

Systems Tool Kit is used to analyze and visualize complex systems with dynamic datasets in four dimensions.

With STK, you can:

- Select, build, or import vehicle and sensor models and combine them to accurately represent existing and proposed systems.
- Simulate the entire system in action at any location and at any time to gain a clear understanding of the system behavior and its mission performance.

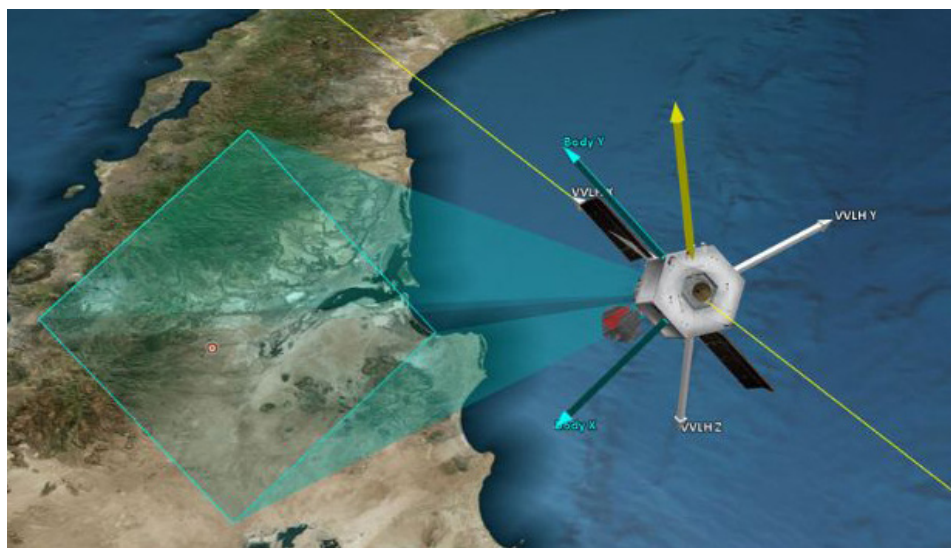
STK Pro features are in italics.

Accurate Environment

- **Accurate Earth representation.** WGS84, MSL and Earth motion (pole wander, nutation, sidereal time).
- **Streaming terrain.** Stream worldwide terrain for both analysis and visualization from the STK Terrain Server.
- **Streaming or local imagery.** Bing Maps, ArcGIS, WMS, .bmp, .jpg, .jp2, .tif and .nif.
- **Import, analyze, and export GIS data.** Import and export KML and shapefiles.
- **Digital terrain data.** *Load all standard types of data to more accurately model and visualize altitude variations, line-of-site restrictions and sensor footprint intersection.*
- **3D Tiles.** Optimally stream massive 3D datasets.

Objects

- **Ground types.** Facility, target, area target, line target.
- **Vehicles types.** Aircraft, ground vehicle, ship, launch vehicle, missile, satellite, and multi-track object.
- **Vehicle routes.** Great arc (with terrain following), ballistic, two-body, J2, J4 SGP4, GPS, 11-Parameter, SPICE, and External (data file).



- **Import standard objects.** Standard object databases that contain thousands of satellites, facilities, ground station networks, aircraft, cities, and sensors are available online and locally.
- **Import user data.** Vehicle data in any format can be imported into STK.
- **Vehicle attitude profiles.** Nadir alignment with ECF or ECI velocity constraint, ECF velocity alignment with nadir or radial constraint, ECI velocity alignment with nadir constraint, GPS External attitude, Coordinated Turn External, User-defined Attitude profiles, *Fixed in Axes, and Aligned and Constrained.*

Sensors

Sensors are used to define Fields of View and Fields of Regard on objects.

- **Sensor Types.** *Simple Conic, Complex Conic, Half Power, Rectangular, and Synthetic Aperture Radar (SAR).*
- **Sensor Pointing.** Along Vector, customer External, Fixed, *radars, push broom sensors and other instruments*

that spin, scan or sweep over time.), Grazing Altitude, Fixed In Axes, 3D Targeted (track other objects.), Spinning (for Model)

- **Sensor AzEl Mask.** Defines an azimuth-elevation mask for the sensor. *Terrain calculated or file defined.*

Constraints

You can impose constraints to add fidelity to an STK object.

- **Basic.** Imposes standard access constraints on an object. Constraints are Altitude, Azimuth angle, Elevation Angle, Line of Sight, Field of View, Range, Azimuth Rate, Elevation Rate, Range Rate, Angular rate, Propagation Delay, Terrain Mask, Facility Az-El Mask, and Sensor Az-El Mask.
- **Sun.** Imposes constraints based on the position of the Sun and Moon. Constraints are Line of Sight, *Lighting, Sun Elevation Angle, Sun Ground Elevation Angle, Lunar Elevation Angle, Line of Sight Sun Exclusion Angle, Line of Sight Lunar Exclusion Angle, Boresight Sun Exclusion Angle,*

Boresight Lunar Exclusion Angle, Sun Specular Point Exclusion, Solar/Lunar Obstruction, Field of View Specular Point Exclusion, and Additional Central Body Obstruction.

- **Temporal.** Imposes time-based constraints on an object.
- **Vector.** Constrains access computations with respect to any valid vector or angle.
- **Zone.** Defines areas where access is or is not allowed using inclusion and exclusion zones.
- **Resolution constraints for sensors.** Limit access based on sensor characteristics and the quality of the inview.
- **Geostationary Belt Exclusion Angle.** Constrains access to an object when it falls within the specified angle. This constraint is useful when calculating access from a facility, place, or target to a LEO satellite.
- **Height Above Horizon.** Constrains access based on the minimum and/or maximum height of the facility, place, or target above the horizon.
- **Terrain Grazing Angle.** Constrains access based on the minimum and/or maximum angle between the relative position vector and the local terrain.
- **Object Exclusion Angle.** Used to select and remove objects that are to be excluded from access computations if they are at the indicated angle from the original object.
- **Elevation Rise-Set Angle.** Used to specify different elevation angle limits for the rise-stage and setting-stage of a satellite.
- **Access constraint plugins.** Provide a method for adding customized constraints directly into visibility computations.
- **Targeting constraints.** Define the relationship between an object and the target of that object.
- **Space-related advanced constraints.** Impose a variety of vehicle-specific constraints.

Reports and Graphs

Create reports and graphics from STK's data providers. There are thousands of data providers, including:

- **Sensor Boresight Grazing LLA and Boresight Grazing LLR data providers** report information on the point along the sensor boresight direction with the lowest detic altitude. The point is computed in the sensor's central body fixed coordinate system.
- **Sensor Access Refraction** reports information of the effects of refraction on elevation angle, range, and propagation delay.
- **Azimuth Elevation Mask data provider** reports the obscuration mask data for a sensor or facility.

Utilities and Tools

Use the following to fine-tune your analysis and enhance your visualization.

- **Access tool.** Determine times one object can "access," or see, another.
- **Data tools and utilities.** Manage, update, and export data.
- **Import and Export tools.** Import data into STK and export STK data, such as ephemeris, attitude, sensor pointing, KML and display times.
- **Object-specific tools.** Manipulate and display the data related to individual objects. These tools include calculating vehicle or sensor swath, or generating a Walker constellation.
- **Share Analysis.** Convert your STK 3D scenarios to VDF files that can be viewed in the free Viewer.
- **Deck Access.** Compute access to a set of objects, not currently defined in the STK scenario, from a single object in the scenario. Deck access operations are useful when you have a large number of objects that no longer need to be in the STK scenario but for which you would like visibility information. Using deck access can greatly reduce load and save time for such scenarios and minimize graphical clutter.
- **Area tool.** Calculate the area of a model from a given view direction, over a given time interval, such as an orbit period.
- **Obscuration tool.** Determine when a sensor's field of view is obscured by one or more objects.

- **Imagery and terrain converter.** Convert a single image, with its terrain data, into a pdttx or jp2 file format that can be displayed in a 3D Graphics window.
- **Calculation tool.** Produce various time-dependent quantities that include installed scalars, conditions, and parameter sets.
- **Vector geometry tool.** Define location, pointing, and orientation in 3D space, using installed points, vectors, angles, axes, and coordinate systems.

Visualization

- **Time-dynamic 3D globe.** Annotations, object lines, lighting, stars, vectors and overlays.
- **Time-dynamic 2D map.** Equidistant cylindrical, Mercator, orthographic and azimuthal equidistant.
- **Timeline view.** Time components, access intervals and ephemeris intervals.
- **3D model database.** Hundreds of models in mdl, COLLADA and glTF format, which can be articulated and scaled.
- **Advanced viewing Controls.** View from/to any STK object, change field of view and more.
- **Advanced analysis display options.** Apply constraints to the graphical display of a Sensor's field of view, display a facility's azimuth-elevation mask.

Extend STK's Capabilities

- Automate tasks, extend analysis, and customize workflows using the fully documented, open API.
- Interface with STK using Connect and the Object Model.
- Extend the computational capabilities of STK using Analysis Workbench.
- Customize STK using UI Plugins.
- Scale computations across multiple cores/compute clusters using the Scalability Extension.