ICS telecom
the ultimate radio network planning tool

ADVANCED RADIO NETWORK PLANNING AND OPTIMIZATION

SUPPORT OF ALL RADIO TECHNOLOGIES IN A SINGLE SOLUTION

BROADCAST TECHNOLOGIES
MOBILE TECHNOLOGIES (LTE, WIMAX, 2G, 3G)
POINT TO MULTIPoint
MICROWAVE LINKS
PMR NETWORKS
AERONAUTICAL SYSTEMS
SATELLITE
RADAR
ICS telecom
the ultimate radio planning tool

ICS telecom is recognized as the most comprehensive radio planning solution. Customers use ICS telecom in a variety of ways, at all stages of a network’s lifecycle, from preliminary design and sizing, to network optimization and densification.

ICS telecom is used globally by:

- Telecom operators
- Broadcasters
- Regulatory authorities (broadcast, telecommunication, civil aviation)
- System integrators
- Equipment makers
- Engineering and consulting firms
- Research institutions.

Main functions of ICS telecom

Radio planning
- Network coverage calculation
- Comprehensive libraries of propagation models
- Path profile
- Interference analysis
- Automated frequency planning
- Traffic/handover analysis
- Population analysis
- Statistics
- Network optimization
- Prospective planning (site searching)
- Measurement/Correlation/Tuning
- ITU specific calculations.

Advanced capabilities
- Co-existence management
- Indoor planning
- Mixed indoor/outdoor calculation
- Wind turbine interference prediction
- Health safety zone calculation.

Flexible interfaces
- Database import/export
- Advanced reporting capabilities
- Digital cartography
- Google Earth export
- Vectorization.

Spectrum management and spectrum control

ICS telecom can be directly integrated into a spectrum control system or a spectrum management system to monitor spectrum usage, license compliance, electromagnetic compatibility, or perform required calculations for international coordination or ITU notification.
Network coverage calculation

ICS telecom handles coverage calculation for any radio technology. It supports multiple technologies managed in a single project, provides a full array of coverage analysis views (composite, best server, margin) and exports results in all popular formats, including Google Earth.

Interference analysis and automated frequency planning engine

ICS telecom features an integrated automated frequency planning engine that offers several optimization algorithms and permits the definition of various objectives and constraints. This enables the optimization of spectrum occupancy and frequency reuse while minimizing the impact of potential interference.

Interference analysis and frequency assignment in C/I mode:
- Protection ratios, antenna discrimination
- Modes: band, group, list, frequency plan, polarization.

Interference analysis and frequency assignment in IRF mode:
- NFD matrix, cross-polar discrimination, noise floor and KTBF.

Propagation models

ICS telecom supports the most comprehensive library of standard and specialized models, across the whole radio frequency spectrum, including ITU models and user-defined models. Models include free space propagation, diffraction, subpath attenuation, troposcattering, ducting, reflections, refraction, absorption, climate impact, 3D specular and lambertian.

Measurement/Correlation/Tuning

ICS telecom provides an advanced correlation analysis engine to compare drive test results with simulations using several types of filters and criteria. The tuning algorithm offers the possibility to tune the propagation models automatically.
Population management & traffic analysis

ICS telecom manages population data by:

- Generating automatically a population model based on density per clutter class and other parameters
- Importing data from a wide variety of formats.

ICS telecom uses population data to plan and optimize data-centric networks: parenting, traffic and handover analysis.

Various types of statistical reports can be generated and expressed in terms of population coverage or QoS by population.

Co-existence management

ICS telecom is able to perform multi-technology coexistence studies in order to:

- Quantify the impact of each technology over the other
- Analyze the affected population and services
- Perform scenario analysis to quantify the impact of various tradeoffs: spectrum allocation, interference impact, costs.

Network optimization and prospective planning/gap filler engine

ICS telecom provides the capability to adjust any parameter of the network (antenna characteristics such as power, height, location, azimuth, frequency plan) in order to achieve targets expressed in terms of coverage or interference.

ICS telecom also features a prospective planning/gap filler engine which allows:

- An initial search for optimal site locations in order to build a network from scratch
- The search for additional site candidates in order to optimize an existing network performance based on coverage or cost targets
- Flexibility to define specific constraints.

Advanced reporting capabilities

ICS telecom provides a broad range of automated reporting capabilities which can be exported in any format or database for further processing:

- Reporting of technical data and parameters (base stations, frequency plans, neighbor lists, traffic information)
- Maps (composite coverage, best server, traffic, handover, margin, interference, multilateration)
- Profile analysis, path budget
- Population-based reports
- Comprehensive statistical reports.
Mixed indoor/outdoor calculation

ICS telecom facilitates the analysis of pure indoor networks as well as the management of mixed outdoor/indoor environments by analyzing the propagation of outdoor networks into building structures. This function requires high resolution cartographic data down to 1 m resolution, including a building layer which provides information about the height and structure of the building.

Wind turbine interference

ICS telecom models wind farms and their impact on any radio communications system such as broadcast, microwave links, radar and satellite.

The wind turbine interference calculation methodologies include near-field zone, signal diffraction, and signal reflection.

Health safety zone calculation

ICS telecom implements EU Council recommendations and FCC-OET-B65 MPE calculations regarding public exposure to electromagnetic field strengths, as well as human exposure such as:

- Maximum Permissible Exposure (MPE)
- The area of exposition risk (in outdoor or indoor environment).

Database import/export

ICS telecom features a wide range of database import and export capabilities:

- ASCII or CSV based
- Any ODBC compatible database: Microsoft Access™, Oracle™, SQL Server™, Informix™
- Associating multimedia files, documents, images, with any object.
Support of multiple technologies in ICS telecom

Covering the complete spectrum of services and standards, ICS telecom enables the user to plan and optimize a large number of analogue and digital technologies, including:

- Broadcast (analog technologies, DVB-T, DVB-T2, ISDB-T, ISDB-Tb, CMMB, DTMB, T-DMB)
- Mobile technologies (LTE, LTE-Advanced, WiMAX, 3G, 2G, GPRS, EDGE, WCDMA, GSM-R)
- Point to Multipoint (WiMAX, CDMA 450, LMDS, MMDS)
- Microwave links, PDH, SDH, IP-radios
- Aeronautical systems
- PMR and trunked radio systems (TETRA, TETRAPOL, APCO-25, MPT 1327)
- Satellite
- Radar.

**Supported frequency bands:** LF MF HF VHF UHF SHF EHF THF

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**Broadcast**

ICS telecom covers the simulation and analysis needs of fixed and mobile broadcast:

- Migration from an analogue network to a digital network
- MFN or SFN configuration
- Support of all technologies: analog TV and radio, DVB-T, DVB-T2, T-DAB, DVB-H, DMB, MediaFLO™, ISDB-T
- Full compliance with ITU recommendations and Geneva06.

ICS telecom is a unique tool to plan technology transitions and convergence.

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**LTE, LTE-Advanced**

ICS telecom is a reference planning tool for any mobile technology. It brings dedicated and tailored capabilities to plan and manage the latest LTE networks.

- 3GPP-compliant
- Supports TDD and FDD schemes
- Set-up of the network stations with e-nodeB parameters
- Cell ID planning
- Analysis according to different traffic scenarios (number of resource blocks allocated to each cell, number of users per cell)
- DL SNIR Maps and UL SNIR traffic Maps (PUSCH)
- LTE throughput calculator
- Usage of MIMO antenna
- Inter-system analysis (handovers, traffic, interferences) between LTE and 2G/3G/3.5G and WiMAX systems
- Generation of LTE users and parenting with the LTE network
- Support for LTE broadcast system (MBSFN) for SFN analysis.
WiMAX
ICS telecom supports all types of WiMAX networks (fixed/nomadic as in 802.16d, or mobile: 802.16e), TDD and FDD mode of operations, different bandwidths and frequency bands:
• OFDM modulation
• Adaptive modulation
• S-OFDMA sub-carrier allocation
• MIMO/smart antenna
• Service flows as specified by the WiMAX forum for the calculation of throughput and network capacity (UGS, ErTPS, rtPS, nrtPS...)
• Multiple user profiles
• Calculation of network capacity/loading over a full day cycle.

Microwave links
The microwave features include all required functions for link budget analysis:
• Adaptive modulation
• Terrain profiles and clearance criteria
• Passive repeaters
• Automatic path budget calculations
• Frequency planning and interference analysis for whole networks
• Diversity antenna optimization (height, gain)
• Various link optimization functions
Calculations take into account space and frequency diversity and multiple ground reflections

Satellite
Satellite database management
ICS telecom handles several satellites simultaneously as a result of the dedicated database structure. It supports both GSO and non-GSO satellites.
Satellite coverage calculations:
• Best server display
• Composite coverage
• Simultaneous coverage
Inter-service calculations:
• Calculation of interference from earth stations to terrestrial applications
• Managing the interaction with other ground-based services
• Line-of-sight analysis
• Earth station frequency automatic assignment.

Aeronautical systems
ICS telecom provides specialized capabilities dedicated to civil aviation authorities, aeronautical system makers and their users. ICS telecom allows the management of congested airport zones, the simulation of various technologies that could be interfering with each other, as well as the management of coordination aspects.

Application and Services
• Ground to air, air to air, satellite (LEO)
• Radio navigation
• Radar (primary, secondary surveillance (SSR))
• Airspace coverage
• Frequency coordination
• UAV mission planning
• Co-existence management with microwave links, radars, wind farms and any interfering network.

Specialized functions
• Aeronautical propagation models (ITU-R P.528)
• HF Module based on the ITU-R P.533 and ITU-R P.1240 recommendations
• Multilateration module allowing the calculation of the accuracy of aircrafts localization: TDOA, TSOA, DME
• Coordination according to ITU-R SM.1009.
ABOUT ICS telecom

ICS telecom is a radio planner’s best friend, enabling users to model and simulate any radio technology.
ICS telecom increases efficiency, reduces costs and mitigates commercial and engineering risks from radio network planning and deployment.
Users can produce accurate simulation results shortly after the installation of the software package.

ABOUT ATDI

ATDI develops best-in-class radio planning solutions for both civilian and military markets, automated spectrum management systems (ASMS) for regulators, as well as associated consulting services, training and cartographic data.

With more than 20 years of experience and a thousand customers, several offices and a broad network of local partners around the world, ATDI boasts the most comprehensive portfolio of software solutions for spectrum management and radio planning.

ATDI is a long standing member of the International Telecommunication Union and is closely following and implementing ITU recommendations in all ATDI tools.

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