

Our offices

<p>ATDI s.a. 8, rue de l'Arcade 75008 Paris France Tel +33 (0)1 53 30 89 40 Fax +33 (0)1 53 30 89 49 atdi@atdi.com www.atdi.com</p>	<p>ATDI Ltd. Kingsland Court, Three Bridges Road Crawley West Sussex, RH10 1HL - UK Tel +44 (0)1293 522 052 Fax +44 (0)1293 522 521 northern-europe@atdi.co.uk www.atdi.co.uk</p>	<p>ATDI Ibérica c/ Orense, 8 Piso 12-D (Neuvos Ministerios) 28020 Madrid - Spain Tel +34 91 598 21 36 Fax +34 91 597 03 01 iberica@atdi.com www.atdi.es</p>	<p>ATDI Inc. 1420 Beverly Road, Suite 140 McLean - VA 22101 USA Tel +1 703 848 4750 Fax +1 703 848 4752 americas@atdi.com www.atdi-us.com</p>
<p>ATDI Est Bd. Aviatorilor, 59 Bucharest Romania Tel +40 21 222 42 10 Fax +40 21 222 42 13 eastern-europe@atdi.com www.atdi.ro</p>	<p>ATDI OOO Sadovnicheskaya st. 72 bld 1 115035 Moscow Russian Federation Tel +7 095 252 96 10 Fax +7 501 408 50 74 moscow@atdi.com www.atdi.ru</p>	<p>ATDI PTY Ltd 79 Macarthur Street - Ultimo NSW 2007 Australia Tel: +61 (0)2 9213 2200 Tel/Fax: +61 (0)2 9213 2299 south-pacific@atdi.com www.atdi-pacific.com</p>	

ATDI's product range



ICS telecom *nG*

- *Radio network planning*
- *Spectrum management*
- *Indoor / outdoor*
- *WiMAX*
- *Digital & analog broadcast*
- *Microwave backbones*
- *PMR & TETRA networks*
- *Mobile networks*
- *Radar*





ICS telecom *nG*: ultimate power in multi-channel planning and modelling



ICS telecom *nG* represents a major innovation in the world of radio planning tools for next generation wireless networks. ICS telecom *nG* is mobile internet-ready. Supporting high bit rate applications such as 3G networks, mobile TV, WiFi or WiMAX, ICS telecom *nG* provides unrivalled accuracy and power to design, simulate and analyze the latest technologies in complex environments, mixing indoor and outdoor situations, dense urban landscape and open areas, multiple services such as voice, data, wireless VoIP or Personal Broadband.

With increasing attention on investment expenditures coupled with regulatory service obligations, radio-communication engineers

must find the most efficient way to roll out systems in continuously shrinking timeframes.

How to control network costs, speed up the roll out phase and minimize network adjustments after installation? ICS telecom *nG* is the key answer to the equation.

Our business is radio

ATDI has the experience and skills to understand radio issues in modelling, planning, measurement and regulation of radio networks.

Our focus is radio and all the technologies and systems that use the radio spectrum for their operation. Our customers are operators, regulators, consultants, systems integrators, equipment vendors and end users who make use of radio technology.

As contributors to the leading world radio institutions, we integrate new standards as soon as they are available, ensuring that our software tools are always at the forefront of technological evolutions.

Multiple technologies, one view

No network uses a single technology. Modern networks are multi-layered, and each layer is intricately linked to the others.

Gone are the times when one could focus on the deployment of a given technology and confidently assume that the others would fit. Today, capacity requirements involve an accurate design and planning of all the technology layers interacting with each other.

Covering a unique spectrum of services and standards, ICS telecom *nG* provides the view and the tools to plan and optimize a large number of analogue and digital technologies, including aeronautical systems, broadcast TV and radio, cellular, fixed radio access, land mobile, marine systems, microwave bearers, mobile data, radar, satellite, telemetry...

ICS telecom *nG* incorporates sophisticated algorithms to manage the diversity of equipments, to ensure that incompatibilities between systems do not adversely

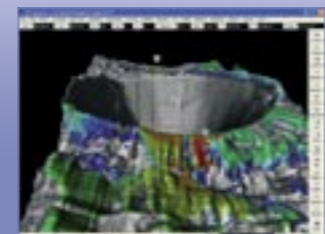
affect the availability of the communications and to forecast capacity bottlenecks in the overall network.

Local or nationwide network management

ICS telecom *nG* is capable of managing any size of network from intensive local area to extensive countrywide regions. The use of internal and external databases allows for easy management of thousands of sites, including their technical parameters and coverage. The needs of the end-user are also taken into account through the following services:

- easy specification of the geographical areas or population to be covered
- detailed subscriber access management
- traffic modelling and estimation

RF planning goes to Mars with ICS telecom *nG*



Discover how on www.atdi.com

Fast and economical network design

ICS telecom *nG* increases efficiency, reduce costs and mitigate commercial and engineering risk. A few days of expert training allows end-users to immediately produce accurate and effective results soon after installation of the software package.

ICS telecom *nG* provides benefits at all stages of the network lifecycle, covering tasks such as technology evaluation, business modelling, infrastructure dimensioning, network planning, spectrum management, network proofing, engineering data sharing, system administration, network optimization, service marketing...

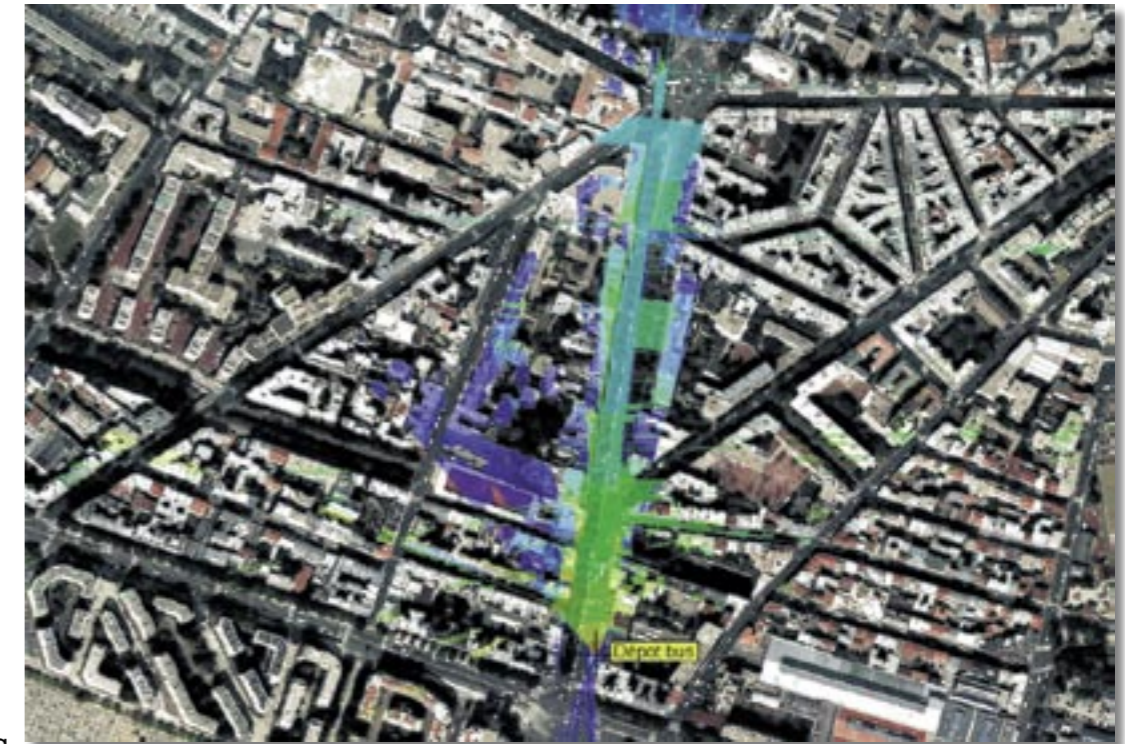
WiMAX

ICS telecom *nG* is the ideal planning tool for WiMAX planning, both for fixed and nomadic (802.16d) and mobile (802.16e). ICS telecom *nG* supports all modes of operations: TDD and FDD, different bandwidths, as well as all frequency bands of operations. It can be used for network dimensioning, detailed network planning, as well as during the roll-out and optimization phases.



ICS telecom *nG* takes into account the numerous technological advances implemented in the WiMAX standard, including:

- the effect OFDM modulation in mitigating the impact of



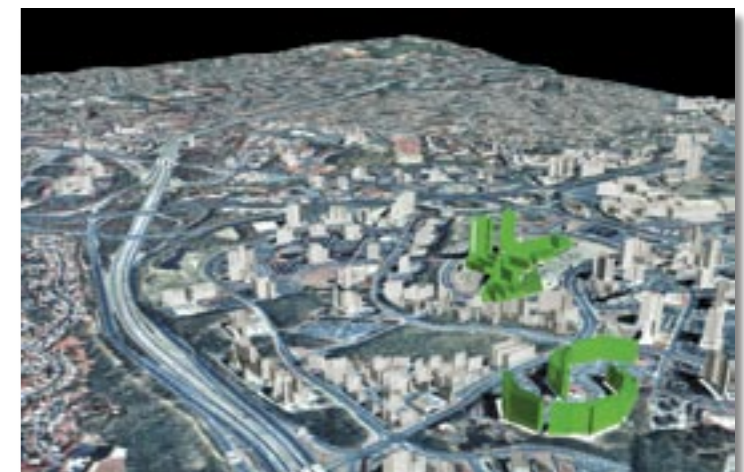
ICS telecom *nG* integrates state-of-the-art digital cartography for network analysis and geomarketing purposes

multipath in coverage calculations

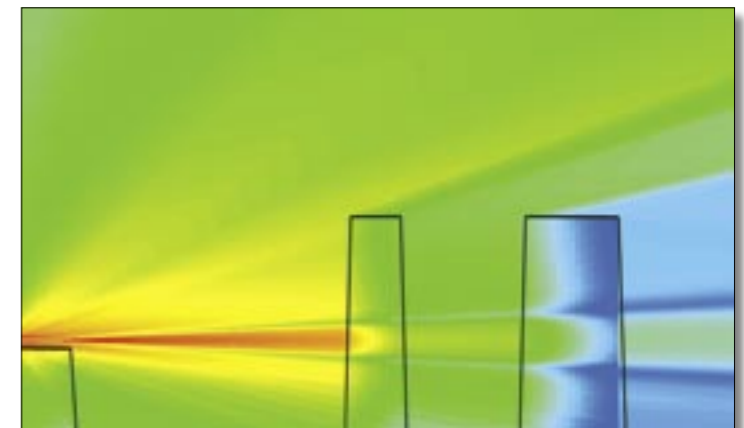
- adaptive modulation in the calculation of link budgets, as well as traffic loading at the base station
- S-OFDMA sub-carrier allocation for mobile WiMAX

the effect of MIMO/smart antennas on the link budgets as well as interference analysis,

- service flows as specified by the WiMAX forum for the calculation of throughput and network capacity (UGS, ErtPS, rtPS, nrtPS...),
- multiple subscriber profiles as well as calculation of network capacity/loading to account for the varying levels of activity of the different subscriber profiles over a full day cycle.



ICS telecom *nG* manages the five cartographic layers that are necessary for the propagation prediction and results display: digital terrain models, geo-referenced maps or imagery, clutter files, vector files and building height files



Path profile in a urban environment with ICS telecom *nG* : outdoor propagation is mixed with signal diffusion into the buildings



ICS telecom *nG* provides the functionality to model every radiocommunications type

ICS telecom *nG* is a comprehensive wireless management software application for civilian and military networks.

ICS telecom *nG* can be configured by the user to be the specialist toolbox for radio planning, technical spectrum management, network planning or just a simple coverage and link planning tool.

Designed to allow integration into other systems, ICS telecom *nG* can communicate with spectrum management and monitoring systems or individual system frequency management packages.

ICS telecom *nG* utilizes a proprietary three dimensional cartographic workspace (Digital Elevation Model) for all operations and analysis. Analysis results can be displayed on 2D or 3D displays.

Its capabilities include but are not limited to:

- Spectrum management

- 3G dedicated design features
- Analog and digital broadcast (fixed & mobile)
- Broadband wireless access (WiMAX, WiFi, RLAN...)
- Microwave link network design
- PMR - Private mobile radio networks (TETRA, TETRAPOL)
- Satellite communication
- Radars and direction finders

ICS telecom *nG* is capable of managing hundreds of thousands of sites within any one project, including all their coverage information. It is based on a graphic user interface for both single users and network planning teams.

Digital communication

ICS telecom *nG* offers the essential functions for digital radio network simulation. Such functions include connectivity, traffic and interference.

These functions completely integrate the requirements for today's technology such as:

- W-CDMA,
- UMTS,
- DVB-T,
- T-DAB,
- WiFi and
- WiMAX.

It also contains a module for digital modulation schemes with delay consideration. This allows processing gain to be computed in simulcast systems.

ICS telecom *nG* computes the relative received signal level to calculate processing gain or loss and it allows the user to randomly place sites to deploy a conceptual network and then compute all the simulations to build a picture of the performance of that network.

This allows extensive scenario modelling to build trends and models.

Statistical charts illustrating simulation results extensively describe interactions between existing and future networks.

Broadcast

ICS telecom *nG* covers thoroughly the simulation and analysis needs of fixed and mobile broadcast.

The migration from an analogue network to a digital network, whether in MFN or SFN configuration can be fully modelled, for technologies such as DVB-T, T-DAB. Broadcast now becomes mobile (DVB-H, DMB, MediaFLO™) and ICS telecom *nG* is a unique tool to account for the convergence of technologies.

ICS telecom *nG* is fully compliant with Geneva 06 recommendations and has been widely used during this ITU conference for the implementation of the digital broadcast plan.

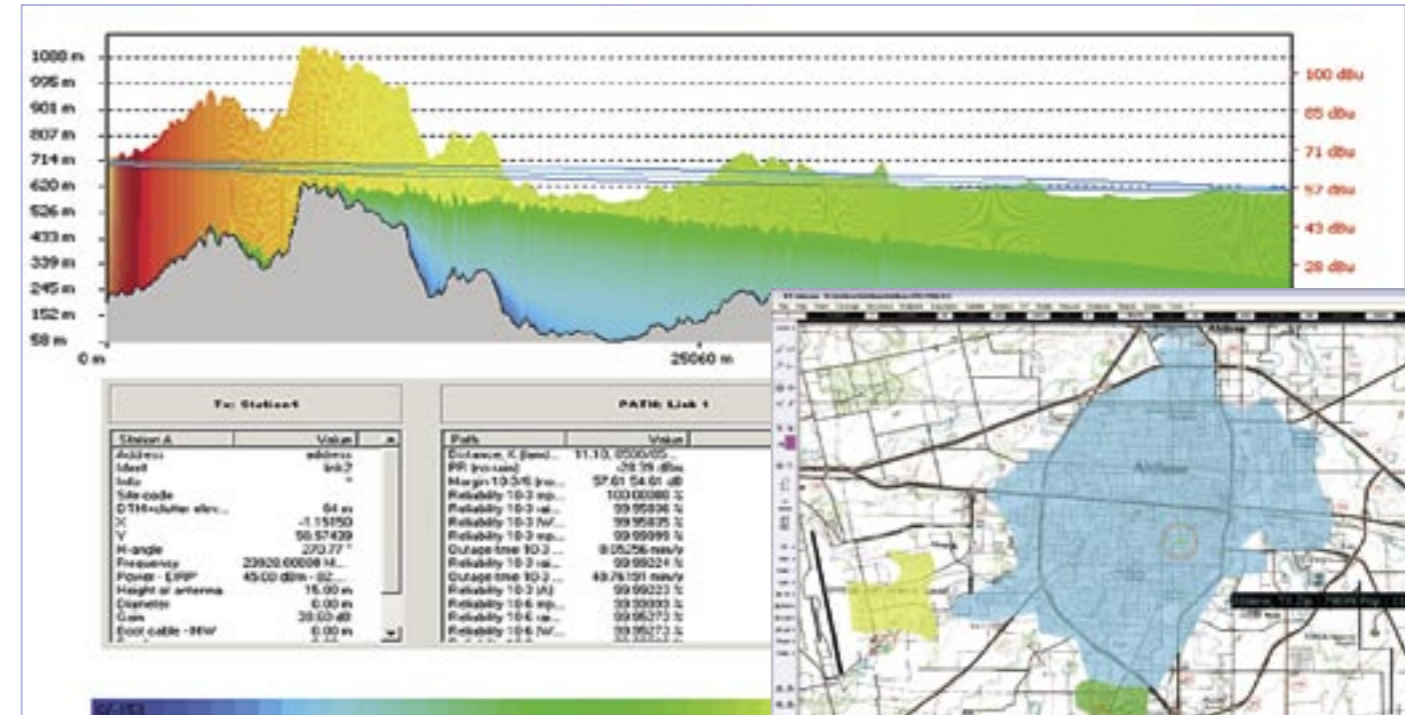
ICS telecom *nG* is the multi-technology toolbox for radio planning, technical spectrum management, or just a simple coverage or link planning tool for reporting purposes

Spectrum management

ICS telecom *nG* automatically assigns frequencies and optimizes spectrum occupancy, re-using frequencies when ever possible.

The frequency assignment module uses C/I threshold degradation methods. The algorithm considers all the possible scenarios across a range of frequencies, or takes channels from a frequency list.

ICS telecom *nG* can be directly integrated within a spectrum control system or a spectrum management system to monitor licensing, electromagnetic compatibility, international coordination...



Microwave link path budget with ICS telecom *nG* : reliability & outage time prediction

Database and multimedia folders

This allows the operator to connect to existing databases and to share technical information on a computer network on a large scale.

Improved map engine

ICS telecom *nG* manages five cartographic layers used for propagation calculations and display :

- Digital elevation models
- Raster background maps
- Satellite and aerial photos
- Clutter information
- Vector data
- 3D building models

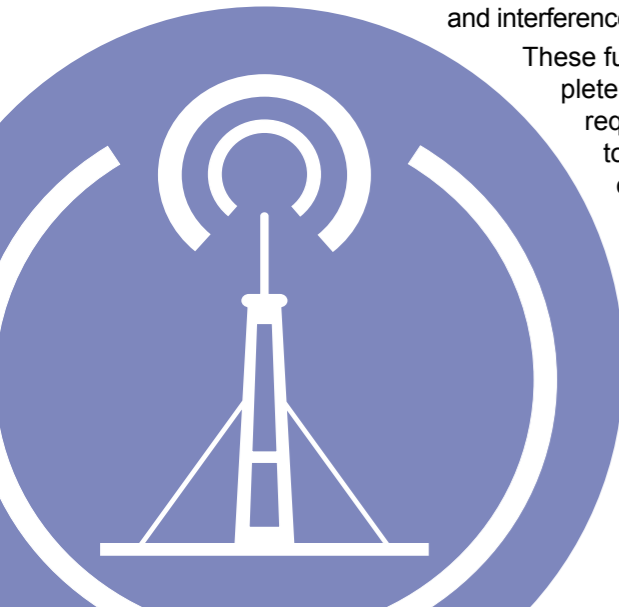
ICS map server, the natural companion tool to ICS telecom *nG* allows for easy import and geo-conversion of standard map data format.

ATDI restitution labs may also quickly build or import the required data.

Population & geomarketing analysis with ICS telecom *nG* : integration of census and demographic data

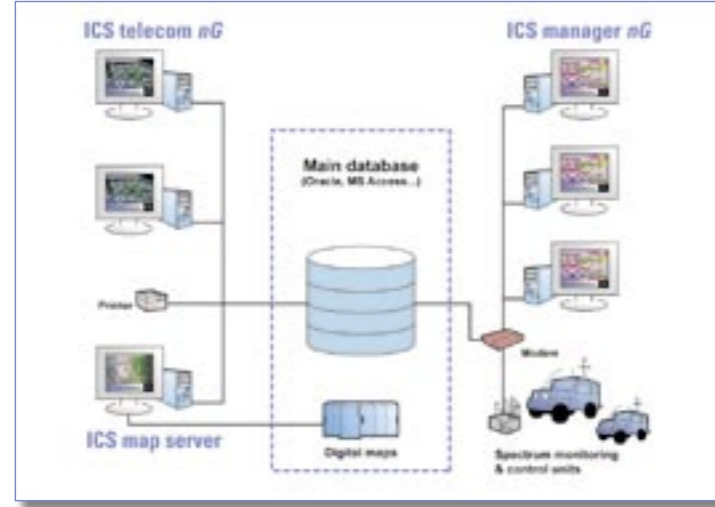


ICS telecom *nG* features technology oriented display : above, overlapping areas of transmitters and below, composite coverage...





**Today we pride ourselves in the supply of solutions.
Solutions to our customers' radio problems, whatever they may be**



Interference analysis

Few radio networks today enjoy the freedom of noise limited coverage. Spectrum demand means frequency sharing.

ICS telecom nG lets the planner analyze the resulting interference and balance network availability with spectrum resource and budget.

Best server identification

In fixed radio access networks and indeed wherever

links are needed to a multiplicity of outstations or subscribers, knowledge of which base station serves best is critical to antenna orientation at that subscriber. The report shown can also include 2nd, 3rd... best server.

Network planning

A simple process allows users to plan their network, considering the geographical area to be covered, the characteristics of the transmitter/receivers and the installation constraints.

The planning engineer can therefore state the network requirements and work to achieve optimal performance in traffic capacity, link budget, reliability, resilience and population or area covered.

Coverage is calculated by considering the technical characteristics of the transmitter, the propagation models (including diffraction from terrain and buildings), earth curvature, rain and other atmospheric effects and the characteristics of the distant receiver.

ICS telecom nG calculates coverage by considering all technical characteristics of the transmitter, including transmitter output power, operating frequency, antenna response in three dimensions and antenna system gains and losses. The associated receiver is described in full by its sensitivity, antenna characteristics, bandwidth and noise floor.

Propagation models

A variety of propagation models are provided within ICS telecom nG to suit the particular modelling scenario.

These cover the effects of diffusion, diffraction, refraction and reflection. The standard models include a wide range of deterministic and statistical models divided in four components to calculate the total path loss: free space losses, diffraction losses, sub-path alternative losses, atmospheric/climate absorption losses (including rain, fog and gas).

In addition several specific models are available, as an option, such as aeronautical propagation (ITU-R P.528), ITU-R P.533 for HF sky wave communications and ITU-R P.368 for LF/MF/HF ground wave communications.

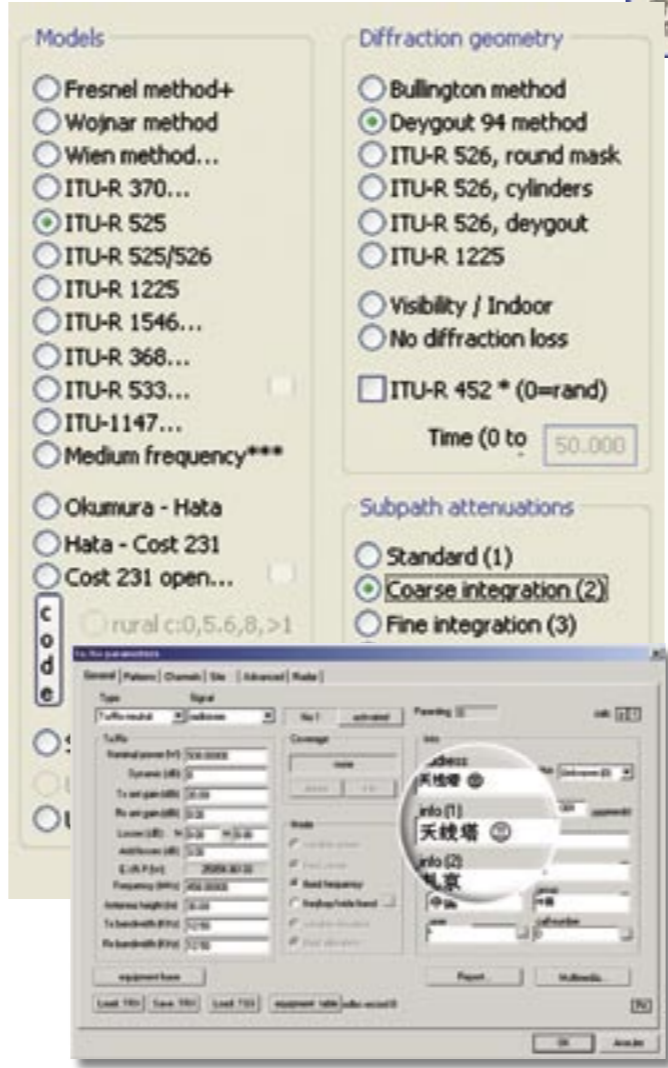
These optional models extend the range of use of ICS telecom down to 10kHz.

Propagation in urban environment

An "Urban Canyon" function in ICS telecom nG shows communications capabilities determined from the urban setting to include building reflections and blockages.

DVB-H dedicated features with ICS telecom nG MFN/SFN networks, OFDM mode, gap fillers ...

Propagation model: deterministic, statistical and ITU compatible (coordination)



Unicode version of ICS telecom nG

Weather effects for ground-to-satellite communications

Weather conditions are modeled using ITU and Crane methods calculations as well as vapor density losses for higher frequency communications.

Microwave links

All links in ICS telecom nG are defined by the technical characteristics of the two terminals. These can be entered manually or by selecting terminal equipment, antennas and feeders from a user-built database. The microwave features include the creation of terrain profiles between two stations using passive repeaters, automatic path budget calculations, frequency planning and interference analysis, and various link optimization functions.

The path analysis takes into account multiple ground reflections. ICS telecom nG

also considers space diversity and optimizes the installation of a second reception antenna.

Directional subscriber antennas

ICS telecom nG has an internal equipment database tool. It allows the user to design their own antennas for use at base stations, link terminals and at subscribers. These polar responses can be viewed and used in 3D, providing the network planner with virtually unlimited network modelling potential.

Windows Vista & 64-bit ready

ATDI maintains its technology leadership by being the first radioplanning tool vendor to roll out a 64-bit ready and Windows Vista compliant

version of its flagship planning tool, ICS telecom nG. This new release, which will be available to customers in Q2 2007, will unleash the full power of 64-bit next generation machines. Users will be able to work with ever-increasing digital map sizes, take advantage of large RAM capacities made available by 64 bit memory addressing, as well as the versatility and increased processing power of multiple CPU machines.

Now available in Unicode

All user-definable strings can be defined using UNICODE characters thereby allowing language customization (including Asian languages such as Chinese, Japanese, Korean and the like).



ICS telecom nG : multi services simulation, automatic site placement and validation

Auto planning of mobile networks

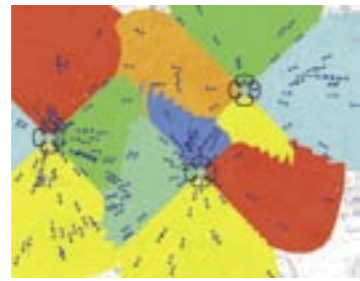
White paper available at: www.atdi.com

The mission was to provide our client with a GSM/3G network plan for all the primary cities and link these to form a national plan for a sizeable country. All of this had to be achieved within 2 weeks. The network design was for business plan analysis and spectrum application and therefore indicative sites with indicative topology were required to scope the network. The technology was 2G although the concept applies equally to 2.5G and 3G. The method proposed and subsequently used by ATDI to produce the required information was

completely successful. The measure of the success of this methodology was that :

- The 2 week deadline was met ;
- 2 engineers were used and hence the cost saving was realised ;
- All the required deliverables were supplied.

The cost benefit to the client was considerable when compared to traditional network planning approaches. The final cost of the job was a

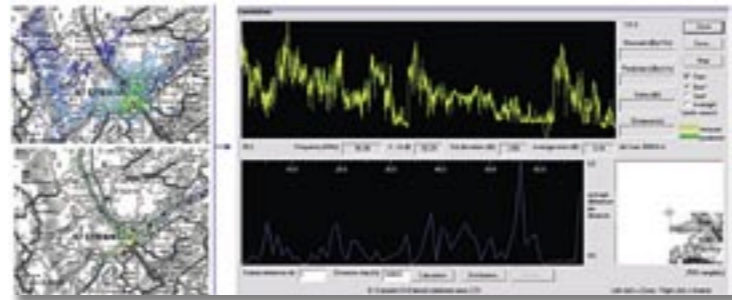


fraction of the cost of manual methods.

Using automatic methods in modelling software does not replace the need for engineering rigour – indeed it makes it all the more essential to avoid the «rubbish in, rubbish out» syndrome so prevalent in automatic systems. It does, however, make the job much quicker, more deterministic and significantly more cost effective.

Dedicated features

- >Existing site validation (GSM)
- >Network analysis
- >Network design and analysis
- >Multi-service traffic modelling



Comparison Measurement / Simulation. ICS telecom nG allows the import of field strength measurements made by on-site drive testers around a site, and allows them to be compared with the simulated coverage along the same route. The resulting correlation allows an optimization of the model that was used for the simulation... Model tuning can be processed either step-by-step or automatically.

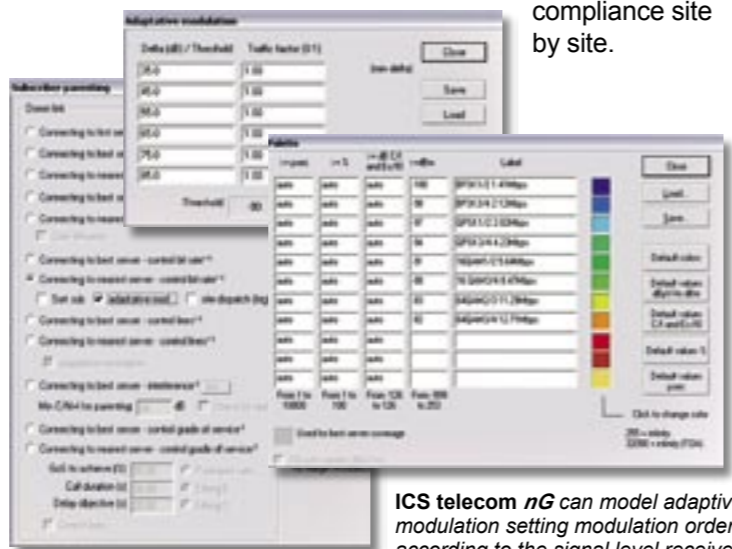
Broadband wireless access

White paper available at: www.atdi.co.uk

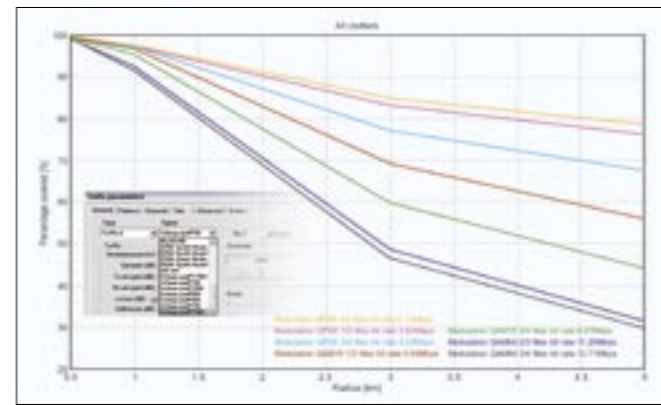
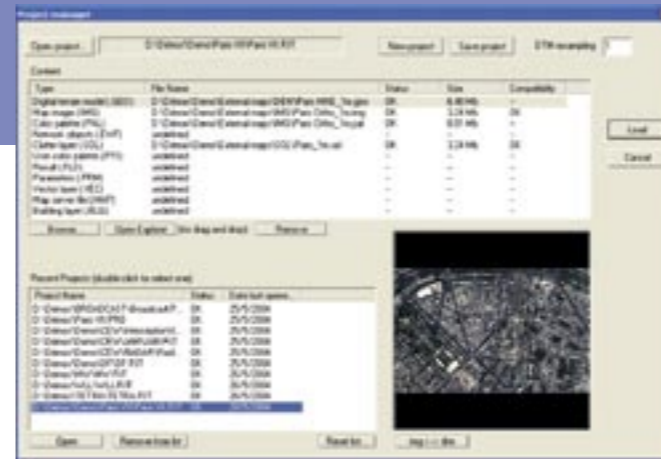
Broadband wireless access is a technology or service that has apparent utility but since the early days of narrow band forerunners it has been searching for a business plan that works and one that will break-even even on a modest scale. ATDI have supported most of the BFWA players across Europe.

During the period when there were many applications for each tranche of spectrum,

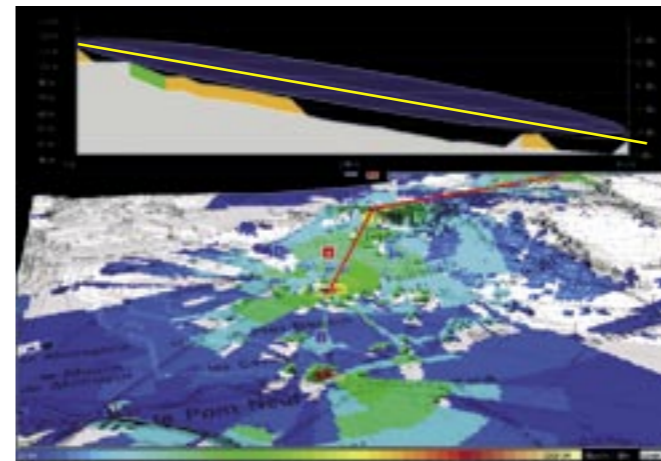
ATDI provided the means of level playing field evaluation. ICS telecom nG was used to model the various offers and to show whether or not the different technologies and different proposals met the regulators' requirements. In countries such as Germany and Switzerland, regulators used ICS telecom nG to determine and demonstrate that exported interference across their borders was at an acceptable level. Operators and their consultants learned too that they needed to comply with the various memoranda of understanding and called on ATDI to check compliance site by site.



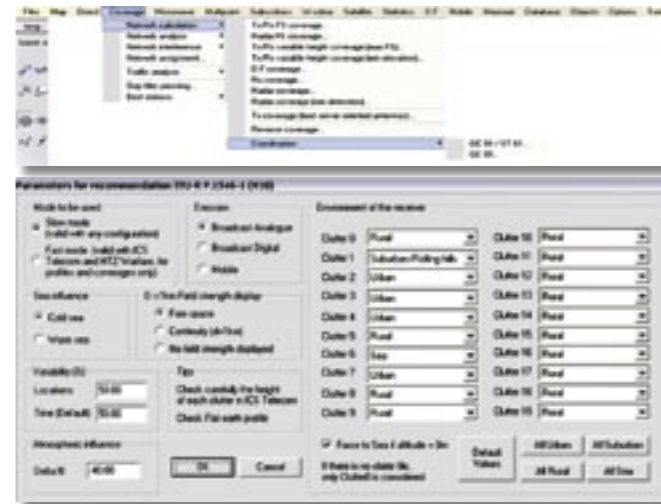
ICS telecom nG can model adaptive modulation setting modulation order according to the signal level received



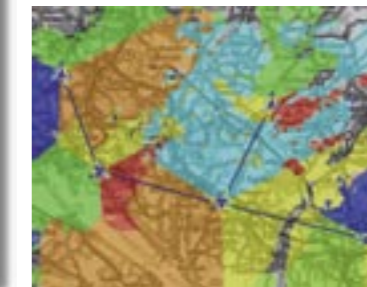
ICS telecom nG features 802.16x access calculations: LOS/nLOS simulation, adaptive modulation, C/I, IRF, COFDM interference calculation, frequency assignment...



Multi-technology oriented: ICS telecom nG includes a multi layered architecture allowing the mix of satellite PoP, WiFi coverage, microwave link backhauling within the same project. **International coordination:** propagation model, list of countries covered, compliant with agreements and recommendations from CEPT, ITU.



ICS telecom nG graphical user interface is intuitive, customizable and improves management of projects...



Tetra network coverage with backbone

As the policy in the regulators changed from beauty contest to auction, ATDI's role changed. Our support to our regulator customers swung from supply of evaluation tools to supply of consultancy services to evaluate methods of licensing.

The regulators were now striving to find ways to divide the spectrum lots to make them attractive. The Irish regulator, ComReg, went one step further contracting ATDI to develop a method of appraising individual site assignment for a regime akin to PMR where BFWA operators could apply for a licence for any number of sites from one upwards.

Tomorrow's networks are likely to use mesh methods where each subscriber is a repeater providing service to others. ICS telecom nG already incorporates advanced mesh functions. Such networks may allow self-installation by the subscriber to reduce the CPE installation overhead thereby improving viability. There are huge challenges for the future and ATDI will again be instrumental in guiding operators.

Dedicated features

- >Search and optimize base station localization
- >Associate each subscriber with the best base station according to spectrum occupancy and traffic
- >Calculate link budget for each subscriber
- >Analyze each station traffic load
- >Complete frequency planning and advanced interferences analysis...

Mixed absorption-diffraction propagation models for wireless proximity networks

White paper available at: www.atdi.com

Outdoor networks transmit signals which may be received indoor. When relatively low frequencies are used, for instance in broadcast, the diffraction is considered to predominate over the absorption and the fact that the receiver is indoors is taken into account through an increase of the reception threshold (cf. Chester 97 Agreement for the coordination and planning of DVB-T).

On the other hand, for purely indoor networks, the standard approach is to neglect the diffraction and to focus on the absorption due to the materials through which the signal passes (cf. IMT-2000/ITU-1225).

With the emergence of the new proximity networks (WiFi, WiMAX, DECT...), using outdoor base stations with indoor and outdoor subscribers at relatively high frequencies, the border between absorption and diffraction becomes much fuzzier, and there is a need to use mixed models.

Diffraction models: the different treatment of buildings and terrain in calculating diffraction in ICS telecom nG is based on standard recommendations (ITU-R 526, Deygout, Bullington...)

Absorption models: for purely indoor networks, ICS telecom nG provides the ability to specify in detail the material of each wall or partition taking information from building drawings.



HTZ warfare nG

HTZ warfare nG is a comprehensive radio planning software application for civil and military networks.

HTZ warfare nG can be configured by the user to be the specialist toolbox for electronic warfare mission planning, technical spectrum management, network planning or just as a simple coverage and link planning tool for field operations. HTZ warfare nG is designed to allow integration into other systems, like system mission planning suites, spectrum management/monitoring systems or individual system frequency management packages.

The HTZ warfare nG tool utilizes digital terrain models to simulate communication effects from 10 kHz to 450 GHz.

HTZ warfare nG capabilities include but are not limited to:

- electronic warfare ;
- spectrum management ;
- tactical communications.

HTZ warfare nG is capable of managing hundreds of thousands of sites within any one project, including all their coverage information. HTZ warfare nG is based on a graphic user interface for both a single user or to network teams.

HTZ warfare nG utilizes a proprietary three-dimensional cartographic workspace (Digital Elevation Model) for all operations and analysis. HTZ warfare nG analysis results can be displayed on 2D or 3D display.



ICS manager nG

ICS manager nG is a software platform dedicated to advanced RF spectrum management. Initially targeted at regulators, its flexibility and ease of use is of great value to operators as well.

The ICS manager nG platform is based on the guidelines of recommendation ITU-R. SM.1370. It offers:

- a safe database system environment ;
- powerful data exchange functions ;
- a customizable report edition tool ;
- dedicated data input interfaces ;
- enhanced visualization functions ;

- customizable process controls.
- As a synthetic tool, ICS manager nG enables to:
- make sure that new services do not interfere with existing systems according to ITU plans and regional & national plans ;
 - manage administrative procedures in accordance with the national, regional and international rules ;
 - optimize the sharing of frequencies ;
 - supply secure administrative and technical data storage and management ;
 - efficiently share information between actors.

The set of standard modules of ICS manager nG covers all the needs of regulating authorities.

ICS microwave

ICS microwave features a complete software dedicated to microwave planning, well integrated with the whole ATDI software suite. For example, ICS microwave can automatically link BTS stations together to suggest a backbone network. Microwave backbone networks are easy to manage thanks to advanced yet easy-to-use dedicated functions, and the database structure specific to microwave links. Features such as automatic frequency assignment, automatic antenna alignment and automatic antenna height setting to meet clearance parameters, link budget analysis, and interference calculations are all standard features of the software.

For each link, the user can open a microwave link analysis window, and analyse the technical characteristics of the link: Availability, quality, margin, losses (diffraction, gases, rain...), RSL...

ICS map server

ICS map server is an advanced software system designed to create and manage digital cartography datasets. Operators working on sizeable networks or those who are present over very large territories need large amounts of cartographic data. ICS map server is a software designed to create topographic data files via the processing of land contours, interpolations, maps, aerial and satellite views, conversions, etc.

The latest release of ICS map server integrates a large number

of new functionalities that make it one of the most powerful systems for cartographic database management. In particular it integrates the automation of the project creation process, making it possible to immediately display the data available for any region, etc. Suitable for all image processing work and digital terrain model files (DTM) it can interface with image processing tools as well as with market-available geographic information system software (GIS).

Antios

Antios is a 3D software system for the design of antennas and antenna systems. The increasing occupation of radio frequencies requires new antenna designs capable of meeting both frequency allocation plans and the coverage requirements of each operator. In particular broadcasting networks must satisfy complex constraints designed to reduce or eliminate possible interference. Modelling such a complex problem was solved with Antios software. This highly innovative product enables engineers to design systems using multiple horizontal or vertical dipole arrays arranged around the support. A 3D diagram enables definition of the positions of antenna components and the necessary phase shifts to obtain the required result.

www.atdi.com

ICS online provides networks on the net - www.atdi.com/icsonline.php

The recently introduced ICS online represents a powerful and yet simple internet / intranet gate to your network data, and a link between the network design team and the marketing department, the sales force, the customer center and the installation and main-

tenance services. ICS online is entirely designed to answer typical questions such as:

- Where should we market the service?
- Can a particular prospect be connected?
- Can I subscribe to your service?
- What are the installation instructions for this new client?
- I cannot use the service today, is there a problem with your network?

Built using the latest Rich Internet Application technologies, ICS online provides everyone in your organization with an up-to-date, intuitive and flexible map interface gathering all the relevant network information:

- Mapping data — handles multiple scales,
- Service coverage: handles multiple services,
- Geomarketing data (companies/clients, addresses and corresponding geographic coordinates),

- Network constituents (base stations, links...),
- Technical notes (for installation, maintenance...),
- Real-time network status (failures, maintenance status...).

Main features

- >Works as an Internet or Intranet application.
- >Map display: Pan, Zoom in / out, Change map scale, Coordinate display
- >Coverage display by service.
- >Address Query based on street number, street name, city, province... (handles misspellings).
- >Coverage quality at the center point of the map. Handles various kinds of coverages (field strength, C/I, Ec/Io, Eb/No...). Customized comments on the coverage quality.
- >Report including map extract, coverage details...

