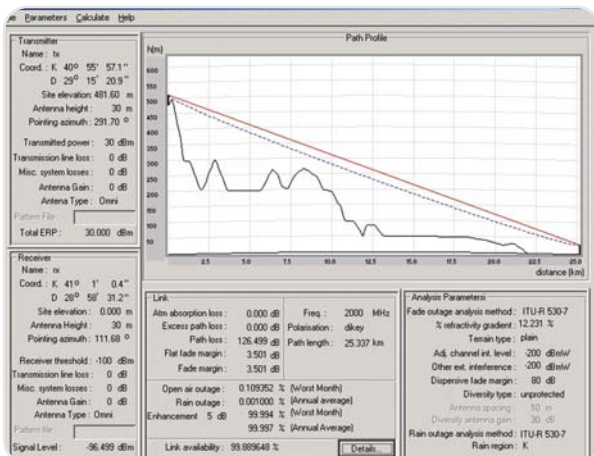# microwave module

SES - Microwave Module is a special tool designed to fulfill your analysis demands for systems operating in the frequency range from 450 MHz to 45 GHz. Its practical tools provide comfort during the point-to-point link and microwave interference analysis. This module provides you excellent path profile handling.

▶ *Point-to-point Microwave Link analysis*

SES - Microwave Module performs following functions:
- Path profile plot
- Link analysis based on:
  o Atmospheric absorption loss
  o Basic path loss
  o Excess path loss
  o Fade margin
  o Flat fade margin
  o Open air outage percentage
  o Rain outage percentage
  o Link enhancement
  o Link percentage availability and details
- Microwave interference analysis

With the SES – Microwave Module, you are able to select the antenna type and define antenna patterns for transmitting and receiving antennas. During your link studies, you can also describe transmitter and receiver site coordinates and antenna heights above ground level. You can define transmission line loss, miscellaneous system losses and antenna gain for the transmitting and receiving antennas. Total ERP (Effective Radiated Power) and link frequency as well as receiver sensitivity can also be defined.

SES - Microwave Module lets you compute the link percentage availability using the fade outage and rain outage analysis methods described in Rec. ITU-R P.530.

You can also define the following parameters related with the link analysis:
- Terrain type
- Adjacent channel interference level
- Other external interference
- Dispersive fade margin and occurrence

- Diversity type
- Antenna spacing
- Diversity antenna gain
- Rain region

SES – Microwave Module's link analysis performs the computation of free space loss, atmospheric absorption, clear air fading, obstruction loss and rain attenuation calculations according to Rec. ITU-R P.530.

SES - Microwave Module can also analyze the interference between point-to-point links. It is possible to define stations by means of a database query function provided by SES – Basic Module. SES – Microwave Module allows you to define your own stations within a specific area and carry out the microwave interference analysis on these stations.

GIS Layer File Characteristics

SES - Microwave Module provides a wide selection of vector and raster map data layers. With its easy to use tools, you can arrange the GIS Layer File parameters based on:
- Elevation
- Radio Meteorological Parameters
  - o Radio Refractivity Index and Gradient
- Terrestrial Parameters
  - o Clutter Code
  - o Zone Code

Radio-meteorological parameters are imported/exported as MapInfo TAB files. Terrestrial parameters are used in point-to-point analysis. Clutter and Zone codes are compliant with Rec. ITU-R P.452.

Link and Station Management

SES – Microwave Module allows you to manage links and stations through a user-friendly Graphical User Interface (GUI). You can add or remove a station as well as defining or breaking a link. Changes made in the coordinates of the stations by using the link management interface are reflected instantly to the map so that the user

has the chance to see the most recent situation of the system on the map background.

SES – Microwave Module allows you to analyze all possible interference situations between a selected link and all other links and stations. The result of interference analysis is presented in several types such as S/I ratio, total interfering signal level and total link power, etc. These results can be saved as XML and text files.

The operational status of a link is determined in accordance with the study results obtained from microwave interference analysis. The module can recommend a more proper link configuration when a link is determined to be non-operational.

Supplementary tools

Effective user-friendly toolbars in the SES – Microwave Module allow you to drag and drop the stations. This facility will help you in changing the locations of your stations. The current coordinates are displayed on the status bar as you move your mouse on the map. You can select one of the GIS map layers to display on the background.
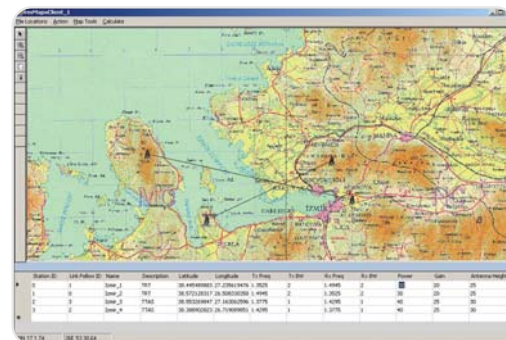
▶ *Stations/links displayed on the map background.*
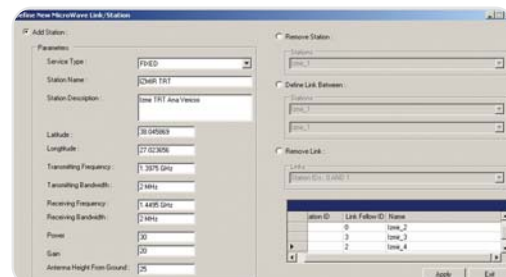
▶ *Station management window for microwave interference analysis.*