STAT Overview & SCENIC Functional Concept

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Expectations of Discussion

• Overview of guiding principles of STAT derivation from back in early 2012
• Functional view of STAT operations
• STAT Demonstration
• Discussion of how functional view of STAT is an excellent model in my perspective of the necessary functional view of the SCENIC Analysis Tool.

• **NOTE:** This is not suggesting that STAT is the solution for the SCENIC Analysis Tool.
What is STAT?

• STAT = SCaN Testbed Analysis Tool
• STAT is a Matlab-based Graphical User Interface that performs link access and RF predictions, visualizations, post-processing, and analysis
• STAT uses Matlab as the data transportation service to send data to STK, control STK, and return data from STK
• STAT uses Matlab as the analysis engine to perform processing/calculations needed per the user request or as an input to STK parameters
• STAT uses STK’s 2D and 3D graphical illustrations to provide scenario visualizations to the user
• STAT is expandable to add new capabilities, with V1.67 to be released the week of May 23, 2016
STAT High-Level Design Principles

- **User-friendly interface**
  - Doesn’t require expert knowledge of STK or Matlab functionality

- **User-selectable operating modes**
  - Different operating modes to enable different functionality
  - Independent treatment of communication and navigation links
  - Independent treatment of access calculation from RF link budget calculation
  - Specific post-processing modes to enable derivation of as-run comparisons to event truth performance model versus nominal prediction/planning usage

- **Database archival of elements**
  - Spacecraft TLE
  - Spacecraft asset identification to spacecraft asset location
  - RF waveform parameter database

- **Scenario/Data User-Configuration**
  - Waveform number
  - Waveform classification
  - User-defined

- **Scenario/Data Visualization**
  - STK Graphical animation (2D & 3D) capabilities
  - Access Table of event timeframes
  - Visualization of dynamic link performance of user-selectable parameters

- **Repeatability/Consistency**
  - Consistent performance data for consistent input setup configuration
  - Consistent output reporting methodology, independent of the number of links/events analyzed

- **Expandable**
  - New spacecraft (TDRS 11, 12, 13, GPS, Galileo launches)
  - New modulation/coding schemes (DVB-S2 technologies)
  - New analysis types (GRC-GS automation, Energy Maximized gimbal pointing)
STAT Functional View

STAT Interface (Stuff the user sees)
- User Interface
  - Scenario Setup
  - Link Setup
  - Access Table
  - Link Budget plots
  - STK 2D & 3D Animation windows
- Comm. Link Tradespace
  - Access Reports, RF Link Reports, Graphical Plots, Matlab and Excel based output files

STAT Analysis Engine (Stuff the user doesn’t see)
- Operational Databases
- STK Orbit Propagator
- STK/External File RF Link Budget Tool
- Additional Analysis Engines
- Additional Technical Reports
- Link Nodes
- Graphical Output
- Position / Access Reports
- RF Link Reports

User A
User B
User Z
Go to Demonstration Here
STAT Functional View (again)

STAT Interface (Stuff the user sees)

User Interface
- Scenario Setup
- Link Setup
- Access Table
- Link Budget plots
- STK 2D & 3D Animation windows

User A
User B
... User Z

Comm. Link Tradespace

Access Reports, RF Link Reports, Graphical Plots, Matlab and Excel based output files

User Interface

STAT Analysis Engine (Stuff the user doesn’t see)

Operational Databases

Link Nodes

STK Orbit Propagator

Graphical Output

Position / Access Reports

STK/External File RF Link Budget Tool

RF Link Reports

Additional Analysis Engines

Additional Technical Reports

STK External Data RF Models
- Antenna Patterns
- BER curves

STAT Interface

Operational Databases

Link Nodes

STK Orbit Propagator

Graphical Output

Position / Access Reports

STK/External File RF Link Budget Tool

RF Link Reports

Additional Analysis Engines

Additional Technical Reports

STK External Data RF Models
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Potential SCENIC Analysis Tool
Functional View

SCENIC Analysis Tool (Stuff the user sees)
- User Interface
  - Architecture / Network Setup
  - Technology Setup
  - MBSE View
  - Reports
  - Tables
  - Graphics
  - Visualizations

Arch. & Tech. to simulate

All Available Reports, Tables, Graphics

SCENIC Analysis Environment (Stuff the user doesn’t see)
- Databases
- Link Nodes
- Orbit Propagator

RF Input

High Fidelity Link Budget Models
- Antenna Patterns
- BER curves
- Propagation Models
- Link Scheduler
- Access Scheme
- Networking
- Etc.

Graphical Output
- Position / Access Reports
- RF Link Reports
- FOM Reports

RF/Optical Link Budget Tool(s)

FOM Analysis Engines

User A
User B
...
User Z
QUESTIONS?