Wireless Network Planning Solutions
for telecommunication professionals

www.cellular-expert.com
Radio Network Planning in ArcGIS

Cellular Expert Company is a technology company, focused on delivering wireless network design solutions to improve telecommunication companies’ performance. We are one of the most experienced companies providing Geographic Information System (GIS) based solutions for Telecommunication market. More than 150 clients have relied on our GIS software & solutions and customer focused services.

Our mission is to deliver useful and engaging solutions for companies performing planning, analysis, optimization and reporting tasks for radio networks. We provide intuitive and user-friendly wireless network design and optimization systems that help to enhance customer service, improve communications across the enterprise and maximize operational efficiency.

Cellular Expert™ is a wireless network planning, optimization and management solution, available to the telecommunication industry since 1995. The software is distinctive for its versatile functionality, calculation precision, multi-technology, intuitive usage. It is built on powerful GIS platform – Esri ArcGIS. Cellular Expert allows users to design, optimize network and analyze information efficiently, to reduce capital expenses and operating cost, increase profitability, and improve the quality of customer support services.

The customer feedback and feature requests are key inputs for the development of our software. The solution is being constantly updated to support the latest communication technologies and also includes the improvements and functions, requested by our customers.

Cellular Expert supports UMTS, CDMA2000, HSDPA technology networks. Functionality includes Network dimensioning, Coverage analysis, Best Server, SHO, Ec/Io, Pilot Pollution and traffic simulations. Traffic simulations can be based on user distribution or Monte Carlo simulation methods. HSDPA coverage analysis is based on traffic simulation results and on network loading scenarios. Given maximum radiated power for HSDPA per cell, coverage for different throughput classes can be displayed geographically.

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SOFTWARE SUPPORTS A WIDE RANGE OF WIRELESS TECHNOLOGIES:

- 4G (LTE, LTE+, WiMAX)
- 3G/3.5G (CDMA2000, WCDMA, UMTS, HSPA+)
- 2/2.5G (GSM, DCS, CDMA, TDMA)
- Transmission (Microwave)
- Broadband access (LMDS, MMDS, WLL)
- Critical communication (TETRA, TETRAPOL, APCO)
- Broadcasting (DVB-T, T-DAB)
- Other technologies in a frequency range up to 100 GHz

TECHNOLOGIES

4G PLANNING

4G network planning functionality, includes nominal planning, automated cell planning, automated site candidate selection to adaptive modulation analysis, MIMO support and traffic modeling and simulation. The user can define the propagation parameters for different terrain types, making the propagation model more accurate for certain environment. Traffic simulations can be done for different user types or different services. Simulation results can be visualized on the map or graphs.

2G PLANNING

Our solution has several coverage prediction models, based on ITU, IEEE, ETSI and COST standards for received signal strength and best server calculations. Signal calculations may include correction factors such as diffraction, clutter loss or building penetration. Using the drive test data signal propagation models may be tuned according real measurement results.

Live traffic data spreading may be used to estimate traffic load for each sector, cell or site. Automatic frequency planning finds the optimal number of carriers to serve the area using predefined parameters and creates a non-interfering frequency plan.

MICROWAVE AND FIXED NETWORK PLANNING

Cellular Expert allows performing point-to-point and point-to-multipoint radio network design, analysis and management tasks. Implemented algorithms are used for path loss, link budget calculations, performance and availability evaluations, interference analysis and power flux density calculations.

In addition to wireless transmission, there is an option to preview, analyze and design fiber network. Fiber network data represents network object location, stores physical connectivity, fiber utilization information, related documentation and other information.
Cellular Expert enables tactical mission planners to design and optimize various types of networks for extreme situations management whenever or wherever the need arises. Cellular Expert provides essential tools to design and model point-to-point links, Mesh networks and Professional mobile networks, perform frequency allocation, traffic modeling and capacity estimation tasks.

Cellular Expert solutions help to ensure fast and secure communications for emergency management, border security and control and are recognized for calculation speed, accuracy and reliability. The software combines several propagation models - to estimate the influence of terrain roughness, obstacle height and type, radio wave diffraction/reflection and other factors.

Find suitable location and optimal parameters of the equipment

For incident management and emergency response our solution can be used to find the best location for temporary base station to quickly increase capacity of the network. As a part of mission planning, Cellular Expert will help you to choose best Radar location for optimal coverage and find location and required output power for Jammers in order to counteract opponents’ radars.

Cellular Expert is interoperable with most formats, data base systems and communication equipment in order to facilitate data import/export in a seamless way.

3D AND VERTICAL PLANNING

3D signal coverage calculations and visualization will help you to understand exposure in every point of building structures.

This function calculates the received signal level on building facades, as well as outdoor-to-indoor penetration for each floor of the building.

3D antenna pattern generation tool uses Free space, Hata or SUI algorithms to generate simplified 3D coverage for antenna direction and tilting angle optimization.
Cellular Expert is complete Enterprise Network Planning Solution for wireless network design, management and optimization. It is built to fulfill a wide range of wireless network planning tasks starting from design, engineering and optimization going to customer care, sales and marketing tasks up to strategic decision making, investment control and other management tasks. Enterprise system is open for data access and import from various data sources, such as network inventory and documenting systems, business intelligent, sales, customer care and other systems, relates the data with geographic information and provides possibility to analyze and share all the information using web solutions and cloud capabilities.
NETWORK DATA MANAGEMENT

Wireless network and equipment data is available for preview and analysis in different views such as maps and tabular representation, graphs and reports.

Network data management tools allow previewing and editing various network objects, managing associations between the objects, defining statuses, parameters and other related information (antenna patterns, documentation, photos and etc.). Equipment and network data may be imported and exported for exchange between different systems and solutions.

BUSINESS ANALYSIS FOR WIRELESS NETWORK

In addition to technical network planning, Cellular Expert can combine technical network parameters with geographic and statistic data and be used for estimation of service penetration, evaluation of the overall network quality and profitability.

Different scenarios can be evaluated, e.g. how network expansion will affect performance and profitability of existing network or predict potential sites ROI. Spatial analytics allows you to identify and quantify the implications, consequences, and impact of your decisions.

NETWORK “SKETCHING”

To establish the best business case, communication service providers need to model, evaluate and compare different deployment scenarios.

Main task for the network planner is to prepare good network project – work out how many base stations to build, choose optimal equipment, define right parameters, combine different technologies and select the best possible place for network deployment.

All that should be done in time within predefined budget. Using Cellular Expert, RF engineers can design initial network using targeted planning mode, optimize existing network considering users’ behavior, compare different technology options and backhaul solutions in one project.

SPATIAL MULTI-CRITERIA ANALYSIS

Different data types (technical, environmental, social and economic) with different meaning can be used of Multi-criteria data analysis to find the most sensitive network locations or find optimal locations for new sites to expand network.

Multi-criteria analysis gives you a logical, well-structured process to follow so different factors can be clearly identified and prioritized. It allows the alternative solutions being considered to be ranked in order of suitability. Functionality saves time for data preparation and can be used for various tasks.
**ARCHITECTURE**

Solution consists of:
- desktop application for professional network design,
- web server applications for various analysis, planning, engineering, customer care and other tasks,
- dashboards for company and network KPI analysis in maps, as well as other modules for data, tasks and information sharing and exchanging all over the enterprise using web server and cloud.

Depending on the company size, complexity of the tasks and other requirements or criteria, network planning goals may be achieved using particular software modules or whole Cellular Expert solution.

Solution may be implemented in a single user environment with a local database or in multiuser environment for collaborative network planning of enterprise. Cellular Expert scalability enables to grow the systems along with the constantly changing demands.

**GIS PLATFORM**

Cellular Expert is built on top of one of most versatile Esri ArcGIS platforms. GIS technology provides advanced visualization, mapping, geo-statistical analysis and reporting capabilities. It complements Cellular Expert software with technologies which allow integration of location-based data in network planning and operations, customer care, sales and marketing, as well as many other tasks.

**CELLULAR EXPERT SERVER**

Platform for task-focused web applications - RF planning, engineering, sales and marketing

Today's telecommunication market requires solutions that can support multi-disciplinary requests and be available in distributed locations. Cellular Expert Server provides the key components for addressing these requirements.

Cellular Expert Server supports multi-user environments through a database architecture that provides user rights management, data sharing, data integrity management, and easy integration with other IT systems.

**Solution for entire organization**

It was designed to help different groups of people in telecom enterprise like engineers, RF planners, customer care specialists, network infrastructure owners/managers to solve wide range of tasks using an internet browser having no need to install any other specialized software. Advantage of this solution is that Users can connect and work simultaneously.

For example, customer care dep. can create and share trouble area maps (with low quality connection, high dropped-call statistics), technical department allocates teams for fixing issues, track progress and delays, update status in real-time for the managers, sales and marketing people can produce and publish up-to-date coverage maps of a wireless network, management can access information of network rollout progress in an easy to use browser based map.

Cellular Expert Server enables users of different roles at telecom enterprise to overcome the most demanded engineering, network planning and management challenges and perform very specific tasks, e.g.:

- Identify available Base Stations for transmission line.
- Calculate Radio Line between selected stations and create calculation report.
- Identify service availability at any selected location.
- Access network rollout simulations in order to provide customers with information about upcoming improvements in the network.
- View traffic coverage statistics for further analysis.
- Analyze customer complain information in a map view by type, status, priority and other parameters.
- Effectively and cost efficiently determine potential new site locations and expand service infrastructure.
Web-based enterprise dashboard to display Telecom KPIs geographically

When it comes to business planning and execution, there is critical business need to monitor market performance indicators like Revenue, Network utilization and customer population density in a geo-visualization framework.

Cellular Expert Dashboard incorporates spatial analytics into the Business Intelligence (BI) framework. This gives your organization a tool to visualize and interpret data more easily, save time on long reporting process and make decisions on the spot.

The Dashboard collects key performance indicators (KPIs) from different systems, displays data geographically and evaluates operational performance daily, weekly, monthly or on any other time period. Information can be sourced from a variety of IT systems in a Telecom Enterprise, including Business intelligence, Network Monitoring (NMS and NOC), Customer Service and Billing.

Cellular Expert Enterprise Dashboard is a unique solution with captivating graphics, maps and features that allows users to make data driven decisions faster than ever before.

Cellular Expert Enterprise Dashboard provides role-based user permissions and access control.

The Dashboard can be used to view performance across entire organization and improve inner collaboration.

Dashboard can increase the analyst’s job efficiency, shorten time spend on reporting and enable managers to analyze current information quickly in various aspects.

Data from different sources automatically is transferred to Cellular Expert Dashboard, where you can always analyze recalculated data by city (or any other location), by sales division or manager, by product segment or the price.

Using Dashboard managers are able to view product performance, identify issues or alarming situations (e.g. drop calls), by drilling down to the lowest level find the root cause and generate reports. Drill down levels could be national, regional, sales division to base station level.

Dashboard provides you with spatial analytics on top of BI for different business scenarios:
1. Analyze revenue drop / growth
2. Monitor Sales performance
3. Identify location based potential for new Sites (Base Stations)

Being integral part of OSS/BSS system is key advantage of Cellular Expert. Many integration options are available, ranging from using the same data and databases to fully automated workflows, depending on organization workflows and needs.

The functionality of Cellular Expert can be extended using .NET or COM APIs, provided with the Product.

Experts of our company offer a wide range of custom services: the localization of the user interface, integration of Cellular Expert with the existing information systems, implementation of additional functionality or modification of the existing one.

Training courses are available at Cellular Expert headquarters or Customer's premises. During trainings participants gain theoretical knowledge and practical experience how to work with Cellular Expert software. Training topics explain the concepts of Cellular Expert and fully cover the software functionality. The courses are oriented to specific technologies according to the customer needs.

Cellular Expert Company offers professional services related to the wireless telecommunication network planning: wireless network design optimization, data preparation, software implementation and customization, system integration projects as well as other services that are in great demand both in local and international markets.

Cellular Expert online helpdesk system is a tool that will help you to find solutions, answers and information more quickly, as well as make communication between you and our technical team more efficient.

The helpdesk consists of two modules: trouble ticket register and knowledge base. Knowledge base is an information hub. We’ll put all technical information there: release notes, links for downloading newest releases of software, patches, custom tools, as well as tutorials, how-to guides for various wireless technologies, technical references. Marketing materials, user stories will also be there. We update information frequently, so please visit helpdesk regularly www.support.cellular-expert.com/helpdesk

In case you have an issue, question or need immediate assistance, simply write e-mail to support@cellular-expert.com
Use code CE2016-2 to get 90-day evaluation version along with premium technical support at http://bit.ly/evaluate_CE

For more information, please visit our web-page www.cellular-expert.com, give us a call +370 (5) 2150575 or drop an e-mail at info@cellular-expert.com

We would be happy to arrange a call, web or live meeting for you.