Cellular Expert WiMAX module features

Tasks	Features
Network data management	Site, sector, construction, customer, repeater management: • Add • Edit • Move • Copy • Delete • Site re-use patterns for nominal planning
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

Radio equipment data management	Antenna, feeders, combiners, modulation performance tables, carriers, radios, spectrum masks management: • Add • Edit • Copy • Delete • Create/Edit antenna pattern • Vertical antenna pattern every 1° • Horizontal antenna pattern every 1° • 3D pattern creation, display, export • Import/Export of antennas Parabolic and sector antenna editors: • Tabular radiation pattern representation with inplace editing • Graphical radiation pattern representation in linear and logarithmic scales • Modulation performance editor • Tabular and graphical representations of the BER vs. signal-to-noise ratio dependencies, approximation by formula • Defined curves for BPSK, QPSK, DQPSK, M-FSK, M-QAM modulations • Carriers list editor • Frequency plans for simplex and duplex channels • Tabular and graphical representations of frequency carriers • Spectrum mask editor • Spectrum density mask editing • Automatic mask generation for predefined bandwidth • Tabular and graphical representations of spectrum masks • MIMO configuration
Visibility calculation	Line of Sight Path clearance Fresnel zone clearance Minimum antenna height
Prediction Model tuning	Evaluation of prediction accuracy Hata model: • 9999 model parameters adjustment • Macro model parameters adjustment • Clutter loss offset determination for each type of clutter Walfish – Ikegami model tuning

	SUI model tuning Line of sight model: • One slope model tuning • Dual slope model tuning
Propagation Models: HATA	Basic algorithm: Okumura-Hata equitation Type: Point-to-multipoint Frequency: ~ 150 MHz - 2 GHz Distance: up to 100 km Hata Model Parameters: • Standard (ETR 364, COST 231 and ITU-R P.529-3) • Macro Model • 9999 Model (Ericsson) Effective Antenna Height methods: • Absolute • Profile • Average • Relative • Slope Diffraction • Single knife-edge (ITU-R P.526-11) • Deygout (ITU-R P.526-11) • Spherical Earth (ITU-R P.526-11) • Average (ITU-R P.530-13)
Line of Sight	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
Walfish-Ikegami	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
SUI	Basic algorithm: IEEE 802.16 Type: Point-to-area (multipoint) Frequency: about 2 GHz - 5 GHz Distance: up to 70 km

Best Server calculation	N^{th} best servers coverage, number of servers coverage N^{th} best servers field strength coverage
Network Analysis: Territory Coverage Statistic Traffic Analysis Drive-test analysis 3D Analysis Coverage probability	 Coverage statistic and condition calculation for specified area Traffic spreading by best server coverage Traffic spreading using clutter weights Import formats: Ericsson TEMS, Motorola, iFTA, NEMO, ASCII files Drive-test post-processing: • Statistical analysis • Filtering • Averaging Drive test decomposition Prediction update with drive test data Measurements to serving cell connection Drive test data player 3D antenna pattern visualization Hata or free space loss algorithms for field strength calculation Ability to optimize antenna parameters (tilt, azimuth, etc.) Coverage probability percentage and fade margin prediction due to shadowing
Frequency planning	 Nominal channel groups creation for nominal planning Quick interference checking between two sectors Labeling tool for frequency visualization Co-channel(C/I) interference: • Separate C/I raster for each channel • Total C/I raster for all channels • Separate and combined C/I raster for hopping and non-hopping cells • Carrier and interferer ID raster Adjacent channel (C/A) interference: • Separate C/A raster for each channel • Total C/A raster for all channels • Carrier and interferer id raster

Automated frequency planning	Neighborhood/Impact matrix calculation Automatic channel release Automatic channel assignment
WiMAX features: Adaptive modulation WiMAX system calculator Monte Carlo Traffic simulation	 Adaptive modulation raster DL and UL throughput raster DL and UL bitrate raster Bitrate calculation Throughput calculation Spectral efficiency calculation Link budget calculation Signal-to-noise + interference ratio calculation Frequency reuse Networks capacity calculation Average throughput per mobile user calculation
Network optimization	Visibility/Site Matrix: • Line-of-sight visibility matrix between selected or all base stations and customers • Signal field strength matrix between selected or all base stations and customers Site optimization: • Suitable base station points from primary defined base station points • Number of sectors assigned to base stations • Antenna type (omni-directional, directional) • Sector power • Antenna height • Antenna tilt (for directional antennas) • Antenna azimuth range (for directional antennas) • Automated site candidate selection • Automated cell planning
DVB-T planning	• Network data configuration • SFN coverage • Signal delay • Coverage probability • Population coverage statistics • Service area and SIR, SINR
Automation	• Automated task processing • Parallel calculations on multicore processors