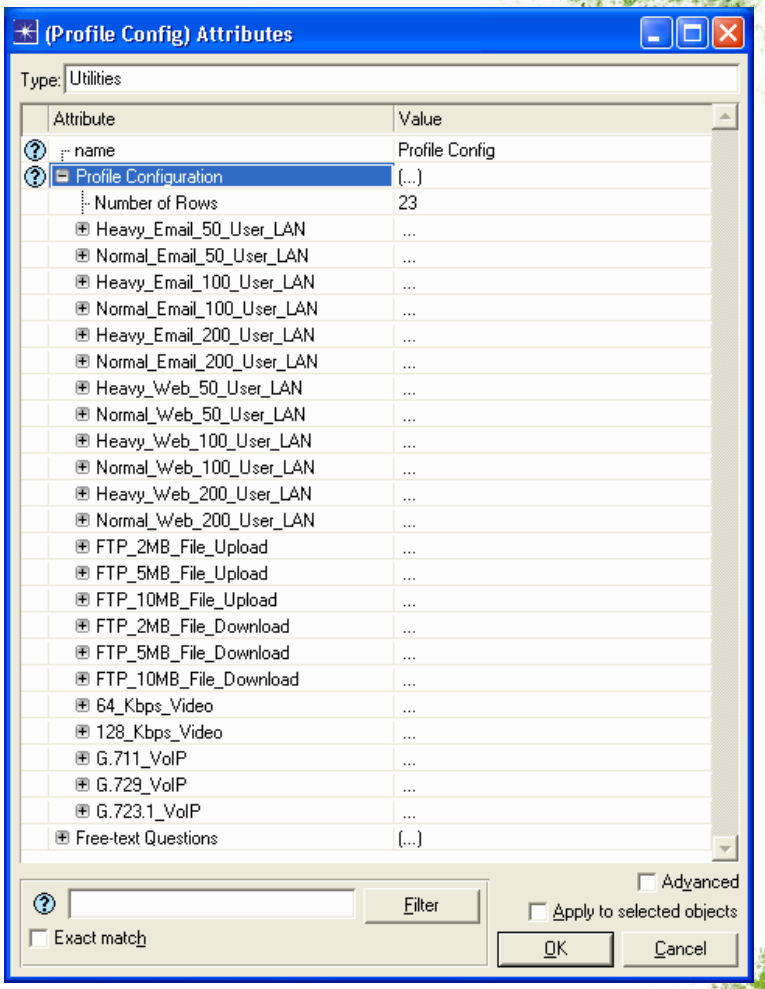






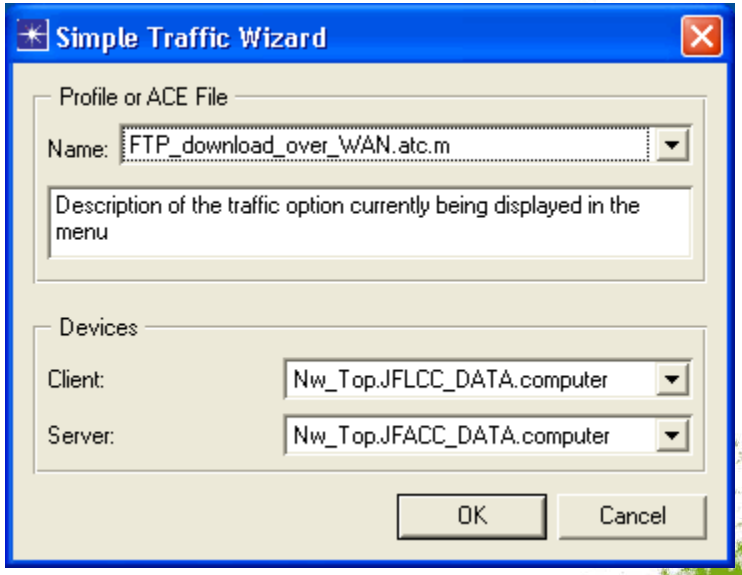
JCSS Applications and Profiles

- **JCSS ships with several default profiles**
  - **Email, web, FTP and video**
  - **Represent various use patterns and numbers of users**



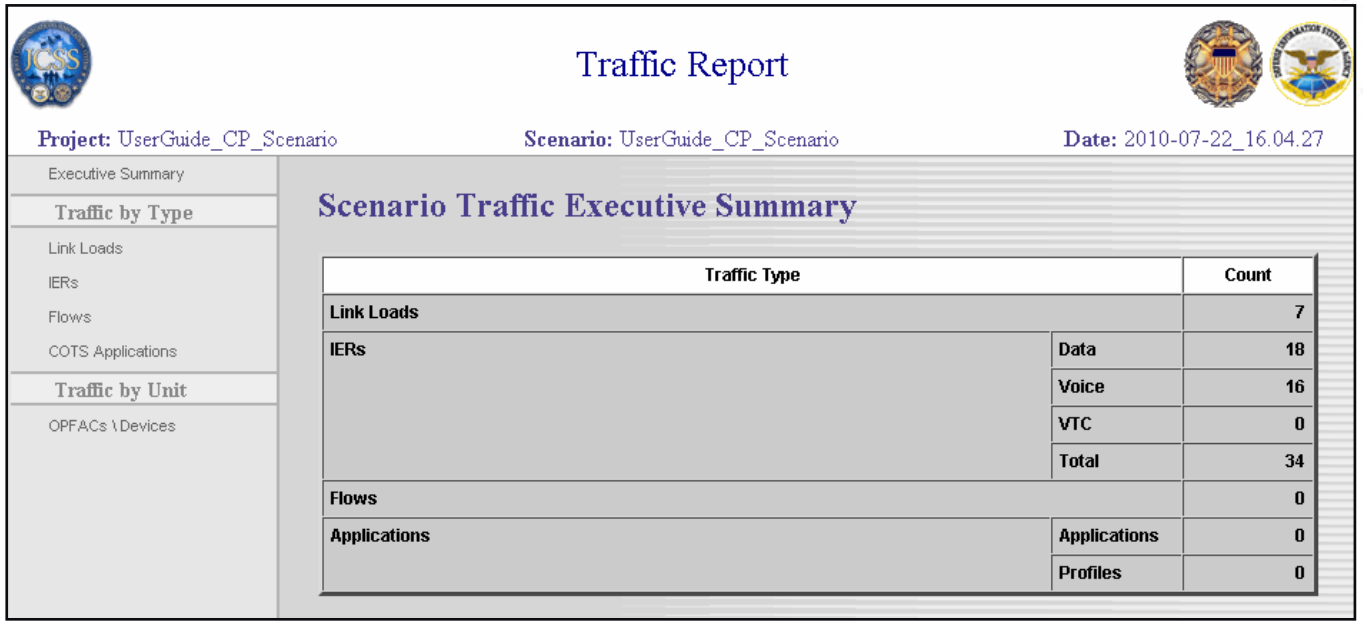
Traffic Wizard

- **Deploy applications quickly**
  - **Select two OPFACs**
  - **Select Traffic > Traffic Wizard or Ctrl+W**
  - **Select profile to be deployed**
  - **Specify client and server devices**
- **Supports**
  - **Standard, custom and JCSS profiles**
  - **ACE 2-tier applications**



Traffic Web Report

- **Current content of the scenario**
  - **Link Loads**
  - **IERs**
  - **Flows**
  - **Applications**
- **Select Traffic > Generate Traffic Web Report**



Traffic Report

Project: UserGuide_CP_Scenario **Scenario:** UserGuide_CP_Scenario **Date:** 2010-07-22_16.04.27

Executive Summary

Traffic by Type

Link Loads

IERs

Flows

COTS Applications

Traffic by Unit

OPFACs \ Devices

Scenario Traffic Executive Summary

Traffic Type		Count
Link Loads		7
IERs	Data	18
	Voice	16
	VTC	0
	Total	34
Flows		0
Applications	Applications	0
	Profiles	0

Lab 3: Deploying Traffic

- **IER**
- **Traffic Wizard**

Agenda

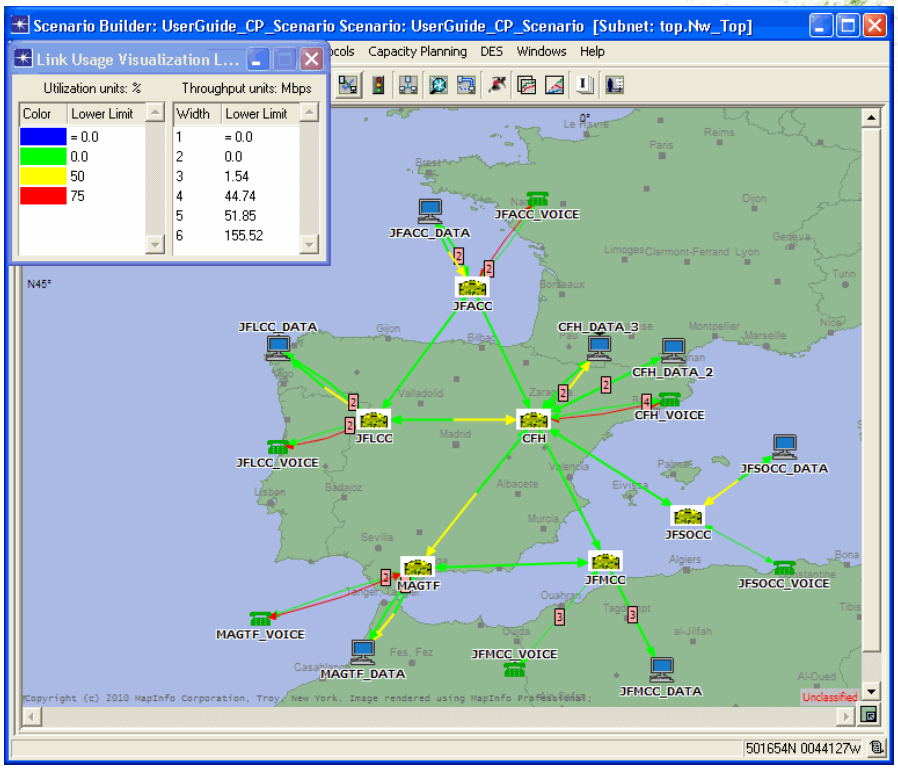
- Introduction
- Unit Laydown
- Infrastructure Deployment
- Traffic Specification
- Capacity Planning
- Views and Briefing
- Conclusion

Capacity Planning

- **Relates to DES**
  - **Use instead of or in addition to DES**
  - **Less time consuming**
- **Two modes**
  - **Evaluation – Snapshot of scenario performance**
  - **Optimization – Suggests network configuration changes**
- **Considers special properties of military devices**
  - **Circuits for Promina devices**
  - **Radio connections**
  - **Recent models not yet supported: AS-SIP, Harris 7800w, JIPM, Waveform Gateway**

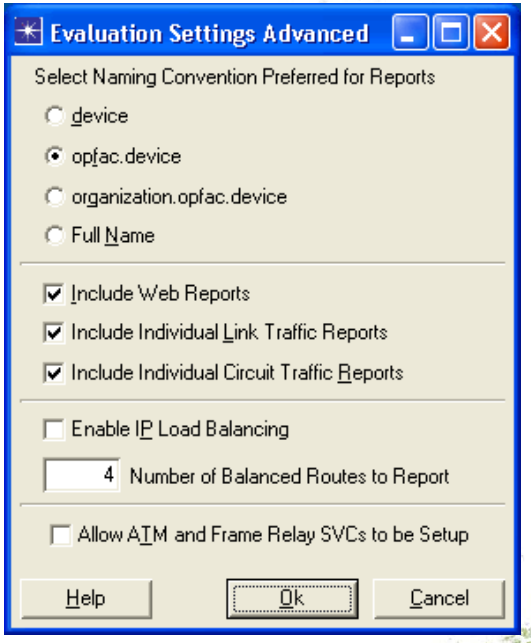
Evaluation

- **Calculates**
  - Load produced by traffic
  - Utilization of connections
- **Routing**
  - Shortest-path
  - May overload links
  - Reports unroutable traffic
- **Evaluate before DES**
  - Sanity check
  - Quick indication of bottlenecks
  - Avoid investing time in repeated simulations



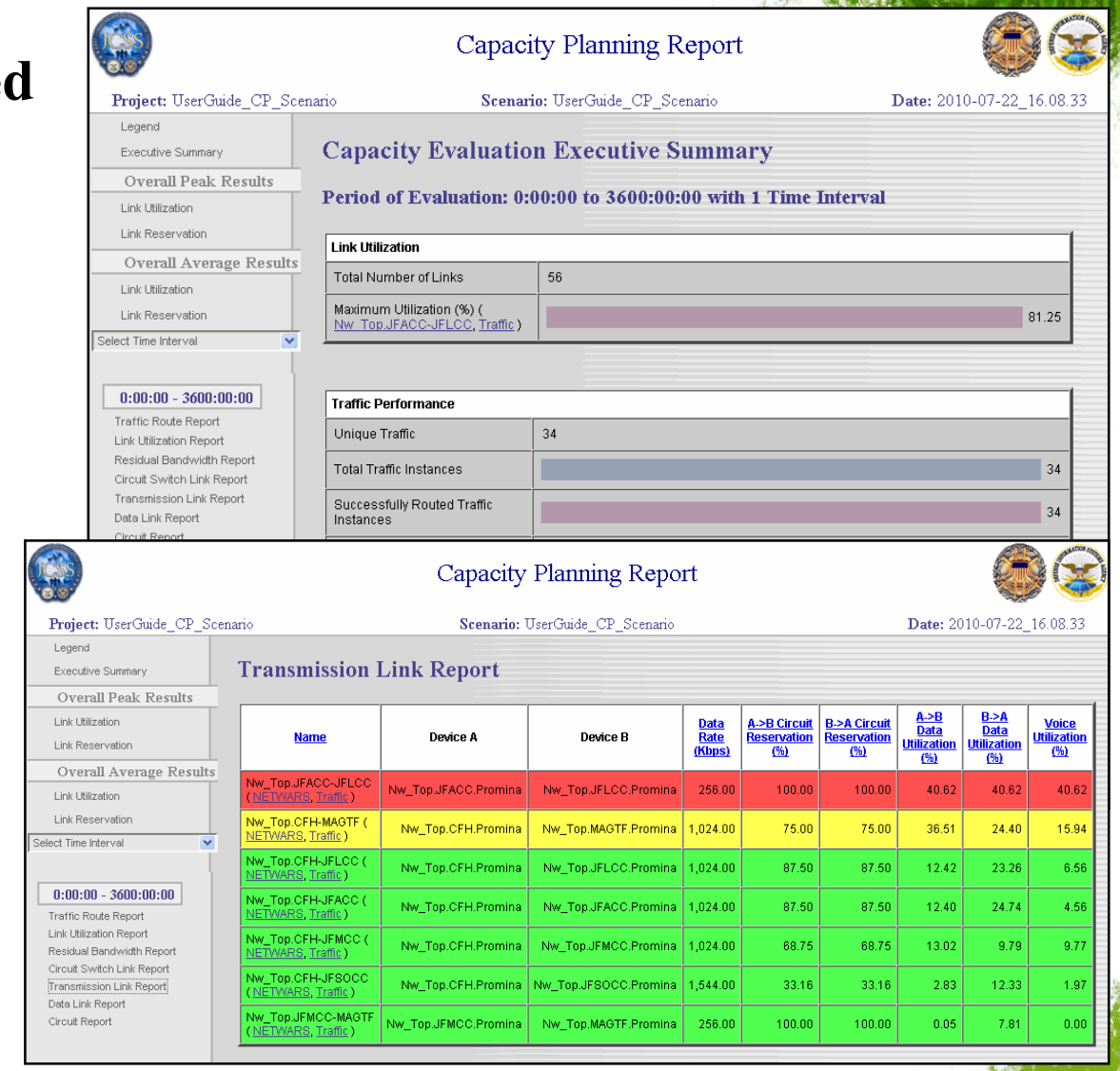
Evaluation Parameters

- **Time**
  - **Multiple time periods**
  - **Specified duration for periods**
  - **Particular start time**
- **IP Load Balancing**
  - **Traffic will use multiple equal hop paths**
- **Appearance of device names in reports**



Evaluation Web Reports

- **Automatically generated by Evaluation**
- **Executive Summary**
  - **Initial page**
  - **Statistics for**
    - **Link utilization**
    - **Traffic**
    - **Circuits**
- **Detailed Reports**
  - **Traffic routes**
  - **Link utilizations**
  - **Residual Bandwidth**
  - **Circuit Switch Link**
  - **Etc.**



Lab 4: Evaluation and Simulation

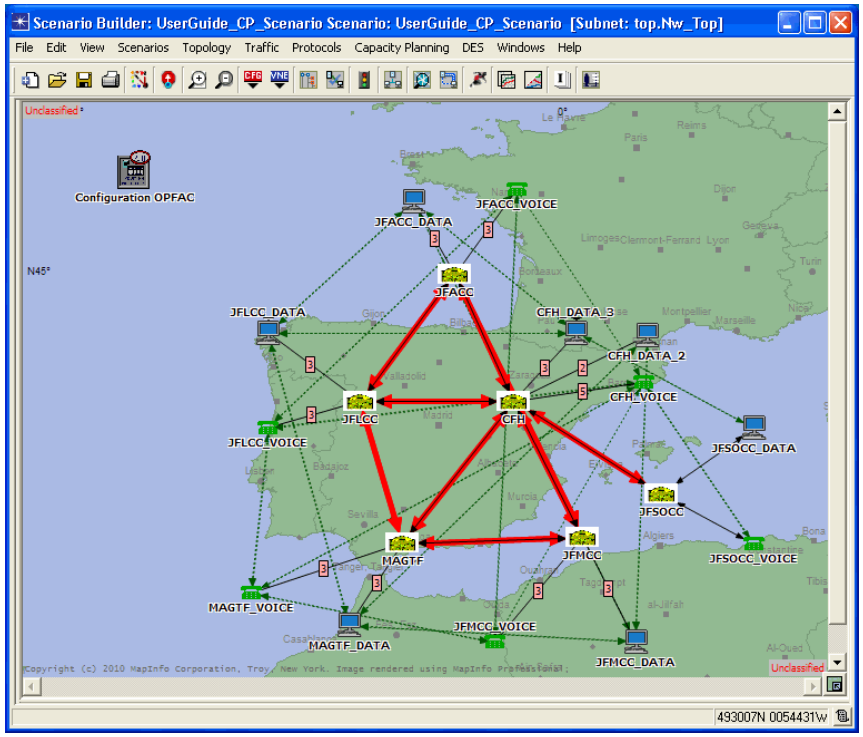
- **Capacity Planning Evaluation**
- **DES IER Reports**

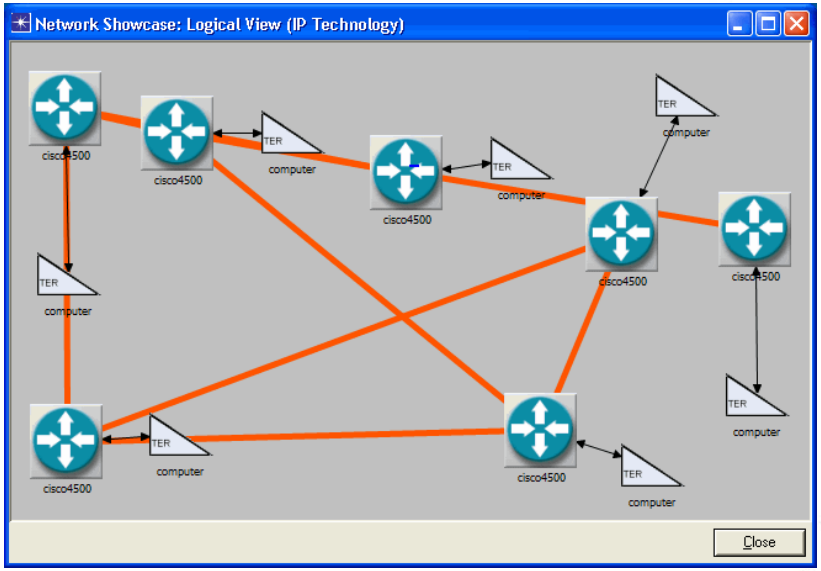
Agenda

- Introduction
- Unit Laydown
- Infrastructure Deployment
- Traffic Specification
- Capacity Planning
- Views and Briefing
- Conclusion

Logical Views

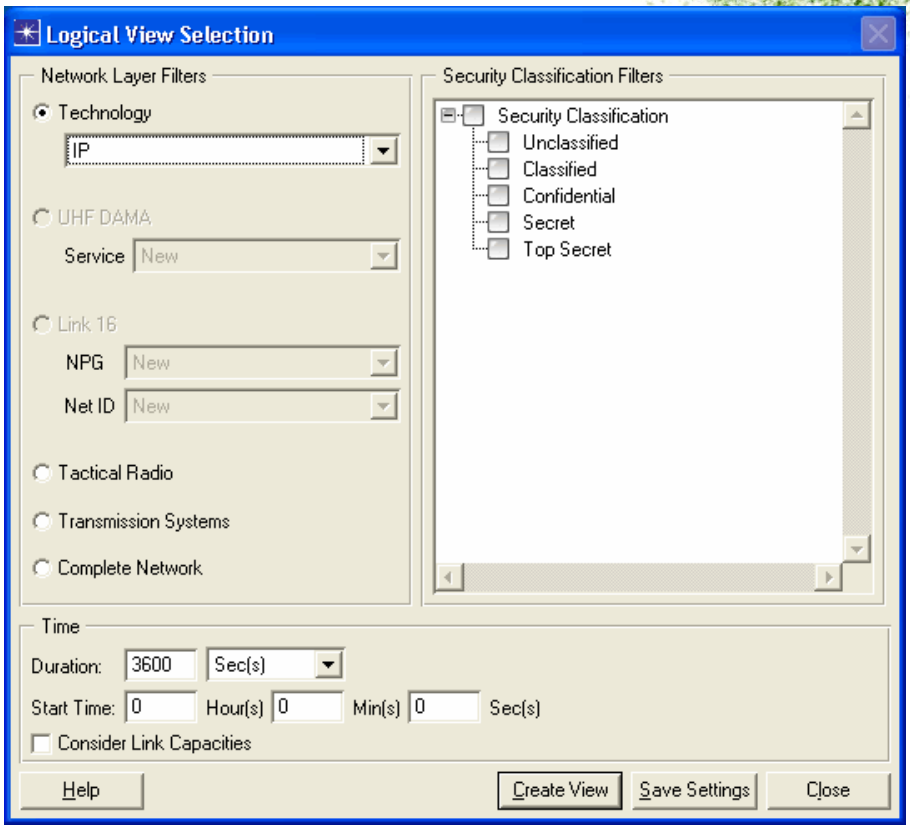
- **Select View > Show Logical Views menu item**
- **Create network showcases based on**
  - **Network layer**
  - **Security classification**





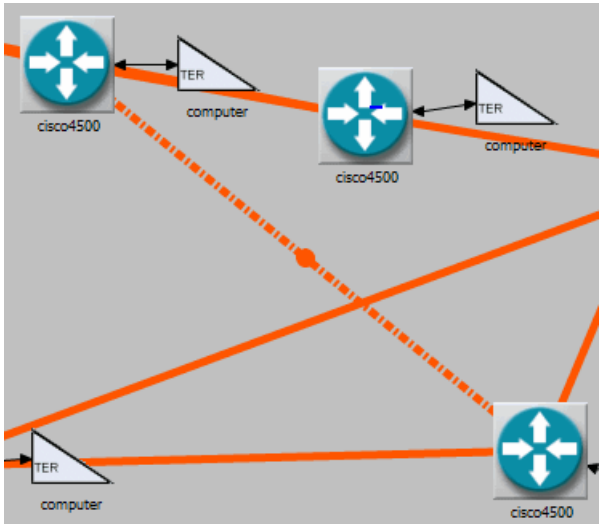
Logical View Selection

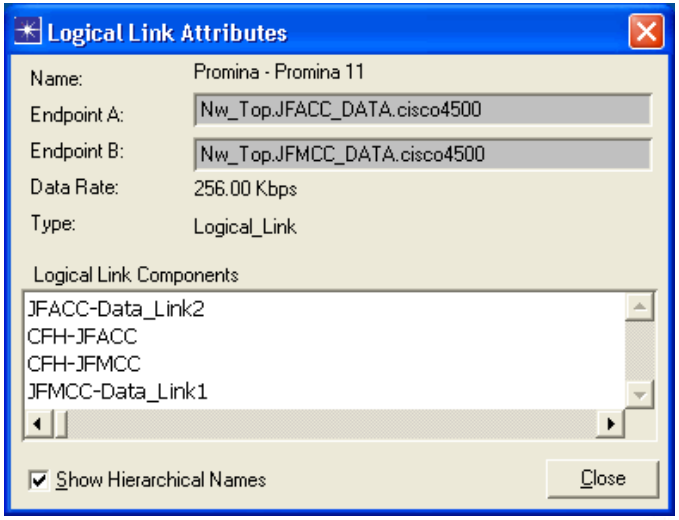
- Filters
  - Limit the included devices
- Security Classifications
  - Limit the included devices
- Time
  - Affect Capacity Planning graphs
  - Duration/Start Time control active traffic
  - Link Capacities may omit overloaded links



Logical Views: Logical Links

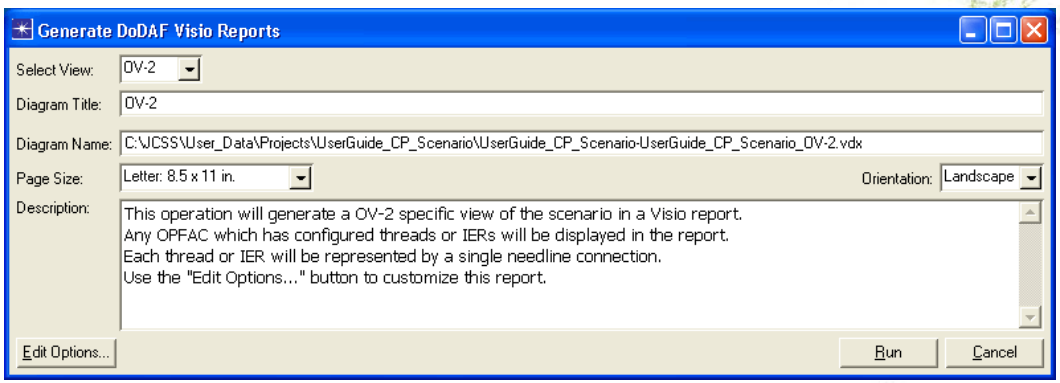
- **Show indirect connectivity between devices**
- **Replace multiple physical links**
- **Select Edit Attributes from right-click menu to find which physical links are represented**
- **Same routing behavior as Capacity Planner**

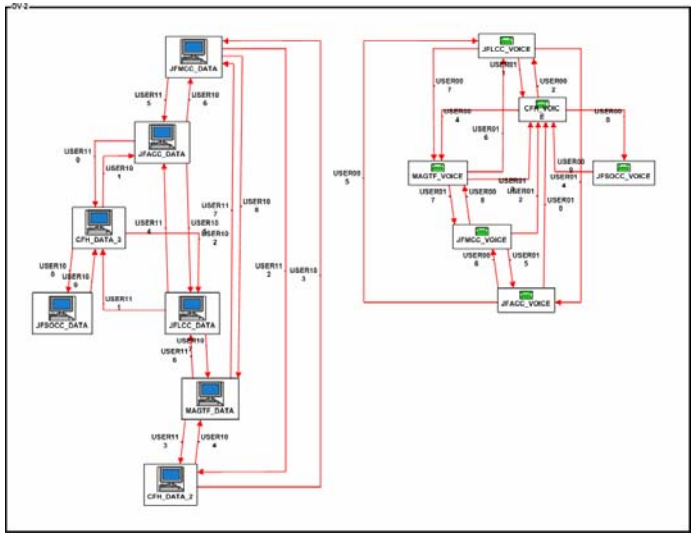


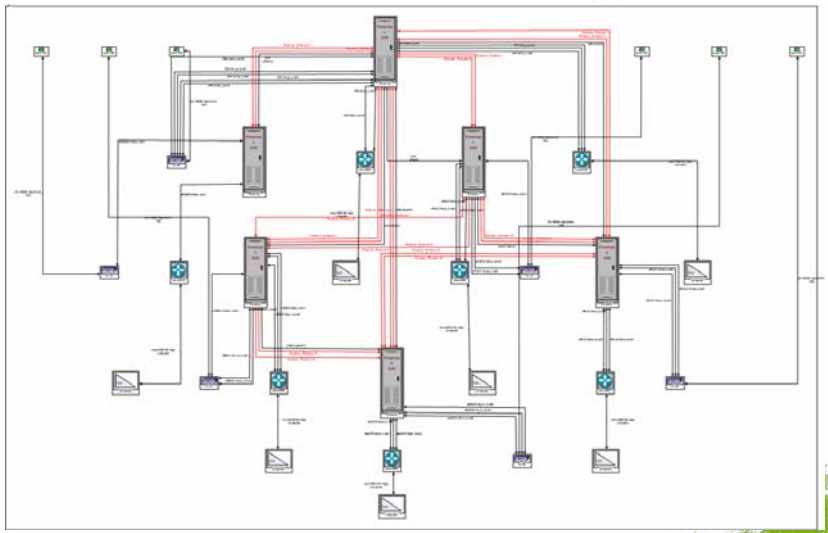


DoDAF Visio Reports

- Export topology and IERs to Visio
- OV-2
  - OPFACs
  - IERs
- SV-2
  - Devices
  - Links
  - Circuits

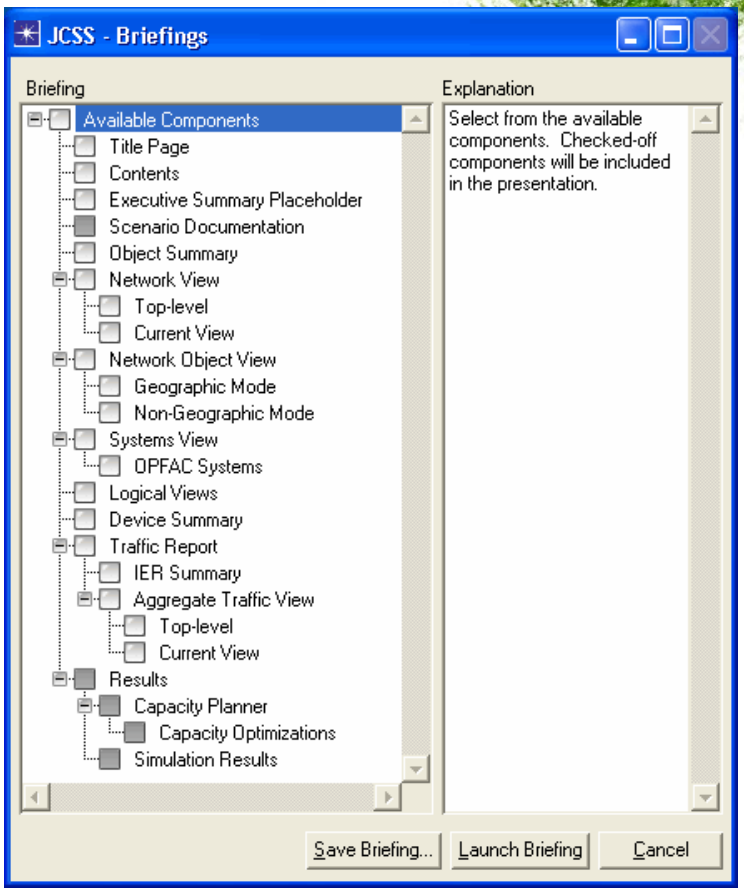






Scenario Briefing

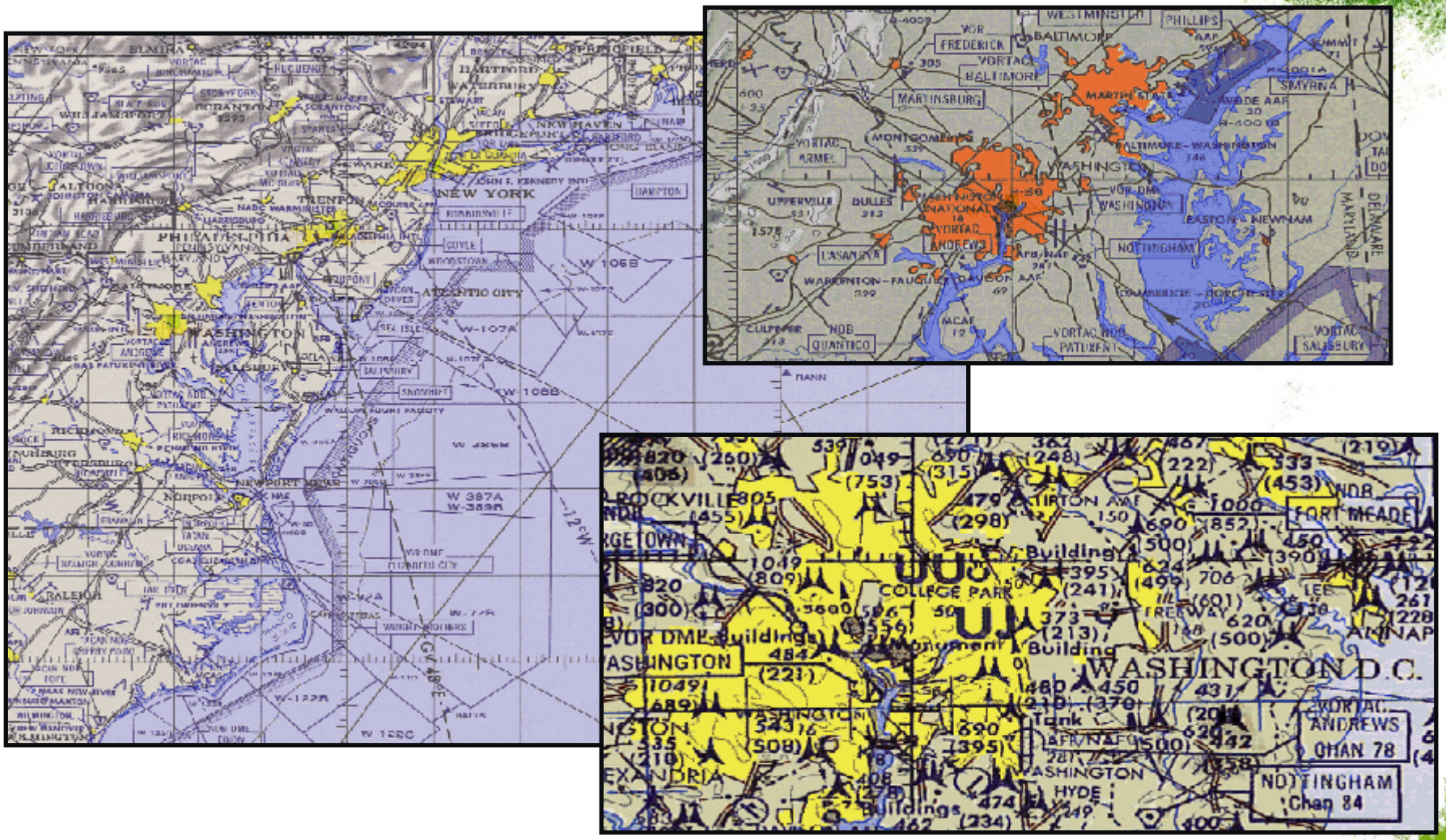
- **Present scenario information at briefings**
  - **Export scenario information directly to PowerPoint**
  - **Requires PowerPoint to create slides**
  - **No need for JCSS to be installed on machine used for briefing**
- **File > Generate Scenario Briefing**



Standard Map Types

- Import all map types using the View > Background menu options
- Border Maps
  - Default maps
- Image Maps
  - Can be superimposed on a border map
  - Add geographical information in form of satellite or aerial images
  - TIFF or GEOTIFF files
- MapInfo Format (MIF) Maps
  - Add geographical information such as roadways, waterways, regions, and counties
- CADRG and CIB Maps
  - Compressed ARC Digitized Raster Graphics (CADRG)
  - Controlled Image Base (CIB)
  - Common map data format used by other programs, such as Falconview
- CADRG/CIB Workflow
  - Set the CADRG/CIB raster catalog directories
    - Select View > Background > Add CADRG/CIB Raster Catalog Directories…
  - Add one or more CADRG/CIB layers to the subnet
    - Select View > Background > Set Properties…
    - Click Edit CADRG/CIB properties…

CADRG Example



Lab 5: Views and Briefing

- **Logical Views**
- **DoDAF OV-2 and SV-2 views**
- **Scenario Briefing**

Agenda

- Introduction
- Unit Laydown
- Infrastructure Deployment
- Traffic Specification
- Capacity Planning
- Views and Briefing
- Conclusion

Roadmap

- **JCSS 10.0**
  - **Released June 2010**
- **JCSS 10.1**
  - **DoDAF Visio Reports enhancements**
  - **Mobility-based IERs (JFCOM Phase 1)**
  - **Waveform Translation Gateway model**
  - **JTRS waveform models**
    - **WNW**
    - **SRW**
    - **Restricted release – requires approval**
  - **Release September 2010**
- **JCSS 11.0**
  - **Reviewing new requirements**
  - **Early 2011**

Obtaining JCSS

- **Obtain JCSS from the JCSS Configuration Manager at DISA**
  - **JCSS@disa.mil**

- **Available to U.S. DoD personnel upon request at no cost**
  - **Submit a Justification Form to JCSS PMO**
  - **JCSS Configuration Manager issues the software**
  - **For more information, visit the JCSS PMO website at:**
    - **www.disa.mil/jcss**

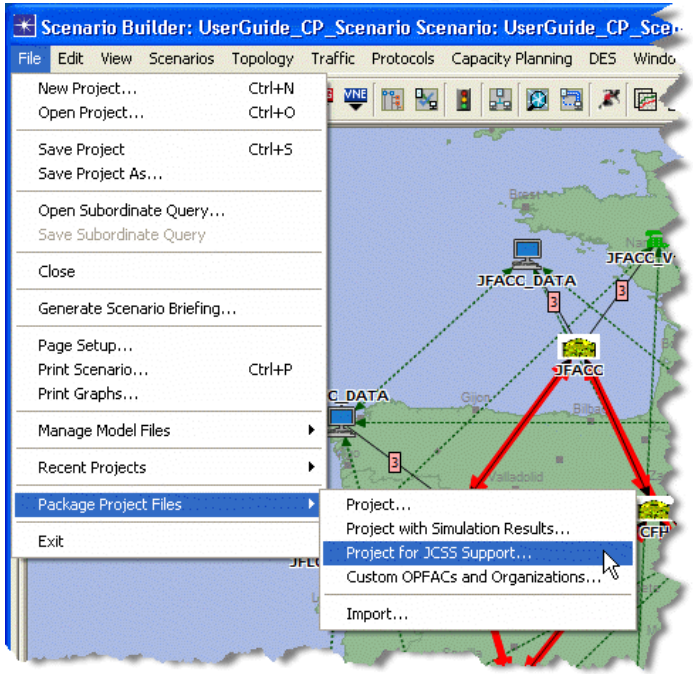
Support Center

- **Information and assistance**
  - **Tech Support Cases**
  - **SPRs**
  - **FAQs**
  - **User Forums**
- **Contacts**
  - **Web – http://www.jcss.disa.mil**
  - **Email – jcss@opnet.com**
  - **Voicemail – 240-497-3000 x6699**

Package Files

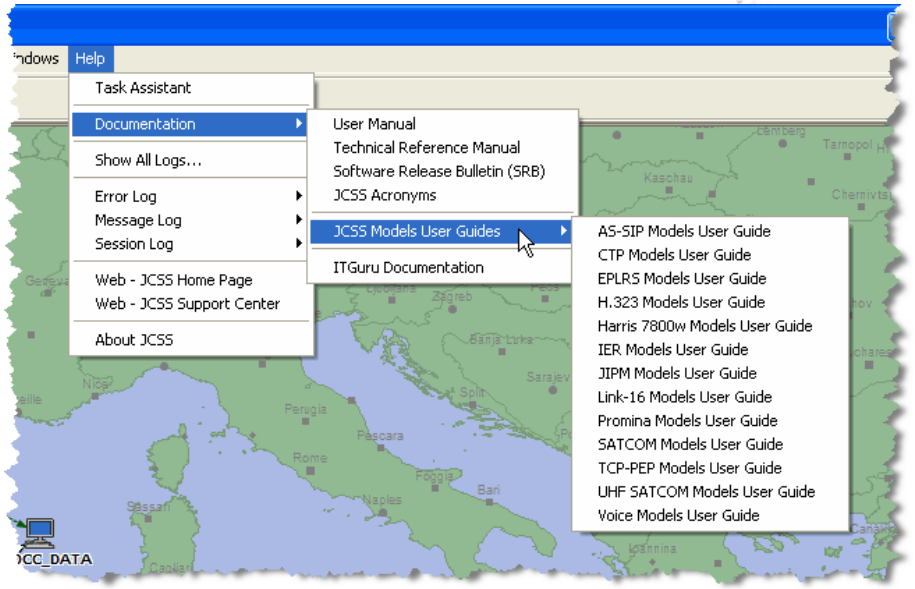
- **Package all files relating to a project**
  - **Run project on another machine**
  - **Report problems to Support Center**

- **Use File > Package Project Files menu items**
  - **Project**
  - **Project for JCSS Support**
  - **Custom OPFACs and Organizations**



Documentation References

- **Available in Help > Documentation menu**
- **User Manual – Workflow**
- **Technical Reference Manual – Individual menu descriptions**
- **Model User Guides**
- **IT Guru Documentation**
- **Software Release Bulletin**
  - **New features**
  - **Reported problems**



Related OPNETWORK Sessions

- 1582 – Planning Tactical Mobile Network Deployments
- 1590 – Modeling Tactical Military Communications Using JCSS

- 1376 – Introduction to Importing and Modeling Network Traffic
- 1382 – Customizing NetDoctor® Rules for Network Auditing and Change Validation
- 1384 – Auditing, Troubleshooting, and Documentation using NetMapper™ Diagrams
- 1502 – Debugging Simulation Models – Introduction
- 1503 – Debugging Simulation Models – Advanced
- 1530 – Modeling Custom Wireless Effects — Introduction
- 1580 – Modeling Custom Wireless Effects — Advanced
- 1586 – Building Realistic Application Models for Discrete Event Simulation
- 1587 – Introduction to 3D Network Visualizer

Take-Away Points

- **Model and analyze networks with military-specific devices**
  - **Tactical radios**
  - **Satellite/earth terminal equipment**
  - **Encryption devices**
  - **Much more**
- **Perform capacity planning analysis of military networks**
  - **IERs**
  - **Promina/IDNX multiplexer circuits**
  - **Other non-commercial network concepts**
- **Complete end-to-end assessments to support equipment and infrastructure acquisition activities**
- **Create briefings to military decision makers**
  - **Logical views**
  - **PowerPoint export**