2012 IMC Spectrum Technology Workshop
16- 20 April, 2012

Presented by

Gary Coffey
gary.coffey@ngc.com

SPEED Overview

- Systems Planning Engineering & Evaluation Device (SPEED)
- Modular software application that provides capabilities to support communications planning, spectrum management and RF engineering
- A Government-Off-The-Shelf (GOTS) program that is free to DoD, all federal agencies and available through Foreign Military Sales
- Current SPEED modules include:
  - Point-To-Point (PTP)
  - Radio Coverage Analysis (RCA)
  - Satellite Planner (SATPLAN)
  - High Frequency Communications Planner (HFCP)
  - Asset Manager (AM)
  - Force Structure Manager (FSM)
  - EPLRS Planner (EP)
  - Spectrum Management (SM)
  - Comm-On-The-Move (COTM)
  - Land Mobile Radio (LMR)
  - WiMAX Planner
  - CPoF Planner

SPEED Overview cont.

- SPEED has been operational since 1988
- Current fielded SPEED version is 11.0.P1 (Jan 2012)
- Current fielded EW Snap-in version is 11.0.0.146 (Feb 2012)
- Authority to Operate (ATO) signed 27 Dec 2011 for the Marine Corps Enterprise Network (MCEN) NIPRNET
- Army Certificate of Networthines (CoN) signed 15 April 2011 only covers version 10.0.3. Army has initiated the CoN process
- Capability to publish overlays to C2PC/JWTC and CPoF
- Air tracks can be exchanged with FalconView, and other air mission planning systems that support Common Route Definition (CRD) file formats
- SPEED unclassified databases can be downloaded via AKO: https://www.us.army.mil/suite/designer

SPEED Training

- SPEED is taught at the following locations:
  - Marine Corps Radio/Communications Chief Course at 29 Palms, Ca.
  - Marine Corps Communication Officer Course at Quantico, Va.
  - Spectrum Operations Apprentice Course (SOAC) at Keesler AFB, Biloxi, Ms.
  - Electromagnetic Spectrum Management (ESM) Course at Fort Gordon, Ga.
  - Ft. Gordon Signal Officer courses, SCCC, BOLC, S6, PRT
  - Ft. Sill Electronic Warfare Officer (EWO) school Incorporating SPEED into the EWO POI
  - Joint Readiness Training Center (JRTC) Fort Polk, La.
  - Mobile Training Team (MTT) support is provided to operating forces worldwide

Version 11.0 P1 Features

- Windows Vista and Windows-7 32/64 bit compatibility
- Database conversation from MS Access to SQL Express
- Enhanced database management via XML import/export
- GPS support for tracking and saving real time routes
- User generated custom reports
- Enhanced mapping and visualization features
- Enhanced spectrum management/interference functionality
- Office 2007 look and feel (ribbons, themes, pinned dialogs)
- Architecture is being redesigned to decouple the business logic/processing from the user interface to more easily support a service-oriented architecture/cloud environment. (This could migrate over to support web and thin client applications.)

"We support web enabled, we will not support web dependant"

Version 11.0 P1 Features cont….

- Mean Sea Level/Above Ground Level (MSL/AGL) support for airborne routes
- Export of MilUnit locations and names
- Auto import of locations into the DB
- Directional antenna modeling enhancements
- Support for selectable gain antennas
- Generate, Import and Export of Shape Files (SHP)
- Generate and Import GeoTiff's
- CPoF overlay export integration
- Ability to change system affiliation (friendly, hostile, unknown)
- Capability to read Digital Terrain Elevation Data (DTED) Level 3
- Print overlay capability
- Auto detection of map folders

Version 11.0 P1 Features cont…

- WiMAX RF Planner integration
  - 802.16d (Fixed WiMAX) Point-To-Point (PTP) analysis
  - 802.16d (Fixed WiMAX) Point-To-Multi-Point (PMP) analysis
  - 802.16e (Mobile WiMAX) analysis
  - Multiple HATA COST-231 propagation models
  - Multiple Stanford University Interim (SUI) propagation models
- Numerous additional WiMAX enhancements from original planner
- Propagation analysis to support frequencies below 1 Mhz
- MCEB Pub-8 compliant conversion
  - Joint Restricted Frequency List (JRFL)
  - Standard Frequency Action Format (SFAF)

Ongoing Coordination with JSC to ensure successful integration

Version 11.0 P1 Install Issues

- Because of the changes in the architecture and database for version 11.0 P1 and follow-on versions, it is very important for all users to verify certain parameters prior to installing SPEED
- For XP users, service pack 3 is required (A lot of non NMCI systems only have service pack 2 installed)
- Issues have been identified with ACES/JACS and some of the Harris communications software, which in some instances prevents SPEED's DB from installing correctly
- Fewer problems have been identified with computers that had more current Microsoft hotfixes and updates installed
- Army users, SPEED can only be verified on systems utilizing the United States Army Golden Master- Build 6002, Vista Client Unclass v3.7, dated 28 Oct 2010

Read the documentation files prior to installing SPEED 11.0 P1!

Version 11.1 Features

- Continued Pub-8 development
  - Frequency proposal submission to SXXIO
  - Check status of proposals
  - Retrieve approved frequencies from SXXIO
- HF ALE multi-day enhancements
  - Multiday sunspot additions
  - Auto apply of ranked antennas
- Asset Manager enhancements
  - Redesigned GUI
  - Incorporation and automation of forms (ECR, SF-153)
  - Additional categories and fields
  - Sync Asset Manager with custom reports
  - Expanded personnel roster capabilities
  - Joint Manning Document (JMD) support
  - Joint Convoy manifest

Version 11.1 Features cont....

- Enhancements to the AN/TRC-170 algorithm (Force Tropo)
- Ability to change map icons from a library of icons
- Import/Export of KML/KMZ files
- DD-1494 template
- Support for both MSL and AGL settings
- Support for and modeling of antennas with different TX/RX gains
- Ability to select distant station or target parameters for coverage plots
  - Operator has the option of selecting limited or detailed parameters

Anticipated release of version 11.1 is the May 2012 timeframe

Version 11.2 Features

- Fully integrated NASA WorldWind map
  - Embedded 2D and 3D map
  - Legacy command map removed
- Re-engineered custom reports and templates
- Enhanced RF modeling to support Frequency Dependent Rejection (FDR)
- Additional equipment and systems
- Continued Pub-8 development
- Additional support for AGL/MSL modeling
- Additional Asset Manager enhancements
- All EW snap-in functionality will be fully integrated into version 11.2

Anticipated release of version 11.2 is the Oct 2012 timeframe

Map Data

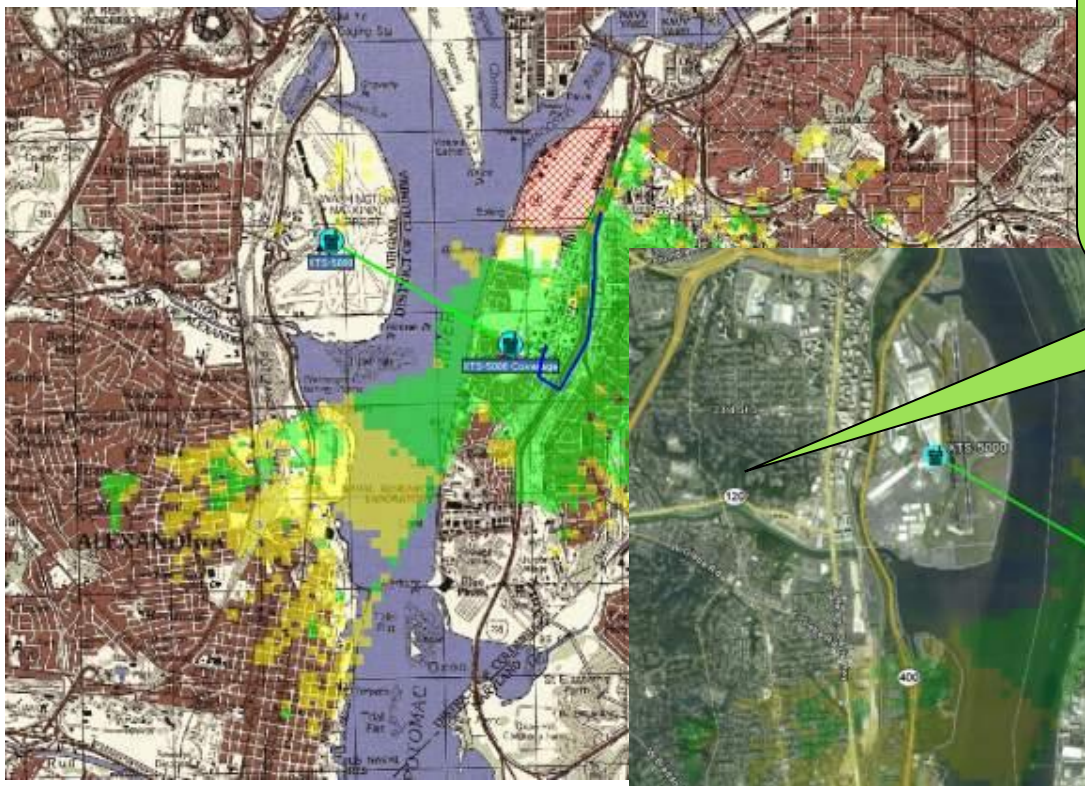
- The following map products are supported by SPEED:
  - Standard Digital Terrain Elevation Data (DTED) Level 1, 2 and 3
  - High Resolution Terrain Elevation (HRTE) Level 2 and 3
  - Shuttle Radar Topology Mission (SRTM) Level 1 and 2
  - Shuttle Radar Topology 2 Filled (SRT2f) Level 1 and 2
  - Compressed Arc Digitized Raster Graphics (CADRG)
  - Controlled Image Base (CIB) 1, 5 and 10 meter
  - Shape Files (shp)
  - KML/KMZ file import/export
  - GEO Tiffs

Shape (SHP) Files

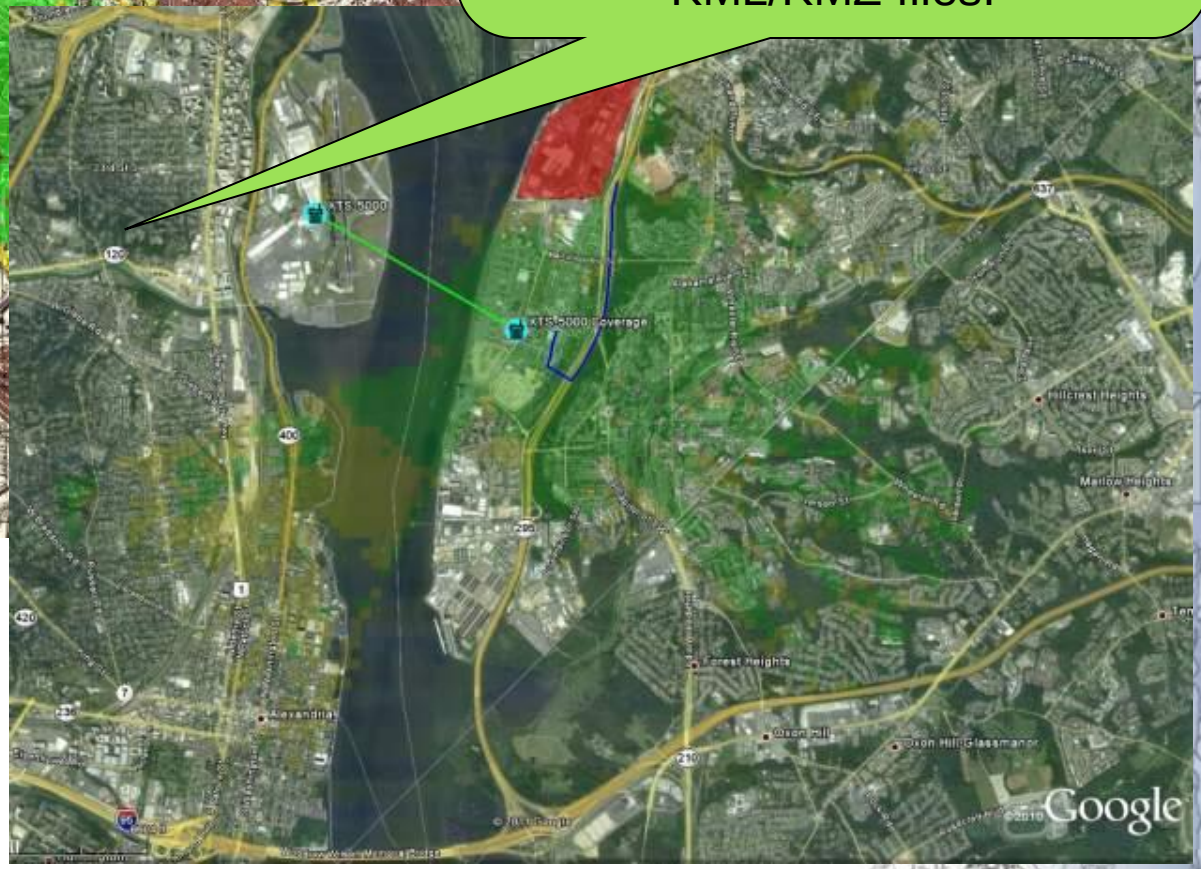
GEOTiffs

Users can import GEOTiff's or generate them from applications such as Google Earth to provide more detailed planning.

KML/KMZ Files



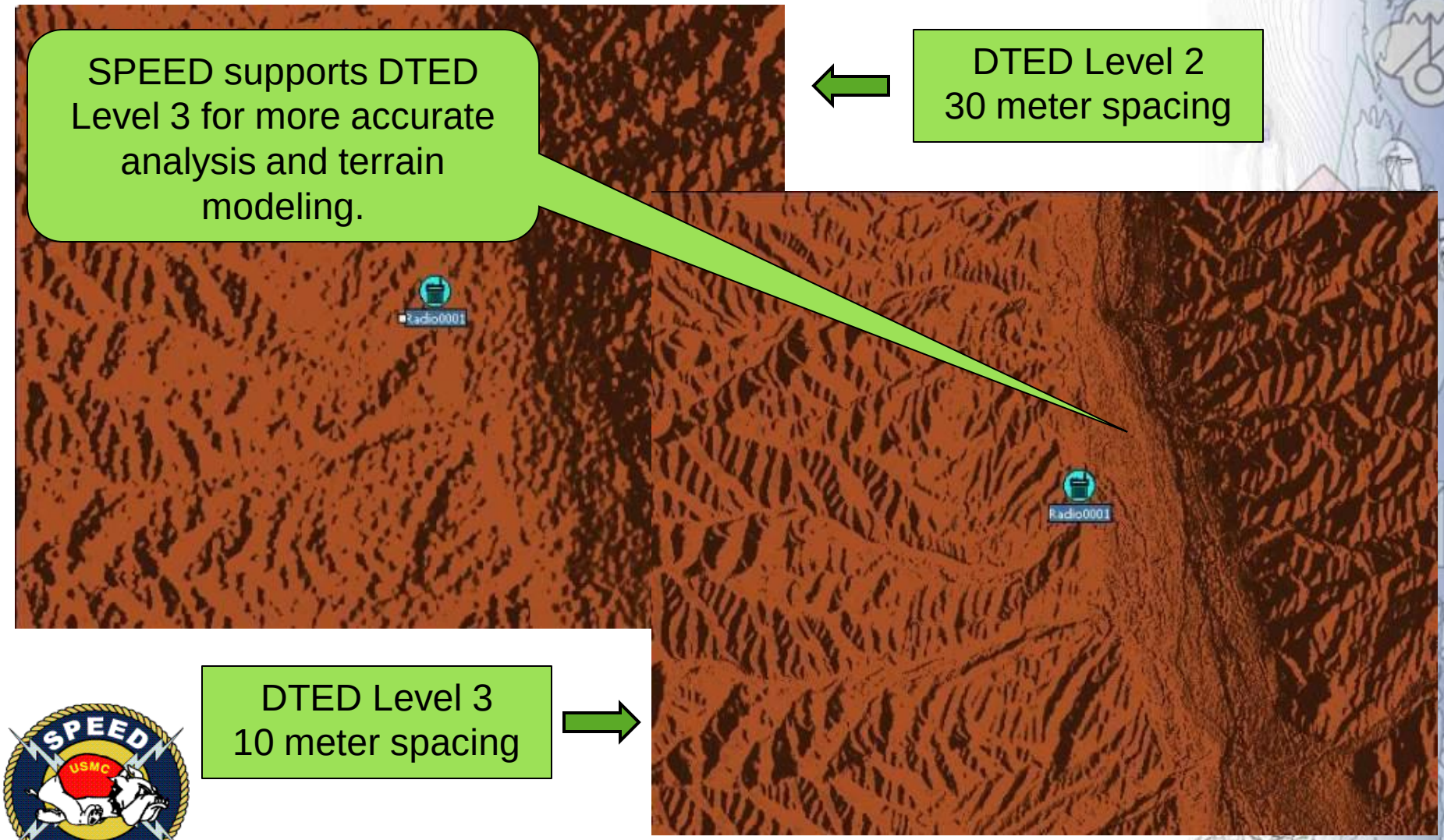
Map graphics and analyses can be exported as KML/KMZ files and opened in Google Earth. SPEED can also import KML/KMZ files.



DTED Level 3

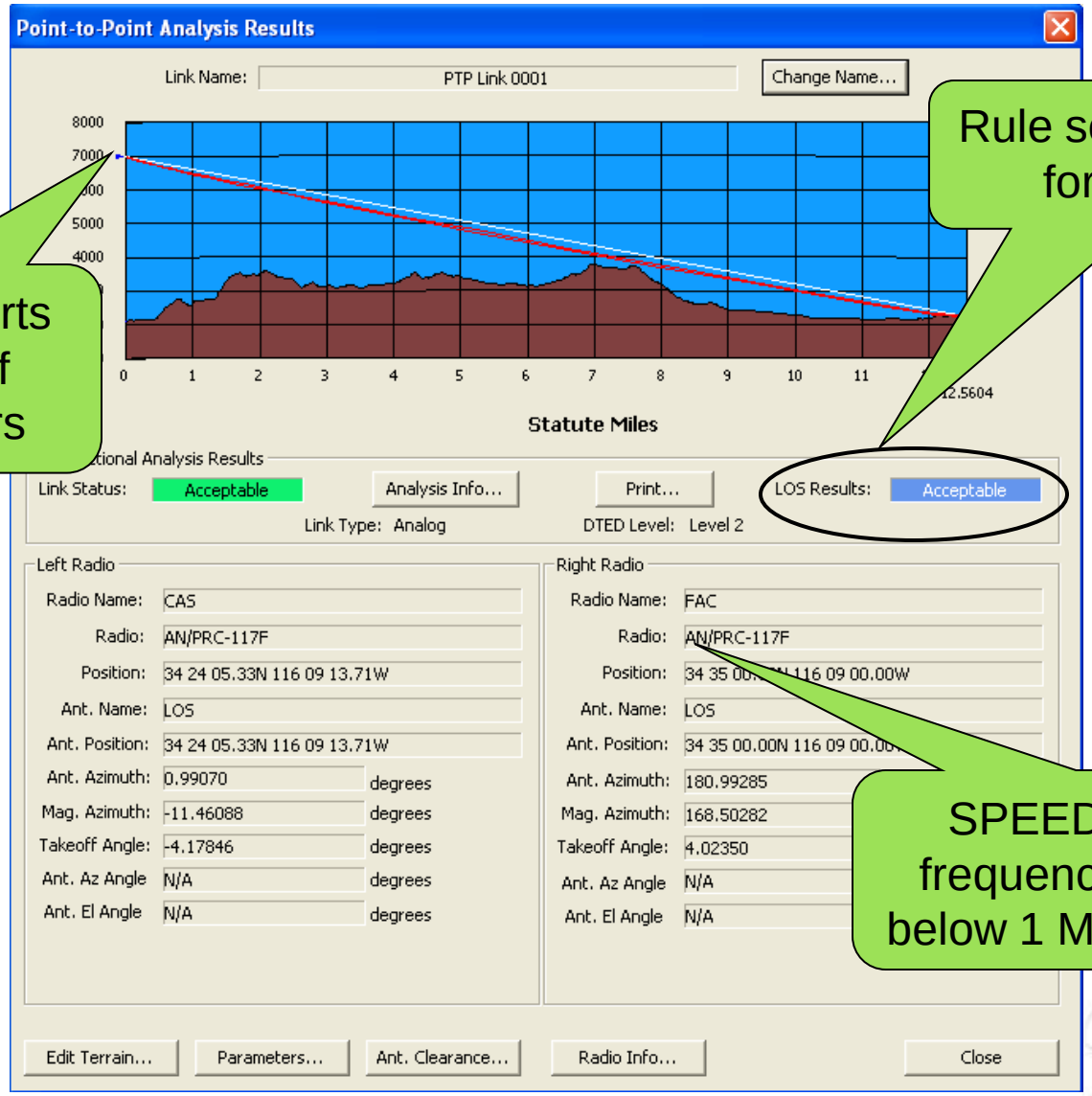
SPEED supports DTED Level 3 for more accurate analysis and terrain modeling.

DTED Level 2
30 meter spacing



DTED Level 3
10 meter spacing

RF Engineering

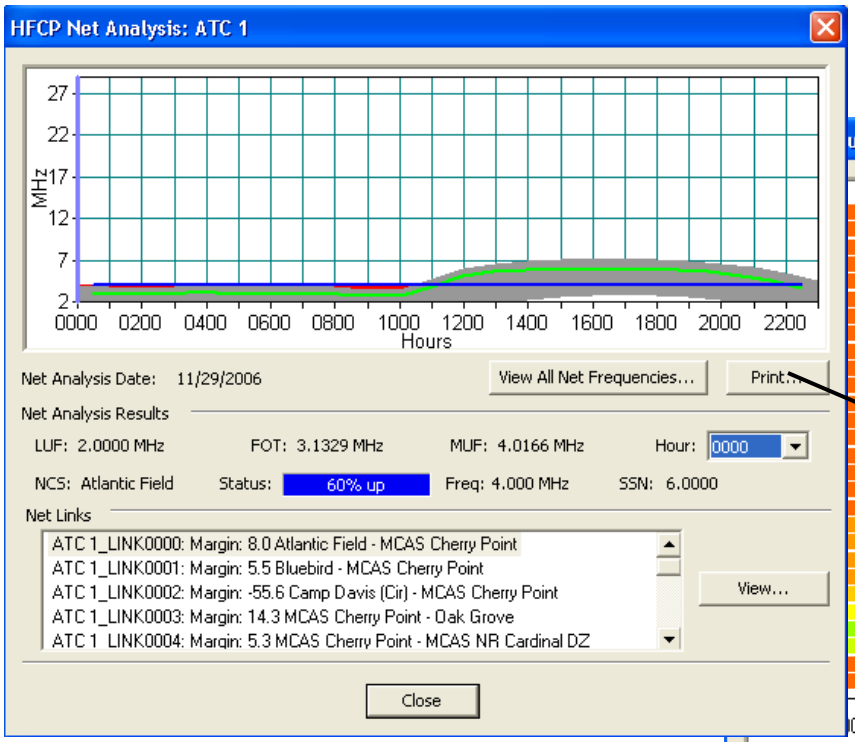


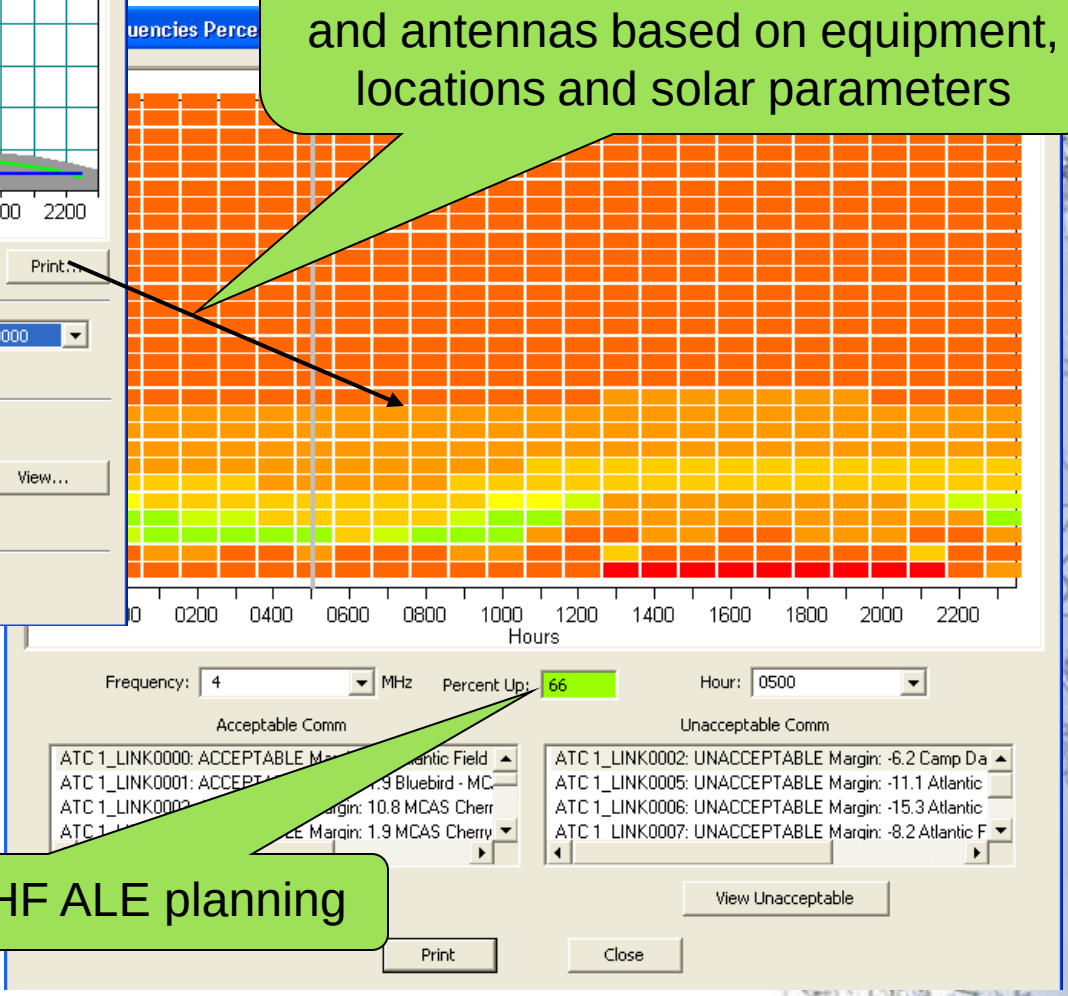
SPEED supports an altitude of 30,000 meters

Rule sets are applied for LOS links

SPEED supports frequencies ranging below 1 Mhz to 20 Ghz

RF Engineering cont.

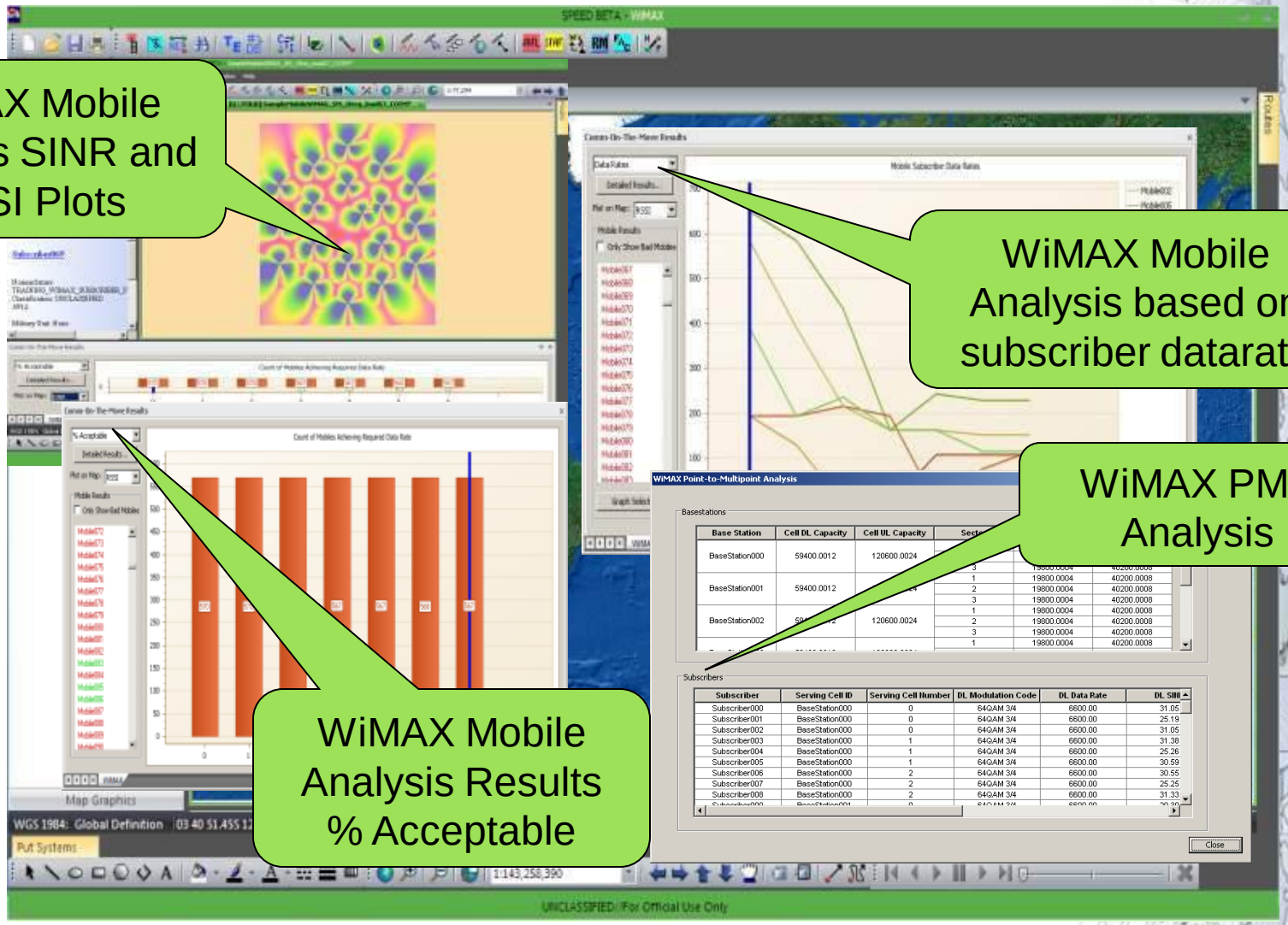




HF links can be analyzed to determine the optimum frequency and antennas based on equipment, locations and solar parameters

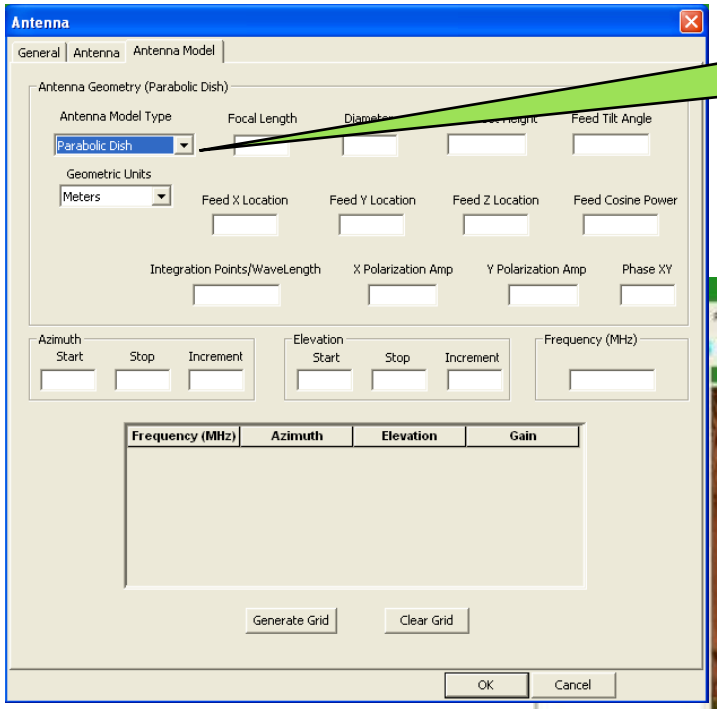
SPEED supports HF ALE planning

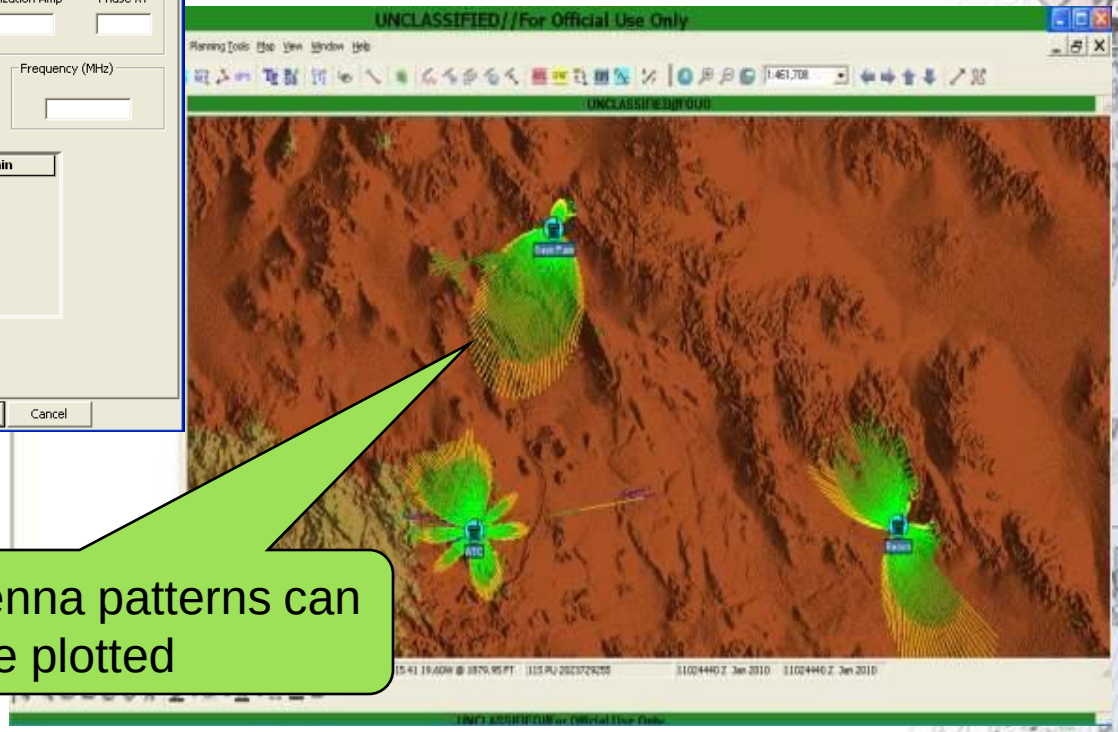
WiMAX Engineering



Directional Antenna Modeling

Directional antennas can be modeled by generating antenna gain grids

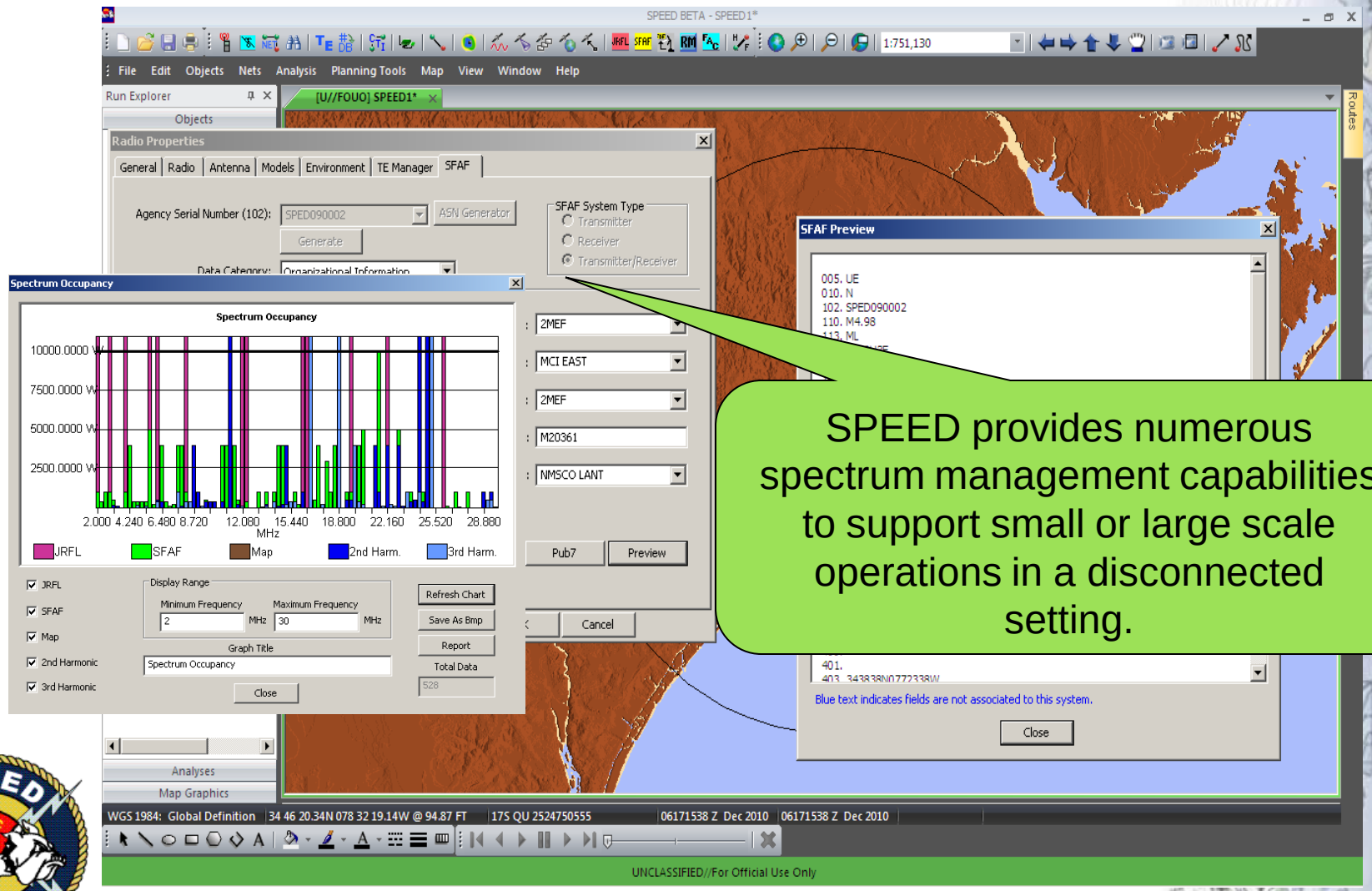




Directional antenna patterns can then be plotted

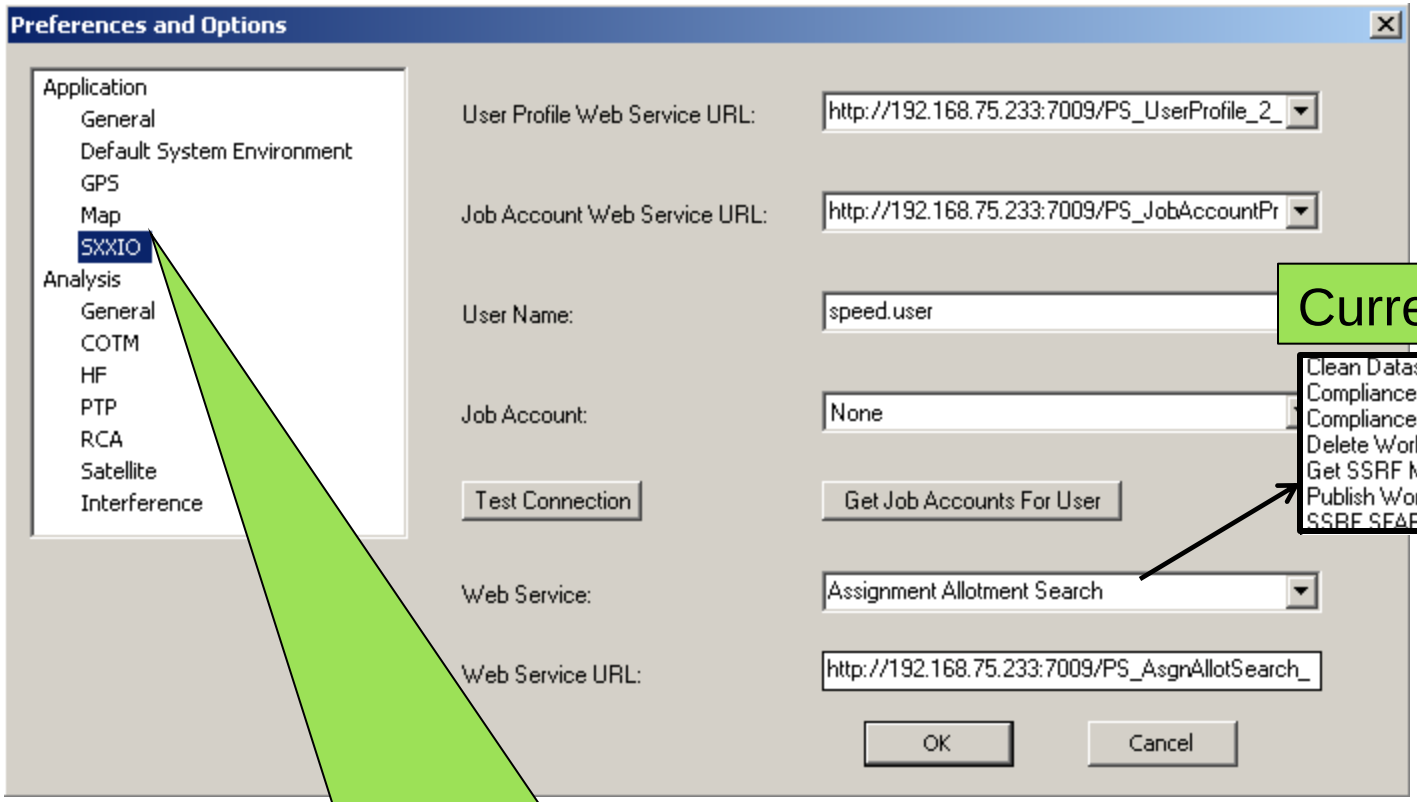
Unclassified

Disconnected Spectrum Management



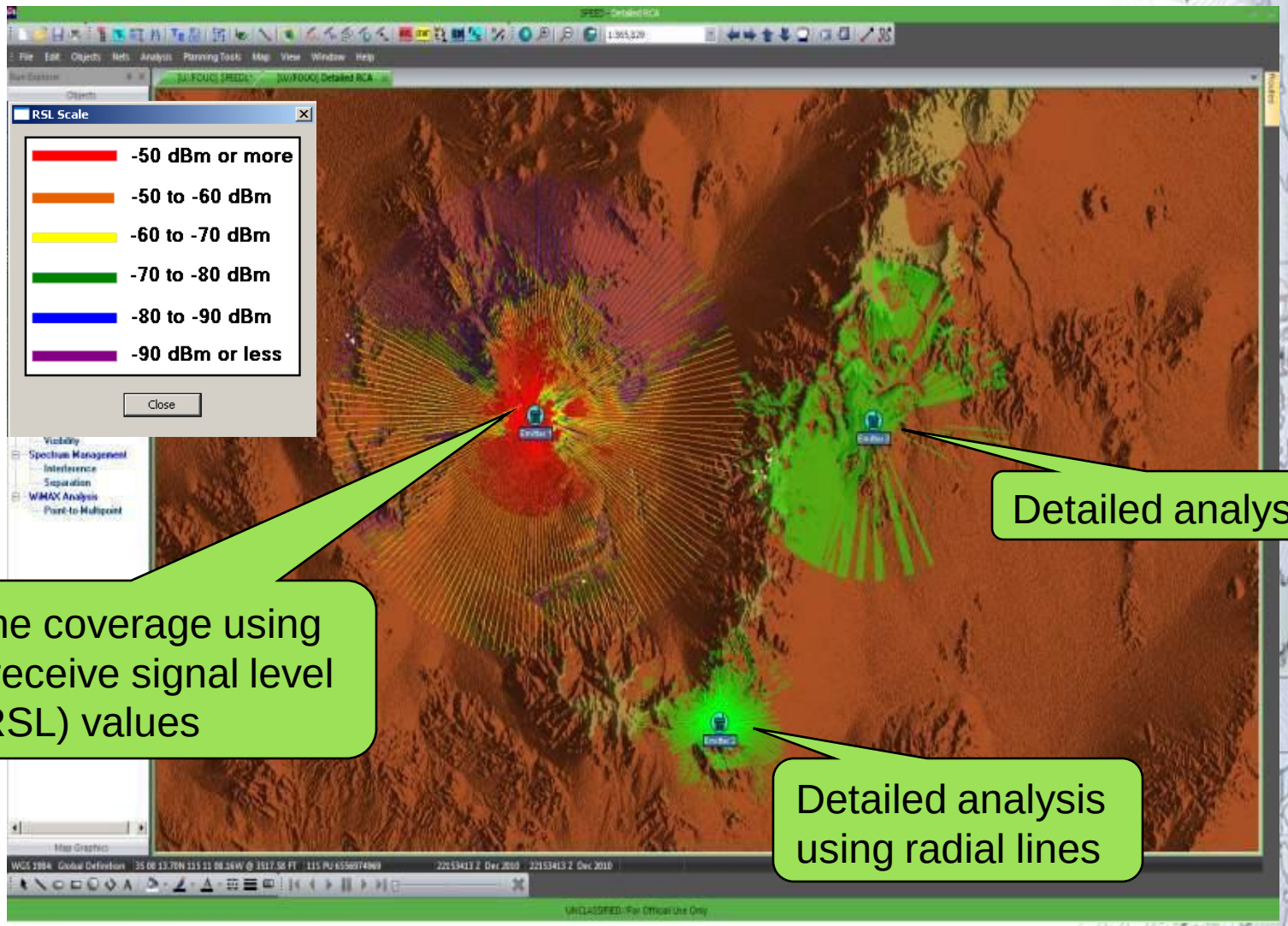
SPEED provides numerous spectrum management capabilities to support small or large scale operations in a disconnected setting.

Online or "Connected" Spectrum Management

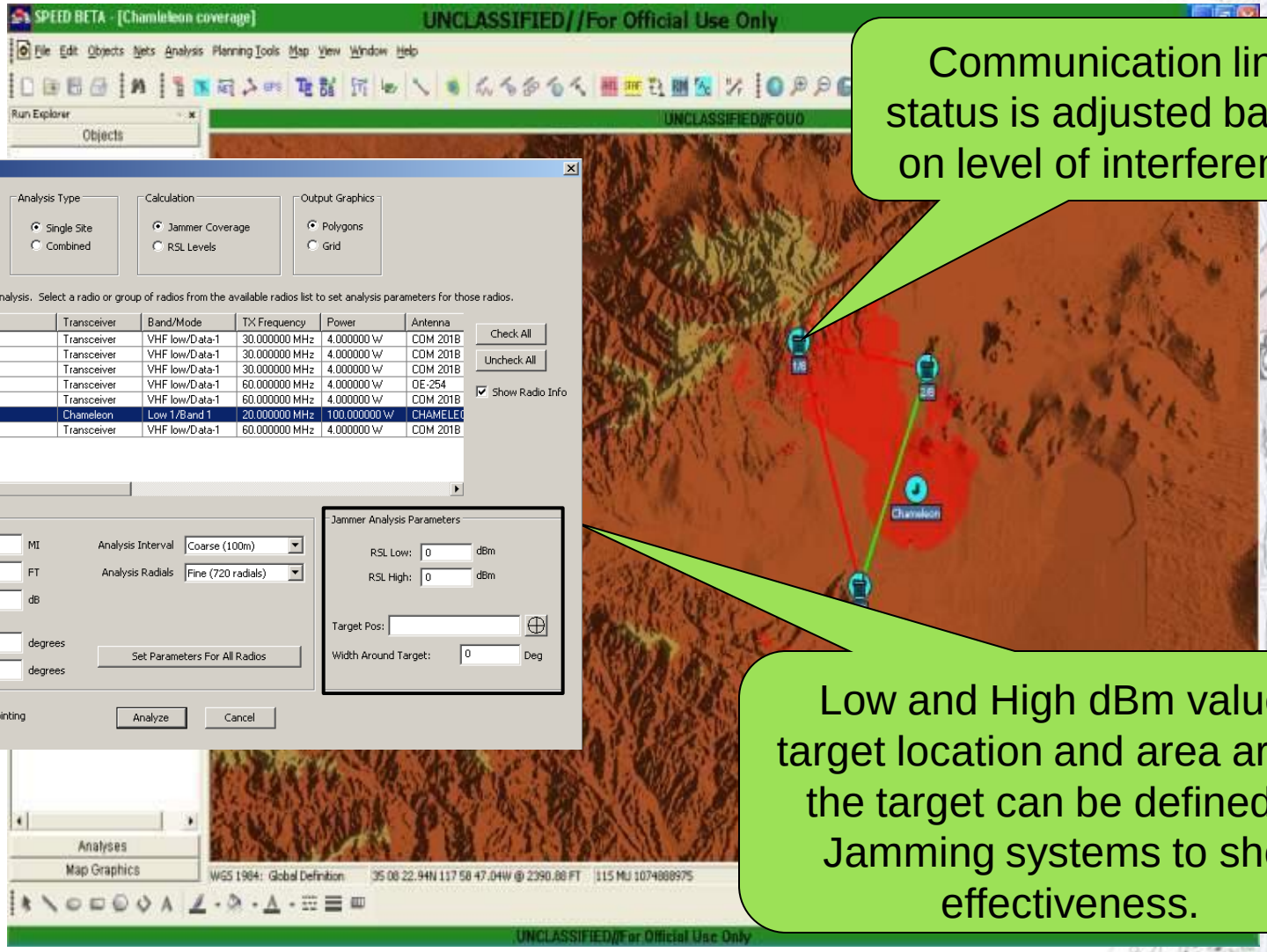


SPEED is one of the first spectrum management tools to exchange web based services with Spectrum XXIO

Enhanced Coverage Plots



Jammer Coverage Plots cont.



Communication link status is adjusted based on level of interference

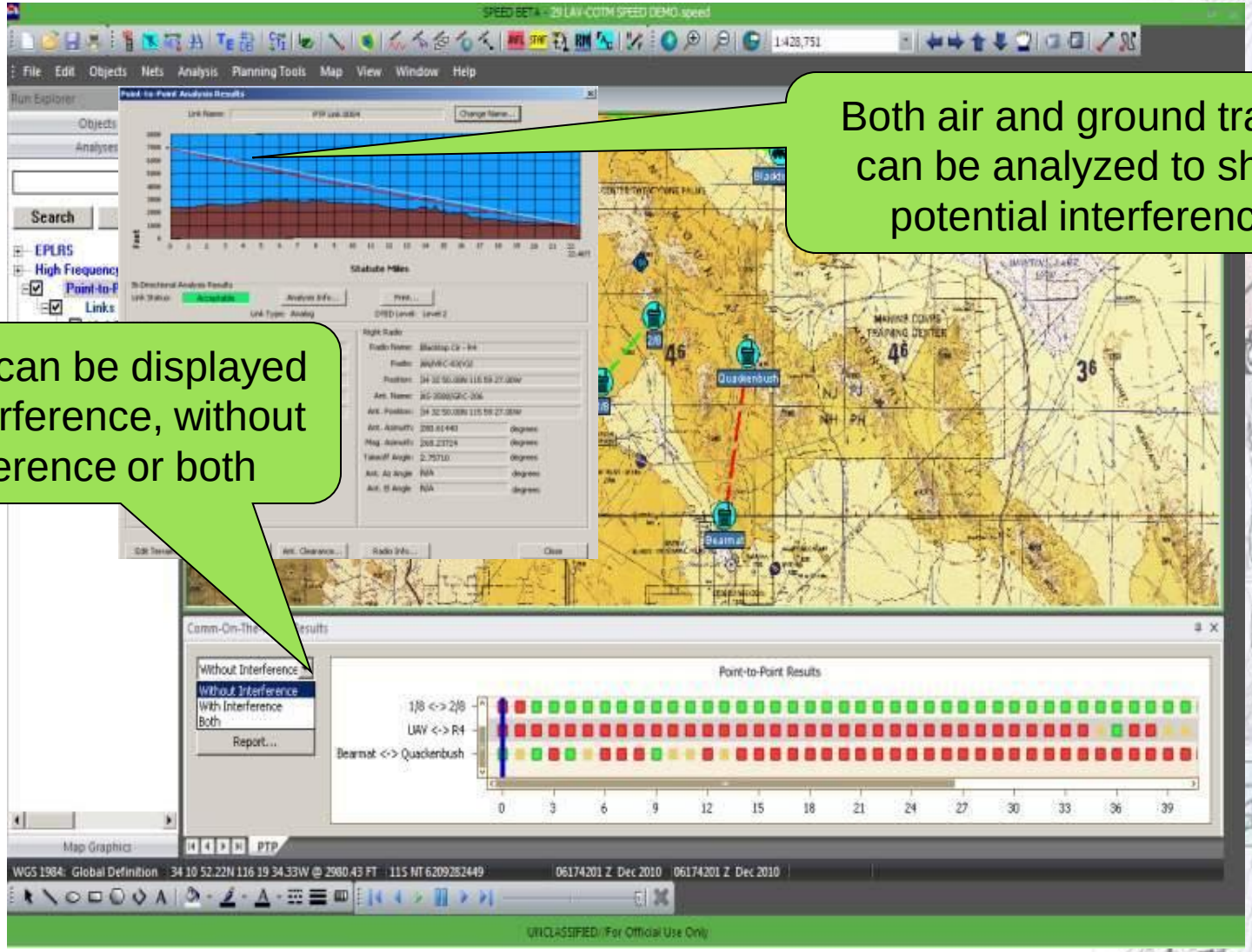
Low and High dBm values, target location and area around the target can be defined for Jamming systems to show effectiveness.

Limited technical data used in the unclassified version

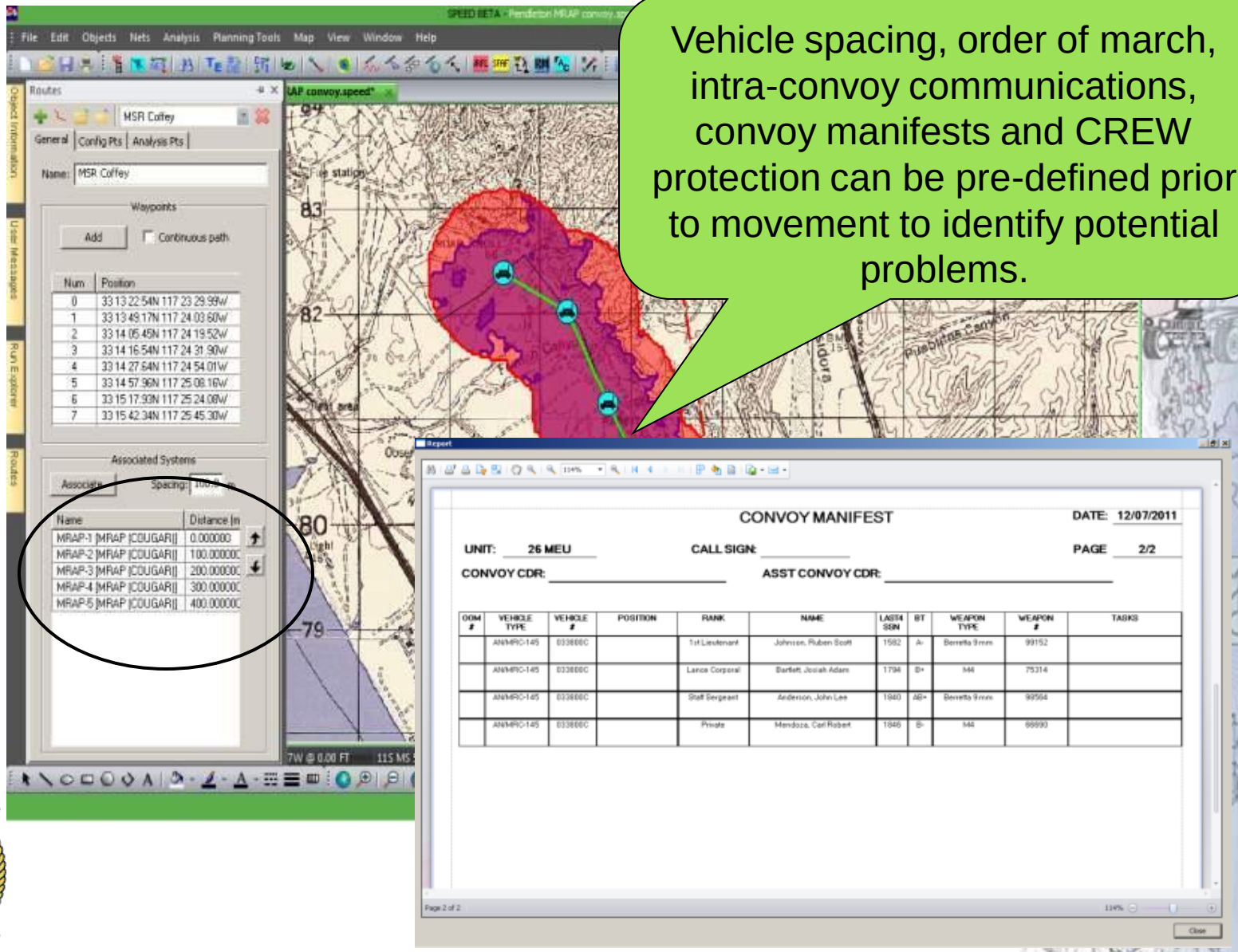
Interference Radials

Interference is shown as color coded radials based on terrain, distance, dBm levels and SNR w/SI.

COTM


Both air and ground tracks can be analyzed to show potential interference
Results can be displayed with interference, without interference or both
Point-to-Point Results
Without Interference
With Interference
Both
Report...
1/8 <-> 2/8
UAV <-> R4
Bearmat <-> Quackenbush
Quackenbush
Bearmat
UNCLASSIFIED / For Official Use Only

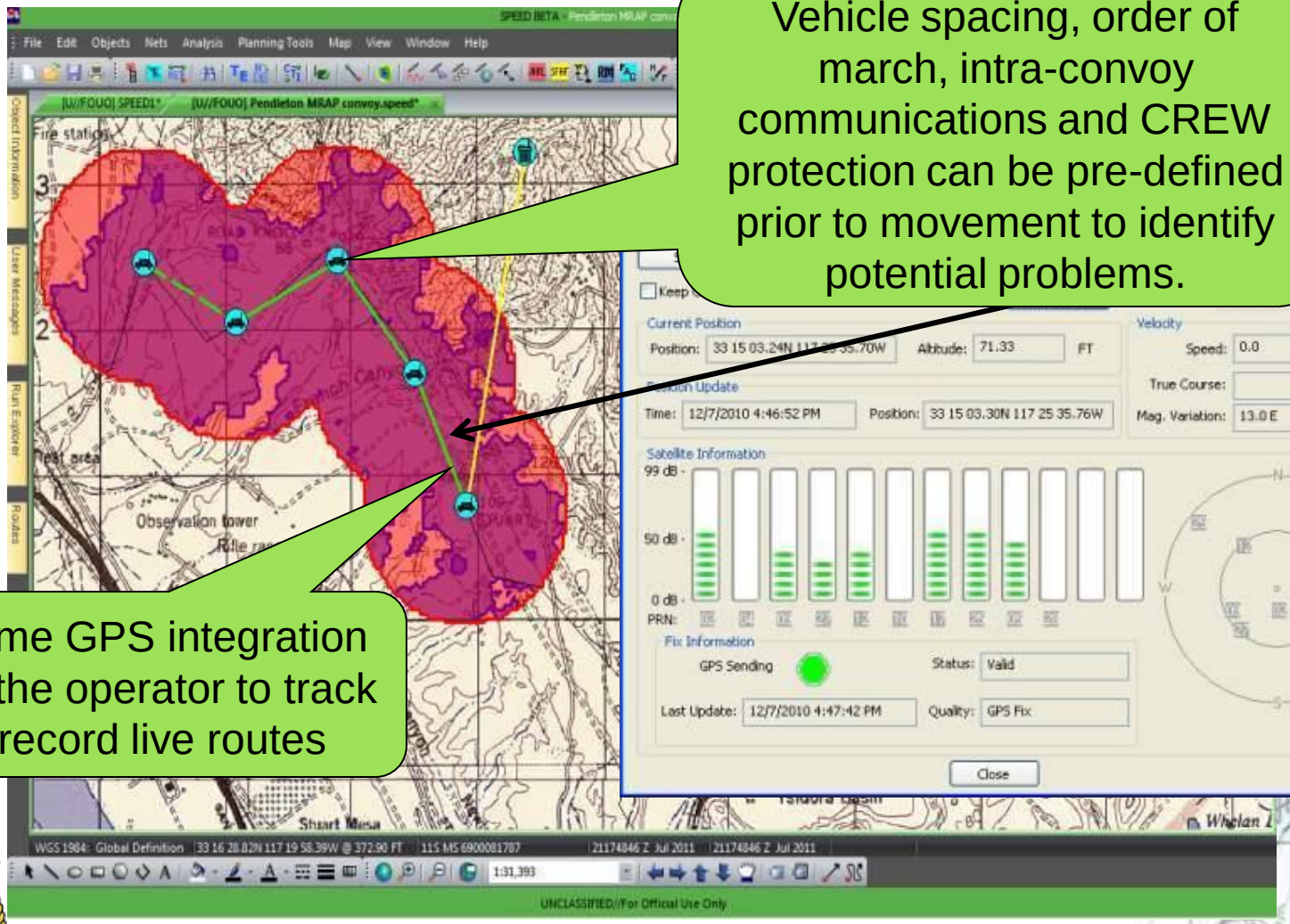
COTM with Jammers



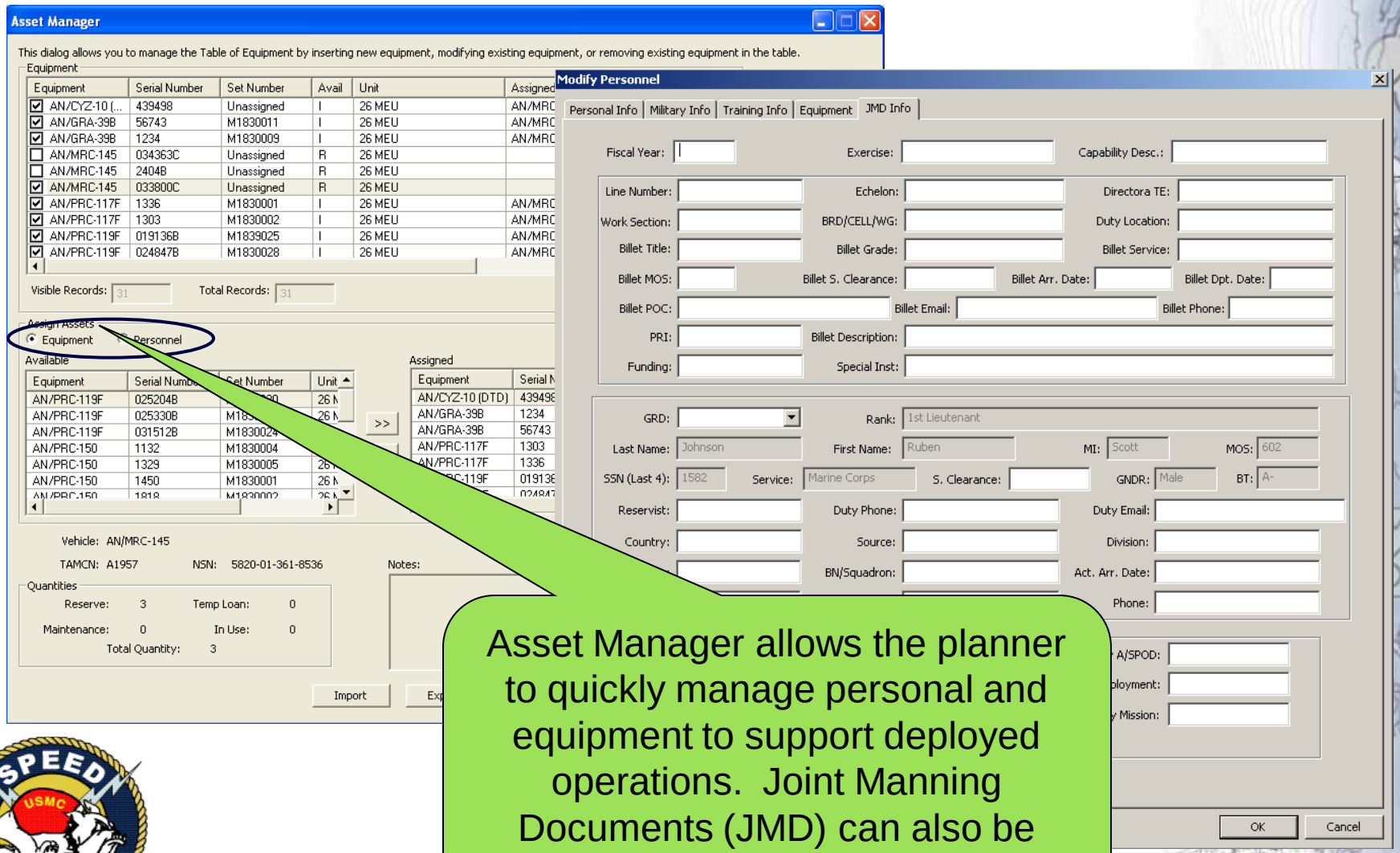
GPS integration

Vehicle spacing, order of march, intra-convoy communications and CREW protection can be pre-defined prior to movement to identify potential problems.

Real time GPS integration allows the operator to track and record live routes



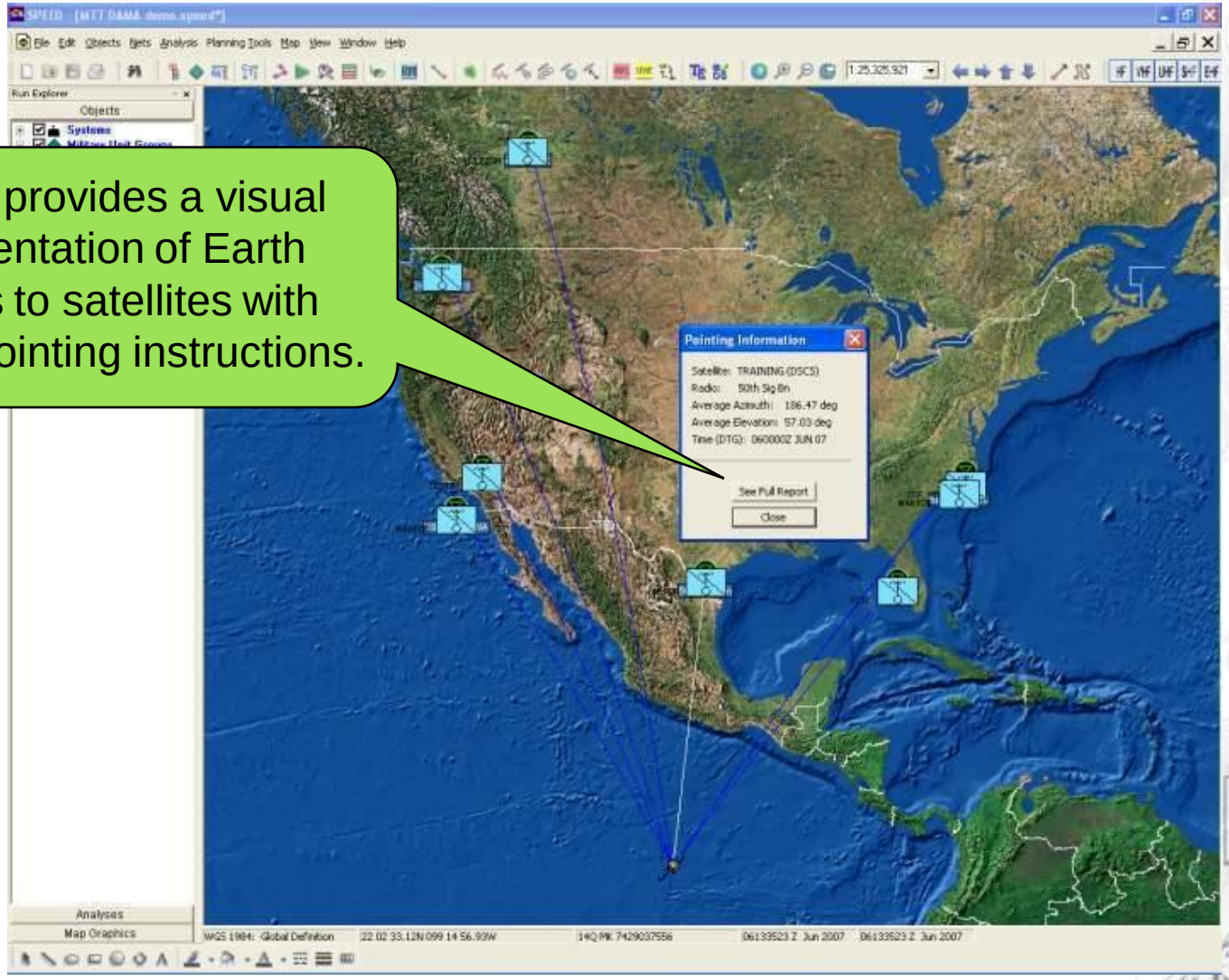
Asset Manager



Asset Manager allows the planner to quickly manage personal and equipment to support deployed operations. Joint Manning Documents (JMD) can also be imported and exported.

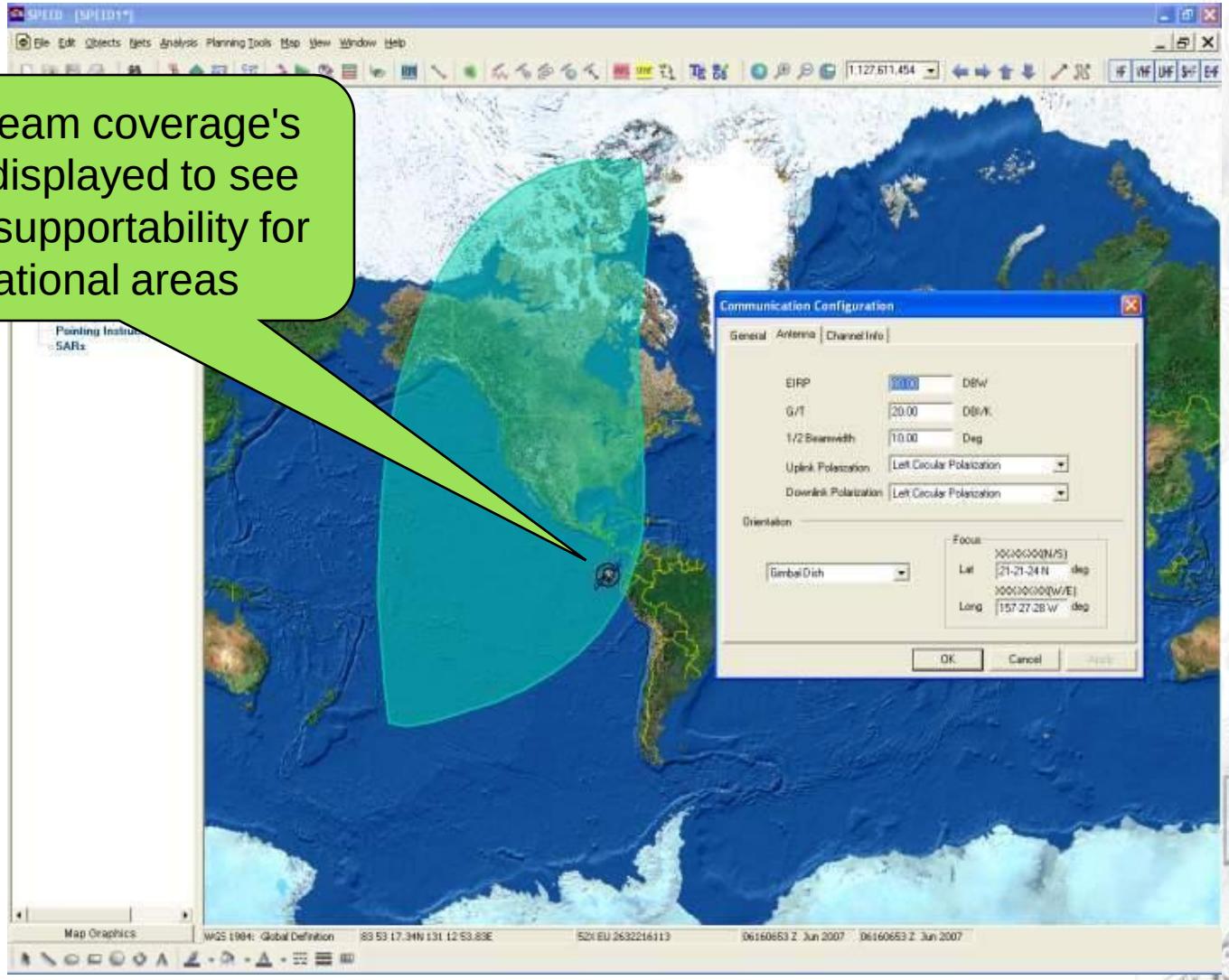
Satellite Look Angles

SPEED provides a visual representation of Earth stations to satellites with detailed pointing instructions.

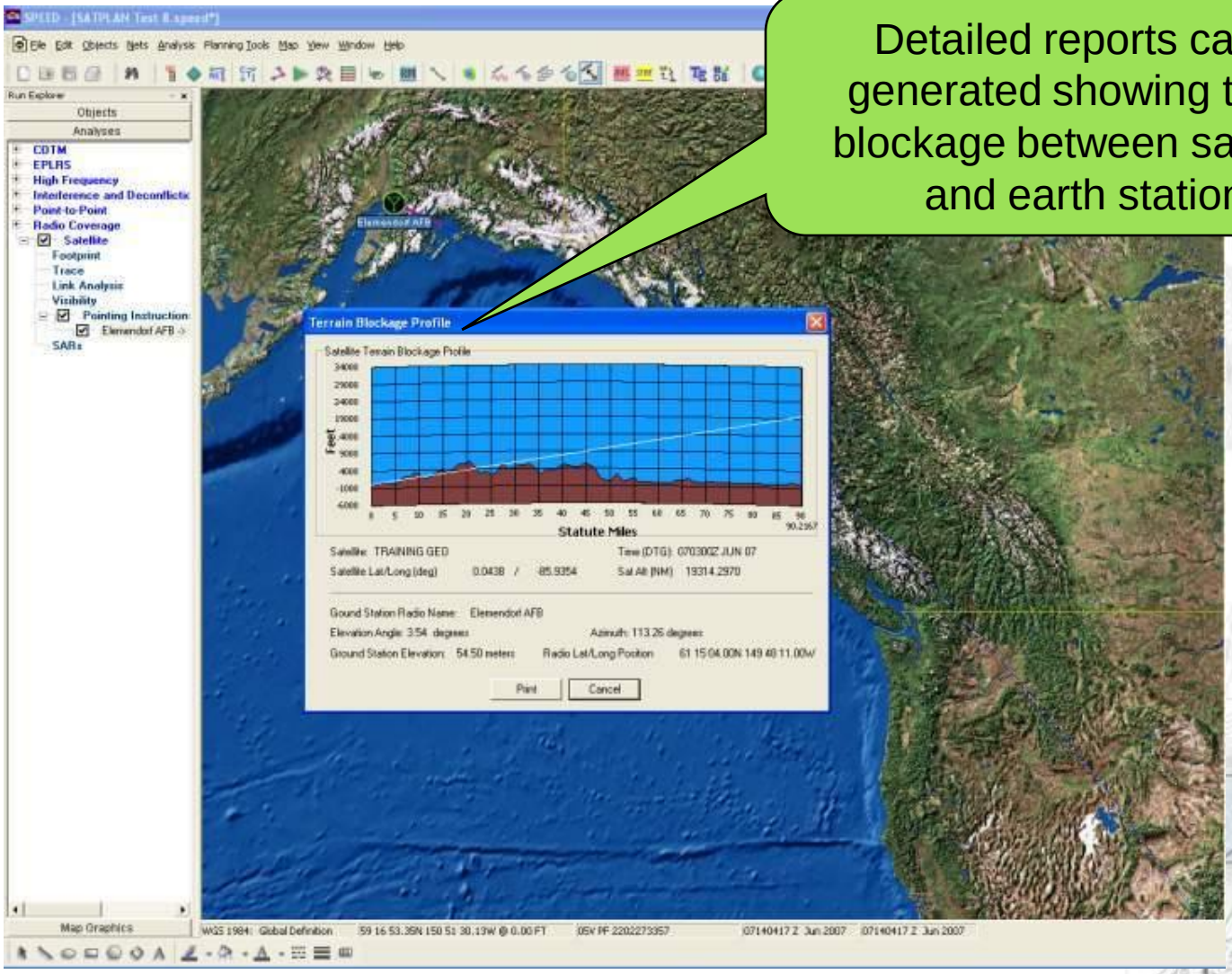


Satellite Footprints

Focus beam coverage's can be displayed to see satellite supportability for operational areas

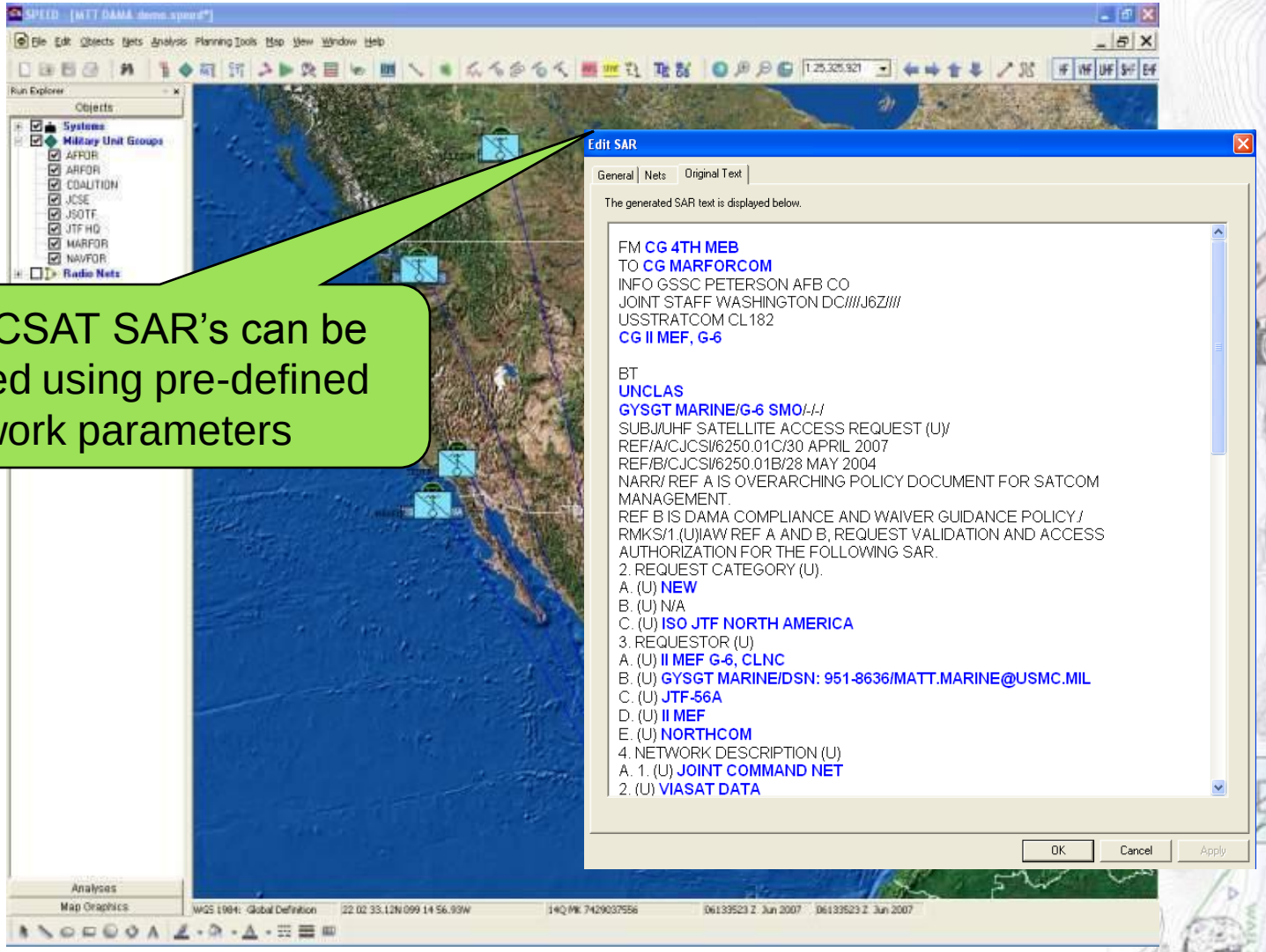


Satellite Terrain Blockage



Satellite Access Requests

UHF TACSAT SAR's can be generated using pre-defined network parameters



SPEED in support of Army Electronic Warfare

EW Snap-In Background

- Army (PMEW) had 3 JUONS from theatre that addressed gaps in electronic warfare capabilities.
- One of those JUONS called for an EW planning tool.
- To meet the needs and intent of a JUON, new development was ruled out, so the Army conducted an evaluation of other existing tools and SPEED was selected for various reasons.
  - Positive feedback from EWO's that evaluated different tools at Ft. Sill in 2010
  - The amount of current Army SPEED users
  - Software was already accredited for the Army network
  - Software was already a program of instruction (POI) within the Army schoolhouses
  - Contract vehicle (SPEED) already in place
- Funding was transferred to the SPEED program to develop the EW functionality as a snap-in to the SPEED baseline.

EW Snap-in Overview

- The Electronic Warfare snap-in is not a stand alone application. It utilizes the SPEED baseline as its foundation, ensuring SPEED specific interoperability between other SPEED users.

- The EW snap-in will install and operate on top of version 11.0 Patch 1 and version 11.1 offering the full capability of SPEED which has numerous EWO capabilities already along with added functionally to directly support the Electronic Warfare Officer (EWO) in their operational planning and analysis.

- Since SPEED is already used throughout the different services and taught at both Army and Marine Corps school houses the learning curve to be proficient on the EW snap-in will be minimal.

Tested on AGM Build 6002, Vista Client Unclass v3.7, 28 Oct 2010

Drop 1 Snap-in Features

- All the capabilities in version 11.0 Patch plus the following:

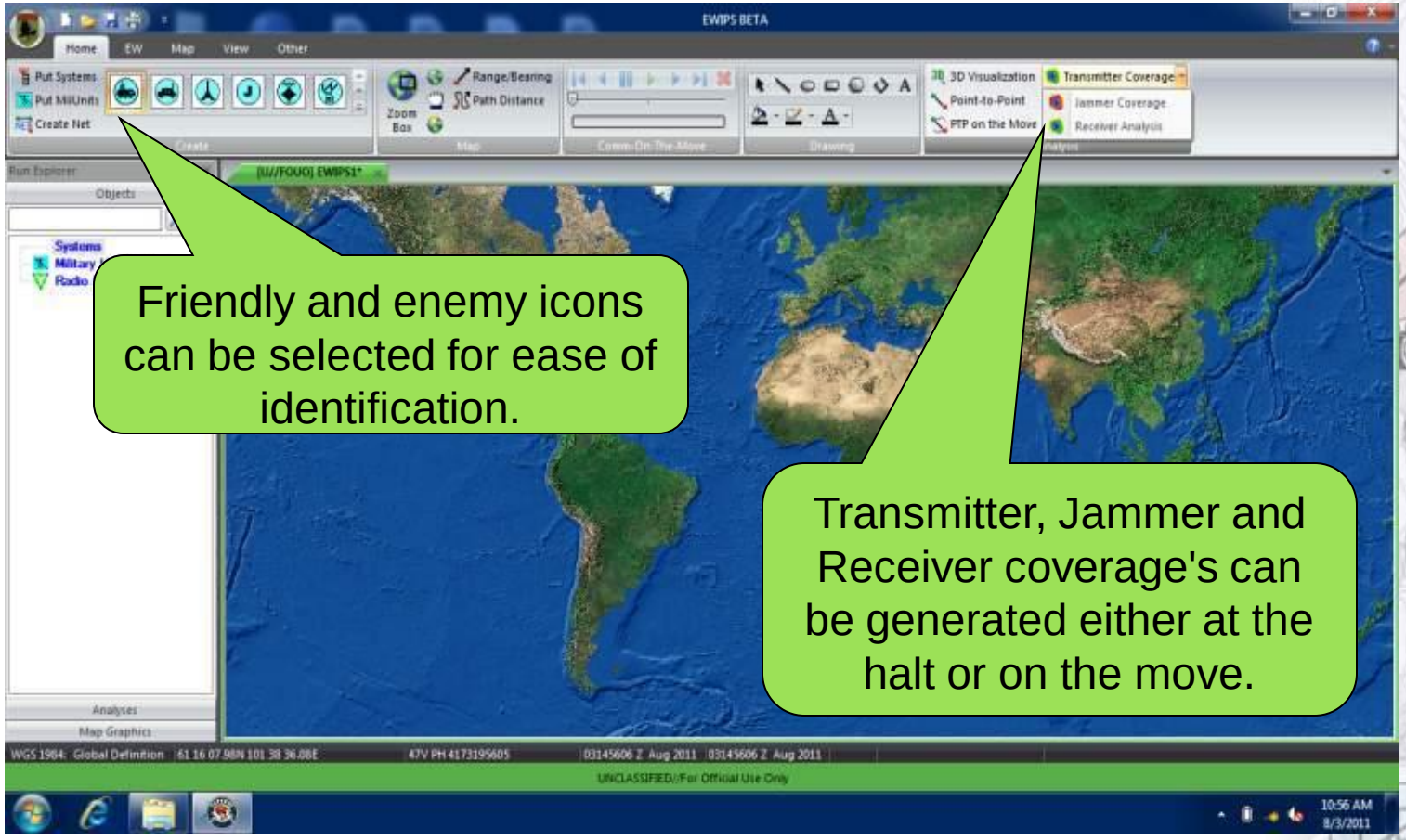
- 3D visualization (Not integrated within SPEED)
- Import emitter data containing time/spatial information
- Import of ASAS data
- Import of ELAT data from CREW systems
- Jam Plan based off of target equipment parameters
- Import/Export of KML/KMZ files to use with Google Earth
- mIRC chat capability to communicate with other IP based systems (Transverse)
- VLC media player to view ISR feeds

Drop 2 Snap-in Features

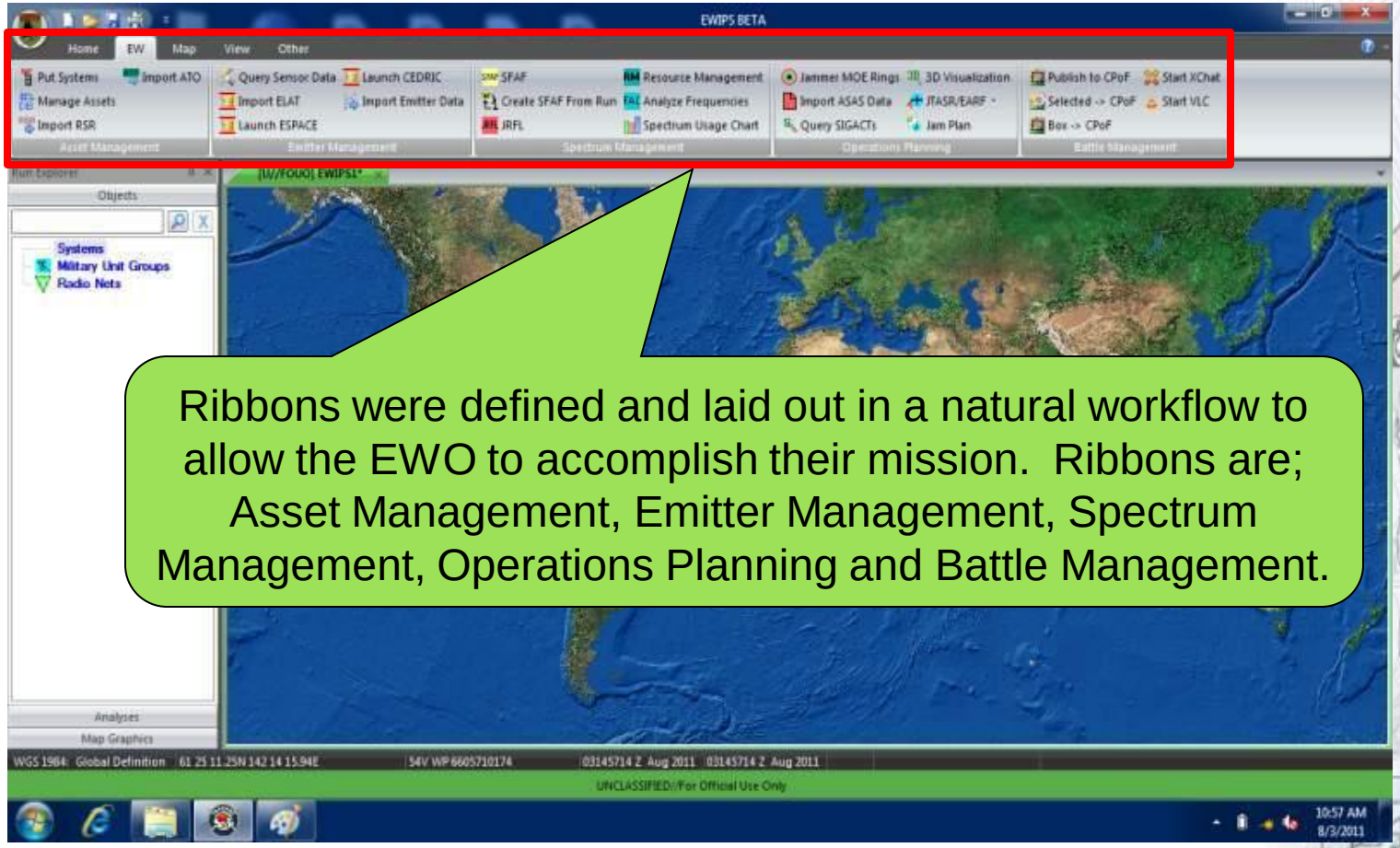
- Ability to import and model measured ARAT data
- Addition of the JSC JETS database to SPEED to provide a more robust emitter database for building the environmental background.
- Jammer Measure of Effectiveness (MOE) templates
- Joint Spectrum Interference Report (JSIR) template
- Ability to access the ESPACE web site, generate queries and download data.
- Ability to access the CEDRIC web site, generate queries and download data.
- Ability to access significant activities (SIGACTs) based on time/spatial queries (SIGACTs) via Data Dissemination Service/Publish and Subscribe Service (DDS/PASS) and display them on the map for added situational awareness.

EW Snap-in Functions

EW ribbons

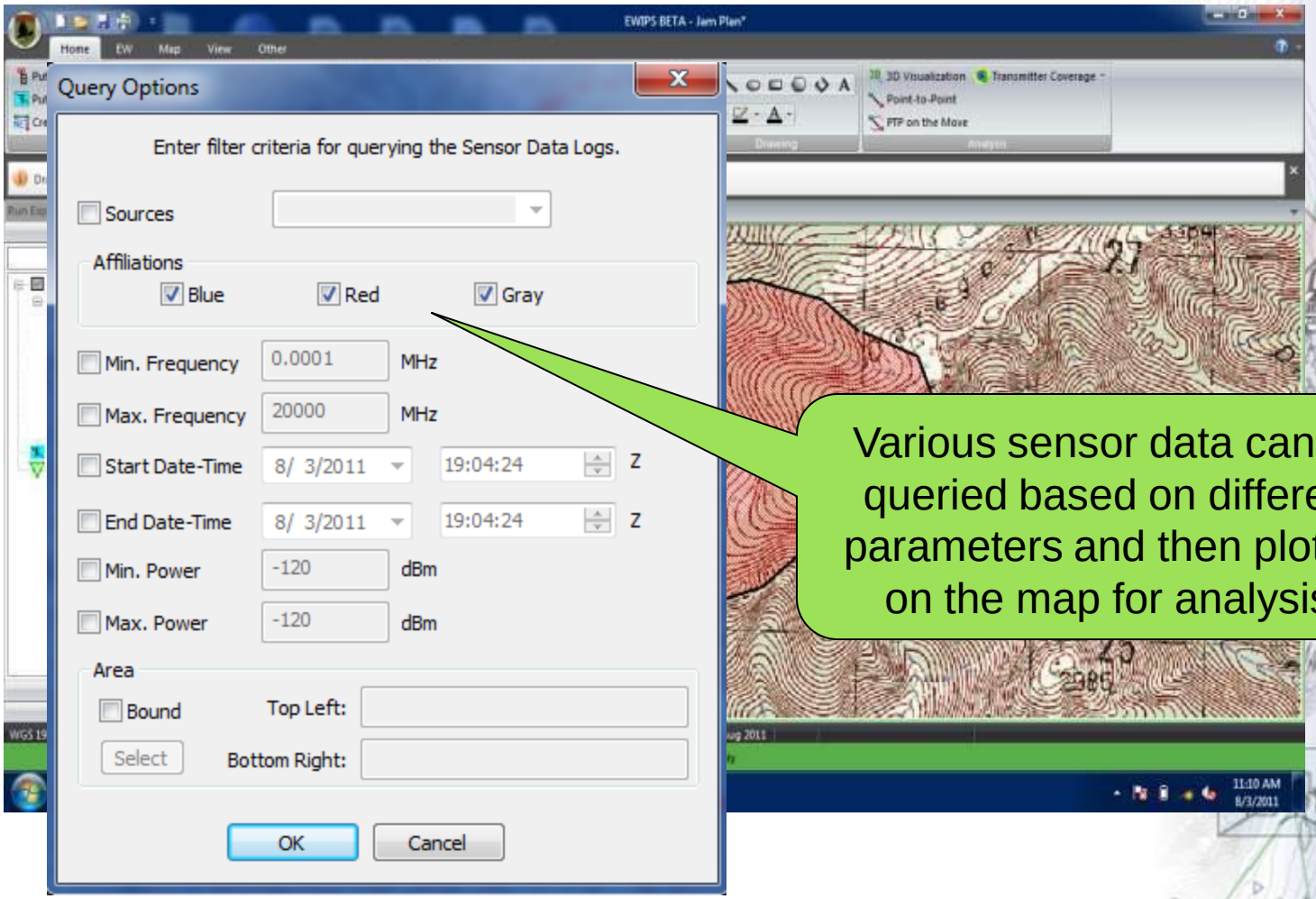

EWIPS BETA
Home
EW
Map
View
Other
Put Systems
Put MilUnits
Create Net
Range/Bearing
Path Distance
Zoom Box
3D Visualization
Point-to-Point
PTP on the Move
Transmitter Coverage
Jammer Coverage
Receiver Analysis
Friendly and enemy icons can be selected for ease of identification.
Transmitter, Jammer and Receiver coverage's can be generated either at the halt or on the move.

EW Ribbons cont…



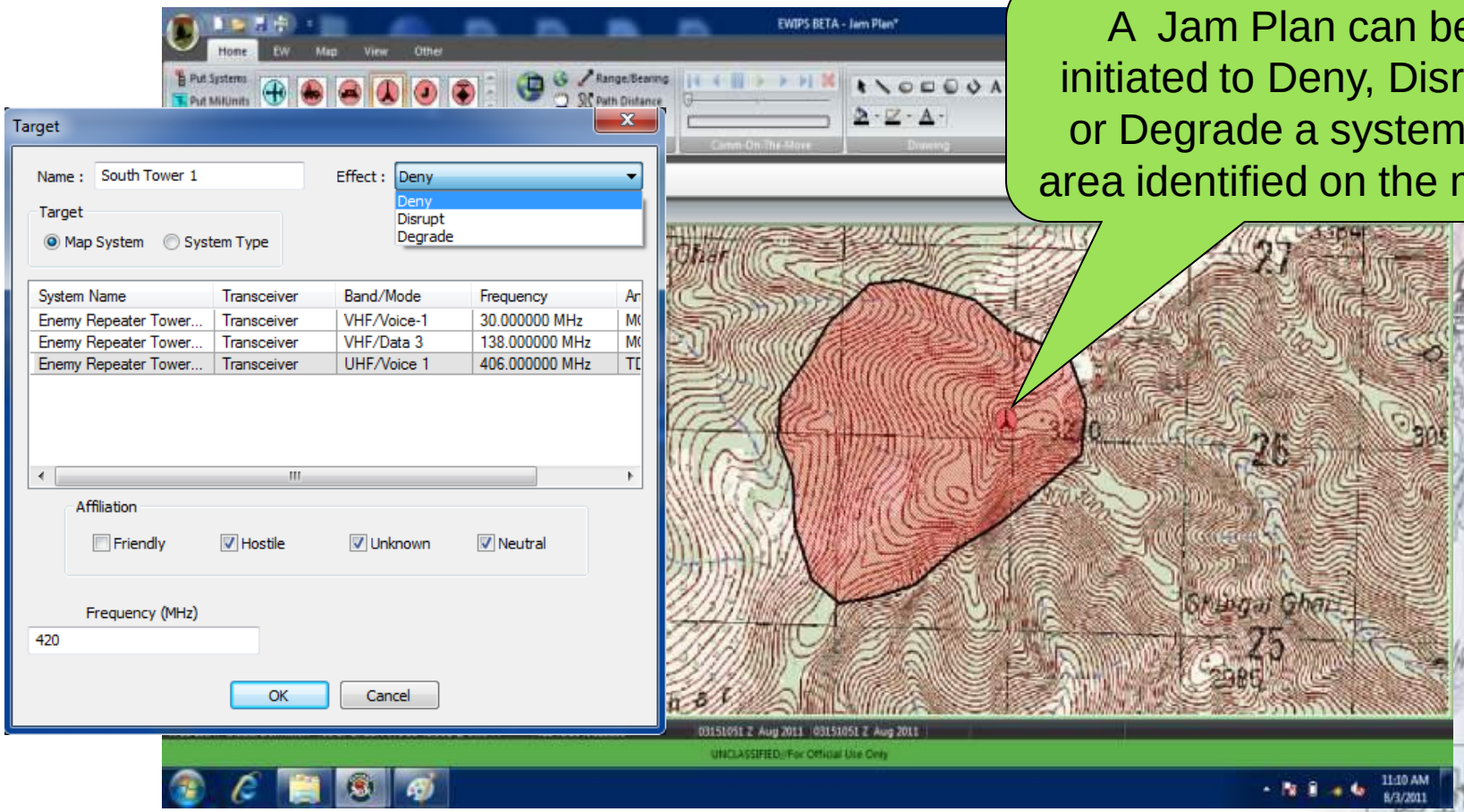
Ribbons were defined and laid out in a natural workflow to allow the EWO to accomplish their mission. Ribbons are; Asset Management, Emitter Management, Spectrum Management, Operations Planning and Battle Management.

Sensor Query Dialog



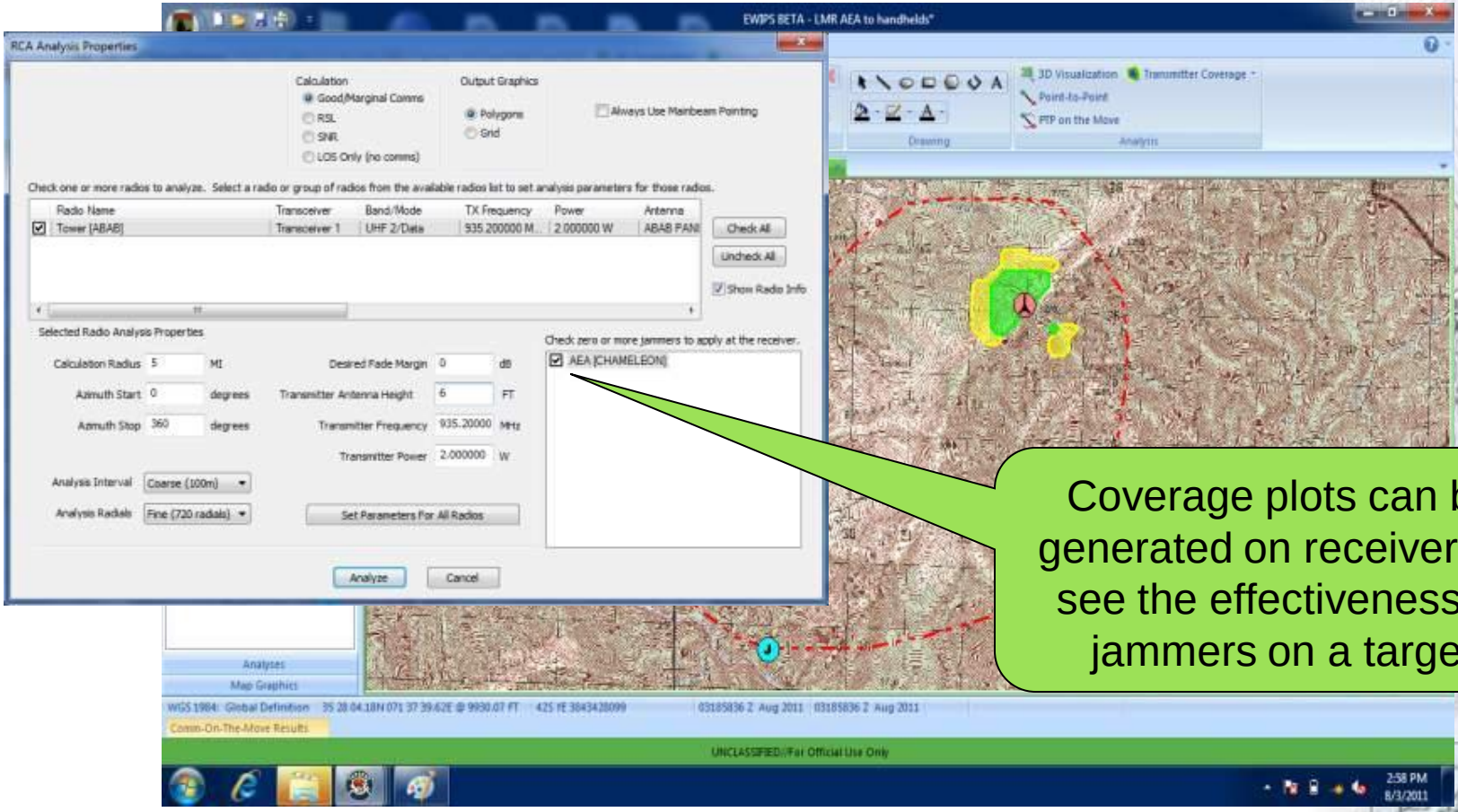
Various sensor data can be queried based on different parameters and then plotted on the map for analysis.

Jam Plan



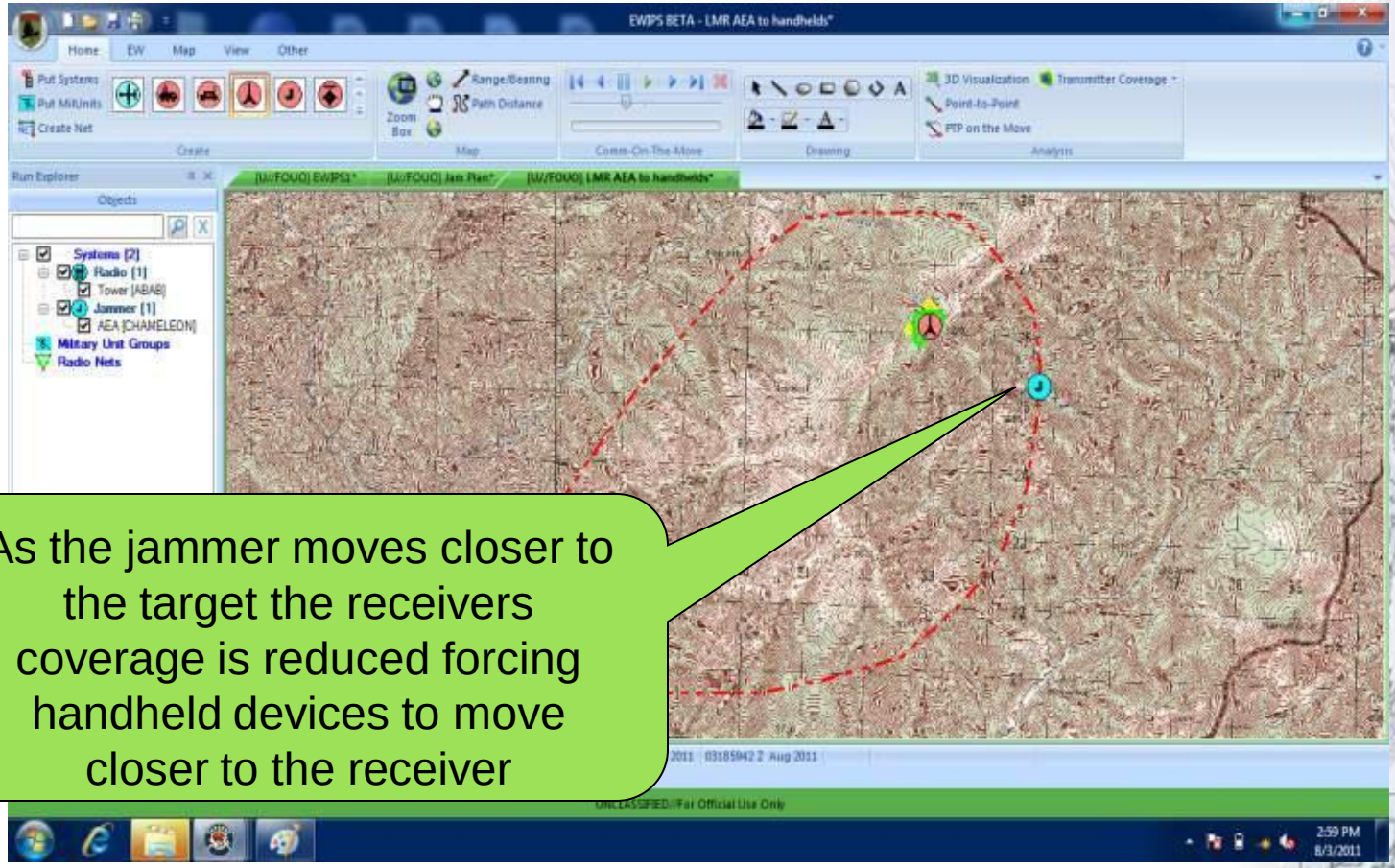
A Jam Plan can be initiated to Deny, Disrupt or Degrade a system or area identified on the map.

Receiver Plot



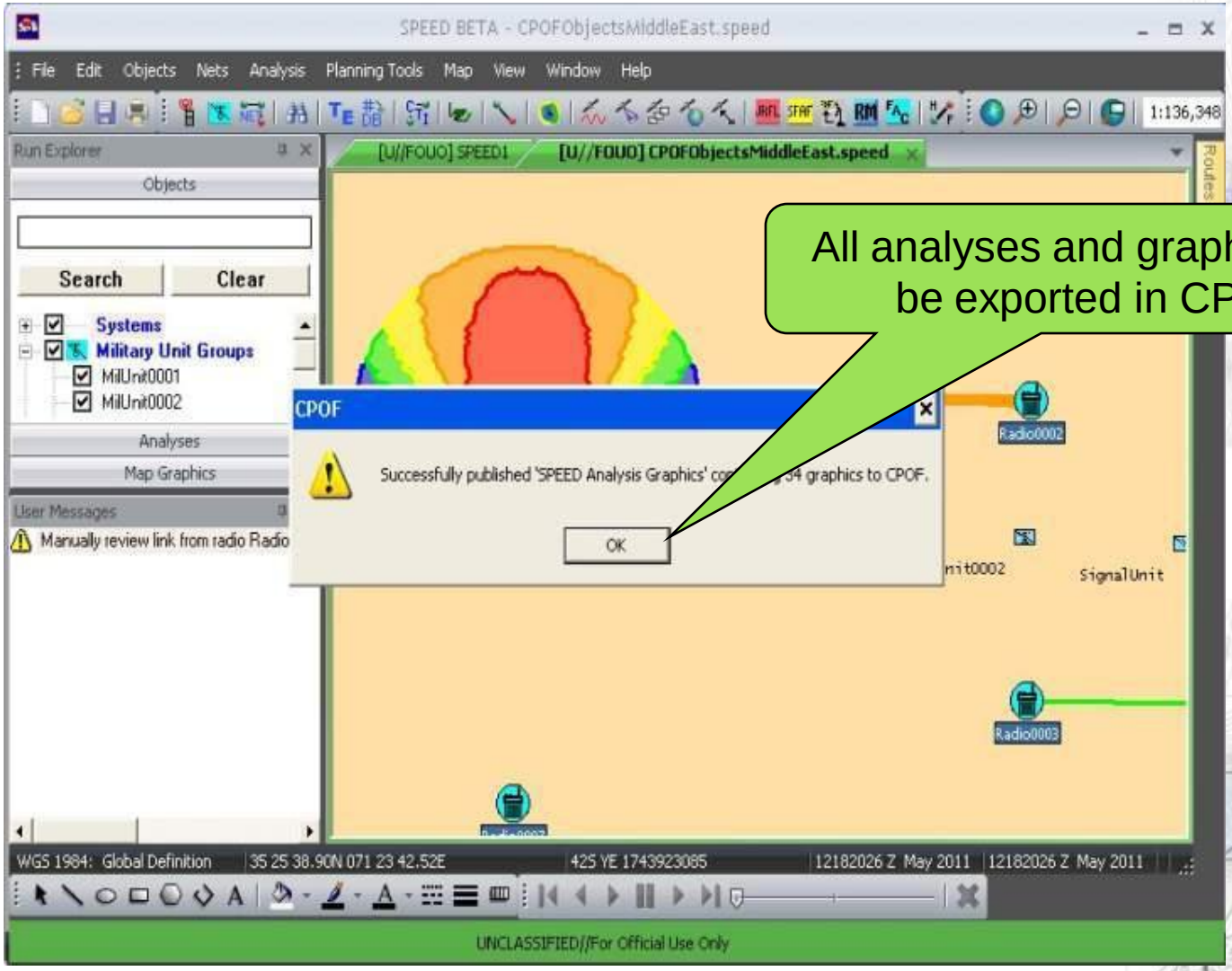
Coverage plots can be generated on receivers to see the effectiveness of jammers on a target

Receiver Plot cont…



As the jammer moves closer to the target the receivers coverage is reduced forcing handheld devices to move closer to the receiver

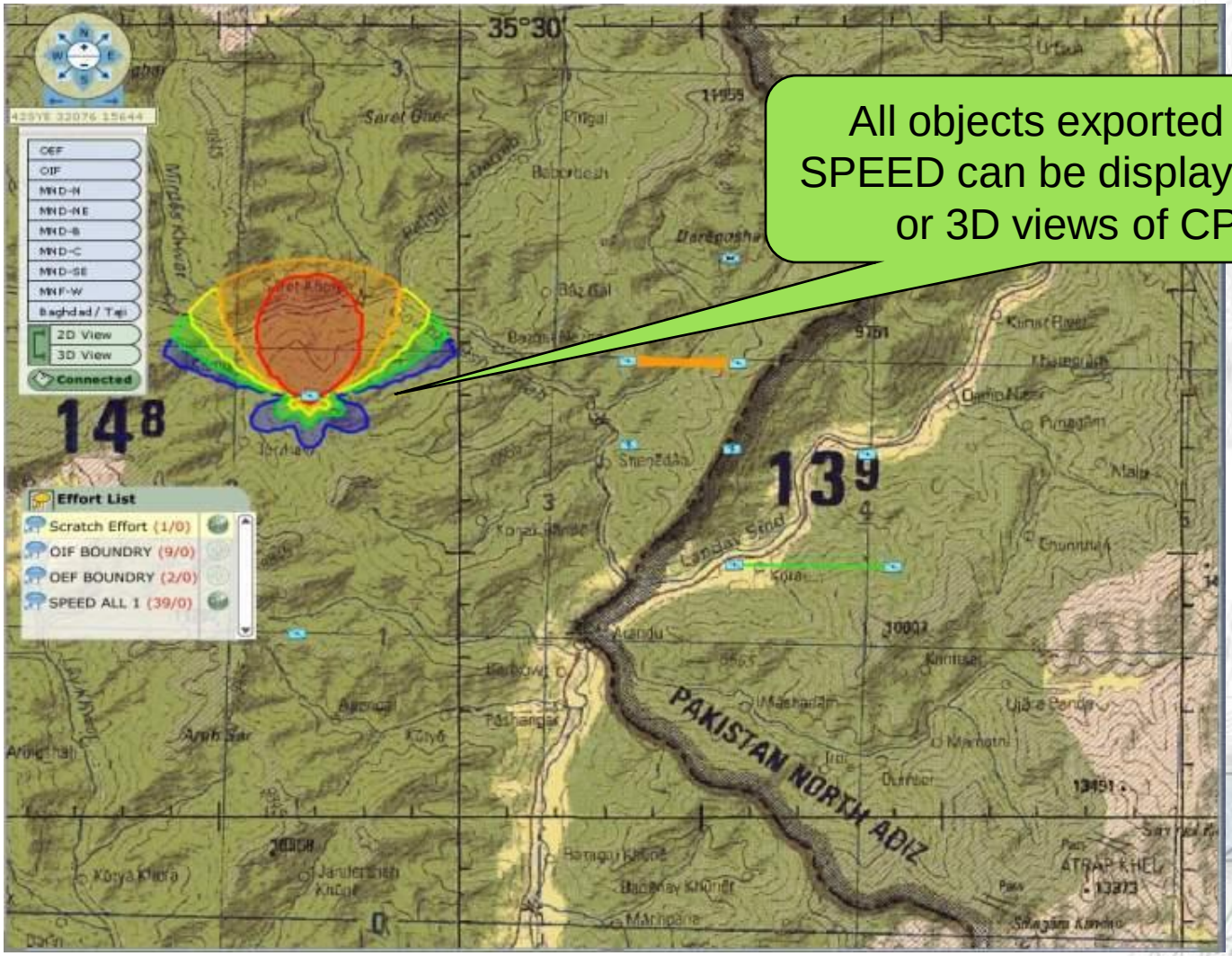
CPOF Integration



All analyses and graphics can be exported in CPoF.

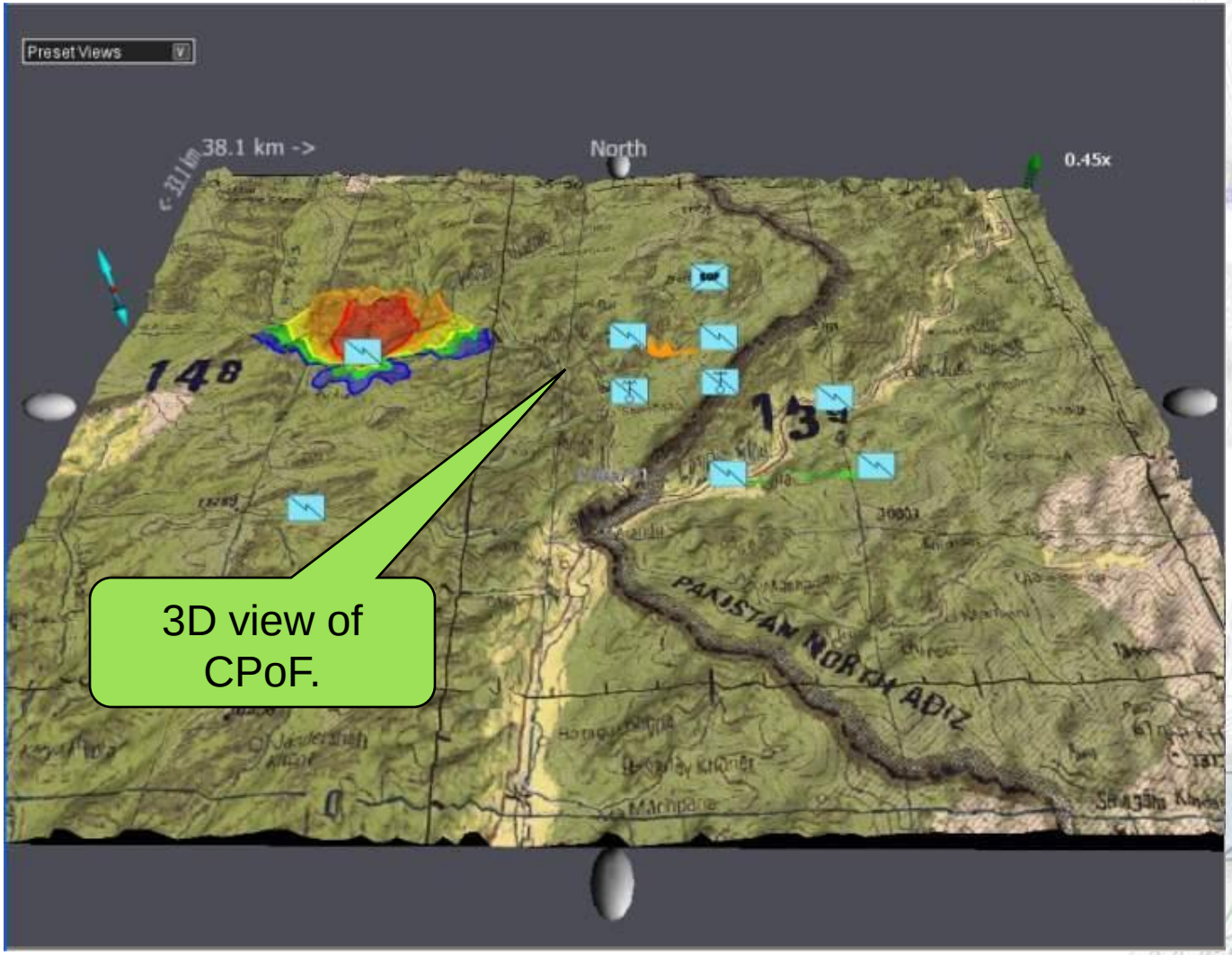
46

CPOF Integration cont...



47

CPOF Integration cont...



48

POC's

- Project Officer:
  MSgt Michael Thorne
  michael.throne@usmc.mil
  (703) 432-7877

- MCTSSA Lead :
  Capt Coba
  javier.coba@usmc.mil
  (760) 725-2655

- SME/MTT Trainer:
  Gary Coffey
  gary.coffey@ngc.com
  (407) 595-1031

- Help Desk
  (800) 808-7634
  DSN: 365-0533
  mctssasmbc4iscenter@usmc.mil
  c4isupportcenter@mctssa.usmc.smil.mil

Overview summary

- SPEED is a very powerful and proven tool that has been used extensively ISO Operation Enduring Freedom (OEF) in Afghanistan and Operation Iraqi Freedom (OIF) in Iraq.
- SPEED has supported numerous JTF's, 2 winter Olympics, the 2009 Presidential Inauguration, HA/DR efforts in support of Hurricane Katrina, Indonesia Tsunami, the Haiti Earthquake and the Earthquake and Tsunami that hit Japan.
- SPEED is a GOTS product that is free to DoD and all federal agencies. It is also available through the Foreign Military Sales (FMS) office.
- For software distribution contact the MCTSSA helpdesk at: 1-800-808-7634 or mctssasmbc4iscenter@usmc.mil to be added to the list.

Glossary

- **SFAF** (Standard Frequency Action Format)
- **JRFL** (Joint Restricted Frequency List)
- **NMCI** (Navy Marine Corps Intranet)
- **RF** (Radio Frequency)
- **COP** (Common Operational Picture)
- **C2PC** (Command and Control Personal Computer)
- **JTCW** (Joint Tactical COP Workstation)
- **MCEB** (Military Communications Electronics Board)
- **CRD** (Common Route Definition)
- **AKO** (Army Knowledge Online)
- **MTT** (Mobile Training Team)
- **BOLC** (Basic Officer Leader Course)
- **SCCC** (Signal Captains Career Course)
- **PRT** (Provisional Reconstruction Team)
- **S6** (Primary Staff Officers Course)
- **EWO** (Electronic Warfare Officer)
- **CTC** (Communications Training Center)
- **MCO** (Marine Corps Order)
- **ITU** (International Telecommunications Union)
- **SINR** (Signal to Interference plus Noise Ratio))
- **RSSI** (Receive Signal Strength Indicator)
- **ALE** (Automatic Link Establishment)
- **CREW** (Counter RCIED Electronic Warfare)
- **SNR w/SI** (Signal To Noise with Signal to Interference)
- **COTM** (Communications On The Move)
- **TACSAT** (Tactical Satellite)
- **JTF** (Joint Task Force)

Questions?