

# HTZ AUTOMATION & API

Release number v2.0

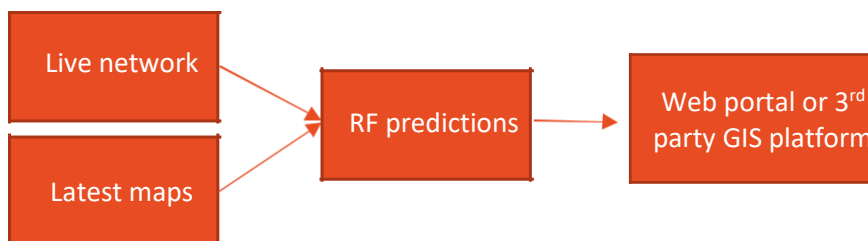
## 1. AUTOMATION INTRODUCTION

HTZ offers a fully automated process of RF coverage prediction and analysis.

The following work processes are required to be customized to produce radio coverage automatically:

- A. Map extraction from Arc-GIS database server
- B. Map conversion to HTZ format
- C. Site location update/corrections by using API and database approach
- D. Network modelling such as 4G/5G, WIFI, PMR, Broadcast, ... in HTZ
- E. Coverage predictions
- F. Coverage analysis
- G. Coverage export to a 3rd party application such as a web-portal

Above requirements can be translated to the following high-level functional blocks:



**Figure 1: High-level automation project target**

Live network: A database to manage all stations' technical & administrative parameters such as unique ID, antenna, height, Lat, Long and so on. The database can be updated by other applications or directly by the trailers. The idea is to have the latest accurate parameters of the live network in the field.

Latest maps: This is managed by a GIS like Map Info, ArcGIS or directly by HTZ.

RF predictions: This task is currently being carried out by HTZ. HTZ is network planning tool supporting 4G/5G/WIFI/Microwave/TETRA, P-MP networks and many more.

HTZ users can operate several networks at the same time. Each network can be considered as an independent project with separate stations, microwave links and so on. While these projects are separate the database should be centralized. HTZ can automatically filter by map boundary so no need to have separate tables or databases. Plus, this database would be accessed by other 3rd party.

There is also a single GIS server where users can host and manage all there latest GIS related data such as Lidar, polygons and so on. A script can be used to cut out the boundary of each network area and save it separately. Once the cartographic datasets are replaced/updated, the script triggers auto coverage re-calculation and analysis etc... at specific time.

#### **Automation task examples that can be performed thanks to the Command line Action Codes.**

- Action code #1008 - The tasks performed are the following:

- Import stations on map from the SQL database linked to the project.
- Compute coverage.
- Export stations to the SQL database.

Example: `c:\ATDI\htzwx64.exe TEST.PRO -ADMIN 1008 2 1000`, with:  
2 = Resampling factor.

1000 = Import all stations. And from 0 to 114 (or more in future versions), select stations having signal type sent in command line (i.e. 2=generic, 0=FM mono...).

Notes:

- The SQL link must be set.
- If the Resampling factor = 1, coverage calculations are performed at the best possible resolution. If The Resampling factor is > 1, the project is loaded with this resampling factor and coverage calculations are performed at the project resolution.

- Action code #1009 - Exports a given MW link database to an EWX file that will be located in the same folder as the database.

Example: `c:\ATDI\htzwx64.exe TEST.PRO -ADMIN 1009 "c:\ATDI\DBMW\\MyDBlocation\\MyDB"`.

Note: Do not add extension in the MW link database name.

- Action code #1010 - On map station coverage calculation.

Computes coverage for all activated stations of the EWX/EWF file attached to the project in "Advanced coverage" mode.

The tasks performed are then: Opens HTZ, loads the project, performs coverage calculation (of activated stations only), saves .EWF file at the end of the calculations and updates the project.

Example: `c:\ATDI\htzwx64.exe TEST.PRO -ADMIN 1010`.

- Action code #1011 - Station database coverage calculation.

Computes coverage for all selected stations in the attached station database.

The tasks performed are then: Opens HTZ, loads the project, performs coverage calculation of the selected stations and updates the current station database.

Example: c:\ATDI\htzwx64.exe TEST.PRO -ADMIN 1011.

Note: The stations to be considered must be selected prior to running the action code.

- Action code #1012 - Exports coverage in Tiff format for all activated stations. Tasks performed:

Opens HTZ, loads the project and exports coverage to .TIFs files, with a generic name

"callsign.TIF" at the same location as the EWF or EWX file.

Note: EWF or EWX file must contain stations with associated coverage and non-duplicated callsigns.

Example: c:\ATDI\htzwx64.exe TEST.PRO -ADMIN 1012.

- Action codes #1100 to 1199 - Runs Addon.

Example: c:\ATDI\htzwx64.exe TEST.PRO -ADMIN 1102

Tasks: Opens HTZ, loads a project and runs Addon #1102 (1102.AddOn).

- Action codes #2001 to 2000001 - Station database coverage calculation.

Computes coverage for a specific station of the attached database, with station record index=2001 to 2000001.

Example: To perform coverage for Station #4 in the database:

c:\ATDI\htzwx64.exe TEST.PRO -ADMIN 2004.

...

#### Notes:

- Action code project files can be in .zip file that must at least include a DTM file (.GEO/.RGE/.IC2/.IDR/.MGE).

- The .PROx format is also supported. Expected format:

Terrain: ... path to/terrain.rge (possible extensions: .GEO, .IC2, .MGE, .RGE, .IDR)

Clutter: ... path to/clutter.rso (possible extensions: .SOL, .IC1, .MSO, .RSO)

Image: ... path to/image.rim (possible extensions: .IMG, .IC1, .MIM, .RIM, .BIM)

Palette: ... path to/palette.pal (possible extension: .PAL)

Building: ...path to /building.blg (possible extensions: .BLG, .IC1, .MBL, .RBL)

Parameter: ... path to/parameter.prm (extension: .PRM)

Network: ... path to/network.ewfx (possible extensions: .EWF, .EWFx, .EWX)

Result: ... path to/result.fld (extension: .FLD)

Legend: ... path to/legend.p11 (extension: .P11)

Vector: ... path to/vector.vec (extension: .VEC)

MapServer: ... path to/vector.map (extension: .MAP)

.PROx files can be loaded by drag and drop on the current map or used as project definition in Action code command lines.

Each file used in the PROx must exist. The terrain layer is mandatory, the other layers are optional.

Example My\_project.PROx:

Terrain: c:\ATDI\Maps\My\_DTM.RGE

Result: c:\ATDI\Results\My\_coverage.fld

A .PROx file creates a temporary project .PRO.

**2. ACTION CODES**

| Action code # | Main task                             | Description  |
|---------------|---------------------------------------|--|
| 1001          | Export Overlap                        | Import Station on map from the SQL database linked and display Best server + Overlapping coverage map in #   |
| 1002          | MW link Path budget (SQL)             | Import MW on map from the SQL database linked and perform Path Budget (ITU- R P.530), save report and send email if minimum height clearance is not met for any of the links |
| 1003          | Export Best server (#)                | Import Station on map from the SQL database linked and display Best server coverage map in #   |
| 1004          | Export RS (dBm)                       | Import Station on map from the SQL database linked and display RS coverage map in dBm ( for 3G/4G/5G stations)   |
| 1005          | Export PR (dBm)                       | Import Station on map from the SQL database linked and display composite coverage map in dBm   |
| 1006          | Export FSR (dB $\mu$ V/m)             | Import Station on map from the SQL database linked and display coverage map. The export field strength to TIF/TFW + KMZ files to the specified destination                   |
| 1007          | TIF conversion                        | Convert and insert 32-bit tiff files into the currently attached GEO file of the project   |
| 1008          | Coverage calculation                  | Import Station on map from the SQL database linked and perform coverage calculations   |
| 1009          | Export a given DB MW to EWX           | Export a given MW link database to an EWX file (same location as the MW link database)   |
| 1010          | On map station coverage calculation   | Compute coverage for all activated stations of the EWX/EWF file attached to the project in "Advanced coverage" mode  |
| 1011          | Station database coverage calculation | Compute coverage for all selected stations in the attached station database  |
| 1012          | Export coverage in Tiff format        | Exports coverage in Tiff format for all activated stations, with generic name "callsign.TIF" at the same location as EWF or EWX file   |
| 1013          | Export C/I+N (dB)                     | Import Station on map from the SQL database linked and calculate C/I+N. Then export result in dB   |
| 1014          | Export 4G/5G PDSCH SINR               | Import Station on map from the SQL database linked and calculate SINR map (for 4G/5G stations). Then export result in dB   |
| 1015          | Export 4G/5G throughput (kbps)        | Import Station on map from the SQL database linked and calculate Throughput (for 4G/5G stations). Then export result in kbps   |
| 1017          | LP map calculation                    | Compute LP map limited to the attached VEC file (polygons) and save result to a FLD file   |
| 1018          | Compute coverage from SQL database    | Import station(s) from the SQL database linked, perform coverage and export the stations with coverage attached to the SQL database  |
| 1019          | Export coverage in Tiff format        | Export coverage in Tiff format for all activated stations on the map (with geocoding in 4DEC and Overview - Pyramid)   |
| 1020          | Combined Overlapping Map              | Compute Combined overlapping map and export coverage values to KMZ and GEOTIFF files   |

|                      |  |  |
|----------------------|--|--|
| 1021                 | Combined Overlapping Map from SQL database | Import station(s) from the SQL database, perform Combined Overlapping Map and export coverage values to KMZ and GEOTIFF files  |
| 1022                 | Compute coverage from SQL database         | Import station(s) from the SQL database linked, perform coverage and export the stations with coverage attached to the SQL database for activated and deactivated stations       |
| 1023                 | Propagation loss map                       | Import station(s) from the SQL database linked, compute coverage, perform propagation map in dB (reference power = ERP/EIRP) and export coverage values to KMZ and GEOTIFF files |
| 1024                 | P2P calculations                           | Import station(s) from the SQL database linked, perform P2P and export report in CSV format  |
| 1025                 | Search nodes                               | Import station(s) from the SQL database linked, then run the "Search nodes" feature and export results to a CSV file. Vector polygons are needed to deploy nodes                 |
| 1026                 | Simultaneous server map                    | Import station(s) from the SQL database linked, display simultaneous server map and export coverage values to KMZ and GEOTIFF files  |
| 1027                 | RSRQ map                                   | Import station(s) from the SQL database linked, perform RSRQ map and export coverage values in dB to KMZ and GEOTIFF files   |
| 1028                 | Composite coverage map                     | Import station(s) from the SQL database linked, display composite coverage and export coverage color values to TIF/TFW files with output code set to WMAS                        |
| From 1100 to 1199    | Run Addons                                 | Open HTZ, loads a project and runs Addon #1100 to #1199 (11xx.AddOn)   |
| From 2001 to 2000001 | Station database coverage calculation      | Compute coverage for 1 given station of the attached database, with station record index=2001 to 2000001   |

### 3. SOME USE CASES

| Description  | Command line   |
|--|--|
| Insert list of TIFF files from "source" into current project "My project.PRO"  | "C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1007 "D:\Action codes\source"   |
| Calculate coverage for all sites in the linked SQL table, within the map boundary and save results back to the SQL database                        | "C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1008 1000   |
| Delete all previous analysis output files generated  | del "D:\Action codes\destination\*.KMZ"<br>del "D:\Action codes\destination\*.TIF"<br>del "D:\Action codes\destination\*.TFW"<br>del "D:\Action codes\destination\*.PRJ" |
| Export all power received heat-maps for all stations within the map boundary located in the linked SQL table. Save results in "destination" folder | "C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1005 1000<br>"D:\Action codes\destination"  |

Action codes can be added on demand.

#### 4. ACTION CODE #1001 (OVERLAP)

##### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, display coverage overlap and export the results to KMZ and TIF/TFW files. Station signal type can be defined. The export location can also be defined as an argument.

##### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1001 **SignalType** **PathToExportFolder**

Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1001 1000 "D:\Action codes\destination"
```

Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1001 70 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                        |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                      |
| ADMIN                            | Always required for action codes                   |
| 1001                             | Overlap server (#) action code                     |
| 1000                             | All signal types (all Tx/Rx stations)              |
| 70                               | WIFI signal type only                              |
| "D:\Action codes\destination"    | Location where KMZ and TIF/TFW files will be saved |

##### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths..
- Default SQL link must be established in HTZ for the computer concerned. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Generated KMZ files are always in Decimal degrees WGS-84 (4DEC).
- Generated TIF files have the same EPSG (grid-code) as that of the DTM (GEO/RGE/MGE) file in the project: Best server color or overlapping code (pink color) / point.
- Ideally project file name (\*.PRO) would not have special characters such as space and ' \_ '.
- If more than one station overlap, color would be pink (255 code).
- If the type of signal is 3G/4G/5G as argument, then the analysis is based on Reference Signal.
- If the type of signal is not 3G/4G/5G as argument, then the analysis is based on RSSI.
- If the type of signal is All (code 1000) as argument, then the analysis is based on RSSI.
- Server color is automatically assigned based on "Assign station color (non-adjacent reuse)" feature.

**Output file name convention:**

There are four output files:

- ProjectFileName-DateTime-OVERLAP.kmz
- ProjectFileName-DateTime-OVERLAP.tif
- ProjectFileName-DateTime-OVERLAP.tfw
- ProjectFileName-DateTime-OVERLAP.prj

The KMZ file export doesn't accept special characters such as "\_". Hence the project name must not contain such chars.

Example, if the project name is "My project.PRO" then the outputs will be:

- My project-201904130924-OVERLAP.kmz
- My project-201904130924-OVERLAP.tif
- My project-201904130924-OVERLAP.tfw
- My project-201904130924-OVERLAP.prj

Where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF/TFW/PRJ files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"
- del "D:\Action codes\destination\\*.TFW"
- del "D:\Action codes\destination\\*.PRJ"

## 5. ACTION CODE #1002 (MW LINK PATH BUDGET)

**Description:**

Automatically connect to the pre-defined SQL link, extract all microwaves within map boundary, import on the map, analyze path budget, export the results to a CSV file and send email notification if configured and if clearance is not reached. The export location folder can also be defined as an argument.

**Syntax examples:**

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1002 minClearance **PathToExportFolder**

Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1002 30 "D:\Action codes\destination"
```



Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1002 20 "D:\Action codes\destination"
```

| Parameter                        | Note                                    |
|----------------------------------|---|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable             |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file           |
| ADMIN                            | Always required for action codes        |
| 1002                             | Microwave Path budget analysis code     |
| 30                               | 30 meter minimum clearance required     |
| "D:\Action codes\destination"    | Location where CSV report will be saved |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_'.
- All other configuration related parameters would be defined in the PRM file attached to the project.
- E-mail is transmitted only if one or more links do not meet the minimum clearance specified by the user through the command line (minClearance).

**Output file name convention:**

There is only one file generated in the output:

- ProjectFileName-DateTime-MW.csv

If project name is "My project.PRO" then the output file would be My project-201904130924-MW.csv, where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated CSV files before executing this action code.

An example is provided below:

```
del "D:\Action codes\destination\*.CSV"
```

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1002 30 "D:\Action codes\destination".
```

**Definition of clearance:**

This is the minimum height clearance between the lower part of the ellipsoid (FZ) and the terrain+clutter height for the entire path-profile.




Clearance for given pixel along path:





- Clearance = Terrain elevation - Height of base of ellipsoid (with heights above sea level).
- In the CSV report, Clearance = Height of base of ellipsoid (with heights above sea level) - Terrain elevation. Hence, if clearance in the CSV file is  $< 0$  then the FZ is blocked. If clearance in the CSV file is  $> 0$ , then it's clear. If clearance in the CSV file is = 10 meter, then the lowest distance between the ellipsoid and the ground+ clutter is 10 meters.

#### Mail services:

As a general matter, all automation action-codes have mail services attached to them. But this specific action code (#1002) is special due to respect of condition. The mail is transmitted if one of the links or more do not fulfill the minimum clearance required. The clearance (in meters) is sent as an argument.

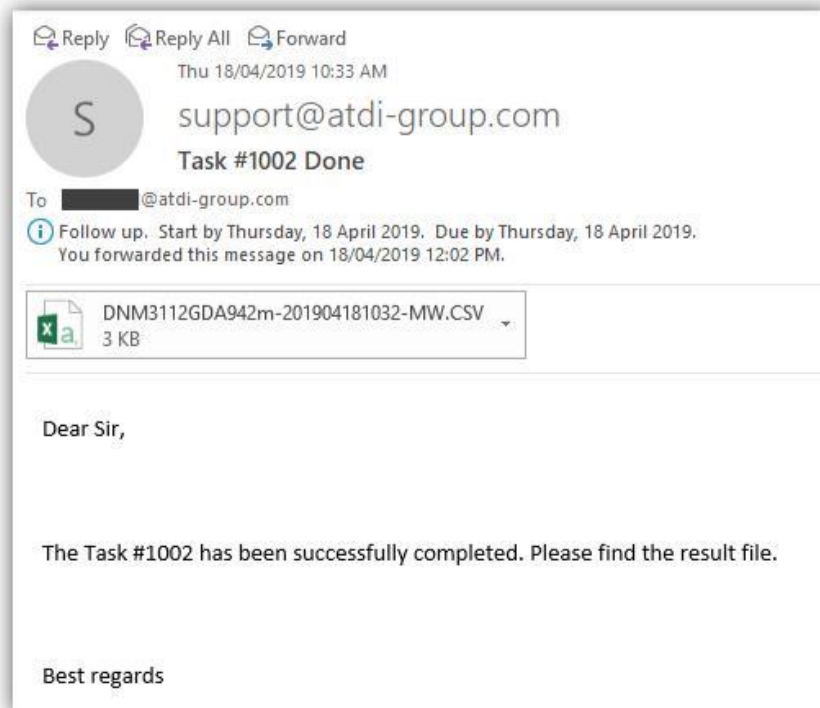
Mail service configurations are located in "C:\ATDI\HTZ x64\PLUGS\MailsService":


 > This PC > Local Disk (C:) > ATDI > HTZ communications x64 > PLUGS > MailsService

| <input type="checkbox"/> Name  | Date modified    | Type          | Size |
|--|------------------|---------------|------|
|  plain-conf.xml   | 18/03/2019 14:58 | XML Document  | 1 KB |
|  ssl-conf.xml     | 18/03/2019 14:58 | XML Document  | 1 KB |
|  template1.txt    | 16/03/2019 18:54 | Text Document | 1 KB |
|  template1002.txt | 16/03/2019 18:54 | Text Document | 1 KB |

A template with the same action-code must exist for the mail service to operate under this action code.

Example, there must be a template file with name "template1002.txt". Also, the conf.xml file must be configured accordingly.

**Sample email received:**

**6. ACTION CODE #1003 (BEST SERVER)**
**Description:**

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, display best server coverage and export the results to KMZ and TIF/TFW files. Station signal type can be defined. The export location can also be defined as an argument.

**Syntax examples:**

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1003 **SignalType PathToExportFolder**

## Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1003 1000 "D:\Action codes\destination"
```

## Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1003 70 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                        |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                      |
| ADMIN                            | Always required for action codes                   |
| 1003                             | Best server (#) action code                        |
| 1000                             | All signal types (all Tx/Rx stations)              |
| 70                               | WIFI signal type only                              |
| "D:\Action codes\destination"    | Location where KMZ and TIF/TFW files will be saved |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- Generated KMZ file is always in Decimal degrees WGS-84.
- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.
- If the signal type is 3G/4G/5G as argument, then the analysis is based on Reference Signal.
- If the signal type is not 3G/4G/5G as argument, then the analysis is based on RSSI.
- If the signal type is All (code 1000) as argument, then the analysis is based on RSSI.
- Server color is automatically assigned based on "Assign station color (non-adjacent reuse)" feature.

**Output file name convention:**

There are four files in the output:

- ProjectFileName-DateTime-BS.kmz
- ProjectFileName-DateTime-BS.tif
- ProjectFileName-DateTime-BS.tfw
- ProjectFileName-DateTime-BS.prj

The KMZ export doesn't accept special characters such as "\_". Hence the project name must not contain such chars.

If the project name is "My project.PRO" then the outputs will be:

- My project-201904130924-BS.kmz
- My project-201904130924-BS.tif
- My project-201904130924-BS.tfw
- My project-201904130924-BS.prj

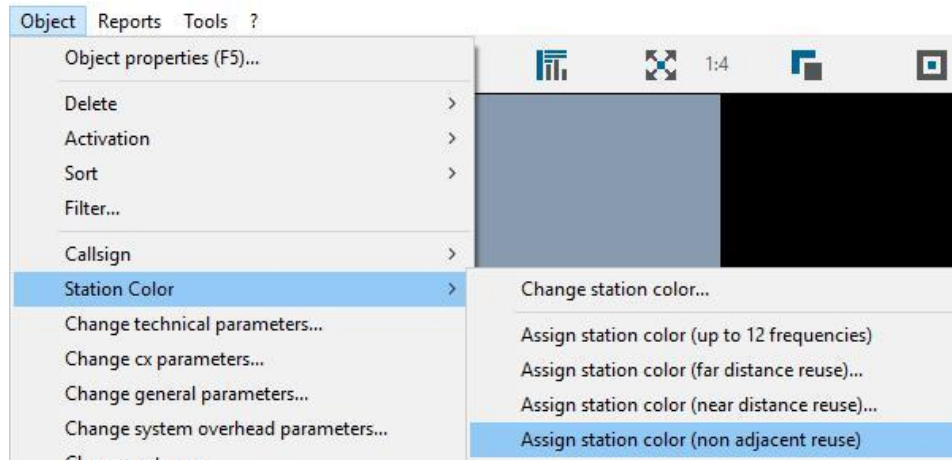
where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF/TFW files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"
- del "D:\Action codes\destination\\*.TFW"
- del "D:\Action codes\destination\\*.PRJ"

Server color is automatically assigned based on "Assign station color (non-adjacent reuse)".



## 7. ACTION CODE #1004 (RSRP/RSCP)

### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, display Reference Signal (3G/4G/5G) coverage and export the results to KMZ and TIF/TFW files. Station signal type can be defined. The export location can also be defined as an argument.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1004 **SignalType** **PathToExportFolder**

Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1004 1000 "D:\Action codes\destination"
```

Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1004 60 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                        |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                      |
| ADMIN                            | Always required for action codes                   |
| 1004                             | Reference Signal action code (RSRP, RSCP..)        |
| 1000                             | All signal types (all Tx/Rx stations)              |
| 60                               | LTE-FDD signal type only                           |
| "D:\Action codes\destination"    | Location where KMZ and TIF/TFW files will be saved |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- Generated KMZ file is always in Decimal degrees WGS-84.
- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.
- % Ref. Signal has to be defined for the 3G/4G/5G cells to be considered.

**Output file name convention:**

There are four files in the output:

- ProjectFileName-DateTime-RSdBm.kmz
- ProjectFileName-DateTime-RSdBm.tif
- ProjectFileName-DateTime-RSdBm.tfw
- ProjectFileName-DateTime-RSdBm.prj

The KMZ export doesn't accept special characters such as " \_ ". Hence the project name must not contain such chars.

If project name is "My project.PRO" then the outputs will be:

- My project-201904130924-RSdBm.kmz
- My project-201904130924-RSdBm.tif
- My project-201904130924-RSdBm.tfw
- My project-201904130924-RSdBm.prj

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF/TFW files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"
- del "D:\Action codes\destination\\*.TFW"
- del "D:\Action codes\destination\\*.PRJ"

## 8. ACTION CODE #1005 (COMPOSITE PR)

### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, display composite coverage in dBm and export the results to KMZ and TIF/TFW files. Station signal type can be defined. The export location can also be defined as an argument.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1005 **SignalType** **PathToExportFolder**

#### Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1005 1000 "D:\Action codes\destination"
```

#### Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1005 60 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                        |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                      |
| ADMIN                            | Always required for action codes                   |
| 1005                             | Composite Power received in dBm action code        |
| 1000                             | All signal types (all Tx/Rx stations)              |
| 60                               | LTE-FDD signal type only                           |
| "D:\Action codes\destination"    | Location where KMZ and TIF/TFW files will be saved |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- Generated KMZ file is always in Decimal degrees WGS-84.
- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.

### Output file name convention:

There are four files in the output:

- ProjectFileName-DateTime-PRdBm.kmz
- ProjectFileName-DateTime-PRdBm.tif
- ProjectFileName-DateTime-PRdBm.tfw
- ProjectFileName-DateTime-PRdBm.prj

The KMZ export doesn't accept special characters such as " \_ ". Hence the project name must not contain such chars.

If project name is "My project.PRO" then the outputs will be:

- My project-201904130924-PRdBm.kmz
- My project-201904130924-PRdBm.tif
- My project-201904130924-PRdBm.tfw
- My project-201904130924-PRdBm.prj

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF/TFW files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"
- del "D:\Action codes\destination\\*.TFW"
- del "D:\Action codes\destination\\*.PRJ"

## 9. ACTION CODE #1006 (COMPOSITE FS COVERAGE)

### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, display composite coverage and export the results to KMZ and TIF/TFW files. Station signal type can be defined. The export location can also be defined as an argument.

### Syntax examples:

HTZx64.exe PathToHTZproject.PRO -ADMIN 1006 SignalType PathToExportFolder

Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1006 1000 "D:\Action codes\destination"
```

Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1006 70 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                        |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                      |
| ADMIN                            | Always required for action codes                   |
| 1006                             | Field strength action code                         |
| 1000                             | All signal types (all Tx/Rx stations)              |
| 70                               | WIFI signal type only                              |
| "D:\Action codes\destination"    | Location where KMZ and TIF/TFW files will be saved |



**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- Generated KMZ file is always in Decimal degrees WGS-84.
- Generated TIF file has the same EPSG (grid-code) as the one of the GEO (terrain) file in the project.

**Output file name convention:**

There are four files in the output:

- ProjectFileName-DateTime-FSdBu.kmz
- ProjectFileName-DateTime-FSdBu.tif
- ProjectFileName-DateTime-FSdBu.tfw
- ProjectFileName-DateTime-FSdBu.prj

The KMZ export doesn't accept special characters such as "\_". Hence the project name must not contain such chars.

If project name is "My project.PRO" then the outputs will be:

- My project-201904130924-FSdBu.kmz
- My project-201904130924-FSdBu.tif
- My project-201904130924-FSdBu.tfw
- My project-201904130924-FSdBu.prj

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF/TFW files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"
- del "D:\Action codes\destination\\*.TFW"
- del "D:\Action codes\destination\\*.PRJ"

## 10. ACTION CODE #1007 (TIF CONVERSION)

### Description:

Automatically convert all TIF files within a specific folder to ATDI IC2 format. Then insert into the current DTM file of the project followed by an interpolation of the undefined values ( -9999).

### Syntax example:

HTZx64.exe PathToHTZproject.PRO -ADMIN 1007 PathToSourceTiffFolder

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1007 "D:\Action codes\source"
```

| Parameter                        | Note                                    |
|----------------------------------|---|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable             |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file           |
| ADMIN                            | Always required for action codes        |
| 1007                             | TIF to GEO conversion action code       |
| "D:\Action codes\source"         | Source folder for all 32-bit TIFF files |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Read/Write permissions are required for the source TIF folder. The tool will generate some temporary files during the conversion process.
- The tool cannot extend the existing DTM (Terrain) file beyond its current area. So only the intersection areas between the DTM file and the TIF files will be updated.
- The TIF files must be in the same GRID code (EPSG) as the one of the DTM file used.

### Batch script or background task runner

The script is performing the following tasks (LTE example):

| Task ID | Task  | input                       | output                                      |
|---------|---|-----------------------------|---|
| 0       | Monitor maps source directory and check for changes | Source maps folder          | Trigger map conversion and coverage process |
| 1       | Convert maps to ATDI format                         | Arc-GIS 32-tiff files + DXF | RGE/IC2 + VEC                               |
| 2       | Get latest snap-shot of network parameters          | ODBC /IP                    | Map/EWX                                     |
| 3       | Run coverage calculations for LTE                   | EWX /EWF                    | KMZ + GEOTIFF                               |
| 4       | Run & export RSRP analysis                          | EWX /EWF                    | KMZ+ GEOTIFF                                |
| 5       | Run & export RSRP best server                       | EWX /EWF                    | KMZ + GEOTIFF                               |
| 6       | Run & export SINR analysis                          | EWX /EWF                    | KMZ + GEOTIFF                               |
| 7       | Run & export Throughput analysis                    | EWX /EWF                    | KMZ + GEOTIFF                               |
| 8       | Export area % coverage per polygon                  | EWX/EWF                     | CSV   |

**Table 1: Sample execution sequence to meet the LTE requirements**

Similar task should be repeated for every area and for every technology.

## 11. ACTION CODE #1008 (COVERAGE CALCULATION)

### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, calculate coverage using attached PRM file and send the coverage results back to the SQL table. Station signal type can be defined.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1008 **SamplingFactor SignalType**

Example (1):

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1008 2 **1000**

Example (2):

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1008 2 **70**

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable  |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file  |
| ADMIN                            | Always required for action codes   |
| 1008                             | Import stations from SQL table and calculate coverage, then save results back to SQL table |
| 2                                | Project loading sampling factor  |
| 1000                             | All signal types (all Tx/Rx stations)  |
| 70                               | WIFI signal type only  |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- Read/Write permissions are required for the linked SQL table.
- If the sampling factor is set to 1, the coverage calculation is performed at the best possible resolution the application can load. If the sampling factor is greater than 1, the project is loaded with this sampling factor and coverage calculation is performed at the project resolution.

## 12. ACTION CODE #1009 (EXPORT MW LINK DB TO EWX)

### Description:

Export a given MW link database to an EWX file that will be located in the same folder as the database.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1009 **PathToDatabase**

Example:

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Export DB MW\Test.PRO" -ADMIN 1009

"C:\ATDI\DBMW\MyDBlocation\MyDB".

| Parameter                        | Note                                   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable            |
| "D:\Export DB MW\Test.PRO"       | Full path to HTZ project file          |
| ADMIN                            | Always required for action codes       |
| 1008                             | Export MW link database to an EWX file |
| "C:\ATDI\DBMW\MyDBlocation\MyDB" | Full path to MW link database          |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Do not add extension in the MW link database name.

### 13. ACTION CODE #1010 (COVERAGE CALCULATION)

**Description:**

Compute coverage for all activated stations of the network file (EWFx/ EWX) attached to the project in "Advanced coverage" mode using attached PRM file and update the network file.

**Syntax examples:**

HTZx64.exe PathToHTZproject.PRO -ADMIN 1010

**Example:**

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Test project\Coverage.PRO" -ADMIN 1010

| Parameter                      | Note                                 |
|--------------------------------|--------------------------------------|
| "C:\ATDI\HTZ x64\HTZx64.exe"   | Full path to HTZ executable          |
| "D:\Test project\Coverage.PRO" | Full path to HTZ project file        |
| ADMIN                          | Always required for action codes     |
| 1010                           | On map station coverage calculations |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.

## 14. ACTION CODE #1011 (COVERAGE CALCULATION)

### Description:

Compute coverage for all selected stations of database attached to the project using attached PRM file and update the current station database.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1011

Example:

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Test project\Coverage.PRO" -ADMIN 1011

| Parameter                      | Note                                   |
|--------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"   | Full path to HTZ executable            |
| "D:\Test project\Coverage.PRO" | Full path to HTZ project file          |
| ADMIN                          | Always required for action codes       |
| 1011                           | Station database coverage calculations |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.

## 15. ACTION CODE #1012 (EXPORT TIFF)

### Description:

Export the coverage attached to on map activated stations of the network file (EWFx/EWX) associated with the project to TIF files.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1012

Example:

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Test project\Export Tiff.PRO" -ADMIN 1012

| Parameter                          | Note  |
|------------------------------------|---|
| "C:\ATDI\HTZ x64\HTZx64.exe"       | Full path to HTZ executable                 |
| "D:\Test project\ Export Tiff.PRO" | Full path to HTZ project file               |
| ADMIN                              | Always required for action codes            |
| 1012                               | Export on map station coverage to TIF files |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- The TIF files are generated with a generic name "callsign.TIF" at the same location as EWF or EWX file.
- EWF or EWX file must contain stations with attached coverage and non-duplicated callsigns.

## 16. ACTION CODE #1013 (C/N+I MAP)

### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, calculate C/N+I map in dB and export the results to KMZ and TIF/TFW files. Station signal type can be defined. The export location can also be defined as an argument.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1013 **SignalType** **PathToExportFolder**

#### Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1013 1000 "D:\Action codes\destination"
```

#### Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1013 70 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                        |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                      |
| ADMIN                            | Always required for action codes                   |
| 1013                             | C/N+I action code                                  |
| 1000                             | All signal types (all Tx/Rx stations)              |
| 70                               | WIFI signal type only                              |
| "D:\Action codes\destination"    | Location where KMZ and TIF/TFW files will be saved |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- Generated KMZ file is always in Decimal degrees WGS-84.
- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.
- All other configuration related parameters would be defined in the PRM file attached to the project.

### Output file name convention:

There are four files in the output:

- ProjectFileName-DateTime-CNIdB.kmz
- ProjectFileName-DateTime-CNIdB.tif
- ProjectFileName-DateTime-CNIdB.tfw
- ProjectFileName-DateTime-CNIdB.prj

The KMZ export doesn't accept special characters such as "\_". Hence the project name must not contain such chars.

If project name is "My project.PRO" then the outputs will be:

- My project-201904130924-CNIDB.kmz
- My project-201904130924-CNIDB.tif
- My project-201904130924-CNIDB.tfw
- My project-201904130924-CNIDB.prj

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF/TFW files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"
- del "D:\Action codes\destination\\*.TFW"
- del "D:\Action codes\destination\\*.PRJ"

## 17. ACTION CODE #1014 (4G/5G SINR)

### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, calculate SINR (4G/5G) map in dB and export the results to KMZ and TIF/TFW files. Station signal type can be defined. The export location can also be defined as an argument.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1014 **SignalType** **PathToExportFolder**

Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1014 1000 "D:\Action codes\destination"
```

Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1014 60 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                        |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                      |
| ADMIN                            | Always required for action codes                   |
| 1014                             | PDSCH (4G/5G) action code                          |
| 1000                             | All signal types (all Tx/Rx stations)              |
| 60                               | LTE-FDD signal type only                           |
| "D:\Action codes\destination"    | Location where KMZ and TIF/TFW files will be saved |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' '.
- Generated KMZ file is always in Decimal degrees WGS-84.
- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.
- All other configuration related parameters would be defined in the PRM file attached to the project.

**Output file name convention:**

There are four files in the output:

- ProjectFileName-DateTime-PDSCHdB.kmz
- ProjectFileName-DateTime-PDSCHdB.tif
- ProjectFileName-DateTime-PDSCHdB.tfw
- ProjectFileName-DateTime-PDSCHdB.prj

The KMZ export doesn't accept special characters such as "\_". Hence the project name must not contain such chars.

If project name is "My project.PRO" then the outputs will be:

- My project-201904130924-PDSCHdB.kmz
- My project-201904130924-PDSCHdB.tif
- My project-201904130924-PDSCHdB.tfw
- My project-201904130924-PDSCHdB.prj

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF/TFW files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"
- del "D:\Action codes\destination\\*.TFW"
- del "D:\Action codes\destination\\*.PRJ"



## 18. ACTION CODE #1015 (4G/5G THROUGHPUT)

### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, calculate Throughput map in kbps or Mbps and export the results to KMZ and TIF/TFW files. Station signal type can be defined. The export location can also be defined as an argument.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1015 **SignalType** **PathToExportFolder**

#### Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1015 1000 "D:\Action codes\destination"
```

#### Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1015 60 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                        |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                      |
| ADMIN                            | Always required for action codes                   |
| 1015                             | 4G/5G throughput map action code                   |
| 1000                             | All signal types (all Tx/Rx stations)              |
| 60                               | LTE-FDD signal type only                           |
| "D:\Action codes\destination"    | Location where KMZ and TIF/TFW files will be saved |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' '.
- Generated KMZ file is always in Decimal degrees WGS-84.
- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.
- All other configuration related parameters would be defined in the PRM file attached to the project.

### Output file name convention:

There are four files in the output:

- ProjectFileName-DateTime-TPTkbps.kmz
- ProjectFileName-DateTime-TPTkbps.tif
- ProjectFileName-DateTime-TPTkbps.tfw
- ProjectFileName-DateTime-TPTkbps.prj

The KMZ export doesn't accept special characters such as "\_". Hence the project name must not contain such chars.

If project name is "My project.PRO" then the outputs will be:

- My project-201904130924-TPTkpbs.kmz
- My project-201904130924-TPTkpbs.tif
- My project-201904130924-TPTkpbs.tfw
- My project-201904130924-TPTkpbs.prj

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF/TFW files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"
- del "D:\Action codes\destination\\*.TFW"
- del "D:\Action codes\destination\\*.PRJ"

## 19. ACTION CODE #1017 (LP MAP)

### Description:

The tasks performed are the following:

- Load project (including .EWF, .PRM and .VEC files);
- Compute LP map limited to the attached VEC file (polygons) and using settings saved in .PRM file;
- Save result to FLD file.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1017 2 **PathToExportFolder**

Example:

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1017 2 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable  |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file  |
| ADMIN                            | Always required for action codes   |
| 1017                             | LP Map action code   |
| 2                                | Project sampling factor. The automation fails if the project cannot be loaded with the sampling factor set in the command line |
| "D:\Action codes\destination"    | Location where FLD file will be saved  |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.

- The folder where the results will be exported must already exist (c:\ATDI\ExchangeFolder in the above example).
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- All other configuration related parameters would be defined in the PRM file attached to the project.

#### Output file name convention:

File name convention for FLD files: projectfilename-yyyymmddhhmm-LPMAP.FLD (for example c:\ATDI\ExchangeFolder\TEST-201910032025-LPMAP.FLD).

There is one file in the output:

- ProjectFileName-DateTime- LPMAP.FLD

If project name is "My project.PRO" then the output will be:

- My project-201904130924- LPMAP.FLD, where "201904130924" is 2019, April, 9:24 AM.

## 20. ACTION CODE #1018 (COVERAGE CALCULATION)

#### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, perform coverage of each selected station and export selected station(s) to SQL database.

#### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1018 **CallNumber SignalType**

Example:

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1018 **2254 1000**

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable  |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file  |
| ADMIN                            | Always required for action codes   |
| 1018                             | Coverage calculation action code   |
| 2254                             | Call number of the station(s) to be imported (if 0, all stations are imported) |
| 1000                             | All signal types (all Tx/Rx stations)  |

#### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.

- All other configuration related parameters would be defined in the PRM file attached to the project.
- Coverage calculation is performed at the best project resolution possible (or area or distance limited).

## 21. ACTION CODE #1019 (EXPORT TIFF)

### Description:

Export the coverage attached to on map activated stations of the network file (EWFx/EWX) associated with the project to TIF files with a geocoding in 4SEC.

### Syntax examples:

HTZx64.exe PathToHTZproject.PRO -ADMIN 1019

Example:

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Test project\Export Tiff.PRO" -ADMIN 1019

| Parameter                          | Note   |
|------------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"       | Full path to HTZ executable  |
| "D:\Test project\ Export Tiff.PRO" | Full path to HTZ project file  |
| ADMIN                              | Always required for action codes                                     |
| 1019                               | Export on map station coverage to TIF files with a geocoding in 4SEC |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- The TIF files are generated with a generic name "callsign.TIF" at the same location as EWF or EWX file.
- EWF or EWX file must contain stations with attached coverage and non-duplicated callsigns.

## 22. ACTION CODE #1020 (COMBINED OVERLAPPING MAP)

### Description:

Compute "Combined overlapping" map considering the activated and deactivated stations of the network file (EWFx/EWX) associated with the project and export the results to KMZ and TIF/TFW files. The export location can also be defined as an argument.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1020 1 **PathToExportFolder**

Example:

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1020 1 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                        |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                      |
| ADMIN                            | Always required for action codes                   |
| 1020                             | Combined overlapping map action code               |
| 1                                | Must be set (this is not an option)                |
| "D:\Action codes\destination"    | Location where KMZ and TIF/TFW files will be saved |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- Generated KMZ file is always in Decimal degrees WGS-84.
- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.
- All other configuration related parameters would be defined in the PRM file attached to the project.

### Output file name convention:

There are four files in the output:

- ProjectFileName-DateTime-COM.kmz
- ProjectFileName-DateTime-COM.tif
- ProjectFileName-DateTime-COM.tfw
- ProjectFileName-DateTime-COM.prj

The KMZ export doesn't accept special characters such as " \_ ". Hence the project name must not contain such chars.

If project name is "My project.PRO" then the outputs will be:

- My project-201904130924-COM.kmz
- My project-201904130924-COM.tif

- My project-201904130924-COM.tfw
- My project-201904130924-COM.prj

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF/TFW files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"
- del "D:\Action codes\destination\\*.TFW"
- del "D:\Action codes\destination\\*.PRJ"

### 23. ACTION CODE #1021 (COMBINED OVERLAPPING MAP)

#### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, perform a "Combined overlapping" map and export the results to KMZ and GEOTIFF files. The export location can also be defined as an argument. Station signal type can be defined.

#### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1021 **SignalType PathToExportFolder**

Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1021 1000 "D:\Action codes\destination"
```

Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1021 60 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                    |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                  |
| ADMIN                            | Always required for action codes               |
| 1021                             | Combined overlapping map action code           |
| 1000                             | All signal types (all Tx/Rx stations)          |
| 60                               | LTE-FDD signal type only                       |
| "D:\Action codes\destination"    | Location where KMZ and TIF files will be saved |

#### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' '.
- Generated KMZ file is always in Decimal degrees WGS-84.

- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.

**Output file name convention:**

There are two files in the output:

- ProjectFileName-DateTime-COMB.kmz
- ProjectFileName-DateTime-COMB.tif

The KMZ export doesn't accept special characters such as "\_". Hence the project name must not contain such chars.

If project name is "My project.PRO" then the outputs will be:

- My project-201904130924-COMB.kmz
- My project-201904130924-COMB.tif

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"

## 24. ACTION CODE #1022 (COVERAGE CALCULATION)

**Description:**

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, calculate coverage of activated and deactivated stations using attached PRM file and send the coverage results back to the SQL table. Station signal type can be defined.

**Syntax examples:**

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1022 **SamplingFactor SignalType**

Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1022 2 1000
```

Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1022 2 70
```

| Parameter                        | Note  |
|----------------------------------|---|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable   |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file   |
| ADMIN                            | Always required for action codes  |
| 1022                             | Coverage calculation for activated and deactivated stations action code |
| 2                                | Project loading sampling factor   |
| 1000                             | All signal types (all Tx/Rx stations)                                   |
| 70                               | WIFI signal type only   |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- Read/Write permissions are required for the linked SQL table.
- If the sampling factor is set to 1, the coverage calculation is performed at the best possible resolution the application can load. If the sampling factor is greater than 1, the project is loaded with this sampling factor and coverage calculation is performed at the project resolution.

## 25. ACTION CODE #1023 (PROPAGATION LOSS)

**Description:**

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, perform coverage calculations for each station, build a propagation map in dB (with reference power = ERP/EIRP) and export the results and GEOTIFF file. The export location can also be defined as an argument.

**Syntax examples:**

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1023 **AntennaHeight PathToExportFolder**

**Example:**

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1023 1.5 "D:\Action codes\destination"

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                        |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                      |
| ADMIN                            | Always required for action codes                   |
| 1013                             | Propagation loss map action code                   |
| 1.5                              | Receiving antenna height in m                      |
| "D:\Action codes\destination"    | Location where KMZ and TIF/TFW files will be saved |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.



- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.
- All other configuration related parameters would be defined in the PRM file attached to the project.

#### Output file name convention:

There is one file in the output:

- ProjectFileName-DateTime-LOSSzzzcm.TIF, with zzz = Receiving antenna height in cm

If project name is "My project.PRO" then the output will be:

- My project-201904130924- LOSS150cm.TIF, for receiving antenna height of 1.5m

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated TIF files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.TIF"

## 26. ACTION CODE #1024 (P2P CALCULATIONS)

#### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, perform point to point calculations between the different stations and export the results to a CSV file. The export location can also be defined as an argument. Station signal type can be defined.

#### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1024 **SignalType PathToExportFolder**

Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1024 1000 "D:\Action codes\destination"
```

Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1024 60 "D:\Action codes\destination"
```

| Parameter                        | Note                                      |
|----------------------------------|---|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable               |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file             |
| ADMIN                            | Always required for action codes          |
| 1024                             | Point to point calculations action code   |
| 1000                             | All signal types (all Tx/Rx stations)     |
| 60                               | LTE-FDD signal type only                  |
| "D:\Action codes\destination"    | Location where the CSV file will be saved |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- All other configuration related parameters would be defined in the PRM file attached to the project.

**Output file name convention:**

There is one file in the output:

- ProjectFileName-DateTime-P2P.CSV

If project name is "My project.PRO" then the output will be:

- My project-201904130924-P2P.CSV

where "201904130924" is 2019, April, 9:24 AM.

## 27. ACTION CODE #1025 (SEARCH NODES)

**Description:**

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, run the "Search nodes" feature and export the results to a CSV file with the following format: From Tx #;Callsign;Longitude;Latitude;To Rx #;Callsign;Longitude;Latitude <CR>. Vector polygons are needed to deploy nodes The export location can also be defined as an argument. Station signal type can be defined.

**Syntax examples:**

HTZx64.exe PathToHTZproject.PRO -ADMIN 1025 MaxNumberofNodes PathToExportFolder

Example:

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1025 5 "D:\Action codes\destination"

| Parameter                        | Note                                      |
|----------------------------------|---|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable               |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file             |
| ADMIN                            | Always required for action codes          |
| 1025                             | Search nodes action code                  |
| 5                                | Maximum number of nodes to deploy         |
| "D:\Action codes\destination"    | Location where the CSV file will be saved |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.

- Default SQL link must be established in HTZ for the computer used. Please refer to Database/SQL Database.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- All other configuration related parameters would be defined in the PRM file attached to the project.
- The coverage of the added nodes is restricted to the vector layer (polygon) and activated vector lines, paths and polygons are considered as inclusion areas.
- If a file named "NODES.TRX" is in the Exchange folder defined in the command line, the nodes will inherit their parameters from that TRX file (including the antenna height).
- The connections can be made only between stations having the same Network ID. Nodes are added with a Network ID set to "RE#".
- The default mode is "Quasi optimal".

#### Output file name convention:

There is one file in the output:

- ProjectFileName-DateTime-NODES.CSV

If project name is "My project.PRO" then the output will be:

- My project-201904130924-NODES.CSV

where "201904130924" is 2019, April, 9:24 AM.

## 28. ACTION CODE #1026 (SIMULTANEOUS SERVER)

#### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, display a simultaneous server map (numbers) and export the results to KMZ and GEOTIFF files. The export location can also be defined as an argument. Station signal type can be defined.

#### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1026 **SignalType PathToExportFolder**

Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1026 1000 "D:\Action codes\destination"
```

Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1026 60 "D:\Action codes\destination"
```

| Parameter                        | Note                             |
|----------------------------------|----------------------------------|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable      |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file    |
| ADMIN                            | Always required for action codes |

|                               |  |
|-------------------------------|--|
| 1026                          | Simultaneous server map action code            |
| 1000                          | All signal types (all Tx/Rx stations)          |
| 60                            | LTE-FDD signal type only                       |
| "D:\Action codes\destination" | Location where KMZ and TIF files will be saved |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Stations in the SQL database must have a coverage attached.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- Generated KMZ file is always in Decimal degrees WGS-84.
- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.
- If the signal type used as argument in the command line is corresponding to 3G, 4G or 5G networks, then the analysis will be based on Reference Signal levels.
- If the signal type used as argument in the command line is not corresponding to 3G, 4G or 5G networks, then the analysis will be based on RSSI levels.
- If the signal type used as argument in the command line is 1000 (All), then the analysis will be based on RSSI levels.

**Output file name convention:**

There are two files in the output:

- ProjectFileName-DateTime-SIMULTANEOUS.kmz
- ProjectFileName-DateTime-SIMULTANEOUS.tif

The KMZ export doesn't accept special characters such as "\_". Hence the project name must not contain such chars.

If project name is "My project.PRO" then the outputs will be:

- My project-201904130924-SIMULTANEOUS.kmz
- My project-201904130924-SIMULTANEOUS.tif

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"

## 29. ACTION CODE #1027 (RSRQ)

### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, compute a RSRQ map and export the results to KMZ and GEOTIFF files. The export location can also be defined as an argument. Station signal type can be defined.

### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1027 **SignalType** **PathToExportFolder**

#### Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1027 1000 "D:\Action codes\destination"
```

#### Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1027 60 "D:\Action codes\destination"
```

| Parameter                        | Note   |
|----------------------------------|--|
| "C:\ATDI\HTZ x64\HTZx64.exe"     | Full path to HTZ executable                    |
| "D:\Action codes\My project.PRO" | Full path to HTZ project file                  |
| ADMIN                            | Always required for action codes               |
| 1027                             | RSRQ map action code                           |
| 1000                             | All signal types (all Tx/Rx stations)          |
| 60                               | LTE-FDD signal type only                       |
| "D:\Action codes\destination"    | Location where KMZ and TIF files will be saved |

### Notes:

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Stations in the SQL database must have a coverage attached.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' '.
- Generated KMZ file is always in Decimal degrees WGS-84.
- Generated TIF file has the same EPSG (grid-code) as the one of the DTM file (terrain) in the project.
- If the signal type used as argument in the command line is corresponding to 3G, 4G or 5G networks, then the analysis will be based on Reference Signal levels.
- If the signal type used as argument in the command line is not corresponding to 3G, 4G or 5G networks, then the analysis will be based on RSSI levels.
- If the signal type used as argument in the command line is 1000 (All), then the analysis will be based on RSSI levels.

### Output file name convention:

There are two files in the output:

- ProjectFileName-DateTime-RSRQdB.kmz
- ProjectFileName-DateTime-RSRQdB.tif

The KMZ export doesn't accept special characters such as "\_". Hence the project name must not contain such chars.

If project name is "My project.PRO" then the outputs will be:

- My project-201904130924-RSRQdB.kmz
- My project-201904130924-RSRQdB.tif

where "201904130924" is 2019, April, 9:24 AM.

Since the file name is always changing, it is advised to delete previously generated KMZ/TIF files before executing this action code.

An example is provided below:

- del "D:\Action codes\destination\\*.KMZ"
- del "D:\Action codes\destination\\*.TIF"

### 30. ACTION CODE #1028 (COMPOSITE COVERAGE)

#### Description:

Automatically connect to the pre-defined SQL link, extract all stations within map boundary, import on the map, Display the composite coverage of the network. The RS coverage is displayed for 3G, 4G and 5G stations. Then export coverage color values to TIF/TFW files with output code set to WMAS. Station signal type can be defined.

#### Syntax examples:

HTZx64.exe **PathToHTZproject.PRO** -ADMIN 1028 **SignalType PathToExportFolder**

Example (1):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1028 1000 "D:\Action codes\destination\My file.TIF"
```

Example (2):

```
"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Action codes\My project.PRO" -ADMIN 1028 60 "D:\Action codes\destination\My file.TIF"
```

| Parameter                                  | Note  |
|--|---|
| "C:\ATDI\HTZ x64\HTZx64.exe"               | Full path to HTZ executable                                     |
| "D:\Action codes\My project.PRO"           | Full path to HTZ project file                                   |
| ADMIN                                      | Always required for action codes                                |
| 1028                                       | Composite coverage map action code                              |
| 1000                                       | All signal types (all Tx/Rx stations)                           |
| 60   | LTE-FDD signal type only  |
| "D:\Action codes\destination\My file.TIF " | Name and location where the TIF and the TFW files will be saved |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- The folder where the results will be exported must already exist and Read/Write permissions are required for the destination folder.
- Stations in the SQL database must have a coverage attached.
- Ideally project file name (\*.PRO) would not have special characters such as while space and ' \_ '.
- The output code of the TIF/TFW dataset is WMAS.
- If the signal type used as argument in the command line is corresponding to 3G, 4G or 5G networks, then the analysis will be based on Reference Signal levels.
- If the signal type used as argument in the command line is not corresponding to 3G, 4G or 5G networks, then the analysis will be based on RSSI levels.

**Output file name convention:**

If the TIF name is "My file" then the outputs will be:

- My file.TIF
- My file.TFW

## 31. ACTION CODES FROM 1100 TO 1199 (ADDONS)

**Description:**

Open HTZ and run Addons.

**Syntax examples:**

HTZx64.exe PathToHTZproject.PRO -ADMIN 11xx

Example to run Addon #1102 (1102.AddOn):

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Test project\My project.PRO" -ADMIN 1102

| Parameter                         | Note                             |
|-----------------------------------|----------------------------------|
| "C:\ATDI\HTZ x64\HTZx64.exe"      | Full path to HTZ executable      |
| "D:\Test project\ My project.PRO" | Full path to HTZ project file    |
| ADMIN                             | Always required for action codes |
| 1102                              | Run addon #1102 (1102.AddOn)     |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.
- Addon files must be located in \\PLUGS\AddOns64\ folder.
- The Addon must use the "Quit" function to close HTZ.

**32. ACTION CODES FROM 2001 TO 2000001 (COVERAGE CALCULATION)**

**Description:**

Compute coverage for 1 given station of the attached database using attached PRM file and update the record in the station database, with station record index=2001-2000001.

**Syntax examples:**

HTZx64.exe PathToHTZproject.PRO -ADMIN 200xxx

Example to perform coverage for station 4 in database:

"C:\ATDI\HTZ x64\HTZx64.exe" "D:\Test project\ My project.PRO" -ADMIN 2004

| Parameter                         | Note  |
|-----------------------------------|---|
| "C:\ATDI\HTZ x64\HTZx64.exe"      | Full path to HTZ executable                     |
| "D:\Test project\ My project.PRO" | Full path to HTZ project file                   |
| ADMIN                             | Always required for action codes                |
| 2004                              | Coverage calculation for Station #4 in database |

**Notes:**

- It is important to have quotes "" especially if there are blank spaces and special characters in the file names or paths.

**33. MAIL SERVICE**

All automation action-codes have mail service capabilities. The idea is to automatically transmit email upon completion of the task.

Two main configurations are required for the mail service to be active.

1. Mail server parameters must be configured

Once the mail server is configured – the tool inherits permission to access the mail server and compose emails. The configuration file also supports SSL configurations.

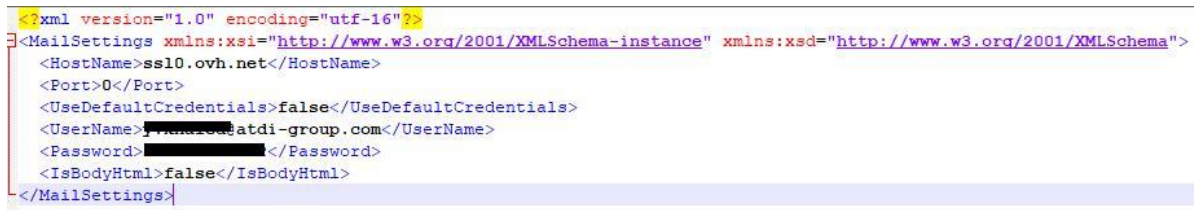
The file must be located at "C:\ATDI\HTZ x64\PLUGS\MailsService\conf.xml"

Example of conf.xml file:

```
<?xml version="1.0" encoding="utf-16"?>
<MailSettings xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <HostName>ssl0.ovh.net</HostName>
  <Type>SSL_TLS</Type>
```



```
<Port>465</Port>
<UseDefaultCredentials>>false</UseDefaultCredentials>
<UserName>support@atdi.com</UserName>
<Password>atdiSupport7GHt</Password>
<IsBodyHtml>>false</IsBodyHtml>
</MailSettings>"
```



```
<?xml version="1.0" encoding="utf-16"?>
<MailSettings xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <HostName>ss10.ovh.net</HostName>
  <Port>0</Port>
  <UseDefaultCredentials>>false</UseDefaultCredentials>
  <UserName>[redacted]@atdi-group.com</UserName>
  <Password>[redacted]</Password>
  <IsBodyHtml>>false</IsBodyHtml>
</MailSettings>
```

Configuration file with no authentication required:

```
<?xml version="1.0" encoding="utf-16"?>
<MailSettings xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <HostName>127.0.0.1</HostName>
  <Type>PLAIN</Type>
  <Port>25</Port>
  <UseDefaultCredentials>>false</UseDefaultCredentials>
  <UserName></UserName>
  <Password></Password>
  <IsBodyHtml>>false</IsBodyHtml>
</MailSettings>
```

2. Template prepared for every action-code required to transmit email.

The action code can only transmit emails if a template file is available under "C:\ATDI\HTZ x64\PLUGS\MailsService\".

For example, if user wishes for action-code #1002 to transmit emails upon completion – then there should be a template named "template1002.txt" under the folder above. For action code 1014 template file name must be "template1014.txt", and so on...

Template format:

```
"
sender@atdi.com
receiver@atdi.com
Task #{TASK_ID} Done
Dear Sir,
The Task #{TASK_ID} has been successfully completed. Please find the result file.
Kind regards
"
```

with TASK\_ID = action code.

Example of template file for action code #1002:

```
"support@atdi.com"
```

marketing@atdi.com

Task #{1002} Done

Dear Sir,

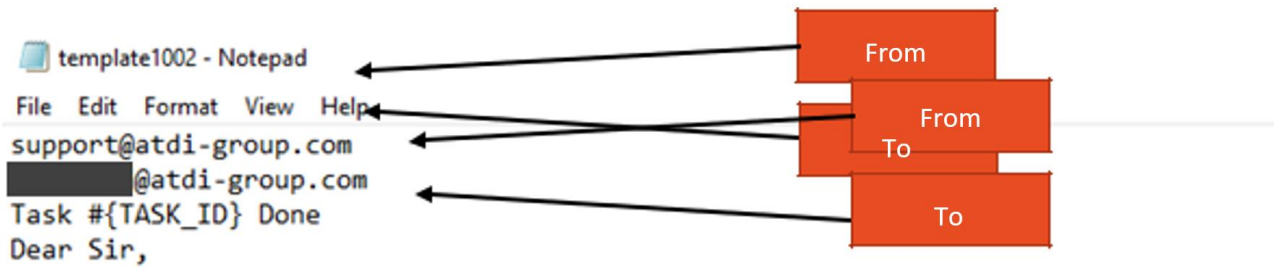
The Task #{1002} has been successfully completed. Please find the result file.

Kind regards"

With:

support@atdi.com = sender email address

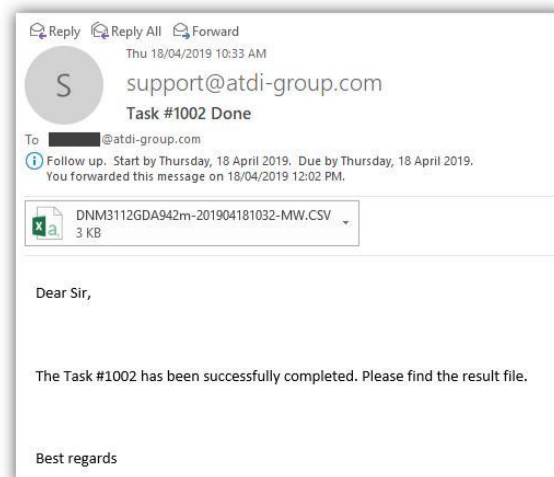
marketing@atdi.com = receiver email address



The Task #{TASK\_ID} has been successfully completed. Please find the result file.

Best regards

### Sample email received:



If a result file is created by the action code function, then the file will be attached to the email (ex: jtemp2001.csv), else Error log file will be attached.

Note: If the template does not exist, no email.

## 34. HTZ AUTOMATION TOOL

It is a simple tool whose main purpose is to continuously monitor a source folder and detect any changes in all \*.TIF files.

The tool would automatically start executing a sequence of commands once a change is detected.

### Definition of change

The changes that the tool is looking at can be:

- 1) New TIF files added or removed from the folder being monitored.
- 2) Any change in the TIFF files contents (hash level).

The tool doesn't consider the file date or name when looking for changes. Any iteration in any pixel in any TIFF file would result in different hash key and hence would trigger the script execution.

### Folder selection

The user can manually select the folder to be monitored. The tool only monitors files with .TIF extension. Other files are automatically ignored.

A reference database (db.csv) is automatically constructed once a folder is selected. The database is saved in the same folder as the one being monitored.

### Polling interval

The tool allows the user to define a polling interval. It allows the engine to sleep for x minutes and start checking for changes in the TIF files once the timer expired. The timer is automatically re-set once the polling is completed. User is advised not to choose a very small interval as that will result in a too frequent polling which can be un-necessary and can potentially result in slowing down the hard drive. The tool typically processes every single TIF file in the folder and builds a hash key table. This process can be intensive for big files. The polling is paused whenever a task is being executed or TIF files being examined for changes. The idea is to prohibit multiple polling during the same run. The applicate is write-safe. Which means, the polling process will be prohibited momentarily if TIF files are being written while running. The idea is to wait for new TIF files to be copied completely before examining them.

### Command sequence

The command sequence can be loaded from an existing BASH (.bash) file. Every line is effectively an action-code or automation task. The acceptable format is:

```
"PathTo/HTZx64.exe", "PathToProject.PRO" -ADMIN CODE ...
```

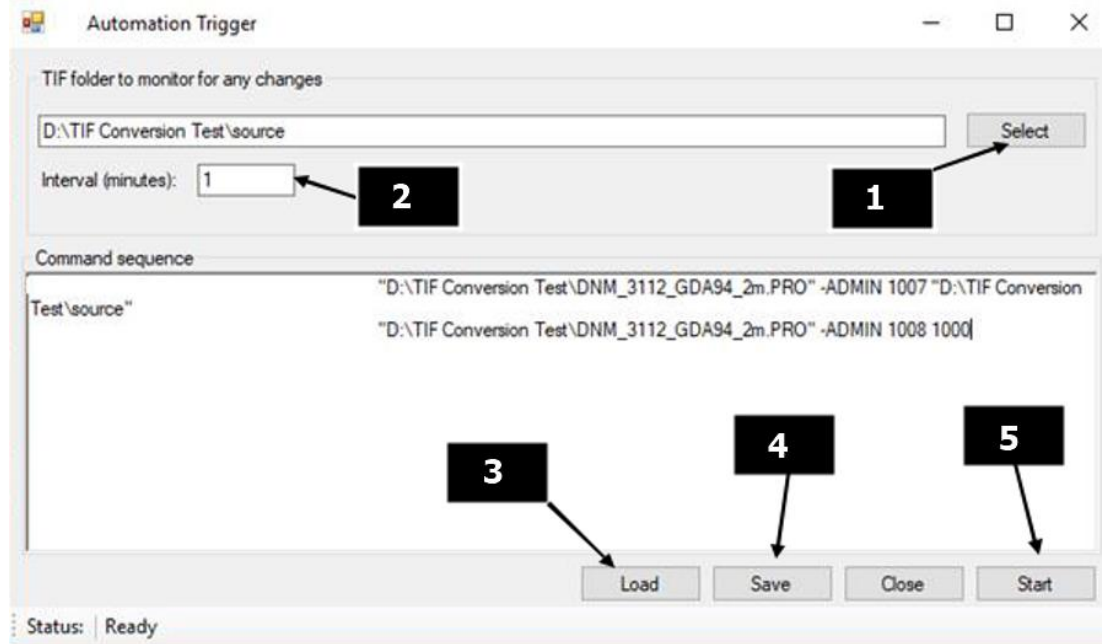
When loading a BASH file – the tool will automatically introduce the "," between HTZx64.exe and the project file. This is mandatory for the tool to be able to execute correctly.

Example of acceptable BASH file:

```
"D:\TIF Conversion Test\DNM3112GDA942m.PRO" -ADMIN 1006 60 "D:\TIF Conversion Test\destination"
```

```
"D:\TIF Conversion Test\DNM3112GDA942m.PRO" -ADMIN 1005 60 "D:\TIF Conversion Test\destination"
```

## Sample configuration



- 1: Select folder with TIF files to monitor.
- 2: Specify the polling interval (10-60 min).
- 3: Load .bash file which is validated to comply with ATDI action-codes.
- 4: Save settings so the tool would remember the folder, the interval and bash file location.
- 5: Start monitoring.

Note: The tool will execute the action-codes the first time the folder is setup. Once completed, no execution would be made unless a change is detected. If the folder was pre-setup (db.csv) and user re-selected the folder, the existing db.csv files will be replaced, and execution will start just like the initial setup.

**Important:** Output result file names are stamped (date/time) with a precision of 1 second. Two command lines with same project and same action code must be spaced a second apart.

## 35. NOTES ON ARC-GIS WEB CLIENT

Arc-GIS web client is a bit picky on the name convention and structure of the KML file.

KMZ is effectively a zip file contains "doc.kml" and other supporting images/folders etc ...

The web client seems to particularly look after "doc.kml" and doesn't accept other names or other KML files. It also doesn't accept upper-case for the suffix. For example, "doc.KML" will not be accepted.

This is an example of accepted KMZ file (renamed to .ZIP to open it):

| Name                                  | Size   | Packed | Type        |
|---------------------------------------|--------|--------|-------------|
| ..                                    |        |        | File folder |
| doc.kml                               | 5,205  | 1,045  | KML         |
| DNM3112GDA942m-201904181022-BS.png    | 63,259 | 46,831 | PNG File    |
| DNM3112GDA942m-201904181022-BSLeg.png | 3,242  | 1,584  | PNG File    |

## 36. ADD-ONS

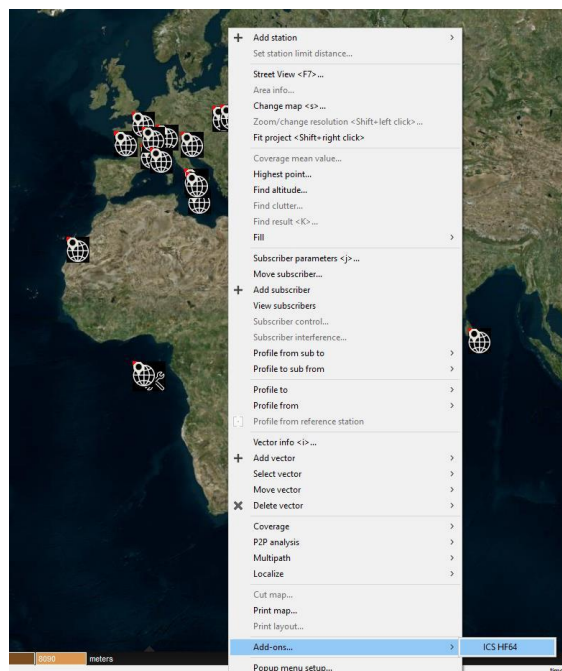
HTZ supports DLLs (Addons) developed on HTZ API.

A DLL (.addon) must be located in Addon folder, examples:

- C:\ATDI\HTZ warfare x64\PLUGS\AddOns64\MyAddon64.Addon (64 bits version)
- C:\ATDI\HTZ warfare x86\PLUGS\AddOns32\MyAddon32.Addon (32 bits version)

To run an Addon:

- 1) From Map: Right click on the map and select Addon (example ICS HF64):



- 2) From Command Line:

99 actions codes are related to Addons (Action codes from 1100 to 1199).

Format: PATH PROJECT -ADMIN ACTIONCODE, with ACTIONCODE = Addon file name (from 1100 to 1199).

Example:

c:\ATDI\HTZ warfare x64\htzwx64.exe TEST.PRO -ADMIN 1102

This command runs HTZ warfare, loads a project (Test.pro) and runs the Addon 1102.Addon located in C:\ATDI\HTZ warfare x64\PLUGS\AddOns64\folder.

The Addon must use the "Quit" function to close HTZ warfare.

## 37. ADD-ON API

An Addon includes "ATDI\_AddOnAPI.H" located in \PLUGS\AddOns64\API folder.

Example: C:\ATDI\HTZ warfare x64\PLUGS\AddOns64\API

```
#define DLLEXPORT __declspec(dllexport)
#define DLLIMPORT __declspec(dllimport)
```

Defined symbols:

```
#define _SP_CALLSIGN 100 //return callsign
#define _SP_LATITUDE 101 //return Latitude in 4DEC
#define _SP_LONGITUDE 102 //return Longitude in DEC
#define _SP_ISACTIVE 103 //return 1 if station is activated, 0 if not
#define _SP_ELEVATION 104 // altitude meter
#define _SP_HEIGHTAGL 105 //antenna height meter (above ground level)
#define _SP_ANTENNASIZE 106 //antenna diameter (m²)
#define _SP_NOMINALPOWER 107 //nominal power W
#define _SP_ADDRESS 108 //address
#define _SP_INFO1 109 //info1
#define _SP_INFO2 110 //info2
#define _SP_FREQUENCY 111 //general frequency MHz
#define _SP_MBITSPERSEC 112 //station bit rate Mbit/s
#define _SP_THRESHOLDDBU 113 //(threshold downlink dBu)
#define _SP_THRESHOLDULDBU 114 //(threshold uplink dBu)
#define _SP_TXBANDWIDTH 115 //Tx BW in kHz
#define _SP_RXBANDWIDTH 116 //Rx BW in kHz
#define _SP_NBTXCH 117 // number of Tx channels
#define _SP_NBRXCH 118 // number of Rx channels
#define _SP_TXCH01 119 //Tx channel 1
#define _SP_TXCH02 120 //Tx channel 2
#define _SP_TXCH03 121 //Tx channel 3
#define _SP_TXCH04 122 //Tx channel 4
#define _SP_TXCH05 123 //Tx channel 5
#define _SP_TXCH06 124 //Tx channel 6
#define _SP_TXCH07 125 //Tx channel 7
#define _SP_TXCH08 126 //Tx channel 8
#define _SP_TXCH09 127 //Tx channel 9
#define _SP_TXCH10 128 //Tx channel 10
#define _SP_TXCH11 129 //Tx channel 11
#define _SP_TXCH12 130 //Tx channel 12
#define _SP_TXCH13 131 //Tx channel 13
#define _SP_TXCH14 132 //Tx channel 14
#define _SP_TXCH15 133 //Tx channel 15
#define _SP_TXCH16 134 //Tx channel 16
#define _SP_RXCH01 135 //Rx channel 1
#define _SP_RXCH02 136 //Rx channel 2
#define _SP_RXCH03 136 //Rx channel 3
#define _SP_RXCH04 138 //Rx channel 4
#define _SP_RXCH05 139 //Rx channel 5
#define _SP_RXCH06 140 //Rx channel 6
```

```

#define _SP_RXCH07 141 //Rx channel 7
#define _SP_RXCH08 142 //Rx channel 8
#define _SP_RXCH09 143 //Rx channel 9
#define _SP_RXCH10 144 //Rx channel 10
#define _SP_RXCH11 145 //Rx channel 11
#define _SP_RXCH12 146 //Rx channel 12
#define _SP_RXCH13 147 //Rx channel 13
#define _SP_RXCH14 148 //Rx channel 14
#define _SP_RXCH15 149 //Rx channel 15
#define _SP_RXCH16 150 //Rx channel 16
#define _SP_NETWORKID 151 //info2
#define _SP_GROUP 152 //info2
#define _PI_RED 651 //coverage point color (red comp.)
#define _PI_GREEN 652 //coverage point color (green comp.)
#define _PI_BLUE 653 //coverage point color (blue comp.)
#define _PI_DBU 654 //coverage point value
#define _PI_LABEL 655 //coverage point label
#define _SP_FREQUENCYPLAN 156 //frequency plan name
#define _FP_COUNT 157 //number of frequencies (frequency plan)
#define _FP_FREQUENCY 158 //frequency MHz at position Index (frequency plan)
#define _FP_CHANNEL 159 //channel at position Index (frequency plan)
#define _FP_BANDWIDTH 160 //BW kHz at position Index (frequency plan)
#define _FP_MODE 161 //status at position Index (frequency plan)
#define _FP_FLAG 162 //intermodulation at position Index (frequency plan)
#define _SP_TYPE 163 //type element
#define _SP_MGRS 164 //coordinates in MGRS
#define _SP_COLOR 165 //station color
#define _SP_RADIUS 166 //station radius km
#define _SP_NFD 167 //NFD matrix name
#define _SP_STRINGC 168 //comment
#define _SP_MODEL 169 //return formula name
#define _SP_HOP 170 //return Hop level
#define _SP_NUMERO 171 //return call number
#define _SP_SELECTED 172 //return selection status
#define _SP_STARTANGLE 173 //start angle for coverage calculation in degree
#define _SP_ENDANGLE 174 //end angle for coverage calculation in degree
#define _SP_DISTANCECALC 175 //Max distance calculation in km
#define _SP_GAINTX 176 //Tx gain in dB
#define _SP_GAINRX 177 //Rx gain in dB
#define _SP_LOSSTX 178 //Tx losses in dB
#define _SP_LOSSRX 179 //Rx losses in dB
#define _MP_NODEAID 301 //return MW station A #
#define _MP_NODEBID 302 //return MW station B #
#define _MP_ISACTIVE 303 //return 1 if MW is activated, 0 if not
#define _MP_COLOR 304 //return a COLORREF
#define _MP_IDENT 305 //MW ident

//_PP_ get profile information
#define _PP_DISTANCE 501//return profile distance in m between Tx/Rx
#define _PP_RSL 502//return profile received signal
#define _PP_DIFFRACTIONLOSS 503//return diffraction loss
#define _PP_FREESPACELOSS 504//return free space loss
#define _PP_PROPAGATIONLOSS 505//return propagation loss
#define _PP_POWERRECEIVED 506//return power received in dBm
#define _PP_MARGIN 507//return margin
    
```

Structure:

```

//Terrain profile structure
typedef struct
{
    float dtm_altitude;
    
```

```

    BYTE clutter_code;
    float clutter_height;
    float distance;
}AO_Profile;

```

#### Functions:

```

DLLEXPORT int GetMicrowaveCount(); //out: return number of MW link(s) (on map)
DLLEXPORT WCHAR* GetMicrowaveParam(int MicrowaveId, int ParamId);
//in: Microwave link #, ParamId: flag _MP_xxxx
//out: string
//flag i.e: _MP_NODEAID or _MP_ISACTIVE
DLLEXPORT int GetProfileMaxSize();//return max number of points could be used by
AO_Profile DLLEXPORT int CalculateMWProfile(int TxId, int RxId, AO_Profile* prf);
//in: station A #, station B #, AO_Profile structure pointer
//out: number of profile points
//remark: fill AO_Profile structure
//must be allocated using GetProfileMaxSize() before call
CalculateMWProfile() DLLEXPORT WCHAR* GetProfileParam(int ParamId);
DLLEXPORT BOOL GetDisplayMapArea(double *ULCX,double *ULCY, double *LRCX,double
*LRCY,char *csys,RECT *re,HWND *hwnd, HDC *dc);
//return rectangle coordinates, projection code (GEOCONV format) and HDC
DLLEXPORT BOOL ConvertCoords(double xin, double yin, char *incode,double *xout,
double *yout, char *oucode);
//Convert coordinates (incode and outcode: GEOCONV format)
DLLEXPORT BOOL SaveResultAsFLD(WCHAR* fname);
//in: Fld file name to be created
//out: create fname.fld, fname.txt, fname.col
//remark: fname.txt=station listing, fname.col=color/value listing
DLLEXPORT int GetStationCount();//out: return number of Tx/Rx (on map)
DLLEXPORT WCHAR* GetStationParam(int StationId, int ParamId);
//in: station #, ParamId: flag _SP_xxxx
//out: string
//flag i.e:_SP_GainTx,_SP_Power
DLLEXPORT WCHAR* GetSubscriberParam(int SubId, int
ParamId); //in: subscriber #, ParamId: flag _SP_xxxx //out:
string
//flag i.e:_SP_GainTx,_SP_Power
DLLEXPORT float GetStationDistance(int StationId, double longit4DEC, double latit4DEC);
DLLEXPORT WCHAR* GetFrequencyPlanParam(WCHAR* FP_name, int Index, int ParamId);
DLLEXPORT int SetStationParam(int StationId, int ParamId, WCHAR* wcsParam);
DLLEXPORT WCHAR* GetPaletteInfo(int index, int InfoId);
DLLEXPORT BOOL GetLayerArea(int LayerId, double *ULCX,double *ULCY, char *csys,
int *nbptx ,int *nbpty, double *step);//csys: coordinate code
DLLEXPORT WCHAR* GetLayerValue(int LayerId, int x, int y);
DLLEXPORT BOOL SetLayerValue(int LayerId, int x, int y, double val);
DLLEXPORT BOOL RefreshMap();
DLLEXPORT BOOL TestDongleAccess(int AddOnId);
DLLEXPORT int AddStation(double xin, double yin, char* grid); // returns station ID
DLLEXPORT int AddSub(double xin, double yin, char* grid); //return number of subscribers
in the current SUB database -1 = error and add subscriber if no error
DLLEXPORT int GetSubCount(); // return number of subscribers in the current database -1
= error
DLLEXPORT int SelectSubDatabase(); // select subscriber database
DLLEXPORT int SetSubParam(int SubId,int ParamId,WCHAR* wcsParam); //sub record # in the
currunt database, paramId (i.e: _SP_CALLSIGN), value (string) - return 1 if success 0
= error
DLLEXPORT float GetFSPRReceivedFromStation(int StationId, double longit4DEC,
double latit4DEC, float RxantennaHeight, int unit);

```



```
DLLEXPORT float GetFSPRRReceived(int TxId, int RxId, int unit); //get power received
in dBuV/m (unit=0) or dBm (unit=1)
DLLEXPORT int CoverageCalculation(int TxId, float rx_antenna_height,float distance);
//Perform Station coverage: rx_antenna_height (m), distance (m)
DLLEXPORT void Quit(); //Quit HTZ
DLLEXPORT BOOL LoadPRM(WCHAR *wfname);// Load PRM file name
DLLEXPORT int MoveStation(int StationId, double xin, double yin, char* grid);
//Move existing station
DLLEXPORT int ImportEWX(WCHAR *EWXname, WCHAR *DBname, int type); //Synchronize DB MW or DB
station or DB subscriber or On map station/microwaves from EWX files (type: 0=on map, 1=DB
station, 2=DB microwave, 3=DB subscriber)
DLLEXPORT int ExportEWX(WCHAR *EWXname, WCHAR *DBname, int type); //Export DB MW or DB
station or DB subscriber or On map station/microwaves to EWX files (type: 0=on map,
1=DB station, 2=DB microwave, 3=DB subscriber)
```

**Example:**

This Addon export current coverage on the map to Google Earth (KML+PNG)

```
- #include "..\RunAddOn\ATDI_AddOnAPI.h"
- #include "..\RunAddOn\AddOnUtils.h"
- #define DLLEXPORT __declspec(dllexport)
- #define DLLIMPORT __declspec(dllimport)
-
- extern "C"
- {
- DLLEXPORT void RunAddOn(HWND hParent);
- DLLEXPORT WCHAR* GetAddOnName() { return L"Export to GoogleEarth";}
- }
-
- void RunAddOn(HWND hParent)
- {
-
-     if(!ConnectAddOn())
-     {
-         MessageBox(hParent,L"Handshake with host failed",L"Message",
- MB_ICONERROR|MB_OK);
-         return;
-     }
-
-     DialogBox(GetModuleHandle(L"Export2GoogleEarth.AddOn"), L"EXPORT2KMLDLG",
- hParent, (DLGPROC)ExportKMLProc);
-
- }
-
- int Export_GoogleEarth()
- {
-     .....
-     i = GetStationCount();
```

```
-     for(j=0;j<i;j++)
-     {
-         if(_wtoi(GetStationParam(j+1,_SP_ISACTIVE)))
-         {
-             XML_CreateElement(&placemark,document,L"Placemark",1);
-             lat = _wtof(GetStationParam(j+1,_SP_LATITUDE));
-             lon = _wtof(GetStationParam(j+1,_SP_LONGITUDE));
-
-             swprintf(wstr,256,L"%s",GetStationParam(j+1,_SP_CALLSIGN));
-             XML_WriteElement(placemark,L"name",wstr,2);
-             XML_CreateElement(&lookat,placemark,L"LookAt",2);
-
-             swprintf(wstr,256,L"%f",lon);
-             XML_WriteElement(lookat,L"longitude",wstr,3);
-             swprintf(wstr,256,L"%f",lat);
-             XML_WriteElement(lookat,L"latitude",wstr,3);
-             XML_WriteElement(lookat,L"altitude",L"0",3);
-             XML_WriteElement(lookat,L"range",L"500",3);
-             XML_WriteElement(lookat,L"tilt",L"0",3);
-             XML_WriteElement(lookat,L"heading",L"0.0",3);
-             XML_WriteElement(lookat,L"altitudeMode",L"relativeToGround"
- ,3);
-             XML_Release(lookat,2);
-         }
-     }
```

A Visual Studio sample project is located in [\\PLUGS\AddOns64\API\addOnSample](#).