

## Terrain Analysis Package (TAP™)

TAP 7 Demo Quick Start Guide

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PO Box 7205 | Charlottesville, VA 22906 | 800.728.4033 | sales@softwright.com



### What is TAP™?

SoftWright's Terrain Analysis Package (TAP™) software is used by federal agencies, state/local public safety departments, energy companies, utilities, and consultants to evaluate radio transmitter sites; predict, map, and analyze radio coverage; plan land mobile radio and cellular systems; conduct intermodulation and adjacent channel interference studies; and design microwave, VHF, and UHF links. TAP<sup>™</sup> models the physical layer of communication systems – specifically, RF propagation over terrain. However, TAP<sup>™</sup> provides straightforward study creation and visualization options to conduct a wide range of advanced wireless communication analyses, including analyses for Project 25 (P25) and TETRA systems.



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### What is the TAP demo?

The TAP demo is the full TAP software package with functionality geographically limited to the state of Colorado, USA. Within Colorado, you have access to a full set of capabilities, including:

- Path Studies
  - Path studies display and analyze point-topoint RF paths between two Fixed Facilities. UHF/VHF and Microwave Path Analysis.

#### Coverage Studies

- Coverage studies calculate RF coverage from a single Fixed Facility transmitter to a Mobile Facility receiver over a user-defined area.
- AutoPath and AutoCoverage Studies
  - Ability to run large batches of Path and Coverage Studies
- Coverage Maps
  - Coverage maps are used to visualize coverage study results using TAP Mapper.
- Intermodulation Studies



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# Step 1: Open the Demo Project

TAP organizes work products, such as Path and Coverage studies, into Projects. This allows the user to organize related studies within Projects. Studies within projects may be further organized using sub-folders.

After installing TAP, launch the program from the desktop or Programs icon. The screen to the right will appear.

- Click the 'Open' Button
- Open the 'Tap7DemoProject'. It contains example path, coverage, Intermod, and autopath studies created using Demo fixed and mobile facilities. It is typically installed at:

C:\Users\[UserName]\Documents\TapWork \Tap7DemoProject



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### Step 2: View the Demo Studies

The demo project contains example path, coverage, Intermod, and autopath studies for reference.

- Click one of the Path Studies in the Project
   Explorer of the left-hand panel. The path graphic and associated Transmit and Receive Fixed
   Facilities are shown in the study area.
- Click one of the Coverage Studies in the Project Explorer. You can view the various study geometry types: Radial, Target, Tile, and Contour.
- Run any or all of the studies using the Run button on the Coverage menu bar. The Study Server will appear and when the study is complete, it will launch TAP Mapper to show the results.
- Click on the Intermod Study. You can run the study to view example Intermod products.
- Click on the AutoPath studies. You can run the studies to view the AutoPath results
- Click on the AutoCoverage studies. You can run the studies to view the AutoCoverage results.



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### Step 3: Create a New Project

The Demo Project is just an example for reference. Actual work should be created and saved in organized projects. The first step in typical work flow is to create a New Project.

- Click on the 'Home' tab.
- Click the 'New' Button.
- Give the project a name, such as 'MyNewDemoProject'. By default the new project will be created in C:\Users\[UserName]\Documents\TapWork



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### Step 4: Create a Path Study

The new project will appear in the Project Explorer pane on the left side of the TAP main window.

- Right-Click on the project name and select Add Path Study from the context menu.
- From the pop-up Study Wizard, select Path Study and give the path study a name, such as New Path Study

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### Path Study Main View

A new path study will appear in the main document view. The TAP Demo includes a set of Fixed Facilities and Mobile Facilities that may not be edited. The initial path is between Cheyenne Mountain and Castle Rock.

- Fixed Facility Transmit: Use the dropdown list to see the available DEMO fixed facilities. Expand any of the regions, such as Site Information or Transmitter to see Fixed Facility parameters.
- Fixed Facility Receive: The same set of fixed facilities is available for the receiver using its drop-down menu.
- Path Settings: The settings that control how the path is drawn, including topo data, Fresnel Zone, and propagation model. Use the tabs to view and edit path settings.



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### Path Profile Graphic

The path profile between the transmitter on the left and receiver on the right is shown in the center graphic of the path view.

- Line of Sight: Red line is the LoS between the Tx and Rx antennas.
- Fresnel Zone: Blue line is the Fresnel –
   Zone and Ratio set in the Path Settings.
- Terrain: Green line is the terrain profile \_\_\_\_\_ along the path.
- Land Cover: Fill colors show Land Cover classification along the path.
- Earth Curvature: Lower blue line shows effective curvature due to refraction parameters set in Path Settings.



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### Path Study Data Views

Two data panes are viewable on the receiver side of the path. Click on the tabs to view:

- Cursor: Enable the data cursor by checking the box and this pane will show live details for the location of the mouse cursor along the path. Shift-Left Click on the path graphic to capture data for a specific location.
- Received Field: This pane shows the RF propagation results for the path as drawn, based on the selected propagation model.



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![](_page_10_Picture_0.jpeg)

### Step 5: Create a Coverage Study

A coverage study is how TAP predicts the talk-out and talk-back coverage from one fixed facility over an area.

- From the pop-up Study Wizard, give the coverage study a name, such as New Coverage Study

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### Coverage Study Main View

A new coverage study will appear in the main document view. This study initially shows the study setup for coverage from the DEMO Castle Rock to a DEMO Handheld with Severe Body Losses

- Fixed Facility: Use the drop-down menu to see that the same set of Fixed Facilities is available for coverage studies.
- Mobile Facility: Select the receiver from a database of mobile facilities. The TAP demo includes a set of DEMO mobile facilities.
- Coverage Settings: Click range to create a tile study area centered on the transmitter location. The study area will be shown on the center map graphic.
- When the parameters required for a study have been entered, the Run Current Study button will become active. Click to run.

![](_page_11_Figure_7.jpeg)

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### Study Server Window

The TAP 7 Study Server window will appear. The Study Server window shows coverage study progress.

- A coverage study is often comprised of many propagation calculations from the Transmitter Fixed Facility location to every location in the coverage study area. The study calculation \_\_\_\_\_\_ progress bar shows the execution progress.
- The Status tab gives more detailed description of the program actions and timing information. Large studies may take a few minutes or more to complete.
- After study completion, the Study Server window remains open.
- When the study is complete, the results are written to a shapefile within Project folder, in a Results folder within the Study Folder. The completed study is now locked and may not be edited. To modify and re-run the study, first unlock with a right-click on the study.

![](_page_12_Picture_6.jpeg)

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![](_page_13_Picture_0.jpeg)

### View Results in TAP Mapper

If TAP Mapper is installed alongside TAP 7 then, when the coverage study completes, TAP Mapper launches to show the study results.

- The Map Layers list will show that the coverage study result has been added to the map. Click to expand the Legend.
- By default, the coverage study is shown with Green above threshold (Coverage) and Red below threshold (No Coverage). – Open the Map Layer settings to adjust the appearance of the coverage study result.
- Use the map controls to select basemap layers and annotate the map. Use the \_\_\_\_\_\_ UTILITIES tab to capture map images or export to a 3D kml file.

![](_page_13_Figure_6.jpeg)

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![](_page_14_Picture_0.jpeg)

### Step 6: Create an AutoPath Study

An AutoPath study is used to design and analyze multi-site networks.

- Right-Click on the project name and this time select Add AutoPath Study from the context menu.
- From the pop-up Study Wizard, give the coverage study a name, such as New AutoPath Study

![](_page_14_Picture_5.jpeg)

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### Create an AutoPath Network

Use the Network Import/Export menu to create an autopath network.

- Import from Fixed Facility Db: Choose Tx and Rx facilities from the existing Fixed Facility database. The network is created by connecting all combinations of Tx to Rx paths.
- Import from Fixed Facility File: Import Tx and Rx facility information from a properlyformatted spreadsheet. Choose the desired facilities to create a network. Examples for base stations and remotes are provided in C:\Users\[UserName]\Documents\TapWork\ Autopath
- Import Network from File: Create a network using a properly-formatted spreadsheet that defines each network path. An example is provided in

C:\Users\[UserName]\Documents\TapWork\ Autopath

![](_page_15_Figure_7.jpeg)

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![](_page_16_Picture_0.jpeg)

### Run AutoPath Study and View Results

The example network import creates a simple relay network. Use the Run Current Study button to run the AutoPath study

- Select paths by clicking on the map or in the Results grid. Details for the selected path appear in the Path Information pane.
- Paths are styled in colors on the 2D overhead map view based on the chosen style parameters in the Results Style tab
- Click on the Path Profile View tab to see the path profile for the selected path just as it would appear in a Path Study.
- AutoPath can optionally create path studies, path graphics, and profile reports when Run based on user settings.

![](_page_16_Figure_7.jpeg)

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![](_page_17_Picture_0.jpeg)

### Get Help!

- Extensive documentation is included with TAP 7 and TAP Mapper. Look the for the '?' icons located on the Main Window and throughout the applications. Click the icon for context-sensitive help. For help on a specific section, left-click on the section and press the 'F1' key.
- Visit the SoftWright website for searchable FAQs and, especially, video tutorials: <u>https://www.softwright.com/knowledgeba</u> <u>se/faqs/video-tutorials-and-webinars/</u>
- Email support@softwright.com.
- Contact <u>sales@softwright.com</u> for information on configuring and purchasing your TAP license.

![](_page_17_Figure_6.jpeg)

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