

## Cellular Expert UMTS module features

Tasks	Features
Network data management	Site, sector, construction, customer, repeater management: <ul style="list-style-type: none"> <li>• Add</li> <li>• Edit</li> <li>• Move</li> <li>• Copy</li> <li>• Delete</li> <li>• Site re-use patterns for nominal planning</li> </ul>
Point-to-point analysis	Free space path loss: ITU-R P.525-2 Fresnel zone ellipsoids: ITU-R P.526-11 Path clearance: ITU-R P.530-13 Specific attenuation: ITU-R P.676-8 using input from ITU-R P.837-5, ITU-R P.838-3 and ITU-R P.839-3 Rain attenuation: ITU-R P.530-13 Diffraction algorithms: Single knife-edge (ITU-R P.526-11) Deygout (ITU-R P.526-11) Average (ITU-R P.530-13) Path loss models: Line-of-sight Hata Diffraction Macro Adaptive SUI Reflection analysis Multipath analysis Anti-correlation analysis Antenna height optimization Reporting

<p>Radio equipment data management</p>	<p>Antenna, feeders, combiners, modulation performance tables, carriers, radios, spectrum masks management:</p> <ul style="list-style-type: none"> <li>• Add</li> <li>• Edit</li> <li>• Copy</li> <li>• Delete</li> <li>• Create/Edit antenna pattern</li> <li>• Vertical antenna pattern every 1°</li> <li>• Horizontal antenna pattern every 1°</li> <li>• 3D pattern creation, display, export</li> <li>• Import/Export of antennas</li> </ul> <p>Parabolic and sector antenna editors:</p> <ul style="list-style-type: none"> <li>• Tabular radiation pattern representation with inplace editing</li> <li>• Graphical radiation pattern representation in linear and logarithmic scales</li> <li>• Modulation performance editor</li> <li>• Tabular and graphical representations of the BER vs. signal-to-noise ratio dependencies, approximation by formula</li> <li>• Defined curves for BPSK, QPSK, DQPSK, M-FSK, M-QAM modulations</li> <li>• Carriers list editor</li> <li>• Frequency plans for simplex and duplex channels</li> <li>• Tabular and graphical representations of frequency carriers</li> <li>• Spectrum mask editor</li> <li>• Spectrum density mask editing</li> <li>• Automatic mask generation for predefined bandwidth</li> <li>• Tabular and graphical representations of spectrum masks</li> <li>• MIMO configuration</li> <li>• </li> </ul>
<p>Visibility calculation</p>	<p>Line of Sight</p> <p>Path clearance</p> <p>Fresnel zone clearance</p> <p>Minimum antenna height</p>
<p>Prediction Model tuning</p>	<p>Evaluation of prediction accuracy</p> <p>Hata model:</p> <ul style="list-style-type: none"> <li>• 9999 model parameters adjustment</li> <li>• Macro model parameters adjustment</li> <li>• Clutter loss offset determination for each type of clutter</li> </ul> <p>Walfish – Ikegami model tuning</p> <p>SUI model tuning</p>

	<p>Line of sight model:</p> <ul style="list-style-type: none"> <li>• One slope model tuning</li> <li>• Dual slope model tuning</li> </ul>
<p>Propagation Models:</p> <p>HATA</p>	<p>Basic algorithm: Okumura-Hata equitation  Type: Point-to-multipoint  Frequency: ~ 150 MHz - 2 GHz  Distance: up to 100 km</p> <p>Hata Model Parameters:</p> <ul style="list-style-type: none"> <li>• Standard (ETR 364, COST 231 and ITU-R P.529-3)</li> <li>• Macro Model</li> <li>• 9999 Model (Ericsson)</li> </ul> <p>Effective Antenna Height methods:</p> <ul style="list-style-type: none"> <li>• Absolute</li> <li>• Profile</li> <li>• Average</li> <li>• Relative</li> <li>• Slope</li> </ul> <p>Diffraction</p> <ul style="list-style-type: none"> <li>• Single knife-edge (ITU-R P.526-11)</li> <li>• Deygout (ITU-R P.526-11)</li> <li>• Spherical Earth (ITU-R P.526-11)</li> <li>• Average (ITU-R P.530-13)</li> </ul>
<p>Line of Sight</p>	<p>Basic algorithm: ITU-R P.452-14  Type: Point-to-point and Point-to-multipoint  Frequency: about 700 MHz - 40 GHz  Distance: up to 100 - 150 km  Percentage of Time: 0.001 to 50.  Specific attenuation: ITU-R P.676-8 using input from ITU-R P.837-5, ITU-R P.838-3 and ITU-R P.839-3.  Diffraction: Deygout method of ITU-R P.526-11  Rain attenuation: ITU-R P.530-13</p>
<p>Walfish-Ikegami</p>	<p>Basic algorithm: COST 231 Model (ETR 364, COST 231 Final Report)  Type: Point-to-area (multipoint)  Frequency: about 800 MHz - 2 GHz  Distance: up to 5 km</p>
<p>SUI</p>	<p>Basic algorithm: IEEE 802.16  Type: Point-to-area (multipoint)  Frequency: about 2 GHz - 5 GHz  Distance: up to 70 km</p>
<p>Best Server calculation</p>	<p>N<sup>th</sup> best servers coverage, number of servers coverage  N<sup>th</sup> best servers field strength coverage</p>

<p>Network Analysis:</p> <p>Territory Coverage Statistic</p> <p>Traffic Analysis</p> <p>Drive-test analysis</p> <p>3D Analysis</p> <p>Coverage probability</p>	<p>Coverage statistic and condition calculation for specified area</p> <p>Traffic spreading by best server coverage</p> <p>Traffic spreading using clutter weights</p> <p>Import formats: Ericsson TEMS, Motorola, iFTA, NEMO, ASCII files</p> <p>Drive-test post-processing:</p> <ul style="list-style-type: none"> <li>• Statistical analysis</li> <li>• Filtering</li> <li>• Averaging</li> </ul> <p>Drive test decomposition</p> <p>Prediction update with drive test data</p> <p>Measurements to serving cell connection</p> <p>Drive test data player</p> <p>3D antenna pattern visualization</p> <p>Hata or free space loss algorithms for field strength calculation</p> <p>Ability to optimize antenna parameters (tilt, azimuth, etc.)</p> <p>Coverage probability percentage and fade margin prediction due to shadowing</p>
<p>Frequency planning</p>	<p>Nominal channel groups creation for nominal planning</p> <p>Quick interference checking between two sectors</p> <p>Labeling tool for frequency visualization</p> <p>Co-channel(C/I) interference:</p> <ul style="list-style-type: none"> <li>• Separate C/I raster for each channel</li> <li>• Total C/I raster for all channels</li> <li>• Separate and combined C/I raster for hopping and non-hopping cells</li> <li>• Carrier and interferer ID raster</li> </ul> <p>Adjacent channel (C/A) interference:</p> <ul style="list-style-type: none"> <li>• Separate C/A raster for each channel</li> <li>• Total C/A raster for all channels</li> <li>• Carrier and interferer id raster</li> </ul>
<p>Automated frequency planning</p>	<p>Neighborhood/Impact matrix calculation</p> <p>Automatic channel release</p> <p>Automatic channel assignment</p>

<p>3G+ features</p> <p>UMTS coverage</p> <p>HSDPA coverage prediction</p> <p>Monte Carlo Traffic simulation</p> <p>CDMA Network Dimensioning Calculator</p> <p>LTE functionality</p>	<p>RSCP calculation          RSSI calculation          Pilot signal prediction          Traffic channel coverage</p> <p>HS-DSCH SINR raster          HSDPA data rate raster</p> <p>UMTS, HSDPA and LTE technology support</p> <p>Networks capacity calculation</p> <p>Average throughput per mobile user calculation</p> <p>capacity and coverage requirements analysis</p> <p>Cell overload estimation</p> <p>Cell range dependence for UL and DL on the number of users</p> <p>LTE coverage prediction for RSRP, RSRQ, RS-SINR, coverage probability and average data rate</p> <p>MIMO antenna support</p> <p>OFDM and fractional frequency reuse</p>
<p>Network optimization</p>	<p>Visibility/Site Matrix:</p> <ul style="list-style-type: none"> <li>• Line-of-sight visibility matrix between selected or all base stations and customers</li> <li>• Signal field strength matrix between selected or all base stations and customers</li> </ul> <p>Site optimization:</p> <ul style="list-style-type: none"> <li>• Suitable base station points from primary defined base station points</li> <li>• Number of sectors assigned to base stations</li> <li>• Antenna type (omni-directional, directional)</li> <li>• Sector power</li> <li>• Antenna height</li> <li>• Antenna tilt (for directional antennas)</li> <li>• Antenna azimuth range (for directional antennas)</li> <li>• Automated site candidate selection</li> <li>• Automated cell planning</li> </ul>
<p>DVB-T planning</p>	<ul style="list-style-type: none"> <li>• Network data configuration</li> <li>• SFN coverage</li> <li>• Signal delay</li> <li>• Coverage probability</li> </ul>



	<ul style="list-style-type: none"><li>• Population coverage statistics</li><li>• Service area and SIR, SINR</li></ul>
Automation	<ul style="list-style-type: none"><li>• Automated task processing</li><li>• Parallel calculations on multicore processors</li></ul>