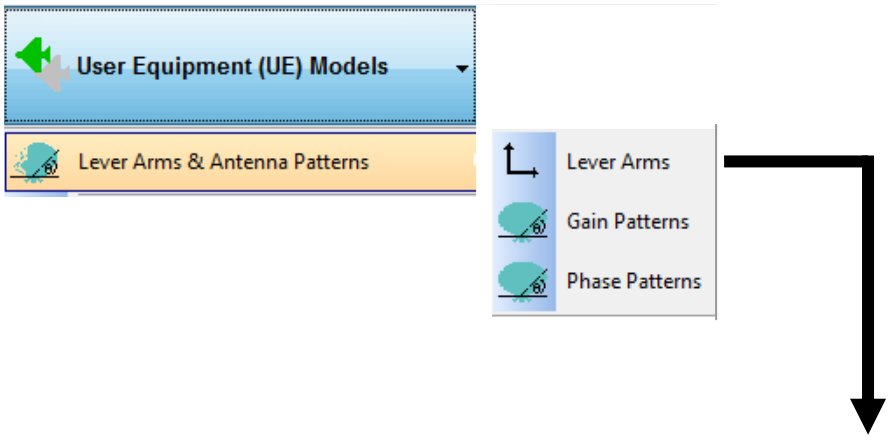
ANTENNA MODELS

- **1^O x 1^O User Receiver Antenna Power Pattern as a function of Azimuth and Elevation**
- **1^O x 1^O User Receiver Antenna Phase-Shift Pattern as a function of Azimuth and Elevation**
- **1^O x 1^O GPS SV Broadcast Power Pattern as a function of Azimuth and Elevation.**
- **L_1 L_2 L_5 versions of all patterns**
- **Antenna Bore-sight Orientation for multiple antennas within multiple RF output systems.**
- **GPS and Inertial Measurement effects resulting from Antenna Lever Arms (Vehicle) dynamics. In addition to GPS lever arms, Inertial Measurement Unit (IMU) lever arms are provided.**

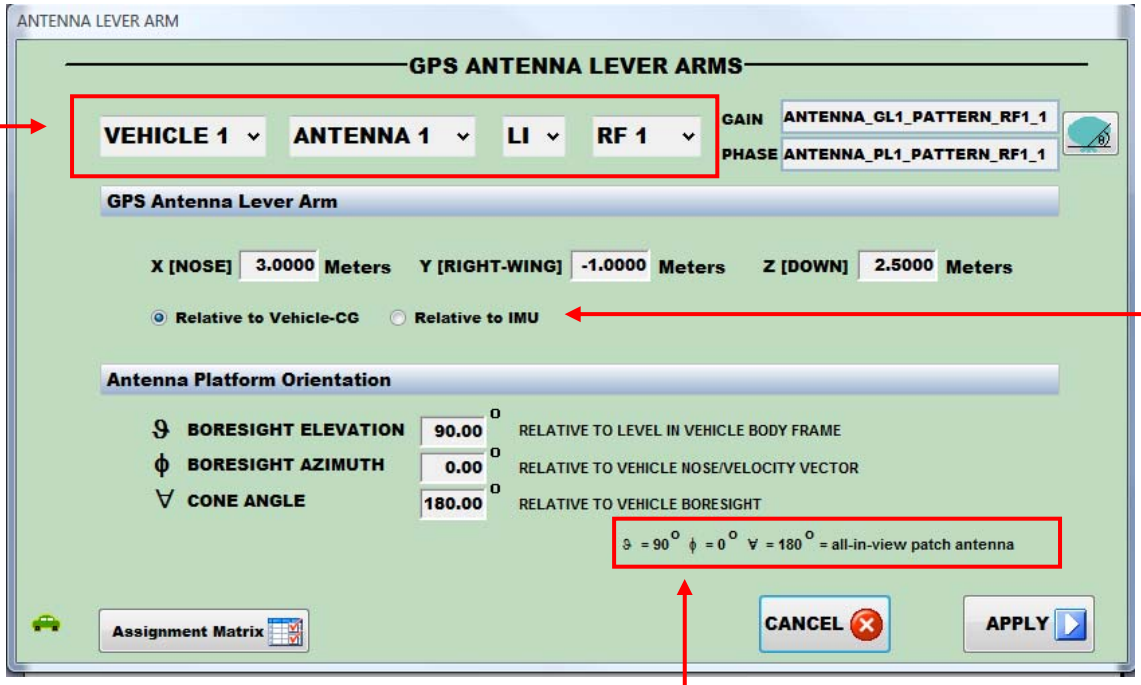
This document provides a description of the implementation.

ANTENNA LEVER ARMS



Use these controls to access specific Antennas

Access Antenna Patterns / Masks for Edit



Check this to reference the GPS Lever Arm to the IMU Frame.

Default settings for an Antenna pointed up

Lever Arm Coordinate Frame (xyz)

By convention, the GPS measurement and auxiliary Sensor Data is modeled at the Vehicle Center of Gravity (cg). To translate the GPS antenna tip elsewhere, enter the Vector Offset of the GPS Antenna Tip relative to the Vehicle cg. The sense is POSITIVE from the cg to the Antenna Tip. Tapestry models the magnitude and dynamics associated with the Vehicle. The (pseudo) range, rate and acceleration effects are ADDED to the nominal cg data.

X (NOSE): The Lever Arm displacement positive along the Vehicle NOSE.

Y (RIGHT WING): The Lever Arm displacement positive along the RIGHT WING.

Z (DOWN): The Lever Arm displacement positive DOWN.

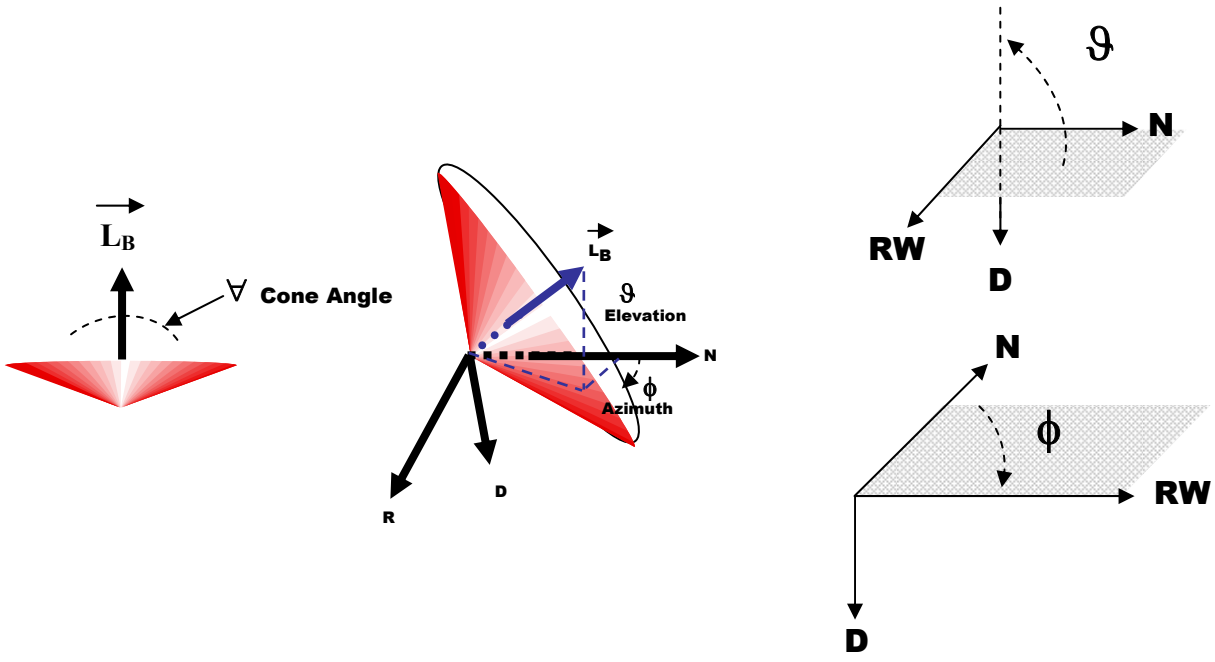
Antenna Orientation (bore-sight $\vartheta\ \phi\ \forall$)

Tapestry provides Antenna Orientation parameters to facilitate multiple Antenna's such as TOP / BOTTOM or FRONT / BACK.

Tapestry uses **Bore sight** as:

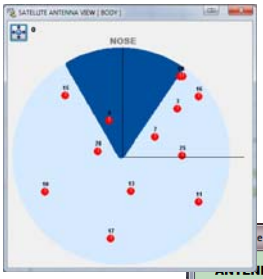
$\vec{L_B}$ = ***The vector pointing outwards (+) along the geometric centerline of the antenna in Vehicle BODY Frame.***

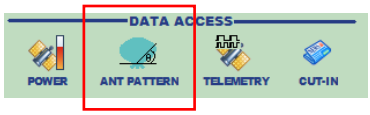
The [Default] Tapestry Antenna bore-sight points straight UP relative to the locally level tangent frame at the user position. This orientation maps to an Elevation Angle (ϑ) of 90^O an Azimuth (ϕ) 0^O and Cone Angle ($\forall$) 180^O relative to the vehicle body coordinate frame.

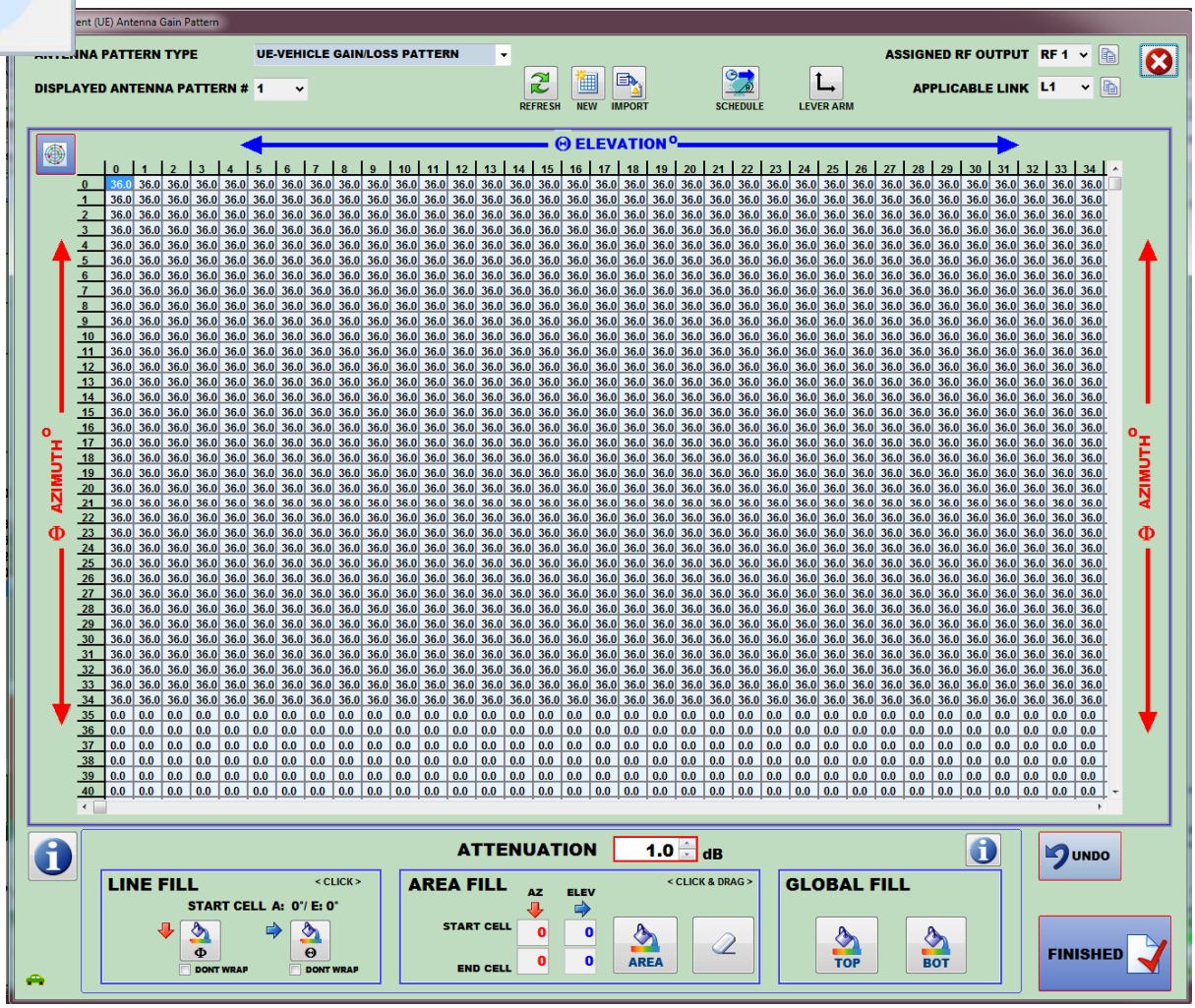


ANTENNA GAIN PATTERNS

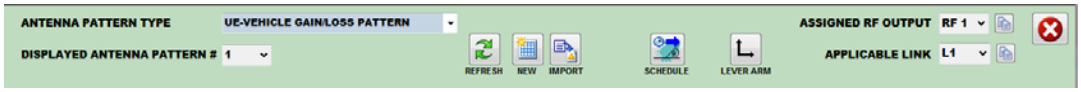
ANTENNA VIEW



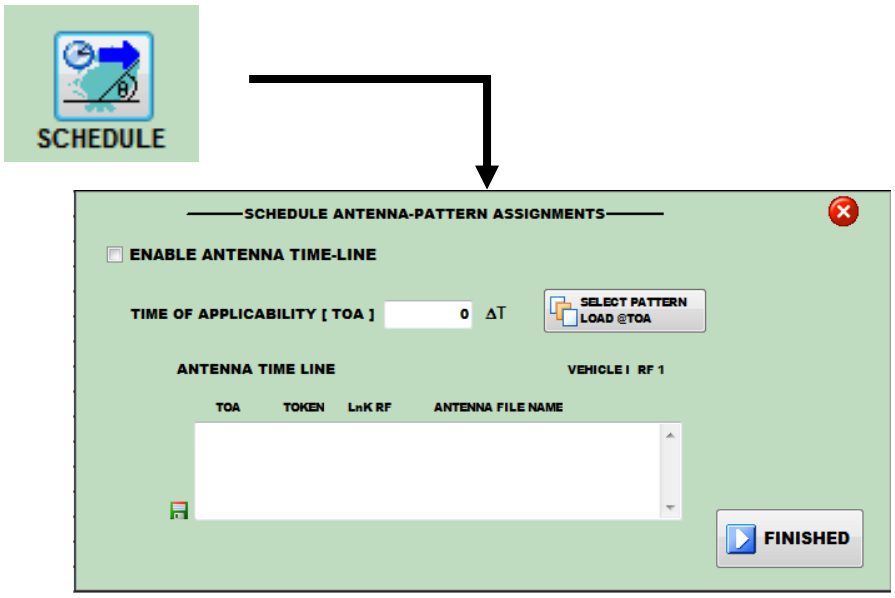




- **1° x 1° Top and Bottom Hemisphere**
- **Attenuation [0-36 dB] / Phase [0-360 Degrees]**
- **Multiple Time-sequenced Patterns**
- **Tapestry transforms Body-to-ECEF automatically.**



SEQUENCING [SCHEDULE] MULTIPLE ANTENNA PATTERNS

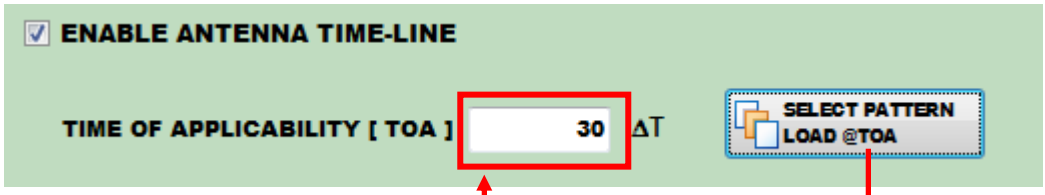


To sequence your multiple Antenna Patterns, an EVENT file has to be created. The Event file (ASCII) contains the Time (seconds into Simulation), the Type of Event, and any Event arguments. The Antenna Event File name is:

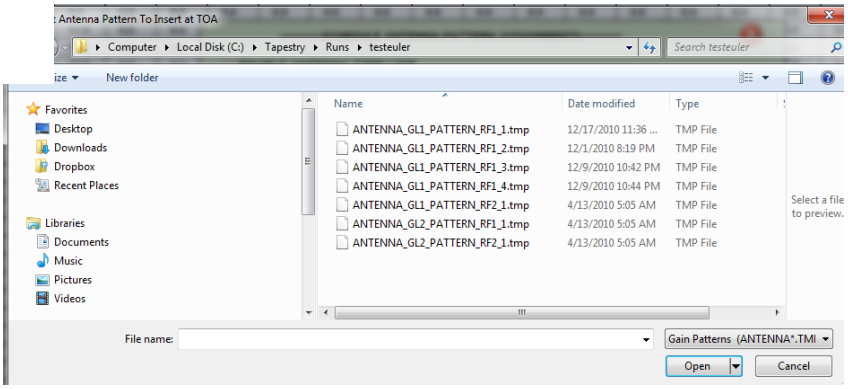
EVENTVEHICLE`.SCN - VEHICLE I

EVENTVEHICLE2.SCN - VEHICLE II

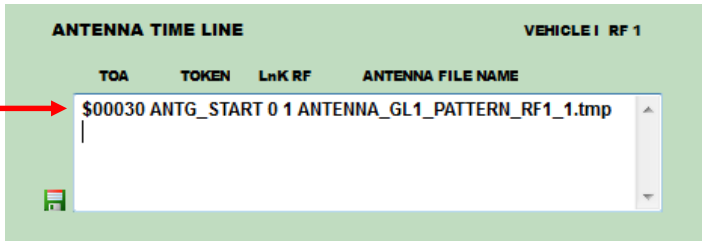
For example, assume there are 3 L_1 Antenna Gain Patterns in the scenario folder. Create the Event File as follows:



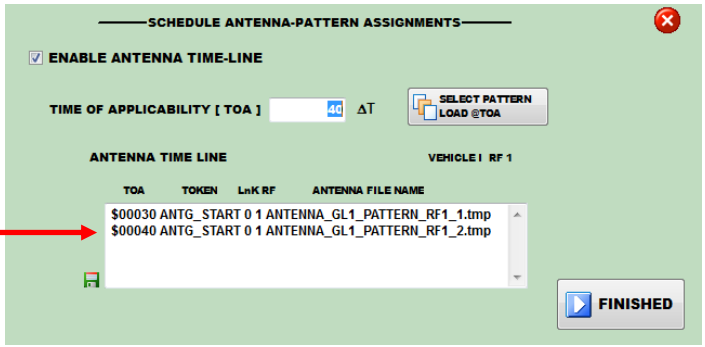
Enter 30 Seconds into Simulation. This is Event Start Time



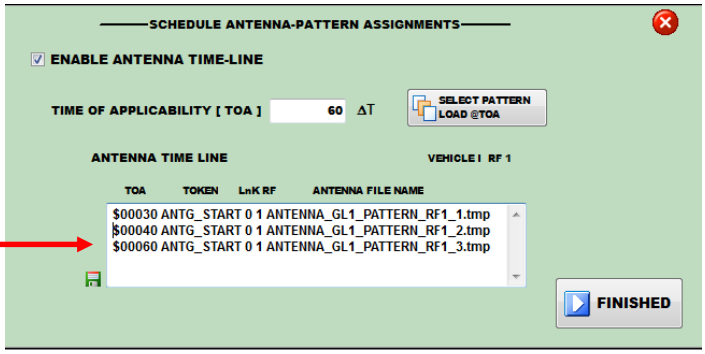
Tapestry Enters the record into the EVENT FILE
LOAD PATTERN 1 VEH 0 RF 1



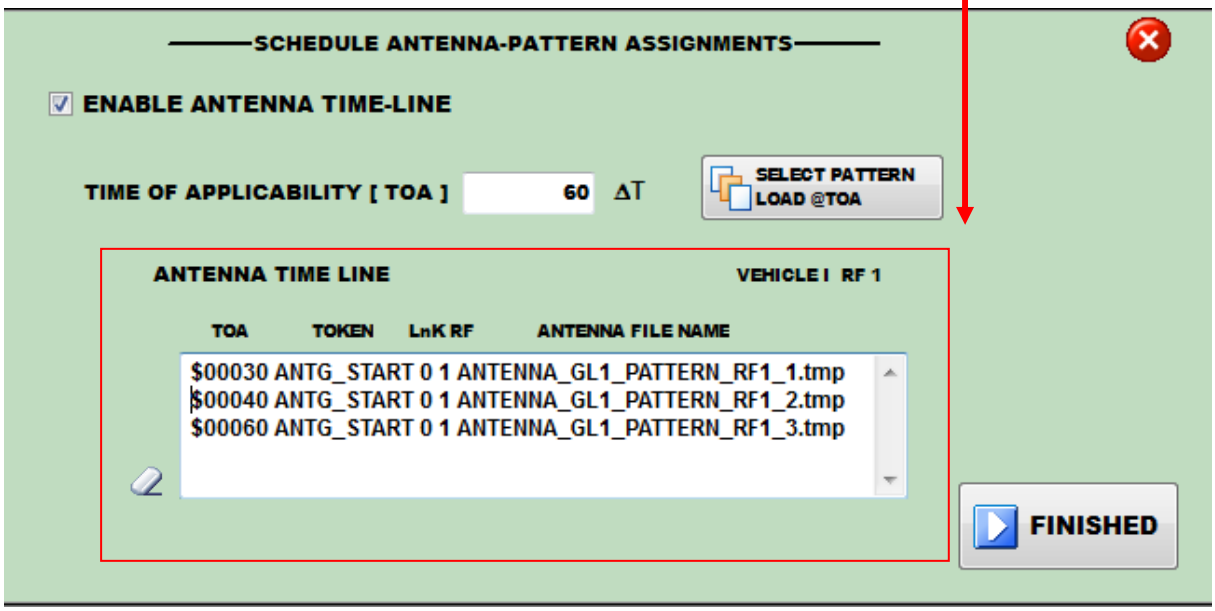
An entry at 40 seconds
LOAD PATTERN 2 VEH 0 RF 1



An entry at 60 seconds
LOAD PATTERN 3 VEH 0 RF 1



You may create the Event File by typing into this control

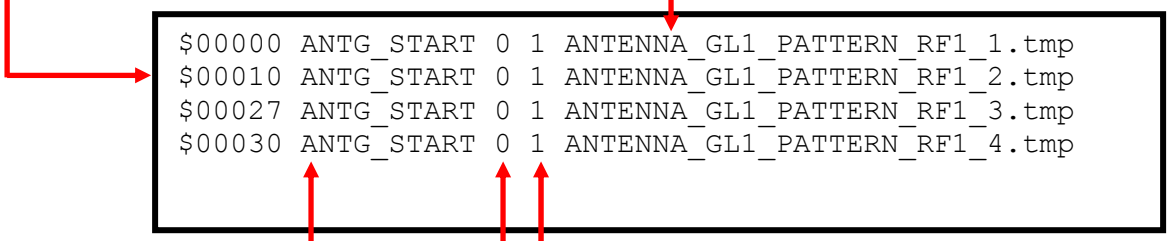


Using Notepad, you may view the EVENTVEHICLE1.SCN/TMP file. It contains the following entries:

EVENTVEHICLE1.SCN

TOA = Time of Applicability
$ = valid event line (column 1)
0010 = Event Start Time (Seconds into Simulation)

FILE NAME to load.
Must be in Scenario Folder



```
$00000 ANTG_START 0 1 ANTENNA_GL1_PATTERN_RF1_1.tmp
$00010 ANTG_START 0 1 ANTENNA_GL1_PATTERN_RF1_2.tmp
$00027 ANTG_START 0 1 ANTENNA_GL1_PATTERN_RF1_3.tmp
$00030 ANTG_START 0 1 ANTENNA_GL1_PATTERN_RF1_4.tmp
```

Event Token

ANTG_START = Load Antenna GAIN Pattern
ANTG_STOP = UNLoad Antenna GAIN Pattern

ANTP_START = Load Antenna PHASE Pattern
ANTP_STOP = UNLoad Antenna PHASE Pattern

VEHICLE # 0/1

RF # 1,2,3,4

If you CREATE the event file, it Must be in the Scenario Folder as well as all the Antenna Files.