ATDI

ATDI Group
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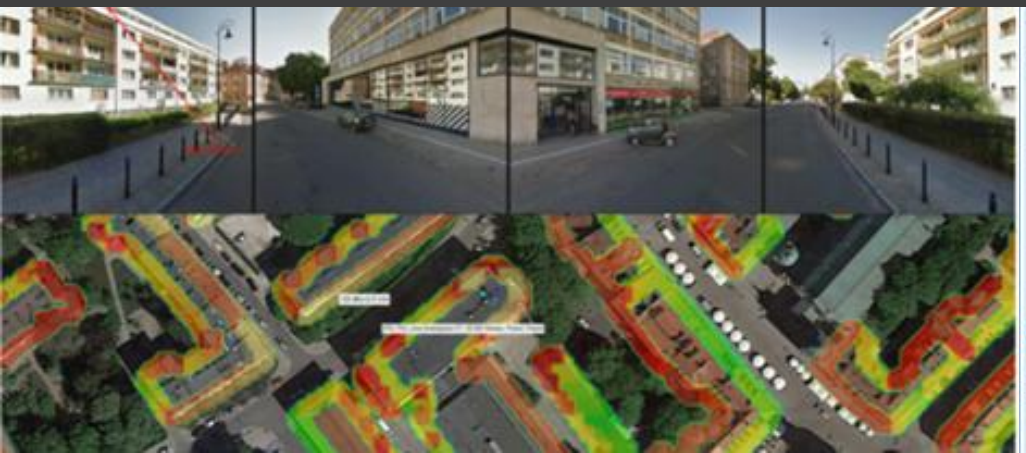
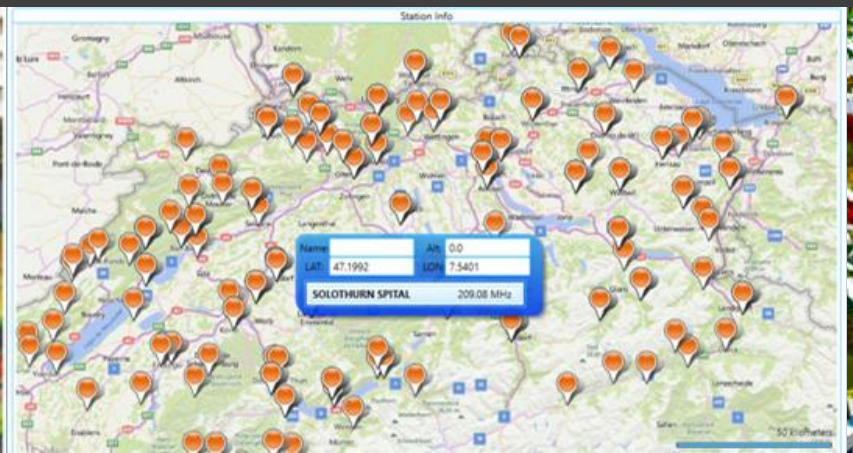
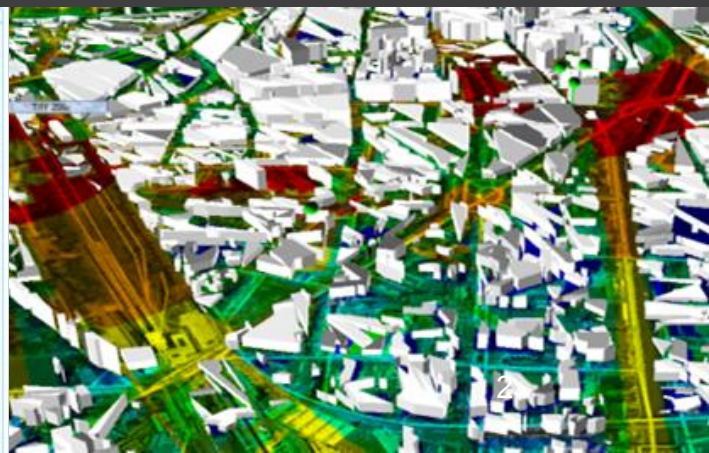
Our
Values & Contributions

- Dedicated R&D to ensure we stay ahead of the game
- Solutions compatible with ITU regulations. Contributions to industry organisations including ITU-R and ITU-D, NATO-STCCT, DCI and Old Crows.
- Our team has an excellent understanding of our customers needs – how – discussions/industry experience and a desire to find the best fit (solution) for the end user
- Our team – built from diverse backgrounds enables us to draw from a wealth of knowledge and understanding of the industry and its requirements
- Work in partnership with our end users to ensure both pre-production, throughout project rollout and beyond.







About Us

BATTLESPACE SPECTRUM MANAGEMENT AND ELECTRONIC WARFARE NETWORK PLANNING AND MODELLING SOFTWARE SOLUTIONS

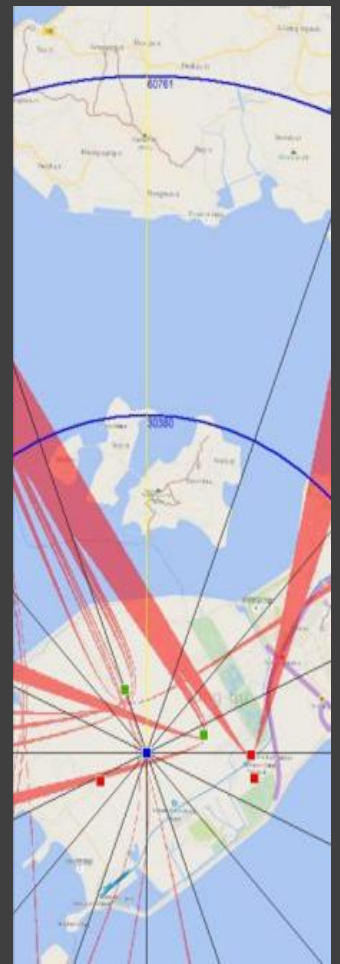
OUR FOCUS IS TO SUCCEED AT EVERY LEVEL OF COMMAND IN ELECTROMAGNETIC SPECTRUM OPERATIONS

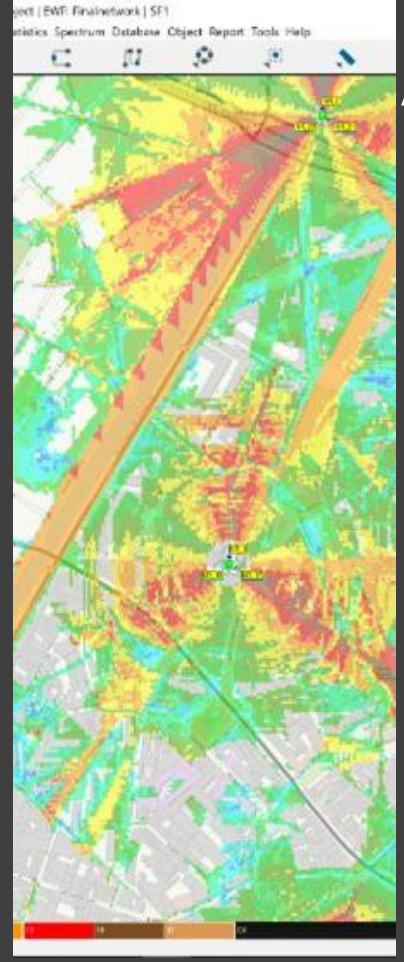
ATDI are global leaders in the development and implementation of automated spectrum management solutions.

For over three decades, we have backed over 2,000 civil and defence spectrum agencies, operators and vendors. Our solutions continue to evolve to meet the growing needs of the defence industry.

We provide a unique and global solutions for:

- **Radio planning and optimisation:** activities for all communication and transmission systems used by the Ground/Air/Sea/Space forces;
- **Frequency management (FM)**
- **Spectrum management solution (SMS):** for planning, coordinating, and managing joint use of the EMS through operational, engineering and administrative procedures;
- **Electronic Warfare (EW)** management / interception and intelligence





Our Offices
Global Footprint

- Allows us to leverage different time zones
- Provide support around the clock
- Fast response times

- Draw resources from across the group to support larger projects ensuring we offer the very best services to our end users

- Shared experiences – combining many man-years experience across the group. At every stage of the project (from project outset to going live) we aim to learn and improve our services. To do that we carry out regular internal project reviews and a group review at handover.

Automated **Spectrum Management Solution**

Electromagnetic Spectrum (EMS) is widely used for military operations. Competing demands for radio spectrum means it must be strictly coordinated and controlled. Battlespace spectrum management is the planning, coordination and management of EMS, to enable military systems to perform their functions without causing or suffering from harmful interference.

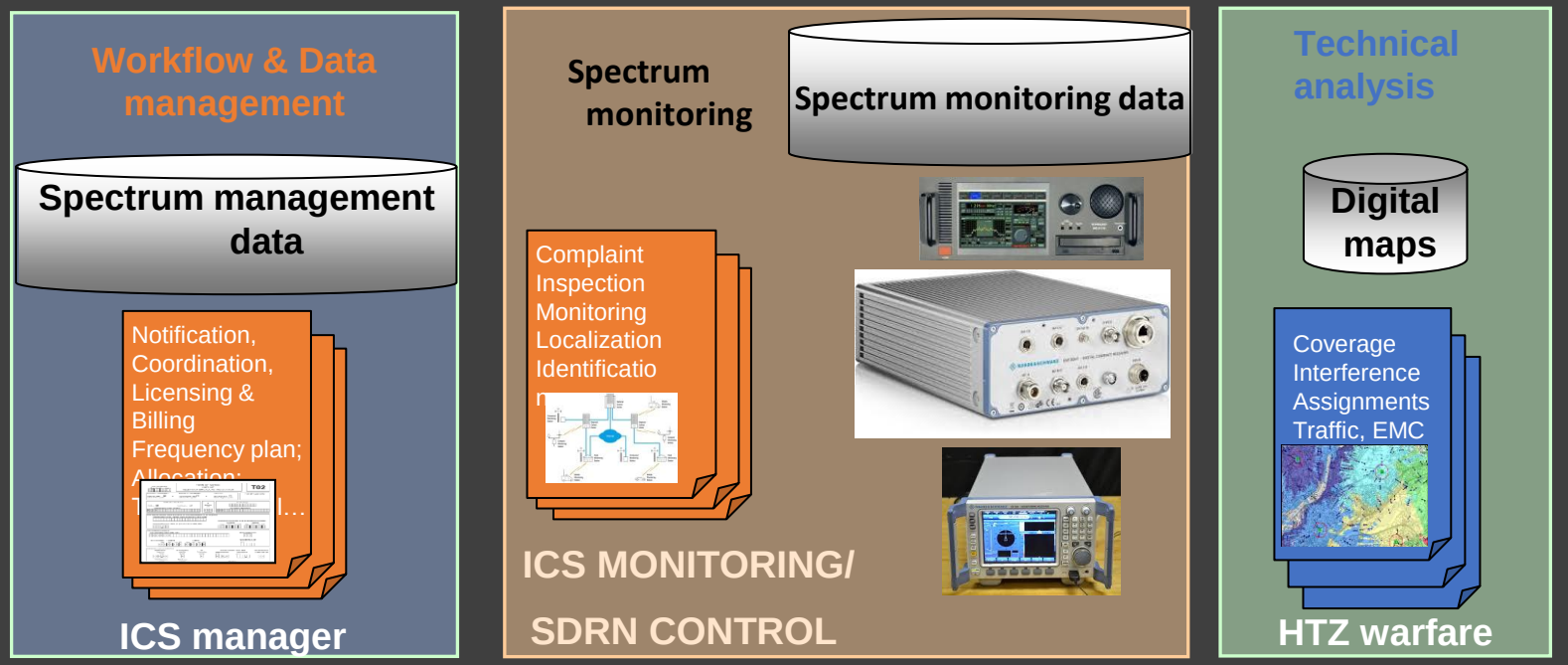
With over three decades of development, ATDI has developed a leading military network planning, EW modelling tool and frequency management solutions, HTZ Warfare and ICS manager.

Our solutions allow defence spectrum managers to:

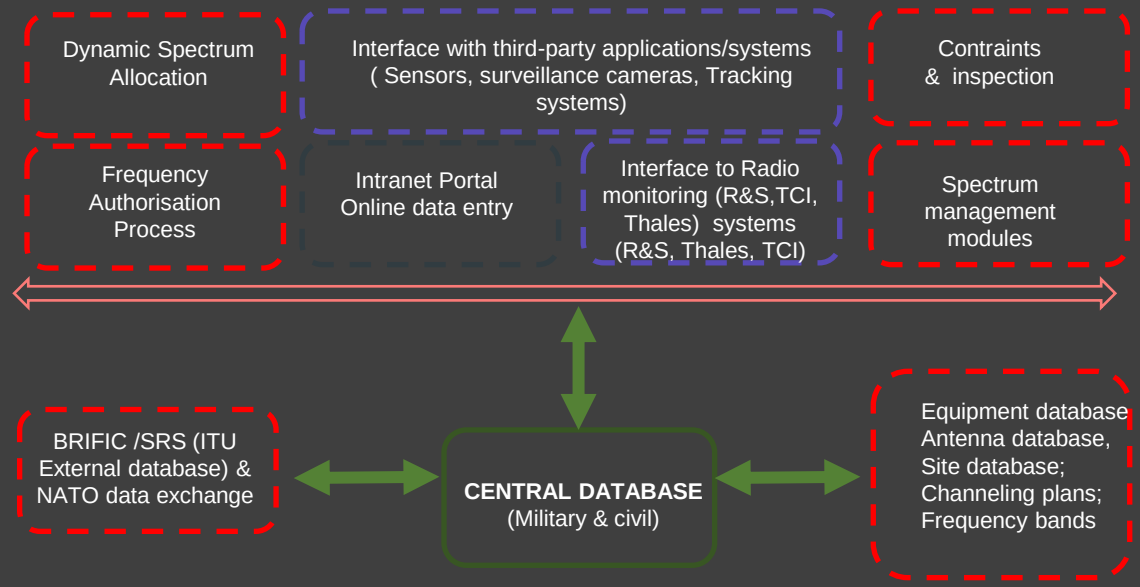
- **Control** the use of spectrum
- **Deconflict** electromagnetic spectrum interference
- **Joint Mission Operation** support standard mission planning data (SFAF, SMEDEF-XML, etc)
- **Tactical Mission Planning** rapid tactical mission network deployment and frequency assignment
- **Convert** private GIS dataset to secure confidential information
- **Automate** complex mission planning workflows to support field operations
- **Share and Control** database to support simultaneous data access

Automated **Spectrum Management Solution**

ATDI SPECTRUM MANAGEMENT & MONITORING SOLUTION



Automated **Spectrum Management Solution**

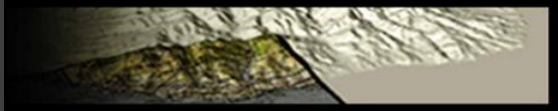


HTZ AUTOMATION

Automation and integration

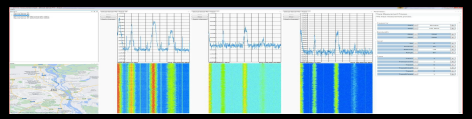
HTZ warfare

communication electronic warfare



SDRN control

Spectrum occupancy monitoring

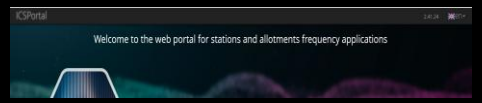


ICS manager

automated spectrum mananagement

ICS Portal

Web-based solution for spectrum managment



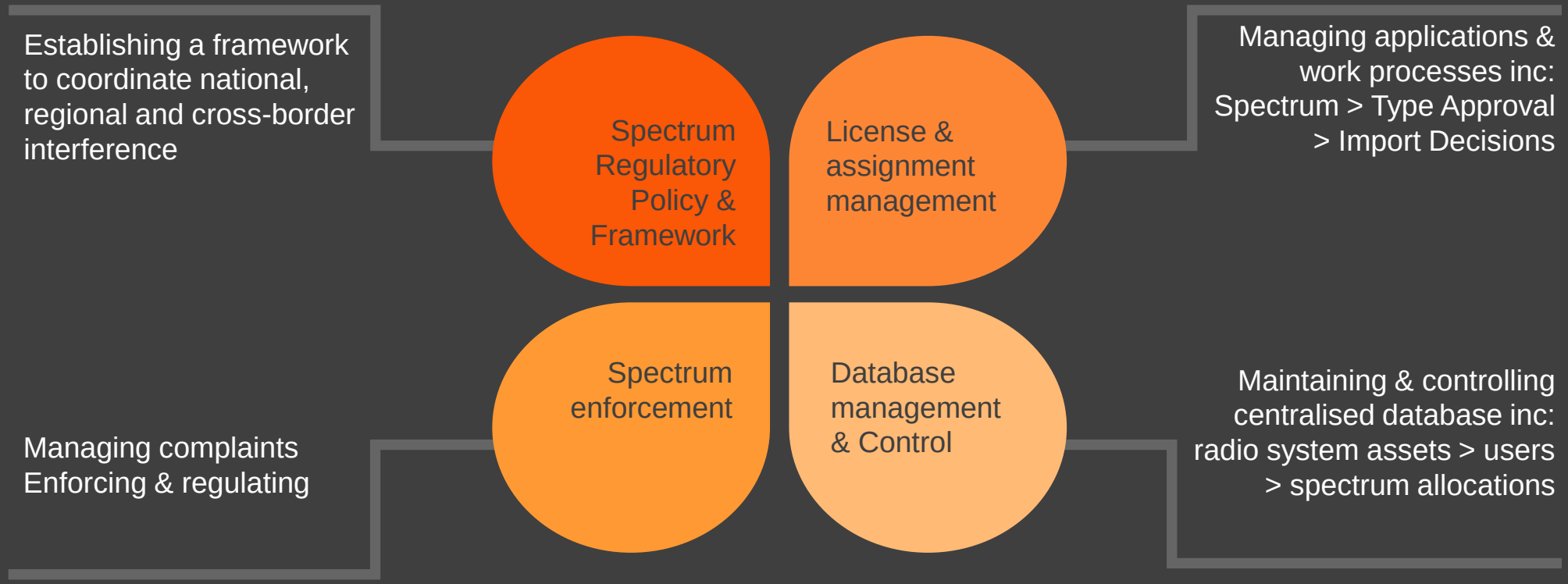
ICS Manager

ICS manager

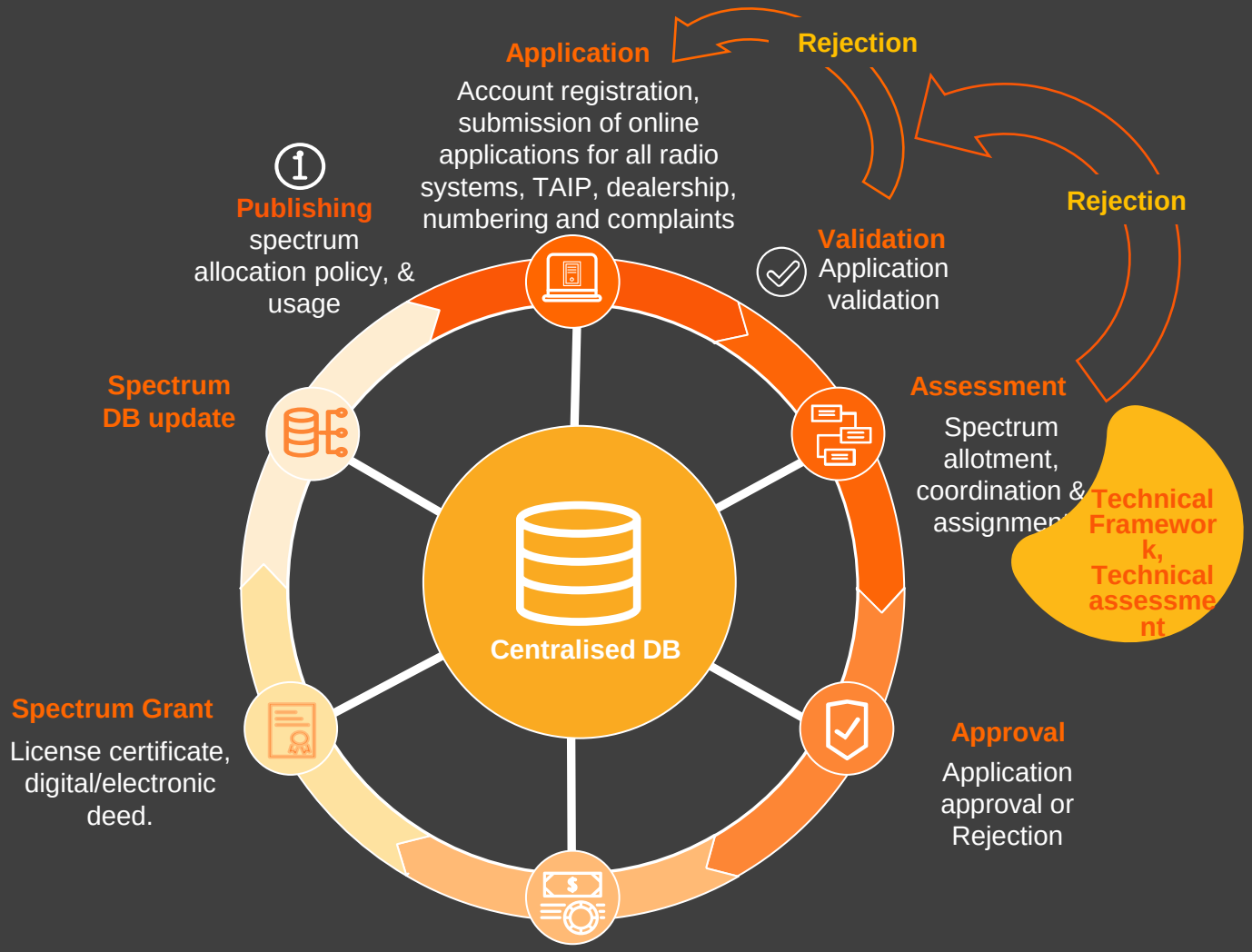
The COMPLETE SOLUTION provided by ATDI to the civil and military regulation authorities allowing to:

- **Validate the new services and avoid interfering with existing systems**
- **Manage the administrative procedures**
- **Optimize the Spectrum**
- **Secure administrative and technical data storage as a basis for running technical analyses .**
- **Exchange efficient information and share with authorized users**
- **Supervise and control the deployed radio networks**

ICS manager


Establishing a framework to coordinate national, regional and cross-border interference
Spectrum Regulatory Policy & Framework
License & assignment management
Managing applications & work processes inc: Spectrum > Type Approval > Import Decisions
Managing complaints Enforcing & regulating
Spectrum enforcement
Database management & Control
Maintaining & controlling centralised database inc: radio system assets > users > spectrum allocations

ICS manager



ICS manager, the main interface of the spectrum management authorities with:

- **ITU (data, forms, files, etc.)**
- **Foreign administrations**
- **Operators**
- **Sensors**
- **Tools for frequency planning**
- **Tools for map management**
- **Tools for radio supervision**

ICS manager

ATDI's Spectrum Management System

- Allocations and Applications
- Channelling Plans & Channel Allotments
- Operational Management for all Services
- International Coordination
- Notification
- Licensing
- Billing
- Monitoring interface
- Workflows (process; history)
- Internal System Management (access rights)
- Technical analysis

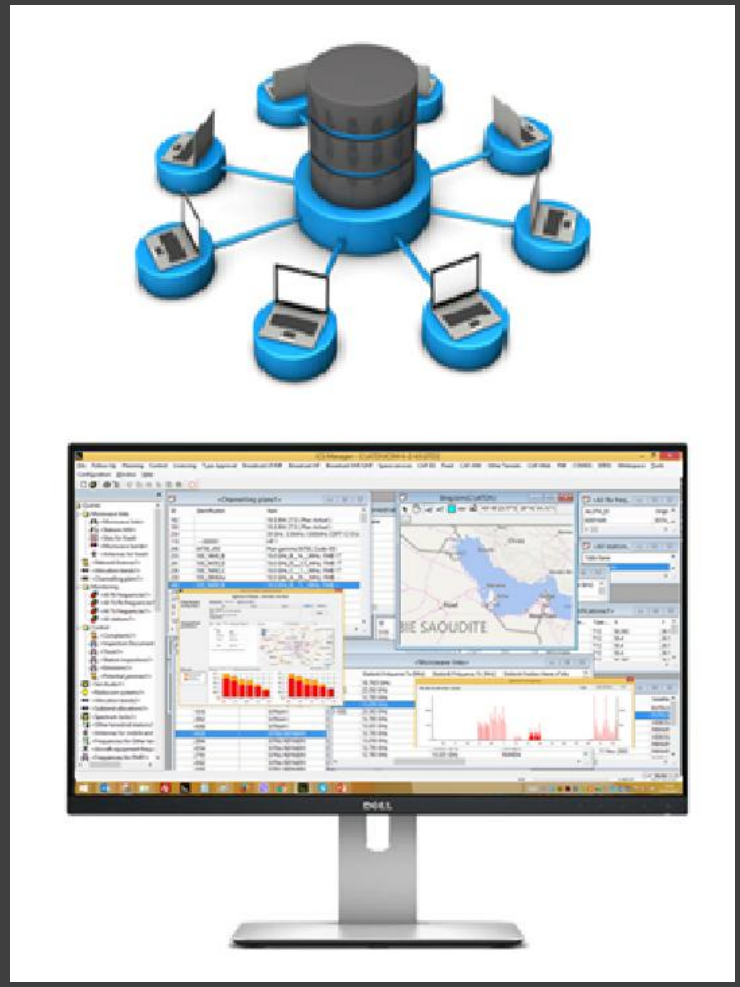
Multi-service oriented architecture

Client-Service architecture

Server: SQL Server

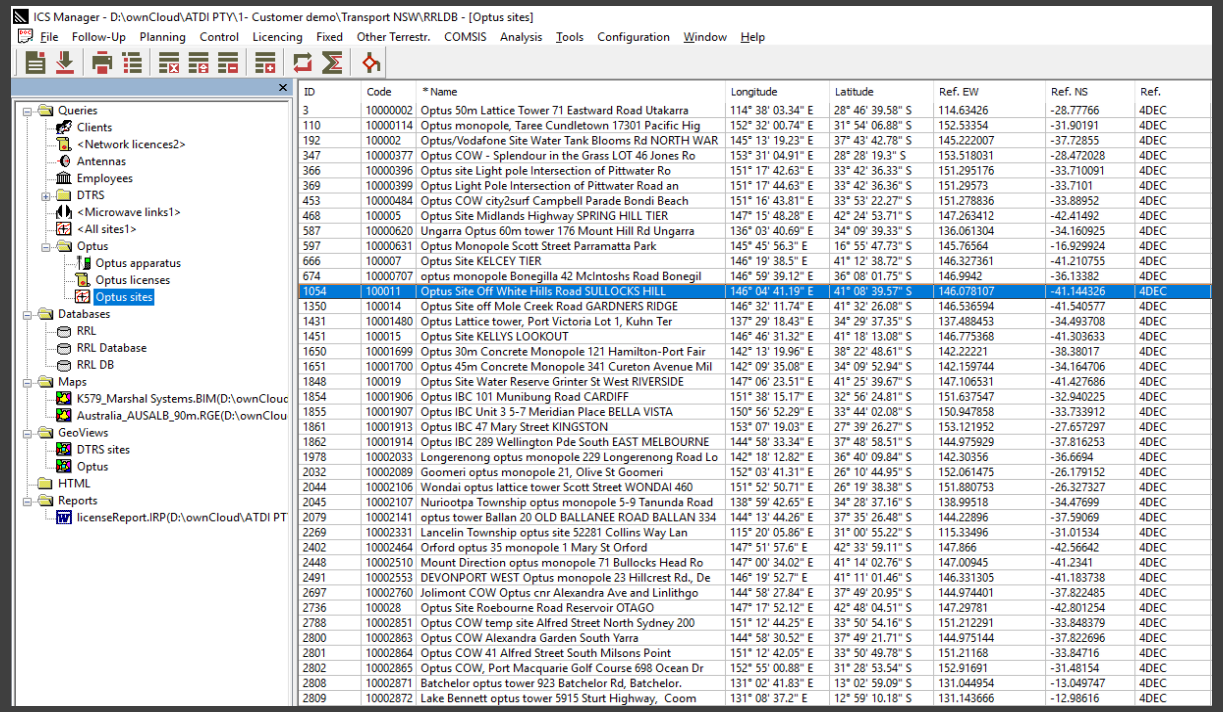
Client: desktop application on laptops/desktops

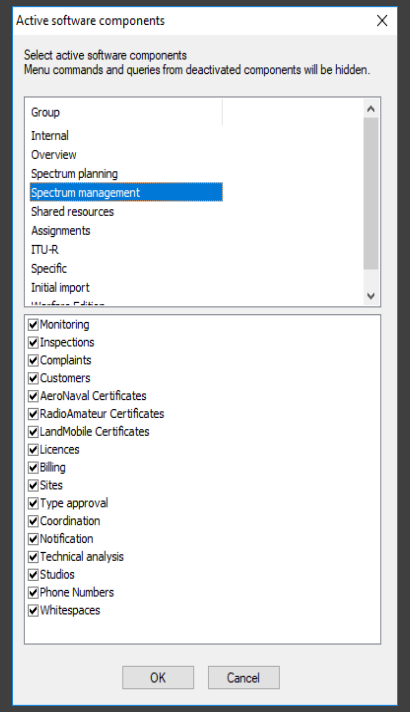
- Support for concurrent users accessing the database
- Ability to lock tables
- Ability to control access levels (Read/Write/Modify): configurable access levels depending on the tasks and rules defined by the the Spectrum Authority (technical, administrative, financial)
- GIS capabilities
- API for 3rd party development and integration: CRM-Systems, financial systems, document, and cartographic management systems
- Reporting: customizable reporting templates to generate reports
- Track changes: system log on any changes in the data

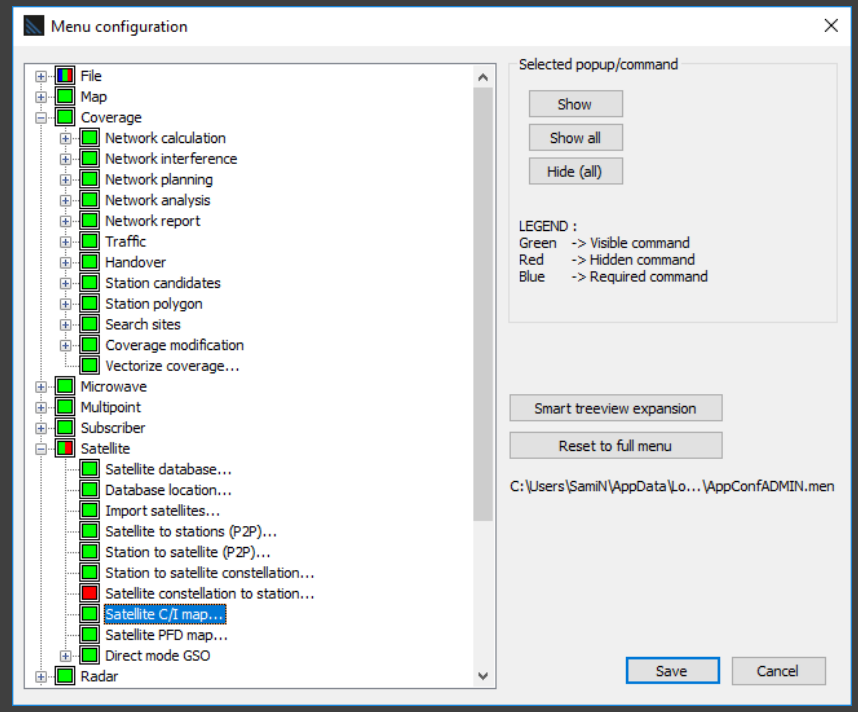


Graphical User Interface

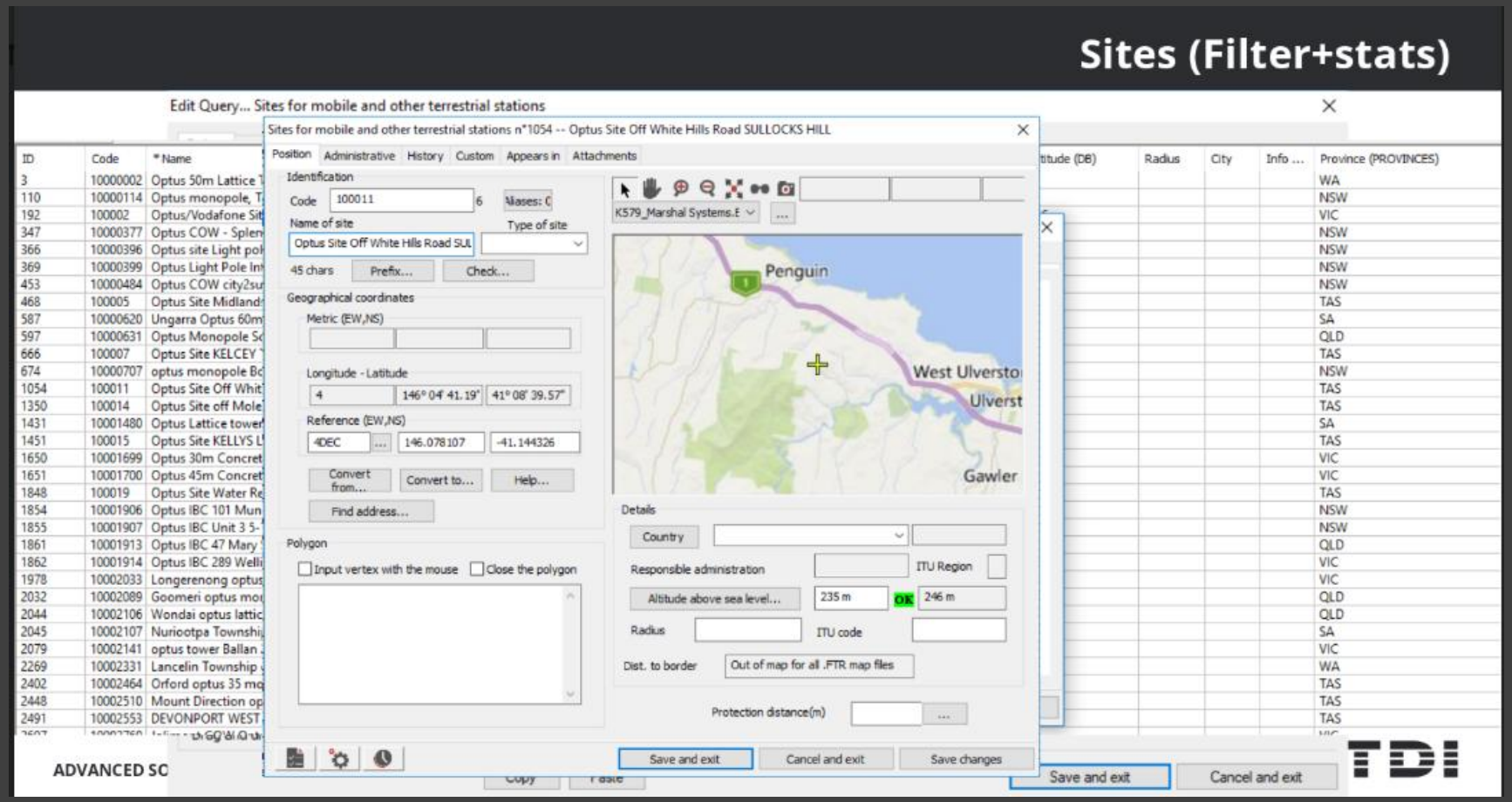
Each module of the offered ATDI system has a user-friendly graphical interface. The user can access the functions and menu items either via toolbars or menus. The GUI can be customized and adapted to the specific need and requirements of each user. Menu and sub-menus can be configurate (display or hide) for each user in order to simplify the Graphical User Interface.







Graphical User Interface

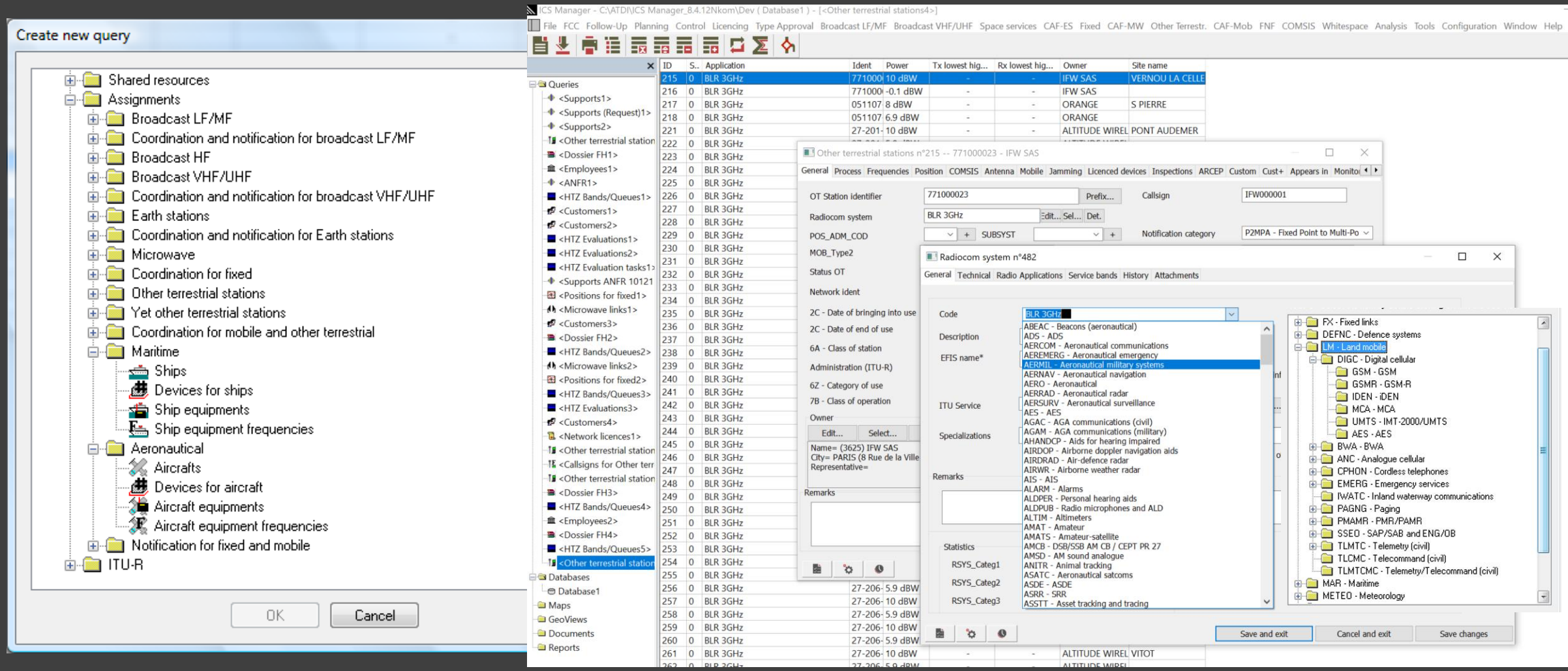


- Possible batch import of applications.

- Possible import of an application in xml, .csv, mdb format

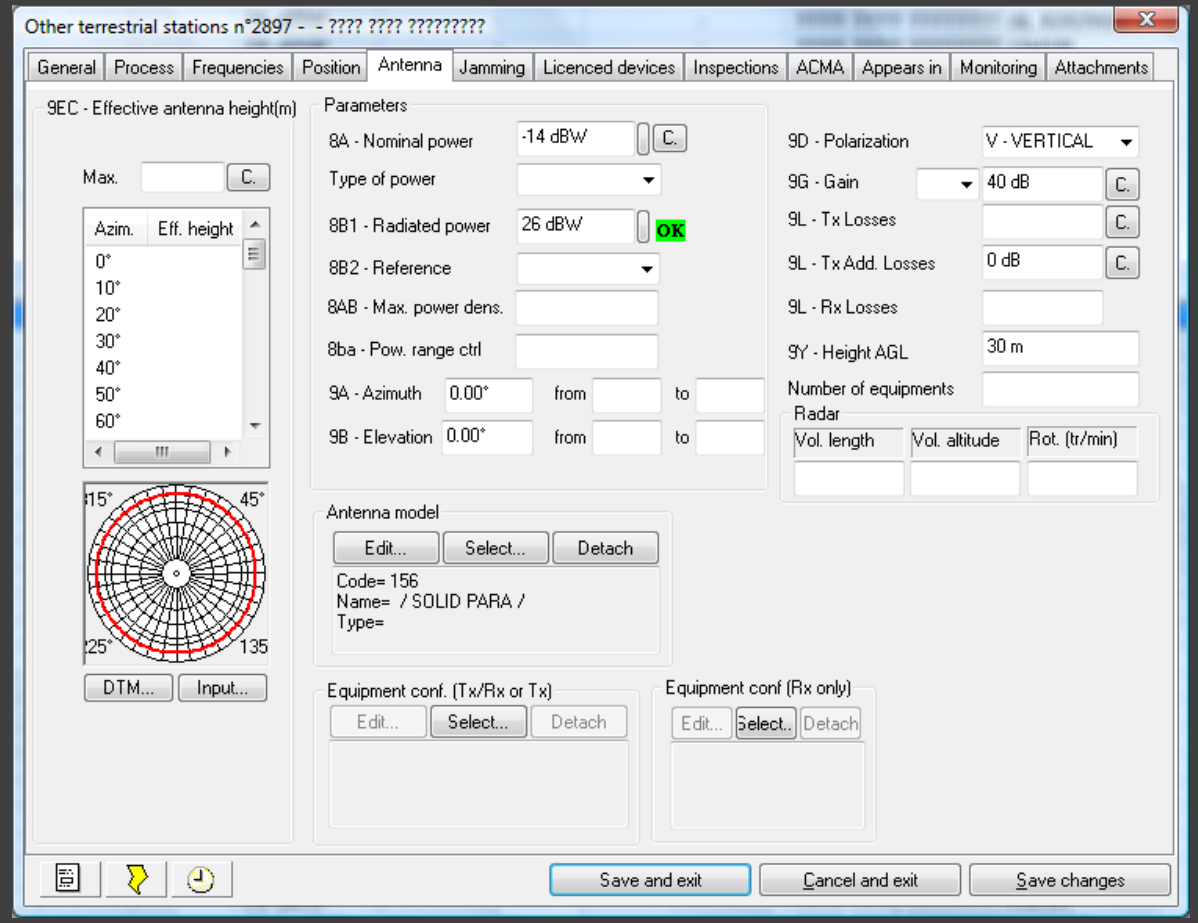
Applications and Services

Including Land mobile/fixed, Maritime and Aeronautical services

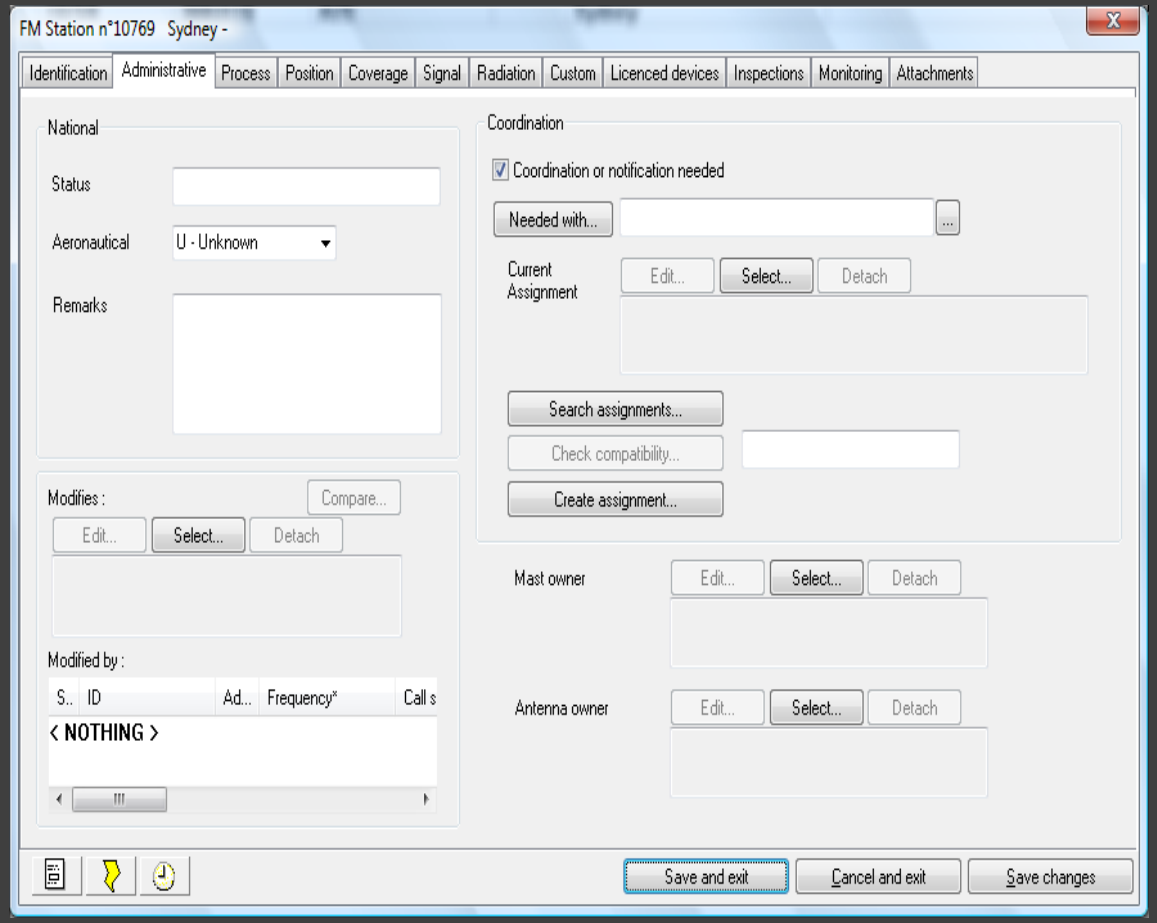


Applications and Services

Technical parameters

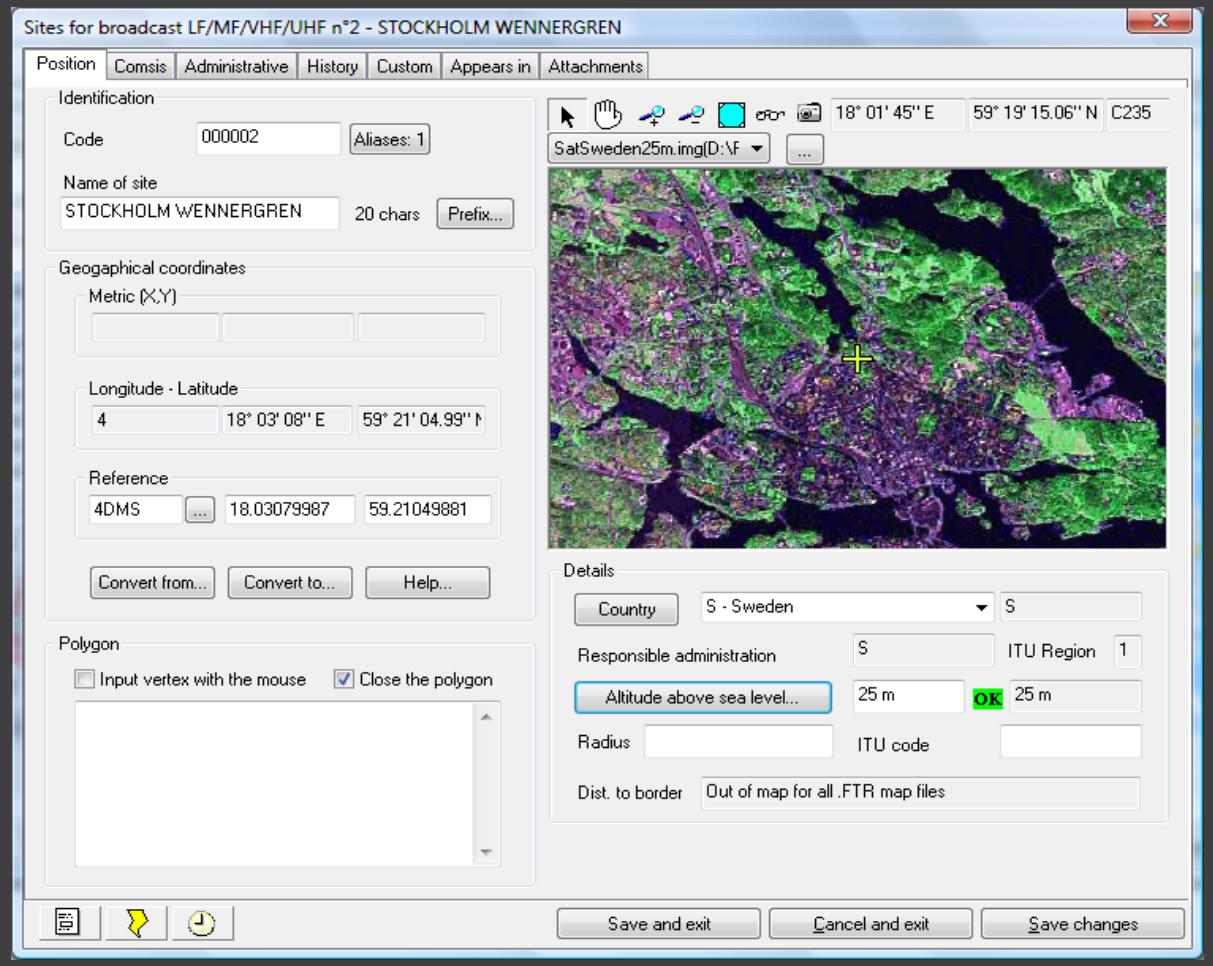


Administrative parameters

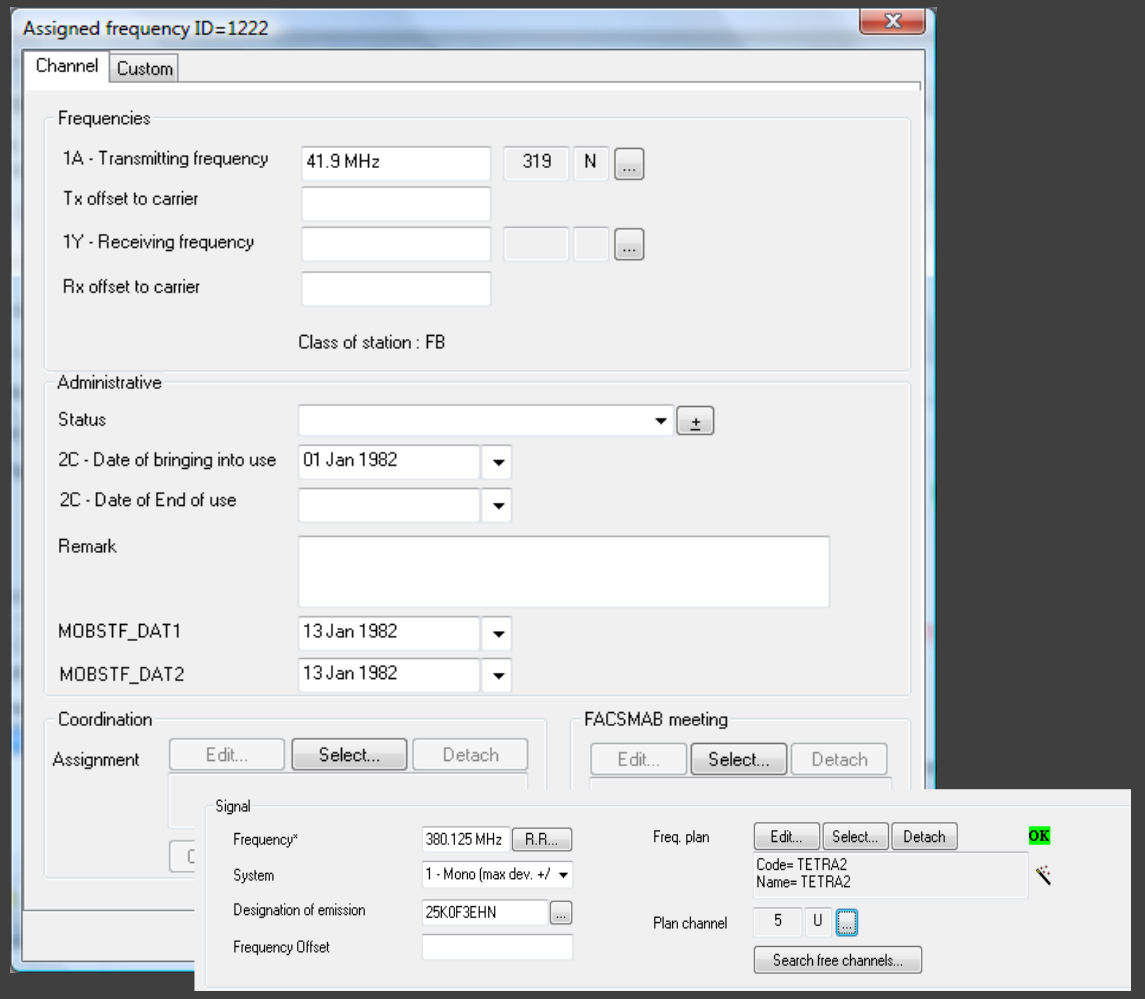


Applications and Services

Location parameters

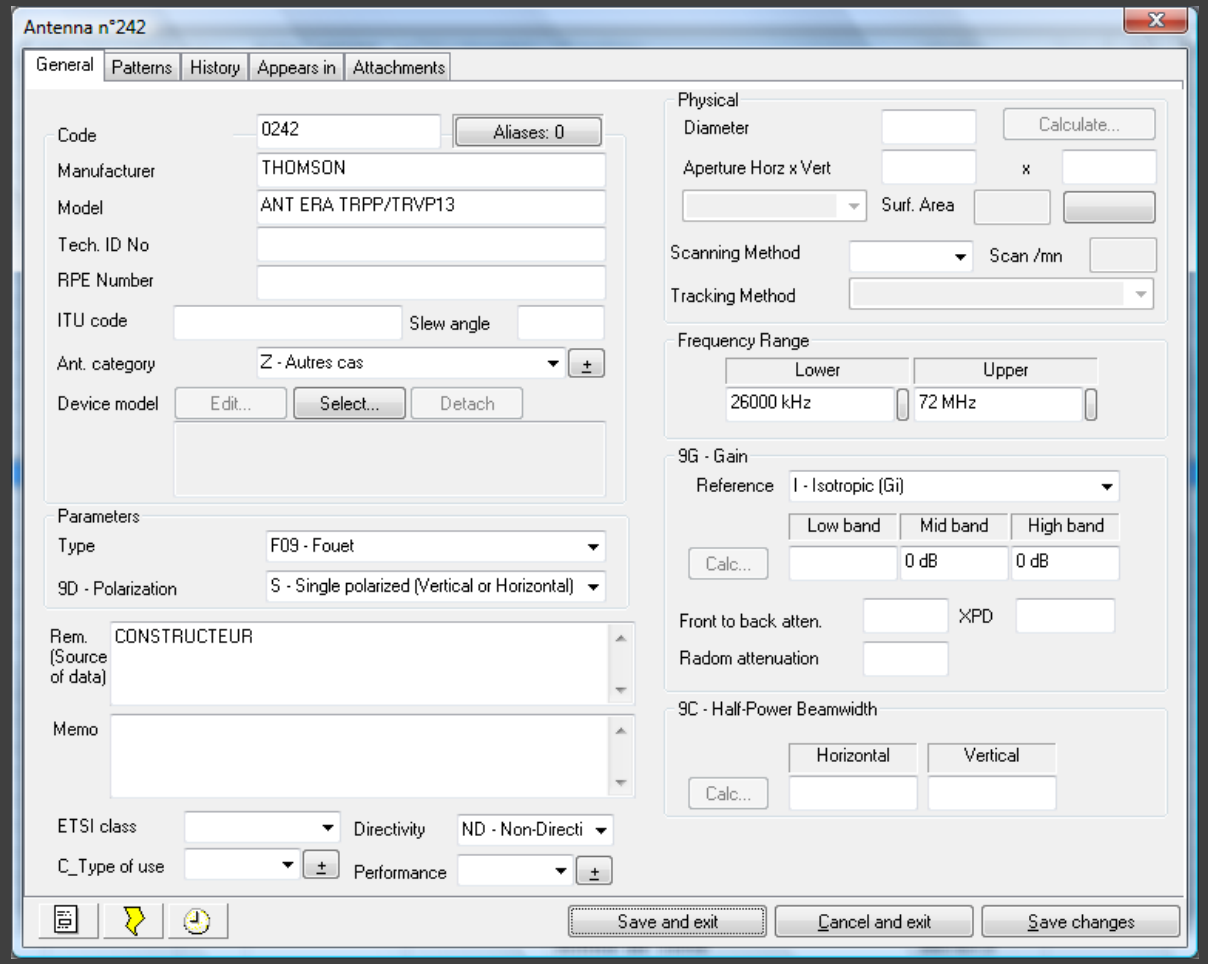


Frequency parameters

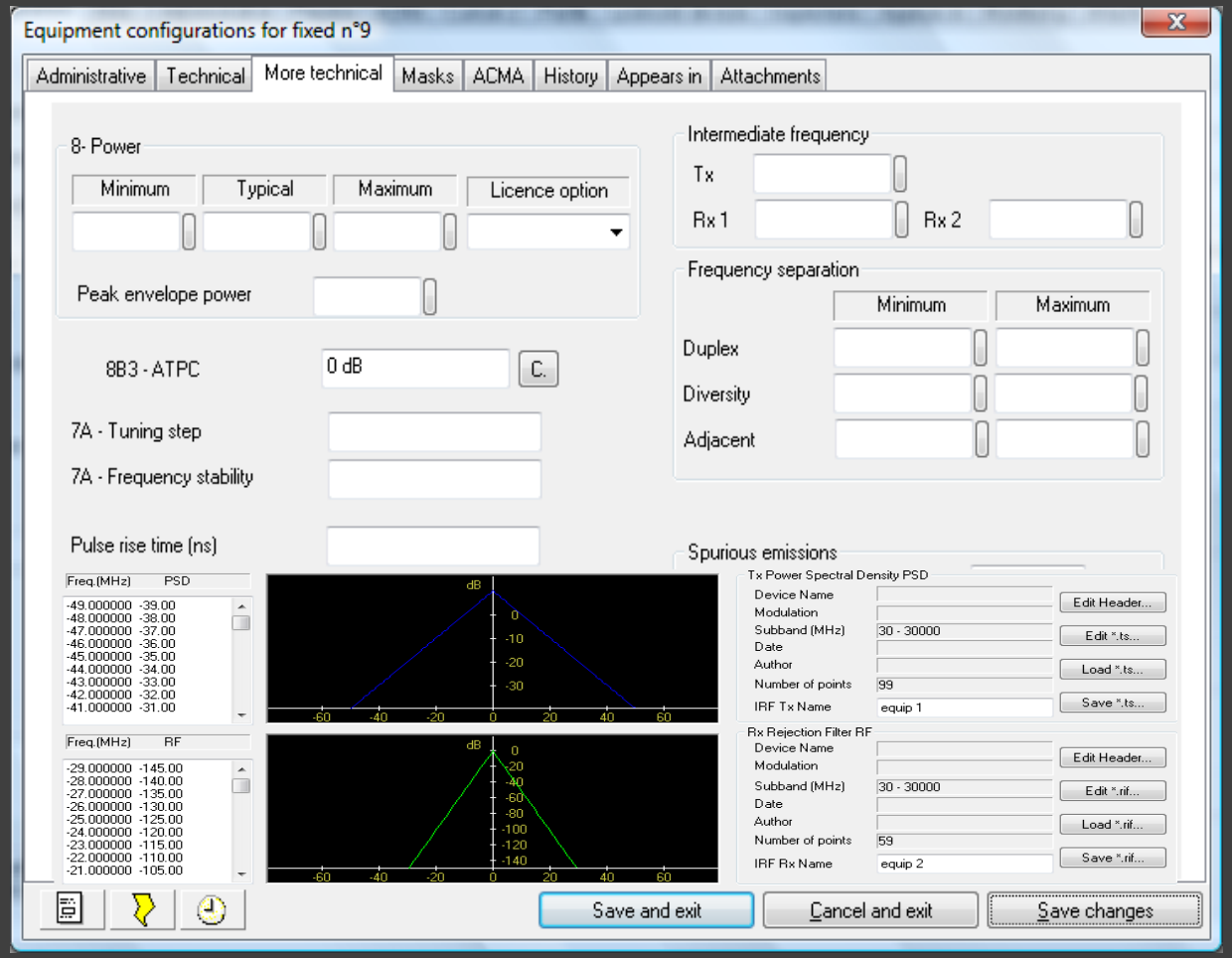


Applications and Services

Antenna parameters

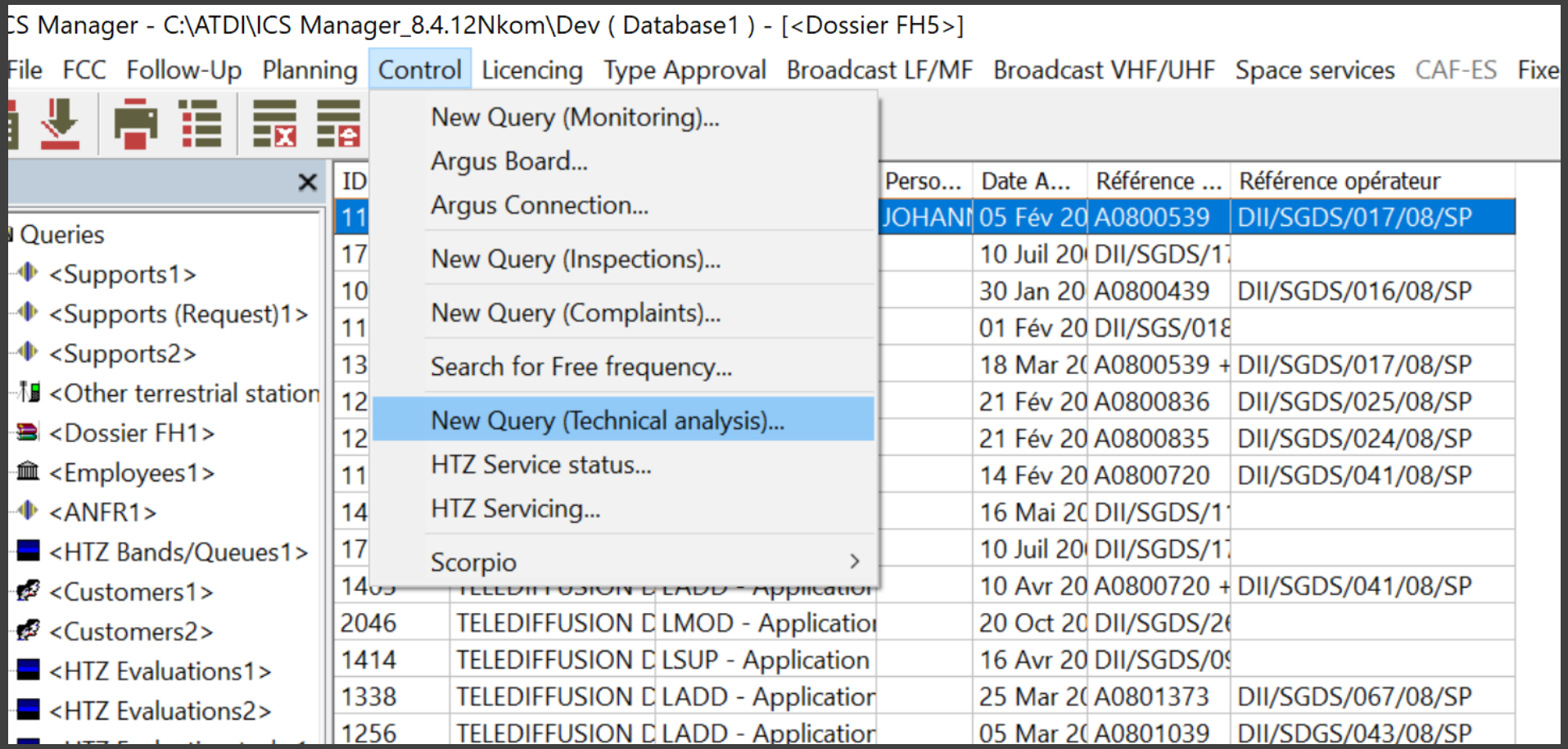


Equipment parameters



Applications and Services

Technical Analysis



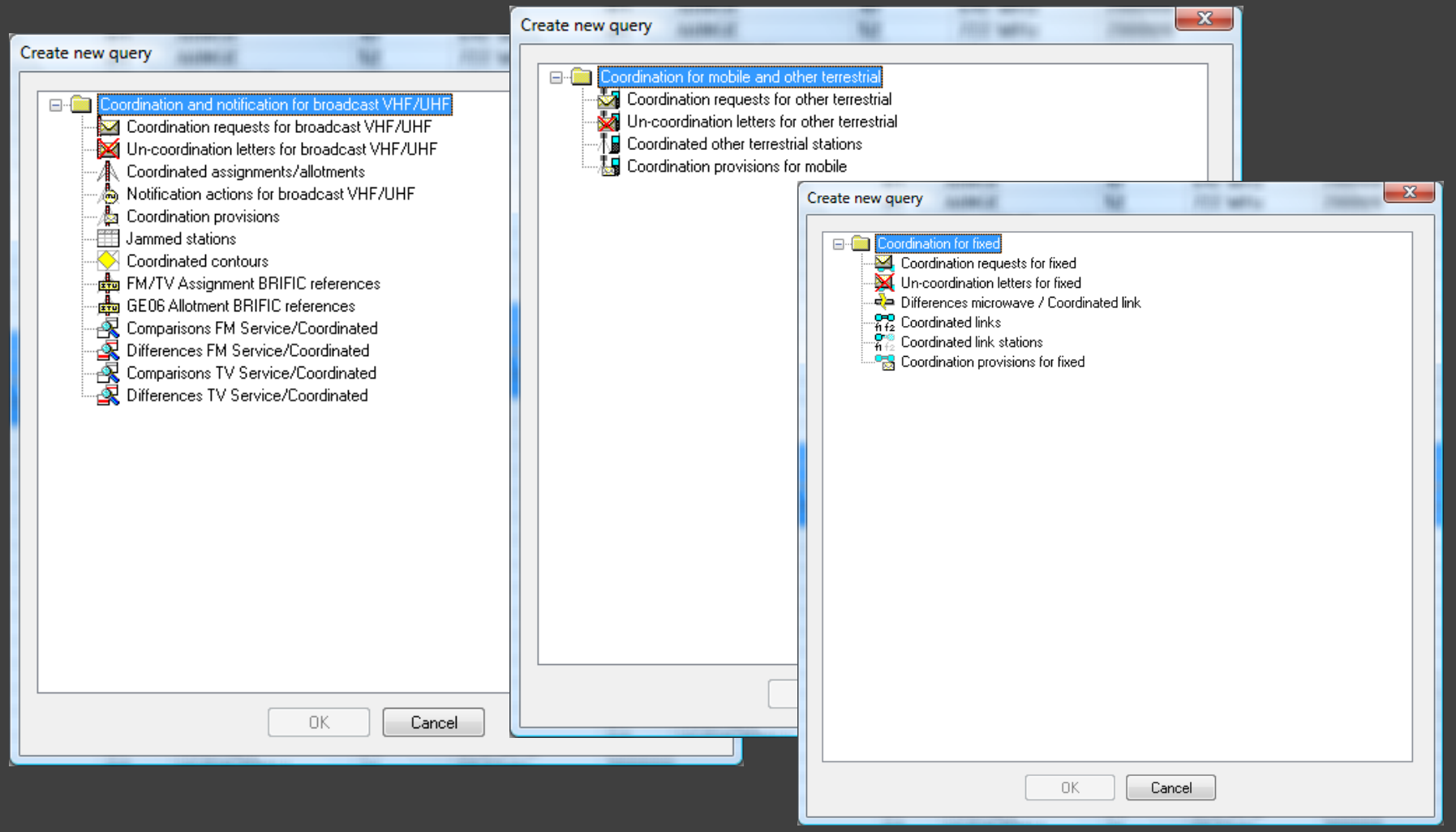
Applications and Services

Technical Analysis

S1	357	TD000007	BAR LE DUC FLANDRES	WILLERONCOURT CROIX PAJO			8066.7 MHz
S1	358	TD000008	WILLERONCOURT CROIX PAJO	PRENY			8066.7 MHz
S1	359	TD000009	ARRAS DEGEORGE	BOUVIGNY BOYEFFLES			8066.7 MHz
S1	361	TD000011	BOISSY SOUS S YON	LES LILAS FT DE ROMAINVILLE			8066.7 MHz
S1	363	TD000013	BOULIAC 2	BORDEAUX CAT			8066.7 MHz
S1	369	TD000019	CAYENNE TROUBIR	CAYENNE VILLE			8066.7 MHz
S1	372	TD000022	CHATEAUROUX	S AOUSTRILLE CLOIS			8066.7 MHz
S1	373	TD000023	CHERBOURG	DIGOSVILLE PANVERSE			8066.7 MHz
S1	374	TD000024	LES CHOUX	RUMONT 2			8066.7 MHz
S1	378	FR3000258	FIENNES LE MONT	BERTHEN MT DES CATS			8066.7 MHz
S1	382	TD000032	LYON FOURVIERE LANGE	LYON CAT			8066.7 MHz
S1	384	EXP000060	METZ MARCONI	LUT			8066.7 MHz
S1	386	TD000036	MONTGE EN GOELE	EPIE			8066.7 MHz
S1	387	TD000037	MONTPEYROUX S BAUDILLE 2	MOI			8066.7 MHz
S1	389	FR3000257	MALZEVILLE 3	NAN			8066.7 MHz
S1	390	TD000040	MALZEVILLE 3	S JU			8066.7 MHz
S1	391	TD000041	PEILLE MT AGEL 2	ROC			8066.7 MHz
S1	394	TD000044	GRANDRIF LES PRADEAUX	ORC			8066.7 MHz
S1	395	TD000045	QUIMPER CROAZ	PLO			8066.7 MHz
S1	396	TD000046	HAUTVILLERS	SON			8066.7 MHz
S1	397	FR3000256	HAUTVILLERS	REIN			8066.7 MHz
S1	399	TD000049	GR COURONNE	HAU			8066.7 MHz
S1	401	TD000051	S BARTHELEMY MORNE LURIN	S M			Hz
S1	402	TD000052	GISY LES NOBLE	CHE			Hz
S1	403	TF1000004	S JULIEN MT DENIS CHANETS S	VAL			Hz
S1	404	TD000054	S LAURENT DU MARONI VILO	MAN			Hz
S1	405	TD000055	S MARTIN DE BELLEVILLE 11	S JE			8066.7 MHz
S1	406	TD000056	LA ROQUEBRUSSANNE LA LOU	SIM			8066.7 MHz
S1	407	TD000057	S PIERRE BASE	S PI			8066.7 MHz
S1	408	FR3000252	NORDHEIM	STR			8066.7 MHz
S1	409	TD000059	S BENOIT SUR SEINE MT COCH	SOM			8066.7 MHz
S1	410	TD000060	LE VILHAIN	NEU			8066.7 MHz
S1	411	TD000061	VILLEDIEU LES POELES GARE	LE P			8066.7 MHz
S1	413	TD000063	GRANE MT BRIAN 4	DOI			8066.7 MHz
S1	415	TD000065	AGEN D AVEYRON	LAB			8099.2 MHz
S1	416	TD000066	ANNECY	LE B			8099.2 MHz

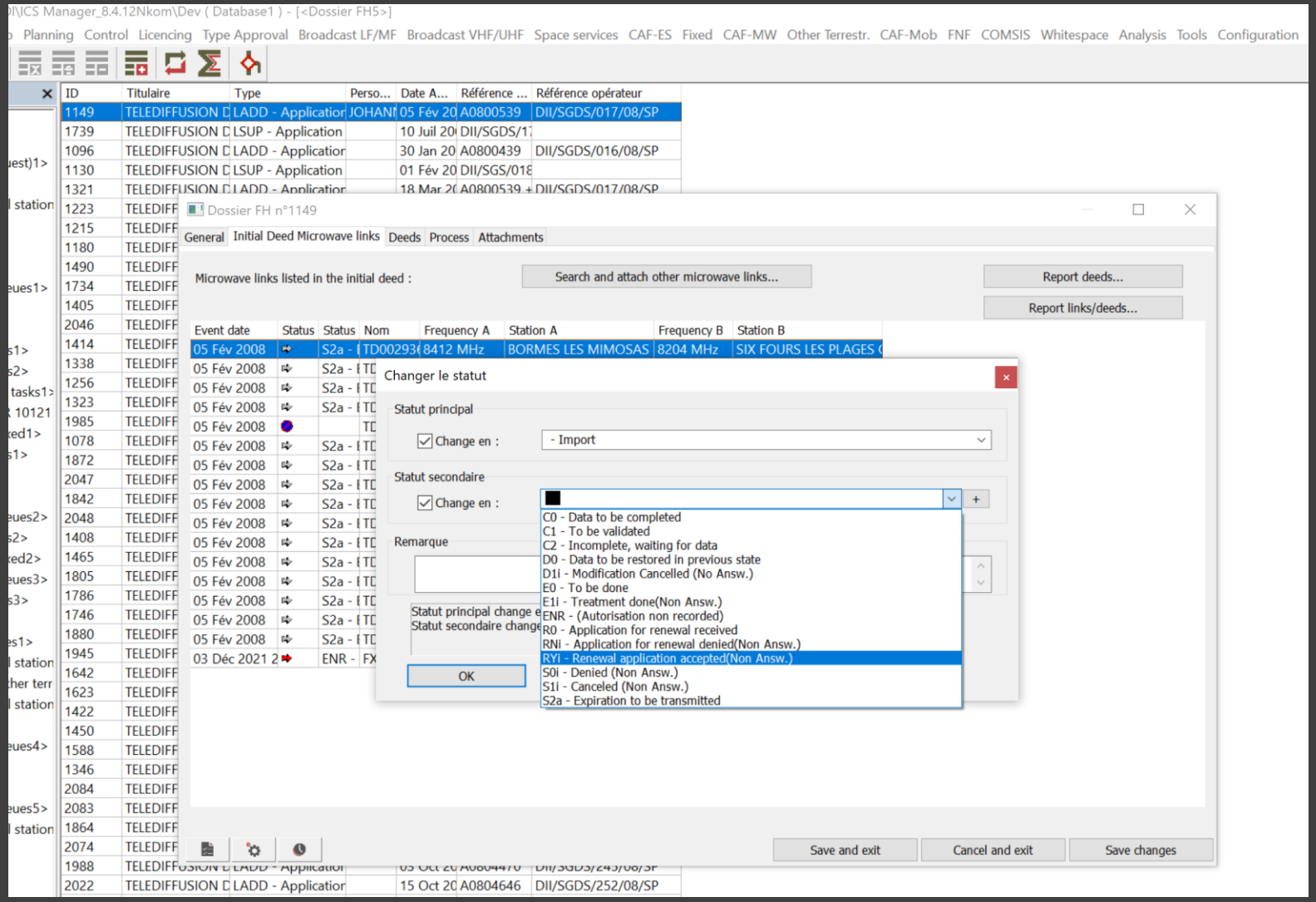
Applications and Services

Technical Analysis



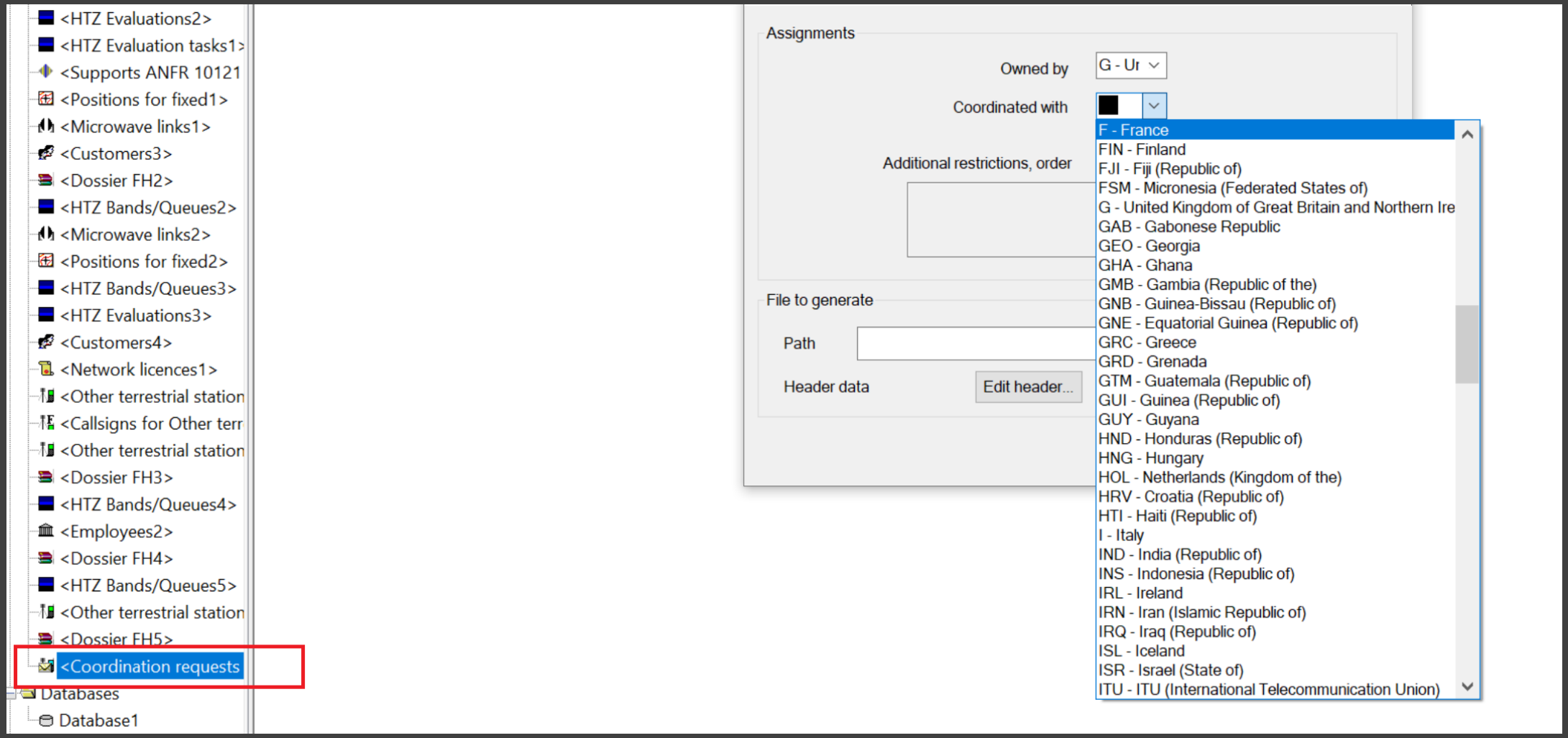
Applications and Services

Approval process



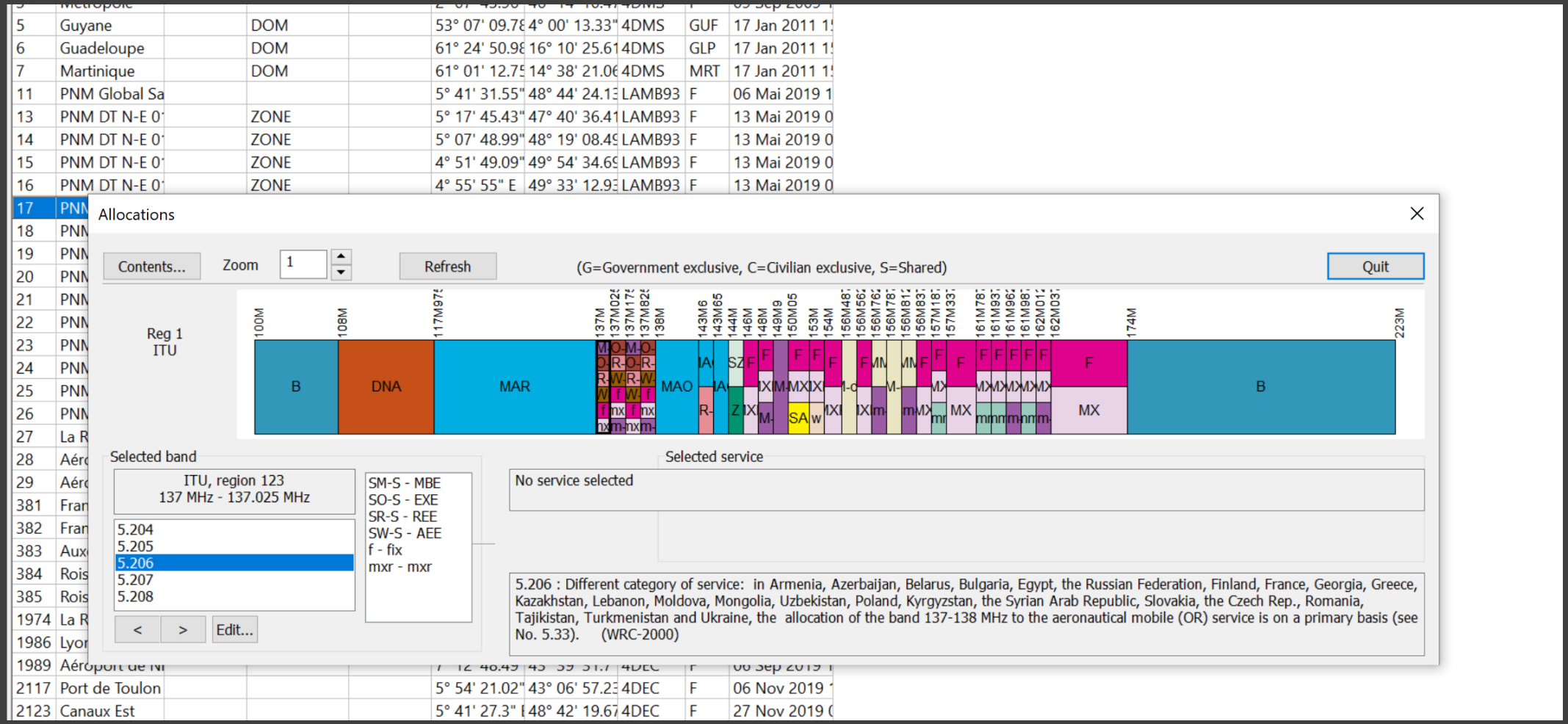
Applications and Services

Outgoing coordination



Applications and Services

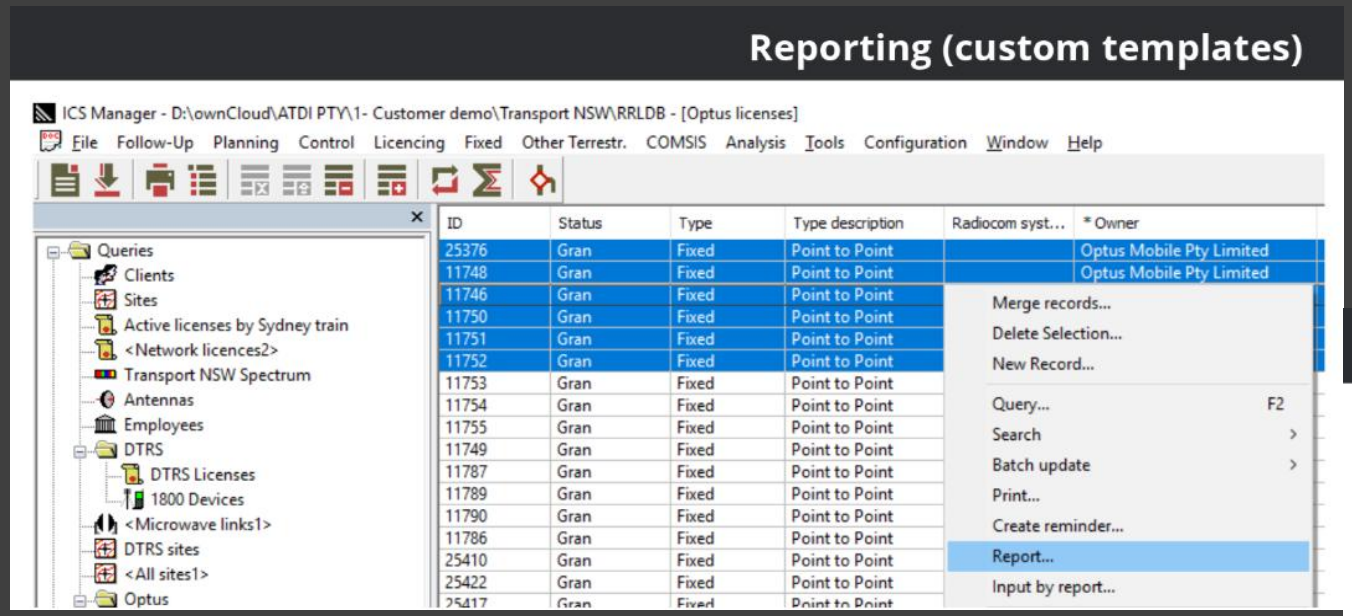
Global Frequency plans/maps



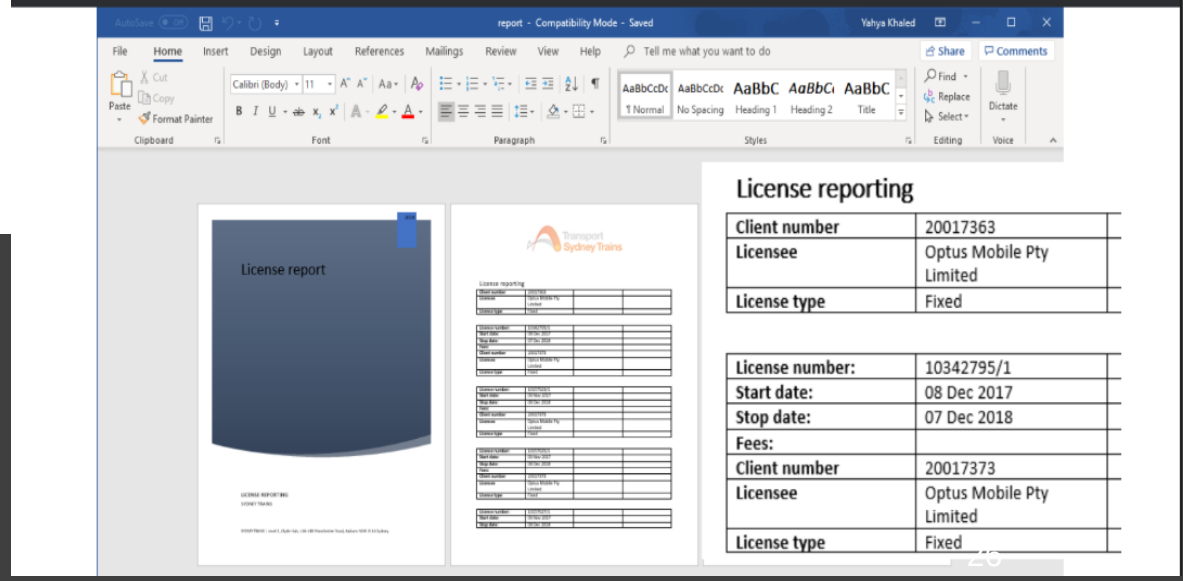
Applications and Services

Reporting and Record Keeping

Reporting (custom templates)

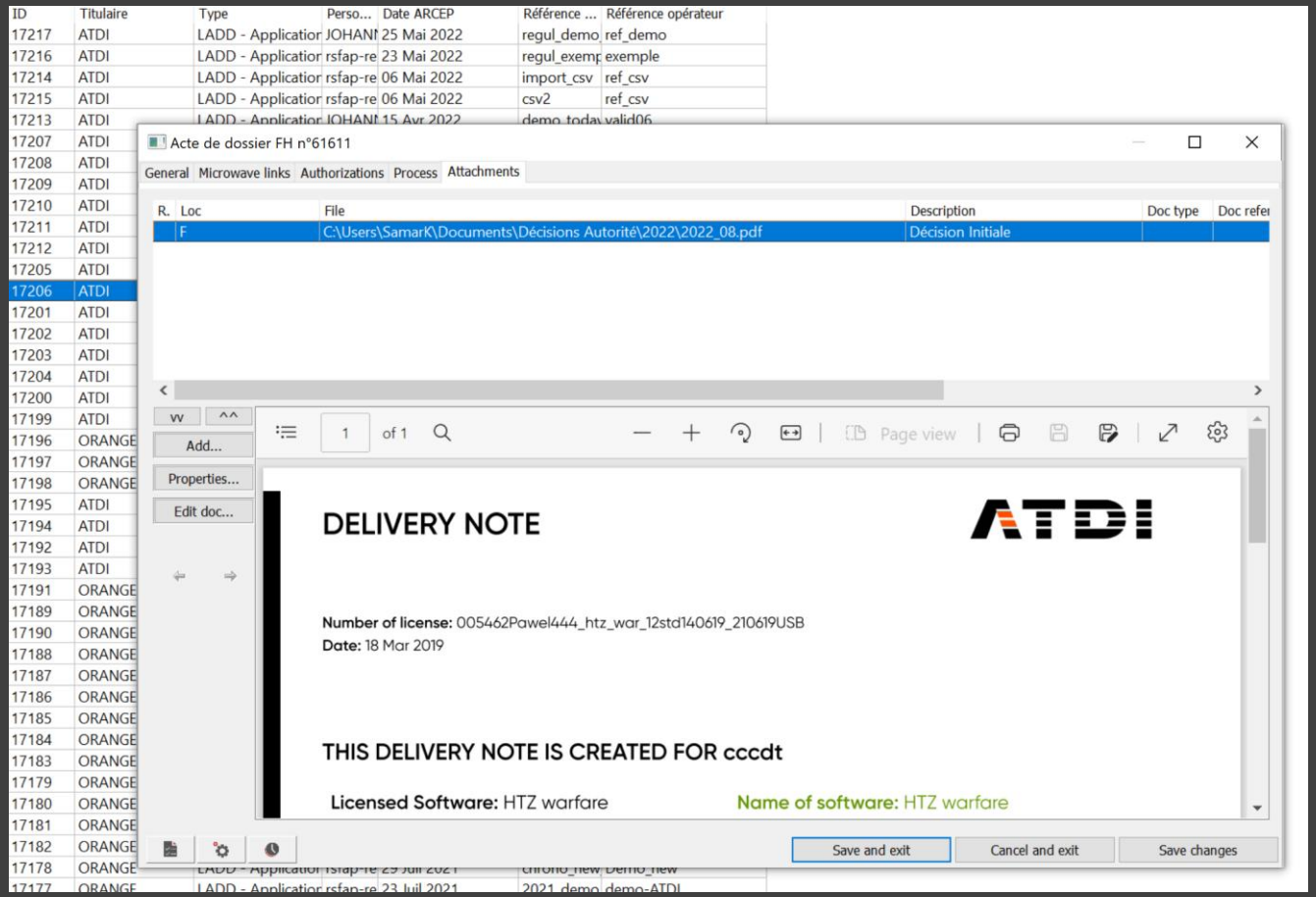


Reporting (custom templates)



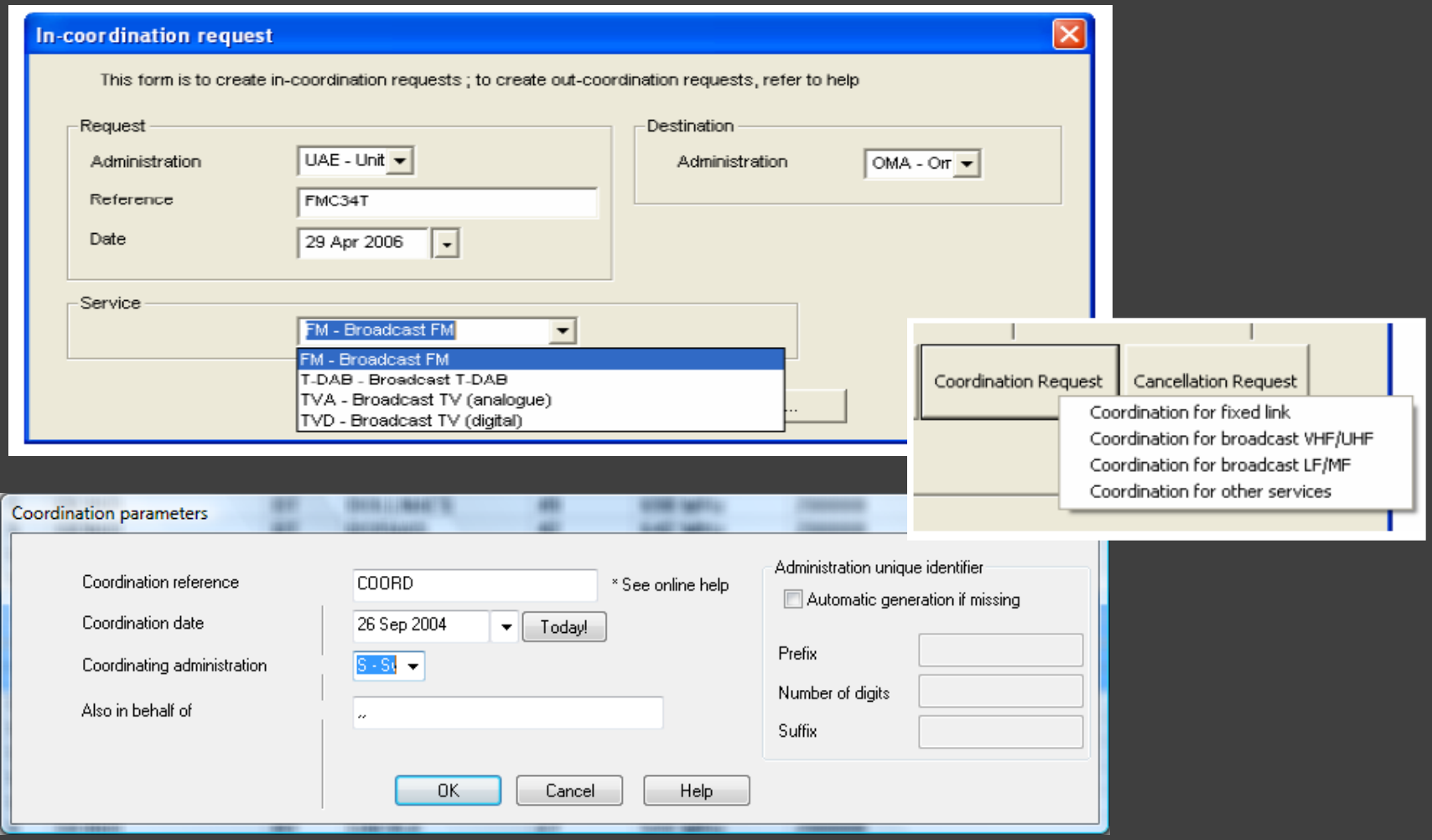
Applications and Services

Reporting and Record Keeping



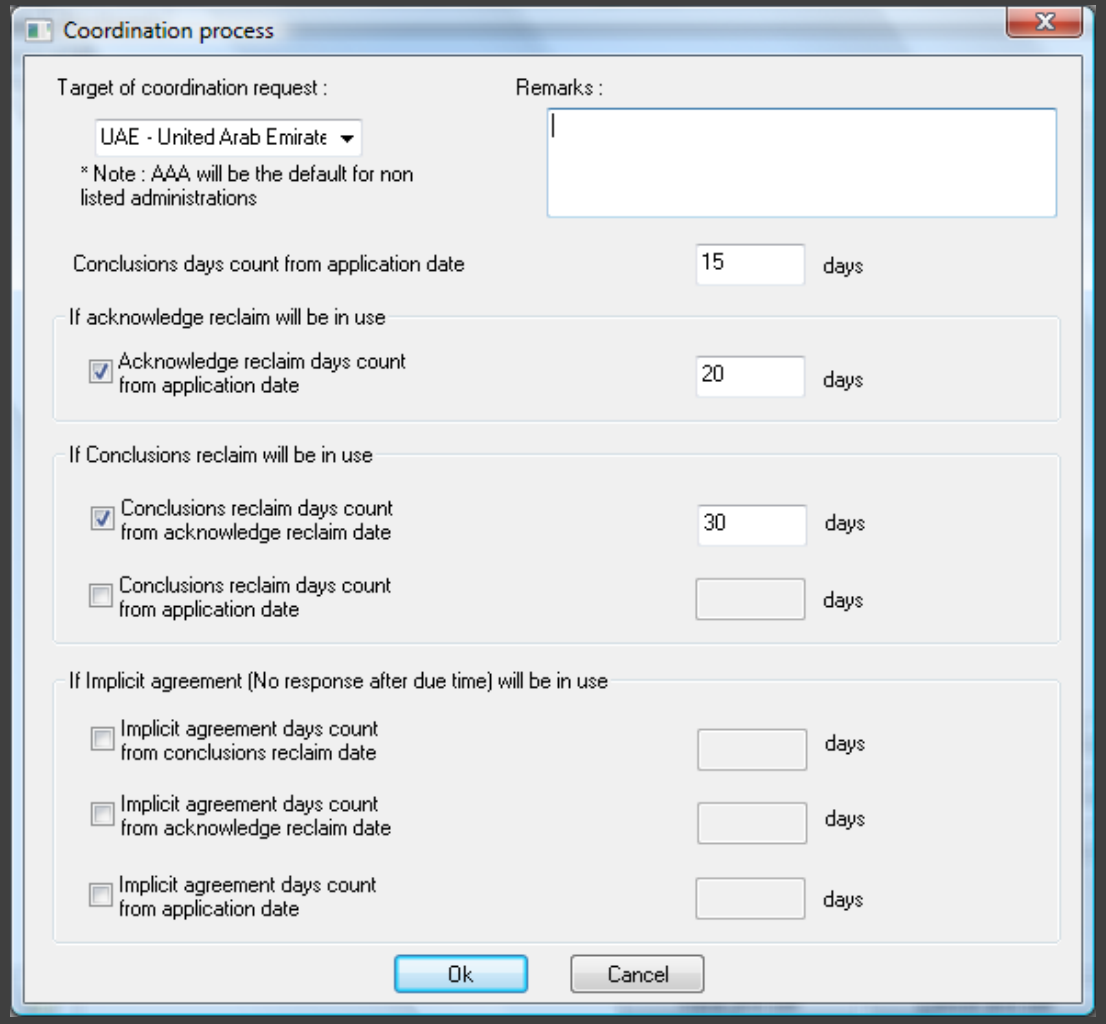
Applications and Services

Illustrative exemple: In-coordination/out-coordination procedure



Applications and Services

Illustrative exemple: Definition of coordination rules

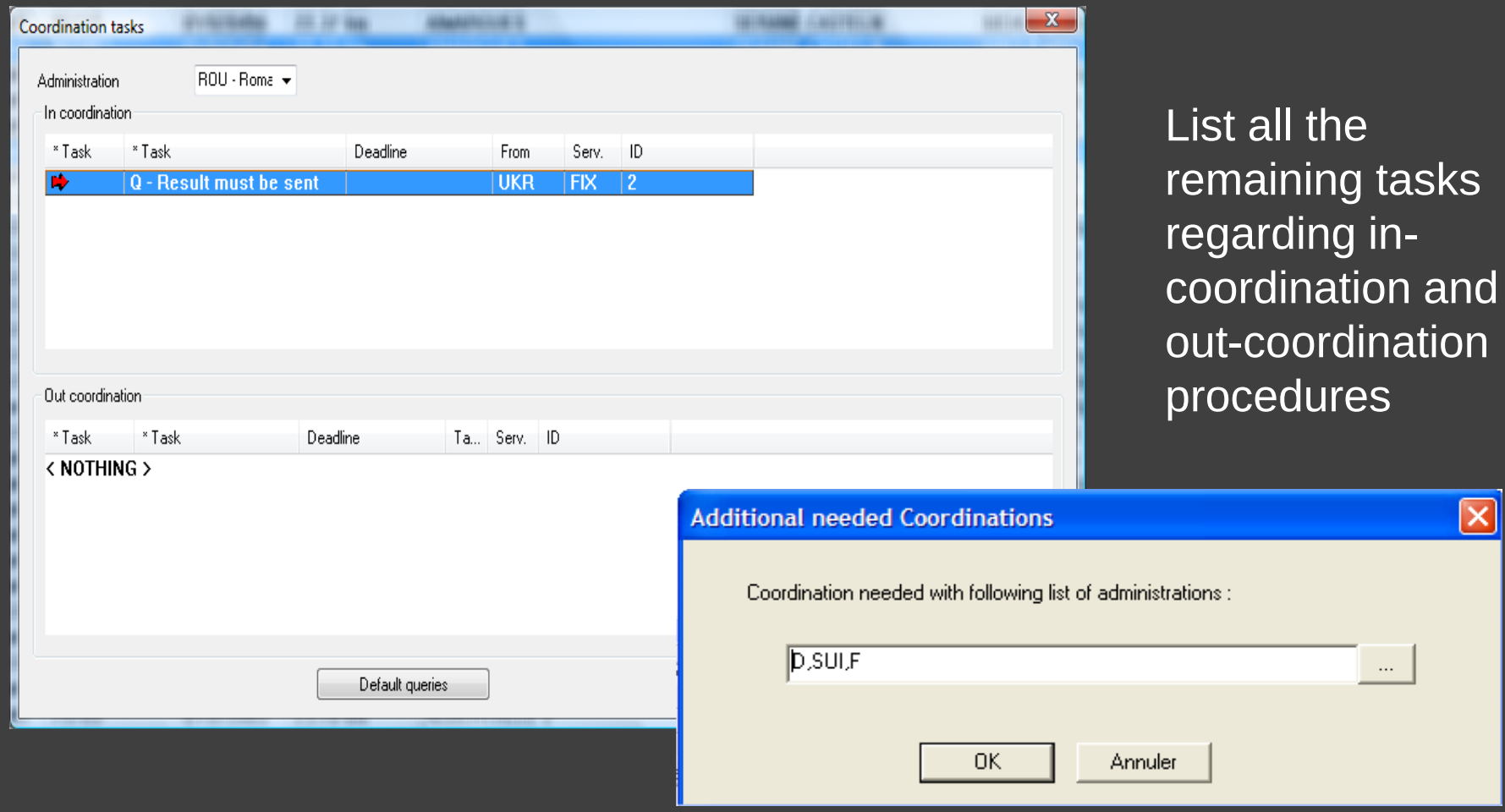


To specify the particular coordination practice of each Administration:

- acknowledge reclaim,
- conclusions reclaim,
- implicit agreement…

Applications and Services

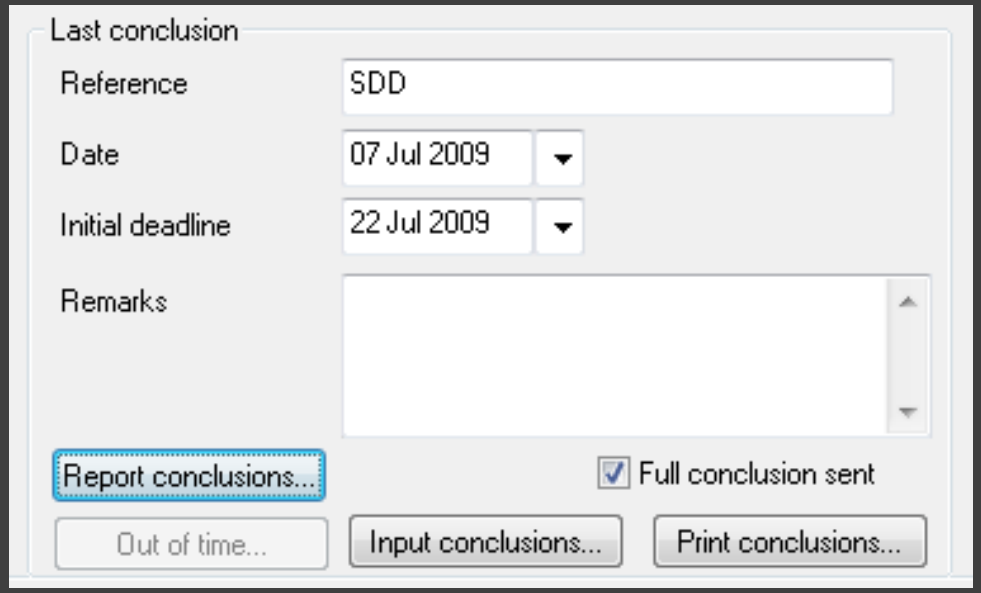
Illustrative exemple: Coordination task follow-up



List all the remaining tasks regarding in-coordination and out-coordination procedures

Applications and Services

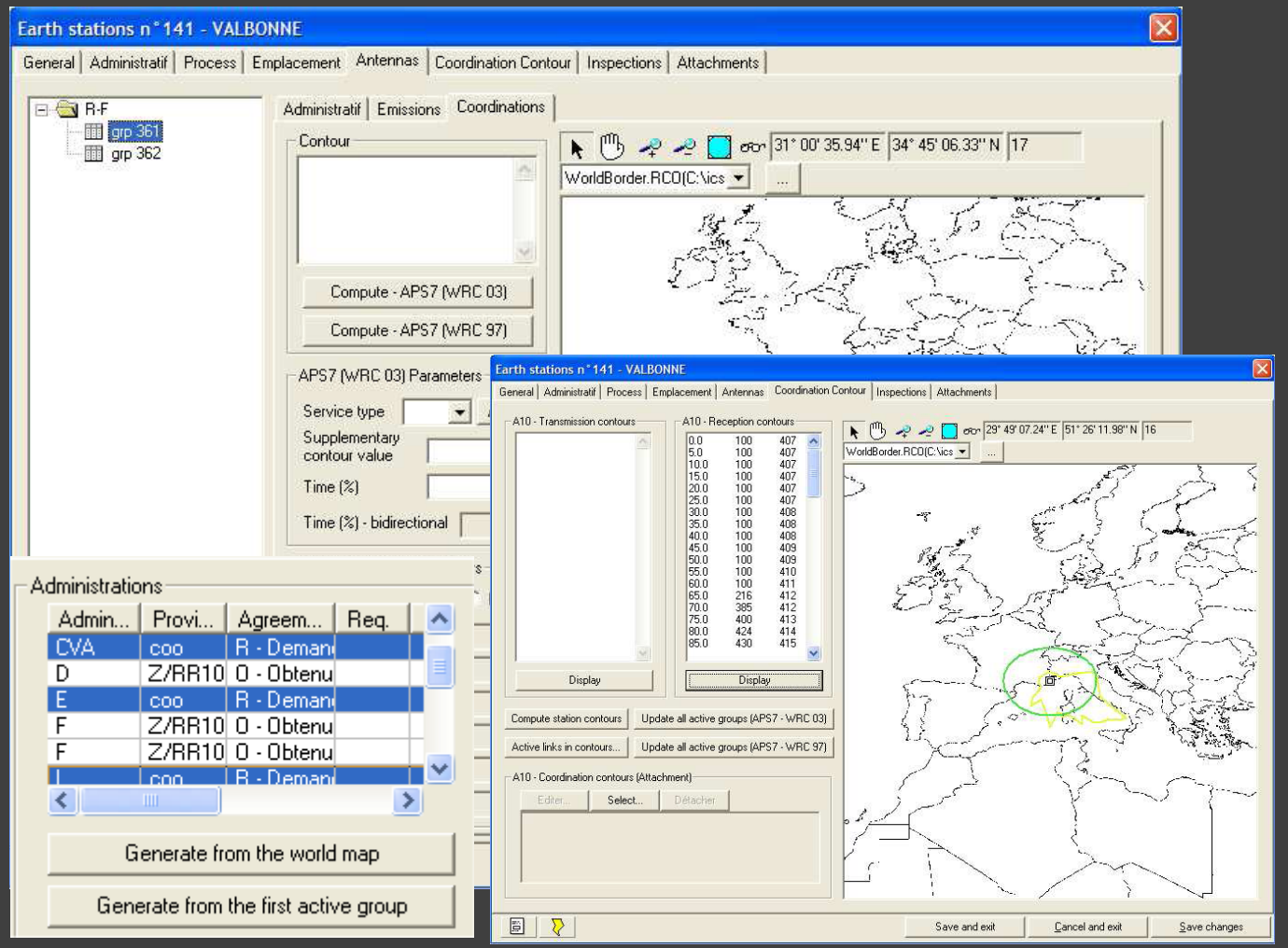
Illustrative exemple: Coordination conclusions



Report, input, and print conclusions

Applications and Services

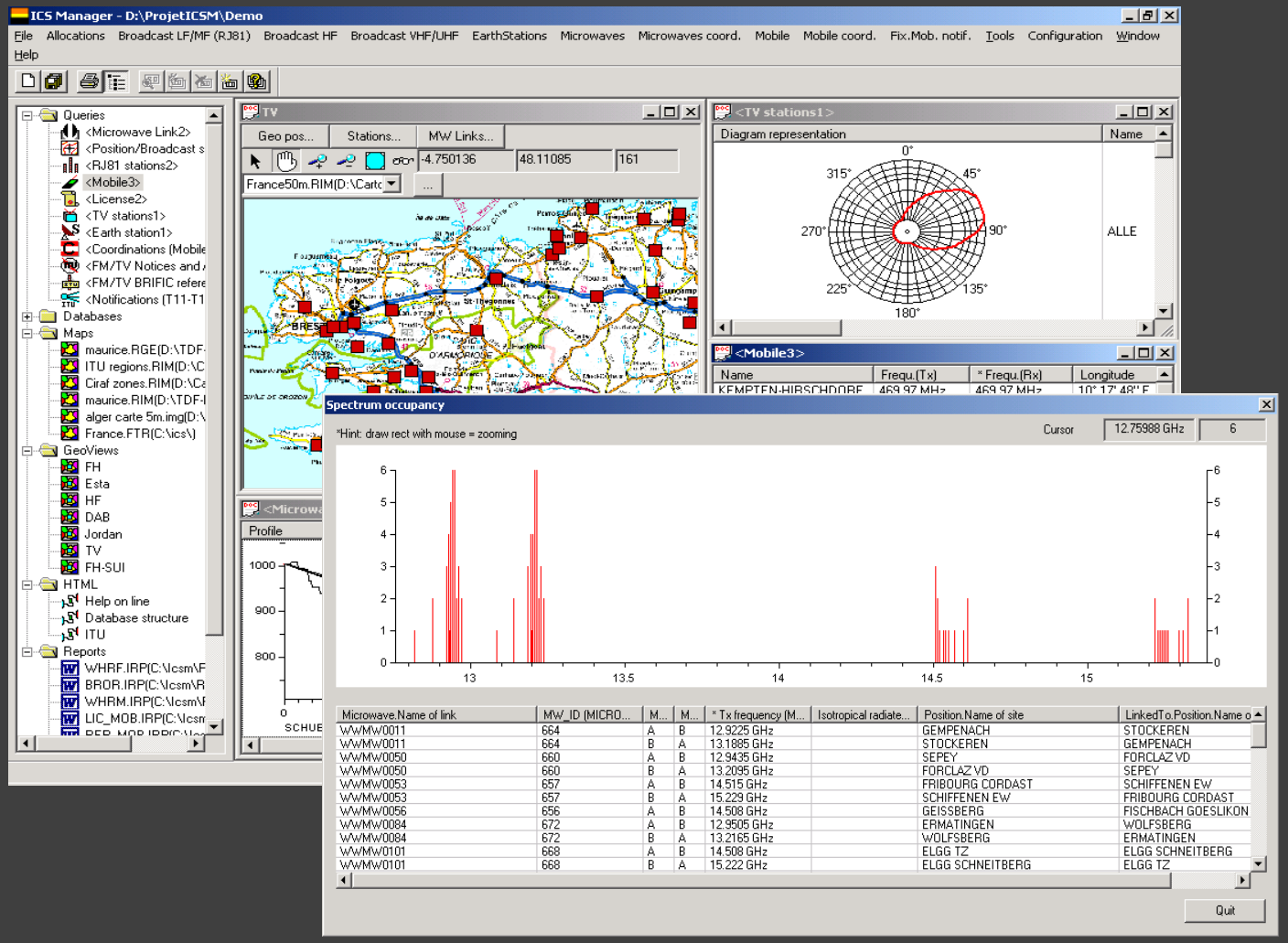
Illustrative exemple: Models/ Calculation modules



- AP7 module for earth stations .
- HCM for
- mobile stations
- Etc.

Applications and Services

Data Display

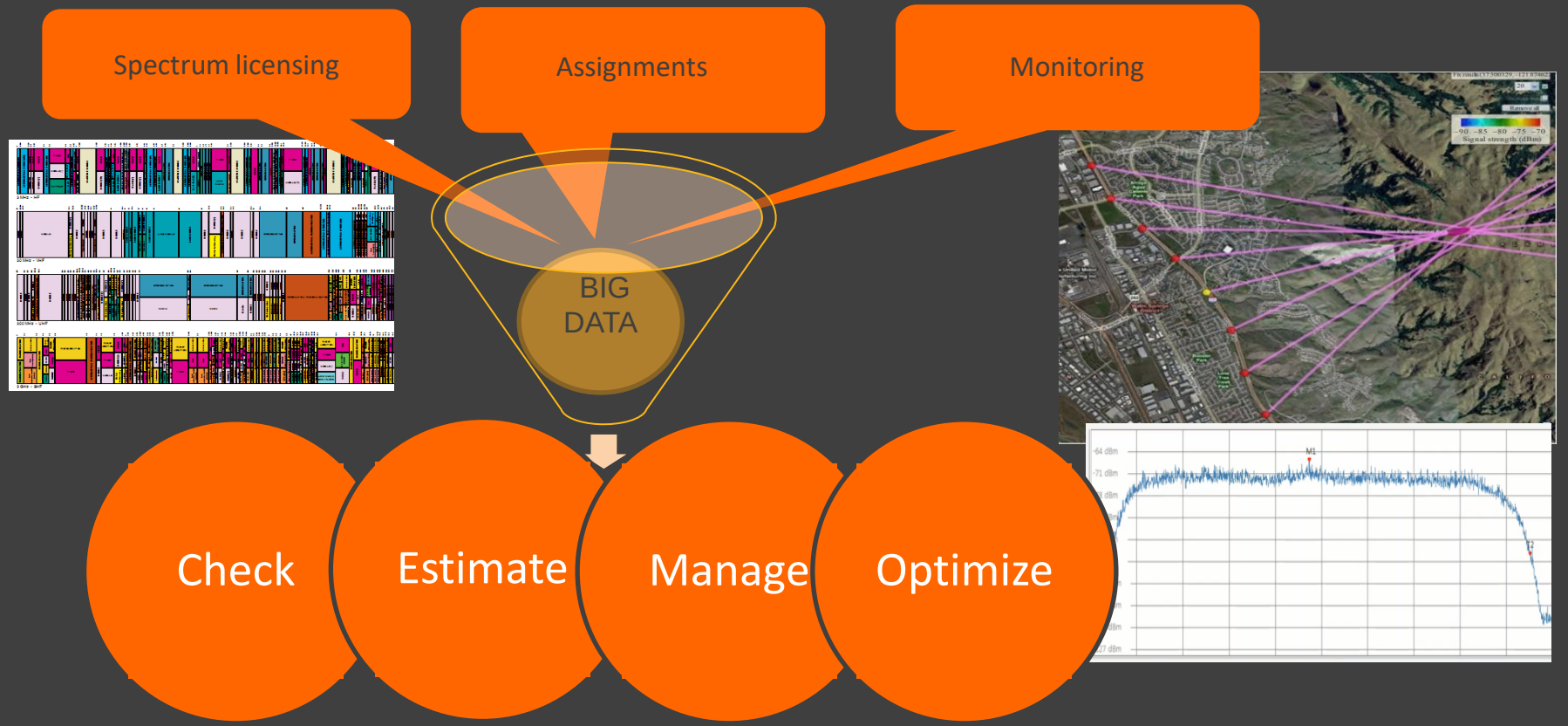


- Multiple list views;
- Formatting;
- Filtering and sorting;
- Statistics;
- Spectrum views
- …

ICS Monitoring / SDRN Control

ICS MONITORING/SDRN CONTROL FORMS PART OF ATDI SPECTRUM MANAGEMENT SYSTEM

GATHERING BIG AMOUNT OF DATA FROM VARIOUS SOURCES



ICS MONITORING/SDRN CONTROL MAIN FUNCTIONS

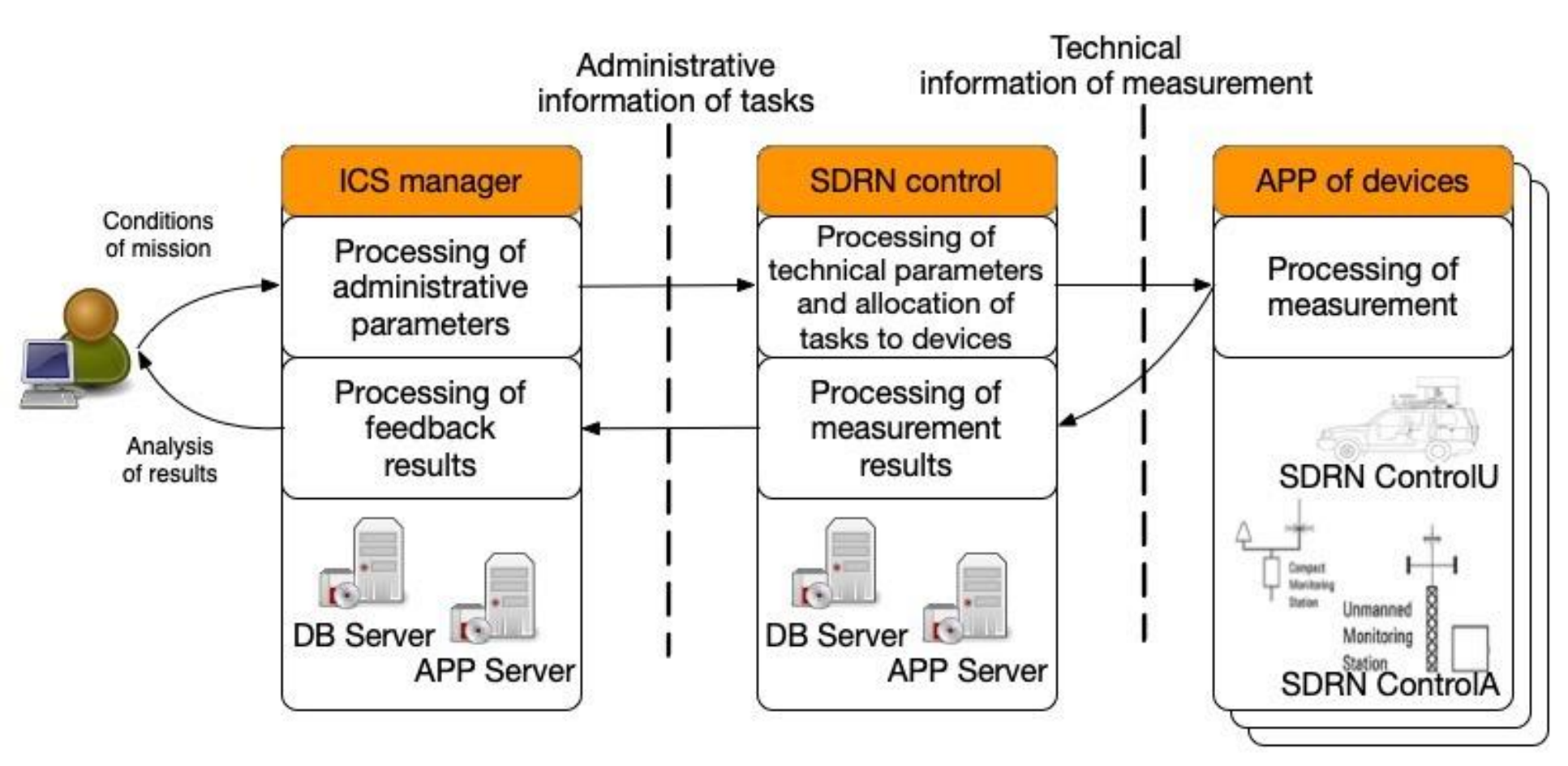
WORKING PRINCIPLES

READINESS TO PERFORM TASKS IN ACCORDANCE WITH THE RADIO REGULATIONS

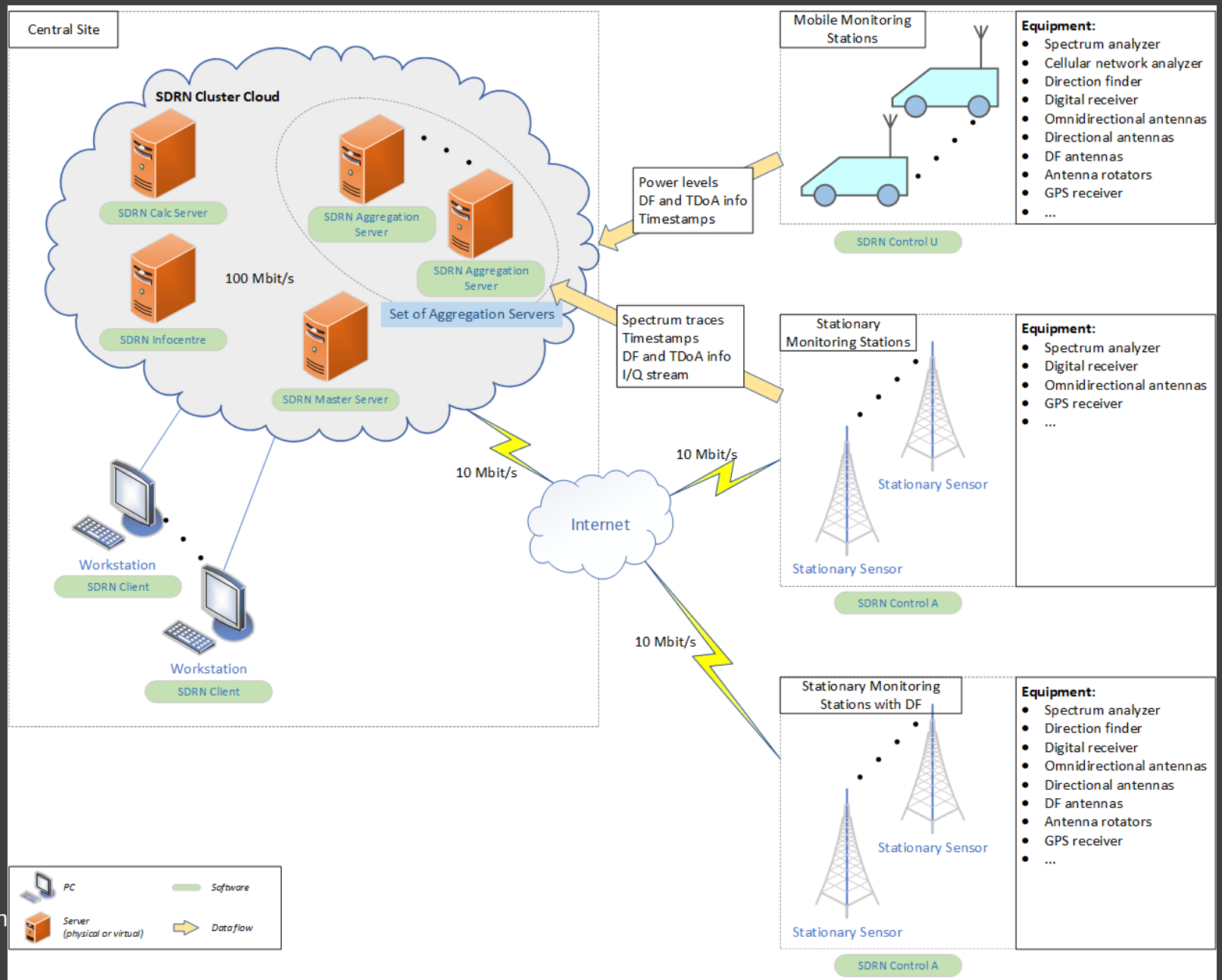
- CHECKING COMPLIANCE WITH THE CONDITIONS OF ASSIGNMENT OF FREQUENCIES
- FREQUENCY BANDS USAGE / CHANNELS OCCUPATION
- STUDY OF INTERFERENCE CASES
- SEARCH FOR UN-AUTHORISED EMISSIONS
- LOCALISATION OF EMISSIONS

ICS MONITORING/SDRN CONTROL: MAIN FUNCTIONS INTEGRATION WITH SMS

ICS MANAGER INTEGRATED WORKFLOW



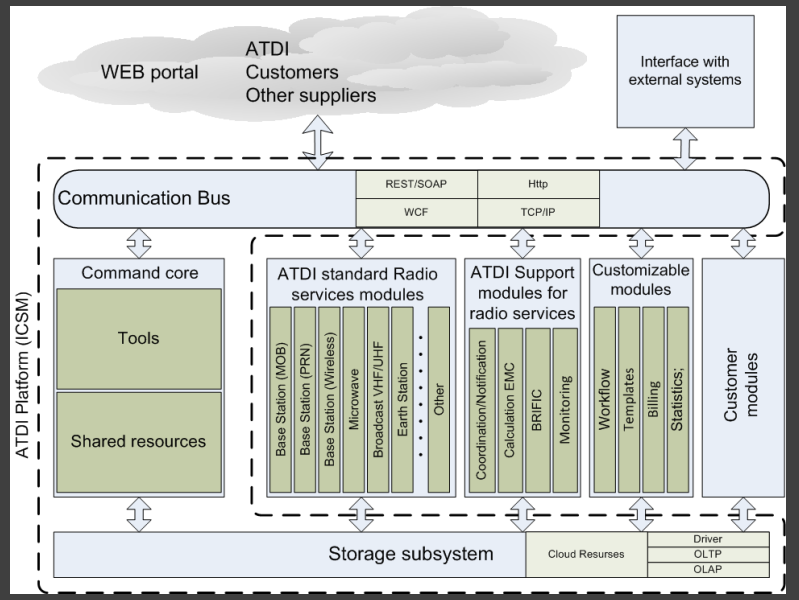
ICS MONITORING/SDRN CONTROL PHYSICAL ARCHITECTURE



ICS MONITORING/SDRN CONTROL
A PLATFORM BASED ON A SERVICE ORIENTED ARCHITECTURE

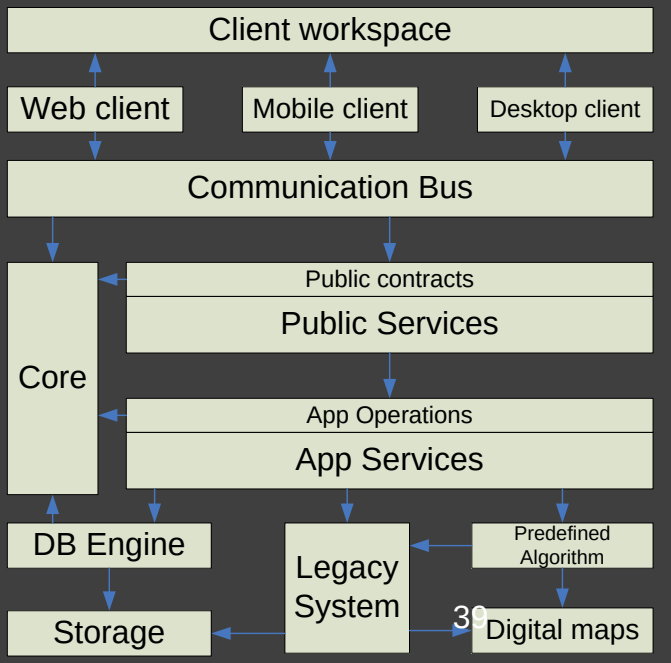
SOA ARCHITECTURE:

- **COMMAND CORE** – CONTAINS INSTRUMENTAL SERVICES TO MANAGE APPLICATION SERVERS
- **SERVICE MODULES** THAT ARE COMPONENTS OF SUBJECT-MATTER LOGIC WHICH CAN BE DISTRIBUTED
- THE **COMMUNICATIONS BUS** IS AN INTERMEDIATE LAYER PROVIDING CONNECTIVITY BETWEEN ALL SERVICE MODULES AND THE CLIENT



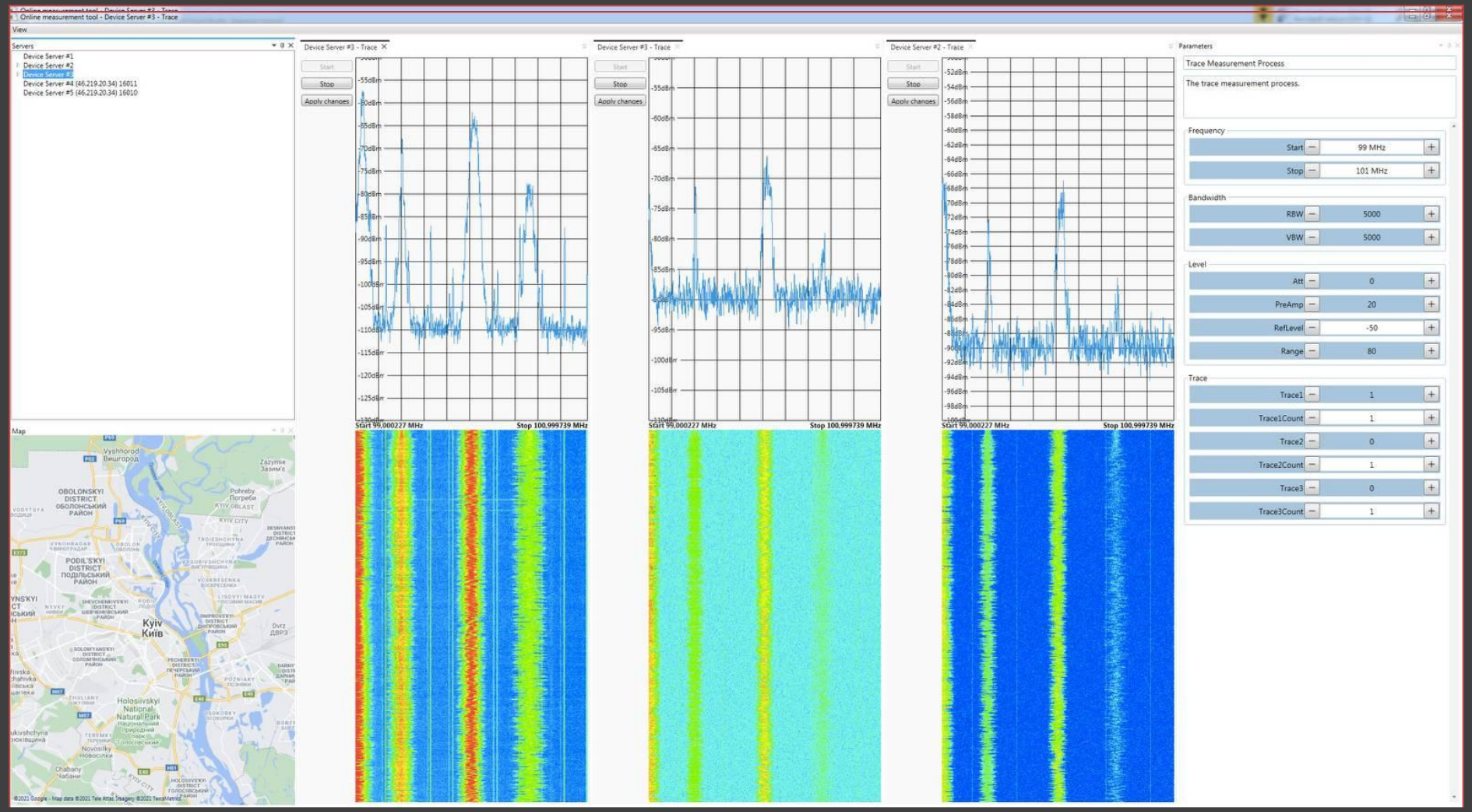
TYPICAL LOGICAL STRUCTURE FOR SERVER-BASED SOLUTIONS WITH THE FOLLOWING KEY LAYERS:

- **PUBLIC SERVICES - A SELECTION OF COMPONENTS FOR THE WCF / REST SERVICES**
- **APP OPERATIONS - A SET OF COMPONENTS FOR IMPLEMENTING INTERFACES FOR USER-DEFINED FUNCTIONS**
- **CORE - AN APPLICATION SERVICE FOR MANAGING COMPONENTS HOSTING AND PUBLISHING DI (DEPENDENCY INJECTION) CONTAINERS**



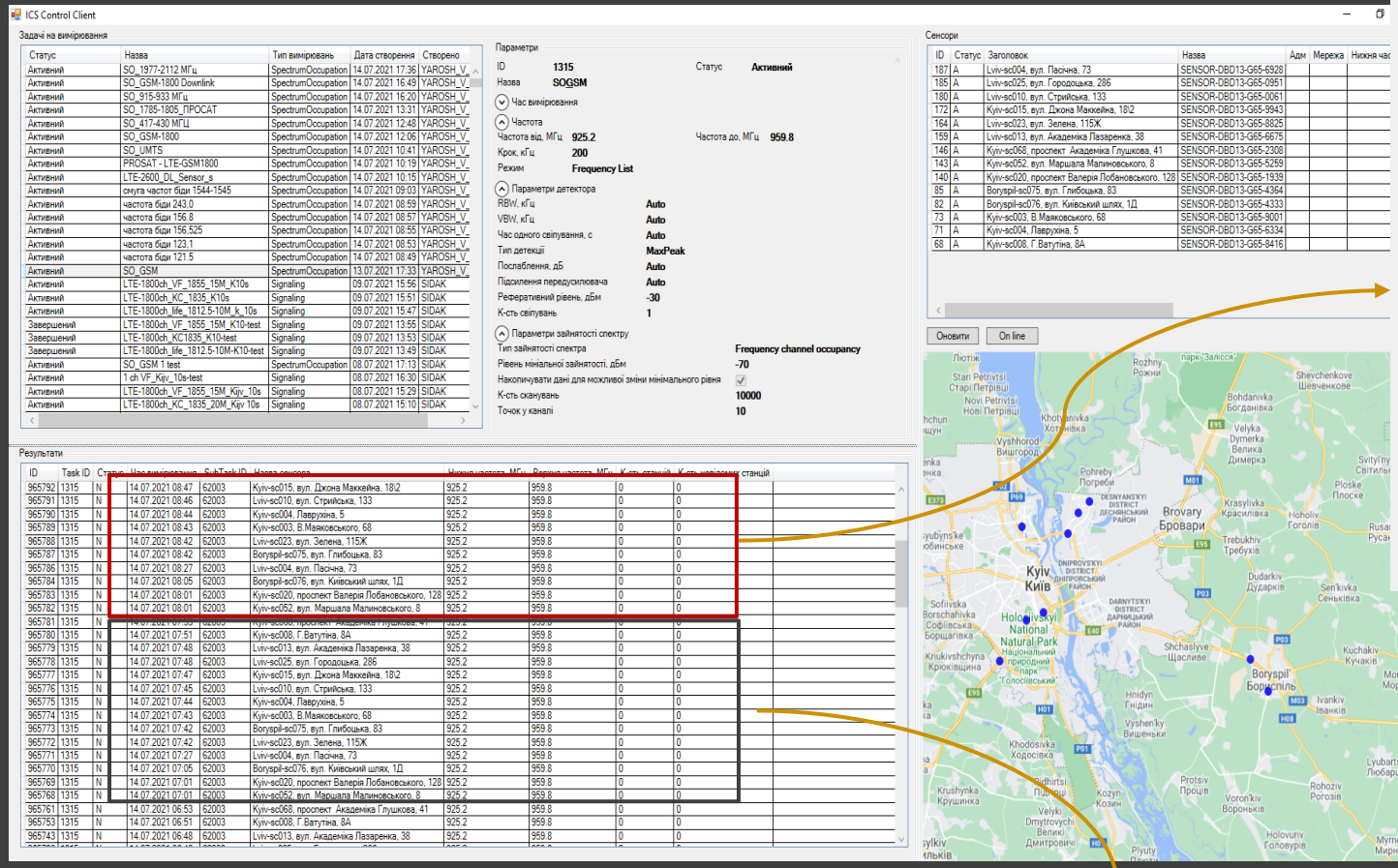
ICS MONITORING/SDRN CONTROL: HIGH PERFORMANCE MULTITASK MEASUREMENTS

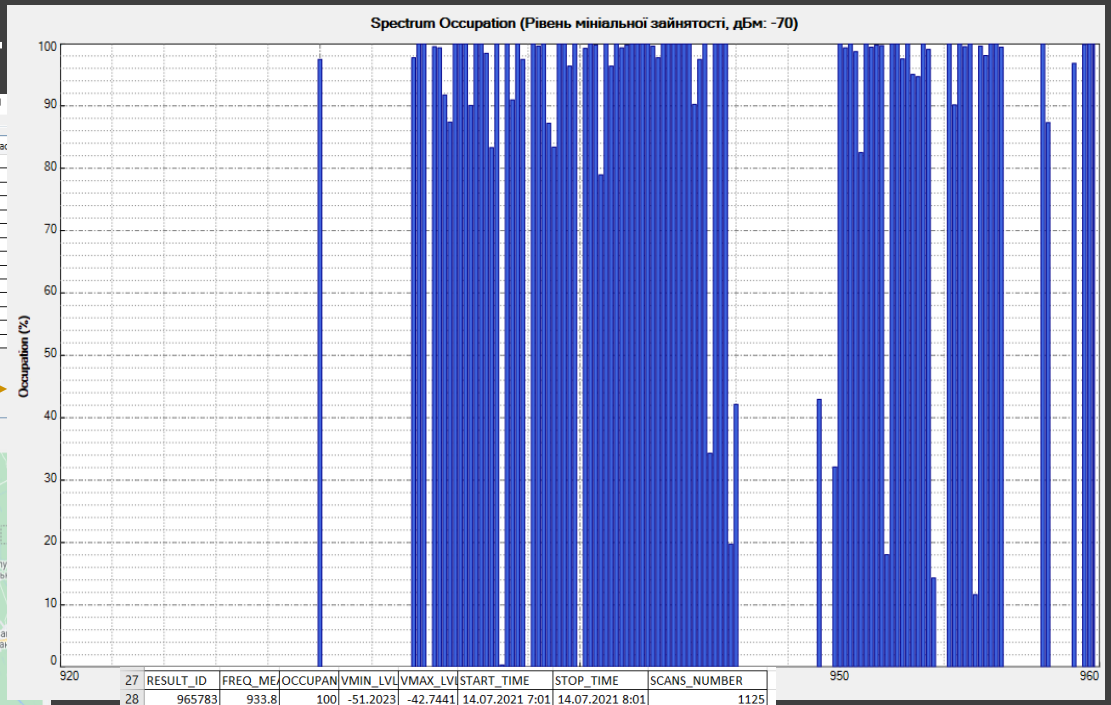
- ONLINE DISPLAY OF SEVERAL DEVICES SIMULTANEOUSLY
- TRANSFORMING A SINGLE CHANNEL RECEIVER IN A MULTIPLE CHANNELS ONE



https://www.youtube.com/watch?v=m2yjexC5d4o

SPECTRUM OCCUPATION MEASUREMENTS WITH ICS MONITORING-SDRN CONTROL





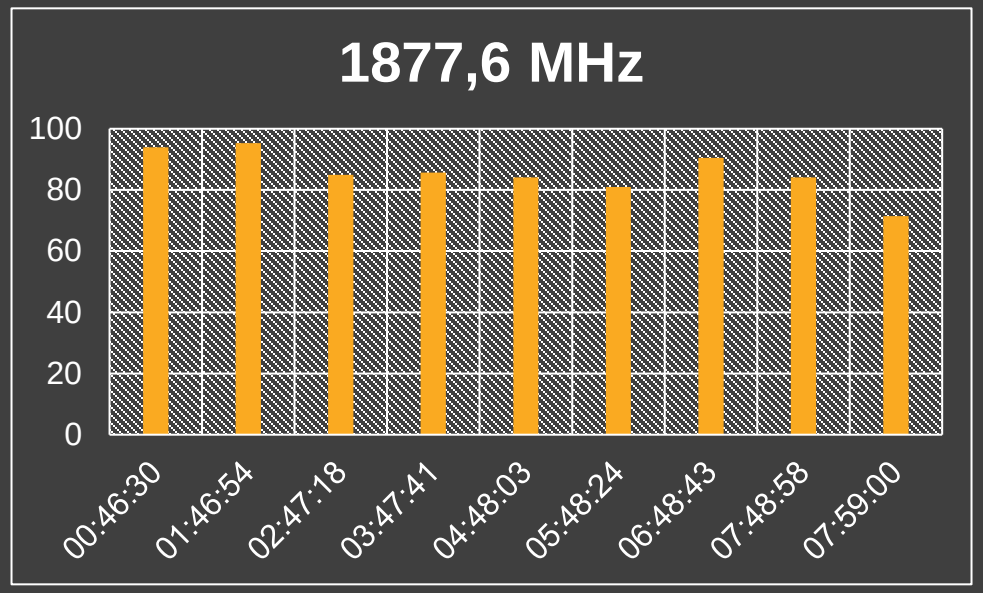
Monitoring of a given frequency band and/or channels around the clock, the results are received every hour

	RESULT_ID	FREQ_ME	OCCUPAN	VMIN_LVL	VMAX_LVL	START_TIME	STOP_TIME	SCANS_NUMBER
28	965783	933.8	100	-51.2023	-42.7441	14.07.2021 7:01	14.07.2021 8:01	1125
29	965783	934	100	-64.6213	-52.6691	14.07.2021 7:01	14.07.2021 8:01	1125
30	965783	934.2	0	-78.3525	-44.3609	14.07.2021 7:01	14.07.2021 8:01	1125
31	965783	934.4	99.55553	-71.1465	-54.5037	14.07.2021 7:01	14.07.2021 8:01	1125
32	965783	934.6	99.37778	-71.4314	-51.1184	14.07.2021 7:01	14.07.2021 8:01	1125
33	965783	934.8	91.82219	-73.4572	-59.4996	14.07.2021 7:01	14.07.2021 8:01	1125
34	965783	935	87.46665	-77.23	-44.2258	14.07.2021 7:01	14.07.2021 8:01	1125
35	965783	935.2	100	-58.8174	-49.2863	14.07.2021 7:01	14.07.2021 8:01	1125
36	965783	935.4	100	-60.9752	-50.6532	14.07.2021 7:01	14.07.2021 8:01	1125
37	965783	935.6	100	-67.4177	-55.6609	14.07.2021 7:01	14.07.2021 8:01	1125
38	965783	935.8	90.13332	-73.85	-57.9931	14.07.2021 7:01	14.07.2021 8:01	1125
39	965783	936	100	-69.1425	-55.4499	14.07.2021 7:01	14.07.2021 8:01	1125
40	965783	936.2	100	-55.4105	-47.6742	14.07.2021 7:01	14.07.2021 8:01	1125
41	965783	936.4	98.4889	-73.3936	-57.4414	14.07.2021 7:01	14.07.2021 8:01	1125
42	965783	936.6	83.37775	-77.6463	-53.8647	14.07.2021 7:01	14.07.2021 8:01	1125
43	965783	936.8	100	-65.6866	-55.142	14.07.2021 7:01	14.07.2021 8:01	1125
44	965783	937	0.444444	-75.3759	-50.5331	14.07.2021 7:01	14.07.2021 8:01	1125
45	965783	937.2	100	-64.5117	-56.0083	14.07.2021 7:01	14.07.2021 8:01	1125
46	965783	937.4	91.02223	-72.9915	-61.8736	14.07.2021 7:01	14.07.2021 8:01	1125
47	965783	937.6	100	-65.3184	-54.094	14.07.2021 7:01	14.07.2021 8:01	1125
48	965783	937.8	97.51112	-73.1222	-55.3588	14.07.2021 7:01	14.07.2021 8:01	1125
49	965783	938	0.088889	-80.5596	-60.1232	14.07.2021 7:01	14.07.2021 8:01	1125
50	965783	938.2	100	-69.3758	-50.3013	14.07.2021 7:01	14.07.2021 8:01	1125
51	965783	938.4	99.64445	-70.8932	-59.7231	14.07.2021 7:01	14.07.2021 8:01	1125
52	965783	938.6	100	-65.1992	-55.4211	14.07.2021 7:01	14.07.2021 8:01	1125
53	965783	938.8	87.28889	-74.353	-56.1157	14.07.2021 7:01	14.07.2021 8:01	1125
54	965783	939	83.46667	-74.6144	-57.5941	14.07.2021 7:01	14.07.2021 8:01	1125
55	965783	939.2	100	-65.3177	-54.2441	14.07.2021 7:01	14.07.2021 8:01	1125
56	965783	939.4	100	-60.9706	-50.8278	14.07.2021 7:01	14.07.2021 8:01	1125
57	965783	939.6	96.44447	-75.0294	-57.9538	14.07.2021 7:01	14.07.2021 8:01	1125
58	965783	939.8	100	-61.9984	-53.2936	14.07.2021 7:01	14.07.2021 8:01	1125
59	965783	940	0	-81.8299	-66.4684	14.07.2021 7:01	14.07.2021 8:01	1125

SPECTRUM OCCUPATION MEASUREMENTS WITH ICS MONITORING-SDRN CONTROL

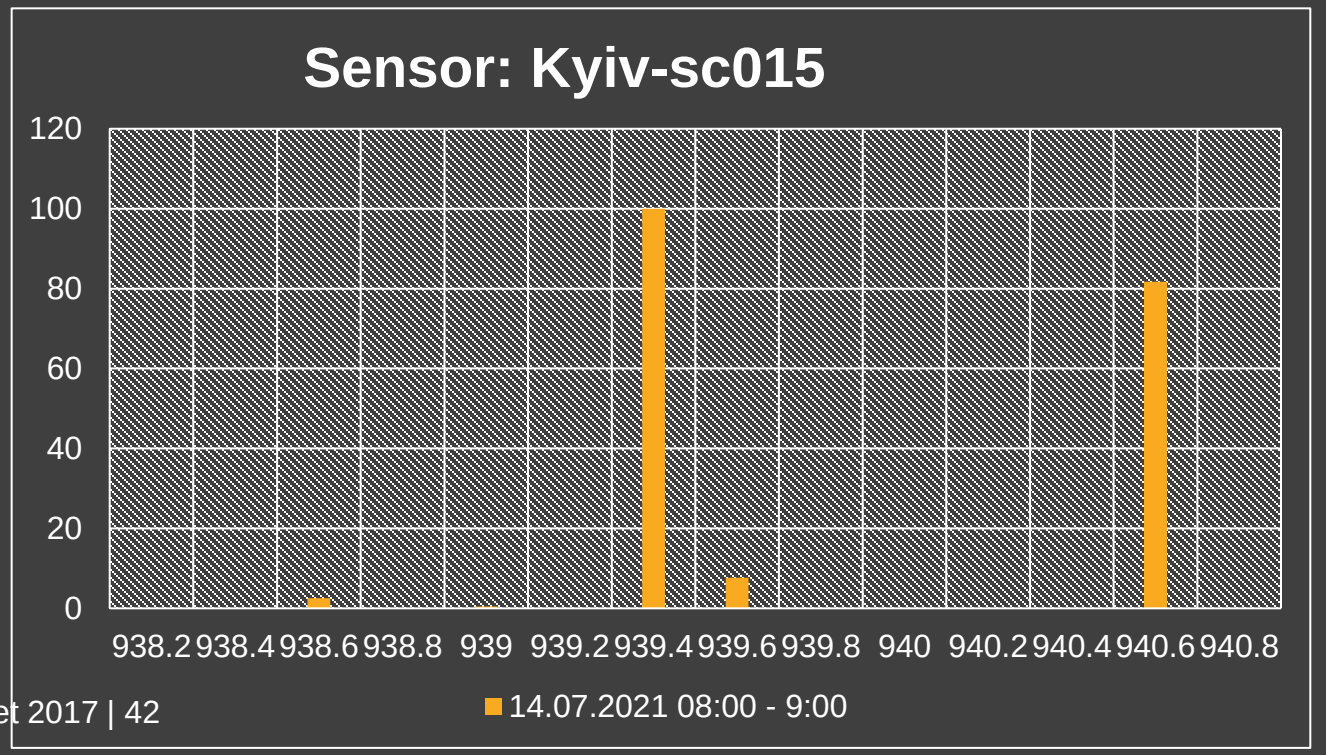
EXAMPLES OF RESULTS

Sensor: Boryspil-sc076



Hourly occupation of channel

Spectrum occupation for 1 hour

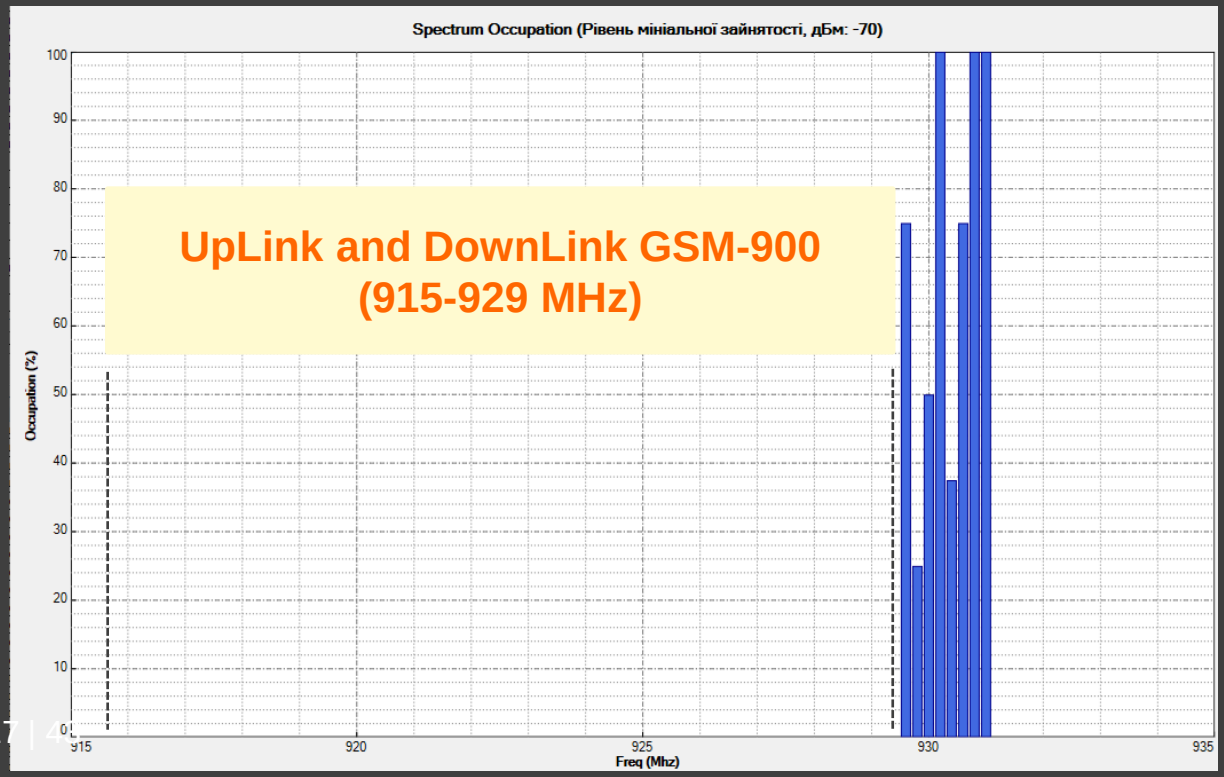


SPECTRUM OCCUPATION MEASUREMENTS WITH ICS MONITORING-SDRN CONTROL

CONTROL OF PROTECTIVE AND PROHIBITED BANDS

The 956.8-957.6 band is prohibited for use. The analysis showed that spectrum occupation is equal to 0, therefore there is no work at these frequencies.

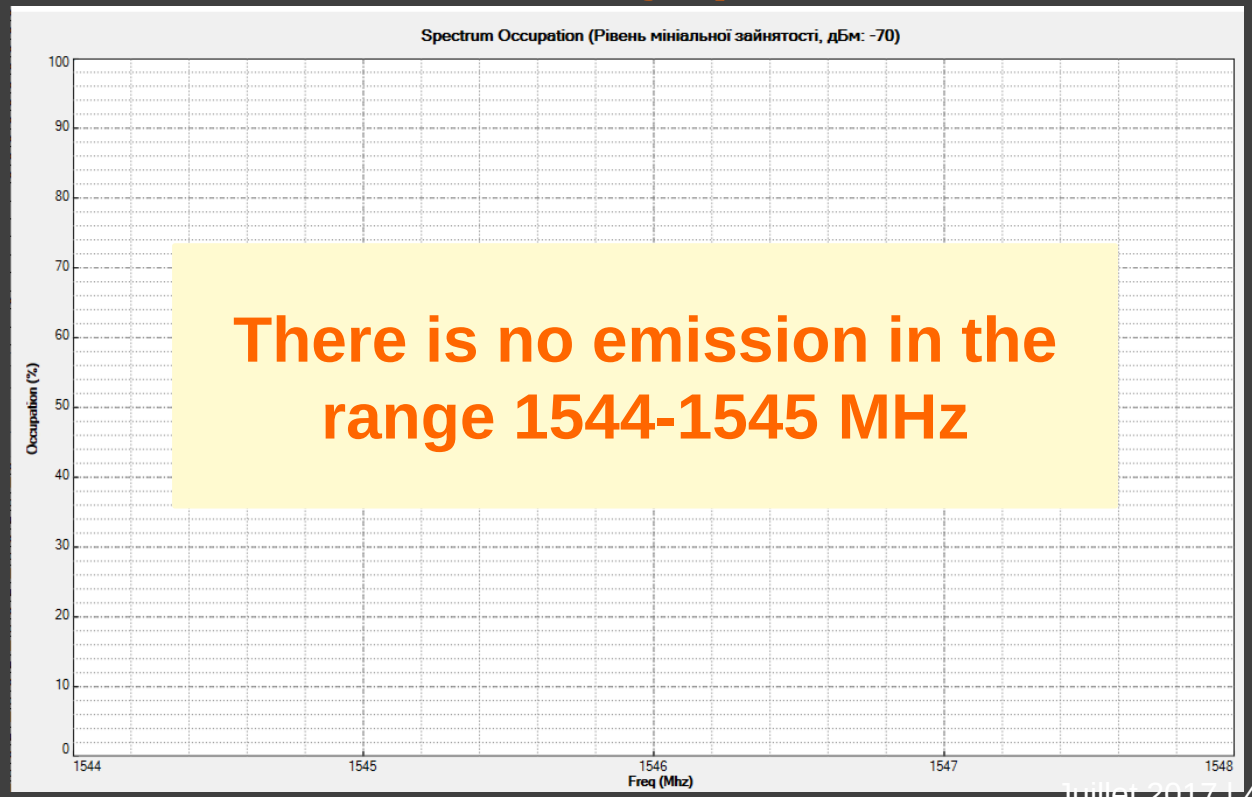
142	965783	956.6	0	-81.8344	-71.9252	14.07.2021 7:01	14.07.2021 8:01	1125
143	965783	956.8	0	-99.2833	-83.9994	14.07.2021 7:01	14.07.2021 8:01	1125
144	965783	957	0	-102.299	-91.9902	14.07.2021 7:01	14.07.2021 8:01	1125
145	965783	957.2	0	-101.757	-91.3097	14.07.2021 7:01	14.07.2021 8:01	1125
146	965783	957.4	0	-102.043	-92.1563	14.07.2021 7:01	14.07.2021 8:01	1125
147	965783	957.6	0	-86.0497	-67.6902	14.07.2021 7:01	14.07.2021 8:01	1125
148	965783	957.8	100	-64.7963	-52.9474	14.07.2021 7:01	14.07.2021 8:01	1125



SPECTRUM OCCUPATION MEASUREMENTS WITH ICS MONITORING-SDRN CONTROL

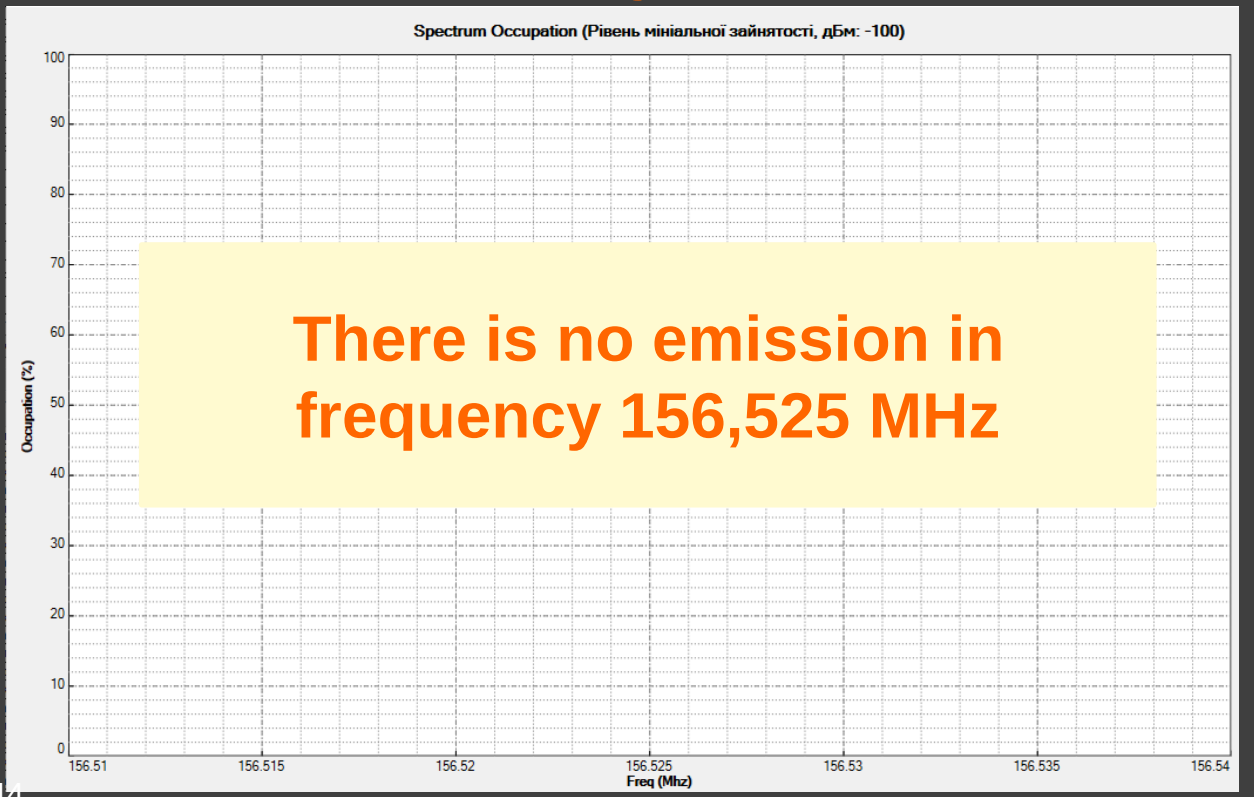
MONITORING THE ABSENCE OF EMISSION ON INTERNATIONAL FREQUENCIES OF TROUBLE

Sensor: Boryspil-sc073



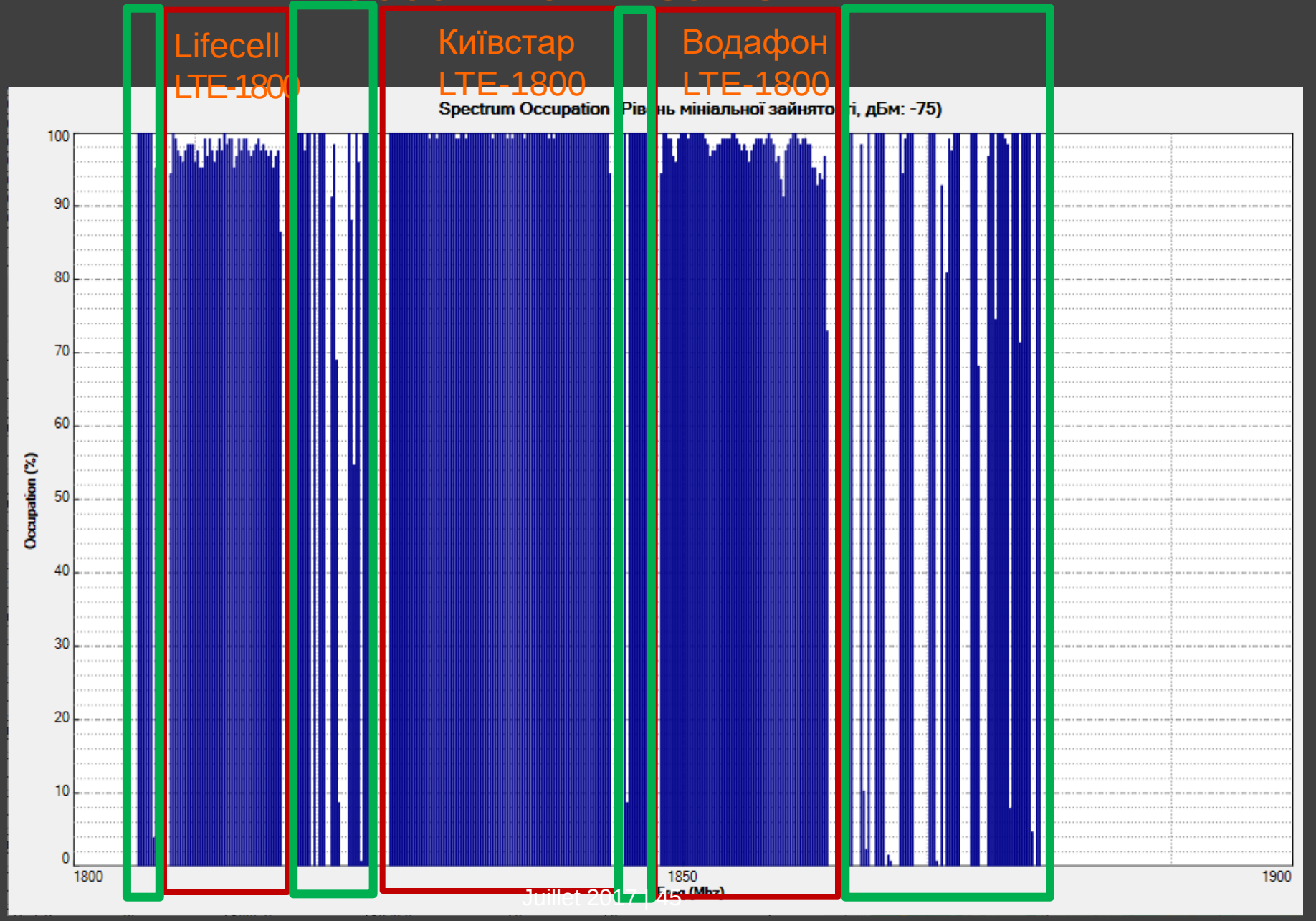
There is no emission in the range 1544-1545 MHz

Sensor: Kyiv-sc065



There is no emission in frequency 156,525 MHz

TRACKING CHANGES IN ELECTROMAGNETIC ENVIRONMENT BASED ON SPECTRUM OCCUPATION RESULTS



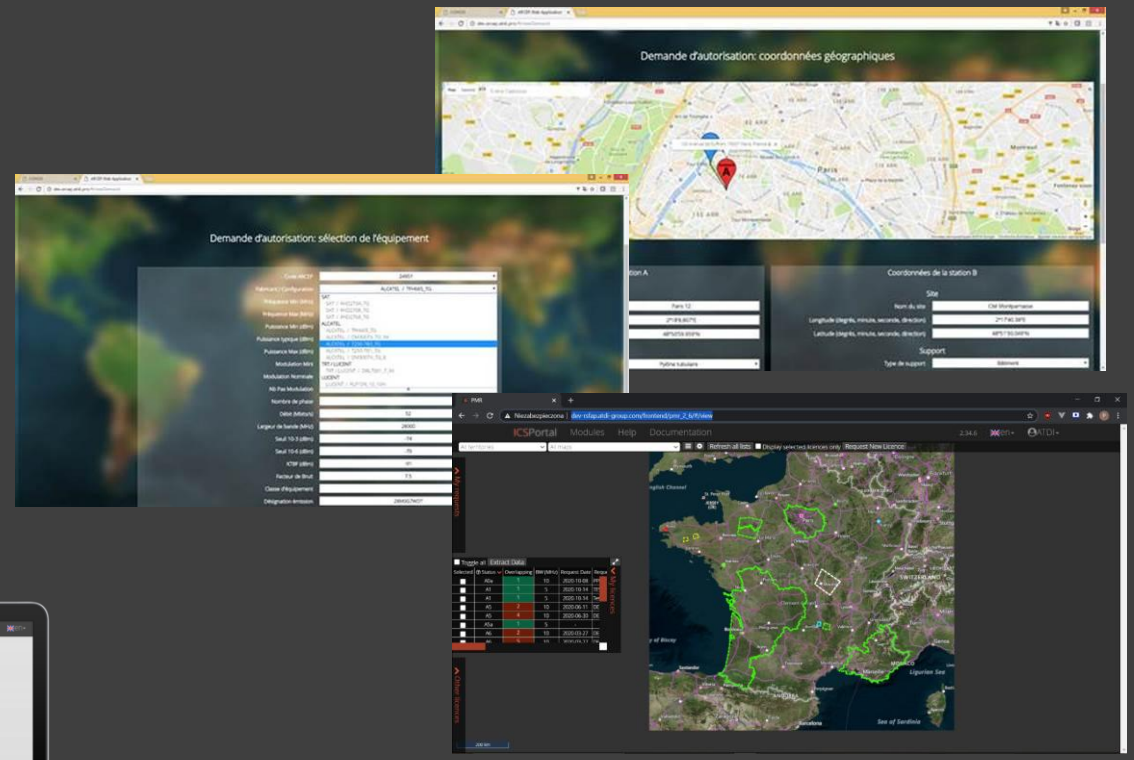
ICS Portal

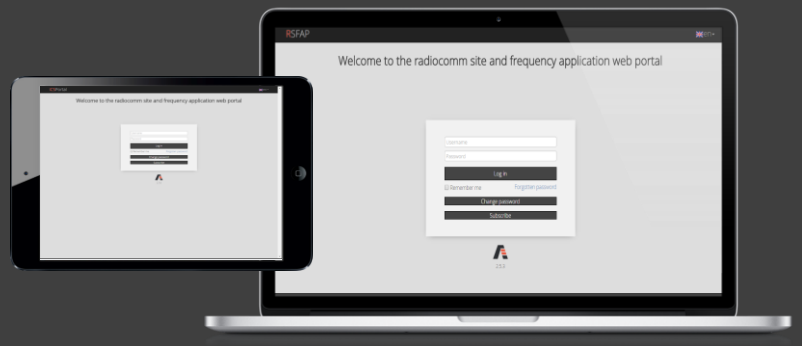
ICS Portal
Web-service Interface

Customizable User Interface:

ICS Portal is a flexible web-platform supporting any browsers, and device types.
The User Interface customization is available to adopt the corporate identification and purpose of the web-service.

- Account Management with SSO and Self-care Portal (External) and Employees Applications Portal (Internal)
- Online applications
- Notification & reminders
- License certificates
- Electronic Signature
- Adaptative design

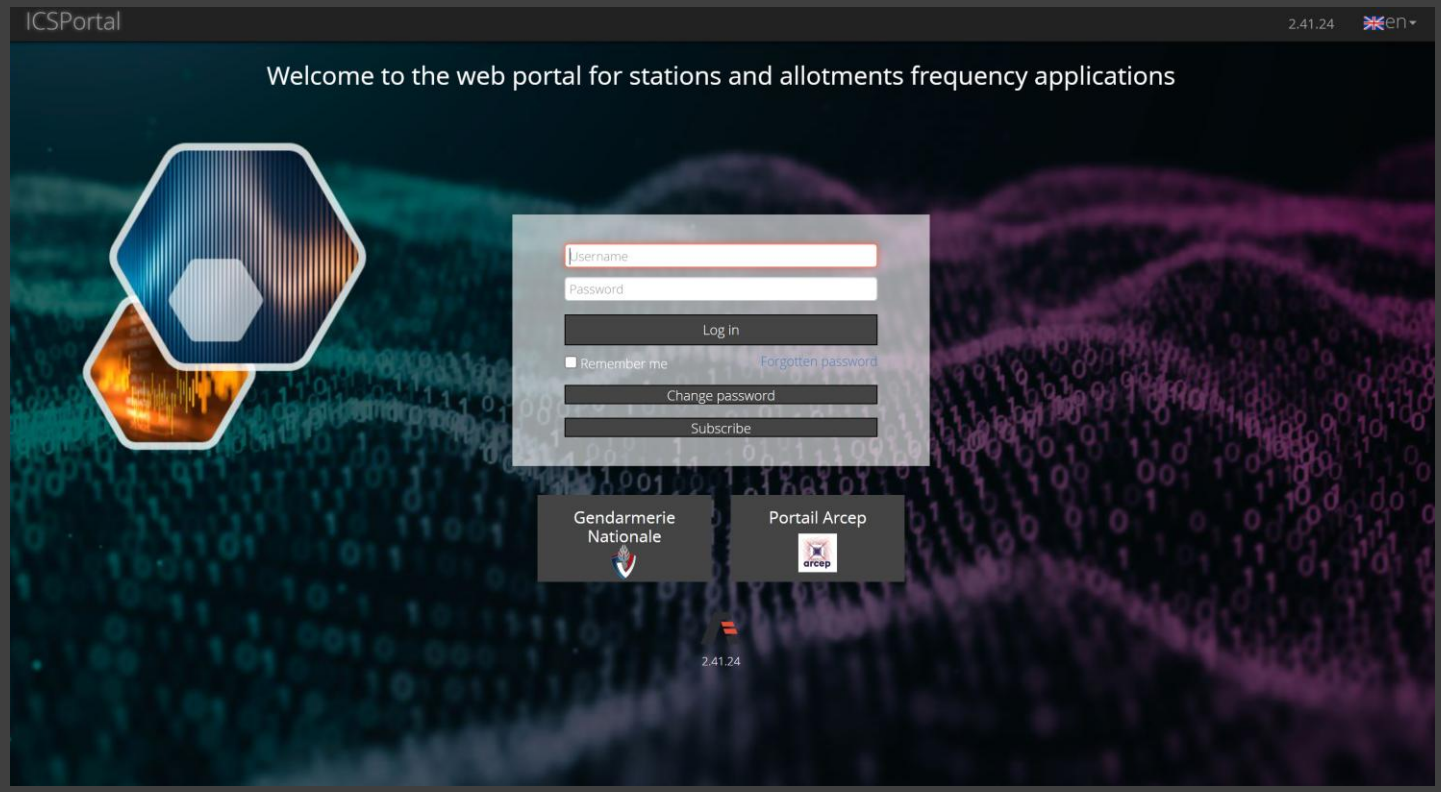




ICS Portal
Web-service Interface

Account Management :

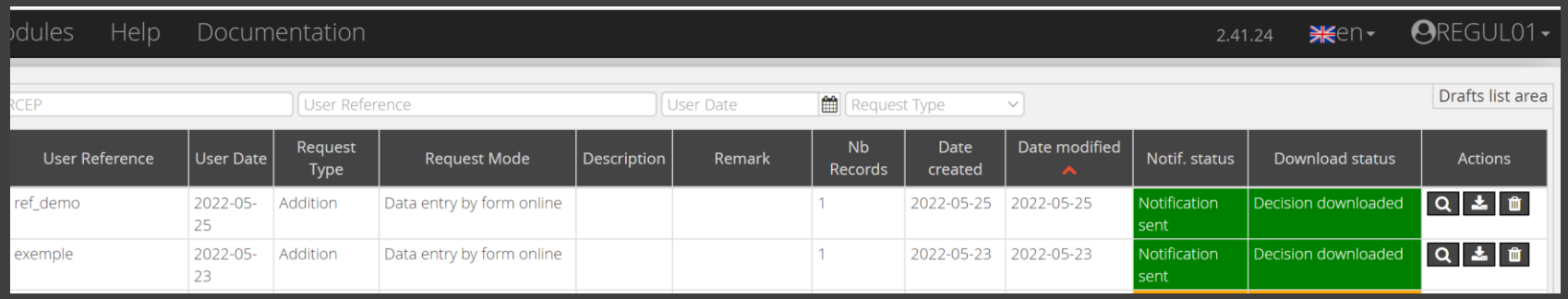
- It is a gateway for external licensees to manage their own self-care to register applications and follow up the assessment status.
- Civil/Military Regulators can assign a corporate account per licensee with account administrator. The account administrator can control the access of internal users for application submission
- Login screen with functions to Sign in, Sign up, Restore password
- Menu entry on main screen with items to edit user/organization profile, create new organization, and change password



ICS Portal
Web-service Interface

Legal documents and consent management

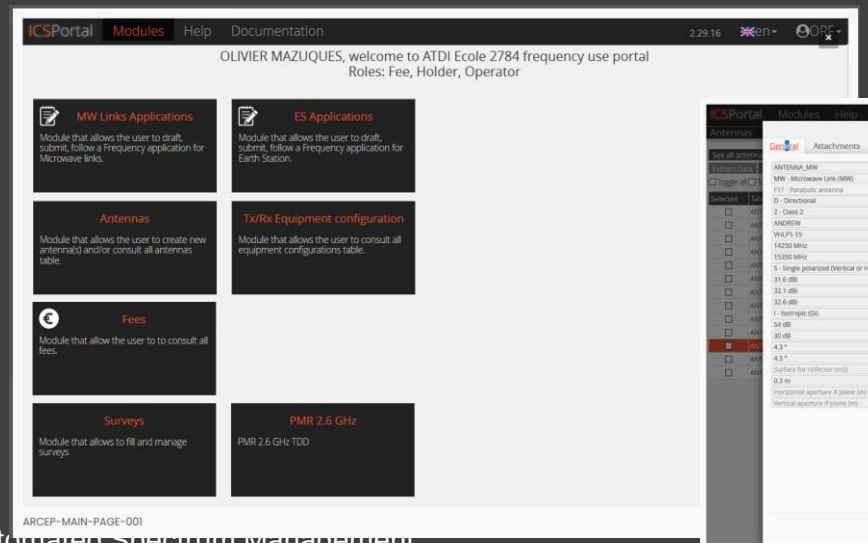
- The system will have an interface in ICS Portal to control versions of deeds agreement, current one and history to be stored in regulators' database and available for the regulatory system administrator to update.
- By default, the system shall require Customer to accept the Master Agreement before continuing to work with the web-service. Date and time of the Acceptance is stored in the database.

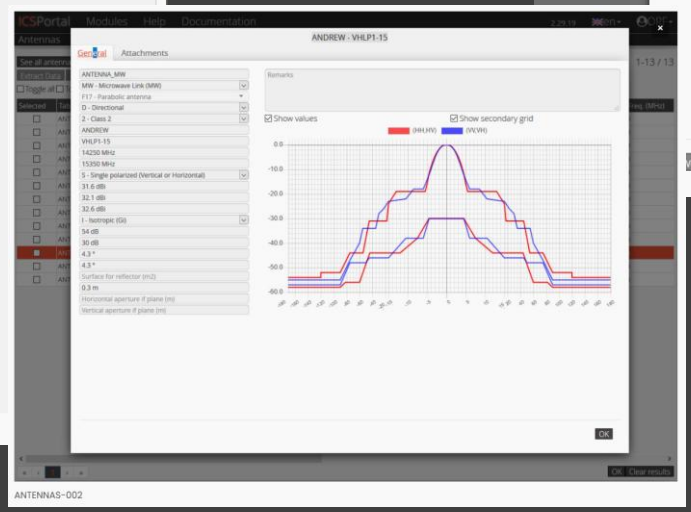


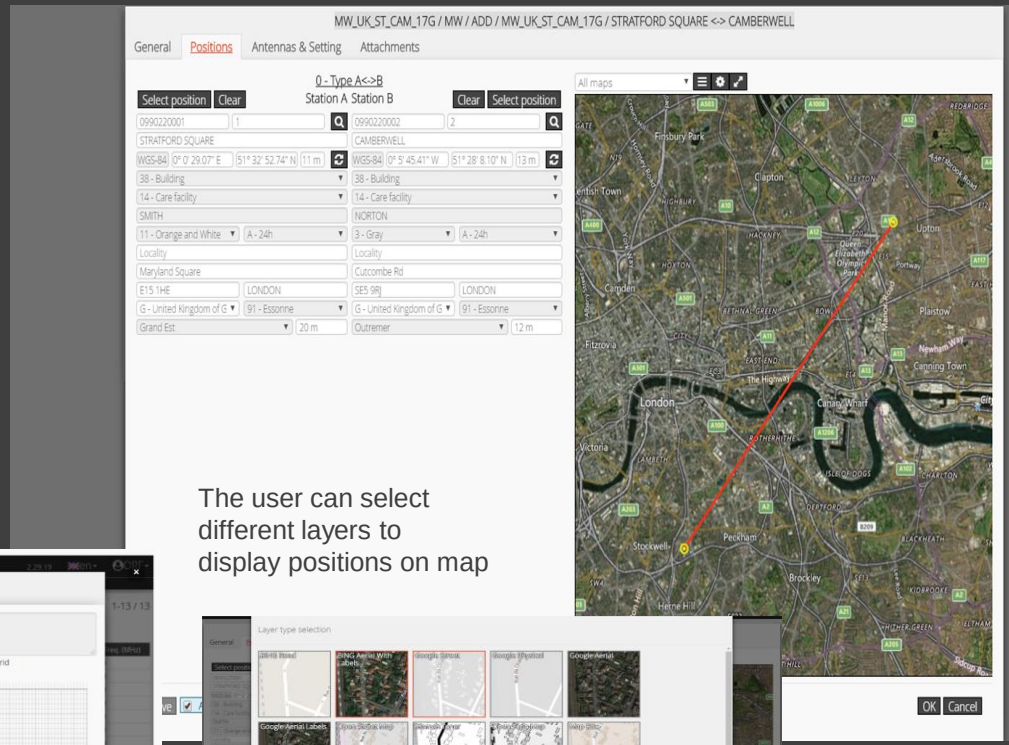
ICS Portal
Web-service Interface

Application management

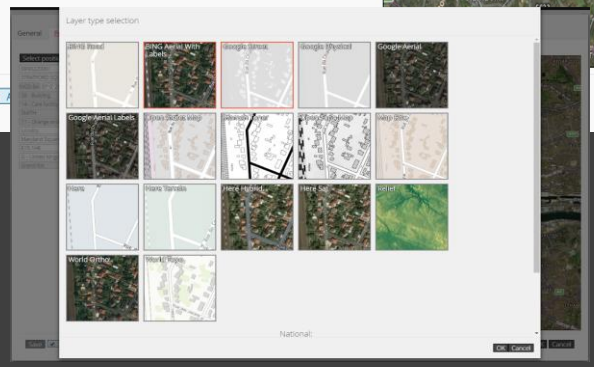
- with functions of manual insert of technical parameters, or batch importation from .csv template, mdb database, etc.
- with automatic data validation check including antenna pattern file and other materials of device specifications and photos uploading and validation.
- With Geographical interface to validate/modify the position and height of antenna.



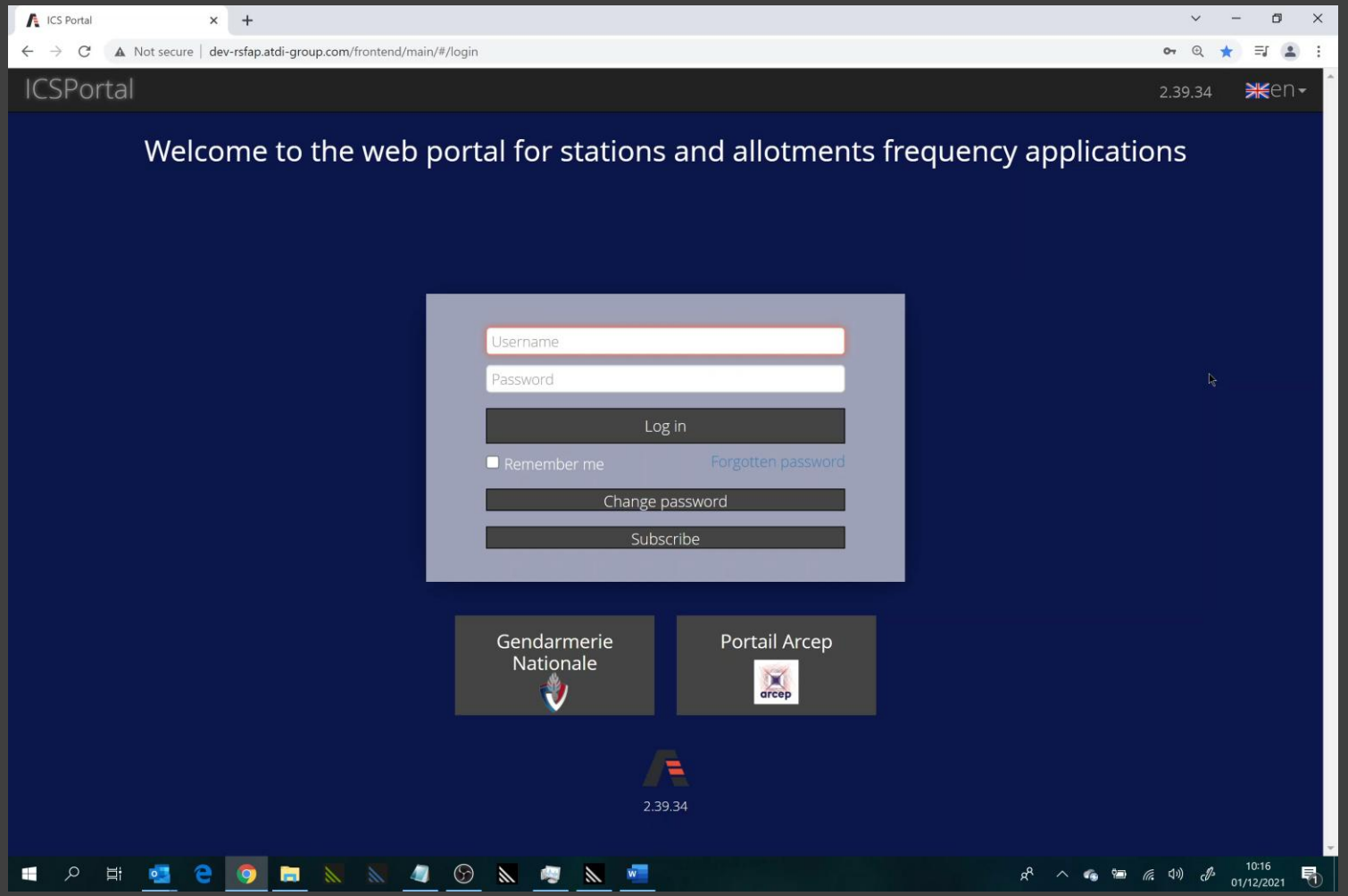




The user can select different layers to display positions on map



ICS Portal
Web-service Interface



HTZ Automation API

HTZ API

Client side

System logical architecture

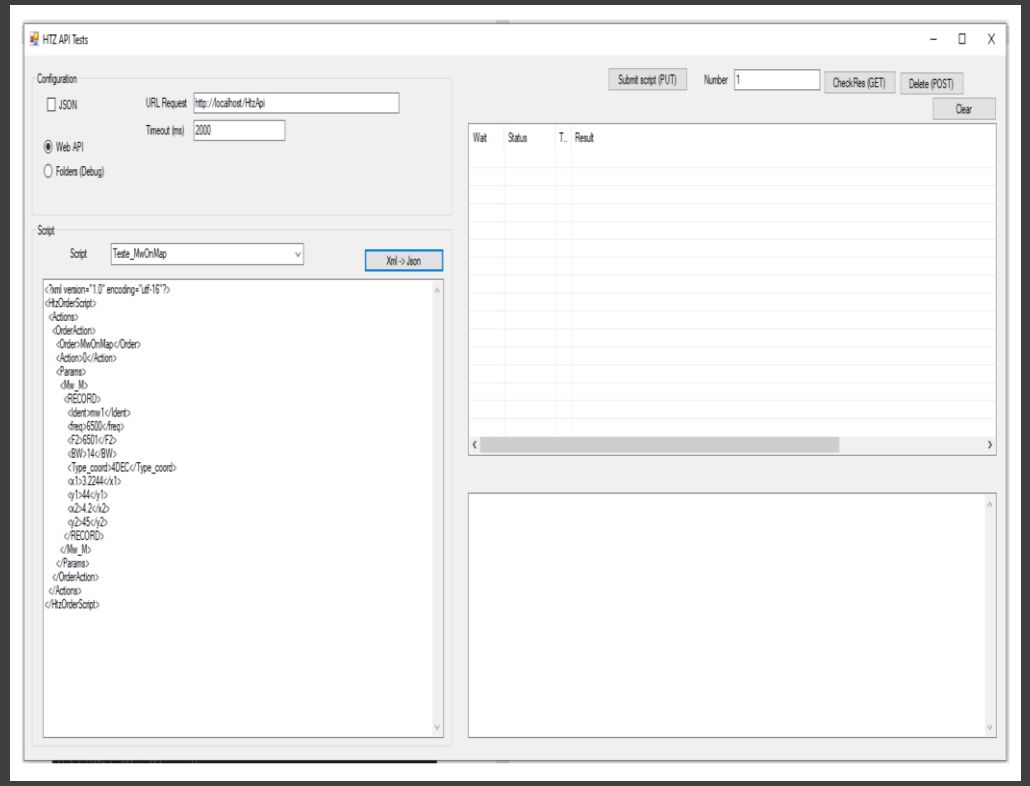
ATDI standard ASMS platform implements a classic three-tier architecture, a kind of client-server architecture in which presentation, application processing, and data management functions are physically separated.

“Client application” is the interface (graphical) component of the platform provided to the end-user. This level has no direct links to the database (for security and scalability requirements).

“Application server” (middle layer, the link layer) is located on the second level, on which most of the business logic is concentrated. Outside the Application server, only fragments are exported to the client and logic elements embedded in the database (stored procedures and triggers). It allows the deployment of additional instances by providing a horizontal scaling of platform performance.

“Database server” (data layer) provides data storage. It is carried to a different level, implemented by the database management system tools, connection to this component being provided only from the application server level.

The platform can be deployed in a fault-tolerant, high-performance configuration, allowing it to support the application without stopping the system.



HTZ warfare

HTZ Warfare
All-in-One Multi Technology Capability

HTZ WARFARE SUPPORTS ALL TECHNOLOGIES & FUNCTIONS FOR THE DEFENCE AND SECURITY MARKETS:

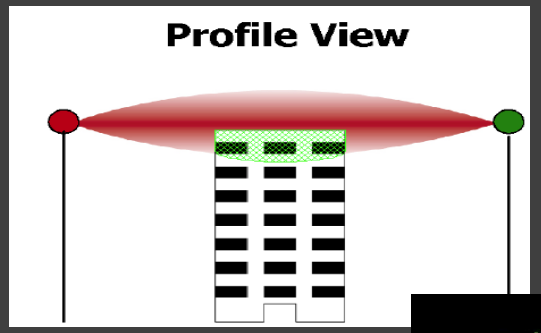
- Radio Critical Communication: VHF/UHF, HF, LINK11, LINK16, TETRA, PMR, TETRAPOL , P25, DMR, CDMA, CDMA 2000, TEDS, PR4G, PS-LTE (Public Safety) , paging…
- Satellite/Earth station
- Microwave-links & Point to Multi-Points
- Radio cellular technologies: GSM, GPRS, EDGE, EDGE Evolution PMR, Trunked Radio Systems (TETRA, TETRAPOL, APCO-25, MPT 1327), GSM-R, DCS, CDMA EVDO GPRS, Wi-Fi (802.11a/b/g/ac), WiMax (802.16 a/d/e), UMTS, R99, HSDPA, HSUPA, HSPA+, DB-HSDPA, DC-HSDPA, CDMA 2000 1x, CDMA 200 EV-DO, DCS, LTE Advanced (latest 3GPP release), MBSFN-LTE, NB-IoT (3GPP), IoT/LoRA/SigFox, WiFi, Ingenu, LoWPAN, RPMA, Zigbee, Enocean, ISA 100, LTE-M, LTE-R (TDD/FDD), ZWave, Mesh network, Smart Grid, CISCO smart grid technology, 5G-NR (FDD/TDD), SCADA,
- Aeronautical & UAVs : Communications (Ground To Ground/Ground To Air), Radio Navigation (GP, markers, Loc, MLAT, DME, TACAN, NDB, Markers, GBAS RX, MLS AZ, etc.) and Surveillance systems, drones
- Radio-localisation: (DF/Sensors/MLAT, Telemetry, TDOA, RSSI, etc.)
- Jammers (Fixed frequency mode, **wide band – diffusion** , **wide band – adaptive mode)**
- Broadcast : Radio analog and digital (FM, AM, LF/MF, TDAB, etc.), TV analog and digital (DVB, DVB-T2, ISDB-T, DMR, DVB-S, DVBS2, etc.)
- Subscribers and User Equipment

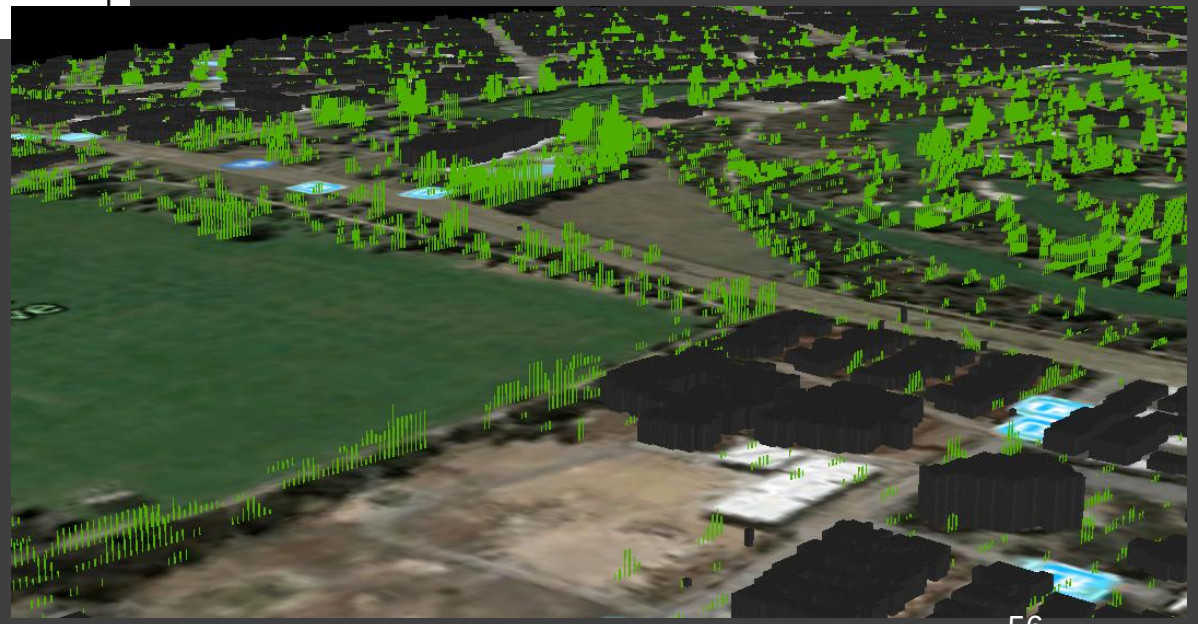
HTZ WARFARE SUPPORTS ALL TECHNOLOGIES & FUNCTIONS FOR THE DEFENCE AND SECURITY MARKETS, INCLUDING:

- TACTICAL COMMUNICATIONS (ELINT, COMINT)
- UAV/UAS MISSION PLANNING
- MARITIME COMMUNICATIONS
- LMR/PMR/P25/TETRA
- PUBLIC SAFETY NETWORK/PPDR
- HF COVERAGE ANALYSIS
- MICROWAVE LINKS
- SATELLITE & EARTH SEGMENT (GSO/NON-GSO) DESIGN
- RADAR, INTERCEPTION, JAMMING EFFICIENCY

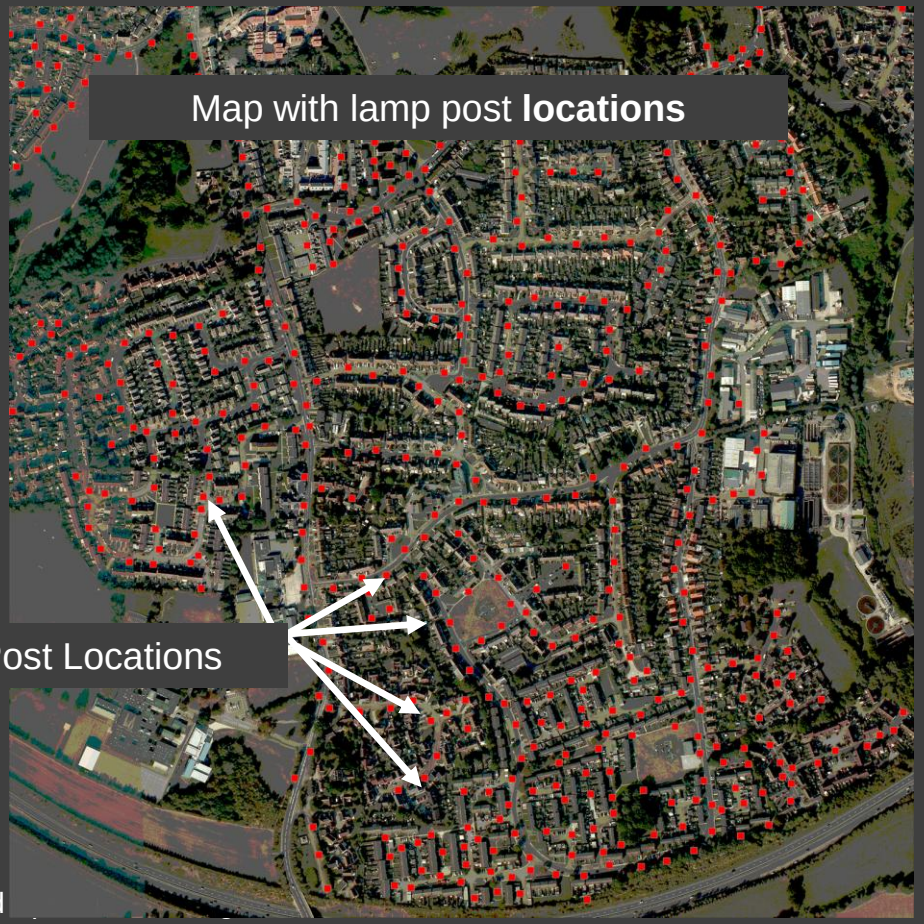
HTZ warfare –
Supporting complete GIS for any technology

- 3D urban environment
- 3D Vegetation layer
- Deterministic propagation model
- 3D ray tracing (Multipath and delay-spread)
- Atmospheric losses
- Outdoor to indoor prediction





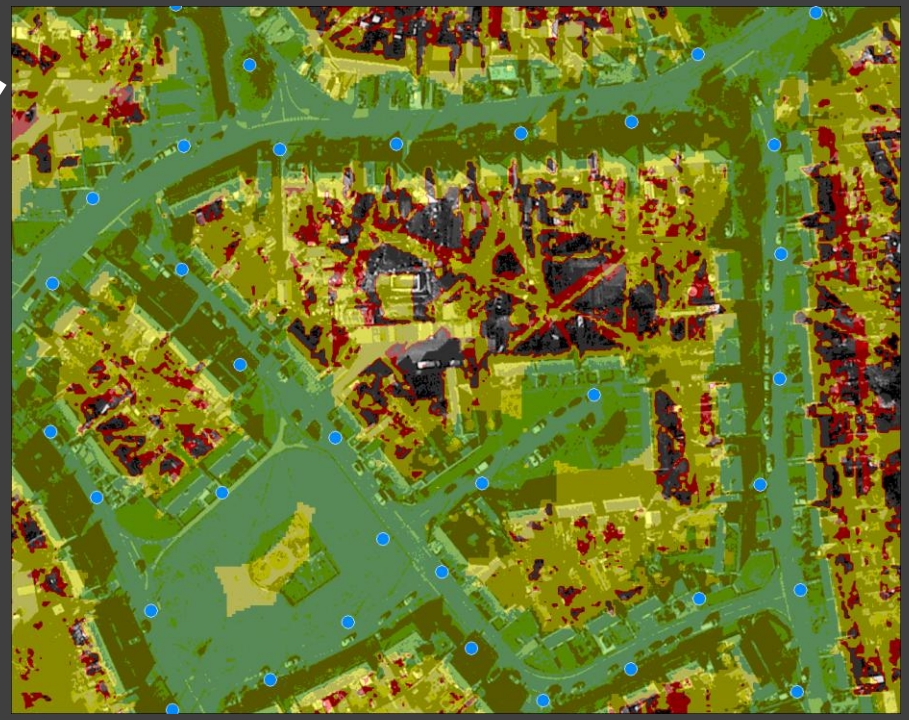
HTZ warfare –
Supporting complete GIS for any technology



Area of Interest of 5G coverage operating in mm wave band (27GHz)

Assumed paramaters for 5G system operating at 26GHz:
TX EIRP 23dBm MIMO antenna on lamp posts at 4m agl.
RX Threshold -55dBm (RX bandwidth 450MHz with 20dB C/I in Dynamic environment)

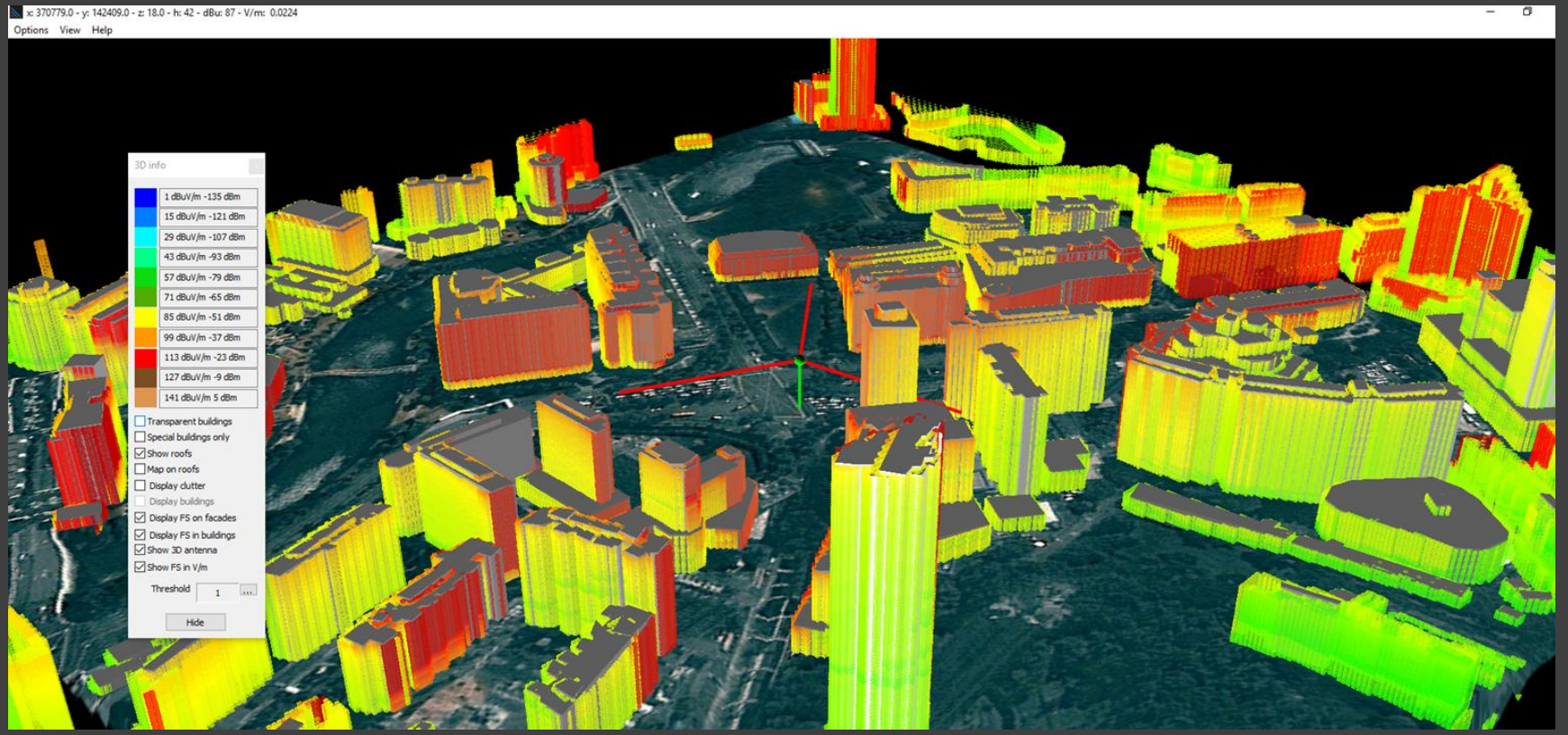
HTZ warfare –
Supporting complete GIS for any technology



>=dBu/OAA	Label
70	Threshold Coverage
80	Good Coverage
100	In-Door Coverage

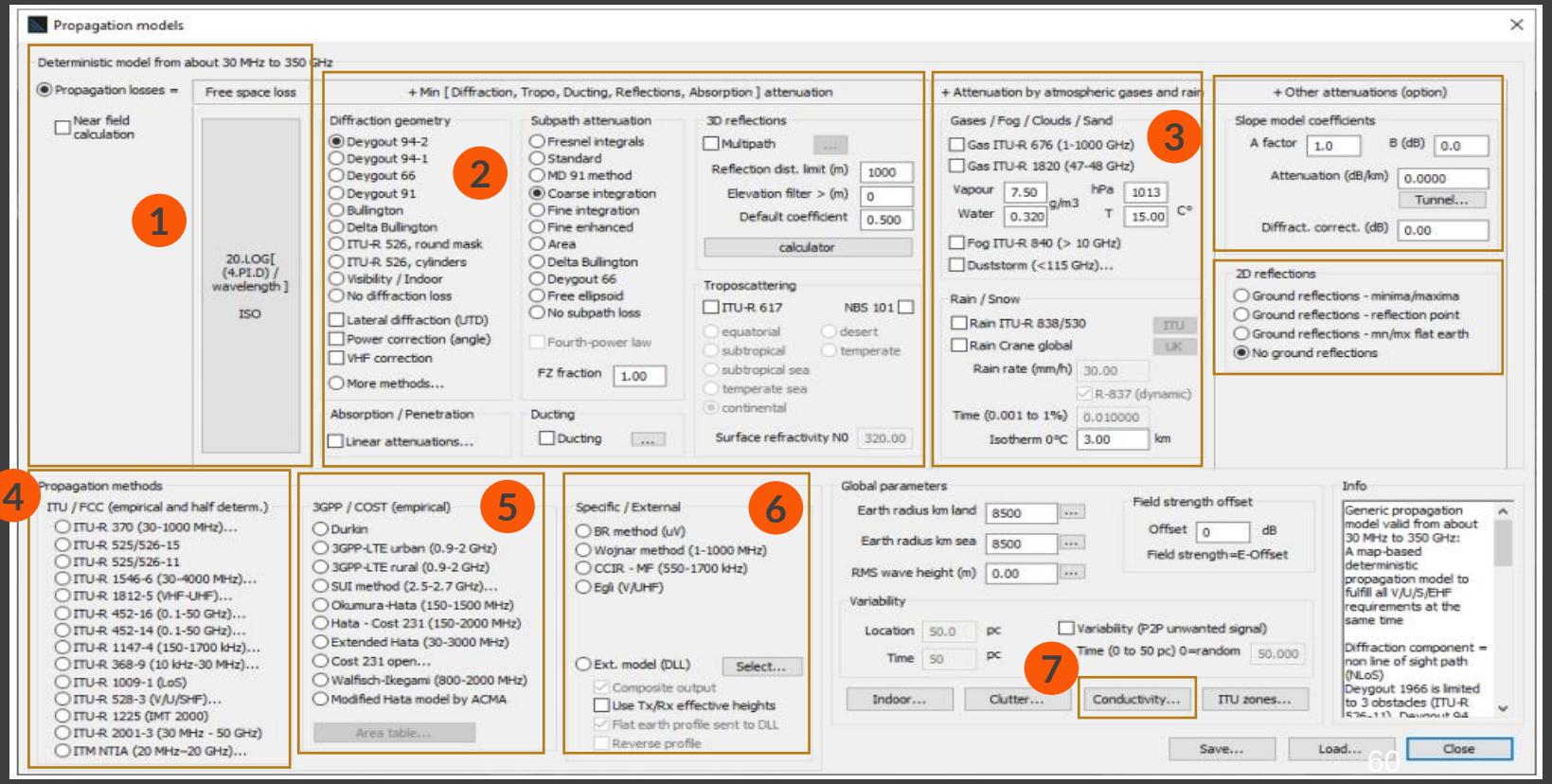
Assumed paramaters for 5G system operating at 26GHz:
TX EIRP 23dBm MIMO antenna on lamp posts at 4m agl.
RX Threshold -55dBm (RX bandwidth 450MHz with 20dB C/I in Dynamic environment)

HTZ warfare –
3D prediction & EMF analysis



HTZ warfare – Propagation models

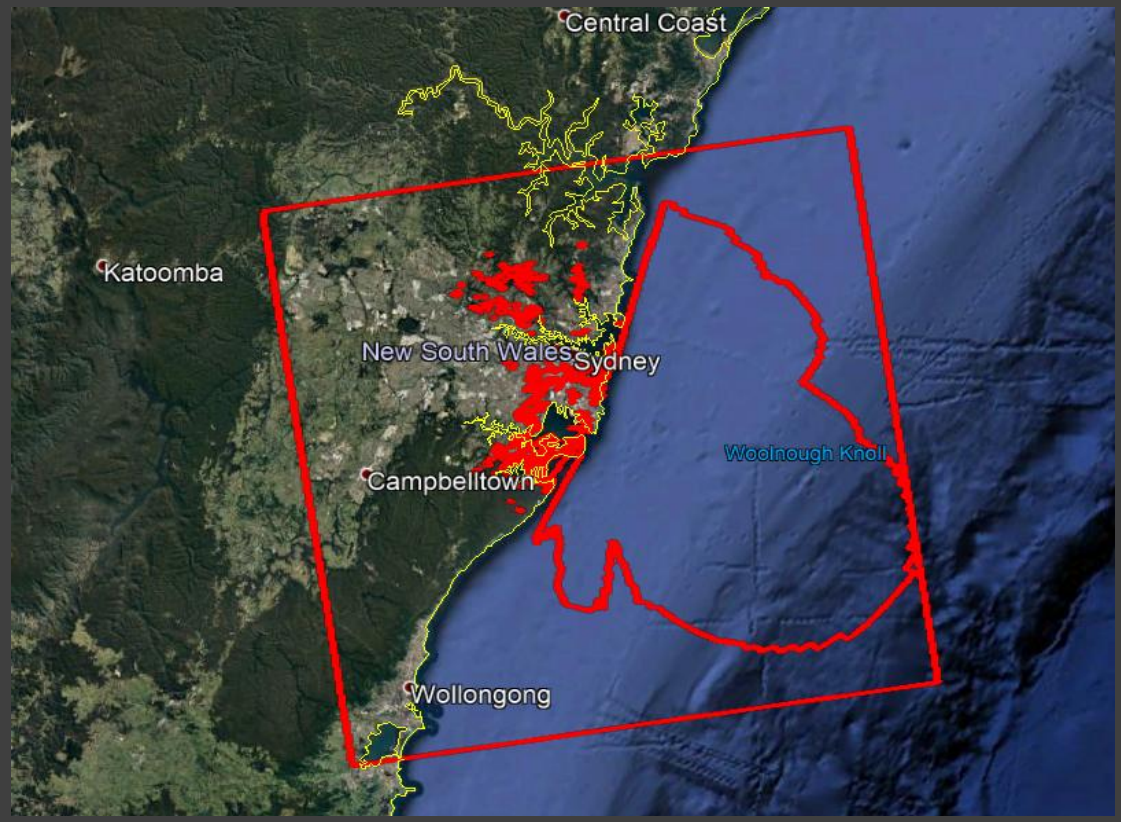
1. Free Space model
2. Diffraction models
3. Tropo-scattering models
4. Deterministic ITU Recommendations
5. Industry standard models
6. Specific/external & custom-built models
7. HF conductivity model



HTZ warfare – Technical framework_exclusion zones

Example case: Earth station vs Terrestrial

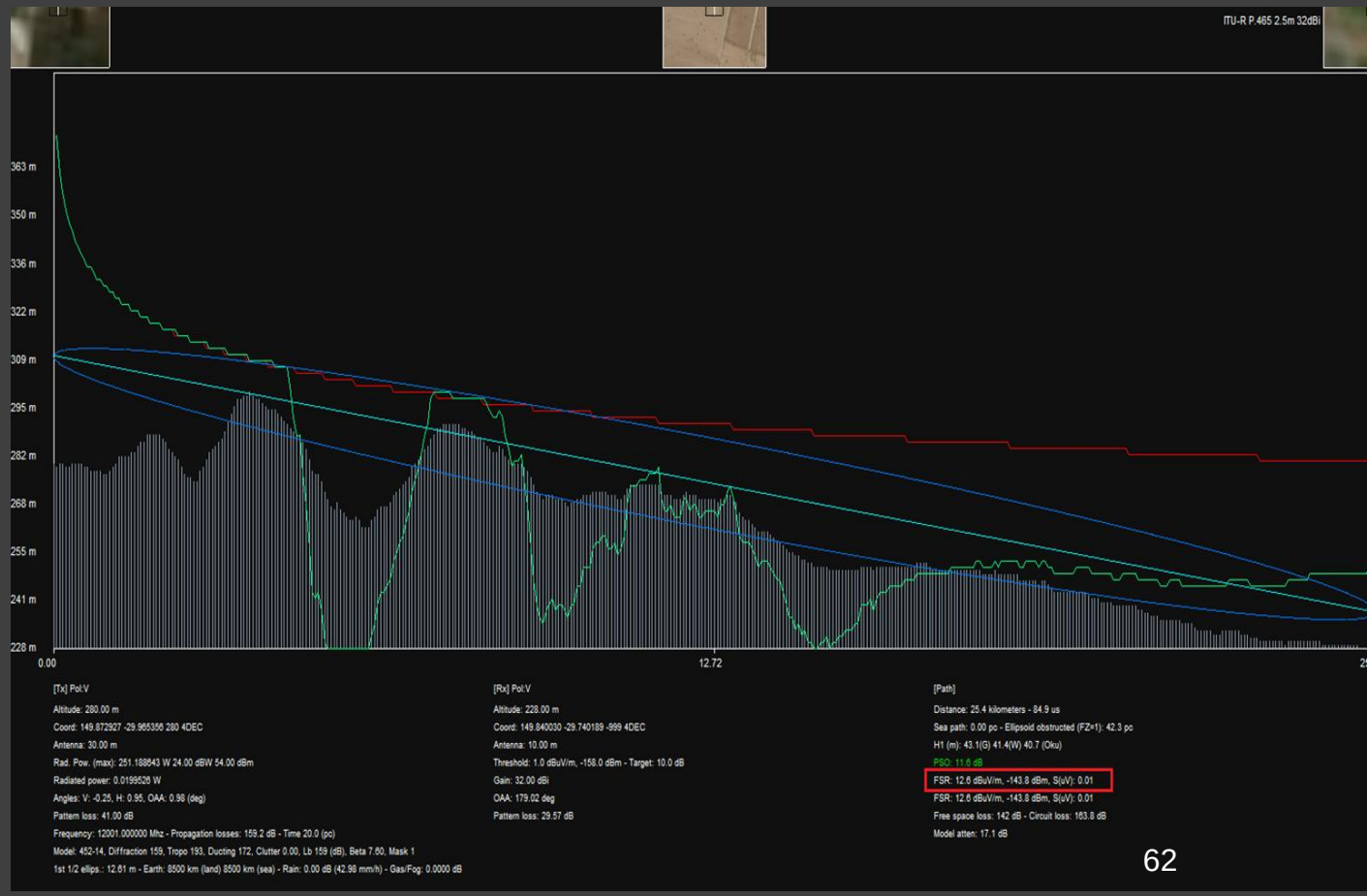
- Model
  - Interferer: Terrestrial services
  - Victim: Earth station
- Predict
  - Threshold degradation
  - Exclusion zone



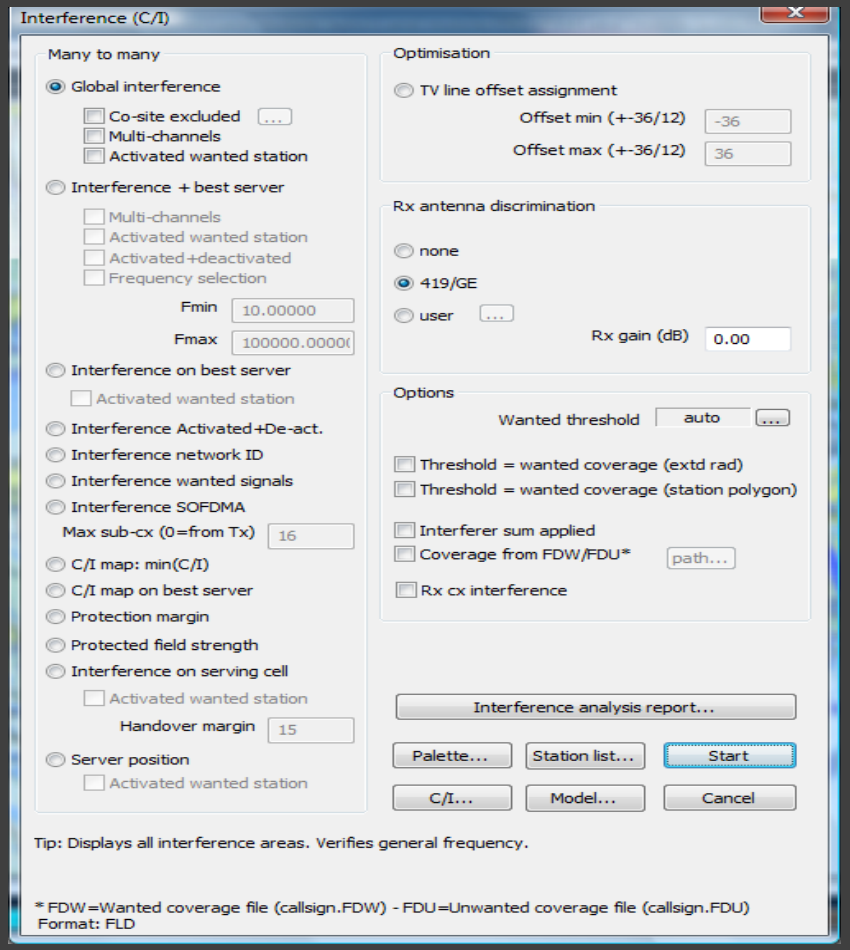
HTZ warfare – Technical framework_Max signal level

Example case: Earth station vs MW

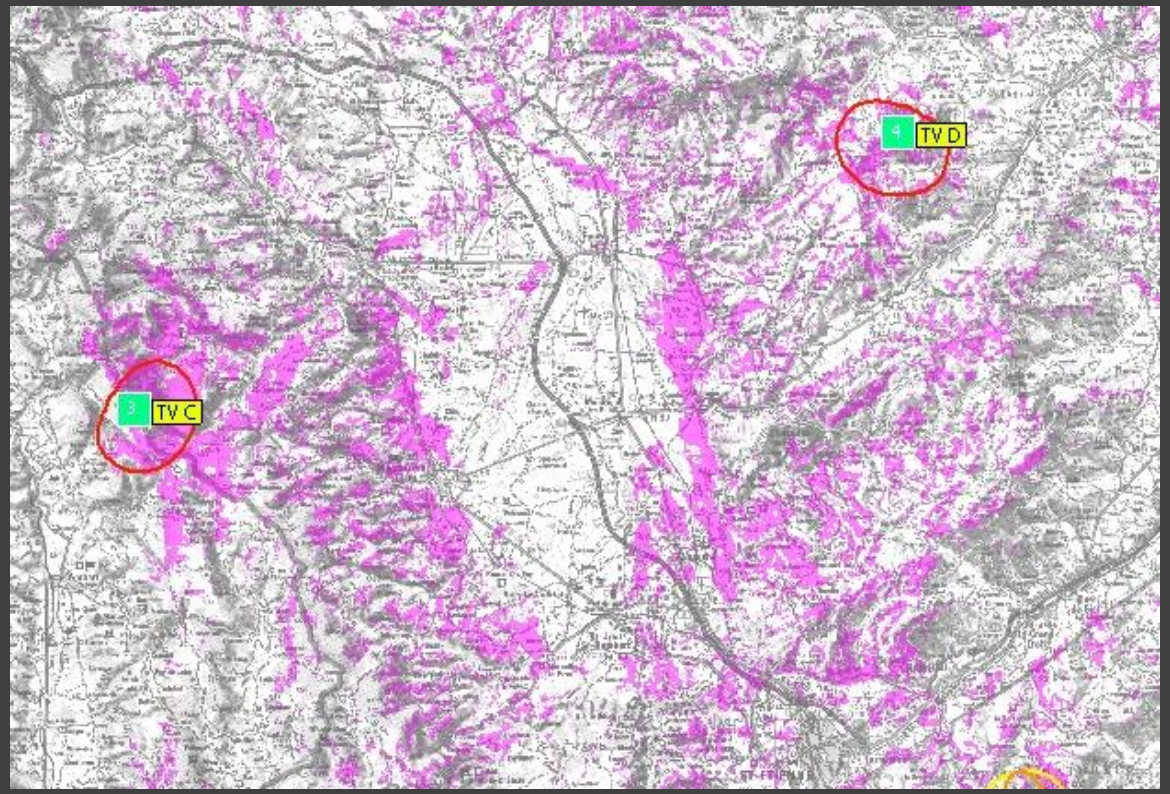
- Model
  - Interferer: Microwave links
  - Victim: Earth station “Test Points”
- Predict
  - ITU-R P.465
  - Signal level at each TP



HTZ warfare –
Interference analysis

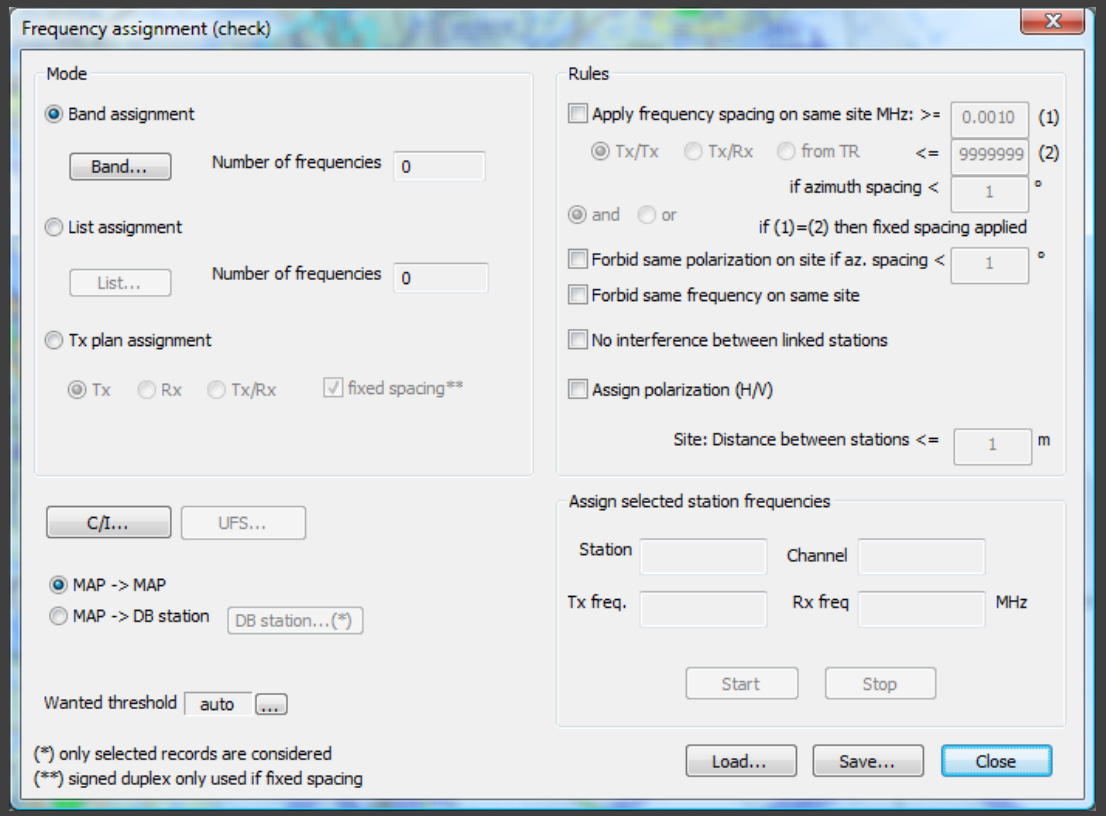


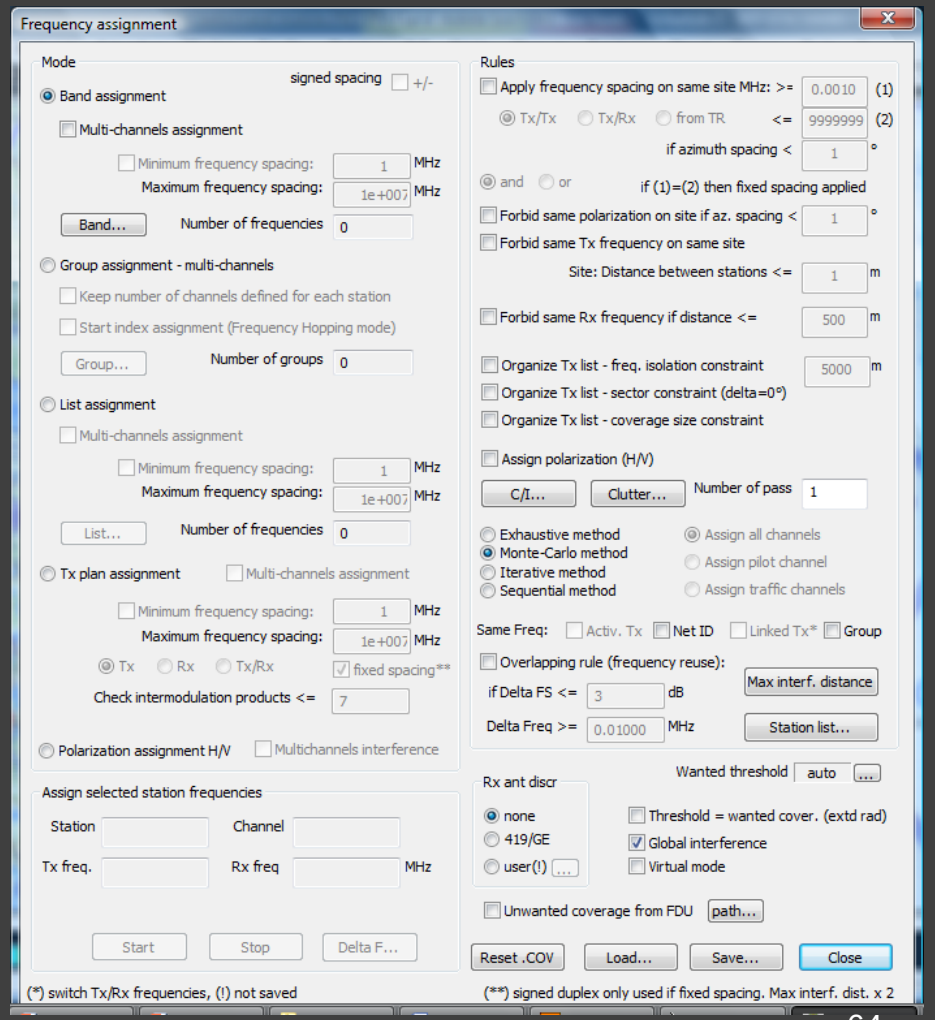
C/I, C/(N+I), IRF, I/N, I/TIL, TD,…
interference calculations



HTZ warfare –

Automatic Frequency assignment for sites

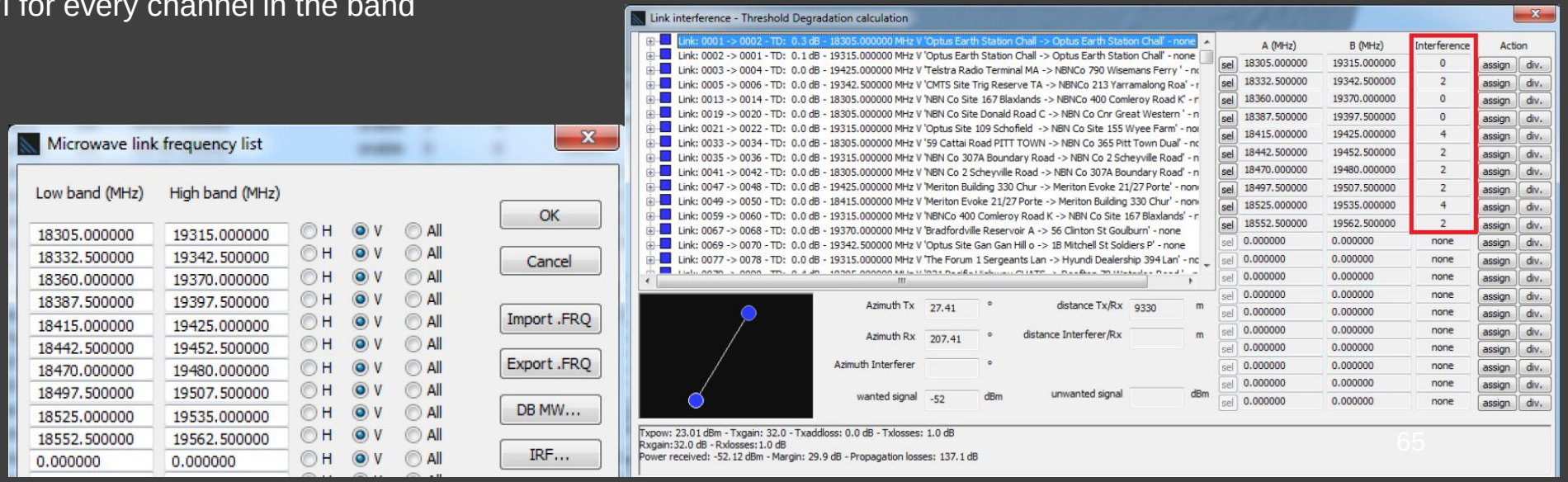




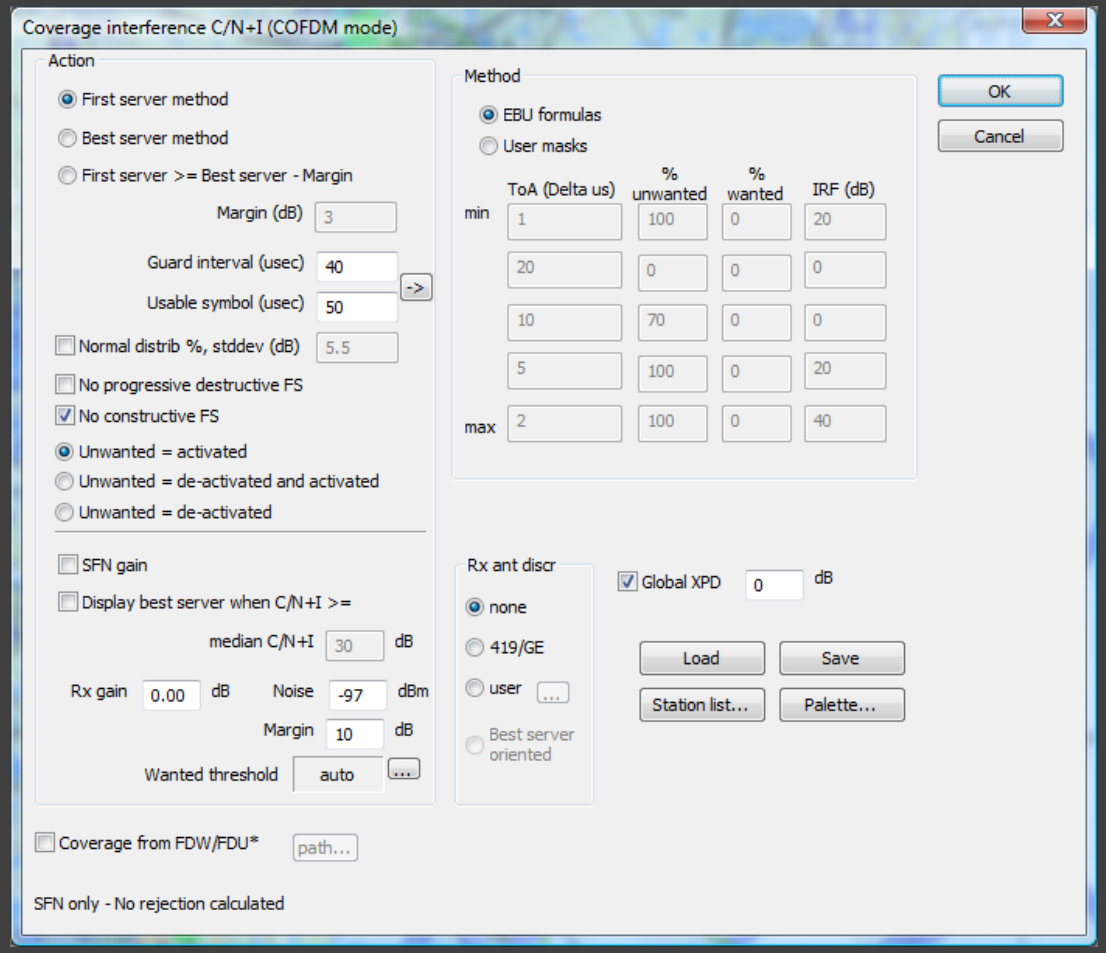
HTZ warfare –

Frequency assignement for P2P/P2MP links

- Scenario
  - New proposed link
  - Existing links
- Requirement
  - Find interference free channel
- Process
  - Query RRL's database
  - Execute C/I for every channel in the band

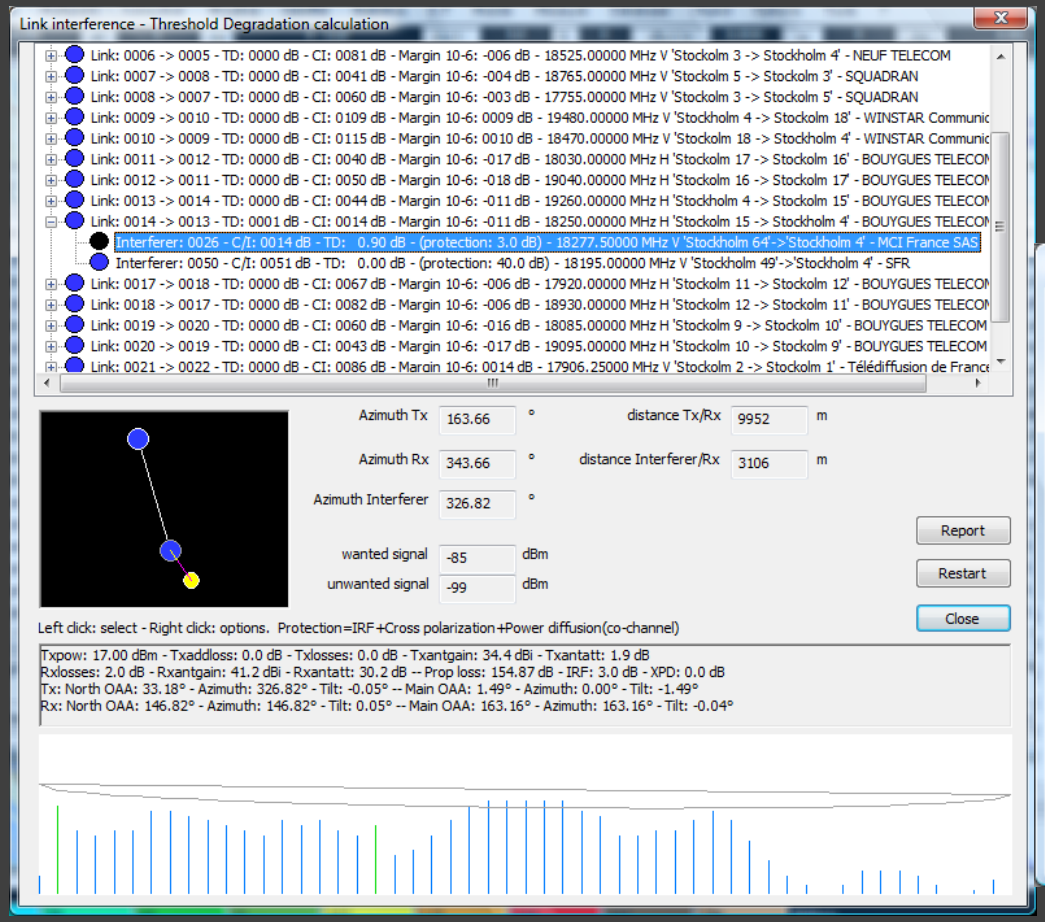


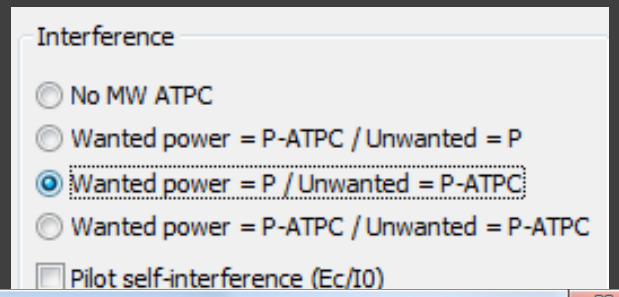
HTZ warfare –
Interference for SFN/MFN

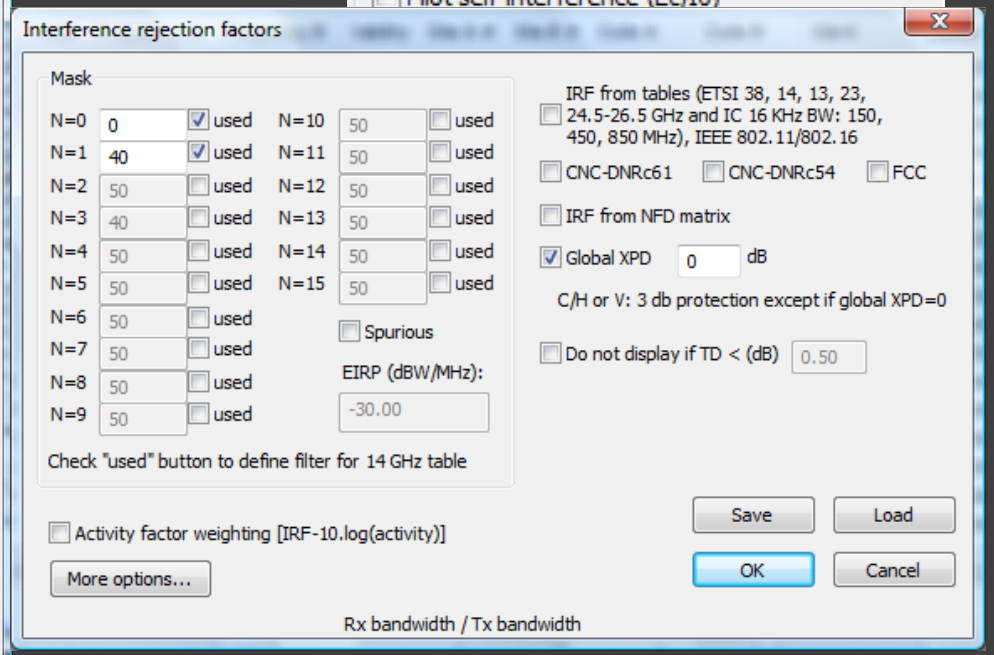


HTZ warfare –

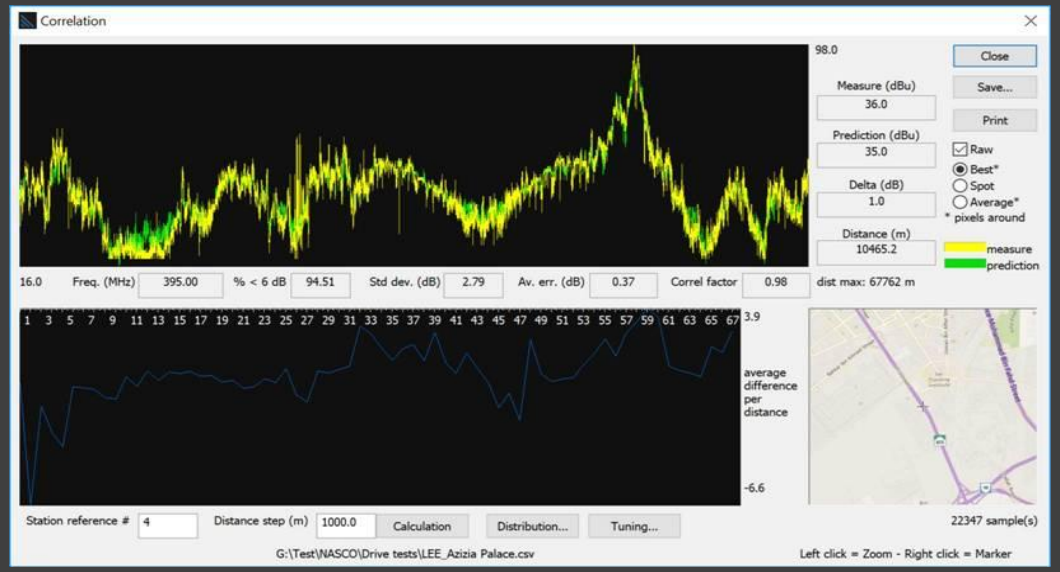
Threshold degradation interference



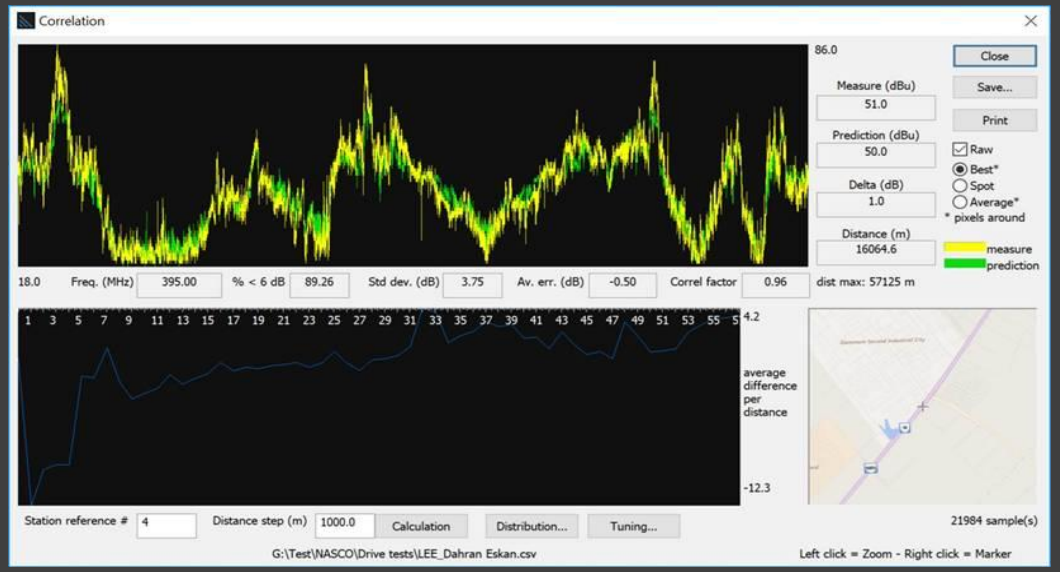




HTZ Warfare
Unprecedented Modelling Accuracy



TETRA station located in Dammam KSA (Azizia Palace)
Standard Deviation Error (dB): 2.79
Correlation Factor: 0.98
Sample measurement: 22347

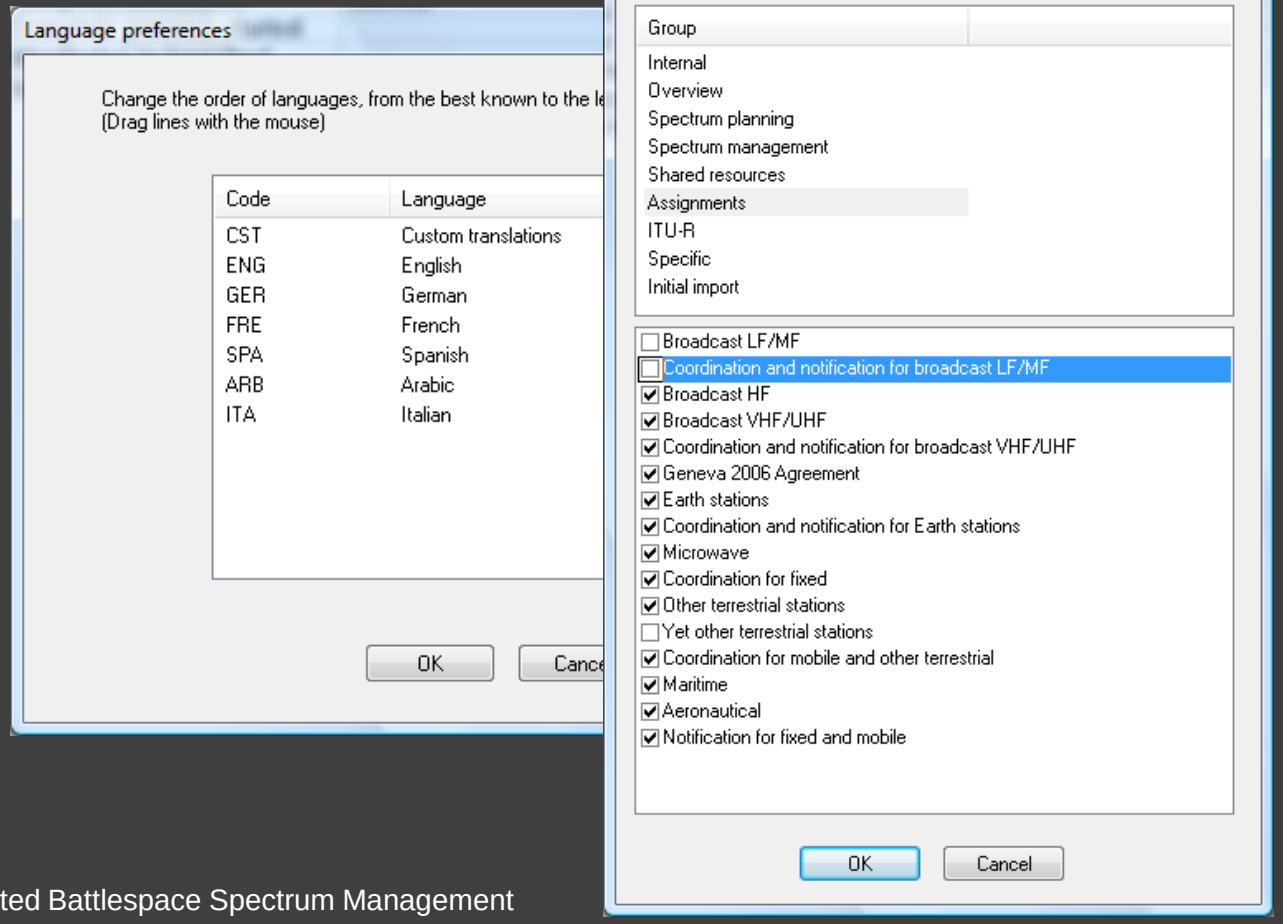


TETRA station located in Dahran Eskan (KSA)
Standard Deviation Error (dB): 3.75
Correlation Factor: 0.96
Sample measurement: 21984

BREAK

User Access - Identity and Management

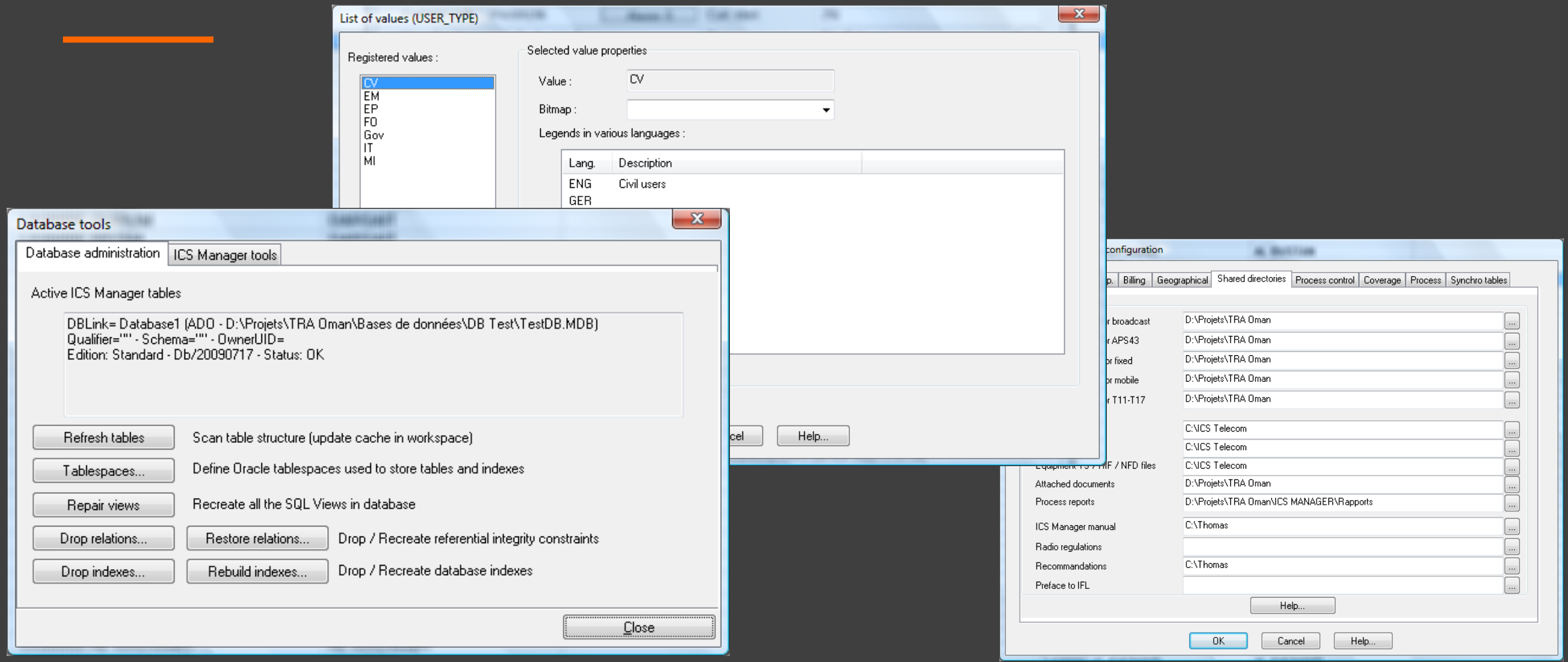
User-Level Customization



- Multilingual environment;
- Activated components: the user can specify the modules to be displayed in the Graphic User Interface (GUI);
- Queries: all the settings of the Queries (choice of the fields, filters, sorts, fonts, size, colors, etc.) are defined by the user himself and stored in the user's Workspace.
- …

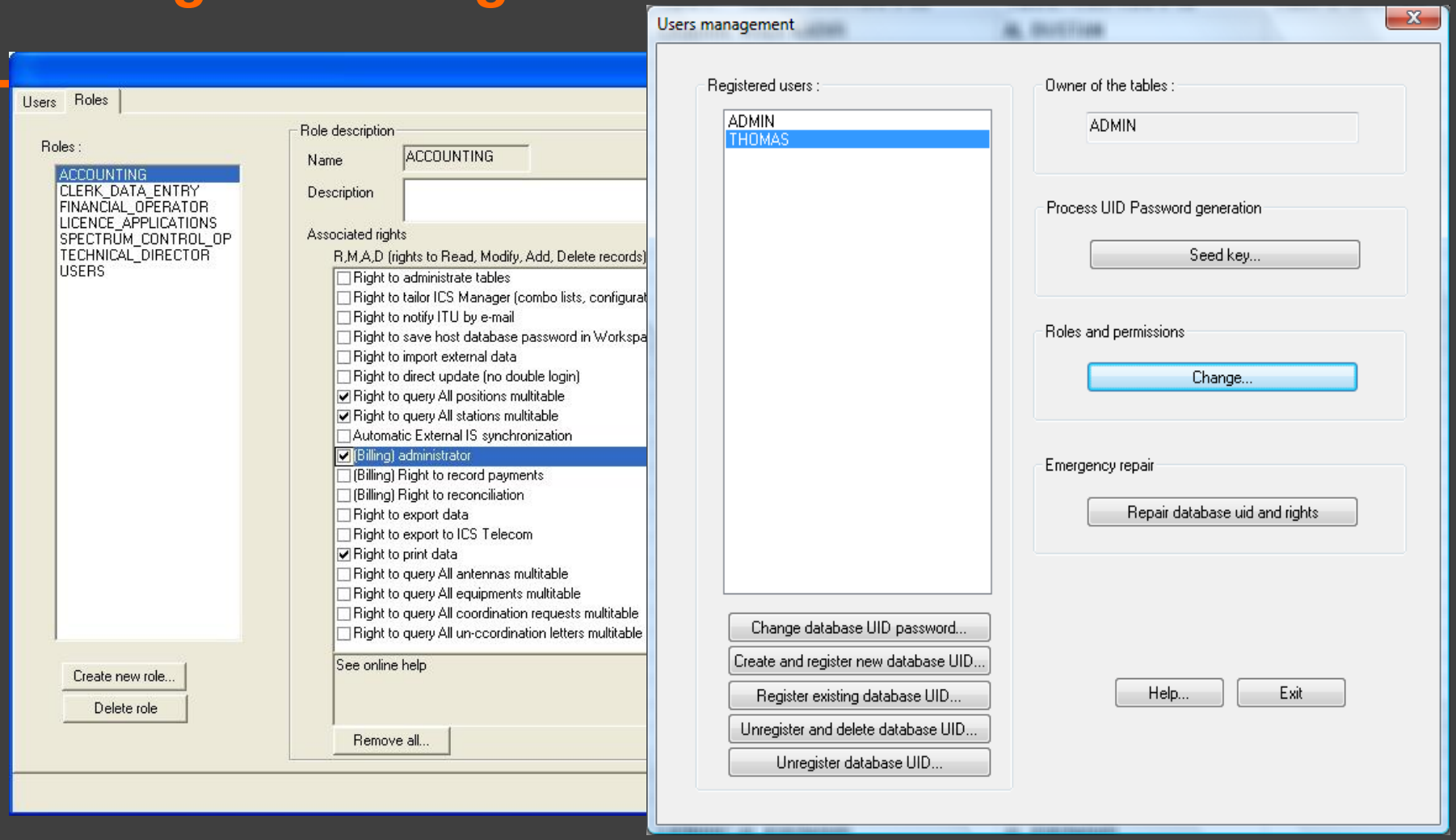
User Access - Identity and Management

Administrator-Level Customization



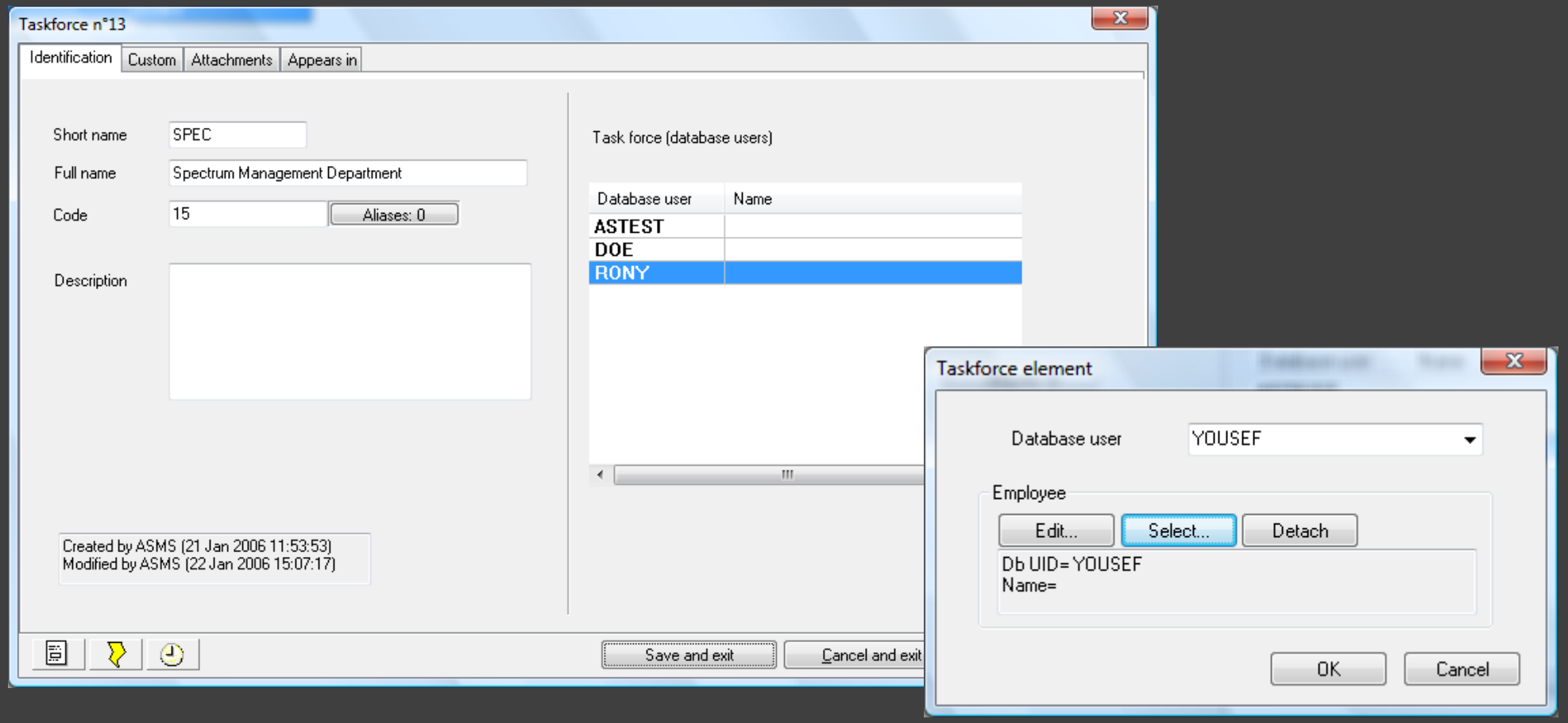
User Access - Identity and Management

Access Rights management



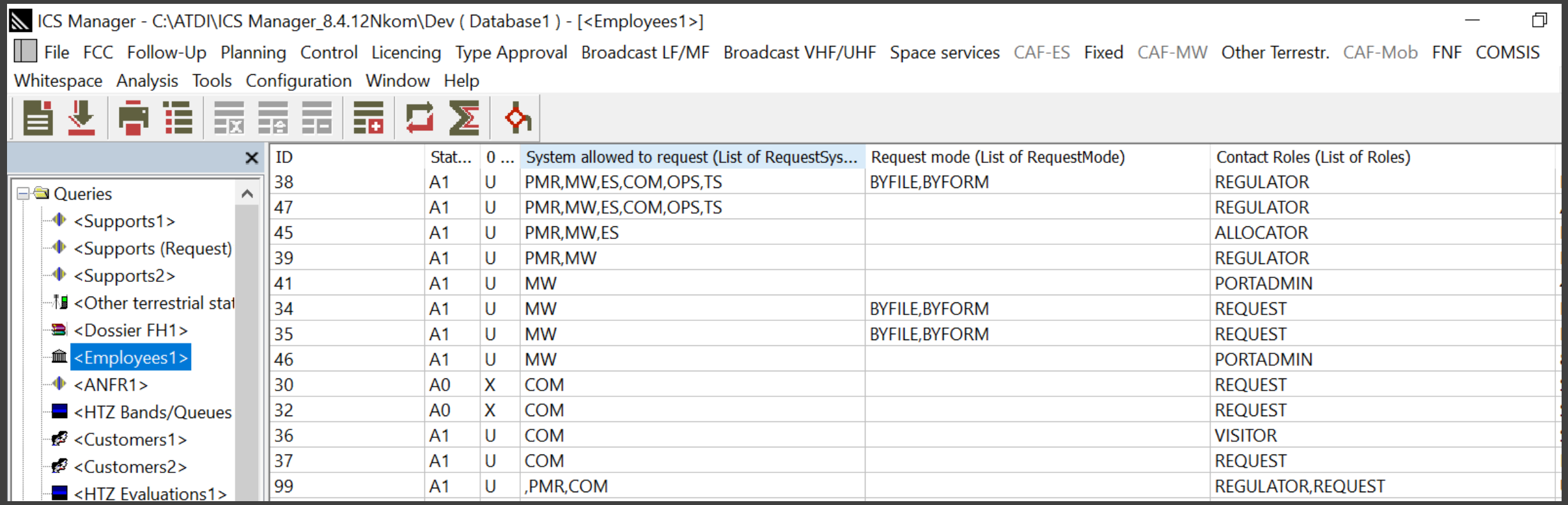
User Access - Identity and Management

Access Rights management



User Access - Identity and Management

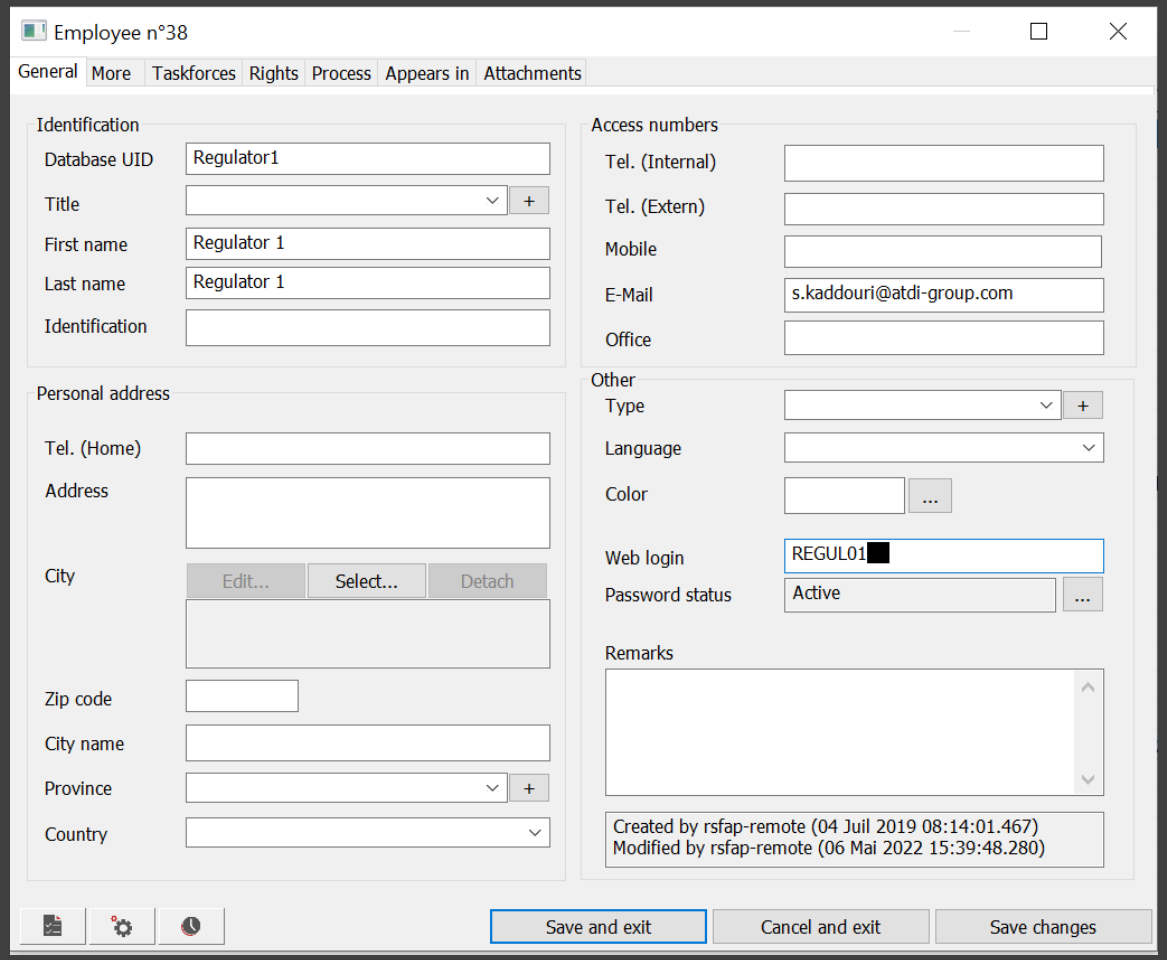
Access Rights management

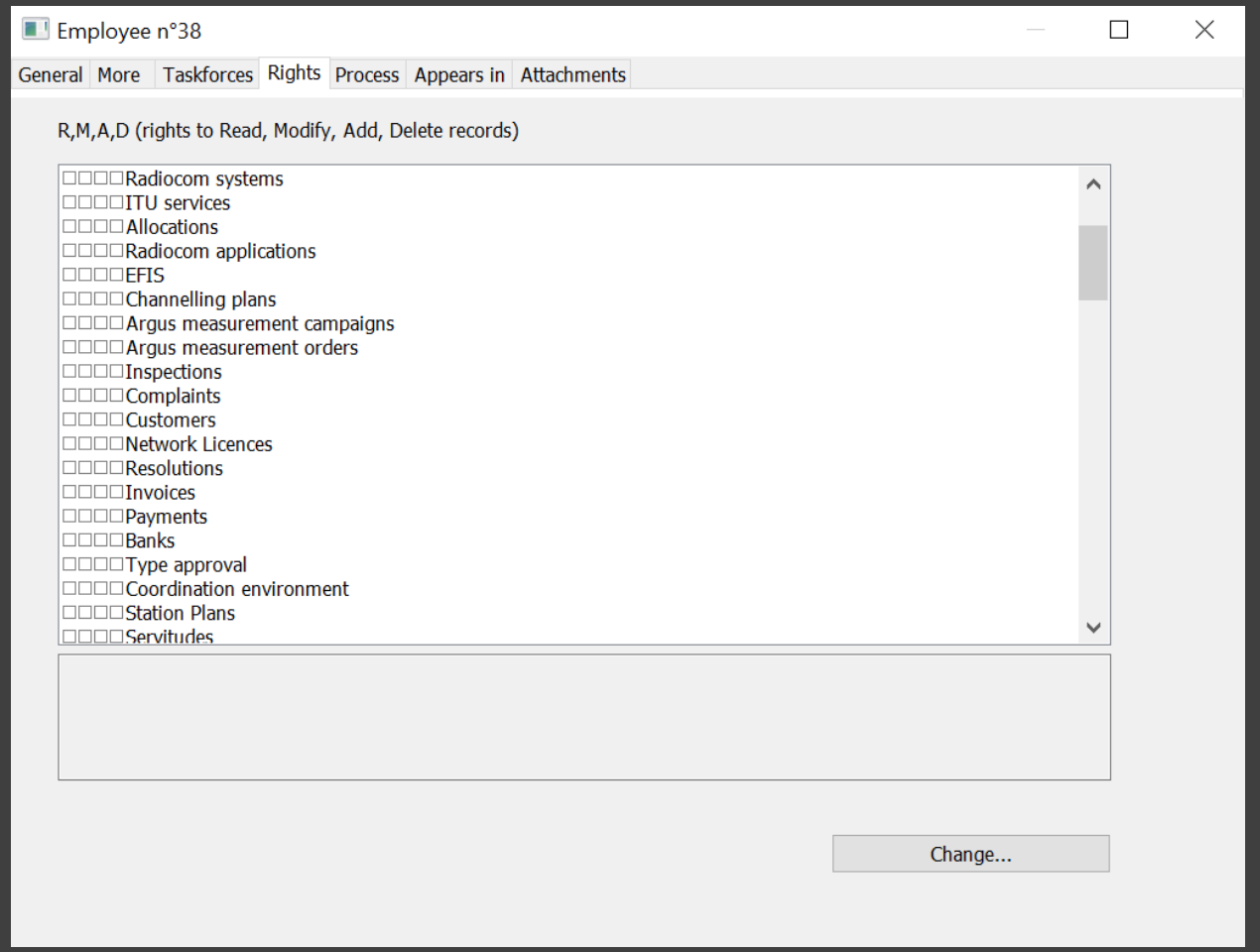


ID	Stat...	0 ...	System allowed to request (List of RequestSys...	Request mode (List of RequestMode)	Contact Roles (List of Roles)
38	A1	U	PMR,MW,ES,COM,OPS,TS	BYFILE,BYFORM	REGULATOR
47	A1	U	PMR,MW,ES,COM,OPS,TS		REGULATOR
45	A1	U	PMR,MW,ES		ALLOCATOR
39	A1	U	PMR,MW		REGULATOR
41	A1	U	MW		PORTADMIN
34	A1	U	MW	BYFILE,BYFORM	REQUEST
35	A1	U	MW	BYFILE,BYFORM	REQUEST
46	A1	U	MW		PORTADMIN
30	A0	X	COM		REQUEST
32	A0	X	COM		REQUEST
36	A1	U	COM		VISITOR
37	A1	U	COM		REQUEST
99	A1	U	,PMR,COM		REGULATOR,REQUEST

User Access - Identity and Management

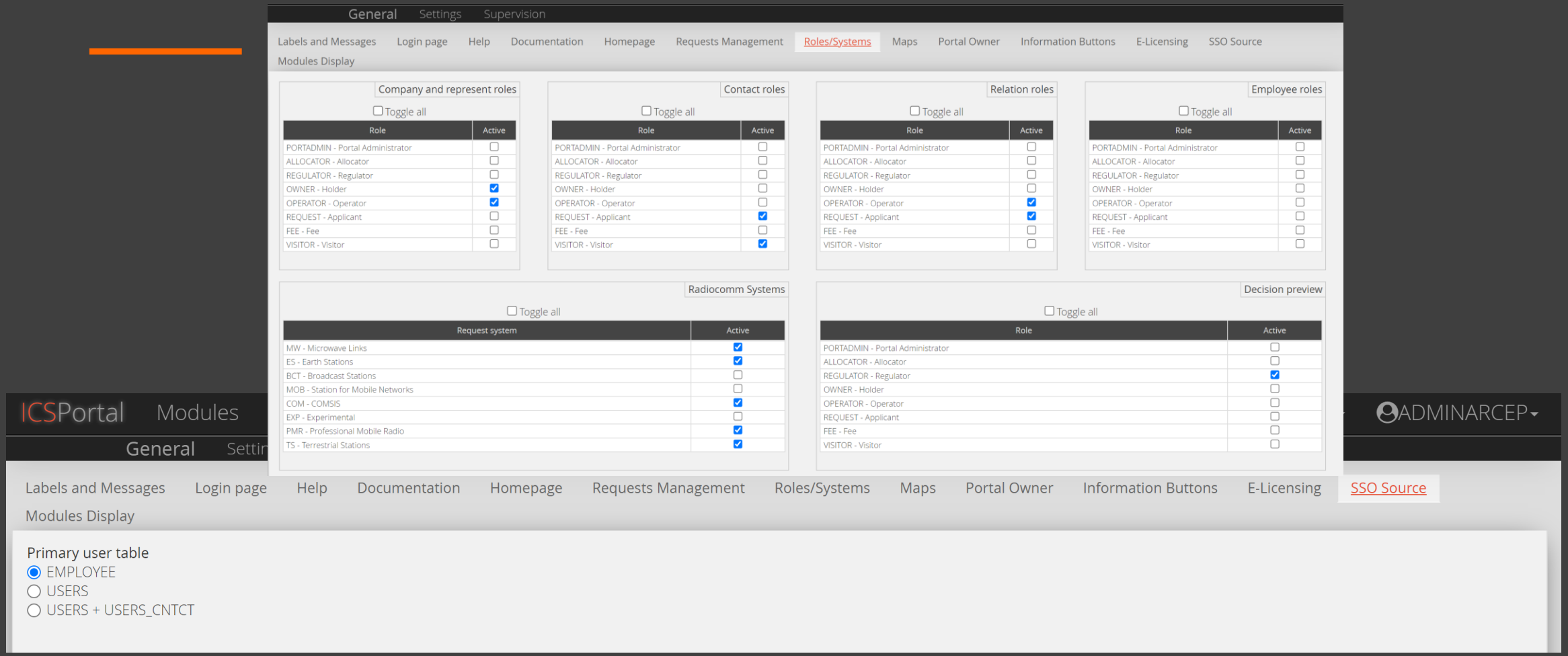
Access Rights management





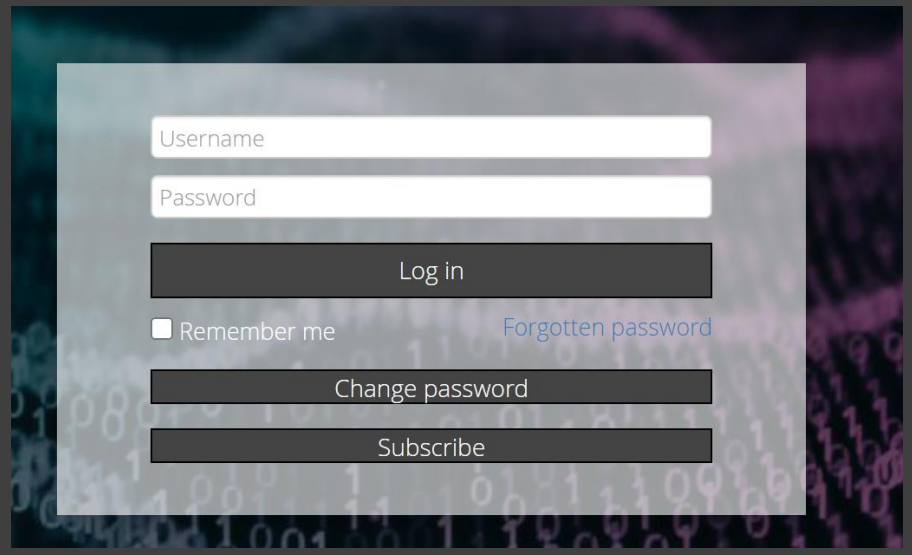
User Access - Identity and Management

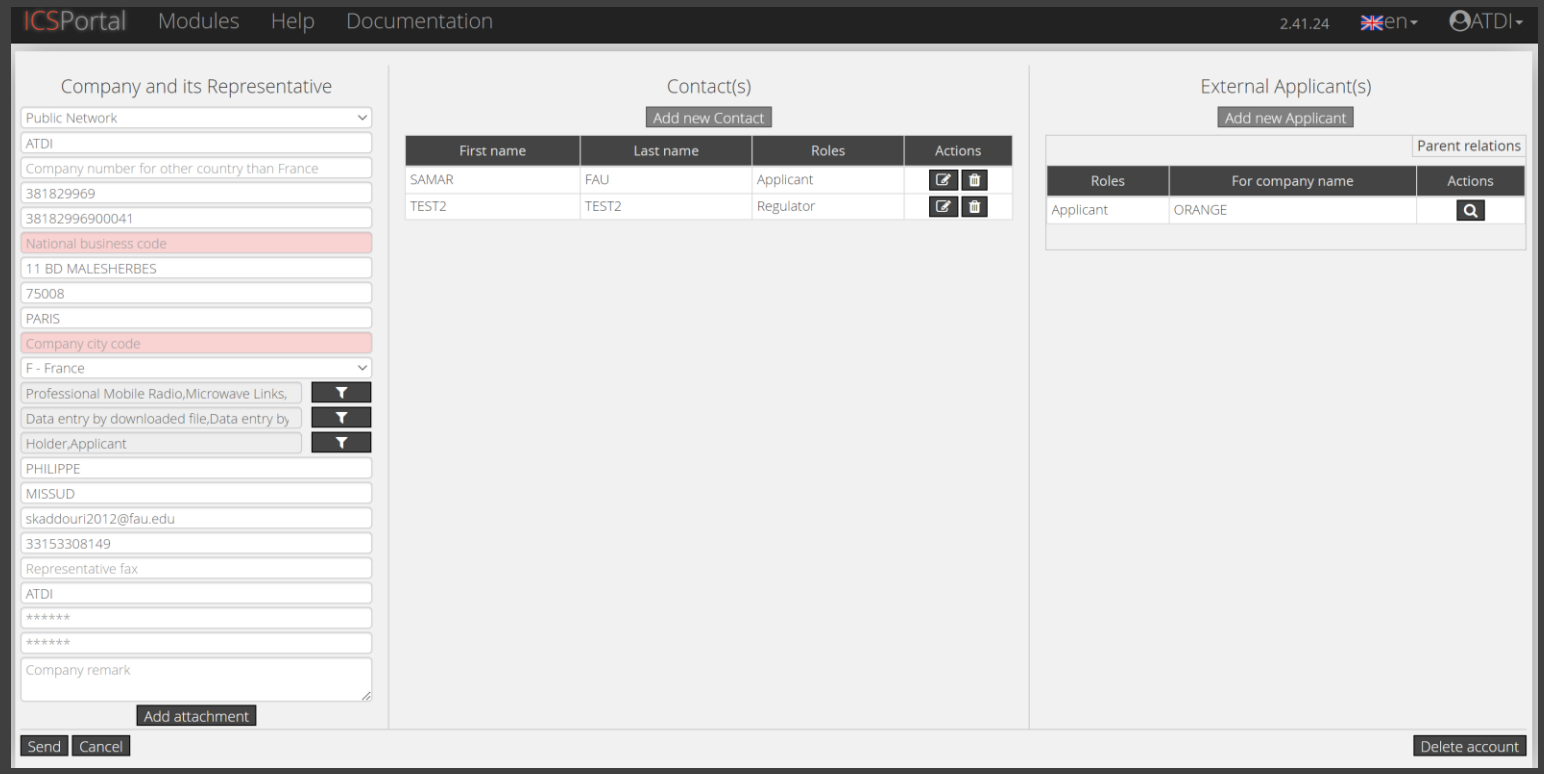
User access/management through the web application



User Access - Identity and Management

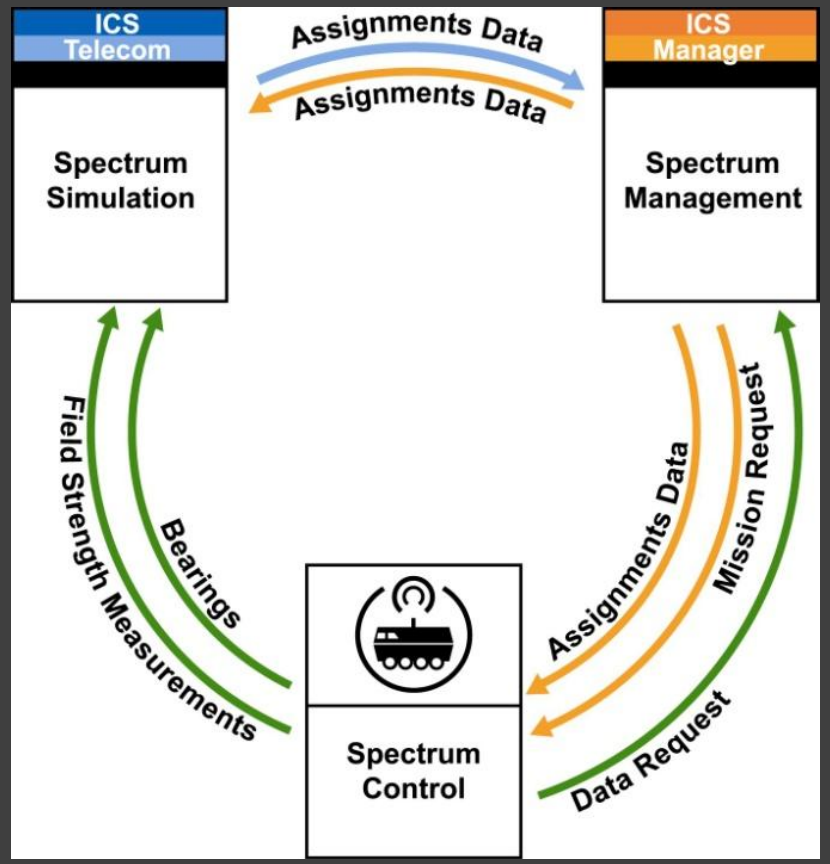
User access/management through the web application





Interoperability and data management

Existing Interface with monitoring systems



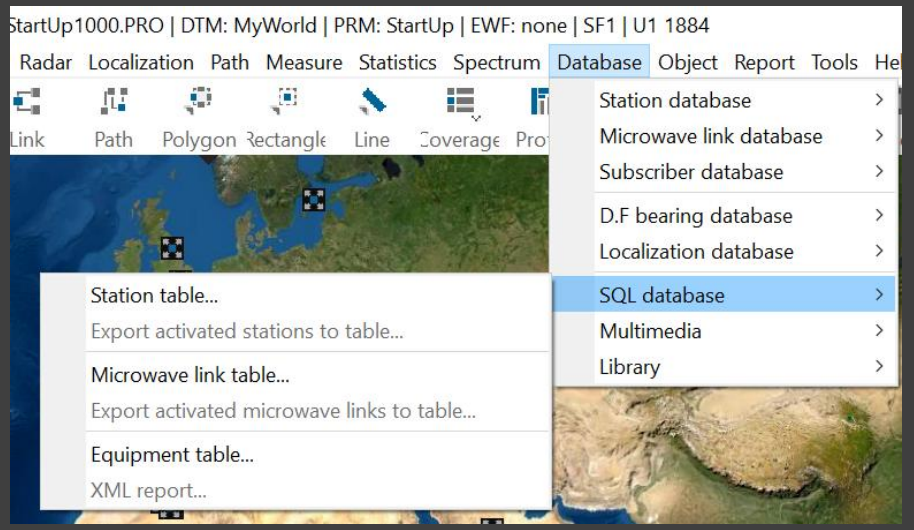
Existing interfaces with:

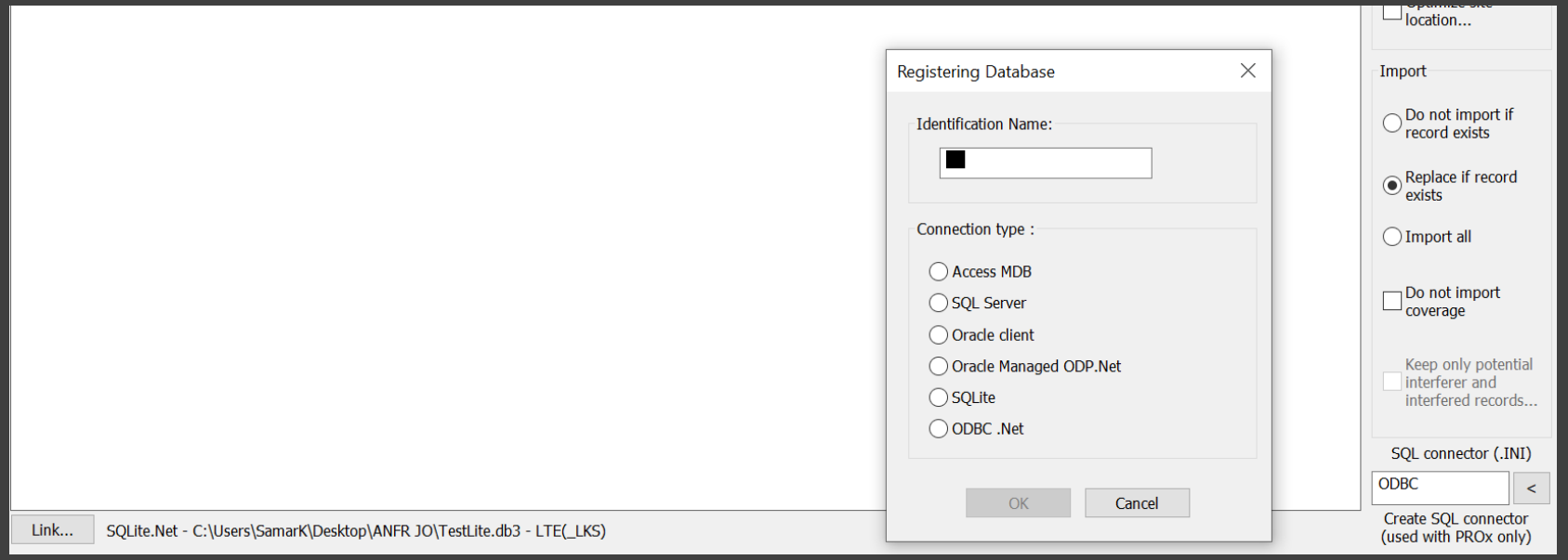
- Rohde & Schwarz;
- TCI;
- Thales;
- Tadiran;
- DRS Codem;

Interoperability and data management

Import Capabilities

- Database import/connection
- **XML, KML, Image formats ,** MS Word, MS Excel, PDF, HTML
- ITU notices
- SMADEF format

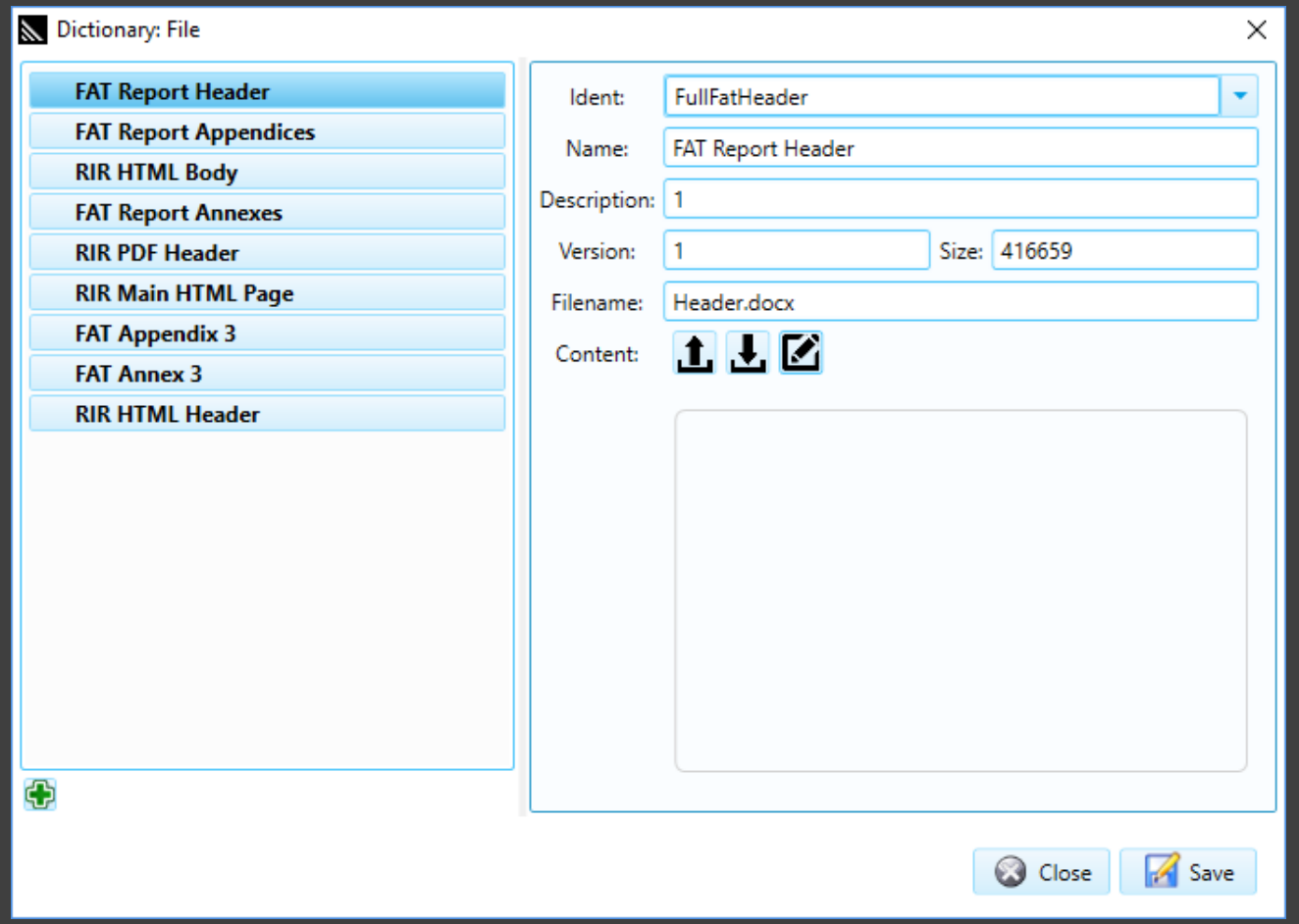




Interoperability and data management

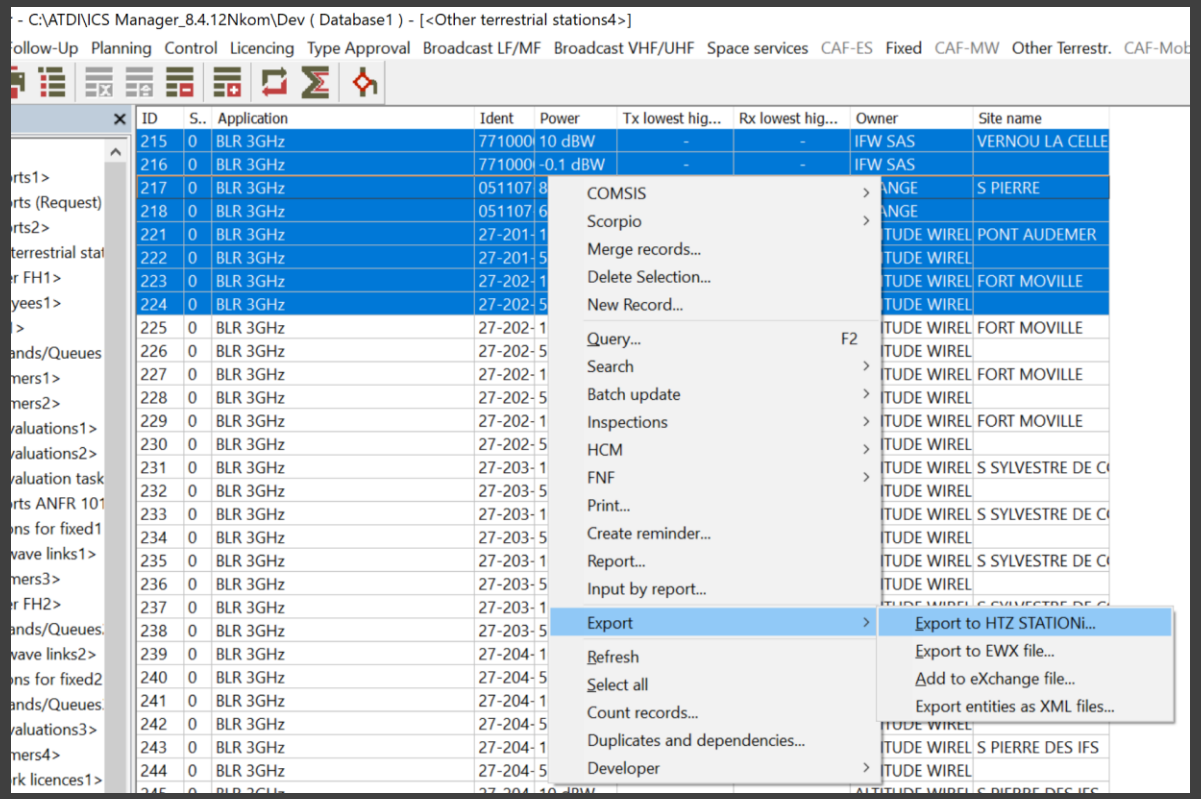
Export Capabilities

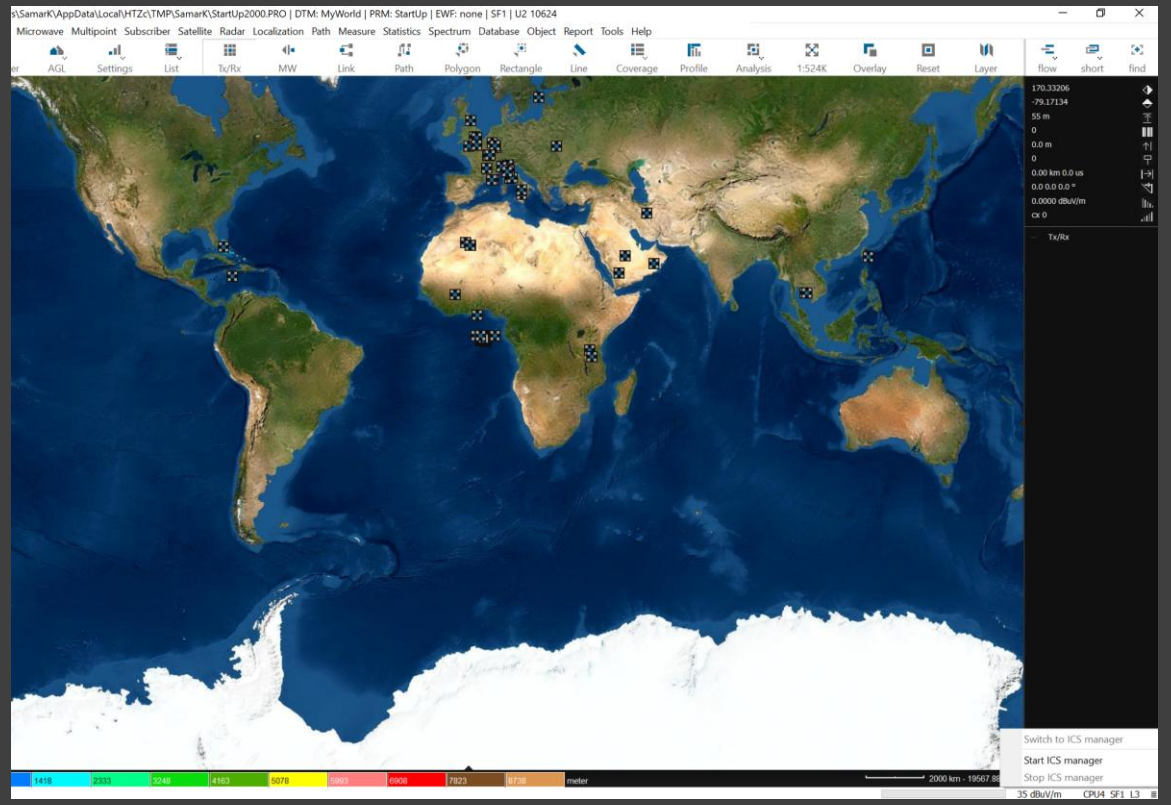
- To **Internet / Intranet / file**
- **EFIS XML**, MS Word, MS Excel, PDF, HTML
- Possibility to create **reports joining FAT, RIR and Documents**
- Database extract



Interoperability and data management

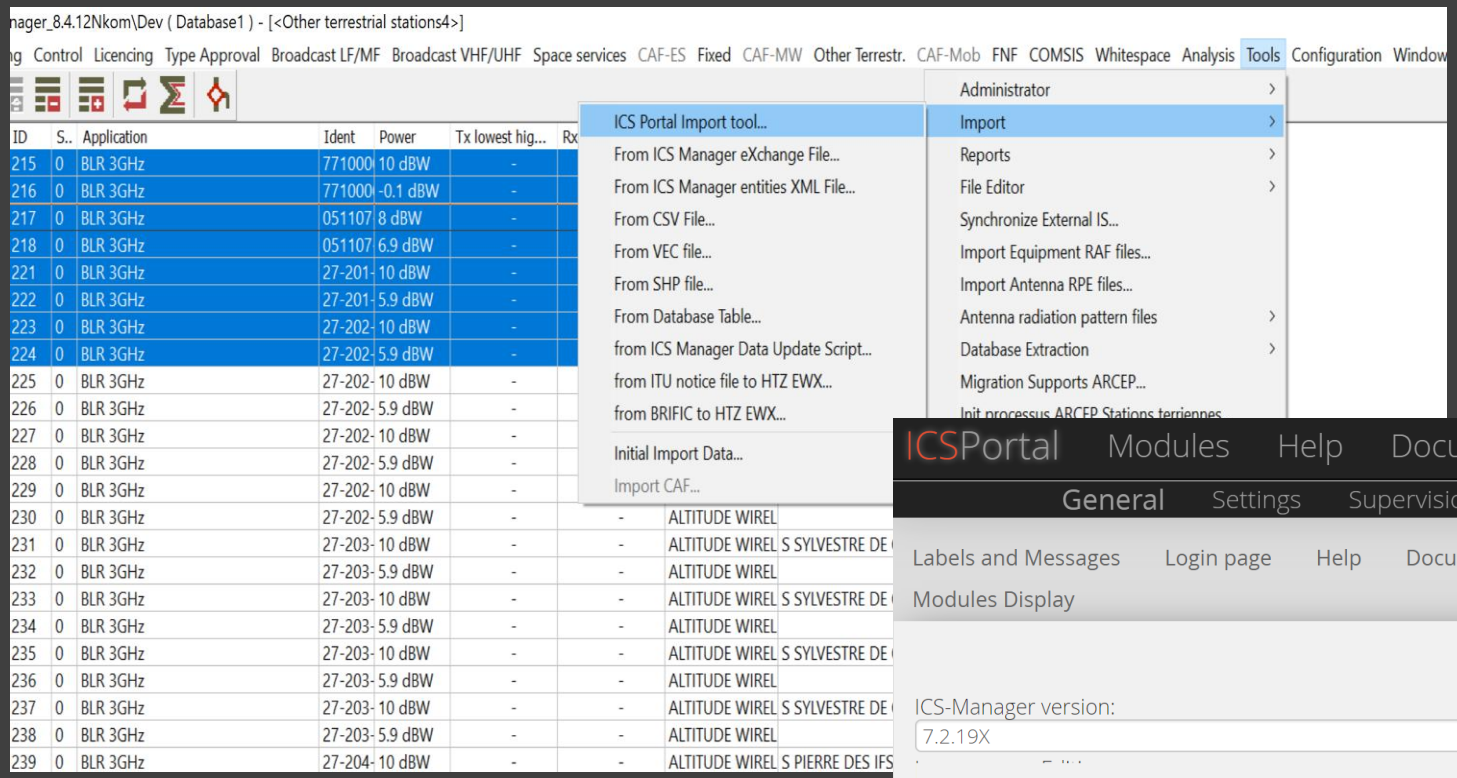
Interoperability within ATDI Tools





Interoperability and data management

Interoperability within ATDI Tools



Interoperability and data management

Other Formats: ARGUS board, SFAF, etc.

- Existing Bridge Service (on an ICS manager station) between the Argus Inbox/Outbox and the ICS manager Database

- xml exchange format;

- ORM (Order measurement) : request from ICS Manager;

- SMDI : request coming from Argus;

Infrastructure need

- Windows Operating System
- IIS for the web services
- Server platform with ICS manager to operate portal
- Server platform with HTZ warfare to use HTZ API
- Mapping/GIS provided with ATDI tools
- Web portal can operate on all browsers

Hardware and Operating System Requirements

The recommended configuration to run HTZ warfare is:

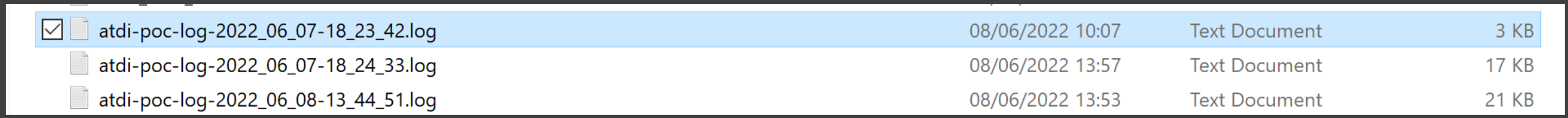
- x64 multicore (Intel™ I7 or better CPU) with 4 cores minimum
- RAM: 16GB and more (minimum 4GB)
- Graphics adapter with memory of 2 GB, OpenGL compatible, Full HD Display (1920 x 1080).
- Graphic card: 2GB, OpenGL compatible, Full HD (1920*1080)
- Hard disk: SSD 1To or more. Storage: 2 TB.
- Internet access (for map download and access to the online library).
- Microsoft Office™ x64
- X64 Operating systems: Windows™ 7, Windows™ 8, Windows™ 10, Windows Server™ 2012, Windows Server™ 2016, Windows Server™ 2019.

Operating system	File management	Usable memory	Multi-core
32-bit	64-bit	≤ 4 GB	Yes
64-bit	64-bit	≤ 128 GB	Yes

From version 16.2, HTZ communications supports multicore, multithreading and parallel processing. Several and concurrent HTZ warfare working sessions could be run from one single computer.

System Management and Maintenance

Logs creation: e.g. HTZ API



atdi-poc-log-2022_06_08-13_44_51.log - Notepad

File Edit Format View Help

```
2022-06-08 13:44:52.224 [main] INFO  org.example.ATDIClient - Send request [Fan senario one site 3 remote sites Rx0,Rx1,Rx2] json is :
2022-06-08 13:44:52.240 [main] INFO  org.example.ATDIClient - {
  "Actions": [
    {
      "Order": "StOnMap",
      "Action": 0,
      "Params": {
        "St_T": {
```

```
  ]
}
2022-06-08 13:44:54.068 [main] INFO  org.example.ATDIClient - got timeout code is [52]
2022-06-08 13:44:56.034 [main] INFO  org.example.ATDIClient -  Request [Fan senario one site 3 remote sites Rx0,Rx1,Rx2] took  [2622] ms
2022-06-08 13:44:56.041 [main] INFO  org.example.ATDIClient - Request [Fan senario one site 3 remote sites Rx0,Rx1,Rx2] response code [200]
2022-06-08 13:44:56.043 [main] INFO  org.example.ATDIClient - Request [Fan senario one site 3 remote sites Rx0,Rx1,Rx2] response json is :
2022-06-08 13:44:56.045 [main] INFO  org.example.ATDIClient - {
  "HtzStartTime": "2022-06-08T14:44:53+02:00",
  "ResActions": [
```

System Management and Maintenance

Logs creation: e.g. ICS Portal

log.log.2021-12-20.log - Notepad

File Edit Format View Help

```
System.Exception: No match
   à RSFAP.Backend.Commons.Utils.RsfapApplicationsRequestsProvider`2.GetOffiData(TRequestInfo requestInfo) dans D:\rsfap\RSFAP_WEB\Backend\Commons\Utils\RsfapApplicationsRequestsProvide
2021-12-20 22:30:00,901 [Worker #d960155a] WARN  - 2.37.42.0: RsfapApplicationsRequestsProvider:SendConsultationReminders: Period 2 expired, but no author for consultation fileC:\ATDI\]
2021-12-20 22:30:01,010 [Worker #d960155a] ERROR - 2.37.42.0: RsfapApplicationsRequestsProvider:GetOffiData: for request: 5aa1f52f-cd3a-4e5f-b35a-61ec448c00ea
System.Exception: No match
   à RSFAP.Backend.Commons.Utils.RsfapApplicationsRequestsProvider`2.GetOffiData(TRequestInfo requestInfo) dans D:\rsfap\RSFAP_WEB\Backend\Commons\Utils\RsfapApplicationsRequestsProvide
2021-12-20 22:30:01,010 [Worker #d960155a] WARN  - 2.37.42.0: RsfapApplicationsRequestsProvider:SendConsultationReminders: Period 2 expired, but no author for consultation fileC:\ATDI\]
2021-12-20 22:30:01,151 [Worker #d960155a] ERROR - 2.37.42.0: RsfapApplicationsRequestsProvider:GetOffiData: for request: 76892856-88f7-41c7-a67f-ed94ded92241
System.Exception: No match
```

ICSPortal Modules Help Documentation 2.41.24 en ADMINARCEP

General Settings Supervision

Labels and Messages | Login page | Help | Documentation | Homepage | Requests Management | Roles/Systems | Maps | Portal Owner | Information Buttons | E-Licensing | SSO Source | Modules Display

Key	Value	Comments
	warning	
_RSFAP_SHARED_WARNING	Warning!	
LOGIN_PAGE_ACCOUNT_DELETED	Warning! Your account is deleted, you must create a new one	
LOGIN_PAGE_ACCOUNT_DISABLED	Warning! Your account is disabled, you must contact {0}	

Our **Services**
Product licensing, Training & Support

Training

Customised training service online or onsite.

Support

24/7 global technical support via phone, email and web-conference

System Customisation

Business analysis, system design, architecture, customisation, integration, and configuration.

Spectrum consulting

Provide professional consulting services in spectrum engineering and management to solve any spectrum issues.

Cartographic data

Medium to High resolution DTM and Clutter library.
Cloud base digital map image streaming and cache support.

System Deployment & Maintenance

Support on Go-Live, Testing, and bug fixing.
On-going maintenance support with software updates.

Quality Systems

- Quality system is fully integrated into each stage of the project execution
- Accredited with ISO 9001/2015
- Agile project delivery
- Change management
- Risk management
- Corrective actions
- Data security
- Software quality management

References
Military, Defence administrations

APCO AFC

US Army Spectrum Management Office

JSC, Joint Spectrum Center

FAA, Federal Aviation Administration

DOE, Dept. of Energy HQ Spectrum Management Office

Bonneville Power Authority

Western Area Power Authority

National Nuclear Security Administration

DOI, Dept. of Interior Wireless Management Office

FCC, Federal Communications Commission

USAF, United States Air Force

NASA, National Aeronautical Space Administration

National Security Agency

DHS, Dept. of Homeland Security Wireless Management

US Coast Guard HQ/LANT/PAC

US Customs and Border Patrol

Immigration and Customs Enforcement

DOJ, Dept. of Justice Wireless Management Office

FBI, DEA

INEL, Idaho National Engineering Laboratory

SPAWAR, Space and Naval Warfare Systems Command

NTIA, National Telecommunications Information Administration

References
Military, Defence administrations

France:
- French National Air Operation center / CNOA (centre national des opérations aériennes française)
- Signal Corps / CNGF (Centre nationale des Gestions des Fréquences)
- DGA MI (Direction Générale de l'armement)
- STAT (Section Technique de l'Armée de Terre)
- DCI (Défense Conseil International)

Europe:
- NARFA (National Allied Radio Frequency Agency) – Norway
- DSTL - Defense Science and Technology Laboratory (UK)
- Royal Air Force Henlow (UK)
- HMGCC – Her Majesty's Government Communications Centre (UK)
- Ministry of Defense (Belarus, Kazakhstan, Serbia, Poland, Romania, etc)
- RUAG Electronics (Switzerland)
- Armasuisse (Switzerland);
- FUB (frequency management department/Frequenzmanagement, Switzerland)
- Finnish Army;
- British Army;
- Portuguese Air Force;
- Norwegian Navy;
- Forsvarets forskningsinstitutt (FFI);

MENA:
- UAE Air Force (Abu Dhabi)
- UAE Electronic warfare (Abu Dhabi)
- Border Guards of KSA
- Direction Centrale des Transmissions et de Guerre Electronique (Algéria)
- QESC (Qatari Electronic Signal Corps)
- Minister of Defense (Bahrein) - BHQ (Bahrein Headquarter)
- Minister of defense of Morocco (Royal Marine)
- Ministry of Defense (Oman, Egypt);
- Egyptian Air Force (EAF)
- PSDARC (KSA)

Asia Pacific:
- Minister of defense of Bangladesh
- Minister of defense of China
- Korean Army Signal School (South Korea)
- Agency of Defence Development (South Korea)
- Joint Chiefs of Staff (South Korea)
- DSO & DSTG (Australia)
- DSTA (Singapore)
- PLPE (Malaysia)
- Land Engineering Agency, ADF (Australia)
- Indian Air force Army;
- DLRL (India);
- Taiwanese Army, Thai Army;…

Our Customers

- Who are our customers
- What do they say about us
- We are listening

Our Customers

ARCEP - French national regulator

Web-based portal for online applications and frequency assignment for everyday use and to support tactical bubbles for critical comms

Our Customers

NARFA France

Spectrum Management solution – inc frequency assignment & interference analysis for military terrestrial static, mobile and airborne services.

Our Customers

Qatar Emiri Signal & Info Tech Group

Spectrum Management and Monitoring solution

Featuring customised workflows and integration with third party monitoring solution

Questions

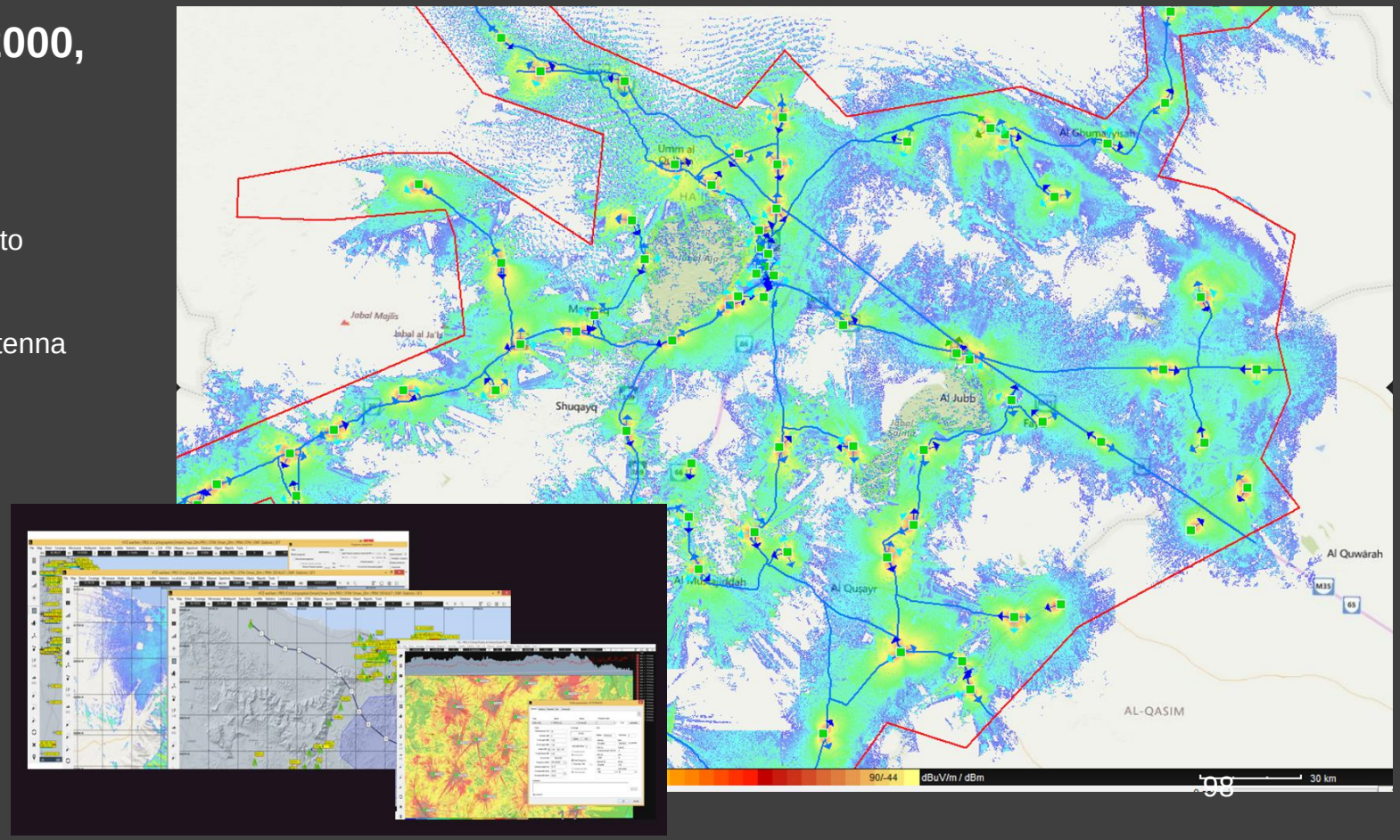
Annex

Technical Analysis Capabilities in HTZ Warfare

HTZ Warfare
Critical Comms Network Planning

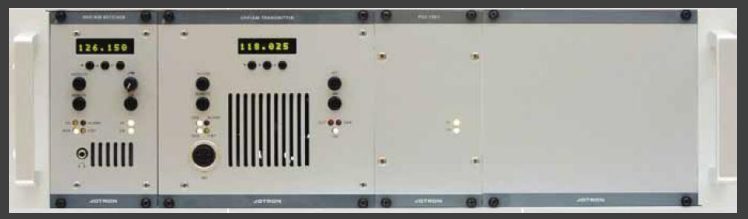
TETRA, P25, DMR, CDMA, CDMA 2000, TEDS,
TETRAPOL, PS-LTE, VHF/UHF…

- DL/UL Coverage planning (outdoor, indoor , in car)
- DL/UL link budget calculator
- Automatic best site selection candidates according to coverage objective
- Automatic site planning
- Automatic site optimization (azimuth, power, tilt, antenna model…)
- Interference calculations
- Automatic Frequency assignment
- Traffic & mobility profile editor (UE)
- Capacity planning (Erlang, data)
- Automated handover, neighbor list planning
- Monte Carlo simulations



HTZ Warfare
Critical Comms Network Planning

Ground to Ground Communications

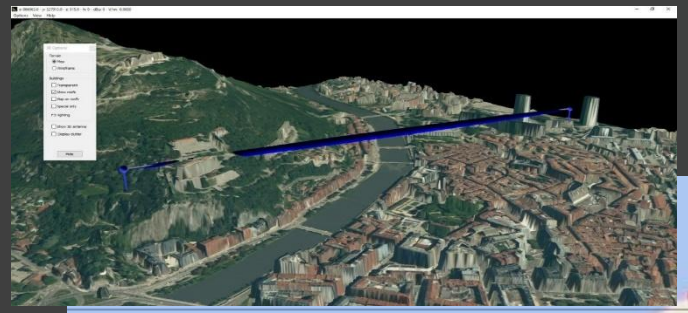


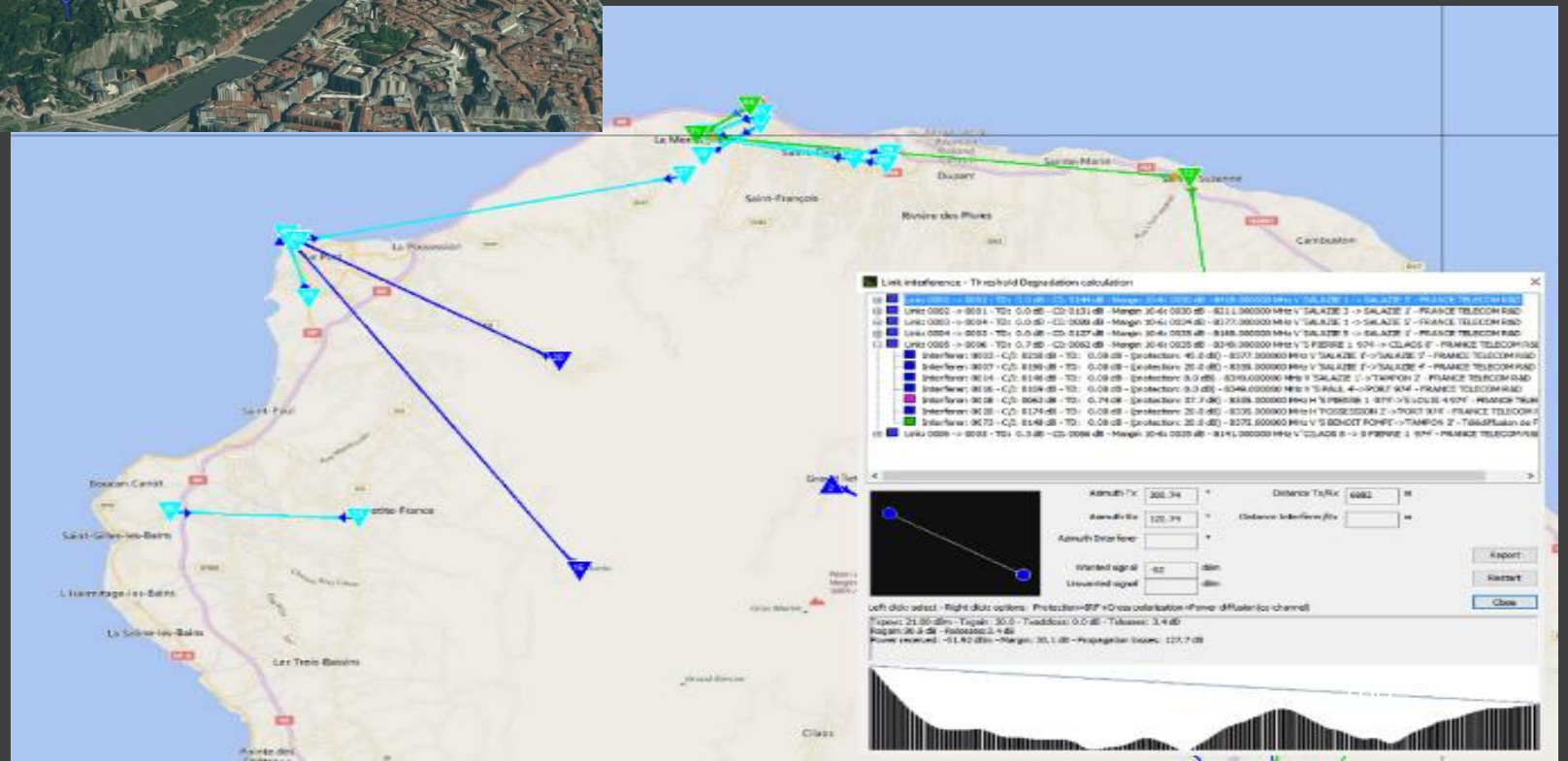
VHF AM radio base station JOTRON (TR-7550)
- Portable Radios (ICOM)
- Mobile Radios (ICOM)

ITEM	CH FREQ. (MHZ)	USE
1	CH 1: 133.500	Ground to Ground communication
2	CH 2: 121.700	Operation room to Tower communication
3	CH 3: 118.100	Monitor in operation room from Air to Ground communication

HTZ Warfare
Microwave, P2MP, Backhaul, mm Wave bands

- Profile budget calculations
- Frequency and space diversity
- Multi-K factor calculations
- Climate and rain parameters
- Reliability calculations
- Automatic antenna orientation
- Link optimization
- Automated frequency planning
- Interference calculations
- Quality objectives calculations (ITU-R F. 1703 and ITU-T G.827
- MIMO Antenna systems
- M2M, D2D, SCADA, CDMA 450, MMDS, WiMAX, LMDS, etc.

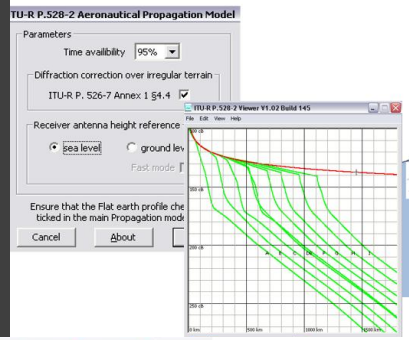


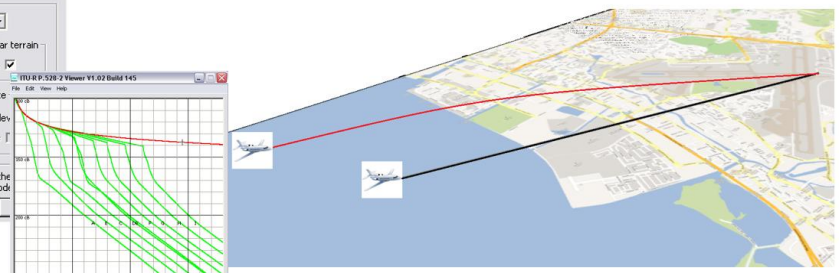


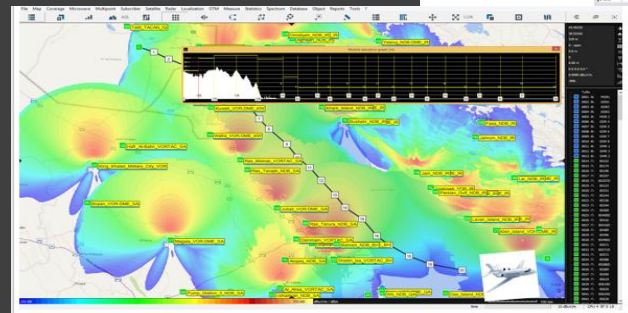
HTZ Warfare
Aeronautical Services

- Aeronautical Communication Systems (VHF/UHF Ground To Air, Air to Ground, Broadband LTE A2G (Air To Ground),
- Radio navigation systems: GP, markers, Loc, MLAT, DME, TACAN, NDB, Markers, GBAS RX, MLS AZ, etc.
- Surveillance system: Radar (PSR, SSR, etc.) including coverage, interference and coexistence analysis
- Multi-lateration (Time Sum of arrival – TSOA / Time Difference of arrival (TDOA)
- Building restricted area ICAO recommendations
- Coexistence between aeronautical services and FM network (ITU-R/ SM1009)
- Coexistence between radar and LTE network (from OFCOM recommendations)
- Traffic/Interference analysis and Automatic Frequency Assignment

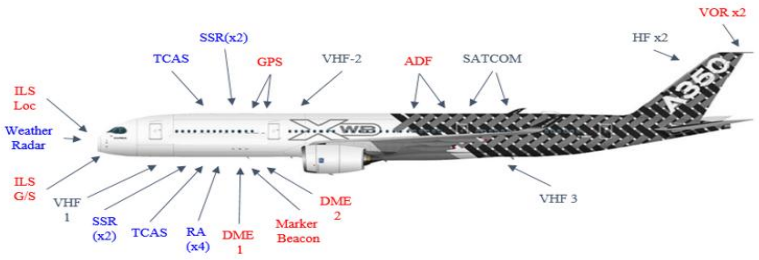
ITU-R P. 528-2 + ITU-R P.526-7 (diffraction)





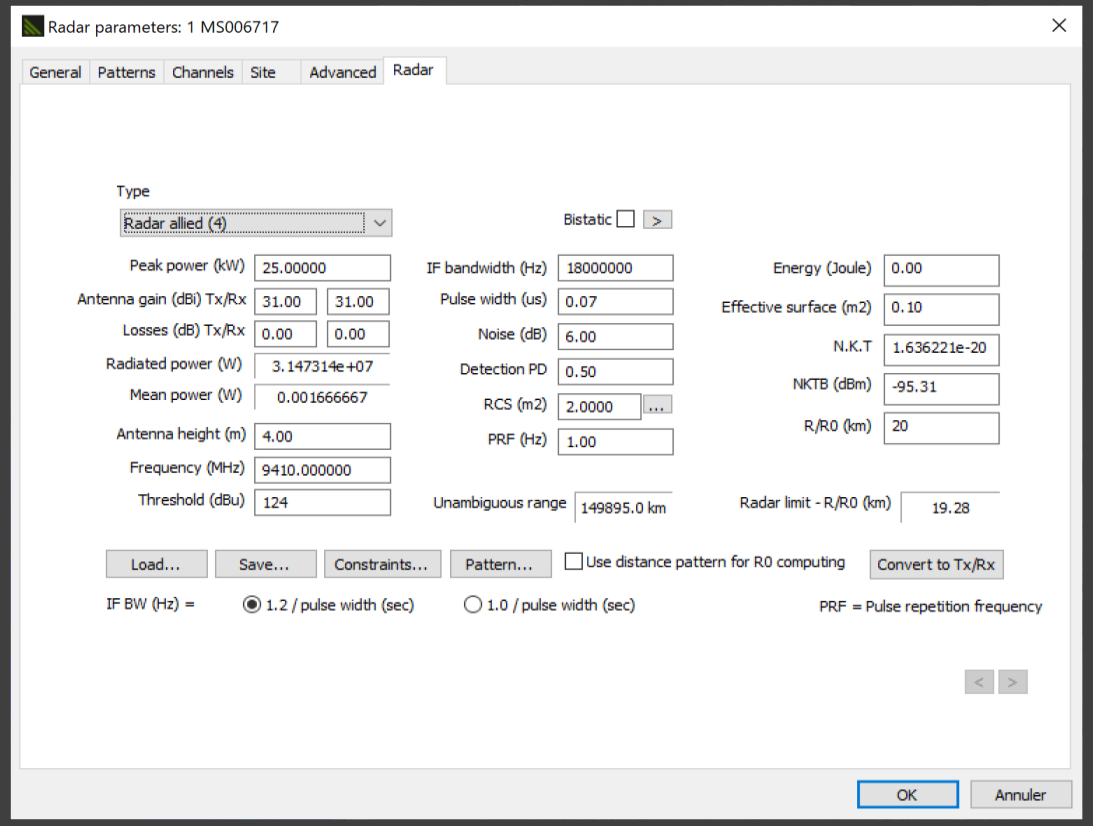


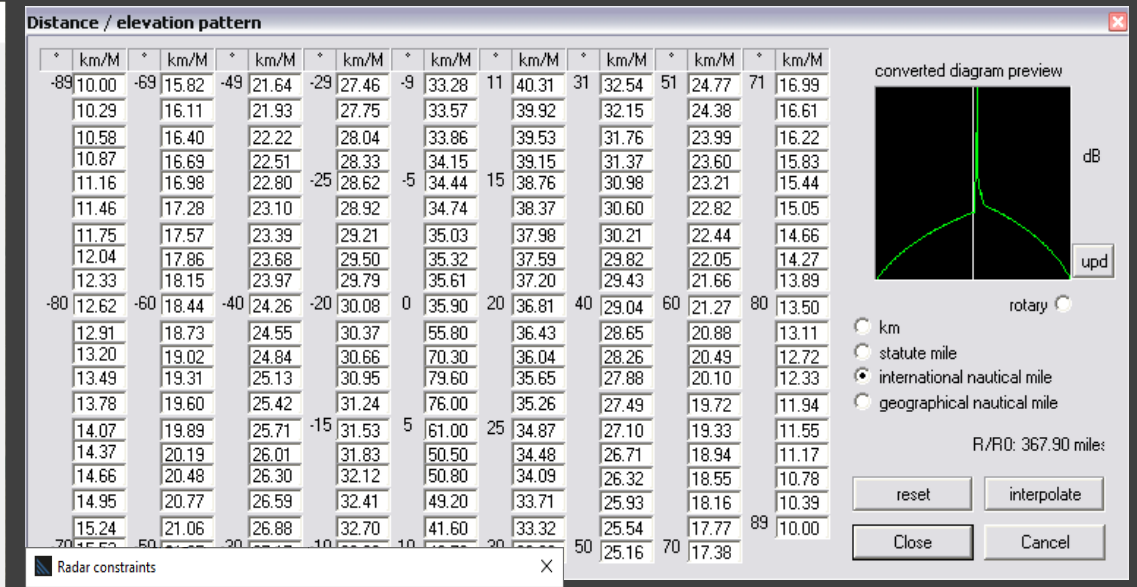
Modeling aircrafts with all radio navigation equipments with HTZ warfare

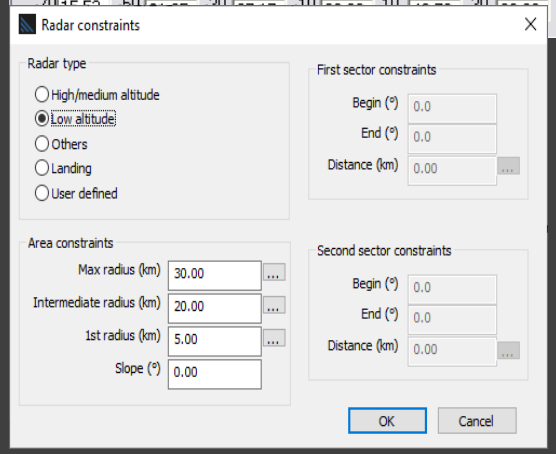


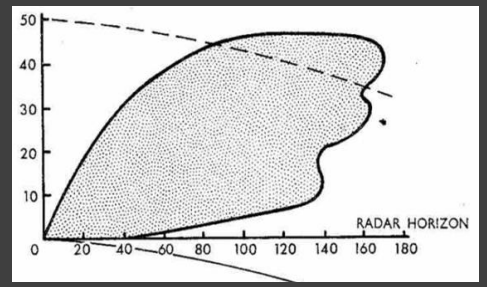
ADF :	Automatic Direction Finder	Loc	Localizer
DME:	Distance Measuring Equipment	RA:	Radio Altimeter
GPS:	Global Positioning System	SATCOM:	Satellite Communication
G/S:	Glide Slope	SSR:	Secondary Surveillance Radar
HF:	High Frequency	TCAS:	Traffic Collision Avoidance System
ILS:	Instrument Landing System	VOR:	VHF Omni ranging

HTZ Warfare
Radar - Parameters

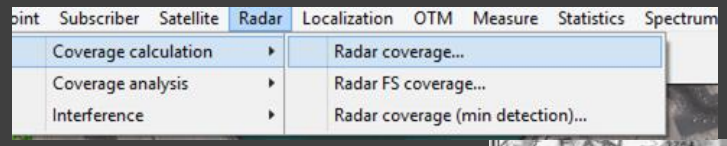


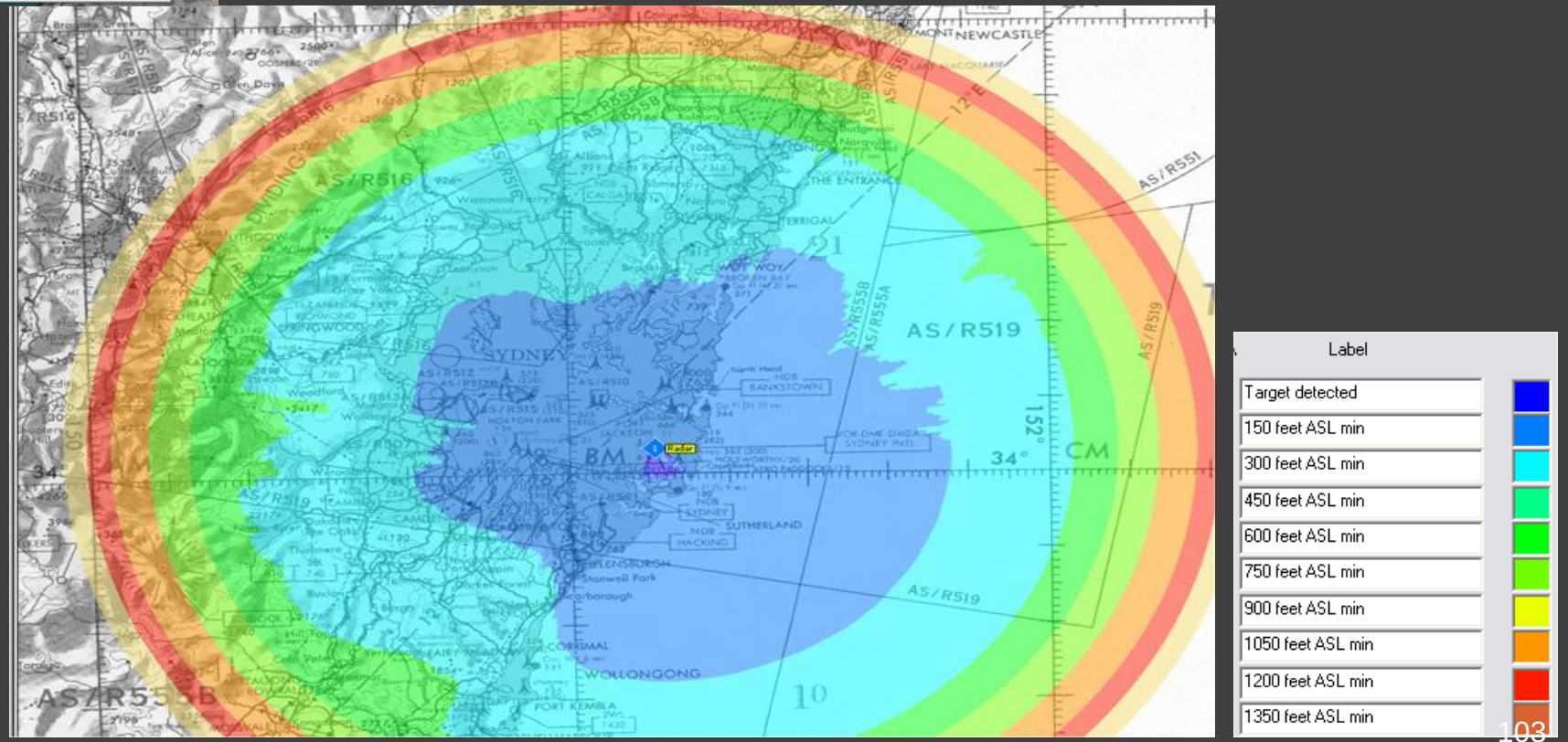




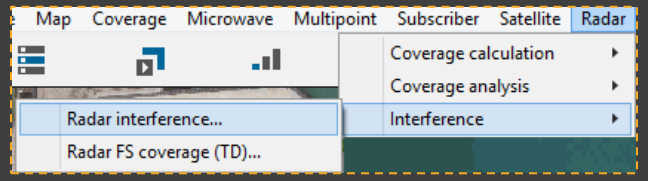


HTZ Warfare
Radar Minimum Detection Height

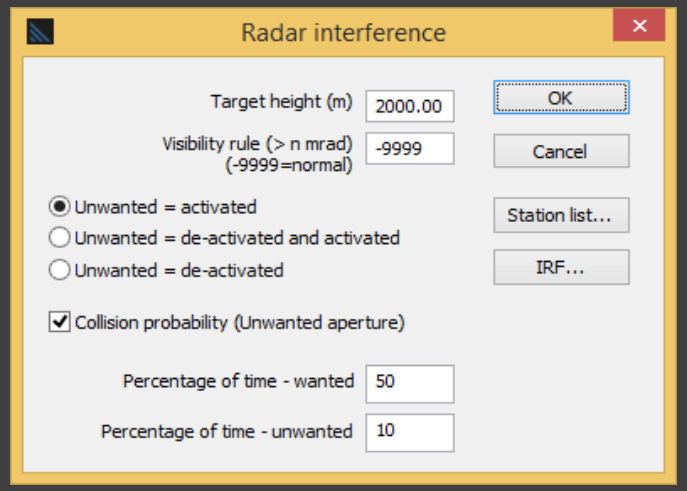


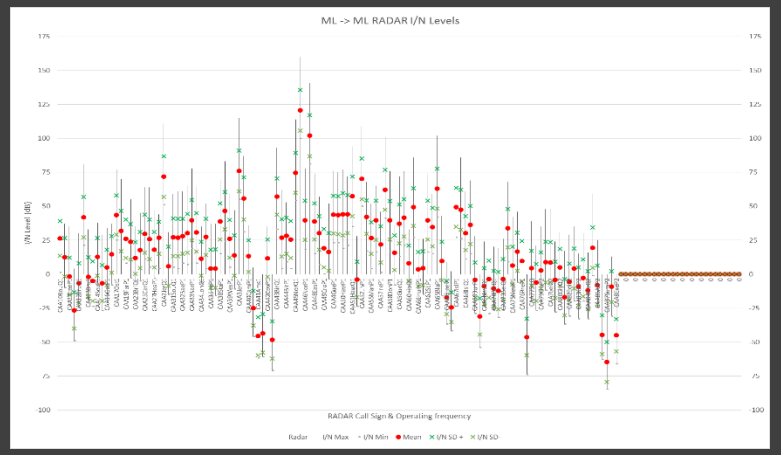


HTZ Warfare
Radar Interference Analysis

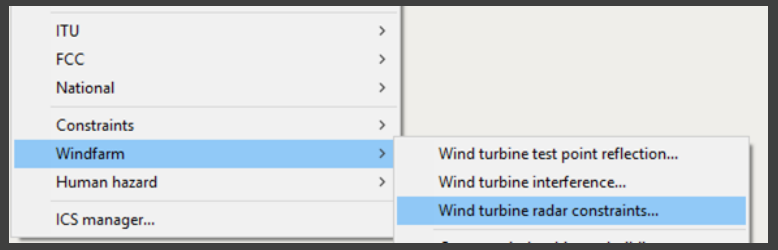


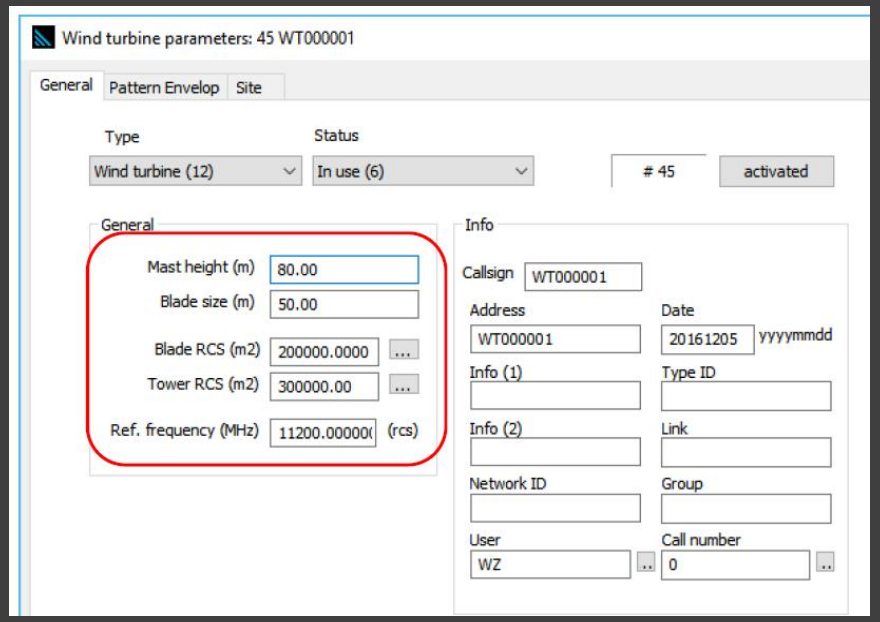
This functions rotates the radar horizontal antenna pattern in 1-degree intervals and calculates the I/N and Threshold degradation. The radar coverage is then calculated using the threshold degradation and then calculates the radar coverage for the given probability of detection and radar cross section.

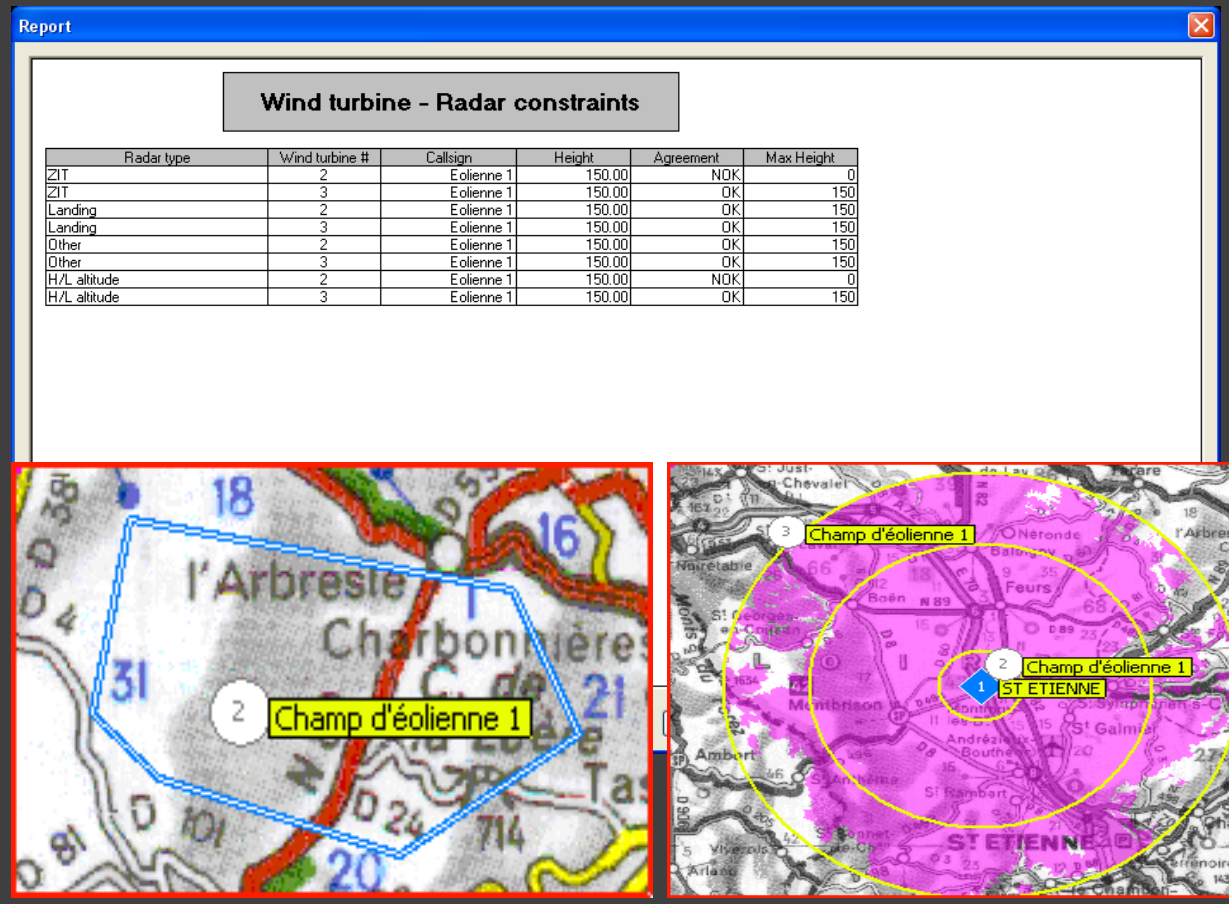




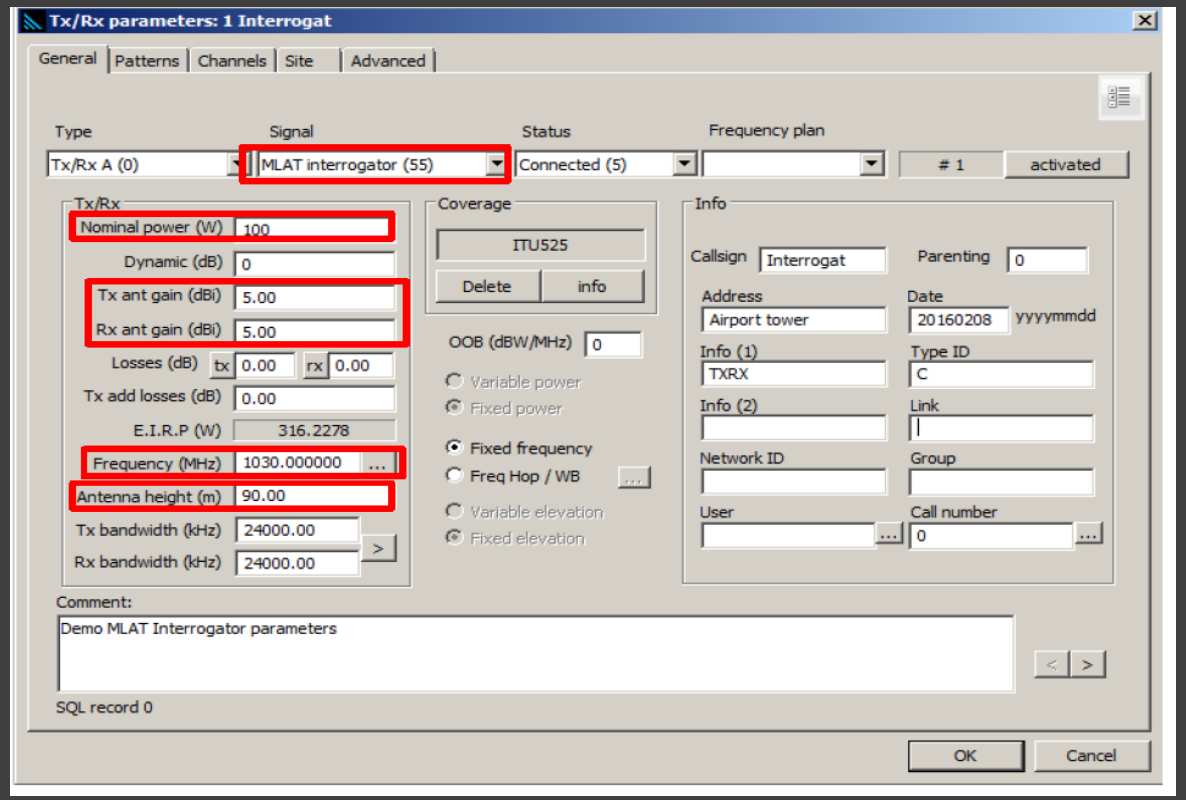
HTZ Warfare
Radar Coexistence; Radar Vs Windfarm

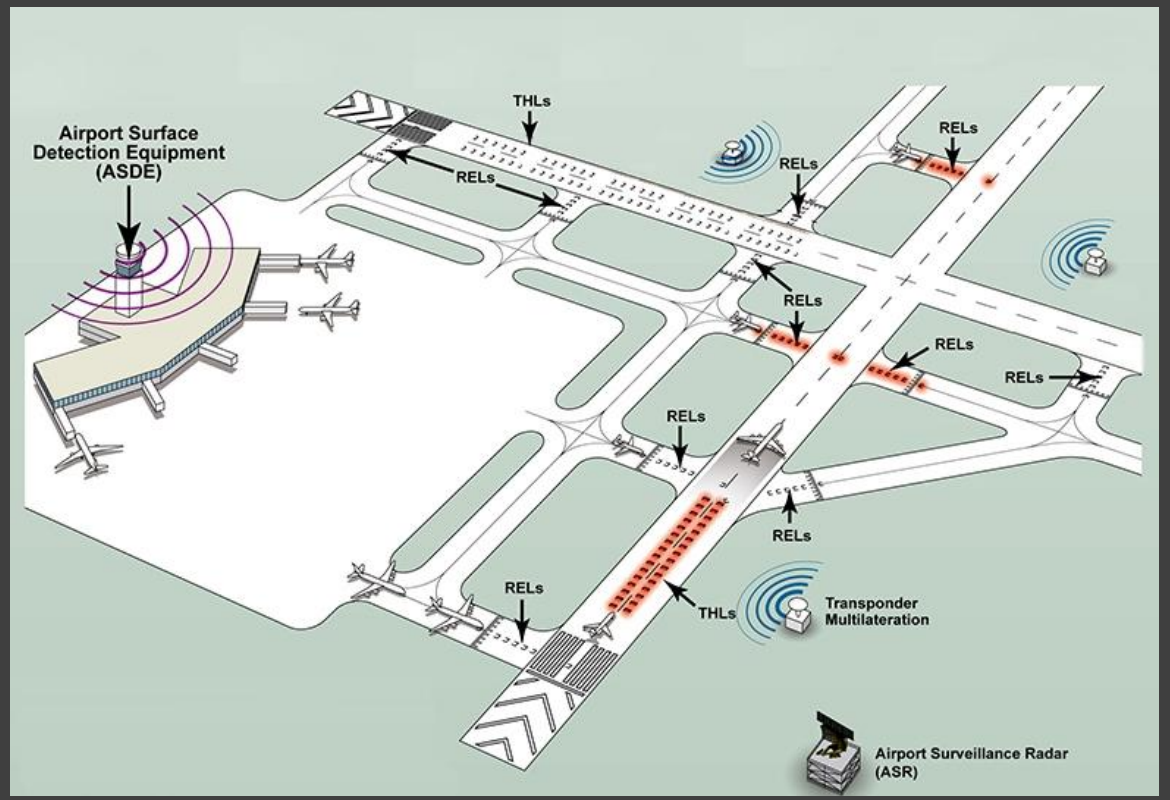






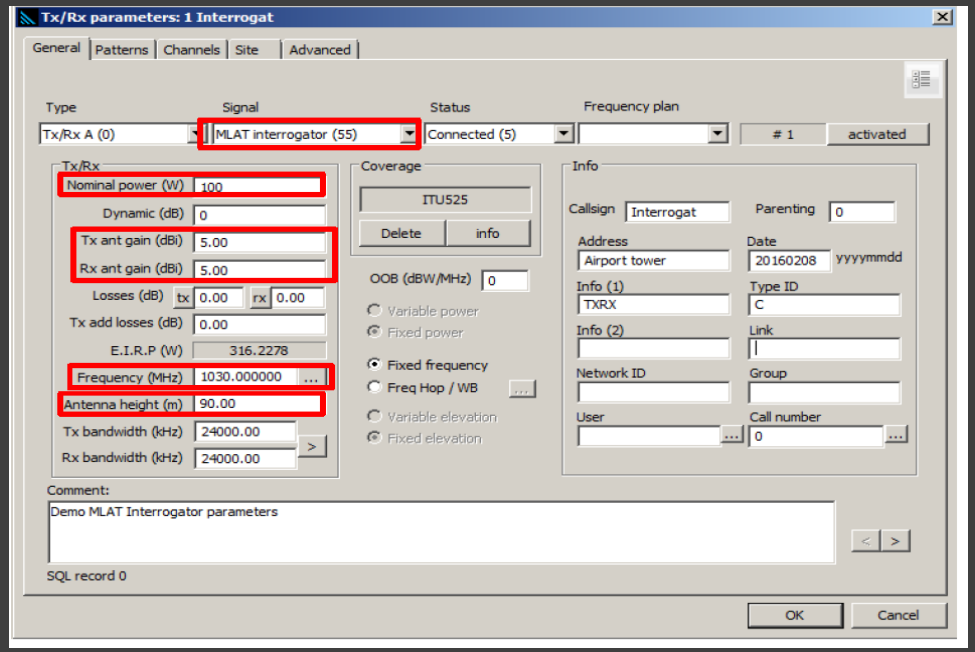
HTZ Warfare
Multi-lateration- Airport surface

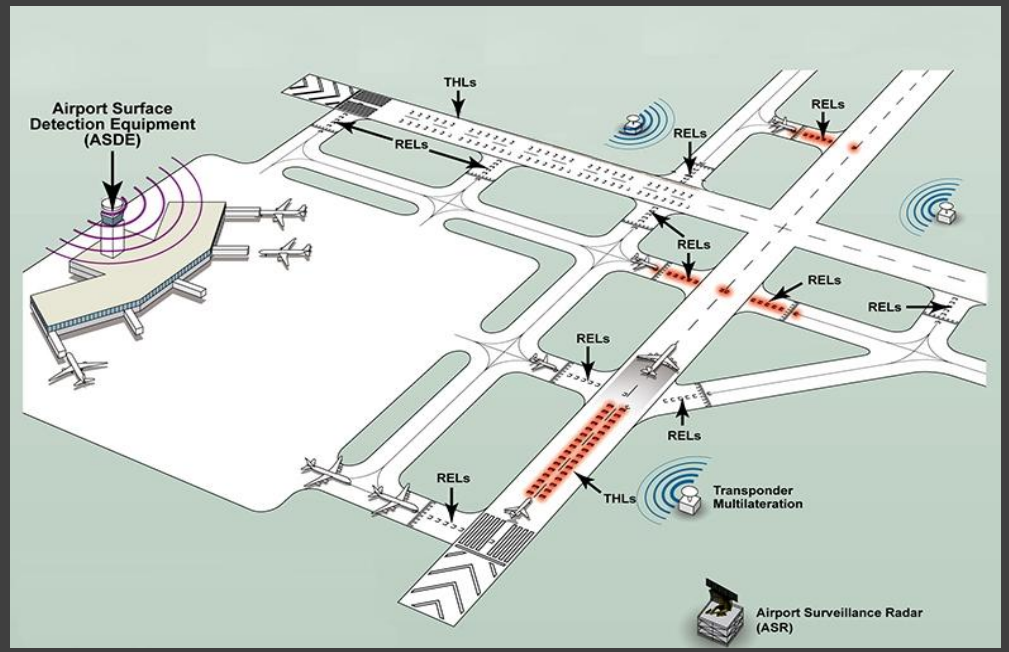




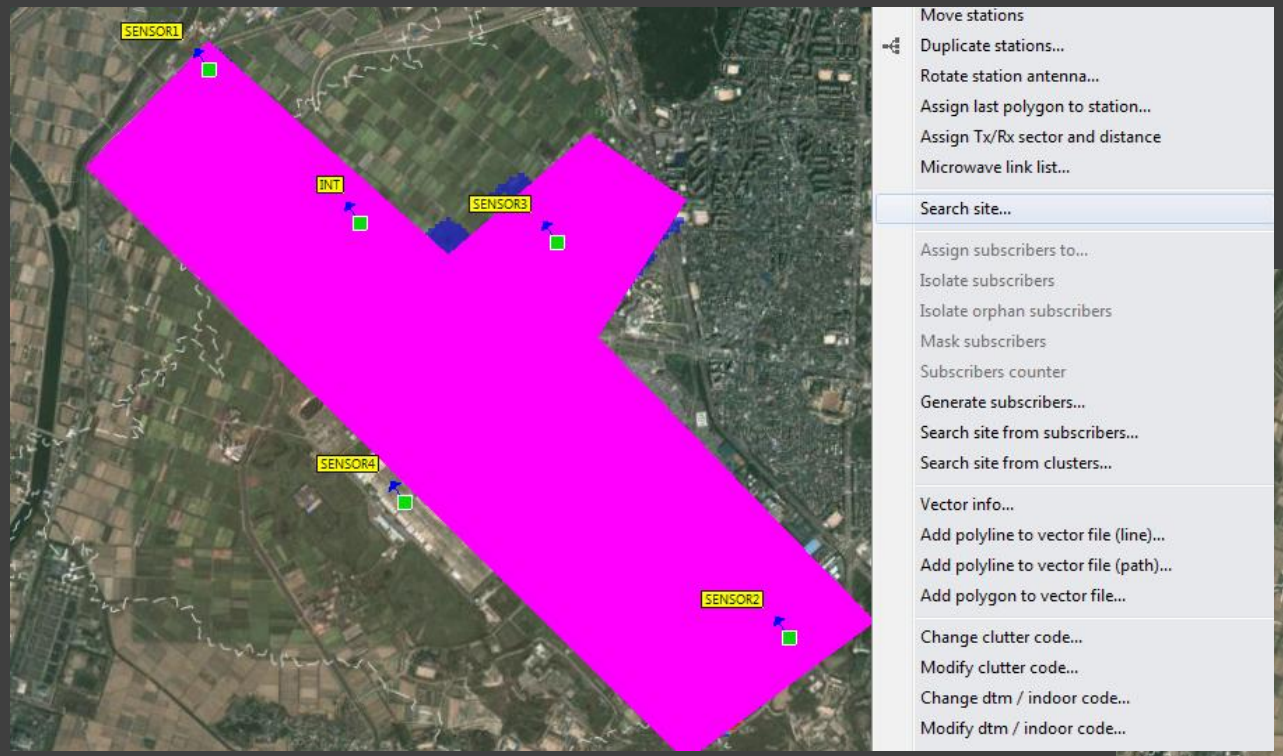
HTZ Warfare
Multi-lateration- Airport surface

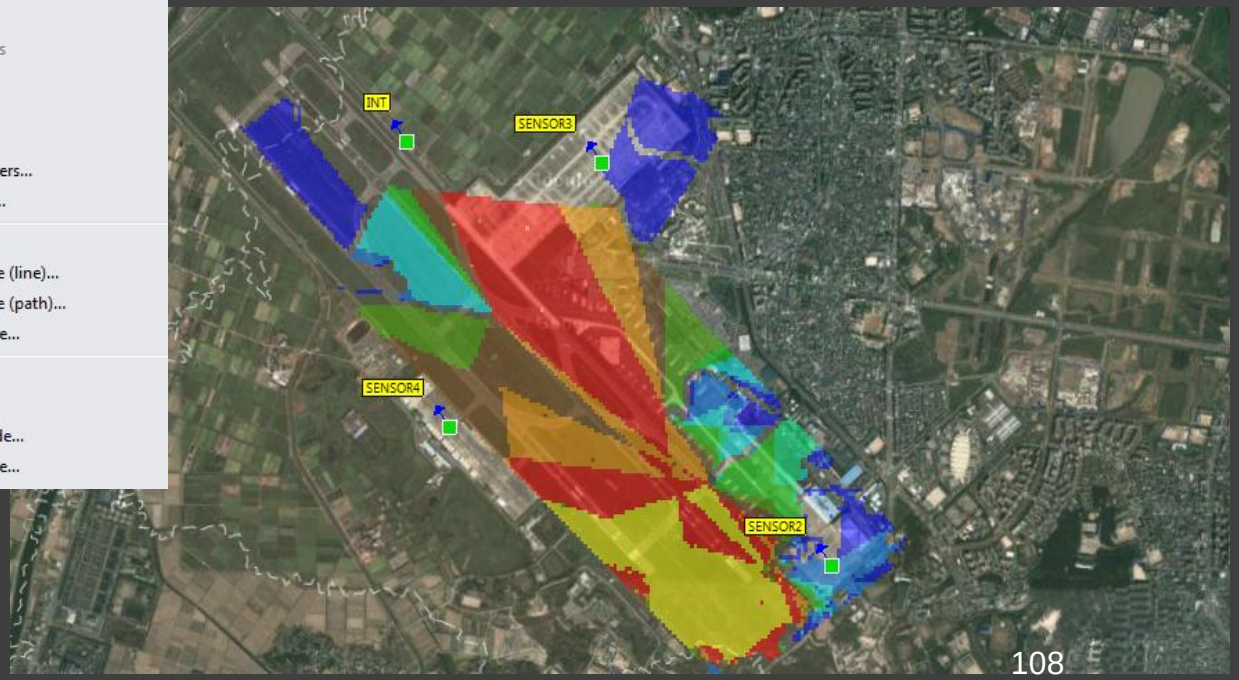
- Planning where to put the sensors
- Planning best spot to put the interrogator
- Evaluate the accuracy/range of the sensor network





HTZ Warfare
Multi-lateration- Airport surface





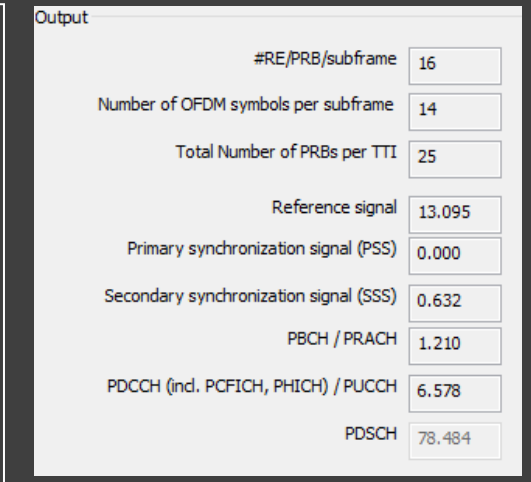
HTZ Warfare
Broadband LTE A2G

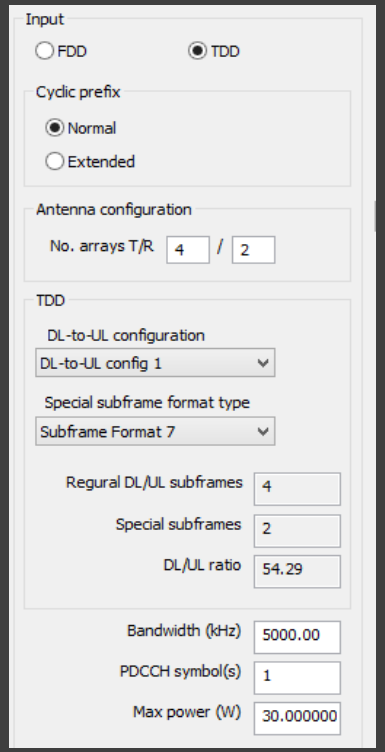
LTE configuration:

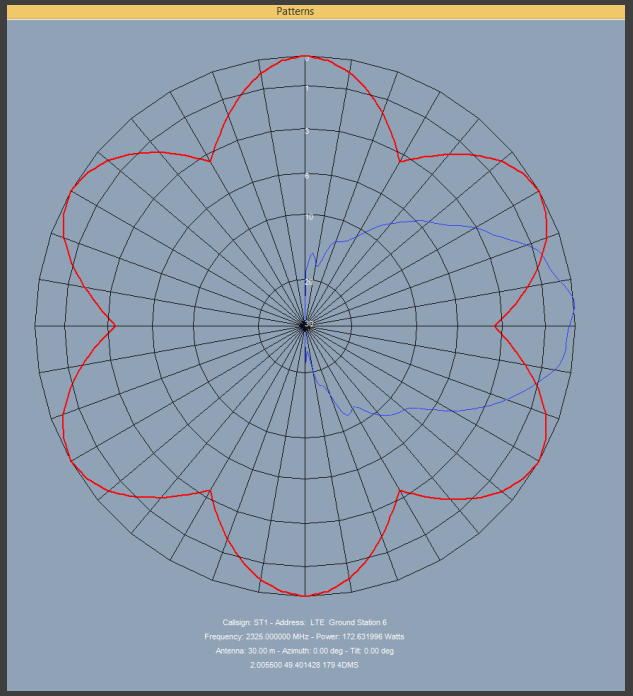
- Freq: 2325 MHz
- Bandwidth: 5MHz
- TDD mode (config 1/ Subframe format 7)
- MIMO 4x2 system

Throughput Target:

- DL/UL : 2Mbps
- Coverage probability: 87,5%
- Aircraft Altitude: 8000 ft.







Antenna patterns (H/V)

HTZ Warfare
Broadband LTE A2G

E-Node B parameters:

Type	Signal
Tx/Rx A (0)	LTE TDD (57)

Tx/Rx

Nominal power (W)	30			
Dynamic (dB)	0			
Tx ant gain (dBi)	9.60			
Rx ant gain (dBi)	9.60			
Losses (dB)	tx 0.50	rx	0.50	
Tx add losses (dB)	1.50			
E.I.R.P (W)	172.632			
Frequency (MHz)	2325.000000	...		
Antenna height (m)	30.00			
Tx bandwidth (kHz)	5000.00			
Rx bandwidth (kHz)	5000.00	>		

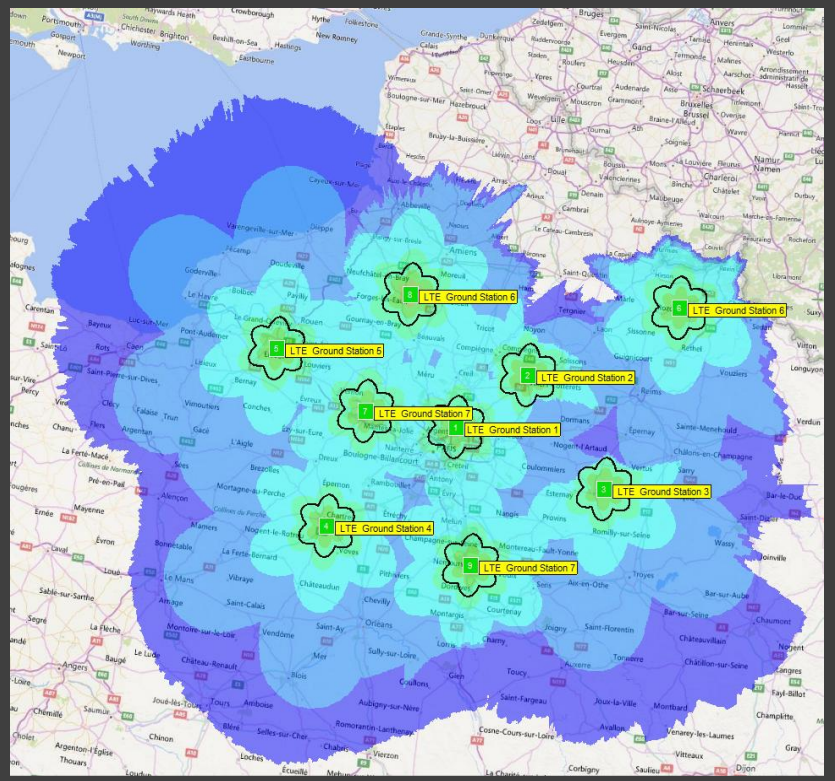


Fig 1: RSRP coverage (Aircraft altitude: 8000 ft)

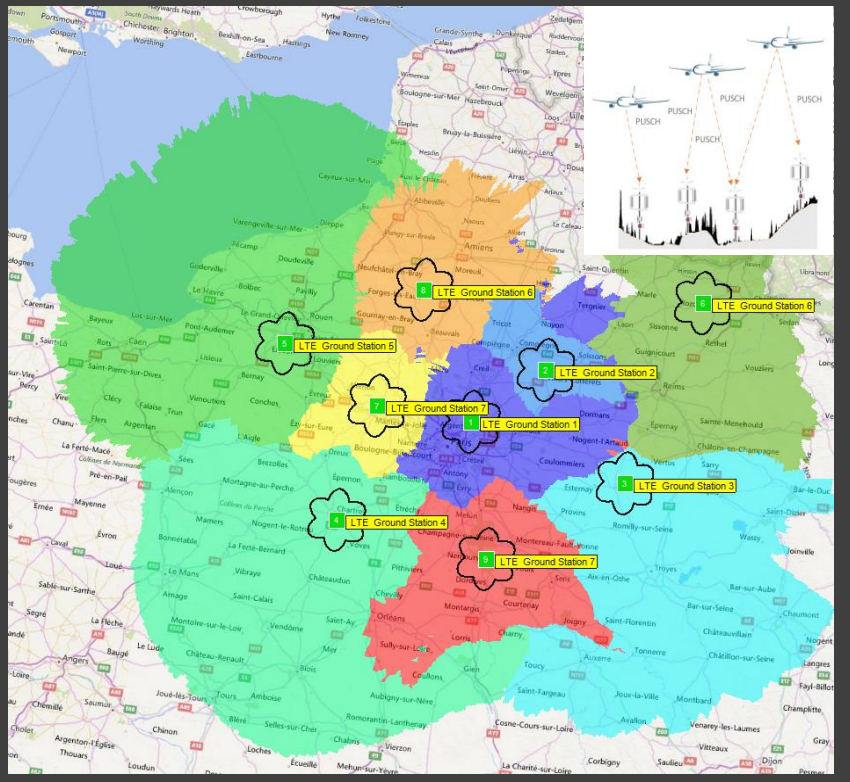
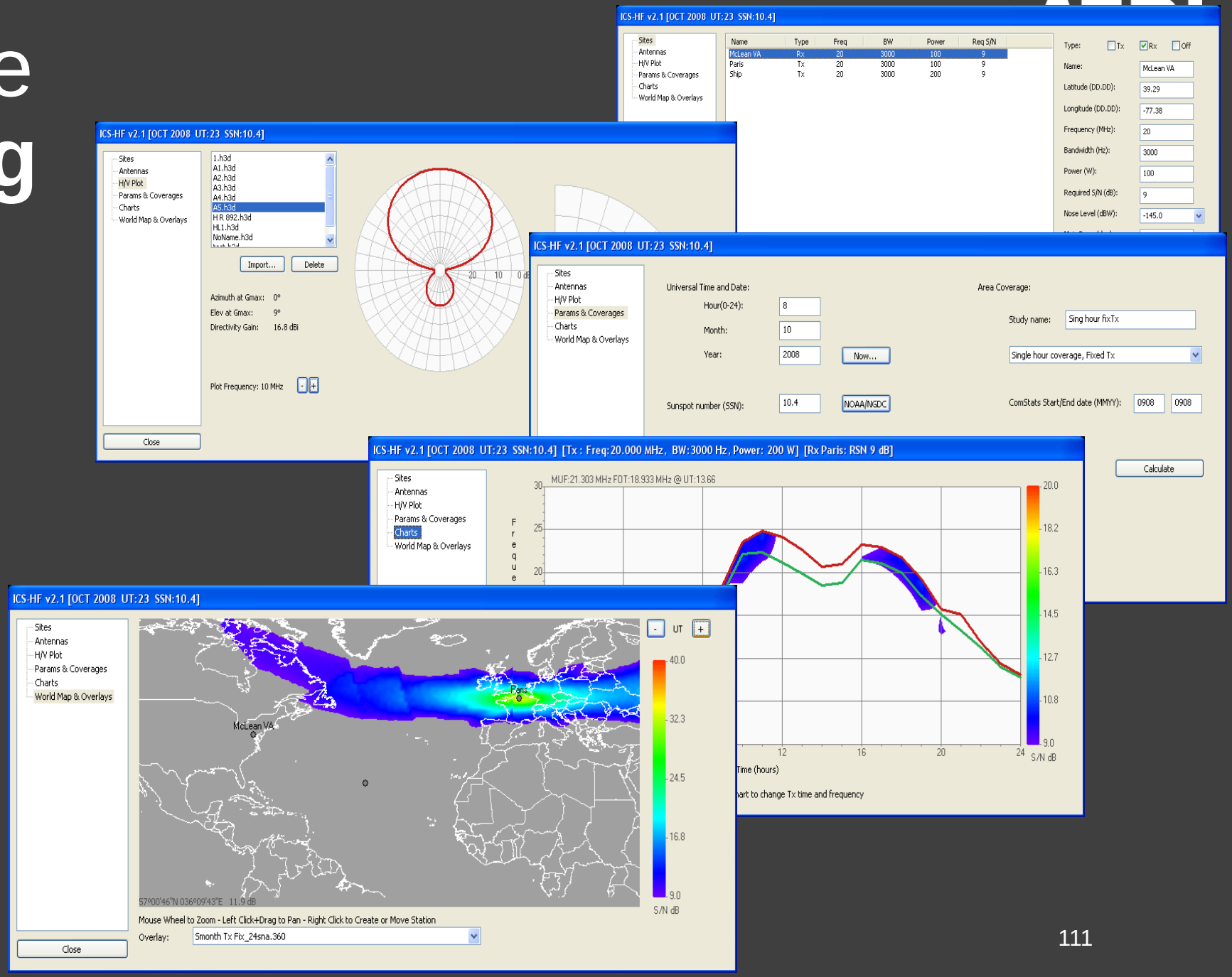


Fig 2: Best server RSRP map (Aircraft altitude: 8000 ft)

HTZ Warfare
HF Planning

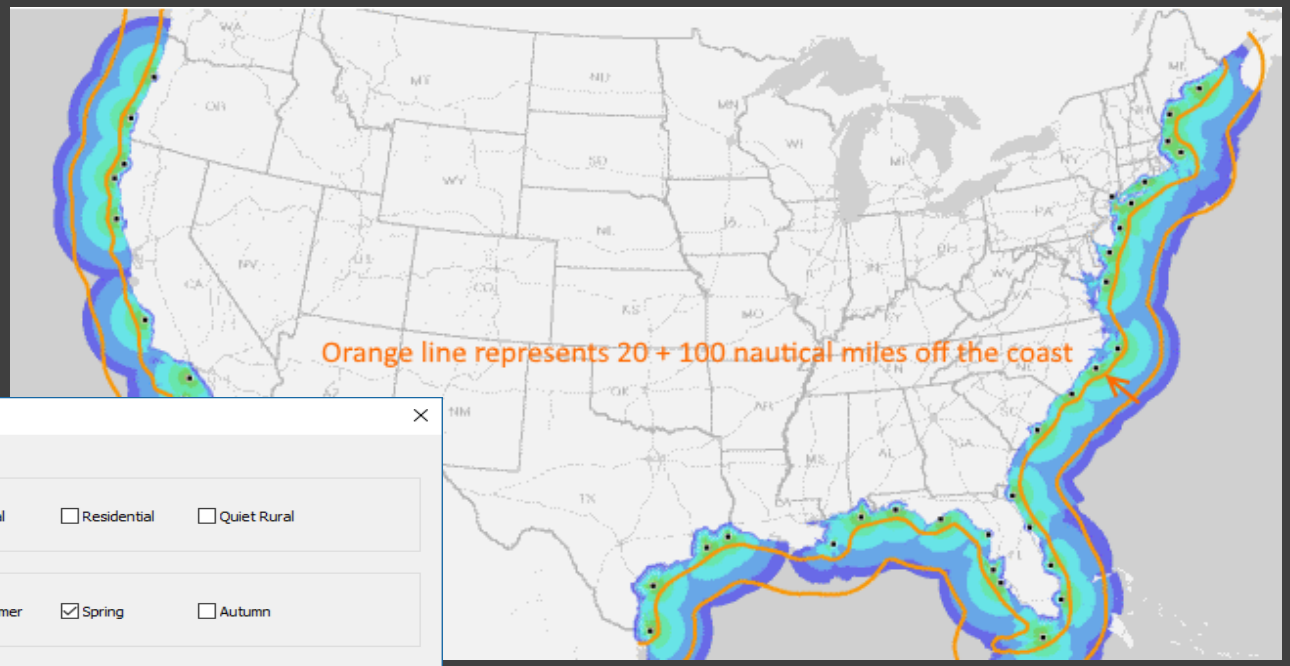
MODE	EQUIPMENT
SINGLE HOUR COVERAGE	FIXED TRANSMITTER
	MOBILE TRANSMITTER
SINGLE MONTH 24h COVERAGE	FIXED TRANSMITTER
	MOBILE TRANSMITTER

CHART ANALYSIS
MUF (Maximum Usable Frequency)
FOT (Frequency of Optimal Transmission)



HTZ Warfare
HF Planning – Maritime Groundwave

In order to properly model the radio wave propagation of MF signals, HTZ warfare integrates the latest ITU recommendations specific to MF Groundwave propagation: ITU-R P.368-9 and ITU-R M.1467-1.
Calculation feature used to generate the field strength received predictions for each pixel on the map is based on the integration of ITU-R P.368-9 into HTZ's propagation engine.



NOISEDAT Calculator

Freq (MHz):	0.518
Bandwidth (Hz):	500
S/N (dB):	8
Dt+(dB) (0->90% 3->95%):	0
Emrp (W):	1000
Latitude (dd.dddd):	45.700457
Longitude (dd.dddd):	2.191760

Rx Environment: ☐ Business ☑ Rural ☐ Residential ☐ Quiet Rural

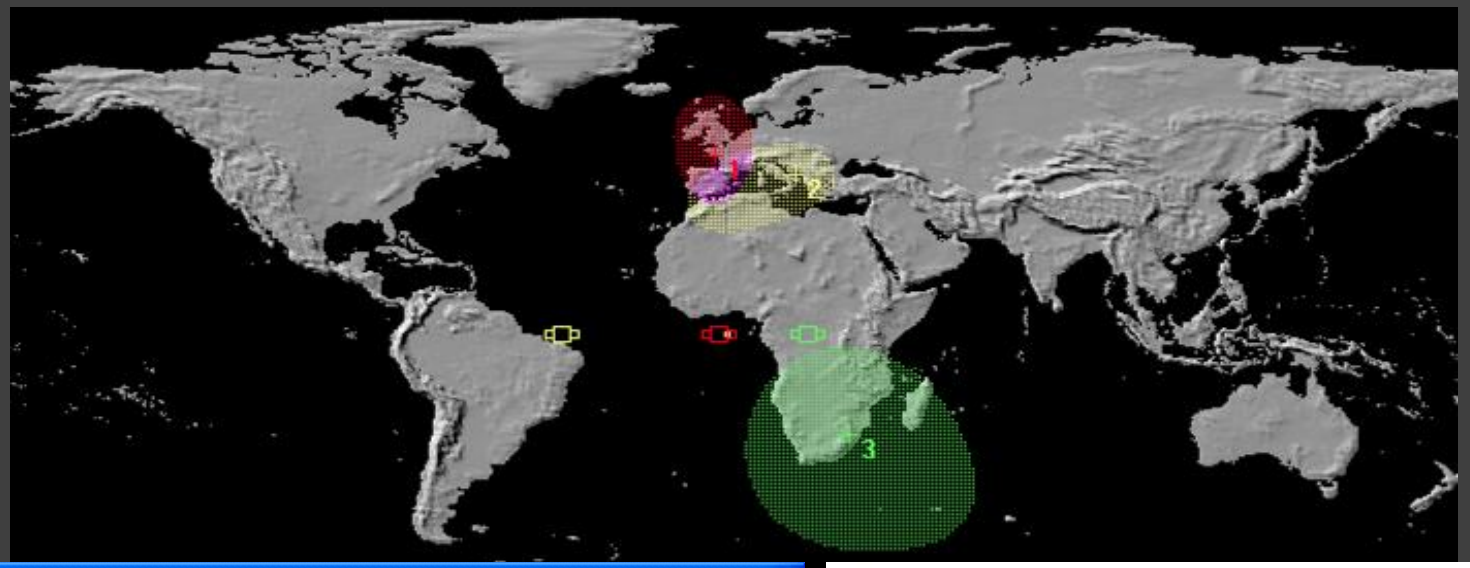
Season: ☐ Winter ☐ Summer ☑ Spring ☐ Autumn

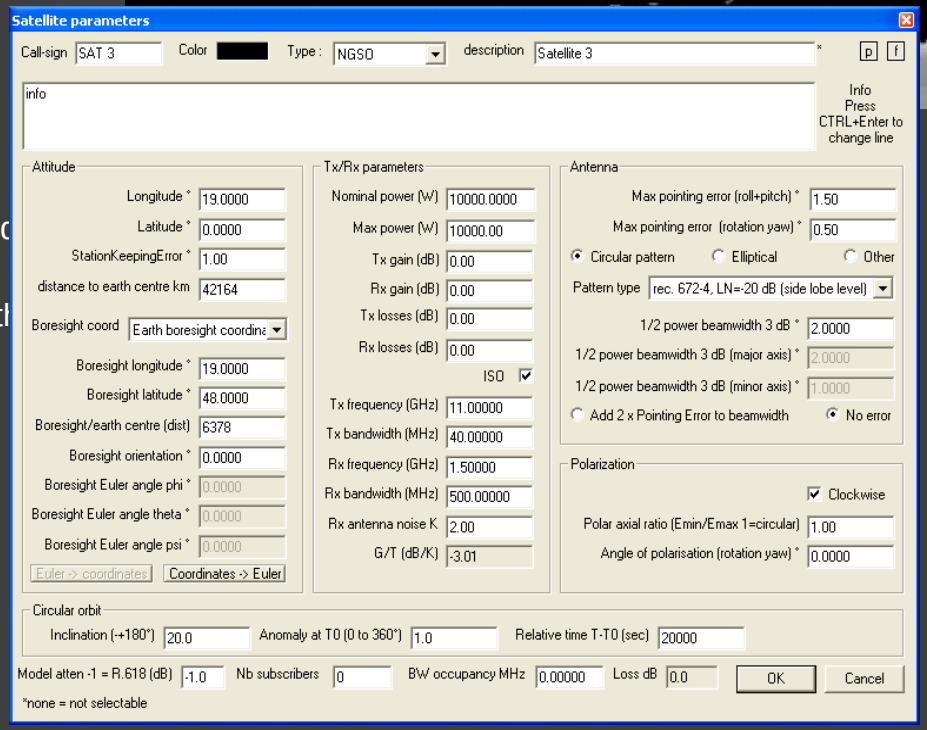
TIME	FA	THRESH	ATMO	GAL	MANMADE	OVERALL	DL	DU	SL
0000-0400	92.6	-46.4	80.4	58.6	75.1	82.0	9.5	10.1	2.2
0400-0800	84.3	-54.7	60.9	58.6	75.1	70.2	10.6	13.8	11.1
0800-1200	85.4	-53.6	47.4	58.6	75.1	75.2	5.9	9.7	1.5
1200-1600	81.7	-57.3	55.8	58.6	75.1	65.4	8.3	16.1	22.9
1600-2000	88.5	-50.5	69.0	58.6	75.1	69.5	15.4	18.7	18.0
2000-2400	92.2	-46.8	80.2	58.6	75.1	82.1	8.8	9.7	2.4

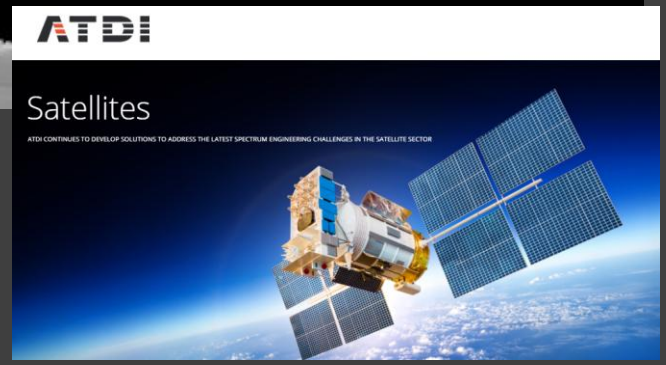
A2 | Calculate | Close

HTZ Warfare **Satellites**

- GSO/non-GSO satellite coverage planning and link budget (EIRP, G/T, C/N)
- Wide-beam and HTS beam planning across all satellite frequency bands
- Automated frequency planning
- GSO vs GSO and GSO vs non-GSO interference analysis (ΔT/T, C/I, PFD and EPFD masks)
- Satellite vs terrestrial co-existence analysis /Earth station coordination (ITU APP 7)
- DTH network planning /VSAT network planning and optimization
- Covers all satellite services: FSS, BSS, MSS, Earth exploration, meteorological and more

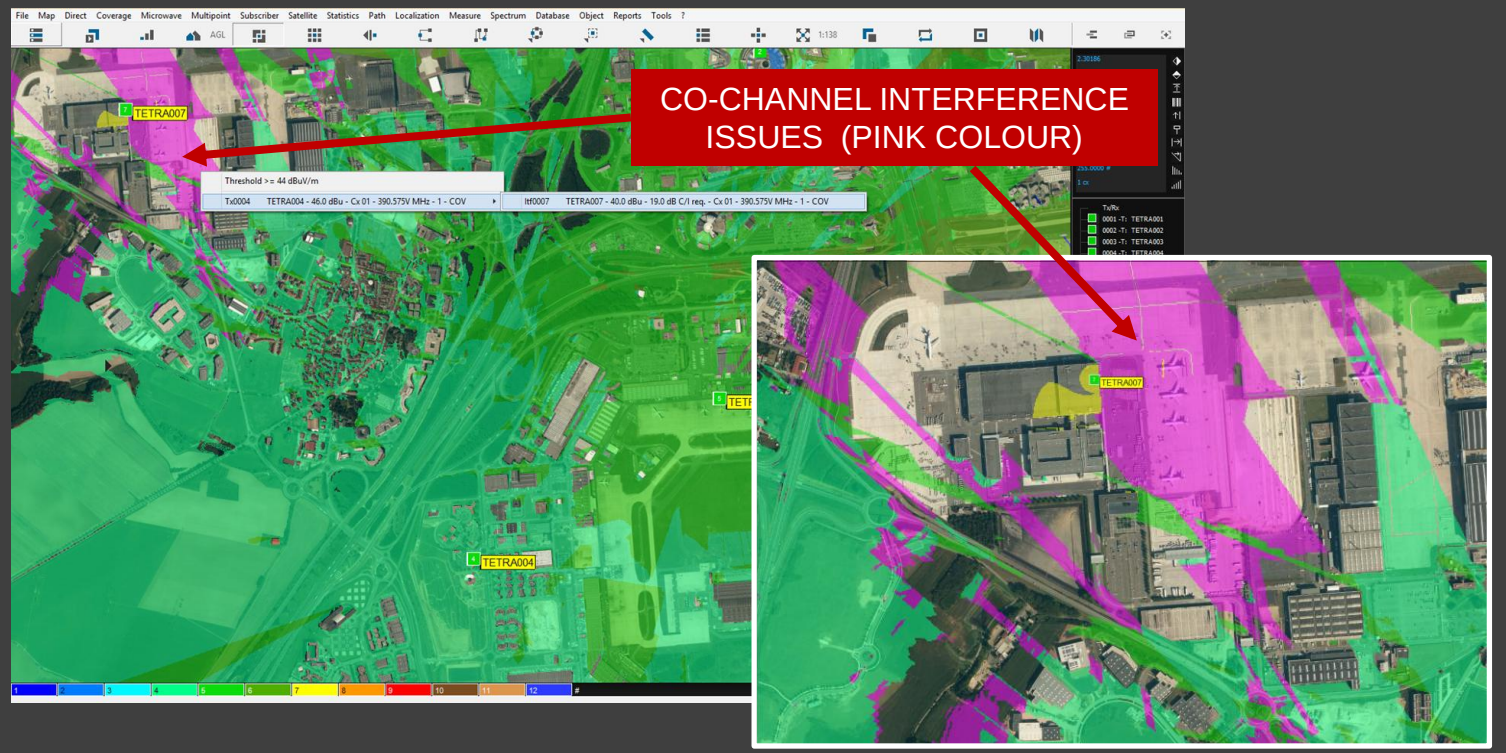






HTZ Warfare
Interference Analysis

- Provides all capacities for frequency interference analyses (co-, interstitial and adjacent channel interference) based on propagation conditions and the scenario of existing stations.
- Procedures are implemented for all services and consider the special behavior of different service types with regards to bandwidth, spectral distribution or filter curve of the receiver. Interference analysis can be performed using a general analysis function delivering a fast result.
- Comprehensive report that summarizes all technical and operational details of the performed interference analysis can be generated . This includes for example the operational characteristics of the transmitters/receivers, their locations, the utilized propagation model, etc. All identified interference cases are presented on the produced interference reports. In addition, all interference cases may also be visualized graphically on the GIS.



HTZ Warfare
Hybrid Localisation from Measurement

This function is drawing a map of the possible locations of the reference station that has been measured (Target transmitter). It will localize the “target transmitter”, based on the measurement file imported,
containing for each coordinate point, either:

- Field strength received (RSSI) measured, or
- Angle of arrival (AOA) of the signal received, or
- Angle of arrival (AOA) of the signal received and Field strength received (RSSI) measured,
- Field strength received (RSSI) measured and measurement azimuth