

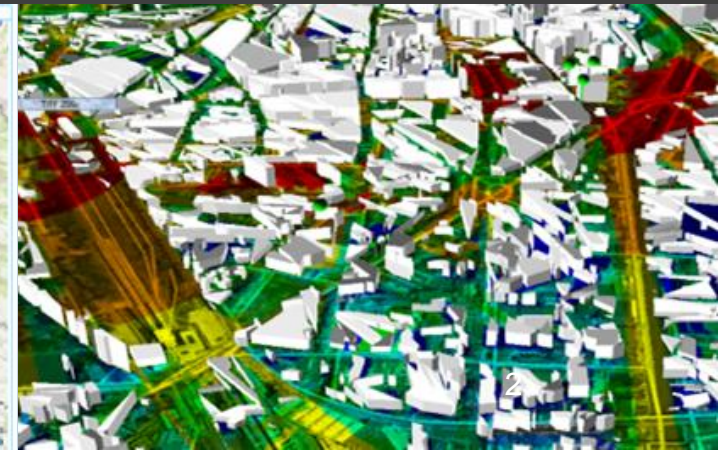
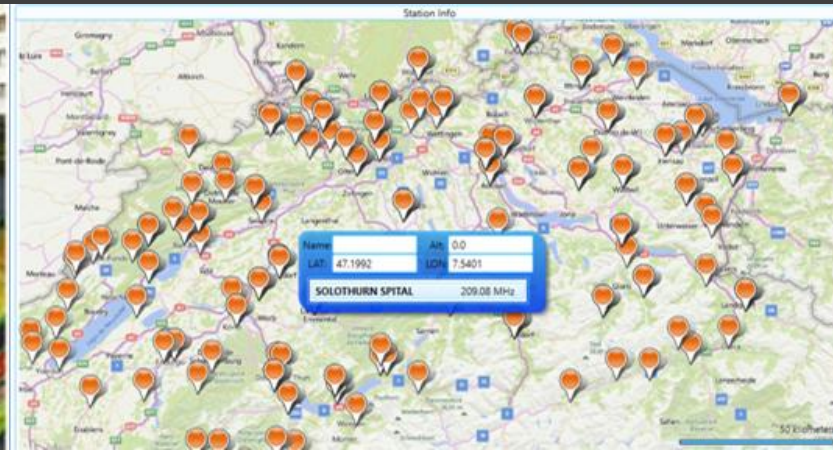
ATDI

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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

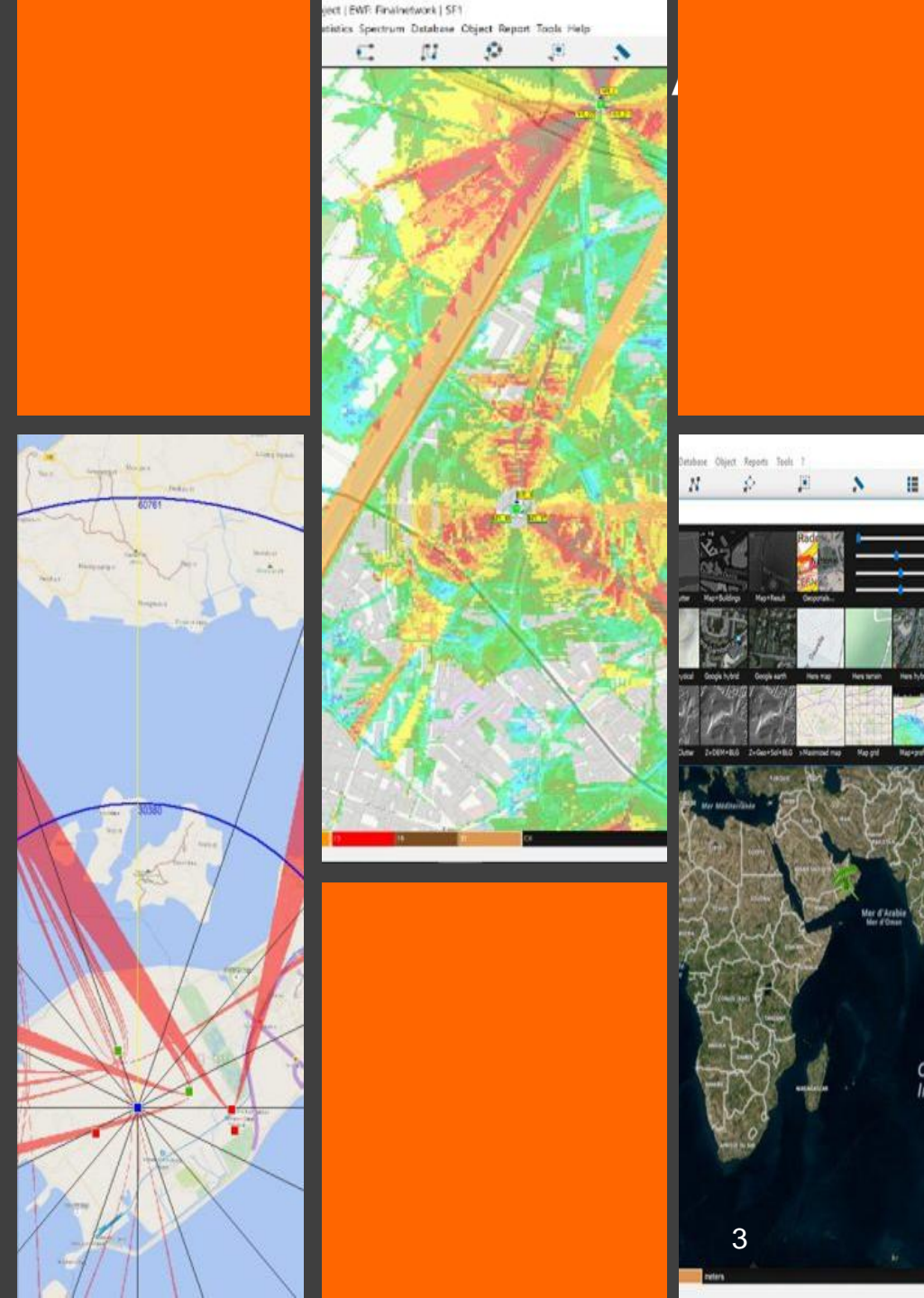
OUR FOCUS IS TO SUCCEED AT EVERY LEVEL OF COMMAND IN ELECTROMAGNETIC SPECTRUM OPERATIONS

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.

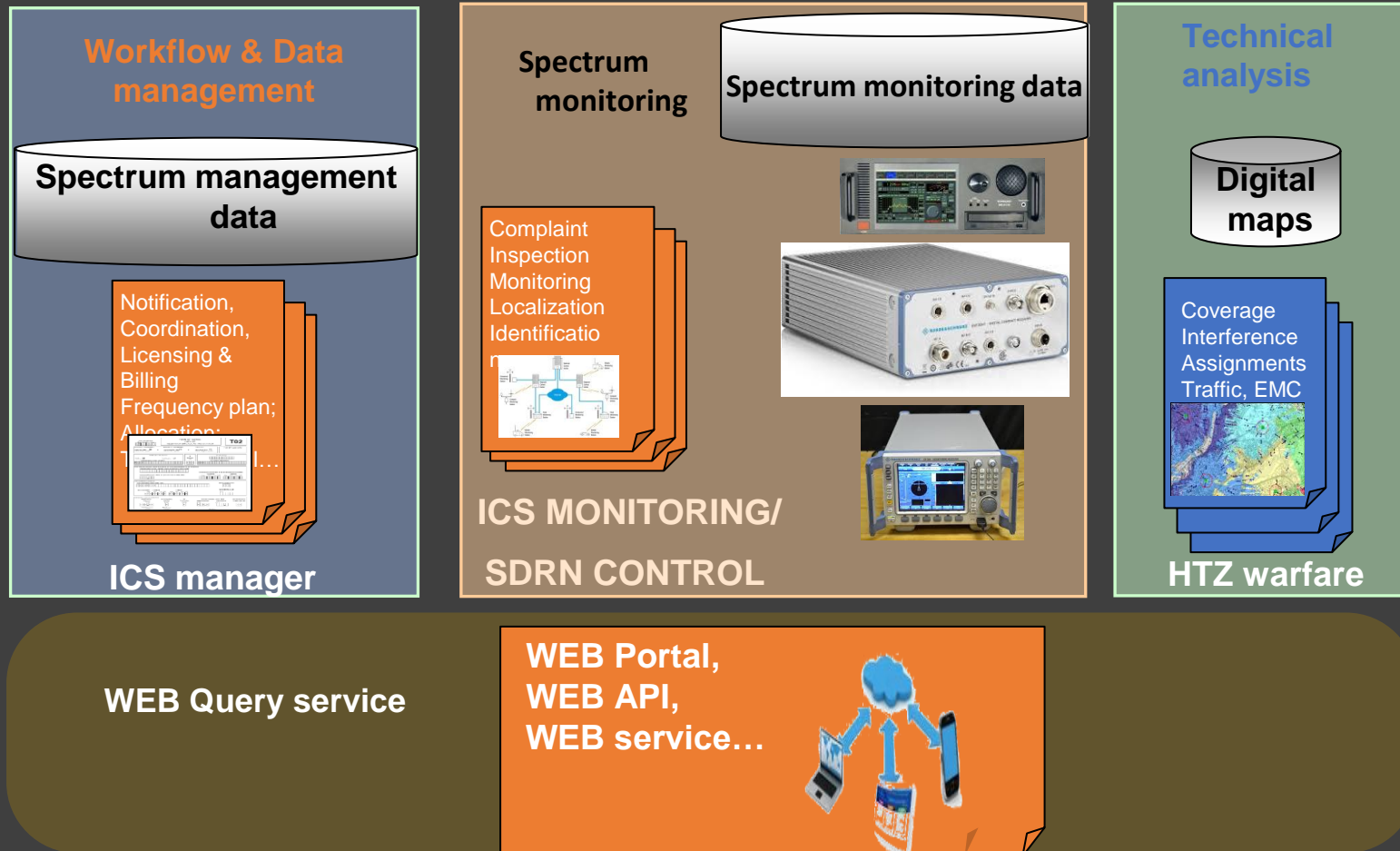
With over three decades of development, ATDI has developed a leading military network planning, EW modelling tool and frequency management solutions, HTZ Warfare and ICS manager.

Our solutions allow defence spectrum managers to:

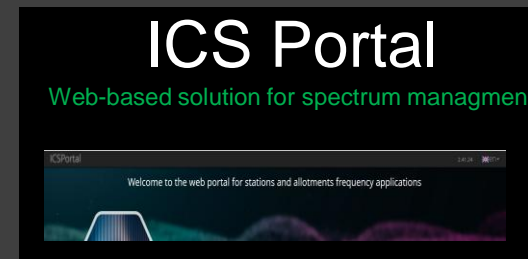
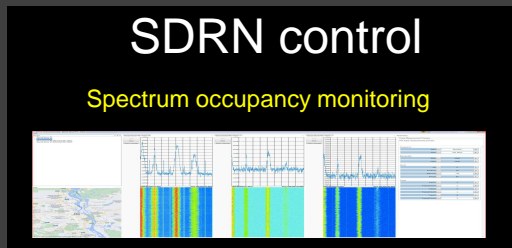
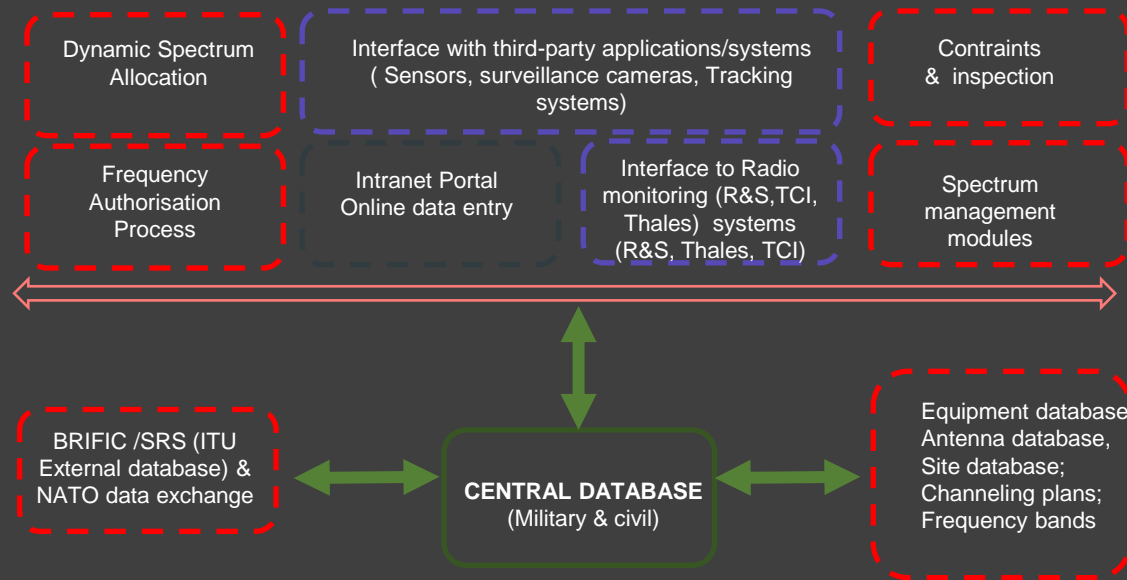
- **Control** the use of spectrum
- **Deconflict** electromagnetic spectrum interference
- **Joint Mission Operation** support standard mission planning data (SFAF, SMEDEF-XML, etc)
- **Tactical Mission Planning** rapid tactical mission network deployment and frequency assignment
- **Convert** private 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



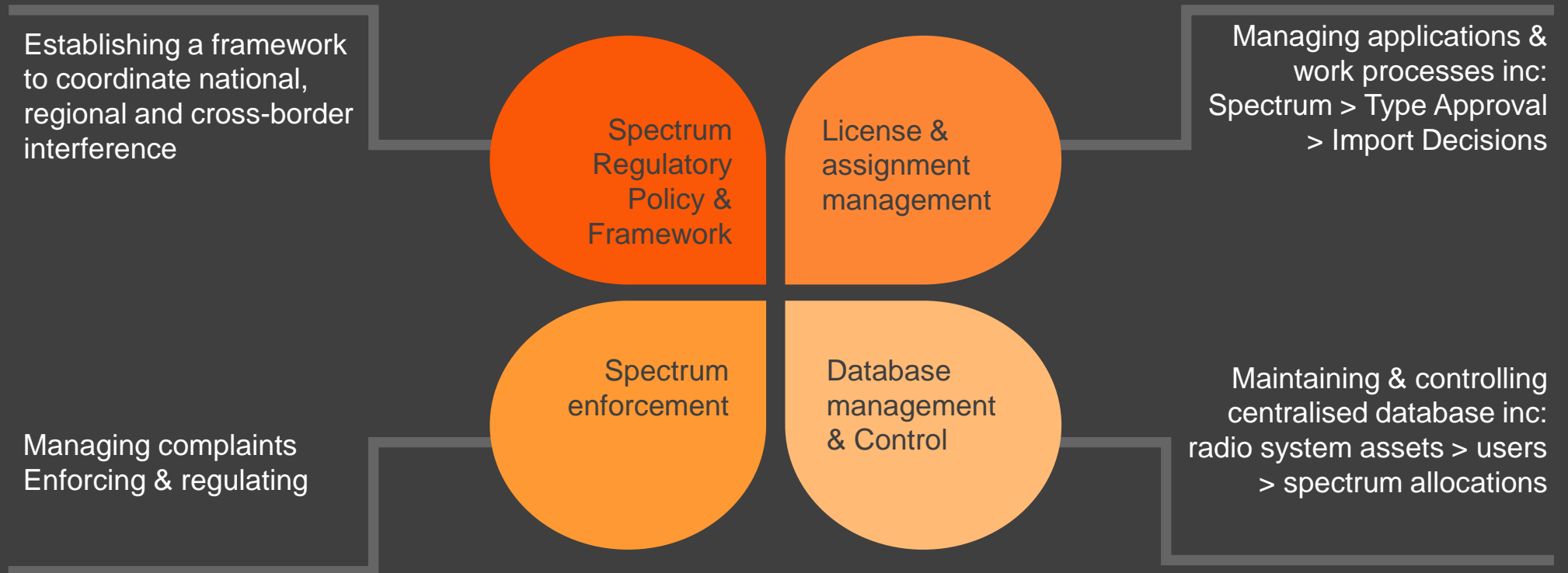
ICS Manager

ICS manager

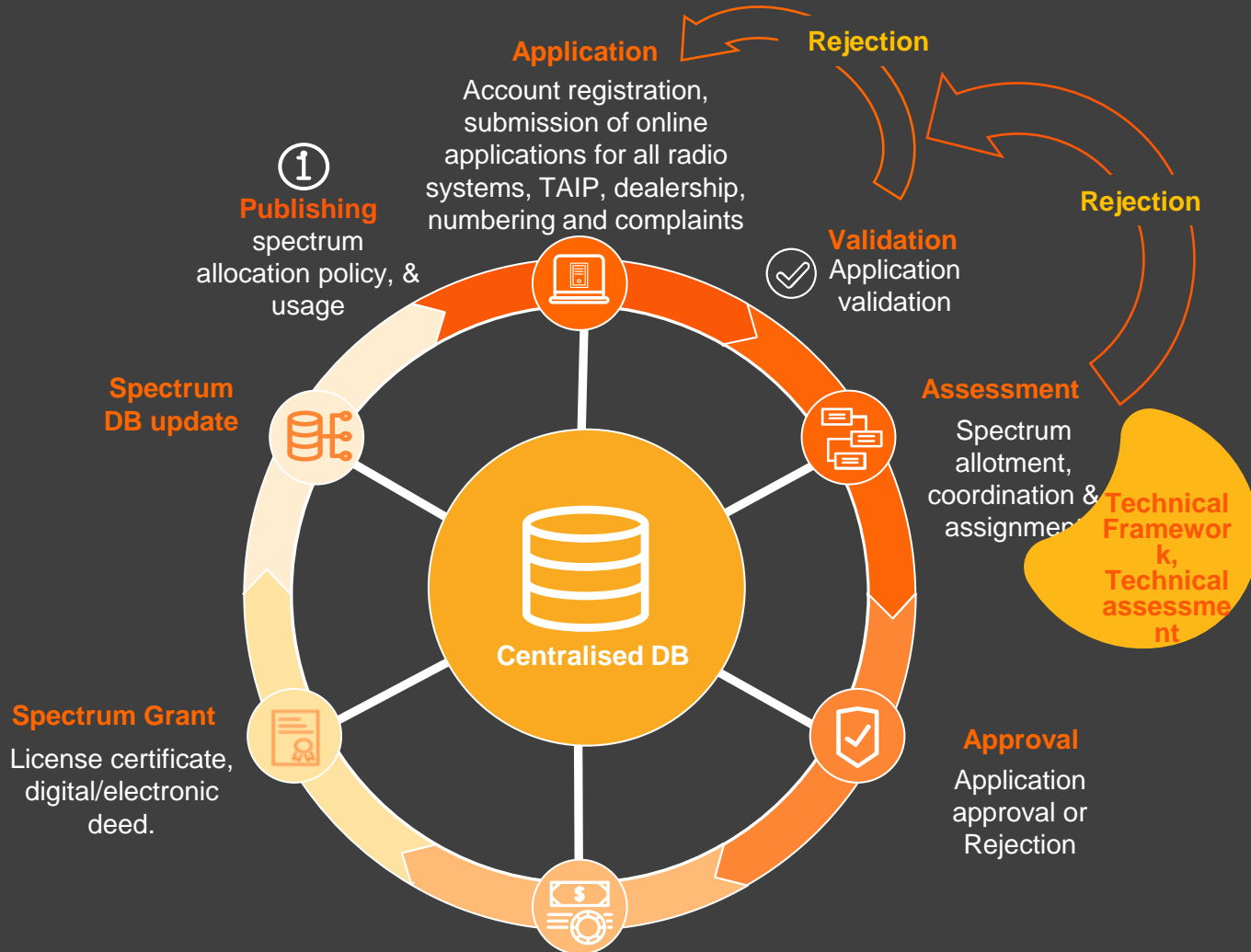
The COMPLETE SOLUTION provided by ATDI to the civil and military **regulation authorities** allowing to:

- 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



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

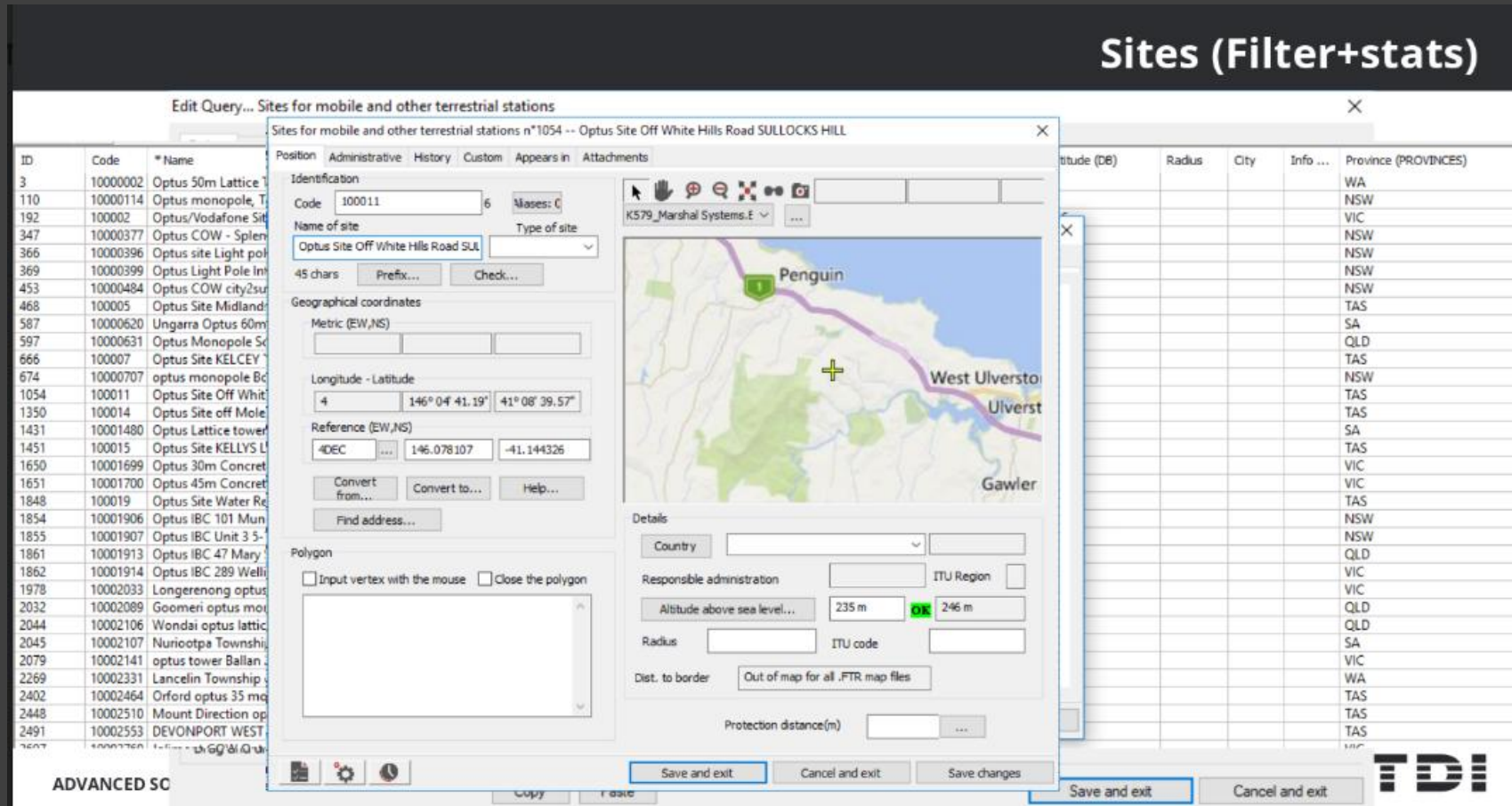
Each module of the offered ATDI system has a user-friendly graphical interface. The user can access the functions and menu items either via toolbars or menus. The GUI can be customized and adapted to the specific need and requirements of each user. Menu and sub-menus can be configure (display or hide)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

The screenshot displays the ATDI software interface with three main windows:

- ICS Manager - D:\ownCloud\ATDI PTY\1- Customer demo\Transport NSW\RLDB - [Optus sites]**: A table listing various sites with columns for ID, Code, *Name, Longitude, Latitude, Ref. EW, Ref. NS, and Ref.
- Active software components**: A window showing a list of components with checkboxes for selection. The 'Spectrum management' component is highlighted.
- Menu configuration**: A window showing a tree view of the software's menu structure. The 'Spectrum management' menu item is selected, and its sub-items are visible in the 'Selected popup/command' list.

ID	Code	*Name	Longitude	Latitude	Ref. EW	Ref. NS	Ref.
3	10000002	Optus 50m Lattice Tower 71 Eastward Road Utakarra	114° 38' 03.34" E	28° 46' 39.58" S	114.63426	-28.77756	4DEC
110	10000114	Optus Monopole, Taree Cundelltown 17301 Pacific Hig	152° 32' 00.74" E	31° 54' 06.88" S	152.53354	-31.90191	4DEC
192	10000002	Optus/Vodafone Site Water Tank Blooms Rd NORTH WAR	145° 13' 19.23" E	37° 43' 42.78" S	145.222007	-37.72855	4DEC
347	10000377	Optus COW - Splendour in the Grass LOT 46 Jones Ro	153° 31' 04.91" E	28° 28' 19.3" S	153.518031	-28.472028	4DEC
366	10000396	Optus site Light pole Intersection of Pittwater Ro	151° 17' 42.63" E	33° 42' 36.36" S	151.295176	-33.710091	4DEC
369	10000399	Optus Light Pole Intersection of Pittwater Road an	151° 17' 42.63" E	33° 42' 36.36" S	151.295176	-33.710091	4DEC
453	10000484	Optus COW city2surf Campbell Parade Bondi Beach	151° 16' 43.81" E	33° 53' 22.27" S	151.278836	-33.88952	4DEC
468	100005	Optus Site Midlands Highway SPRING HILL TIER	147° 15' 48.28" E	42° 24' 53.71" S	147.263412	-42.41492	4DEC
587	10000620	Unngarra Optus 60m tower 176 Mount Hill Rd Unngarra	136° 03' 40.69" E	34° 09' 39.33" S	136.061304	-34.160925	4DEC
597	10000631	Optus Monopole Scott Street Parramatta Park	145° 45' 56.3" E	16° 55' 47.73" S	145.76564	-16.929924	4DEC
666	100007	Optus Site KELCEY TIER	146° 19' 38.5" E	41° 12' 38.72" S	146.327361	-41.210755	4DEC
674	10000707	Optus Monopole Bonegilla 42 McIntoshs Road Bonegill	146° 59' 39.12" E	36° 08' 01.75" S	146.9942	-36.13382	4DEC
1054	100011	Optus Site Off White Hills Road SULLOCKS HILL	146° 04' 41.19" E	41° 08' 39.57" S	146.078107	-41.144326	4DEC
1350	100014	Optus Site off Mole Creek Road GARDNERS RIDGE	146° 32' 11.74" E	41° 32' 26.08" S	146.536594	-41.540577	4DEC
1431	10001480	Optus Lattice tower, Port Victoria Lot 1, Kuhn Ter	137° 29' 18.43" E	34° 29' 37.35" S	137.488453	-34.493708	4DEC
1451	100015	Optus Site KELLYS LOOKOUT	146° 46' 31.32" E	41° 18' 13.08" S	146.775368	-41.303633	4DEC
1650	10001699	Optus 30m Concrete Monopole 121 Hamilton-Port Fair	142° 13' 19.96" E	38° 22' 48.61" S	142.22221	-38.38017	4DEC
1651	10001700	Optus 45m Concrete Monopole 341 Cretton Avenue Mil	142° 09' 35.08" E	34° 09' 52.94" S	142.159744	-34.164706	4DEC
1848	100019	Optus Site Water Reserve Grinter St West RIVERSIDE	147° 06' 23.51" E	41° 25' 39.67" S	147.106531	-41.427886	4DEC
1854	10001906	Optus IBC 101 Munibung Road CARDIFF	151° 38' 15.17" E	32° 56' 24.81" S	151.637547	-32.940225	4DEC
1855	10001907	Optus IBC Unit 3 5-7 Meridian Place BELLA VISTA	150° 56' 52.29" E	33° 44' 02.08" S	150.947858	-33.733912	4DEC
1861	10001913	Optus IBC 47 Mary Street KINGSTON	153° 07' 19.03" E	27° 39' 26.27" S	153.121952	-27.657297	4DEC
1862	10001914	Optus IBC 289 Wellington Pde South EAST MELBOURNE	144° 58' 33.34" E	37° 48' 58.51" S	144.975929	-37.816253	4DEC
1978	10002033	Longerengong optus monopole 229 Longerengong Road Lo	142° 18' 12.82" E	36° 40' 09.84" S	142.30356	-36.6694	4DEC
2032	10002089	Goomeri optus monopole 21, Olive St Goomeri	152° 03' 41.31" E	26° 10' 44.95" S	152.061475	-26.179152	4DEC
2044	10002106	Wondai optus lattice tower Scott Street WONDAL 460	151° 52' 50.71" E	26° 19' 38.38" S	151.880753	-26.327327	4DEC
2045	10002107	Nuriootpa Township optus monopole 5-9 Tanunda Road	138° 59' 42.65" E	34° 28' 37.16" S	138.99518	-34.47699	4DEC
2079	10002141	optus tower Ballan 20 OLD BALLANEE ROAD BALLAN 334	144° 13' 44.26" E	37° 35' 26.48" S	144.22896	-37.59069	4DEC
2269	10002331	Lancelin Township optus site 52281 Collins Way Lan	115° 20' 05.86" E	31° 00' 55.22" S	115.33496	-31.01534	4DEC
2402	10002464	Orford optus 35 monopole 1 Mary St Orford	147° 51' 57.6" E	42° 33' 59.11" S	147.866	-42.56642	4DEC
2448	10002510	Mount Direction optus monopole 71 Bullocks Head Ro	147° 00' 34.02" E	41° 14' 02.76" S	147.00945	-41.2341	4DEC
2491	10002553	DEVONPORT WEST Optus monopole 23 Hilcrest Rd, De	146° 19' 52.7" E	41° 11' 01.46" S	146.331305	-41.183738	4DEC
2697	10002760	Jolimont COW Optus cnr Alexandra Ave and Linlithgo	144° 58' 27.84" E	37° 49' 20.95" S	144.974401	-37.822485	4DEC
2736	100028	Optus Site Roebourne Road Reservoir OTAGO	147° 17' 52.12" E	42° 48' 04.51" S	147.29781	-42.801254	4DEC
2788	10002851	Optus COW temp site Alfred Street North Sydney 200	151° 12' 44.25" E	33° 50' 54.16" S	151.212291	-33.848379	4DEC
2800	10002863	Optus COW Alexandra Garden South Yarra	144° 58' 30.52" E	37° 49' 21.71" S	144.975144	-37.822696	4DEC
2801	10002864	Optus COW 41 Alfred Street South Milsom Point	151° 12' 42.05" E	33° 50' 49.78" S	151.21168	-33.84716	4DEC
2802	10002865	Optus COW, Port Macquarie Golf Course 698 Ocean Dr	152° 55' 00.88" E	31° 28' 53.54" S	152.91691	-31.48154	4DEC
2808	10002871	Batchelor optus tower 923 Batchelor Rd, Batchelor.	131° 02' 41.83" E	13° 02' 59.09" S	131.044954	-13.049747	4DEC
2809	10002872	Lake Bennett optus tower 5915 Sturt Highway, Coom	131° 08' 37.2" E	12° 59' 10.18" S	131.143666	-12.98616	4DEC

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

The screenshot displays the ICS Manager software interface. On the left, a tree view shows the hierarchy of resources, including Shared resources, Assignments, Broadcast LF/MF, Broadcast HF, Broadcast VHF/UHF, Coordination and notification for broadcast LF/MF, Coordination and notification for broadcast VHF/UHF, Earth stations, Coordination and notification for Earth stations, Microwave, Coordination for fixed, Other terrestrial stations, Yet other terrestrial stations, Coordination for mobile and other terrestrial, Maritime, Ships, Devices for ships, Ship equipments, Ship equipment frequencies, Aeronautical, Aircrafts, Devices for aircraft, Aircraft equipments, Aircraft equipment frequencies, Notification for fixed and mobile, and ITU-R. The main window shows a list of queries, with the selected query being 'Other terrestrial stations n°215 -- 77100023 - IFW SAS'. The details for this query are shown in the right pane, including the Radiocom system, POS_ADM_COD, MOB_Type2, Status OT, Network ident, and various parameters like 2C - Date of bringing into use, 2C - Date of end of use, 6A - Class of station, Administration (ITU-R), 6Z - Category of use, 7B - Class of operation, Owner, and Remarks. A dropdown menu for 'Code' is open, showing a list of codes and their descriptions, with 'BLR 3GHz' selected. The bottom of the interface shows buttons for 'Save and exit', 'Cancel and exit', and 'Save changes'.

ID	S.	Application	Ident	Power	Tx lowest hig...	Rx lowest hig...	Owner	Site name
215	0	BLR 3GHz	7710001	10 dBW	-	-	IFW SAS	VERNOU LA CELLE
216	0	BLR 3GHz	7710001	-0.1 dBW	-	-	IFW SAS	
217	0	BLR 3GHz	051107	8 dBW	-	-	ORANGE	S PIERRE
218	0	BLR 3GHz	051107	6.9 dBW	-	-	ORANGE	
221	0	BLR 3GHz	27-201	10 dBW	-	-	ALTITUDE WIREL	PONT AUDEMER
222	0	BLR 3GHz						
223	0	BLR 3GHz						
224	0	BLR 3GHz						
225	0	BLR 3GHz						
226	0	BLR 3GHz						
227	0	BLR 3GHz						
228	0	BLR 3GHz						
229	0	BLR 3GHz						
230	0	BLR 3GHz						
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257	0	BLR 3GHz						
258	0	BLR 3GHz						
259	0	BLR 3GHz						
260	0	BLR 3GHz						
261	0	BLR 3GHz						
262	0	BLR 3GHz						

Applications and Services

Technical parameters

Other terrestrial stations n°2897 - - ??? ???? ????????

General Process Frequencies Position Antenna Jamming Licenced devices Inspections ACMA Appears in Monitoring Attachments

SEC - Effective antenna height(m)

Max. C.

Azim. Eff. height

0° 10° 20° 30° 40° 50° 60°

15° 45° 25° 135°

DTM... Input...

Parameters

8A - Nominal power -14 dBW C.

Type of power

8B1 - Radiated power 26 dBW OK

8B2 - Reference

8AB - Max. power dens.

8ba - Pow. range ctrl

9A - Azimuth 0.00° from to

9B - Elevation 0.00° from to

9D - Polarization V - VERTICAL

9G - Gain 40 dB C.

9L - Tx Losses C.

9L - Tx Add. Losses 0 dB C.

9L - Rx Losses

9Y - Height AGL 30 m

Number of equipments

Radar

Vol. length Vol. altitude Rot. (tr/min)

Antenna model

Edit... Select... Detach

Code= 156
Name= / SOLID PARA /
Type=

Equipment conf. (Tx/Rx or Tx)

Edit... Select... Detach

Equipment conf (Rx only)

Edit... Select... Detach

Save and exit Cancel and exit Save changes

Administrative parameters

FM Station n°10769 Sydney -

Identification Administrative Process Position Coverage Signal Radiation Custom Licenced devices Inspections Monitoring Attachments

National

Status

Aeronautical U - Unknown

Remarks

Coordination

☒ Coordination or notification needed

Needed with...

Current Assignment Edit... Select... Detach

Search assignments...

Check compatibility...

Create assignment...

Modifies :

Edit... Select... Detach

Compare...

Modified by :

S. ID Ad... Frequency* Call s

< NOTHING >

Mast owner Edit... Select... Detach

Antenna owner Edit... Select... Detach

Save and exit Cancel and exit Save changes

Applications and Services

Location parameters

Sites for broadcast LF/MF/VHF/UHF n°2 - STOCKHOLM WENNERGREN

Position Consis Administrative History Custom Appears in Attachments

Identification

Code 000002 Aliases: 1

Name of site
STOCKHOLM WENNERGREN 20 chars Prefix...

Geographical coordinates

Metric (X,Y)

Longitude - Latitude
4 18° 03' 08" E 59° 21' 04.99" N

Reference
4DMS ... 18.03079987 59.21049881

Convert from... Convert to... Help...

Polygon

☐ Input vertex with the mouse ☒ Close the polygon

Details

Country S - Sweden S

Responsible administration S ITU Region 1

Altitude above sea level... 25 m OK 25 m

Radius ITU code

Dist. to border Out of map for all .FTR map files

Save and exit Cancel and exit Save changes

Frequency parameters

Assigned frequency ID=1222

Channel Custom

Frequencies

1A - Transmitting frequency 41.9 MHz 319 N ...

Tx offset to carrier

1Y - Receiving frequency

Rx offset to carrier

Class of station : FB

Administrative

Status

2C - Date of bringing into use 01 Jan 1982

2C - Date of End of use

Remark

MOBSTF_DAT1 13 Jan 1982

MOBSTF_DAT2 13 Jan 1982

Coordination

Assignment Edit... Select... Detach

FACSMAB meeting Edit... Select... Detach

Signal

Frequency* 380.125 MHz R.R...

System 1 - Mono (max dev. +/-)

Designation of emission 25K0F3EHN

Frequency Offset

Freq. plan Edit... Select... Detach OK

Code= TETRA2
Name= TETRA2

Plan channel 5 U

Search free channels...

Applications and Services

Antenna parameters

Antenna n°242

General | Patterns | History | Appears in | Attachments

Code: 0242 Aliases: 0

Manufacturer: THOMSON

Model: ANT ERA TRPP/TRVP13

Tech. ID No:

RPE Number:

ITU code: Slew angle:

Ant. category: Z - Autres cas

Device model: Edit... Select... Detach

Parameters

Type: F09 - Fouet

9D - Polarization: S - Single polarized (Vertical or Horizontal)

Rem. CONSTRUCTEUR (Source of data)

Memo

ETSI class: Directivity: ND - Non-Directi

C_Type of use: Performance

Physical

Diameter: Calculate...

Aperture Horz x Vert: x

Surf. Area:

Scanning Method: Scan /mn

Tracking Method:

Frequency Range

Lower: 26000 kHz Upper: 72 MHz

9G - Gain

Reference: I - Isotropic (Gi)

Low band: 0 dB Mid band: 0 dB High band:

Calc...

Front to back atten. XPD

Radom attenuation:

9C - Half-Power Beamwidth

Horizontal: Vertical:

Calc...

Save and exit Cancel and exit Save changes

Equipment parameters

Equipment configurations for fixed n°9

Administrative | Technical | More technical | Masks | ACMA | History | Appears in | Attachments

8- Power

Minimum Typical Maximum Licence option

Peak envelope power:

8B3 - ATPC: 0 dB C.

7A - Tuning step:

7A - Frequency stability:

Pulse rise time (ns):

Intermediate frequency

Tx: Rx 1: Rx 2:

Frequency separation

Minimum Maximum

Duplex:

Diversity:

Adjacent:

Spurious emissions

Tx Power Spectral Density PSD

Device Name: Modulation: Subband (MHz): 30 - 30000 Date: Author: Number of points: 99 IRF Tx Name: equip 1

Rx Rejection Filter RF

Device Name: Modulation: Subband (MHz): 30 - 30000 Date: Author: Number of points: 59 IRF Rx Name: equip 2

Save and exit Cancel and exit Save changes

Applications and Services

Technical Analysis

ICS Manager - C:\ATDI\ICS Manager_8.4.12Nkom\Dev (Database1) - [<Dossier FH5>]

File FCC Follow-Up Planning **Control** Licencing Type Approval Broadcast LF/MF Broadcast VHF/UHF Space services CAF-ES Fixe

Queries

- <Supports1>
- <Supports (Request)1>
- <Supports2>
- <Other terrestrial station>
- <Dossier FH1>
- <Employees1>
- <ANFR1>
- <HTZ Bands/Queues1>
- <Customers1>
- <Customers2>
- <HTZ Evaluations1>
- <HTZ Evaluations2>

Control menu:

- New Query (Monitoring)...
- Argus Board...
- Argus Connection...
- New Query (Inspections)...
- New Query (Complaints)...
- Search for Free frequency...
- New Query (Technical analysis)...**
- HTZ Service status...
- HTZ Servicing...
- Scorpio >

ID	Perso...	Date A...	Référence ...	Référence opérateur
11	JOHANN	05 Fév 20	A0800539	DII/SGDS/017/08/SP
17		10 Jul 20	DII/SGDS/17	
10		30 Jan 20	A0800439	DII/SGDS/016/08/SP
11		01 Fév 20	DII/SGS/018	
13		18 Mar 20	A0800539 +	DII/SGDS/017/08/SP
12		21 Fév 20	A0800836	DII/SGDS/025/08/SP
12		21 Fév 20	A0800835	DII/SGDS/024/08/SP
11		14 Fév 20	A0800720	DII/SGDS/041/08/SP
14		16 Mai 20	DII/SGDS/17	
17		10 Jul 20	DII/SGDS/17	
1405	TELEDIFFUSION D LADD - Application	10 Avr 20	A0800720 +	DII/SGDS/041/08/SP
2046	TELEDIFFUSION D LMOD - Application	20 Oct 20	DII/SGDS/20	
1414	TELEDIFFUSION D LSUP - Application	16 Avr 20	DII/SGDS/09	
1338	TELEDIFFUSION D LADD - Application	25 Mar 20	A0801373	DII/SGDS/067/08/SP
1256	TELEDIFFUSION D LADD - Application	05 Mar 20	A0801039	DII/SDGS/043/08/SP

Applications and Services

Technical Analysis

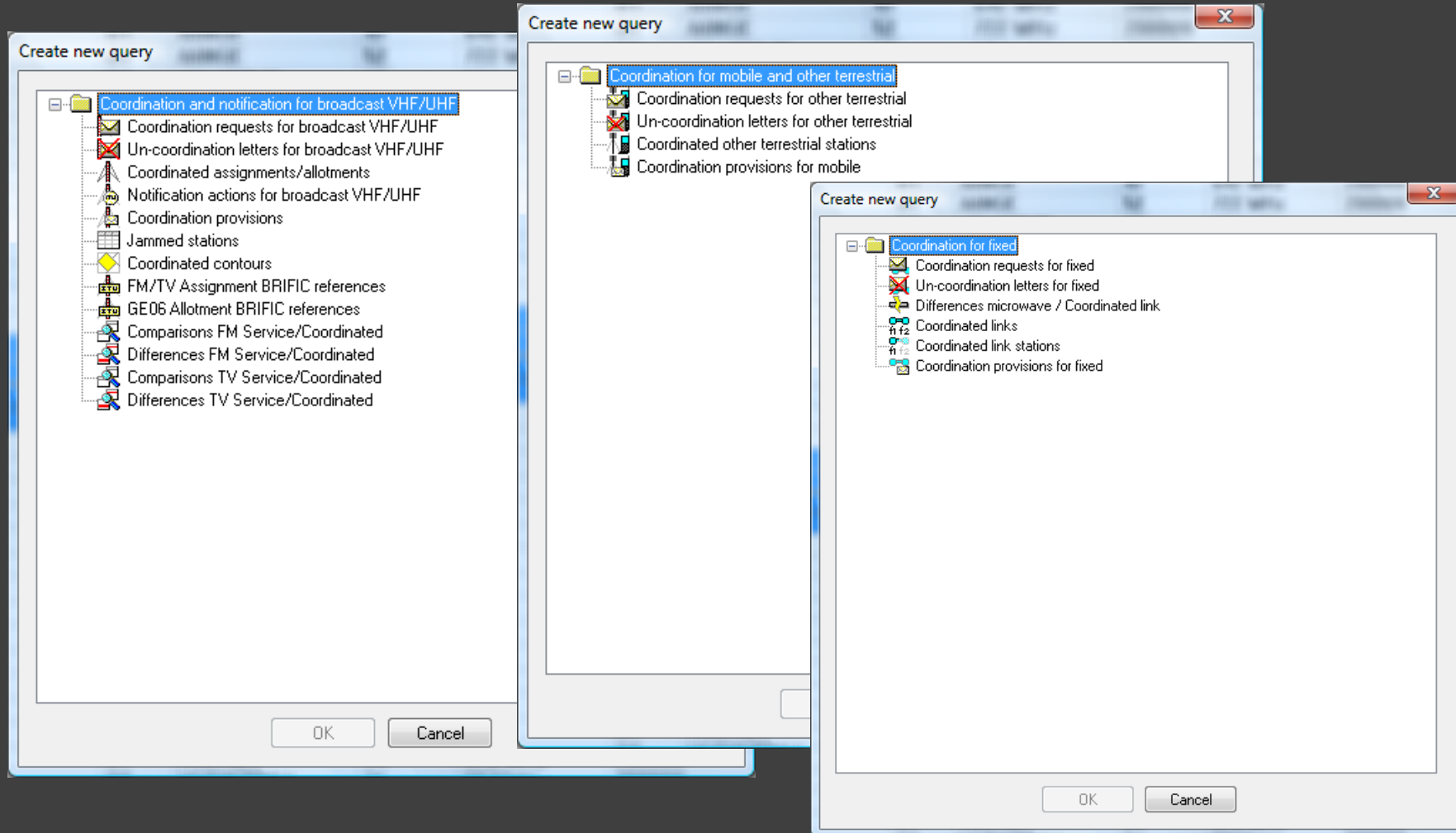
S1	357	TD000007	BAR LE DUC FLANDRES	WILLERONCOURT CROIX PAJO			8066.7 MHz	
S1	358	TD000008	WILLERONCOURT CROIX PAJO	PRENY			8066.7 MHz	
S1	359	TD000009	ARRAS DEGEORGE	BOUVIGNY BOYEFFLES			8066.7 MHz	
S1	361	TD000011	BOISSY SOUS S YON	LES LILAS FT DE ROMAINVILLE			8066.7 MHz	
S1	363	TD000013	BOULIAC 2	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	PLOI			8066.7 MHz	
S1	396	TD000046	HAUTVILLERS	SOM			8066.7 MHz	
S1	397	FR3000256	HAUTVILLERS	REIM			8066.7 MHz	
S1	399	TD000049	GR COURONNE	HAL			8066.7 MHz	
S1	401	TD000051	S BARTHELEMY MORNE LURIN	S M			8066.7 MHz	
S1	402	TD000052	GISY LES NOBLE	CHE			8066.7 MHz	
S1	403	TF1000004	S JULIEN MT DENIS CHANETS	S VAL			8066.7 MHz	
S1	404	TD000054	S LAURENT DU MARONI VILO	MAN			8066.7 MHz	
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 PII			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	

ARCEP...
Calcul des redevances...
Autorisation initiale de durée...
Edit record...
Duplicate Record...
Delete Record
New Record...
Query...
Copy Cell
Search >
Batch update >
Coordination >
FNF >
CAF >
Print...
Create reminder...
Report...
Input by report...
Export >
Refresh
Select all

Record...
Potential interferences...
Constraint violations...
Duplicates...

Applications and Services

Technical Analysis



Applications and Services

Approval process

ICS Manager_8.4.12Nkom\Dev (Database1) - [<Dossier FH5>]

Planning Control Licencing Type Approval Broadcast LF/MF Broadcast VHF/UHF Space services CAF-ES Fixed CAF-MW Other Terrest. CAF-Mob FNF COMSIS Whitespace Analysis Tools Configuration

ID	Titulaire	Type	Perso...	Date A...	Référence ...	Référence opérateur
1149	TELEDIFFUSION C LADD - Application	JOHANI	05 Fév 20	A0800539	DII/SGDS/017/08/SP	
1739	TELEDIFFUSION C LADD - Application		10 Juil 20	DII/SGDS/17		
1096	TELEDIFFUSION C LADD - Application		30 Jan 20	A0800439	DII/SGDS/016/08/SP	
1130	TELEDIFFUSION C LADD - Application		01 Fév 20	DII/SGDS/016		
1321	TELEDIFFUSION C LADD - Application		18 Mar 20	A0800539	DII/SGDS/017/08/SP	

Dossier FH n°1149

General Initial Deed Microwave links Deeds Process Attachments

Microwave links listed in the initial deed :

Search and attach other microwave links...

Report deeds...

Report links/deeds...

Event date	Status	Status Nom	Frequency A	Station A	Frequency B	Station B
05 Fév 2008	S2a - I TD00293	8412 MHz	BORMES LES MIMOSAS	8204 MHz	SIX FOURS LES PLAGES	

Changer le statut

Statut principal

☒ Change en : - Import

Statut secondaire

☒ Change en :

Remarque

Statut principal change en

Statut secondaire change en

OK

C0 - Data to be completed
C1 - To be validated
C2 - Incomplete, waiting for data
D0 - Data to be restored in previous state
D11 - Modification Cancelled (No Answ.)
E0 - To be done
E11 - Treatment done(Non Answ.)
ENR - (Autorisation non recorded)
R0 - Application for renewal received
RNI - Application for renewal denied(Non Answ.)
RY1 - Renewal application accepted(Non Answ.)
S01 - Denied (Non Answ.)
S11 - Canceled (Non Answ.)
S2a - Expiration to be transmitted

Save and exit Cancel and exit Save changes

Applications and Services

Outgoing coordination

The screenshot displays the ATDI interface for 'Outgoing coordination'. On the left, a sidebar lists various data sources, with '<Coordination requests>' highlighted in a red box. The main panel shows the 'Assignments' section, which includes a dropdown for 'Owned by' (set to 'G - Ur'), a dropdown for 'Coordinated with' (set to 'F - France'), and a list of countries. The 'File to generate' section includes a 'Path' field and a 'Header data' field with an 'Edit header...' button.

Assignments

Owned by: G - Ur

Coordinated with: F - France

Additional restrictions, order:

File to generate:

Path:

Header data: Edit header...

Country List:

- F - France
- FIN - Finland
- FJI - Fiji (Republic of)
- FSM - Micronesia (Federated States of)
- G - United Kingdom of Great Britain and Northern Ire
- GAB - Gabonese Republic
- GEO - Georgia
- GHA - Ghana
- GMB - Gambia (Republic of the)
- GNB - Guinea-Bissau (Republic of)
- GNE - Equatorial Guinea (Republic of)
- GRC - Greece
- GRD - Grenada
- GTM - Guatemala (Republic of)
- GUI - Guinea (Republic of)
- GUY - Guyana
- HND - Honduras (Republic of)
- HNG - Hungary
- HOL - Netherlands (Kingdom of the)
- HRV - Croatia (Republic of)
- HTI - Haiti (Republic of)
- I - Italy
- IND - India (Republic of)
- INS - Indonesia (Republic of)
- IRL - Ireland
- IRN - Iran (Islamic Republic of)
- IRQ - Iraq (Republic of)
- ISL - Iceland
- ISR - Israel (State of)
- ITU - ITU (International Telecommunication Union)

Allocations

Contents... Zoom 1 Refresh (G=Government exclusive, C=Civilian exclusive, S=Shared) Quit

Reg 1
ITU

Selected band

ITU, region 123
137 MHz - 137.025 MHz

5.204
5.205
5.206
5.207
5.208

SM-S - MBE
SO-S - EXE
SR-S - REE
SW-S - AEE
f - fix
mxr - mxr

Selected service

No service selected

5.206 : Different category of service: in Armenia, Azerbaijan, Belarus, Bulgaria, Egypt, the Russian Federation, Finland, France, Georgia, Greece, Kazakhstan, Lebanon, Moldova, Mongolia, Uzbekistan, Poland, Kyrgyzstan, the Syrian Arab Republic, Slovakia, the Czech Rep., Romania, Tajikistan, Turkmenistan and Ukraine, the allocation of the band 137-138 MHz to the aeronautical mobile (OR) service is on a primary basis (see No. 5.33). (WRC-2000)

Applications and Services

Reporting and Record Keeping

Reporting (custom templates)

ICS Manager - D:\ownCloud\ATDI PTY\1- Customer demo\Transport NSW\RLDB - [Optus licenses]

File Follow-Up Planning Control Licencing Fixed Other Terrest. COMSIS Analysis Tools Configuration Window Help

Queries

- Clients
- Sites
- Active licenses by Sydney train
- <Network licences2>
- Transport NSW Spectrum
- Antennas
- Employees
- DTRS
- DTRS Licenses
- 1800 Devices
- <Microwave links1>
- DTRS sites
- <All sites1>
- Optus

ID	Status	Type	Type description	Radiocom syst...	* Owner
25376	Gran	Fixed	Point to Point		Optus Mobile Pty Limited
11748	Gran	Fixed	Point to Point		Optus Mobile Pty Limited
11746	Gran	Fixed	Point to Point		
11750	Gran	Fixed	Point to Point		
11751	Gran	Fixed	Point to Point		
11752	Gran	Fixed	Point to Point		
11753	Gran	Fixed	Point to Point		
11754	Gran	Fixed	Point to Point		
11755	Gran	Fixed	Point to Point		
11749	Gran	Fixed	Point to Point		
11787	Gran	Fixed	Point to Point		
11789	Gran	Fixed	Point to Point		
11790	Gran	Fixed	Point to Point		
11786	Gran	Fixed	Point to Point		
25410	Gran	Fixed	Point to Point		
25422	Gran	Fixed	Point to Point		
25417	Gran	Fixed	Point to Point		

Merge records...
Delete Selection...
New Record...
Query... F2
Search >
Batch update >
Print...
Create reminder...
Report...
Input by report...

Reporting (custom templates)

report - Compatibility Mode - Saved

File Home Insert Design Layout References Mailings Review View Help

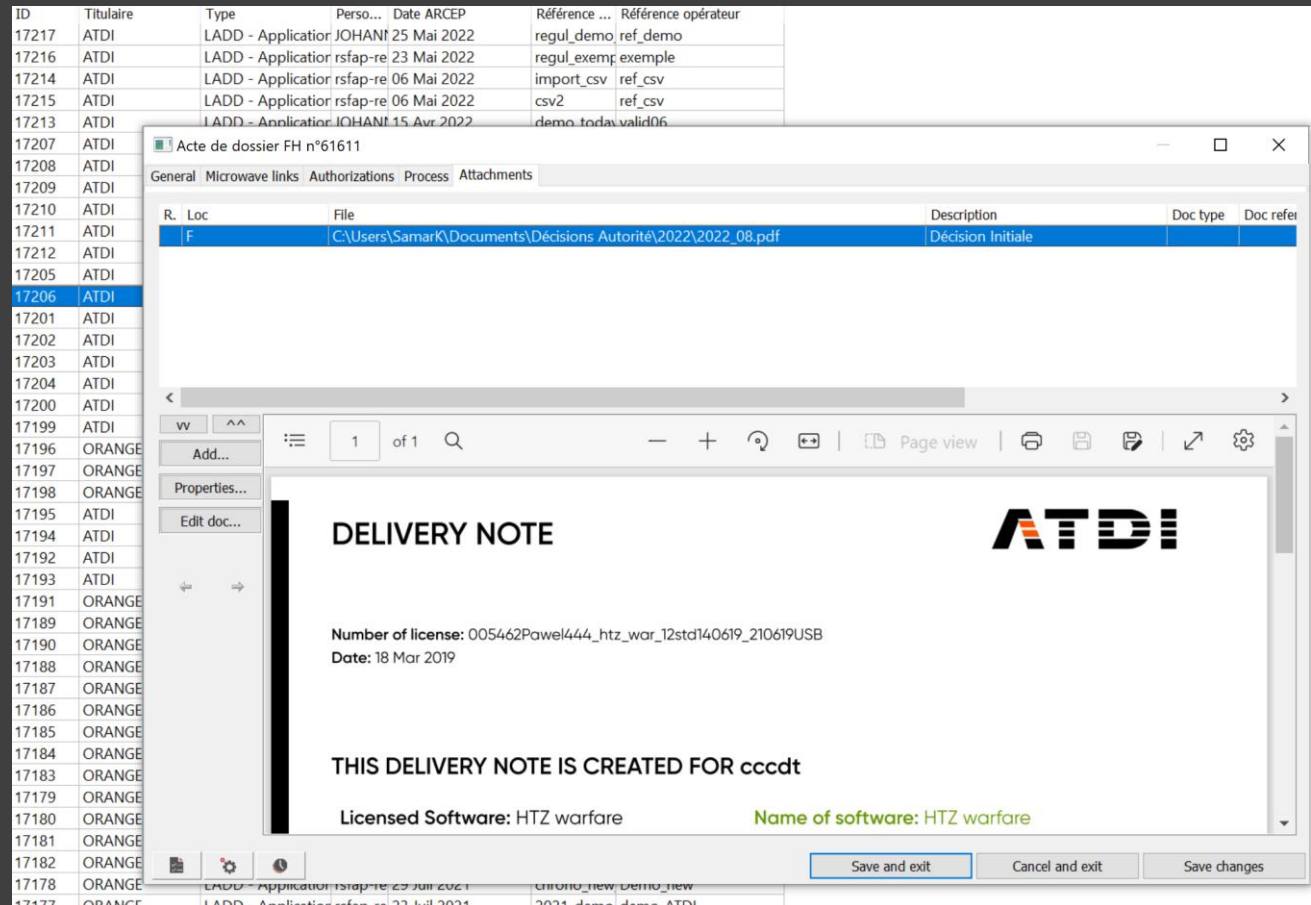
License reporting

Client number	20017363
Licensee	Optus Mobile Pty Limited
License type	Fixed

License number:	10342795/1
Start date:	08 Dec 2017
Stop date:	07 Dec 2018
Fees:	
Client number	20017373
Licensee	Optus Mobile Pty Limited
License type	Fixed

Applications and Services

Reporting and Record Keeping



The screenshot displays the ATDI software interface. On the left, a table lists applications with columns for ID, Titulaire, Type, Perso..., Date ARCEP, Référence..., and Référence opérateur. The table contains several rows, with row 17206 highlighted. On the right, a window titled 'Acte de dossier FH n°61611' is open, showing a detailed view of a delivery note. The window has tabs for General, Microwave links, Authorizations, Process, and Attachments. The 'General' tab is active, showing a table with columns for R. Loc, File, Description, Doc type, and Doc refer. The table contains one row with the file 'C:\Users\SamarK\Documents\Décisions Autorité\2022\2022_08.pdf' and description 'Décision Initiale'. Below the table, there is a section titled 'DELIVERY NOTE' with the ATDI logo. The text in this section includes: 'Number of license: 005462Pawel444_htz_war_12std140619_210619USB', 'Date: 18 Mar 2019', 'THIS DELIVERY NOTE IS CREATED FOR cccdt', 'Licensed Software: HTZ warfare', and 'Name of software: HTZ warfare'. At the bottom of the window, there are buttons for 'Save and exit', 'Cancel and exit', and 'Save changes'.

ID	Titulaire	Type	Perso...	Date ARCEP	Référence ...	Référence opérateur
17217	ATDI	LADD - Applicatio	JOHANI	25 Mai 2022	regul_demo	ref_demo
17216	ATDI	LADD - Applicatio	rsfap-re	23 Mai 2022	regul_exemp	exemple
17214	ATDI	LADD - Applicatio	rsfap-re	06 Mai 2022	import_csv	ref_csv
17215	ATDI	LADD - Applicatio	rsfap-re	06 Mai 2022	csv2	ref_csv
17213	ATDI	LADD - Applicatio	JOHANI	15 Avr 2022	demo_today	valid06
17207	ATDI					
17208	ATDI					
17209	ATDI					
17210	ATDI					
17211	ATDI					
17212	ATDI					
17205	ATDI					
17206	ATDI					
17201	ATDI					
17202	ATDI					
17203	ATDI					
17204	ATDI					
17200	ATDI					
17199	ATDI					
17196	ORANGE					
17197	ORANGE					
17198	ORANGE					
17195	ATDI					
17194	ATDI					
17192	ATDI					
17193	ATDI					
17191	ORANGE					
17189	ORANGE					
17190	ORANGE					
17188	ORANGE					
17187	ORANGE					
17186	ORANGE					
17185	ORANGE					
17184	ORANGE					
17183	ORANGE					
17179	ORANGE					
17180	ORANGE					
17181	ORANGE					
17182	ORANGE					
17178	ORANGE					
17177	ORANGE					

Applications and Services

Illustrative example: In-coordination/out-coordination procedure

The image displays two software windows from the ATDI Automated Battlespace Spectrum Management application.

The top window, titled "In-coordination request", contains the following fields and options:

- Request:**
 - Administration: UAE - Unit
 - Reference: FMC34T
 - Date: 29 Apr 2006
- Destination:**
 - Administration: OMA - Orr
- Service:**
 - FM - Broadcast FM (selected)
 - FM - Broadcast FM
 - T-DAB - Broadcast T-DAB
 - TVA - Broadcast TV (analogue)
 - TVD - Broadcast TV (digital)

Below the main form, there are two tabs: "Coordination Request" and "Cancellation Request". A tooltip for the "Coordination Request" tab lists the following services:

- Coordination for fixed link
- Coordination for broadcast VHF/UHF
- Coordination for broadcast LF/MF
- Coordination for other services

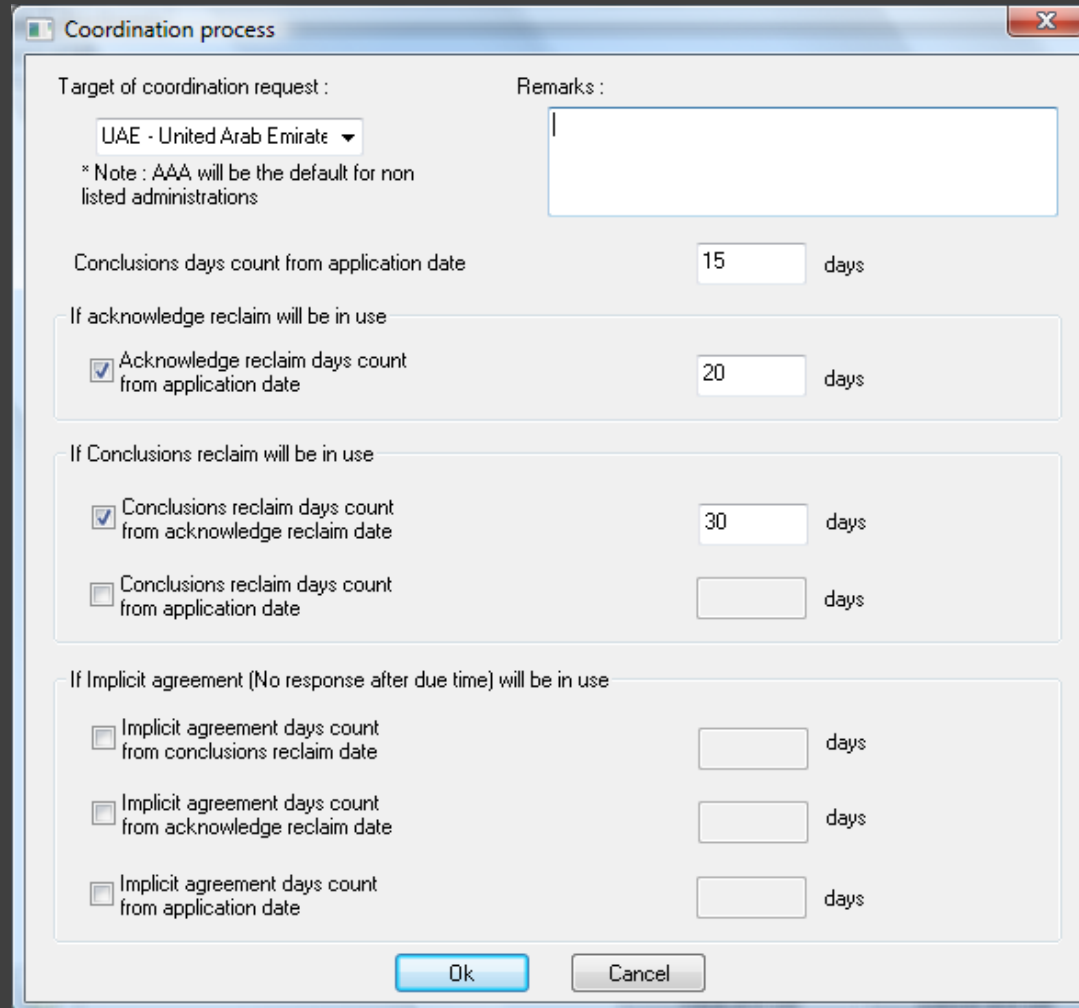
The bottom window, titled "Coordination parameters", contains the following fields and options:

- Coordination reference:** COORD * See online help
- Coordination date:** 26 Sep 2004 (dropdown) and Today! (button)
- Coordinating administration:** S - Sri (dropdown)
- Also in behalf of:** .. (text field)
- Administration unique identifier:**
 - ☐ Automatic generation if missing
 - Prefix: (text field)
 - Number of digits: (text field)
 - Suffix: (text field)

At the bottom of the "Coordination parameters" window are three buttons: OK, Cancel, and Help.

Applications and Services

Illustrative example: Definition of coordination rules



The screenshot shows a 'Coordination process' dialog box with the following fields and options:

- Target of coordination request :** A dropdown menu showing 'UAE - United Arab Emirate'. Below it, a note states: '* Note : AAA will be the default for non listed administrations'.
- Remarks :** A large empty text area.
- Conclusions days count from application date**: A text box containing '15' followed by 'days'.
- If acknowledge reclaim will be in use**: A section containing a checked checkbox for 'Acknowledge reclaim days count from application date' and a text box containing '20' followed by 'days'.
- If Conclusions reclaim will be in use**: A section containing two options:
 - A checked checkbox for 'Conclusions reclaim days count from acknowledge reclaim date' and a text box containing '30' followed by 'days'.
 - An unchecked checkbox for 'Conclusions reclaim days count from application date' and an empty text box followed by 'days'.
- If Implicit agreement (No response after due time) will be in use**: A section containing three unchecked checkboxes, each followed by a text box and 'days':
 - 'Implicit agreement days count from conclusions reclaim date'
 - 'Implicit agreement days count from acknowledge reclaim date'
 - 'Implicit agreement days count from application date'
- Buttons**: 'Ok' and 'Cancel' buttons at the bottom.

To specify the particular coordination practice of each Administration:

- acknowledge reclaim,
- conclusions reclaim,
- implicit agreement...

Applications and Services

Illustrative exemple: Coordination task follow-up

Coordination tasks

Administration: ROU - Rome

In coordination

* Task	* Task	Deadline	From	Serv.	ID
	Q - Result must be sent		UKR	FIX	2

Out coordination

* Task	* Task	Deadline	Ta...	Serv.	ID
< NOTHING >					

Default queries

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

Additional needed Coordinations

Coordination needed with following list of administrations :

D,SUI,F

OK Annuler

Applications and Services

Illustrative example: Coordination conclusions

The 'Input parameters' dialog box contains the following fields and options:

- Reference of conclusion: RFUAE-FM
- Date of conclusion: 30 Apr 2006
- Conclusion: C - Agreed without reservation
- Remarks: C - Agreed without reservation
E - Agreed on a non interference basis
G - Agreed, without any reservation to interference which may be caused by the a
H - Agreed with reservation (E+G)
Z - Request for agreement refused

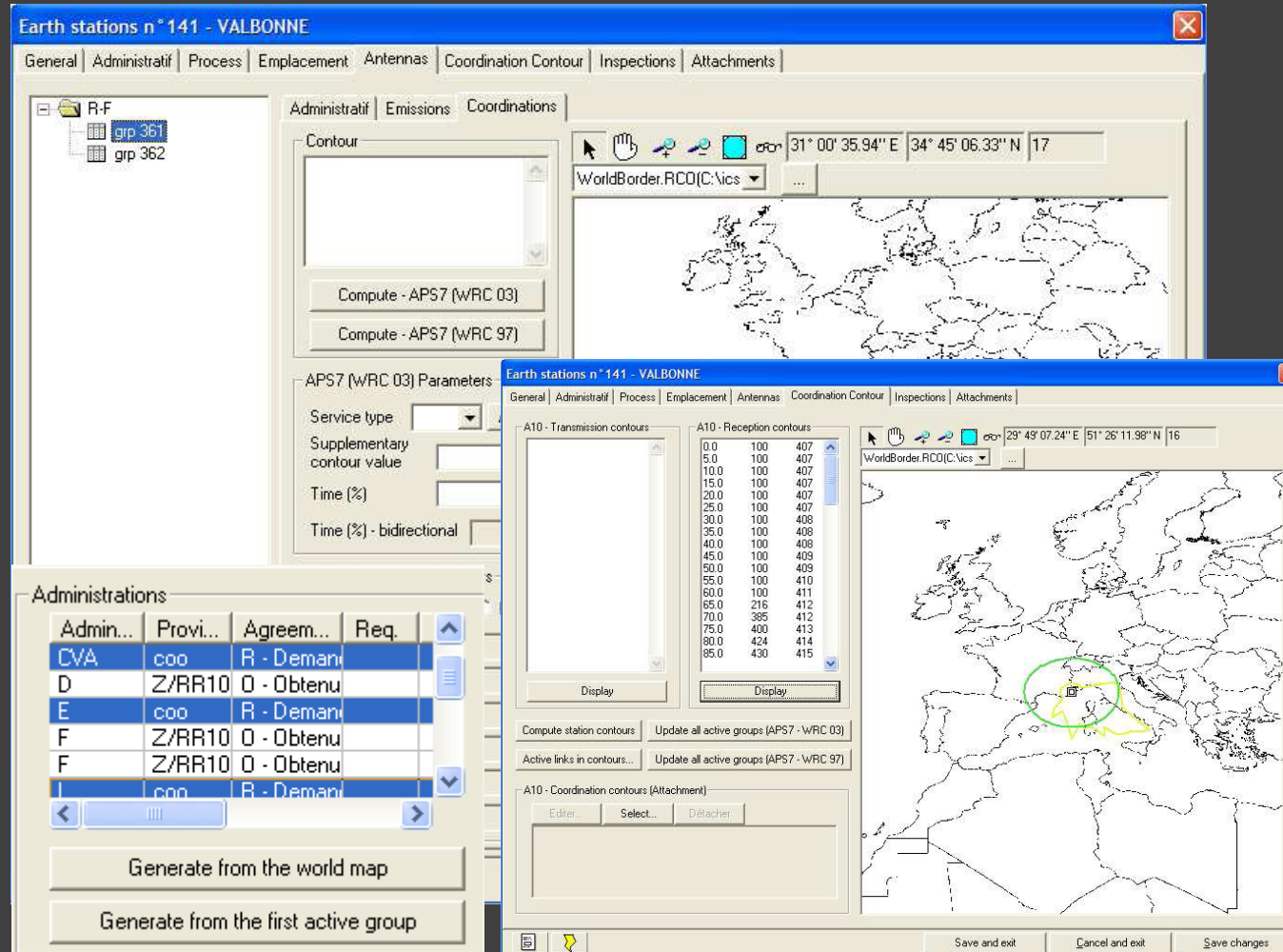
The 'Last conclusion' dialog box contains the following fields and options:

- Reference: SDD
- Date: 07 Jul 2009
- Initial deadline: 22 Jul 2009
- Remarks: (Empty text area)
- Buttons: Report conclusions..., Out of time..., Input conclusions..., Print conclusions...
- Checkbox: ☒ Full conclusion sent

Report, input, and
print conclusions

Applications and Services

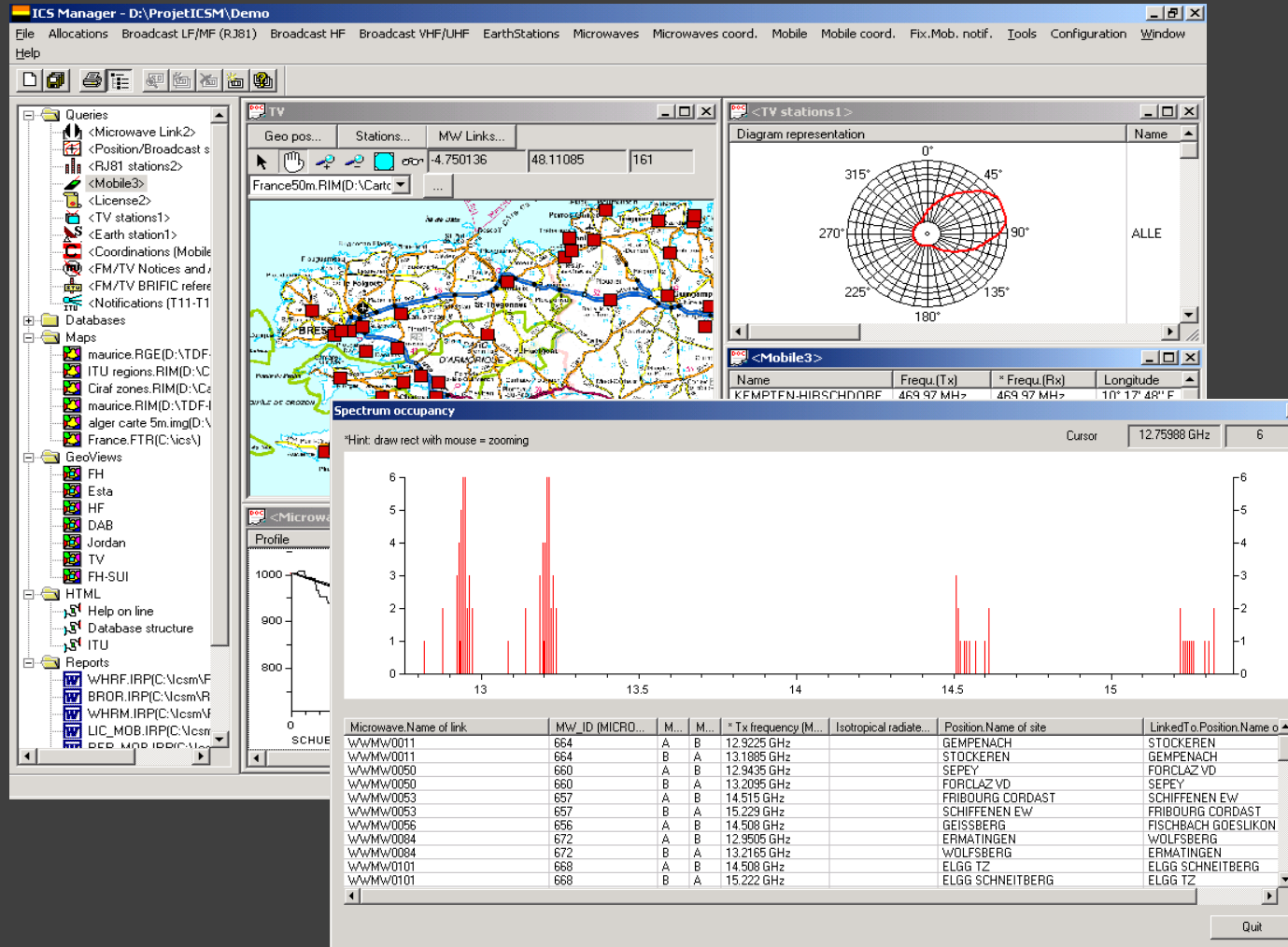
Illustrative example: Models/ Calculation modules



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

Applications and Services

Data Display

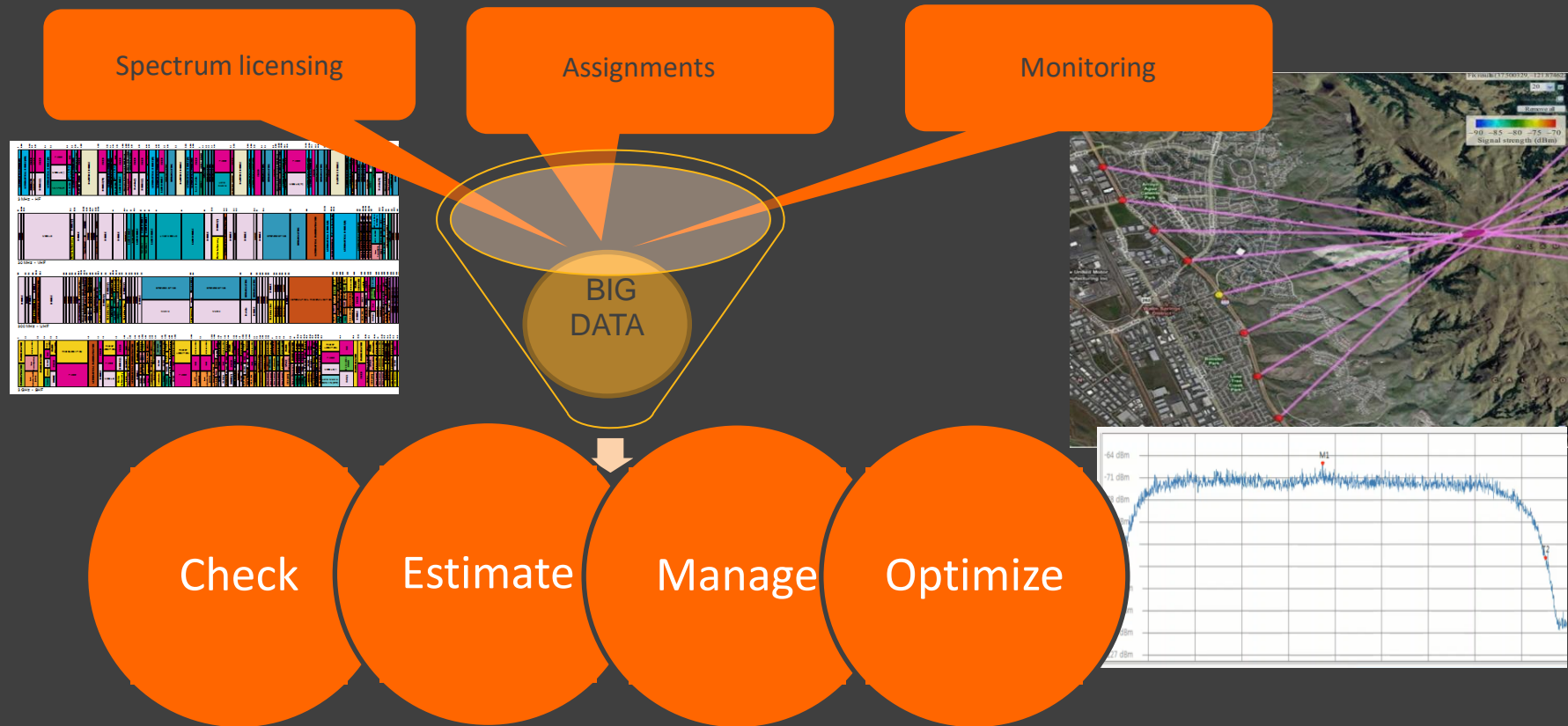


- Multiple list views;
- Formatting;
- Filtering and sorting;
- Statistics;
- Spectrum views

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



INSPECTION

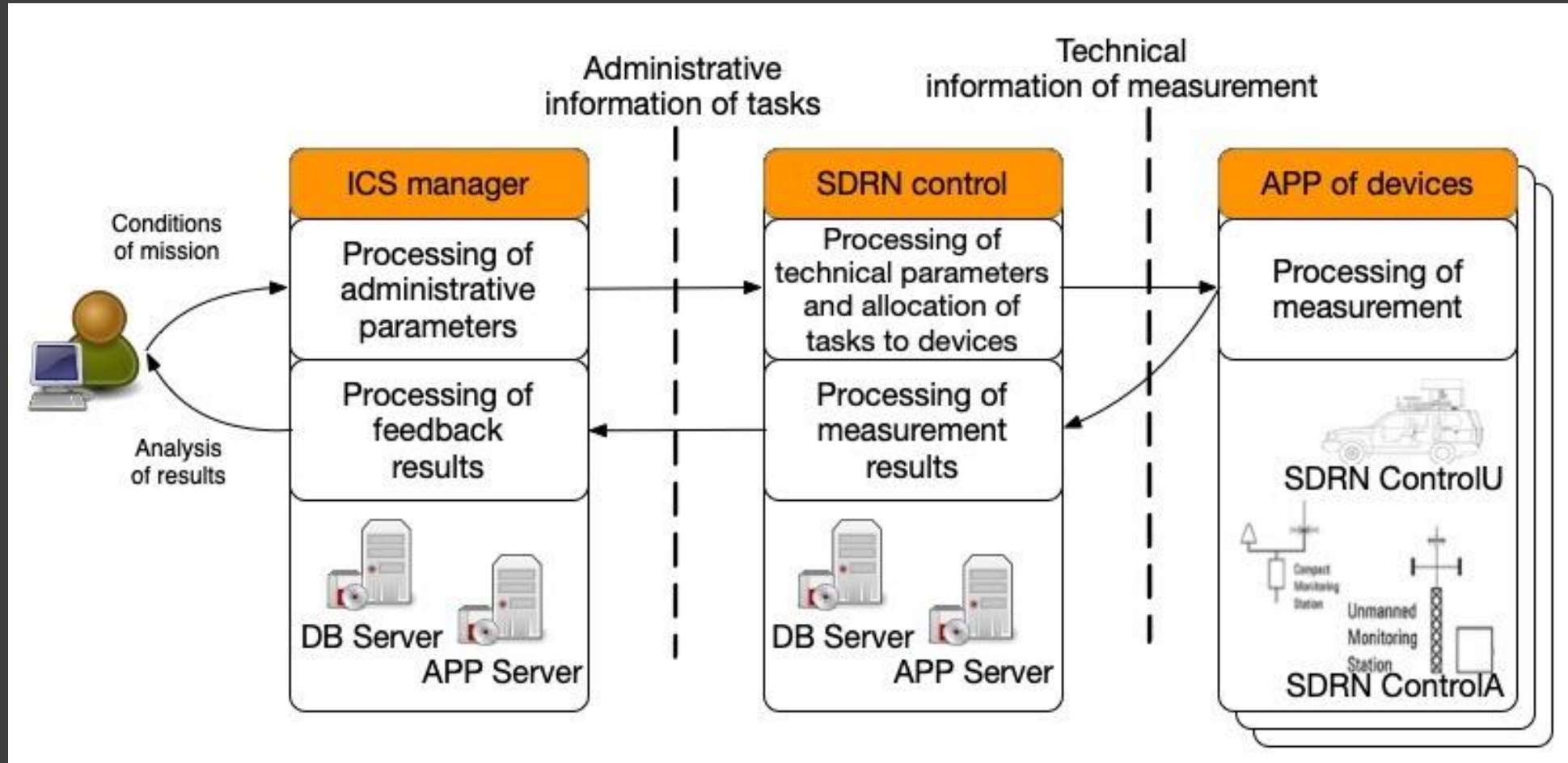


MONITORING

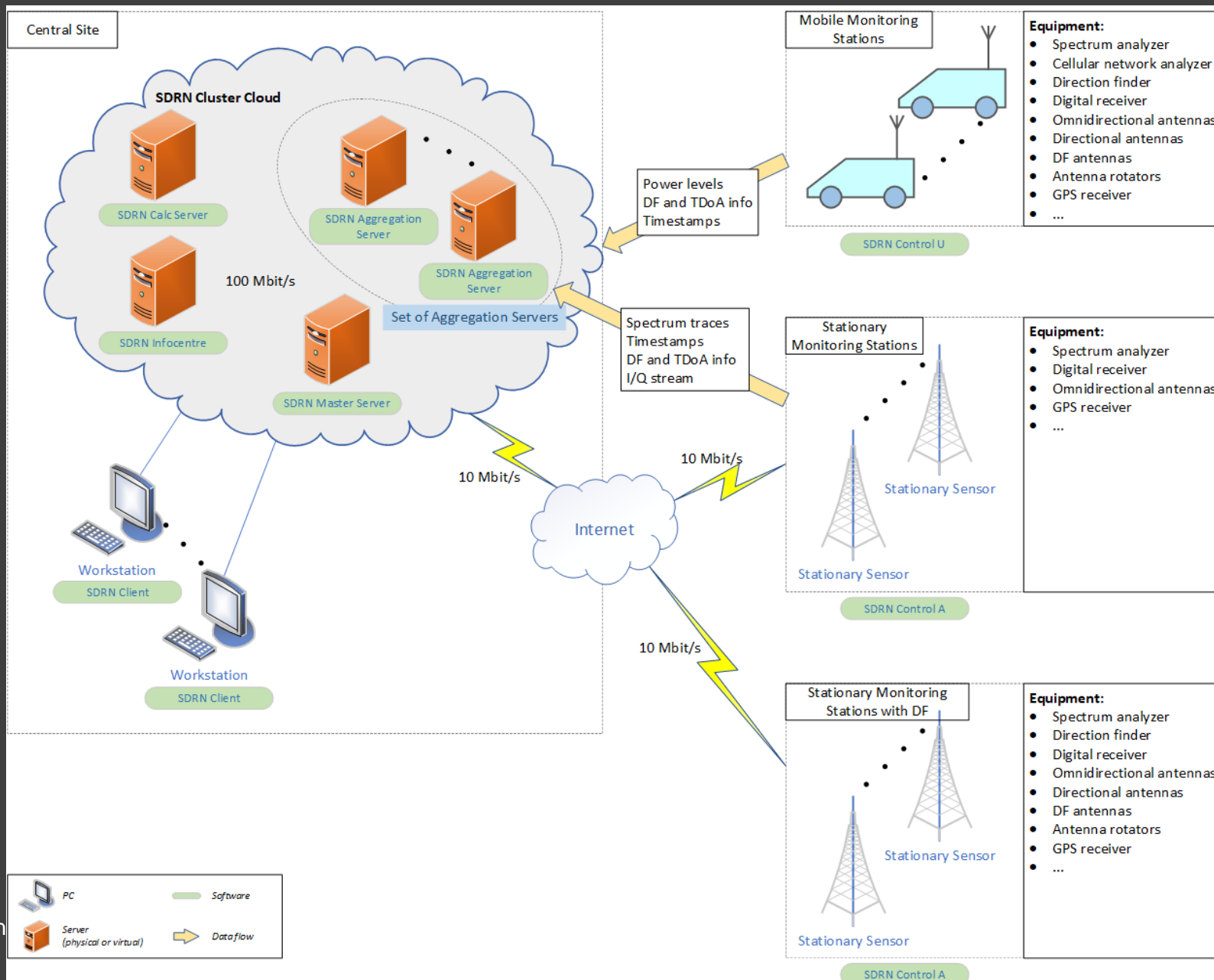


SPECTRUM EFFICIENCY

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



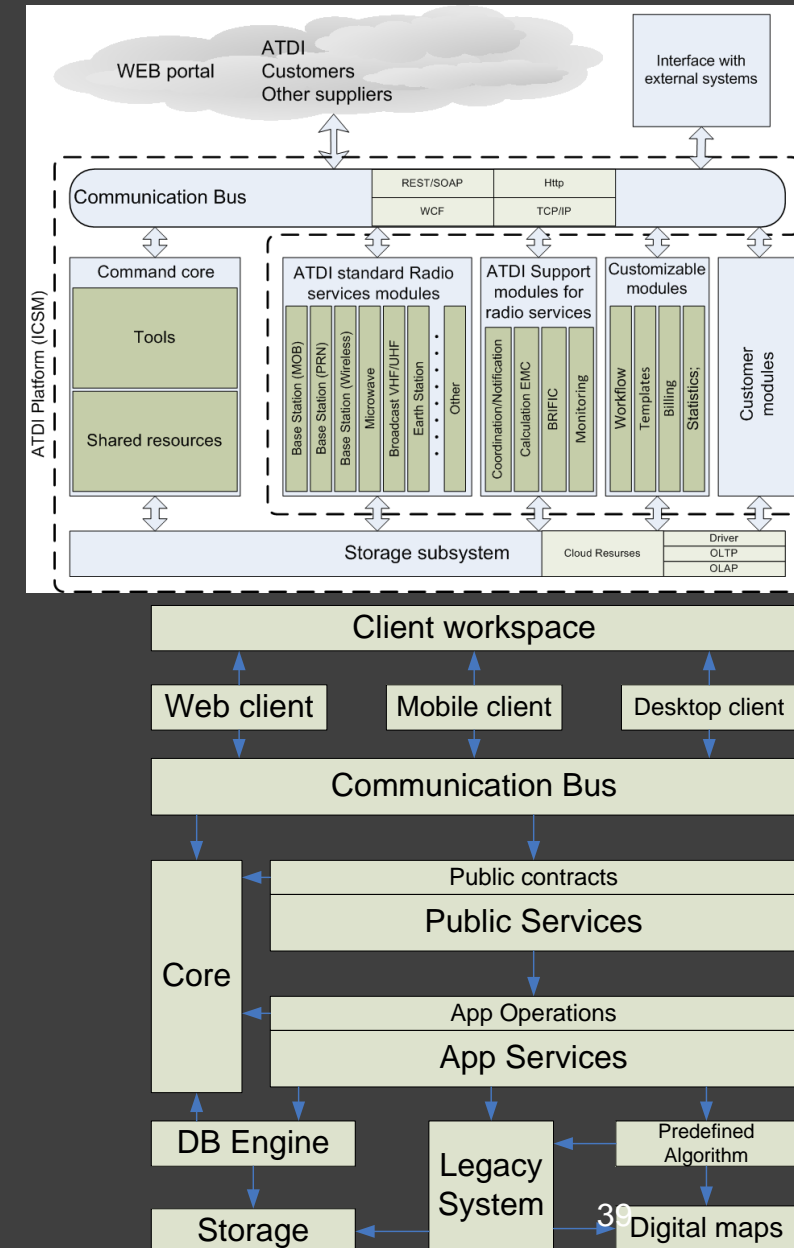
SOA ARCHITECTURE:

- **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:

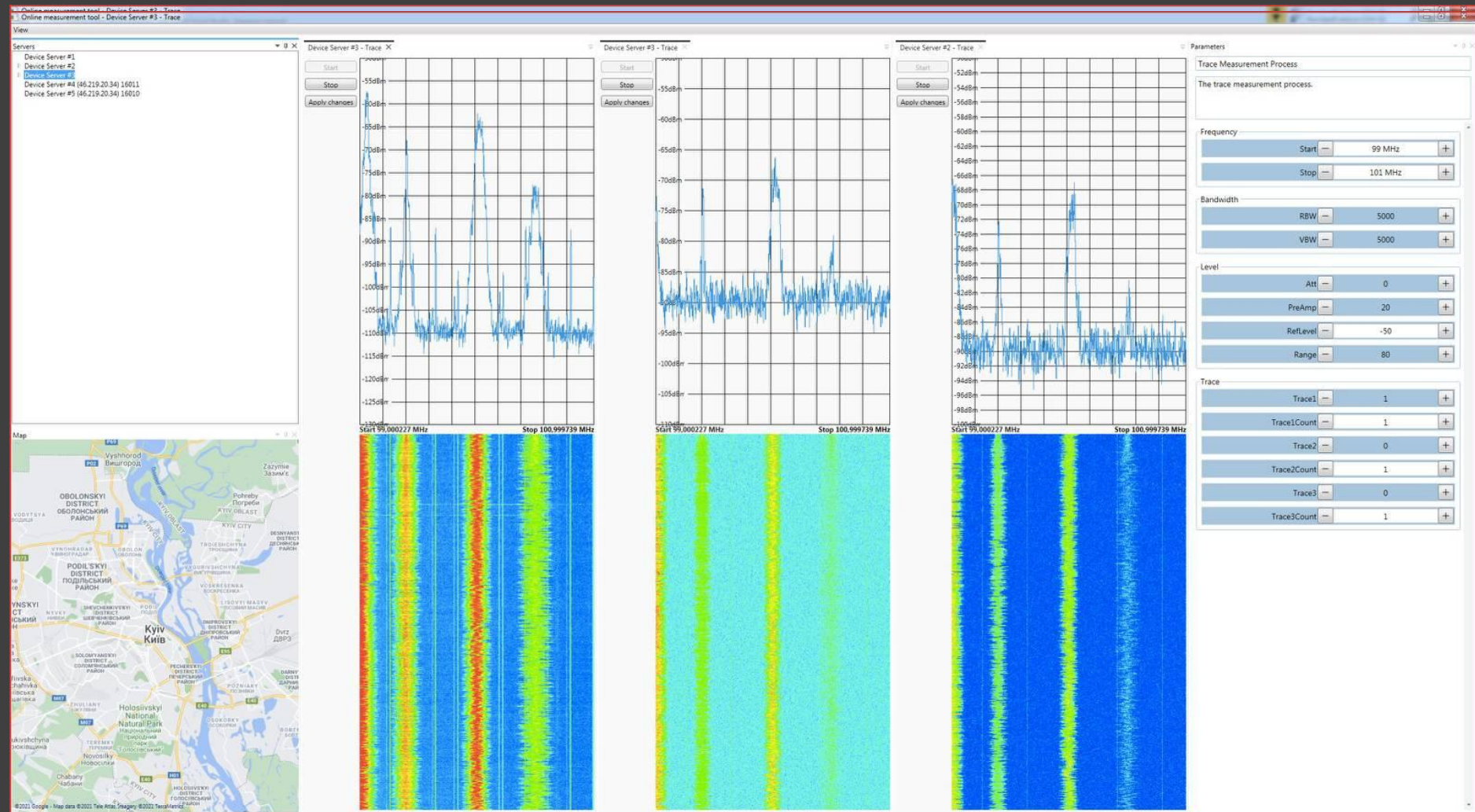
- **PUBLIC SERVICES** - A SELECTION OF COMPONENTS FOR THE WCF / REST SERVICES
- **APP OPERATIONS** - A SET OF COMPONENTS FOR IMPLEMENTING INTERFACES FOR USER-DEFINED FUNCTIONS
- **CORE** - AN APPLICATION SERVICE FOR MANAGING COMPONENTS HOSTING AND PUBLISHING DI (DEPENDENCY INJECTION) CONTAINERS

ATDI | Automated Battlespace Spectrum Management



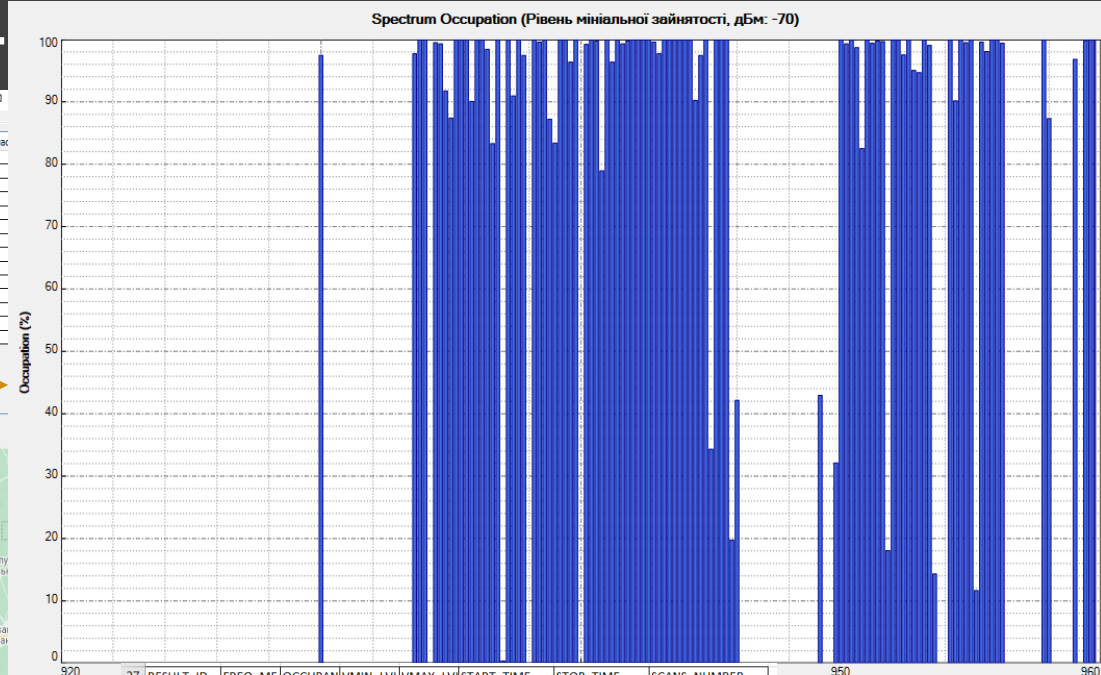
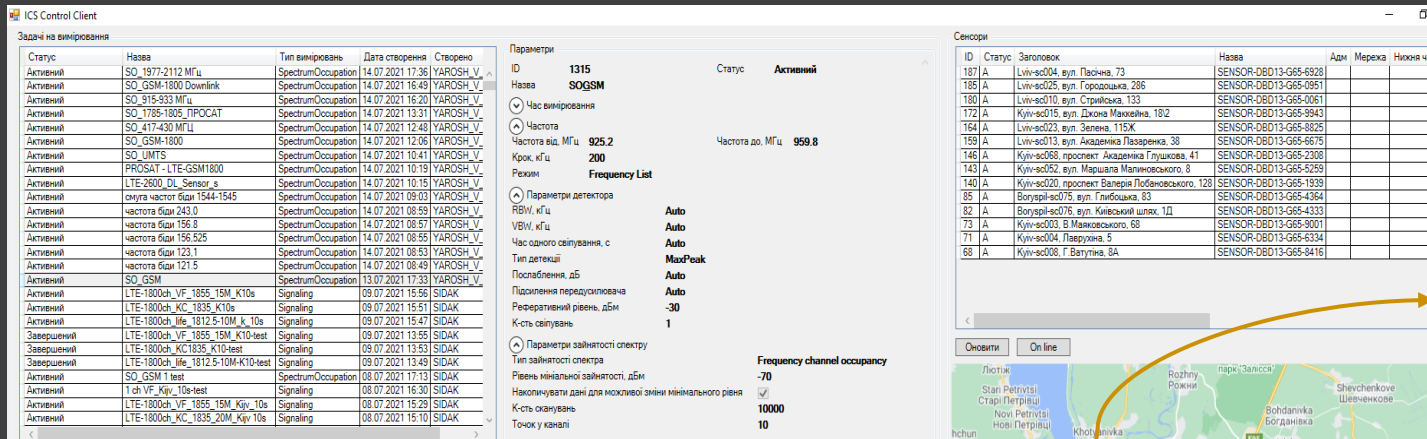
ICS MONITORING/SDRN CONTROL: HIGH PERFORMANCE MULTITASK MEASUREMENTS

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



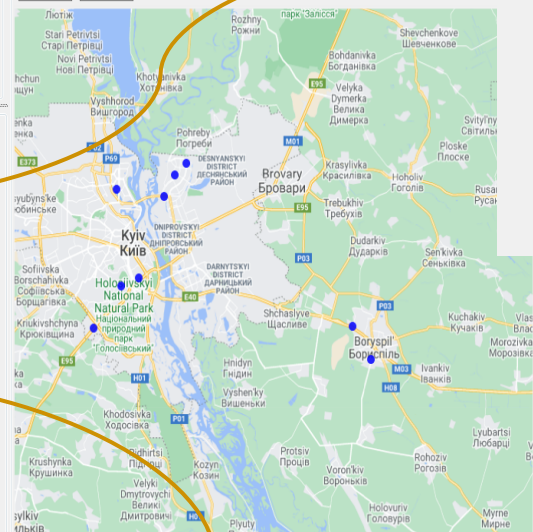
<https://www.youtube.com/watch?v=m2yjexC5d4o>

SPECTRUM OCCUPATION MEASUREMENTS WITH ICS MONITORING-SDRN CONTROL



Результати

ID	Task ID	Сенсор	Час вимірювання	SA Task ID	Мережа	Мінімум, МГц	Максимум, МГц	К-сть каналів	К-сть співмірня	Станція
965792	1315	N	14.07.2021 08:47	62003	Kyiv-ec015, вул. Дікона Максимівна, 182	925.2	999.8	0	0	
965791	1315	N	14.07.2021 08:46	62003	Liv-ec010, вул. Стрийська, 133	925.2	999.8	0	0	
965790	1315	N	14.07.2021 08:44	62003	Kyiv-ec004, Лаврушка, 5	925.2	999.8	0	0	
965789	1315	N	14.07.2021 08:43	62003	Kyiv-ec003, В. Мавковського, 68	925.2	999.8	0	0	
965788	1315	N	14.07.2021 08:42	62003	Liv-ec023, вул. Зелена, 115K	925.2	999.8	0	0	
965787	1315	N	14.07.2021 08:42	62003	Boyarpr-ec076, вул. Глибочка, 83	925.2	999.8	0	0	
965786	1315	N	14.07.2021 08:27	62003	Liv-ec004, вул. Пасічна, 73	925.2	999.8	0	0	
965784	1315	N	14.07.2021 08:05	62003	Boyarpr-ec076, вул. Київський шлях, 1Д	925.2	999.8	0	0	
965783	1315	N	14.07.2021 08:01	62003	Kyiv-ec020, проспект Валерія Лобановського, 128	925.2	999.8	0	0	
965782	1315	N	14.07.2021 08:01	62003	Kyiv-ec068, вул. Маршала Малиновського, 8	925.2	999.8	0	0	
965781	1315	N	14.07.2021 07:59	62003	Kyiv-ec068, вул. Маршала Малиновського, 8	925.2	999.8	0	0	
965780	1315	N	14.07.2021 07:51	62003	Kyiv-ec008, Г. Ватутиня, 8А	925.2	999.8	0	0	
965779	1315	N	14.07.2021 07:48	62003	Liv-ec013, вул. Академіка Пазаренка, 38	925.2	999.8	0	0	
965778	1315	N	14.07.2021 07:48	62003	Liv-ec025, вул. Городецька, 286	925.2	999.8	0	0	
965777	1315	N	14.07.2021 07:47	62003	Kyiv-ec015, вул. Дікона Максимівна, 182	925.2	999.8	0	0	
965776	1315	N	14.07.2021 07:46	62003	Liv-ec010, вул. Стрийська, 133	925.2	999.8	0	0	
965775	1315	N	14.07.2021 07:44	62003	Kyiv-ec004, Лаврушка, 5	925.2	999.8	0	0	
965774	1315	N	14.07.2021 07:43	62003	Kyiv-ec003, В. Мавковського, 68	925.2	999.8	0	0	
965773	1315	N	14.07.2021 07:42	62003	Boyarpr-ec076, вул. Глибочка, 83	925.2	999.8	0	0	
965772	1315	N	14.07.2021 07:42	62003	Liv-ec023, вул. Зелена, 115K	925.2	999.8	0	0	
965771	1315	N	14.07.2021 07:27	62003	Liv-ec004, вул. Пасічна, 73	925.2	999.8	0	0	
965770	1315	N	14.07.2021 07:05	62003	Boyarpr-ec076, вул. Київський шлях, 1Д	925.2	999.8	0	0	
965769	1315	N	14.07.2021 07:01	62003	Kyiv-ec020, проспект Валерія Лобановського, 128	925.2	999.8	0	0	
965768	1315	N	14.07.2021 07:01	62003	Kyiv-ec068, вул. Маршала Малиновського, 8	925.2	999.8	0	0	
965767	1315	N	14.07.2021 06:53	62003	Kyiv-ec068, вул. Маршала Малиновського, 41	925.2	999.8	0	0	
965763	1315	N	14.07.2021 06:51	62003	Kyiv-ec008, Г. Ватутиня, 8А	925.2	999.8	0	0	
965743	1315	N	14.07.2021 06:48	62003	Liv-ec013, вул. Академіка Пазаренка, 38	925.2	999.8	0	0	

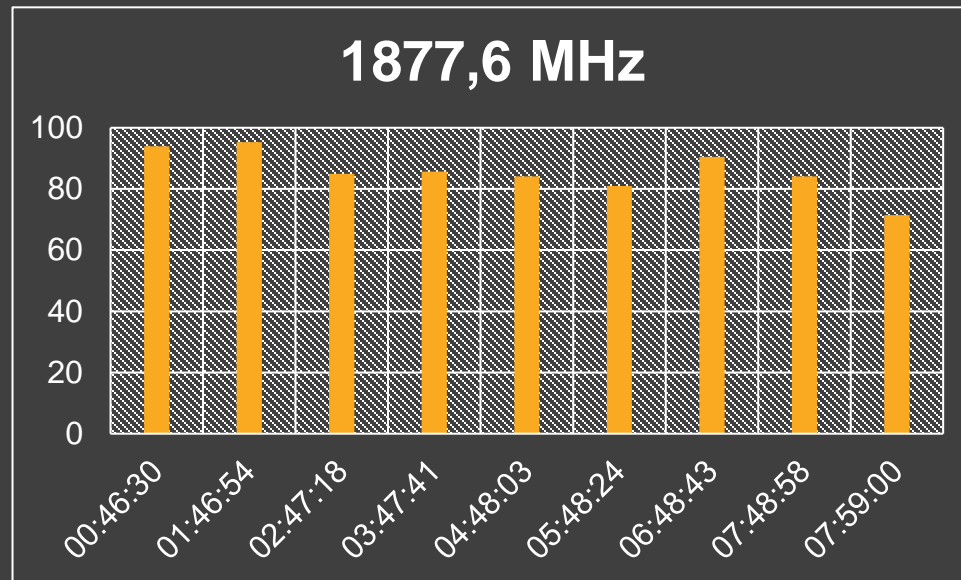


Monitoring of a given frequency band and/or channels around the clock, the results are received every hour

SPECTRUM OCCUPATION MEASUREMENTS WITH ICS MONITORING-SDRN CONTROL

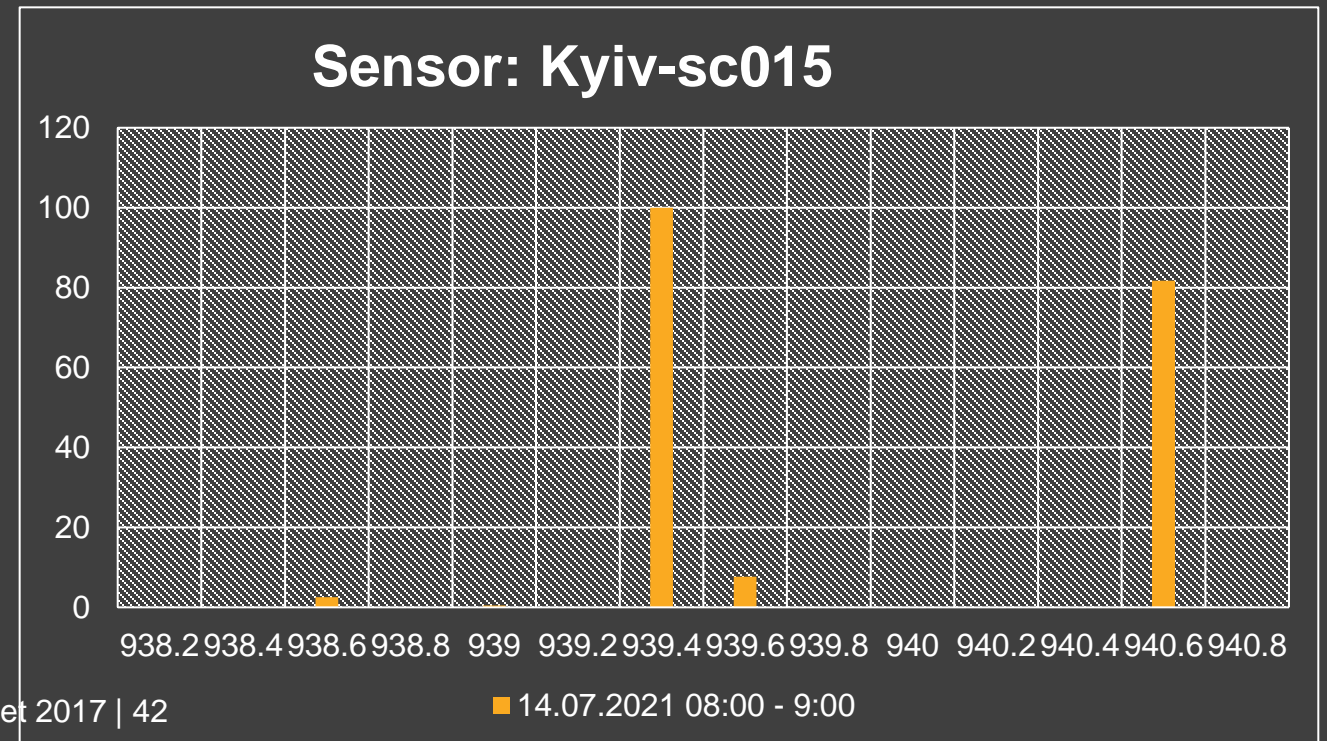
EXAMPLES OF RESULTS

Sensor: Boryspil-sc076



Hourly occupation of channel

Spectrum occupation for 1 hour

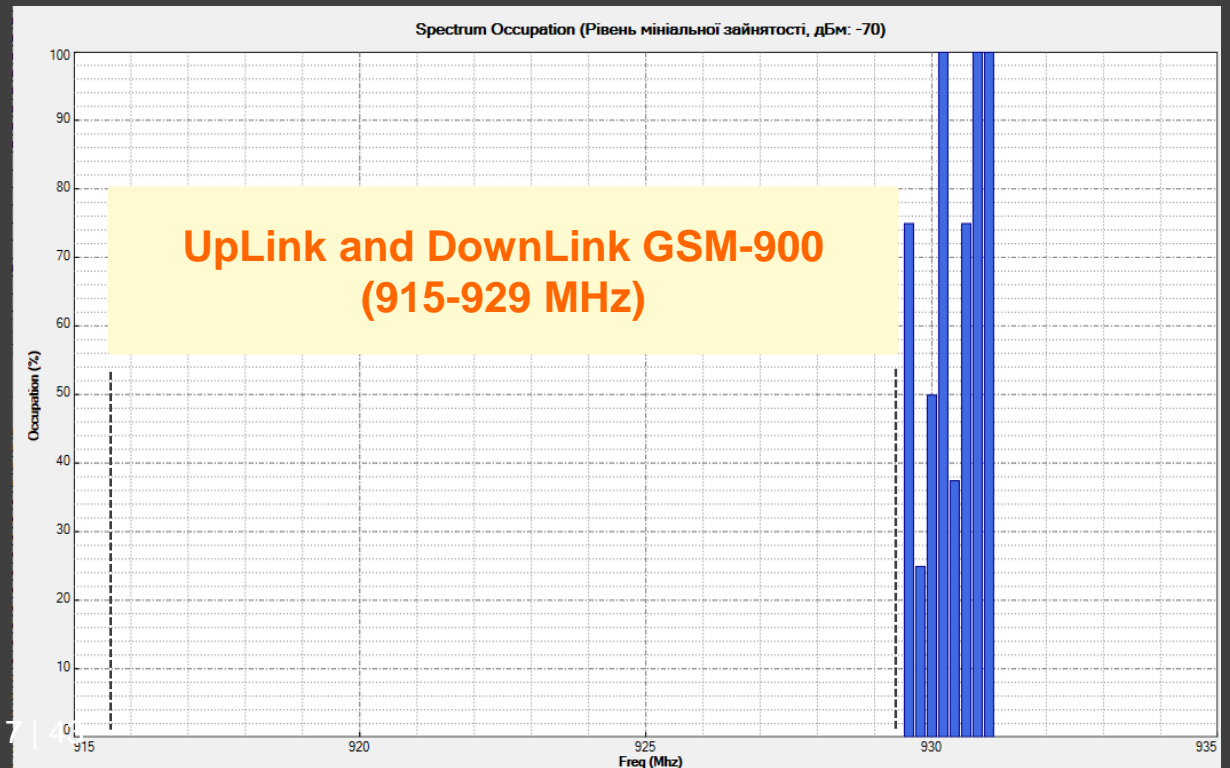


SPECTRUM OCCUPATION MEASUREMENTS WITH ICS MONITORING-SDRN CONTROL

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.

141	965783	956.4	0	-89.8553	-73.2954	14.07.2021 7:01	14.07.2021 8:01	1125
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
149	965783	958	87.37775	-75.5517	-42.7613	14.07.2021 7:01	14.07.2021 8:01	1125

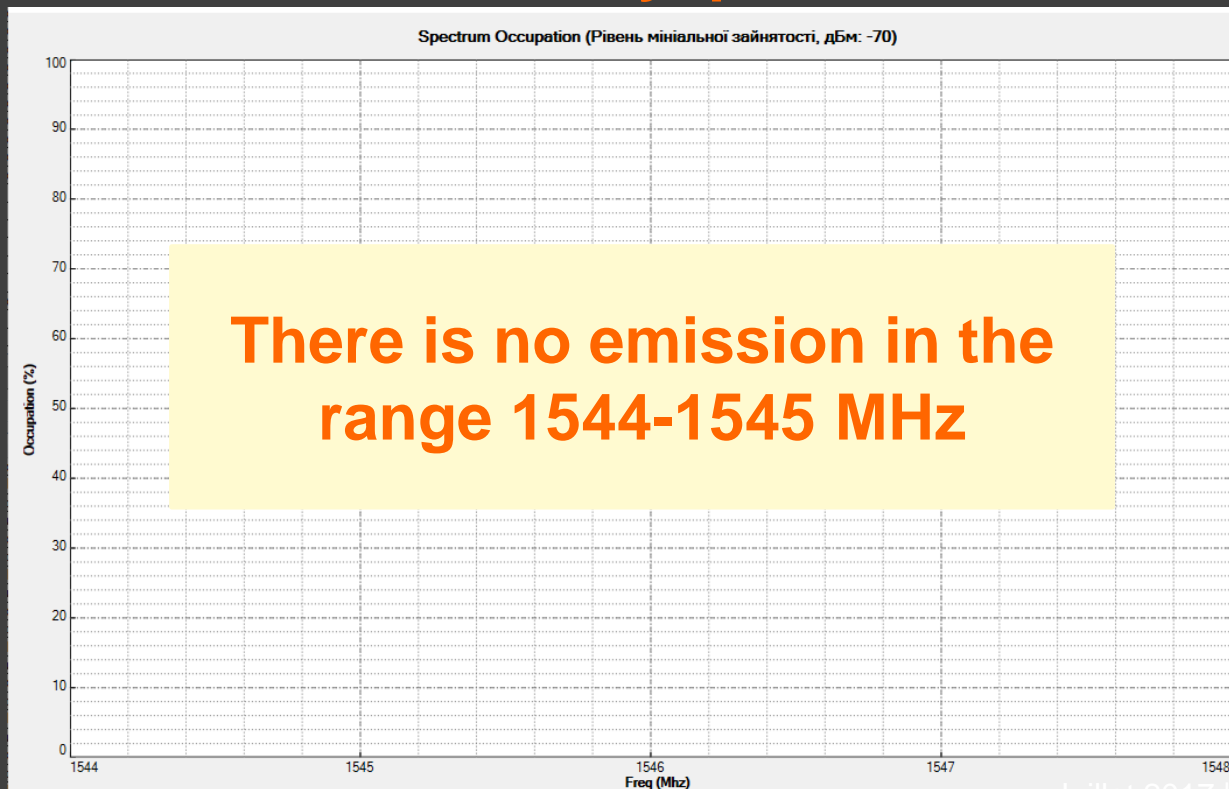


SPECTRUM OCCUPATION MEASUREMENTS WITH ICS MONITORING-SDRN CONTROL

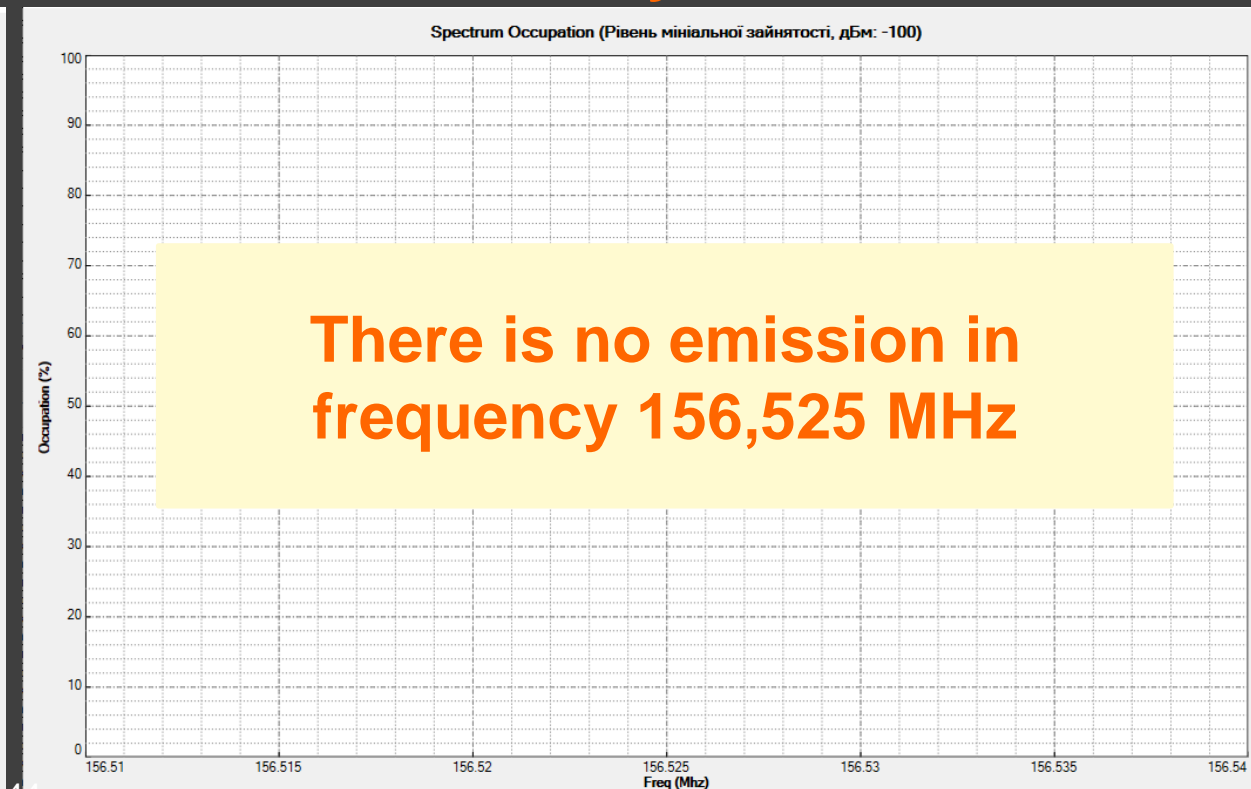


MONITORING THE ABSENCE OF EMISSION ON INTERNATIONAL FREQUENCIES OF TROUBLE

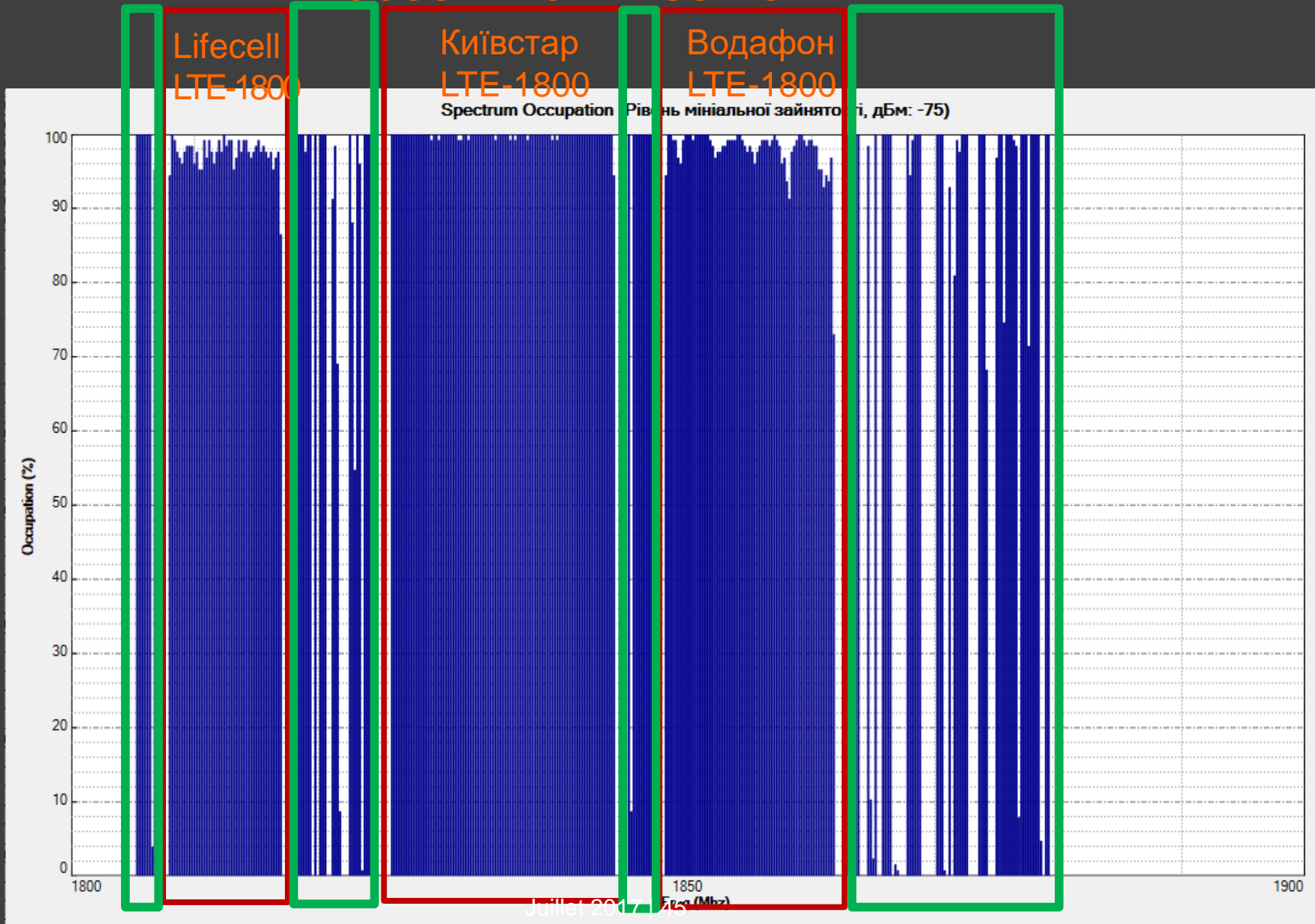
Sensor: Boryspil-sc073



Sensor: Kyiv-sc065



TRACKING CHANGES IN ELECTROMAGNETIC ENVIRONMENT BASED ON SPECTRUM OCCUPATION RESULTS



ICS Portal

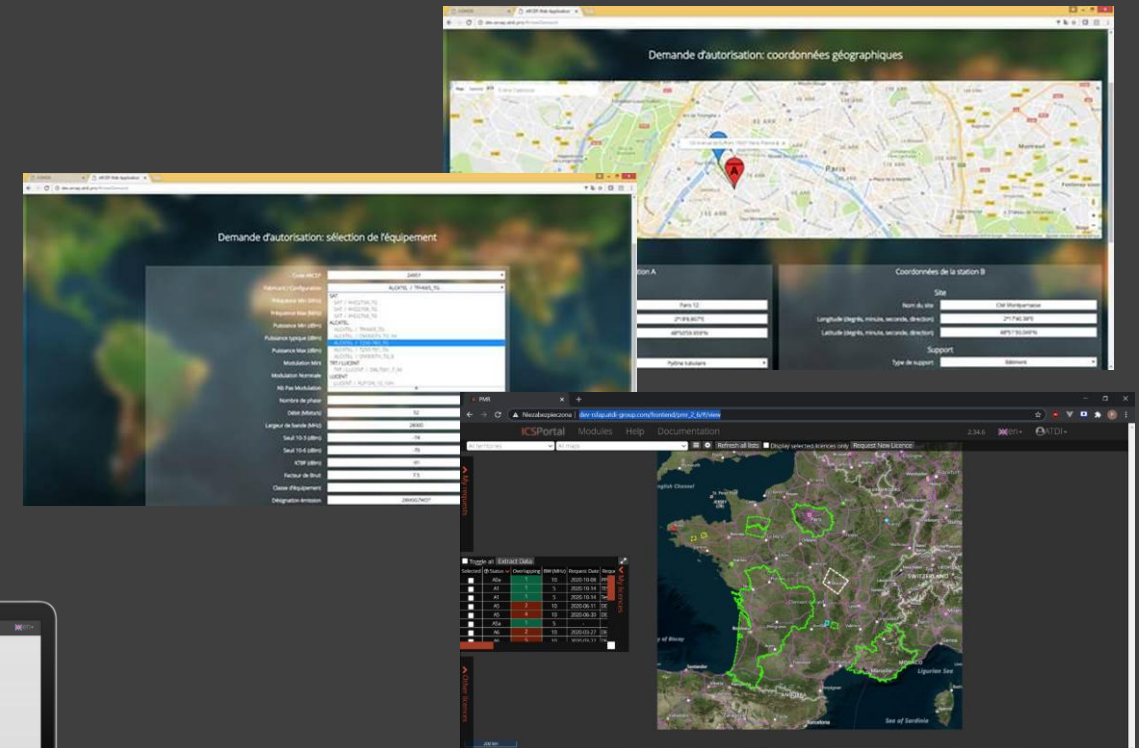
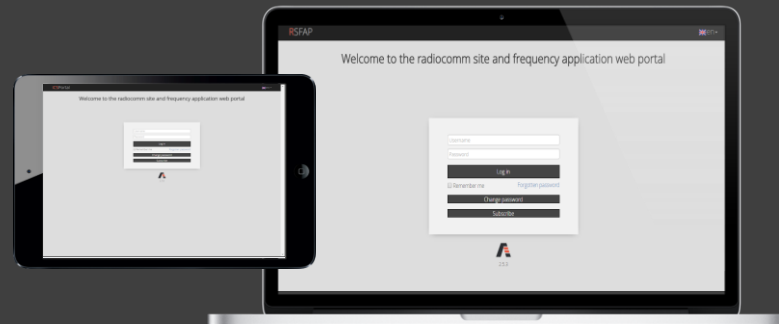
ICS Portal

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
- Adaptive design

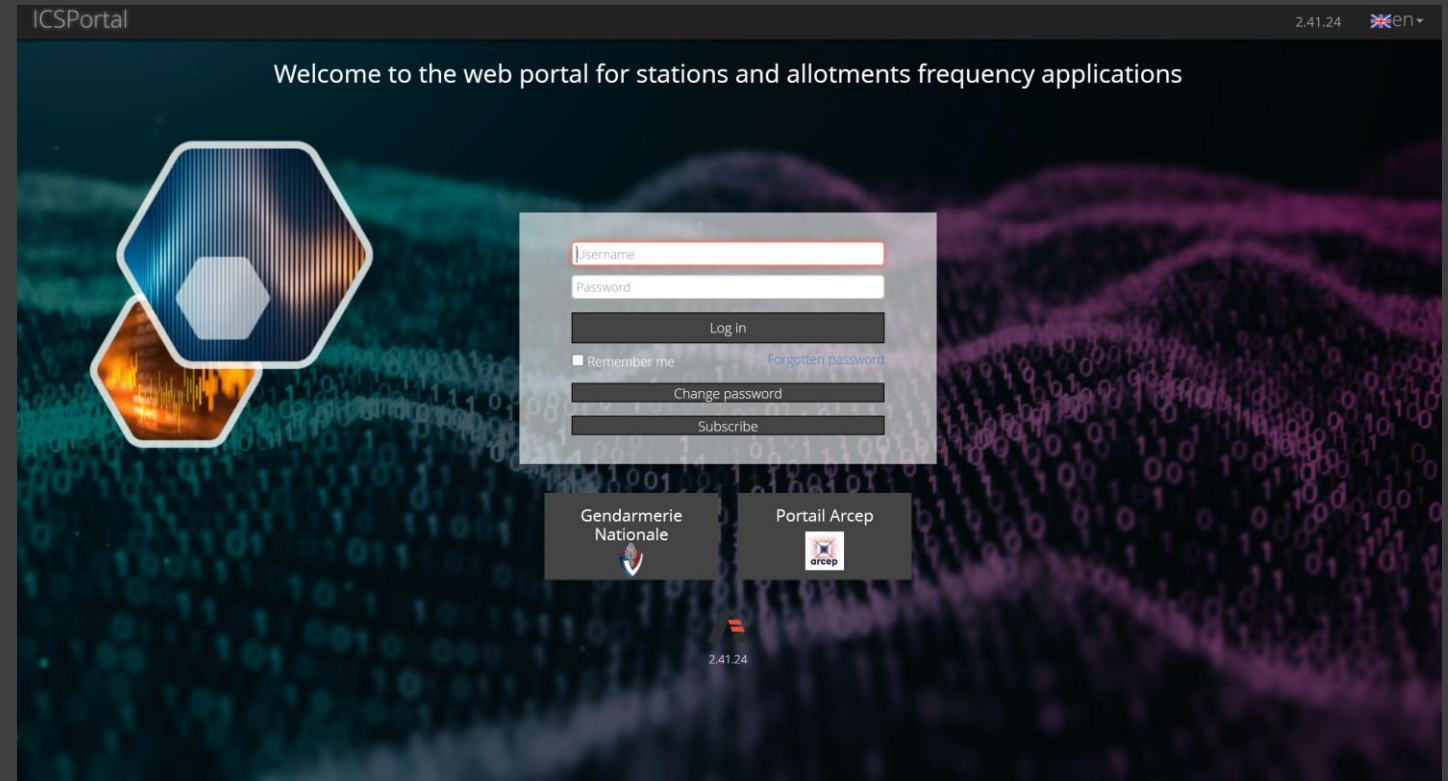


ICS Portal

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

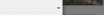
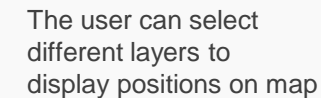
Web-service Interface

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.

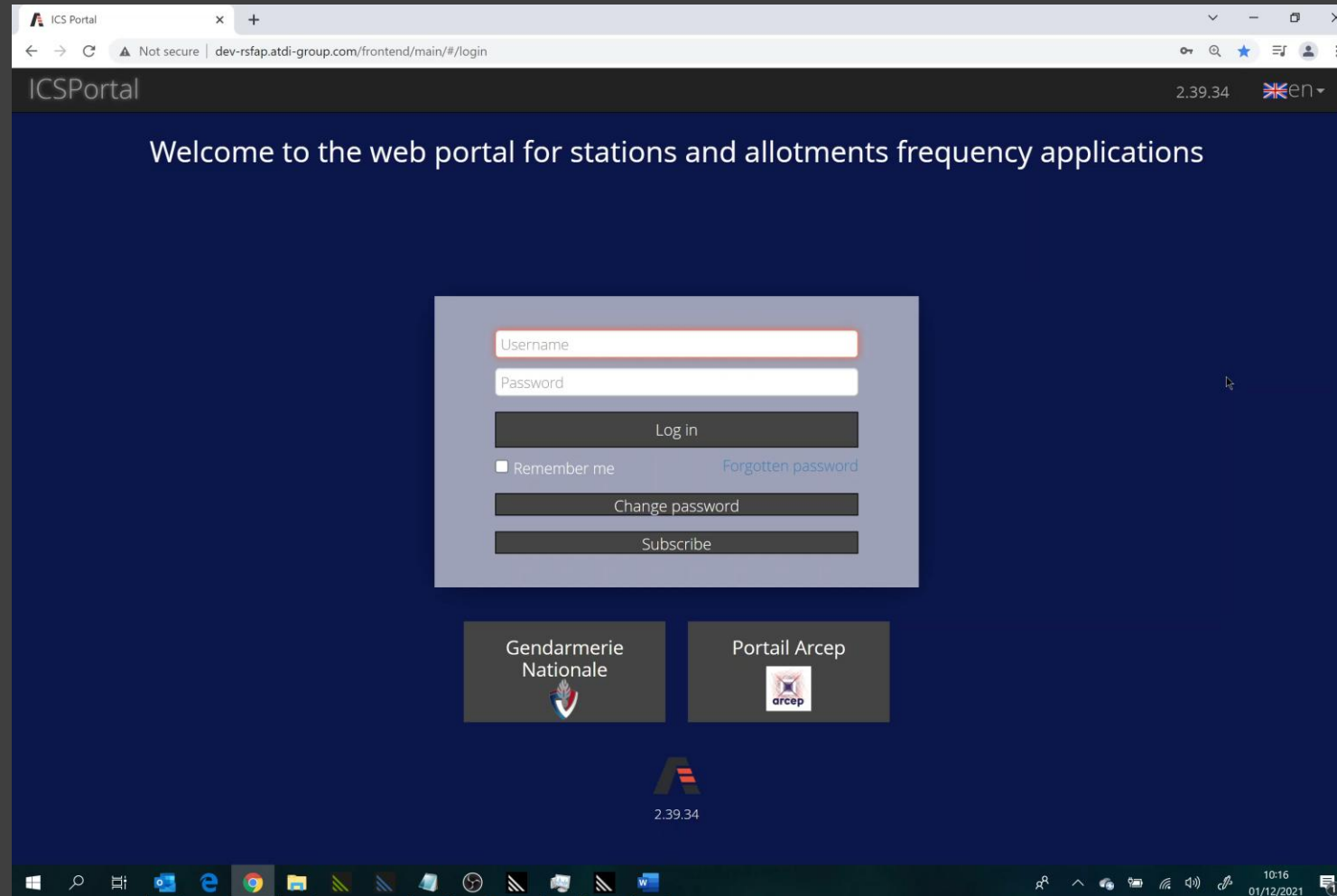
Modules Help Documentation										2.41.24	en	REGUL01
<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>												
User Reference	User Date	Request Type	Request Mode	Description	Remark	Nb Records	Date created	Date modified	Notif. status	Download status	Actions	
ref_demo	2022-05-25	Addition	Data entry by form online			1	2022-05-25	2022-05-25	Notification sent	Decision downloaded	<input type="text"/> <input type="text"/> <input type="text"/>	
exemple	2022-05-23	Addition	Data entry by form online			1	2022-05-23	2022-05-23	Notification sent	Decision downloaded	<input type="text"/> <input type="text"/> <input type="text"/>	

- 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.



ICS Portal

Web-service Interface



HTZ Automation API

HTZ API

Client side

System logical architecture

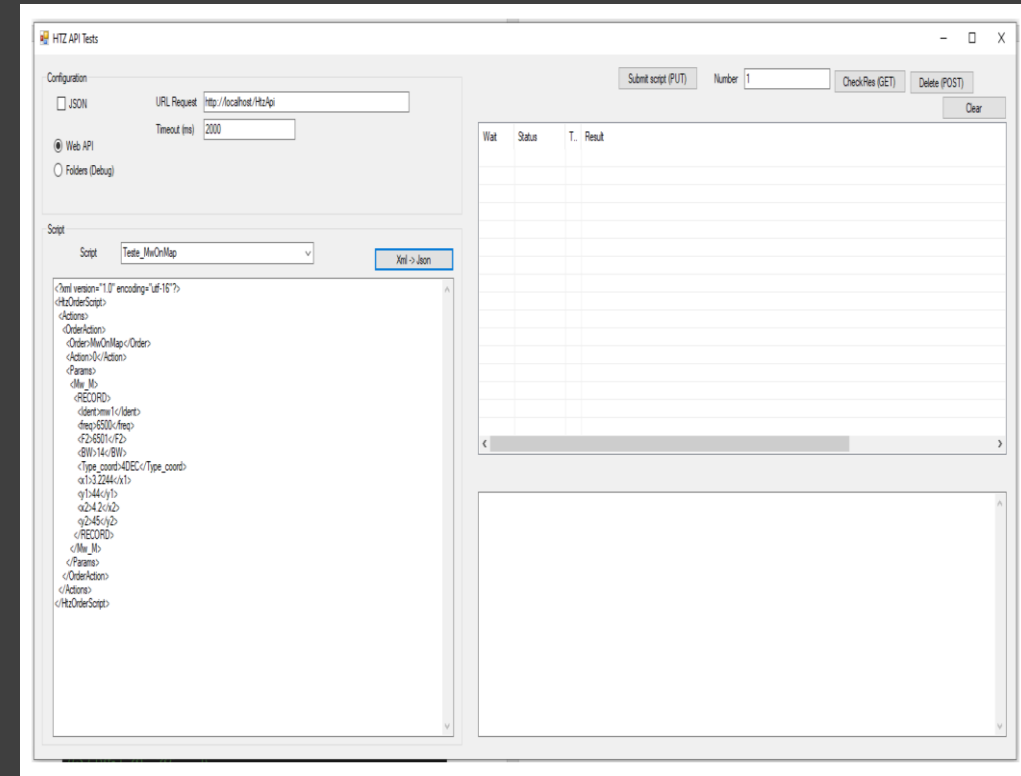
ATDI standard ASMS platform implements a classic three-tier architecture, a kind of client-server architecture in which presentation, application processing, and data management functions are physically separated.

“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:

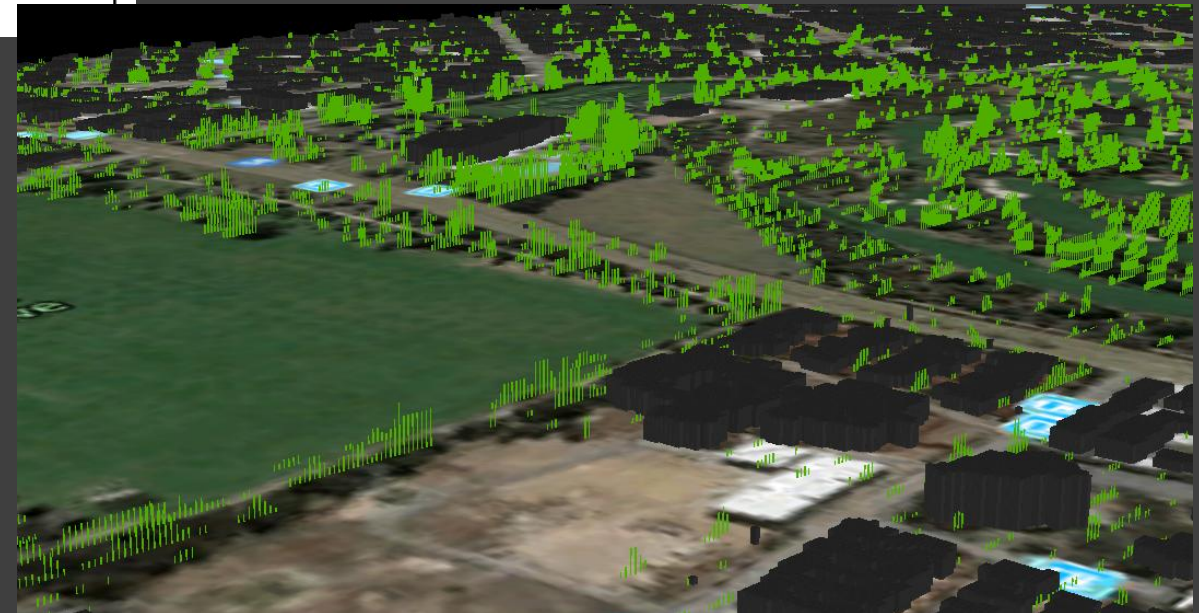
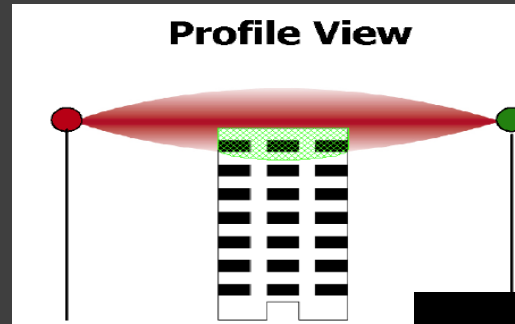
- Radio Critical Communication: VHF/UHF, HF, LINK11, LINK16, TETRA, PMR, TETRAPOL, P25, DMR, CDMA, CDMA 2000, TEDS, PR4G, PS-LTE (Public Safety), paging...
- Satellite/Earth station
- Microwave-links & Point to Multi-Points
- Radio cellular technologies: GSM, GPRS, EDGE, EDGE Evolution PMR, Trunked Radio 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:

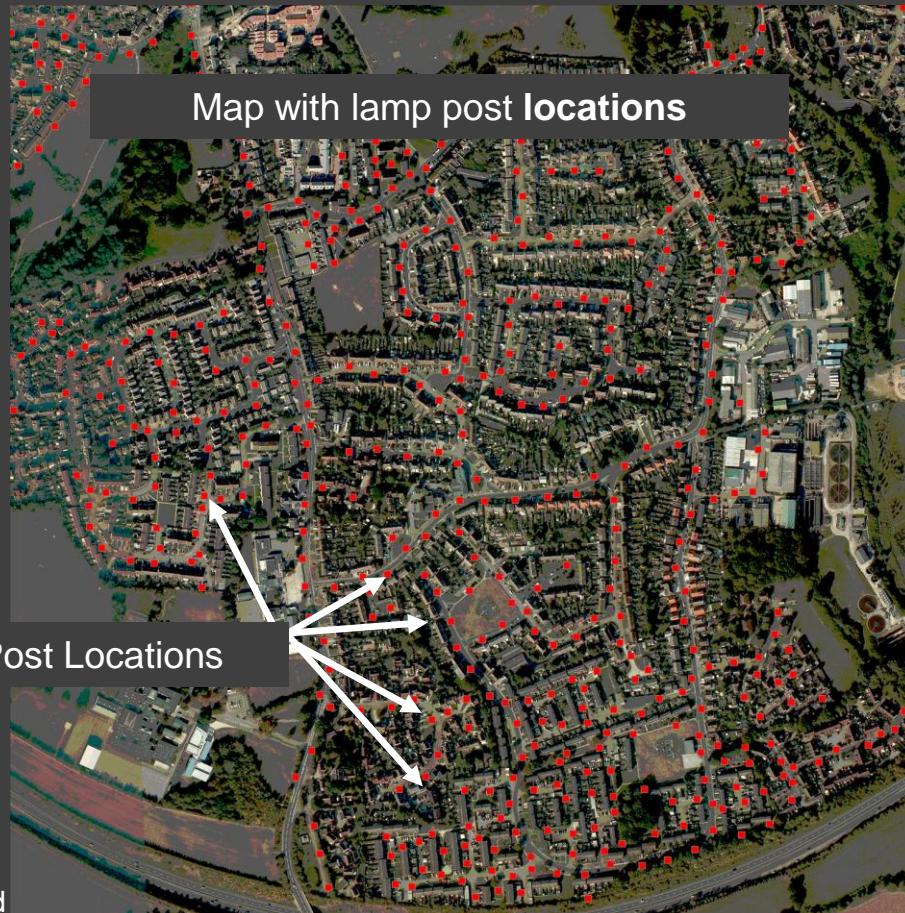
- **TACTICAL COMMUNICATIONS (ELINT, COMINT)**
- **UAV/UAS MISSION PLANNING**
- **MARITIME COMMUNICATIONS**
- **LMR/PMR/P25/TETRA**
- **PUBLIC SAFETY NETWORK/PPDR**
- **HF COVERAGE ANALYSIS**
- **MICROWAVE LINKS**
- **SATELLITE & EARTH SEGMENT (GSO/NON-GSO) DESIGN**
- **RADAR, INTERCEPTION, JAMMING EFFICIENCY**

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

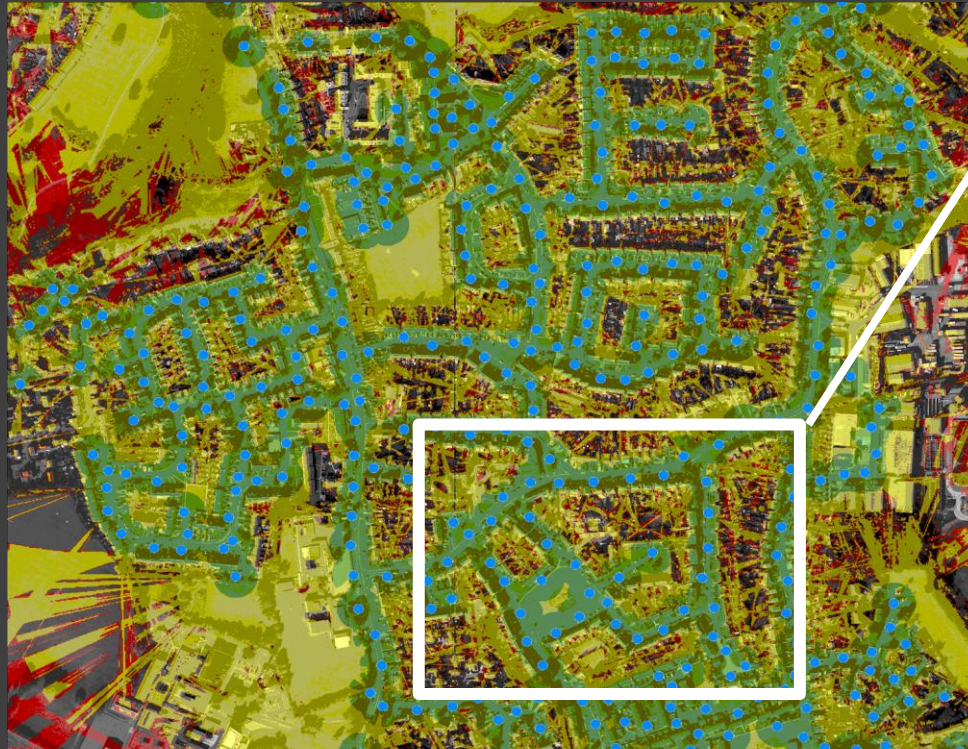


Area of Interest of 5G coverage operating
in mm wave band (27GHz)

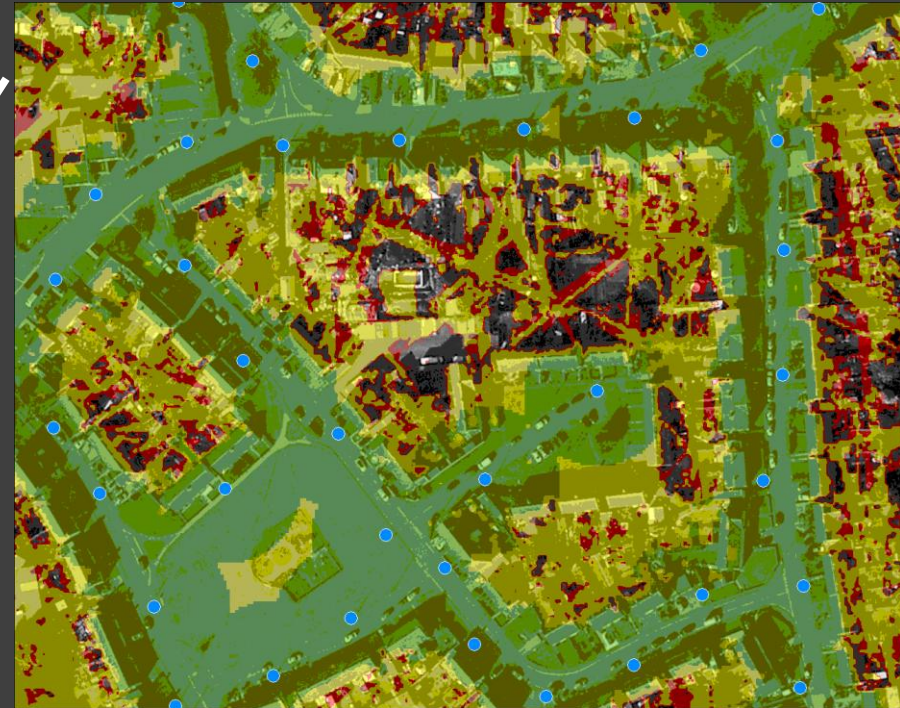


Assumed paramaters for 5G system operating at 26GHz:
TX EIRP 23dBm MIMO antenna on lamp posts at 4m agl.
RX Threshold -55dBm (RX bandwidth 450MHz with 20dB C/I in Dynamic environment)

HTZ warfare – Supporting complete GIS for any technology

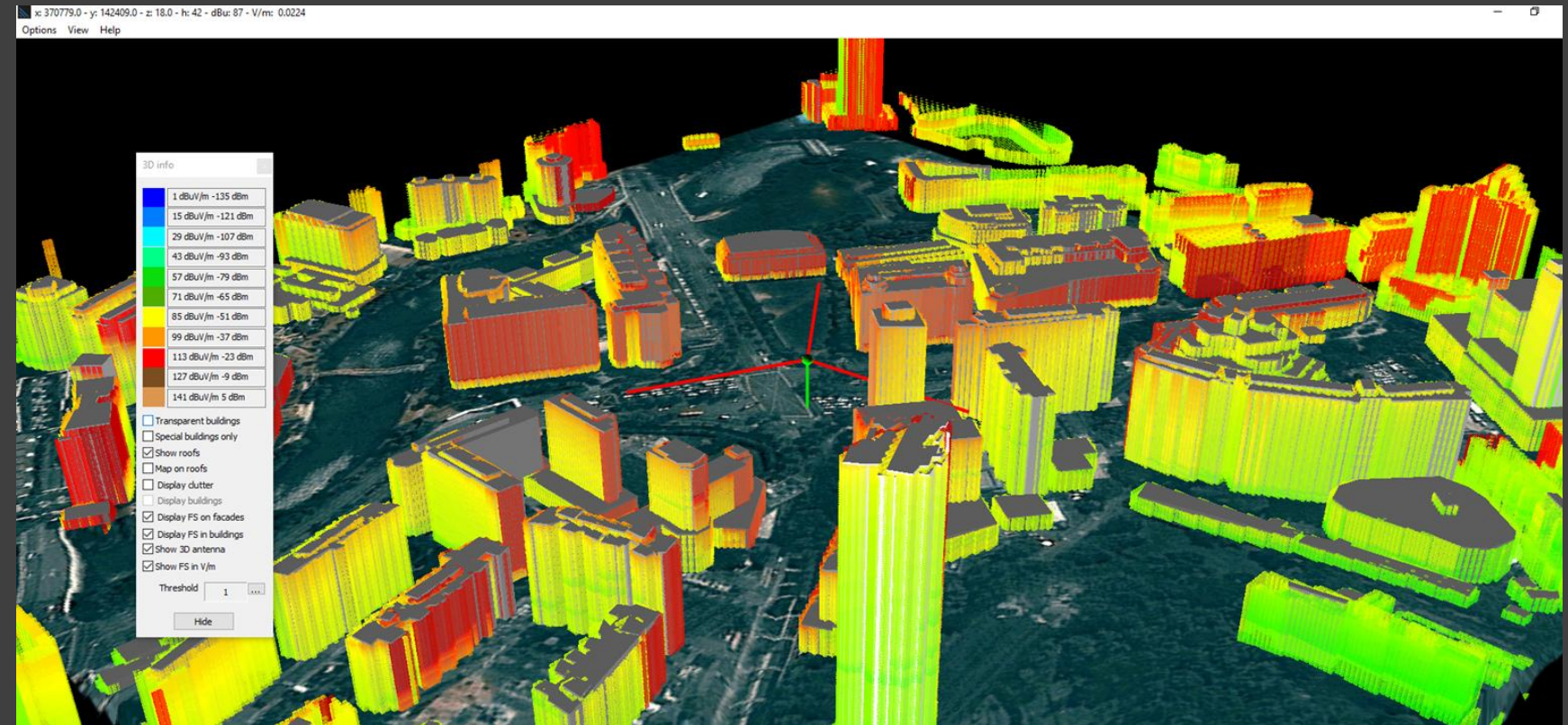


Assumed parameters for 5G system operating at 26GHz:
TX EIRP 23dBm MIMO antenna on lamp posts at 4m agl.
RX Threshold -55dBm (RX bandwidth 450MHz with 20dB C/I in
Dynamic environment)



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

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

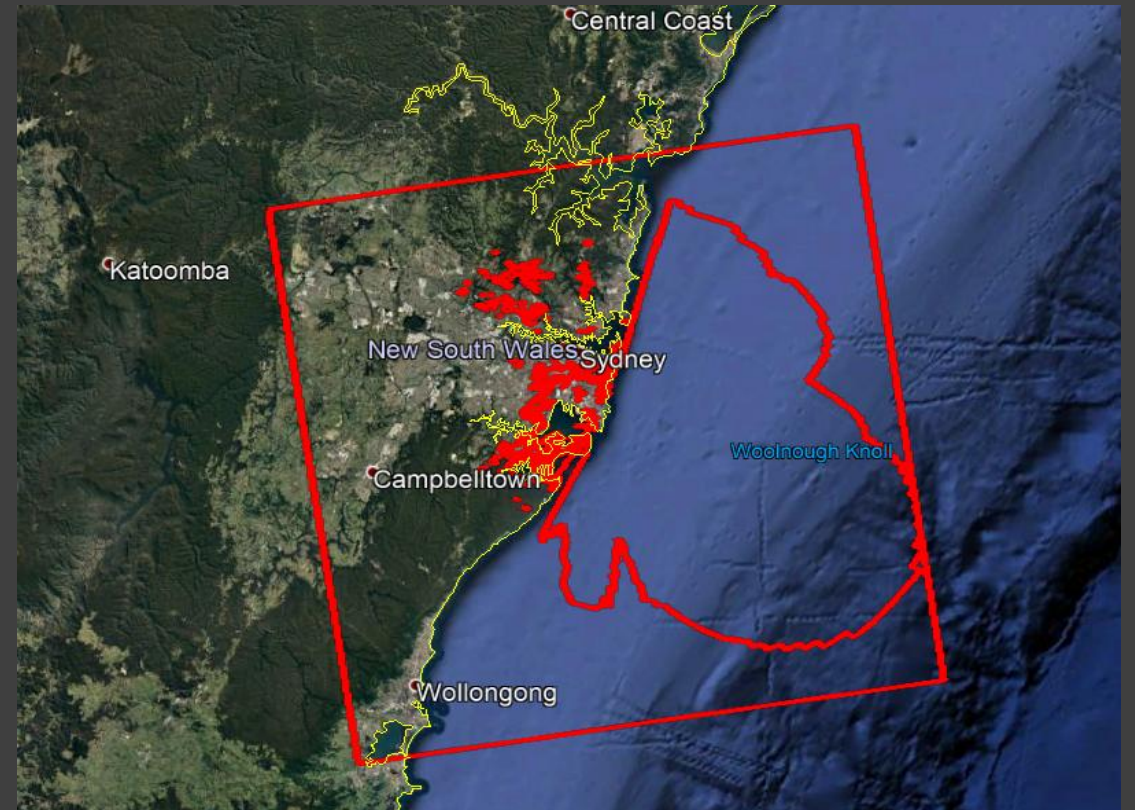
The screenshot shows the 'Propagation models' window with the following sections highlighted by numbered callouts:

- 1:** Free space loss calculation section, showing 'Free space loss' and 'ISO' options.
- 2:** Diffraction geometry section, including options like 'Deygout 94-2', 'Deygout 94-1', 'Deygout 66', 'Deygout 91', 'Bullington', 'Delta Bullington', 'ITU-R 526, round mask', 'ITU-R 526, cylinders', 'Visibility / Indoor', 'No diffraction loss', 'Lateral diffraction (UTD)', 'Power correction (angle)', 'VHF correction', and 'More methods...'.
- 3:** Attenuation by atmospheric gases and rain section, including 'Gases / Fog / Clouds / Sand', 'Rain / Snow', and 'Rain rate (mm/h)'.
- 4:** Propagation methods section, listing various ITU and FCC models like 'ITU-R 370 (30-1000 MHz)', 'ITU-R 525/526-15', 'ITU-R 525/526-11', 'ITU-R 1546-6 (30-4000 MHz)', 'ITU-R 1812-5 (VHF-UHF)', 'ITU-R 452-16 (0.1-50 GHz)', 'ITU-R 452-14 (0.1-50 GHz)', 'ITU-R 1147-4 (150-1700 kHz)', 'ITU-R 368-9 (10 kHz-30 MHz)', 'ITU-R 1009-1 (LoS)', 'ITU-R 528-3 (V/U/SHF)', 'ITU-R 1225 (MT 2000)', 'ITU-R 2001-3 (30 MHz - 50 GHz)', and 'ITM NTIA (20 MHz-20 GHz)'.
- 5:** 3GPP / COST (empirical) section, including 'Dukin', '3GPP-LTE urban (0.9-2 GHz)', '3GPP-LTE rural (0.9-2 GHz)', 'SUI method (2.5-2.7 GHz)', 'Okumura-Hata (150-1500 MHz)', 'Hata - Cost 231 (150-2000 MHz)', 'Extended Hata (30-3000 MHz)', 'Cost 231 open...', 'Walisch-Ikegami (800-2000 MHz)', and 'Modified Hata model by ACMA'.
- 6:** Specific / External section, including 'BR method (uV)', 'Wojnar method (1-1000 MHz)', 'CCIR - MF (550-1700 kHz)', 'Egli (V/UHF)', 'Ext. model (DLL)', 'Composite output', 'Use Tx/Rx effective heights', 'Flat earth profile sent to DLL', and 'Reverse profile'.
- 7:** Global parameters section, including 'Earth radius km land', 'Earth radius km sea', 'RMS wave height (m)', 'Variability', 'Location', 'Time', 'Field strength offset', 'Field strength=E-Offset', 'Variability (P2P unwanted signal)', 'Time (0 to 50 pc)', 'Indoor...', 'Clutter...', 'Conductivity...', and 'ITU zones...'.

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

Interference (C/I)

Many to many

☒ Global interference

☐ Co-site excluded ...

☐ Multi-channels

☐ Activated wanted station

☐ Interference + best server

☐ Multi-channels

☐ Activated wanted station

☐ Activated+deactivated

☐ Frequency selection

Fmin 10.00000

Fmax 100000.00000

☐ Interference on best server

☐ Activated wanted station

☐ Interference Activated+De-act.

☐ Interference network ID

☐ Interference wanted signals

☐ Interference SOFDMA

Max sub-cx (0=from Tx) 16

☐ C/I map: min(C/I)

☐ C/I map on best server

☐ Protection margin

☐ Protected field strength

☐ Interference on serving cell

☐ Activated wanted station

Handover margin 15

☐ Server position

☐ Activated wanted station

Optimisation

☐ TV line offset assignment

Offset min (+-36/12) -36

Offset max (+-36/12) 36

Rx antenna discrimination

☐ none

☒ 419/GE

☐ user ...

Rx gain (dB) 0.00

Options

Wanted threshold auto ...

☐ Threshold = wanted coverage (extd rad)

☐ Threshold = wanted coverage (station polygon)

☐ Interferer sum applied

☐ Coverage from FDW/FDU* path...

☐ Rx cx interference

Interference analysis report...

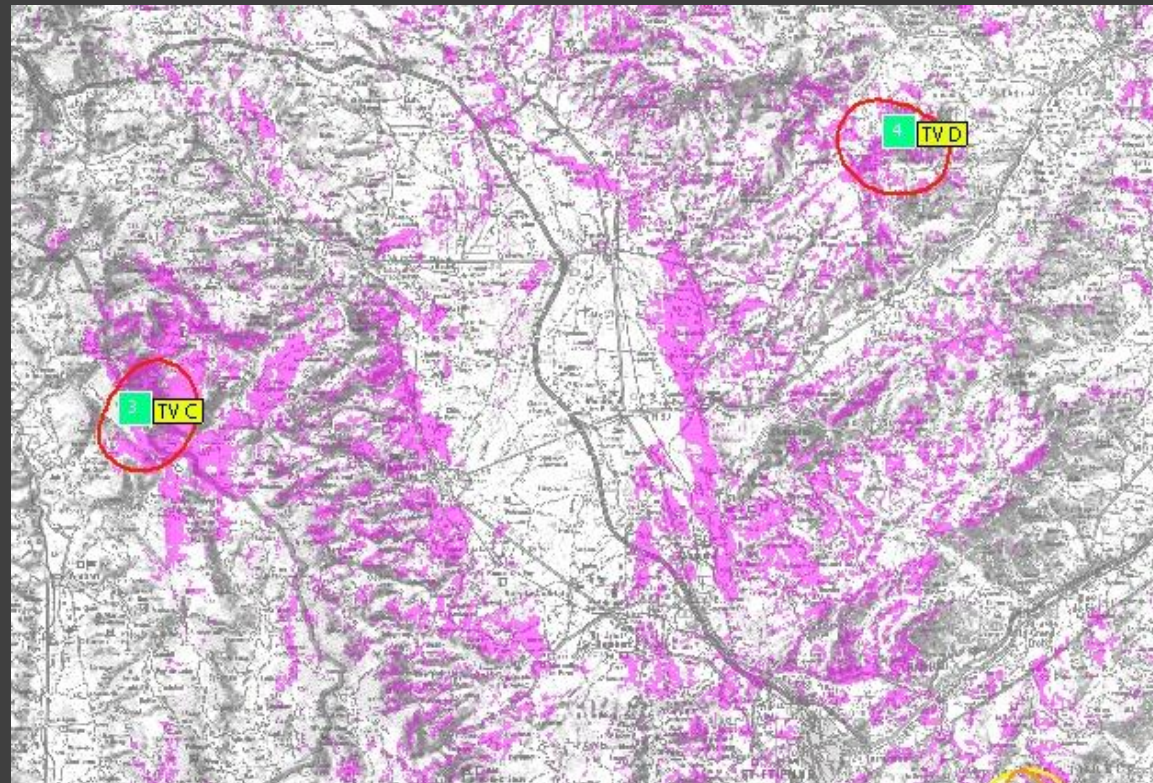
Palette... Station list... Start

C/I... Model... Cancel

Tip: Displays all interference areas. Verifies general frequency.

* FDW=Wanted coverage file (callsign.FDW) - FDU=Unwanted coverage file (callsign.FDU)
Format: FLD

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



HTZ warfare –

Automatic Frequency assignment for sites

Frequency assignment (check)

Mode

☒ Band assignment

Band... Number of frequencies 0

☐ List assignment

List... Number of frequencies 0

☐ Tx plan assignment

☒ Tx ☐ Rx ☐ Tx/Rx ☒ fixed spacing**

C/I... UFS...

☒ MAP -> MAP

☐ MAP -> DB station DB station...(*)

Wanted threshold auto ...

(*) only selected records are considered
(**) signed duplex only used if fixed spacing

Rules

☐ Apply frequency spacing on same site MHz: \geq 0.0010 (1)

☒ Tx/Tx ☐ Tx/Rx ☐ from TR \leq 9999999 (2)

if azimuth spacing $<$ 1 °

☒ and ☐ or if (1)=(2) then fixed spacing applied

☐ Forbid same polarization on site if az. spacing $<$ 1 °

☐ Forbid same frequency on same site

☐ No interference between linked stations

☐ Assign polarization (H/V)

Site: Distance between stations \leq 1 m

Assign selected station frequencies

Station Channel

Tx freq. Rx freq. MHz

Start Stop

Load... Save... Close

Frequency assignment

Mode

☒ Band assignment signed spacing ☐ +/-

☐ Multi-channels assignment

☐ Minimum frequency spacing: 1 MHz

☐ Maximum frequency spacing: 1e+007 MHz

Band... Number of frequencies 0

☒ Group assignment - multi-channels

☐ Keep number of channels defined for each station

☐ Start index assignment (Frequency Hopping mode)

Group... Number of groups 0

☒ List assignment

☐ Multi-channels assignment

☐ Minimum frequency spacing: 1 MHz

☐ Maximum frequency spacing: 1e+007 MHz

List... Number of frequencies 0

☒ Tx plan assignment ☐ Multi-channels assignment

☐ Minimum frequency spacing: 1 MHz

☐ Maximum frequency spacing: 1e+007 MHz

☒ Tx ☐ Rx ☐ Tx/Rx ☒ fixed spacing**

Check intermodulation products \leq 7

☒ Polarization assignment H/V ☐ Multichannels interference

Assign selected station frequencies

Station Channel

Tx freq. Rx freq. MHz

Start Stop Delta F...

(*) switch Tx/Rx frequencies, (!) not saved

Rules

☐ Apply frequency spacing on same site MHz: \geq 0.0010 (1)

☒ Tx/Tx ☐ Tx/Rx ☐ from TR \leq 9999999 (2)

if azimuth spacing $<$ 1 °

☒ and ☐ or if (1)=(2) then fixed spacing applied

☐ Forbid same polarization on site if az. spacing $<$ 1 °

☐ Forbid same Tx frequency on same site

Site: Distance between stations \leq 1 m

☐ Forbid same Rx frequency if distance \leq 500 m

☐ Organize Tx list - freq. isolation constraint 5000 m

☐ Organize Tx list - sector constraint (delta=0°)

☐ Organize Tx list - coverage size constraint

☐ Assign polarization (H/V)

C/I... Clutter... Number of pass 1

☐ Exhaustive method ☒ Monte-Carlo method ☐ Iterative method ☐ Sequential method

☒ Assign all channels ☐ Assign pilot channel ☐ Assign traffic channels

Same Freq: ☐ Activ. Tx ☐ Net ID ☐ Linked Tx* ☐ Group

☐ Overlapping rule (frequency reuse):

if Delta FS \leq 3 dB Max interf. distance

Delta Freq \geq 0.01000 MHz Station list...

Rx ant discr

☒ none ☐ 419/GE ☐ user(!) ...

☐ Threshold = wanted cover. (extd rad)

☒ Global interference ☐ Virtual mode

☐ Unwanted coverage from FDU path...

Wanted threshold auto ...

Reset .COV Load... Save... Close

(**) signed duplex only used if fixed spacing. Max interf. dist. x 2

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

Microwave link frequency list

Low band (MHz)	High band (MHz)			
18305.000000	19315.000000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All
18332.500000	19342.500000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All
18360.000000	19370.000000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All
18387.500000	19397.500000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All
18415.000000	19425.000000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All
18442.500000	19452.500000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All
18470.000000	19480.000000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All
18497.500000	19507.500000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All
18525.000000	19535.000000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All
18552.500000	19562.500000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All
0.000000	0.000000	<input type="radio"/> H	<input checked="" type="radio"/> V	<input type="radio"/> All

Buttons: OK, Cancel, Import .FRQ, Export .FRQ, DB MW..., IRF...

Link interference - Threshold Degradation calculation

	A (MHz)	B (MHz)	Interference	Action
Link: 0001 -> 0002 - TD: 0.3 dB - 18305.000000 MHz V 'Optus Earth Station Chalf' -> Optus Earth Station Chalf' - none	18305.000000	19315.000000	0	assign div.
Link: 0002 -> 0001 - TD: 0.1 dB - 19315.000000 MHz V 'Optus Earth Station Chalf' -> Optus Earth Station Chalf' - none	18332.500000	19342.500000	2	assign div.
Link: 0003 -> 0004 - TD: 0.0 dB - 19425.000000 MHz V 'Telstra Radio Terminal MA -> NBNC0 790 Wisemans Ferry' - none	18360.000000	19370.000000	0	assign div.
Link: 0005 -> 0006 - TD: 0.0 dB - 19342.500000 MHz V 'CMTS Site Trig Reserve TA -> NBNC0 213 Yarramalong Road' - none	18387.500000	19397.500000	0	assign div.
Link: 0013 -> 0014 - TD: 0.0 dB - 18305.000000 MHz V 'NBNC Co Site 167 Blaxlands -> NBNC0 400 Comleroy Road K' - none	18415.000000	19425.000000	4	assign div.
Link: 0019 -> 0020 - TD: 0.0 dB - 18305.000000 MHz V 'NBNC Co Site Donald Road C -> NBNC Co Cnr Great Western' - none	18442.500000	19452.500000	2	assign div.
Link: 0021 -> 0022 - TD: 0.0 dB - 19315.000000 MHz V 'Optus Site 109 Schofield -> NBNC Co Site 155 Wyee Farm' - none	18470.000000	19480.000000	2	assign div.
Link: 0033 -> 0034 - TD: 0.0 dB - 18305.000000 MHz V '59 Cattai Road PITT TOWN -> NBNC Co 365 Pitt Town Dual' - none	18497.500000	19507.500000	2	assign div.
Link: 0035 -> 0036 - TD: 0.0 dB - 19315.000000 MHz V 'NBNC Co 307A Boundary Road -> NBNC Co 2 Scheyville Road' - none	18525.000000	19535.000000	4	assign div.
Link: 0041 -> 0042 - TD: 0.0 dB - 18305.000000 MHz V 'NBNC Co 2 Scheyville Road -> NBNC Co 307A Boundary Road' - none	18552.500000	19562.500000	2	assign div.
Link: 0047 -> 0048 - TD: 0.0 dB - 19425.000000 MHz V 'Meriton Building 330 Chur -> Meriton Evoke 21/27 Porte' - none	0.000000	0.000000	none	assign div.
Link: 0049 -> 0050 - TD: 0.0 dB - 18415.000000 MHz V 'Meriton Evoke 21/27 Porte -> Meriton Building 330 Chur' - none	0.000000	0.000000	none	assign div.
Link: 0059 -> 0060 - TD: 0.0 dB - 19315.000000 MHz V 'NBNC0 400 Comleroy Road K -> NBNC Co Site 167 Blaxlands' - none	0.000000	0.000000	none	assign div.
Link: 0067 -> 0068 - TD: 0.0 dB - 19370.000000 MHz V 'Bradfordville Reservoir A -> 56 Clinton St Goulburn' - none	0.000000	0.000000	none	assign div.
Link: 0069 -> 0070 - TD: 0.0 dB - 19342.500000 MHz V 'Optus Site Gan Gan Hill o -> 1B Mitchell St Soldiers P' - none	0.000000	0.000000	none	assign div.
Link: 0077 -> 0078 - TD: 0.0 dB - 19315.000000 MHz V 'The Forum 1 Sergeants Lan -> Hyundl Dealership 394 Lan' - none	0.000000	0.000000	none	assign div.

Parameters: Azimuth Tx: 27.41, distance Tx/Rx: 9330 m, Azimuth Rx: 207.41, distance Interferer/Rx: m, Azimuth Interferer: , wanted signal: -52 dBm, unwanted signal: dBm

Summary: Txpow: 23.01 dBm - Txgain: 32.0 - Txloss: 0.0 dB - Txlosses: 1.0 dB, Rxgain: 32.0 dB - Rxlosses: 1.0 dB, Power received: -52.12 dBm - Margin: 29.9 dB - Propagation losses: 137.1 dB

HTZ warfare –

Interference for SFN/MFN

Coverage interference C/N+I (COFDM mode)

Action

☒ First server method
☐ Best server method
☐ First server >= Best server - Margin
 Margin (dB)
 Guard interval (usec)
 Usable symbol (usec) ->
☐ Normal distrib %, stddev (dB)
☐ No progressive destructive FS
☒ No constructive FS
☒ Unwanted = activated
☐ Unwanted = de-activated and activated
☐ Unwanted = de-activated
☐ SFN gain
☐ Display best server when C/N+I >=
 median C/N+I dB
 Rx gain dB Noise dBm
 Margin dB
 Wanted threshold ...
☐ Coverage from FDW/FDU*

Method

☒ EBU formulas
☐ User masks

	ToA (Delta us)	% unwanted	% wanted	IRF (dB)
min	<input type="text" value="1"/>	<input type="text" value="100"/>	<input type="text" value="0"/>	<input type="text" value="20"/>
	<input type="text" value="20"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
	<input type="text" value="10"/>	<input type="text" value="70"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
	<input type="text" value="5"/>	<input type="text" value="100"/>	<input type="text" value="0"/>	<input type="text" value="20"/>
max	<input type="text" value="2"/>	<input type="text" value="100"/>	<input type="text" value="0"/>	<input type="text" value="40"/>

Rx ant discr

☒ none
☐ 419/GE
☐ user ...
☐ Best server oriented

☒ Global XPD dB

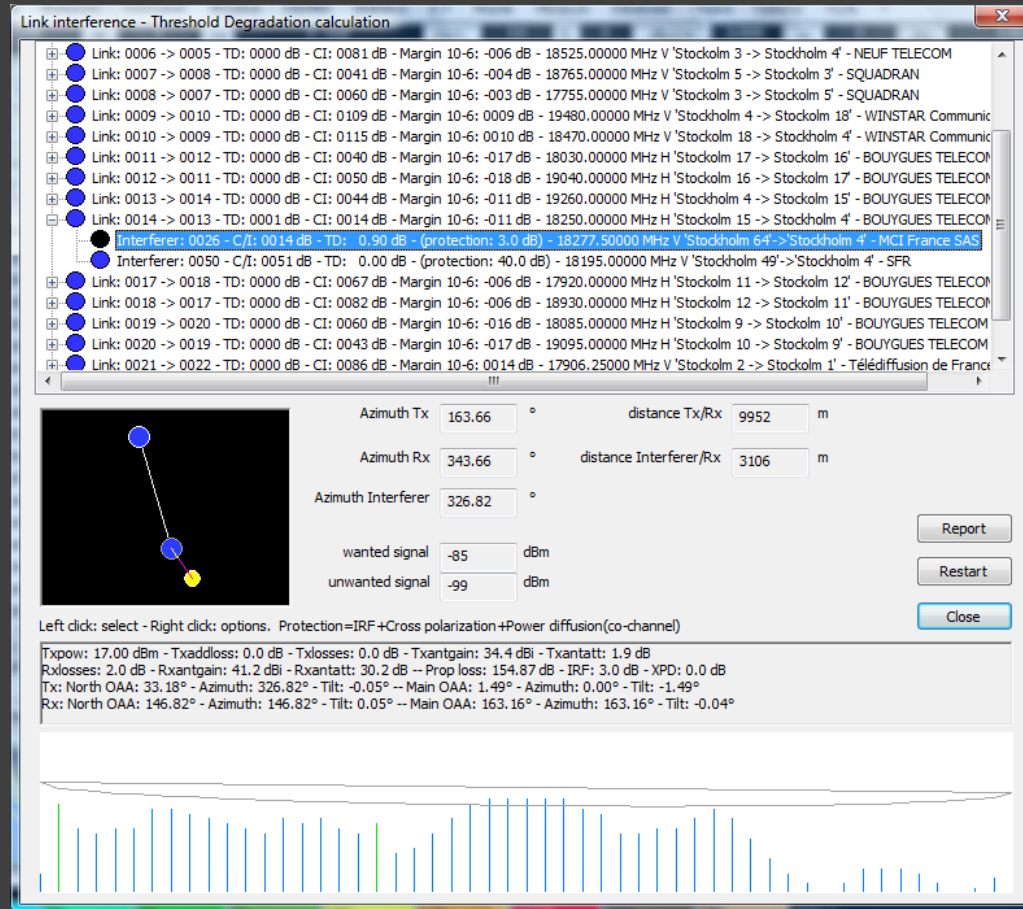
Load Save
 Station list... Palette...

OK
 Cancel

SFN only - No rejection calculated

HTZ warfare –

Threshold degradation interference



Interference

☐ No MW ATPC
☐ Wanted power = P-ATPC / Unwanted = P
☒ Wanted power = P / Unwanted = P-ATPC
☐ Wanted power = P-ATPC / Unwanted = P-ATPC
☐ Pilot self-interference (Ec/I0)

Interference rejection factors

Mask

N=0	0	<input checked="" type="checkbox"/> used	N=10	50	<input type="checkbox"/> used
N=1	40	<input checked="" type="checkbox"/> used	N=11	50	<input type="checkbox"/> used
N=2	50	<input type="checkbox"/> used	N=12	50	<input type="checkbox"/> used
N=3	40	<input type="checkbox"/> used	N=13	50	<input type="checkbox"/> used
N=4	50	<input type="checkbox"/> used	N=14	50	<input type="checkbox"/> used
N=5	50	<input type="checkbox"/> used	N=15	50	<input type="checkbox"/> used
N=6	50	<input type="checkbox"/> used			<input type="checkbox"/> Spurious
N=7	50	<input type="checkbox"/> used			EIRP (dBW/MHz):
N=8	50	<input type="checkbox"/> used			-30.00
N=9	50	<input type="checkbox"/> used			

Check "used" button to define filter for 14 GHz table

☐ Activity factor weighting [IRF-10.log(activity)]

More options...

IRF from tables (ETSI 38, 14, 13, 23, 24.5-26.5 GHz and IC 16 KHz BW: 150, 450, 850 MHz), IEEE 802.11/802.16
☐ CNC-DNRc61 ☐ CNC-DNRc54 ☐ FCC
☐ IRF from NFD matrix
☒ Global XPD 0 dB
 C/H or V: 3 db protection except if global XPD=0
☐ Do not display if TD < (dB) 0.50

Save Load
 OK Cancel

Rx bandwidth / Tx bandwidth

HTZ Warfare

Unprecedented Modelling Accuracy

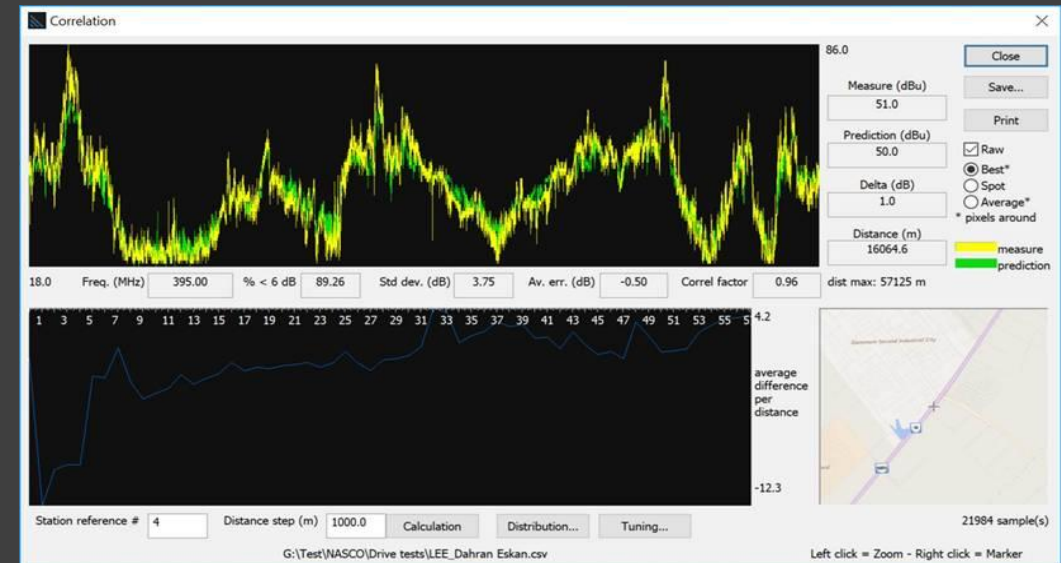


TETRA station located in Dammam KSA (Azizia Palace)

Standard Deviation Error (dB): 2.79

Correlation Factor: 0.98

Sample measurement: 22347



TETRA station located in Dahran Eskin (KSA)

Standard Deviation Error (dB): 3.75

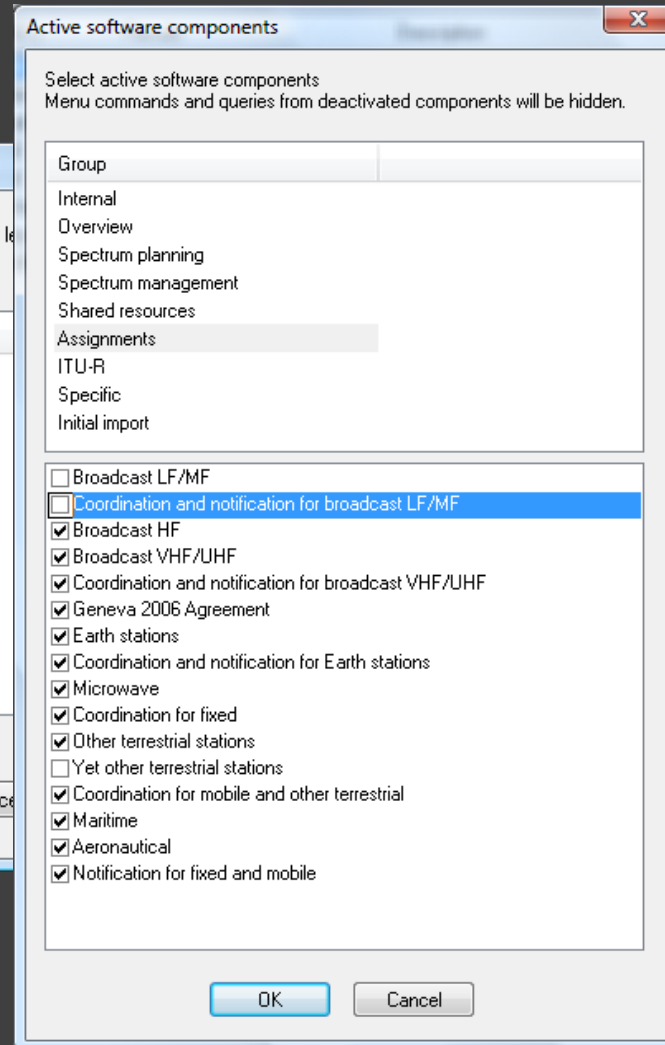
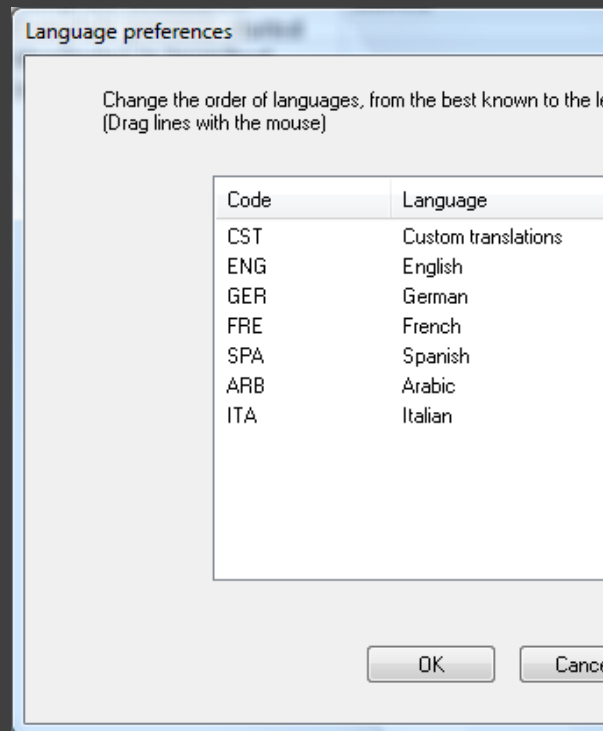
Correlation Factor: 0.96

Sample measurement: 21984

BREAK

User Access - Identity and Management

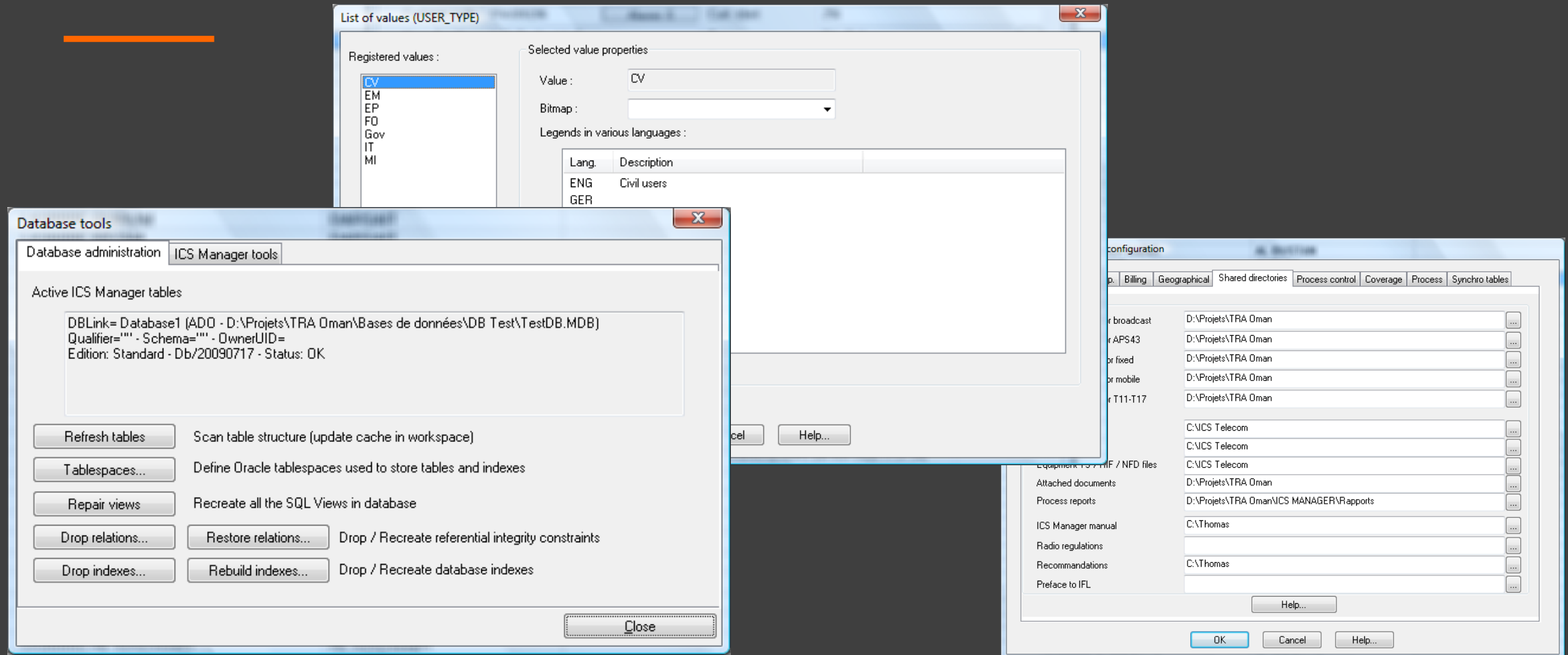
User-Level Customization



- 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.
- ...

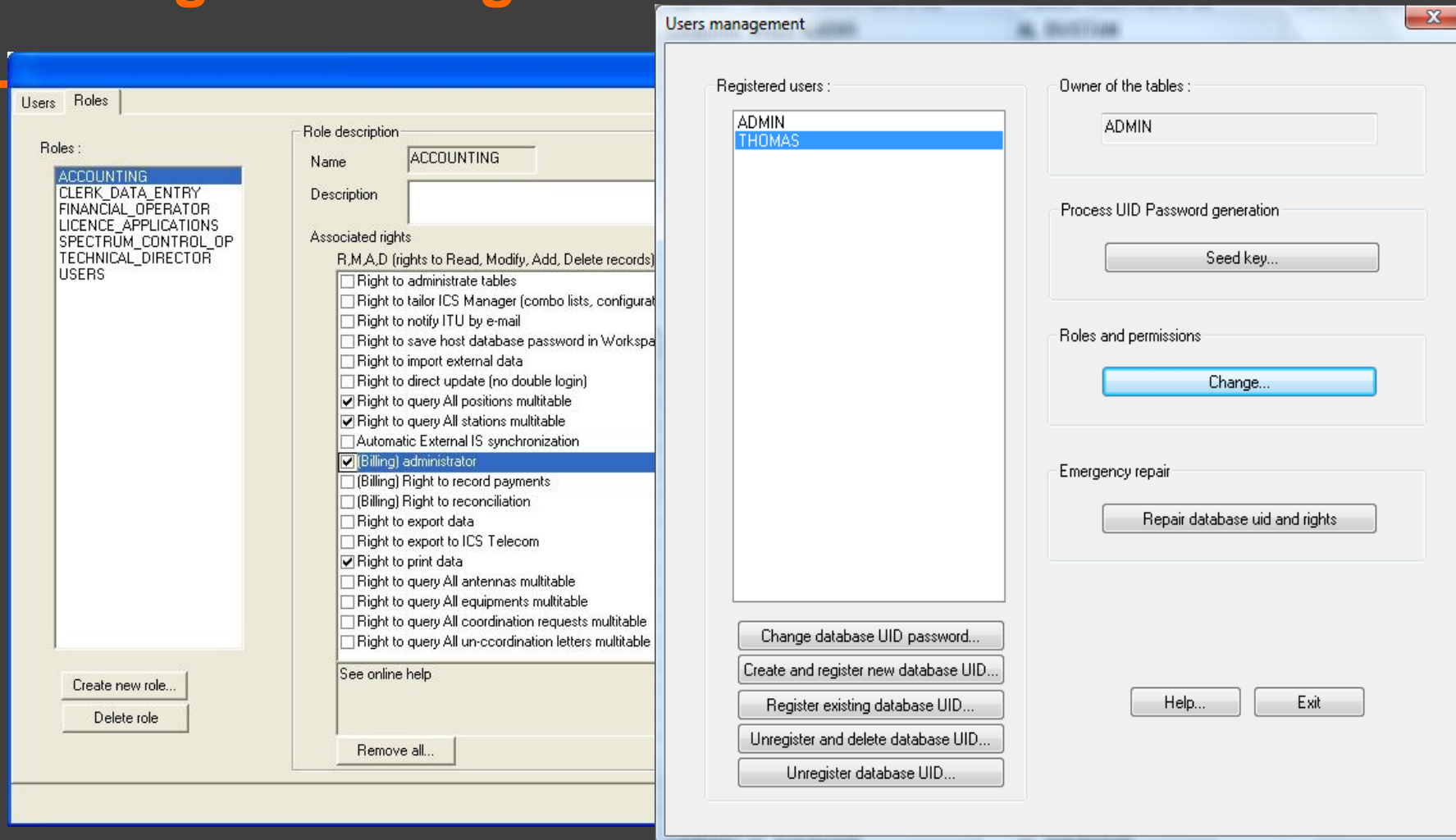
User Access - Identity and Management

Administrator-Level Customization



User Access - Identity and Management

Access Rights management



The image displays two screenshots of the ATDI software interface, specifically the 'Users management' window.

Left Screenshot (Users management - Roles tab):

- Roles:** A list of roles is shown, with 'ACCOUNTING' selected. Other roles include CLERK_DATA_ENTRY, FINANCIAL_OPERATOR, LICENCE_APPLICATIONS, SPECTRUM_CONTROL_OP, TECHNICAL_DIRECTOR, and USERS.
- Role description:** The 'Name' field is set to 'ACCOUNTING'. The 'Description' field is empty.
- Associated rights:** A list of rights is shown, with 'R.M.A.D (rights to Read, Modify, Add, Delete records)' selected. Other rights include:
 - ☐ Right to administrate tables
 - ☐ Right to tailor ICS Manager (combo lists, configurat
 - ☐ Right to notify ITU by e-mail
 - ☐ Right to save host database password in 'Workspa
 - ☐ Right to import external data
 - ☐ Right to direct update (no double login)
 - ☒ Right to query All positions multitable
 - ☒ Right to query All stations multitable
 - ☐ Automatic External IS synchronization
 - ☒ (Billing) administrator
 - ☐ (Billing) Right to record payments
 - ☐ (Billing) Right to reconciliation
 - ☐ Right to export data
 - ☐ Right to export to ICS Telecom
 - ☒ Right to print data
 - ☐ Right to query All antennas multitable
 - ☐ Right to query All equipments multitable
 - ☐ Right to query All coordination requests multitable
 - ☐ Right to query All un-coordination letters multitable
- Buttons:** 'Create new role...', 'Delete role', and 'Remove all...'.

Right Screenshot (Users management - Users tab):

- Registered users:** A list of users is shown, with 'ADMIN' and 'THOMAS' listed. 'THOMAS' is selected.
- Owner of the tables:** A text field containing 'ADMIN'.
- Process UID Password generation:** A button labeled 'Seed key...'.
- Roles and permissions:** A button labeled 'Change...'.
- Emergency repair:** A button labeled 'Repair database uid and rights'.
- Buttons:** 'Change database UID password...', 'Create and register new database UID...', 'Register existing database UID...', 'Unregister and delete database UID...', 'Unregister database UID...', 'Help...', and 'Exit'.

User Access - Identity and Management

Access Rights management

The screenshot displays the 'Taskforce n°13' window with the 'Identification' tab selected. The window contains the following fields and controls:

- Short name:** SPEC
- Full name:** Spectrum Management Department
- Code:** 15 (with an 'Aliases: 0' button next to it)
- Description:** (empty text area)
- Task force (database users):** A table with two columns: 'Database user' and 'Name'. The table contains three rows: 'ASTEST', 'DOE', and 'RONY' (which is highlighted in blue).
- Metadata:** Created by ASMS (21 Jan 2006 11:53:53), Modified by ASMS (22 Jan 2006 15:07:17)
- Buttons:** Save and exit, Cancel and exit

A 'Taskforce element' dialog is open in the foreground, showing the 'Database user' dropdown set to 'YOUSEF'. It includes an 'Employee' section with 'Edit...', 'Select...' (highlighted), and 'Detach' buttons. Below these buttons, the fields 'Db UID=YOUSEF' and 'Name=' are visible. The dialog has 'OK' and 'Cancel' buttons at the bottom right.

User Access - Identity and Management

Access Rights management

ICS Manager - C:\ATDI\ICS Manager_8.4.12Nkom\Dev (Database1) - [<Employees1>]

File FCC Follow-Up Planning Control Licencing Type Approval Broadcast LF/MF Broadcast VHF/UHF Space services CAF-ES Fixed CAF-MW Other Terrestr. CAF-Mob FNF COMSIS Whitespace Analysis Tools Configuration Window Help

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

Employee n°38

General More Taskforces Rights Process Appears in Attachments

Identification

Database UID: Regulator1

Title: [v] +

First name: Regulator 1

Last name: Regulator 1

Identification: []

Personal address

Tel. (Home): []

Address: []

City: [Edit... Select... Detach]

Zip code: []

City name: []

Province: [v] +

Country: [v]

Access numbers

Tel. (Internal): []

Tel. (Extern): []

Mobile: []

E-Mail: s.kaddouri@atdi-group.com

Office: []

Other

Type: [v] +

Language: [v]

Color: [] ...

Web login: REGUL01 []

Password status: Active [] ...

Remarks

[]

Created by rsfap-remote (04 Jul 2019 08:14:01.467)
Modified by rsfap-remote (06 Mai 2022 15:39:48.280)

Save and exit Cancel and exit Save changes

Employee n°38

General More Taskforces Rights Process Appears in Attachments

R,M,A,D (rights to Read, Modify, Add, Delete records)

☐ Radiocom systems

☐ ITU services

☐ Allocations

☐ Radiocom applications

☐ EFIS

☐ Channelling plans

☐ Argus measurement campaigns

☐ Argus measurement orders

☐ Inspections

☐ Complaints

☐ Customers

☐ Network Licences

☐ Resolutions

☐ Invoices

☐ Payments

☐ Banks

☐ Type approval

☐ Coordination environment

☐ Station Plans

☐ Servitudes

Change...

User Access - Identity and Management

User access/management through the web application

ICSPortal

Modules

General

Settings

Labels and Messages

Login page

Help

Documentation

Homepage

Requests Management

Roles/Systems

Maps

Portal Owner

Information Buttons

E-Licensing

SSO Source

Modules Display

Company and represent roles

☐ Toggle all

Role	Active
PORTADMIN - Portal Administrator	<input type="checkbox"/>
ALLOCATOR - Allocator	<input type="checkbox"/>
REGULATOR - Regulator	<input type="checkbox"/>
OWNER - Holder	<input checked="" type="checkbox"/>
OPERATOR - Operator	<input checked="" type="checkbox"/>
REQUEST - Applicant	<input type="checkbox"/>
FEE - Fee	<input type="checkbox"/>
VISITOR - Visitor	<input type="checkbox"/>

Contact roles

☐ Toggle all

Role	Active
PORTADMIN - Portal Administrator	<input type="checkbox"/>
ALLOCATOR - Allocator	<input type="checkbox"/>
REGULATOR - Regulator	<input type="checkbox"/>
OWNER - Holder	<input type="checkbox"/>
OPERATOR - Operator	<input type="checkbox"/>
REQUEST - Applicant	<input checked="" type="checkbox"/>
FEE - Fee	<input type="checkbox"/>
VISITOR - Visitor	<input checked="" type="checkbox"/>

Relation roles

☐ Toggle all

Role	Active
PORTADMIN - Portal Administrator	<input type="checkbox"/>
ALLOCATOR - Allocator	<input type="checkbox"/>
REGULATOR - Regulator	<input type="checkbox"/>
OWNER - Holder	<input type="checkbox"/>
OPERATOR - Operator	<input checked="" type="checkbox"/>
REQUEST - Applicant	<input checked="" type="checkbox"/>
FEE - Fee	<input type="checkbox"/>
VISITOR - Visitor	<input type="checkbox"/>

Employee roles

☐ Toggle all

Role	Active
PORTADMIN - Portal Administrator	<input type="checkbox"/>
ALLOCATOR - Allocator	<input type="checkbox"/>
REGULATOR - Regulator	<input type="checkbox"/>
OWNER - Holder	<input type="checkbox"/>
OPERATOR - Operator	<input type="checkbox"/>
REQUEST - Applicant	<input type="checkbox"/>
FEE - Fee	<input type="checkbox"/>
VISITOR - Visitor	<input type="checkbox"/>

Radiocomm Systems

☐ Toggle all

Request system	Active
MW - Microwave Links	<input checked="" type="checkbox"/>
ES - Earth Stations	<input checked="" type="checkbox"/>
BCT - Broadcast Stations	<input type="checkbox"/>
MOB - Station for Mobile Networks	<input type="checkbox"/>
COM - COMSIS	<input checked="" type="checkbox"/>
EXP - Experimental	<input type="checkbox"/>
PMR - Professional Mobile Radio	<input checked="" type="checkbox"/>
TS - Terrestrial Stations	<input checked="" type="checkbox"/>

Decision preview

☐ Toggle all

Role	Active
PORTADMIN - Portal Administrator	<input type="checkbox"/>
ALLOCATOR - Allocator	<input type="checkbox"/>
REGULATOR - Regulator	<input checked="" type="checkbox"/>
OWNER - Holder	<input type="checkbox"/>
OPERATOR - Operator	<input type="checkbox"/>
REQUEST - Applicant	<input type="checkbox"/>
FEE - Fee	<input type="checkbox"/>
VISITOR - Visitor	<input type="checkbox"/>

ADMINARCEP

Labels and Messages

Login page

Help

Documentation

Homepage

Requests Management

Roles/Systems

Maps

Portal Owner

Information Buttons

E-Licensing

SSO Source

Modules Display

Primary user table

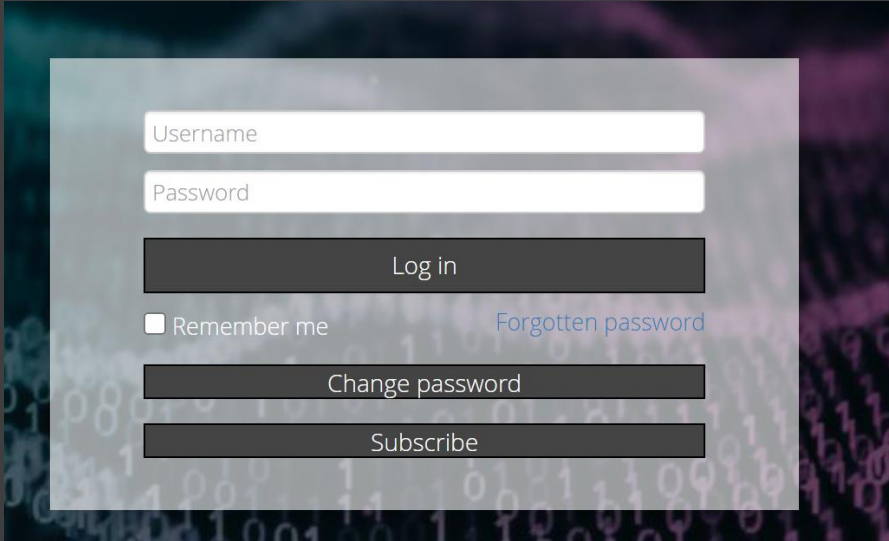
☒ EMPLOYEE

☐ USERS

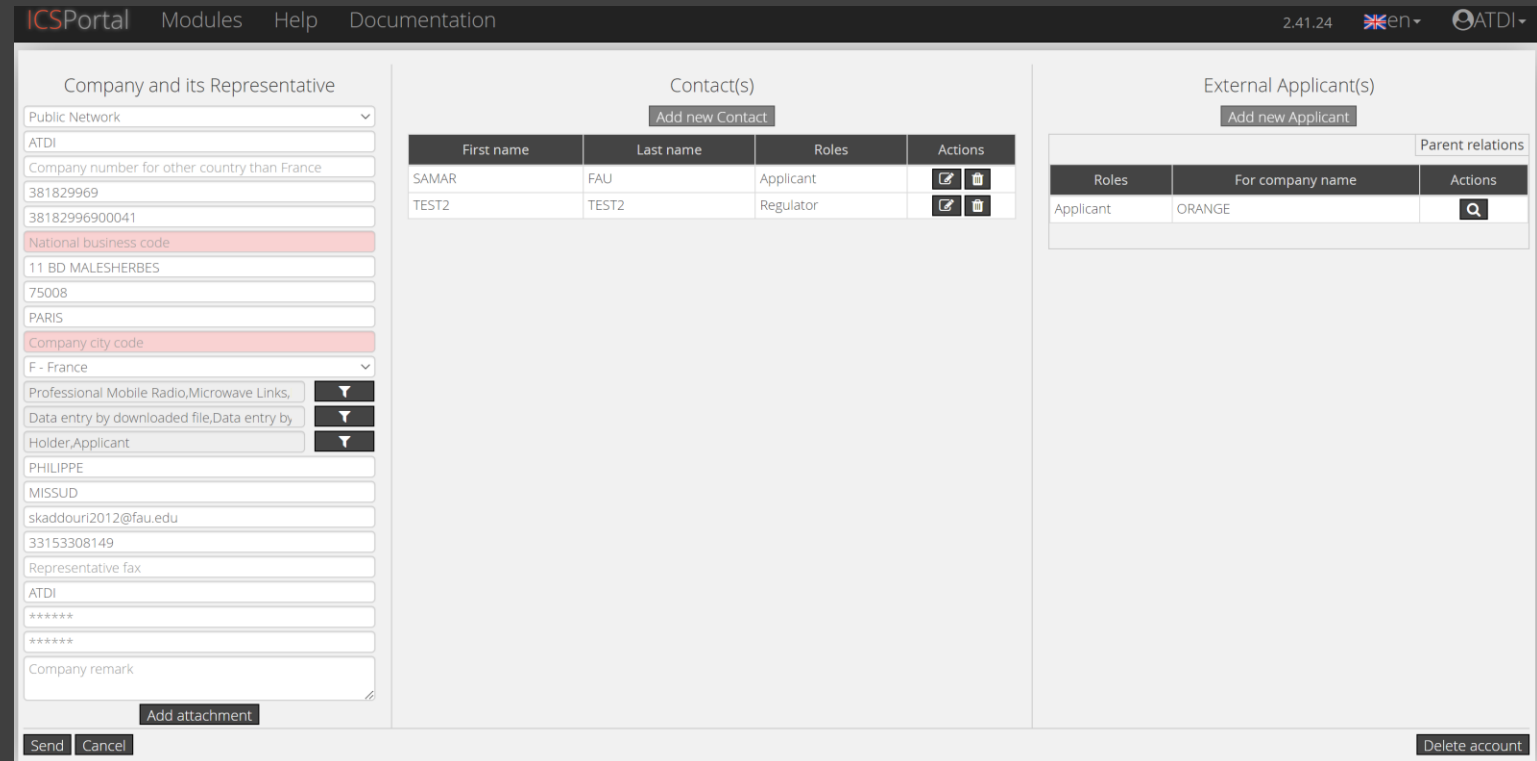
☐ USERS + USERS_CNTCT

User Access - Identity and Management

User access/management through the web application



A login and management interface with a dark background and binary code. It includes input fields for 'Username' and 'Password', a 'Log in' button, a 'Remember me' checkbox, a 'Forgotten password' link, a 'Change password' button, and a 'Subscribe' button.



The ICSPortal interface for user management, featuring three main sections: 'Company and its Representative', 'Contact(s)', and 'External Applicant(s)'. The top navigation bar includes 'ICSPortal', 'Modules', 'Help', 'Documentation', the version '2.41.24', a language dropdown set to 'en', and the ATDI logo.





Company and its Representative

Public Network (dropdown)
ATDI
Company number for other country than France
381829969
38182996900041
National business code
11 BD MALESHERBES
75008
PARIS
Company city code
F - France (dropdown)
Professional Mobile Radio, Microwave Links, (dropdown)
Data entry by downloaded file, Data entry by (dropdown)
Holder, Applicant (dropdown)
PHILIPPE
MISSUD
skaddouri2012@fau.edu
33153308149
Representative fax
ATDI

Company remark
Add attachment
Send Cancel


Contact(s)

Add new Contact

First name	Last name	Roles	Actions
SAMAR	FAU	Applicant	 
TEST2	TEST2	Regulator	 

External Applicant(s)

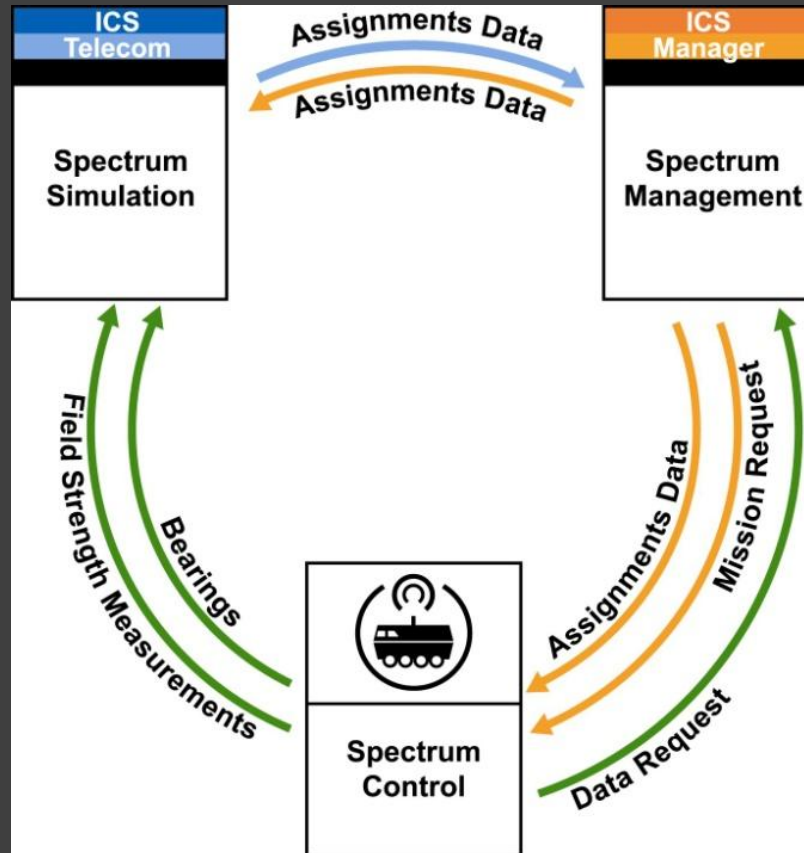
Add new Applicant

Parent relations		
Roles	For company name	Actions
Applicant	ORANGE	

Delete account

Interoperability and data management

Existing Interface with monitoring systems



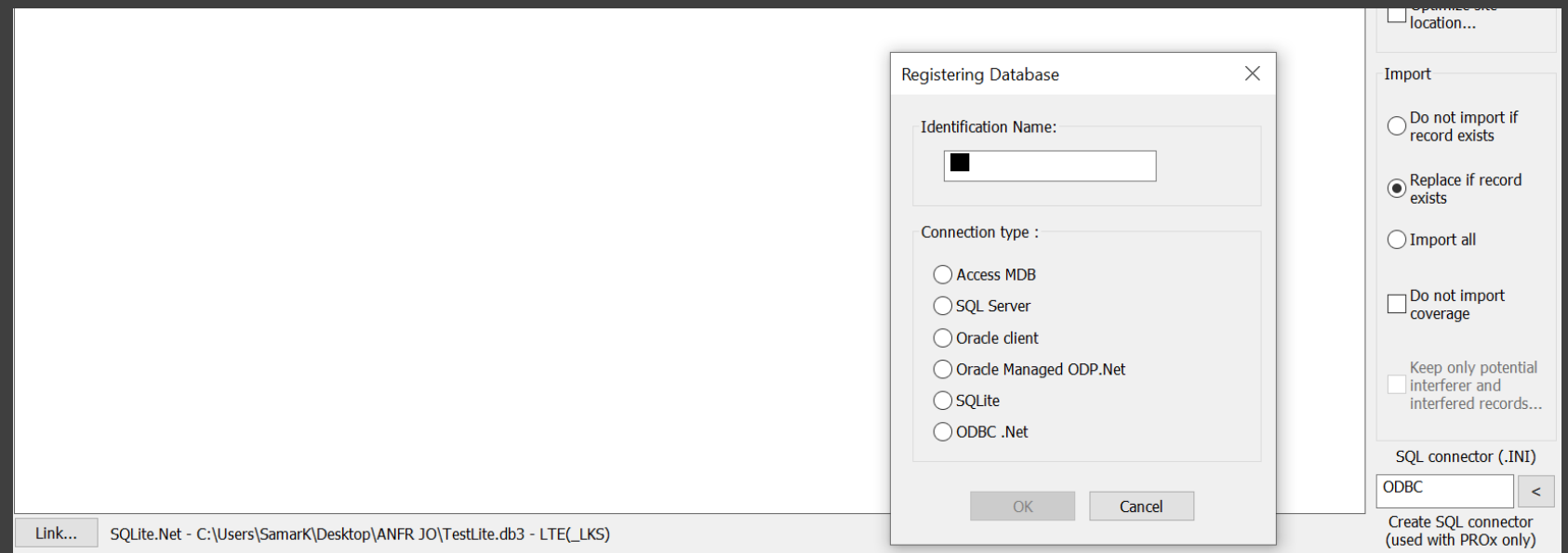
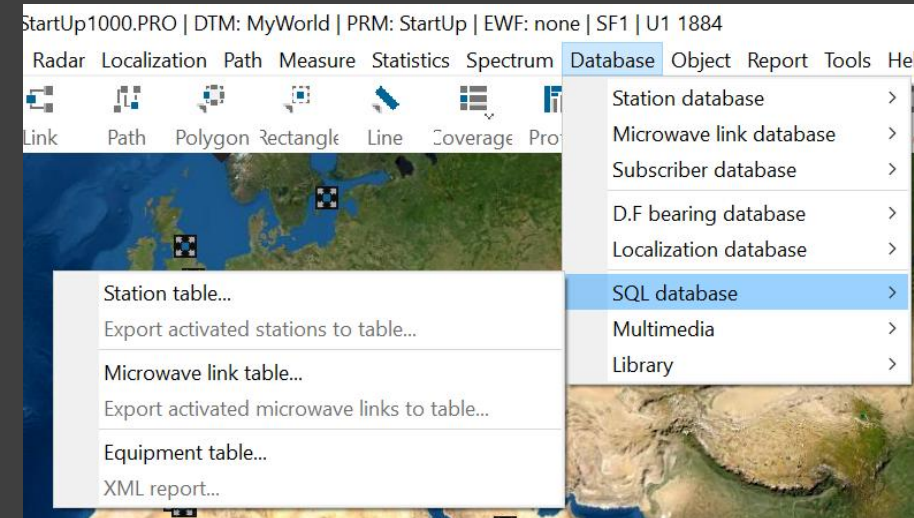
Existing interfaces with:

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

Interoperability and data management

Import Capabilities

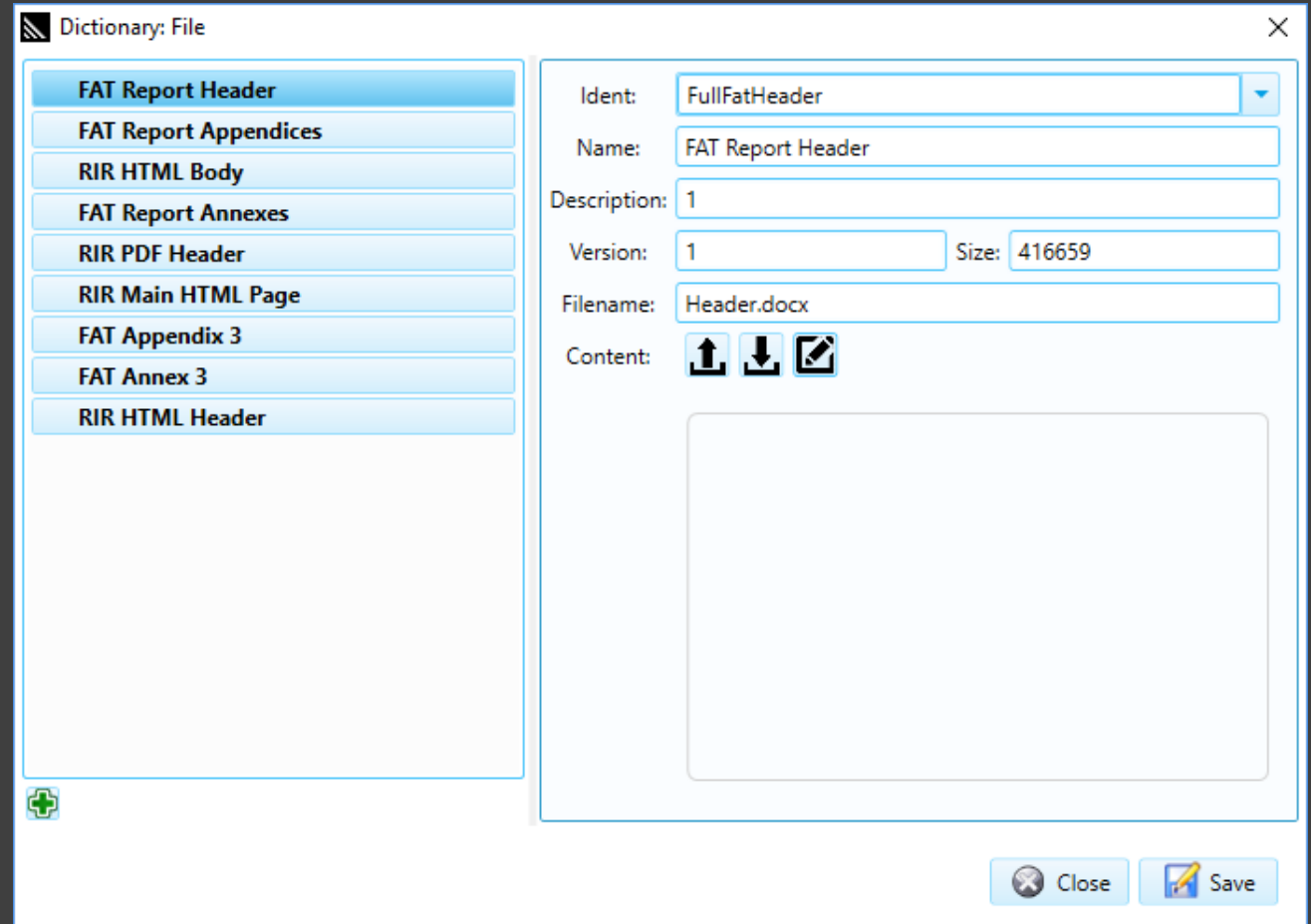
- Database import/connection
- **XML, KML, Image formats** , MS Word, MS Excel, PDF, HTML
- ITU notices
- SMADEF format



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



The screenshot shows a software window titled "Dictionary: File". On the left is a list of report components: "FAT Report Header" (selected), "FAT Report Appendices", "RIR HTML Body", "FAT Report Annexes", "RIR PDF Header", "RIR Main HTML Page", "FAT Appendix 3", "FAT Annex 3", and "RIR HTML Header". On the right is a form for the selected item, "FAT Report Header". The form fields are: "Ident:" (FullFatHeader), "Name:" (FAT Report Header), "Description:" (1), "Version:" (1), "Size:" (416659), and "Filename:" (Header.docx). Below these fields are three icons: an up arrow, a down arrow, and a document icon. At the bottom right of the window are "Close" and "Save" buttons.

Interoperability and data management

Interoperability within ATDI Tools

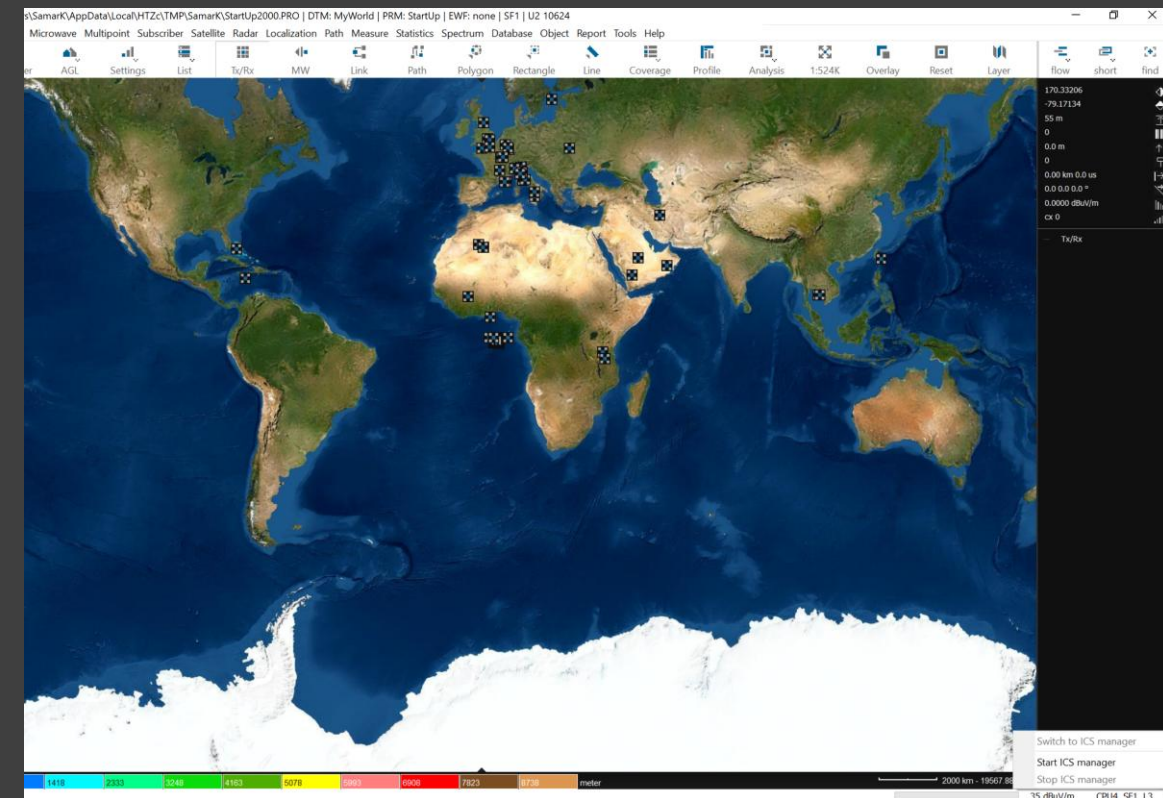
- C:\ATDI\ICS Manager_8.4.12Nkom\Dev (Database1) - [<Other terrestrial stations4>]

Follow-Up Planning Control Licencing Type Approval Broadcast LF/MF Broadcast VHF/UHF Space services CAF-ES Fixed CAF-MW Other Terrestrial CAF-Mob

ID	S..	Application	Ident	Power	Tx lowest hig...	Rx lowest hig...	Owner	Site name
215	0	BLR 3GHz	771000	10 dBW	-	-	IFW SAS	VERNOU LA CELLE
216	0	BLR 3GHz	771000	-0.1 dBW	-	-	IFW SAS	
217	0	BLR 3GHz	051107	8			ANGE	S PIERRE
218	0	BLR 3GHz	051107	6			ANGE	
221	0	BLR 3GHz	27-201-1				ITUDE WIREL	PONT AUDEMER
222	0	BLR 3GHz	27-201-5				ITUDE WIREL	
223	0	BLR 3GHz	27-202-1				ITUDE WIREL	FORT MOVILLE
224	0	BLR 3GHz	27-202-5				ITUDE WIREL	
225	0	BLR 3GHz	27-202-1				ITUDE WIREL	FORT MOVILLE
226	0	BLR 3GHz	27-202-5				ITUDE WIREL	
227	0	BLR 3GHz	27-202-1				ITUDE WIREL	FORT MOVILLE
228	0	BLR 3GHz	27-202-5				ITUDE WIREL	
229	0	BLR 3GHz	27-202-1				ITUDE WIREL	FORT MOVILLE
230	0	BLR 3GHz	27-202-5				ITUDE WIREL	
231	0	BLR 3GHz	27-203-1				ITUDE WIREL	S SYLVESTRE DE C
232	0	BLR 3GHz	27-203-5				ITUDE WIREL	
233	0	BLR 3GHz	27-203-1				ITUDE WIREL	S SYLVESTRE DE C
234	0	BLR 3GHz	27-203-5				ITUDE WIREL	
235	0	BLR 3GHz	27-203-1				ITUDE WIREL	S SYLVESTRE DE C
236	0	BLR 3GHz	27-203-5				ITUDE WIREL	
237	0	BLR 3GHz	27-203-1				ITUDE WIREL	S SYLVESTRE DE C
238	0	BLR 3GHz	27-203-5				ITUDE WIREL	
239	0	BLR 3GHz	27-204-1				ITUDE WIREL	
240	0	BLR 3GHz	27-204-5				ITUDE WIREL	
241	0	BLR 3GHz	27-204-1				ITUDE WIREL	
242	0	BLR 3GHz	27-204-5				ITUDE WIREL	
243	0	BLR 3GHz	27-204-1				ITUDE WIREL	S PIERRE DES IFS
244	0	BLR 3GHz	27-204-5				ITUDE WIREL	
245	0	BLR 3GHz	27-204-1	10 dBW			ITUDE WIREL	S PIERRE DES IFS

Export

- Export to HTZ STATION...
- Export to EWX file...
- Add to eXchange file...
- Export entities as XML files...



Interoperability and data management

Interoperability within ATDI Tools

Manager_8.4.12Nkom\Dev (Database1) - [<Other terrestrial stations4>]

ng Control Licencing Type Approval Broadcast LF/MF Broadcast VHF/UHF Space services CAF-ES Fixed CAF-MW Other Terrest. CAF-Mob FNF COMSIS Whitespace Analysis Tools Configuration Window

ICS Portal Import tool...

- From ICS Manager eXchange File...
- From ICS Manager entities XML File...
- From CSV File...
- From VEC file...
- From SHP file...
- From Database Table...
- from ICS Manager Data Update Script...
- from ITU notice file to HTZ EWX...
- from BRIFIC to HTZ EWX...

Initial Import Data...

Import CAF...

Administrator

- Import
- Reports
- File Editor
- Synchronize External IS...
- Import Equipment RAF files...
- Import Antenna RPE files...
- Antenna radiation pattern files
- Database Extraction
- Migration Supports ARCEP...
- Init processus ARCEP Stations terriennes

ID	S..	Application	Ident	Power	Tx lowest hig...	Rx
215	0	BLR 3GHz	771000	10 dBW	-	
216	0	BLR 3GHz	771000	-0.1 dBW	-	
217	0	BLR 3GHz	051107	8 dBW	-	
218	0	BLR 3GHz	051107	6.9 dBW	-	
221	0	BLR 3GHz	27-201	10 dBW	-	
222	0	BLR 3GHz	27-201	5.9 dBW	-	
223	0	BLR 3GHz	27-202	10 dBW	-	
224	0	BLR 3GHz	27-202	5.9 dBW	-	
225	0	BLR 3GHz	27-202	10 dBW	-	
226	0	BLR 3GHz	27-202	5.9 dBW	-	
227	0	BLR 3GHz	27-202	10 dBW	-	
228	0	BLR 3GHz	27-202	5.9 dBW	-	
229	0	BLR 3GHz	27-202	10 dBW	-	
230	0	BLR 3GHz	27-202	5.9 dBW	-	
231	0	BLR 3GHz	27-203	10 dBW	-	
232	0	BLR 3GHz	27-203	5.9 dBW	-	
233	0	BLR 3GHz	27-203	10 dBW	-	
234	0	BLR 3GHz	27-203	5.9 dBW	-	
235	0	BLR 3GHz	27-203	10 dBW	-	
236	0	BLR 3GHz	27-203	5.9 dBW	-	
237	0	BLR 3GHz	27-203	10 dBW	-	
238	0	BLR 3GHz	27-203	5.9 dBW	-	
239	0	BLR 3GHz	27-204	10 dBW	-	

ICSPortal Modules Help Documentation

General Settings Supervision

Labels and Messages Login page Help Documentation Homepage Requests Management Roles/Systems Maps [Portal Owner](#)

Modules Display

☒ Toggle all

ICS-Manager version: 7.2.19X

Portal language	Active
de	<input checked="" type="checkbox"/>
en	<input checked="" type="checkbox"/>
es	<input checked="" type="checkbox"/>
fr	<input checked="" type="checkbox"/>

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

<input checked="" type="checkbox"/>	atdi-poc-log-2022_06_07-18_23_42.log	08/06/2022 10:07	Text Document	3 KB
<input type="checkbox"/>	atdi-poc-log-2022_06_07-18_24_33.log	08/06/2022 13:57	Text Document	17 KB
<input type="checkbox"/>	atdi-poc-log-2022_06_08-13_44_51.log	08/06/2022 13:53	Text Document	21 KB

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\RsfapApplicationsRequestsProvider`2.cs:100
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\log.log.2021-12-20.log
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\RsfapApplicationsRequestsProvider`2.cs:100
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\log.log.2021-12-20.log
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
	<input type="text" value="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 (Algérie)
 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

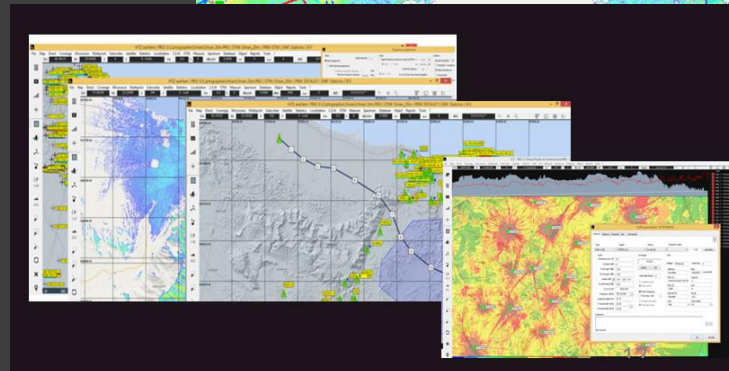
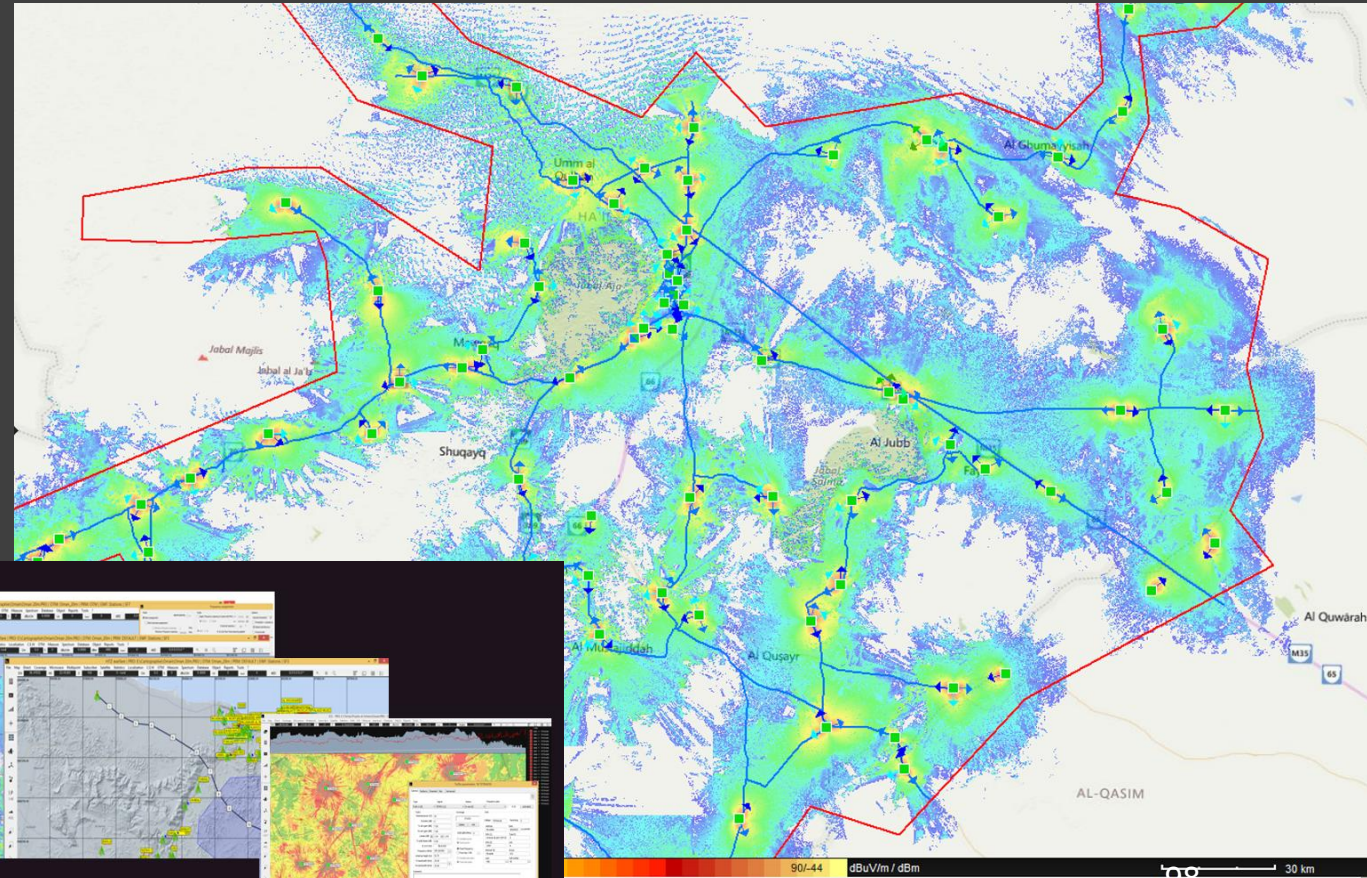
Technical Analysis Capabilities in HTZ Warfare

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

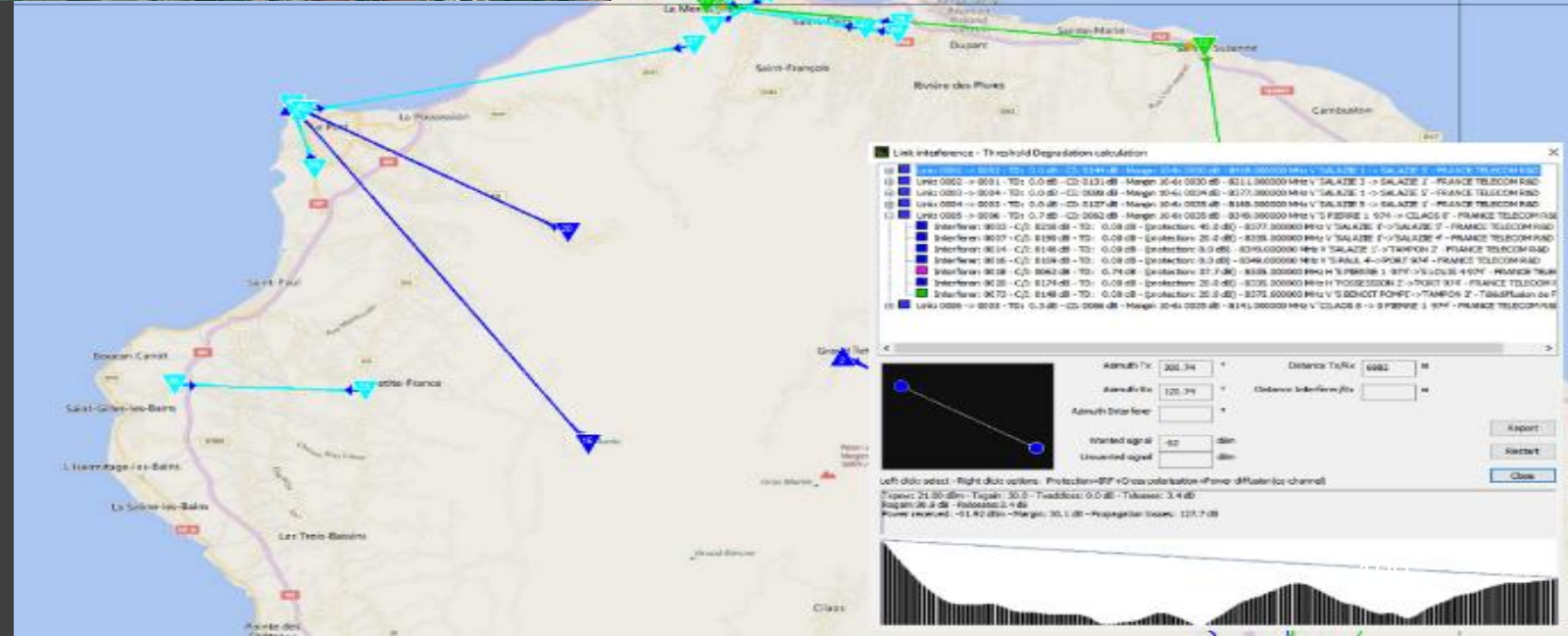
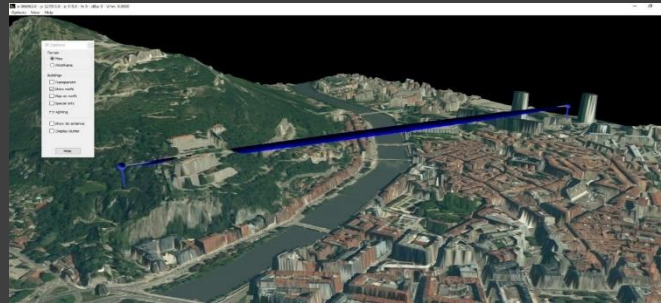


99

HTZ Warfare

Microwave, P2MP, Backhaul, mm Wave bands

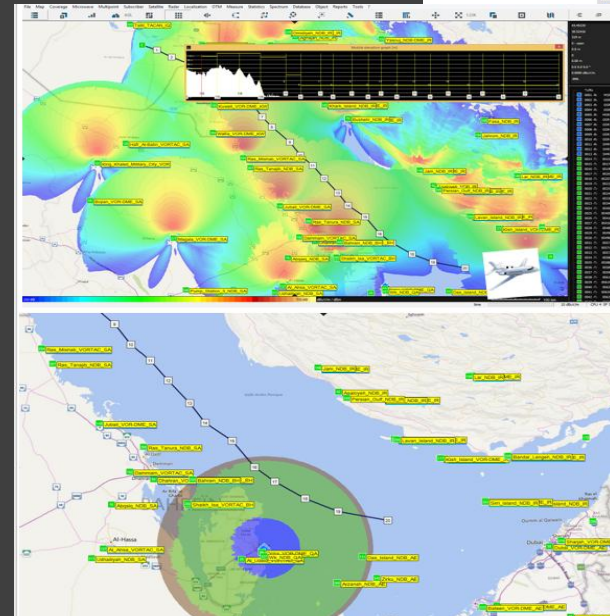
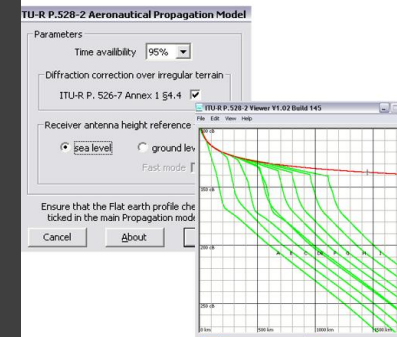
- Profile budget calculations
- Frequency and space diversity
- Multi-K factor calculations
- Climate and rain parameters
- Reliability calculations
- Automatic antenna orientation
- Link optimization
- Automated frequency planning
- Interference calculations
- Quality objectives calculations (ITU-R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



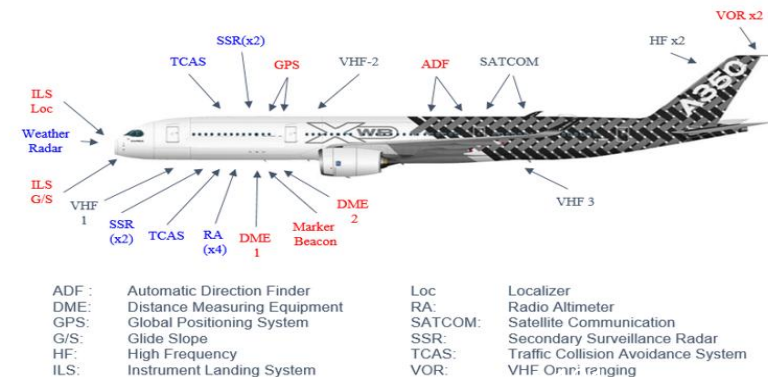
HTZ Warfare Aeronautical Services

- 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 aircraft with all radio navigation equipments with HTZ warfare



Distance / elevation pattern

°	km/M	°	km/M	°	km/M	°	km/M	°	km/M	°	km/M	°	km/M	°	km/M	°	km/M
-89	10.00	-69	15.82	-49	21.64	-29	27.46	-9	33.28	11	40.31	31	52.54	51	64.77	71	76.99
	10.29		16.11		21.93		27.75		33.57		39.92		52.15		64.38		76.61
	10.58		16.40		22.22		28.04		33.86		39.53		51.76		63.99		76.22
	10.87		16.69		22.51		28.33		34.15		39.15		51.37		63.60		75.83
	11.16		16.98		22.80	-25	28.62	-5	34.44	15	38.76		50.98		63.21		75.44
	11.46		17.28		23.10		28.92		34.74		38.37		50.60		62.82		75.05
	11.75		17.57		23.39		29.21		35.03		37.98		50.21		62.44		74.66
	12.04		17.86		23.68		29.50		35.32		37.59		49.82		62.05		74.27
	12.33		18.15		23.97		29.79		35.61		37.20		49.43		61.66		73.89
-80	12.62	-60	18.44	-40	24.26	-20	30.08	0	35.90	20	36.81	40	49.04	60	61.27	80	73.50
	12.91		18.73		24.55		30.37		35.80		36.43		48.65		60.88		73.11
	13.20		19.02		24.84		30.66		70.30		36.04		48.26		60.49		72.72
	13.49		19.31		25.13		30.95		79.60		35.65		47.88		60.10		72.33
	13.78		19.60		25.42		31.24		76.00		35.26		47.49		59.72		71.94
	14.07		19.89		25.71	-15	31.53	5	61.00	25	34.87		47.10		59.33		71.55
	14.37		20.19		26.01		31.83		50.50		34.48		46.71		58.94		71.17
	14.66		20.48		26.30		32.12		50.80		34.09		46.32		58.55		70.78
	14.95		20.77		26.59		32.41		49.20		33.71		45.93		58.16		70.39
	15.24		21.06		26.88		32.70		41.60		33.32		45.54		57.77	89	70.00
70	15.53	50	21.35	30	27.17	10	33.00	10	33.00	20	33.00	50	45.16	70	57.38		

converted diagram preview

dB

rotary ☐

☐ km
☐ statute mile
☒ international nautical mile
☐ geographical nautical mile

R/R0: 367.90 miles

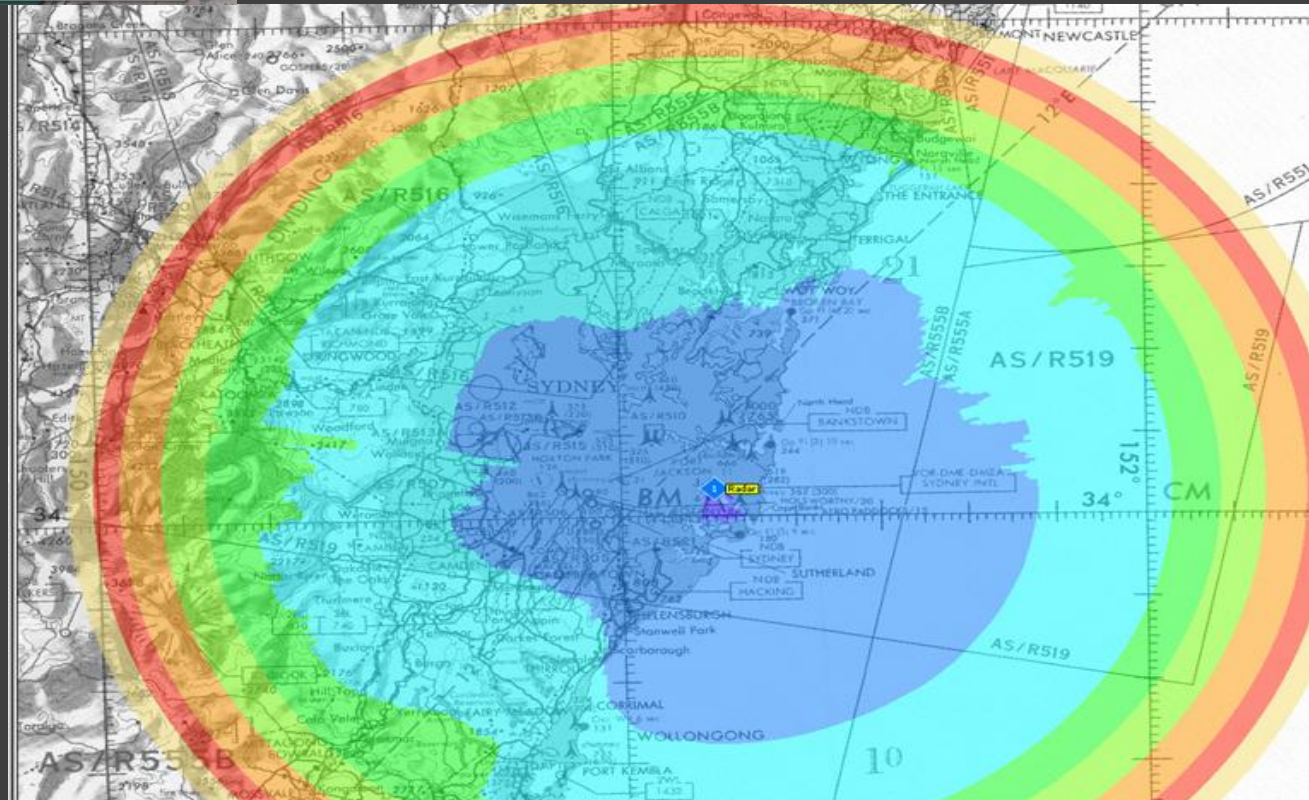
reset interpolate

Close Cancel

HTZ Warfare

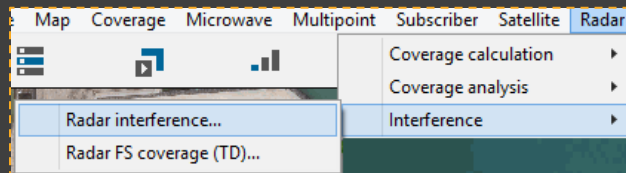
Radar Minimum Detection Height

Point	Subscriber	Satellite	Radar	Localization	OTM	Measure	Statistics	Spectrum
			Coverage calculation			Radar coverage...		
			Coverage analysis			Radar FS coverage...		
			Interference			Radar coverage (min detection)...		



Label	
Target detected	Blue
150 feet ASL min	Cyan
300 feet ASL min	Green
450 feet ASL min	Light Green
600 feet ASL min	Yellow-Green
750 feet ASL min	Yellow
900 feet ASL min	Orange
1050 feet ASL min	Red
1200 feet ASL min	Dark Red
1350 feet ASL min	Dark Red

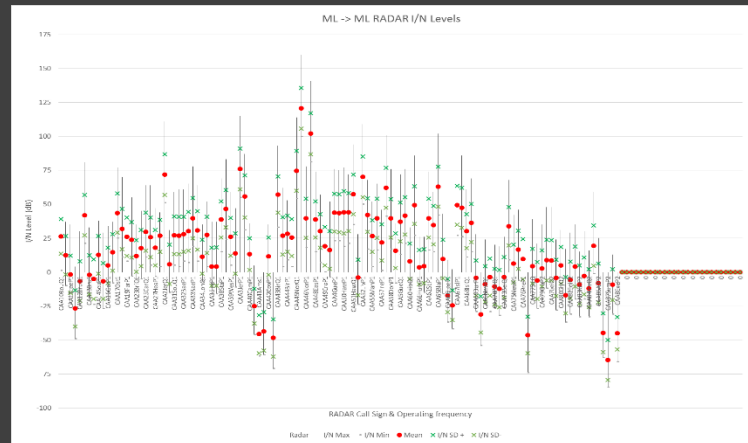
HTZ Warfare Radar Interference Analysis



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.

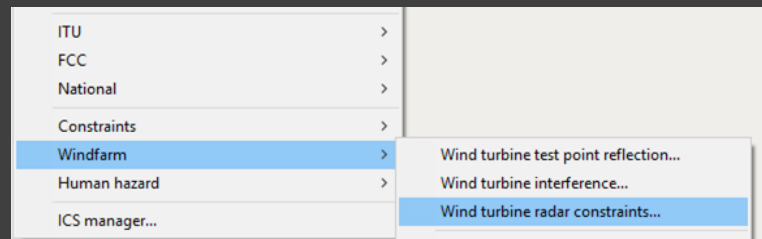
The 'Radar interference' dialog box contains the following settings:

- Target height (m): 2000.00
- Visibility rule (> n mrad) (-9999=normal): -9999
- Unwanted = activated (selected)
- Unwanted = de-activated and activated
- Unwanted = de-activated
- Collision probability (Unwanted aperture): ☒
- Percentage of time - wanted: 50
- Percentage of time - unwanted: 10
- Buttons: OK, Cancel, Station list..., IRF...



HTZ Warfare

Radar Coexistence; Radar Vs Windfarm



Wind turbine parameters: 45 WT000001

General Pattern Envelop Site

Type: Wind turbine (12) Status: In use (6) # 45 activated

General

Mast height (m): 80.00
 Blade size (m): 50.00
 Blade RCS (m2): 200000.0000
 Tower RCS (m2): 300000.00
 Ref. frequency (MHz): 11200.00000 (rcs)

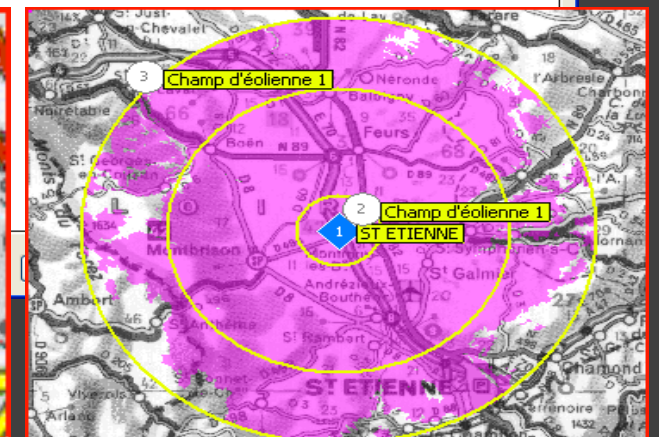
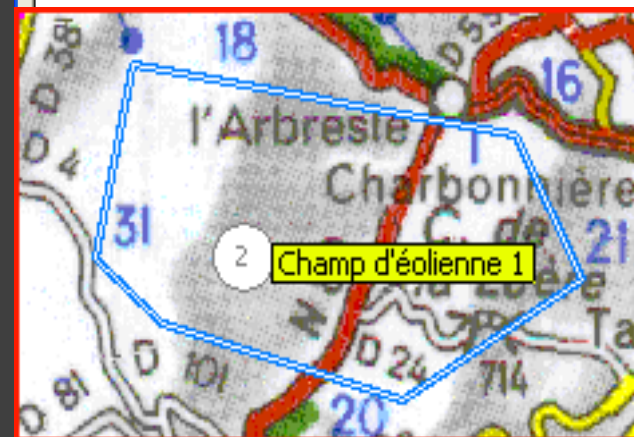
Info

Callsign: WT000001
 Address: WT000001 Date: 20161205
 Info (1): Type ID
 Info (2): Link
 Network ID: Group
 User: WZ Call number: 0

Report

Wind turbine - Radar constraints

Radar type	Wind turbine #	Callsign	Height	Agreement	Max Height
ZIT	2	Eolienne 1	150.00	NOK	0
ZIT	3	Eolienne 1	150.00	OK	150
Landing	2	Eolienne 1	150.00	OK	150
Landing	3	Eolienne 1	150.00	OK	150
Other	2	Eolienne 1	150.00	OK	150
Other	3	Eolienne 1	150.00	OK	150
H/L altitude	2	Eolienne 1	150.00	NOK	0
H/L altitude	3	Eolienne 1	150.00	OK	150



HTZ Warfare

Multi-lateration- Airport surface

Tx/Rx parameters: 1 Interrogat

General | Patterns | Channels | Site | Advanced

Type: Tx/Rx A (0) | Signal: **MLAT interrogator (55)** | Status: Connected (5) | Frequency plan: # 1 | activated

Tx/Rx

Nominal power (W): **100**

Dynamic (dB): 0

Tx ant gain (dBi): **5.00**

Rx ant gain (dBi): **5.00**

Losses (dB): tx 0.00 rx 0.00

Tx add losses (dB): 0.00

E.I.R.P (W): 316.2278

Frequency (MHz): **1030.000000**

Antenna height (m): **90.00**

Tx bandwidth (kHz): 24000.00

Rx bandwidth (kHz): 24000.00

Coverage

ITU525

Delete info

OOB (dBW/MHz): 0

☐ Variable power

☐ Fixed power

☒ Fixed frequency

☐ Freq Hop / WB

☐ Variable elevation

☒ Fixed elevation

Info

Callsign: Interrogat | Parenting: 0

Address: Airport tower | Date: 20160208 | Type ID: C

Info (1): TXRX | Link: |

Info (2): | Group: |

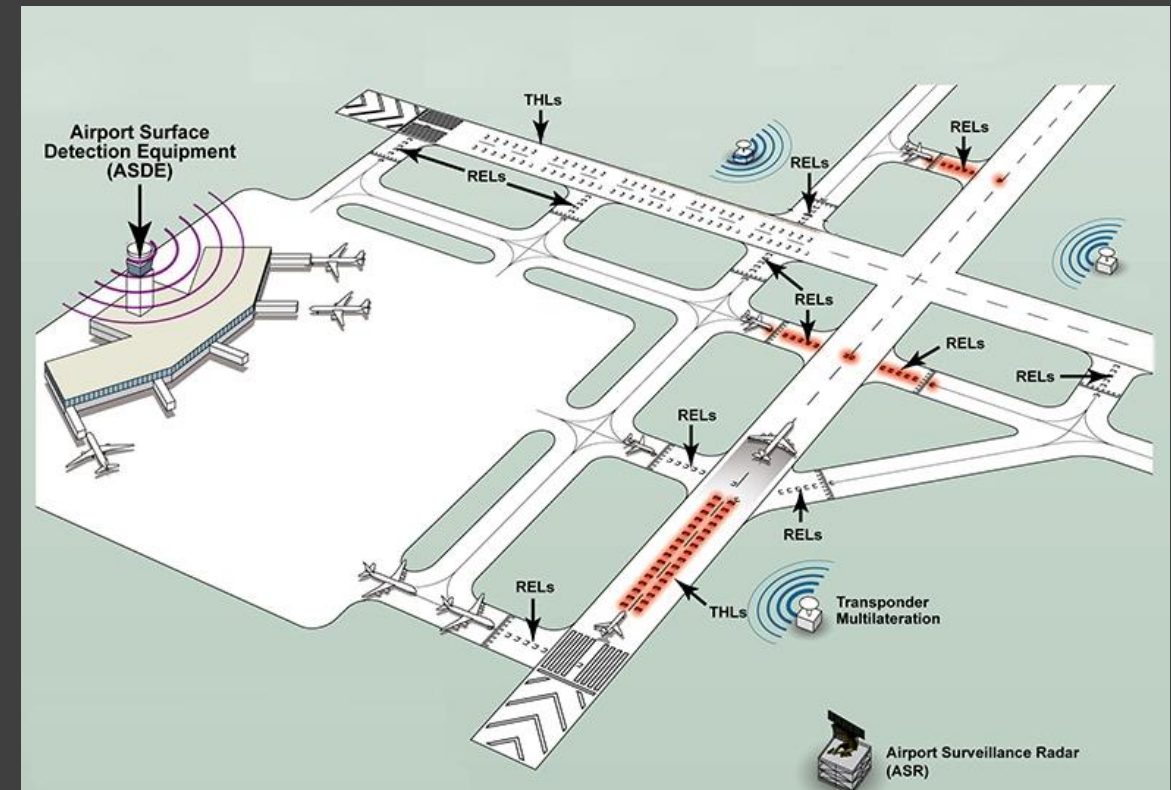
Network ID: | Call number: 0

User: |

Comment: Demo MLAT Interrogator parameters

SQL record 0

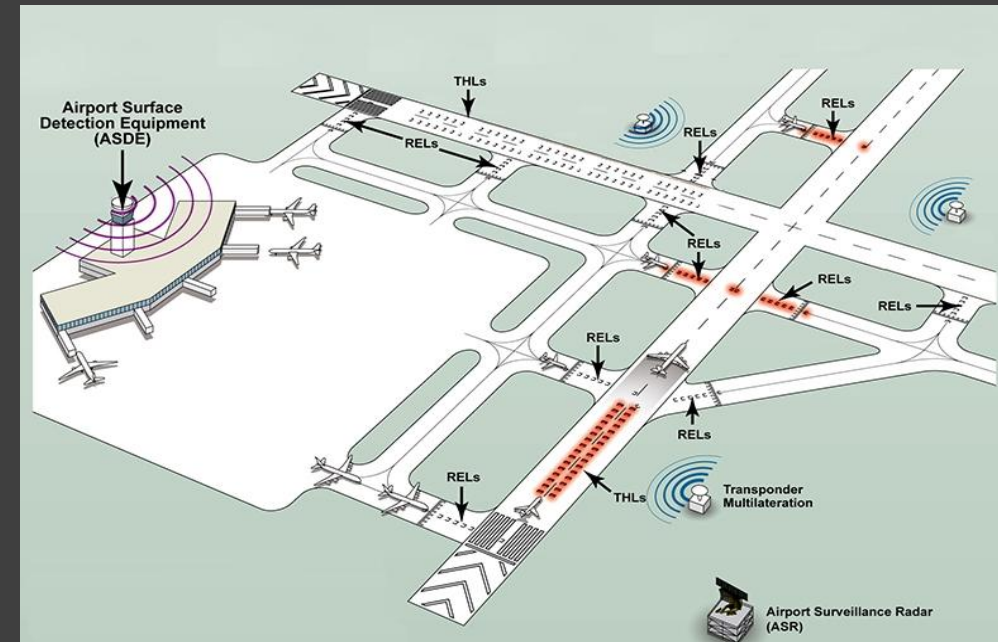
OK Cancel



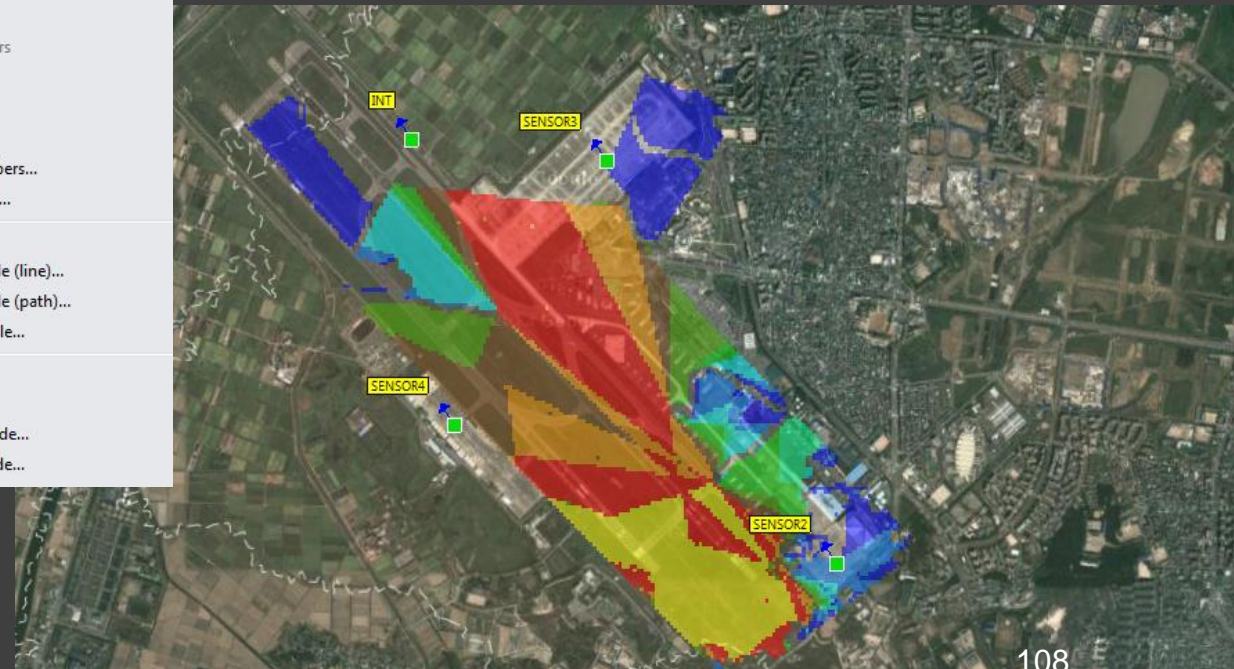
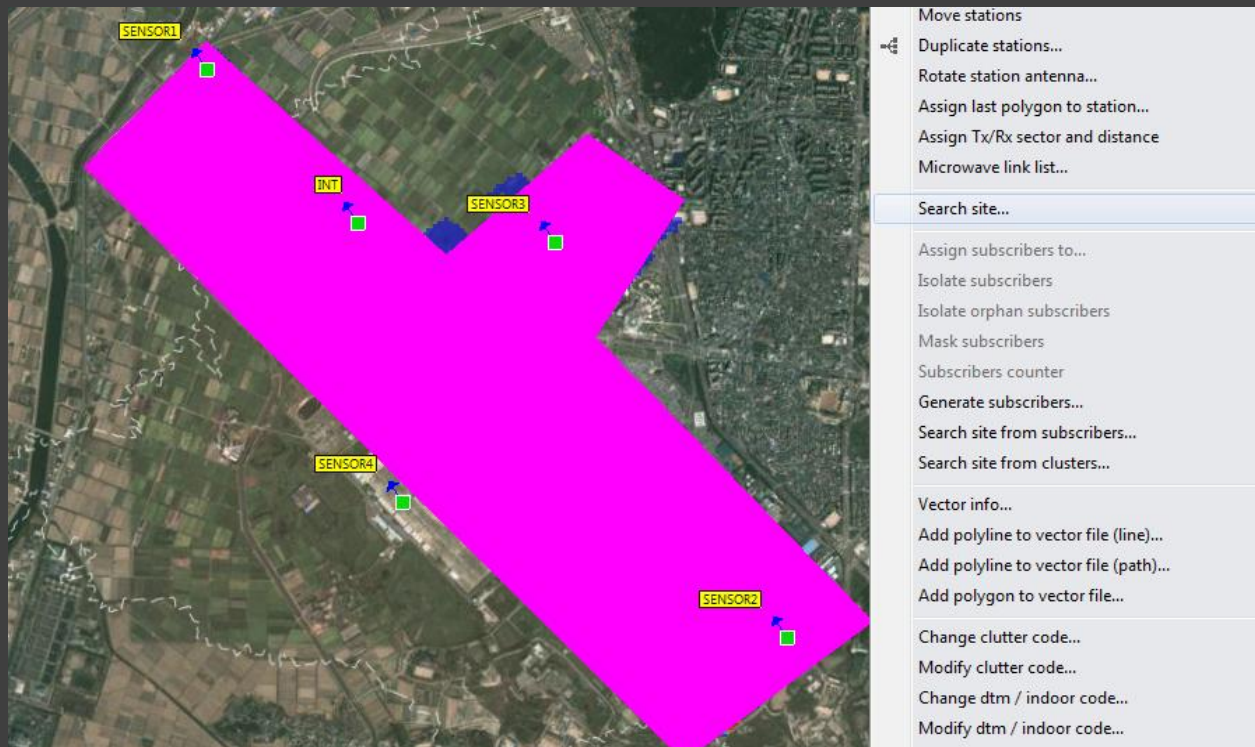
HTZ Warfare

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.

Output

#RE/PRB/subframe	16
Number of OFDM symbols per subframe	14
Total Number of PRBs per TTI	25
Reference signal	13.095
Primary synchronization signal (PSS)	0.000
Secondary synchronization signal (SSS)	0.632
PBCH / PRACH	1.210
PDCCH (incl. PCFICH, PHICH) / PUCCH	6.578
PDSCH	78.484



Input

☐ FDD
 ☒ TDD

Cyclic prefix

☒ Normal
 ☐ Extended

Antenna configuration

No. arrays T/R 4 / 2

TDD

DL-to-UL configuration

DL-to-UL config 1

Special subframe format type

Subframe Format 7

Regulal DL/UL subframes 4

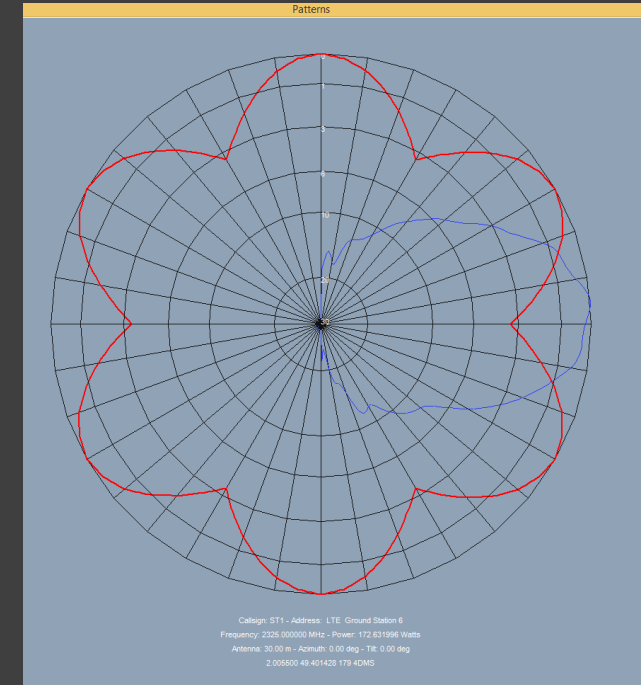
Special subframes 2

DL/UL ratio 54,29

Bandwidth (kHz) 5000,00

PDCCH symbol(s) 1

Max power (W) 30.000000



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

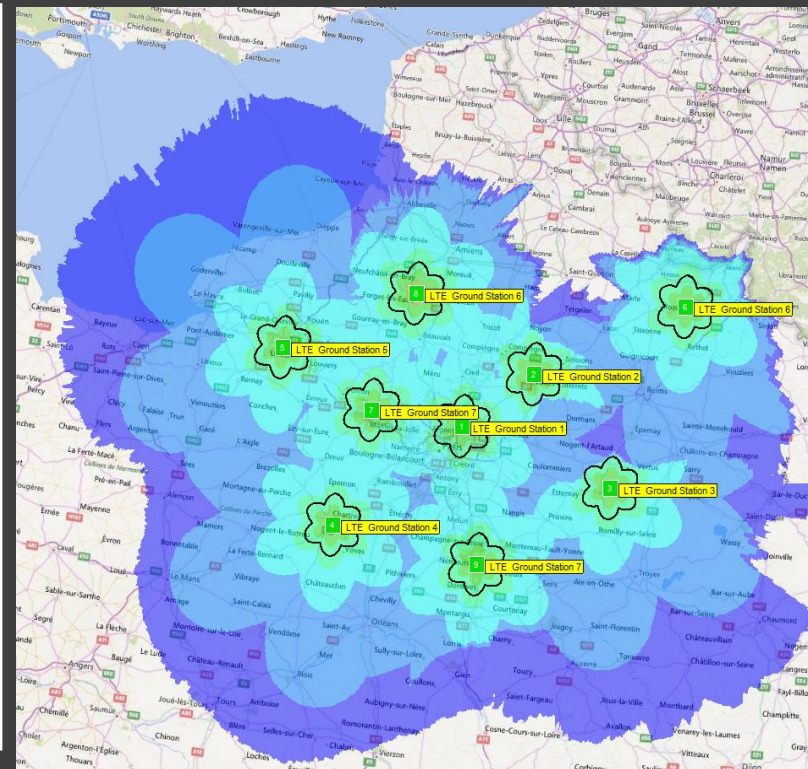


Fig 1: RSRP coverage (Aircraft altitude: 8000 ft)

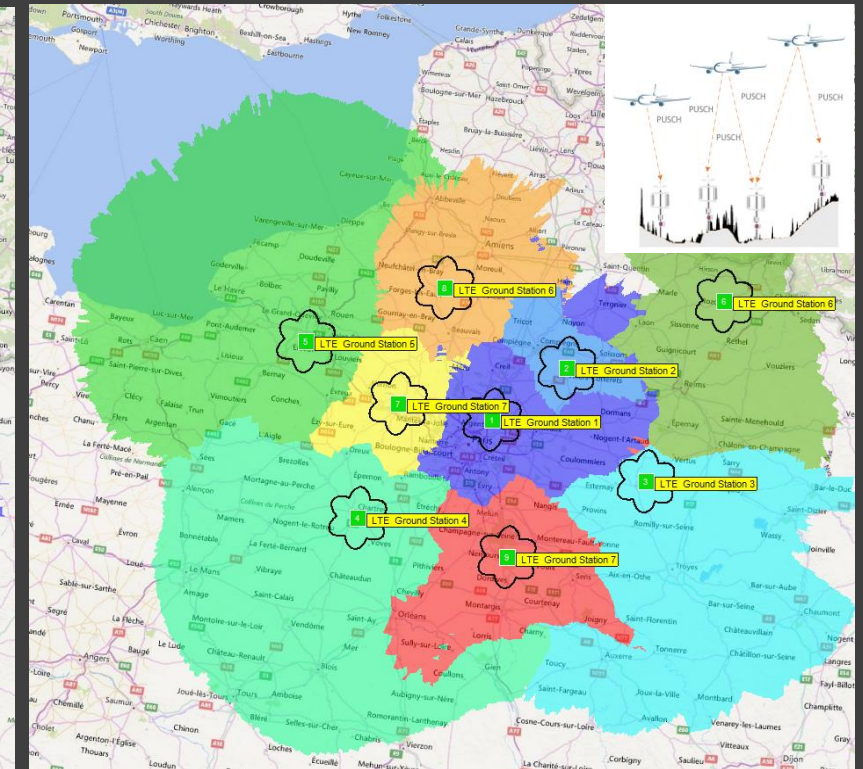


Fig 2: Best server RSRP map (Aircraft altitude: 8000 ft)

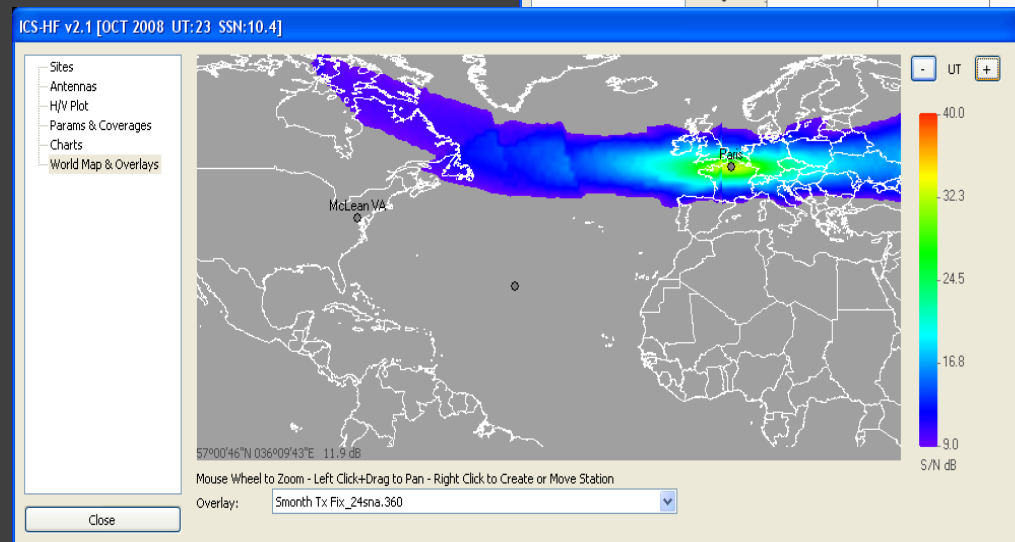
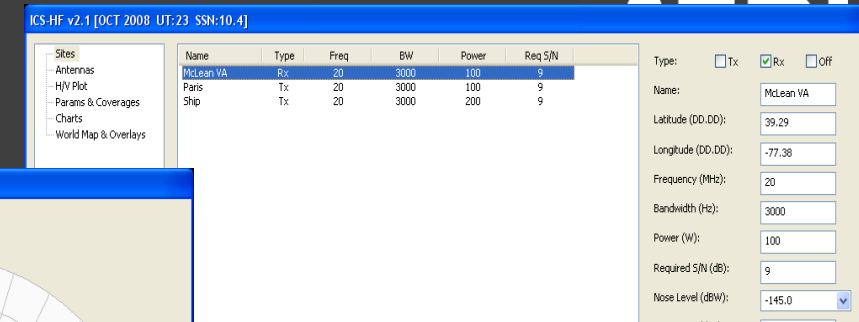
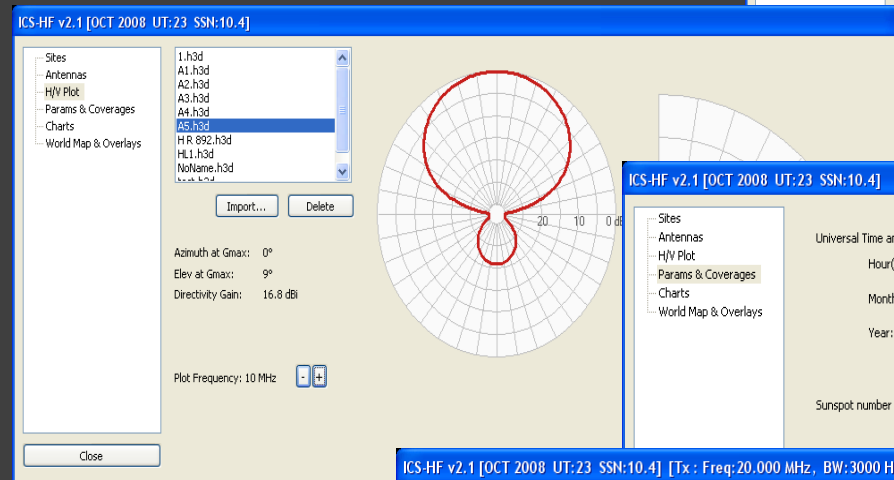
HTZ Warfare HF Planning

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

CHART ANALYSIS

MUF (Maximum Usable Frequency)

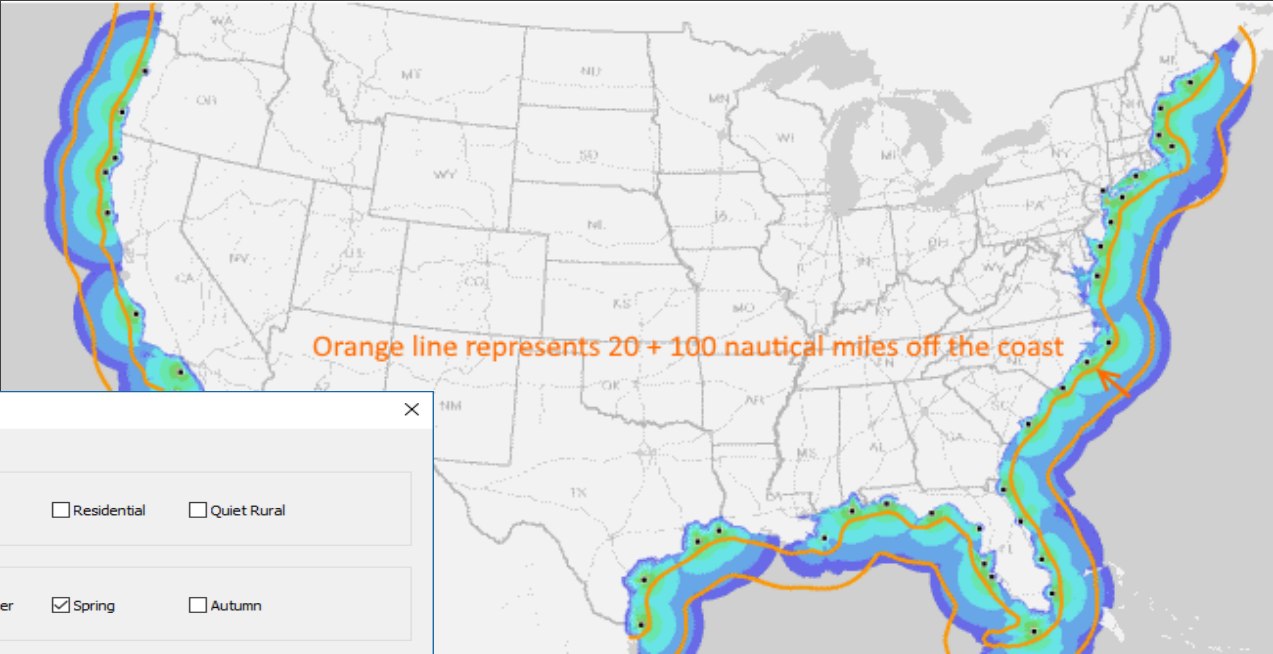
FOT (Frequency of Optimal Transmission)



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.ddd):

45.700457

Longitude (dd.ddd):

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

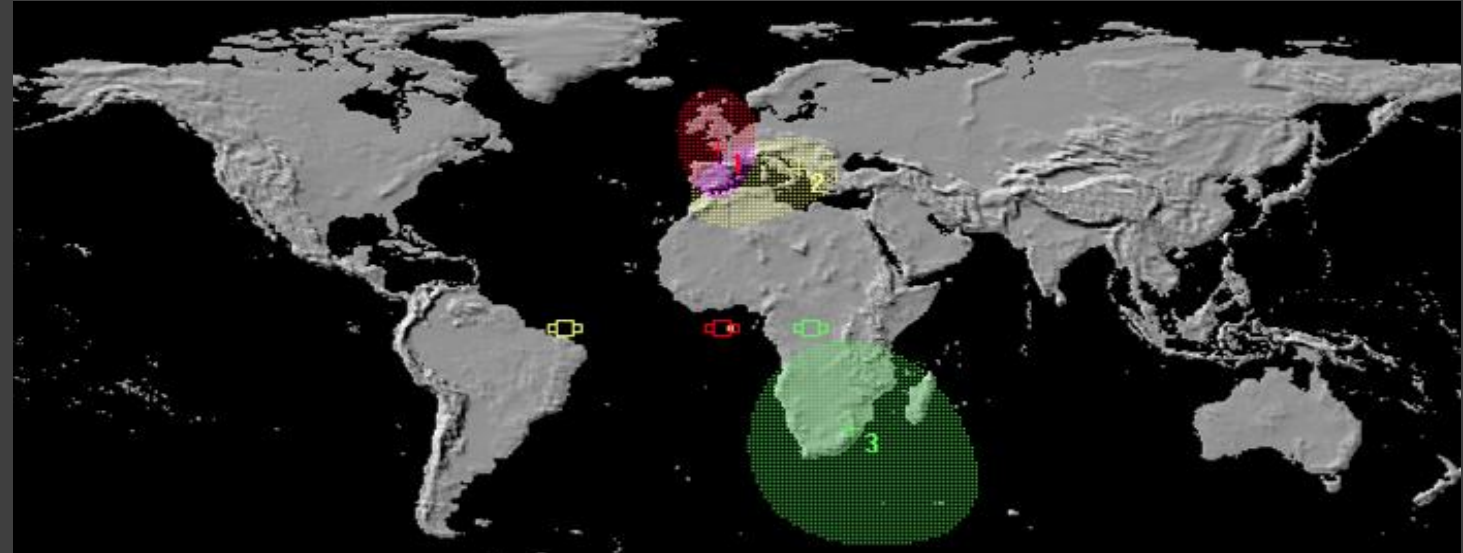
A2

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 ($\Delta T/T$, 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



Satellite parameters

Call-sign: SAT 3 Color: [Black] Type: NGS0 description: Satellite 3

Info Press CTRL+Enter to change line

Altitude

Longitude * 19.0000
Latitude * 0.0000
Station Keeping Error * 1.00
distance to earth centre km 42164

Boresight coord [Earth boresight coordinates]

Boresight longitude * 19.0000
Boresight latitude * 48.0000
Boresight/earth centre (dist) 6378
Boresight orientation * 0.0000
Boresight Euler angle phi * 0.0000
Boresight Euler angle theta * 0.0000
Boresight Euler angle psi * 0.0000

[Euler -> coordinates] [Coordinates -> Euler]

Tx/Rx parameters

Nominal power (W) 10000.0000
Max power (W) 10000.00
Tx gain (dB) 0.00
Rx gain (dB) 0.00
Tx losses (dB) 0.00
Rx losses (dB) 0.00
ISO ☒

Tx frequency (GHz) 11.00000
Tx bandwidth (MHz) 40.00000
Rx frequency (GHz) 1.50000
Rx bandwidth (MHz) 500.00000
Rx antenna noise K 2.00
G/T (dB/K) -3.01

Antenna

Max pointing error (roll+pitch) * 1.50
Max pointing error (rotation yaw) * 0.50
☒ Circular pattern ☐ Elliptical ☐ Other
Pattern type [rec. 672-4, LN=-20 dB (side lobe level)]
1/2 power beamwidth 3 dB * 2.0000
1/2 power beamwidth 3 dB (major axis) * 2.0000
1/2 power beamwidth 3 dB (minor axis) * 1.0000
☐ Add 2 x Pointing Error to beamwidth ☒ No error

Polarization

☒ Clockwise
Polar axial ratio (Emin/Emax 1=circular) 1.00
Angle of polarisation (rotation yaw) * 0.0000

Circular orbit

Inclination (+180°) 20.0 Anomaly at T0 (0 to 360°) 1.0 Relative time T-T0 (sec) 20000

Model atten -1 = R.618 (dB) -1.0 Nb subscribers 0 BW occupancy MHz 0.00000 Loss dB 0.0 [OK] [Cancel]

*none = not selectable



-
- The screenshot displays a software interface for signal coverage analysis. The main map shows a city area with signal coverage overlaid. A red arrow points to a pink area labeled 'TETRA007'. A text box indicates 'Threshold >= 44 dBu/m'. A legend on the right shows 'Tetra007' in pink. An inset map shows a zoomed-in view of the pink area.

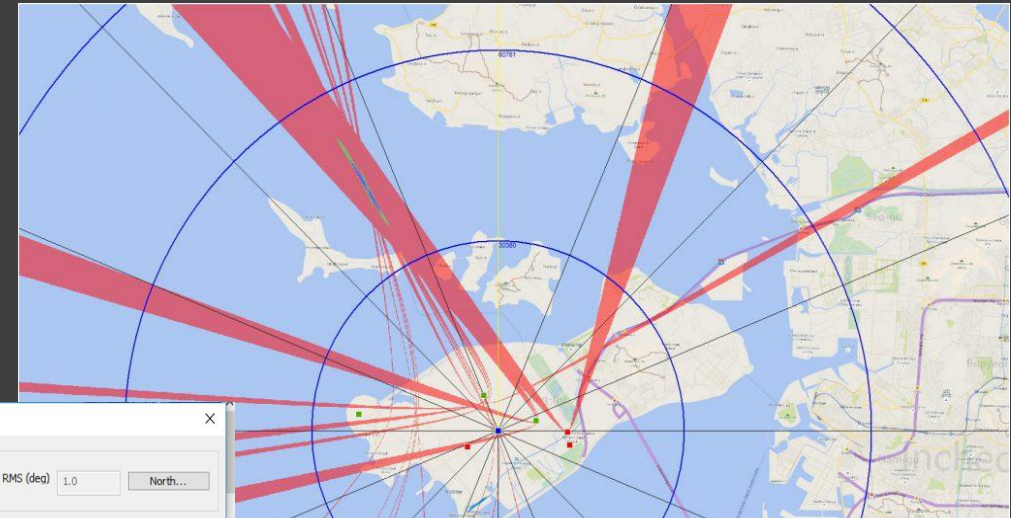


HTZ Warfare

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



Hybrid localization from measurements

Measurement file name:

Preview

Generic format: X[separator]Y[separator]FS[separator]AOA (deg) <CR>

Measurement file settings

Separator ☐ X and Y are inverted

Coordinate code

Number of values

☐ Move measurements on vector line

☐ Use vector polygon(s) as mask

☐ Set clutter to 0 on measurement point

☐ Add measurement to vector layer

Processing

☐ RSSI only

☐ AOA only

☐ AOA + RSSI / AOA or RSSI

☐ Homing (Direction + RSSI)

Tolerance margin (max - n) (dB)

Distance discrimination (meas. pts) (m)

Clutter filter (target transmitter location)

<input checked="" type="checkbox"/> 0 open	<input checked="" type="checkbox"/> 10 rail
<input checked="" type="checkbox"/> 1 village	<input checked="" type="checkbox"/> 11 road
<input checked="" type="checkbox"/> 2 suburban	<input checked="" type="checkbox"/> 12 airport
<input checked="" type="checkbox"/> 3 urban	<input checked="" type="checkbox"/> 13 tunnel
<input checked="" type="checkbox"/> 4 dense urban	<input checked="" type="checkbox"/> 14 open rural
<input checked="" type="checkbox"/> 5 forest	<input checked="" type="checkbox"/> 15 b-plaster
<input checked="" type="checkbox"/> 6 hydro	<input checked="" type="checkbox"/> 16 b-brick
<input checked="" type="checkbox"/> 7 high urban	<input checked="" type="checkbox"/> 17 b-glass
<input checked="" type="checkbox"/> 8 park/wood	<input checked="" type="checkbox"/> 18 b-wood
<input checked="" type="checkbox"/> 9 roof - building	<input checked="" type="checkbox"/> 19 route

Bearing measurement

RMS (deg)

RSSI measurement

Conversion to dBu (+dB)

Min range (measurement)

Max range (measurement)

Tolerance (measure - prediction) (dB)

Threshold (dBu/m)

Meas. Rx antenna (m) ☒ AGL ☐ ASL

LOS calculation only ☐

Measurement file cases:

If FS, RSSI localization will be performed

If AOA and FS, RSSI localization sector limited (AOA+RSSI)

If AOA only, DF localization (AOA+RSSI)

If Homing, AOA = measurement azimuth+RMS

☒ Add localized point(s) on the map

