EazyRF V4.77
Intermodulation calculation

User Guide

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1 - Presentation

Version 4 of EazyRF is the continuation of version 3 with all its facilities and new features.

The presentation was first improved, the views have more color to put the sections more in evidence.

The list of Variable Frequencies devices and Fixed Frequencies devices have been merged for greater flexibility.

A new Device Group list is added to EazyRF. It is thus possible to group together devices and assign frequencies simultaneously.

Here are some examples: a BTR-800 A2 group contains the BTR-800 A2-TX and the BTR-800 A2-RX, an ABC Theater group contains all the devices in this theater, and the assigned frequencies can be included for each device.

There is no limit on the number of devices in a group.

Searching for a device in the device list can now be done more easily. For example, a search can be done for a microphone type device whose starting frequency is greater than one value, or less than another, or between two values.

EazyRF can transfer data to Wisycom Manager software (Frequency Table), either by the clipboard, by saving a file (.xwdf), or directly in the "Frequency Table" window.

Finally, other tools have been added: automatic start frequency of devices, the frequencies are not necessarily assigned consecutively from one type of device to another, as far as possible; two versions of a document can now be compared.

EazyRF now uses the .NET Framework 4.5.

We find of course all the features of version 3 without having messed up the layout of commands, no need to relearn where are the functions of EazyRF, no loss of efficiency.

So we always have the same facilities: ATSC video standard, PAL and SECAM, reading files created by frequency samplers (scanner) from several manufacturers, with this data we can create interferences list or TV channels; modules Global View, Detailed View, Frequency Plan, Spectral View, On Tour.

EazyRF always requires a USB key to validate the username and its activation code. The key must remain in place during program execution. A license file can also be used but it is linked to a hardware configuration (one and only one system). More information on the eazyrf.com website.

The USB key is available in two formats, USB-A (standard) and USB-C:

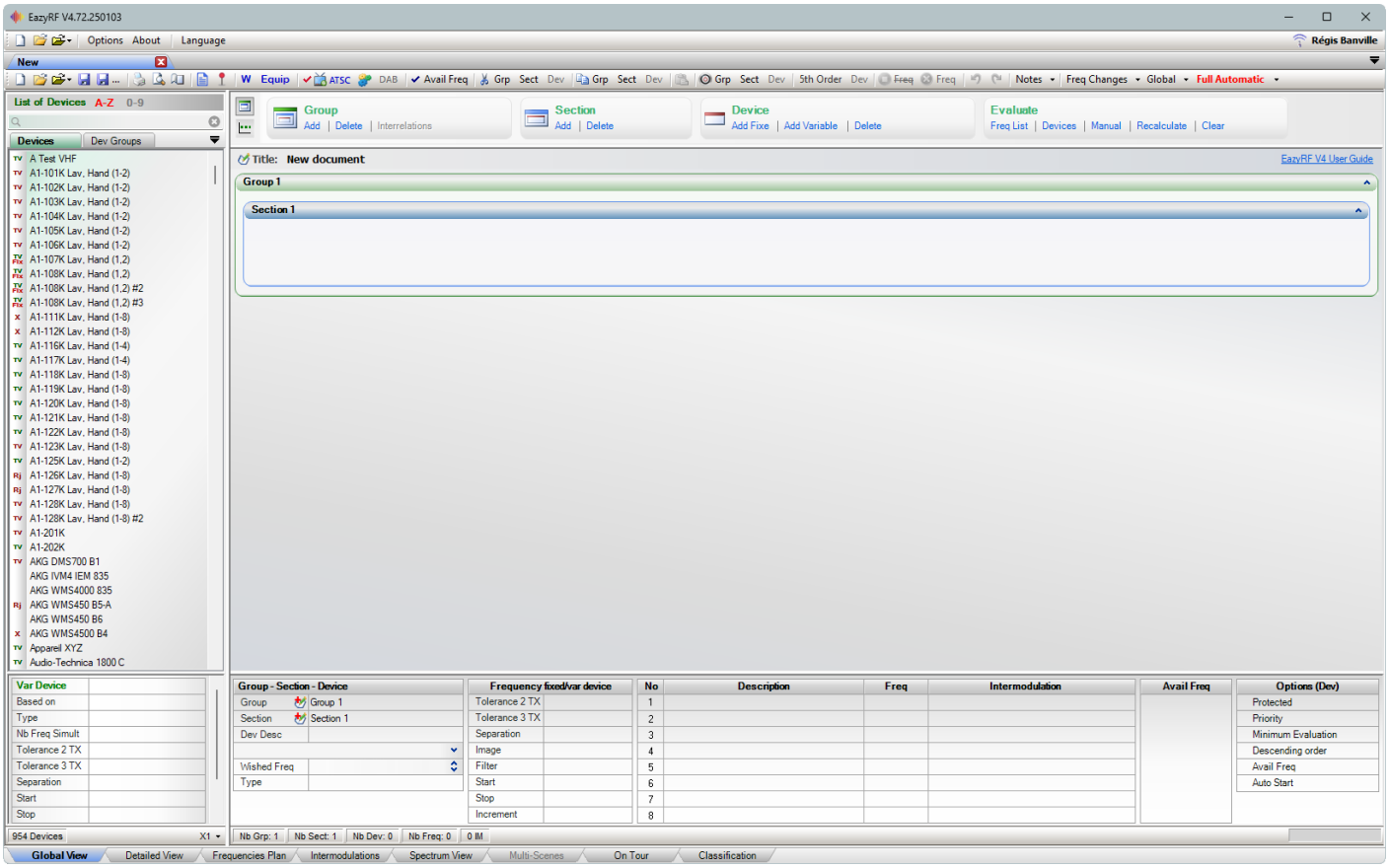
To install EazyRF, download the application on the site: : http://eazyrf.com/english/windows.html. It is necessary to install the version adequate to your operating system Windows (32 or 64 bits), otherwise the drivers of the USB key will not work.

A new directory is created when you install version 4, which is C:\Program Files (x86)\EazyRF V4. Versions 3 and 4 can be installed on the same computer (version 3 is installed in the C:\Program Files (x86)\EazyRF V3.2 directory).

Now look at this environment.

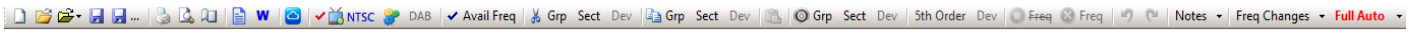
1.1 Launching

At starting up the following screen appears:

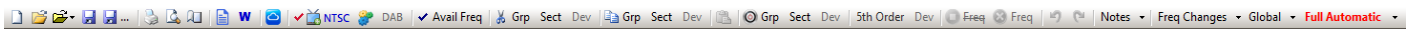


By default, EazyRF uses the maximum available screen space. The reduction of the image in this guide does not allow to see adequately the contents. EazyRF fits automatically with the available screen size (the minimal resolution is 1366 x 768).

According to the width of the screen, the buttons of the toolbar adapt themselves. With the minimal resolution, it takes this shape:

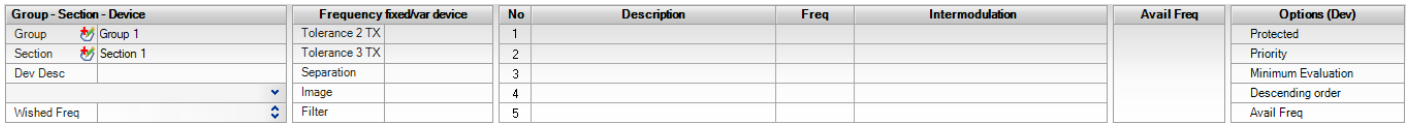


Or if the resolution is higher:

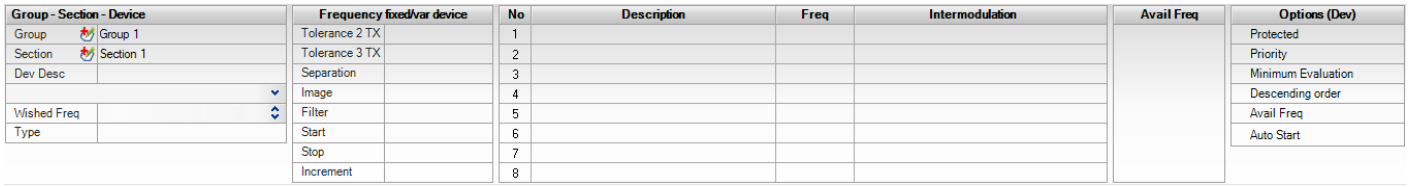


According to the available width, the least used controls are removed (more details in Global View).

The detail zone of a device (Global View) also varies with the height of the screen. In its simplest form:



Or in its most detailed form:



At starting up, the "Global View" is activated. The View Bar components (bottom completely) allow to change views:

The "Global View" component is the overview of all devices in the document. The chapter 2 explains it in detail. The "Detailed View" display the frequencies of all devices, see chapter 3.

The component "Frequencies Plan" display the details of all devices continuously (like an Excel spreadsheet) and allow changes to the display (text size, color, etc..). See chapter 4.

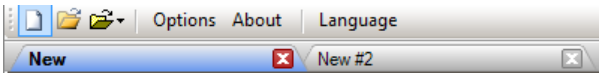
The "Intermodulations" pane shows the frequency spectrum occupied by all devices. It consists of an overview and a detailed view. The detailed view shows the intermodulation between the frequencies. Moreover, this view allows you to edit the frequency by moving them with the mouse. This component also allows for editing of devices of the document (adding, deleting). More detail in chapter 5.

The "Spectral View" pane visualize the spectral space occupied by all devices and TV channels. More details in chapter 6.

The component "On Tour" is responsible for the preparation of a compatible frequency plan on tour, i.e. in several cities. More details in chapter 7.

Finally, the component "Classification" shows the order of evaluation of devices, details in chapter 8.

EazyRF is a software that allows you to edit multiple documents simultaneously. Control bar at the top part of the application is used to manage the creation of additional documents (new or opening):



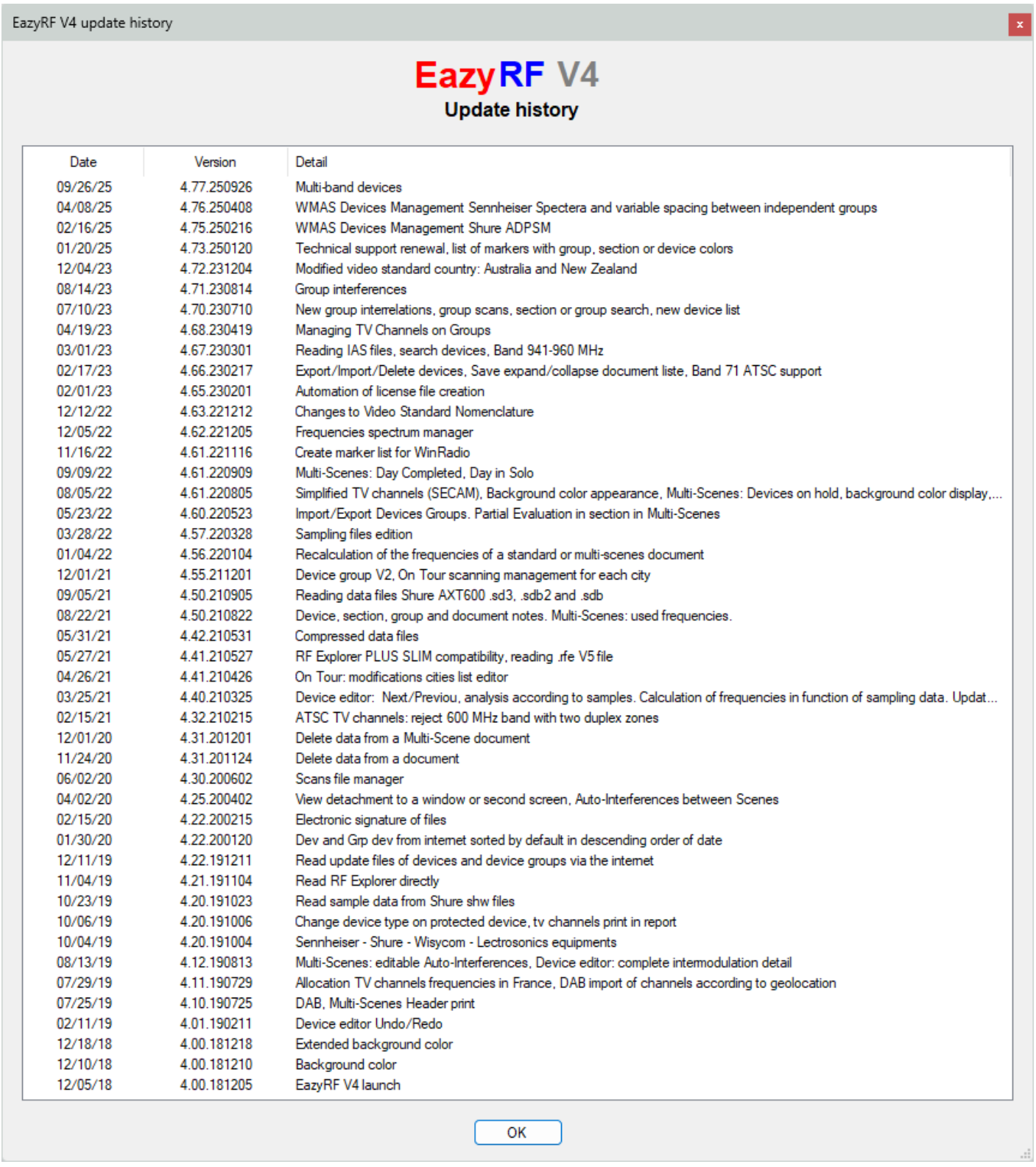
These commands always add a new tab to the documents bar.

In addition, the only system commands are found in this area: "Options", "About" and "Language".

The "Options" command will be explained in chapter 8.

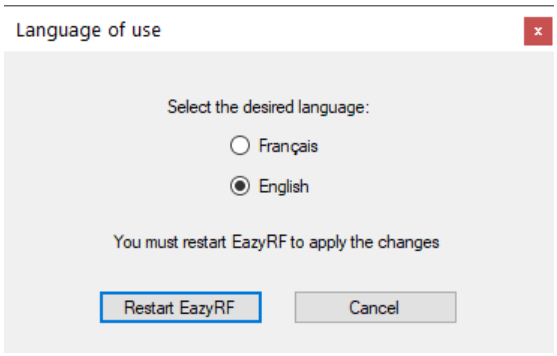
The "About" command displays the Welcome window:

The "History" command displays the history of EazyRF updates:



Date	Version	Detail
09/26/25	4.77.250926	Multi-band devices
04/08/25	4.76.250408	WMAS Devices Management Sennheiser Spectera and variable spacing between independent groups
02/16/25	4.75.250216	WMAS Devices Management Shure ADPSM
01/20/25	4.73.250120	Technical support renewal, list of markers with group, section or device colors
12/04/23	4.72.231204	Modified video standard country: Australia and New Zealand
08/14/23	4.71.230814	Group interferences
07/10/23	4.70.230710	New group interrelations, group scans, section or group search, new device list
04/19/23	4.68.230419	Managing TV Channels on Groups
03/01/23	4.67.230301	Reading IAS files, search devices, Band 941-960 MHz
02/17/23	4.66.230217	Export/Import/Delete devices, Save expand/collapse document liste, Band 71 ATSC support
02/01/23	4.65.230201	Automation of license file creation
12/12/22	4.63.221212	Changes to Video Standard Nomenclature
12/05/22	4.62.221205	Frequencies spectrum manager
11/16/22	4.61.221116	Create marker list for WinRadio
09/09/22	4.61.220909	Multi-Scenes: Day Completed, Day in Solo
08/05/22	4.61.220805	Simplified TV channels (SECAM), Background color appearance, Multi-Scenes: Devices on hold, background color display,...
05/23/22	4.60.220523	Import/Export Devices Groups. Partial Evaluation in section in Multi-Scenes
03/28/22	4.57.220328	Sampling files edition
01/04/22	4.56.220104	Recalculation of the frequencies of a standard or multi-scenes document
12/01/21	4.55.211201	Device group V2, On Tour scanning management for each city
09/05/21	4.50.210905	Reading data files Shure AXT600 .sd3, .sdb2 and .sdb
08/22/21	4.50.210822	Device, section, group and document notes. Multi-Scenes: used frequencies.
05/31/21	4.42.210531	Compressed data files
05/27/21	4.41.210527	RF Explorer PLUS SLIM compatibility, reading .rfe V5 file
04/26/21	4.41.210426	On Tour: modifications cities list editor
03/25/21	4.40.210325	Device editor: Next/Previou, analysis according to samples. Calculation of frequencies in function of sampling data. Updat...
02/15/21	4.32.210215	ATSC TV channels: reject 600 MHz band with two duplex zones
12/01/20	4.31.201201	Delete data from a Multi-Scene document
11/24/20	4.31.201124	Delete data from a document
06/02/20	4.30.200602	Scans file manager
04/02/20	4.25.200402	View detachment to a window or second screen, Auto-Interferences between Scenes
02/15/20	4.22.200215	Electronic signature of files
01/30/20	4.22.200120	Dev and Grp dev from internet sorted by default in descending order of date
12/11/19	4.22.191211	Read update files of devices and device groups via the internet
11/04/19	4.21.191104	Read RF Explorer directly
10/23/19	4.20.191023	Read sample data from Shure shw files
10/06/19	4.20.191006	Change device type on protected device, tv channels print in report
10/04/19	4.20.191004	Sennheiser - Shure - Wisycom - Lectrosonics equipments
08/13/19	4.12.190813	Multi-Scenes: editable Auto-Interferences, Device editor: complete intermodulation detail
07/29/19	4.11.190729	Allocation TV channels frequencies in France, DAB import of channels according to geolocation
07/25/19	4.10.190725	DAB, Multi-Scenes Header print
02/11/19	4.01.190211	Device editor Undo/Redo
12/18/18	4.00.181218	Extended background color
12/10/18	4.00.181210	Background color
12/05/18	4.00.181205	EazyRF V4 launch

The "Language" command :

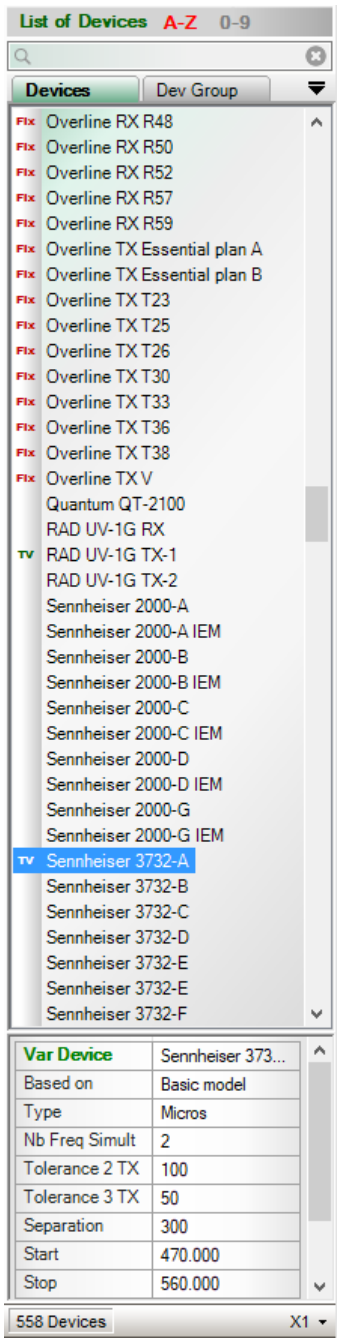


It allows you to change the language of the application. Note that you must restart EazyRF to apply the change.

1.2 Devices List

An EazyRF device is equivalent (or almost) of an existing device on the market. The only difference is when a device has a TX and RX as a BTR-800. In these cases it is necessary to define a device for the TX and another for RX because the frequency range is not the same.

There are two types of EazyRF devices: Variables Frequencies and Fixed Frequencies. In version 4 these lists are merged:



A device is said of variable type when the frequency can be set between a Start and a Stop value with a predetermined increment value. A fixed device is when the frequencies are predetermined (a choice of frequencies X) often adjustable from a rotary switch (identify with Fix).

EazyRF a device has a set of characteristics:

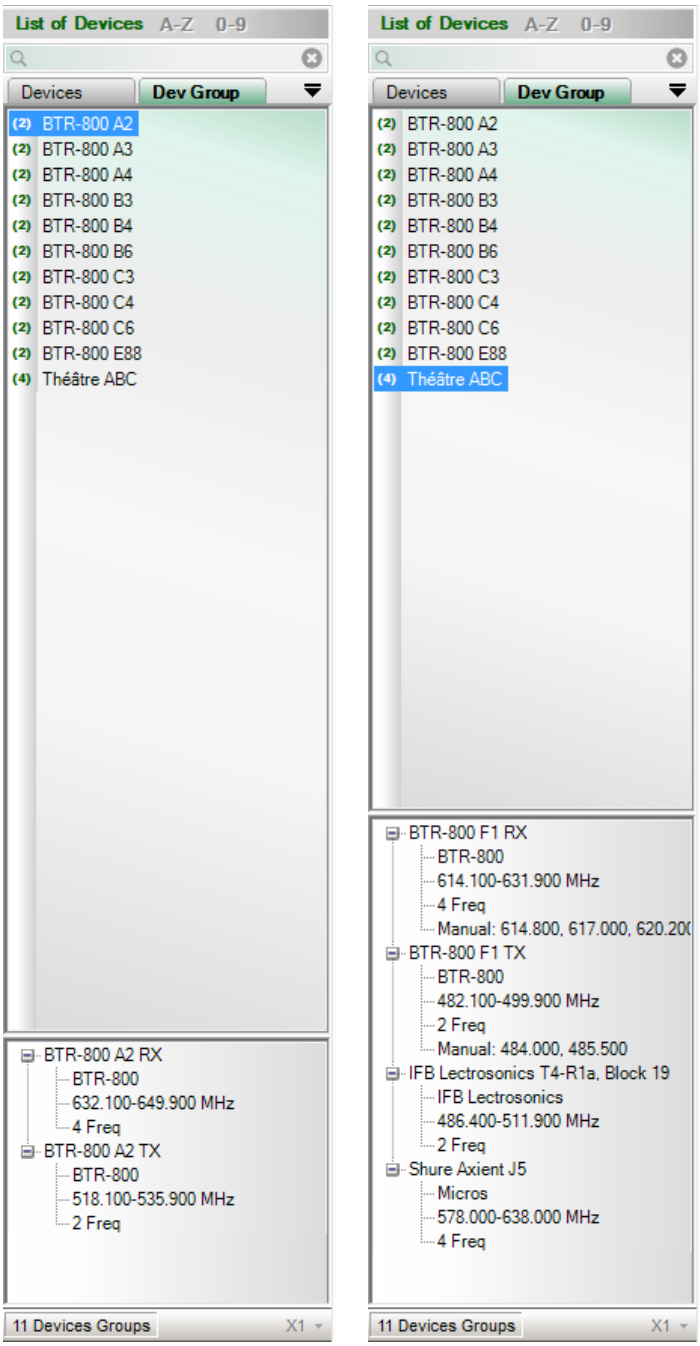
- Intermodulations Tolerance 2 TX (2nd order), 3 TX (3th order) and 5th order (2 TX to 5 TX)
- Separation between frequencies
- Type of Frequencies (Micros, BTR-800, In-Ear, etc.)
- RF Filter (width)

- Image Frequency (optional)
- Transmit power level
- If Variable : Start - Stop Frequencies and Increment value
- If Fixed : Fixed Frequencies list

Chapter 9 on "Options" explains all these parameters and the method to define them.

1.3 Device Group

A group of devices can contain a multitude of devices with variable or fixed frequencies. here are some examples:

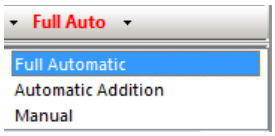


The number of a device in a group can be changed and its frequencies can be set manually or automatically. There is no restriction.

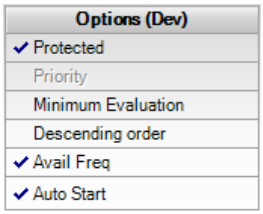
Chapter 9 on "Options" explains all these parameters and the method of defining them.

1.4 Mode of calculation

EazyRF uses three operation modes selectable with the command:



First of all, every device can be "protected", the frequencies allocated can only be changed by the user. This option is enabled by:



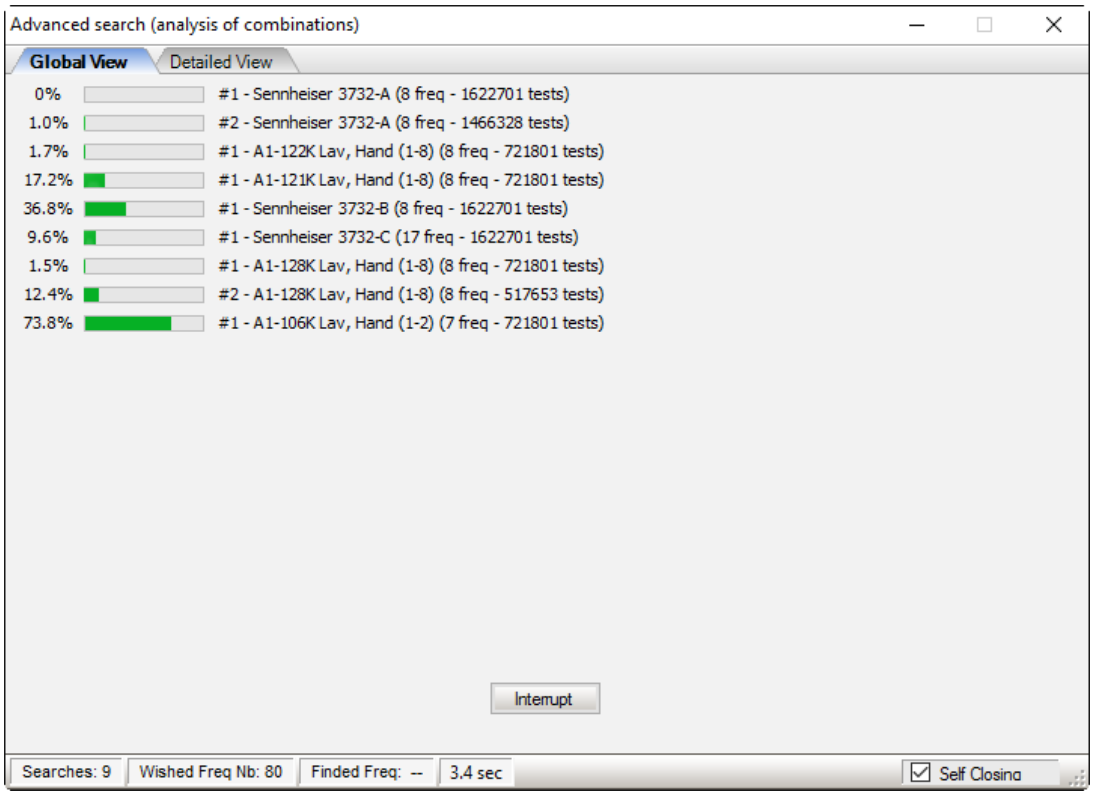
In Full Automatic mode, all non-"Protected" devices are classified by Start frequency (Fixed frequency devices are classified before Variables if the frequencies are close to one another). Thereafter, depending on the operation requested (which concerned device), EazyRF retains only devices influenced by this command. Example: If a BTR-800 A2-RX is added (Start - 632.100, Stop - 649.900), devices included in this frequency range more or less the width of the "Filter" will be subject to an evaluation; a Shure UHF-as R L3 as example (Start - 638.000, Stop - 698.000).

In addition, EazyRF V4 offers automatic start, i.e. if two devices overlap in their frequency assignment areas, EazyRF will calculate a separation margin between the two devices. A small example, with version 3:

And with version 4:

It can be seen that in the case of version 3, the beyerdynamic immediately follows the allocation of frequencies allocated to the BTR-800. In version 4, the first allocated frequency is 536,400 instead of 471,900. It all depends on the frequencies available in an area. This new option can be enabled globally for the document, or for each device.

Finally, EazyRF tries to find the largest possible number of frequencies by making permutations automatically. If the choice proves difficult, the "Advanced Search" window appears:

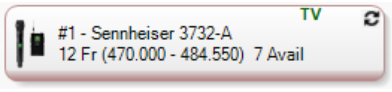


Sometimes it is necessary to recalculate the devices several times, this window allows you to follow the progress of operations.

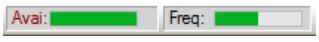
With the mode of calculation "Automatic Addition", only the modified or added device is calculated.

The "Manual" mode allows the user to use specific frequencies (EazyRF still suggest valid list of available frequencies).

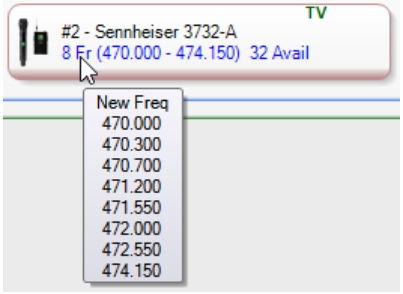
When evaluating a device, an animation indicates which device is recalculated:



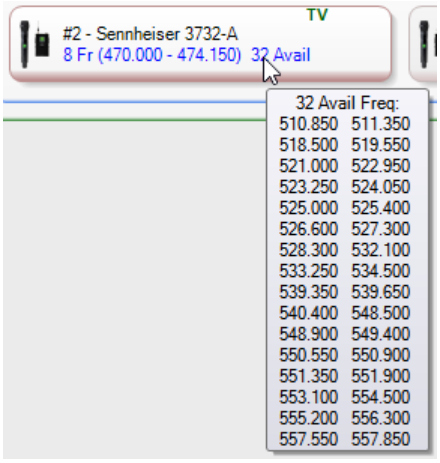
In addition, the status bar displays the calculation steps:



EazyRF always calculates the number of required and available frequencies for a device. By moving the mouse cursor over the number of frequencies, the list appears:



It is the same when the cursor is over the available frequencies:



When evaluating frequency, if its value changes, then the frequency is displayed in blue and also the number of frequencies.

When two devices with the same basic name (e.g. BTR-800 RX A2) have the same parameters of evaluation, then the available frequencies are calculated for the first one only and only the display indicates "Avail to share" for both devices.

The list of Available Frequencies is valid only if no frequency is changed in all the devices. Therefore in calculation mode Fully Automatic, if the devices are not protected, it is possible that the revaluation brings different results according to the order of calculation (see Chapter 8 Classification).

The "Evaluate" commands can be used to request a manual recalculation:

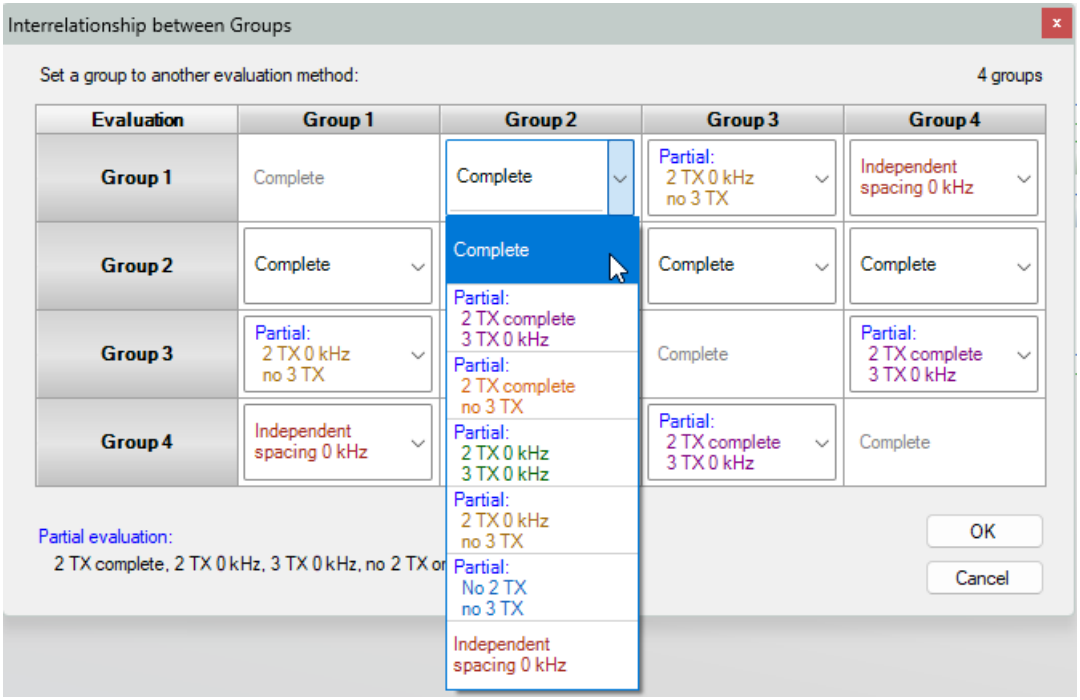
"Evaluate Freq List" allows the evaluation the frequencies between them. "Evaluate Devices" request a revaluation of the devices according to the mode of calculation by respecting the protected devices.

1.5 Group - Section - Device

EazyRF uses Groups and Sections to clarify the presentation of the devices of the document. So, a section can collect Micros, another BTR-800, another In-Ear, etc. A group can be used to represent a room, a company, or any other affinity.

To manage these Groups - Sections, use the commands:

The Group has an additional feature: it can be used to define a relationship in a set of groups. So, it is possible to define how the evaluation of these groups should be. To call the editor, use the Group / Interrelations command or double-click the header of a group:



Relationships between groups can be Full, Partial, or Independent. Partial relations can be defined with all possible combinations of 2 TX and 3 TX intermodulation. There are no restrictions on the possible combinations since version 4.70 of EazyRF.

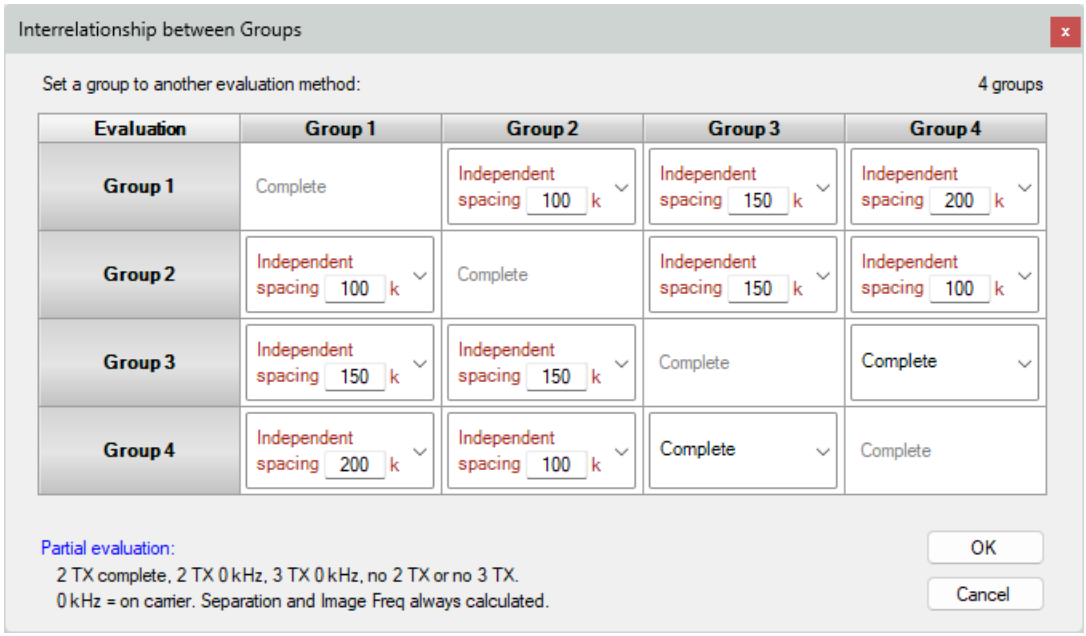
To change the relationship of a group on a horizontal line, simply click on the cell of the group name in the left box. The change is circular (Full / Partial / Independent).

To change the relationship of a group to a vertical column, simply click on the header of the group name on the top area. The change is also circular.

To define the relationship for all groups to "Complete" or "Partial", click on the "Evaluation" heading on the upper left corner.

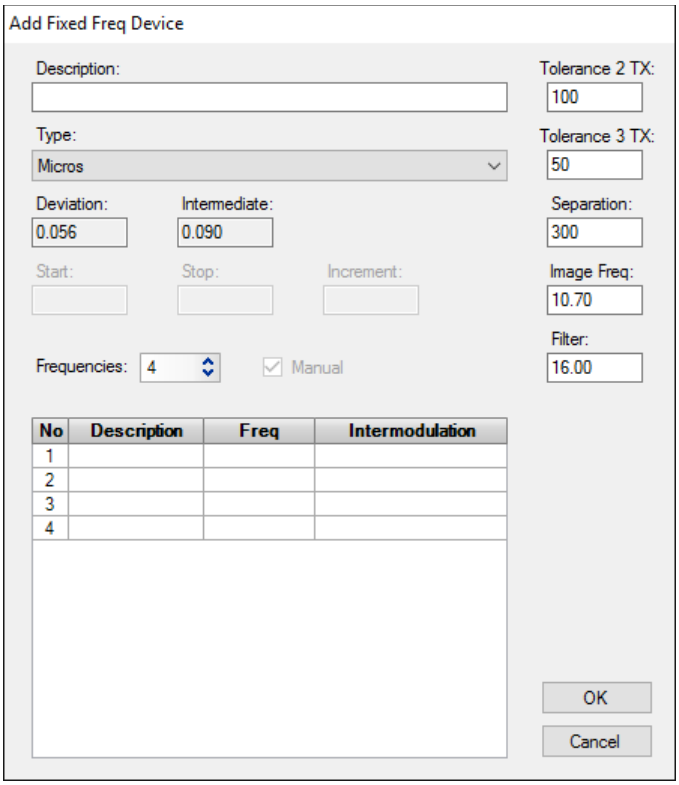
It is preferable to define relationships when creating a new document. Thereafter, it is possible to change these relationships, but intermodulations may appear.

From version 4.76 onwards, you can adjust the distance between independent groups as you wish. The default value is the one defined for the document:

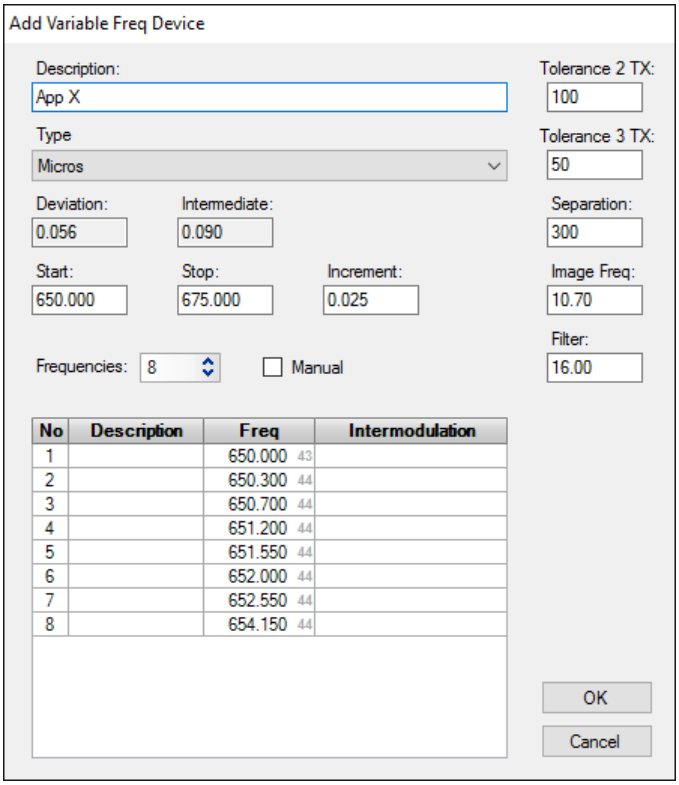


EazyRF lets you add devices not included in the list of devices with the command:

The "Add Fixe" command allows you to add a device with Fixed Frequency:



Use "Add Variable" to add a device by setting the Start and Stop frequencies:



It is still possible to enter frequencies without defining Start and Stop.

1.6 Television Channels

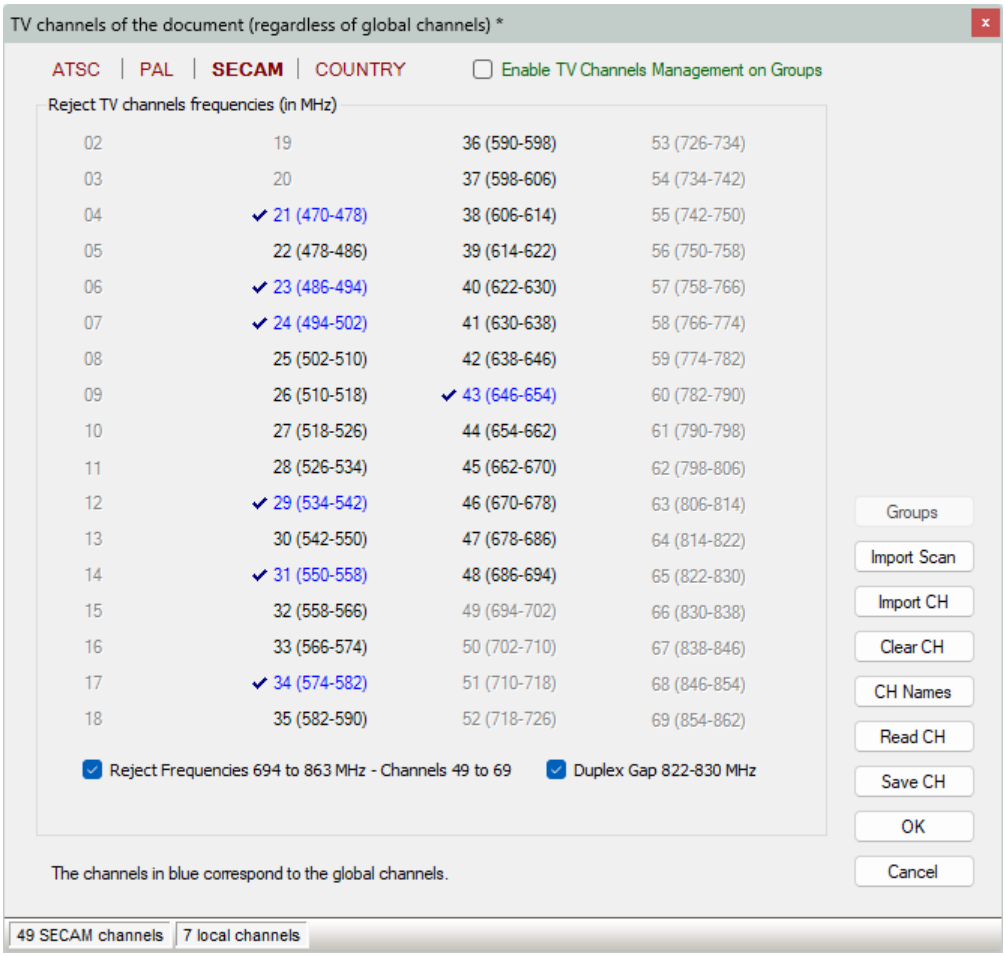
EazyRF 4.x supports standard television channels ATSC (USA-Canada), PAL and SECAM for Western Europe.

From version 4.72, EazyRF now supports certain countries that use the same video standards but with different configurations, for example Australia and New Zealand.

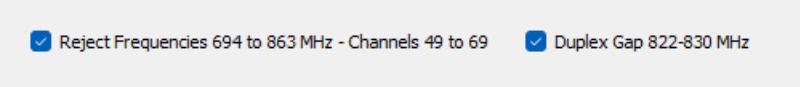
The channel list can be global (Options / Channels TV) or local (in a document). Global list contains the channels your hometown normally (to be defined by the user). The local list is used when traveling. The lists can be saved and retrieved later.

You can also import TV channels (public database) from a given location (see section 9.1).

Here is the local definition window (for SECAM video standard):



Since the advent of digital television and 4G and 5G cellular telephony, frequency bands have to be freed up and thus become unavailable. In every standard of television, a TV option enables the rejection of these frequencies:



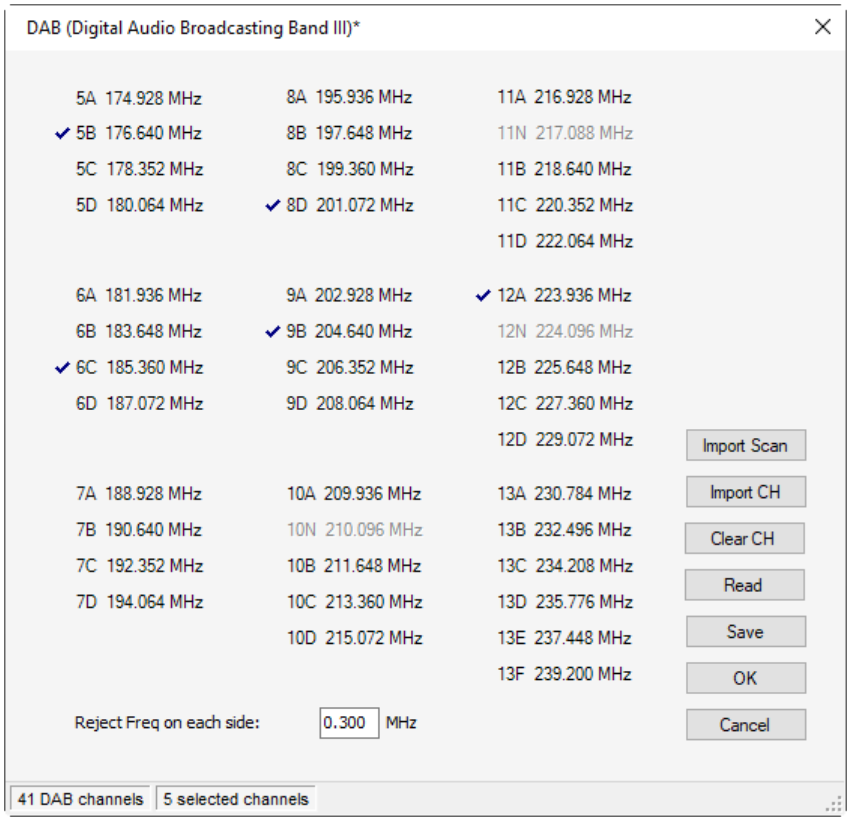
See section 2.6.3 and 10.1 for further explanation of rejection areas.

1.7 Digital Audio Broadcasting

EazyRF 4.1 now supports DAB (Digital Audio Broadcasting). For the moment only band III is covered, mainly used in Europe (178 MHz to 223 MHz).

In North America this frequency band is used by digital TV, so this control is not accessible with the ATSC video standard.

Here is an overview:

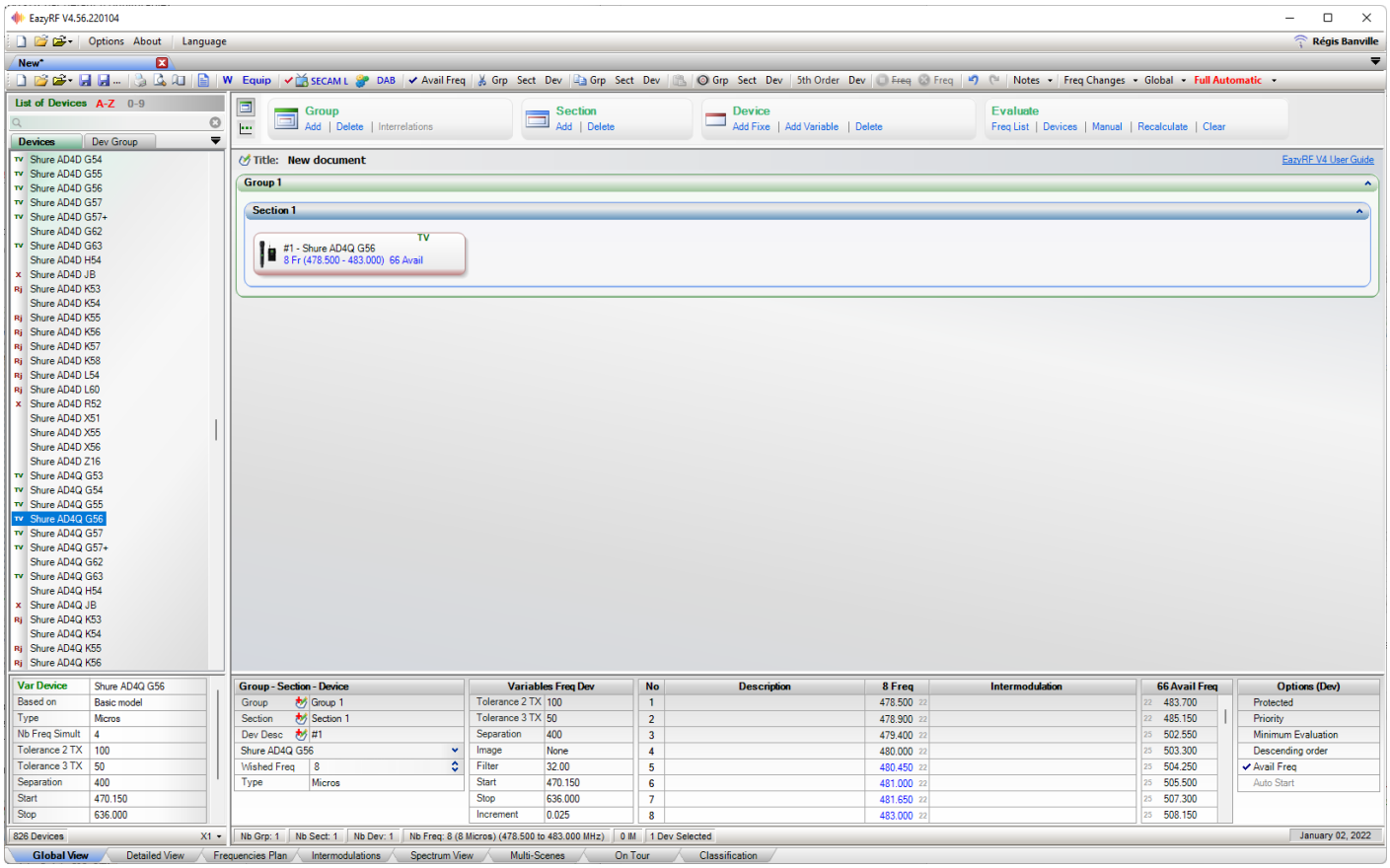


1.8 Interferences

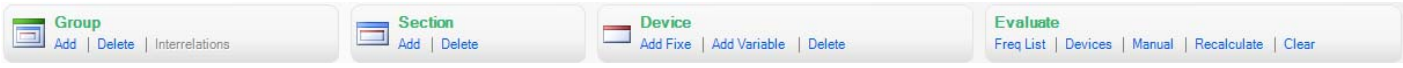
It is allowed to define zones not to be used in the frequency allocation. This is done in the "Intermodulation" pane, see Chapter 5.

2 - Global View

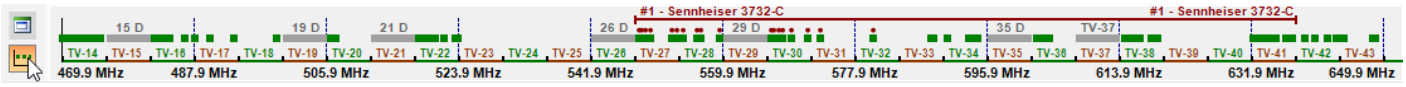
The "Global View" is the visual representation of the document on devices not detailed form of frequencies, only the desired number of available frequencies and each device is displayed with some indicators.



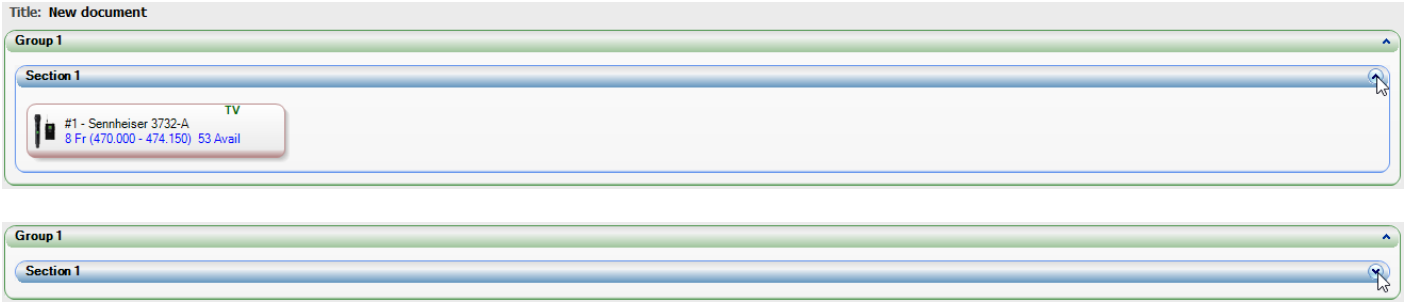
The command bar "Group / Section / Device / Evaluate" has been seen in Chapter 1 (see section 2.12 for the command “Evaluate”):



This bar can be changed to display the summary of the frequency spectrum:



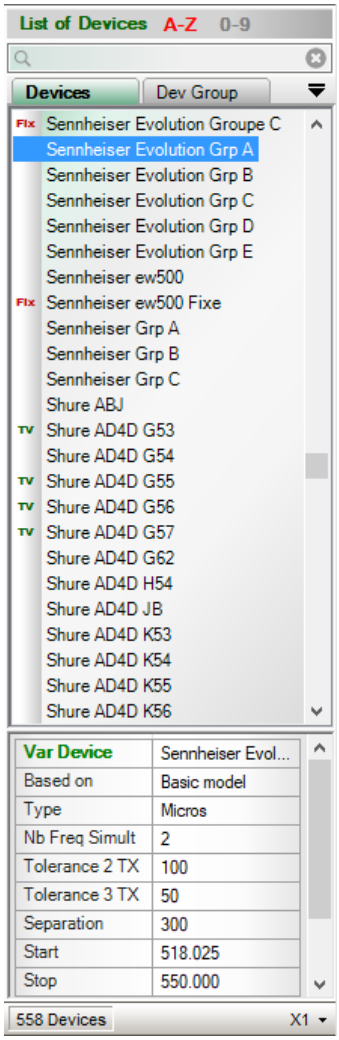
Each Group and Section can be opened or closed by its upper right button:



The section "Title" is used to identify the document, it is this title that is displayed in the header prints.

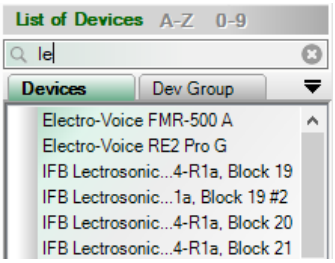
2.1 Devices

In chapter 1, we approached the "List of Devices". Let us look closer at this list:



The list can be sorted alphabetically or by Ascending Frequencies with buttons A-Z or 0-9:

In addition, a filter can be applied on the list at the beginning or middle name:



In addition, a more advanced search can be performed by starting the search with a question mark.

Some examples :

?m to search all type devices starting with m (Micros), the word micro can be written in full or some letters

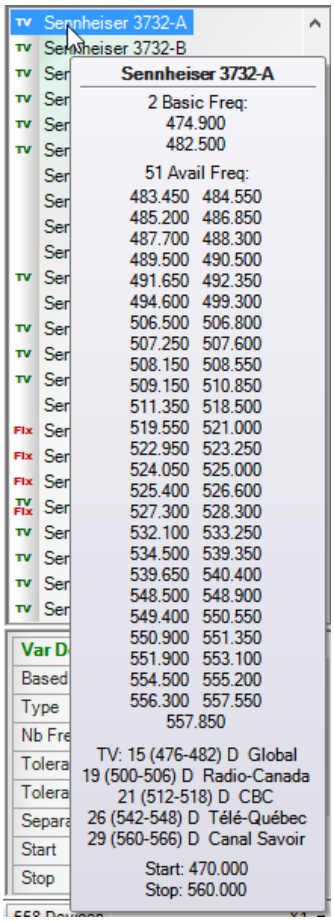
?m>value to search for all microphones whose starting frequency is greater than or equal to the requested value

?b<value to search for all BTRs whose stop frequency is less than or equal to the value

?in>value1<value2 to search all In-Ear whose starting frequency is greater than or equal to value1 and the stop frequency is less than or equal to value2

Finally, you can display the inactive devices in the list by inserting the @ symbol. See section 10.4 for the "Active Device" option.

By leaving the cursor on the name of a device, the number of Desired Frequencies (defined in Options/Devices) is calculated as well as the list of the Available Frequencies. The TV channels affecting the device are also showned:

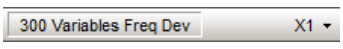


The calculation of Available Frequencies is optional (Options/Startup).

By clicking a device, the detail is displayed in the lower part of the section:

Var Device	Sennheiser 3732-A
Based on	Basic model
Type	Micros
Nb Freq Simult	2
Tolerance 2 TX	100
Tolerance 3 TX	50
Separation	300
Start	470.000
Stop	560.000
Increment	0.005
Image	10.70
Filter	16.00

The status bar of the List shows us the number of devices and a command:

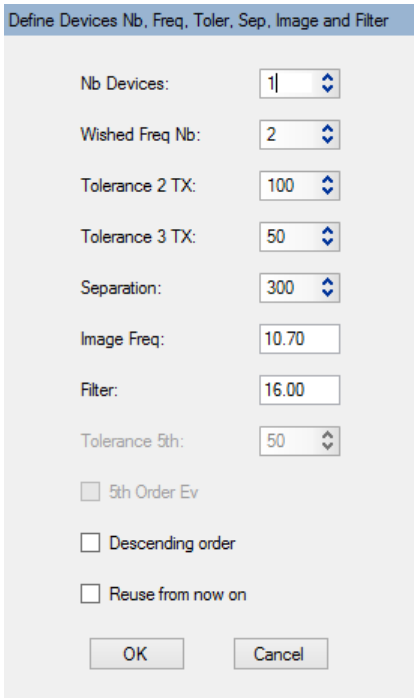


The command "X1" allows to set the number of devices added simultaneously:

The status bar always indicates the number of devices to add:

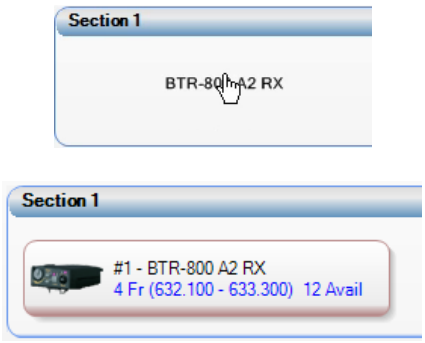
This value can be maintained or reset to 1 after use (Options/Startup).

It is also possible to define the parameters and the number of devices with "Define Nb of Dev":



To use a predefined value for a device parameter, simply enter "0" as value. The option "Reuse from now on" allows to keep these settings for all the new additions.

To add one or more devices to a section, just drag its selection on a section (a group can contain only sections, and a section only devices):

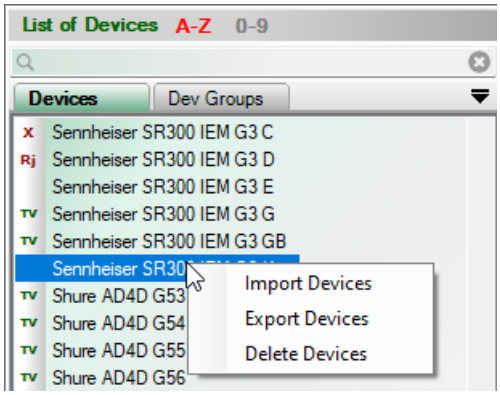


To insert a device, drag the selection on the device to insert it at this position. To add to the end, drop it into an unoccupied area of the section. It is also possible to select multiple devices with Ctrl + Device.

To move a device from one position to another, select the device, and drag to the desired position. This can be done in a section to another, from one document to another, or from one application to another (in this case the operation is a copy).

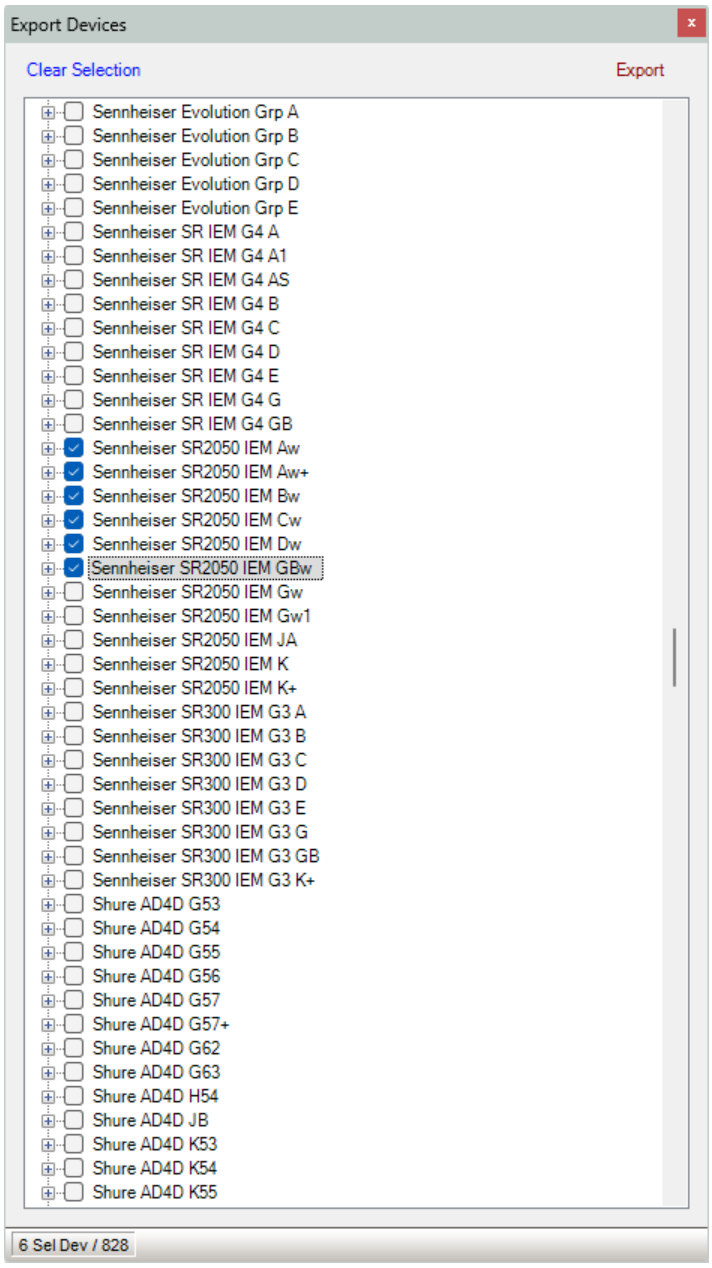
2.1.1 Export / Import / Delete Devices

From the list of devices on the left side of the views, it is now possible to export, import or delete devices. Simply call up a menu with the right mouse button on one of the devices in the list:



2.1.1.1 Export Devices

Just make the desired selection:

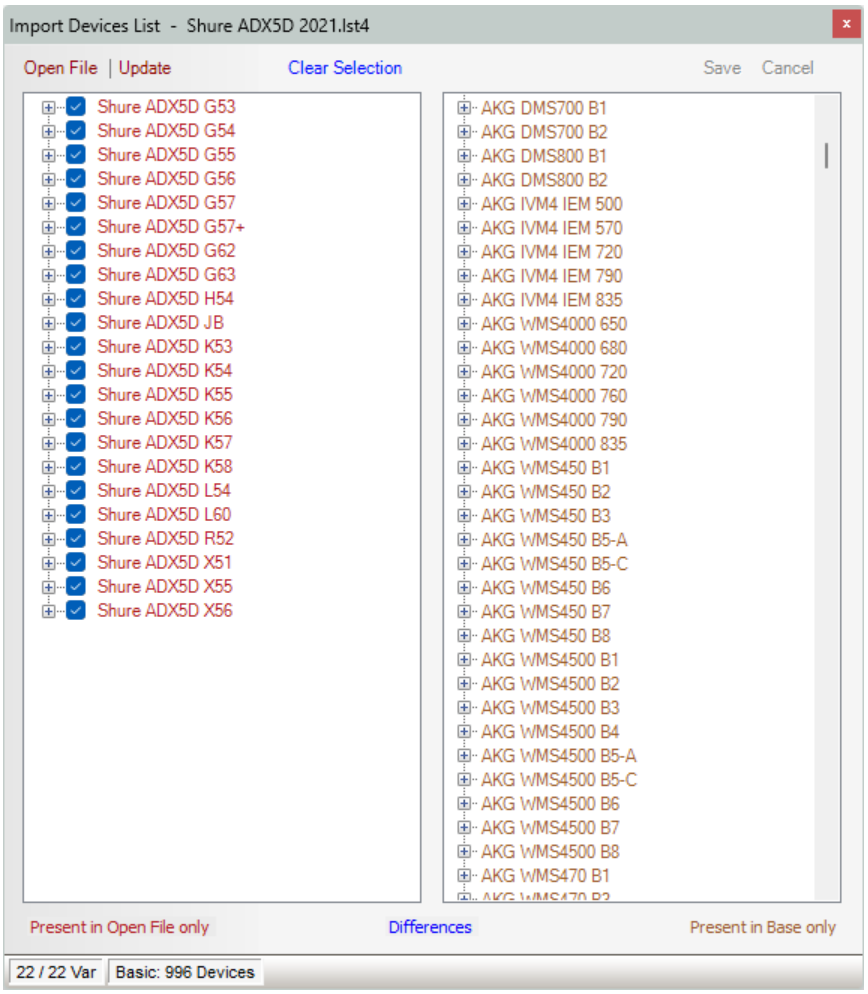


Then, click the “Export” command to enter the name of the new file to be saved. The original list is called "Appareils.lst4" and cannot be used as a new name.

Reminder: the device list file (Appareils.lst4), is the most crucial file in your EazyRF environment, make sure you have backup copies.

2.1.1.2 Import Devices

To import devices, simply open a device file (created by a user (export) or importing from eazyrf.com):

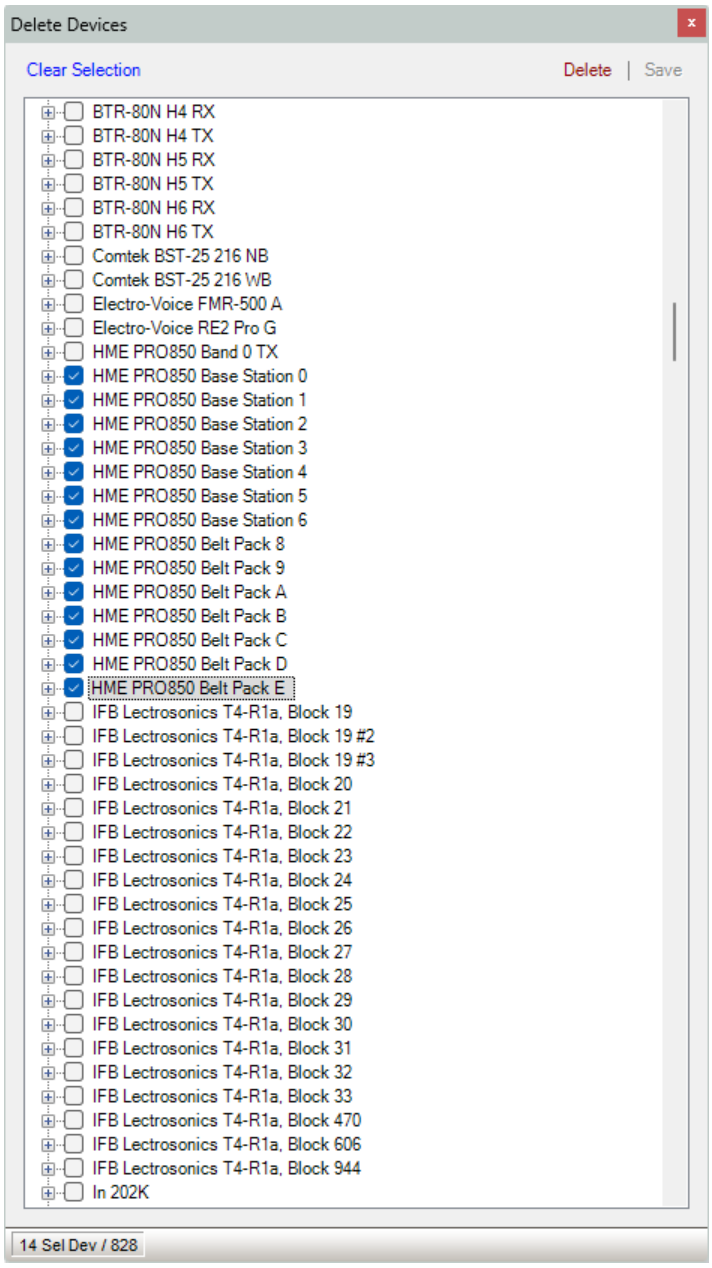


The differences between the two lists are displayed with different colors. Devices present only in the open list are in red, devices present only in the system list are in brown. A device present in both lists but with different parameters is displayed in blue. Identical devices in both lists are not displayed in the list on the left.

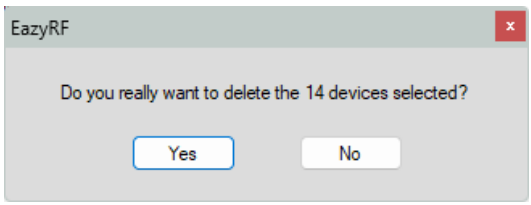
After making a selection of devices, just click on “Update” and “Save” everything.

2.1.1.3 Delete Devices

Select the devices to delete:



After completing your selection, just click on "Delete" and a message asks for confirmation:

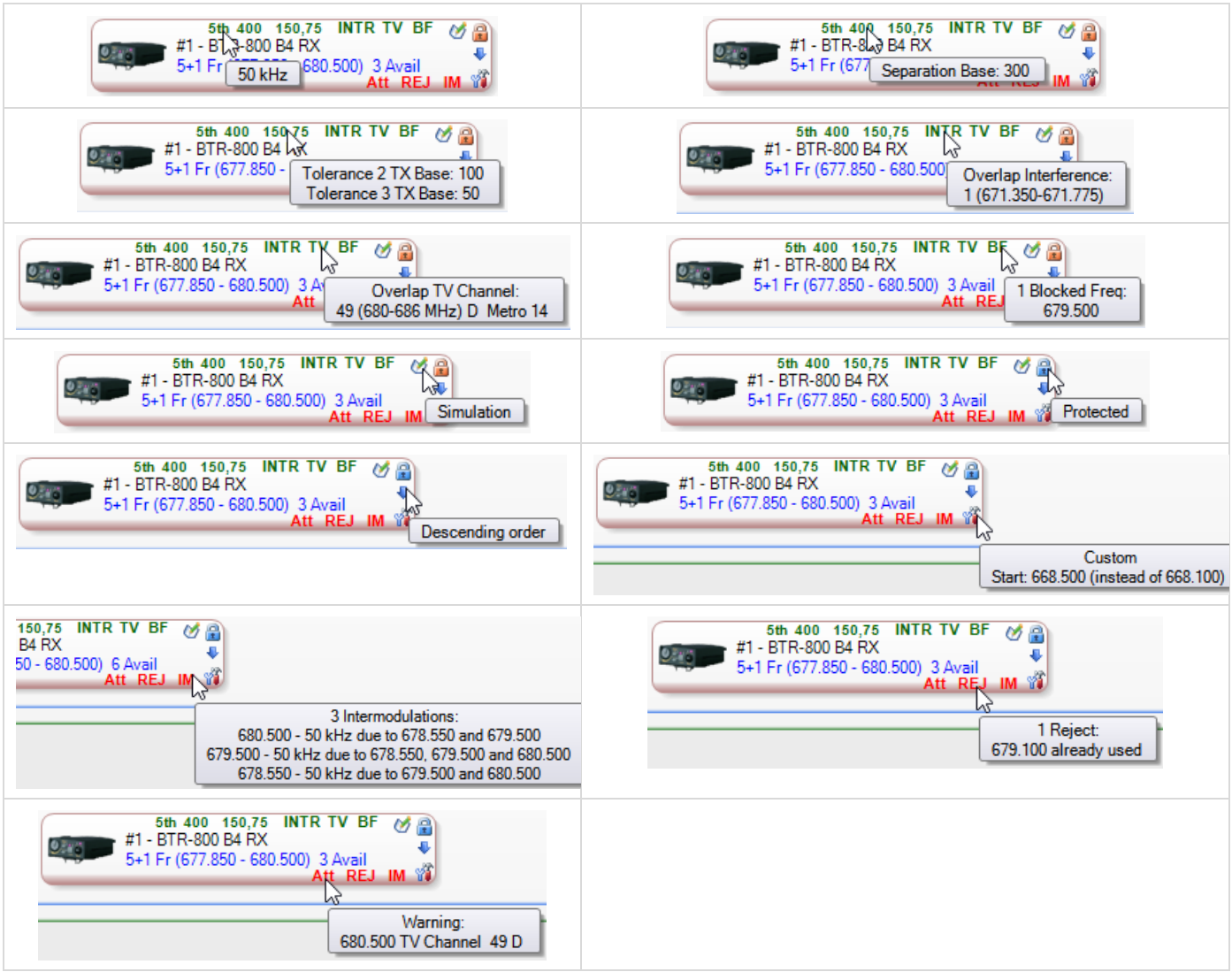


Finally, you must “Save” the changes to the EazyRF devices file.

2.1.2 Devices indicators

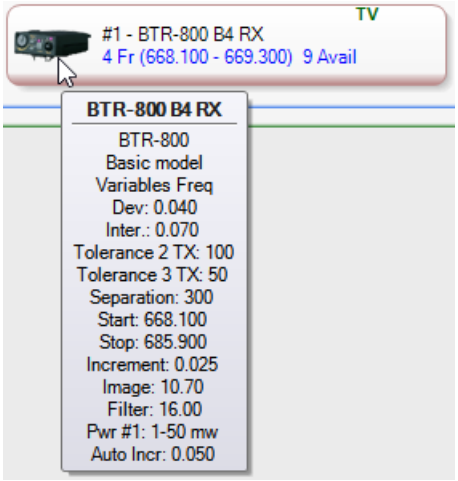
A device has several indicators:

En déplaçant le curseur de la souris au-dessus de chaque indicateur, le détail s'affiche :



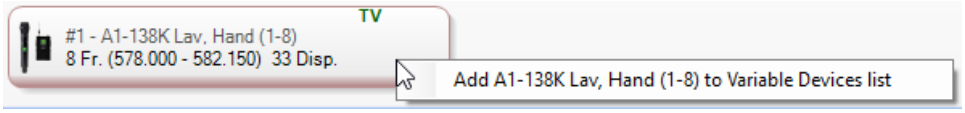
A green indicator indicates a difference of data, while red indicates an anomaly of frequencies found in the stage of the evaluation of all the frequencies.

By placing the cursor over the image of the device, all the parameters of the device are displayed:



The last parameter displayed, Auto-Increment, is a parameter calculated by EazyRF to accelerate calculations. Thus, when the increment is larger, the number of frequencies tested decreases. The value of this parameter depends on several factors, the main ones being Tolerance 2 and 3 TX.

It is possible to add a device NOT INCLUDED in the list of devices (obtained from an external file). To do this, just make a click with the RIGHT mouse button and the following menu appears:



When opening a document, if a device does not exist, its name is DISPLAYED IN GREY (as in the example). In addition, if the device is of type Fixed, the number of Available Freq does not appear, because it cannot be recalculated if the device is not part of the list of devices.

Devices "Undefined" cannot be added to a list.

This option enables the exchange of data file without exchanging the devices file.

TO BE ABLE TO USE THIS OPTION, YOUR DOCUMENT MUST HAVE BEEN SAVED WITH A COPY OF EAZYRF 3.20.120326 OR MORE. Because additional information must be saved with the document.

This option works with a Fixed or Variable unit. The menu does not appear if the file does not contain the necessary information.

2.2 Devices Groups

2.2.1 Devices Groups V1

There are two types of devices groups, the first type is the one used before version 4.55. These are created in the options module, see sections 10.7, 10.8 and 10.9 for more information.

Type 1 is actually an equivalent of a multiple selection of devices in the "Devices" pane.

2.2.2 Devices Groups V2

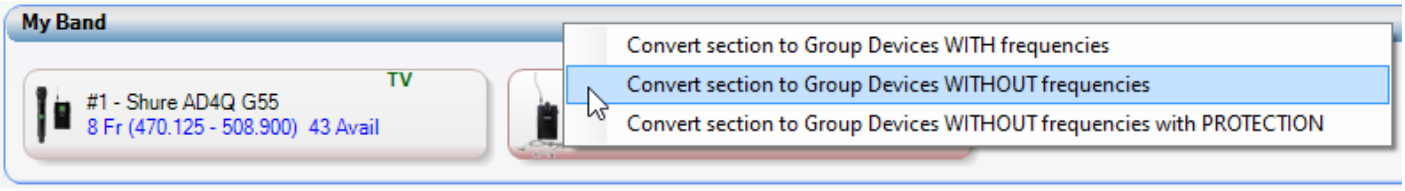
With version 4.55 of EazyRF, a new type of devices group has been developed. A type that is easier to create and more complete, with all the parameters for evaluating the devices.

To define this new type, just transform a section of devices into a group of devices. The goal is to reuse a set of devices for a group of musicians for example.

New groups are displayed in blue:

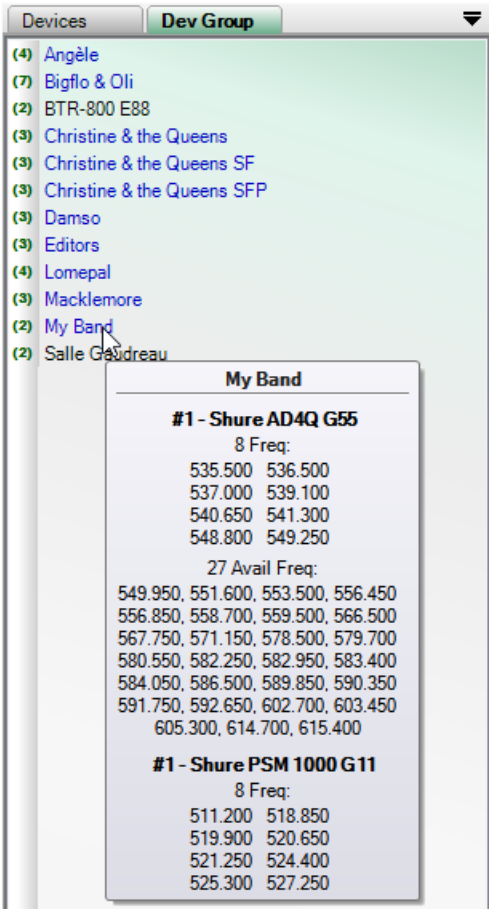
The groups of version 1 are in black.

To create a new group from a section, just click on the section header with the right mouse button:



The menu offers the choice of creating a group with the frequencies already assigned or of creating a group without assigned frequencies, with or without protection. A group without frequencies and with protection only contains the skeleton of needs.

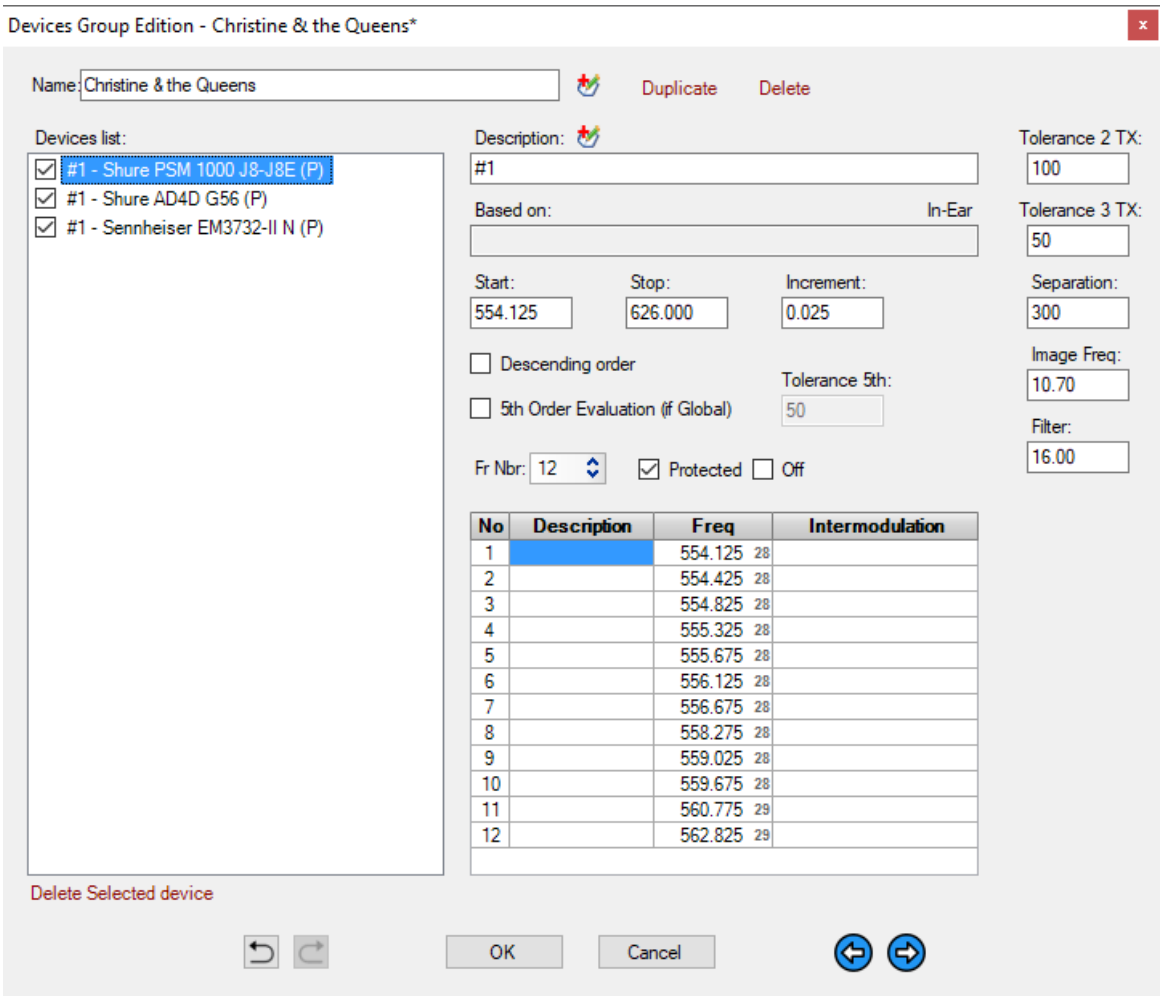
The name of the section is used as the name of device groups, this name is assigned to the section used during the drag and drop operation (only if the section does not contain any device):



The group frequency calculation preview is displayed by moving the mouse pointer over the group names, as in the device list.

EazyRF automatically saves the new group in the device groups file (GrpAppareil.grp).

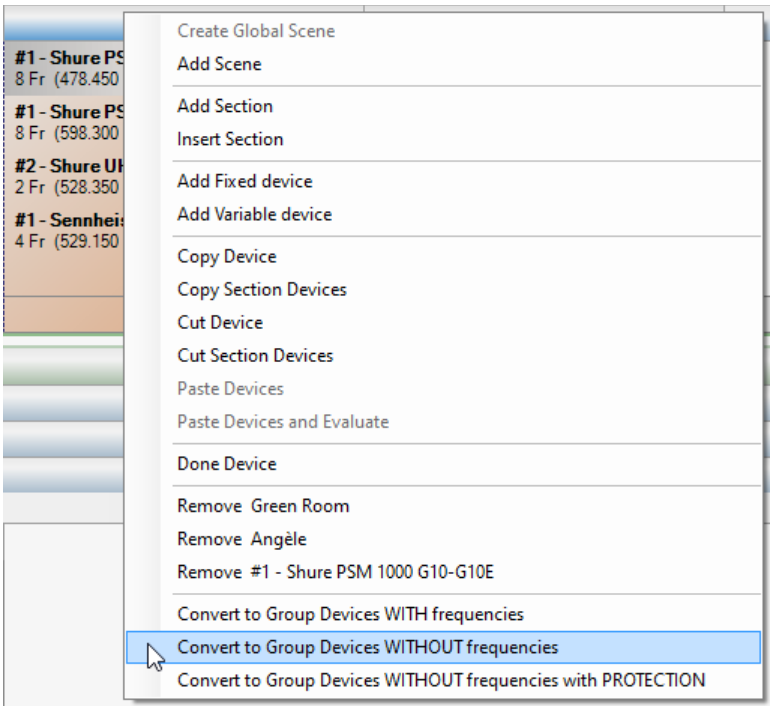
To edit a device group, just double click on the group name:



The editor allows you to modify all the evaluation parameters of each device, to duplicate the group, or to delete it. You can move to the next or previous group with the arrows at the bottom of the screen. An “Undo / Redo” system makes it possible to correct the changes made.

You can remove a device from a group, but you cannot add devices. To add devices, you have to go back to the document, make the changes and save the device group again. Why, because the goal of these new groups is to have custom devices, not devices with basic parameters.

The "Multi-Scenes" pane also allows you to create groups of devices from the sections:

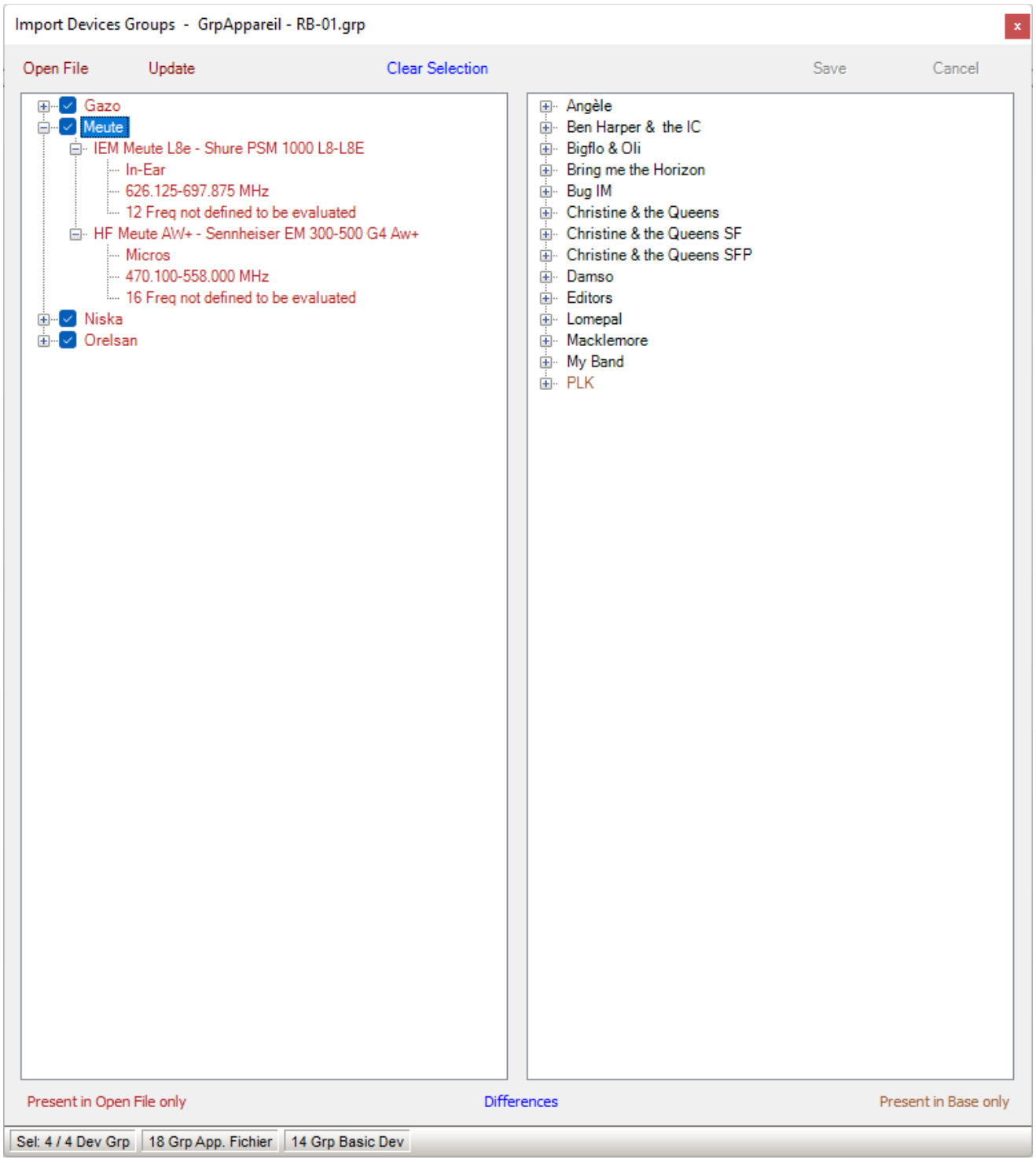


2.2.2.1 Import Devices Groups V2

With version 4.60 it is now possible to import or export parts of a devices groups file.

Simply right click on the list of devices groups to display the menu:

The “Import Groups” editor:



The operation is identical to that of the standard groups (V1), section 10.8.

To get started, just open a devices groups file (created with the Export command, next section).

The differences between the two lists are displayed with different colors. Devices groups present only in the open list are in red, devices groups present in the system list only are in brown. A group of devices present in both lists but

with differences in parameters is displayed in blue. The groups of identical devices in the two lists are not displayed in the left list for a little more clarity.

The contents of the settings can be examined by opening the device detail (+).

The devices groups of the opened file can be selected individually before performing the update. By default, when opening a file, the groups that are not in the basic list are selected.

Finally, you must end the operation with the Save command.

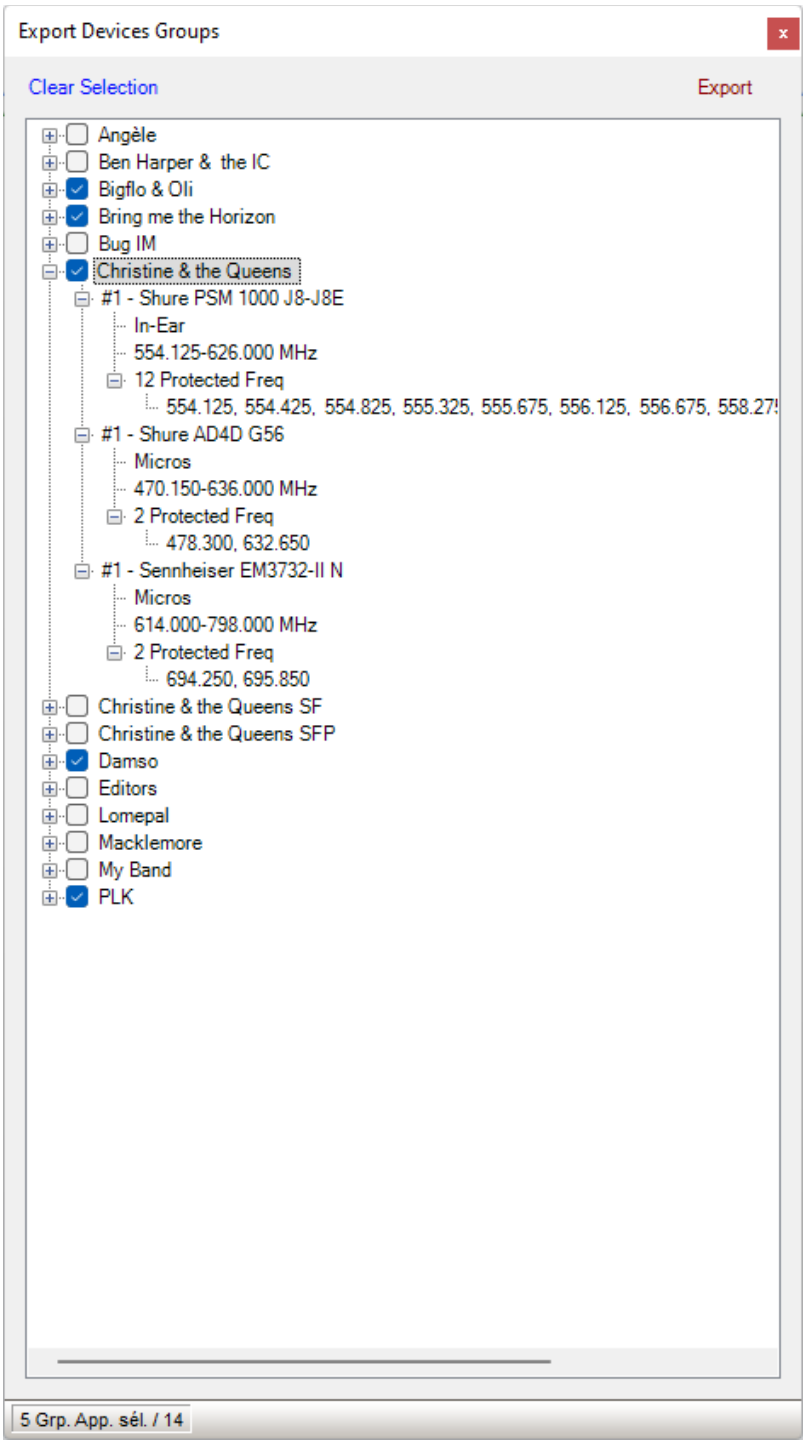
Updating can only be done from the open file to the system list, never the other way around.

2.2.2.2 Export Devices Groups V2

With version 4.60 it is now possible to import or export parts of a devices groups file.

Simply right-click on the list of device groups to display the menu:

The “Export Groups” editor:

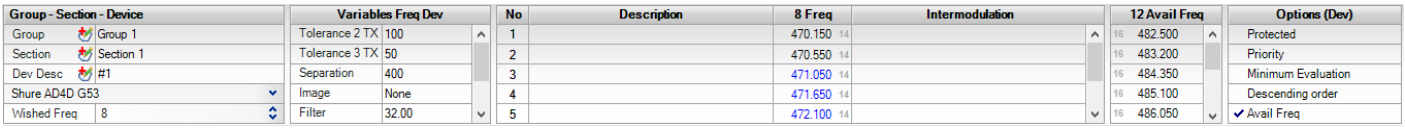


The list of system devices groups is displayed, just select the groups to export. Finally, the “Export” command saves the selected list under a group name. Note that the name “GrpAppareil.grp” is reserved for EazyRF.

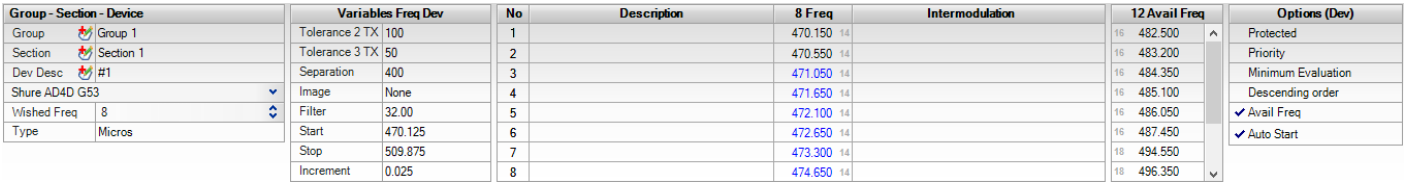
The files thus created can be imported via the “Import Groups” utility, thus facilitating the exchange of data between partners.

2.3 Details

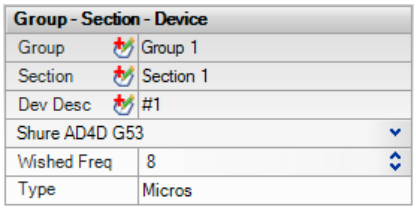
The bottom section of the Global View displays the details of the group, the section and the selected device. This section allows you to edit the parameters and frequencies:



This section may take another form if the size of the screen allows it:

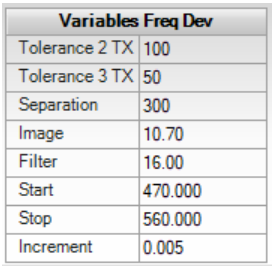


The name of the Group and the Section can be edited in this zone:



The description of the device (function) can be changed also. The desired number of frequencies can be changed with the arrows or entered directly (up to 40 frequencies per device). It is also allowed to change devices, such BTR-800 B4 RX to BTR-800 E88 RX or any other device. It is not allowed to change an "Undefined" device.

The parameters of the selected device appear in:

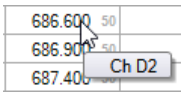


The third part of details display the frequencies:

No	Description	4 Freq	Intermodulation
1	Camera 4	470.000	
2	Camera 5	470.300 14	
3		470.700 14	
4		471.200 14	

The column Description provides a description of the use of the frequency. To auto-increment the description (it takes that it ends with a digit): select the description, press the Ctrl and Alt keys simultaneously and then extend the selection keys. To copy without incrementing, press Alt only.

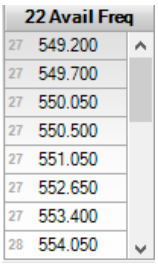
In the case of devices "Lectrosonics", they use a hexadecimal numbering number corresponding to the frequency channel, this value is displayed by moving the mouse cursor on the frequency:



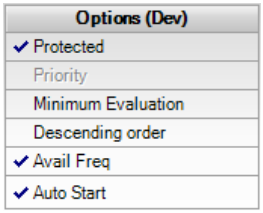
The "Intermodulation" column is not editable, it is reserved for EazyRF to display problematic results of the evaluation of each frequency.

The frequencies can be changed manually. It is allowed to drag&drop data from an Excel spreadsheet. In Excel, the data must be in columns. Text data is copied in the Description column and numeric data in the Frequency column (this can be done in all editing windows).

Available frequencies appear here:



These frequencies can be dragged onto the frequency list. the device becomes "Protected" of an automatic evaluation.



The Options section allows you to modify some evaluation parameters. The "Protected" option has already been seen. The "Priority" option allows you to place a device first and foremost in the list of evaluation. If the device is protected, it goes without saying that the assessment cannot have a priority.

The option "Minimum Evaluation" is intended for devices of type "Walkie/Talkie" which uses frequencies too close. With this option only the verification of the value of the frequency is retained in the evaluation (without evaluation of intermodulations).

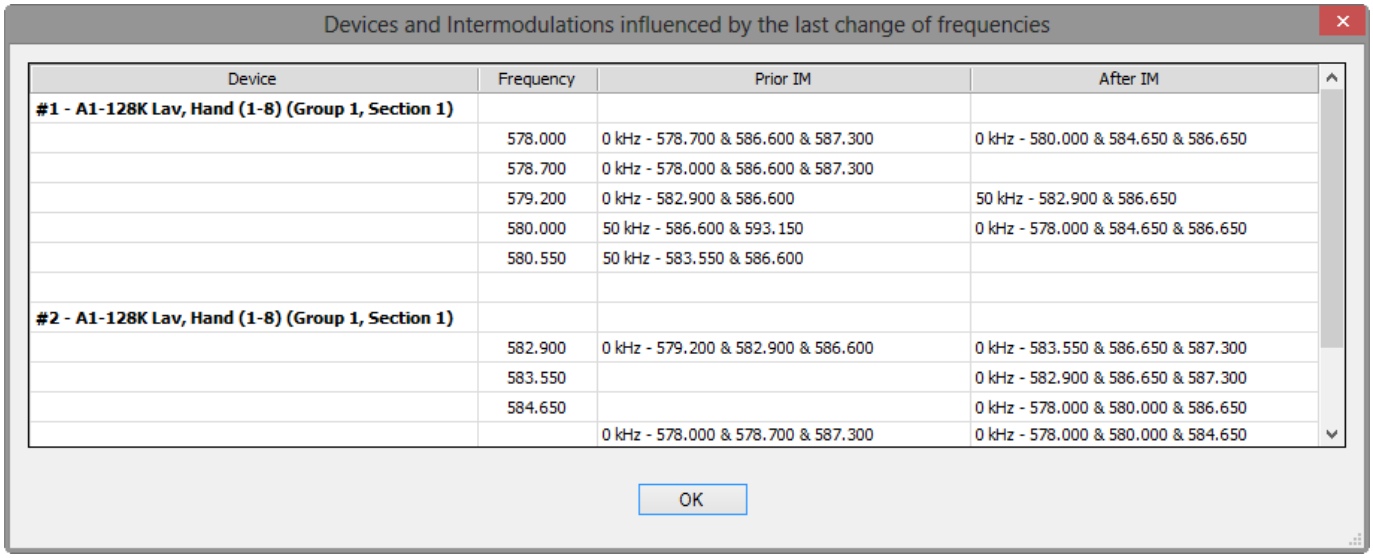
The option "Descending Order" allows to estimate the frequencies of a device from the "Stop" value down to the "Start".

The “Avail Freq” enable or disable the calculation of available frequencies if the global option is on.

The "Auto Start" option enables or disables the Auto Start function. When the Auto Start calculation is enabled, the first device different from the previous one will use a Start frequency a little further than the values found on the previous device in the evaluation order. An example:

Instead of:

When entering frequency manually, it is possible that the added value influences the existing devices. Then a window will appear to indicate that this data will influence "Intermodulations" on some devices:



2.4 Evaluation parameters

Variables Freq Dev	
Tolerance 2 TX	100
Tolerance 3 TX	50
Separation	300
Image	10.70
Filter	16.00
Start	470.000
Stop	560.000
Increment	0.005

2.4.1 Tolerance 2 TX

A 2 TX intermodulation is the one created by two carriers, the strongest of the intermodulations.

The 2 TX Tolerance is the value beyond which all the 2 TX intermodulations are accepted. The default value is 100 kHz on each side of the carrier.

The value 0 allows to accept all the 2 TX intermodulations, thus deactivate the 2 TX calculations.

2.4.2 Tolerance 3 TX

A 3 TX intermodulation is an intermodulation created by three carriers, less strong than the 2 TX, but equally important.

The 3 TX Tolerance is the value beyond which all the 3 TX intermodulations are accepted. The default value is 50 kHz on each side of the carrier.

The value 0 allows to accept all the 3 TX intermodulations, thus deactivate the 3 TX calculations.

For the intermodulations, there are no limits in theory, but only the odd are significant (except 2 TX). The more the number of TX is raised (brought up) (5 TX, 7 TX, etc.), the less the intensity is important and becomes not significant (5 TX can become annoying occasionally).

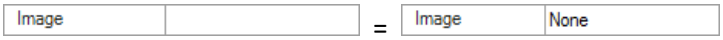
The 5 TX Tolerance default value is 50 kHz and is editable only in the devices editor (section 2.7).

2.4.3 Separation

The separation is the minimal value between two frequencies, 300 kHz by default.

2.4.4 Image Frequency

The Image frequency is an old phenomenon of the analog world when two frequencies were separated by 10.7 MHz (default value), both receivers decode the same signal. With the digital world, this value can be null. If it remains active, it does not matter, the result of calculations will be a little bit different, but that does not really change the number of possible frequencies in a given area. Just erase the value to disable it :



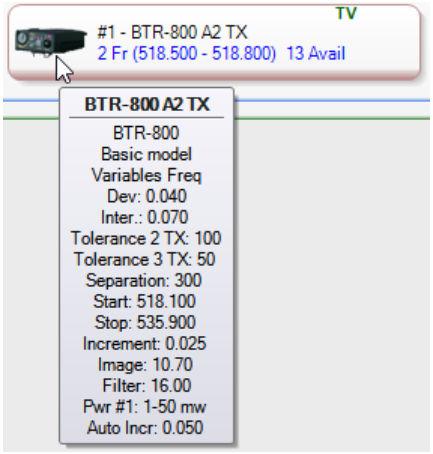
2.4.5 Filter

The value used to determine the gap between the frequencies to consider during the calculation of the intermodulations (16 MHz by default). Thus for a carrier set to 500 MHz, all the frequencies between 484 MHz and 516 MHz will be used for the calculation of intermodulations. Any device has an electronic filter in the amplification circuit of the signal received by the antenna to limit the interferences. This value can be found in service manuals, but 16 MHz constitute a good value. For In-Ear, increasing this value can help if the RF environment is very loaded.

2.4.6 Start, Stop and Increment

With Variable Devices, there is a frequency range available to program the device. For example, the transmitter of a BTR-800 A2 operates between the frequencies 518.100 and 535.900 by step of 25 kHz. So the fields Start, Stop and Increment are used to define these data.

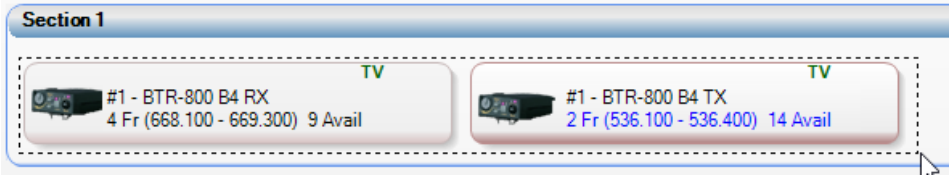
The BTR-800 has a possibility of 712 frequencies. EazyRF uses an algorithm to accelerate the calculations. A value of increment is fitted to the parameters of evaluation and is called Auto-Increment. For example, the increment value of a BTR is 25 kHz, the auto-increment is set to 50 kHz (depending of others parameters). The value can be seen with the device detail:



For Fixed devices, these parameters don't exist.

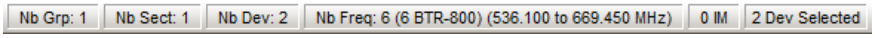
2.5 Selection

It is possible to select multiple devices simultaneously in two ways. The first method uses the CTRL + click a device button. The second method is to click on the unoccupied end of a section or group, keep the mouse button pressed and extend the selection:



When there is more than one device selected, the illustrated description corresponds to the button which is the clearest (in this case, the BTR-800 B4 TX):

The status line shows the number of selected devices (in addition to providing information on the document):



With a multiple selection, some parameters can be changed simultaneously: Tolerance, Separation, the Image Frequency and Filter. The value of Start, Stop or Increment will change only for the highlighted device.

It is allowed to click one of the devices selected without losing its selection (allows to bring individual modifications). To end a multiple selection, click an unselected device, or the bottom of a section or a group.

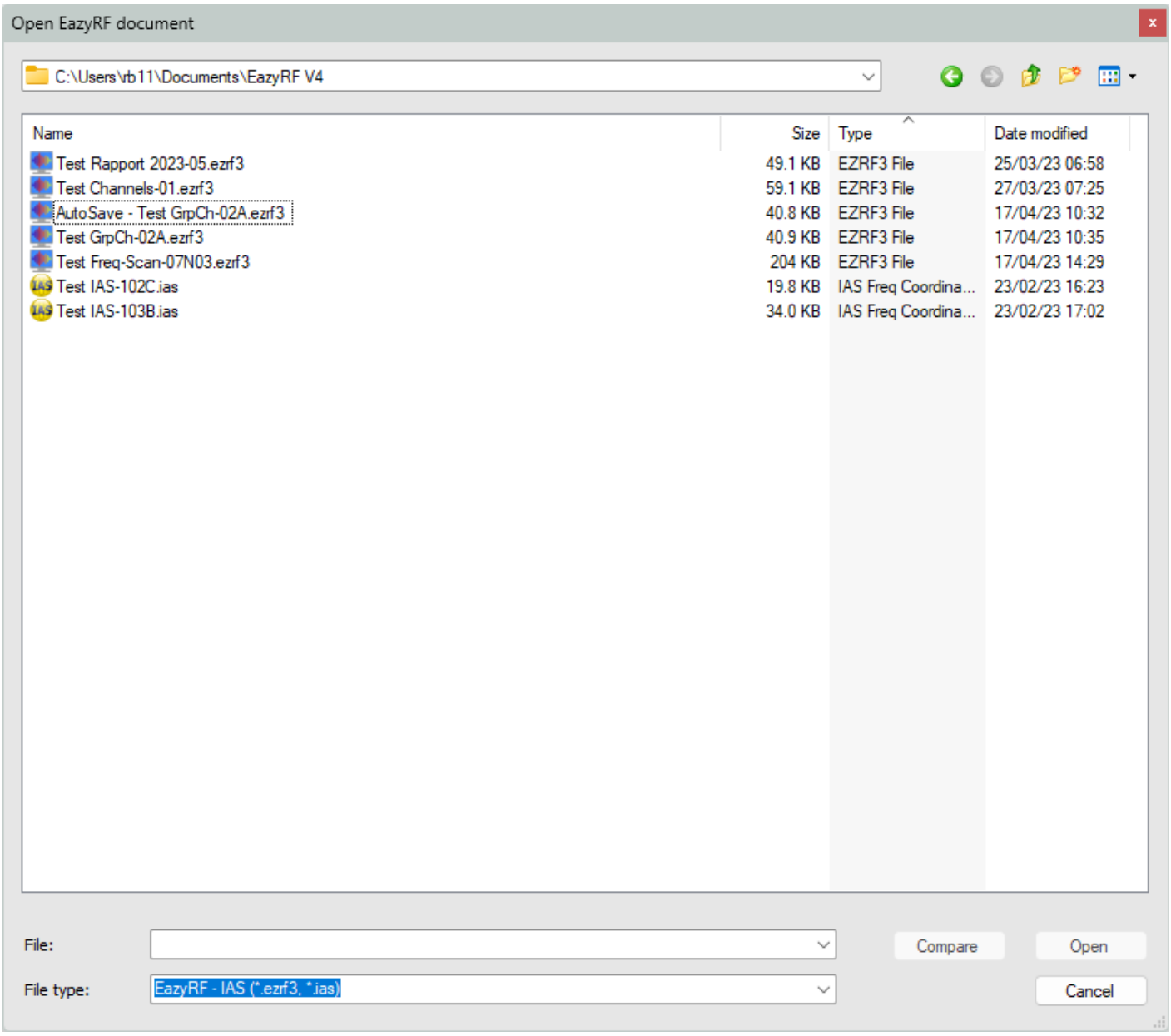
2.6 Toolbar

2.6.1 File management

The toolbar EazyRF is divided into some sections. At first the management of files:

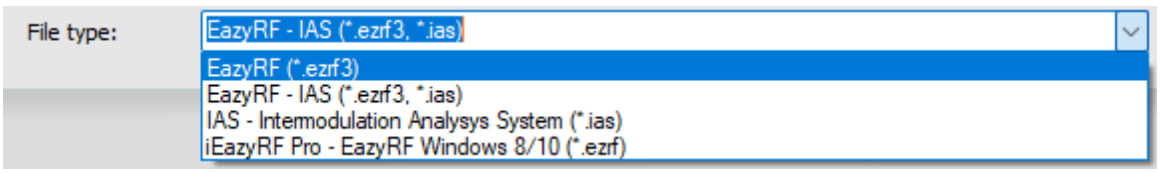
The first item allows to create a new document (if the current document has been modified, a confirmation is required before replacing it). All documents have the ezrf3 extension and are related to EazyRF during installation (so that double-clicking the file name in Explorer launches EazyRF with the document).

The 2nd and 3rd item allow you to open a document. The second item displays the window opening a document:

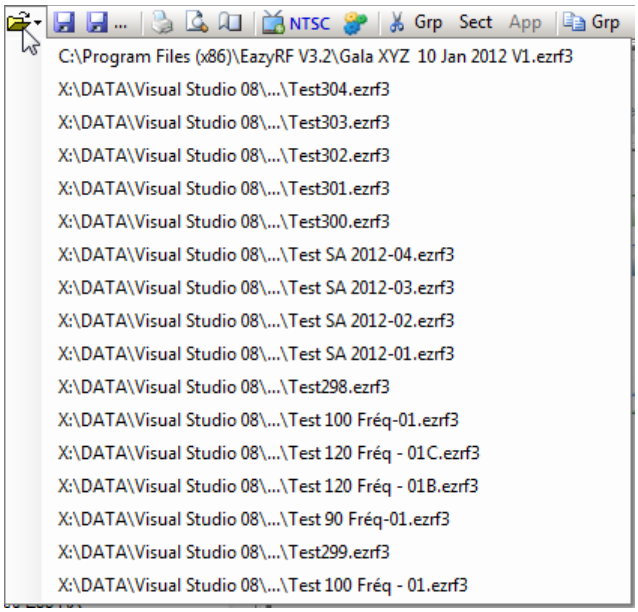


The selected folder is saved for later use. The window size can be changed as well as the column width or display documents method. All these settings are retained.

The File Type option opens documents created by IAS, iOS (iEazyRF Pro) or by the touch screen version of Windows (EazyRF):



The third item displays a list of recently opened documents. Just leave the cursor on the icon and the list appears:

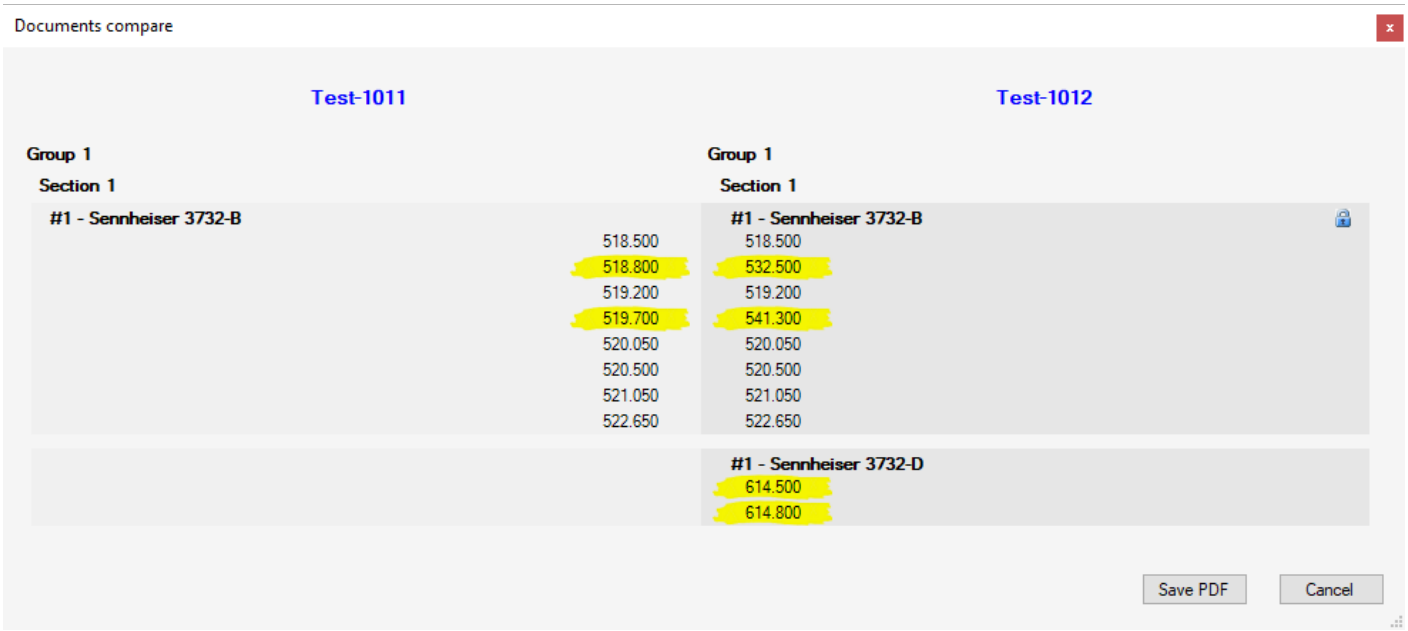


In the opening of a file created with the global television channels, if the current global channels and those saved with the document differ, they are converted into local channels automatically (a warning will be display).

Finally, the 4th and 5th item allow you to save a document. The 4th save on the same name and the 5th display the save window (very similar to the window of opening of a document).

The file manager makes it possible to compare two documents in order to display the differences between the two versions with the "Compare" command:

The selected file is compared to the already opened file, which gives for example:

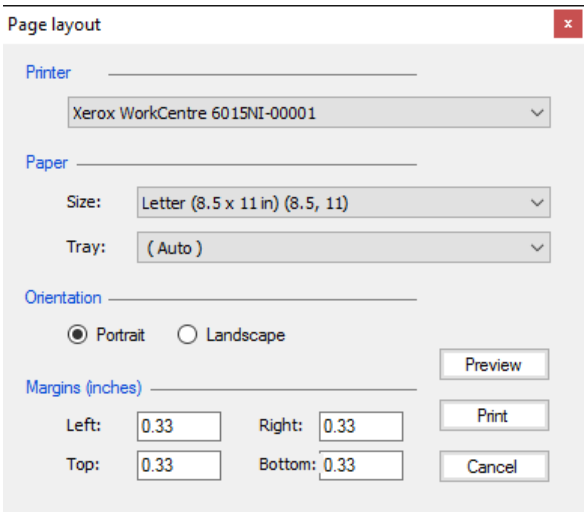


The result of the comparison can be saved in PDF format with the command "Save. PDF ».

2.6.2 Printing

The second section of the toolbar allows you to manage printing and page layout:

The second item can preview before printing. The third item shows the page layout:

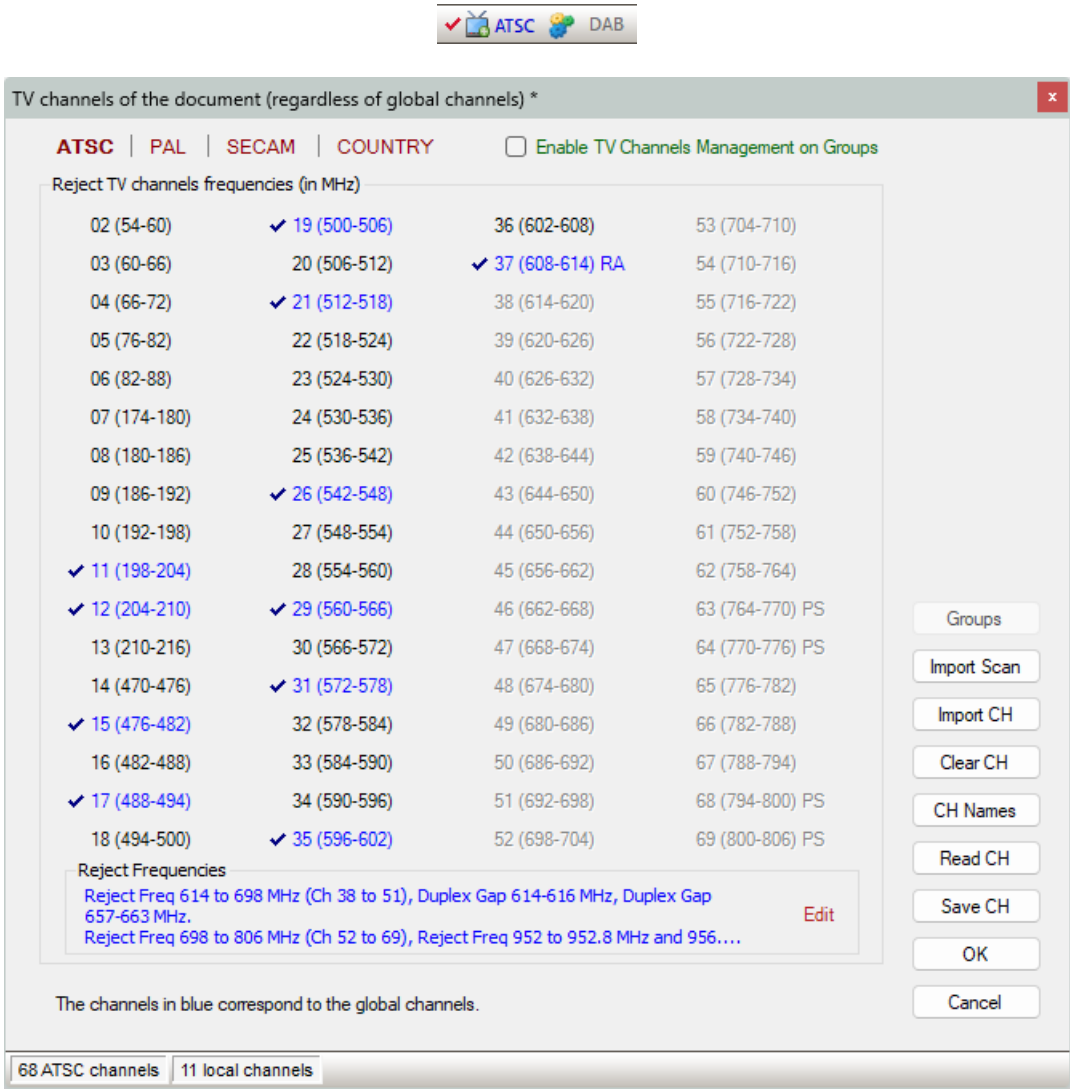


N.B. 1 inch = 2.54 cm

Finally, the last option allows you to create and manage the presentation of a report for a client, see section 2.8.

2.6.3 Document TV channels

The third section of the toolbar allows you to manage television channels and evaluation parameters of the document:



Global channels are those defined in "Options/TV Channels" and are normally set for his hometown. Local channels are assigned according to each locality. It is best to save each file under the name of the city, it will be more useful in the pane "On Tour", Chapter 7.

2.6.3.1 Video Standard

It is allowed to change standard TV even if it is not the same as global. To change the standard, simply click on one of the items:

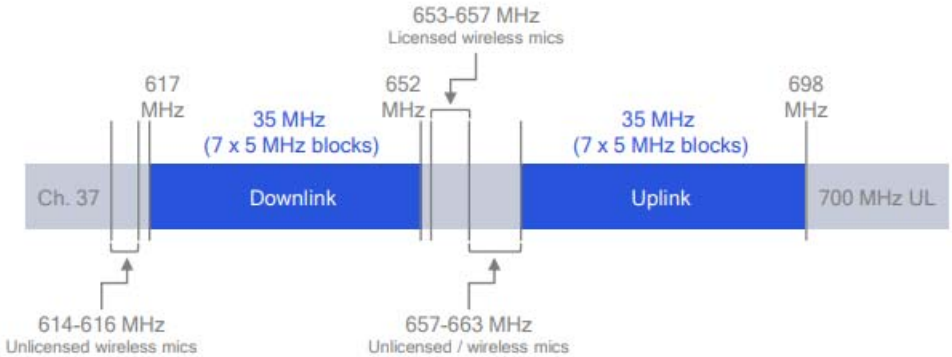
Some countries use one of the three video standards, but with different configurations, see section 2.6.4.

The toolbar displays the selected format:

The red color indicates that the video standard is different from the standard defined globally (otherwise it is blue). The hook indicates a local definition.

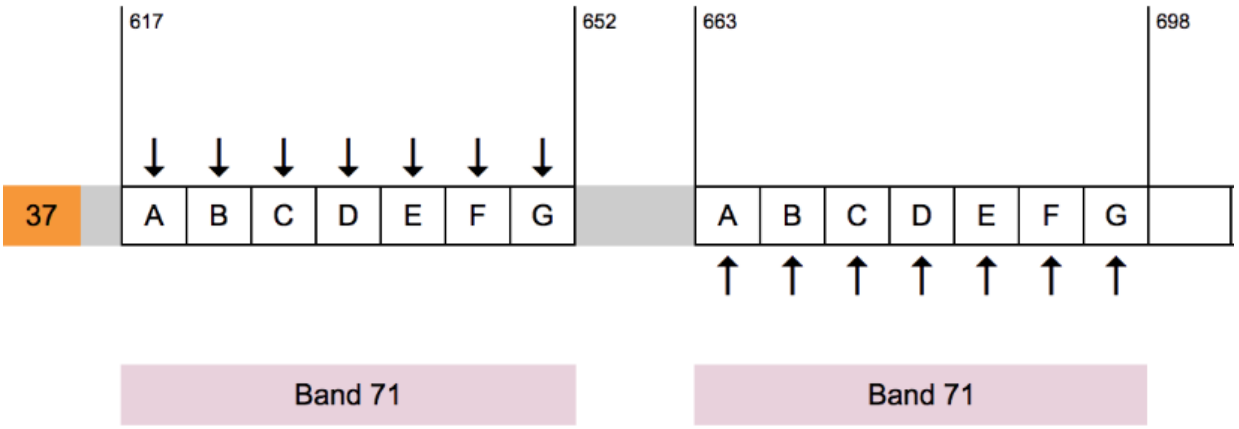
2.6.3.2 North America Frequency Rejection Zone

In North America, the 600 MHz frequency band has moved from the allocation of digital television channels (Ch 38 to 51) to those of 5G LTE cellular telephony. Here is the attribution:



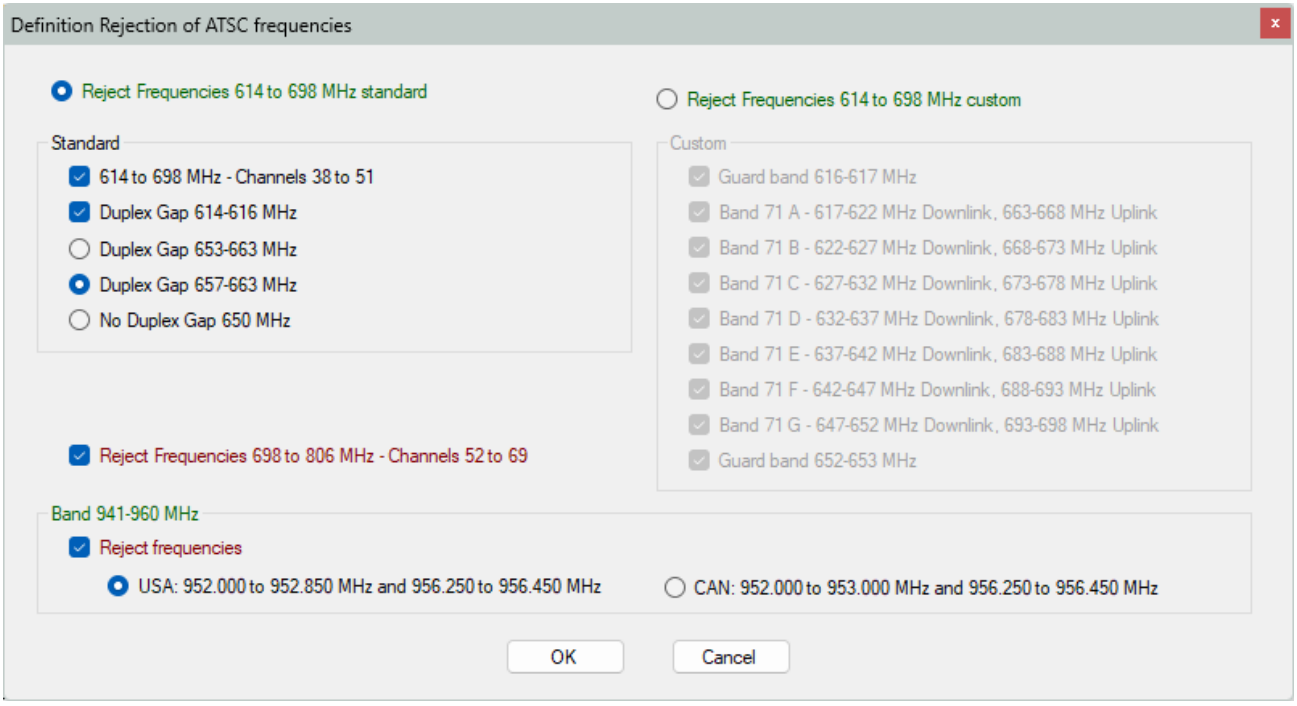
600 MHz Spectrum

The “Downlink” and “Uplink” zones are called band 71 in the cellular world. These two areas are separated into 7 blocks of 5 MHz:



The FCC which manages the allocation of frequencies in the United States allows the use of the 5 MHz blocks in the 71 band (downlink and uplink are paired) when they are free in some regions.

Just click on “Edit” to call up the rejection zone editor:



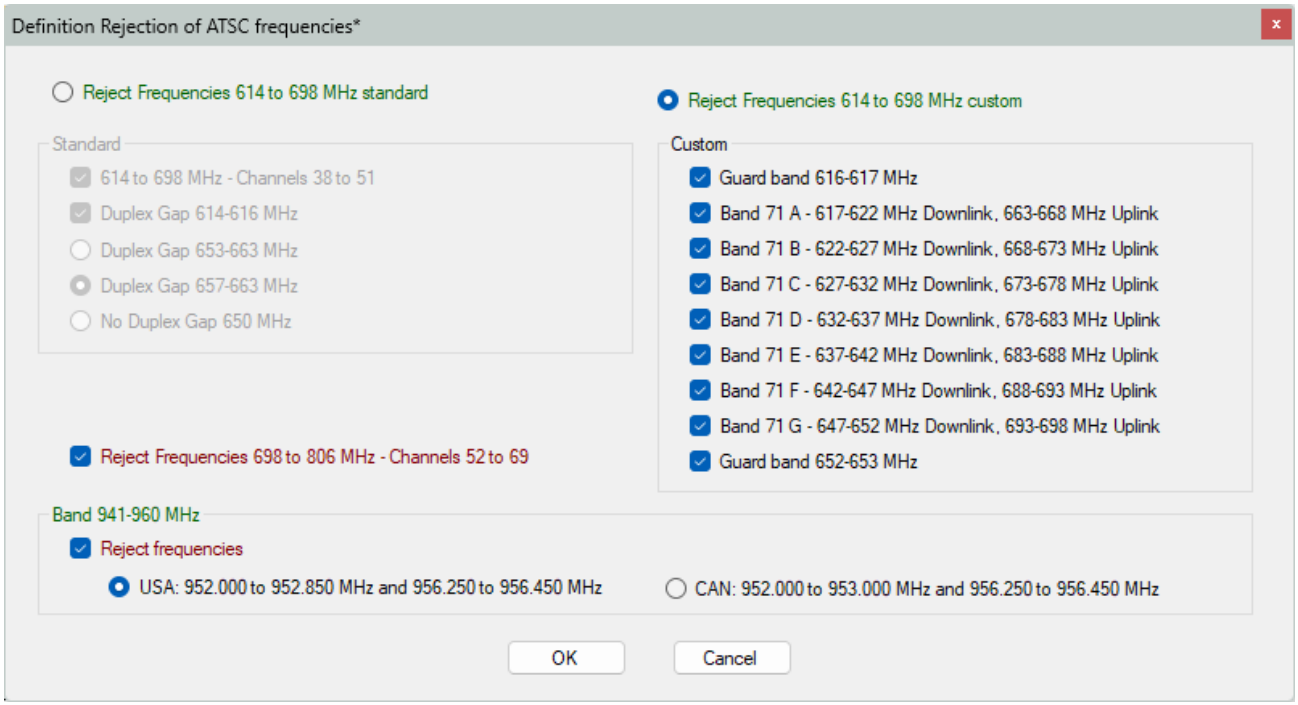
The editor is separated into two parts, the left part allows you to manage the 614 to 698 MHz band. The part on the right is used to manage the allocation of frequency blocks to be used according to the authorizations granted by the FCC.

The “Reject 614 to 698 MHz Frequencies standard” or “Reject 614 to 698 MHz Frequencies custom” selector is used to define the desired use.

Note that the 698 to 806 MHz rejection zone remains active in the two management modes of the 614 to 698 MHz zone.

The “Reject frequencies” selector of the 941-960 Mhz frequency band allows you to exclude frequencies that are not permitted in this region according to the American or Canadian format.

Let's take a closer look at the custom mode:



The downlink and uplink blocks work together, impossible to use them individually.

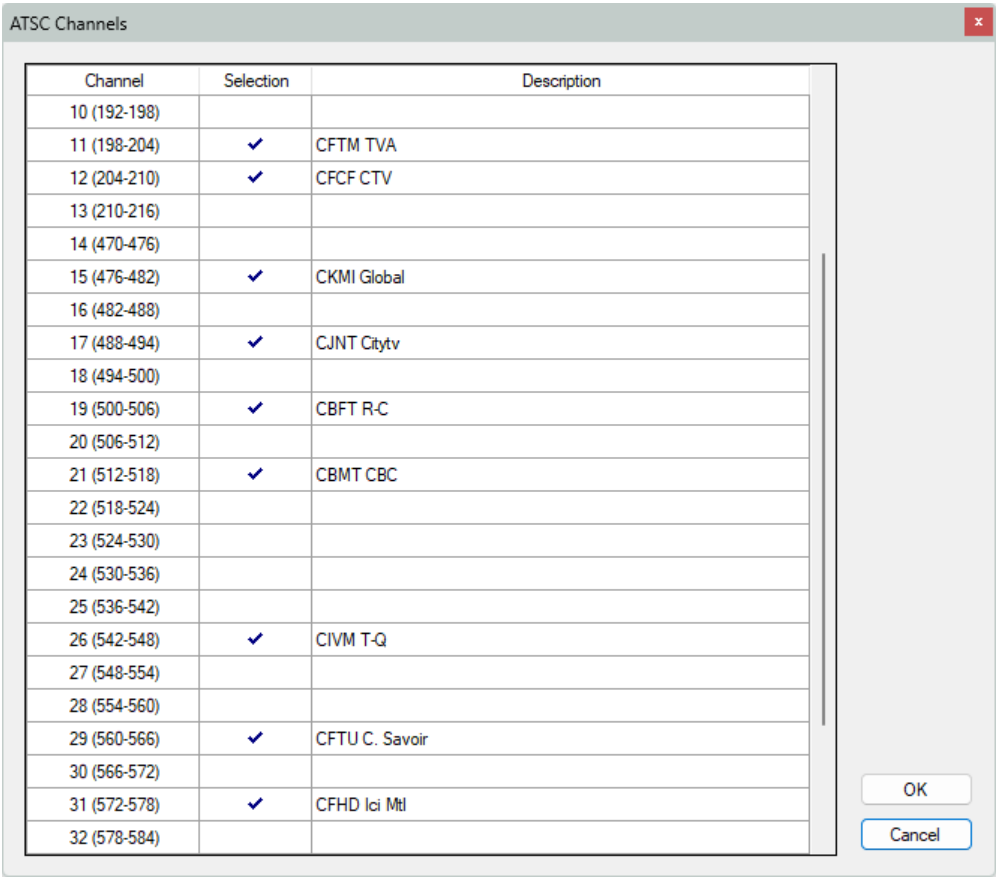
2.6.3.3 Frequency rejection zone in Europe

Much simpler than in North America.

Each rejection zone has one or more exclusion zones, i.e., zones where the use of frequencies is permitted.

2.6.3.4 Channels name

The "CH Names" window allows you to define the name of each channel:

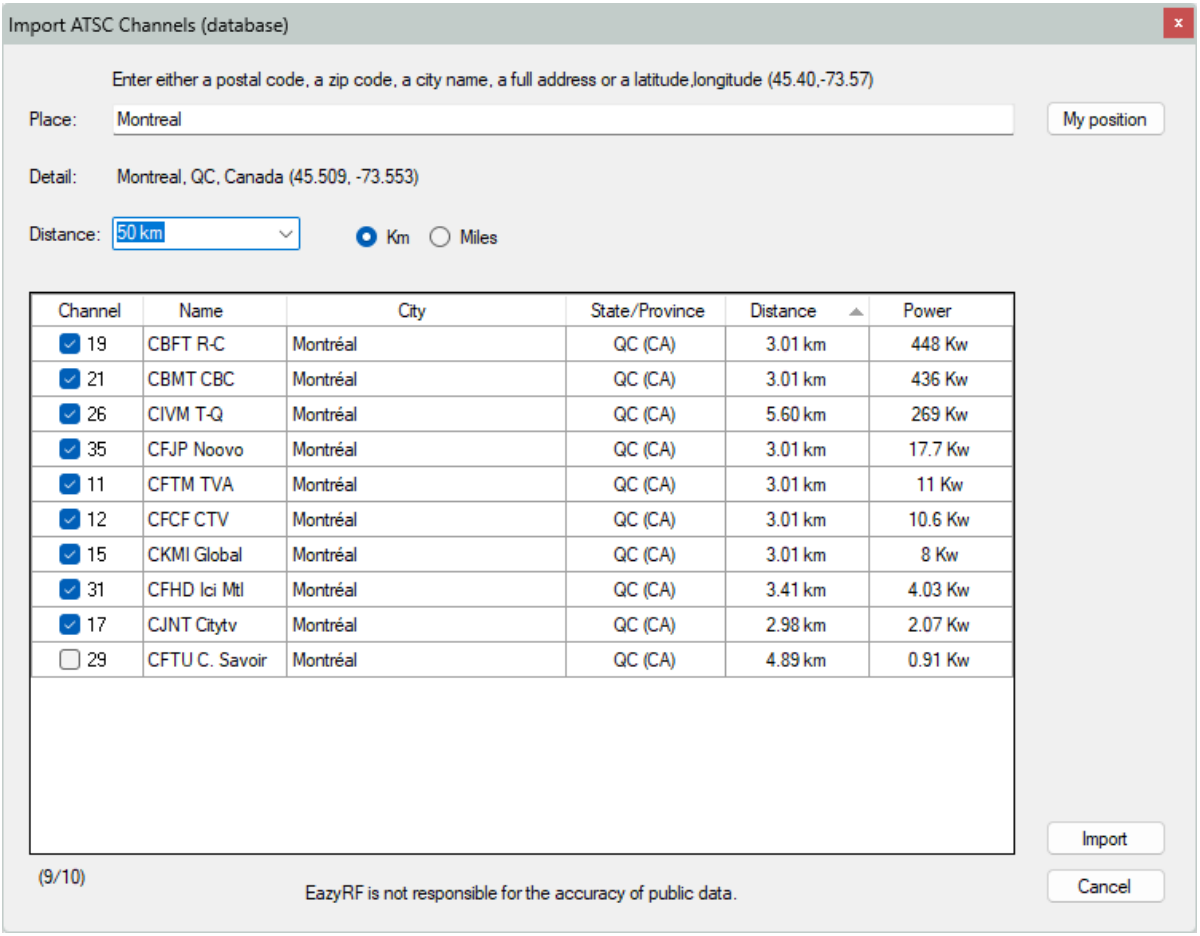


2.6.3.5 Clear, Read and Save Channels

The "Clear CH" button removes all selected CH. Finally, Read and Save CH buttons allow you to save and retrieve corresponding cities. The selection is confirmed by the "OK" button.

2.6.3.6 Channels Import

You can also import TV channels from public databases for a specific location with the command “Import CH”:



Just type a location data as a postal code, a zip code, a city name, a full address, or GPS data, or latitude-longitude in the format: 54.75, -123.01 (degrees minutes must be in decimal).

The regions covered for ATSC are Canada, the US and the border area with Mexico. For SECAM, coverage includes France and its border regions.

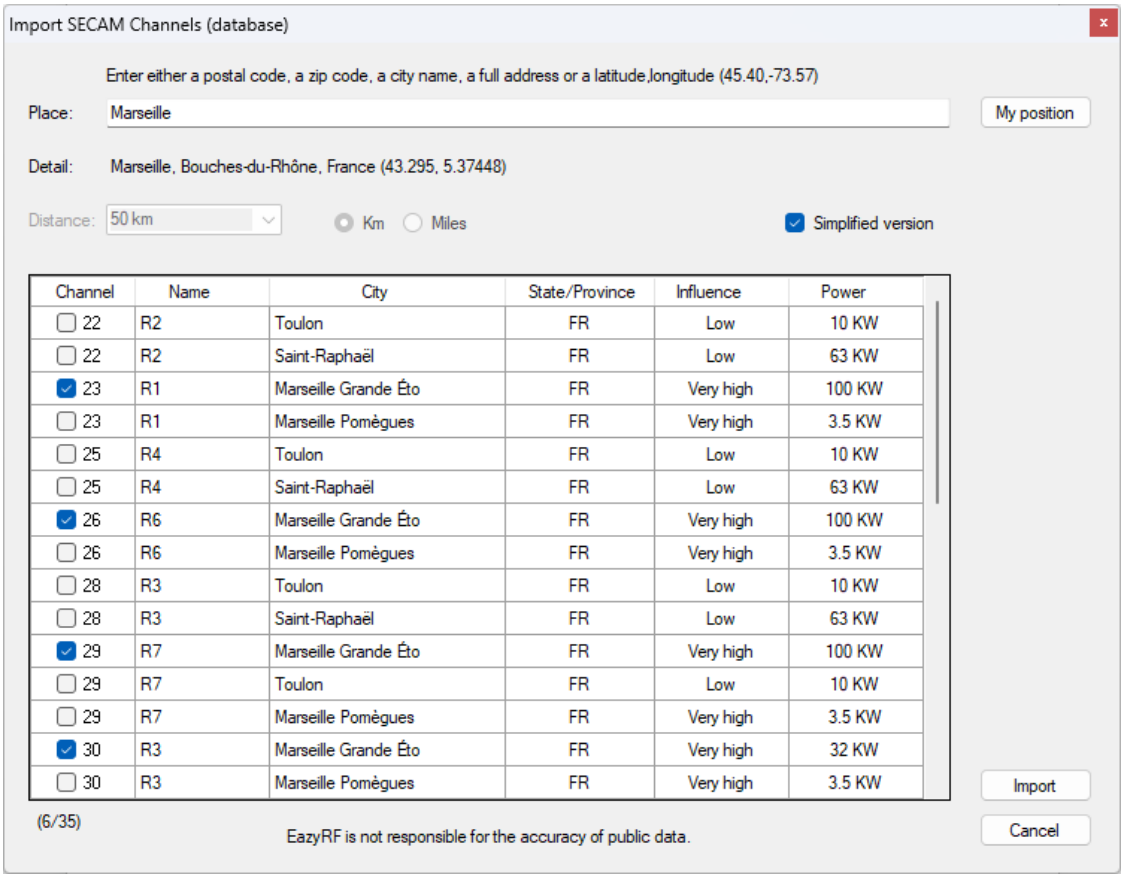
The list displayed depends on the selected distance, between 50 and 200 km. The selected channels vary depending on the combination of distance and power. This suggestion is not foolproof, only the scanner can be reliable. Some channels are allocated but not used, attention to NEWDT or HDTV channels. Only digital channels are shown.

Distances can be displayed in kilometers or miles.

The choice of the desired measurement system and the default distance can be done in Options/General/Startup (see section 9.3).

EazyRF 4.61 and more has a simplified version of the import of SECAM channels in order to better orient the choice of channels offered (the number of channels is much higher in France).

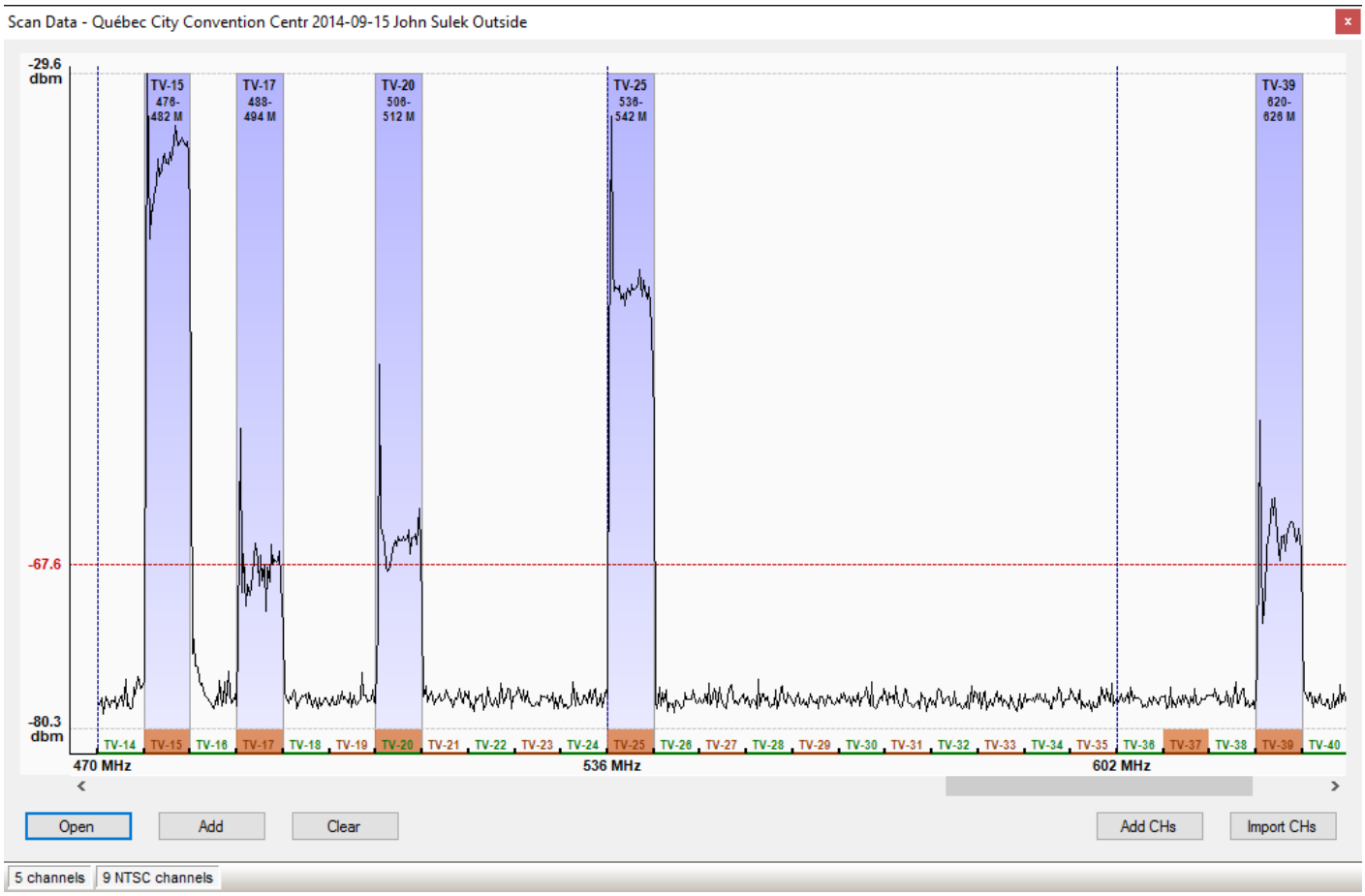
The simplified display is accessible via the “Simplified version” option:



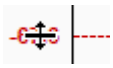
A combined rating of distance and power was estimated to create a new “Influence” data, with the results: Very High, High, Medium, or Low.

2.6.3.7 Import scans

The “Import Scan” command read a file created from a frequency scanner format – 35s, dat, csv, rfe, spa, trc):



The red line is the detection level for a TV channel (if the cumulative width exceeds 40%). This level can be changed by dragging the text value:



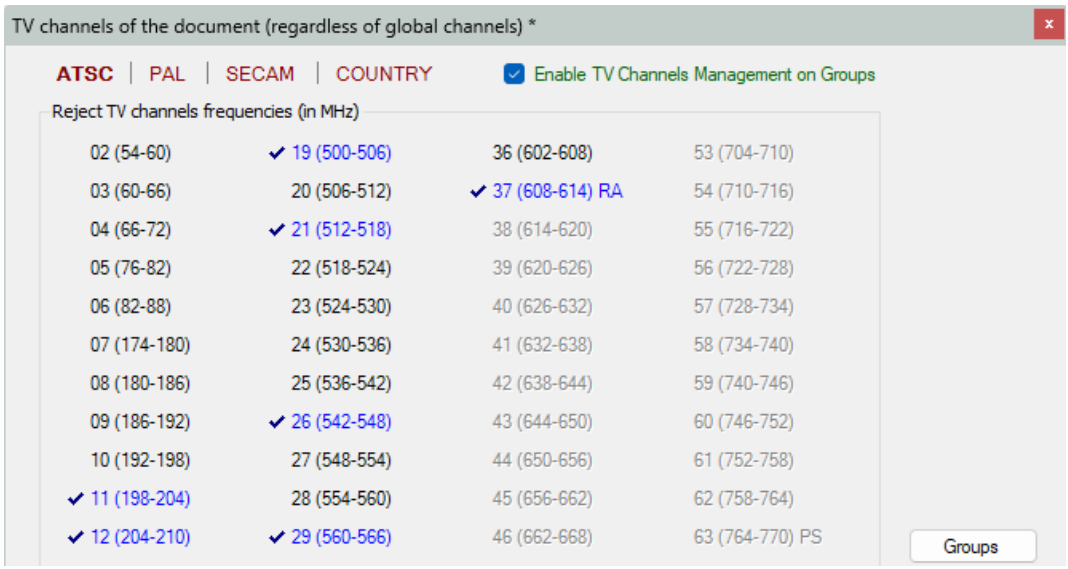
A channel can be activated / deactivated with a click of the mouse. The selected channels of the document appear in orange. Detected channels are independent of the channels in the document. Selection is not automatic because sampling does not necessarily cover the entire range.

The scans files are global, so they are shared with the Intermodulations - Scans module. The data is saved with the document, so if they are no longer useful, it would be better to delete them.

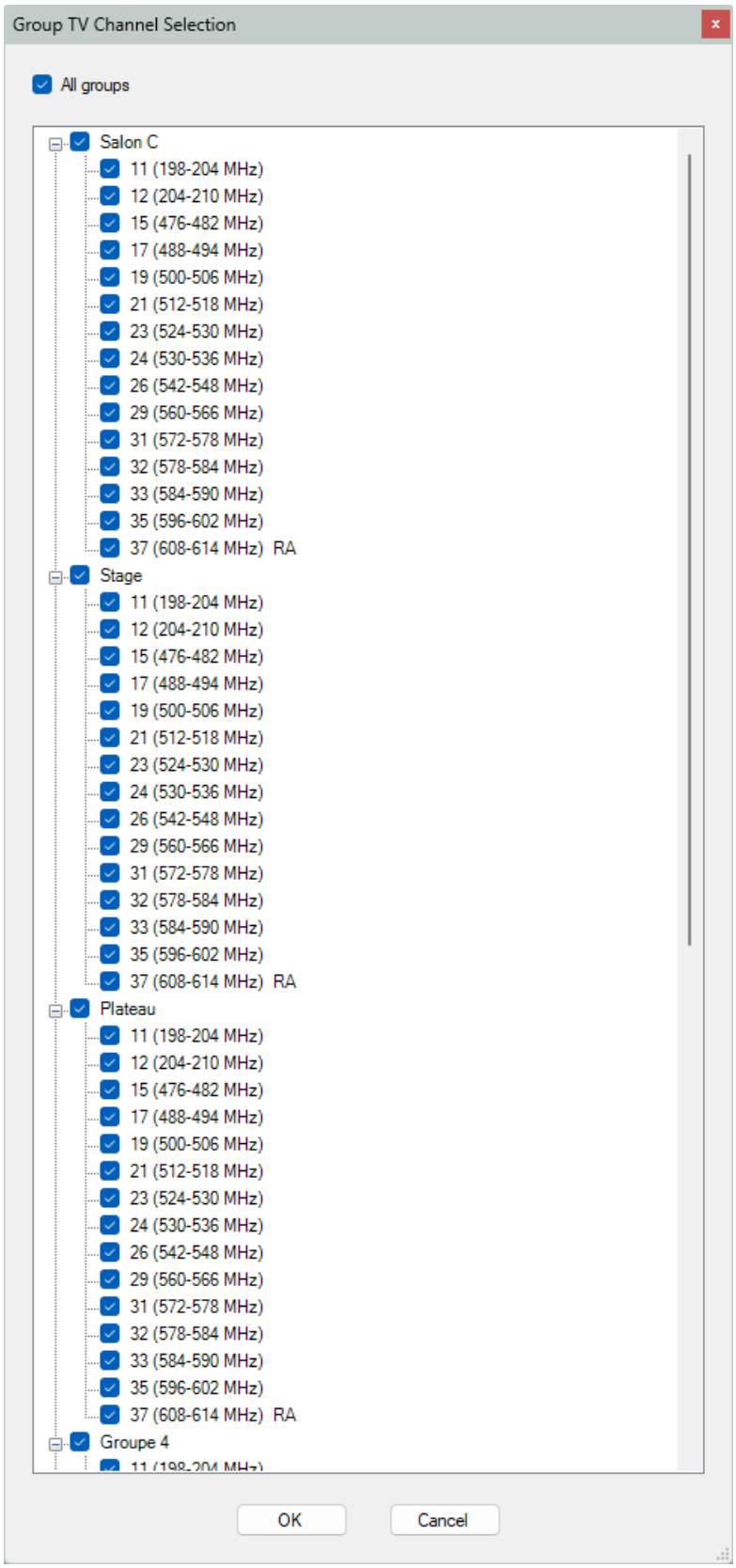
The selection can be imported to the active list (deleting old ones) or added to the list.

2.6.3.8 Management of TV channels on groups

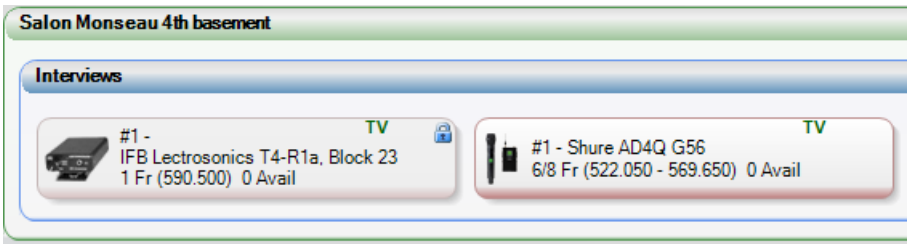
Locally defined TV channels are attached to the current document. The “Enable TV Channels Management on Groups” command:



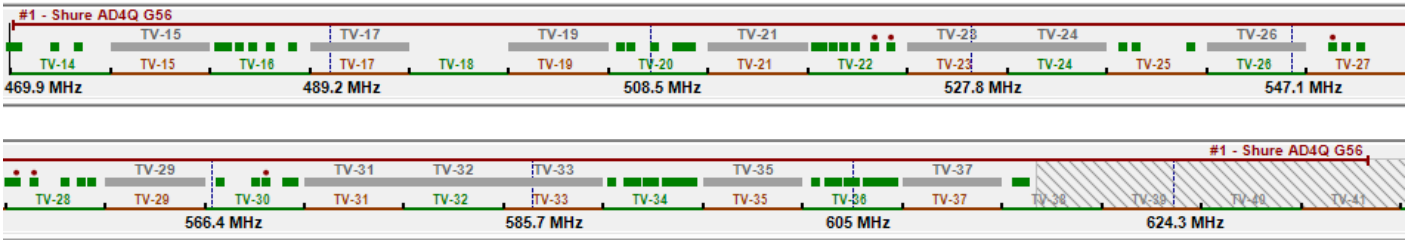
Allows you to copy the list of active channels from the document to groups for independent management. The “Groups” button calls the manager:



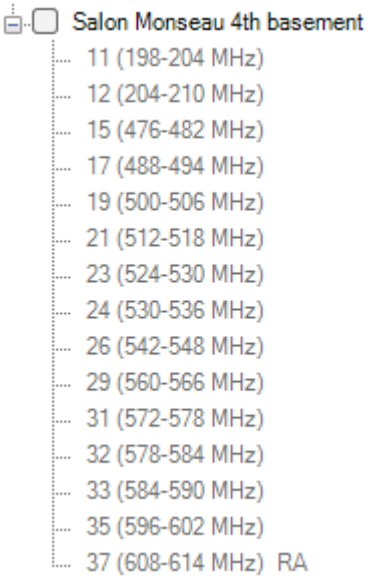
You can activate / deactivate each TV channel on each group. Let's take a simple example, on this event, we have a simple installation in the 4th basement of a theater for interviews during the exit of the artists after the make-up.



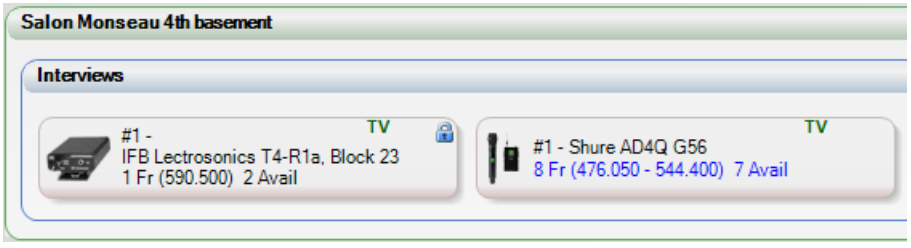
8 frequencies are needed for the AD4Q G54 device, but only 6 are available. If we look at the spectrum:



TV channels occupy a large place in the range. In the 4th basement, the signal from most TV channels is negligible. If all the channels of the group are freed:

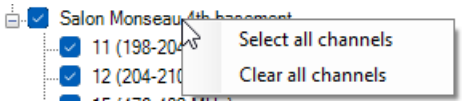


We easily obtain the number of desired frequencies and even more:

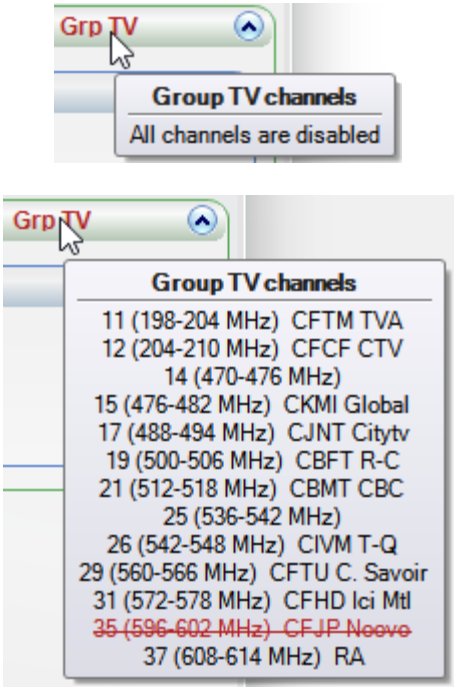


We could also have obtained a satisfactory result by deactivating the weakest channels only.

In the group channel manager, you can call up a menu with the right mouse button by clicking on the name of the group to select or not all the channels:



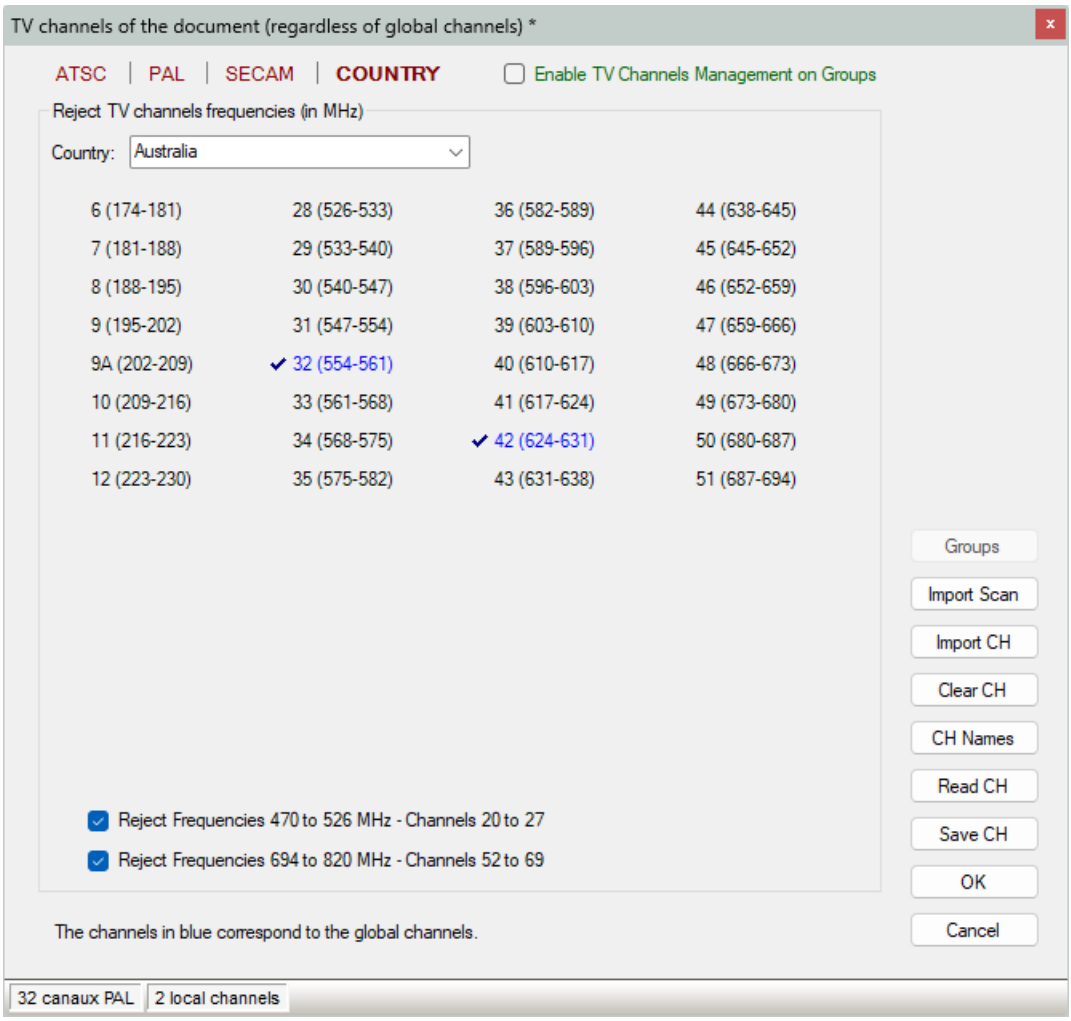
The groups header displays an indicator when the TV on groups channel manager is used, it is in green to indicate that there is no change compared to the channel list of the document and in red when there is:



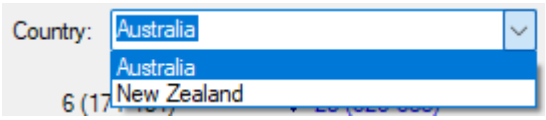
2.6.4 Modified video standard country

Some countries have adapted a video standard by changing the bandwidth of a channel from 8 MHz to 7 MHz for example and by changing the allocation of channel numbers.

The management of basic EazyRF video standards does not allow this type of change. So, a new method has been added to manage this situation, a COUNTRY section has been added to the TV channel management module:

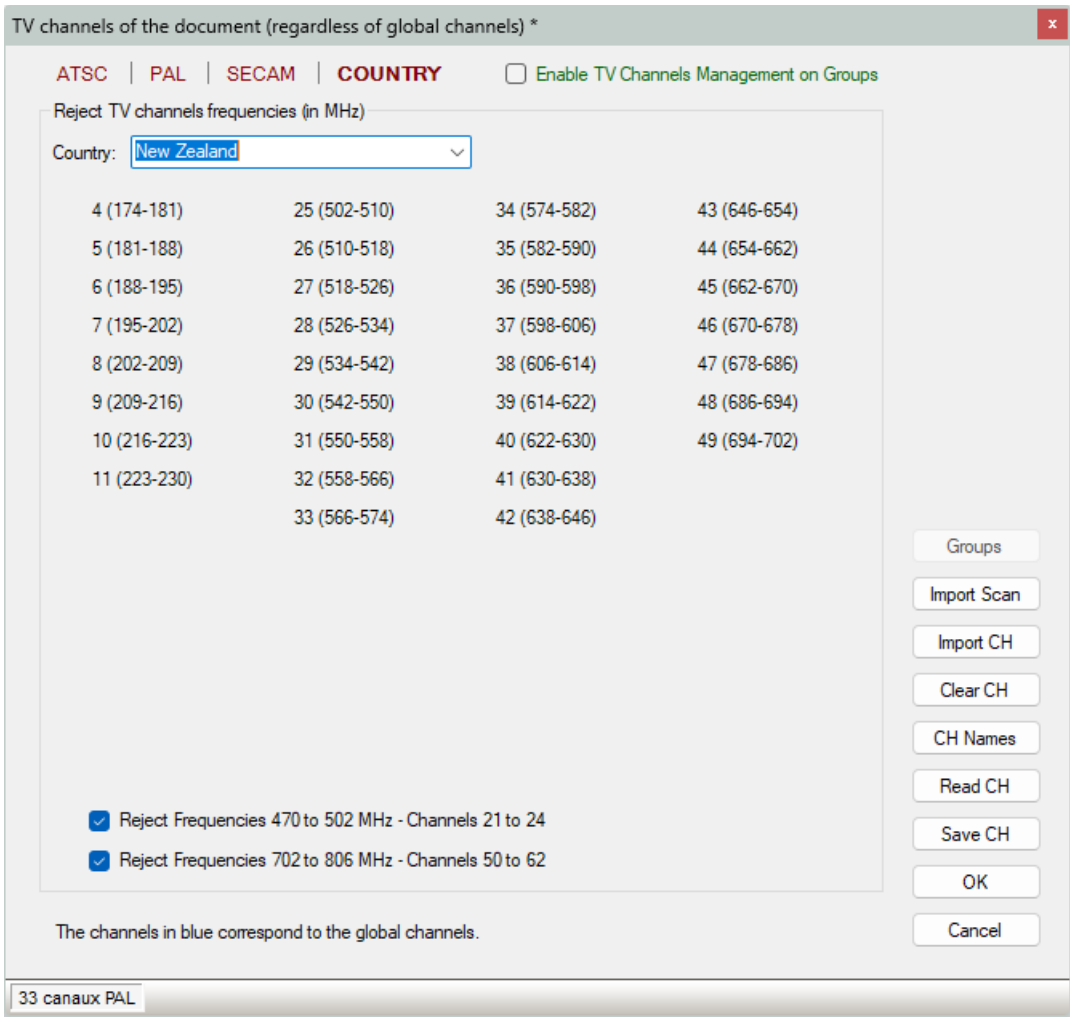


You can thus select the configuration of a country:

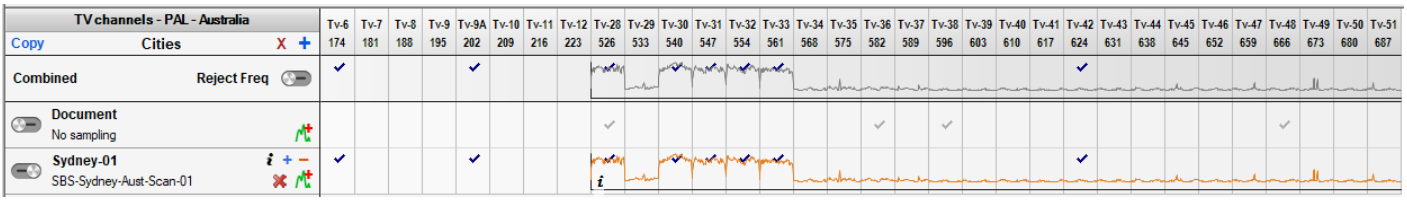


For the moment the list of countries is limited to Australia and New Zealand. Other countries will be added as needed.

Which gives for New Zealand:

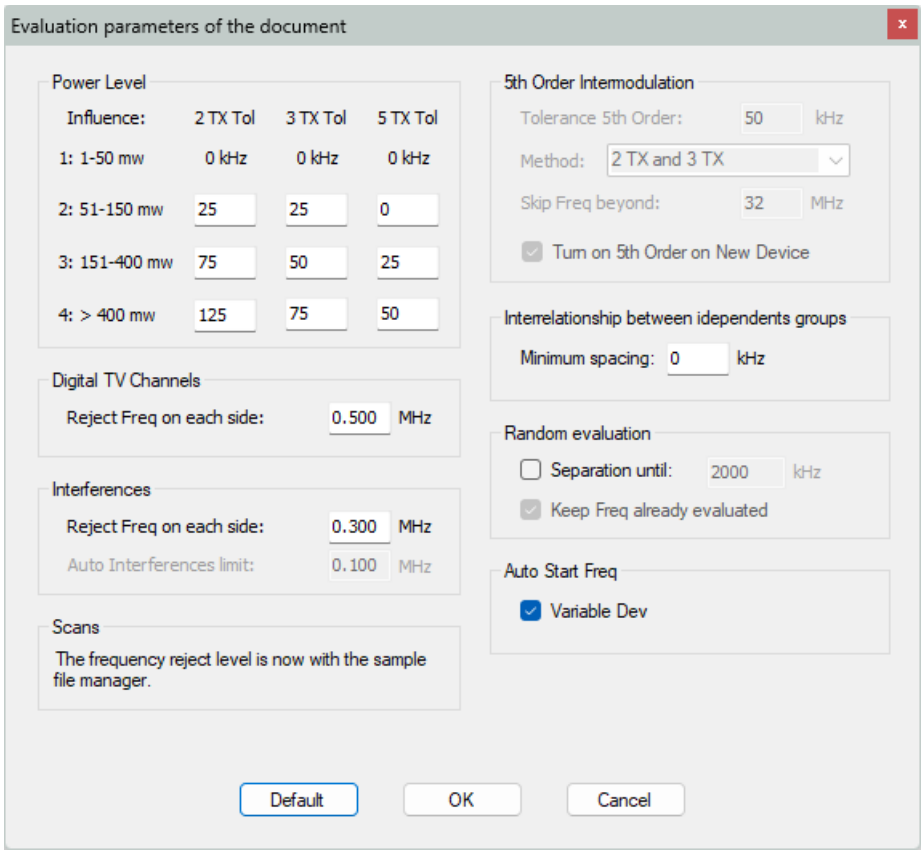


This new management of TV channels is also supported by the “On Tour” view:



2.6.5 Document Options

The item next to the channels called local settings for a document:

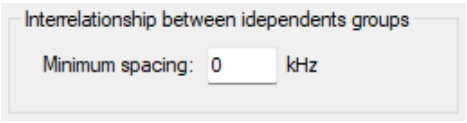


This window allows you to adjust the evaluation parameters. By modifying a parameter, the global parameters become local (by clicking "OK" of course).

Power Level settings can be changed as needed locally. Chapter 9 explains how to use these settings.

For digital TV channels and areas of interference, the area occupied is adjusted by the given offset width.

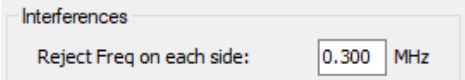
To change data of the "5th Order Intermodulation", the Option 5th Order needs to be selected (we will see it later).



When two groups have an independent interrelation (see section 1.5), the gap between two identical frequencies can be defined with this parameter or set to 0 to use the same frequencies.

The Random Evaluation is a mode or when evaluating frequency, instead of assigning frequencies consecutively random separation is added to the value found (like IAS).

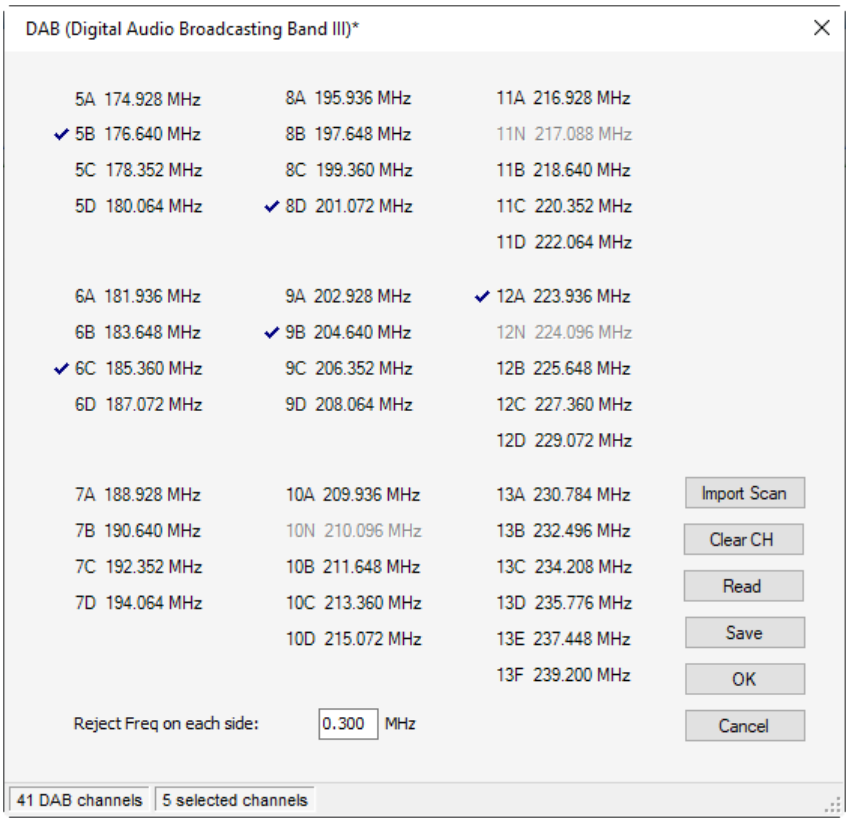
The Auto Start frequency of Variable Device can be activated / deactivated for all the document (in priority to the option on the devices). This allows frequencies that are far apart from each other to be assigned to each device if possible.



Interferences can be added manually or from a sample file, see section 5.6. This parameter is used to determine at what distance from a carrier it is accepted or rejected.

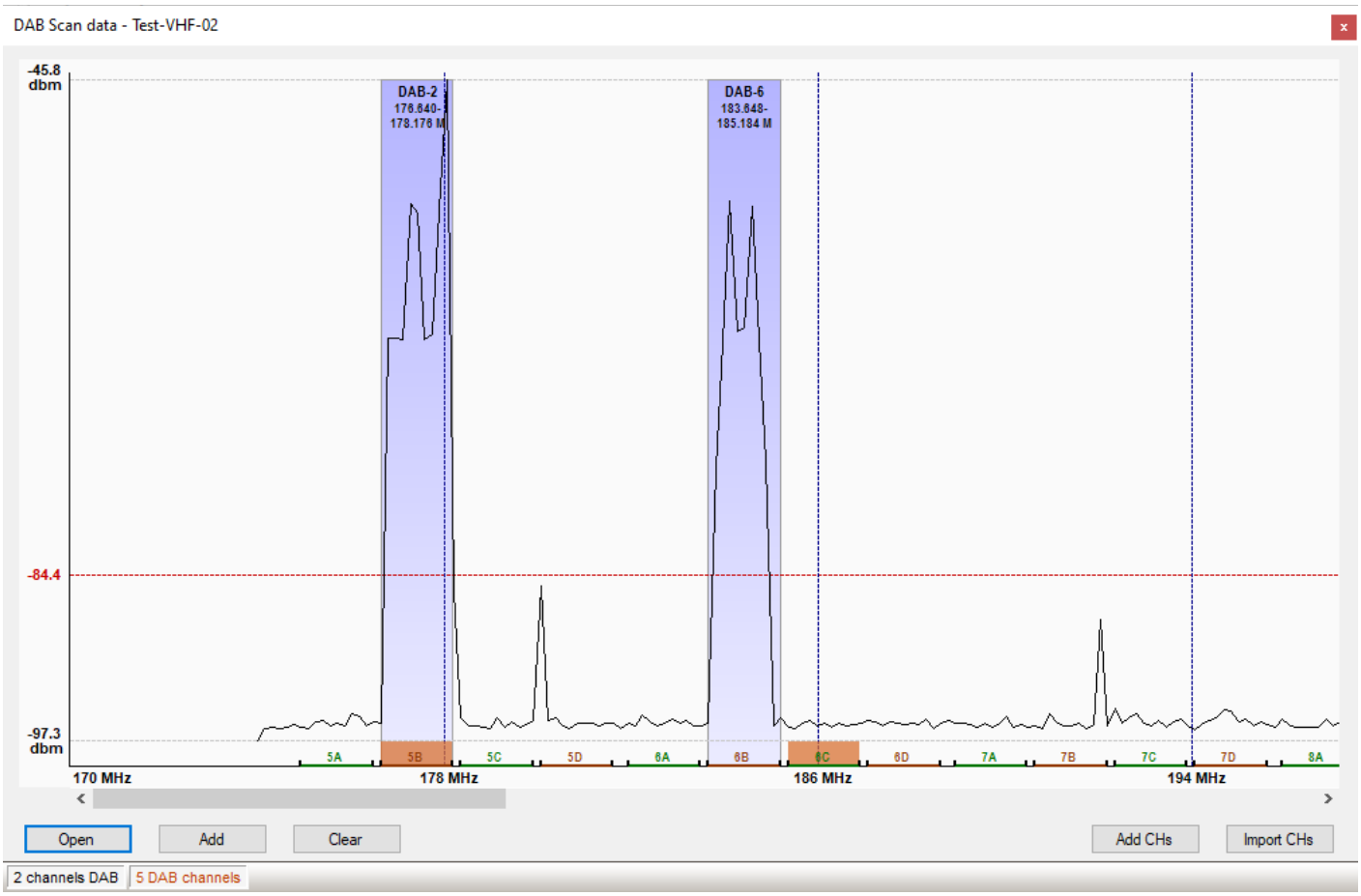
2.6.6 DAB – Digital Audio Broadcasting

The 3rd command allows to call the editor of DBA channels (Digital Audio Broadcasting) Group III. This publisher is not accessible with the ATSC video standard because this frequency band is used by digital television in North America:

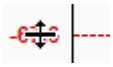


Like the TV channels editor, you can save a list for each city and use it later.

You can also select DAB channels from a scan file:



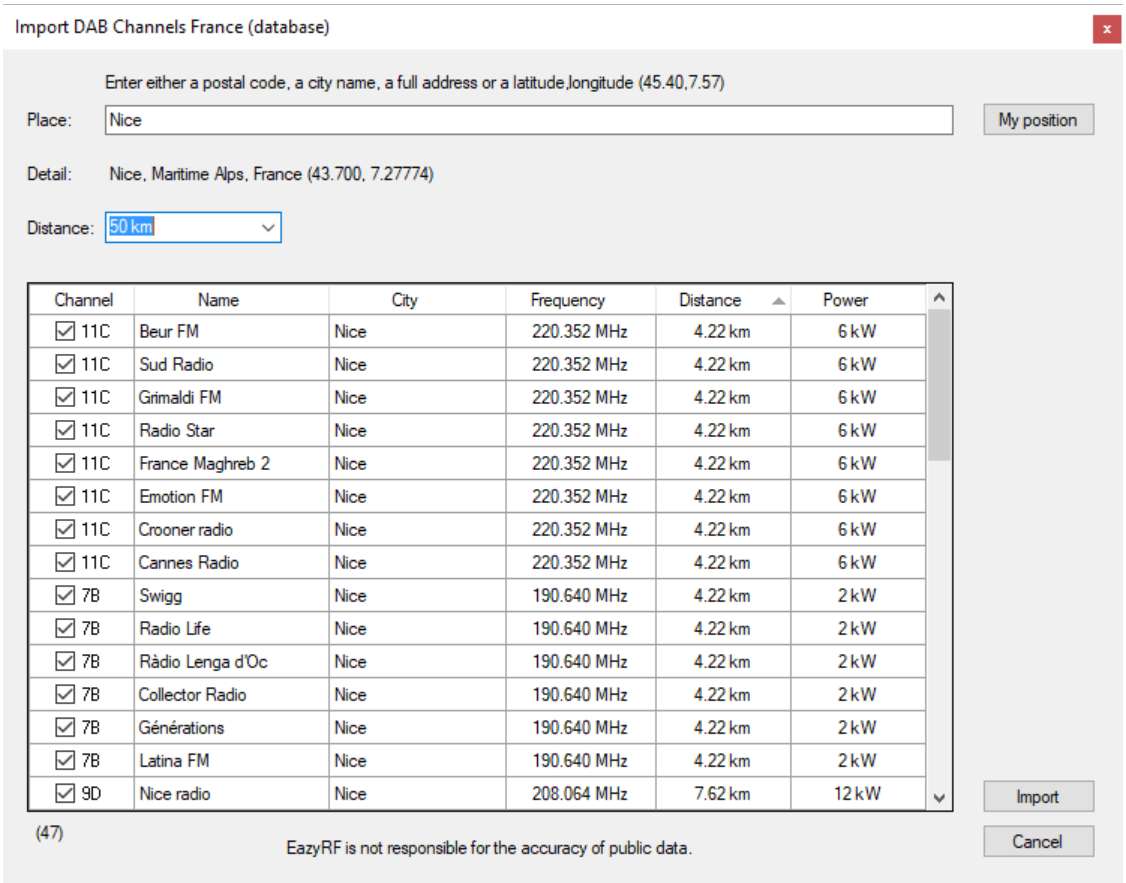
The red line is the detection level for a DAB channel (if the cumulative width exceeds 40%). This level can be changed by dragging the text value:



A channel can be activated / deactivated with a click of the mouse. The selected channels of the document appear in orange. Detected channels are independent of the channels in the document. Selection is not automatic because sampling does not necessarily cover the entire range.

The scans files are global, so they are shared with the Intermodulations - Scans module and TV Channels module. The data is saved with the document, so if they are no longer useful, it would be better to delete them.

You can also import DBA channels from public databases for a specific location with the command “Import CH”:

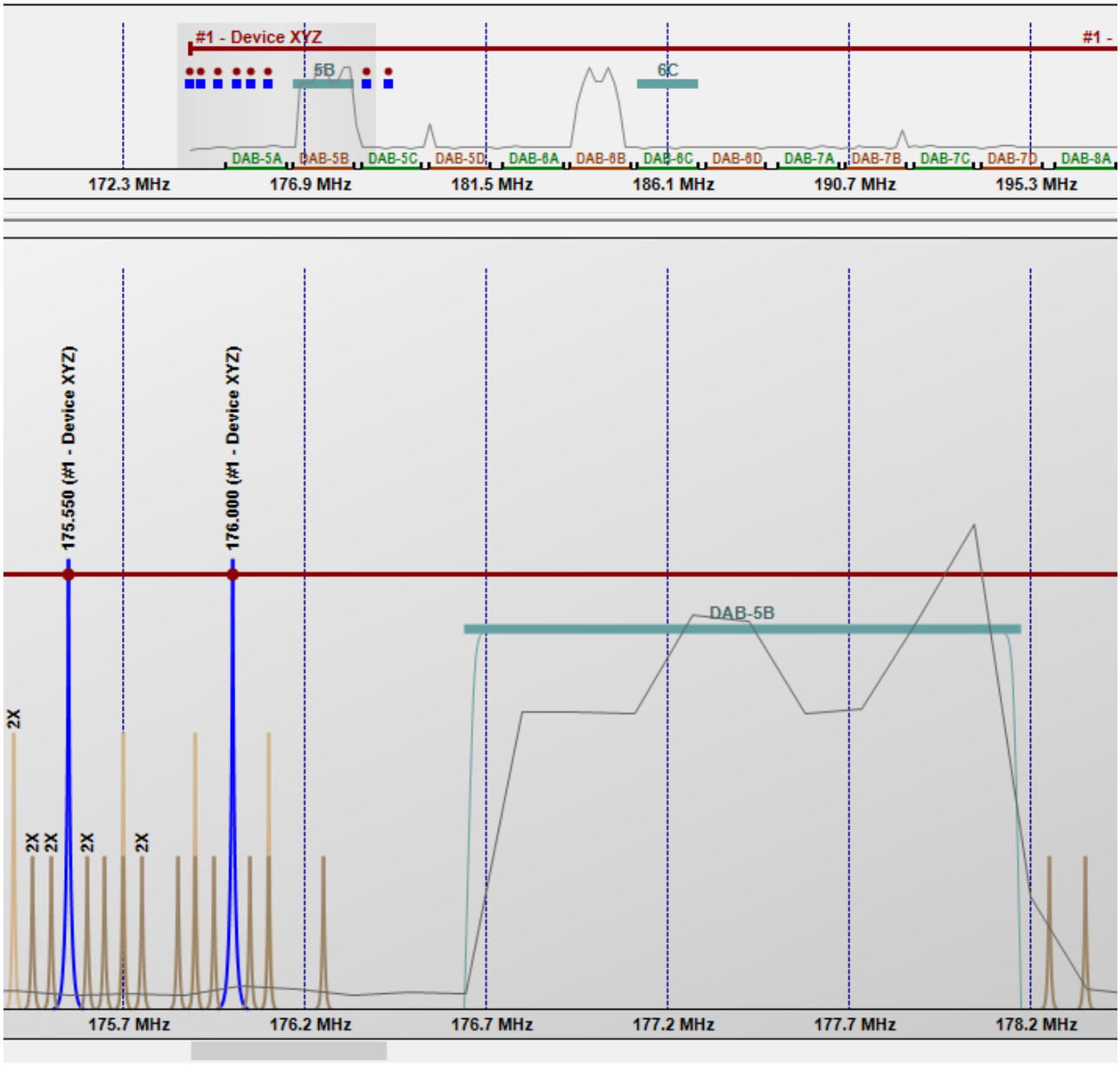


Just type a location data as a postal code, a city name, a full address, or GPS data, or latitude-longitude in the format: 44.75, 7.01 (degrees minutes must be in decimal).

Coverage includes France only.

The list displayed depends on the selected distance, between 50 and 200 km. The selected channels vary depending on the combination of distance and power. This suggestion is not foolproof, only the scanner can be reliable. Some channels are allocated but not used.

Finally, the DAB channels are displayed in the same way as the TV channels in the frequency detail:



2.6.7 Available Frequencies

The following zone of the toolbar:

This command enables or disable the calculation of available frequencies. With a device type Shure UHF-R L3 for example, frequencies vary from 638.000 to 698.000 in steps of 25 kHz, thus a possibility of 2400 frequencies. With several devices of this type and a lot of frequencies within this range, the calculation of available frequencies with each of the possible values with a large number of frequencies requires a high time. As the processor performance

has its limits of performance, there are not so many solutions. EazyRF becomes slow according to the power of the computer. This command allows to bypass this type of problems.

By deactivating the calculation of the available frequencies, EazyRF finds a big fluidity. In addition, the calculation of available frequencies can be enabled or disabled for each device individually.

In the window of edition or addition of manual device, an option allows you to launch the calculation of the available frequencies only for the concerned device:

In this way, the calculation is more quickly made and you keep access to the list of available frequencies.

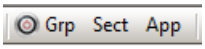
2.6.8 Clipboard

The following zone of the toolbar allows to manage the operations of the clipboard:

In the first part of the commands, you can cut a group, a section or a device. In the second part, the commands allow the copy of a group, a section or a device. Finally, the last item allows to paste the data from the previous operation. Obviously, these commands work from a document to the other one or from an EazyRF application to another one.

2.6.9 Off function

The next area of the toolbar manages "Off Function":



EazyRF allows to put a device, a section or a group to "Off", a bit like turning power off on devices. When a device is off, it is displayed as:

No	Description	Freq	Intermodulation
1		Off(632.100)	
2		Off(632.400)	
3		Off(632.850)	
4		Off(633.450)	

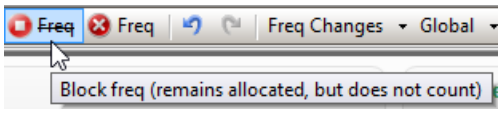
This operation frees the frequencies assigned to a device. The display allows you to see what these frequencies were. Note that if I add another device, these frequencies become available and may be assigned to it.

The purpose of these commands is to release devices without removing them.

2.6.10 Blocked / Released Frequencies

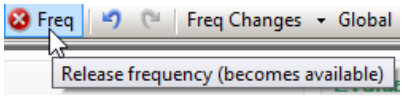
The following section of the toolbar allows to manage frequencies individually:

The first command:



Will block a frequency, e.g. eliminate this frequency of allocation in another device. A blocked frequency corresponds to a frequency that you can identify as used but not on your frequency plan (undesirable). It is best to use this command in a device containing only those blocked (easier to see) frequencies.

The second command:



Frees a frequency, e.g. remove the attribution of the plan. So it becomes available for another device. This is the equivalent of putting device "Off" but for a particular frequency.

These commands may not be displayed if the width of main window is not sufficient.

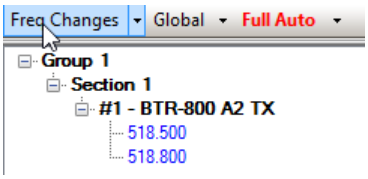
2.6.11 Undo / Redo

The next section of the toolbar control operations "Undo" & "Redo" commands:

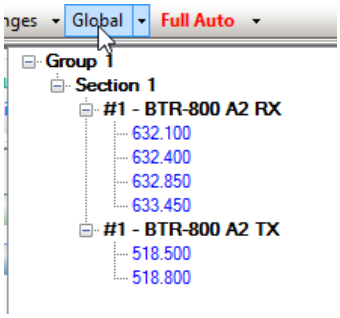
There is no limit on the level of undo/redo of the commands.

2.6.12 Notes / Changes

Finally, the last commands of the toolbar allow you to see the frequencies changes. The first command shows the changes arisen in the last made operation:



The following command displays the changes since the last backup or opening of the document:



The command affecting the modes of calculations was seen in the chapter 1.

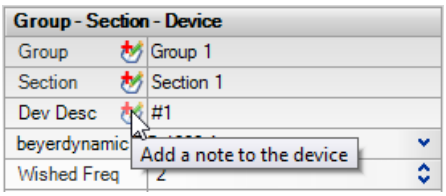
2.7 Notes

2.7.1 Notes – Global View

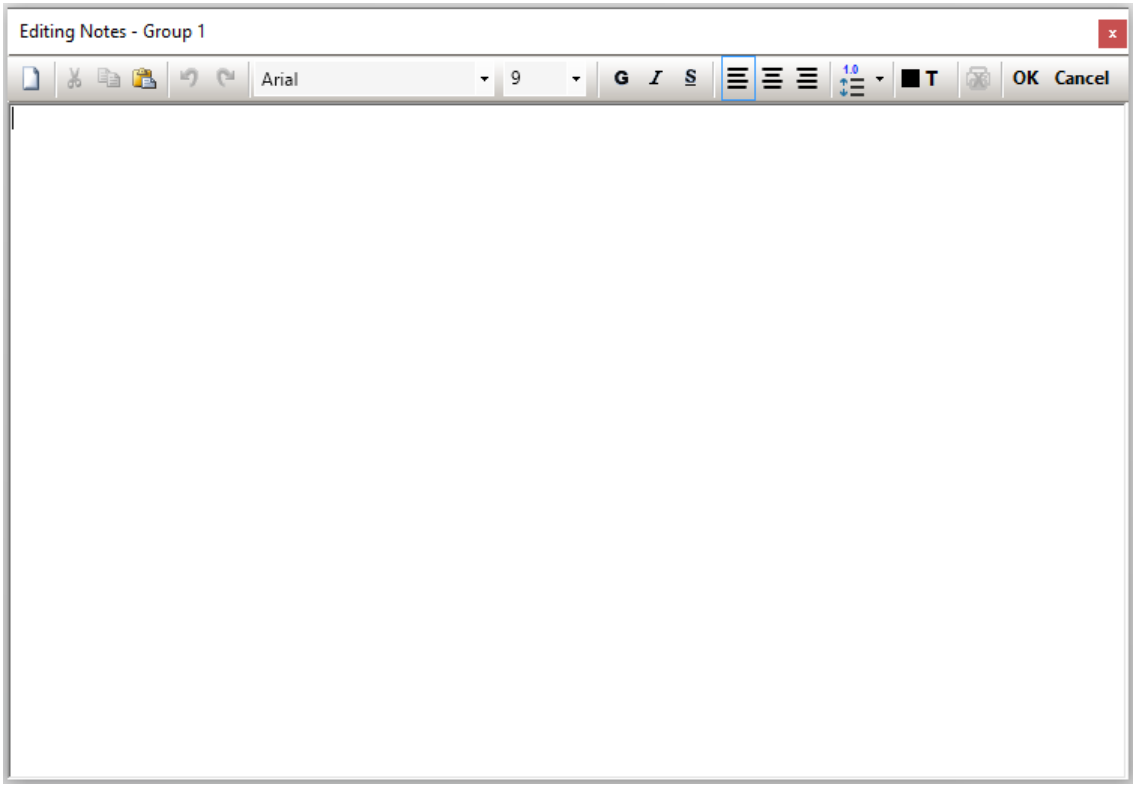
Notes can be added to the document, groups, sections and devices.

The principle of operation is simple, commands to add a note and commands to modify each device, section, group; for the document, only one button to add / modify because there is only one document to edit.

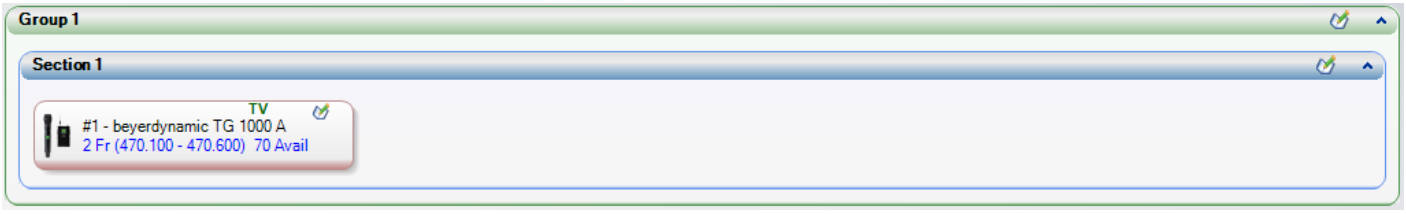
The commands for adding notes have been centralized in the detail section of the selection:



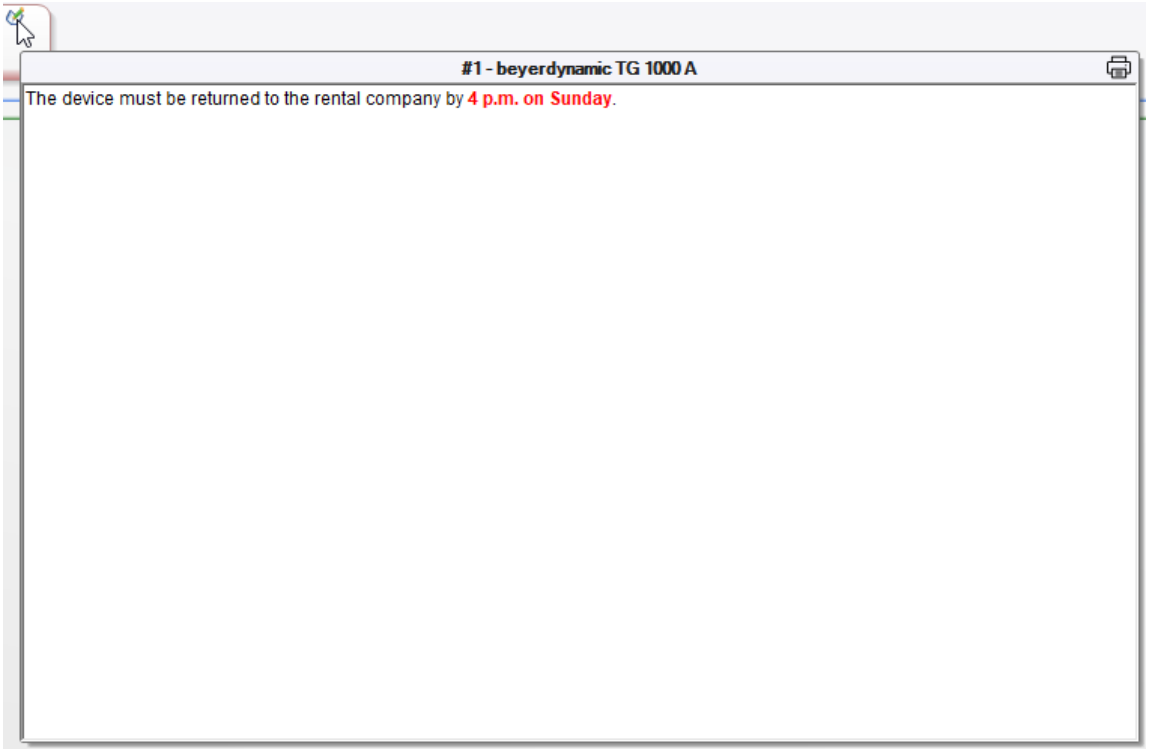
The "Note" icon contains a "+" to indicate an addition of a note. By clicking on the add note, the editor appears:



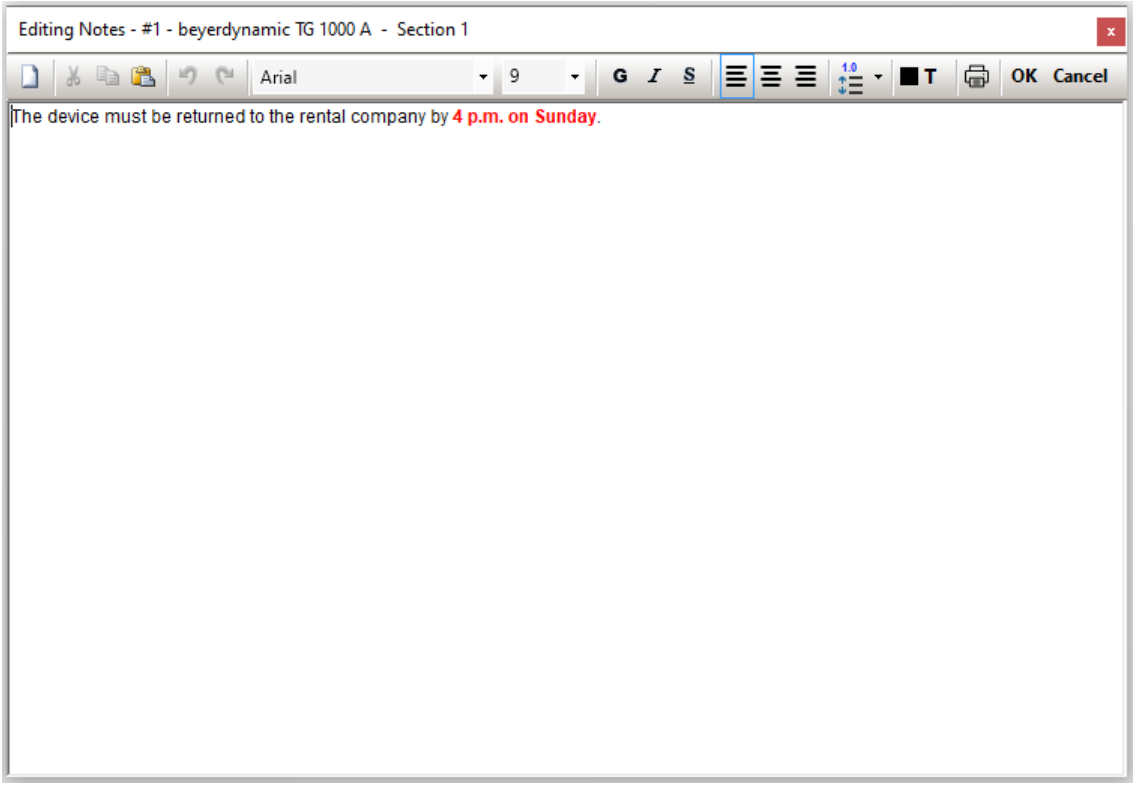
When a note is added, the add note icon disappears and another icon appears on the group, section or device:



By moving the mouse pointer over the note icons, the content appears:

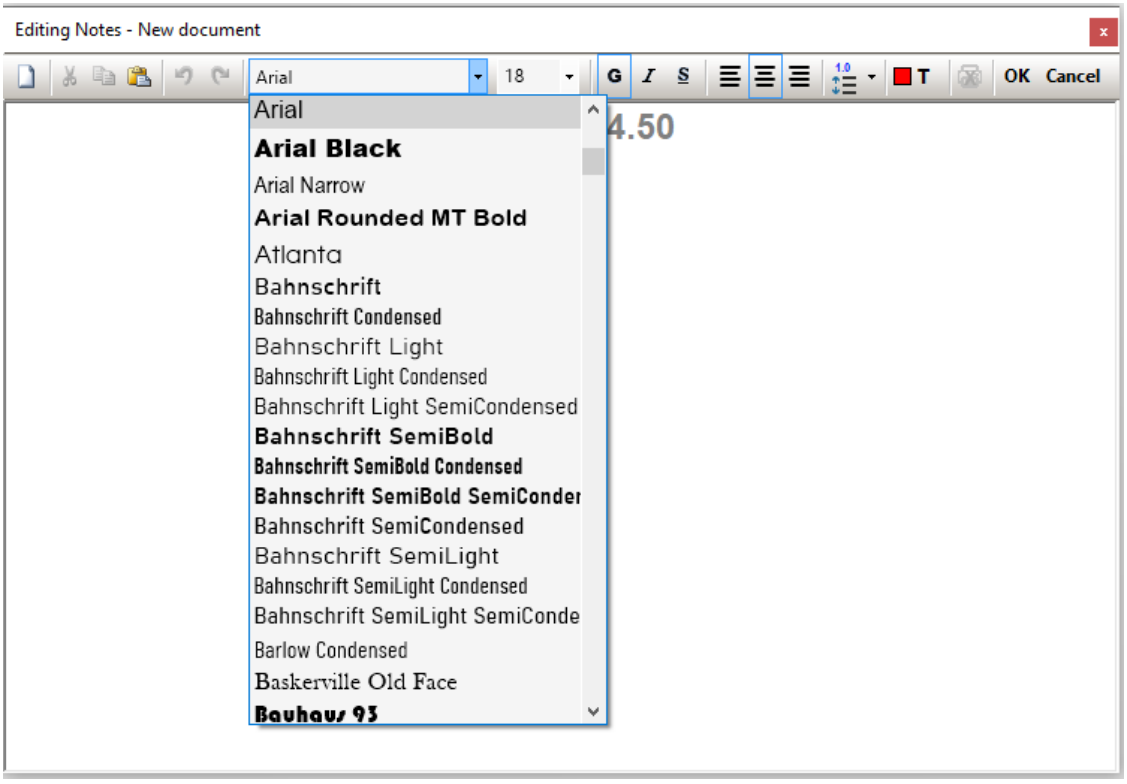


By clicking on the icon, the note editor appears instead of the text bubble:

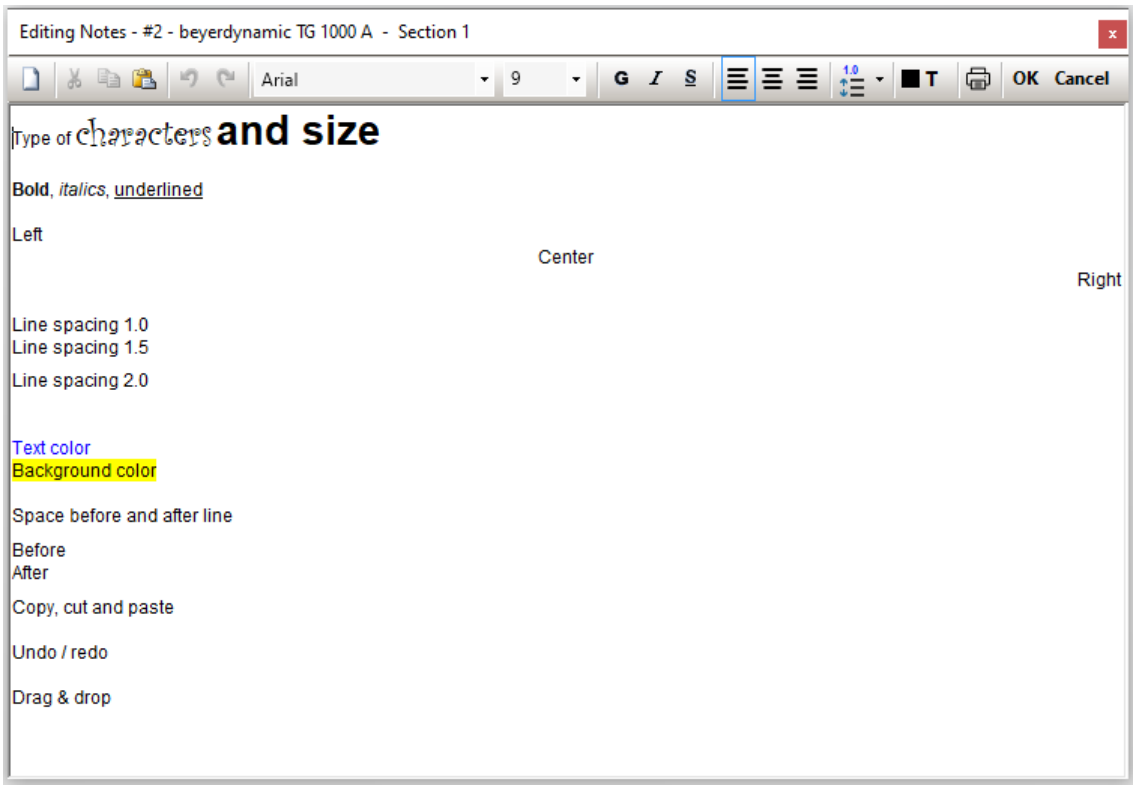


2.7.2 Note editor

The note editor allows you to style the text from its toolbar:

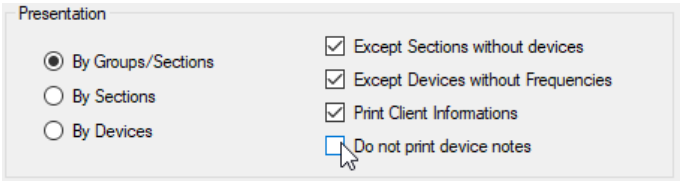


Here is an overview of the supported formatting:

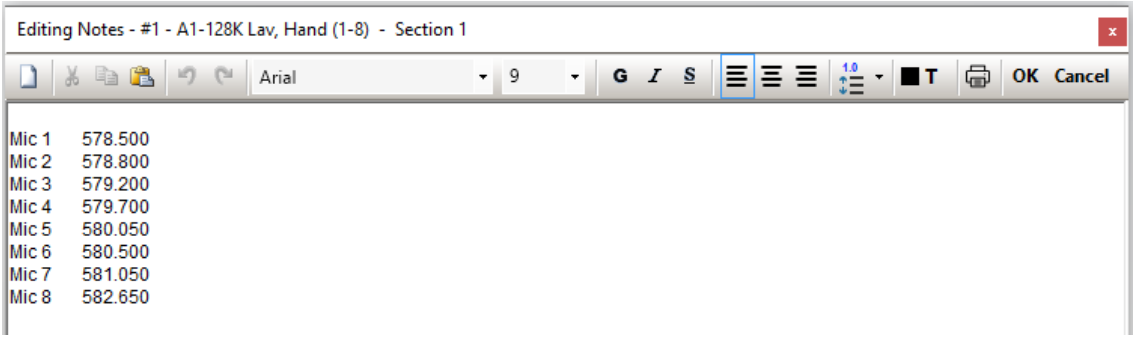


The printer icon sets whether or not to print device notes in reports (or). Only device notes are printable.

Printing of notes for devices can be enabled individually for each device and globally enabled / disabled when printing reports:



To copy frequencies and descriptions of a device, make a selection in a device editor, copy with the keyboard: CTRL + C:



To drag & paste from Excel or Word, these must have been started as administrator.

You can paste pictures as well.

If you need more sophisticated text formatting, you can do it in Word and simply copy it to EazyRF.

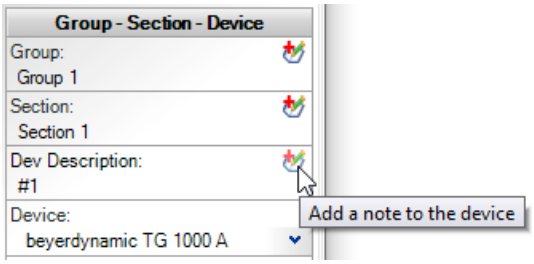
The data is saved in compressed format (zip), therefore of reasonable size.

The size of the edit window can be adjusted and saved for use when EazyRF is restarted. To restore the default size, increase or decrease the size with the CTRL key, the size will be adjusted at the end of the operation.

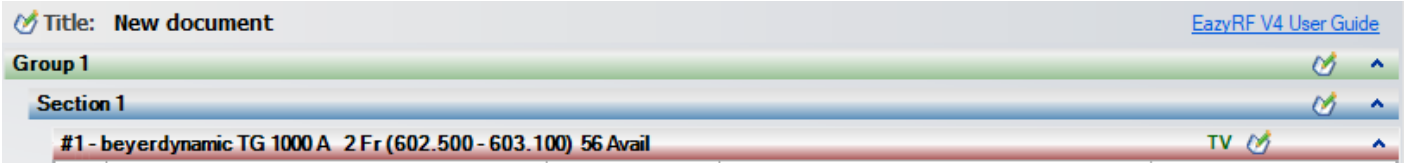
The TAB key moves to the note of the next device, while Shift + TAB, moves to the previous device. To use tabulation, you must use the CTRL key simultaneously.

2.7.3 Notes – Detailed View

Adding a note from the "Detailed View" pane is done in a similar way, the commands are always found in the detail section of the selection:

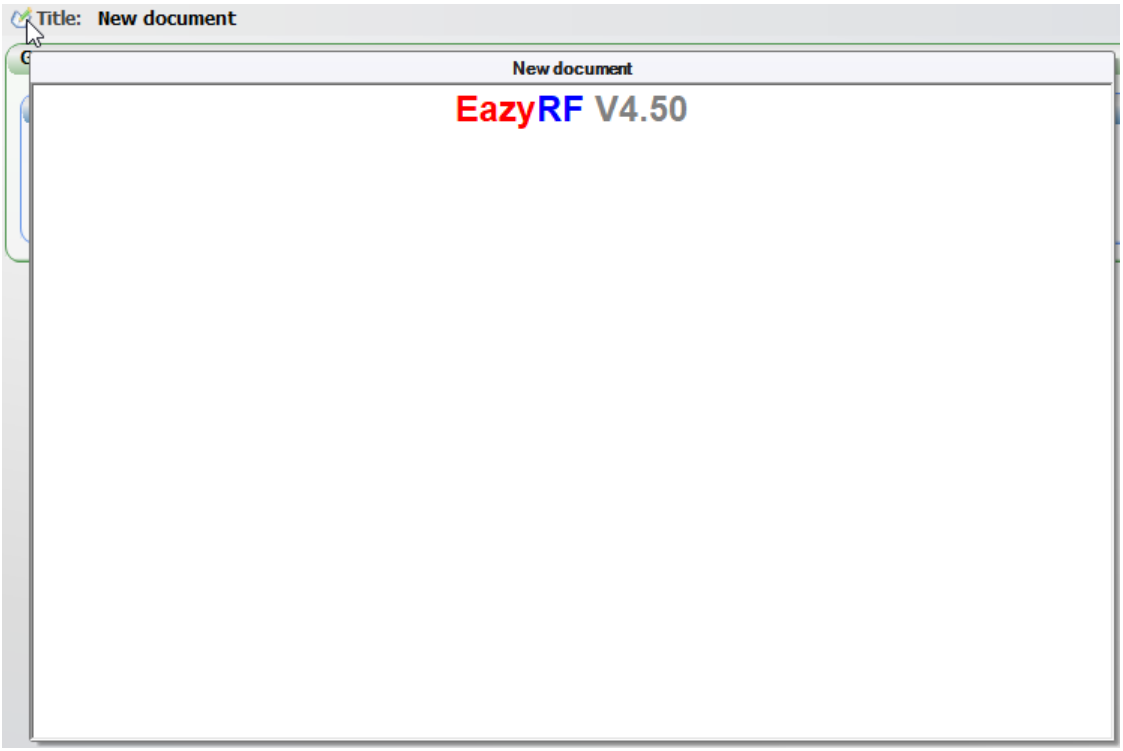


With the result when notes are added to a device, a section, a group and to the document:

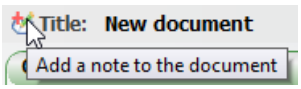


2.7.4 Notes – Document

The operation of a note for the document is slightly different. By default, EazyRF offers content (EazyRF with the latest version number):



Adding and viewing the note is done from the same command:



2.7.5 Notes – Frequencies Plan

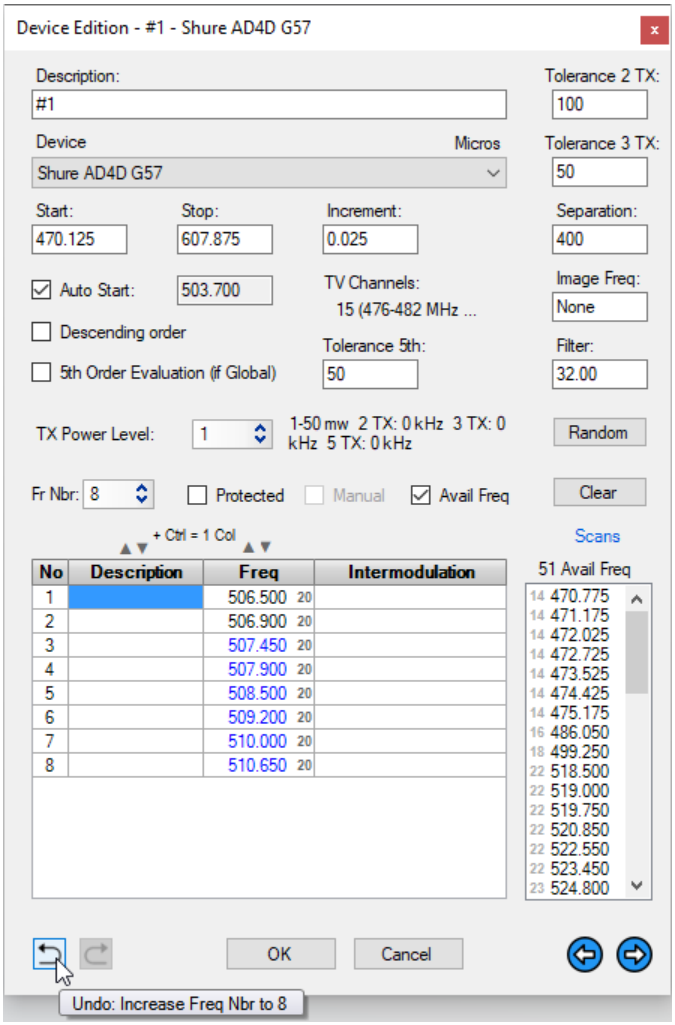
In the "Frequencies Plan" view, only the command for the document note is found:

2.7.6 Notes – Multi-Scenes

See section 8.8.8 of chapter 8.

2.8 Edition of a Device

The editing window of a device is called by making a double-click on a device in a section:



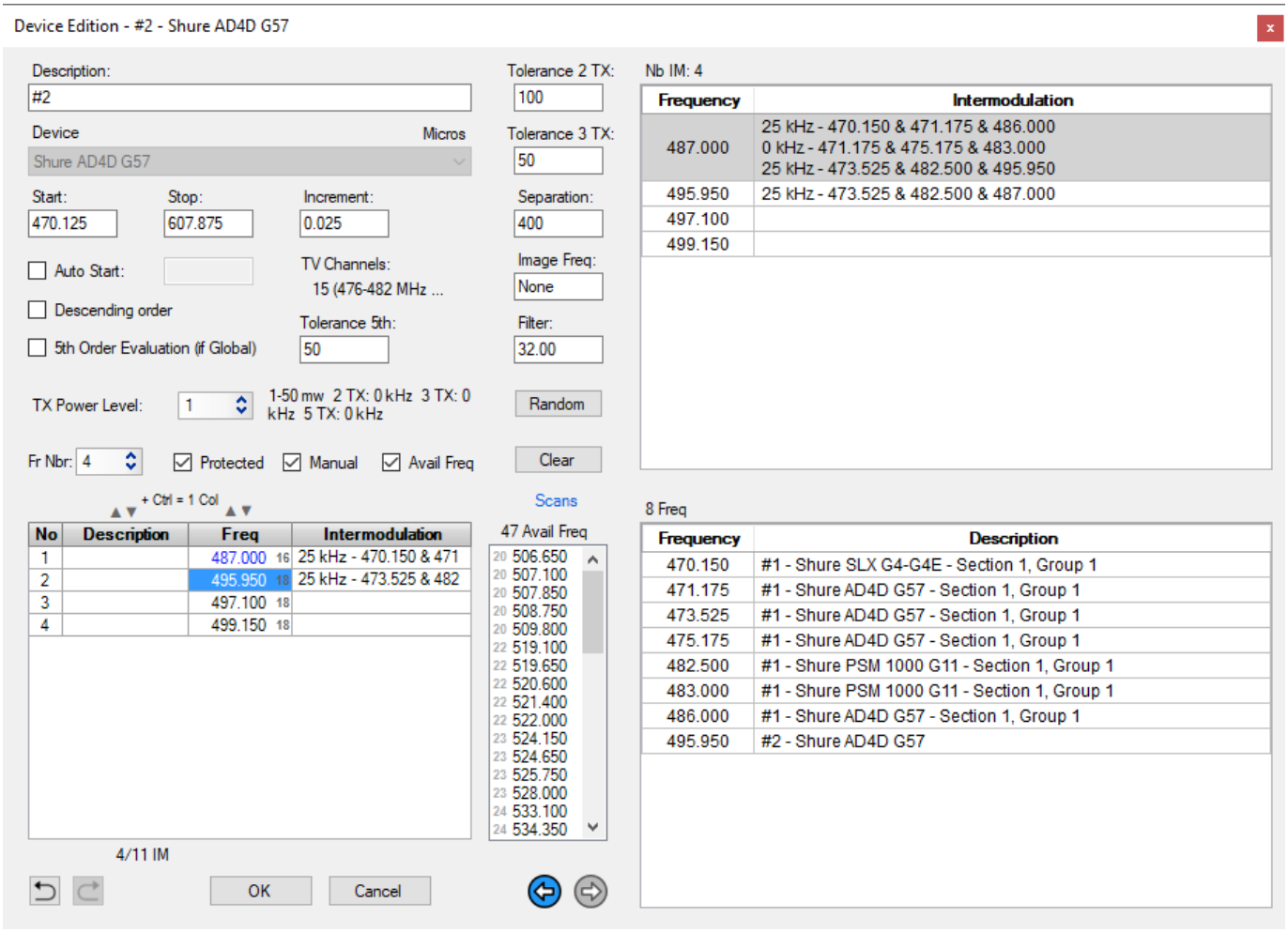
This window allows you to edit all the parameters affecting the evaluation of the device. It is also possible to use the list of available frequencies to make changes. To classify the frequencies in ascending or descending order, use the arrows at the top of the header "Freq". It is also possible to classify the frequencies by description. It is also possible to auto-increment the description frequencies using Ctrl + Alt (as seen above) and import data from Excel.

The editor has its own system of "Undo/Redo" which allows to cancel/repeat each operation. The command "Undo/Redo" of the "Global View" and "Detailed View" panes allows you to cancel/repeat the complete editing done on a device.

In addition, the editor now has a visual effect when moving available frequencies to clearly identify the destination, the background color varies:

This visual effect is also available in the "Global View" pane.

The format of the editor changes when there are intermodulations in order to display the details of them:



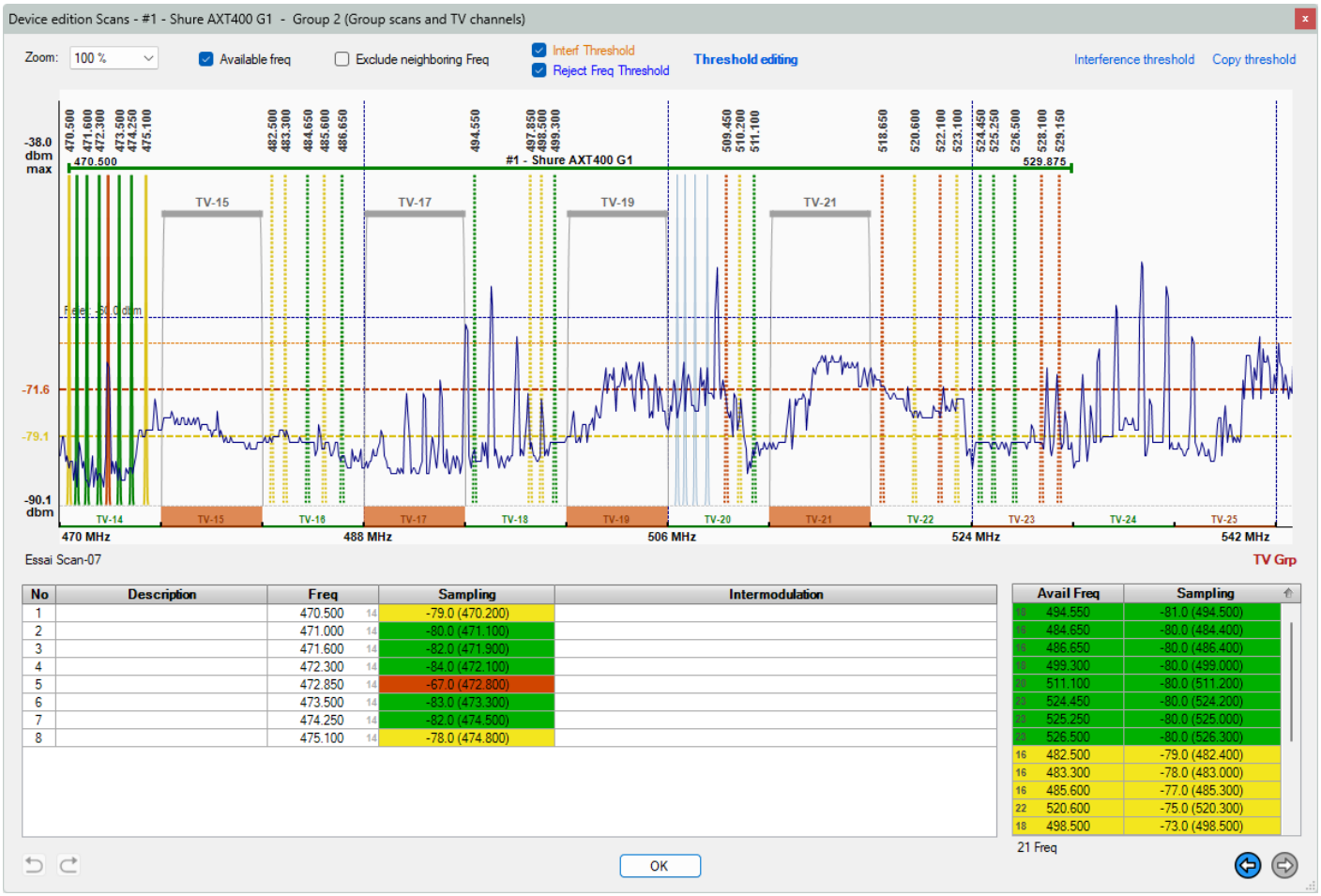
EazyRF offers several data editing methods. The result is the same regardless of the method used. The objective is to eliminate the navigation to find commands. Normally there is always a method of edition within the reach of the user.

The buttons:

Allow you to move from device to device without having to close the editor and open it with another device.

2.8.1 Device scans

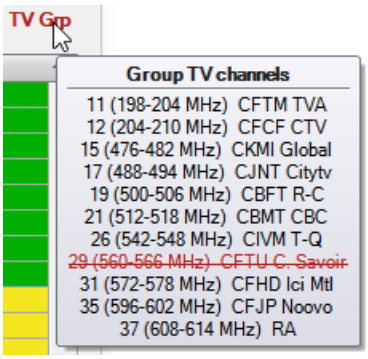
The "Scans" command of the device editor calls up the sampling analysis module according to a device, i.e. for the range of frequencies covered by the device:



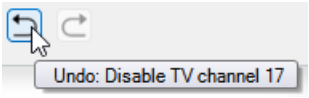
The title bar displays which type of scan file is used by the group associated with the device, either that of the group or of the document (see section 5.6), the scans are displayed in gray when they come from the document or in blue if they belong to the group.

The name of the scan file is displayed at the bottom of the sampling display area on the left.

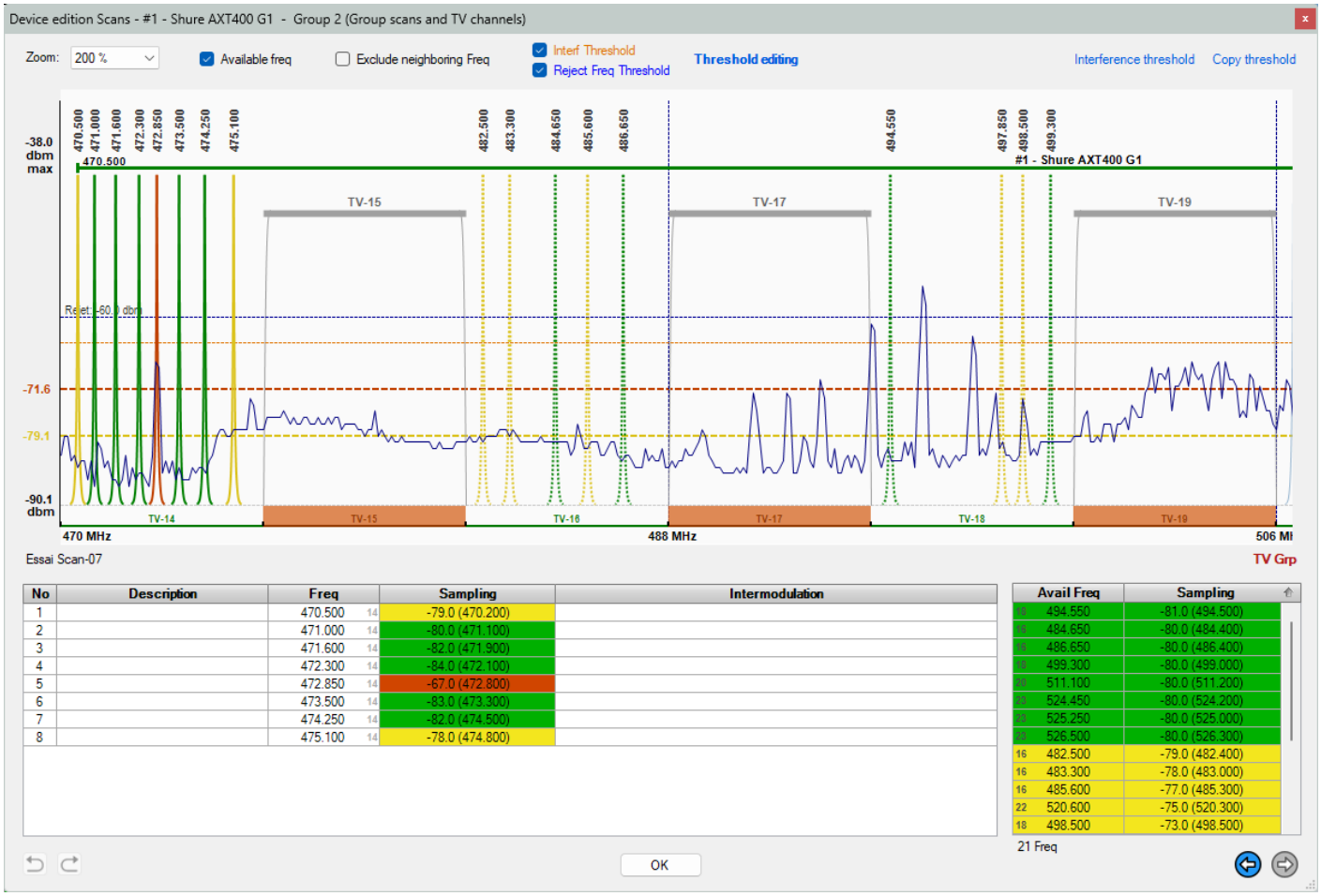
If the group manages the TV channels, the display "TV Grp" appears at the bottom right of the sampling display area:



TV channels can also be modified as in the scan module, but the difference is that in this editor, there is no need to save TV channels because the change is made immediately for real-time viewing. As this editor has Undo/Redo commands, changing TV channels uses it:

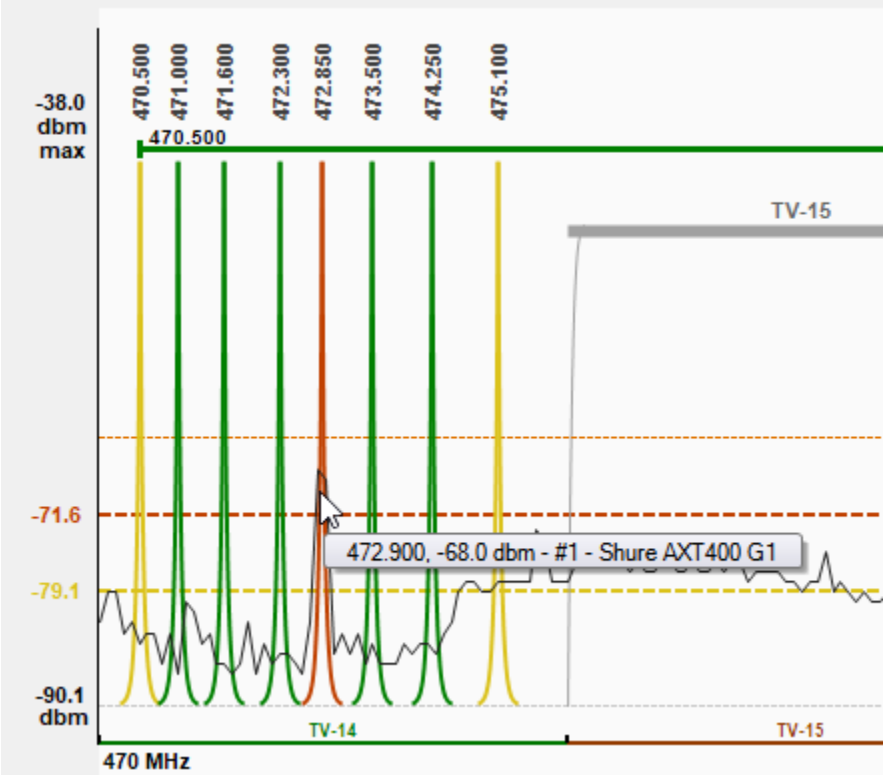


By default, EazyRF displays the full range of frequencies, the "Zoom" command displays more details:



The frequency analysis is based on the level of the samples, the value of the rejection width of the interference frequencies (0.300 MHz by default) is used for the calculation (document parameters).

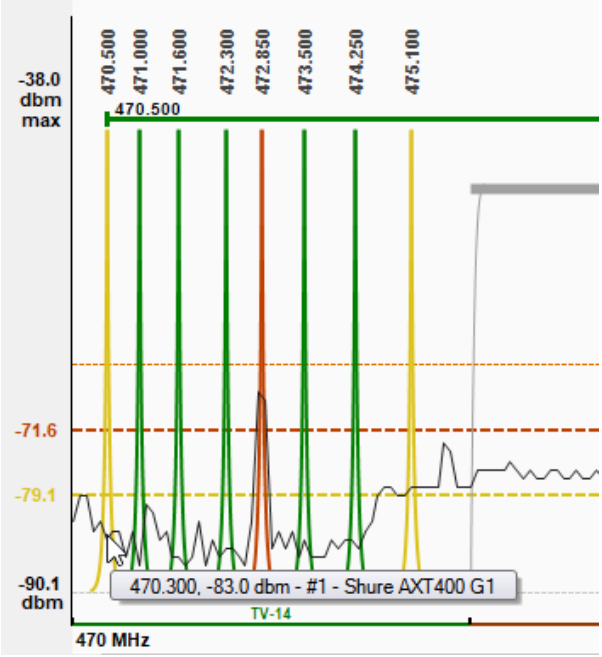
A yellow tolerance threshold is used to detect the frequencies that can be reached by sampling:



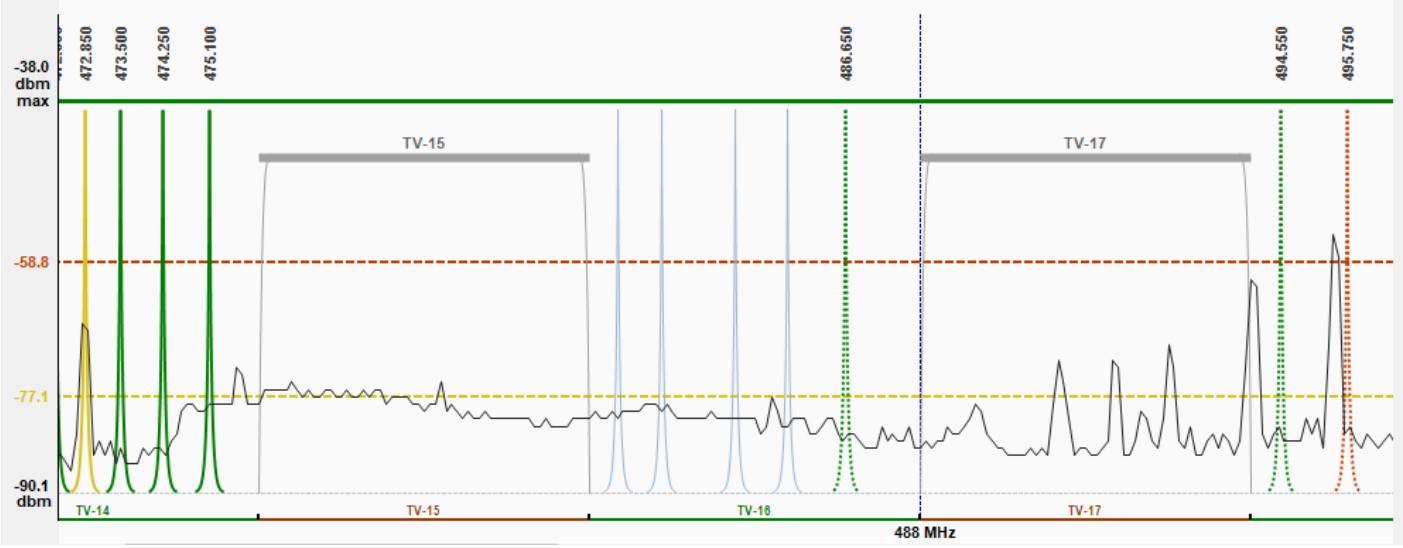
The detection threshold of the red zone is fixed here at -71.6 dbm, the frequency 472.850 is near a sampling peak at 472.900, level -68.0 dbm. The affected frequency is displayed in red to illustrate the possible problem.

The yellow zone makes it possible to detect the frequencies less reached by the samplings.

The frequencies shown in green are located in an area where sampling is less accentuated.



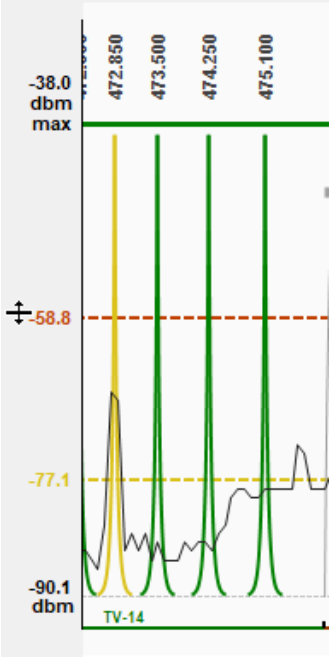
See section 2.7.1.2 for more details on detection thresholds.



The available frequencies are also analyzed, they are displayed in dotted lines. Frequencies in light blue are frequencies assigned to other devices (without being analyzed), but within the spectrum of the displayed device.

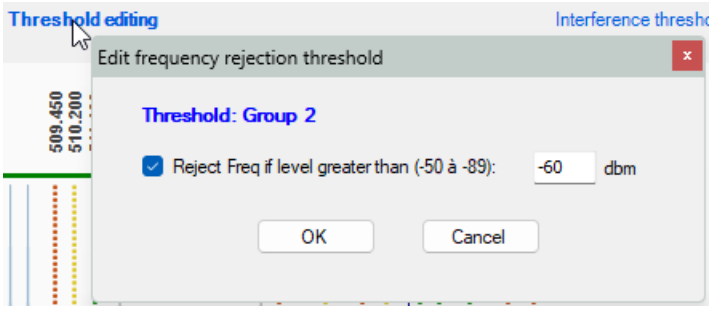
The following controls allow you to display or not the available frequencies and those of other devices:

To move the tolerance level, all you have to do is drag the text of the level displayed in the left part:



At this point, the mouse pointer changes shape to indicate the displacement.

The rejection zone threshold can be modified, the threshold is defined for the document or for the group and not for a device:



2.8.1.1 Device Scans – Results analysis

EazyRF analyzes the frequencies (basic and available) and displays the result using a colored background (green, yellow and red):

No	Description	Freq	Sampling	Intermodulation
1		470.500 14	-79.0 (470.200)	
2		471.000 14	-80.0 (471.100)	
3		471.600 14	-82.0 (471.900)	
4		472.300 14	-84.0 (472.100)	
5		472.850 14	-67.0 (472.800)	
6		473.500 14	-83.0 (473.300)	
7		474.250 14	-82.0 (474.500)	
8		475.100 14	-78.0 (474.800)	

We see that the frequency 470.500 is in the yellow zone because of the sampling 470.200 of level -79.0 dbm. The frequency 472.850 is found in the red zone because of the sampling 472.800 of level -67.0 dbm.

The analysis of the available frequencies goes a little further:

Avail Freq	Sampling
18 494.550	-81.0 (494.500)
16 484.650	-80.0 (484.400)
16 486.650	-80.0 (486.400)
18 499.300	-80.0 (499.000)
20 511.100	-80.0 (511.200)
23 524.450	-80.0 (524.200)
23 525.250	-80.0 (525.000)
23 526.500	-80.0 (526.300)
16 482.500	-79.0 (482.400)
16 483.300	-78.0 (483.000)
16 485.600	-77.0 (485.300)
22 520.600	-75.0 (520.300)
18 498.500	-73.0 (498.500)

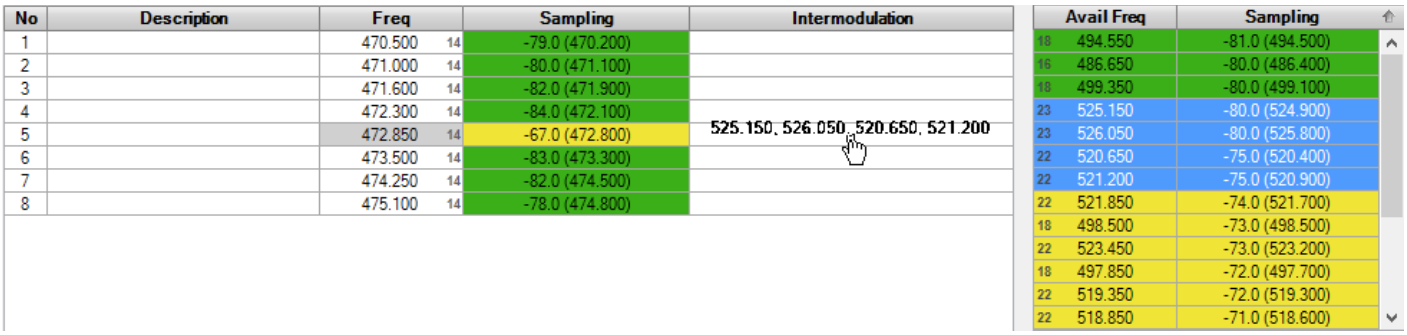
Avail Freq	Sampling
16 482.500	-79.0 (482.400)
16 483.300	-78.0 (483.000)
16 485.600	-77.0 (485.300)
22 520.600	-75.0 (520.300)
18 498.500	-73.0 (498.500)
22 523.100	-73.0 (522.800)
18 497.850	-72.0 (497.700)
20 510.200	-72.0 (509.900)
22 522.100	-71.0 (522.300)
20 509.450	-70.0 (509.200)
22 518.650	-70.0 (518.400)
23 529.150	-69.0 (529.000)
23 528.100	-68.0 (528.400)

The frequencies are classified by detection zone (green, yellow and red) and moreover, they are classified according to the level of the samplings and then by frequency value. So EazyRF suggests you the best frequencies according to the sampling, the frequency 482.500 (-79.0 dbm, 482.400) is a better choice than the frequency 510.200 (-72.0 dbm, 509.900) for example.

The frequencies can be classified in ascending or descending order of samplings, or frequency values by clicking on the headers, an indicator illustrates the direction:

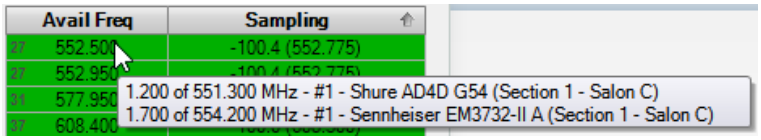
In addition, the frequency order follows the "Ascending / Descending" direction of the device.

This module is not an editor of the parameters of a device, it only allows you to drag and paste the available frequencies. To do this, make a selection with the left mouse button for a non-continuous selection (use Shift for an extended selection or Ctrl for a multiple selection), or drag the right mouse button for a continuous selection. Finally, to move the selection, use the left button:

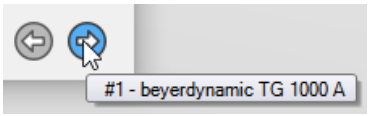


Any modification can be canceled and redone using the “Undo / Redo” commands.

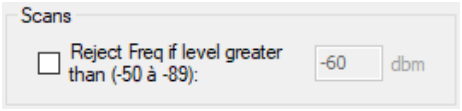
By positioning the mouse pointer over the list of available frequencies, the lower and upper spacing of the frequency from the document frequencies is displayed:



The arrows at the bottom of the window allow you to move to the next or previous device:

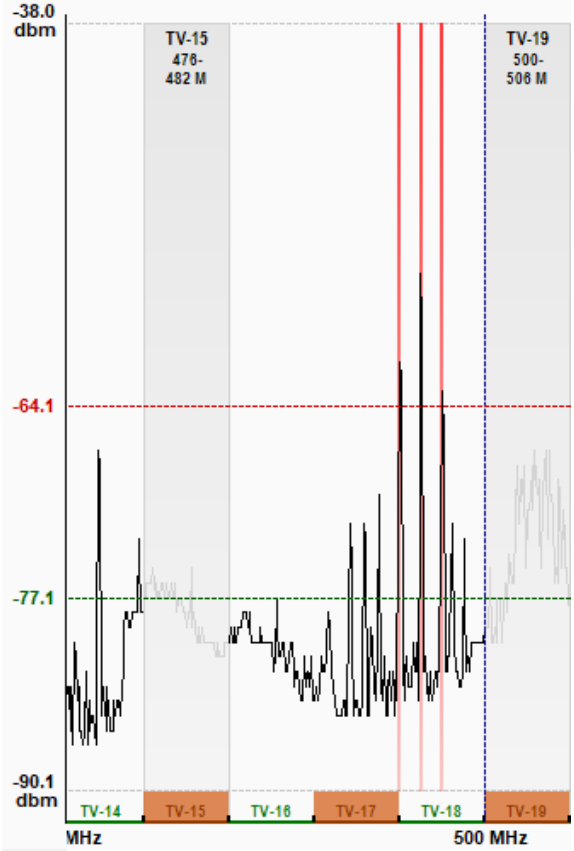


The "Sampling" option of the document parameters allows frequencies to be rejected automatically during calculations (see section 2.5.4):

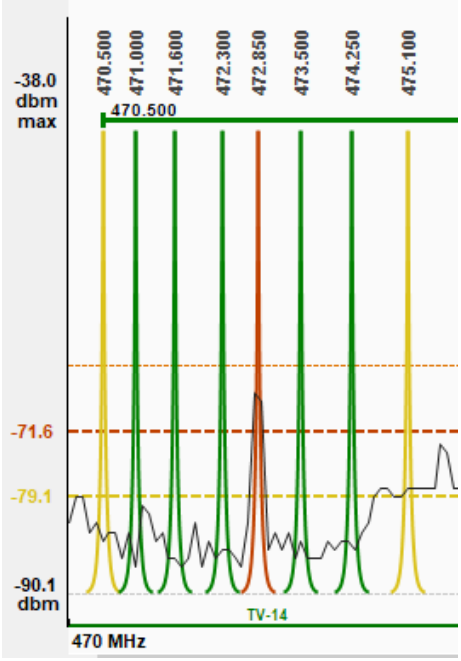


2.8.1.2 Device Scans – Threshold detection

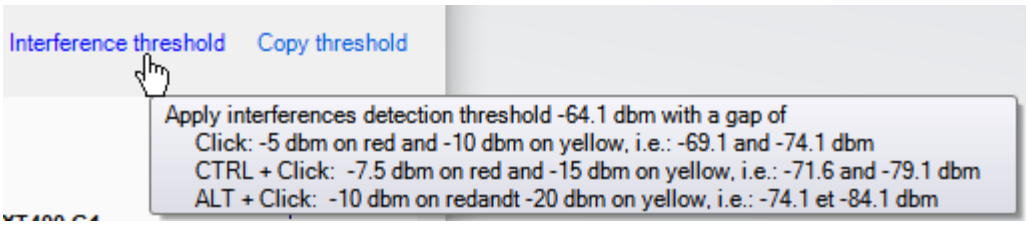
By default, EazyRF uses the interference detection threshold of the Sampling module:



In this example, the threshold is set to -64.1 dbm. EazyRF will use this value with an offset of -7.5 dbm for the red level and -15 dbm for the yellow level, i.e. -71.6 and -79.1 respectively when adding a device:

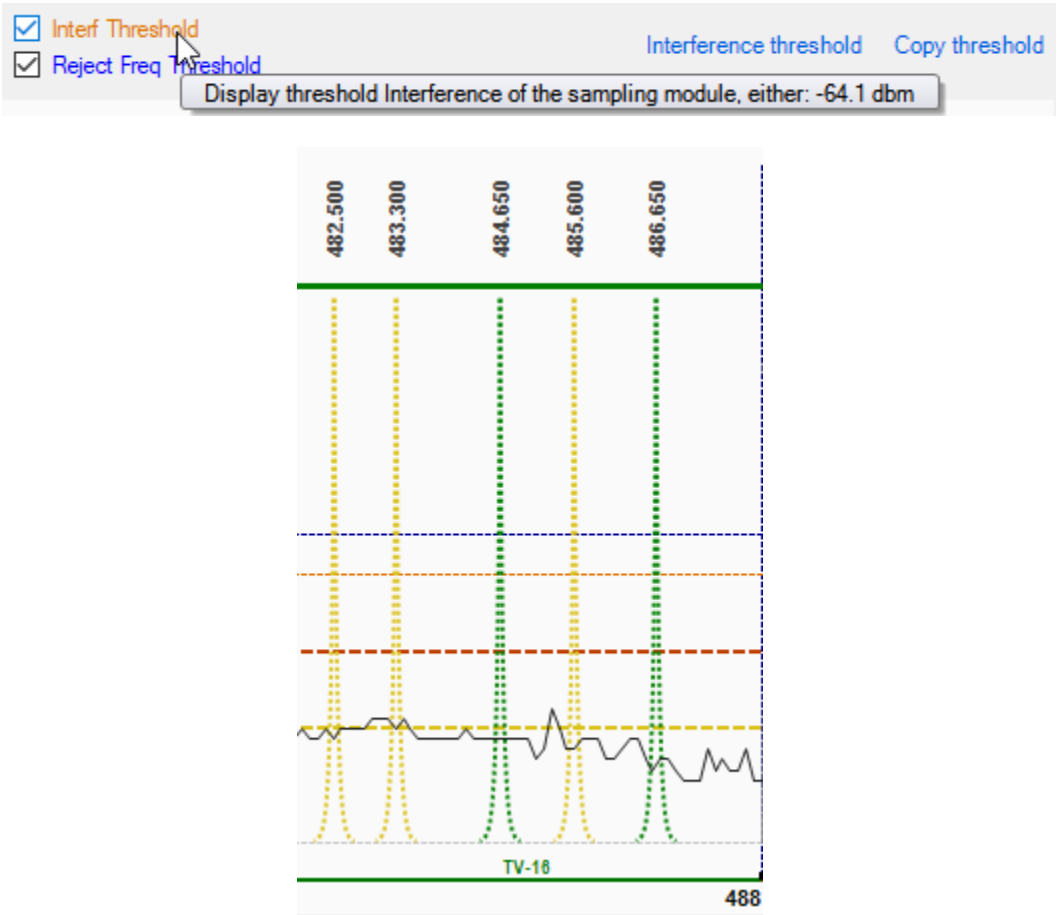


These values can be modified manually or directly with the command:

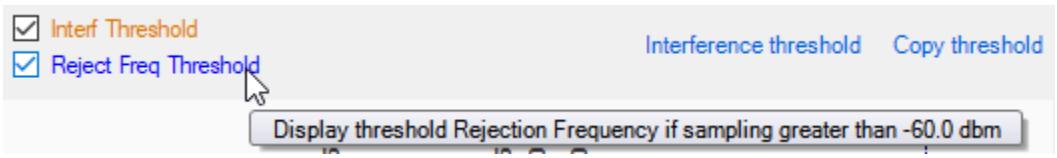


Thus, by using the Ctrl, Alt or none keys, a different correction can be assigned from the level of interference detection.

The threshold of the interference level or that of the rejection frequencies can be displayed with these commands:

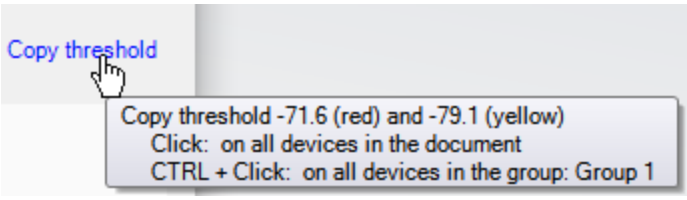


The orange threshold represents the level of interference and the blue that of the automatic frequency rejection (if activated).



See section 2.5.4 for more information on the rejection of frequencies according to sampling.

Finally, the red and yellow threshold values can be copied to all devices in the document or in a group:



2.9 Client Report creation

This module is used to create a report for delivery to a customer. The report can be created in pdf or printed directly.

Here is an example of a report:

Logo

Address

Email
Phone

Frequencies Coordination

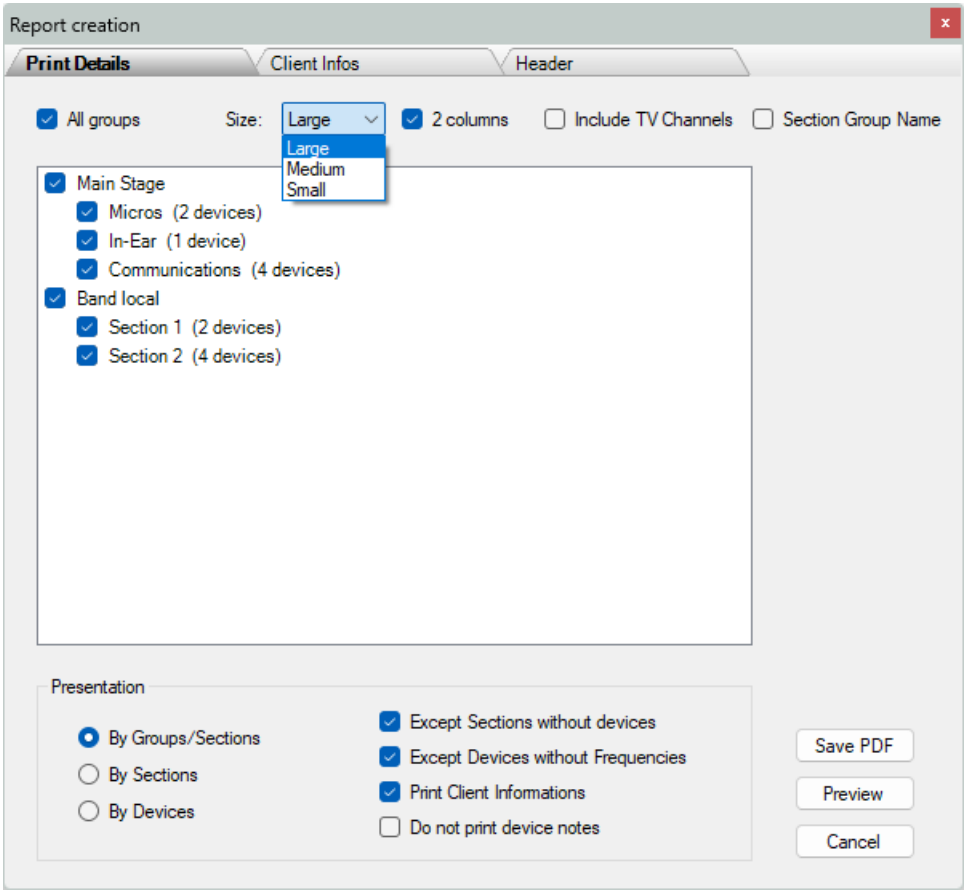
Version: **Guide Test 4.71 221101-1200**
Event: **New document**
Client: **NW**
City: **Montreal**
Date: **11/11/23**
Contact: **Roger Rog**
Phone: **123-456-7890**
Email: **lui@me.com**

Main Stage			
Micros			
#1 - beyerdynamic TG 1000 A			
	584.750	585.850	
	586.850	587.400	
	588.100	588.600	
	589.450	590.600	
#1 - beyerdynamic TG 1000 B			
	552.500	553.000	
	553.650	554.200	

In-Ear			
#1 - Shure PSM 1000 G11			
	527.800	528.900	

To create this report, use the command:

2.9.1 Print Details



The tool has three panes that allow you to define the elements to be printed, the client informations, and the customized creation of the report header.

In the "Print Details" pane, you can select each group or section separately, the "All Groups" option selects all groups and sections.

The size makes it possible to reduce the height of the lines of the document and the "2 columns" option, to place two frequencies per line. The “Section Group Name” option allows you to display the name of the group following the name of the section.

In the "Presentation" section, the "By Groups / Sections" option displays device data by section with the group name, while "By Sections" displays the section name only. The "By Devices" option displays data per device separately without the section and group name.

Sections without devices may not be displayed with "Except Sections without devices", while the option "Except Devices without Frequencies" does not display devices with no allocated frequency.

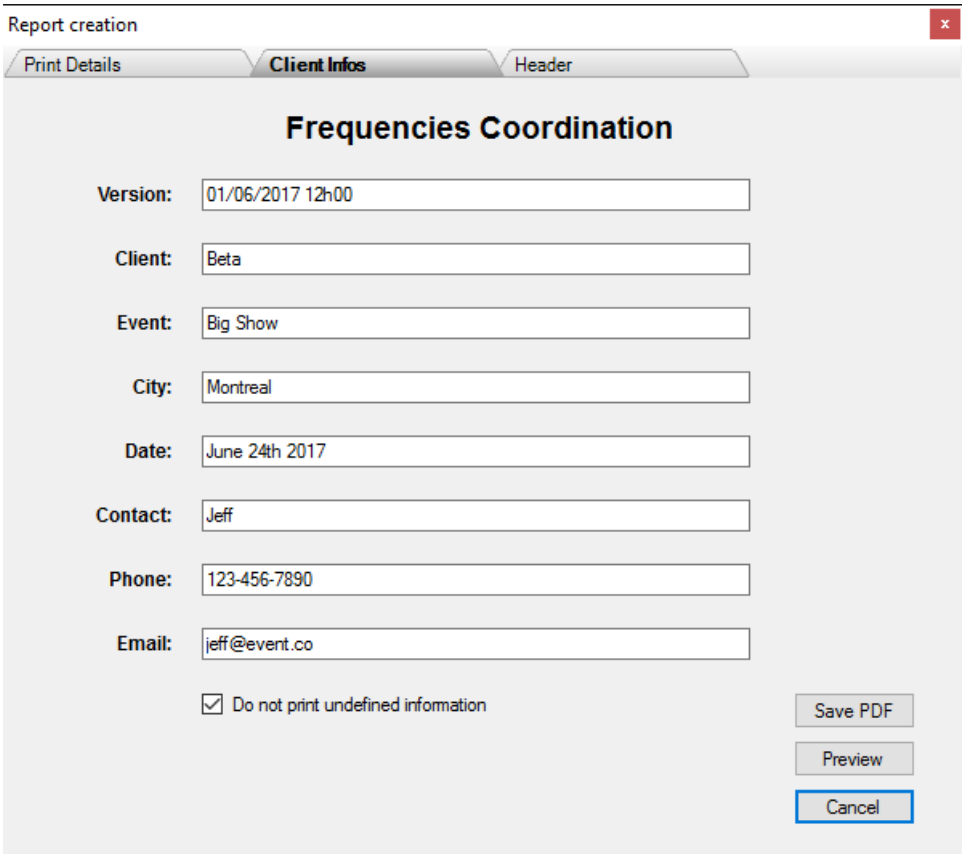
The option "Print Client Informations" allows to display the data relating to a client, data entered in the "Client Infos" pane in next section.

The "Do not print device notes" option is used not to print notes added to devices, even if they are marked as printable (see section 2.6.2).

The “Preview” button display the report before printing.

The “Save PDF” button allows to save the report in a PDF file. This file is locked and can’t be edited by anyone.

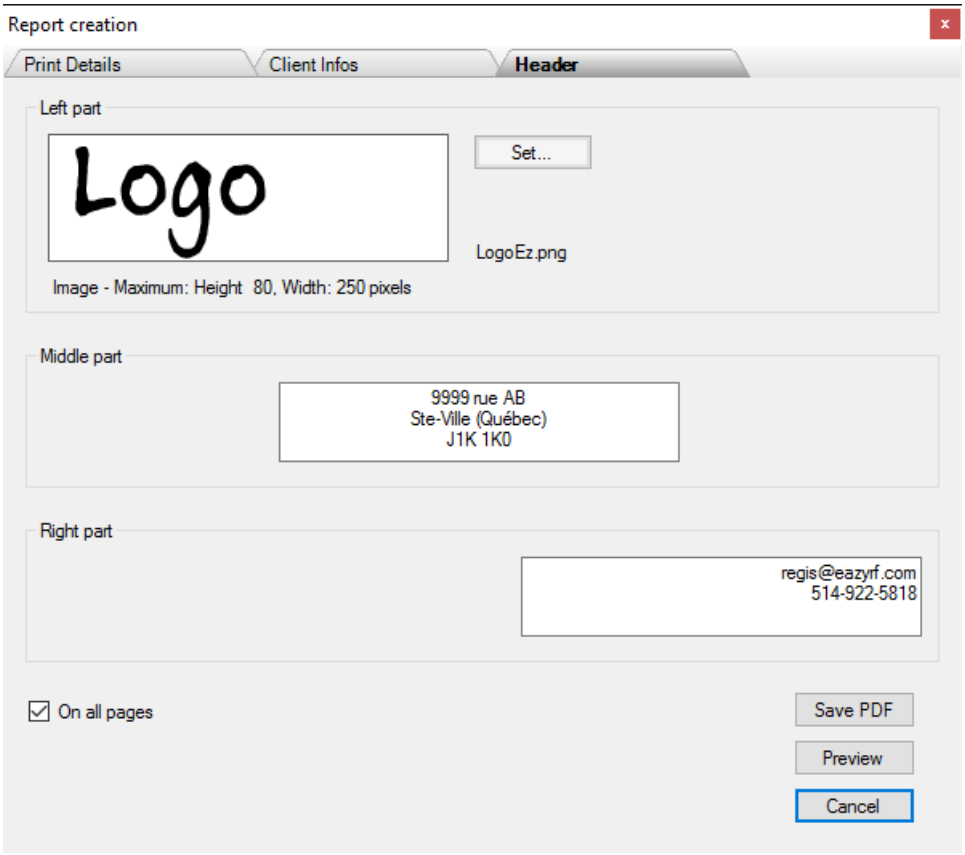
2.9.2 Client Informations



This pane allows you to define the data for a client and for an event. The title data (in bold) is also editable, it is global to all documents, while personal data is relative to the current document only.

The option "Do not print undefined information" is used to cancel the printing of an undefined data line (right part).

2.9.3 Header



The document header has three parts, the left, center, and right.

In the left part, an image can be added (company logo). The "Set" button allows you to select an image. The image is copied to the EazyRF installation directory. The maximum size displayed (and not the base image) is 80 pixels for height and 250 for width (proportion retained).

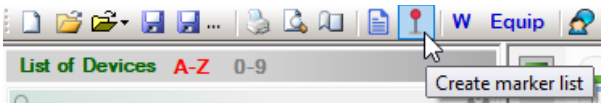
The central part is used to define the address of your company.

The right part is intended to display the contact data of your company.

The "On all pages" option prints this header on all pages of the document or only on the first page (the name to which the EazyRF license was granted appears on the subsequent pages at that time).

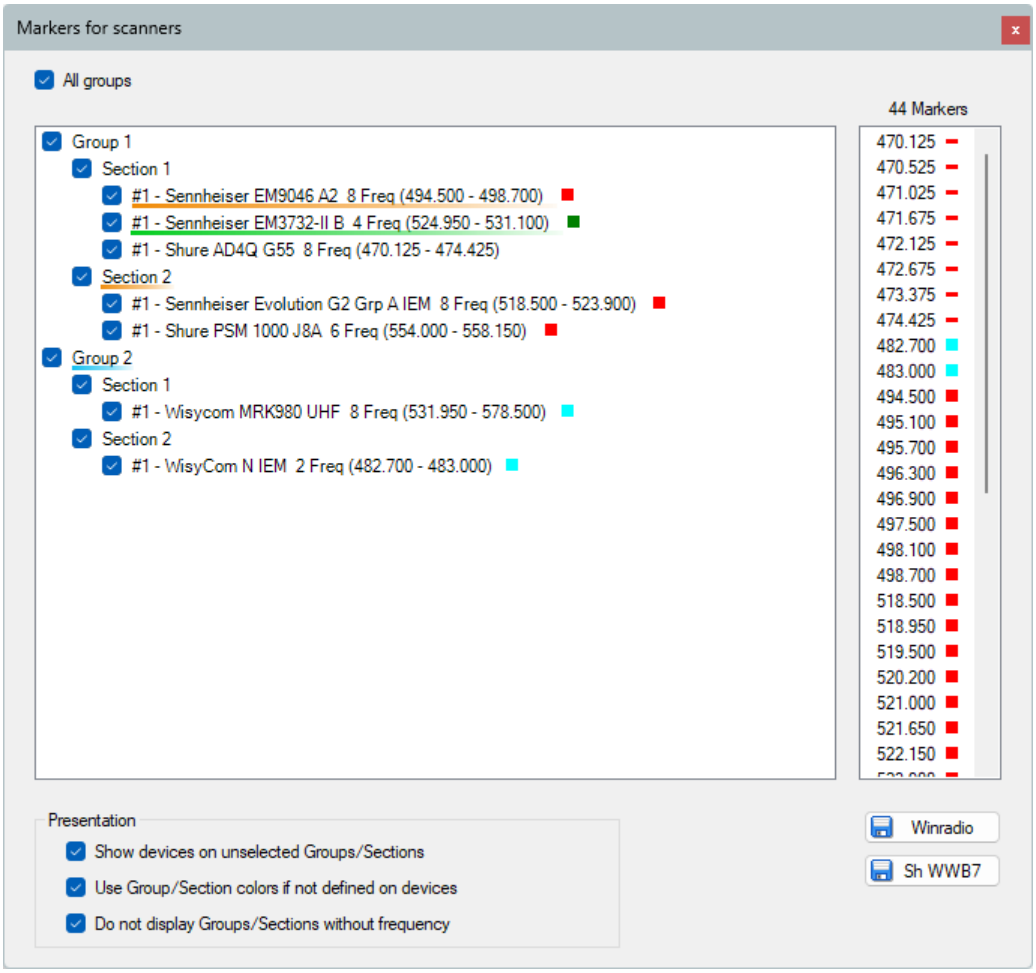
2.10 Creating WinRadio or Shure WWB7 marker list

It is allowed to use the colors assigned to the groups, sections and devices of the document to create a list of markers.

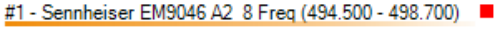


EazyRF uses two coloring systems, the one in the “Frequencies Plan” view is independent and appears only in this view.

Additionally, it is now possible to select each group, section or device:

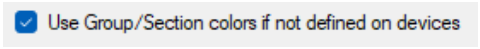


The color of each group, section or device is indicated by a colored line below the name:

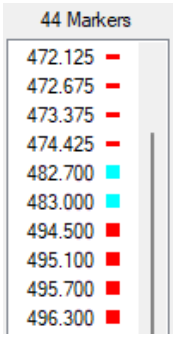


The color block at the end of the name represents the corresponding color in a 16-color system such as WinRadio.

If a device does not have a defined color, an option allows to use the color of the section if defined, otherwise that of the group:



If no color is defined, red is selected by default and is indicated by a line instead of a block:

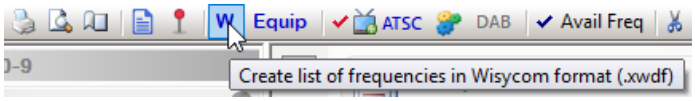


You can save the list as a .csv file in WinRadio or Shure WWB7 format.

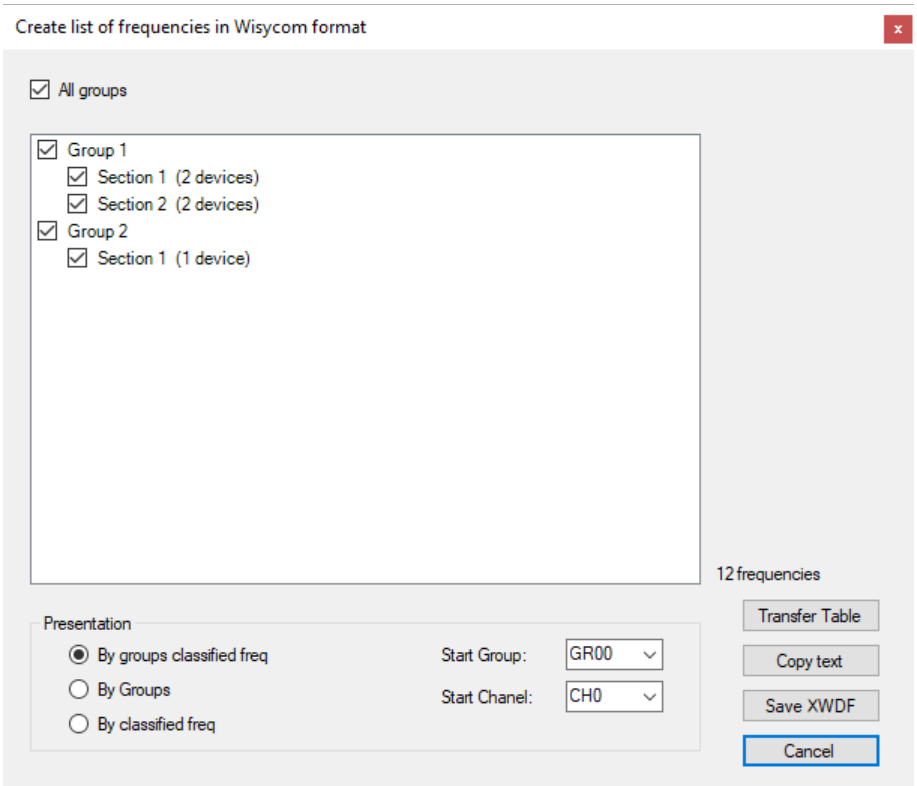
2.11 Creation of Wisycom frequency list

This option allows you to create frequency lists in Wisycom format, ie 450000 instead of 450.000 MHz.

The command:



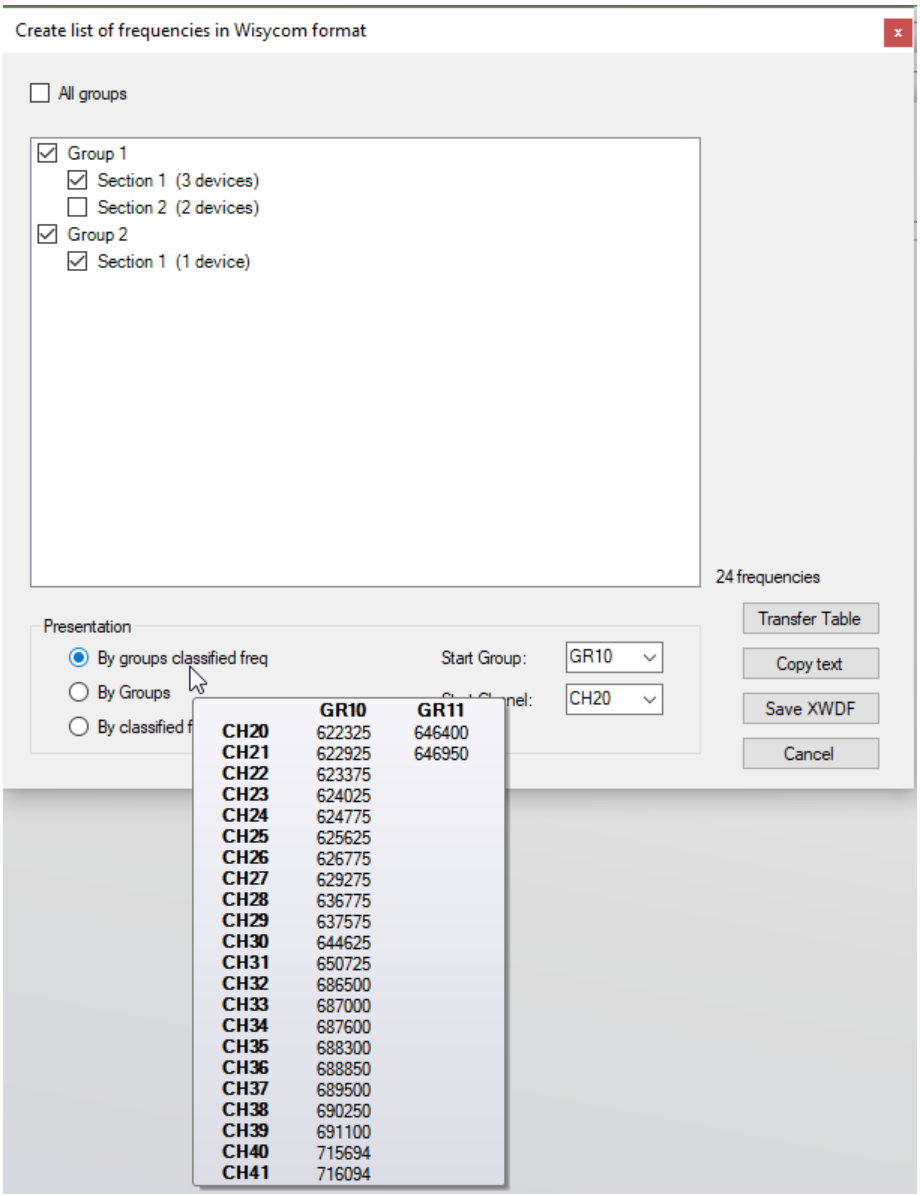
Call the editor:



Like the client reporting tool, group / section selection is allowed.

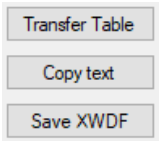
In the "Presentation" section, simply select the desired type of frequency classification, then select the destination cell for the Wisycom frequency editor.

For the following selection:

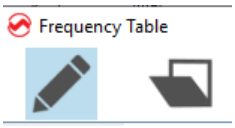


The frequencies of each group are classified.

There are three ways to transfer data to the Wisycom Frequency Editor:



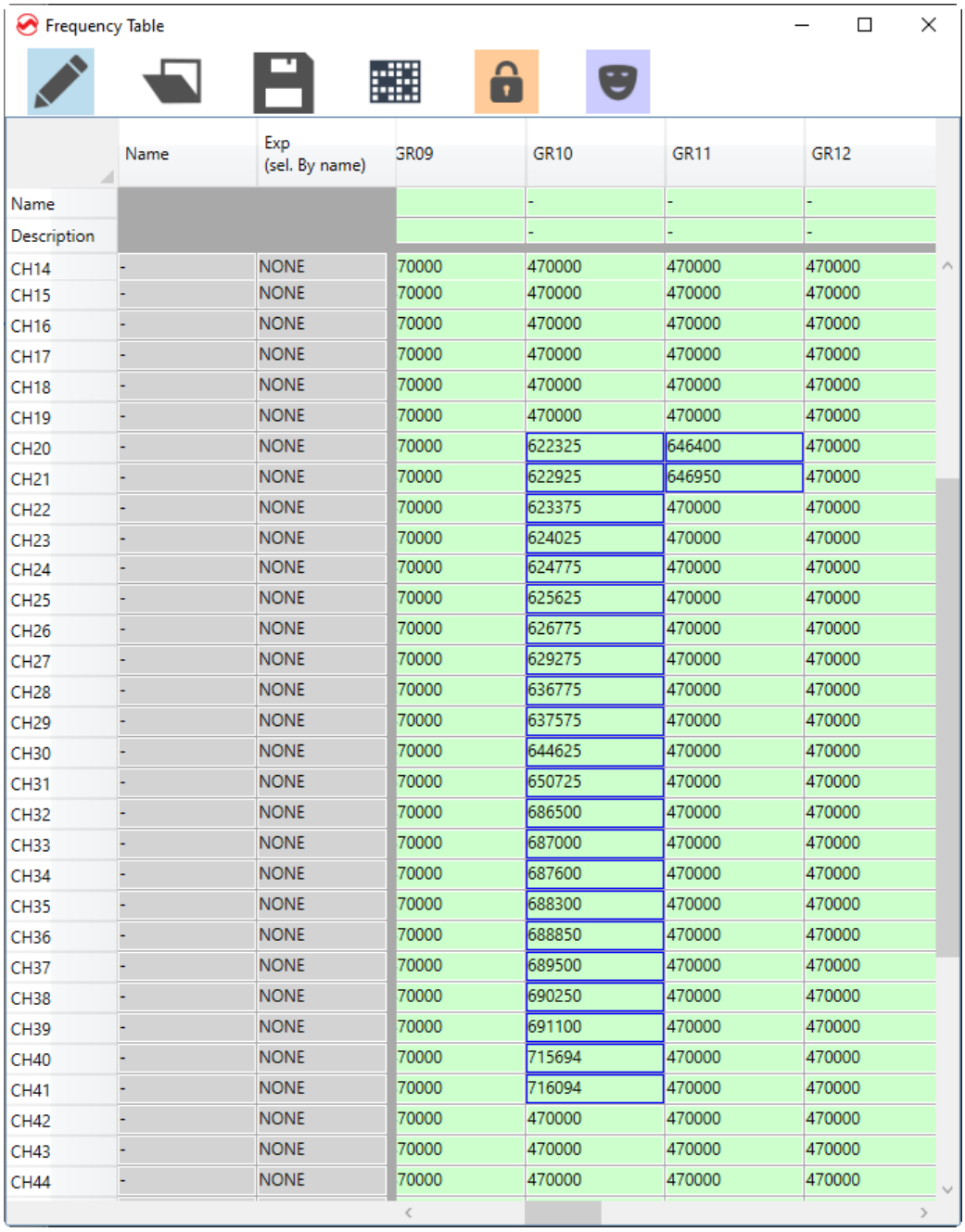
We can transfer the frequencies directly in the editor of Wisycom if no file is open, the reason is simple, EazyRF looks for the window with the title "Frequency Table":



Second option, via the clipboard. This makes it possible to paste the frequencies if a file is open (command Ctrl + V).

Finally, the last option is the creation of a file in .xwdf format, format recognized by Wisycom.

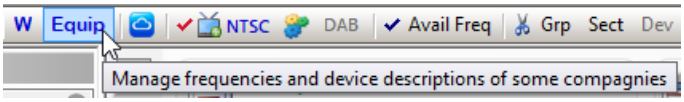
And we get the result:



	Name	Exp (sel. By name)	GR09	GR10	GR11	GR12
Name				-	-	-
Description				-	-	-
CH14	-	NONE	70000	470000	470000	470000
CH15	-	NONE	70000	470000	470000	470000
CH16	-	NONE	70000	470000	470000	470000
CH17	-	NONE	70000	470000	470000	470000
CH18	-	NONE	70000	470000	470000	470000
CH19	-	NONE	70000	470000	470000	470000
CH20	-	NONE	70000	622325	646400	470000
CH21	-	NONE	70000	622925	646950	470000
CH22	-	NONE	70000	623375	470000	470000
CH23	-	NONE	70000	624025	470000	470000
CH24	-	NONE	70000	624775	470000	470000
CH25	-	NONE	70000	625625	470000	470000
CH26	-	NONE	70000	626775	470000	470000
CH27	-	NONE	70000	629275	470000	470000
CH28	-	NONE	70000	636775	470000	470000
CH29	-	NONE	70000	637575	470000	470000
CH30	-	NONE	70000	644625	470000	470000
CH31	-	NONE	70000	650725	470000	470000
CH32	-	NONE	70000	686500	470000	470000
CH33	-	NONE	70000	687000	470000	470000
CH34	-	NONE	70000	687600	470000	470000
CH35	-	NONE	70000	688300	470000	470000
CH36	-	NONE	70000	688850	470000	470000
CH37	-	NONE	70000	689500	470000	470000
CH38	-	NONE	70000	690250	470000	470000
CH39	-	NONE	70000	691100	470000	470000
CH40	-	NONE	70000	715694	470000	470000
CH41	-	NONE	70000	716094	470000	470000
CH42	-	NONE	70000	470000	470000	470000
CH43	-	NONE	70000	470000	470000	470000
CH44	-	NONE	70000	470000	470000	470000

2.12 Sennheiser – Shure – Wisycom – Lectrosonics Equipment

The purpose of the "Equipment" module is to transfer the "Frequencies - Descriptions" values of EazyRF devices to Sennheiser, Shure, Wisycom and Lectrosonics branded equipment using the programming software for these devices; module called by the command:



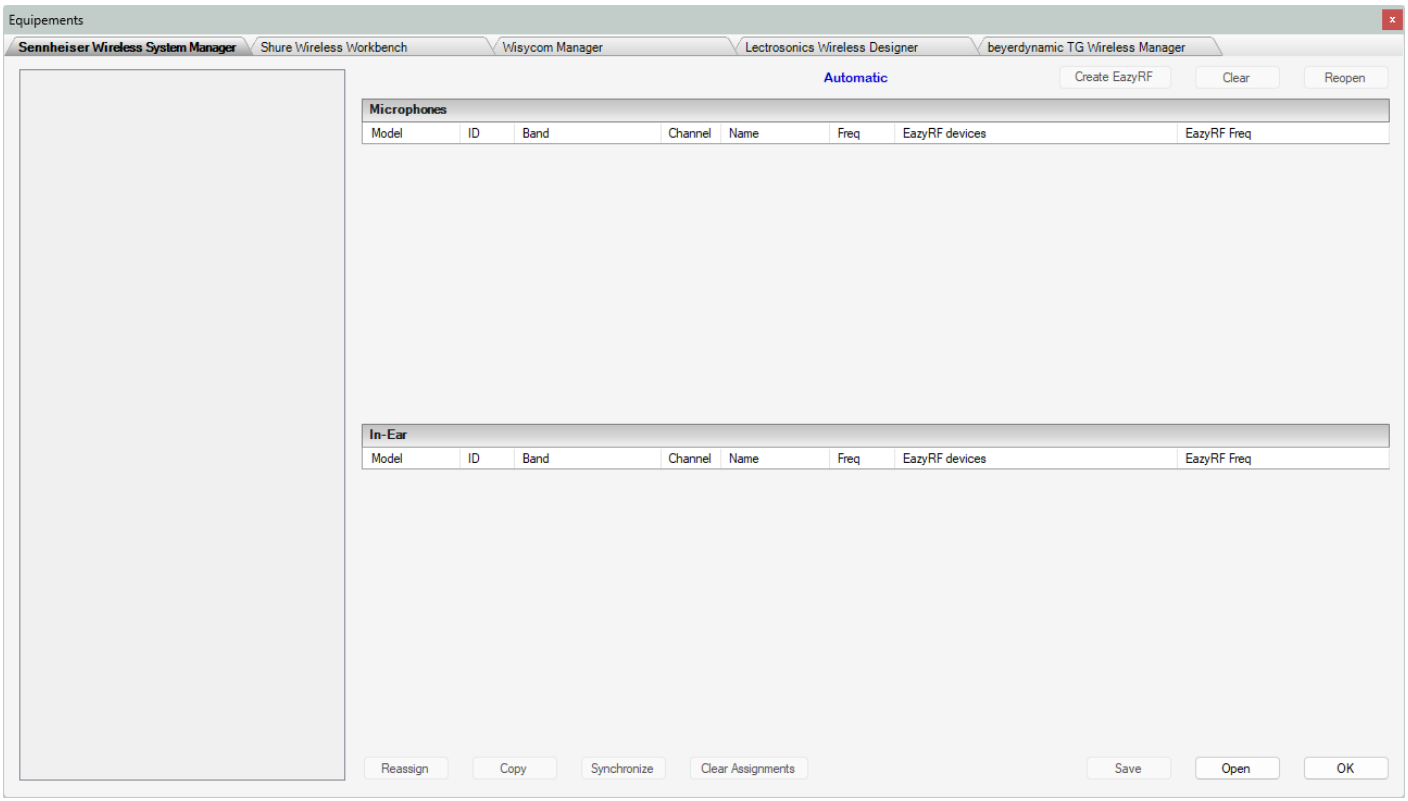
To get there, EazyRF reads the manufacturers' data files: .wsm for Sennheiser, .shw for Shure, .wshow for Wisycom and .wproj for Lectrosonis. The data of these files are in xml format, so readable (text format). EazyRF replaces the values of frequencies and descriptions of the data file by that of the devices used.

A correspondence must exist between the device names of the data document and the name used by EazyRF. This module makes it possible to link the devices of a Shure file, for example, with that of EazyRF.

Everything is done automatically according to some basic rules. The name of the manufacturer, the device model and the frequency bank must appear in the name of the EazyRF devices.

New lists of devices with the correct names are available on the EazyRF download site. You can use them or adapt your lists according to your choice, more details in section 2.10.5.

The module is divided into four sections: Sennheiser, Shure, Wisycom and Lectrosonics, and work similarly:



2.12.1 Sennheiser Equipment

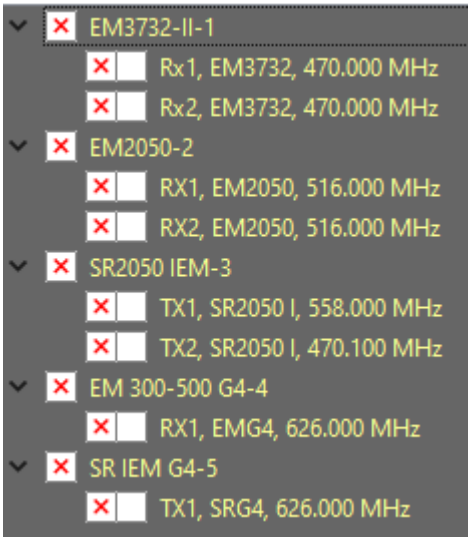
Let's start from a simple example with this need:

Group 1		
Section 1		
#1 - Sennheiser EM2050 Aw		
Mary	518.500	22
Peter	519.000	22
#1 - Sennheiser EM 300-500 G4 Bw		
Jason	626.000	39
#1 - Sennheiser EM3732-II L		
Vox 1	548.500	27
Vox 2	548.900	27
Section 2		
#1 - Sennheiser SR2050 IEM Gw		
Mary	558.000	28
Peter	558.450	28
#1 - Sennheiser SR IEM G4 B		
Jason	626.450	40

So we need three receivers and two transmitters, all Sennheiser type.

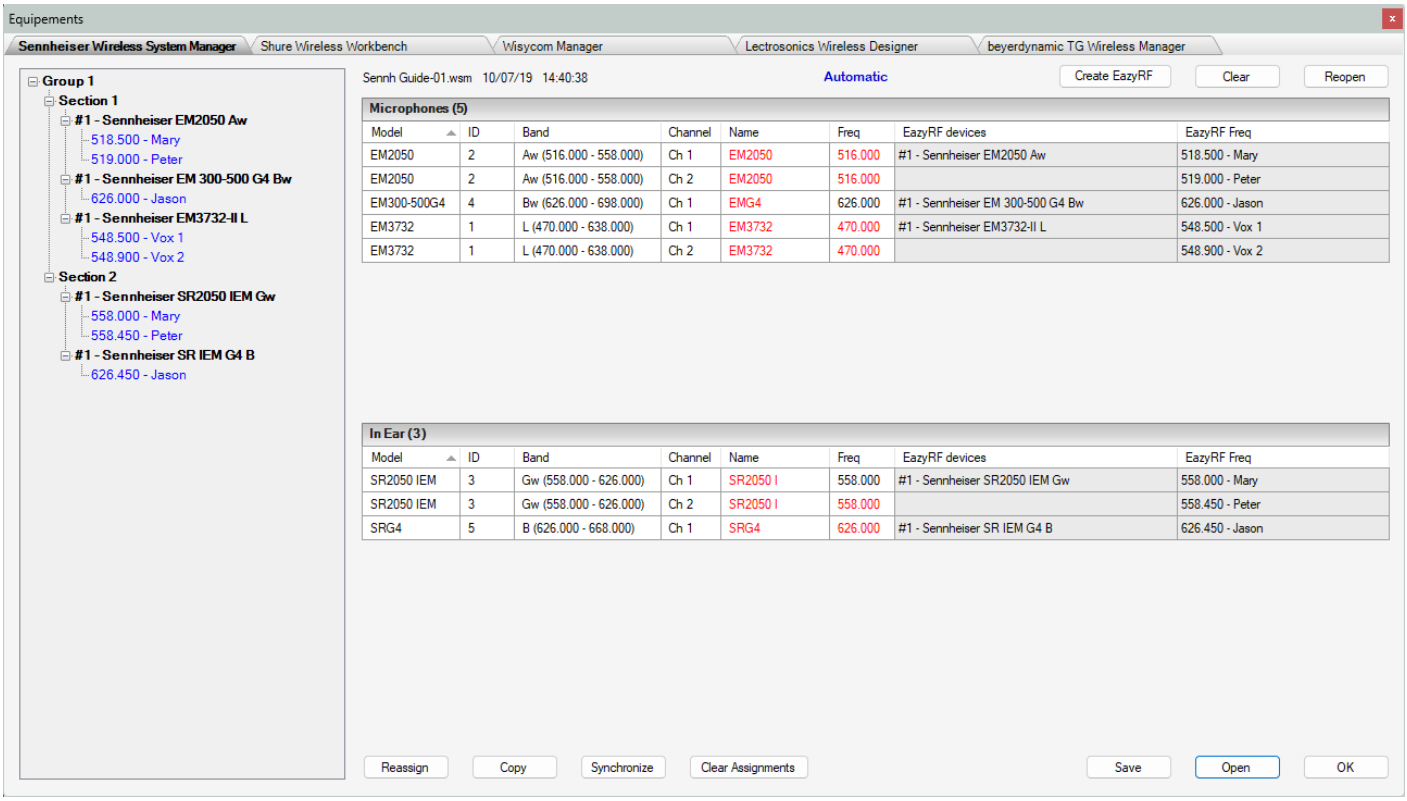
We need to create the Sennheiser configuration file, either online or offline. If the file is created offline, it will need to be paired with the devices later. It's easier to work online though.

So let's prepare the equipment in the Sennheiser - Wireless System Manager software, which gives:

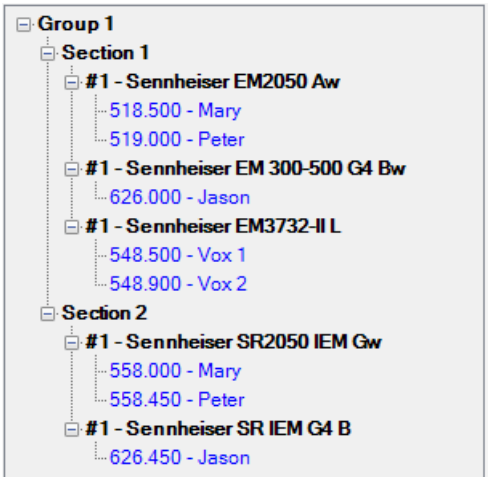


Let's leave the frequencies at the default values. The goal is to modify them with EazyRF.

Let's open the file from the EazyRF Equipment module:



Let's take a closer look at the information. The left part displays the list of Sennheiser equipment that is part of the document:



The frequencies in blue means that they are affected.

The upper right shows the "Microphones" section, the receivers:

Microphones (5)

Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
EM2050	2	Aw (516.000 - 558.000)	Ch 1	EM2050	516.000	#1 - Sennheiser EM2050 Aw	518.500 - Mary
EM2050	2	Aw (516.000 - 558.000)	Ch 2	EM2050	516.000		519.000 - Peter
EM300-500G4	4	Bw (626.000 - 698.000)	Ch 1	EMG4	626.000	#1 - Sennheiser EM 300-500 G4 Bw	626.000 - Jason
EM3732	1	L (470.000 - 638.000)	Ch 1	EM3732	470.000	#1 - Sennheiser EM3732-II L	548.500 - Vox 1
EM3732	1	L (470.000 - 638.000)	Ch 2	EM3732	470.000		548.900 - Vox 2

The bottom right shows the list of In-Ear, the transmitters:

In Ear (3)

Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
SR2050 IEM	3	Gw (558.000 - 626.000)	Ch 1	SR2050 I	558.000	#1 - Sennheiser SR2050 IEM Gw	558.000 - Mary
SR2050 IEM	3	Gw (558.000 - 626.000)	Ch 2	SR2050 I	558.000		558.450 - Peter
SRG4	5	B (626.000 - 668.000)	Ch 1	SRG4	626.000	#1 - Sennheiser SR IEM G4 B	626.450 - Jason

Everything happened automatically because there is correspondence between the device names:

Model	ID	Band
EM2050	2	Aw (516.000 - 558.000)
EM2050	2	Aw (516.000 - 558.000)
EM300-500G4	4	Bw (626.000 - 698.000)
EM3732	1	L (470.000 - 638.000)
EM3732	1	L (470.000 - 638.000)

EazyRF devices
#1 - Sennheiser EM2050 Aw
#1 - Sennheiser EM 300-500 G4 Bw
#1 - Sennheiser EM3732-II L

Model	ID	Band
SR2050 IEM	3	Gw (558.000 - 626.000)
SR2050 IEM	3	Gw (558.000 - 626.000)
SRG4	5	B (626.000 - 668.000)

EazyRF devices
#1 - Sennheiser SR2050 IEM Gw
#1 - Sennheiser SR IEM G4 B

The middle section is red because the name and the frequency do not correspond to the values of the EazyRF document, when they are identical, they are displayed in black.

The frequencies and their descriptions are not automatically copied to the data in the Sennheiser file to not overwrite them systematically.

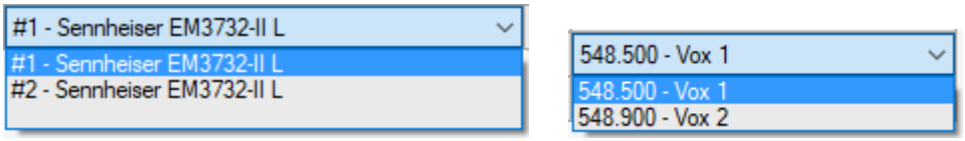
The commands at the bottom of the module allow you to do this:

The "Copy" command transfers the frequencies and their descriptions to the Sennheiser data section:

Microphones (5)							
Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
EM2050	2	Aw (516.000 - 558.000)	Ch 1	Mary	518.500	#1 - Sennheiser EM2050 Aw	518.500 - Mary
EM2050	2	Aw (516.000 - 558.000)	Ch 2	Peter	519.000		519.000 - Peter
EM300-500G4	4	Bw (626.000 - 698.000)	Ch 1	Jason	626.000	#1 - Sennheiser EM 300-500 G4 Bw	626.000 - Jason
EM3732	1	L (470.000 - 638.000)	Ch 1	Vox 1	548.500	#1 - Sennheiser EM3732-II L	548.500 - Vox 1
EM3732	1	L (470.000 - 638.000)	Ch 2	Vox 2	548.900		548.900 - Vox 2

In Ear (3)							
Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
SR2050 IEM	3	Gw (558.000 - 626.000)	Ch 1	Mary	558.000	#1 - Sennheiser SR2050 IEM Gw	558.000 - Mary
SR2050 IEM	3	Gw (558.000 - 626.000)	Ch 2	Peter	558.450		558.450 - Peter
SRG4	5	B (626.000 - 668.000)	Ch 1	Jason	626.450	#1 - Sennheiser SR IEM G4 B	626.450 - Jason

The assignment of devices and frequencies can be done manually if desired:



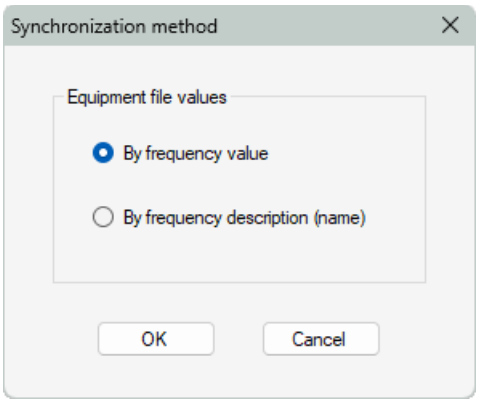
The mode of allocation of the matching EazyRF-Manufacturer devices is indicated in the upper part of the module:

The allocation of frequencies and descriptions must absolutely be saved in the manufacturer's data file, under another name preferably, if not at the reopening of the EazyRF file, the assignment will not have followed. EazyRF does not save any data from the manufacturer file.

To clear a device from the assignment, select the last choice in the list, an empty line. To clear all assignments, use the "Clear Assignments" command.

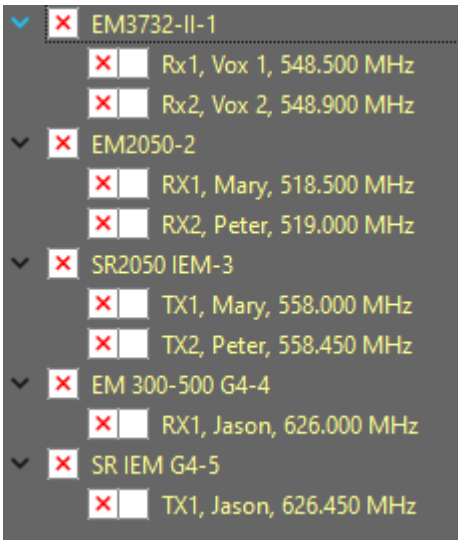
The "Reassign" command allows you to redo an assignment automatically. The assignment order of devices of the same type, EM3732 for example, follows the order of appearance in a section. If you want to assign specific frequencies to a device, move a device to a section and "Reassign".

The "Synchronize" command automatically finds the value of the Sennheiser frequency in the EazyRF list or the frequency description. You can select the option with this screen:



This pairing becomes necessary when the order of the Sennheiser devices is changed by "Wireless System Manager".

After doing the desired assignment, simply save the data to a Sennheiser file with the "Save" command and then open the new file in Sennheiser WSM:



What gives the expected result, the frequencies and their descriptions are assigned to the wright devices and sent to the wright equipment.

The upper right contains 3 other commands:

The "Reopen" command is used to open the data file again, if modified, for example.

"Delete" deletes all data and assignment.

Finally, "Create EazyRF "allows you to create EazyRF devices from the data file, if needed.

2.12.2 Shure Equipment

The procedure is identical as that used in Section 2.10.1 with the Sennheiser, in summary:

Need:

Group 2		
Section 1		
#1 - Shure AXT400 J5		
Annick	578.050	32
Lora	578.550	32
#1 - Shure ULXD4D L50		
Mark	632.000	40
Jim	632.500	41
#1 - Shure AD4Q K55		
Jojo	606.150	36
Tom	606.550	36
Brit	607.100	36
Judy	614.500	38
Section 2		
#1 - Shure PSM 1000 G11		
Jojo	482.500	16
Tom	483.000	16
#1 - Shure PSM 1000 J8A		
Brit	554.000	27
Judy	554.550	28

Shure configuration file (.shw):

Model	Channel Name	Device ID	Band	G & Ch	Frequency	Zone
			Microphone (8)			
AD4D-B	Shure	[AD4D-B]	K55	G:– Ch:–	Find Best	Default
AD4D-B	Shure	[AD4D-B]	K55	G:– Ch:–	Find Best	Default
AD4D-B	Shure	[AD4D-B]	K55	G:– Ch:–	Find Best	Default
AD4D-B	Shure	[AD4D-B]	K55	G:– Ch:–	Find Best	Default
AXT400 A	Shure	[AXT400A]	J5	G:– Ch:–	Find Best	Default
AXT400 A	Shure	[AXT400A]	J5	G:– Ch:–	Find Best	Default
ULXD4D	Shure	[ULXD4D]	L50	G:– Ch:–	Find Best	Default
ULXD4D	Shure	[ULXD4D]	L50	G:– Ch:–	Find Best	Default
			In Ear Monitor (4)			
PSM1000	Shure	[P10T]	J8A	G:– Ch:–	Find Best	Default
PSM1000	Shure	[P10T]	J8A	G:– Ch:–	Find Best	Default
PSM1000	Shure	[P10T]	G11	G:– Ch:–	Find Best	Default
PSM1000	Shure	[P10T]	G11	G:– Ch:–	Find Best	Default

Loading .shw file into Equipment module - Shure:

Microphones (8)							
Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
AD4D-B	AD4D-B 1	K55 (606.125 - 693.875)	Ch 1	Shure		#1 - Shure AD4Q K55	606.150 - Jojo
AD4D-B	AD4D-B 1	K55 (606.125 - 693.875)	Ch 2	Shure			606.550 - Tom
AD4D-B	AD4D-B 2	K55 (606.125 - 693.875)	Ch 1	Shure		#1 - Shure AD4Q K55	607.100 - Brit
AD4D-B	AD4D-B 2	K55 (606.125 - 693.875)	Ch 2	Shure			614.500 - Judy
AXT400 A	AXT400A	J5 (578.000 - 638.000)	Ch 1	Shure		#1 - Shure AXT400 J5	578.050 - Annick
AXT400 A	AXT400A	J5 (578.000 - 638.000)	Ch 2	Shure			578.550 - Lora
ULXD4D	ULXD4D 1	L50 (632.000 - 696.000)	Ch 1	Shure		#1 - Shure ULXD4D L50	632.000 - Mark
ULXD4D	ULXD4D 1	L50 (632.000 - 696.000)	Ch 2	Shure			632.500 - Jim

In Ear (4)							
Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
PSM1000	P10T	G11 (479.125 - 541.875)	Ch 1	Shure		#1 - Shure PSM 1000 G11	482.500 - Jojo
PSM1000	P10T	G11 (479.125 - 541.875)	Ch 2	Shure			483.000 - Tom
PSM1000	P10T	J8A (554.000 - 615.875)	Ch 1	Shure		#1 - Shure PSM 1000 J8A	554.000 - Brit
PSM1000	P10T	J8A (554.000 - 615.875)	Ch 2	Shure			554.550 - Judy

Device name correspondence:

Model	ID	Band	EazyRF devices
AD4D-B	AD4D-B 1	K55 (606.125 - 693.875)	#1 - Shure AD4Q K55
AD4D-B	AD4D-B 1	K55 (606.125 - 693.875)	
AD4D-B	AD4D-B 2	K55 (606.125 - 693.875)	#1 - Shure AD4Q K55
AD4D-B	AD4D-B 2	K55 (606.125 - 693.875)	
AXT400 A	AXT400A	J5 (578.000 - 638.000)	#1 - Shure AXT400 J5
AXT400 A	AXT400A	J5 (578.000 - 638.000)	
ULXD4D	ULXD4D 1	L50 (632.000 - 696.000)	#1 - Shure ULXD4D L50
ULXD4D	ULXD4D 1	L50 (632.000 - 696.000)	

Model	ID	Band	EazyRF devices
PSM1000	P10T	G11 (479.125 - 541.875)	#1 - Shure PSM 1000 G11
PSM1000	P10T	G11 (479.125 - 541.875)	
PSM1000	P10T	J8A (554.000 - 615.875)	#1 - Shure PSM 1000 J8A
PSM1000	P10T	J8A (554.000 - 615.875)	

Only the number of receivers vary between the AD4D (2) and AD4Q (4) models.

Copy data:

Microphones (8)							
Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
AD4D-B	AD4D-B 1	K55 (606.125 - 693.875)	Ch 1	Jojo	606.150	#1 - Shure AD4Q K55	606.150 - Jojo
AD4D-B	AD4D-B 1	K55 (606.125 - 693.875)	Ch 2	Tom	606.550		606.550 - Tom
AD4D-B	AD4D-B 2	K55 (606.125 - 693.875)	Ch 1	Brit	607.100	#1 - Shure AD4Q K55	607.100 - Brit
AD4D-B	AD4D-B 2	K55 (606.125 - 693.875)	Ch 2	Judy	614.500		614.500 - Judy
AXT400 A	AXT400A	J5 (578.000 - 638.000)	Ch 1	Annick	578.050	#1 - Shure AXT400 J5	578.050 - Annick
AXT400 A	AXT400A	J5 (578.000 - 638.000)	Ch 2	Lora	578.550		578.550 - Lora
ULXD4D	ULXD4D 1	L50 (632.000 - 696.000)	Ch 1	Mark	632.000	#1 - Shure ULXD4D L50	632.000 - Mark
ULXD4D	ULXD4D 1	L50 (632.000 - 696.000)	Ch 2	Jim	632.500		632.500 - Jim

In Ear (4)							
Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
PSM1000	P10T	G11 (479.125 - 541.875)	Ch 1	Jojo	482.500	#1 - Shure PSM 1000 G11	482.500 - Jojo
PSM1000	P10T	G11 (479.125 - 541.875)	Ch 2	Tom	483.000		483.000 - Tom
PSM1000	P10T	J8A (554.000 - 615.875)	Ch 1	Brit	554.000	#1 - Shure PSM 1000 J8A	554.000 - Brit
PSM1000	P10T	J8A (554.000 - 615.875)	Ch 2	Judy	554.550		554.550 - Judy

Save data in Shure .shw document, the result:

Model	Channel Name	Device ID	Band	G & Ch	Frequency
				Microphone (8)	
AD4D-B	Brit	[AD4D-B]	K55	G:-- Ch:--	607.100 MHz
AD4D-B	Judy	[AD4D-B]	K55	G:-- Ch:--	614.500 MHz
AD4D-B	Jojo	[AD4D-B]	K55	G:-- Ch:--	606.150 MHz
AD4D-B	Tom	[AD4D-B]	K55	G:-- Ch:--	606.550 MHz
AXT400 A	Annick	[AXT400A]	J5	G:-- Ch:--	578.050 MHz
AXT400 A	Lora	[AXT400A]	J5	G:-- Ch:--	578.550 MHz
ULXD4D	Mark	[ULXD4D]	L50	G:-- Ch:--	632.000 MHz
ULXD4D	Jim	[ULXD4D]	L50	G:-- Ch:--	632.500 MHz
				In Ear Monitor (4)	
PSM1000	Jojo	[P10T]	G11	G:-- Ch:--	482.500 MHz
PSM1000	Tom	[P10T]	G11	G:-- Ch:--	483.000 MHz
PSM1000	Brit	[P10T]	J8A	G:-- Ch:--	554.000 MHz
PSM1000	Judy	[P10T]	J8A	G:-- Ch:--	554.550 MHz

2.12.3 Wisycom Equipment

The procedure is identical as that used in Section 2.10.1 with the Sennheiser, in summary:

Need:

Group 3	
Section 1	
#1 - Wisycom MRK960	
Choir 1	549.650 27
Choir 2	550.300 27
Choir 3	551.350 27
Choir 4	555.500 28
Choir 5	566.500 30
Choir 6	567.600 30
Choir 7	569.500 30
Choir 8	570.300 30
Section 2	
#1 - Wisycom MTK952	
Choir 1	470.000
Choir 4	470.600 14

Wisycom configuration file (.wshow):

N°	Model	Name	Freq MHz	Gr Ch	Link	Type	Serial
1	1 MRK960		470.000	CH01 GR00	192.168.10.121	RX1	V4000059
2	1 MRK960		470.000	CH02 GR00	192.168.10.121	RX2	V4000059
3	2 MRK960		470.000	CH01 GR00	192.168.10.122	RX1	V4000060
4	2 MRK960		470.000	CH02 GR00	192.168.10.122	RX2	V4000060
5	3 MRK960		470.000	CH01 GR00	192.168.10.123	RX1	V4000061
6	3 MRK960		470.000	CH02 GR00	192.168.10.123	RX2	V4000061
7	4 MRK960		470.000	CH01 GR00	192.168.10.124	RX1	W0900002
8	4 MRK960		470.000	CH02 GR00	192.168.10.124	RX2	W0900002
9	5 MTK952A		525.000	Gr 00 Ch 01	192.168.10.205	Tx1	W2400003
10	5 MTK952A		525.000	Gr 00 Ch 02	192.168.10.205	Tx2	W2400003

Loading .wshow file into devices module - Wisycom:

Microphones (8)

Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
MRK960	1	470.000 - 840.000	CH01 GR00		470.000	#1 - Wisycom MRK960	549.650 - Choir 1
MRK960	1	470.000 - 840.000	CH02 GR00		470.000		550.300 - Choir 2
MRK960	2	470.000 - 840.000	CH01 GR00		470.000	#1 - Wisycom MRK960	551.350 - Choir 3
MRK960	2	470.000 - 840.000	CH02 GR00		470.000		555.500 - Choir 4
MRK960	3	470.000 - 840.000	CH01 GR00		470.000	#1 - Wisycom MRK960	566.500 - Choir 5
MRK960	3	470.000 - 840.000	CH02 GR00		470.000		567.600 - Choir 6
MRK960	4	470.000 - 840.000	CH01 GR00		470.000	#1 - Wisycom MRK960	569.500 - Choir 7
MRK960	4	470.000 - 840.000	CH02 GR00		470.000		570.300 - Choir 8

In Ear (2)

Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
MTK952A	12	470.000 - 800.000	CH01 GR00		525.000	#1 - Wisycom MTK952	470.000 - Choir 1
MTK952A	12	470.000 - 800.000	CH02 GR00		525.000		470.600 - Choir 4

The matching of the equipment names is pretty obvious.

Copy data:

Microphones (8)

Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
MRK960	1	470.000 - 840.000	CH01 GR00	Choir 1	549.650	#1 - Wisycom MRK960	549.650 - Choir 1
MRK960	1	470.000 - 840.000	CH02 GR00	Choir 2	550.300		550.300 - Choir 2
MRK960	2	470.000 - 840.000	CH01 GR00	Choir 3	551.350	#1 - Wisycom MRK960	551.350 - Choir 3
MRK960	2	470.000 - 840.000	CH02 GR00	Choir 4	555.500		555.500 - Choir 4
MRK960	3	470.000 - 840.000	CH01 GR00	Choir 5	566.500	#1 - Wisycom MRK960	566.500 - Choir 5
MRK960	3	470.000 - 840.000	CH02 GR00	Choir 6	567.600		567.600 - Choir 6
MRK960	4	470.000 - 840.000	CH01 GR00	Choir 7	569.500	#1 - Wisycom MRK960	569.500 - Choir 7
MRK960	4	470.000 - 840.000	CH02 GR00	Choir 8	570.300		570.300 - Choir 8

In Ear (2)							
Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
MTK952A	12	470.000 - 800.000	CH01 GR00	Choir 1	470.000	#1 - Wisycom MTK952	470.000 - Choir 1
MTK952A	12	470.000 - 800.000	CH02 GR00	Choir 4	470.600		470.600 - Choir 4

Save data in Wisycom document .wshow, the result:

N°	Model	Name	Freq MHz	Gr Ch	Link	Type	Serial
1	1 MRK960	Choir 1	549.650	CH01 GR00	192.168.10.121	RX1	V4000059
2	1 MRK960	Choir 2	550.300	CH02 GR00	192.168.10.121	RX2	V4000059
3	2 MRK960	Choir 3	551.350	CH01 GR00	192.168.10.122	RX1	V4000060
4	2 MRK960	Choir 4	555.500	CH02 GR00	192.168.10.122	RX2	V4000060
5	3 MRK960	Choir 5	566.500	CH01 GR00	192.168.10.123	RX1	V4000061
6	3 MRK960	Choir 6	567.600	CH02 GR00	192.168.10.123	RX2	V4000061
7	4 MRK960	Choir 7	569.500	CH01 GR00	192.168.10.124	RX1	W0900002
8	4 MRK960	Choir 8	570.300	CH02 GR00	192.168.10.124	RX2	W0900002
9	5 MTK952A	Choir 1	470.000	Gr 00 Ch 01	192.168.10.205	Tx1	W2400003
10	5 MTK952A	Choir 4	470.600	Gr 00 Ch 02	192.168.10.205	Tx2	W2400003

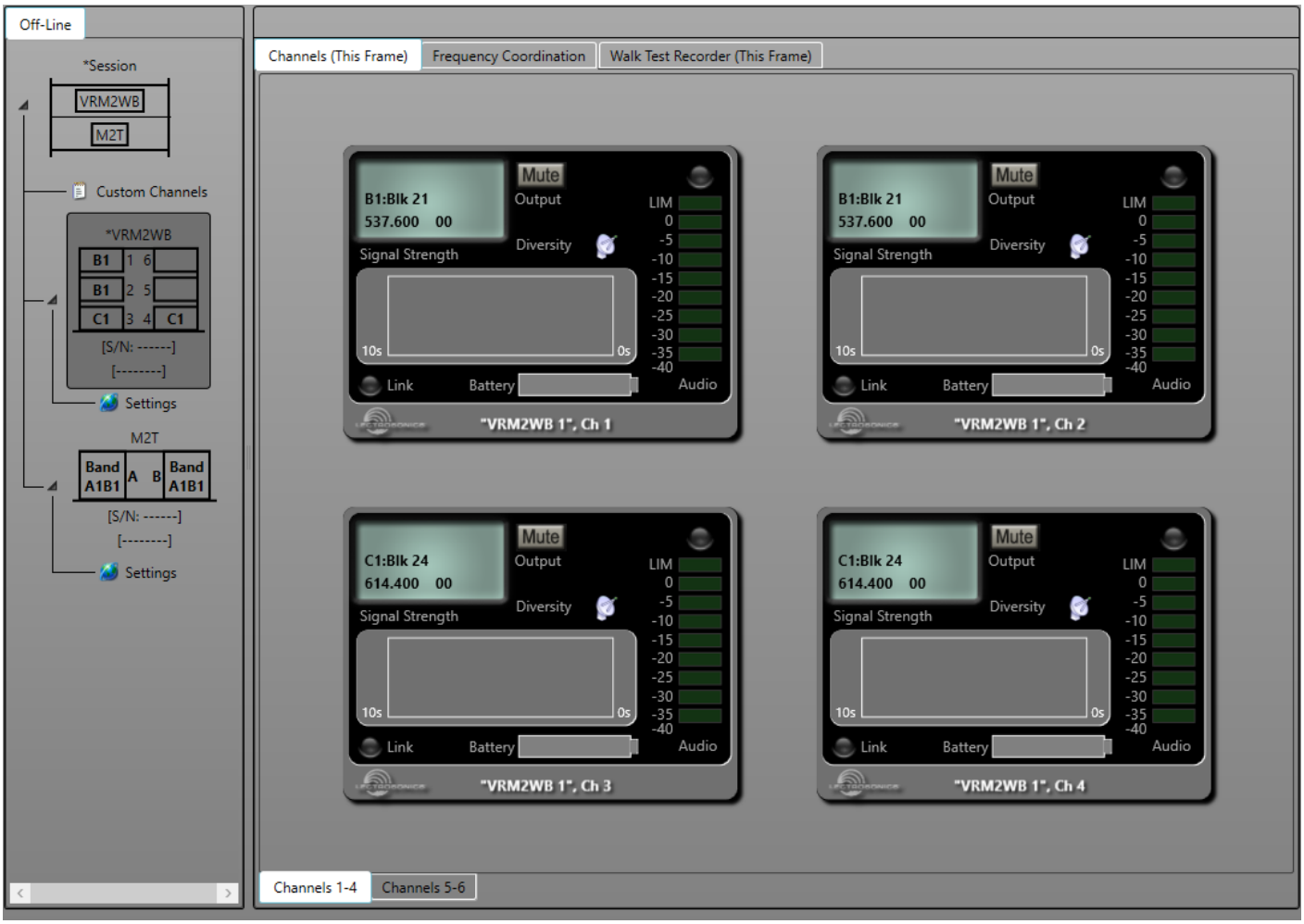
2.12.4 Lectrosonics Equipment

The procedure is identical as that used in Section 2.10.1 with the Sennheiser, in summary:

Need:

Group 4	
Section 1	
#1 - Lectrosonics VRM2WB B1	
Mary	540.200 25
Paul	541.050 25
#1 - Lectrosonics VRM2WB C1	
Kim	615.100 38
Jessy	615.800 38
Section 2	
#1 - Lectrosonics M2T A1B1	
Kim	506.500 20
Jessy	506.900 20

Lectrosonics configuration file (.wproj):



Loading .wproj file in Equipment module - Lectrosonics:

Microphones (4)							
Model	ID	Band	Ch	Name	Freq	EazyRF devices	EazyRF Freq
VRM2WB	1	B1 (537.600 - 614.375)	1		537.600	#1 - Lectrosonics VRM2WB B1	540.200 - Mary
VRM2WB	1	B1 (537.600 - 614.375)	2		537.600		541.050 - Paul
VRM2WB	1	C1 (614.400 - 691.175)	3		614.400	#1 - Lectrosonics VRM2WB C1	615.100 - Kim
VRM2WB	1	C1 (614.400 - 691.175)	4		614.400		615.800 - Jessy

In Ear (2)							
Model	ID	Band	Ch	Name	Freq	EazyRF devices	EazyRF Freq
M2T	1	A1B1 (470.100 - 614.375)	1		470.100	#1 - Lectrosonics M2T A1B1	506.500 - Kim
M2T	1	A1B1 (470.100 - 614.375)	2		470.100		506.900 - Jessy

The matching of the equipment names is pretty obvious.

Copy data:

Microphones (4)							
Model	ID	Band	Ch	Name	Freq	EazyRF devices	EazyRF Freq
VRM2WB	1	B1 (537.600 - 614.375)	1	Mary	540.200	#1 - Lectrosonics VRM2WB B1	540.200 - Mary
VRM2WB	1	B1 (537.600 - 614.375)	2	Paul	541.050		541.050 - Paul
VRM2WB	1	C1 (614.400 - 691.175)	3	Kim	615.100	#1 - Lectrosonics VRM2WB C1	615.100 - Kim
VRM2WB	1	C1 (614.400 - 691.175)	4	Jessy	615.800		615.800 - Jessy

In Ear (2)							
Model	ID	Band	Ch	Name	Freq	EazyRF devices	EazyRF Freq
M2T	1	A1B1 (470.100 - 614.375)	1	Kim	506.500	#1 - Lectrosonics M2T A1B1	506.500 - Kim
M2T	1	A1B1 (470.100 - 614.375)	2	Jessy	506.900		506.900 - Jessy

Save data in Lectrosonics .wproj document, the result:

2.12.5 List Devices and Names

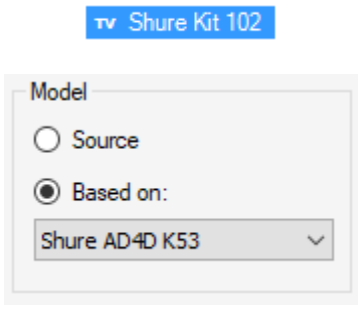
The correspondence between the names of EazyRF devices and Sennheiser, Shure, Wisycom and Lectrosonics equipment is essential for the proper functioning of this module.

A list of suitable names exists on the EazyRF download site:

http://www.eazyrf.com/DownloadDevices2019.html.

For updates on the device list, see section 10.5.

For a name to be recognized, the name of the manufacturer must be present, as well as the model of the device and the frequency band, for example Shure AD4D K53, or an evening device based on this name:



This device name is valid because it is a Shure AD4D K53 set.

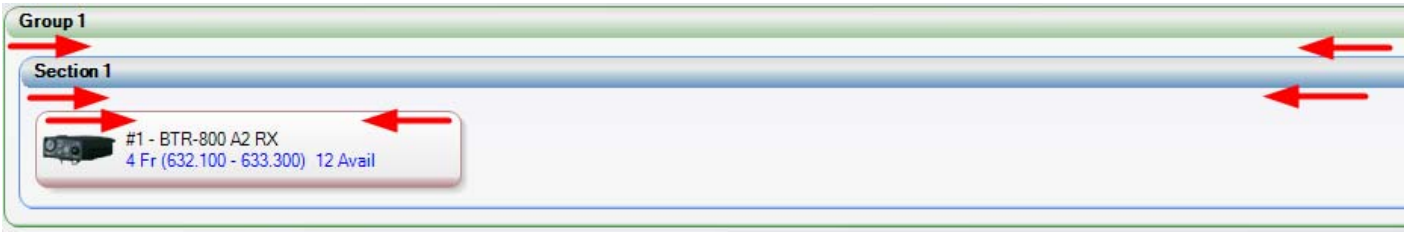
Better still, you can download the new names, update the list of devices, then change only the model setting, in the device editor, from basic model to based.

You can also change the name of your device to include the necessary credentials, in which case the old name is retained, and when you open a document containing the old name, it is automatically changed to the new one. , a temporary message tells you.

It is also possible to add to the description of the device the missing elements, for example if # 1 - Shure Axient J5 is not recognized, AD4D # 1 - Shure Axient J5 will be recognized as Shure AD4D J5 because all identifiers are present.

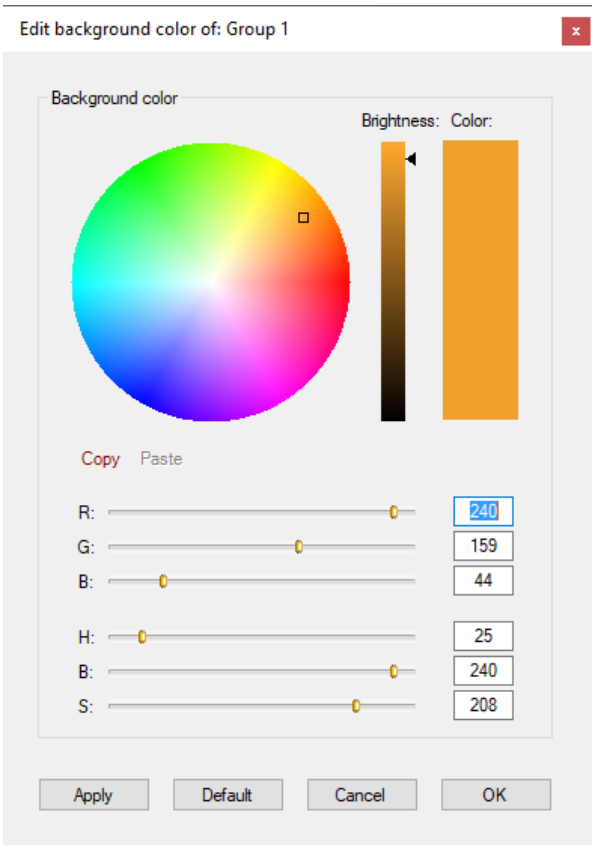
2.13 Background color – Group/Section/Device/Frequencies

One of the background colors of each group, section, and device can be changed in most panes. You can also change the background color of the frequencies in the global, detailed pane and in the device editor (no matter where it is called). To do this, simply double-click at the top of the group (at the bottom of the title area), at the top of a section (at the bottom of the title area), or in the top area. of a device:



To change the background color of one or more frequencies, several methods exist, either by the global view, the detailed view, the device editor and the list of the contents of the document, more details in the following sections.

The color editor:



The "Apply" command allows the same color to be applied to a selection of devices (the selection of devices can be done on several sections of the same group). When the device selection is multiple, the displayed color is the color of the device that was double-clicked.

The "Default" button recalls the basic color used by EazyRF.

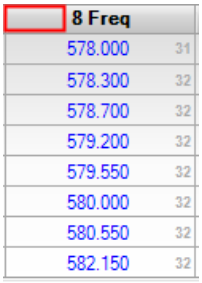
"Cancel" restores the color(s) used when calling the editor.

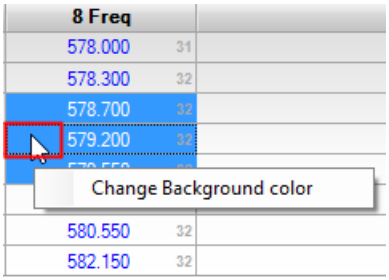
The "Copy/Paste" commands allow you to copy a color and apply it elsewhere.

The purpose of this command is to emphasize certain details and not to create a multitude of colors:

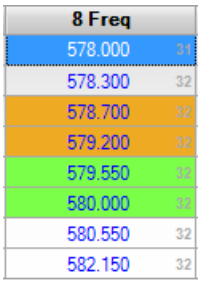
2.13.1 Frequency Background Color - Global and Detailed View

First a frequency or more must be selected before being able to call the background color editor. This can be called in two ways, either by double-clicking on a section of the frequency header (global view), or by right-clicking on the frequencies (size of the area - 30 %):





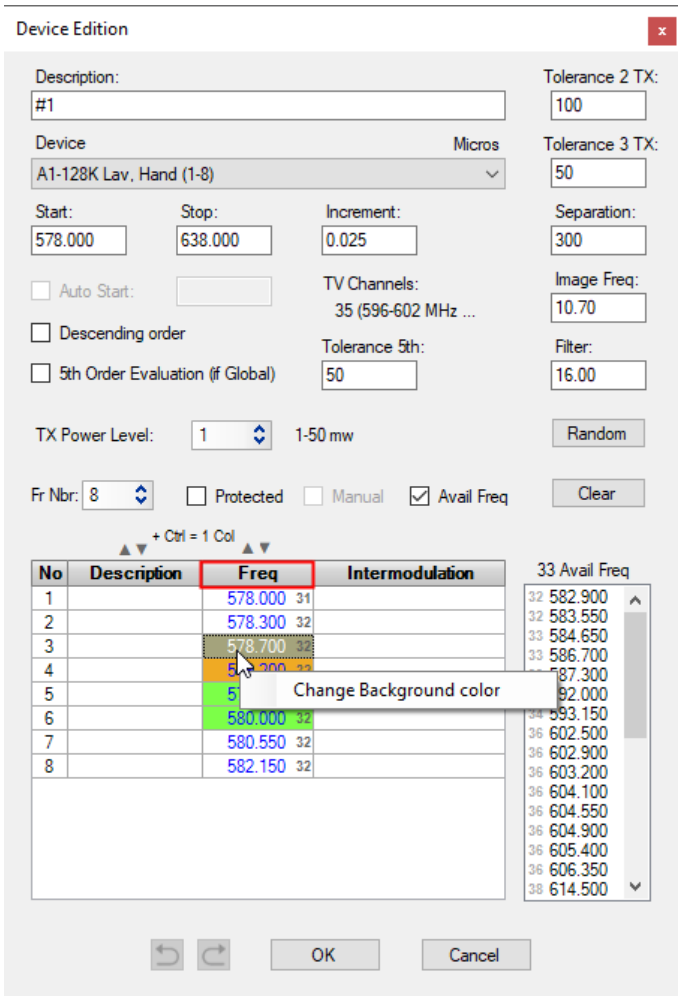
With as result for example:



The background color of the selected frequency is displayed when launching the editor.

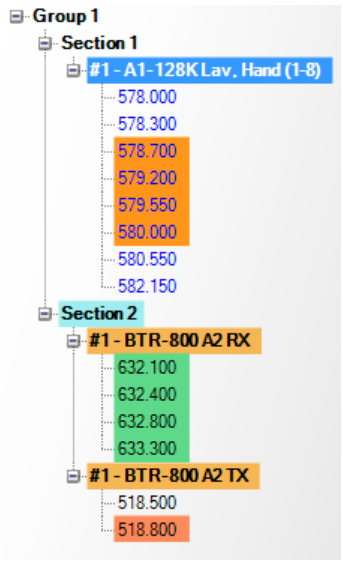
2.13.2 Background Color Frequencies - Device Editor

We can do the same treatment with the device editor in the global pane:



The background color editor can be called either by the right mouse button or by double-clicking on the frequency header (full area).

The background colors of the group/section/device/frequency are displayed in the device list of a document in the panes: Intermodulation, Spectrum View, On Tour and Classification:

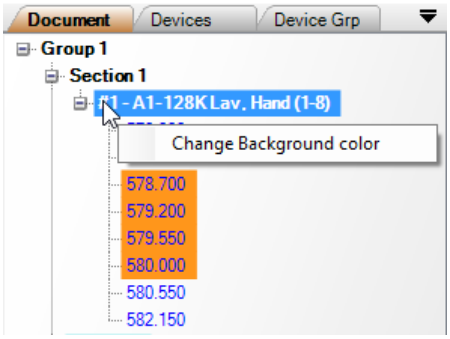


The background colors of groups, sections, and devices can be changed from this list.

In addition, the background color of the frequencies can be changed wherever the device editor can be called.

2.13.3 Frequency Background Color - Document List

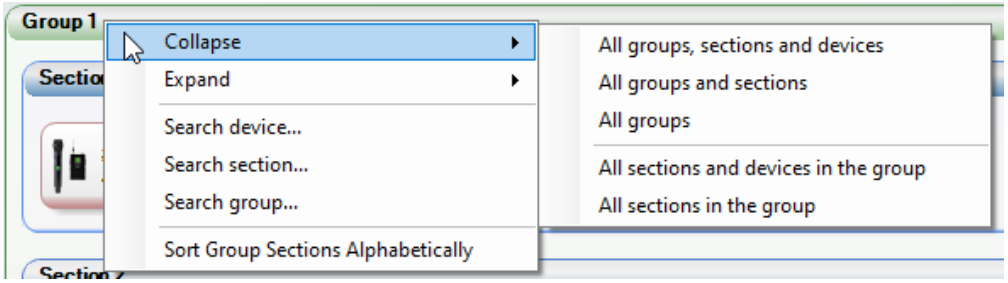
You can also call the background color editor via the list of the contents of a document in the Intermodulations and On Tour (as well as Multi-Scenes) panes:

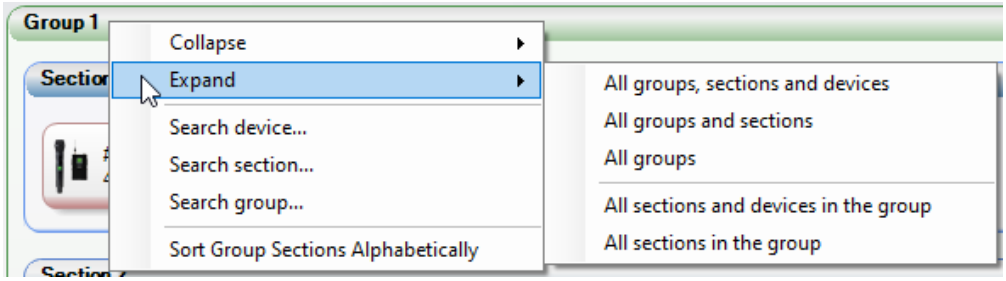


2.14 Group / Section menu

2.14.1 Collapse / expand

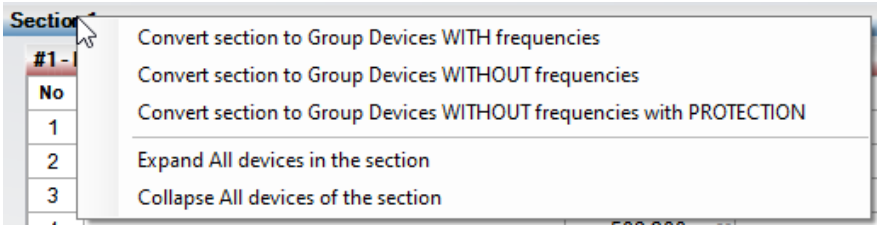
From the global and detailed views, a menu is accessible with the right mouse button on the group header:





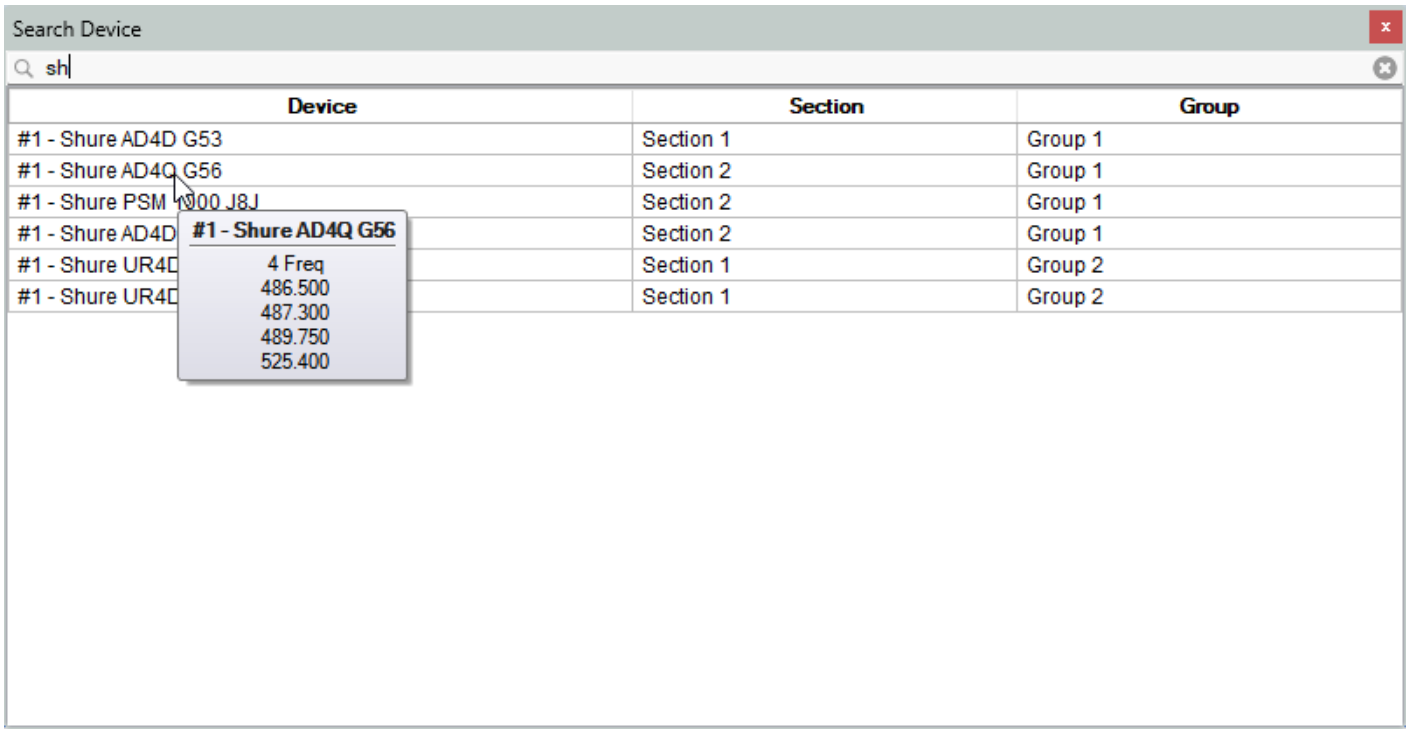
It is thus possible to apply the expand / collapse function to all groups, sections or devices of the document, of a group or of a section.

The "Detailed View" is used to manage the expand/collapse of devices in a section:

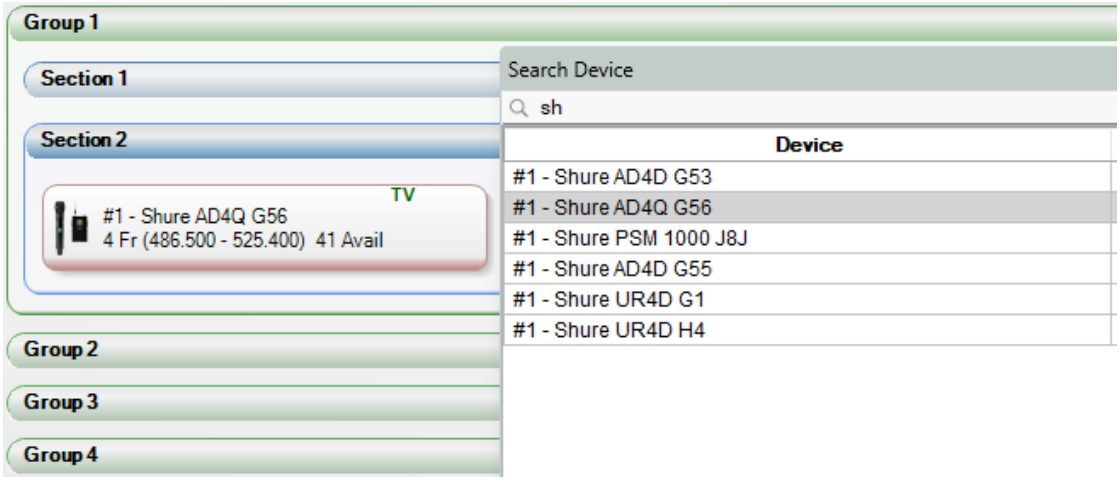


2.14.2 Search Device, Section or Group

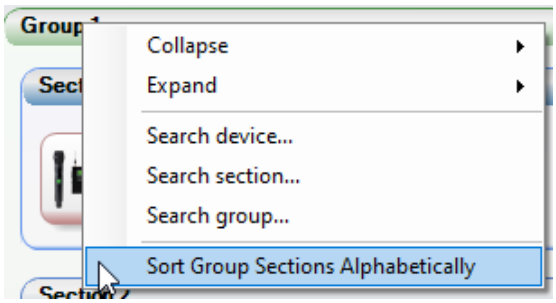
The “Search device…” function allows you to find a device by entering part of its name:



Selecting a device in the list displays the device in the document even if the group or section is in collapsed:



2.14.3 Classification of section names in alphabetical order



2.15 Evaluate commands

2.15.1 Evaluate Frequencies list

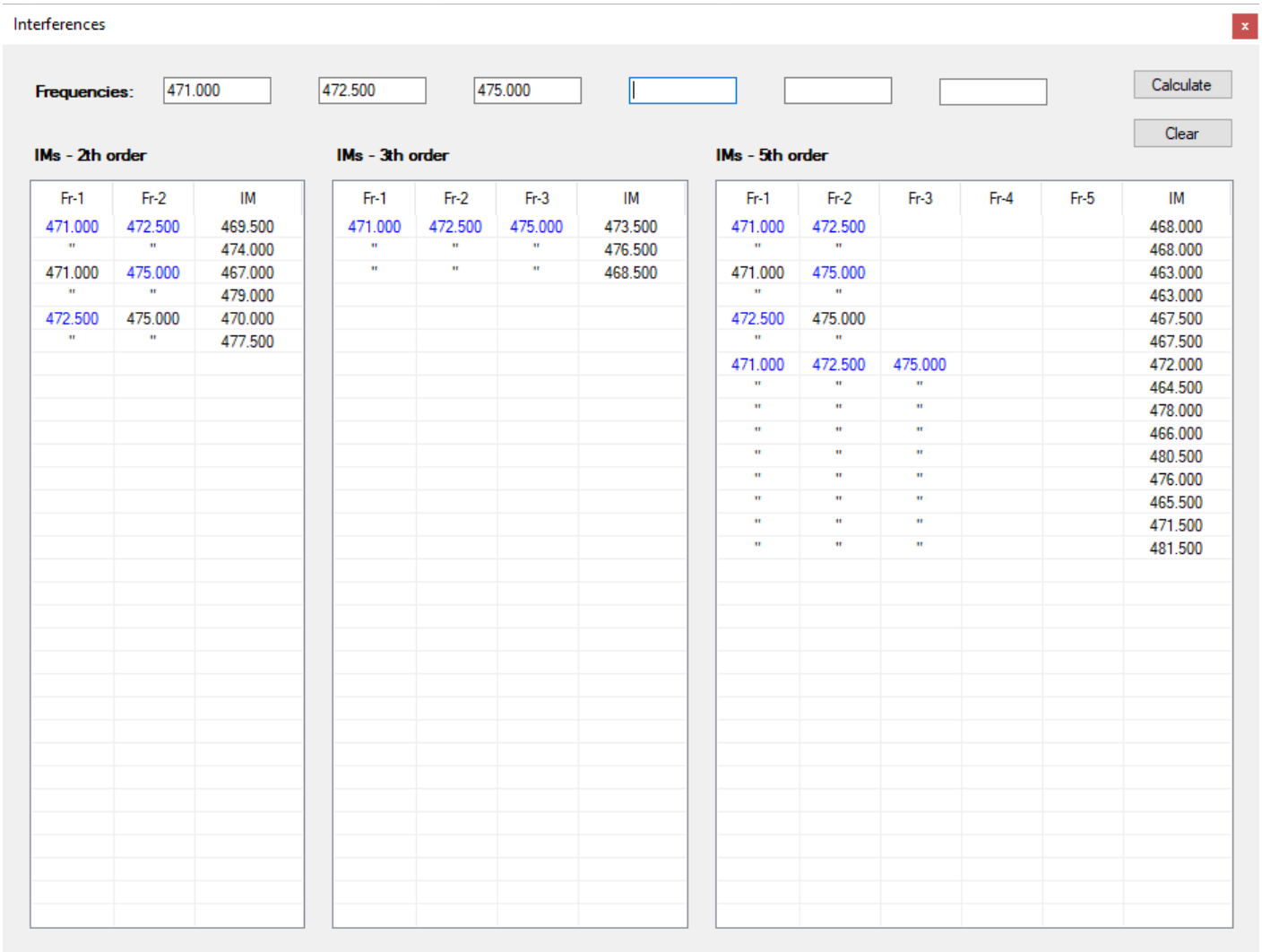
This command restarts the calculation of intermodulations manually to check whether a change has not occurred.

2.15.2 Evaluate Devices

This allows the calculation of the frequencies of unprotected devices to be redone in automatic mode.

2.15.3 Manual Evaluation

This operation launches an editor allowing to perform intermodulation calculations for frequencies independent of those of the document, the goal is to display the values of the intermodulations:



Thus, the values of the intermodulation frequencies are displayed, the aim of the exercise is theoretical.

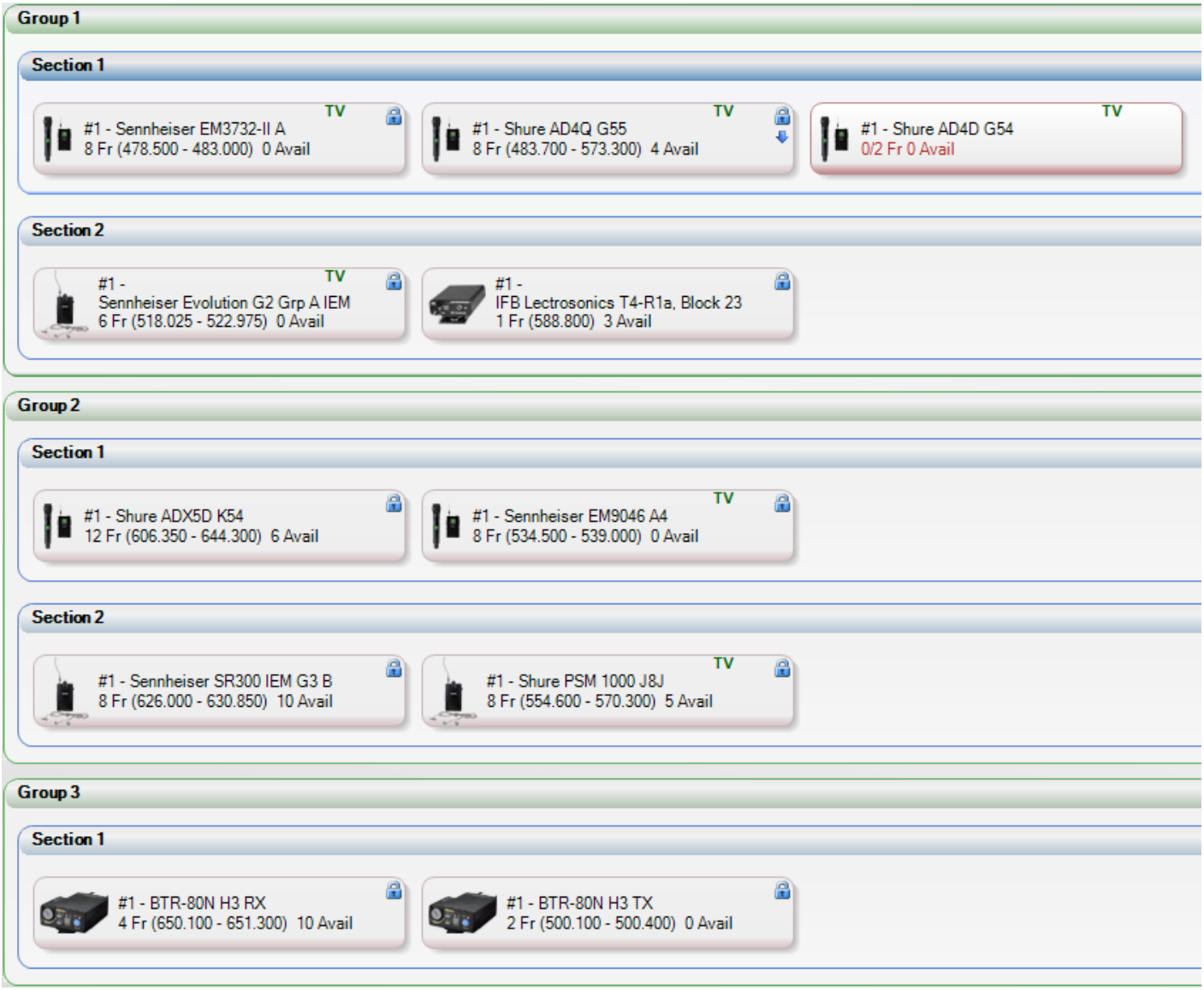
2.15.4 Recalculate (frequencies)

This module allows you to recalculate all device frequencies in a document, regardless of whether they are protected or not, and the calculation mode is irrelevant.

It goes without saying that this command is not intended to find a solution when adding to an event already in operation. Its purpose is to find new frequencies, either when reusing a previous plan or during planning and the solution is not found at first glance.

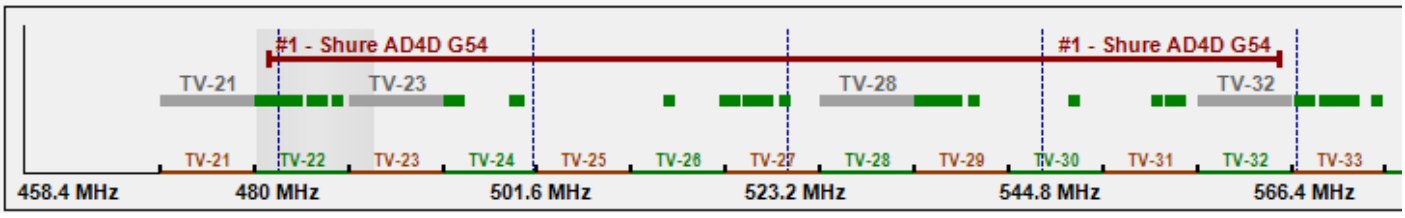
Recalculating frequencies is a destructive operation, there is no undoing. The only way to do this is to reload the document, so don't forget before proceeding.

Let's take a simple theoretical example:

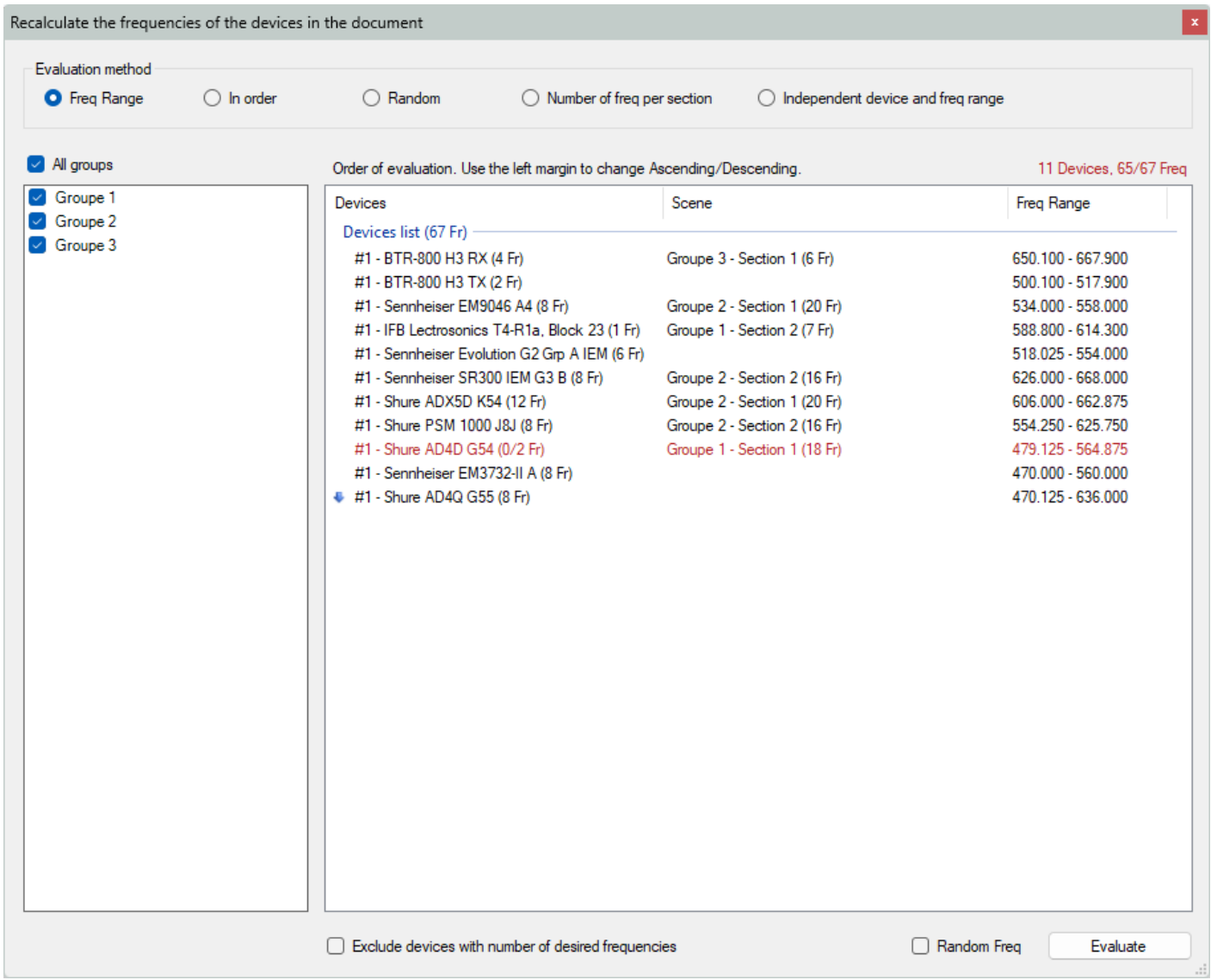


The Shure AD4D G54 device has just been added and no frequencies are available.

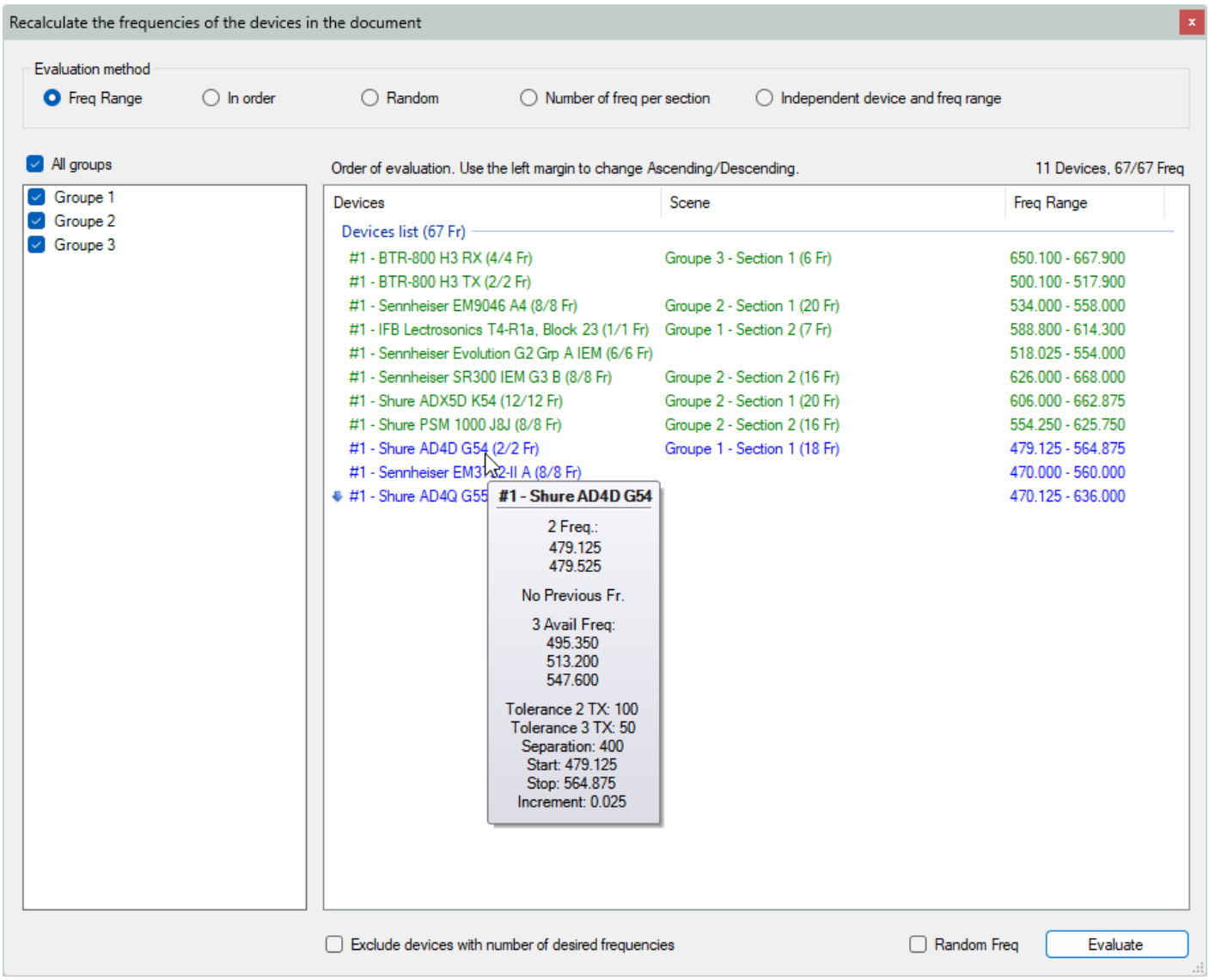
If we take a look at the frequency spectrum, we can see that the frequency band used by the device is not overused:



So maybe a recalculation of the devices would allow a rearrangement of frequencies. The "Recalculate" module allows you to do this:



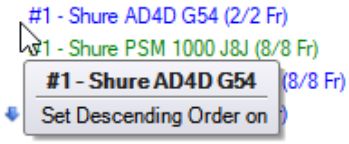
EazyRF displays by default the list of devices according to the frequency bandwidth of each device less the spaces occupied by the television channels, that is the option "Freq Range" of the "Evaluation method". So, devices with limited bandwidth will be re-evaluated first and so on. Let's do an assessment:



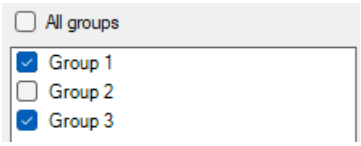
We can see that all devices now have their frequencies. The color of the device name indicates the status of the changes: green = reassessment without changes, blue = reassessment with frequency changes, and red = the desired number of frequencies was not found.

Different evaluation methods exist: by "Freq Range", seen previously, "In Order", according to the order of appearance in the groups / sections, "Random", in an undefined order based on chance and finally, by "Number of freq by sections" and by "Devices of independent groups with frequency range".

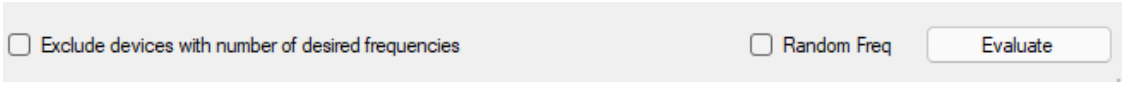
The devices can be recalculated in descending order using the left margin of the device name:



All groups can be recalculated or selected as needed:



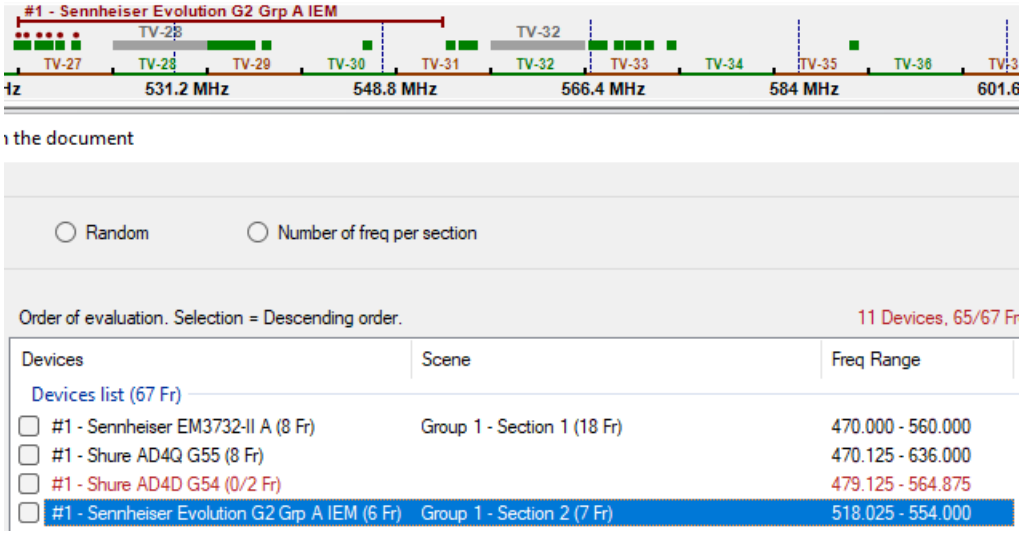
Finally, in the lower part of the window there are some additional options:



The "Exclude devices with number of desired frequencies" option allows you to exclude devices whose frequencies have already been found from re-evaluation. It goes without saying that this option is of no use for a single device, a certain number is required for a tangible result.

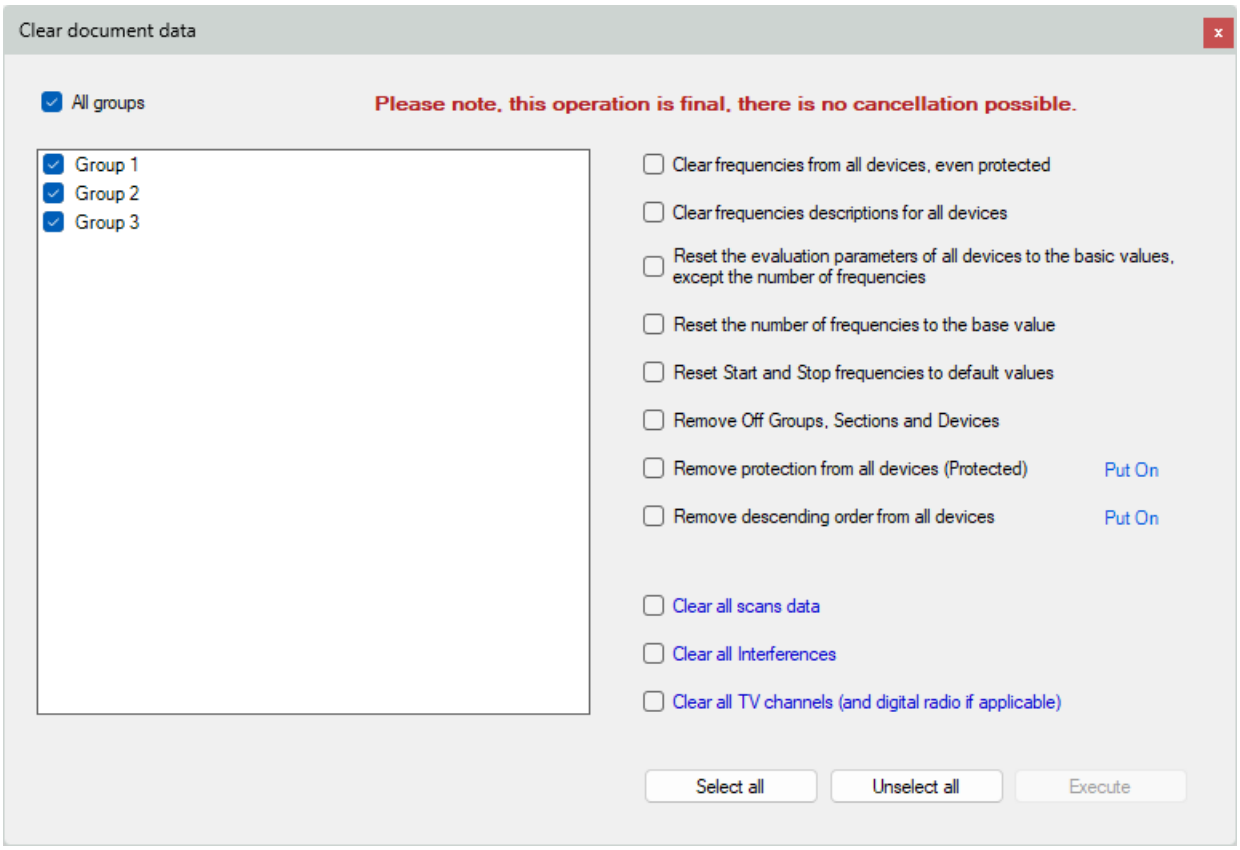
The option "Random Freq" recalculates the frequencies of the devices randomly, so never the same result twice.

Each device on the list can be selected and the monitoring is done in the views thus allowing to have a better idea of a solution (descending order for example):



2.15.5 Clear (data)

This tool allows you to erase part of the data from a document:

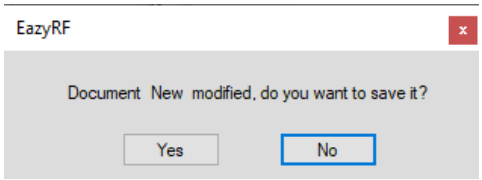


First, you select which groups will be affected, or all groups. No device is erased, only its data.

Then you have the choice to erase either the frequencies of the devices of the selected groups, or the descriptions of the frequencies, or to put the evaluation parameters back to their basic values (except the number of frequencies), or to replace the number of frequencies to the default number, either to replace the start and stop frequencies to default, either to remove the deactivation (power off) of the groups, sections and devices, and finally, or to remove or put on the protection on the devices of the groups. These functions can be combined.

When all the groups are selected, you have the choice to erase the global data of the document, either the scans, the list of interference or the list of TV channels (and digital radio channels for France).

This function is final, no undo option exists. For this reason, if your document has not been saved beforehand, when you launch the "Execute" command, a window asks you if you want to save it:



2.16 Shortcuts

There are some keyboard shortcuts to perform certain commands:

Delete or Backspace: erase one cell (or several)

Ctrl + F: Add Fixe Device

Ctrl + V: Add Variable Device

Ctrl + G: Add Group

Ctrl + S: Add Section

Ctrl + Z: Undo command

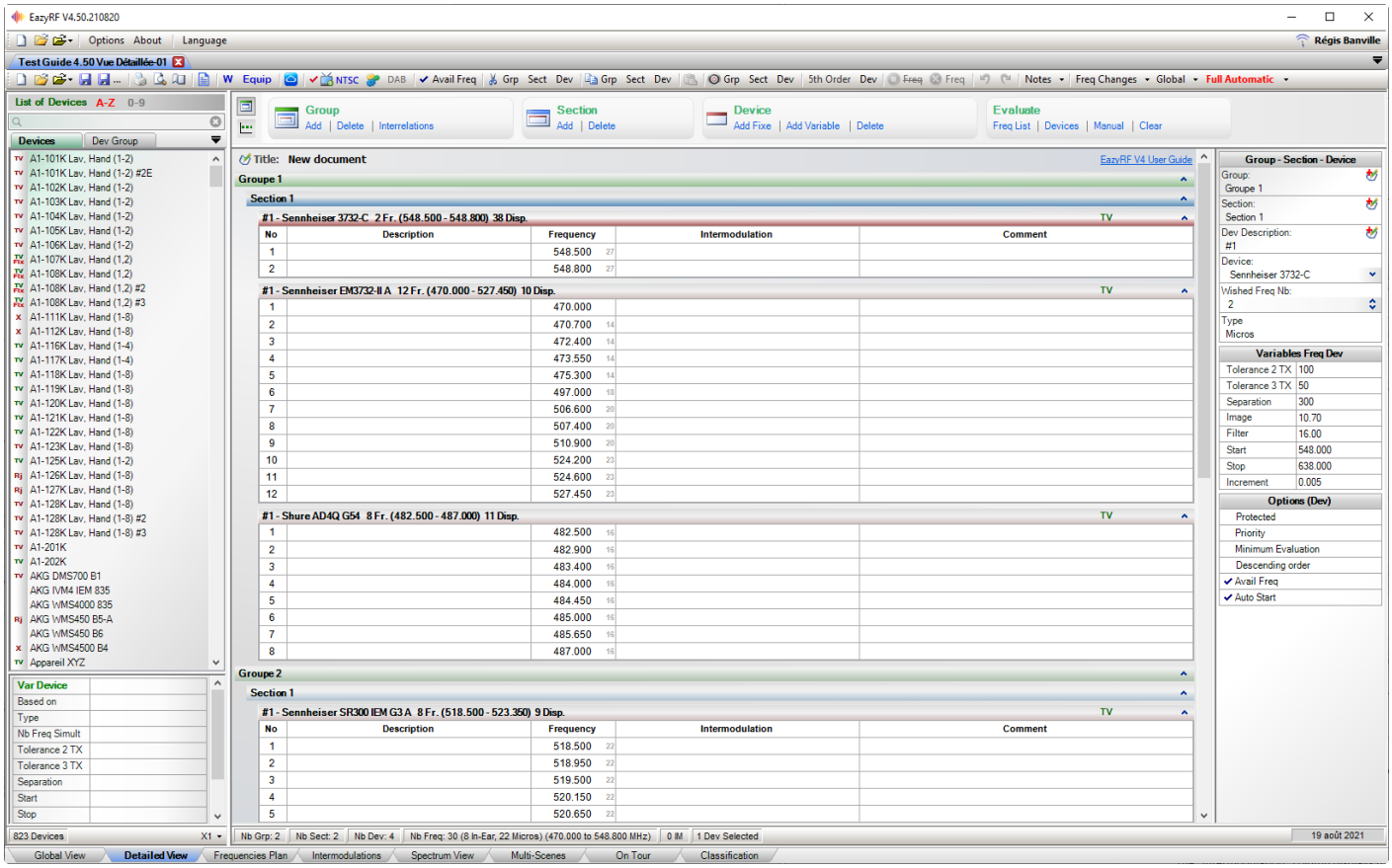
Ctrl + Y: Redo command

Ctrl + A: Enable/Disable Auto-Increment of the device

Arrow Left, Right, Up and Down: Move the selection to another device in a section

3 - Detailed View

The "Detailed View" is a different representation of the data of the "Global View". It allows the detailed display of devices frequencies:



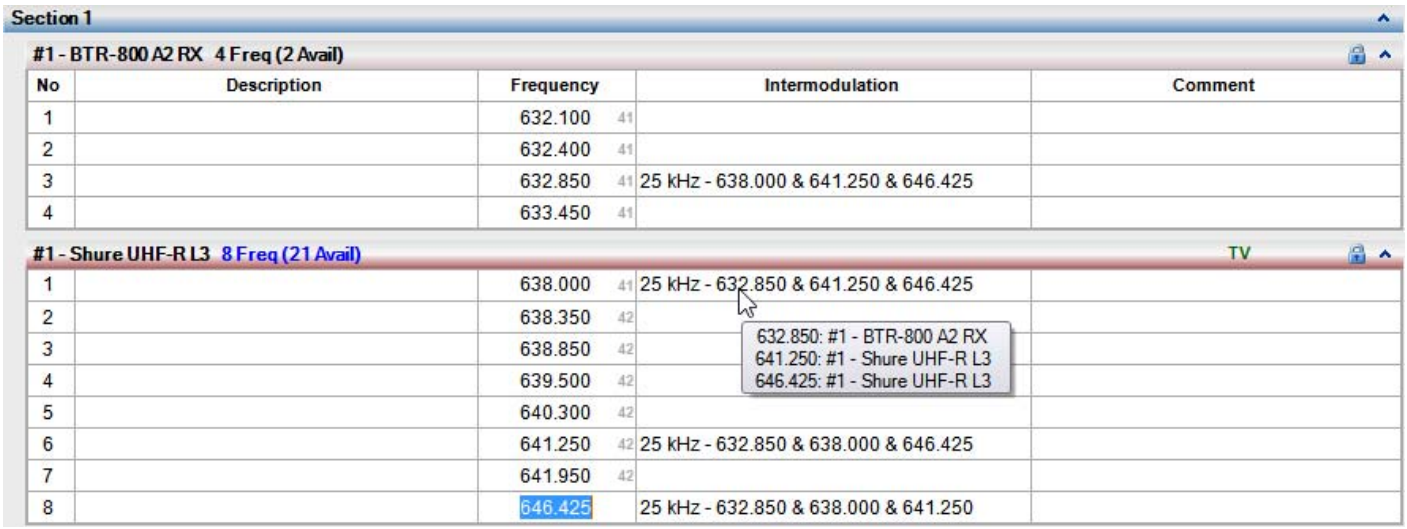
The zone of "Details" finds itself to the right and in vertical format instead of being in the bottom in horizontal (global view).

The toolbar is the same as in "Global View".

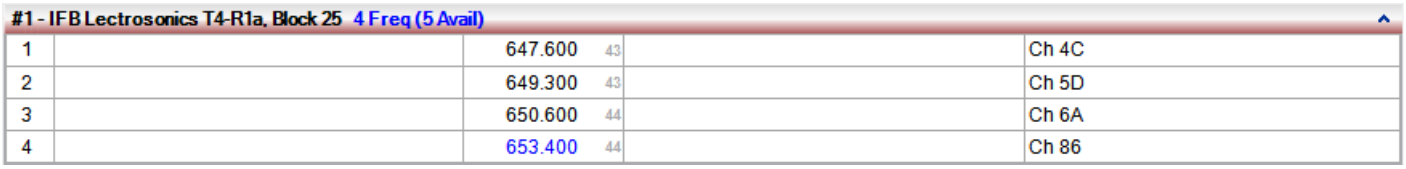
The indicators of the devices are not all presents because the detail of the Frequencies and the Intermodulations makes their presence unnecessary.

An additional column, "Comment", allows adding information. In the case of devices with Fixed frequencies, the channel number is displayed (CH-02 for example).

The "Intermodulation" column displays the details of intermodulation and mouse can identify the source of these frequencies:



The "Comment" column shows the channel number of Lectrosonics devices:

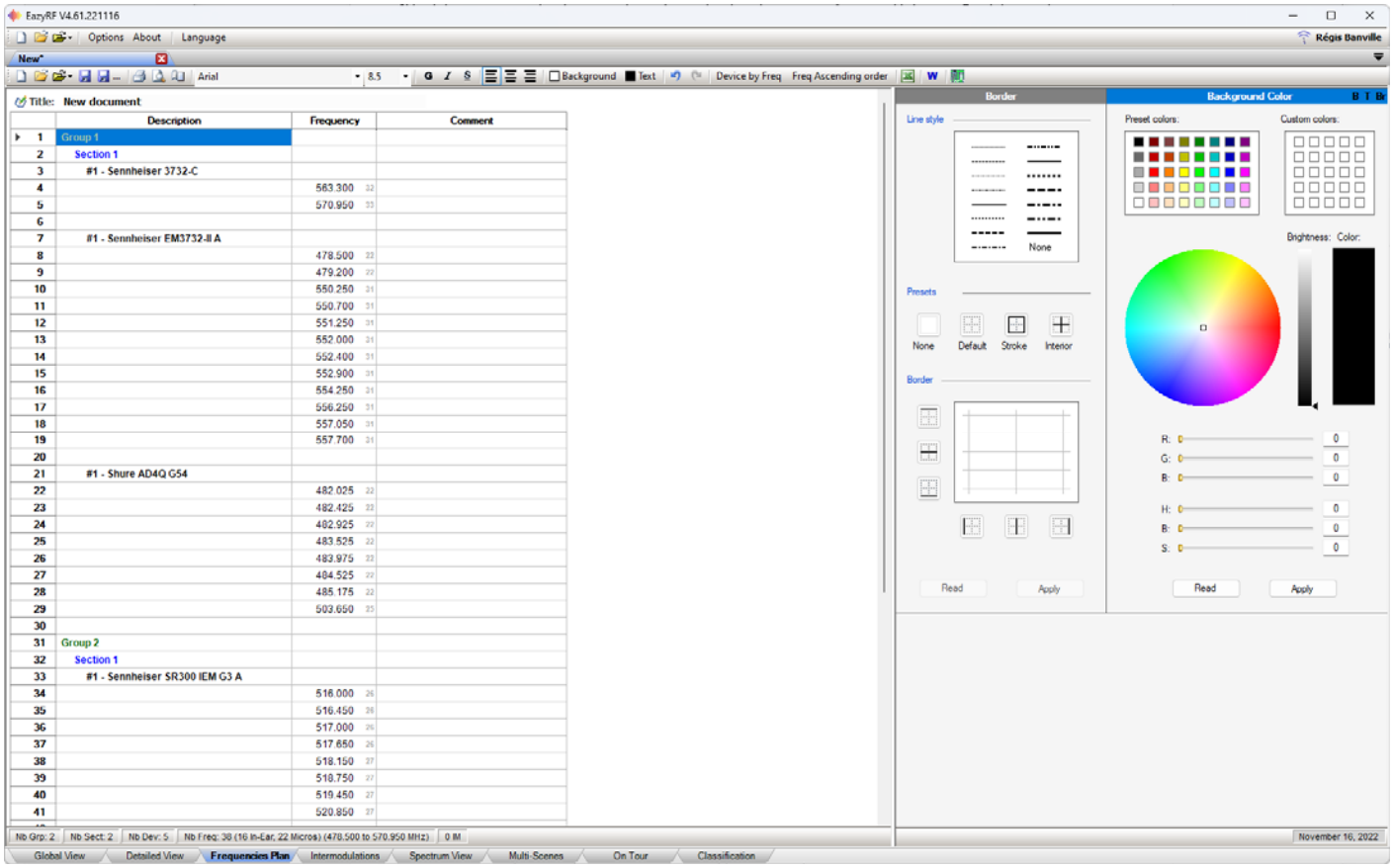


The editor of devices is called by double-clicking on the title area of the device.

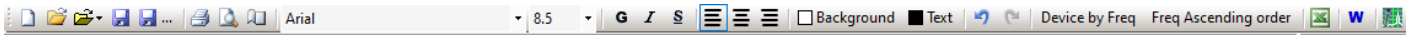
The Global view allows to have an overall view of devices whereas the Detailed view allows to see better frequencies of devices.

4 - Frequencies Plan

View "Frequencies Plan" shows the data but does not allow editing of frequencies. It lets you customize the presentation (color, type characters, size ...):



The Toolbar is adapted to the edition of the shape of the text, text color and background color:



The editor allows to add borders:

#1 - Shure UHF-R J5		
	578.000 31	
	578.300 32	
	578.700 32	
	579.200 32	
	579.550 32	
	580.000 32	
	580.550 32	
	582.150 32	

The editor has the usual commands "Undo" and "Redo".

The column width can be changed.

The devices can be classified by order of frequency with the command: "Device By Freq"

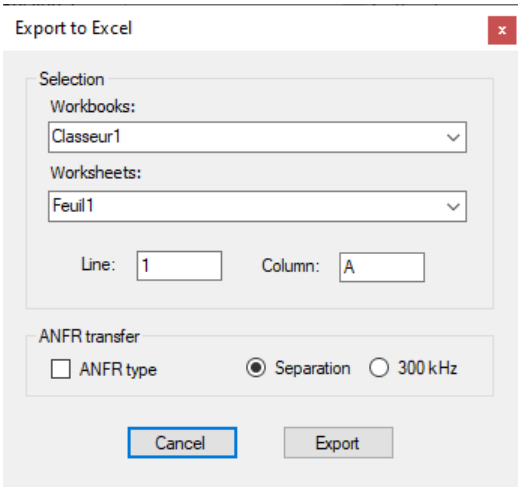
	Description	Frequency	Comment
1	#1 - Sennheiser 3732-A		
2		470.000	
3		470.300 14	
4		470.700 14	
5		471.200 14	
6		471.550 14	
7		472.000 14	
8		472.550 14	
9		474.150 14	
10		474.900 14	
11		482.500 16	
12		483.100 16	
13		484.150 16	
14	#1 - BTR-800 A2 TX		
15		518.500 22	
16		518.800 22	
17	#1 - Sennheiser 3732-C		
18		548.500 27	
19		548.800 27	
20	#1 - Shure UHF-R J5		
21		578.000 31	
22		578.300 32	
23		578.700 32	
24		579.200 32	
25		579.550 32	
26		580.000 32	
27		580.550 32	
28		582.150 32	
29	#1 - BTR-800 A2 RX		
30		632.100 41	
31		632.400 41	
32		632.800 41	
33		633.300 41	

The frequencies can be classified in ascending order with the command “Freq. Ascending order"

	Description	Frequency	Comment
1		470.000	#1 - Sennheiser 3732-A - Section 1
2		470.300 14	#1 - Sennheiser 3732-A - Section 1
3		470.700 14	#1 - Sennheiser 3732-A - Section 1
4		471.200 14	#1 - Sennheiser 3732-A - Section 1
5		471.550 14	#1 - Sennheiser 3732-A - Section 1
6		472.000 14	#1 - Sennheiser 3732-A - Section 1
7		472.550 14	#1 - Sennheiser 3732-A - Section 1
8		474.150 14	#1 - Sennheiser 3732-A - Section 1
9		474.900 14	#1 - Sennheiser 3732-A - Section 1
10		482.500 16	#1 - Sennheiser 3732-A - Section 1
11		483.450 16	#1 - Sennheiser 3732-A - Section 1
12		484.550 16	#1 - Sennheiser 3732-A - Section 1
13		518.500 22	#1 - BTR-800 A2 TX - Section 1
14		518.800 22	#1 - BTR-800 A2 TX - Section 1
15		548.500 27	#1 - Sennheiser 3732-C - Section 1
16		548.800 27	#1 - Sennheiser 3732-C - Section 1
17		578.500 32	#1 - Shure UHF-R J5 - Section 1
18		578.800 32	#1 - Shure UHF-R J5 - Section 1
19		579.200 32	#1 - Shure UHF-R J5 - Section 1
20		579.700 32	#1 - Shure UHF-R J5 - Section 1
21		580.050 32	#1 - Shure UHF-R J5 - Section 1
22		580.500 32	#1 - Shure UHF-R J5 - Section 1
23		581.050 32	#1 - Shure UHF-R J5 - Section 1
24		582.650 32	#1 - Shure UHF-R J5 - Section 1
25		632.100 41	#1 - BTR-800 A2 RX - Section 1
26		632.400 41	#1 - BTR-800 A2 RX - Section 1
27		632.800 41	#1 - BTR-800 A2 RX - Section 1
28		633.300 41	#1 - BTR-800 A2 RX - Section 1

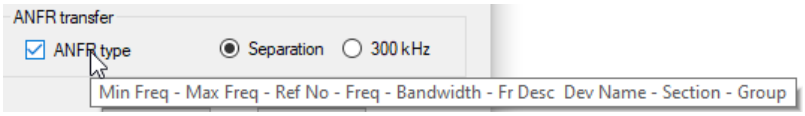
4.1 Transfer to Excel

EazyRF allows you to export data to an Excel spreadsheet:



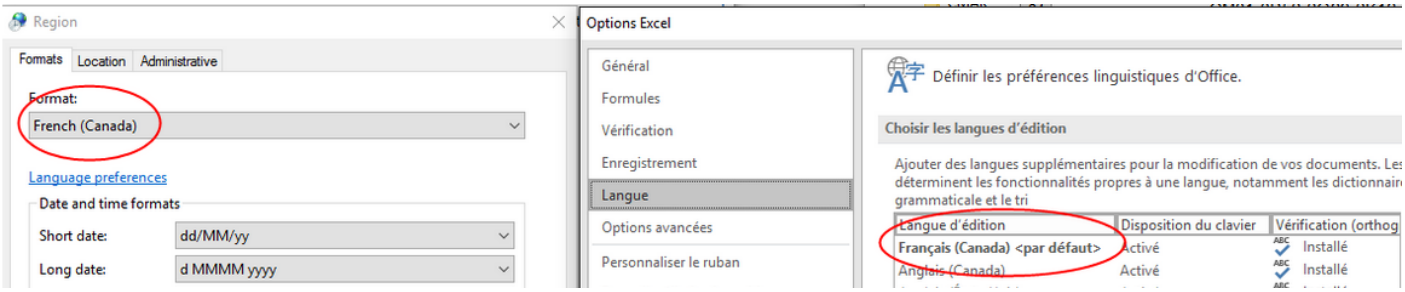
Simply choose the workbook, the worksheet and the destination cell.

If the frequencies are listed in ascending order, the data can be transferred to Excel in a format compatible with the ANRF's Frequencies Blockchain:



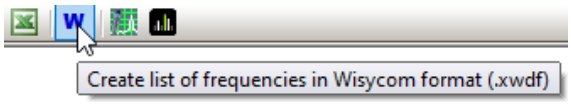
See https://www.anfr.fr/l-anfr/politique-dinnovation/blockchain-des-frequences/ for more information.

In order for the transfer to Excel to work properly, the same language module must be installed in Windows and Excel:



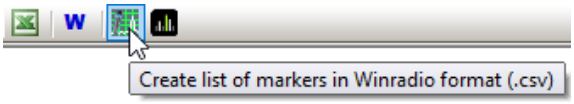
In addition, Excel must be started in administrator mode (shortcut settings, advanced). For a document to be visible, it must be opened directly by Excel and not by double clicking in File Explorer.

4.2 Transfer to Wisycom Manager



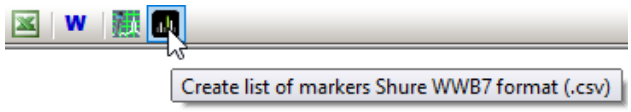
And as in Global View, you can transfer frequencies to Wisycom Manager, see section 2.10.

4.3 Create list of markers for WinRadio



This function allows you to save the list of frequencies in ascending order in csv format to be used as markers in WinRadio; csv format: ID,Frequency,Name,Colour. The background color of the frequency cells is used as the color for the markers.

4.4 Create list of markers for Shure WWB7



A list of frequencies in ascending order in csv format can also be created to be used as markers for the Shure Wireless Workbench 7.

4.5 View detachment to a window (2nd screen)

The "Frequencies Plan" view can be detached from the EazyRF application towards a window on a 2nd screen or overlayed with EazyRF if a 2nd screen is not connected.

To activate this function, double-click on the name of the view:

The name of the view is displayed in red to indicate that it is detached:

To return to standard mode, either close the window or redo a double click on the name of the pane (in red).

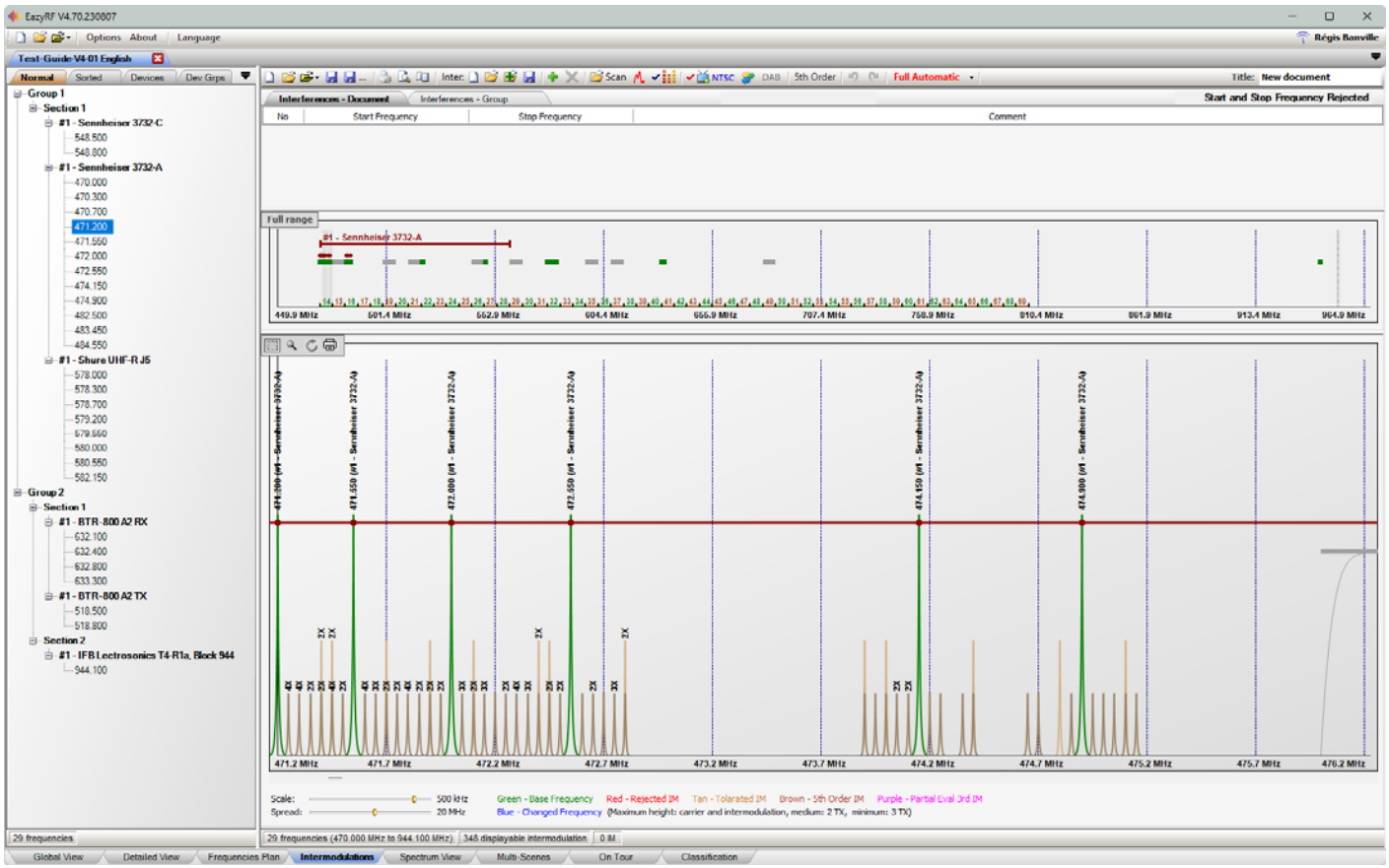
The "Intermodulations", "Spectrum View" and "On Tour" views can also be detached.

If more than one view is detached, a simple click on the name of the view will bring it to the foreground.

Obviously, the content of the detached views is synchronized with the changes made no matter where they are made.

5 - Intermodulations

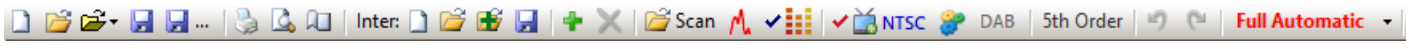
View "Intermodulation" displays the list of devices of the document with an overview of frequencies and a detailed vision of frequencies and intermodulations:



The editor of devices can be called by double-clicking the name of a device or a frequency in the device list (left part of the view).

Areas of interference can be defined with the right mouse button.

5.1 Toolbar



The toolbar contains items already examined in global/detailed views: file management, printing, TV channels, local options, undo/redo commands and method of calculation.

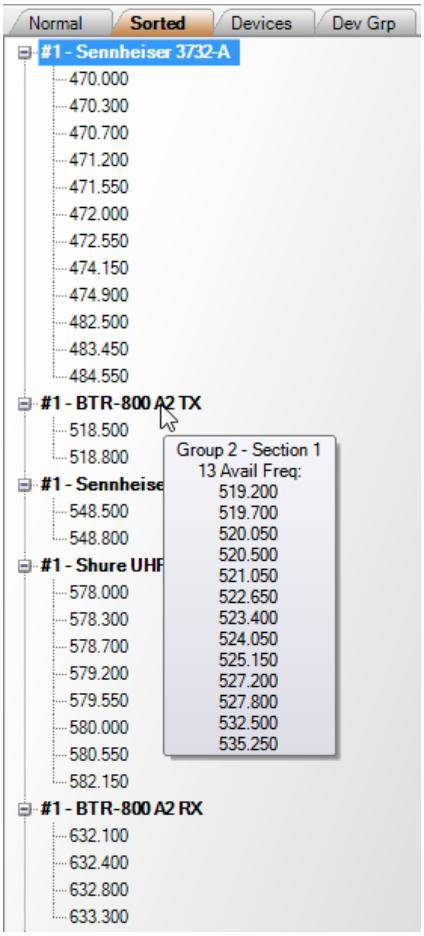
Some additional items concern interferences which we shall see in the section 5.6.

Finally, the title of the document can be found on the bar to get a little space (instead of in the document area).

5.2 Devices

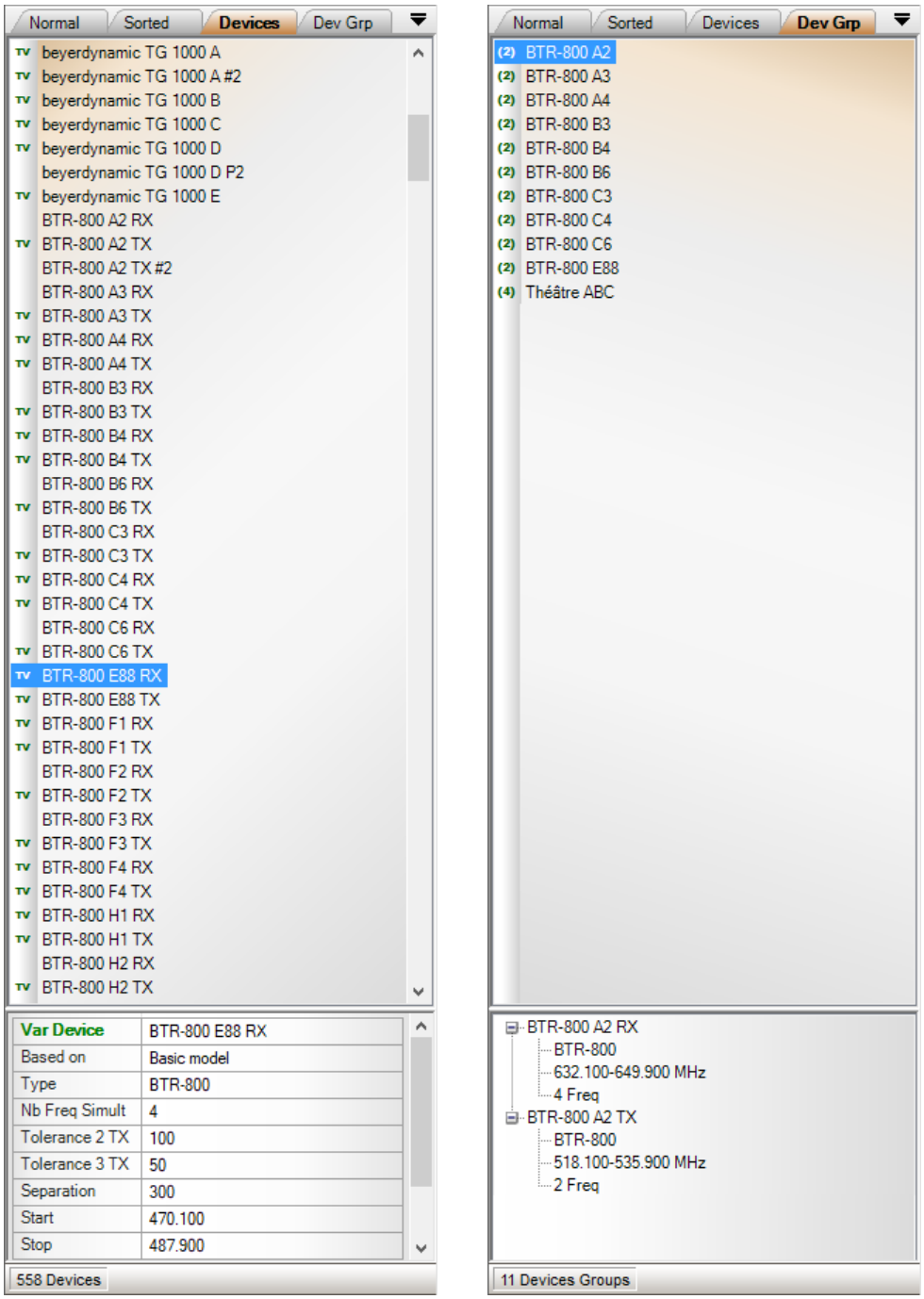
The left part of the window consists of four components:

"Normal" pane displays the list of devices of the document in the order of global/detailed view. The "Sorted" section classifies devices in ascending order of frequency:

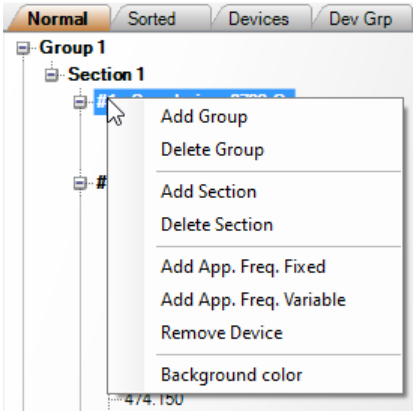


Information follow the mouse cursor: available frequencies, changes...

Tabs "Variables" and "Fixed" display the list of devices like the "Global View". It is thus allowed to add a device to the document:



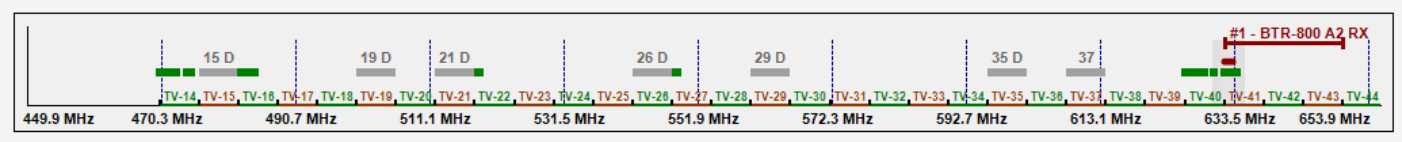
In the details pane "Normal" the following menu appears by clicking the right mouse button:



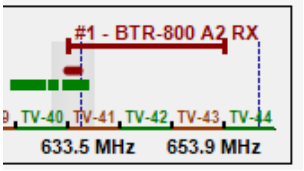
It is thus possible to manage groups, sections, and devices as in the global and detailed views so avoiding moving from a window to the other one. This operation is not possible in the component "Sorted".

5.3 Global Frequencies

The overall representation of the frequency spectrum occupied by the document is displayed in the right middle section:

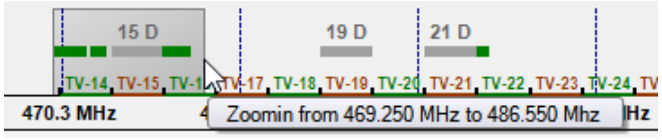


The selected device is displayed by its name and the space occupied by the Start to Stop frequencies of the device:

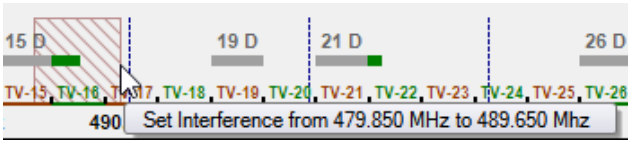


The zone in degraded grey represents the space occupied by the detailed section.

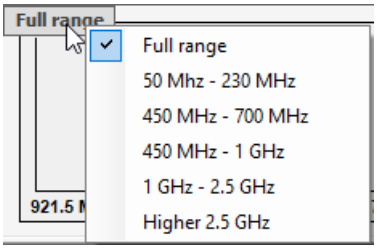
To view a section directly in detail, click on a point or draw the area to be enlarged with the left mouse button:



A zone of interferences takes shape when dragging with the right mouse button:

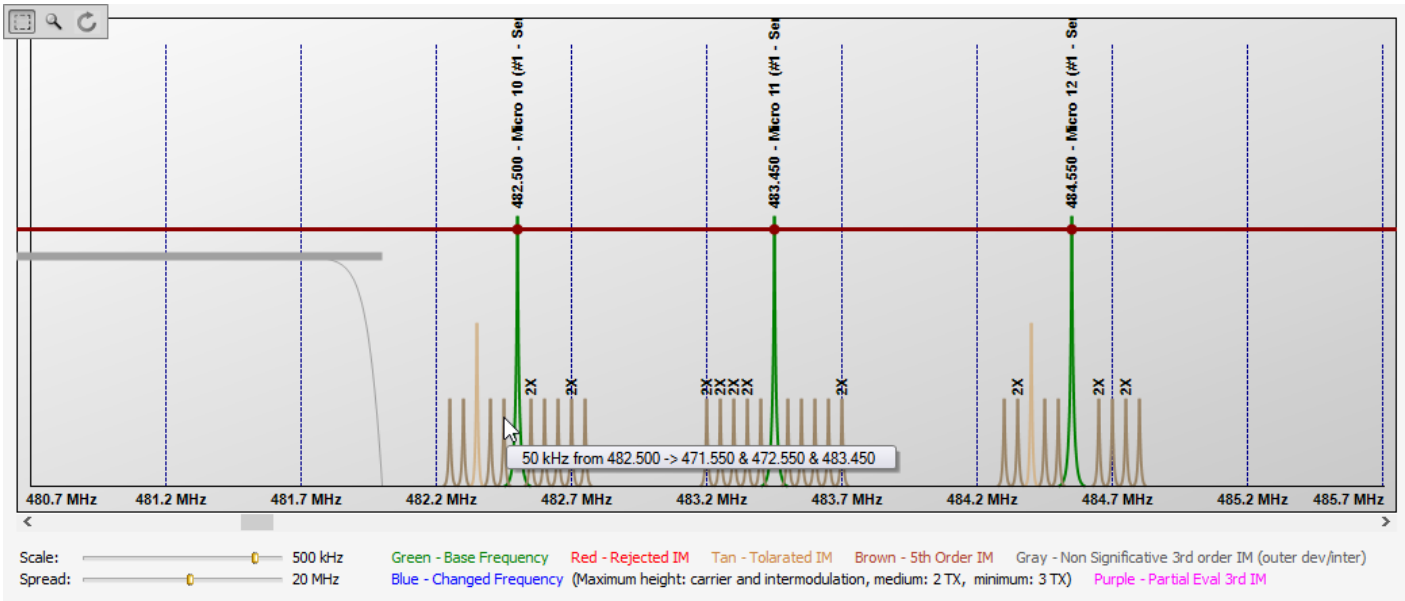


Finally, the "Full range" command allows you to enlarge the viewing area when frequencies in MHz and GHz are used:

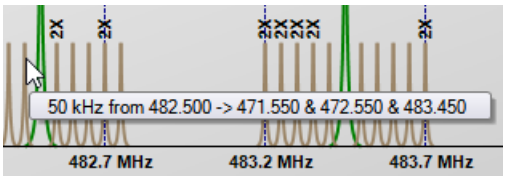


5.4 Detailed Frequencies

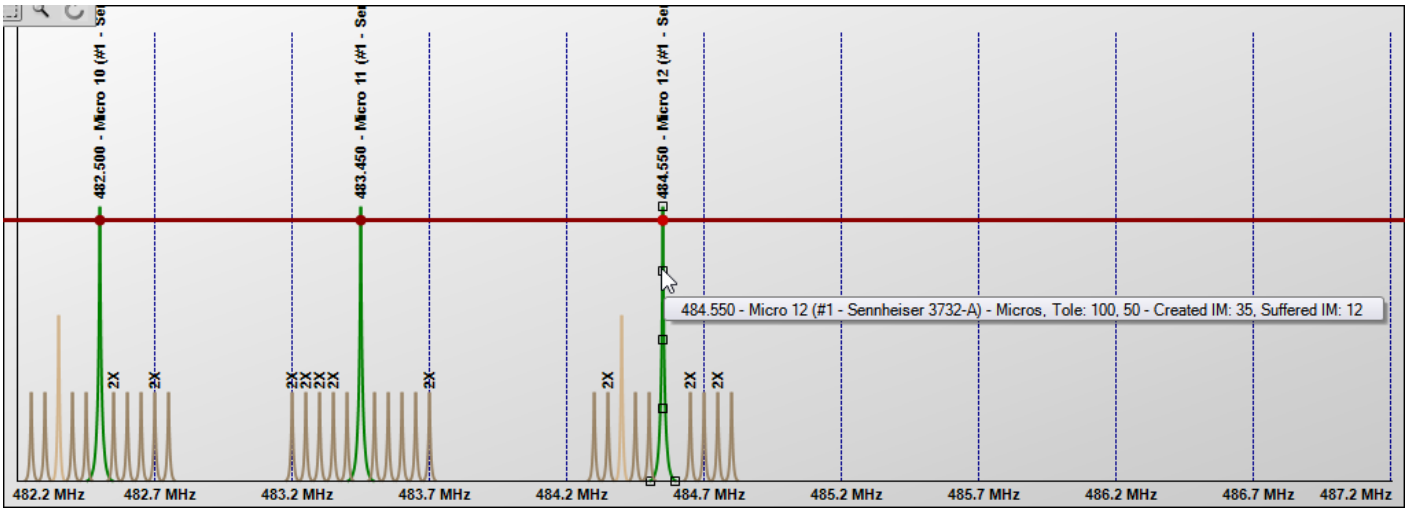
The detailed zone shows a section of the global zone with the graphic representation of the frequencies and the intermodulations:

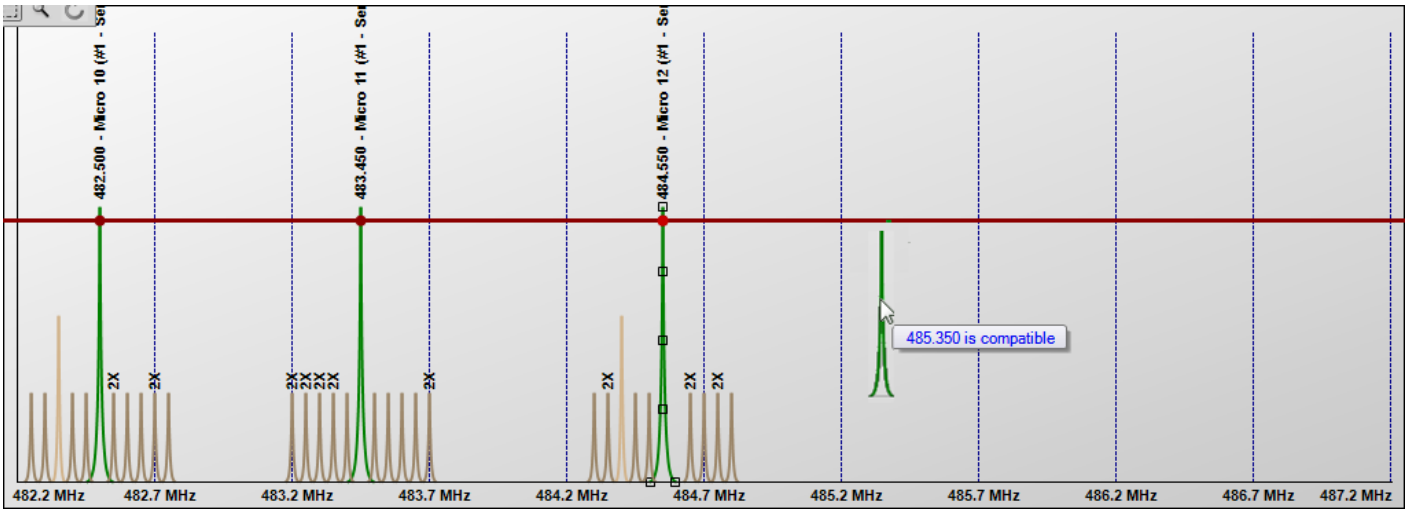


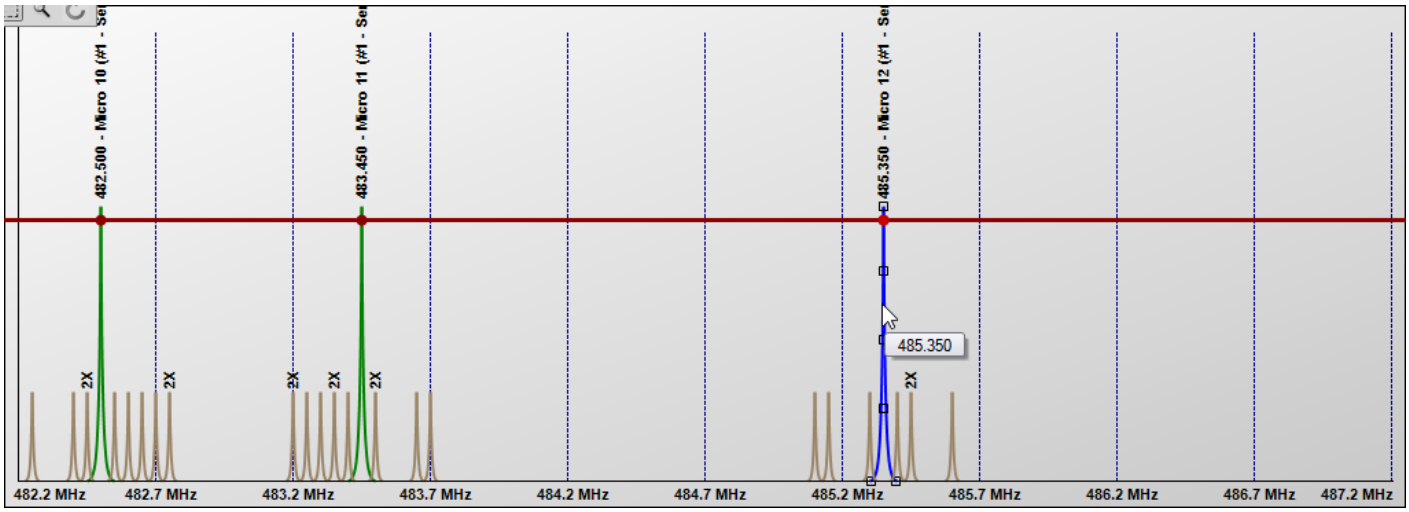
The mouse cursor shows the detail of every intermodulation:



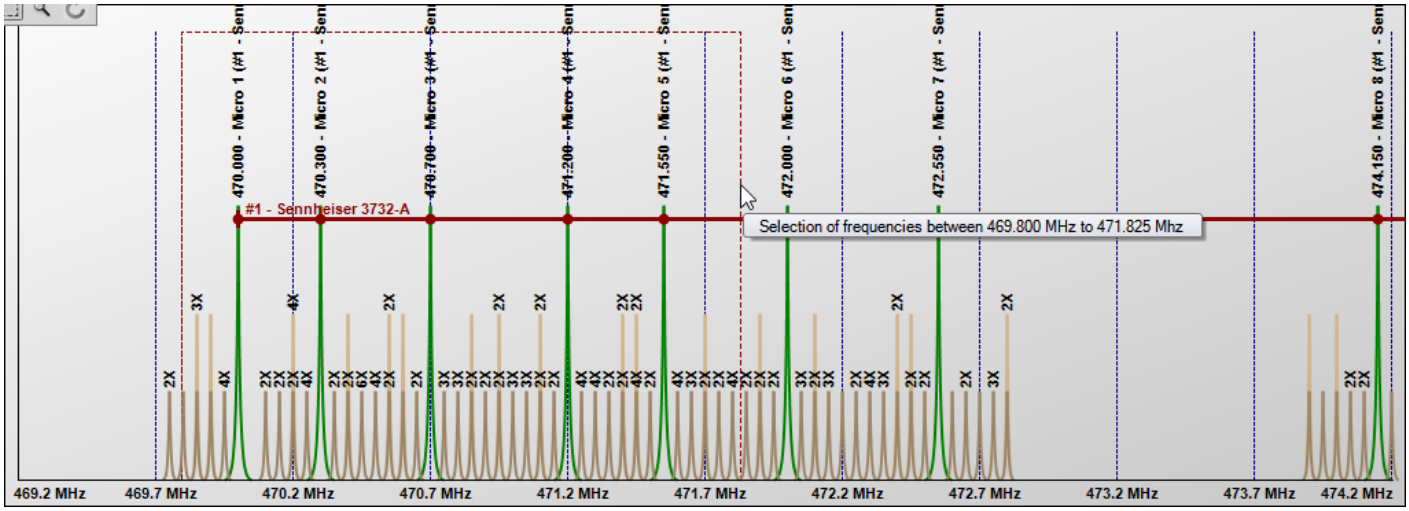
From this zone, the frequencies can be selected and moved:

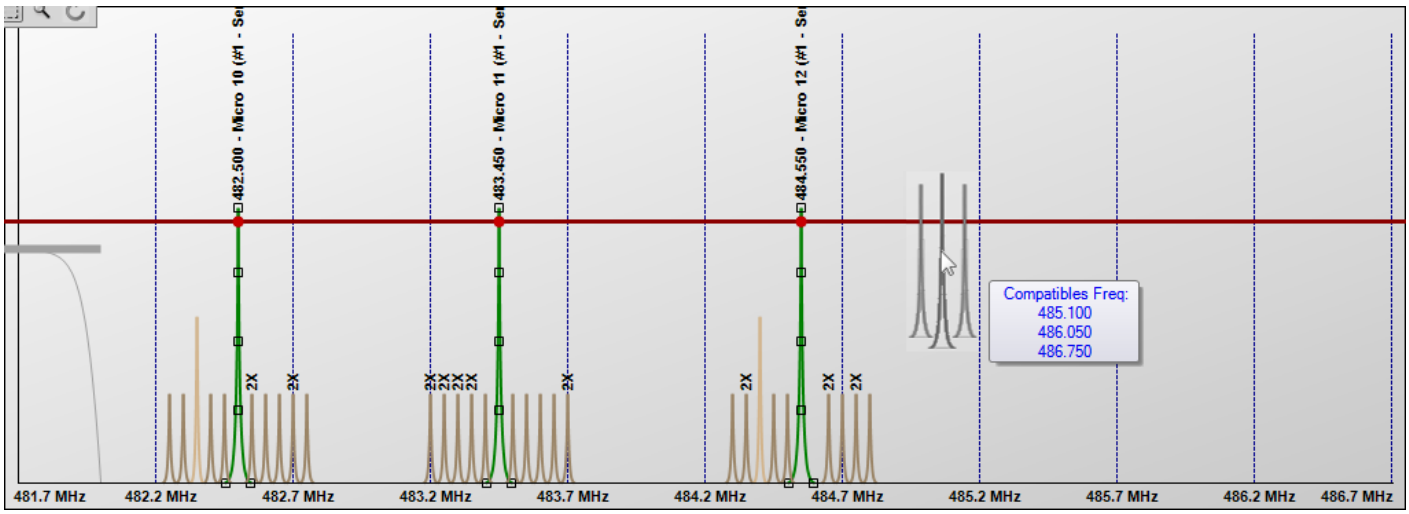


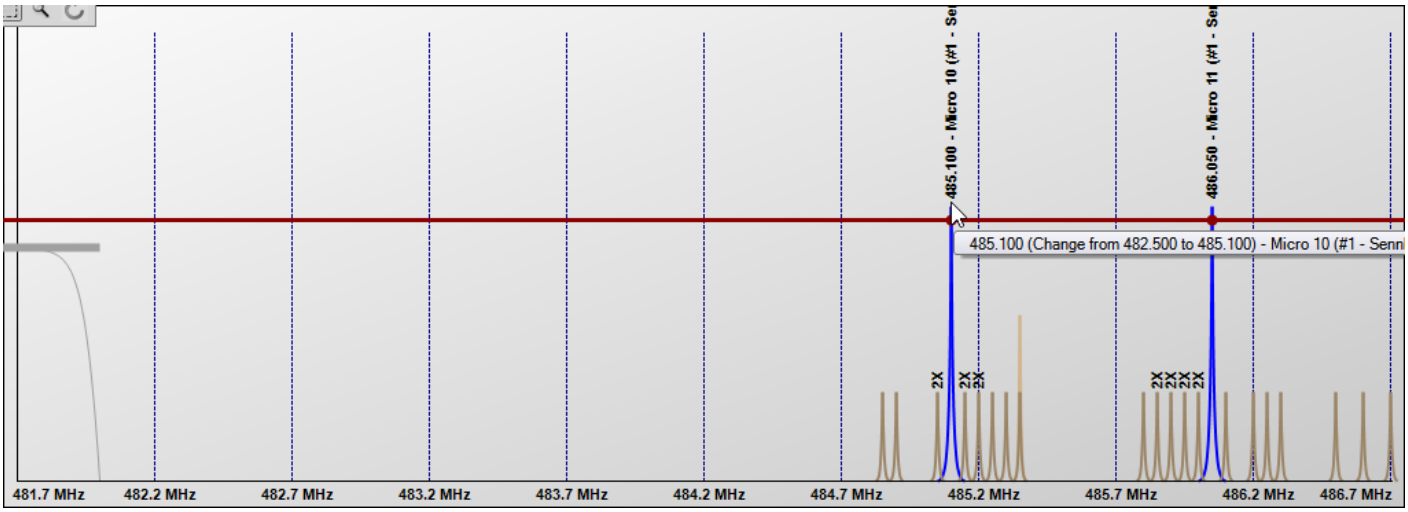




A group of frequencies can be also selected and moved by dragging the mouse or by selecting the frequencies one by one by holding the touch Ctrl between every selection:







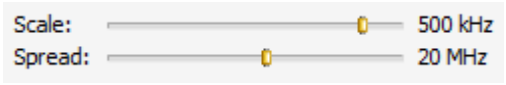
The commands:

The first two allow you to make either a selection or an enlargement in the detailed area. The third command recalculates the intermodulations and refreshes the display.

Finally the last command displays the spectrum management module 470-614 MHz for the ATSC video standard and the 470-694 MHz spectrum for the SECAM video standard. See section 5.10 for more information.

5.5 Scale and Spread

The bottom of the detailed zone possesses two controls:



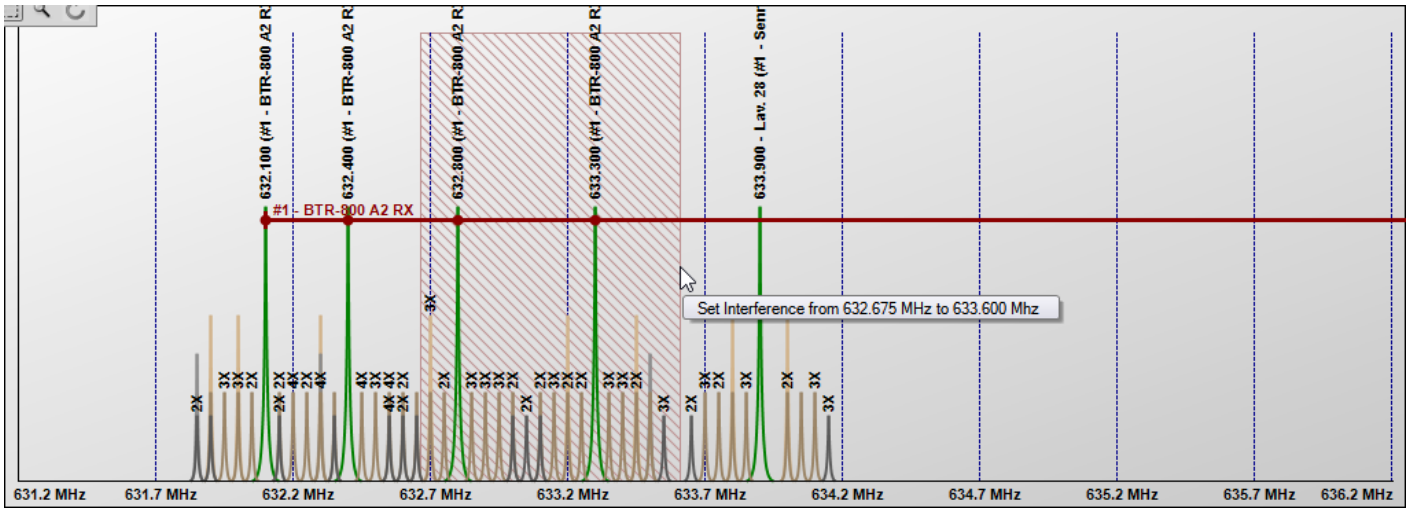
The control "Scale" allows to enlarge or to decrease the detailed vision of the frequencies. Beyond 5 MHz between two steps, there is not enough space to draw adequately the frequencies and the intermodulations. Thus only a block represents every frequency.

The control "Spread" allows to increase/decrease the area added to the overall spectrum size.

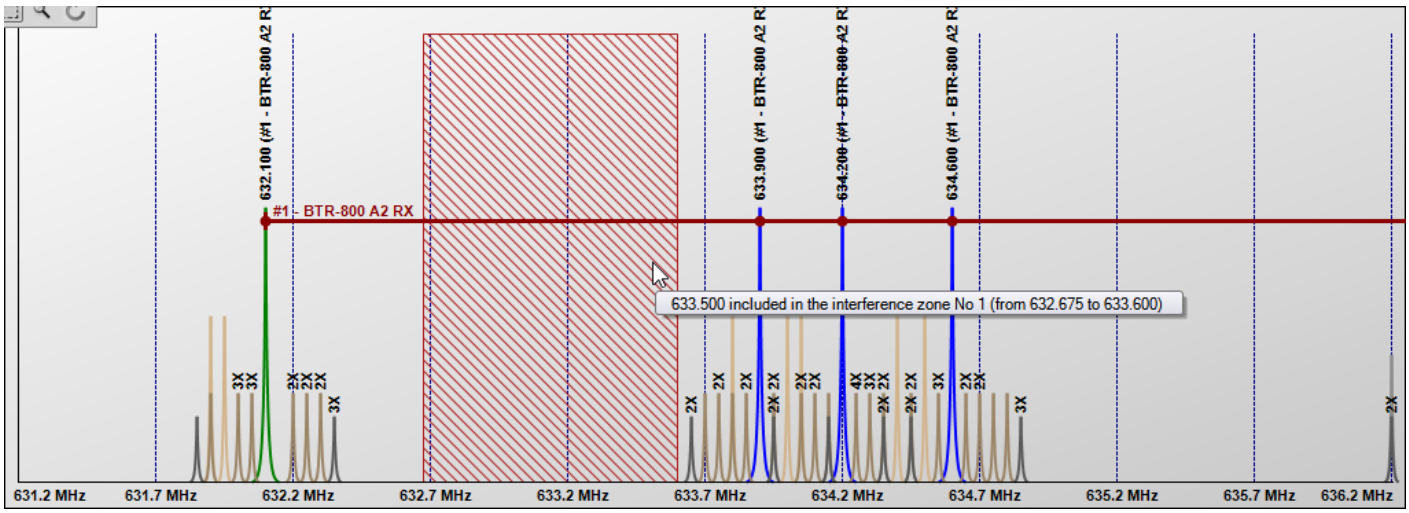
5.6 Interferences

An interference region is a region of the spectrum excluded when allocating frequencies. So if unwanted modulations are observed, we can define an area not to assign frequencies in it. This is an area, so there is no evaluation of intermodulation, only a rejection of frequencies.

To create an interference area, use the right mouse button and hold it down by enlarging the area:



In this case, this operation causes the recalculation of frequencies (full automatic mode):



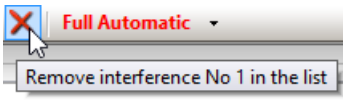
This can be done in the overall frequency range or in the detail area.

The upper right part of the window displays detailed interference:

The Start and Stop frequencies can be changed directly.

To add interference manually, use . You can enter a sequence of values (without evaluation between each data) by using the "+" key on the numeric keypad or the "+ / =" key on a standard keyboard.

To delete an area, select it from the list and use the tool:



These interferences can be saved and retrieved later from the toolbar:

The command allows to add a file to the existing list while the open command erases the data previously.

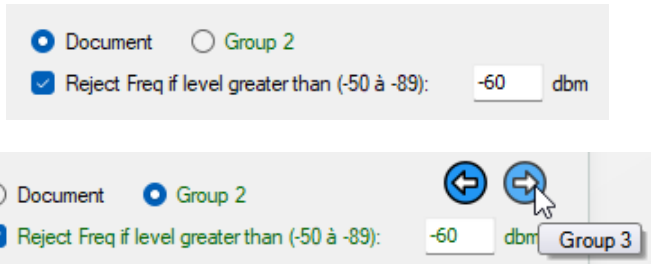
The "Scan" command can be used to import interference from a file created by a frequency scanner:

The "Add" command does not erase the data before opening a file. The "Delete" command is used to destroy the data. The data is saved with the document, so if it is no longer needed, it should be deleted.

The command "RF Explorer" allows to read the data directly from the RF Explorer scanner. See section 5.6.2 for operation.

The “Edit” command allows modification of the sample data, see section 5.6.1 for more details.

Since version 4.70 of EazyRF, samples can be added to each group and are managed by:



If a scan file is assigned to a group, it takes priority over the document scan file, so a group without a sample file uses the document file.

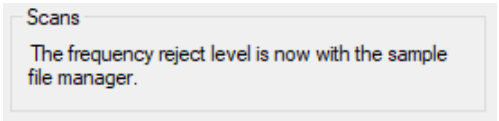
The next/previous buttons allow you to travel from one group to another without leaving the editor.

The activation of the "Reject Frequencies if level" and the detection level are now accessible by this module instead of the module "Document parameters" in order to manage the document and the groups.

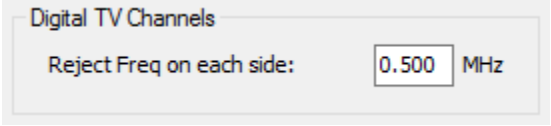
The frequency rejection level is adjusted separately for each group and for the document.

Enabling or disabling TV channels affects document and groups. If the Document/Group selector is assigned to groups, only the channels belonging to the group can be modified. Always save TV channel changes.

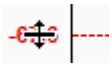
The detection threshold of frequency reject according to scan level has been removed from the "Document options":



The interference detection is done in accordance with the exclusion zone on each side of a TV channel, depending on the parameter of the document:



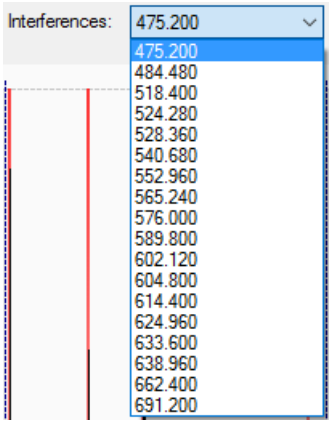
Two lines (red and green) can be used to adjust the interference detection threshold (red), while the green adjusts the threshold for detecting the TV channels. To move the lines, it is necessary to drag the indicator text of the level:



An interference can be deselected by clicking on the red vertical line. To add one manually, click on a line of the graph.

Two selection modes exist, either the selection of interferences or TV channels. The first command at the top of the window allows you to change the mode. The sampling values included in the selected TV channels are excluded from the interference detection.

To navigate directly to an interference value, make a selection from the drop-down list at the top of the window to the right:



Finally, after making the desired choice, finish with the command "Add Interference" to insert the data in the current list. You can clear the list before copying the interferences:

The interferences are added to the document or to the group according to the “Document / Group” selection:

Interferences - Document | **Interferences - Group** | 9 interferences | **Start and Stop Frequency Rejected**

No	Start Frequency	Stop Frequency	Comment
1	500.025	500.025	
2	532.825	532.825	
3	533.075	533.075	
4	533.275	533.275	
5	533.325	533.325	

The TV channels of the document are displayed in orange:

TV channels can be selected or not by clicking on the channel no. After making changes to the document channels, the "Save CHs" command becomes accessible. You must save the changes before leaving the editor.

The selection of TV channels for interference detection is different from that of TV channels in the document and is not linked. It is not done automatically because sampling does not necessarily cover the whole range.

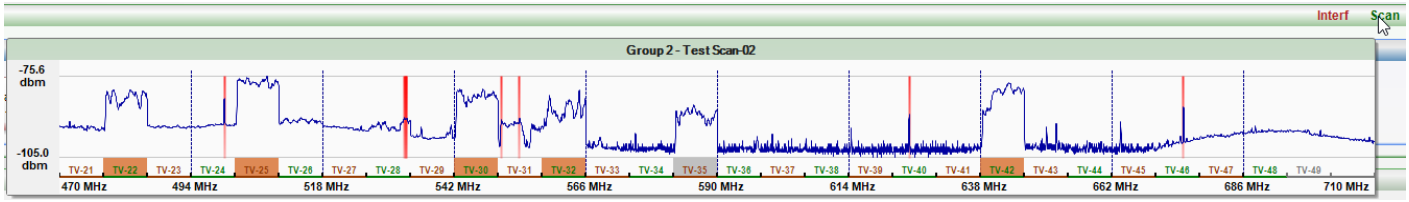
The sampling data is shared with the Channel Scan module.

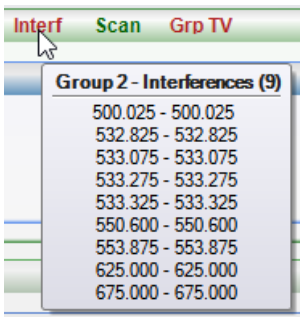
The data is also saved with the document. If they are no longer useful, it would be nice to erase them.

The sampling data can be superimposed on intermodulations with the tool .

Indicators on the header of the groups of the global and detailed views display the presence of TV channels, a sample file or an interference list for a group:

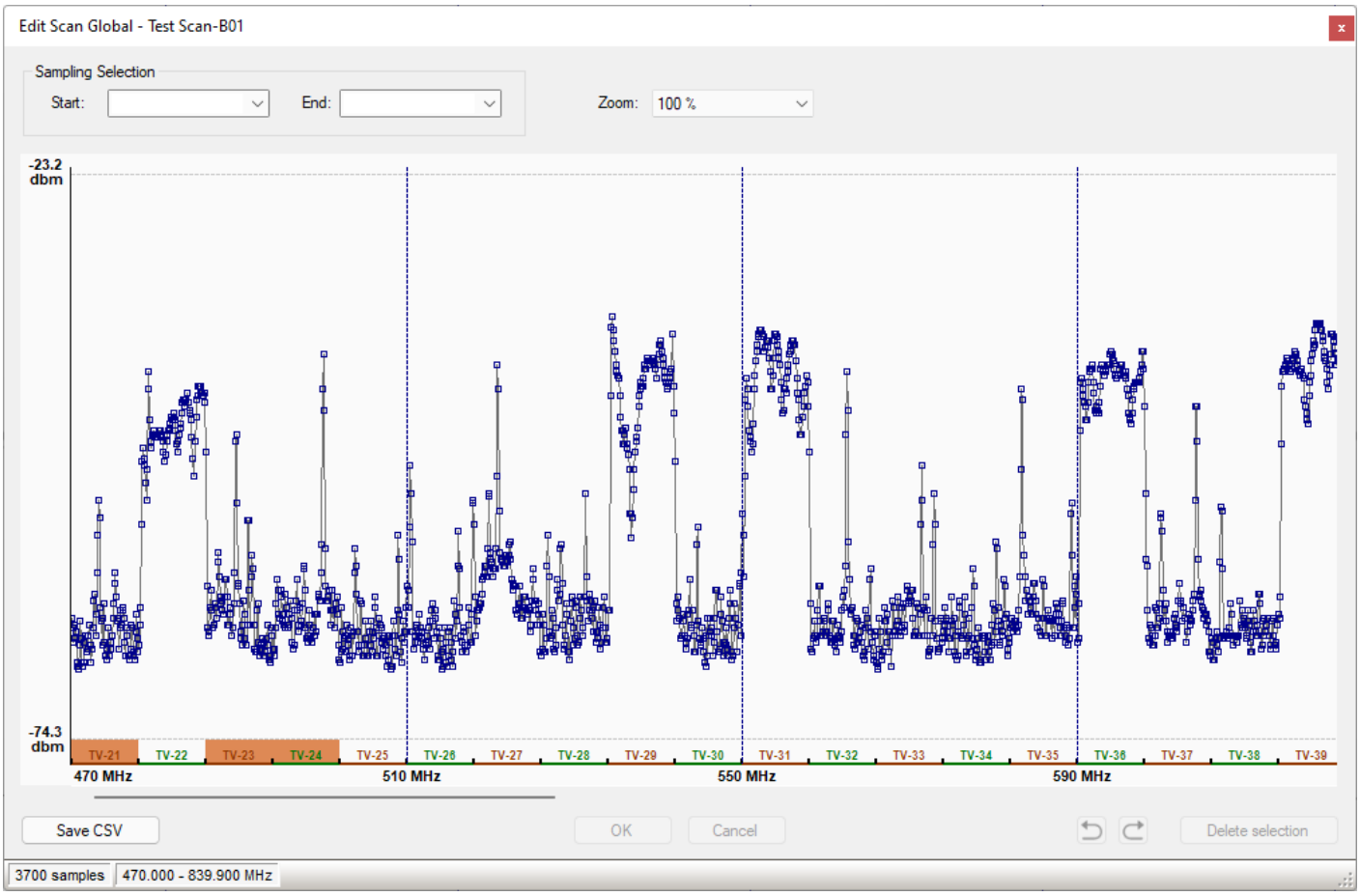
By positioning the mouse pointer over one of these indicators, the content is displayed:





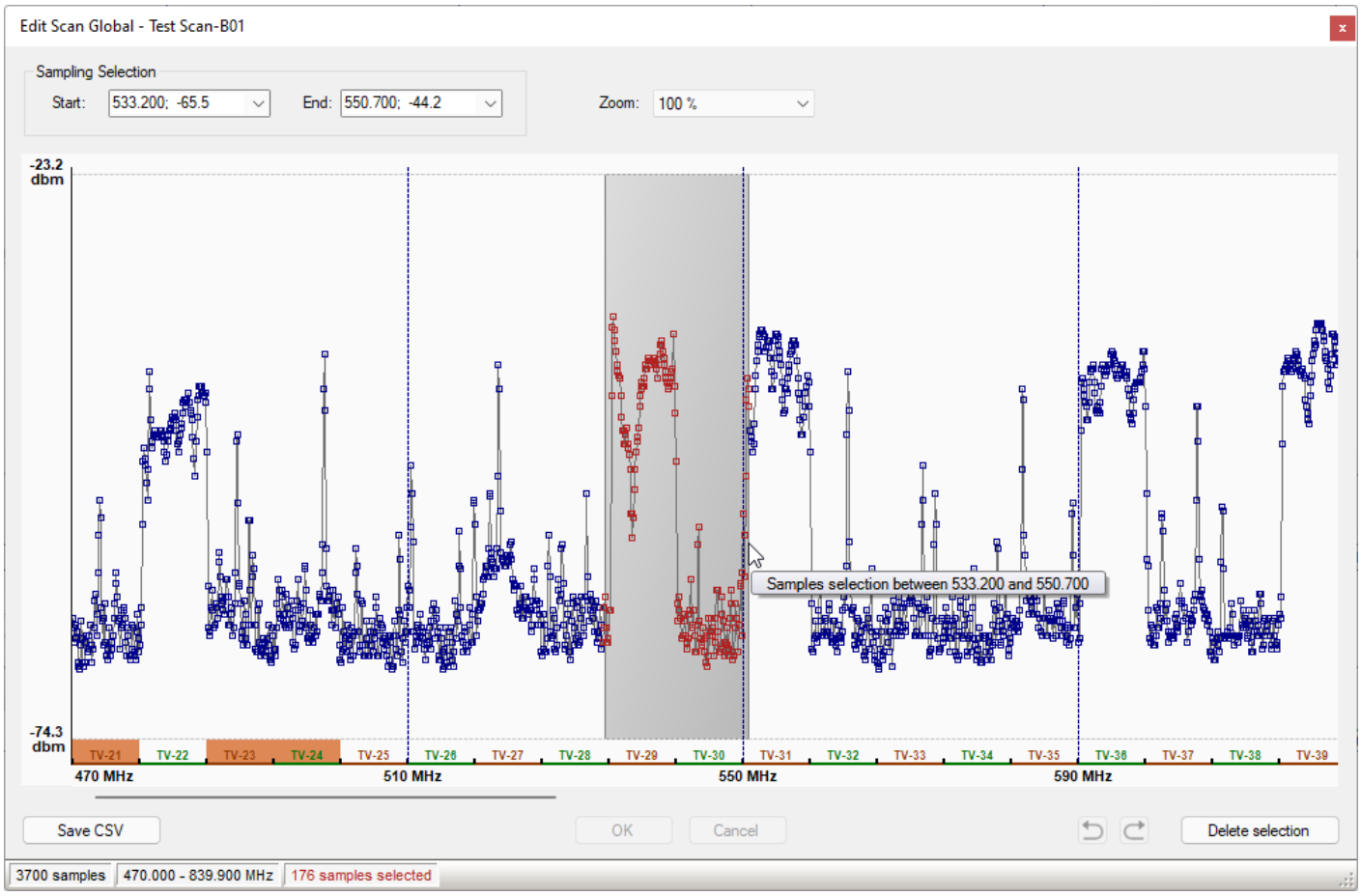
5.6.1 Sampling edition

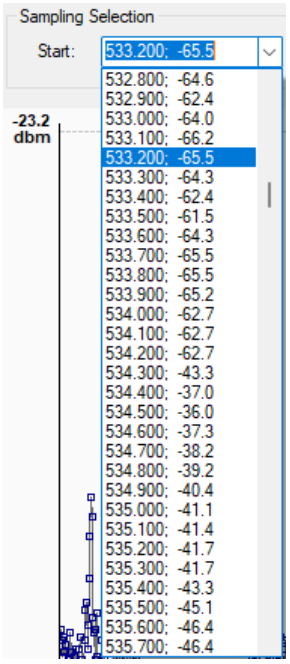
The “Edit” command calls the sampling editor:

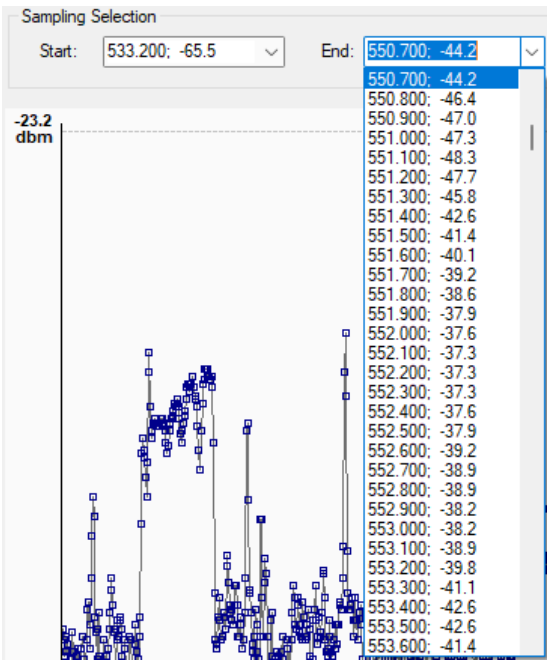


The lower information bar displays the total number of samples in the file, as well as the frequency range covered.

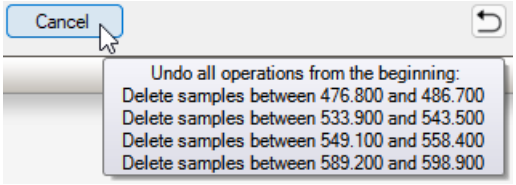
The editor allows you to select a region of the spectrum (or a single sample) and erase it. You can select a region by pressing the left mouse button on the starting frequency and dragging the mouse to the right to extend the selection. It goes without saying that it is not easy to a frequency precisely with the mouse (the zoom can help), but this is not important, because the drop-down lists for the start and end of the selection allow you select the desired frequencies:







The editor has its own undo/redo system, the "Undo" command allows you to undo a series of operations:

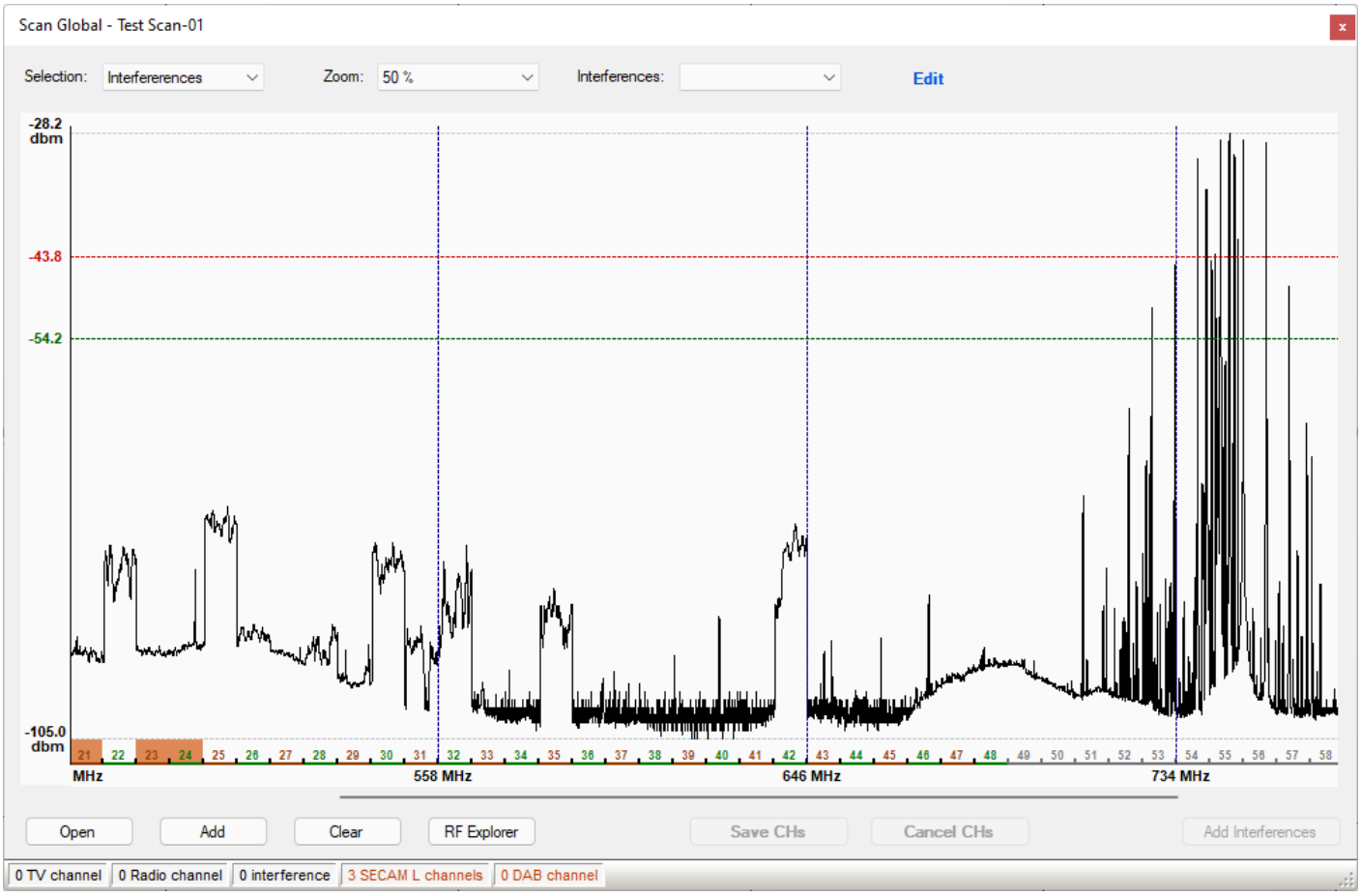


Changes can be undone until a new sample file is uploaded, regardless of changes made to the document.

The modified sample file can be saved separately, in EazyRF CSV format.

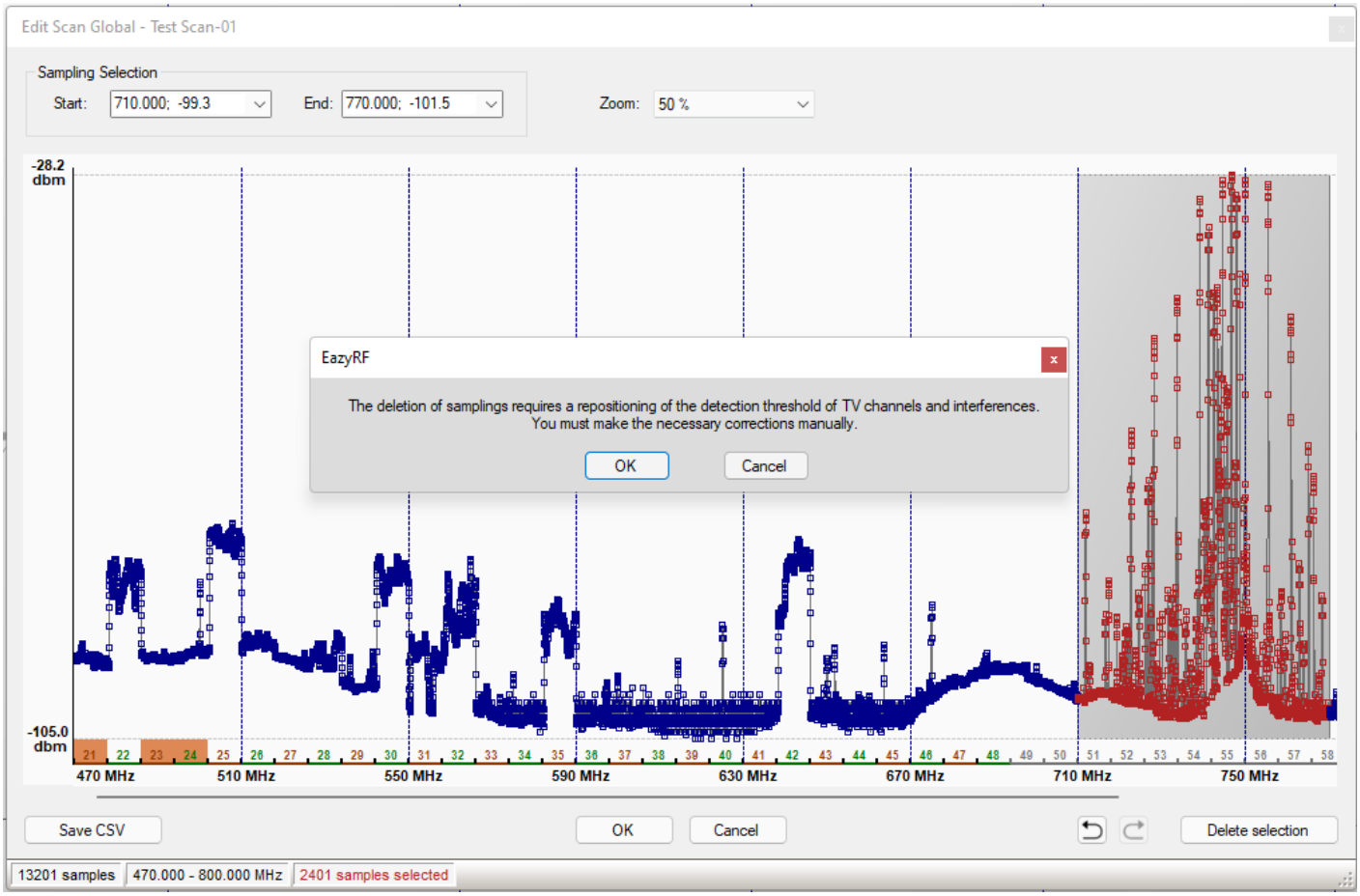
Reminder:

EazyRF reads the sample files and finds the minimum and maximum sample value (as well as the minimum and maximum frequencies). There is no magnitude scale for the sample values, EazyRF automatically adjusts to give a full-scale view of the sample values. This can sometimes give unexpected results, let's take an example:

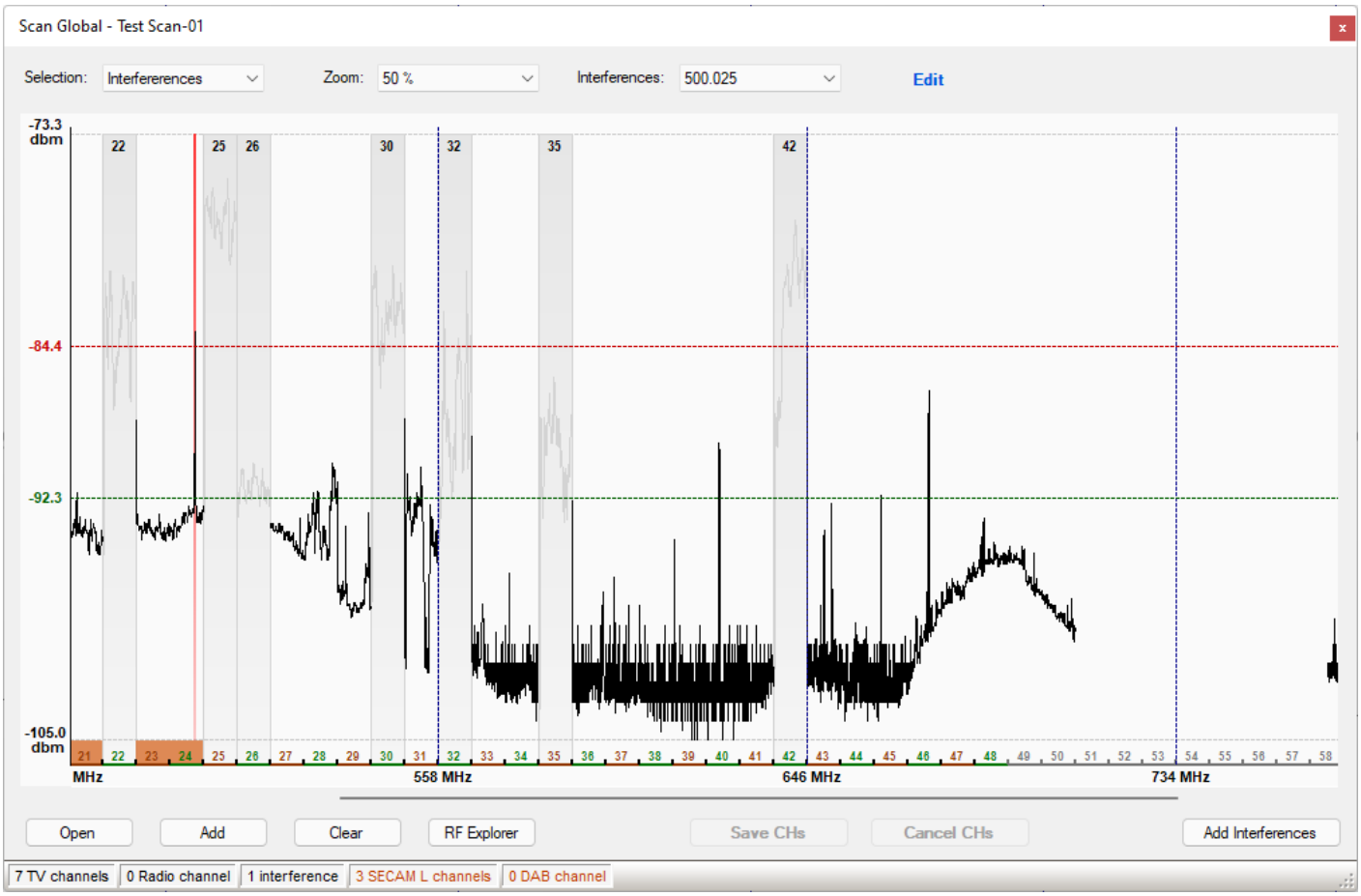


We see that there is a lot of activity in the 710 to 770 MHz range, as this part of the spectrum is no longer accessible for our needs, let's try to erase it to see the difference. Before proceeding, take note of the values for the maximum

level (-28.2 dbm), minimum level (-105.0 dbm), and interference detection (-43.8 dbm) and TV channel detection (-54.2 dbm) thresholds.



First of all, EazyRF advises us that this change will cause a repositioning of the detection thresholds of TV channels and interference. Let's look at the result to understand:



Minimum and maximum sampling values are now -105.0 and -73.3 dbm. It goes without saying that the old detection thresholds, i.e. -43.8 for interference and -54.2 for TV channels no longer make sense, they are higher than the new maximum value -73.3 dbm. In this case, EazyRF proposes values based on a percentage of the sampling extent, i.e. 40% for TV channels and 65% for interference.

This change in the scope of the sampling values is major, it goes without saying that such a modification in an already configured environment is not desirable. This is a change that must be made at the start of the configuration because all the frequency calculations of devices that depend on certain sampling levels will no longer have any meaning, or even worse, will be erroneous.

N.B. Sampling values in dbm or dbu do not really matter but should not be used together.

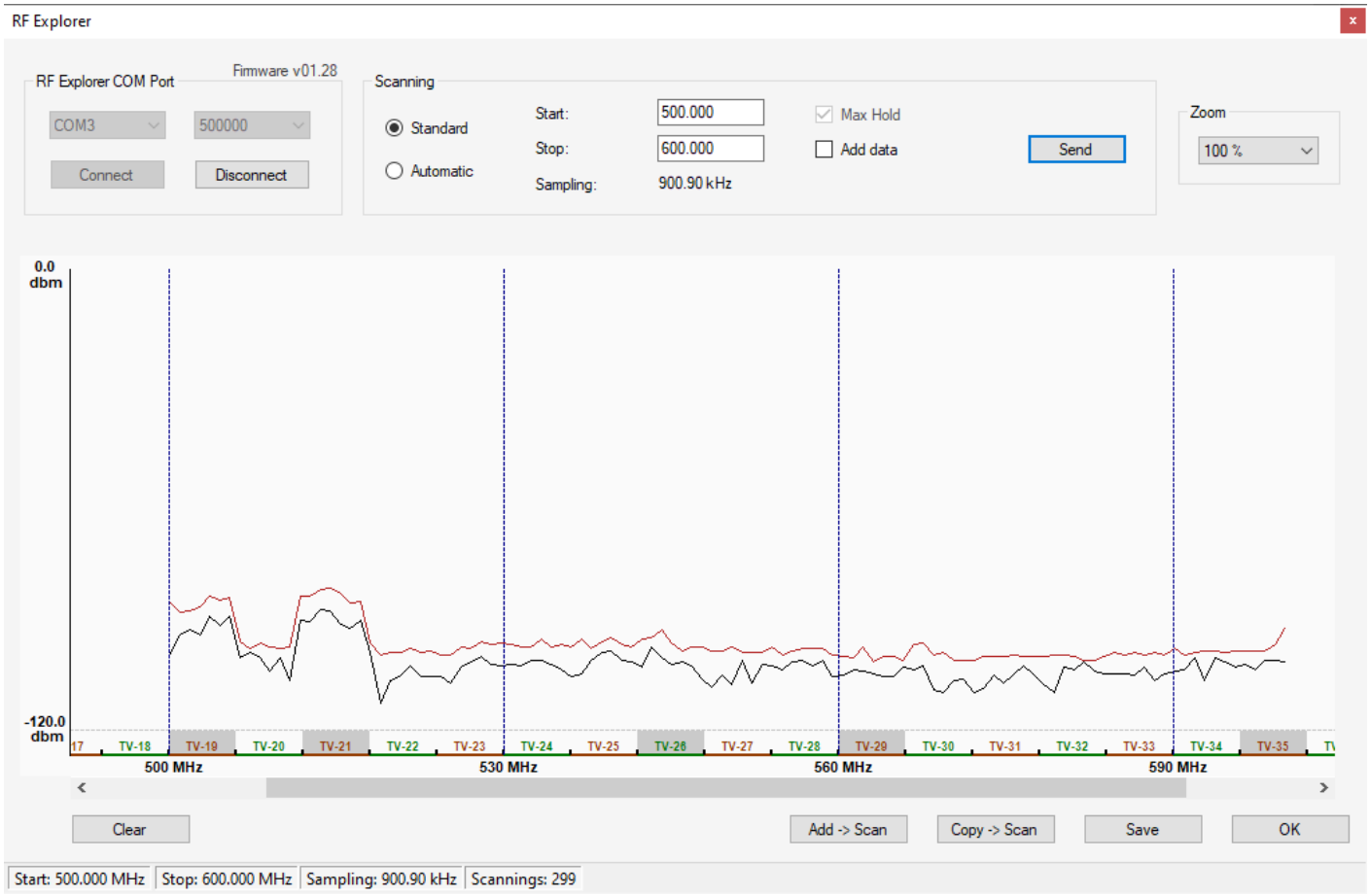
5.6.2 RF Explorer

The RF Explorer scanner can be managed by EazyRF. EazyRF can open .rfe files created by RF Explorer, as well as files exported in .csv format (single signal or cumulative).

The RF Explorer (or PLUS) do not allow managing a range of frequencies with precise sampling, only 112 samplings for a given range is allowed.

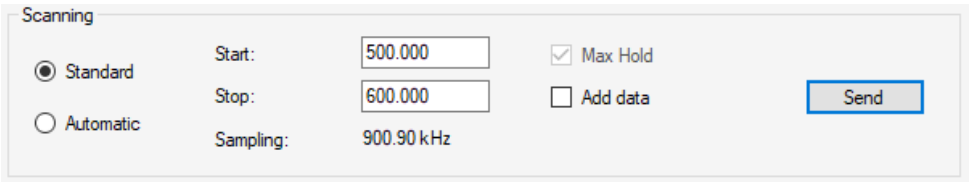
To overcome this constraint, EazyRF uses a public library to communicate with RF Explorer directly (RFExplorer-for-.NET). Thanks to the developers.

Here is this tool:



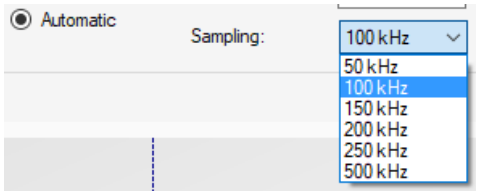
At launch, EazyRF automatically connects to the first RF Explorer connected to a USB port. The communication is done by serial port at the speed of 500000 bits / sec (not modifiable).

Two types of scanning exist:

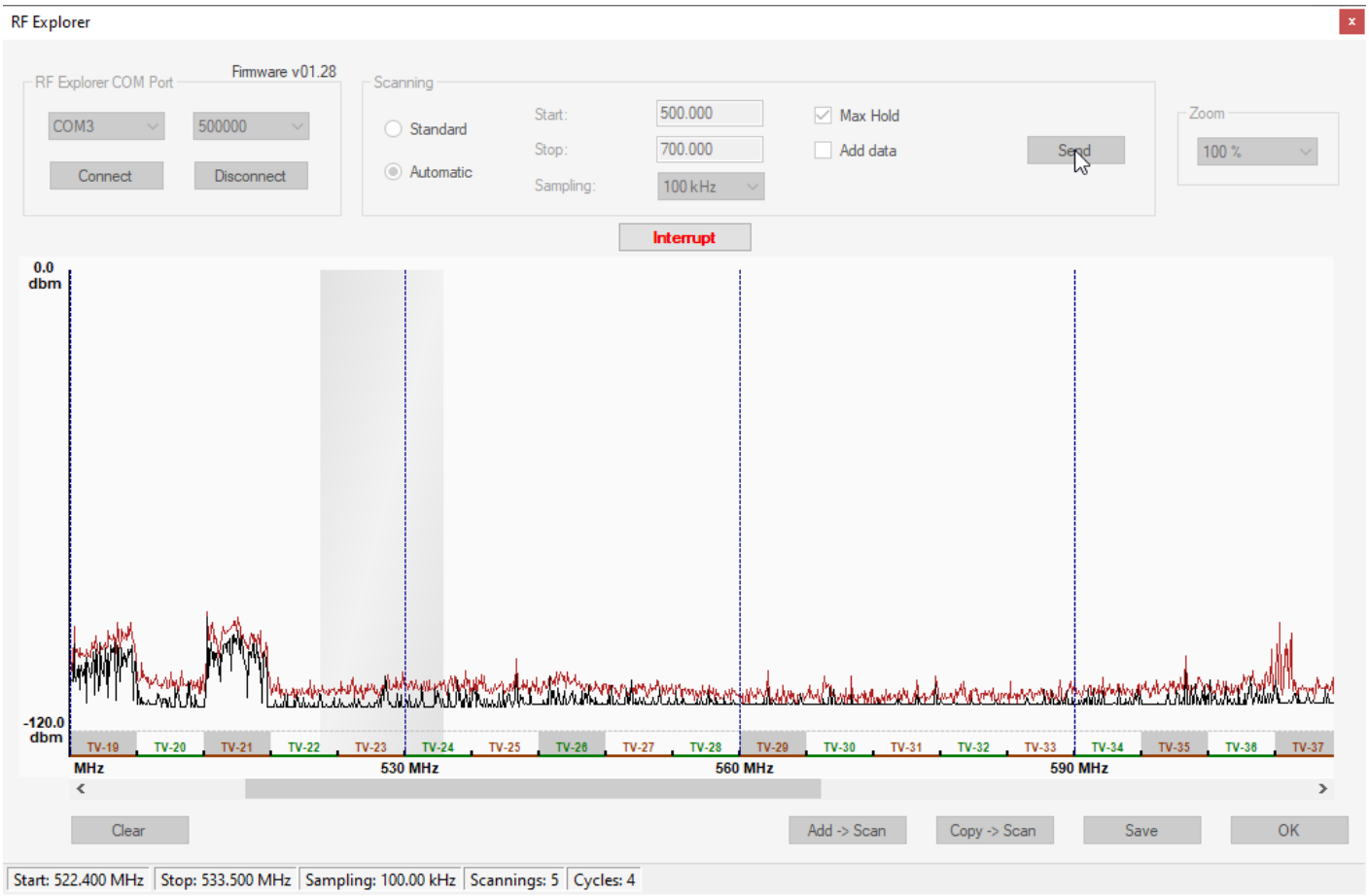


Standard scanning is the classic operating mode of the RF Explorer. A start and stop frequency are set and RF Explorer determines the sampling value. RF Explorer uses 112 samplings over the defined frequency range. In fact, it is 111 steps, so for a range of 100 MHz, we obtain a sampling of 900.90 kHz.

This is not a sufficient precision. EazyRF has therefore created an automatic mode of operation to define the sampling:



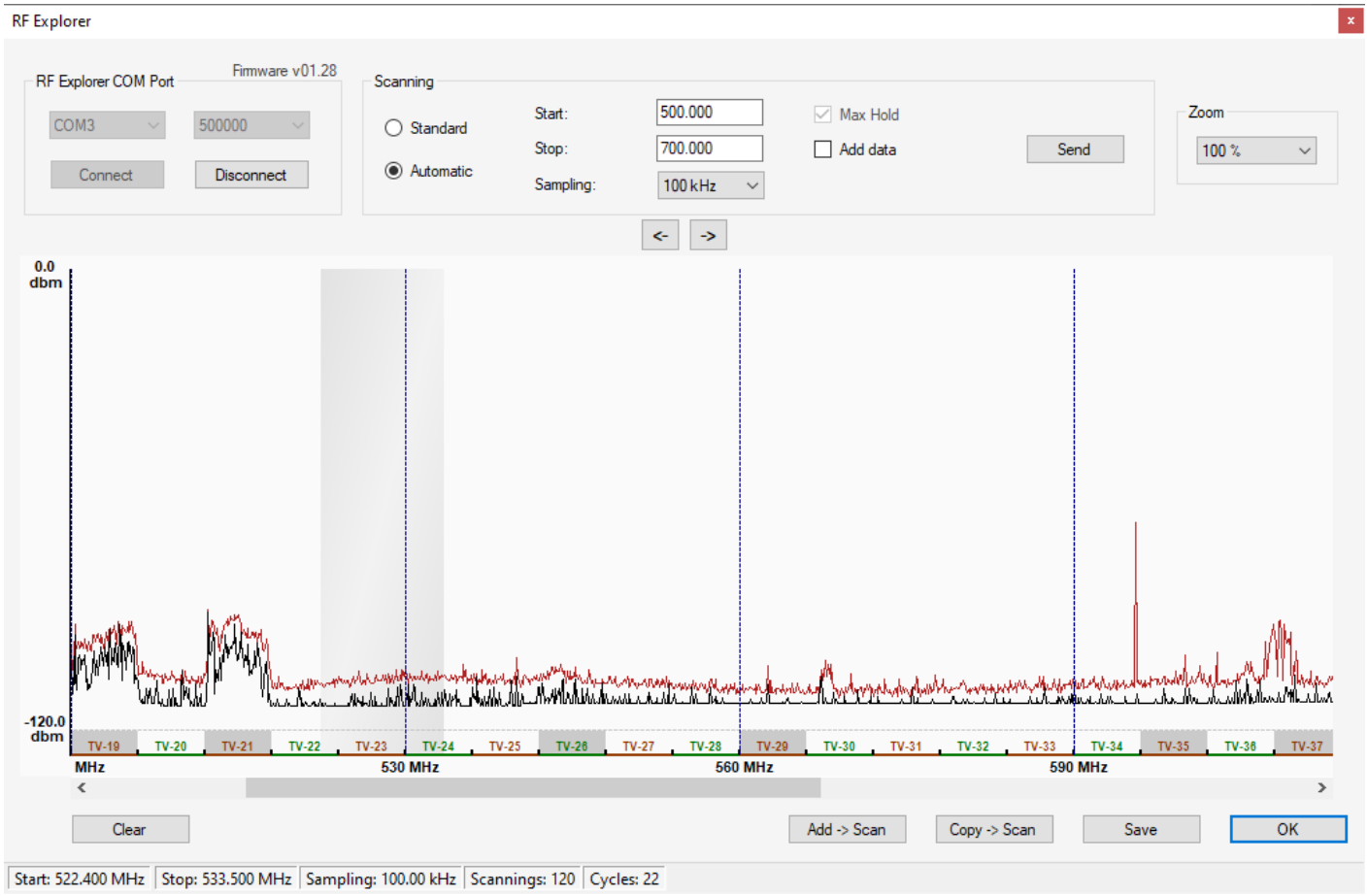
From the "Start" and "Stop" values, EazyRF reprograms RF Explorer in frequency intervals to obtain the desired result. Therefore, for a 500 MHz to 700 MHz scan at 100 kHz sampling, RF Explorer must be reprogrammed 18 times, from 500.000 MHz to 511.100 MHz for a first reading, then from 511.200 MHz to 522.300 MHz, and so on. The result:



After having defined the sampling frequencies, it is necessary to launch the operation by the command "Send".

EazyRF is monopolized by this operation and you must terminate it with the "Interrupt" command:

At this moment, you get:

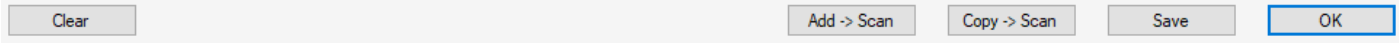


The commands:

allow you to move forward or backward manually from one sweep section to another.

The "Zoom" command allows you to enlarge or reduce the display.

Finally, the commands at the bottom of the window:



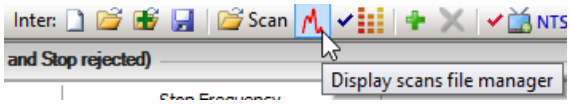
"Clear" resets the data, display and samples.

"Add -> Scan" allows to add the sampling to the previous module ("Scan"), while the command "Copy -> Scan" erases the data of the "Scan" module and replaces it with those of RF Explorer.

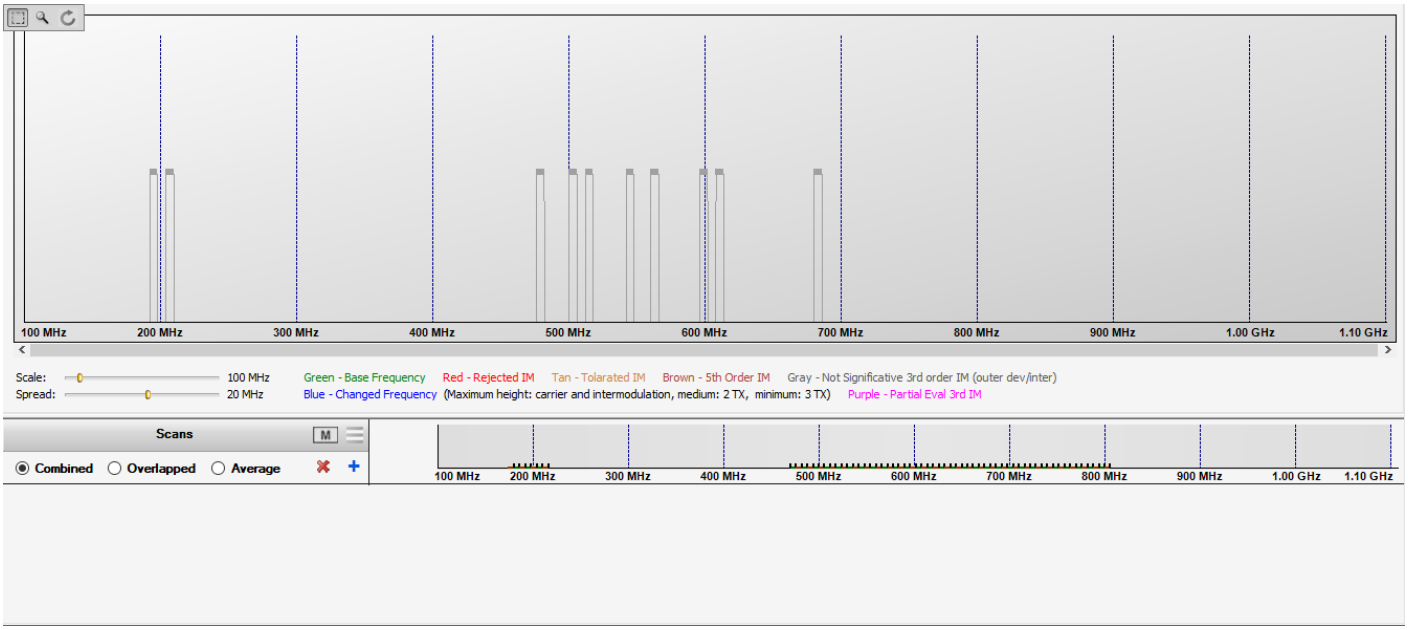
"Save" creates a data file in CSV format.

5.7 Scans File Manager

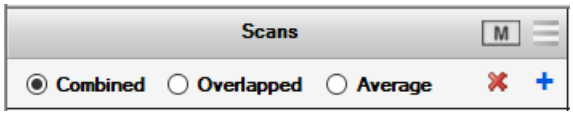
The command:



Display the scans file manager section below the details of the intermodulations.

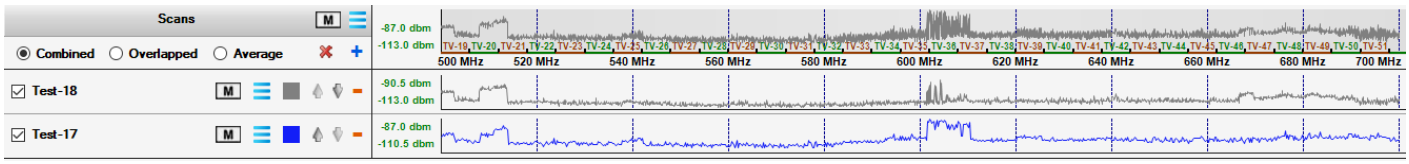


Adding scans files is done with the command '+':

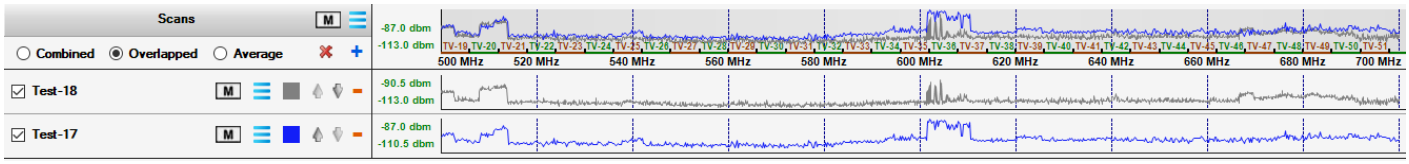


The 'X' command erases the files list.

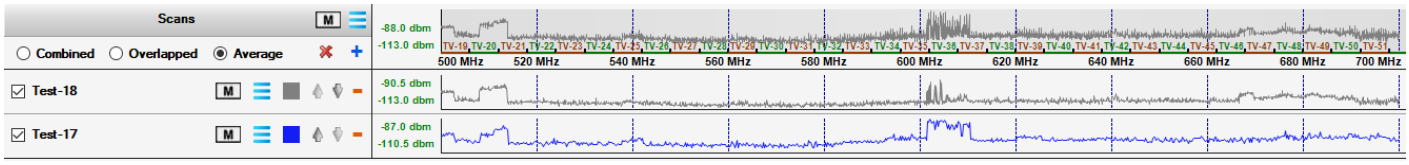
Let's take an example:



The upper part of the scans displays the combination of files, either in "Combined" mode, as above, or "Overlapped" mode:

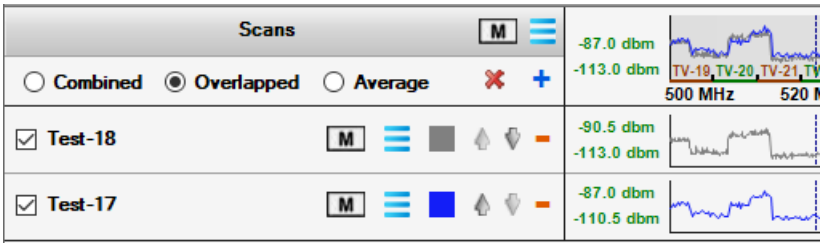


Or, in ‘Average’ mode:



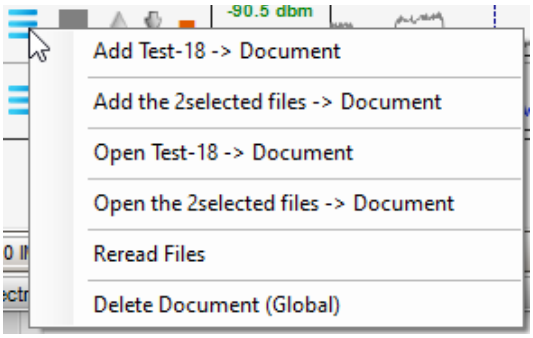
In ‘Combined’ mode, only the peak value is displayed, whilw in ‘Average’ mode, the average of the values is displayed.

Let's take a closer look at the file list:



Each item in the list can be activated or deactivated in the global section. The command ‘-‘ allows you to delete a file. The order of the files can be changed with the arrows "Up" and "Down". The color of the trace can also be changed.

The menu command allows you to manage the integration of these files into the system:

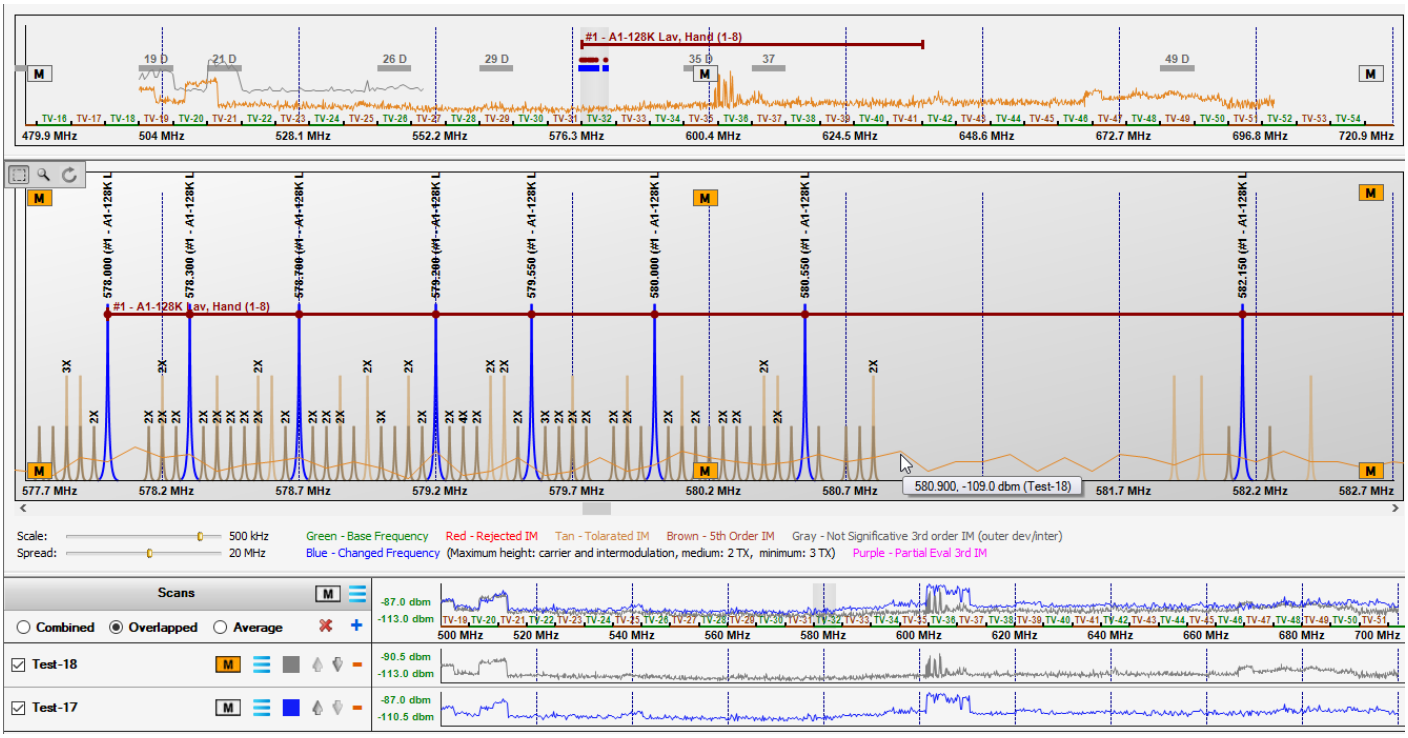


As in the standard scans manager, the "Add" command adds a file to the document, while the "Open" command erases the data before adding it. It is allowed to add all selected files simultaneously.

The "Reread Files" command allows you to read files again if changes have been made.

The “Delete” command deletes the data present in the document.

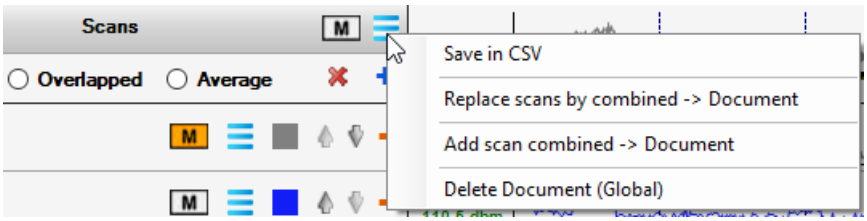
Finally, the command ‘M’ for ‘Monitor’ allows you to add one or more files overlapped on the global or detailed view:



The objective is to compare a more recent scan compared to that integrated into the document. In addition, you have access to all the functions of moving, zoom-in, etc. Flashing orange lights indicate that you are in ‘Monitor’ mode and that the data displayed are not all present in the document. A single click on the flashing indicator close the preview.

A double click on the ‘M’ button on the file list allows to select or unselect all the files.

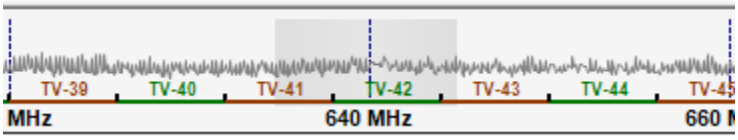
The combined part of the scans has its own menu:



It is thus allowed to save the combination of samplings or to integrate it into the document. The save command is not allowed in ‘Overlapped’ mode.

You can also preview the result with the ‘Monitor’ command.

Finally, the upper part of the sampling area displays the space occupied by the detailed area (as in the overview):



A click in the band of any scan allows to move the detailed area on this region of the spectrum.

5.8 Print

It is possible to print the graphical representation of global and detailed frequencies area with intermodulations. The printing is done in full screen portrait or landscape mode (by default) depending on the desired paper source. The values of frequencies of start and stop are the same, but the graphical representation is adjusted to the size of paper and the application window size does not influence.

5.9 View detachment to a window (2nd screen)

The "Intermodulations" view can be detached from the EazyRF application towards a window on a 2nd screen or overlayed with EazyRF if a 2nd screen is not connected.

To activate this function, double-click on the name of the view:

The name of the view is displayed in red to indicate that it is detached:

To return to standard mode, either close the window or redo a double click on the name of the pane (in red).

The "Frequencies Plan", "Spectrum View" and "On Tour" views can also be detached.

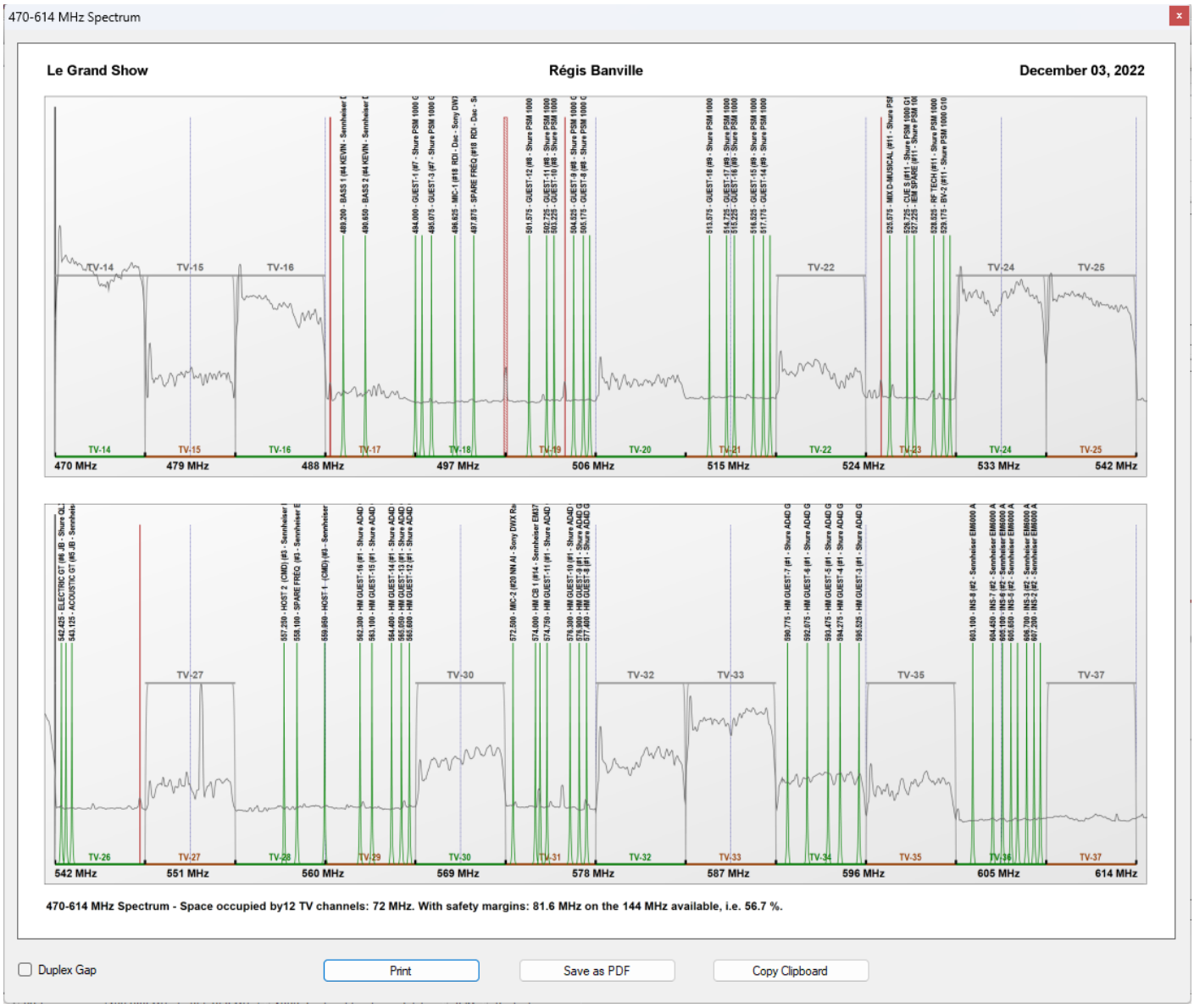
If more than one view is detached, a simple click on the name of the view will bring it to the foreground.

Obviously, the content of the detached views is synchronized with the changes made no matter where they are made.

5.10 Frequencies spectrum manager

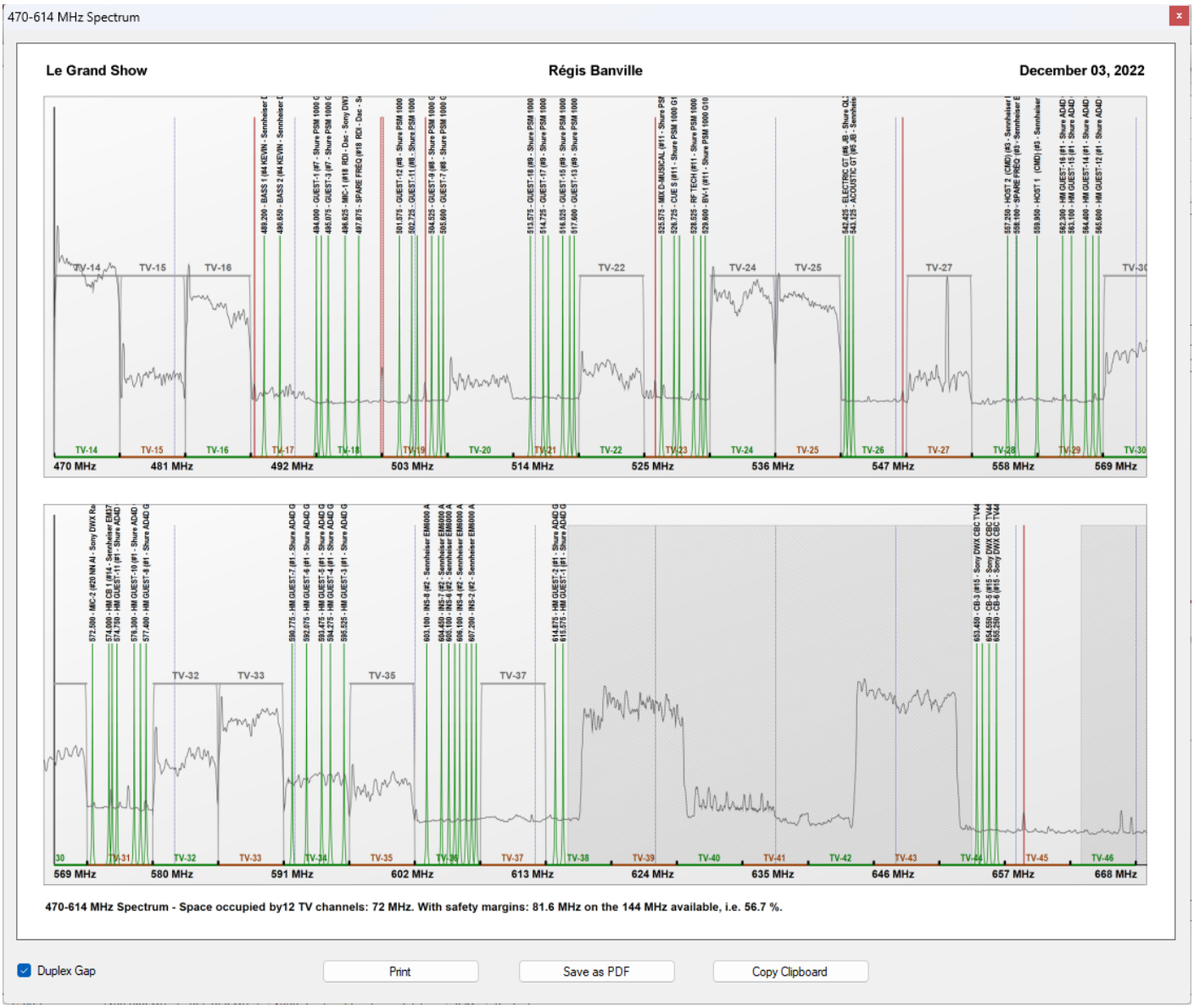
The frequencies spectrum manager is called by the last command in the detailed intermodulation section:

Which give:

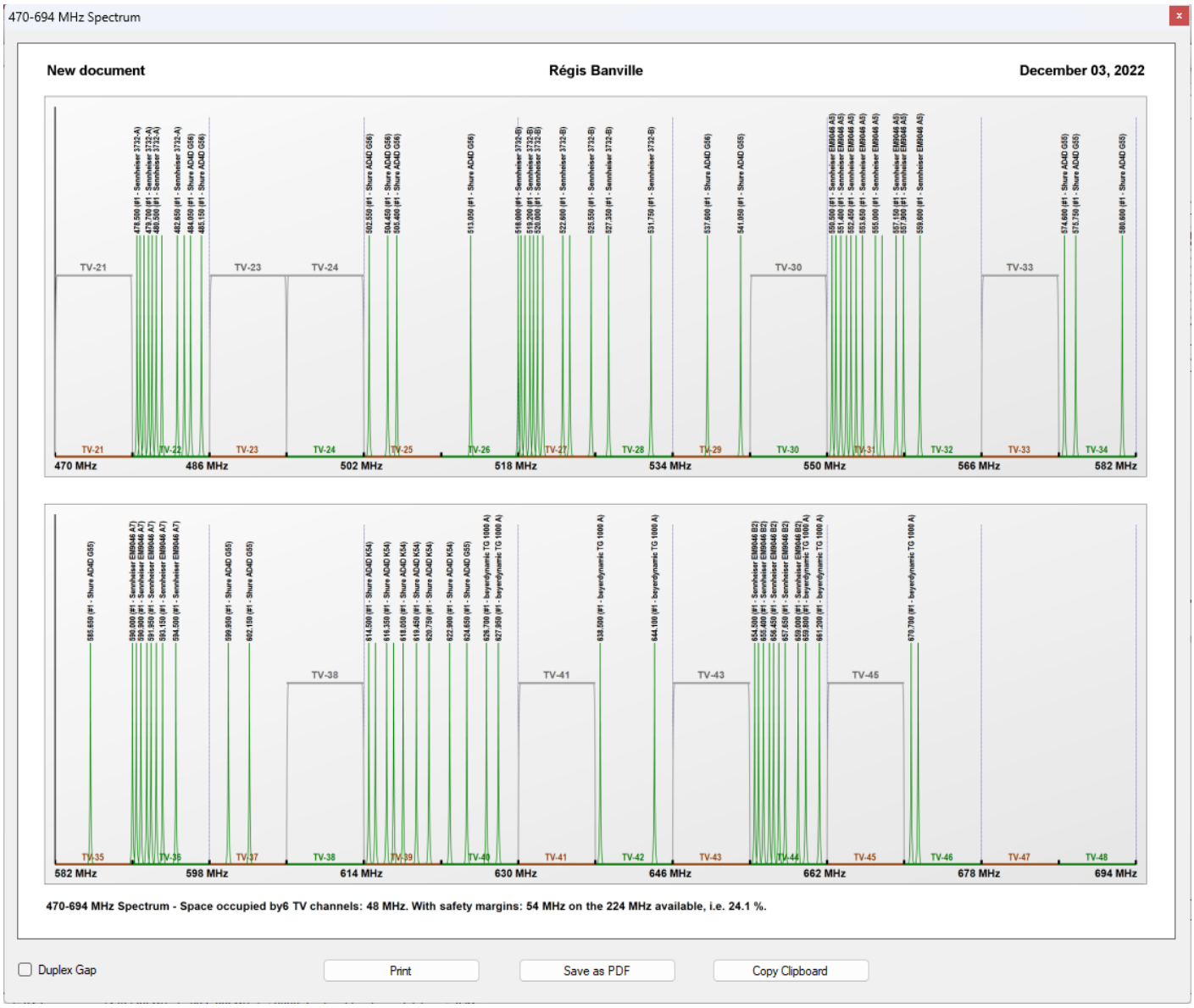


The spectrum displayed corresponds to the frequency band reserved for commercial use between 470 and 700 MHz. The “Duplex Gap” option expands the band to the permitted region at the top.

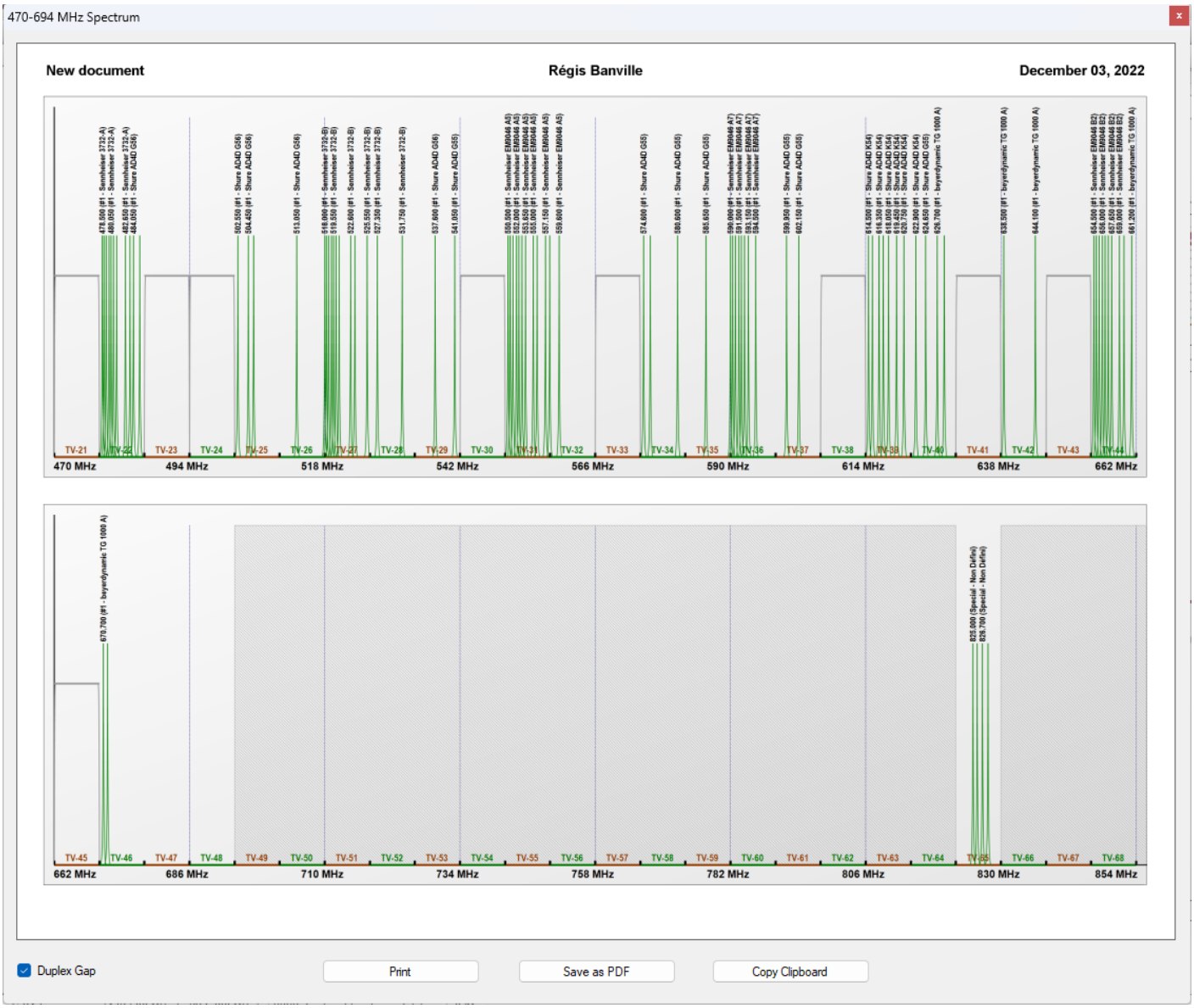
In North America, the base area available is 470 MHz to 614 MHz with a duplex gap of 614 to 616 MHz and another of 653 to 663 MHz. EazyRF displays the 470 MHz to 668 MHz zone with the duplex gap activated.



In Europe, the base area available is 470 MHz to 694 MHz with a duplex gap of 822 to 830 MHz.



EazyRF displays the 470 MHz to 854 MHz band with the duplex gap activated.



The purpose of the module is to illustrate the entire RF space by spreading the frequency range over two sections in order to be able to print it on a single page or do the viewing without moving.

The window size adjusts to the resolution of the Windows desktop. The image shown is only a preview of the actual image. The image can be printed, saved in PDF format, or copied to the clipboard for use with other software.

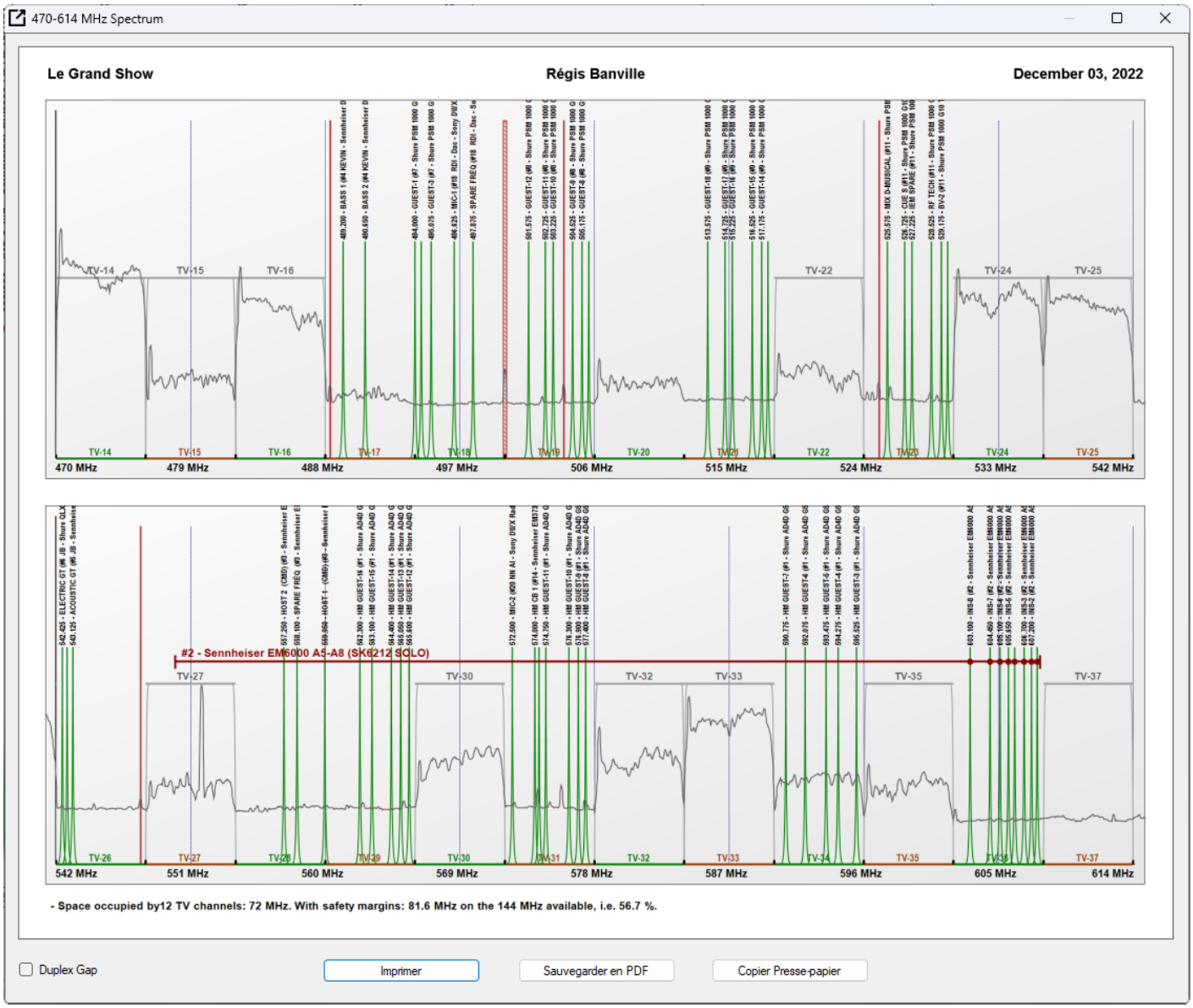
The basic size corresponds to the letter paper size used in America, which is 8.5 in by 11 in. This size only serves to illustrate a potential rendering. When printing, the size used is that of the paper of the selected printer.

The paper size used for saving in PDF format is that defined for the "Microsoft Print to PDF" device which allows high resolution (requires Windows 10 or higher).

EazyRF uses a high-resolution representation, 300 dpi, for detailed printing. The computer screen can only display lower resolution by using a reduction from 300 to 100 dpi.

5.10.1 Module detachment to a window (2nd screen)

By double-clicking on the title of the spectrum window, you can detach the module and display it either on a 2nd screen or in a floating window:

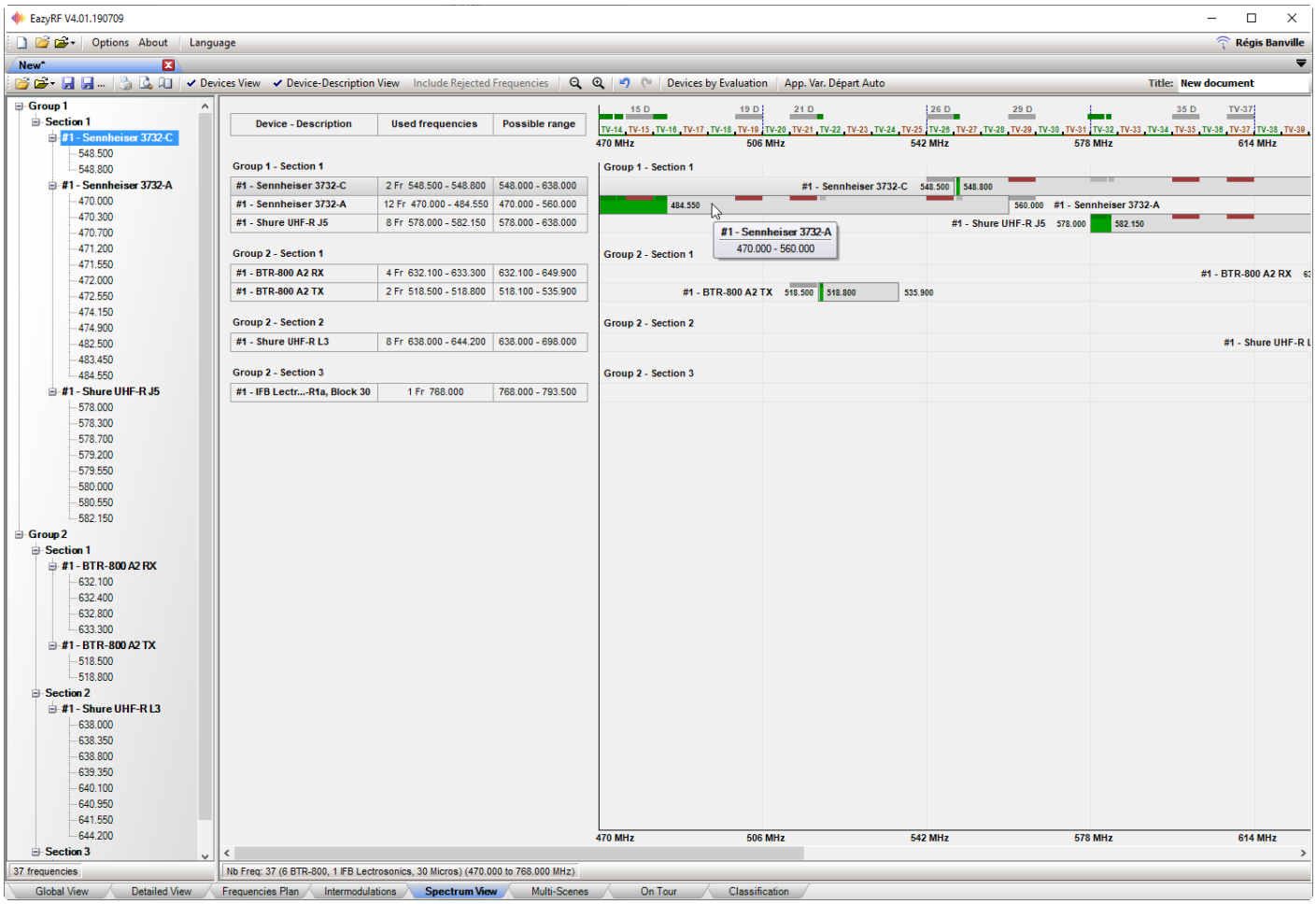


The window now displays the content of the spectrum continuously and no longer in static mode. The window is variable in size. The print is always made from the paper size, only the copy to the clipboard corresponds to the window size in high resolution.

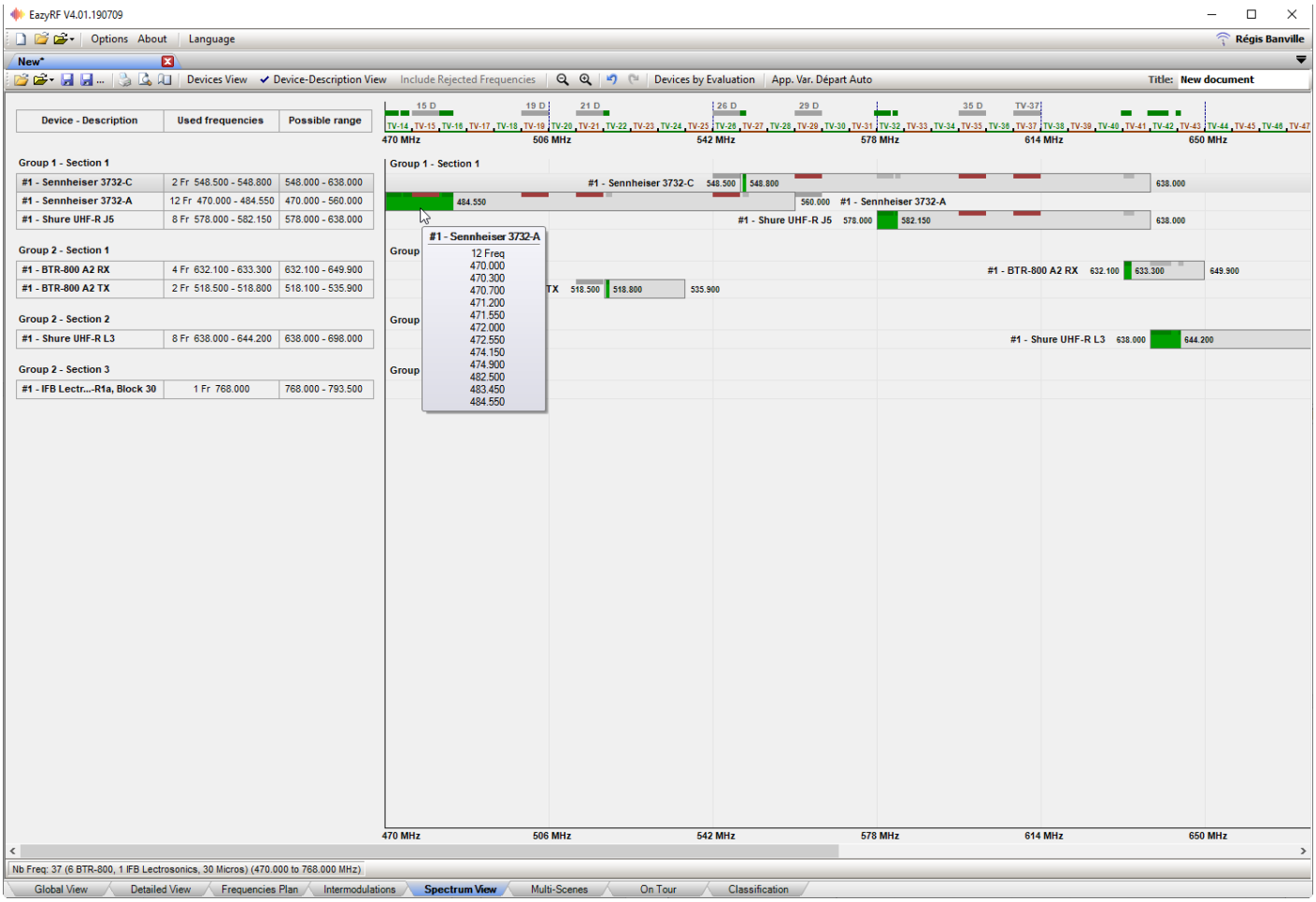
This module does not allow any selection or modification of the document, it is only a dynamic viewing module.

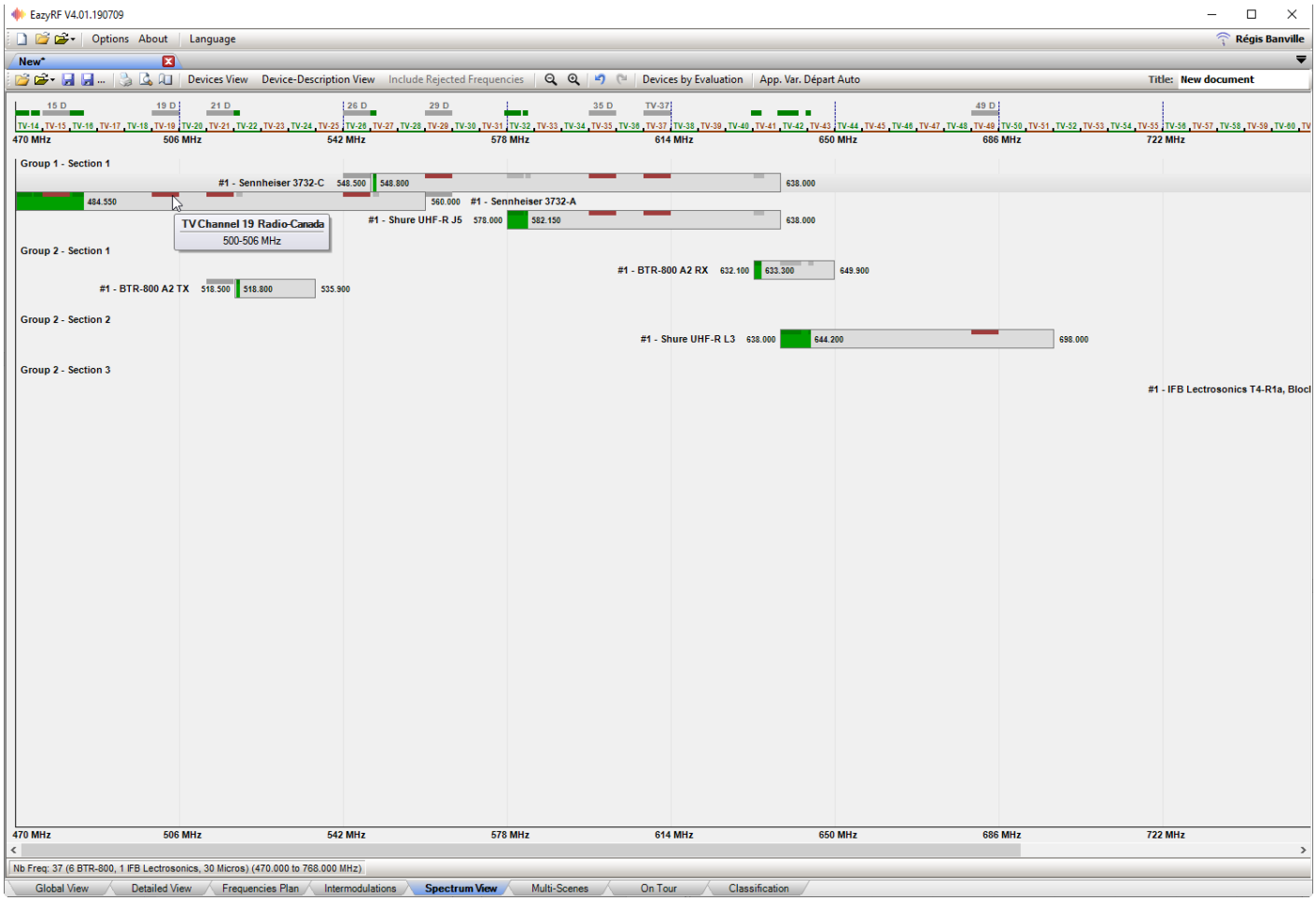
6 - Spectrum View

The "Spectrum View" pane displays the spectral space occupied by the devices, the TV channels and the area of rejected frequencies. Here is an example:



The list of devices can be retracted as the list Device-Description to leave it up to the spectrum:


EazyRF V4.01.190709
Options About Language
Régis Banville
New*
Devices View
Device-Description View
Include Rejected Frequencies
Devices by Evaluation
App. Var. Départ Auto
Title: New document
Device - Description
Used frequencies
Possible range
Group 1 - Section 1
#1 - Sennheiser 3732-C
2 Fr 548.500 - 548.800
548.000 - 638.000
#1 - Sennheiser 3732-A
12 Fr 470.000 - 484.550
470.000 - 560.000
#1 - Shure UHF-R J5
8 Fr 578.000 - 582.150
578.000 - 638.000
Group 2 - Section 1
#1 - BTR-800 A2 RX
4 Fr 632.100 - 633.300
632.100 - 649.900
#1 - BTR-800 A2 TX
2 Fr 518.500 - 518.800
518.100 - 535.900
Group 2 - Section 2
#1 - Shure UHF-R L3
8 Fr 638.000 - 644.200
638.000 - 698.000
Group 2 - Section 3
#1 - IFB Lectr...-R1a, Block 30
1 Fr 768.000
768.000 - 793.500
470 MHz
506 MHz
542 MHz
578 MHz
614 MHz
650 MHz
#1 - Sennheiser 3732-A
12 Freq
470.000
470.300
470.700
471.200
471.550
472.000
472.550
474.150
474.900
482.500
483.450
484.550
Nb Freq: 37 (6 BTR-800, 1 IFB Lectrosonics, 30 Micros) (470.000 to 768.000 MHz)
Global View
Detailed View
Frequencies Plan
Intermodulations
Spectrum View
Multi-Scenes
On Tour
Classification



All video standard (ATSC, PAL and SECAM) use the frequency 470 MHz for the start of the UHF region. So the alignment point is 470 more or less usable frequencies (start and stop of a device) or TV channels with the rejected reserved area zone (optional). The display area is adjusted automatically (the TV channels below 470 MHz are ignored if no device uses these frequencies).

The display options are global e.g. they are saved as master EazyRF parameters and not with the document.

This component is not an editor, so no changes are allowed (only zoom in, zoom out). Use the Devices pane to locate a Device or Group/Section in the field of detailed view (there is no selection).

The printout includes detailed part, adjusted according to the size of the paper and a vertical scale to ensure that all devices are displayed on a single page.

6.1 View detachment to a window (2nd screen)

The "Spectrum View" view can be detached from the EazyRF application towards a window on a 2nd screen or overlayed with EazyRF if a 2nd screen is not connected.

To activate this function, double-click on the name of the view:

The name of the view is displayed in red to indicate that it is detached:

To return to standard mode, either close the window or redo a double click on the name of the pane (in red).

The "Frequencies Plan", "Intermodulations" and "On Tour" views can also be detached.

If more than one view is detached, a simple click on the name of the view will bring it to the foreground.

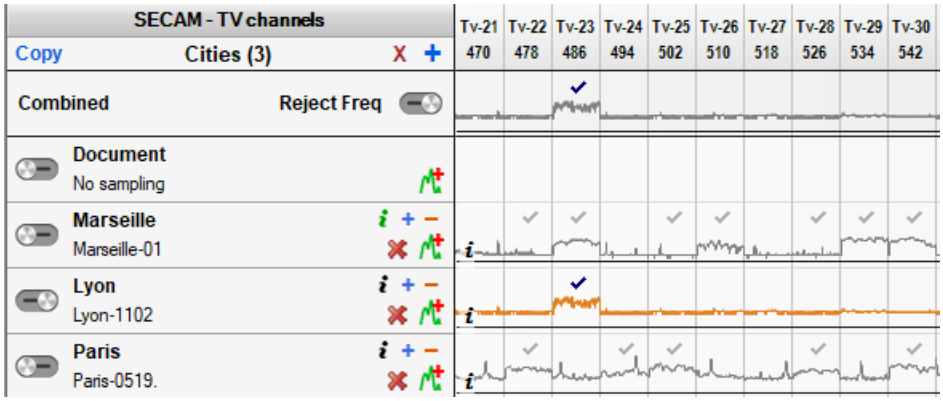
Obviously, the content of the detached views is synchronized with the changes made no matter where they are made.

7 - On Tour

The component "On Tour" allows to prepare a plan of frequencies compatible for several cities simultaneously. What varies from one city to another? Obviously, these are the TV channels. This component allows for the management of a plan by adding the TV channels of several cities. Each city can be enabled or disabled as needed.

The presentation is a bit like the "Spectrum View," but the emphasis has been placed on the position of the TV channels in relation to the devices in the plan. Here is an overview:

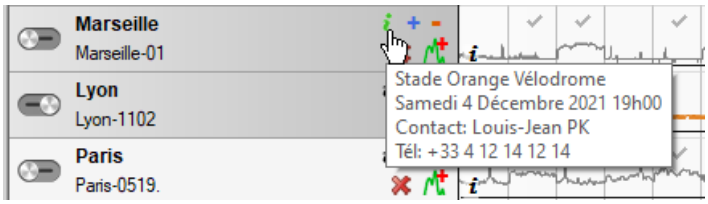
The management of cities, channels and samples of each city is done by the editor:



You can add, insert, delete or move one or more cities simultaneously. In addition, these modifications are now part of the "Undo / Redo" manager. The selection can be moved.

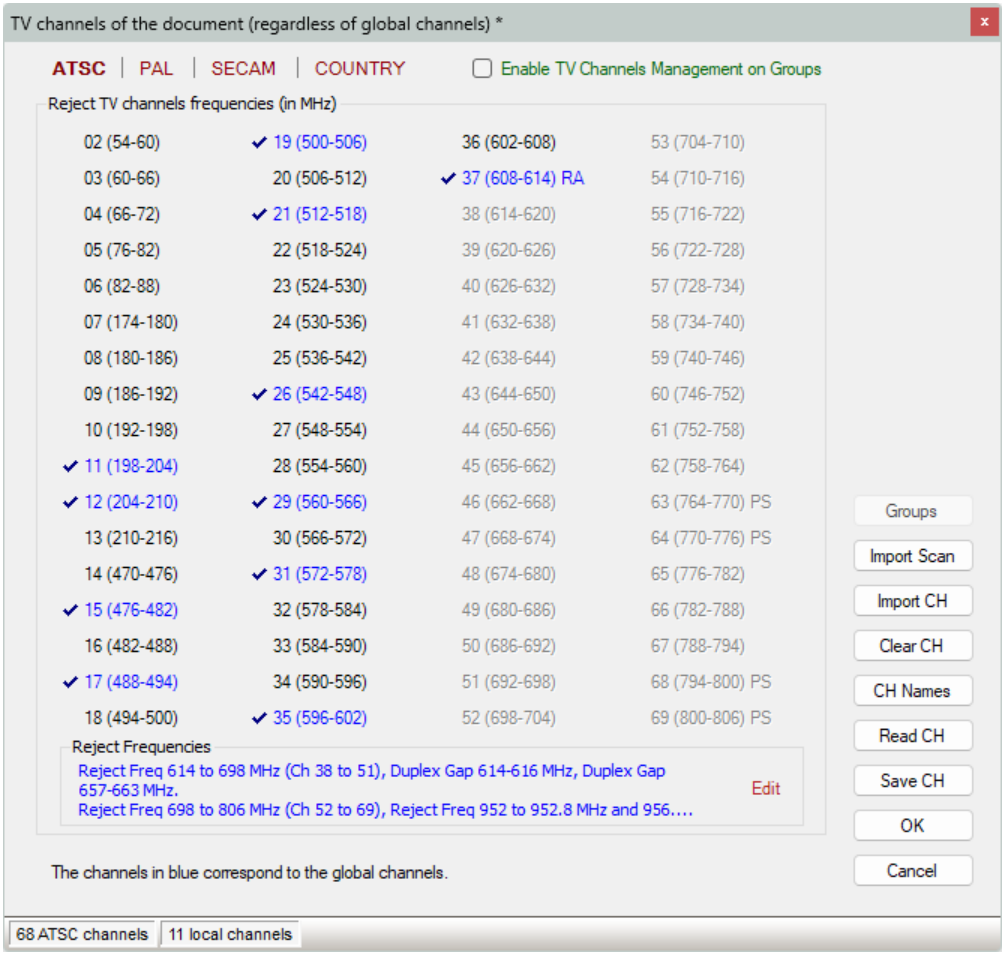
By default, adding cities is done in non-active mode. With a new document, adding a city turns off the document's channels.

The "i" command allows you to add information about an event, date, time, address, contact, etc. (text zone) :



The "i" command is displayed in green if information is present. Just click on the "i" to call the editor:

It is possible to add a series of TV channels previously created and saved with the standard TV channels editor:



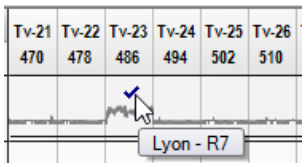
A command allows you to delete the list with its names. You must create and save each list by this tool. After adding a more than one city in the "On Tour", this tool is not available any more in the Global, Detailed and Intermodulations view. A message tells you to return to On Tour for editing channels.

If the channels of the document are activated document, the editor of channels works in a normal way. As against, if the channels of the document are disabled:

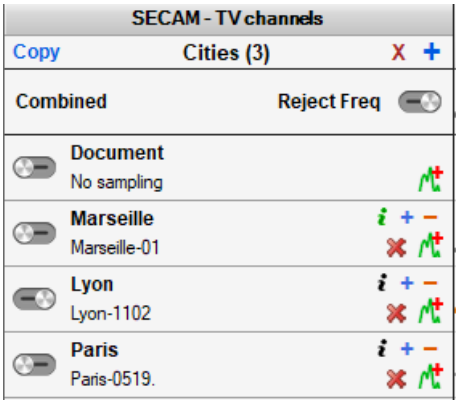
Then the editor no longer displays the channels of the document and so allows to create new cities or edit them. The result of the editing of a city is not illustrated in the lower part. You must remove the city and re-import it. Changes are not allocated to the channels of the document because they are inactive.

As EazyRF is multi documents and multi applications (launched more than once), it is still possible to launch a new document and create new cities if desired.

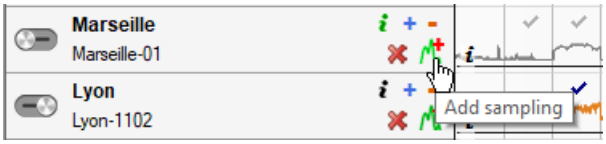
It is strongly recommended to add a name (description) for each channel, this allows to identify them more clearly:



Each city can be changed directly (add or delete a channel). These changes do not affect the file of the city, besides the changes in external file does not have influences. Finally, the setting on or off is also permitted (much like the "Layers" in Photoshop):

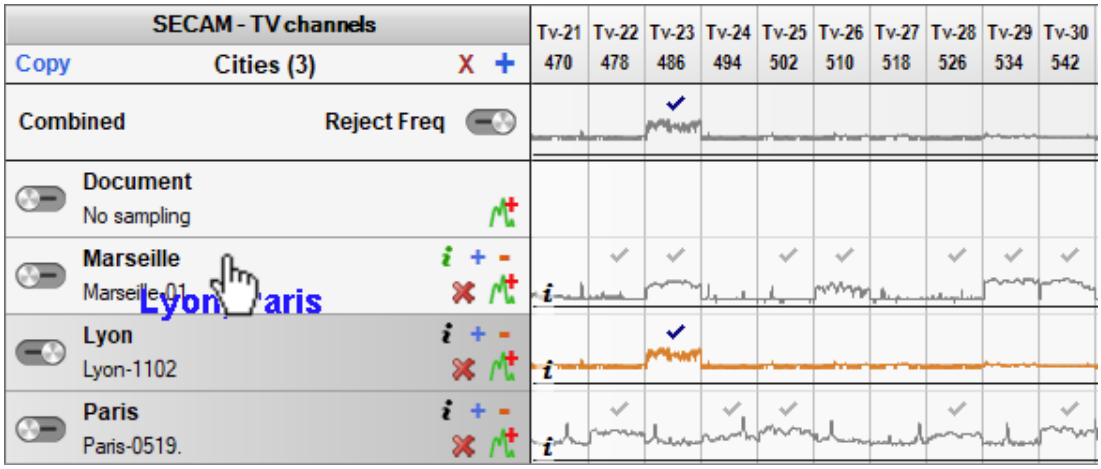


A sample file can be added to each city with the commands of the 2nd line of a city:

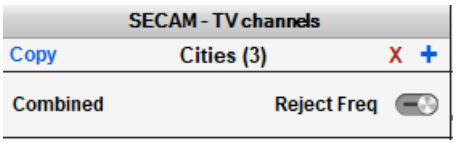


When adding a file, only the path to the filename is saved, not the sample data.

The list can also be reclassified by dragging the selection (with no effect on the devices evaluation):



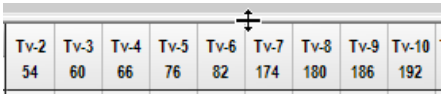
To delete a city, use the command "-". To delete the whole list, use the "X" command:



Activation of rejection of frequencies for each video standard can also be enabled or disabled. For the ATSC video standard, the rejection of the 600 MHz and 700 MHz bands matches the values in the document and then changes simultaneously when enabling or disabling the rejection of frequencies. Standard channel editing allows this to be done independently.

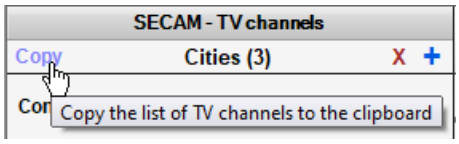
To build a plan intended for a tour, it's better to clear the channel list of the document and add the desired cities.

When several cities are added to the document, the placeholder may not be sufficient to have a complete view. The channel area can be enlarged up to about 80% of the window size with:



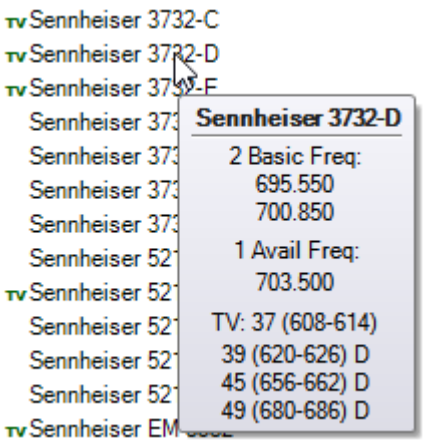
The position is saved with the document for subsequent use.

If the list is too long, you can use the "Copy" command:



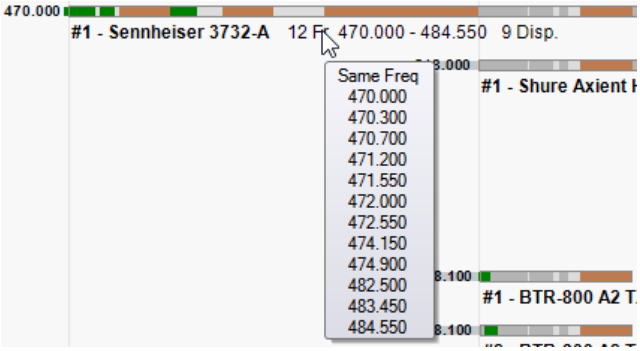
The image of the list will be copied to the clipboard for viewing on another application.

To add devices to the document, just use the tabs "Variables" and "Fixed". The list of available frequencies is naturally displays:



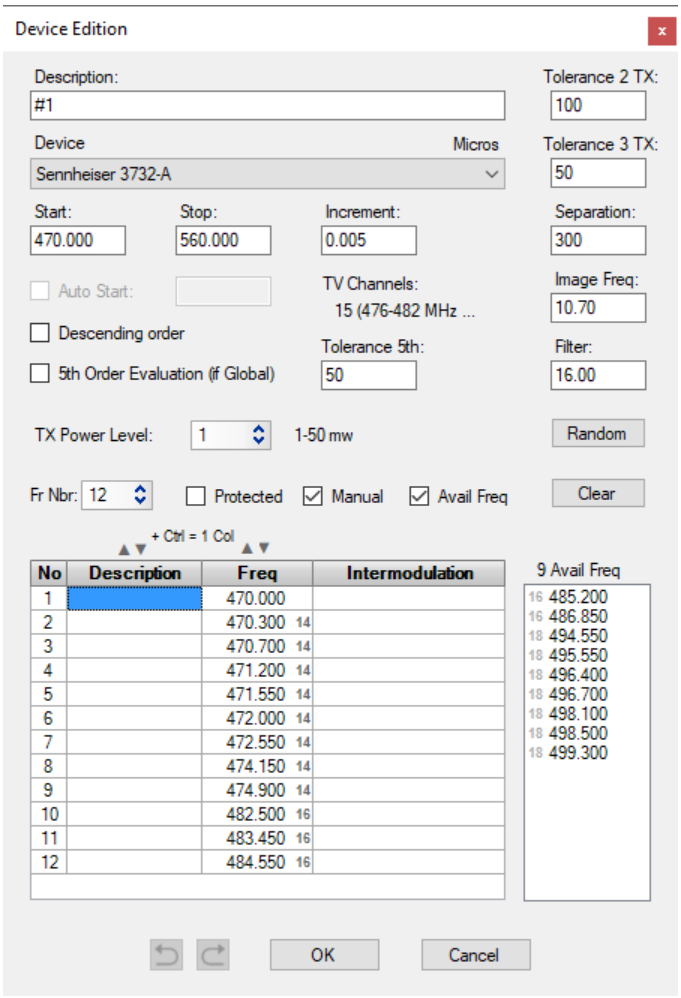
The creation of a document with several cities is more delicate given the higher number of TV channels. Just do a first draft in "Full Automatic" mode. EazyRF recalculate the frequencies of each device to find a solution. Although in the case of previous Sennheiser, there seems to be only 1 frequency available, should not be afraid to ask for a higher number in automatic mode, the final outcome cannot be predicted. The indication given corresponds to the current situation if no changes can be made (manual mode, adding automatic or protected devices).

For each device of the document, detailed information is available in tool tip or description of the device, the frequency list, the list of available frequencies, the details of a TV channel, the list of irregularities (intermodulation, rejection, etc.):



The edition of the document in this component is not total. It is allowed to add or delete groups, sections and devices. It is not allowed to move them however (the general views do that very well).

To edit a device, simply double-click on a device (regardless of the horizontal position) and standard editor is displayed:



After completing a first draft with a list of possible cities (there is still a limit to the number of channels), just save the plan under different names and disable unnecessary TV channels cities. For example, if you are touring in Quebec, no need to keep the channels of Montreal and other cities. This will allow you to make local changes with greater flexibility.

The purpose of this component is to prepare a plan that will be compatible with the most possible cities. It is practically impossible to put too much TV channels (you have to keep some space for devices).

7.1 View detachment to a window (2nd screen)

The "On Tour" view can be detached from the EazyRF application towards a window on a 2nd screen or overlayed with EazyRF if a 2nd screen is not connected.

To activate this function, double-click on the name of the view:

The name of the view is displayed in red to indicate that it is detached:

To return to standard mode, either close the window or redo a double click on the name of the pane (in red).

The "Frequencies Plan", "Intermodulations" and "Spectrum View" views can also be detached.

If more than one view is detached, a simple click on the name of the view will bring it to the foreground.

Obviously, the content of the detached views is synchronized with the changes made no matter where they are made.

8 - Multi-Scenes

The « Multi-Scenes » view has been developed to meet the demands of music festivals taking place on several stages over a few days or more.

More than a hundred groups follow each other in different stages. So, one can easily imagine the large number of frequencies needed, impossible to calculate with a standard document.

If we analyze the process, we realize that the groups come on stage in turn with a time of reinstallation between two performances.

Therefore, it is not necessary to calculate the intermodulations for the overall performance.

In the first place, there are only the permanent installations which return from day to day. Secondly, for each stage there are only three groups that are in function simultaneously. While one group delivers its performance, the previous one dismantles and the next one gets ready.

From these needs, a new module has been created to manage these calculation commutations: « Multi-Scenes ».

This module is not functional with the basic license, it is optional and at an additional cost.

8.1 Presentation

This component is different from the others. You must first create a document in multi-scene mode. Why? Because this mode of operation is not available with conventional authoring tools. Scenes are groups as before but with independent evaluation relationships.

Moreover, an additional need requires the presence of a "flying" team that can intervene on each of the scenes.

So a new group is added. This group has a complete evaluation relationship. This format is not compatible with the standard evaluation of EazyRF.

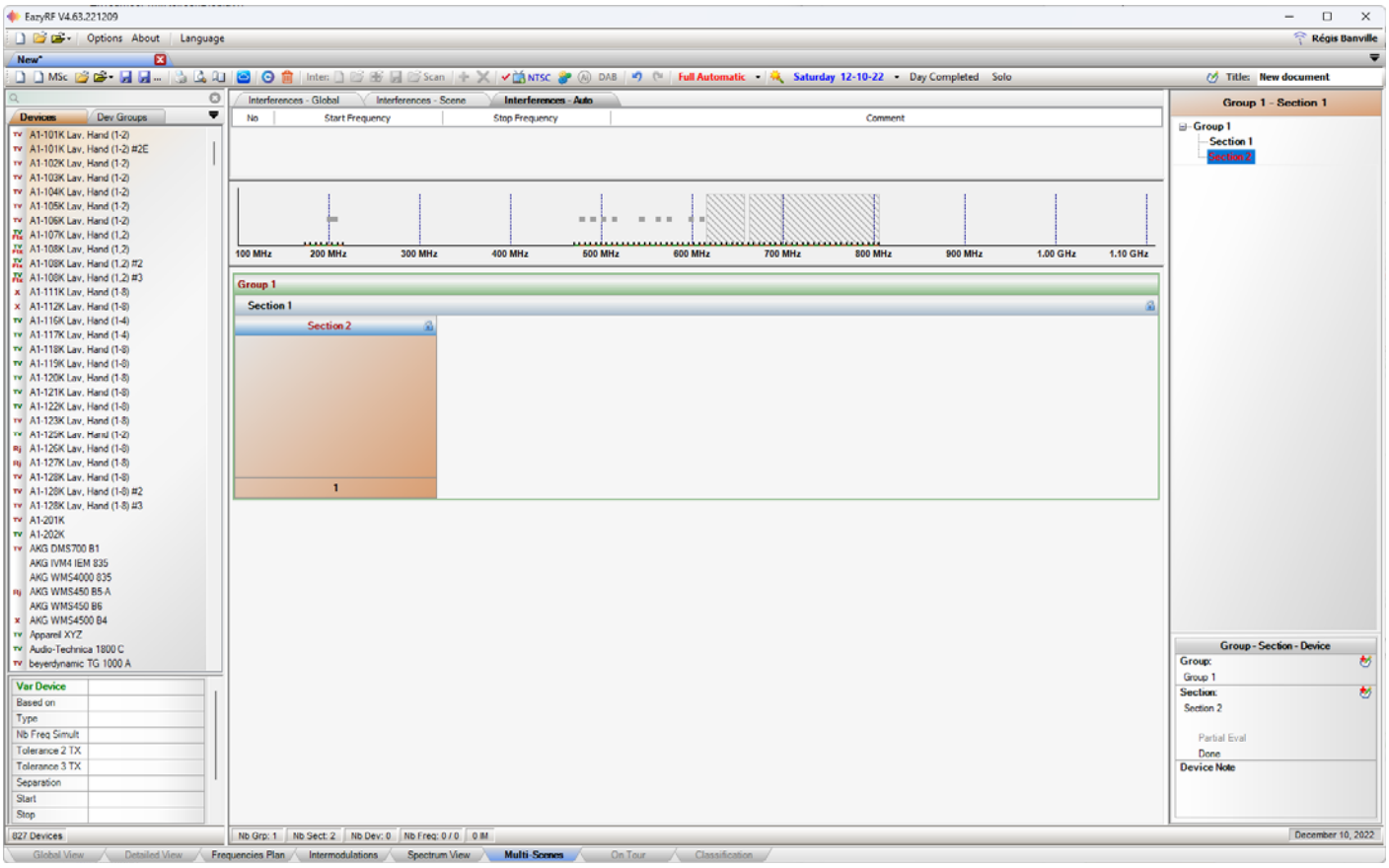
A new calculation method deals with this case. EazyRF takes care of switching sections when calculating intermodulations.

To avoid the repetition of two frequencies between the independent groups a trick is used: an auto-interference. This is created from the value of a carrier but with a small variation on both sides, 100 kHz by default (configurable).

The partial evaluation method can even be used with some permanent sections

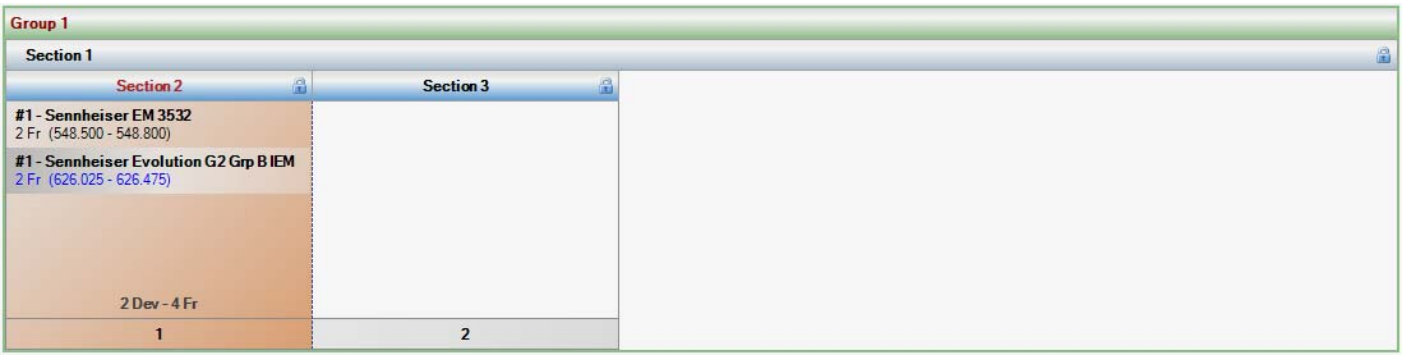
By creating a multi-scene document, the "Global View" and "Detailed View" panes are no longer accessible due to the unconventional structure of the document (the structure is untouchable).

Let's look at a basic multi-scenes document:



The left part contains the list of devices (as in the global view). The central part has three zones: the interference list, the global view of the spectrum and the lower part displays the contents of the document. The section on the right gives details of the devices of the selection with the devices in common.

If we add some devices, we get this:



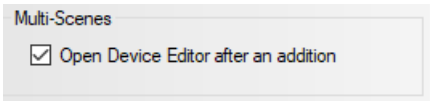
We can see the layout of sections and devices in the group. The sections line up horizontally in the group and the devices vertically in a section.

First feature, all devices added are automatically "Protected" and the protection can’t be removed.

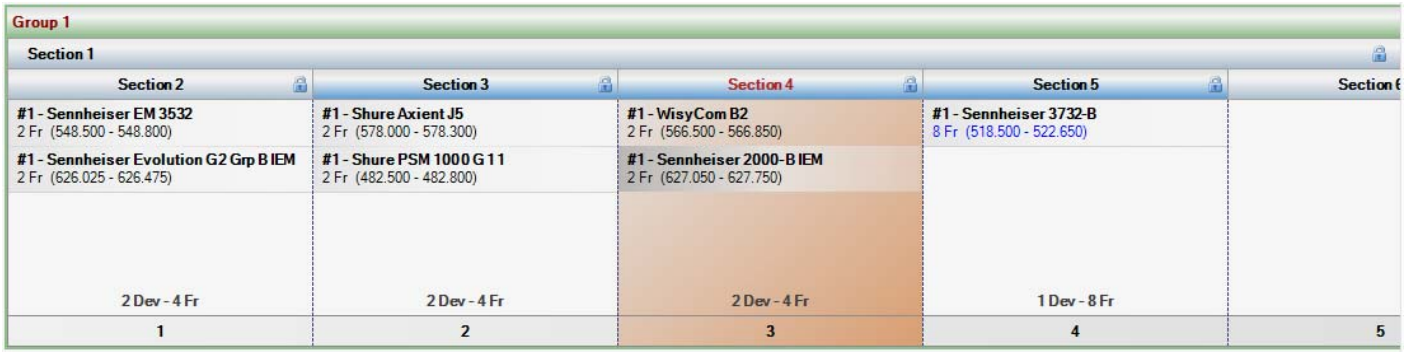
For the data to be valid all times, they must not automatically vary i.e. regardless of the method of calculation chosen, the result will be identical.

The calculation of the available frequencies is deactivated for the whole document because the values vary according the switching, thus to be redone continuously. Available frequencies only appear when editing a device or when the mouse pointer is over the name of a device on the left list.

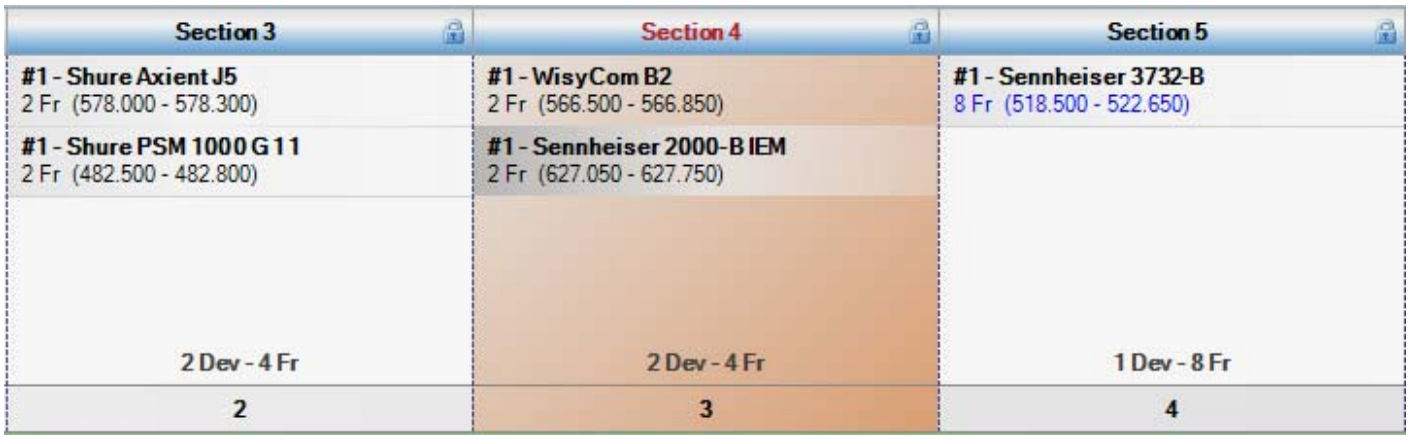
When adding a device, the editor automatically appears in order to make the necessary modifications (number of frequencies, etc.). This function can be activated / deactivated in the Options / Startup - Global / Global Options menu:



Now let's add some sections and devices:

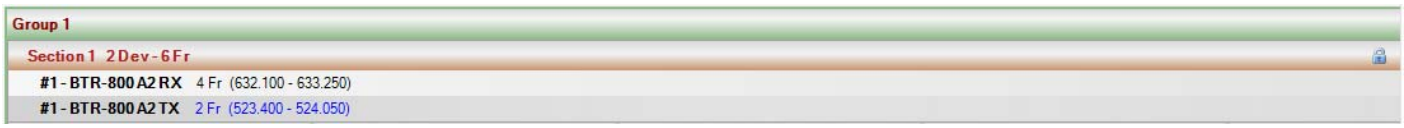


We can notice the selection of the section 4. As explained previously only three performances are active simultaneously on every stage. In this case, sections 3, 4 and 5 are highlighted:



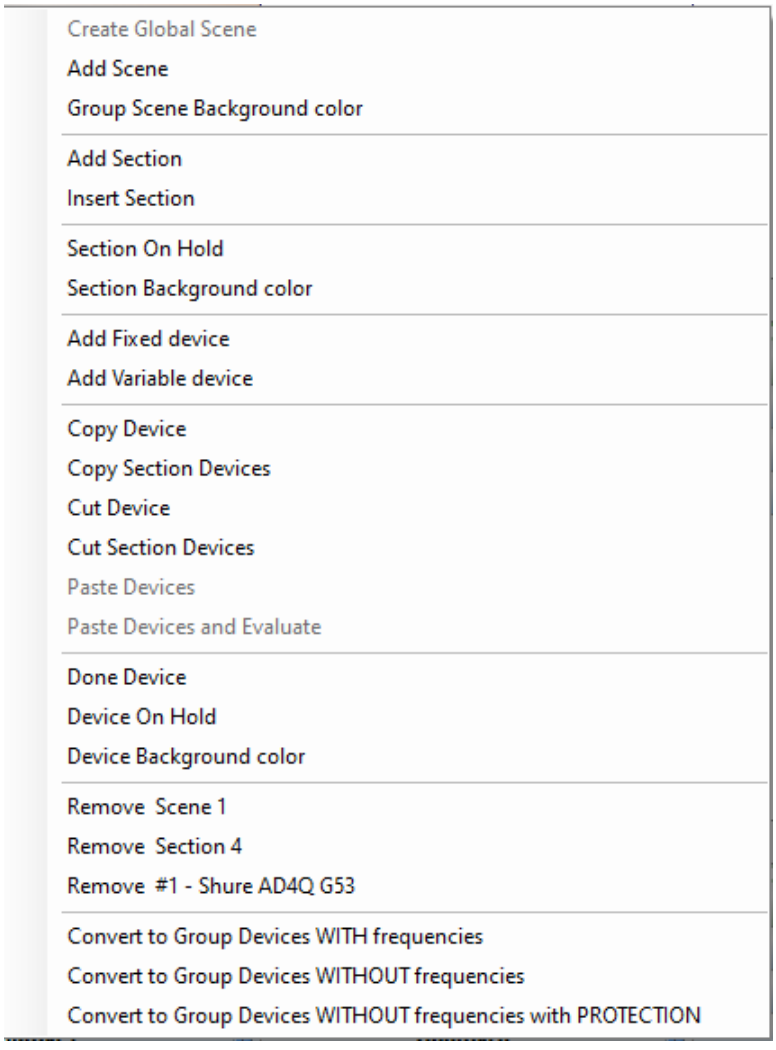
The protection icon is displayed to the right of the section header. Devices are added as usual by dragging a device from the list on the left, but only on the selected section.

The sections occupying the top of a group are the permanent sections, i.e. the sections used during the duration of the event. For example :



The devices used during the entire event must be placed in these sections.

To create sections a menu must be called from the right mouse button, to ensure the position of the desired action. Let's look at the menu:

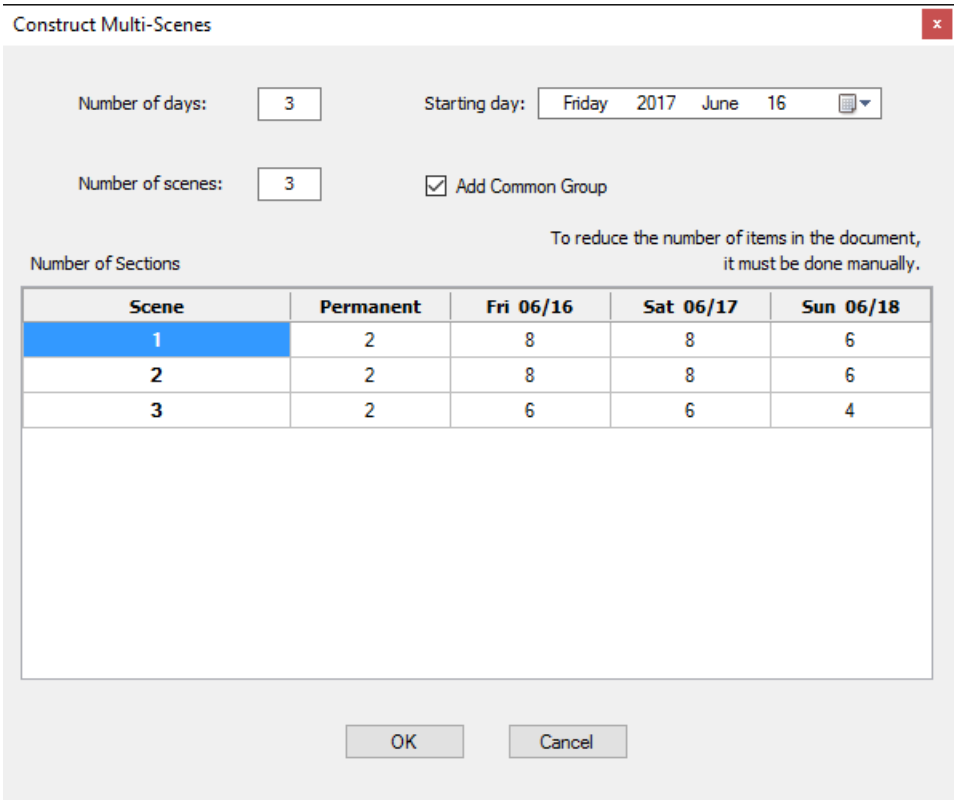


This menu allows you to manage groups, sections and devices.

It would be tedious to create a multi-scenes document entirely this way. A tool allows to do it of a stroke, the constructor (next section).

8.2 Multi-scenes construction

The tool allows you to call the multi-scenes builder:

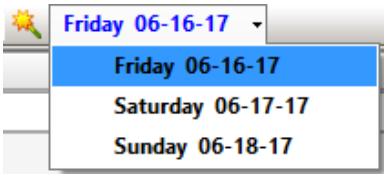


To start, you have to define the date of the beginning of the event, then the number of days, the number of scenes and the addition of a group common to all scenes.

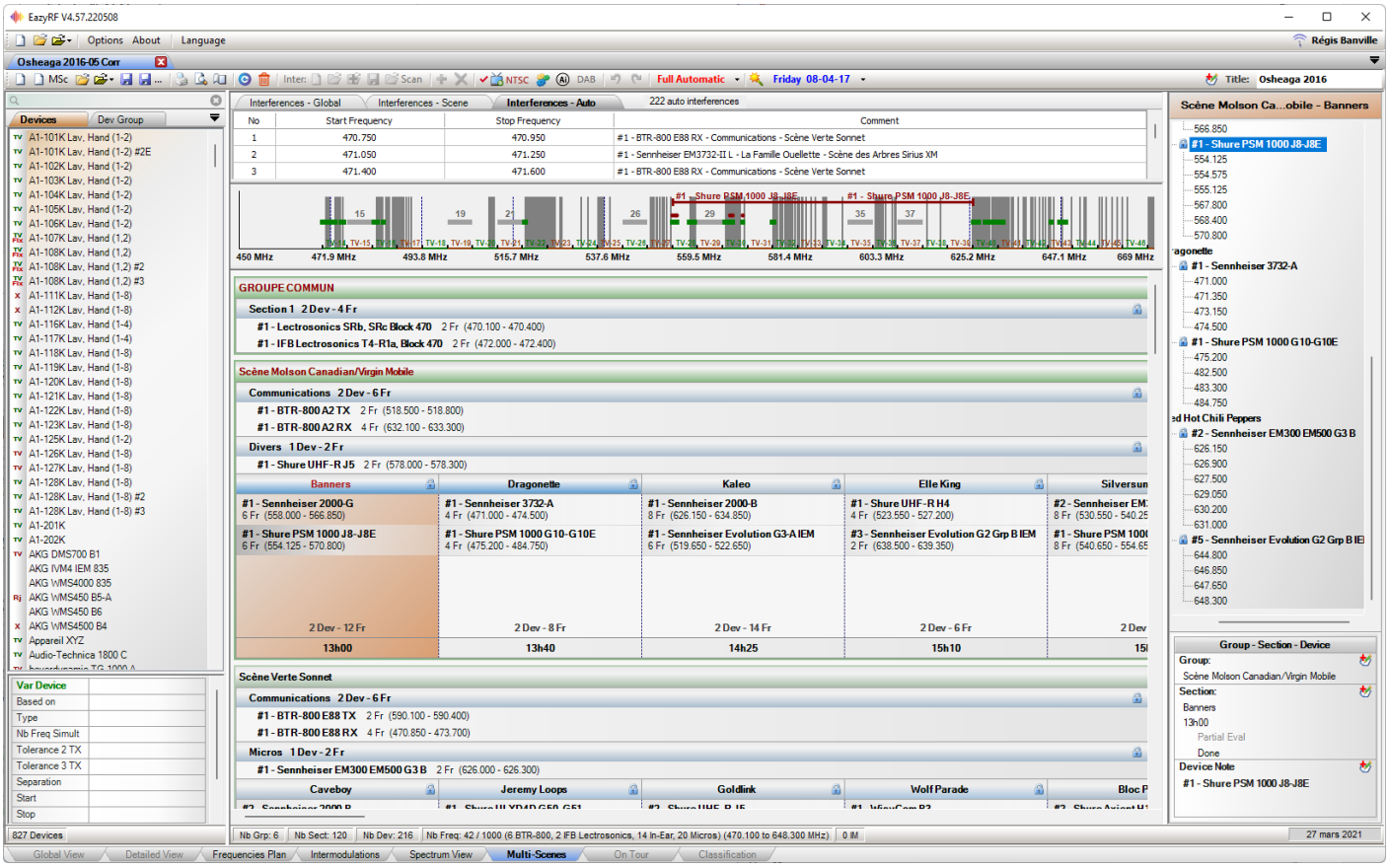
The number of permanent sections and sections for the performance of each scene must be defined subsequently.

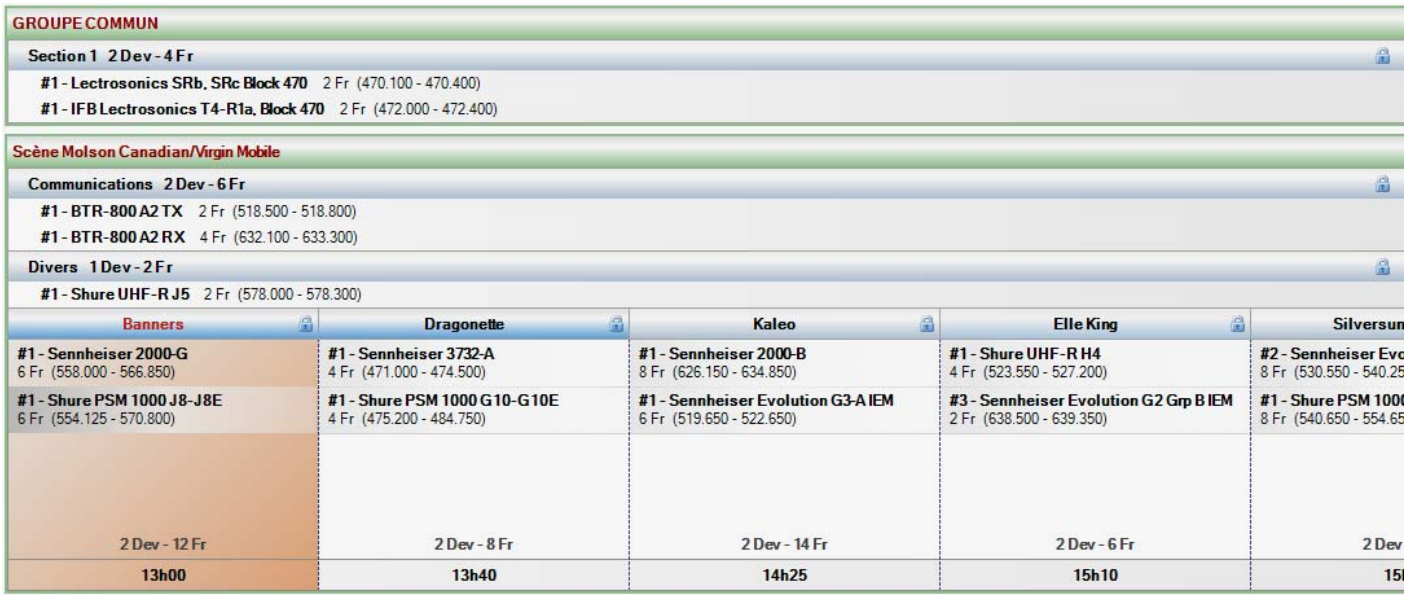
This tool can be used later to change the date or number of sections or scenes. The editor only increases the number of items. To delete sections or scenes, use the menu previously seen. There is no undo/redo for this editor.

After creating a multi-scene document of two days or more, a command appears on the menu bar to navigate from one day to another:

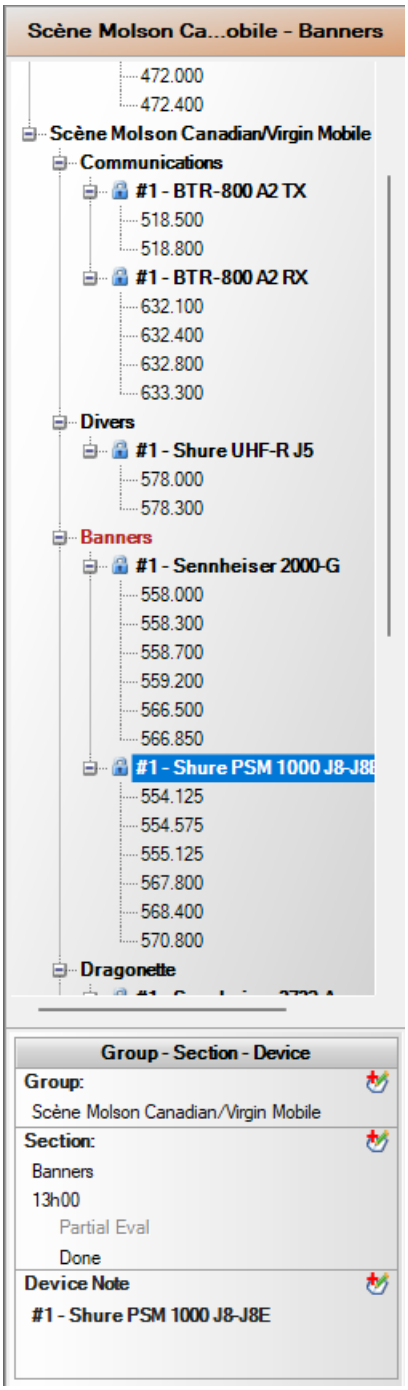


Here is an example of a festival:

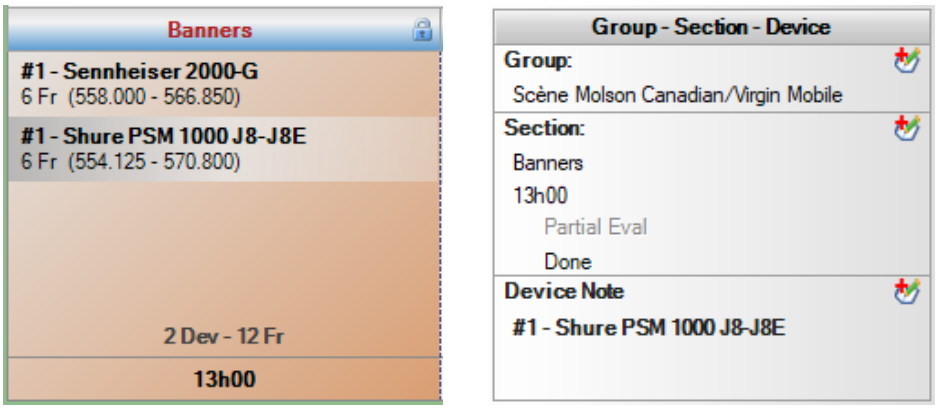




The detail of the selected section:



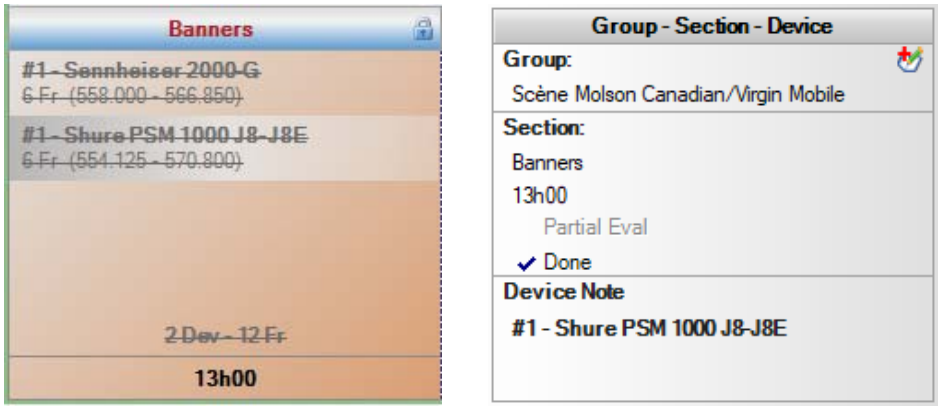
Each section contains header and footer information:



By placing the time as information at the bottom of the section, it is thus easier to follow the flow.

The section name or section footer editor allows you to enter data faster by allowing you to move to the next section with the « Tab » key.

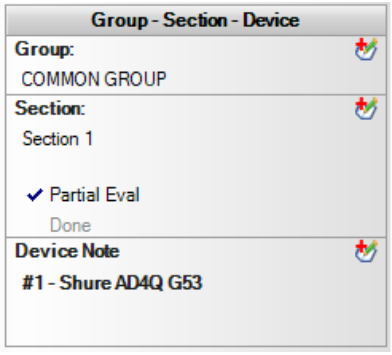
The command « Done » frees the frequencies used when the performance is completed:



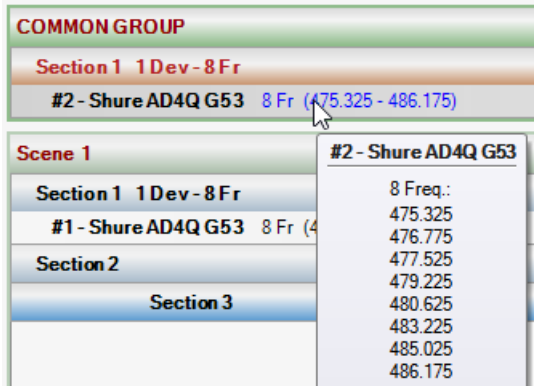
8.3 Partial Evaluation

Partial evaluation exists in a conventional document (not multi-scenes) between groups of the document. The structure used for the multi-scenes does not allow to redefine the relationship between the groups because it is rigid, the common group has a complete relationship with all the scenes, and the scenes have an independent relationship with each other, the auto-interference being used to avoid frequency duplication.

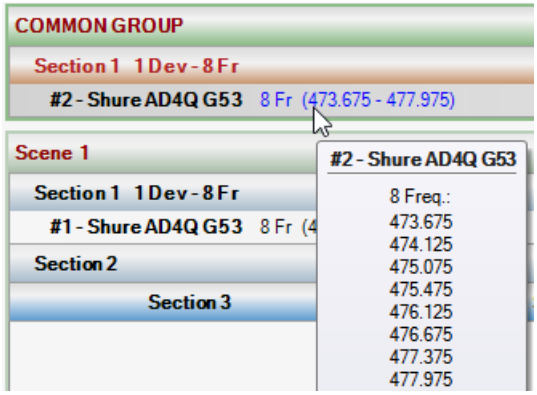
Starting from version 4.60, multi-scenes support partial evaluation from permanent sections of the common group and scenes. It is activated by the “Partial Eval” option of the selection detail section:



An example without “Partial Eval” :



And with the option “Partial Eval” :

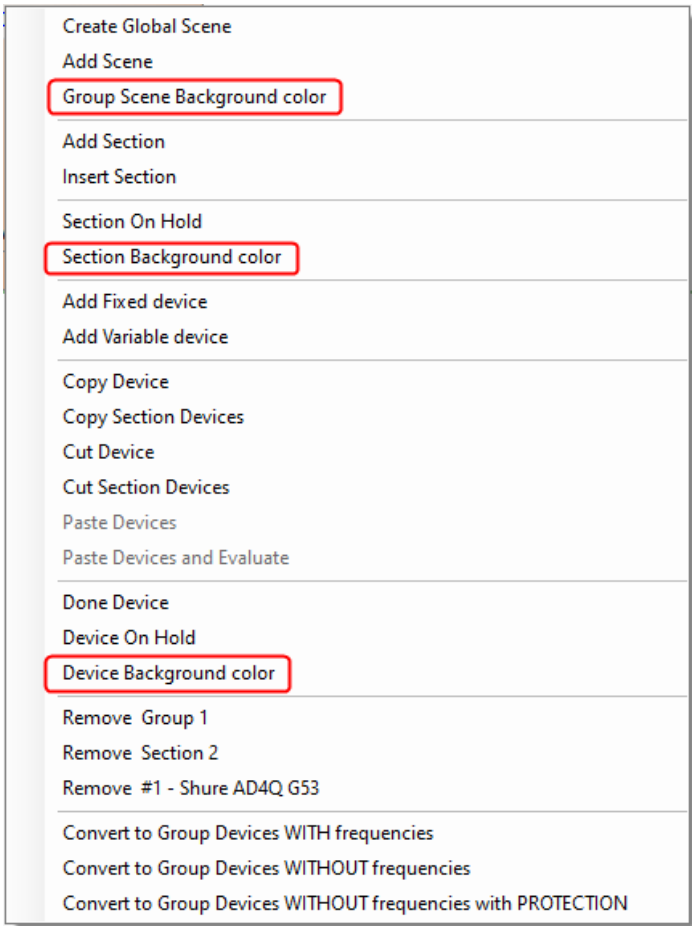


An indicator illustrates which section is in “Partial Eval" :

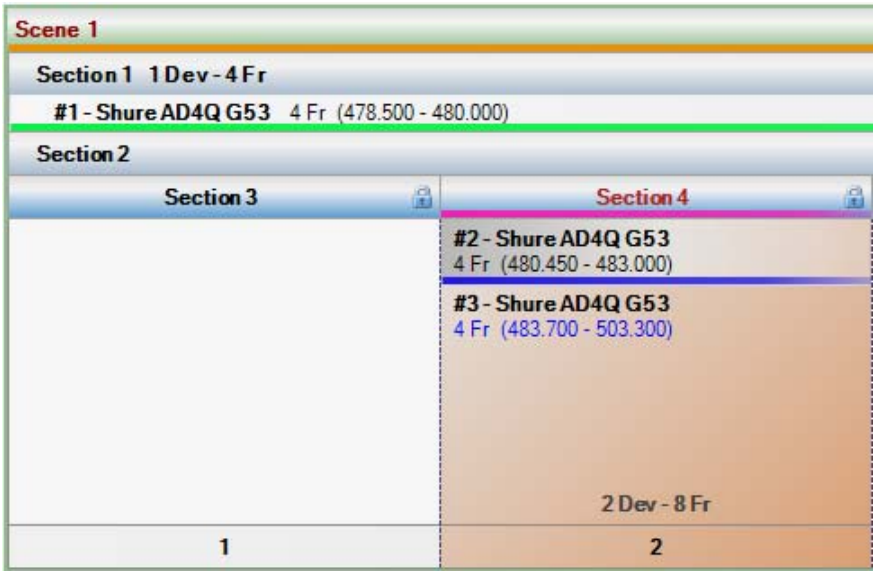
Partial evaluation from one scene will influence all performance sections, you be the judge of usefulness. The primary function is the use for the common group.

8.4 Group, Section and Devices – Background color

The menu under the mouse pointer lets you add a background color to a group, section or device:

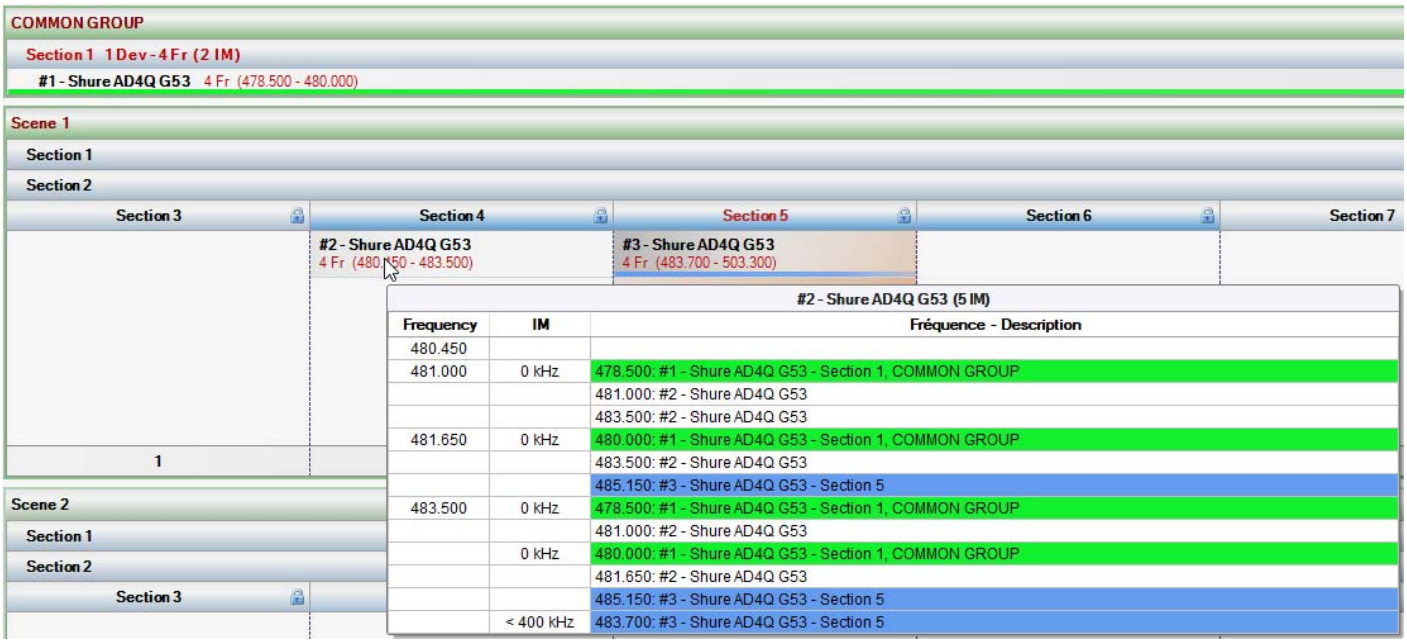


A horizontal bar of the background color is added at the bottom of each element:



8.5 Display of intermodulations

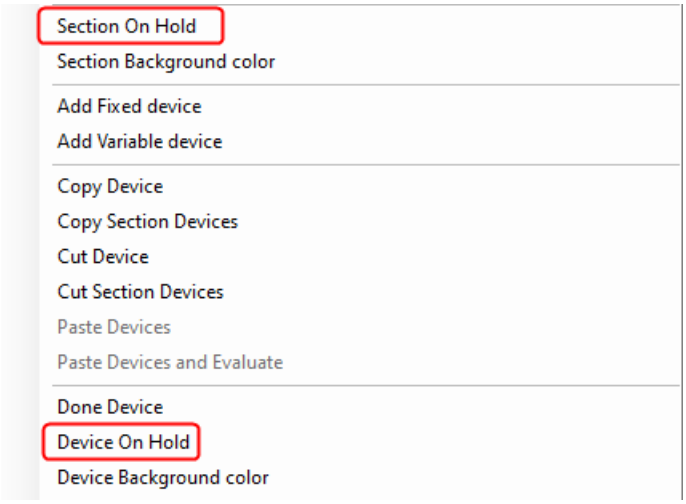
You can display the detail of the intermodulations of all the devices by movng the mouse over the detail of the frequencies:



The background color of the detail of the frequencies causing the intermodulations follows the background color of an element in this order: group, section and device.

8.6 Devices and section On Hold

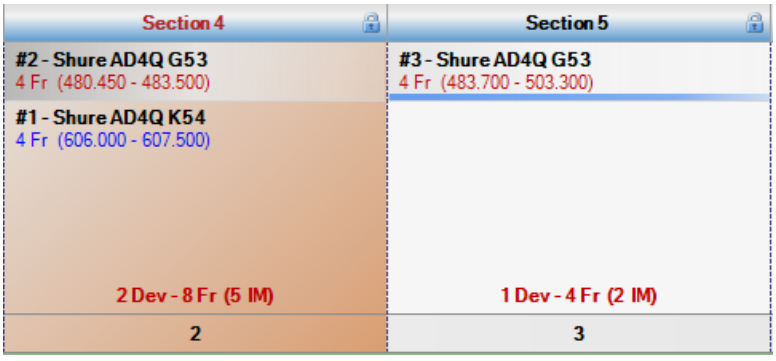
You can put one or more devices or an entire section on hold from the menu called up by the right mouse button:



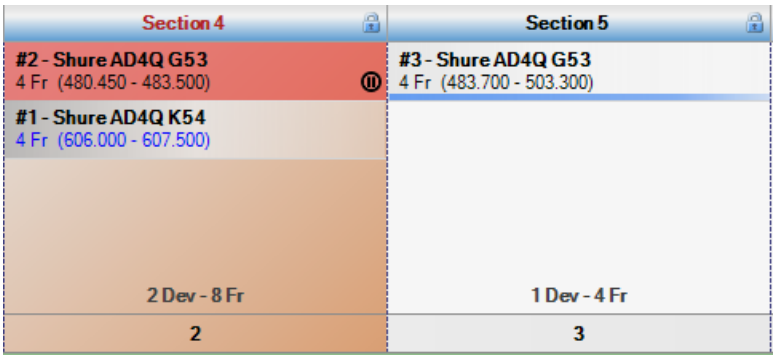
The “On Hold” command is similar to the “Done” command but does not act identically. An on hold device is a device whose frequencies are not calculated in the intermodulations but still calculated in the self-interferences.

The purpose of this command is to exclude frequencies that cause intermodulation due to an impossibility of finding other frequencies, the range being too busy. This technique is used to eliminate the display of intermodulations. In practice, these devices are put into operation at the last minute.

Before “On Hold”:



After:

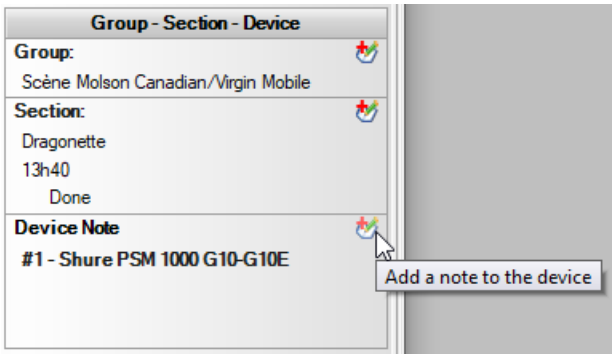


As this operation is delicate, EazyRF displays these “On Hold” devices quite clearly with a red background and the “Pause” symbol:

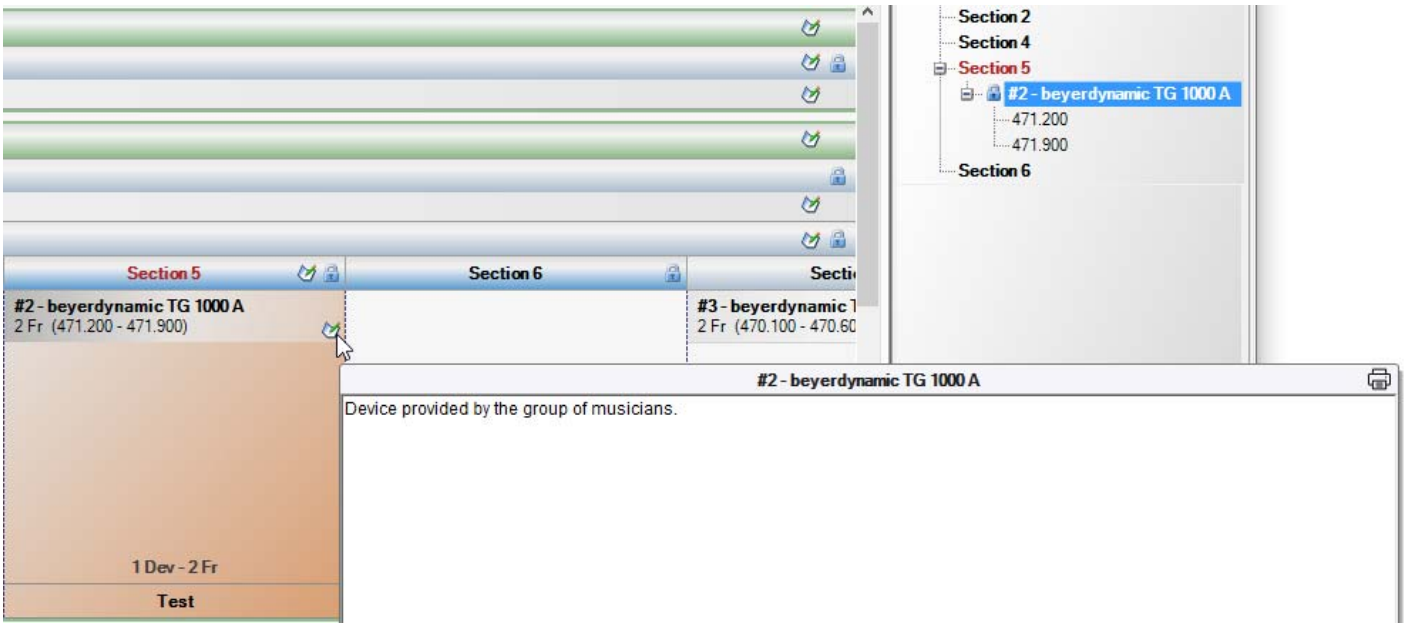
8.7 Notes

The “Multi-Scenes” module supports note taking for devices, sections, scenes and document, just like in the “Global View” module.

The editor is called up through the selection detail section:

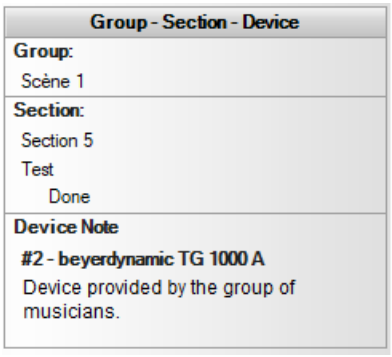


If we add notes to devices, sections and to the group:



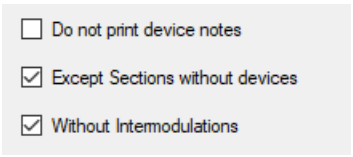
See the details of how notes work in section 2.6.

There is a small difference compared to the operation of the other views, the detail section of the selection displays the first lines of the note of the selected device:



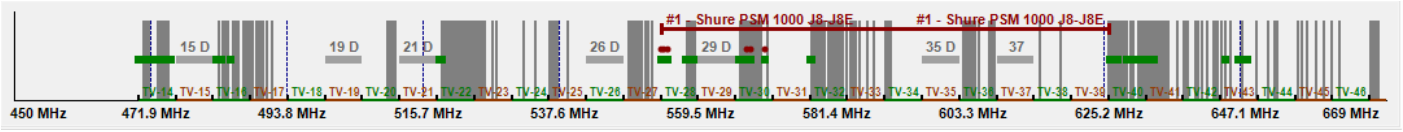
A click in the text box calls up the note editor.

The printing module allows you to print or not the notes for the whole document:

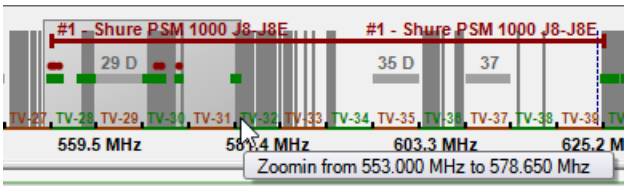


8.8 Global Spectrum

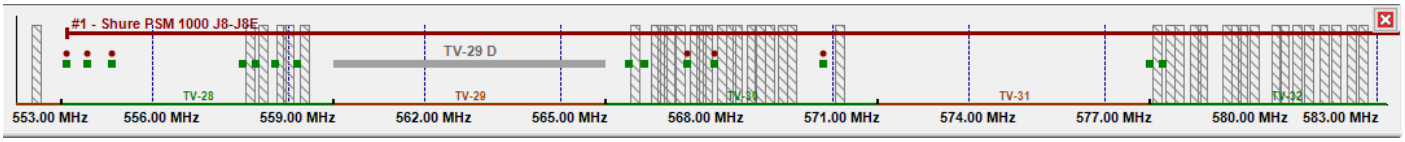
The frequency spectrum of the document is displayed in the middle part of the document:



You can magnify an area by dragging and holding the left mouse button:



Which give :



There is no limit to the number of magnifications, i.e. you can enlarge an enlargement. To end enlargements, simply close the area by clicking the close button at the top right of the enlargement

8.9 Interferences

A multi-scene document has three interference sections:

Interferences - Global | Interferences - Scene | **Interferences - Auto** | 222 auto interferences

No	Start Frequency	Stop Frequency	
1	470.750	470.950	Scène Verte Sonnet
2	471.050	471.250	Scène des Arbres Sirius XM
3	471.400	471.600	Scène Verte Sonnet

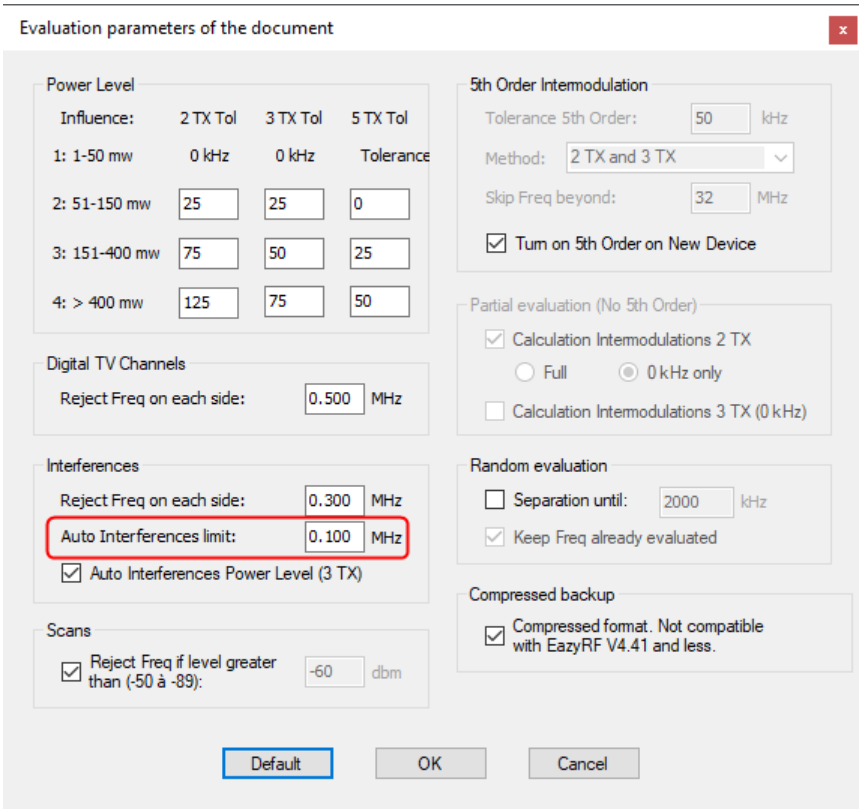
The global interferences are those used in the « Intermodulations » view, see section 5.6.

A new tab has been added: "Interferences - Scene". Each stage can have its own interference list.

See Chapter 5 for interference management: manual addition, adding from a data file created with a frequency scanner.

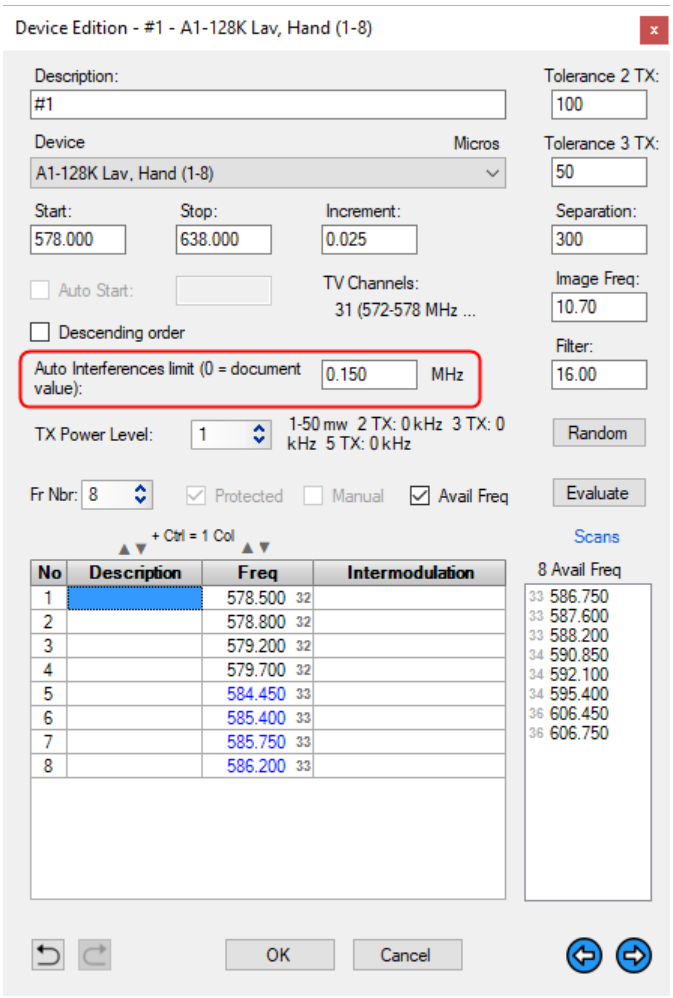
The "Interferences - Auto" pane contains the list of interferences created automatically by EazyRF for each stage to avoid using a frequency assigned to another stage. This list is not editable.

The default value of the auto-interference width is set in the document parameters:



The default value is set to 100 kHz. This value is global to the document and must be modified at the beginning of the creation of an event, otherwise a lot of error messages will appear because the already calculated frequencies are locked and validated to the value of the limit of auto-interference.

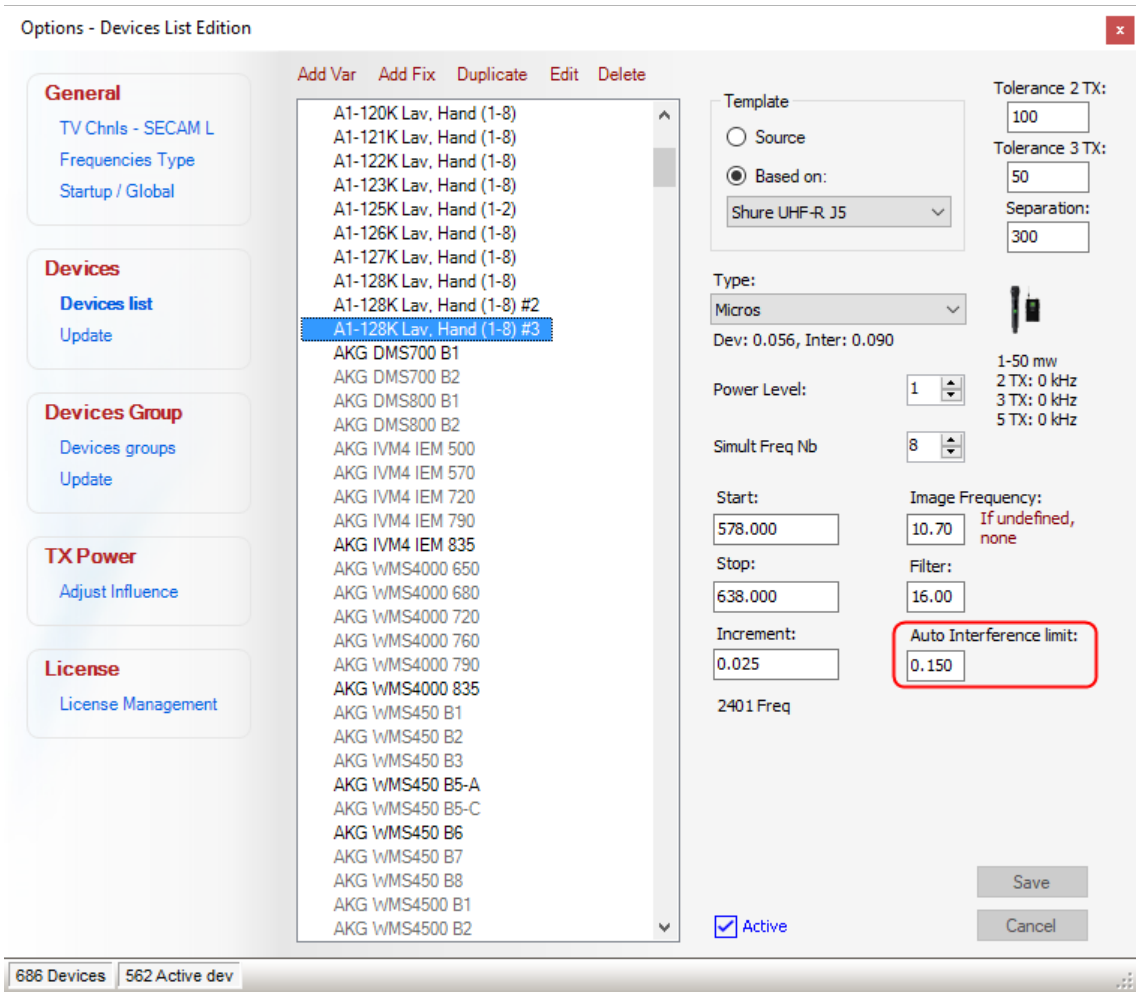
Since version 4.12 of EazyRF, it is now possible to change the value of the auto-interference limit for each device from the device editor:



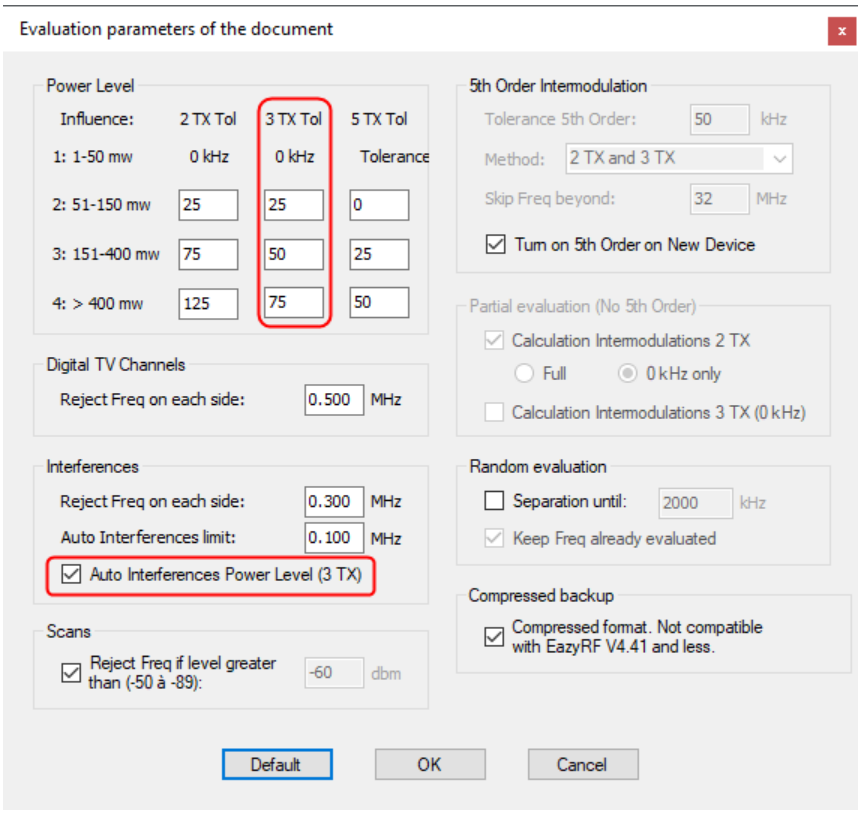
If the limit is increased, EazyRF will look for a space in the frequency spectrum to fill that demand, so the frequencies may change dramatically or may not be available.

A value of zero for the limit of a device means to use the default value of the document.

In addition, to simplify these boundary changes, the device list editor now allows you to set a default value for each device:



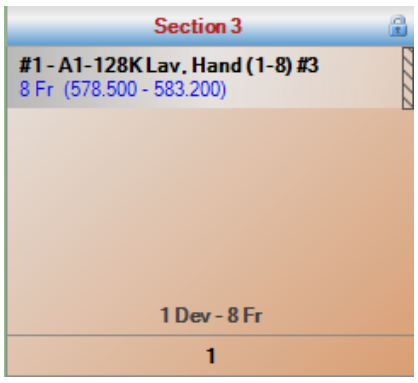
Finally, you can also make an automatic correction to the limit of auto-interference according to the power of the device with this option of the document settings:



EazyRF automatically adds a value to the auto-interference limit according to the parameters set in the Tolerance 3 TX of the Power Level.

The auto-interference value set manually for a device has priority over automatic correction.

Finally, some additions have been made to the graphics of the Multi-Scenes module to better illustrate the use of parameters.

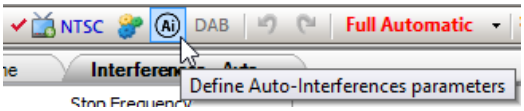


The right area at the device means that the device has its own auto-interference limit parameter.

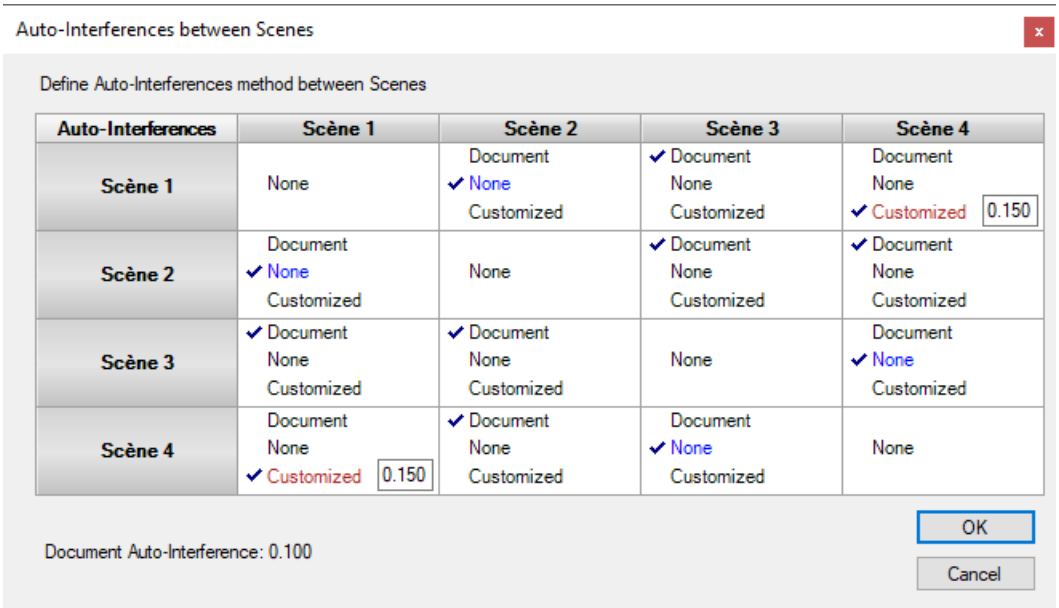
The left side of the device shows the power level and the automatic tracking of the auto-interference limit. The indicator changes color according to the power level: yellow level 2, orange level 3 and red level 4.

8.10 Auto-Interferences between Scenes Editor

The "Ai" command in the toolbar:



Calls up the auto-interference editor between scenes:



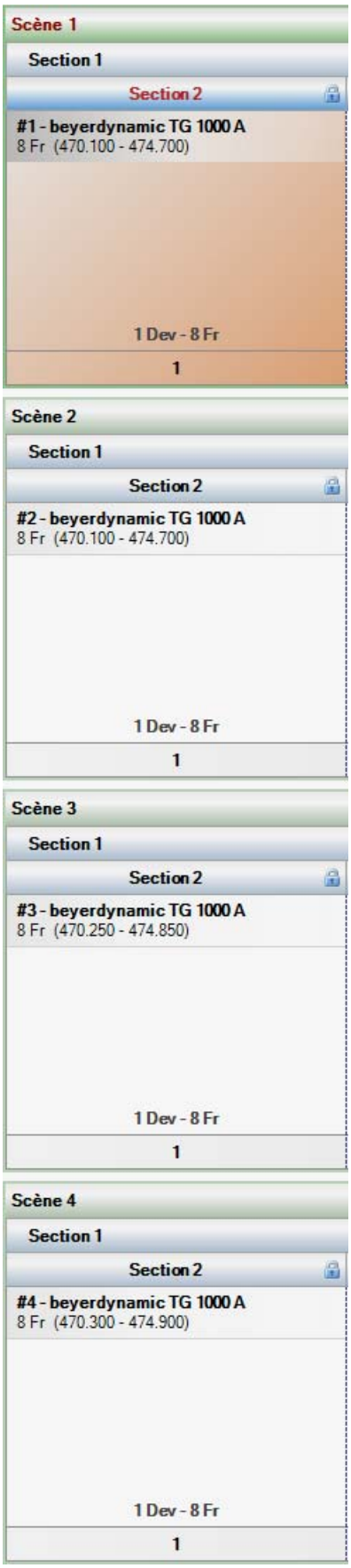
The editor works on the principle of the "Group Relations" editor.

The Auto-Interference between scenes method is based on the value defined either in the document, either on a custom value or without any value.

The auto-interference value of a device has the highest priority, followed by the custom value, if used, and finally that of the document.

If you click on the "Scene X" headers, this affects all the self-interference of a scene simultaneously and in circular mode, namely: Document, None and Custom. If the Ctrl key is activated when clicked, this allows the first self-interference value of a scene to be copied to all subsequent scenes (practical if customized).

If we use this data:



Auto-Interferences	Scène 1
Scène 1	None
Scène 2	Document ✔ None Customized
Scène 3	✔ Document None Customized
Scène 4	Document None ✔ Customized 0.150

The following results are obtained:

Interferences - Global | Interferences - Scene | **Interferences - Auto** | 16 auto interferences

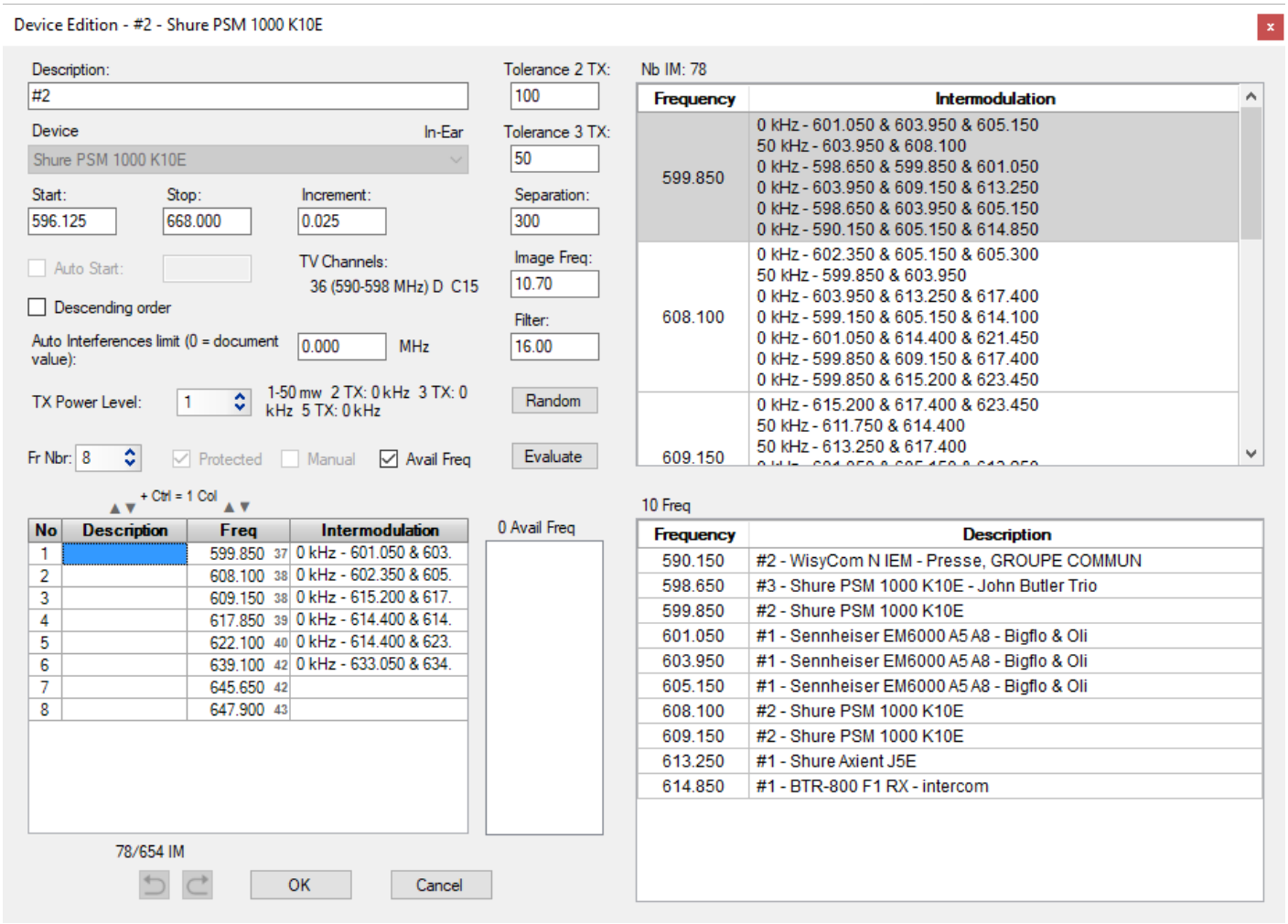
No	Start Frequency	Stop Frequency	
1	470.150	470.350	Scène 3
2	470.150	470.450	Scène 4
3	470.650	470.850	Scène 3
4	470.650	470.950	Scène 4
5	471.250	471.450	Scène 3
6	471.250	471.550	Scène 4
7	471.950	472.150	Scène 3
8	471.950	472.250	Scène 4
9	472.500	472.700	Scène 3
10	472.500	472.800	Scène 4
11	473.150	473.350	Scène 3
12	473.150	473.450	Scène 4
13	473.900	474.100	Scène 3
14	473.900	474.200	Scène 4
15	474.750	474.950	Scène 3
16	474.750	475.050	Scène 4

It can be noted that all the self-interference generated by scene 3 (Document) has a width of 200 kHz, 100 kHz on each side of the carrier, as defined in the document. Whereas the scene 4 (Custom) auto-interference is 300 kHz wide, twice the custom value of 150 kHz. Finally, scene 2 does not generate any self-interference (None).

You must define these auto-interferences in the first steps of creating a new document before adding devices in order to find frequencies that respect these auto-interferences.

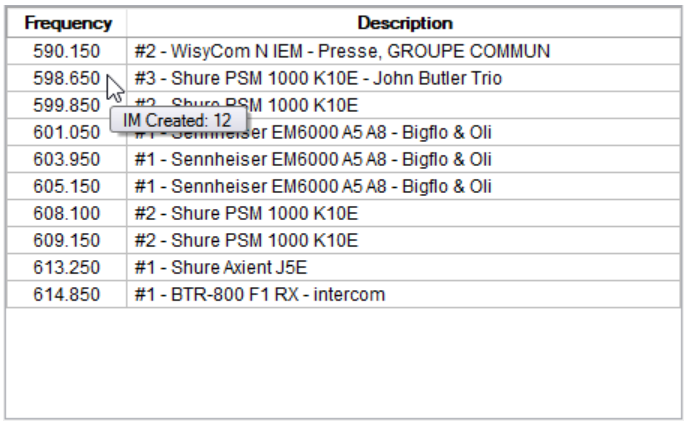
8.11 Device Edition

The device editor in the "Multi-Scenes" module takes a different form when a device has intermodulations:



The detail of the intermodulations of each frequency appears in the upper right part of the editor. In the lower right, the location of each frequency that caused intermodulation appears. You can know the origin of the problem and on what scene.

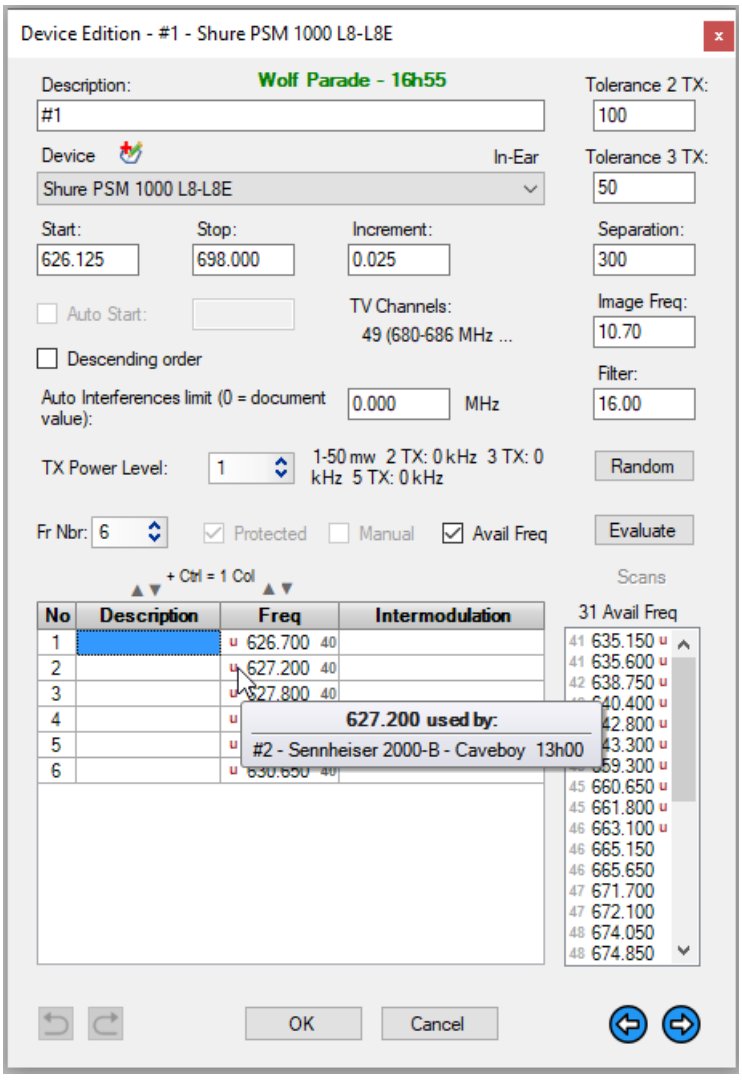
In addition, when the mouse is over a frequency, the number of intermodulations created by it is displayed:

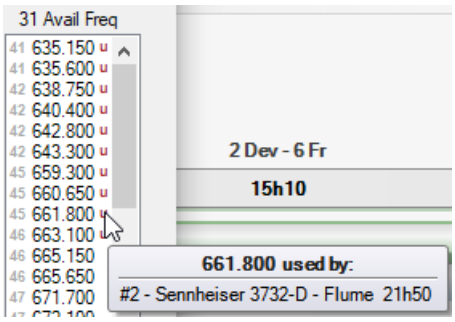


Finally, by double-clicking on one of the frequencies in this list (or the name of the device), the editor closes, selects the right device in the detailed part and restarts the editor with the new device. This procedure allows you to save data by switching from one device to another and taking advantage of the undo / redo functions.

8.11.1 Frequencies used

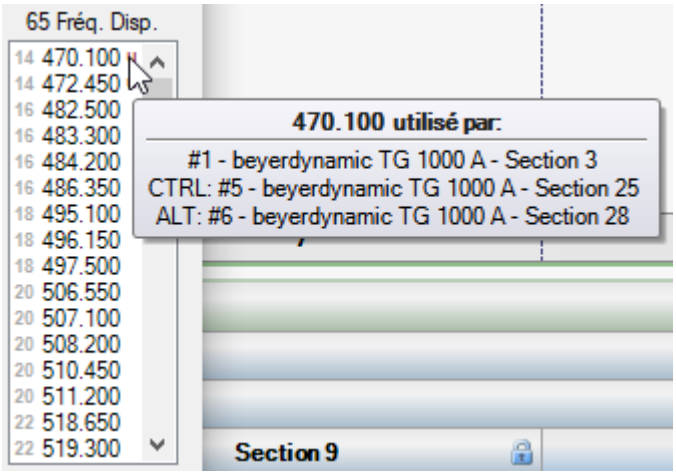
The indication of frequencies already used by other Performances of the same scene is illustrated by the display "u" next to the frequencies of the device and the available frequencies:





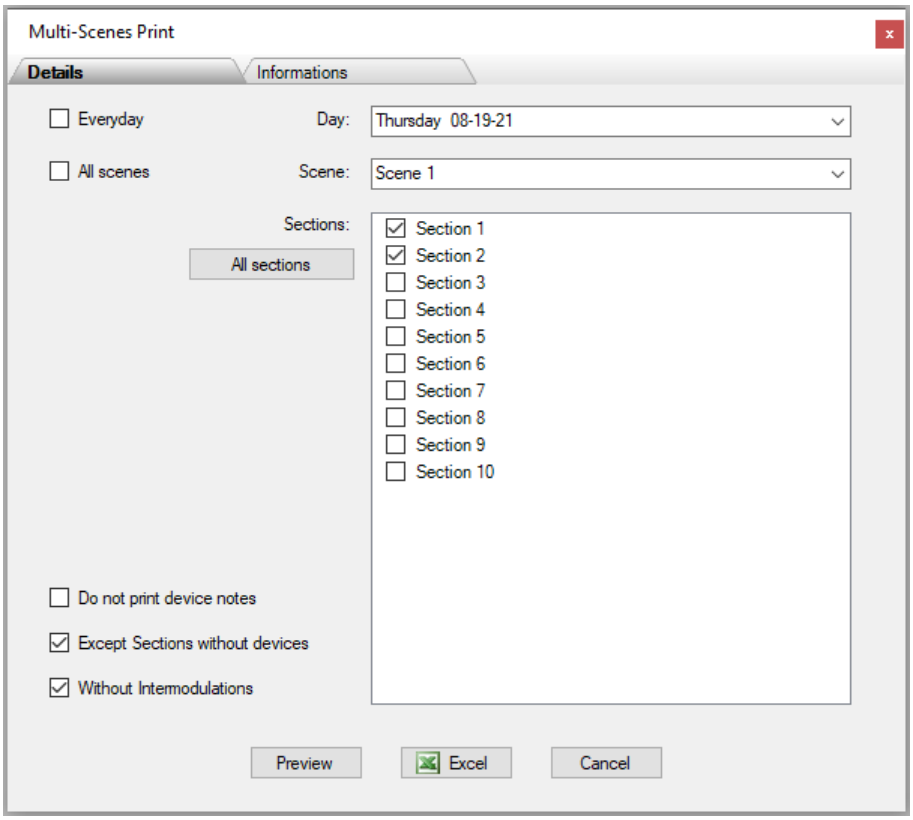
Thus, if a transmitter remains on after its use, one can easily find out where it has been used.

By double clicking on the "u" indicator, the editor goes directly to the indicated device. If more than one device uses this frequency, you can use the CTRL or ALT keys to navigate to the first three frequencies:



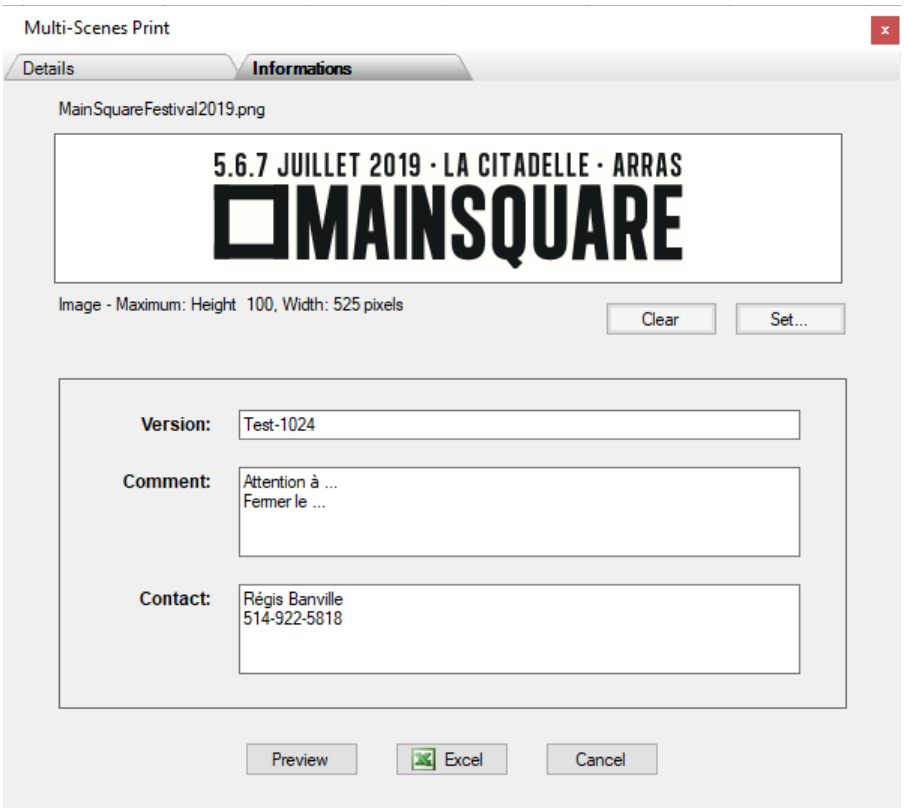
8.12 Printing

Before printing, you must select which groups, sections or days needs to be printed:



These same options apply for a transfer to an Excel document.

With version 4.1 of EazyRF, it is now possible to create a header to print with the "Informations" pane:



Areas without contents are not printed.

Result:

New document | Régis Banville | July 23, 2019

5.6.7 JUILLET 2019 · LA CITADELLE · ARRAS
MAINSQUARE

Version:	Test-1024
Comment:	Attention Turn Off...
Contact:	Régis Banville 514-922-5818

Friday 07-26-19

Scene 1			
Section 1			
#1 - BTR-800 A2 RX			
1		632.100	
2		632.400	
3		632.800	
4		633.300	
#1 - BTR-800 A2 TX			
1		518.500	
2		518.800	
Section 3			
#1 - beyerdynamic TG 1000 A			
1		470.100	
2		470.600	

8.13 Frequencies Plan view

The « Frequencies Plan» pane allows you to view the plan by the day of the event:

The option « Dev by Freq » displays the list of frequencies used in a day in numerical order:

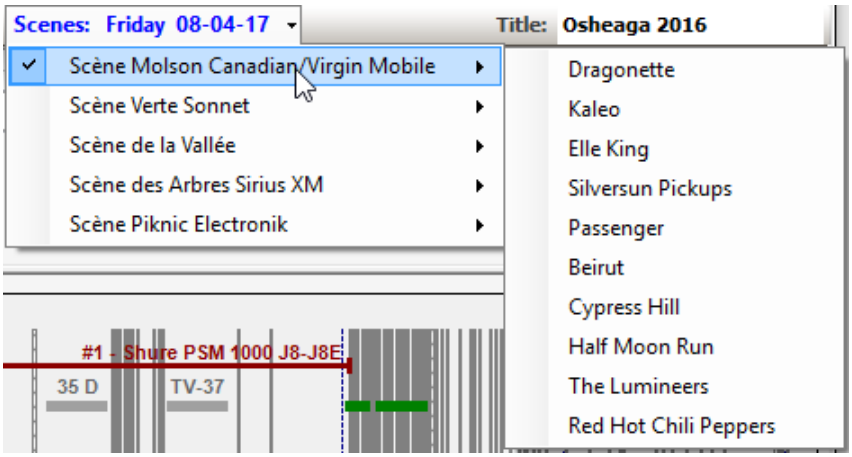
Frequency		Comment
470.100	14	#1 - Lectrosonics SRb, SRc Block 470 - Section 1
470.400	14	#1 - Lectrosonics SRb, SRc Block 470 - Section 1
470.850	14	#1 - BTR-800 E88 RX - Communications
471.000	14	#1 - Sennheiser 3732-A - Dragonette 13h40
471.150	14	#1 - Sennheiser EM 3732-II L - La Famille Ouellette 13h35
471.350	14	#1 - Sennheiser 3732-A - Dragonette 13h40
471.500	14	#1 - BTR-800 E88 RX - Communications
472.000	14	#1 - IFB Lectrosonics T4-R1a, Block 470 - Section 1
472.400	14	#1 - IFB Lectrosonics T4-R1a, Block 470 - Section 1
473.000	14	#1 - BTR-800 E88 RX - Communications
473.150	14	#1 - Sennheiser 3732-A - Dragonette 13h40
473.300	14	#1 - Sennheiser EM 3732-II L - La Famille Ouellette 13h35
473.700	14	#1 - BTR-800 E88 RX - Communications
474.100	14	#1 - Sennheiser EM 3732-II L - La Famille Ouellette 13h35
474.250	14	#1 - Shure ULX-D G50-G51 - Jeremy Loops 14h05
474.500	14	#1 - Sennheiser 3732-A - Dragonette 13h40
474.800	14	#1 - Sennheiser EM 3732-II L - La Famille Ouellette 13h35
475.200	14	#1 - Shure PSM 1000 G10-G10E - Dragonette 13h40
482.500	16	#1 - Shure PSM 1000 G10-G10E - Dragonette 13h40
482.500	16	#4 - Shure PSM 1000 G11 - The Lumineers 20h20
482.900	16	#1 - Shure ULX-D G50-G51 - Jeremy Loops 14h05
482.900	16	#4 - Shure PSM 1000 G11 - The Underrachievers 20h00
483.300	16	#1 - Shure PSM 1000 G10-G10E - Dragonette 13h40
483.300	16	#4 - Shure PSM 1000 G11 - The Lumineers 20h20
483.450	16	#1 - Sennheiser EM 3732-II L - La Famille Ouellette 13h35
483.600	16	#1 - Shure Axient G12 - Paul Kalkbrenner Live 19h20
483.800	16	#1 - Sennheiser EM 3732-II L - La Famille Ouellette 13h35
483.950	16	#1 - Shure ULX-D G50-G51 - Jeremy Loops 14h05
483.950	16	#4 - Shure PSM 1000 G11 - The Underrachievers 20h00
484.100	16	#1 - Shure Axient G12 - Paul Kalkbrenner Live 19h20
484.400	16	#2 - Shure PSM 1000 G11 - Safia Nolin 14h45

If a frequency is used more than once, it is displayed with a gray area. It is permissible to use the same frequency more than once on the same stage by switching. There are always only three performances or sections active simultaneously on a stage, so outside of them, a frequency becomes available again.

Double-clicking on a data takes you directly to this value in the Multi-Scenes pane.

8.14 Intermodulations view

The Intermodulations module allows to display them by performance or section only:

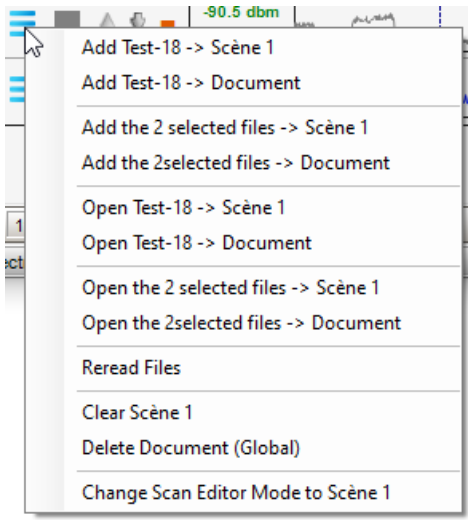


We can only show one section (the selected) because the frequencies on the other ones are not compatibles with them (outside the three), otherwise wrong intermodulations will be detected.

Just as the common group to all the scenes cannot be displayed for the same reasons.

The scanning manager (see section 5.7) supports the two data editing modes, ‘Global ’mode for the whole environment and ‘Scene’ mode independent for each scene.

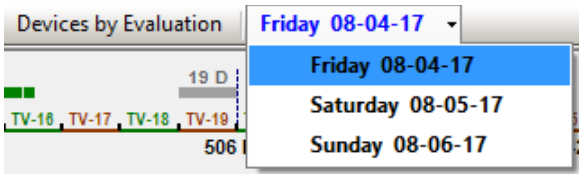
The scanning manager allows you to make changes to the two modes with the context menu:



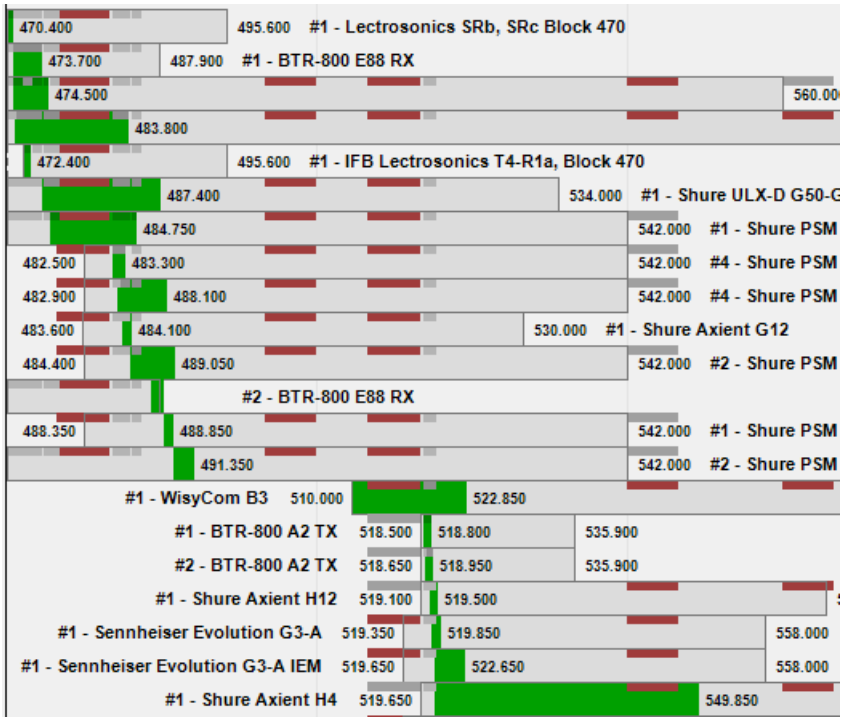
The "Change Scan Editor Mode to ..." command allows you to directly display the data contained in the "Multi-Scene" module without going through this module to access global or scene data.

8.15 Spectrum view

The Spectrum pane displays the data per event day :

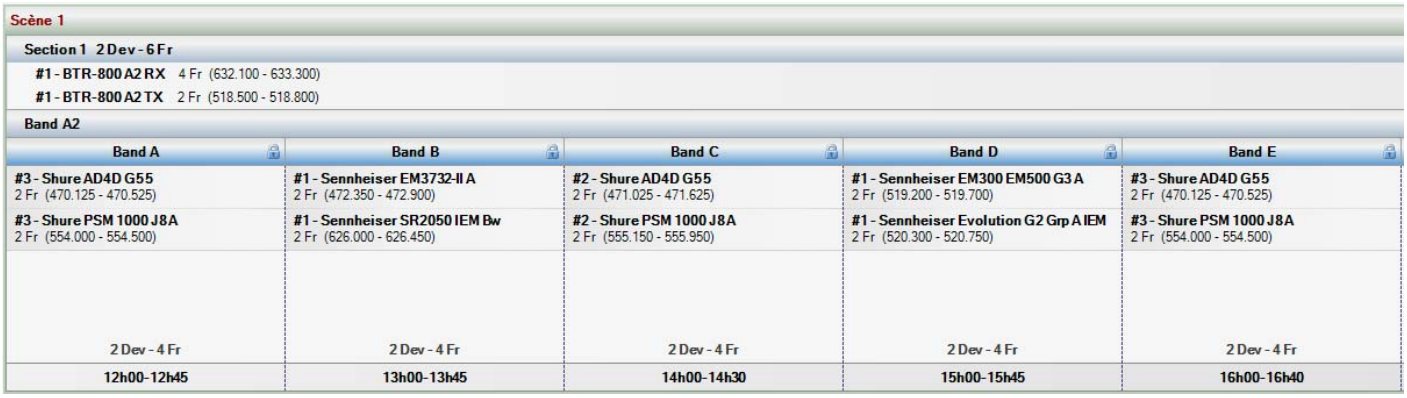


The classification of the devices by evaluation displays the list by value of allocated frequencies:



8.16 Changes in schedule

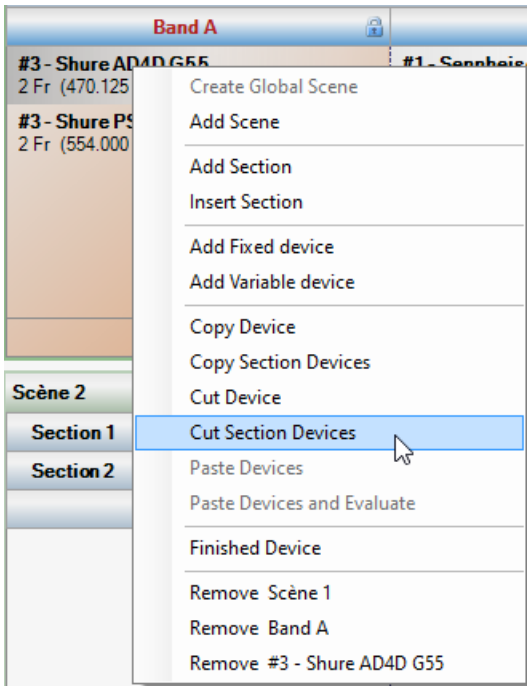
Suppose there is a change to the schedule, let's start from this situation:

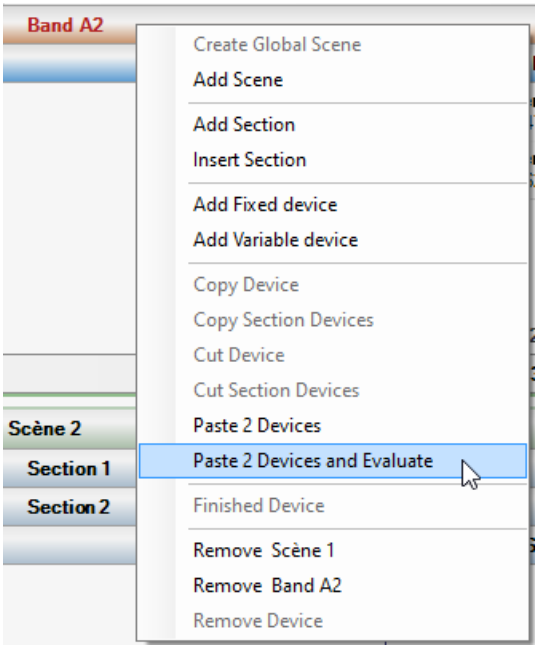


We are rehearsing in the morning and surprise Band A is not there. So, we start with Band B, followed by C and Band D is installed and ready. Installation of Band E has started. We decided to include Band A in the rehearsal, what to do Band A and Band E uses same frequencies because it should not be on stage in the same period of time.

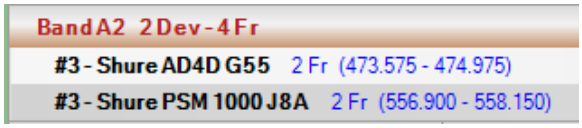
It is necessary to modify the frequencies of Band A, but impossible with the current positioning because they are isolated. The solution: move the devices from the Band A section to a permanent section, recalculate the frequencies and move the devices back to the original section.

Move the devices from Band A to the permanent section Band A2:





By selecting the “Paste X Devices and Evaluate” command, EazyRF places the two devices in the permanent section and recalculate the frequencies:

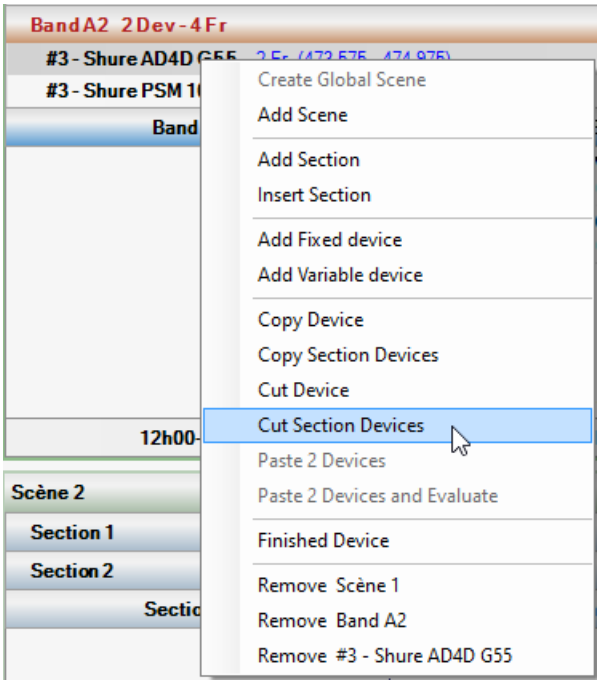


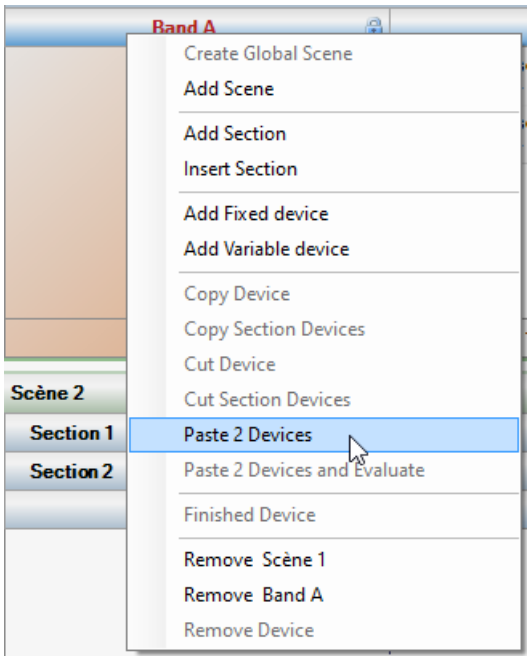
We now have frequencies compatible with the current sequence.

We can now setup Band A and the frequencies are compatible with the whole sequence of this scene. So, there may not be enough frequencies available. If you are sure that during the show Band A will perform at the right time, you can put certain bands using the same devices but not in the same space-time.

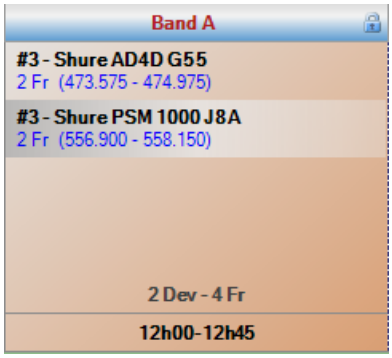
It is preferable to keep the devices moved from Band A to the permanent section during the rehearsal in case of modifications.

When the rehearsal is finished, the devices are moved to the original position:



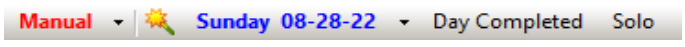


And we have compatible frequencies for the smooth running of the event:



8.17 Day Completed

The “Day Completed” function of the command bar:

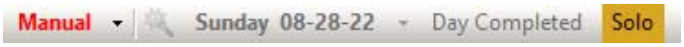


Allows you to put all performance sections in finished mode thus releasing the non-permanent frequencies of all the scenes for the selected day.

It is useless to keep the frequencies of the days prior to the current date of the event. This frees up frequencies for the present day and the days to come. In addition, this considerably reduces the number of calculations to be made, and therefore faster.

8.18 Day in Solo

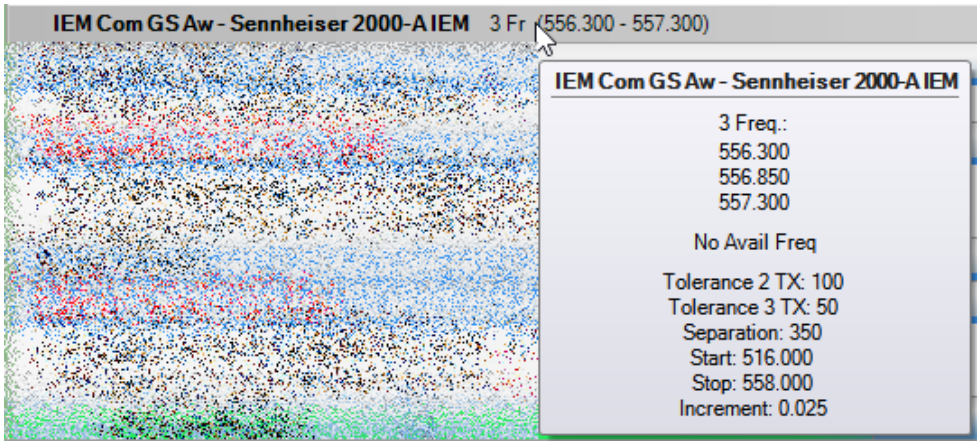
The “Solo” command from the toolbar:



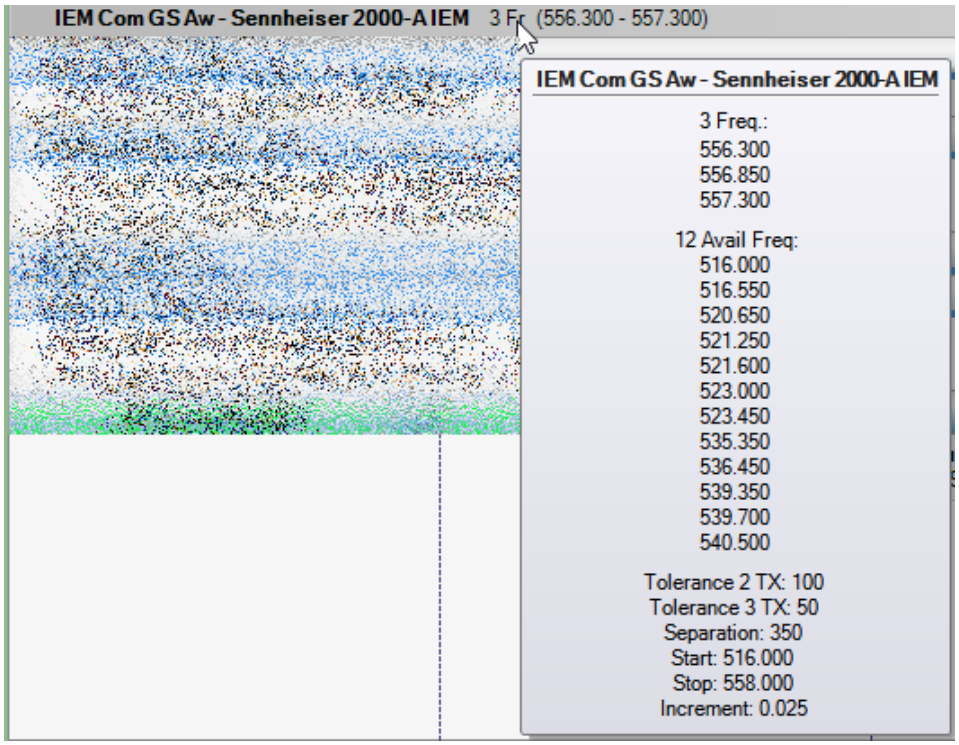
Allows you to put all the days of the event in finished mode, except the day displayed.

The primary purpose of this command is to find a solution to a temporary unforeseen event for the current day.

This makes it possible to find compatible frequencies for the day in question. An example, in normal mode, this device has no frequency available:



And in solo mode:



12 frequencies are now available.

These frequencies ARE NOT COMPATIBLE with the course of the following days, it is a troubleshooting solution and not a permanent solution.

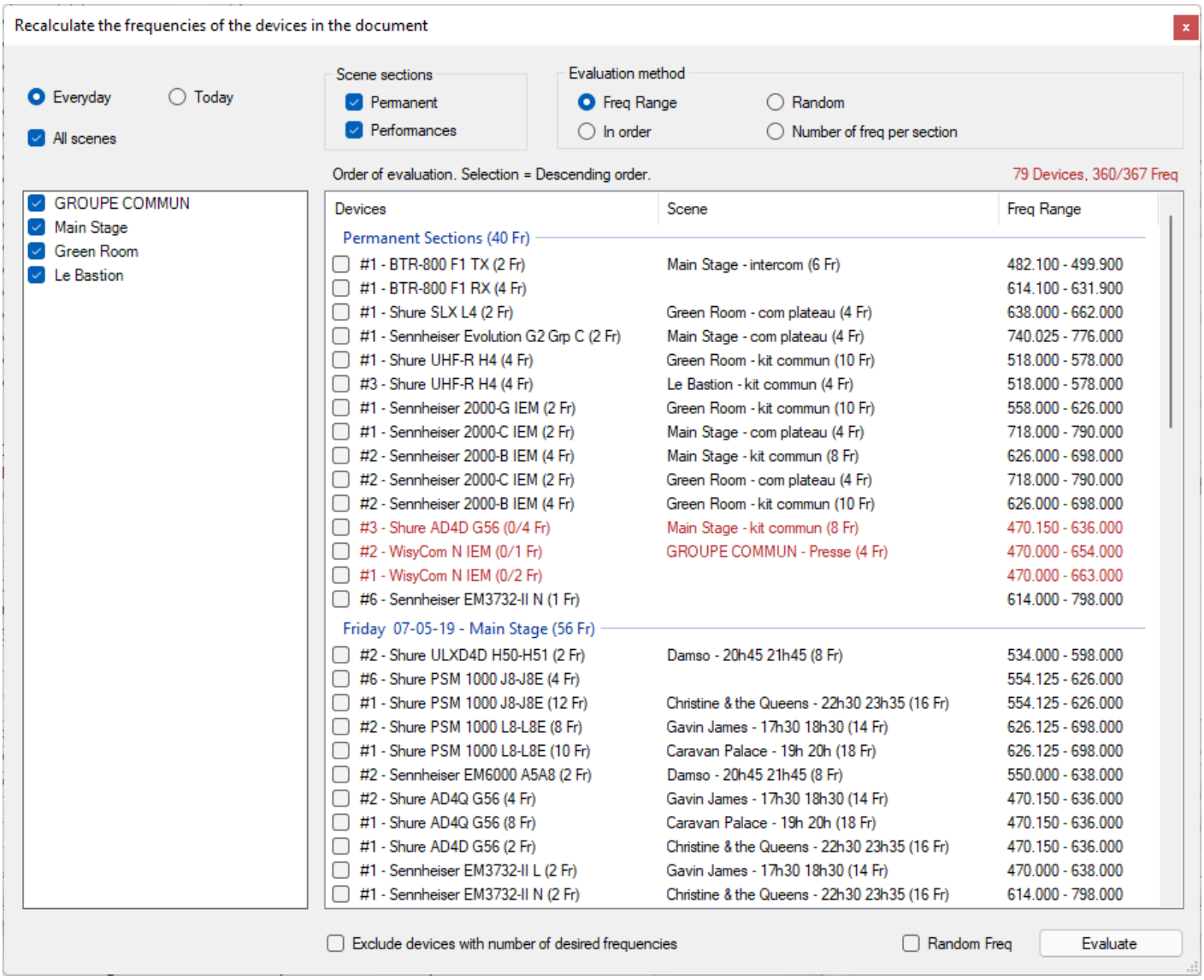
8.19 Recalculate frequencies

This module makes it possible to recalculate all the frequencies of a multi-scenes document according to certain criteria, either for one or all days; for one, several or all the scenes; for permanent or performance sections only. Different evaluation methods are also available.

The primary purpose of the operation is to reuse an event under different conditions or needs. You can also recalculate the frequencies during planning if you can't find a solution.

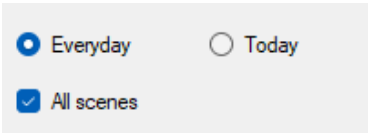
The recalculation of frequencies is a destructive operation, there is no undoing possible. The only way to do this is to reload the document, so don't forget to make a backup before proceeding.

Let's take a look at the editor:

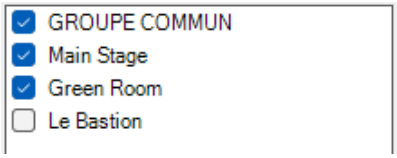


It looks like the editor of the recalculation of the frequencies of the global and detailed views (see section 2.13.4), the color of the name of the devices indicates the same results: blue = new frequencies, green = same frequencies and red = number of desired frequencies not found.

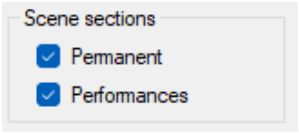
The "Everyday" or "Today" option allows you to redo the calculations for one day only or for all days of the event.



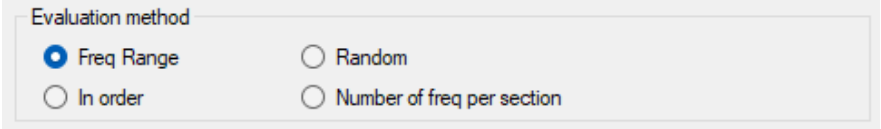
All scenes can be recalculated or selected as needed:



The recalculation can be done for the permanent sections, or even for the performance sections only via the options of the “Scenes sections”.



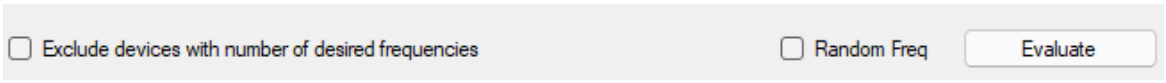
The "Evaluation method" determines the criteria for classifying devices for recalculation. The default method is “Freq Range", this classifies devices according to the bandwidth of the device minus the space occupied by the TV channels.



The other methods are "Random", the order is based on chance, the "In order" method respects the order of arrangement of the devices. Finally, the method “Number of freq per Sections" will class the sections that have the most frequencies on a stage in descending order, devices within the section will be ordered by bandwidth.

Regardless of the evaluation method chosen, the recalculation will always be done in the order of the days, then in the order of the scenes. In addition, permanent sections are always evaluated first (if option selected), because these frequencies must be compatible with the entire document.

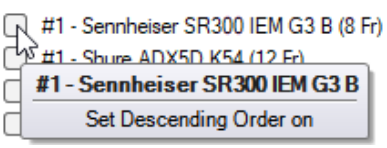
The "Exclude devices with number of desired frequencies" option allows you to exclude devices whose frequencies have already been found from re-evaluation.



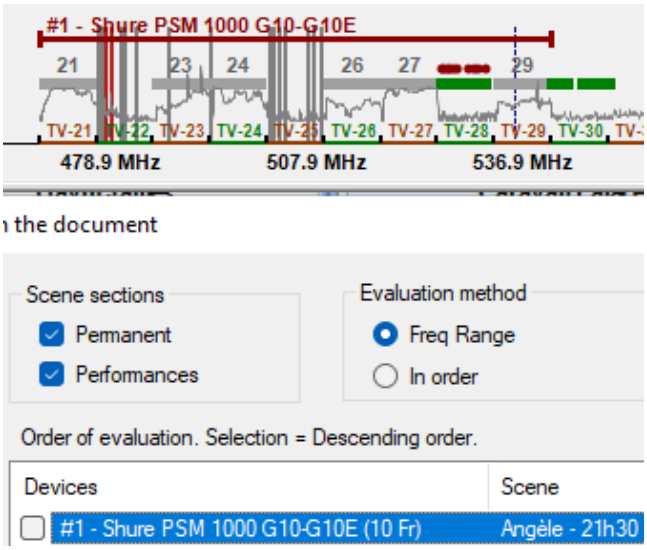
A multi-scene document has a lot of devices, so protecting frequencies in a complex area can pay off.

The option "Random Freq” recalculates the frequencies of the devices randomly, so never the same result twice.

The devices can be recalculated in descending order using the selection box:



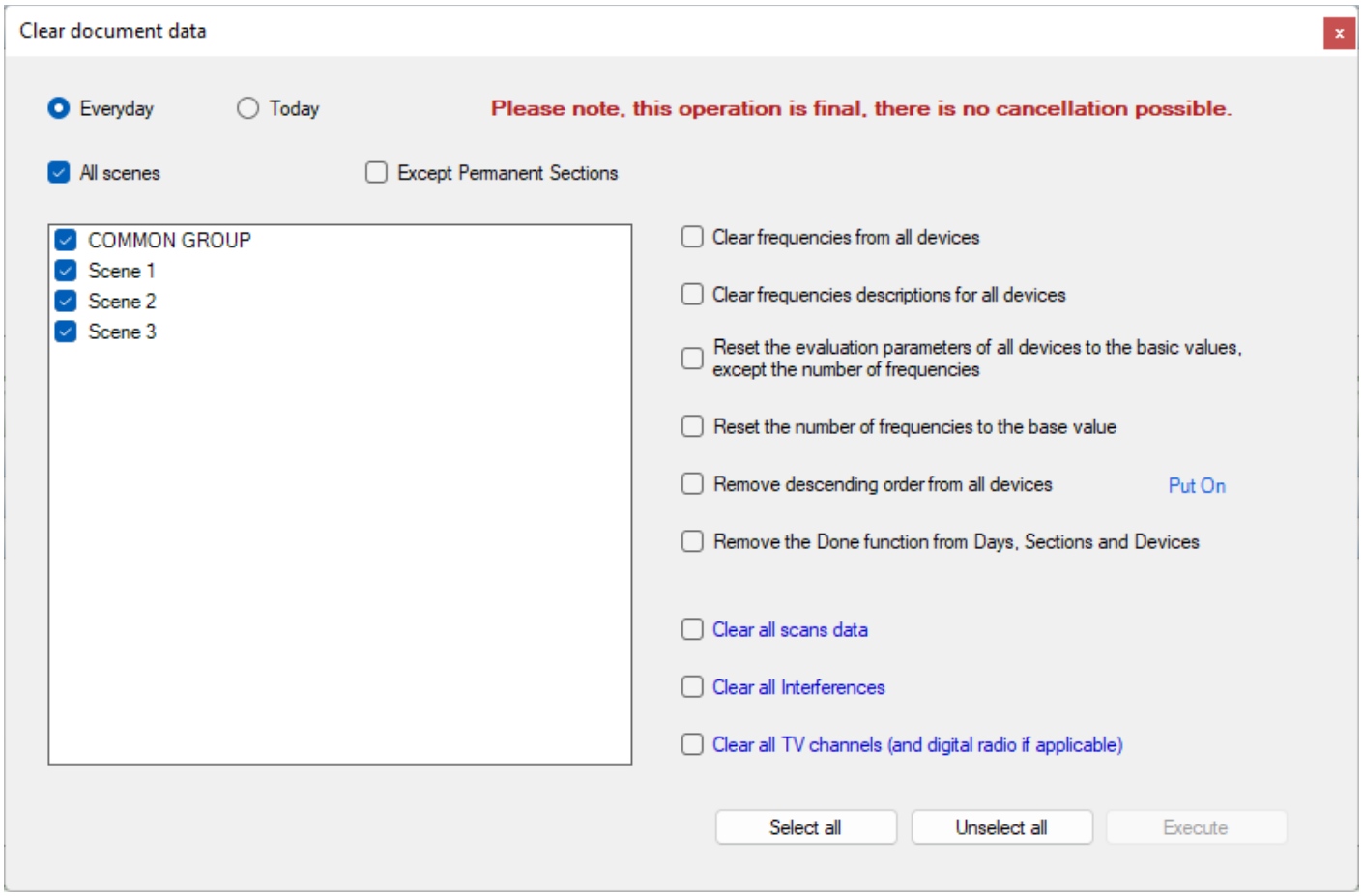
Each device on the rating list can be selected and the multiscreen display is tracked simultaneously, regardless of the day.



It can be noticed that this region of the spectrum is occupied by several TV channels, so it will be quite complicated to find frequencies for devices that operate in this frequency range. Sooner or later you will have to choose a different device, and even redoing the calculations you won't be able to find a solution.

8.20 Delete data

This command calls the document data deletion module:



The operation of the module is very similar to that seen in section 2.12.4 of the “Global View” with some small additions relating to the multi-scene module.

You can choose to clear data for the displayed day or for all days of the event. We can exclude the permanent sections, so keep the data of the devices used every day and erase only those of the daily performances.

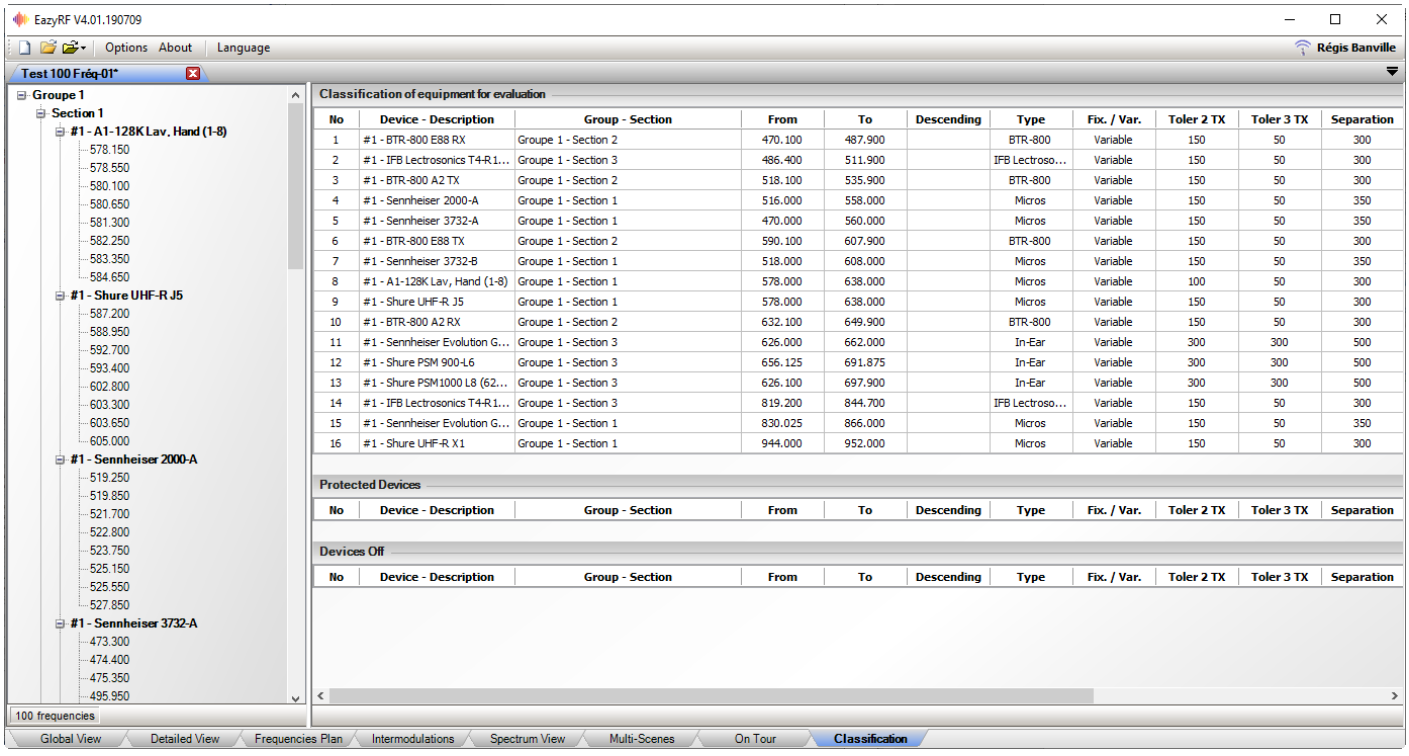
The descending order can be removed or put on the desired devices.

You can also delete the "Done" function on the selected sections.

9 - Classification

The view "Classification" displays the order of evaluation of unprotected and not off devices. If we have this document:

The "Classification" will show:



Let us examine the list closer:

Classification of equipment for evaluation

No	Device - Description	Group - Section	From	To
1	#1 - BTR-800 E88 RX	Group 1 - Section 2	470.100	487.900
2	#1 - IFB Lectrosonics T4-R1...	Group 1 - Section 3	486.400	511.900
3	#1 - BTR-800 A2 TX	Group 1 - Section 2	518.100	535.900
4	#1 - Sennheiser 2000-A	Group 1 - Section 1	516.000	558.000
5	#1 - Sennheiser 3732-A	Group 1 - Section 1	470.000	560.000
6	#1 - IFB Lectrosonics T4-R1...	Group 1 - Section 3	563.200	588.700
7	#1 - BTR-800 E88 TX	Group 1 - Section 2	590.100	607.900
8	#1 - Sennheiser 3732-B	Group 1 - Section 1	518.000	608.000
9	#1 - A1-128K Lav, Hand (1-8)	Group 1 - Section 1	578.000	638.000
10	#1 - Shure UHF-R J5	Group 1 - Section 1	578.000	638.000
11	#1 - BTR-800 A2 RX	Group 1 - Section 2	632.100	649.900
12	#1 - Sennheiser Evolution G...	Group 1 - Section 3	626.000	662.000
13	#1 - Shure PSM 900 L6	Group 1 - Section 3	656.000	692.000
14	#1 - Shure PSM 1000 P8	Group 1 - Section 3	710.000	790.000
15	#1 - Sennheiser Evolution G...	Group 1 - Section 1	830.025	866.000
16	#1 - Shure UHF-R X1	Group 1 - Section 1	944.000	952.000

This list shows the order of evaluation of devices in full automatic mode (unprotected devices).

The devices are sorted by Start and Stop frequency, but sometimes there is inversion to allow a device with its frequency range is narrower, to be evaluated before another which its range is wider. For example, the BTR-800 A2 TX (518.100-535.900) and Sennheiser 3732-A (470.000 to 560.000). The BTR-800 is classified before 3732-A because of its narrower range of frequencies, so it will be easier to find X frequencies of BTR if these frequencies have not been assigned to another device. The 3732-A has a much greater range, it should be easier to find frequencies for this device.

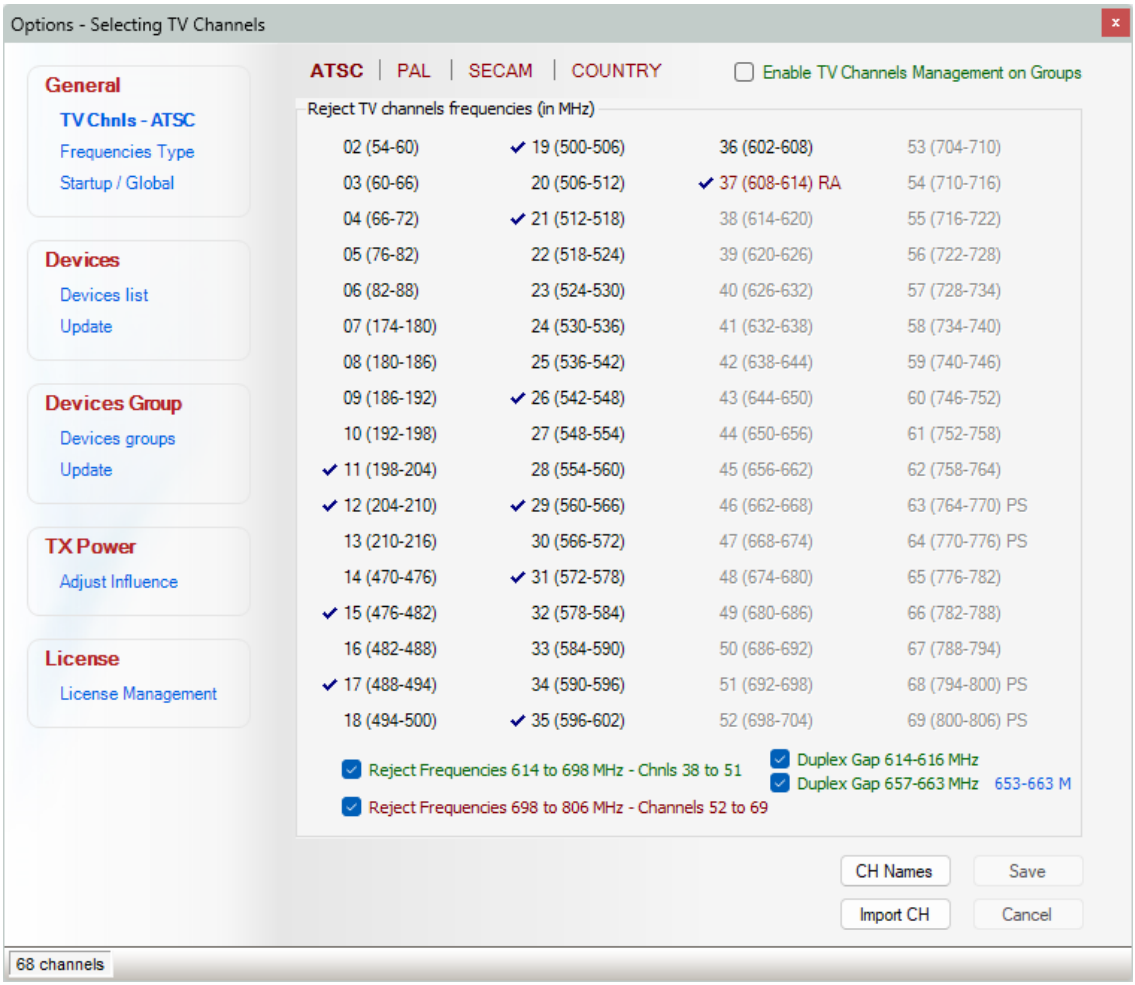
Obviously this method has its limits, when there is no possible solution, there is simply no.

Both lists of protected devices and off complete the list of devices for informational purposes only.

The list of devices of the left part of the view allows to identify a device in the right lists and vice versa by selecting it.

10 - Options

The "Options" menu allows to set the TV Channels, the Type of frequencies, the start options and default settings of a document, the list of Variables and Fixed devices, the influence of the Power level and the management of license file.



To set an option, click on the items in the list on the left side.

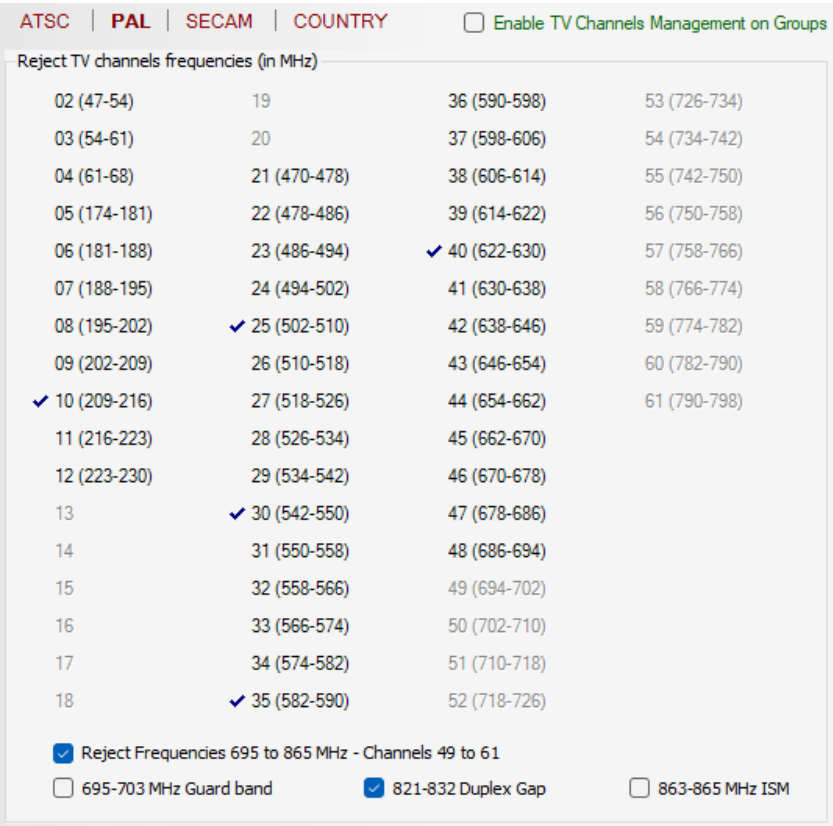
10.1 TV Channels

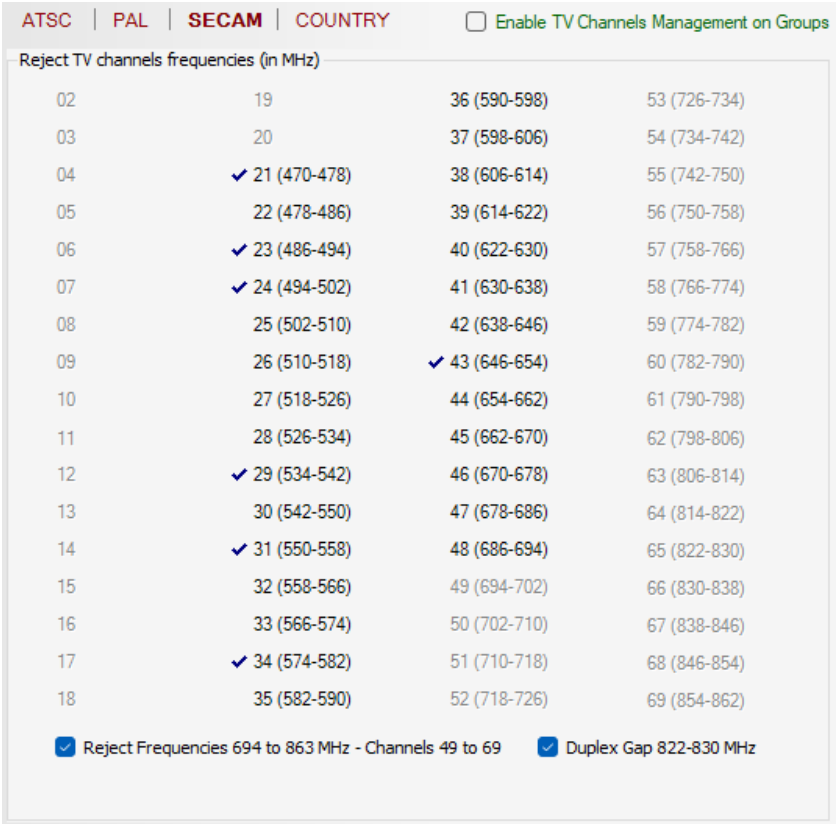
The channels of TV defined in Options are the ones used by default during the creation of a document.

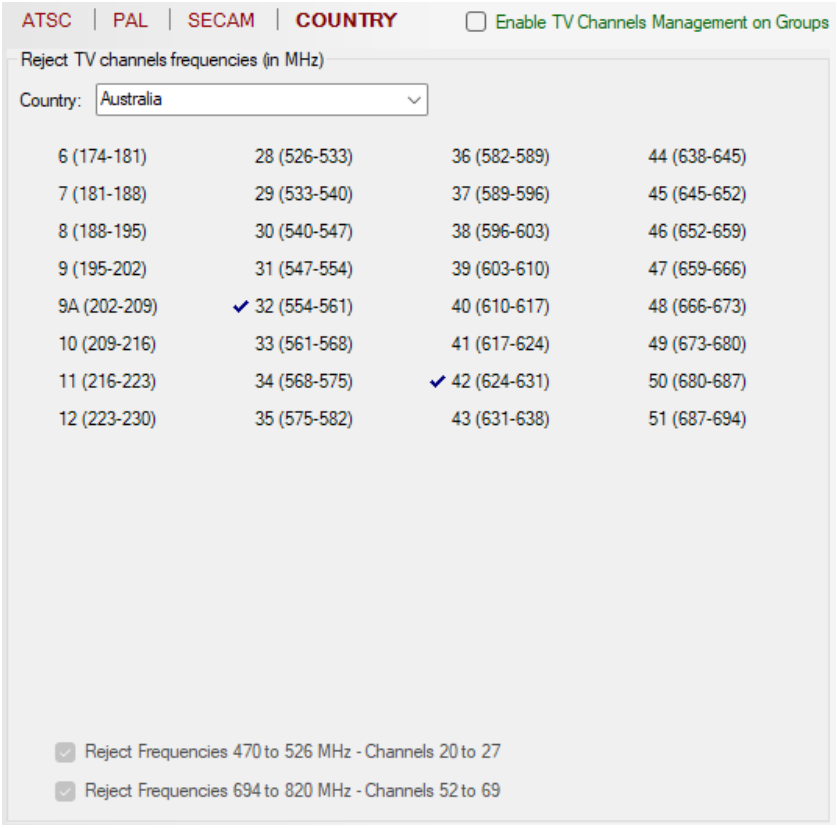
EazyRF supports three main video standards of television: ATSC, PAL and SECAM.

To change standard, select one of the options:

ATSC | PAL | SECAM | COUNTRY







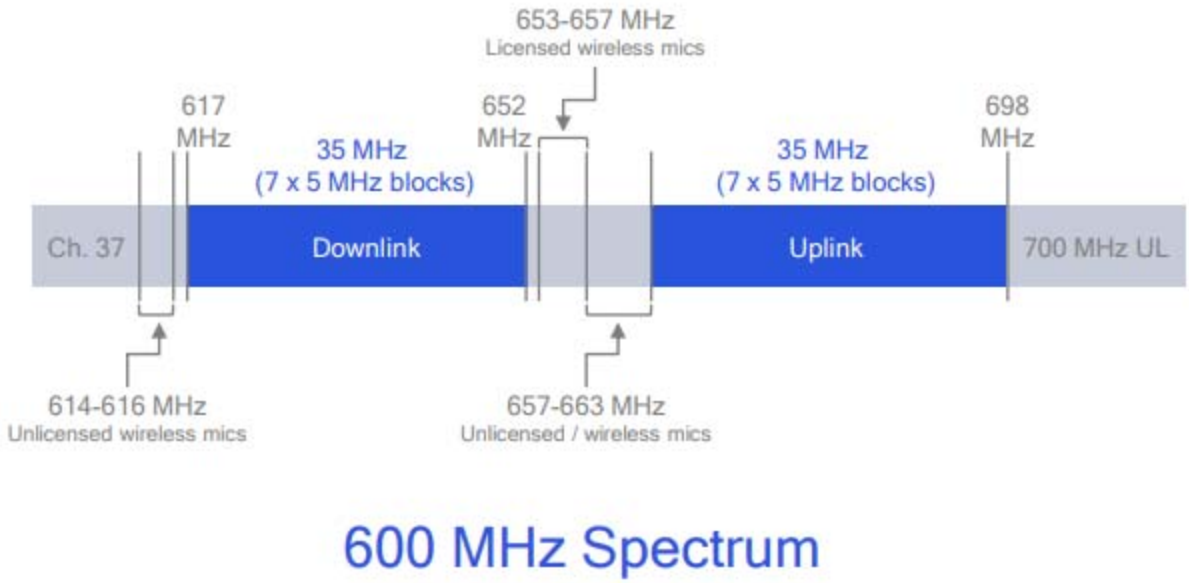
Simply select the desired channels.

10.1.1 Reject zone

An additional option allows to activate or deactivate the rejection of the frequency band reserved for commercial use in certain countries since the switch to digital television and to 4G and 5G cellular telephony.

Each rejection zone has one or more exclusion zones, i.e., zones where the use of frequencies is permitted.

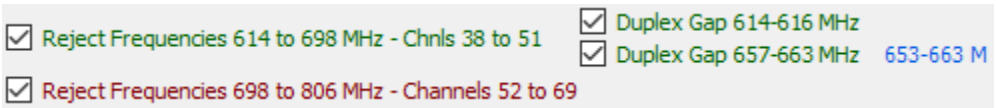
In North America, the 600 MHz frequency band has moved from being allocated digital television channels to 5G cellular telephony. Here is the new attribution:



600 MHz Spectrum

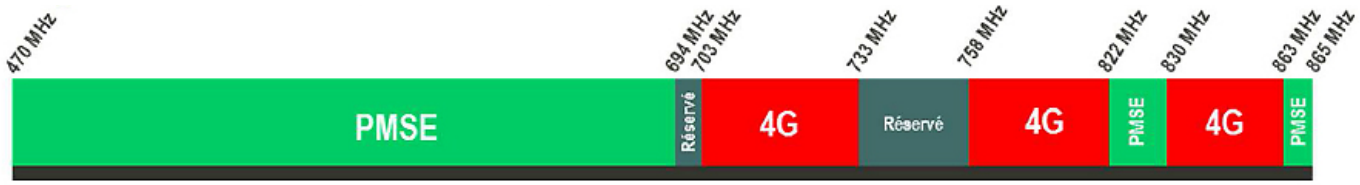
The frequency zones 614-616 MHz, 653-657 MHz and 657-663 MHz remain available for the use of RF audio equipment. The 653-657 MHz zone requires a user license, therefore private.

EazyRF allows you to manage the use of these areas:

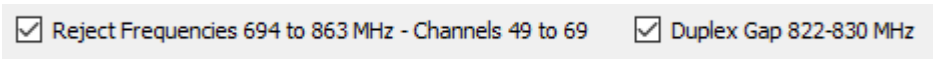


Since the 653-657 MHz zone is not suitable for everyone, the 653-663 command alternates the size of the zone from 657-663 MHz to 653-663 MHz.

Europe does not yet use the 600 MHz zone. EazyRF uses this attribution:

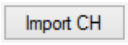


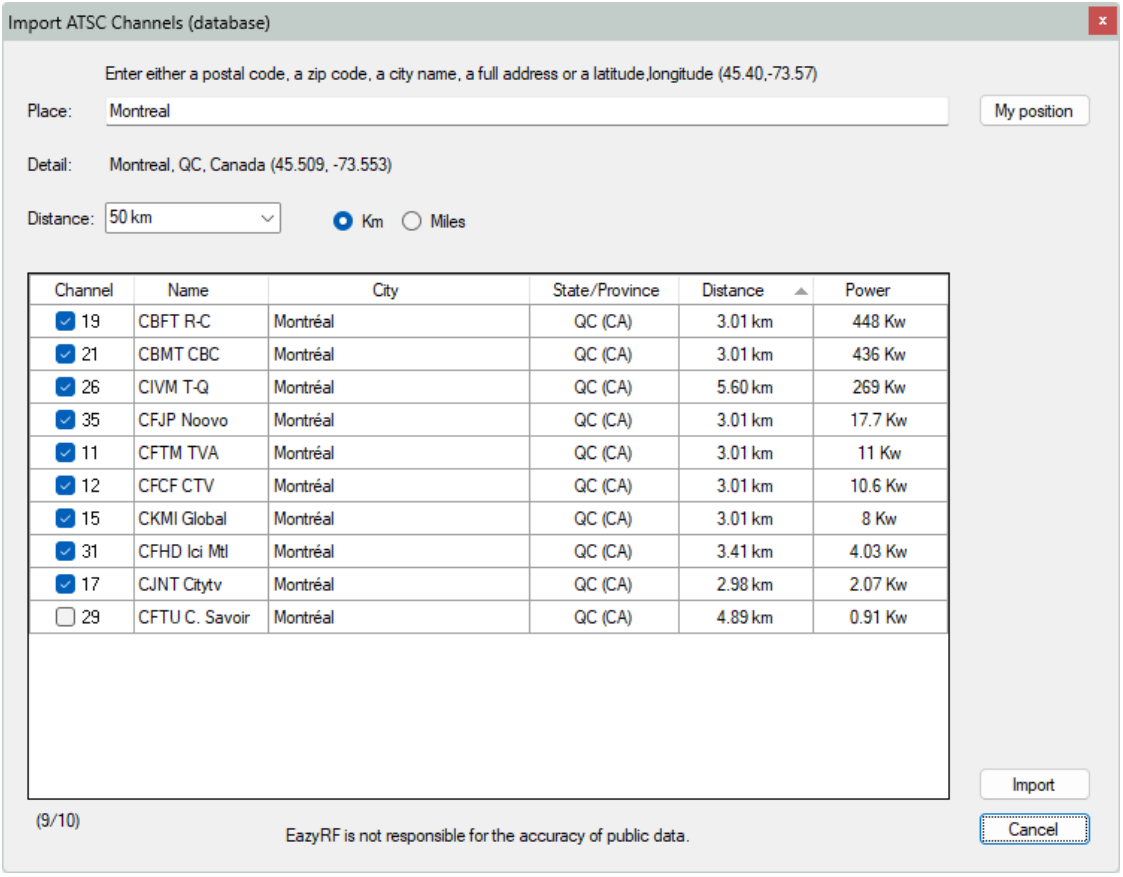
With the video standard SECAM L, there is a recoverable zone of frequencies in the zone of rejection of frequencies. The entire area extends from 694 MHz to 863 MHz. However an area of 8 MHz is recoverable from 822 MHz. This area is called "Duplex Gap." This option is available upon activation of the rejection area:



10.1.2 Channels importation

You can also import TV channels from public databases for a specific location with the command:





Just type a location data as a postal code, a zip code, a city name, a full address, or GPS data, or latitude-longitude in the format: 54.75, -123.01 (degrees minutes must be in decimal).

If your computer has a geolocation service, the "My Location" button allows you to enter your data automatically.

The regions covered for ATSC are Canada, the US and the border area with Mexico (there is no data available for Newfoundland though). For SECAM, coverage includes France and its border regions.

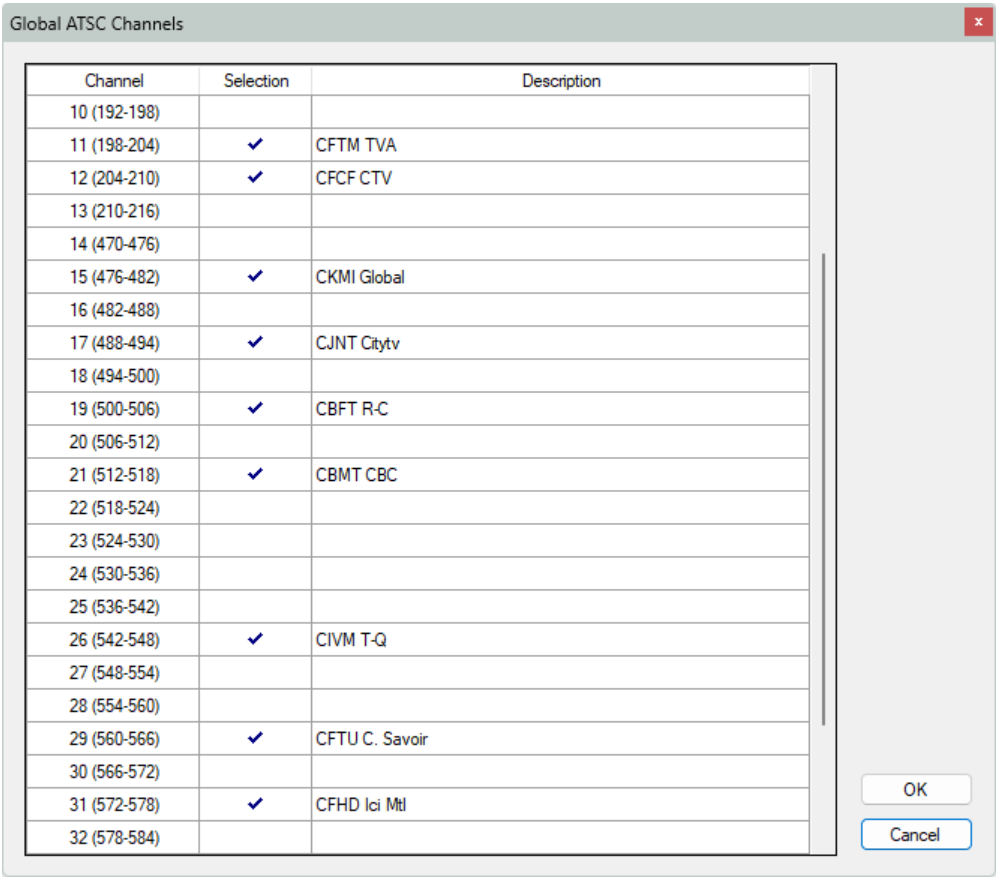
The list displayed depends on the selected distance, between 50 and 200 km. The selected channels vary depending on the combination of distance and power. This suggestion is not foolproof, only the scanner can be reliable. Some channels are allocated but not used, attention to NEWDT or HDTV channels. Only digital channels are shown.

Distances can be displayed in kilometers or miles.

The choice of the desired measurement system and the default distance can be done in Options/General/Startup (see section 9.3).

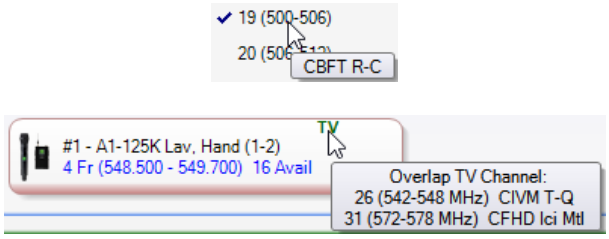
Then, the command:

Will display the following window:

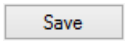


It is thus allowed to assign a name to a channel (and enable or disable).

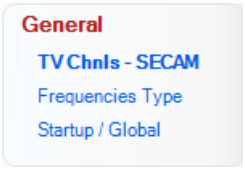
This information is displayed when moving the mouse pointer:



To save the system data and enable it as default values, select:



The video standard used now appears in the list of options:



Only changes to the standard that is saved are kept.

These basic channels appear in blue in the list of local channels (Chapter 2).

10.1.3 Video standard

Here is a list of video standards used in different countries.

Country/region	Format
Afghanistan	PAL
Algeria	PAL
Antigua	ATSC
Argentina	PAL
Australia	PAL
Austria	PAL
Bahrain	PAL

Bangladeshi	PAL
Barbados	ATSC
Belgium	PAL
Bermuda	ATSC
Brazil	PAL
Brunei	PAL
Bulgaria	SECAM
Canada	ATSC
Canary Islands	PAL
Chile	ATSC
China	PAL
Colombia	ATSC
congo	SECAM
Costa Rica	ATSC
Cuba	ATSC
Cyprus	PAL/SEC
Czechoslovakia	SECAM
Denmark	PAL
Dominican Republic	ATSC
Dubai	PAL
Ecuador	ATSC
Egypt	SECAM
Ireland	PAL
El Salvador	ATSC
Ethiopia	PAL
Finland	PAL
France	SECAM
Germany	PAL
Ghana	PAL
Gibraltar	PAL
Greece	SECAM
Guatemala	ATSC
Haiti	SECAM
Honduras	ATSC

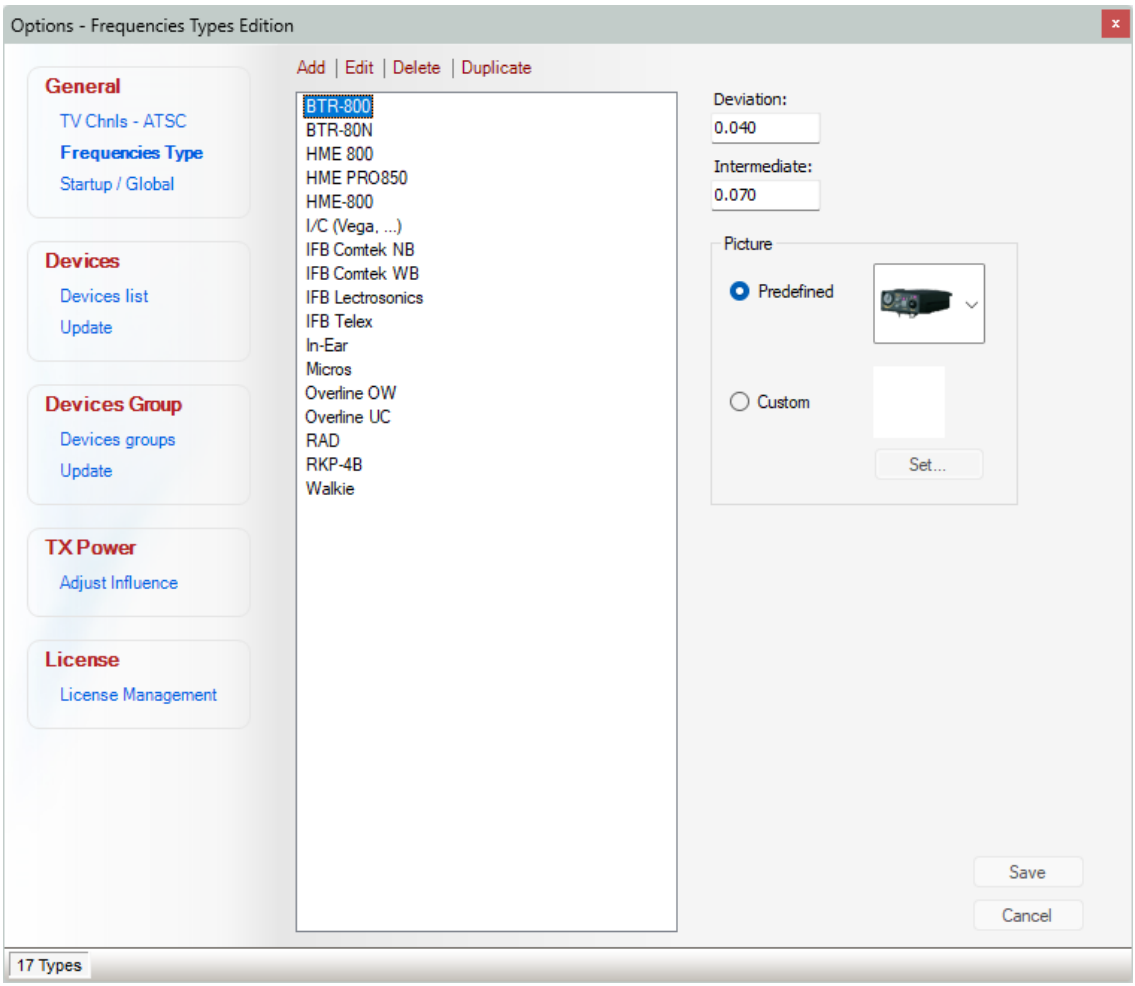
hong kong	PAL
Hungary	SECAM
Iceland	PAL
India	PAL
Indonesia	PAL
Iran	SECAM
Iraq	SECAM
Israel	PAL
Italy	PAL
Ivory Coast	SECAM
Jamaica	ATSC
Japan	ATSC
Jordan	PAL
Kenya	PAL
Korea	ATSC
Kuwait	PAL
Lebanon	SECAM
Liberia	PAL
Libya	PAL
Luxemburg	PAL/SEC
Malaysia	PAL
Malta	PAL
MAURITIUS ISLAND	SECAM
Mexico	ATSC
monaco	SECAM/PAL
Morocco	SECAM
Netherlands	PAL
New Zealand	PAL
Nicaragua	ATSC
Nigeria	PAL
Norway	PAL
Oman	PAL
Pakistan	PAL
Panama	ATSC

Peru	ATSC
Philippines	ATSC
Poland	SECAM
Portugal	PAL
Porto Rico	ATSC
Qatar	PAL
Saba, Sarawak	PAL
Saudi Arabia	SECAM
Sierra Leone	PAL
Singapore	PAL
South Africa	PAL
Spain	PAL
Sri Lanka	PAL
Sudan	PAL
Suriname	ATSC
Sweden	PAL
Swiss	PAL
Syria	SECAM
Taiwan	ATSC
Tanzania	PAL
Thailand	PAL
Trinidad	ATSC
Tunisia	SECAM
turkiye	PAL
United Arab Emirates	PAL
Uganda	PAL
UK	PAL
Uruguay	PAL
United States	ATSC
USSR	SECAM
Venezuela	ATSC
Yemen	PAL
Yugoslavia	PAL
Zaire	SECAM

Zambia	PAL
Zanzibar	PAL
Zimbabwe	PAL

10.2 Frequencies Type

The type of frequency includes three parameters:



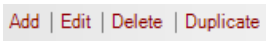
The Deviation and Intermediate parameters are related to the Frequency Modulation (FM). These parameters are determined by the manufacturer.

The image can be defined from a list included or customized as needed.

It is this image that is used in the Global view devices.

EazyRF grants a minimal importance for the parameters Deviation and Intermediate settings. Only the view "Intermodulations" still mention them.

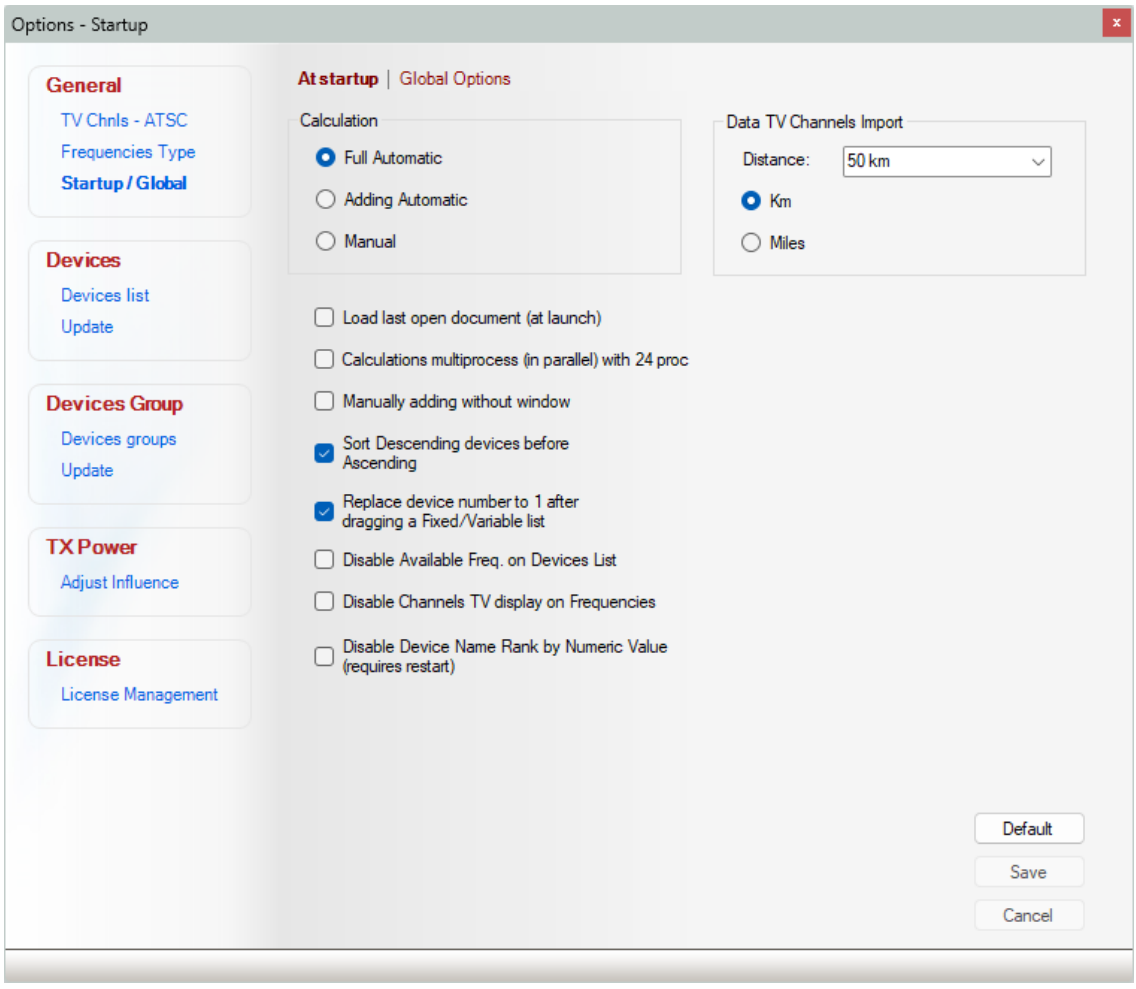
The menu:



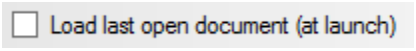
Allows you to manage the items of the list.

10.3 Options Startup/Global

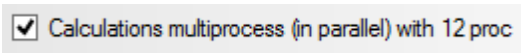
The following items can be set and used at start of EazyRF:



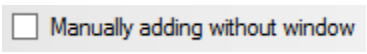
The calculation determines which mode to use at starting up and at creation of new document.



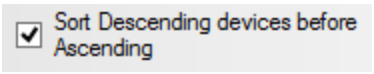
Reloads the last working document at start of EazyRF.



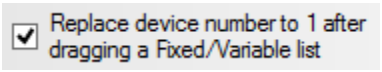
Enable or disable the computation across multiple cores.



In calculation mode "Manual" when adding a device a window appears to enter frequencies. This option allows you to add devices directly without window with 0 frequency.

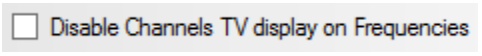


In "Full Automatic" calculation mode, the devices are evaluated in order of growth of the start frequencies. In the case of the evaluation of a device in descending order, the starting value calculations is found to be the stop frequency. This option is used to reverse the order of evaluation.

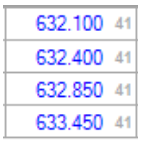


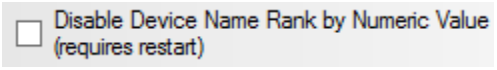
In global and detailed views the number of devices added simultaneously can be defined (X1 or Xx), this option resets the counter to 1 or retains its value (see chapter 2).

Turns off the calculation of available frequencies in the global and detailed views when the mouse cursor is positioned on the name of a device. If your computer is not fast enough, this option will give more fluidity (see Chapter 2).



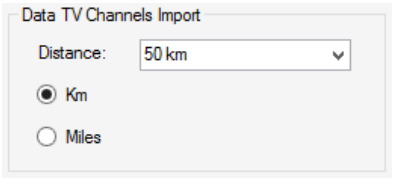
This option disables the display of a TV channel number for the frequency:





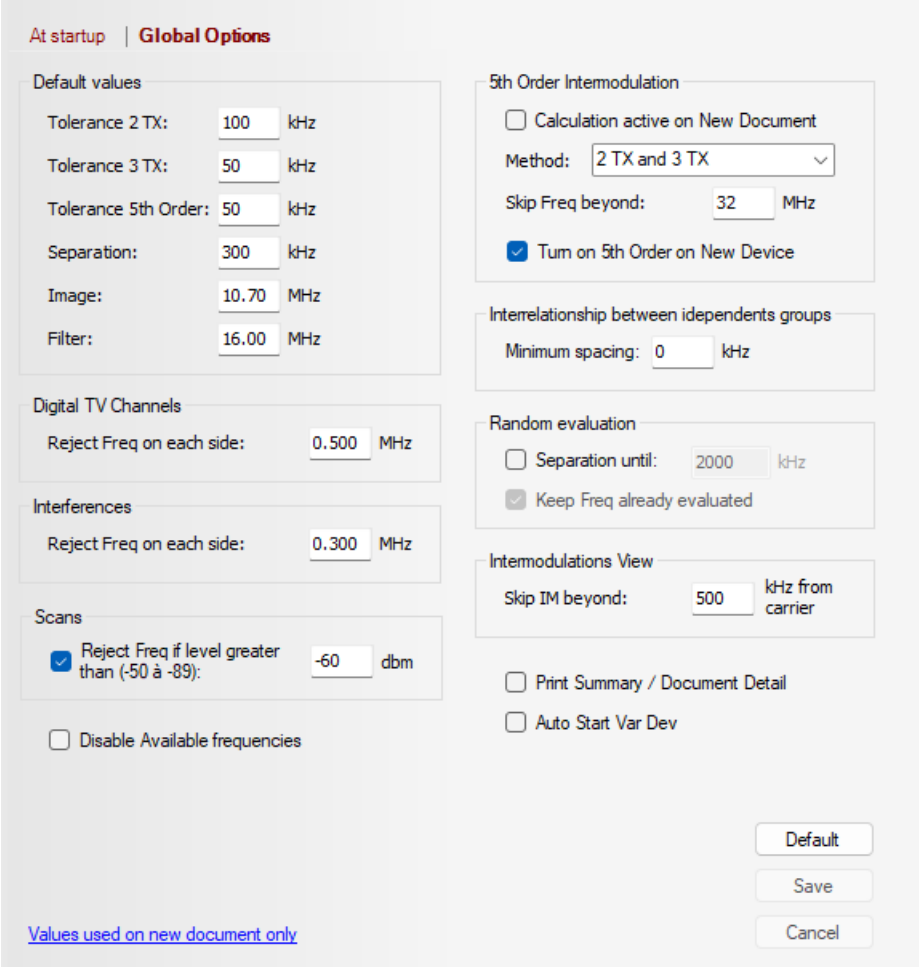
The name of the devices with a number are listed in order of numerical value (example: Shure PSM 900, Shure PSM 1000). This option allows to classify the devices alphabetically (1000 above 900).

The section:



Sets the default settings for import of TV channels via public databases (see section 9.1).

The second part of Startup/Global determines the evaluation parameters of frequencies:



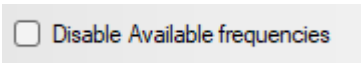
All these parameters are used when creating a new document. Local Options window allows you to adapt them to his document (section 2.5.4).

The "Print Summary / Document Detail" option displays or not the document summary and device details (tolerance, separation, etc.) when printing.

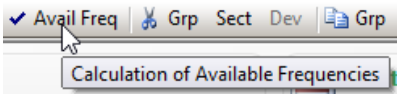
"Auto Start Var Dev »enables / disables the automatic value of the start frequency of a variable frequency device. During the automatic evaluation of the devices, these are classified in order of departure (in reality it is a little more than that), with this option the evaluation is done in this way: the first device keeps its frequency of original start, the first different device will use a higher starting frequency than the last frequency of the previous device with an automatic deviation. A small example:

Instead of:

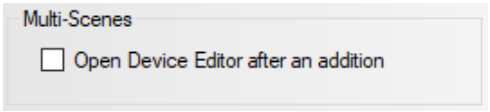
This method of evaluation allows to leave a little space between the devices if possible.



This option allows you to deactivate the calculation of available frequencies when creating a new document (used for opening an IAS file). This option can be reactivated in the global and detailed view.



Finally, if you have a “Multi-Scene” license, an additional option appears when the “Options” module is called from the “Multi-Scene” view:



This option automatically opens the device editor when each device is added.

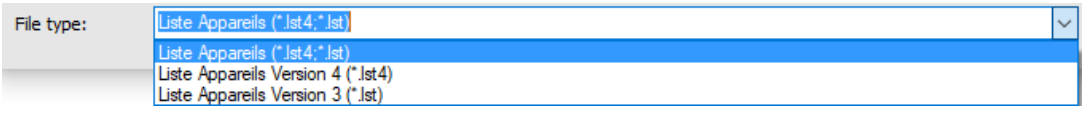
10.4 Devices

The list of "Fixed Frequencies" devices and the list of "Variable Frequencies" devices have been merged with EazyRF version 4.

A new file format has been created with the extension .lst4. The old file format (.lst) can be read by EazyRF.

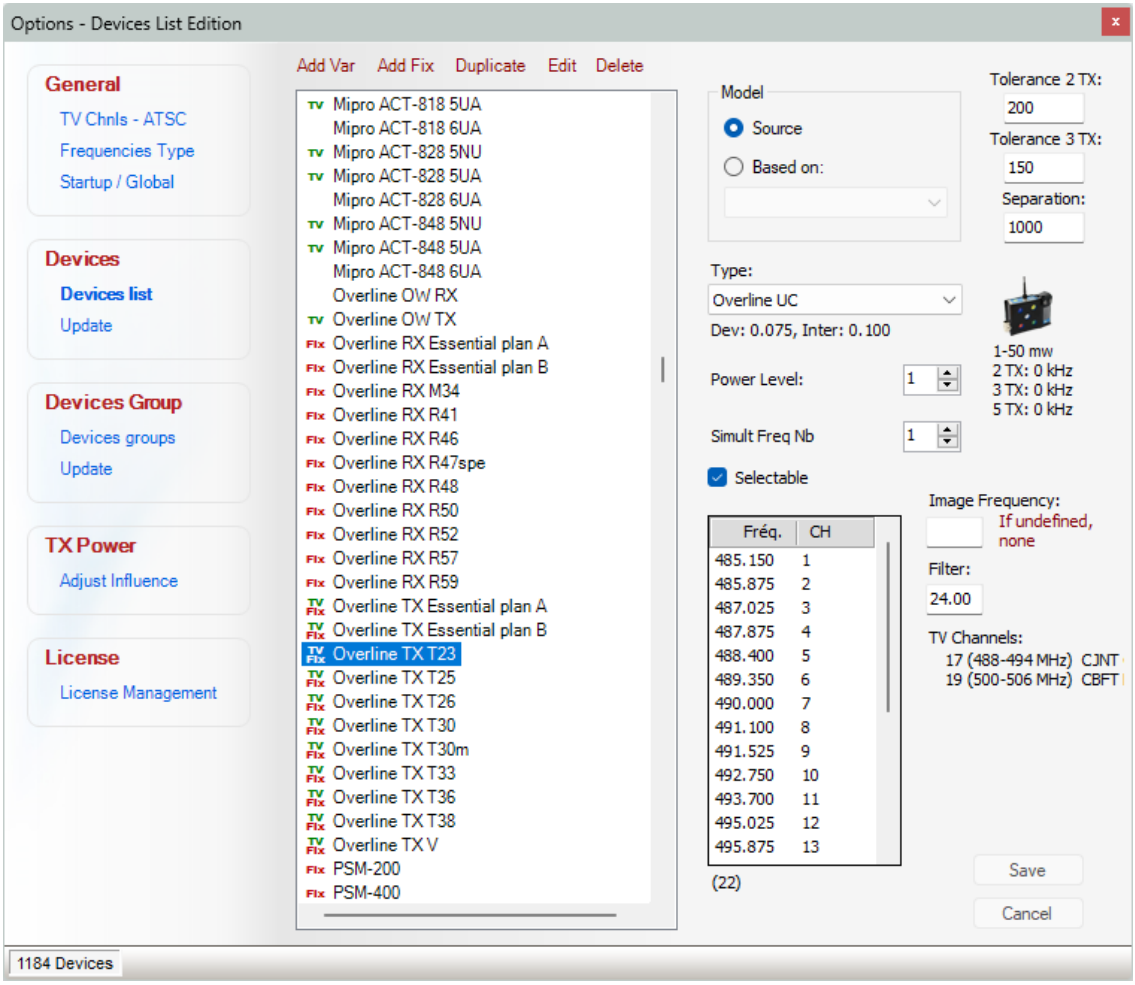
To convert the old device file to the new format, EazyRF offers two solutions. The first one should be used after the installation of EazyRF. Just copy the old file into the new installation directory (from C:\Program Files (x86)\EazyRF V3.2 to C:\Program Files (x86)\EazyRF V4). Then you have to rename the file Devices.lst4 (to your taste), otherwise this one will be open by default at the launch of EazyRF. EazyRF opens the Devices.lst file and converts it to the new format and saves it as Devices.lst4

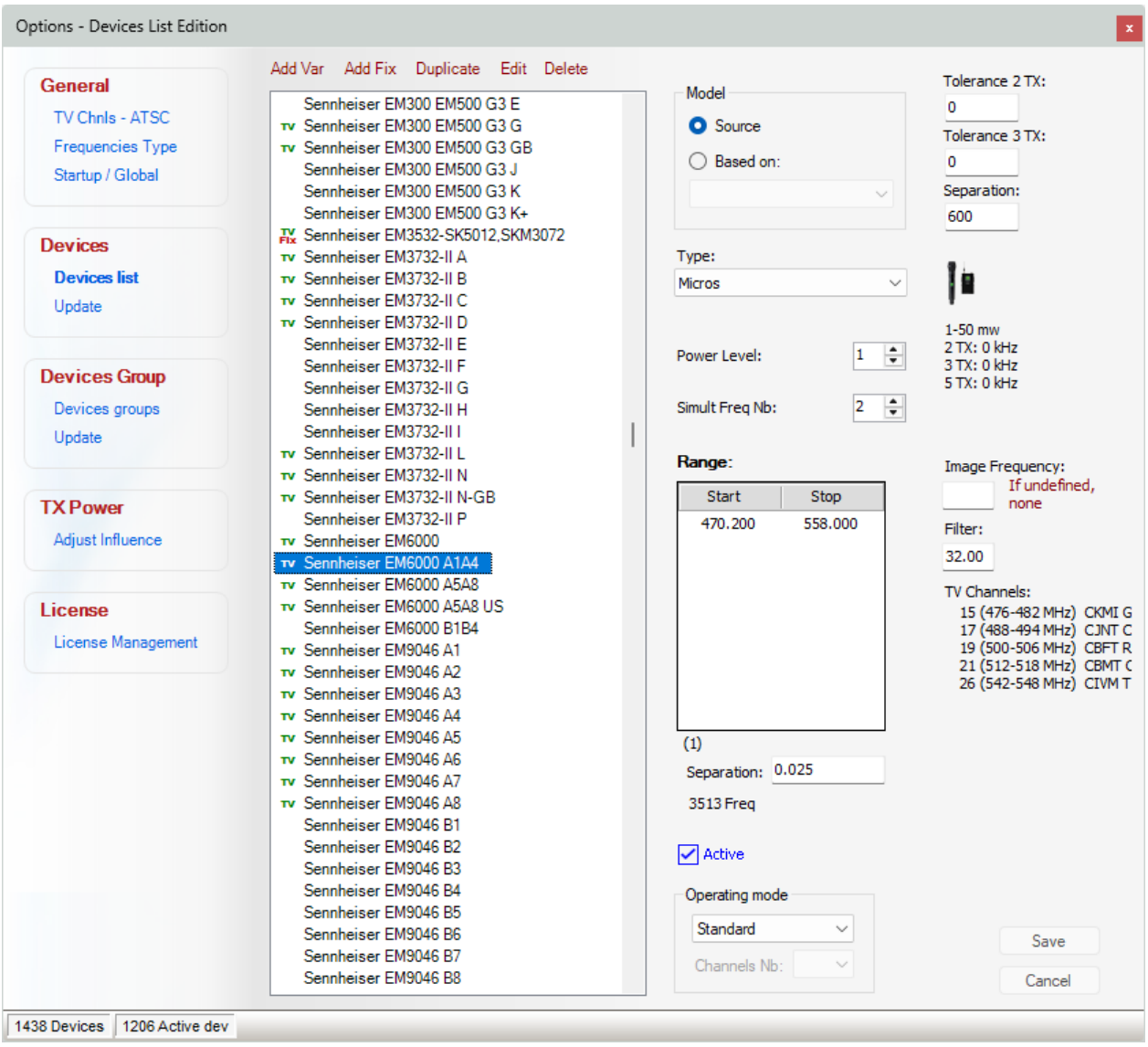
The second method is to use the device update module and open the old device lists:



See the next section for using the device update module.

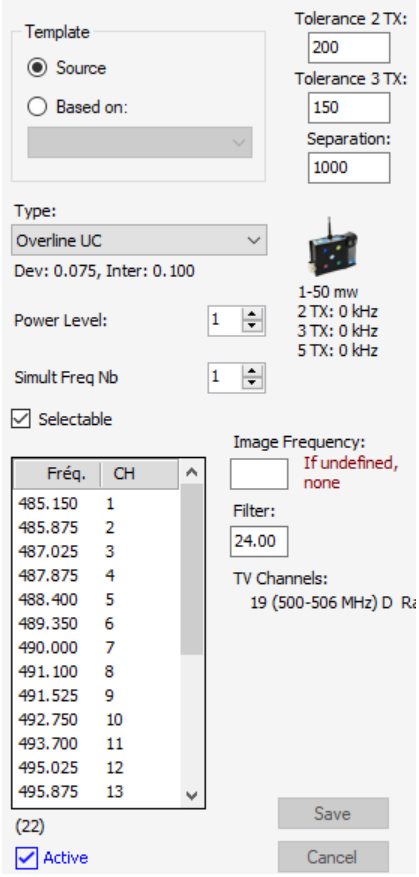
The edition of the list of devices changes according to the type of devices (variable or fixed):





A fixed frequency device has only a few selectable frequencies (it is not programmable).

The editor allows to manage these devices by defining their list of frequencies and channels:



If one of these frequencies is included in one of the active television channels, a list will indicate it.

A device can be defined as the base model (the first in the chain). Another device can be created from a base model and inherited from its frequencies (used for case numbers).

The frequency type uses the predefined types previously (section 9.2).

Tolerance values are the accepted intermodulation limit values for this device. Separation is the minimum distance between two frequencies.

The power level can vary from 1 to 4, with 1 being the normal level. This level influences the rejection of intermodulations according to the transmission power (see section 9.7). The displayed match (Tolerance values) is the value of the global parameters.

The number of frequencies is the number of frequencies to be found when adding to one of the views.

The image frequency is an intermediate frequency used during demodulation with older devices. As a result, it was impossible to differentiate two carriers separated from the value used (10.7 MHz was the norm). This value is optional (if not defined, unused).

The filter of the device represents the difference of the frequencies supported during the calculations. For a value of 16 MHz, the frequencies between the carrier minus 16 MHz and the carrier plus 16 MHz will be used in the calculations. A bit like an electronic filter.

It is possible to copy a frequency list from Excel. The value of the frequency must be on the 1st column and the value of the channel on the 2nd column. You must move both columns simultaneously.

In addition, Excel must be started in administrator mode (shortcut settings, advanced).

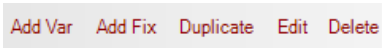
The "Active" command is used to activate / deactivate a device.

When a device is turned off, it no longer appears in the Add Devices list. Thus, instead of removing a device from the list, it can simply be disabled and remain in the list.

The names of disabled devices are displayed in gray.

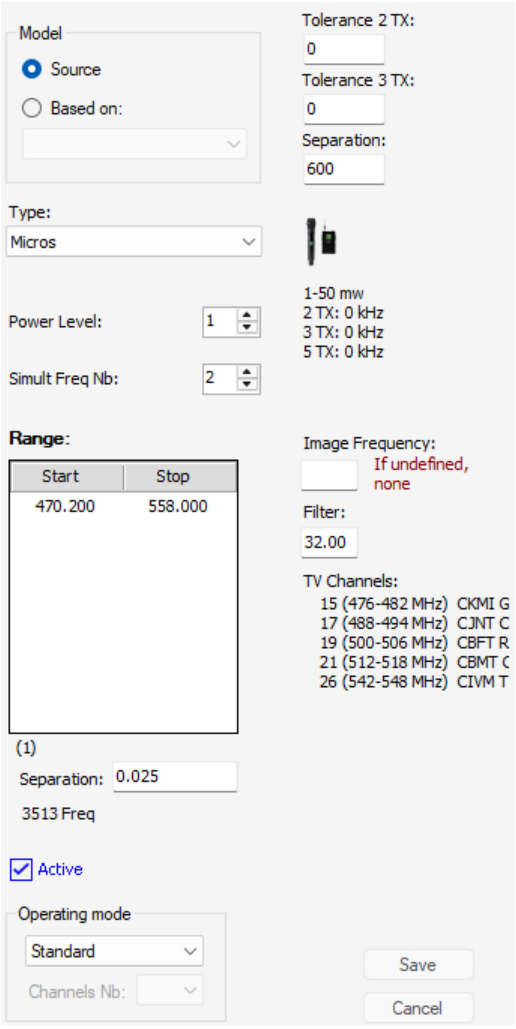
To activate / deactivate several devices continuously, make sure that the list of devices has keyboard focus (the selection border has a fine dashed border). Use the following keys on the keyboard to make changes: "Enter" toggles the value Active, "+ (keypad or + / =)" to activate the value Active and "- (keypad - / _)" allows to disable the Active value. The next device is automatically selected and the operation is ready to be repeated.

The commands :



Manage the items in the list.

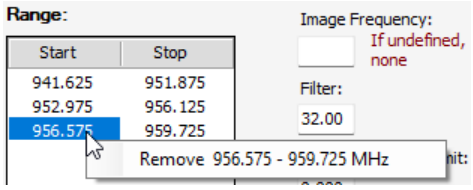
The editing of variable frequency devices is different:



A variable frequency device has as a Start frequency, a Stop frequency and an Increment step.

EazyRF uses a list of start/stop frequencies to define devices with multiple frequency ranges.

The list is automatically sorted in ascending numerical order. To delete an item, simply right-click on it:



Like fixed frequency devices, a variable frequency device can be defined as a basic device or based on another (and inherited from its parameters).

The parameters Model, Type, Tolerance, Separation, Power Level, Image Frequency, Filter and Number of Frequencies have the same usage as for Fixed Frequency Devices.

The Start, Stop and Increment values are the heart of this kind of device. The list of TV channels included in this data is for information only.

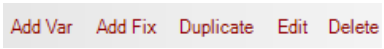
The "Active" command is used to activate / deactivate a device.

When a device is turned off, it no longer appears in the Add Devices list. Thus, instead of removing a device from the list, it can simply be disabled and remain in the list.

The names of disabled devices are displayed in gray.

To activate / deactivate several devices continuously, make sure that the list of devices has keyboard focus (the selection border has a fine dashed border). Use the following keys on the keyboard to make changes: "Enter" toggles the value Active, "+ (keypad or + / =)" to activate the value Active and "- (keypad - / _)" allows to disable the Active value. The next device is automatically selected and the operation is ready to be repeated.

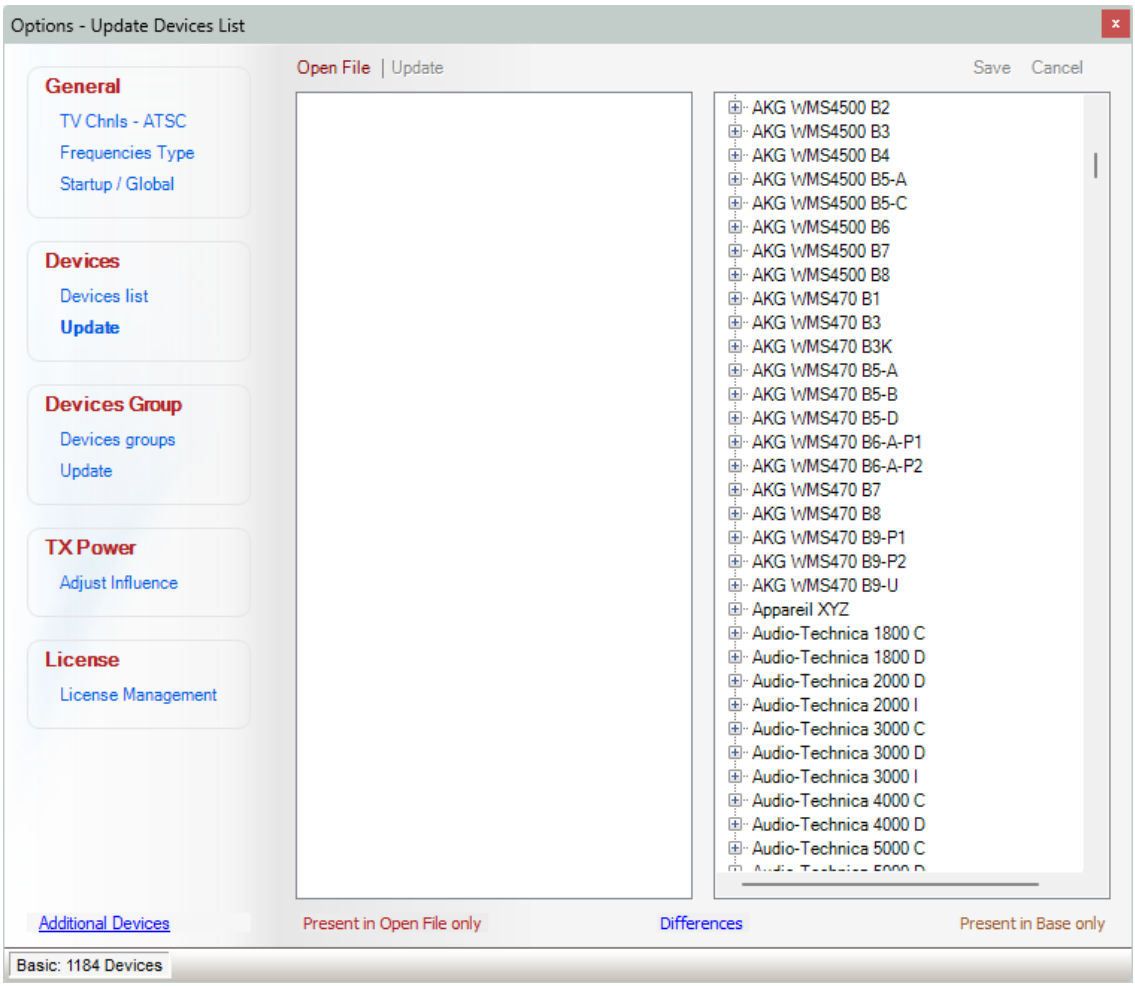
The commands :



Manage the items in the list.

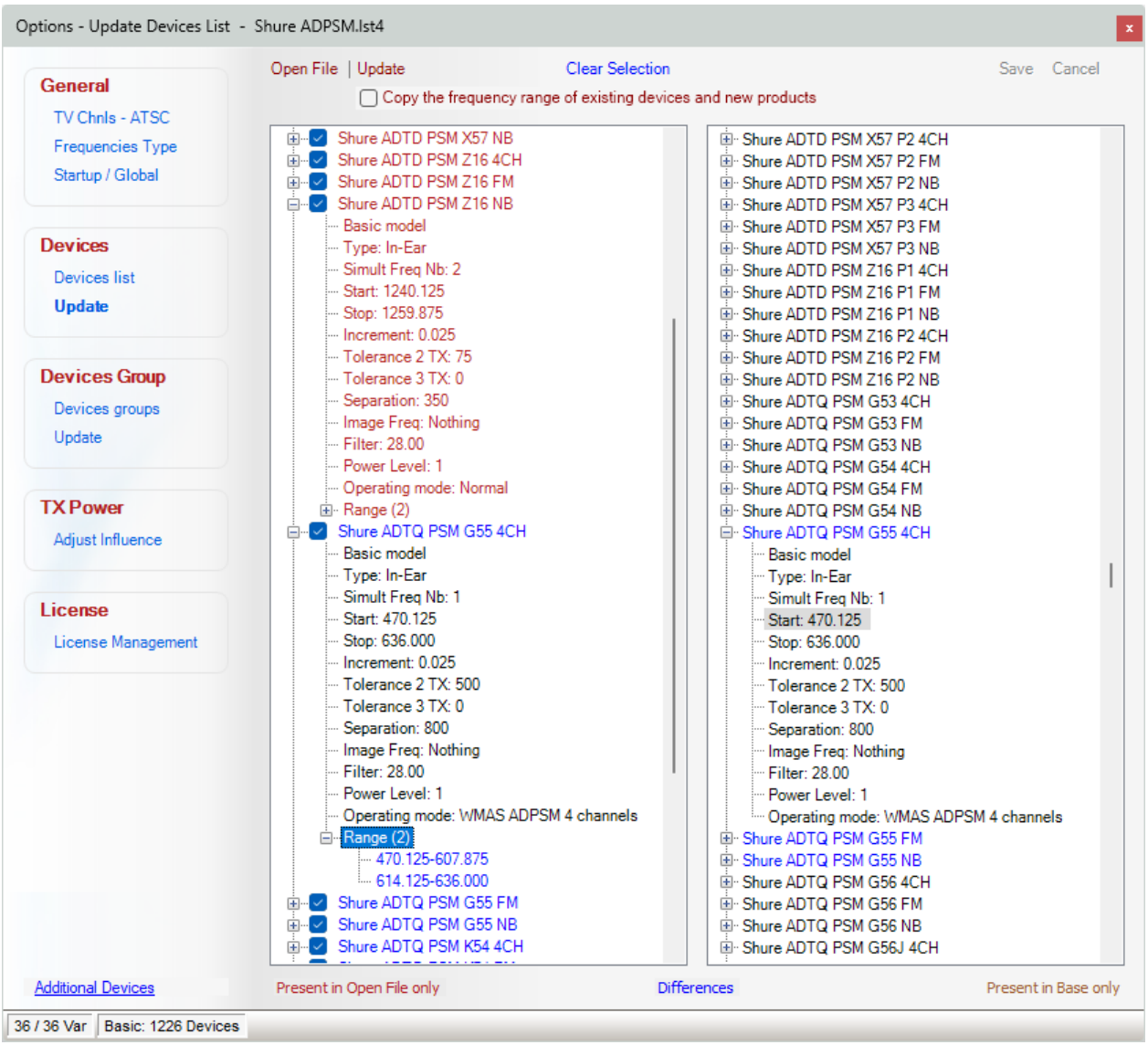
10.5 Devices Update

This option allows to compare two lists of devices:



The "Additional Devices" hyperlink allows you to download additional device lists.

To start, open a list of devices with the "Open File" command. After opening:



The open file is in the list on the left, the right list shows the current list of the system. Device files from version 3 (.lst) or version 4 (.lst4) can be opened.

The differences between the two lists are displayed with different colors. The devices present only in the open list are in red, the devices in the system list only are in brown. A device presents in both lists but with differences in parameters is displayed in blue. The identical devices in both lists are not displayed in the list on the left for a little more clarity.

The contents of the parameters can be examined by opening the detail of the device (+).

Devices in the open file can be selected individually before updating. By default, when a file is opened, devices that are not in the basic list are selected.

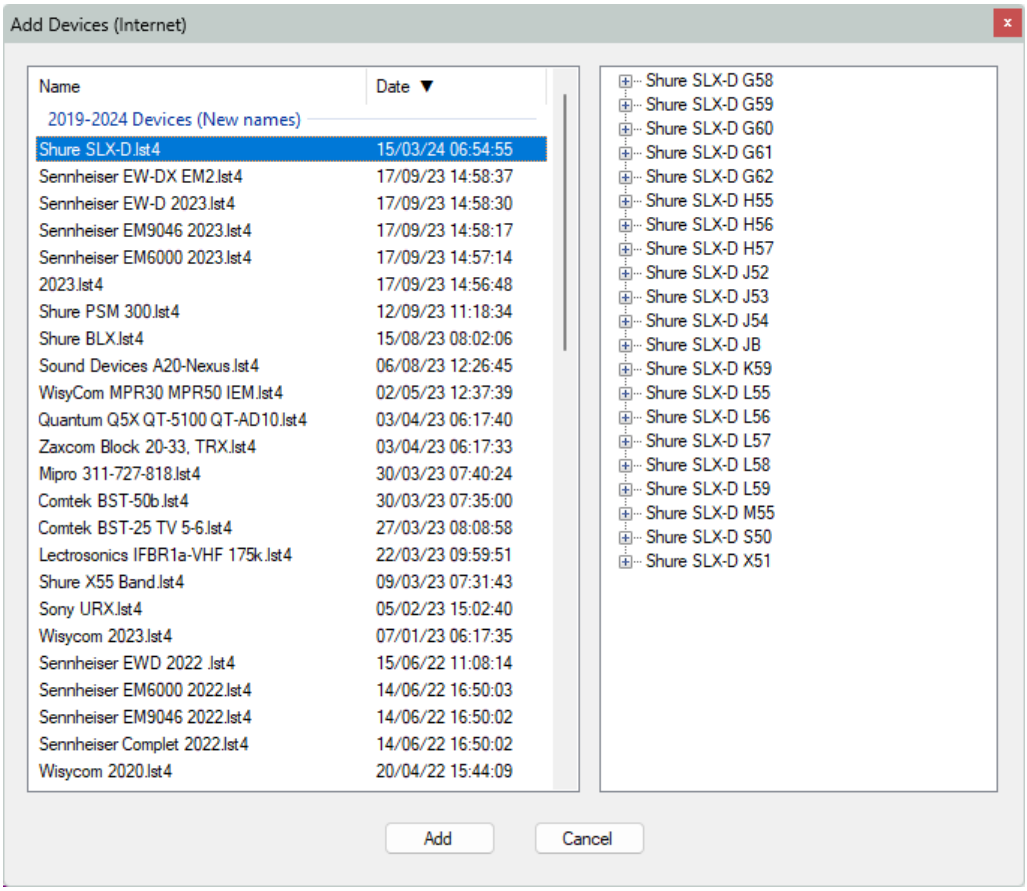
Finally, it is necessary to complete the operation by the Save command.

The option “Copy the frequency range of existing devices and new products” allows you to update only the frequency range while retaining the settings from your own list.

The update can only be made from the opened file to the list of the system, not the other way.

10.6 Additional Devices

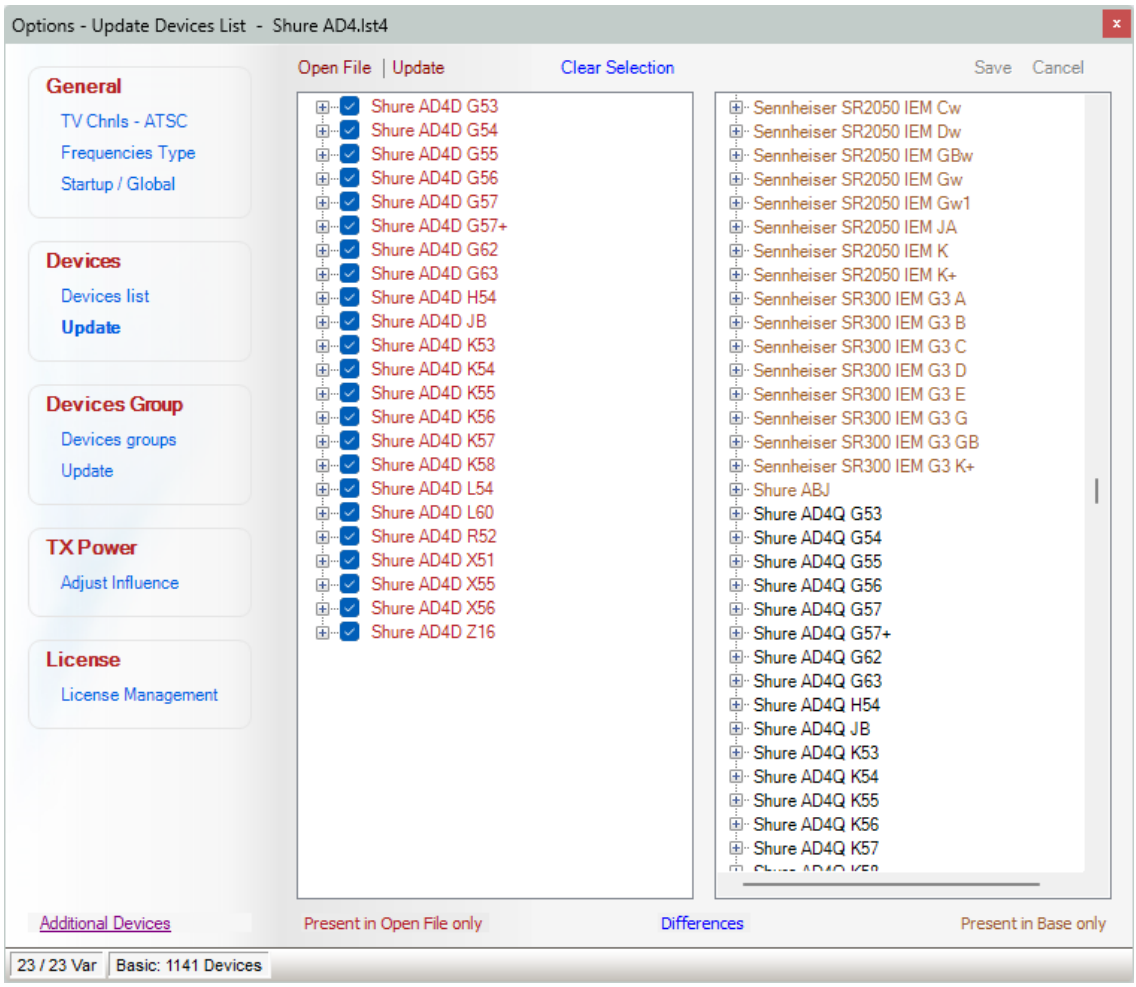
The "Additional Devices" command calls the add-ons import module available on the EazyRF website:



The list is split into two groups, the 2019-2020 devices (EazyRF Version 4) and the standard devices (EazyRF Version 3).

The contents of a list can be viewed on the right side of the display. Devices not in your device list appear in blue and the number of new devices is shown at the bottom of the list.

To add a list to EazyRF, just make a selection and use the "Add" command. The contents of the list are displayed in the "Devices - Update" module (section 10.5) as with the "Open File" command:

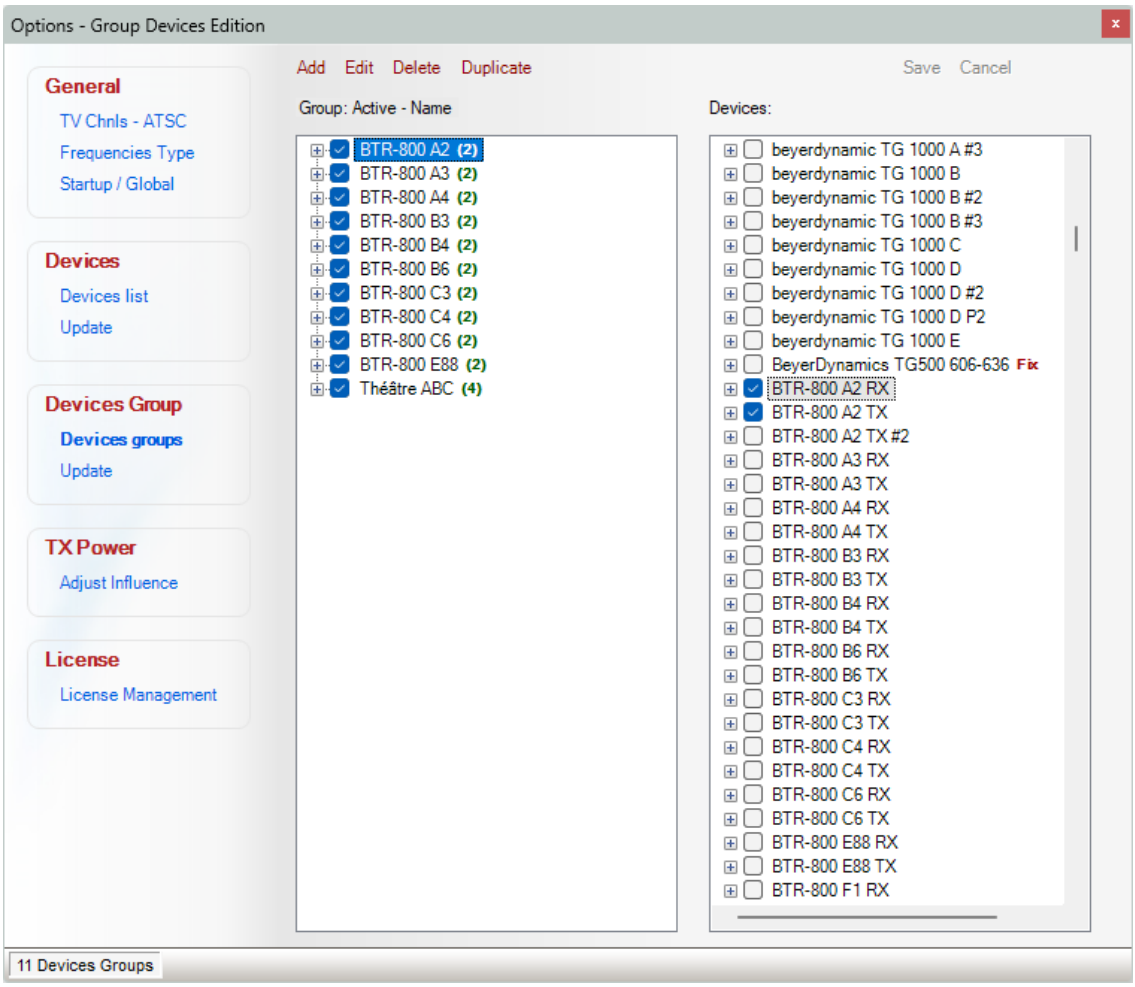


10.7 Devices group

EazyRF version 4 now offers the ability to create device groups.

A device group can contain an unlimited number of variable or fixed frequency devices. The number of devices of each type is definable. In addition, the number of frequencies of each device is changeable and the value of each frequency can be entered manually (in an existing environment).

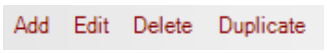
Let's see how to manage these groups.



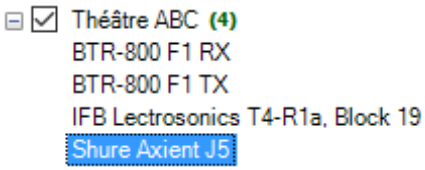
The list on the left contains all defined device groups. The list on the right contains the list of system devices (variable and fixed devices).

To add a device to a group just select it in the list on the right:

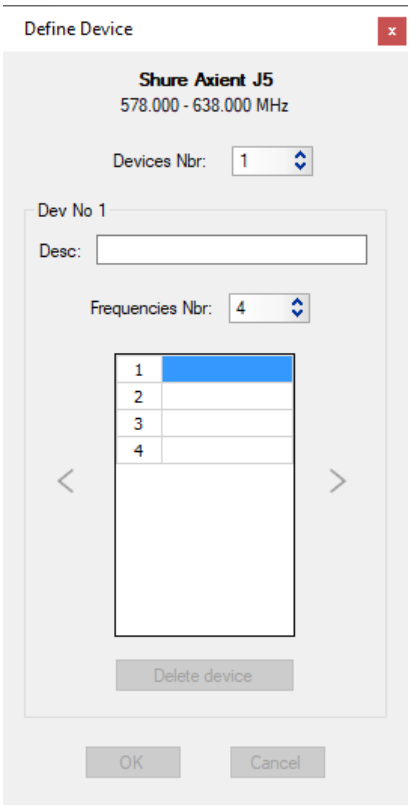
Management of the list on the left is done with these commands:



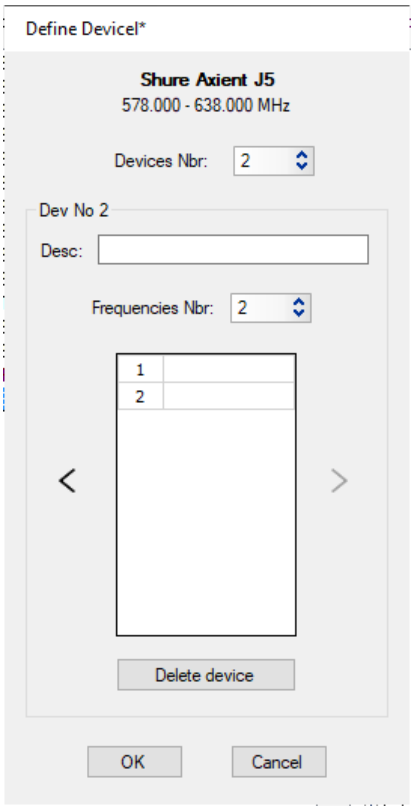
To change the number of devices or frequencies, double-click on the device name:



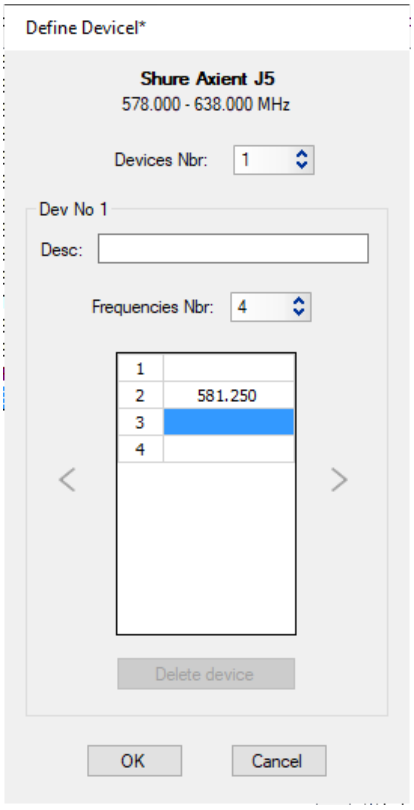
What calls the editor:



When the number of devices is greater than 1, to decrease the quantity of device, it is necessary to select one of the devices by moving with the left arrows right and to use the command "Delete Device":



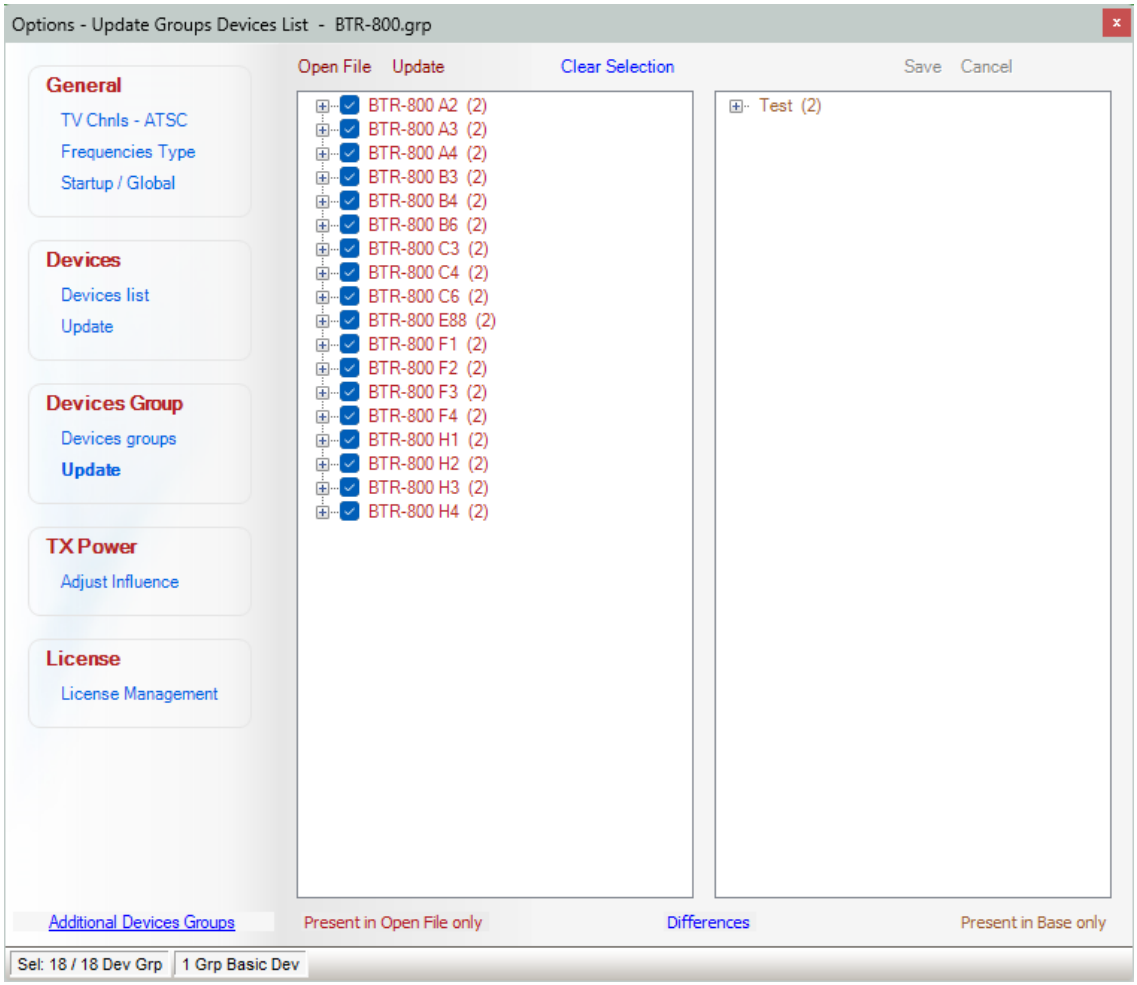
To set frequencies manually, simply enter the desired frequencies:



When frequencies are set manually, EazyRF does not calculate the frequencies of this device when the group is added.

10.8 Devices group – Update

Like the device list, the device group list can be updated from a device group file. A hyperlink allows to go on the website for additional groups.



The update works like that of the devices.

The differences between the two lists are displayed with different colors. The device groups present only in the open list are in red, the device groups in the system list only are brown. A device group in both lists but with different settings is displayed in blue. The groups of identical devices in the two lists are not displayed in the list on the left for a little more clarity.

The contents of the parameters can be examined by opening the device details (+).

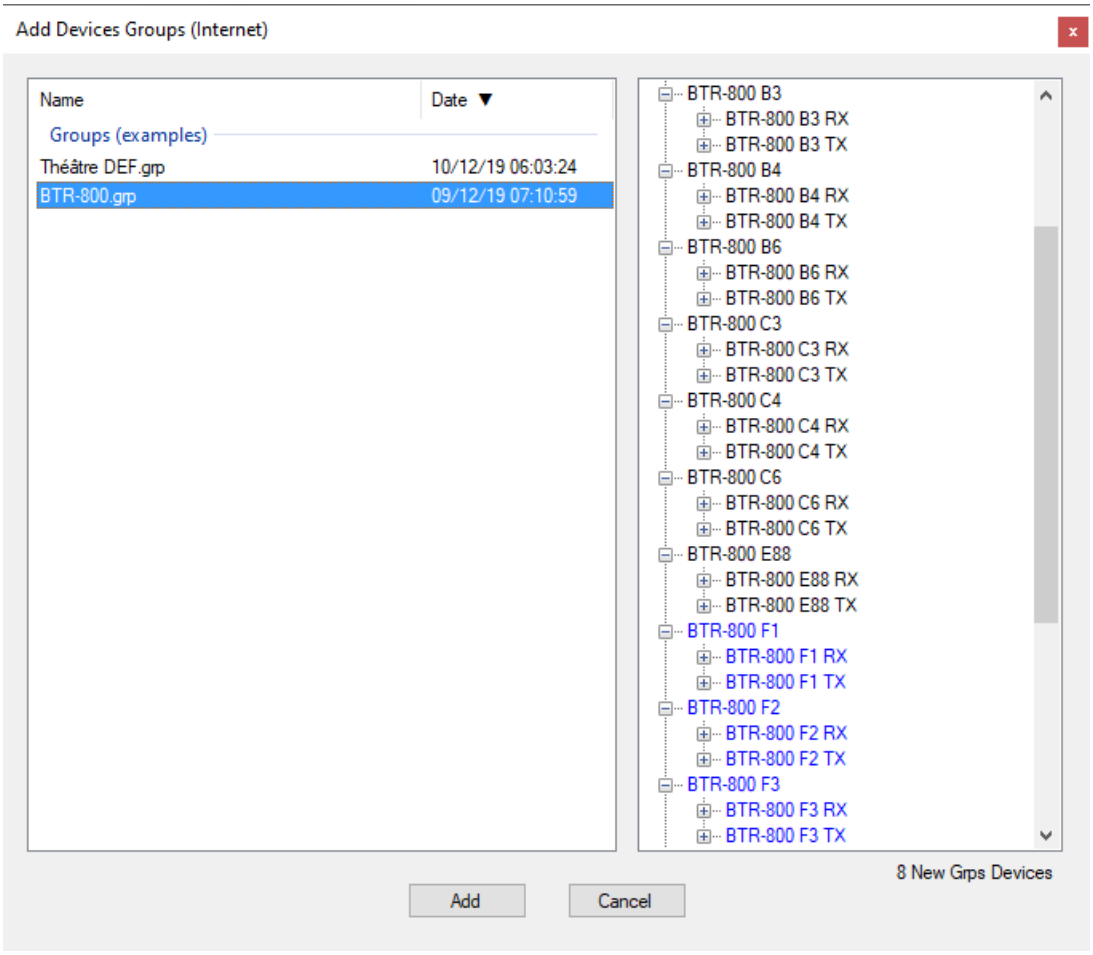
Device groups in the open file can be selected individually before updating. By default, when you open a file, the groups that are not in the base list are selected.

Finally, you must complete the operation with the Save command.

The update can only be done from the open file to the list of the system, never in the other direction.

10.9 Additional Devices Groups

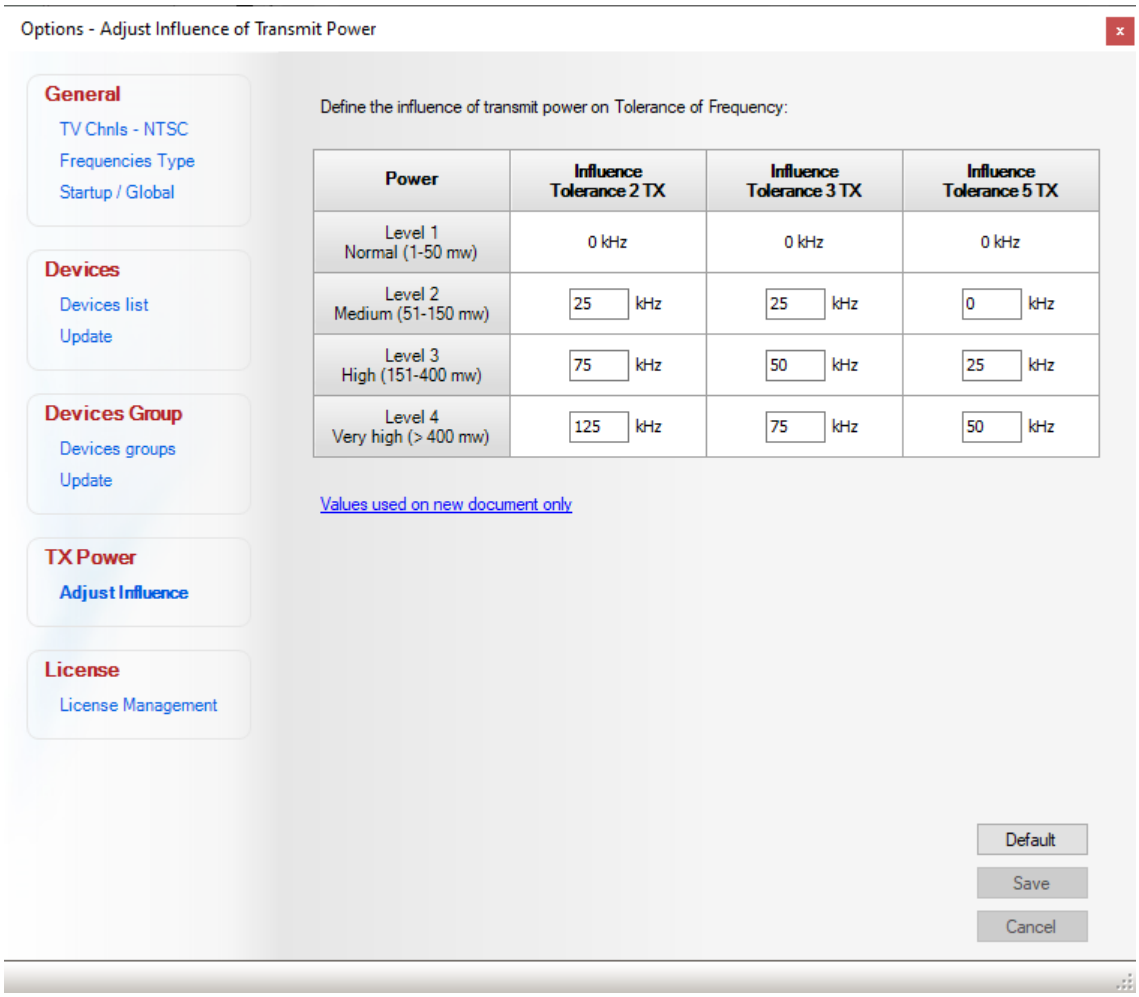
This command allows you to import device group lists from the EazyRF website and open it in the "Devices Group - Update" module:



This module works like "Add-On Devices", the "Add" command is the same as opening a file (section 10.8).

10.10 TX Power – Adjust Influence

This option allows to define the influence of the transmit power level:



The power level of a transmitter influences a receiver.

To understand the effects of the power, let us take a small example. If the Tolerance (2 TX, 3 TX or 5th order) of a device is set at 50 kHz, this means that all the intermodulations of 50 kHz and more on both sides of the carrier will be tolerated. If one of the frequencies causing this intermodulation at 50 kHz is due to a carrier of stronger power, its effect on the reception can thus be perceptible.

To take care of these effects, EazyRF allows to add an automatic correction to the calculations of intermodulations if one of the carriers who caused this tolerated intermodulation is of stronger power.

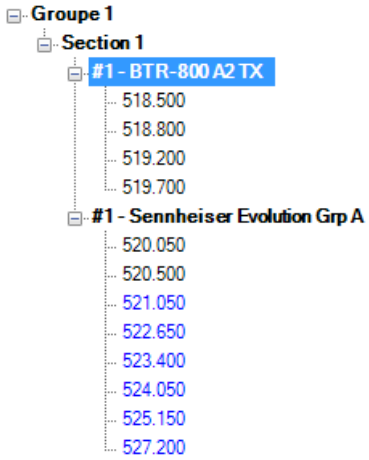
The power was separated in four categories: Normal (1-50 mW), Medium (51-100 mW), High (151-400 mW) and Very High (more than 400 mW).

For each level, simply set a different correction for Tolerance 2 TX, 3 TX and 5 TX (5th order).

The normal level has no correction. The higher the level, the greater the influence will be marked.

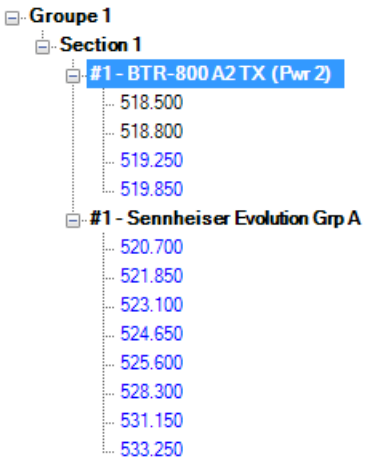
Note that this modification in one of the Tolerances has not the same effect as if made directly to a receiver, because at this time it is all the frequencies of the device that will be affected, not only those of higher power level.

Let's take a small example:

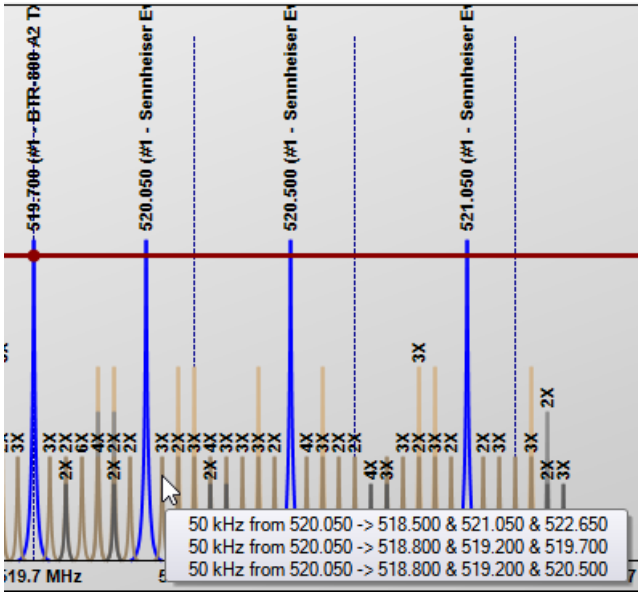


One BTR and one Evolution in the same frequency region.

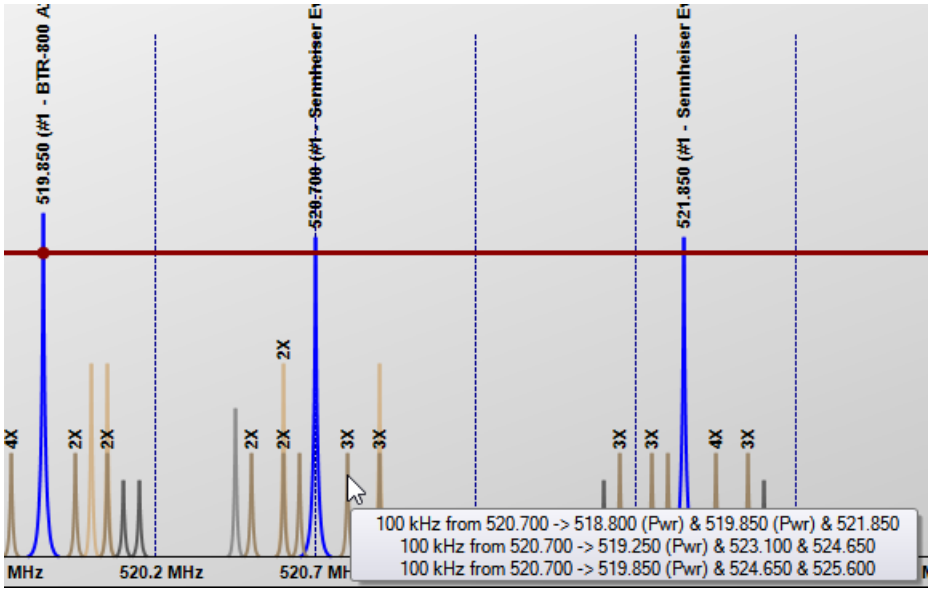
With the power of TX of BTR set to level 2, the frequencies obtained are:



For the BTR-800, the power change gives the same results as if we change the parameters of tolerance for the device. For Evolution, the result is not the same. Before the change, the carriers of the BTR adds 3rd order intermodulation at 50 kHz (default value):

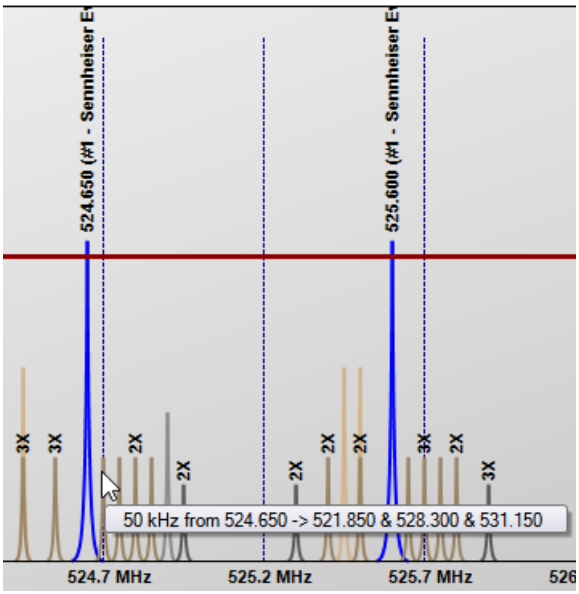


After modification of the power of the BTR we obtain:



518.500 and 518.800 two frequency of the BTR cannot create any more IM in 50 kHz on the Evolution because the automatic adjustment of its effect of TX power prevents the other devices from being perturbed by those of the BTR WITHOUT CHANGING the Tolerance of the Evolution.

If we look the intermodulations of the Evolution:

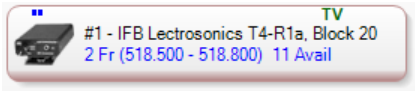


The frequencies of the Evolution (with its Tolerance to 50 kHz) influences it as intended. While the BTR has a superior influence because of its power and the effect of automatic adjustment.

We absolutely cannot recreate this effect by adjusting the tolerance of Evolution.

For each document, the parameters of TX Power can be adjusted separately by the Local Options (section 2.3).

In Global and Detailed Views, if a device has a transmit power level higher than normal, an indicator appears:



Warning: the parameters of influences of tolerance are global to a document, so if you copy a device from one document to another one, the device will take values of the document where it is pasted.

10.11 License Management

This option takes care of the management of a license file. If this menu does not appear in the Options, it is because you have an active license file.

A license file is tied to the hardware configuration (computer components). Thus, a license is valid for one and only one computer.

Using the USB remains the most flexible method, without any hardware limit.

There are two methods of creating a license file: by purchasing a new license on the website or by renewing as needed. Both methods are automated from a server that emails you a license file automatically when requesting a license file.

10.11.1 Purchase of a new license

After purchasing a license on the website eazyrf.com, you will receive an email to confirm your order. With the purchase of a license on USB key, you are entitled to a license file as well.

Remember that the license file is linked to the hardware configuration, so it is compatible with one and only one computer.

So you will receive an email confirming your purchase with the license number assigned to your name and email address, names provided during the PayPal transaction:

EazyRF V4

Frequencies calculation software for RF equipment

Hi Nouveau_client,

Your payment has been received. Thanks.

Here is your license number linked to the email address:
0000-0000-0000-0000-0000-0000
usager@email.com

First, you need to install EazyRF from the installation file: EazyRF V4.

After installation, start EazyRF and accept to do the proposed update, otherwise you will not be able to continue.

If you have purchased more than one license or if your email address is not that one of the user, do not continue the installation and contact me regis@eazyrf.com

To enter your license number and your e-mail address, use the Options/License Management commands and click on "License request".

An email will be sent to the license file creation server. You should receive an email at the address provided with the license file attached.

You just have to copy the EazyRF.license file in the EazyRF installation directory, ie C:\Program Files (x86)\EazyRF V4. Restart EazyRF to activate your license.

If you have purchased a USB key, shipping details will be sent to you as soon as possible.

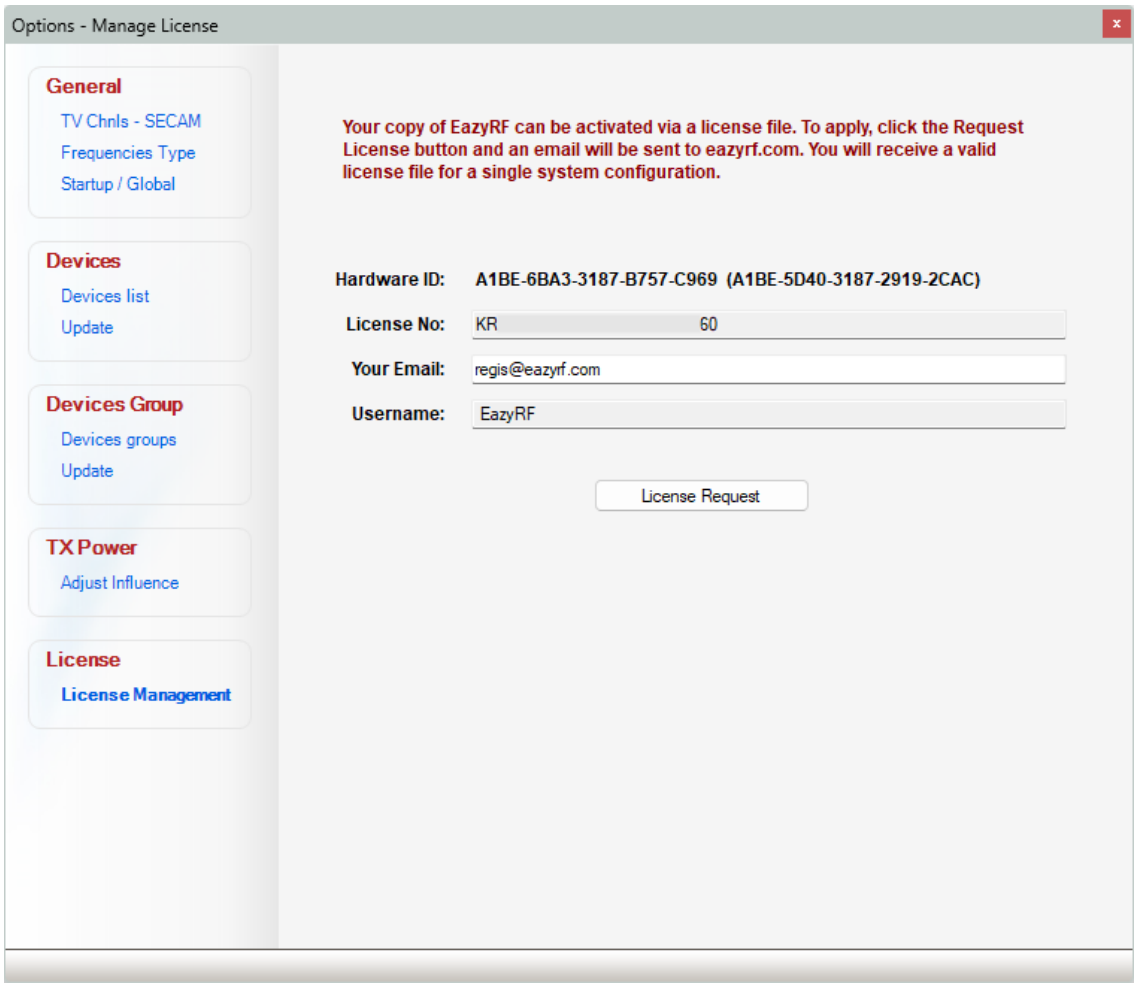
The invoice will be sent to you by email.

If you have any questions, do not hesitate to contact me regis@eazyrf.com

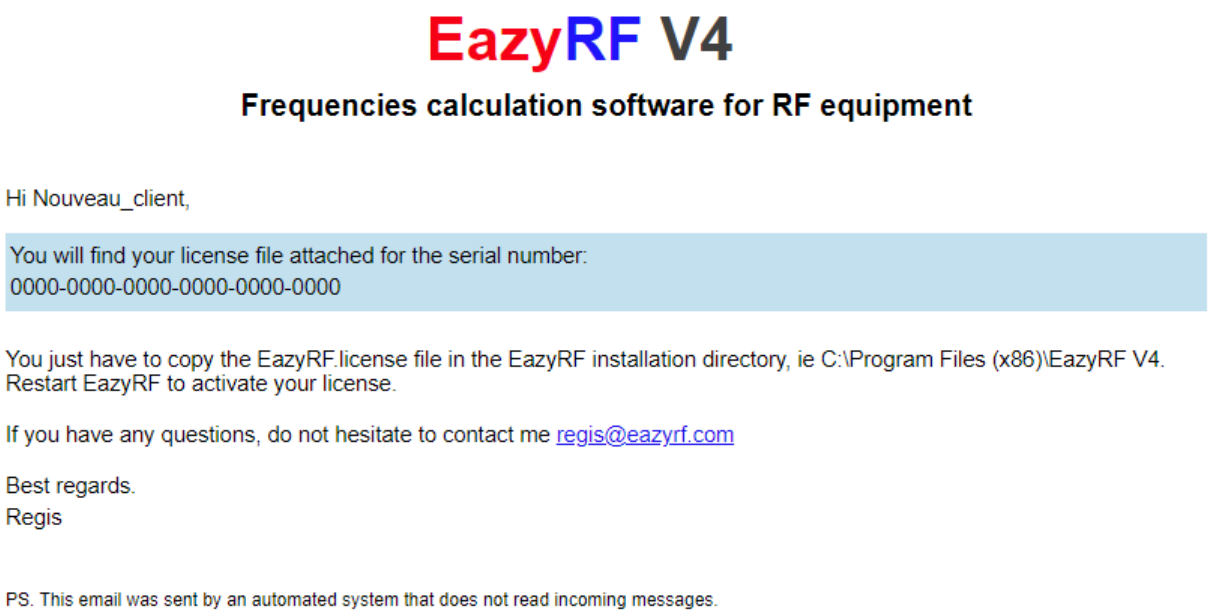
Best regards.
Regis

PS. This email was sent by an automated system that does not read incoming messages.

Thereafter, you just need to enter the license number in EazyRF, Options / License Management:



After entering the license number, the email address and username will be displayed automatically from the information obtained by PayPal. You can change the username and email address. Click on "Request License". An email will be sent to the entered address with a license file attached:



EazyRF V4

Frequencies calculation software for RF equipment

Hi Nouveau_client,

You will find your license file attached for the serial number:
0000-0000-0000-0000-0000-0000

You just have to copy the EazyRF.license file in the EazyRF installation directory, ie C:\Program Files (x86)\EazyRF V4.
Restart EazyRF to activate your license.

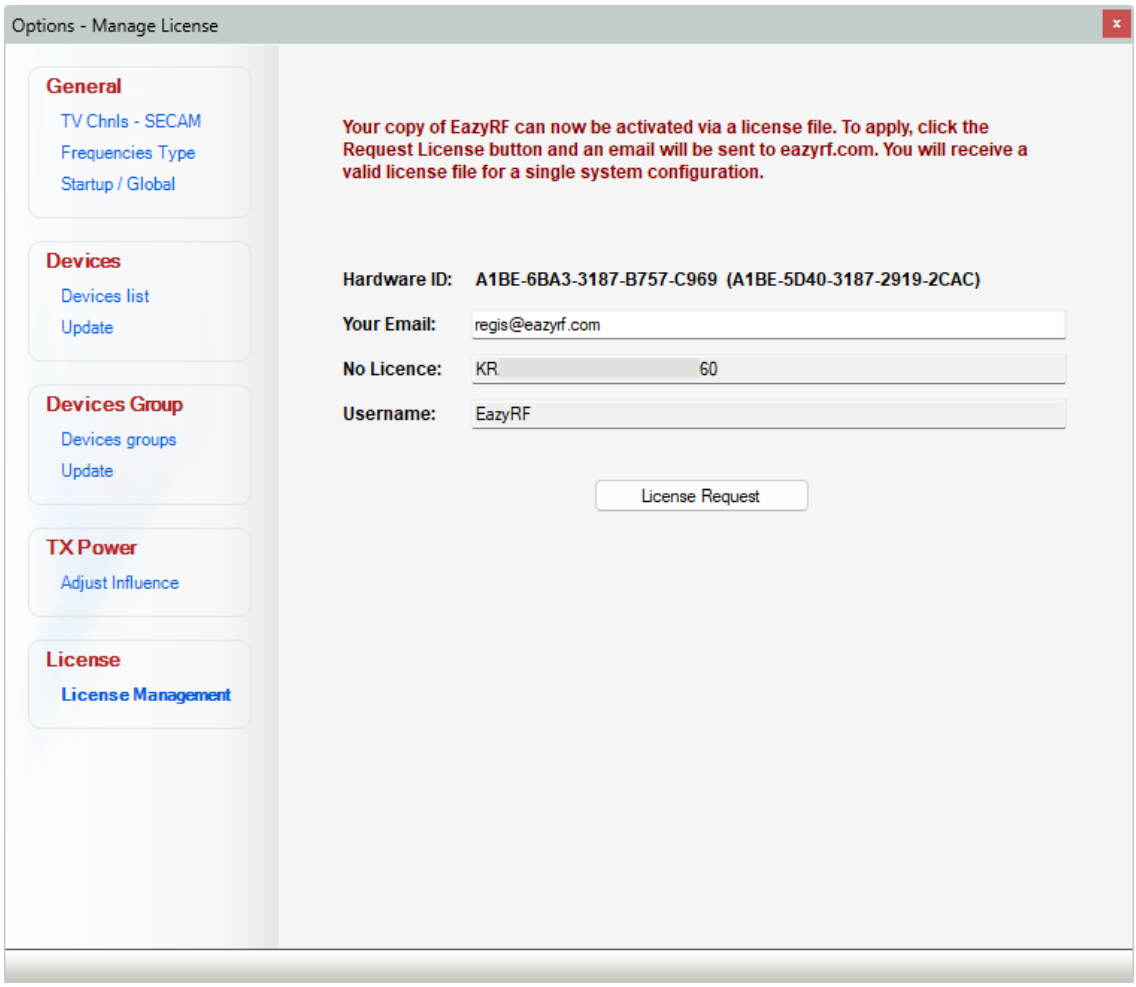
If you have any questions, do not hesitate to contact me regis@eazyrf.com

Best regards.
Regis

PS. This email was sent by an automated system that does not read incoming messages.

10.11.2 Renewal of a license

You can now request a new license file and receive it by email a few seconds later. If you have a USB key or a license file not assigned to the computer used, the license number will be displayed automatically. Your email address will only be displayed for those who have purchased a license via the previous procedure, so during future requests only.

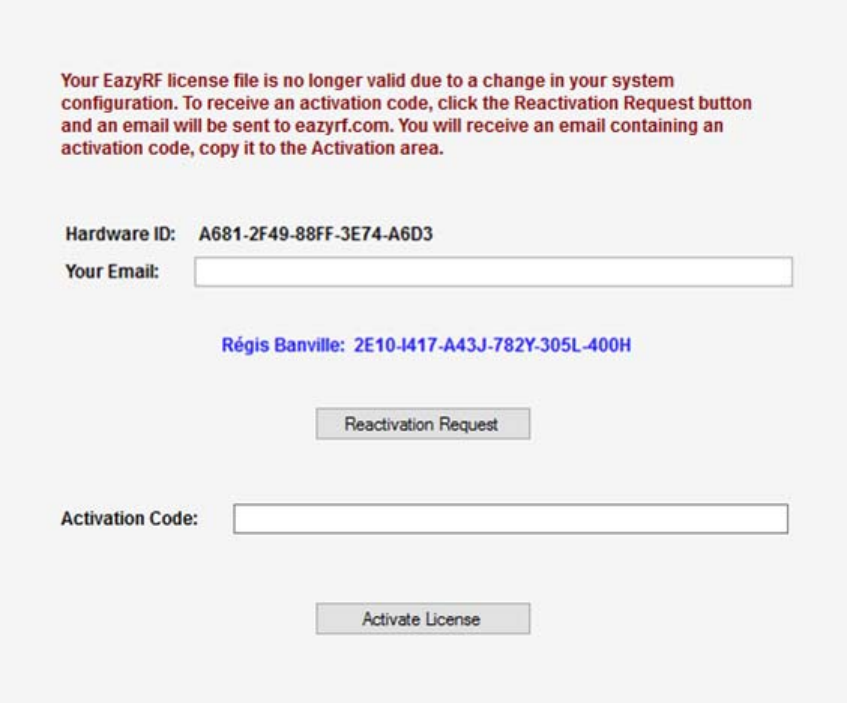


After installing EazyRF on a new computer, if you don't have a USB key, you must copy your old license file into the EazyRF installation directory (C:\Program Files (x86)\EazyRF V4) to validate your license number and username. The license number can only be validated for new customers. The email address can be changed but not the username.

Warning: This automatic renewal procedure comes with an important restriction; you can only request a new license file on different computers at a minimum interval of 30 days in order to avoid the multiplication of active licenses simultaneously. An old license will be automatically deactivated. On the same computer used for the creation of the last license, there are no renewal restrictions.

10.11.3 Reactivating a license

If your license becomes inactive due to major changes to your system or expired, the license manager displays it to you if this situation arises. Then you have to make a license reactivation request via the manager:



A reactivation code will be sent by email. Just copy it into the activation box and click the "Activate License" button.

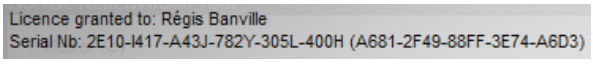
Warning: if you use a virtual environment (Parallels Desktop, VMware or VirtualBox), it is easy to change the hardware configuration and thus deactivate your license (pay attention to the CPU and motherboard).

Starting always prioritizes the USB key, then the license. If neither is present, the starting is made in demonstration copy mode with 20 frequencies.

To verify the mode used, check the About window.

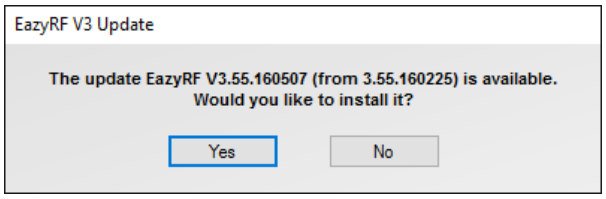
Starting up by key:

Starting up by license (hardware ID display):

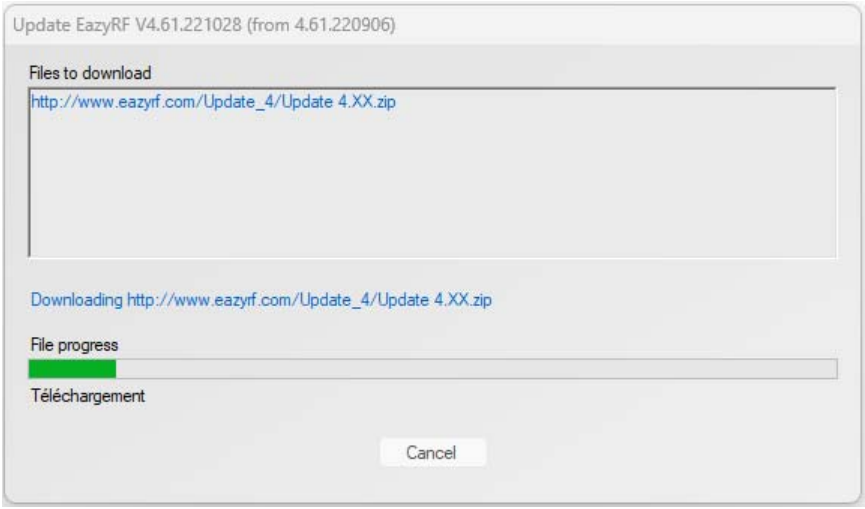


11 - Automatic Update EazyRF

At the starting up of EazyRF, if you are connected to internet, EazyRF verify on eazyrf.com site if started version is the last on-line version. If a new version is available, a message asks you if you want to install it:



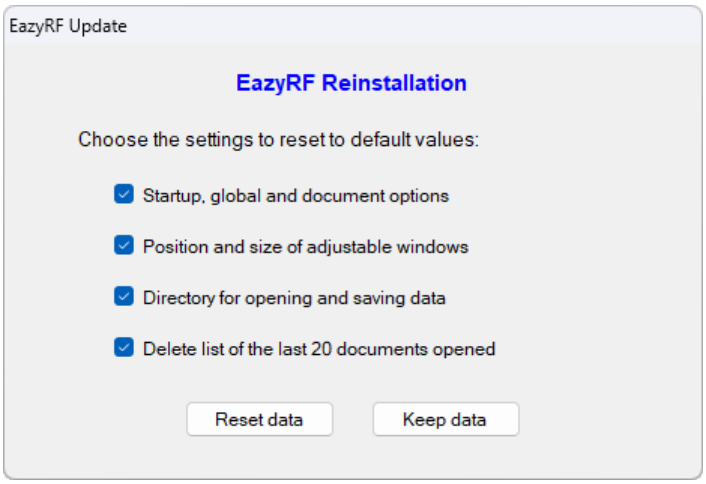
By accepting the update, the EazyRF window closes and the application update starts:



Afterward EazyRF restarts and the update is completed.

The updates sometimes are minor, sometimes more important. If the update is more important, an e-mail is sent to the users to indicate it.

After an uninstallation of EazyRF, followed by a reinstallation from the EazyRF_V4_Setup.exe file (version 4.22 of EazyRF), an option is added during the first installation of the EazyRF update. It is thus permitted to delete the following data:



EazyRF offers you the choice of erasing some sections of the data saved during previous executions of EazyRF, i.e. the data of the options at startup (default calculation mode, default tolerance, etc.), the position and size of the windows (the windows containing sample data are all of adjustable sizes), the data directory (document and sample files, TV channels, etc.) and the list of the last 20 documents opened.

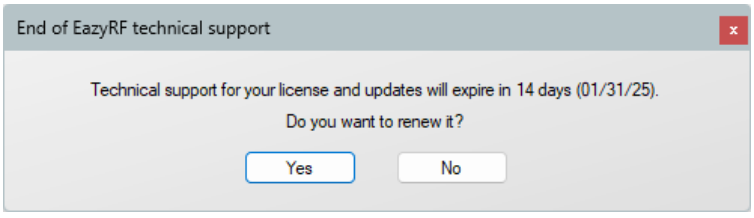
Note that the device and device group files, as well as the EazyRF global TV channel selection are never deleted during an uninstallation because this data is precious and has been carefully modified.

11.1 Renewal of Technical support

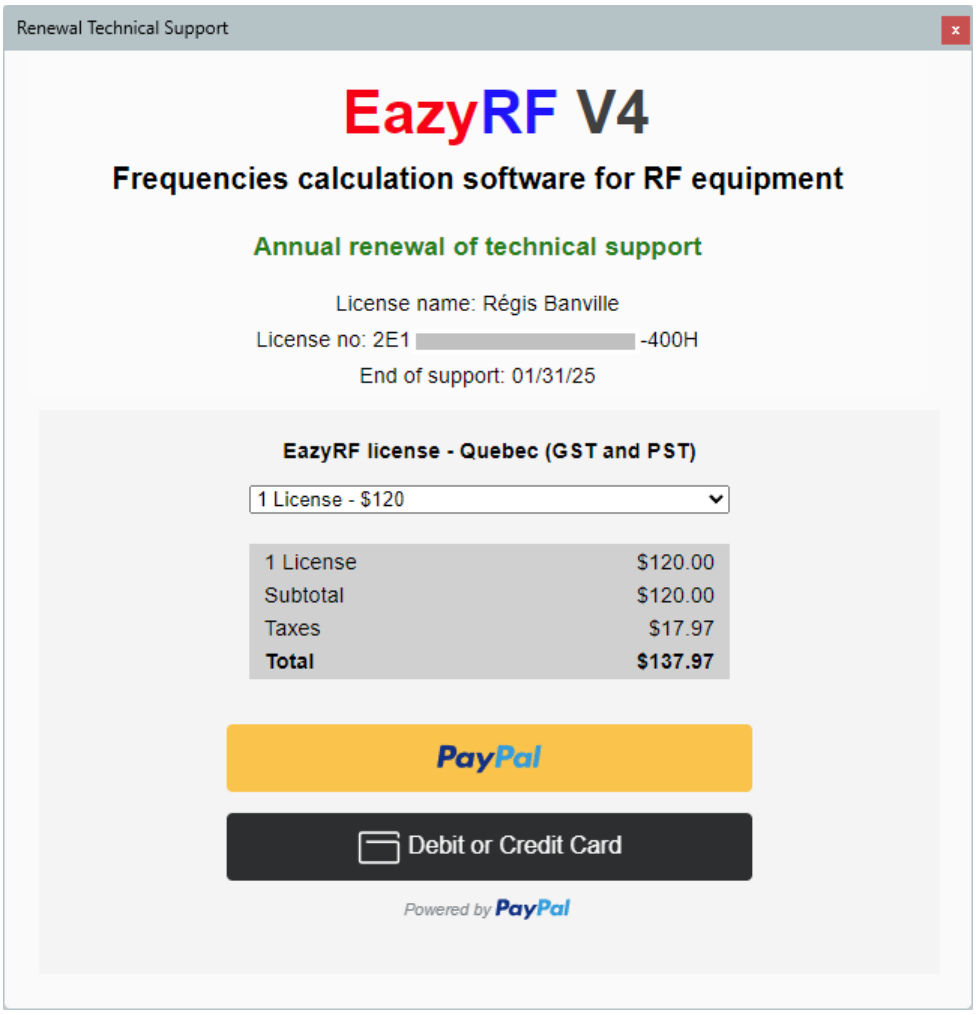
It is possible to purchase annual technical support renewal from EazyRF. Technical support includes customer support, updates, and automated license file creation.

When purchasing a license, 24 months of technical support are included. Then, the support must be renewed annually.

When there are only 28 days left before technical support expires, a new window will appear on startup:

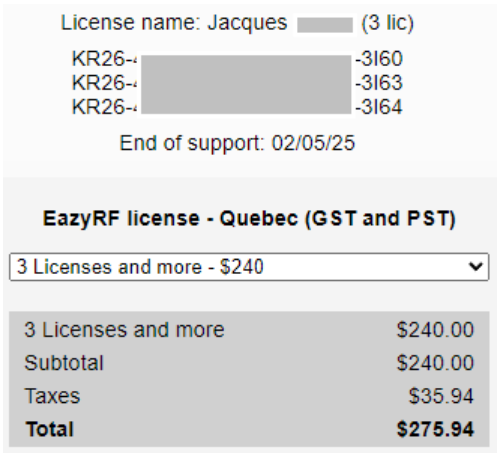


It is displayed during the period of 28 days before the end of support until 28 days after (closes automatically after 15 seconds). By accepting the renewal, the payment module is displayed:

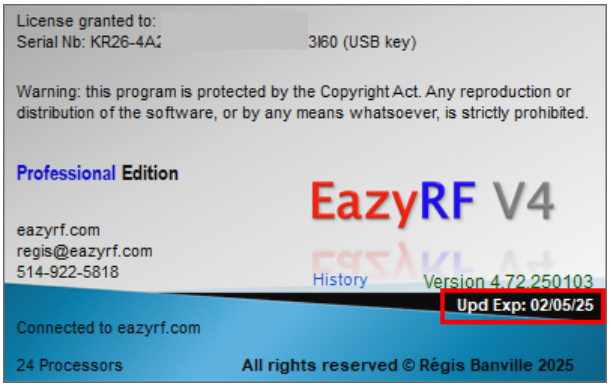


EazyRF applies taxes if necessary, depending on the user's place of residence. For residents outside of Canada, no taxes apply.

If a user has more than one license with the same renewal date, a list of license numbers is displayed, and the renewal price is adjusted:

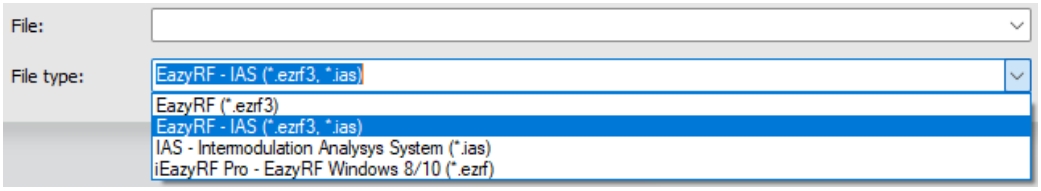


Outside the period of plus or minus 28 days from the end of support date, the payment module can be called by double-clicking on the end of support date in the “About” window:



Appendix 1 – Reading IAS files

EazyRF can now read IAS version 5 files. Just open a document as usual:

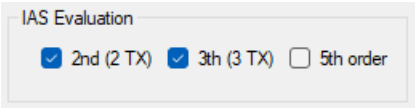


By default EazyRF offers both file types, *.ezrf3 and *.ias. The selection made is saved for future use.

The IAS data read are:

- Zones, which become groups in partial evaluation without intermodulation calculations
- Assignments, which become sections
- Frequencies, which are grouped by device
- TV channels
- Sampling data
- Band 71 frequency exclusion zones only
- The activation of the global 2 TX and 3 TX intermodulations

New parameters are displayed in the global options for an IAS document type only:



Appendix 2 – WMAS Devices

EazyRF now supports devices using WMAS (Wireless Multichannel Audio Systems) mode transmission.

Initially, Shure ADPSM devices will be supported. Subsequently, Sennheiser Spectera devices will follow, when the documentation is published.

Shure ADPSM

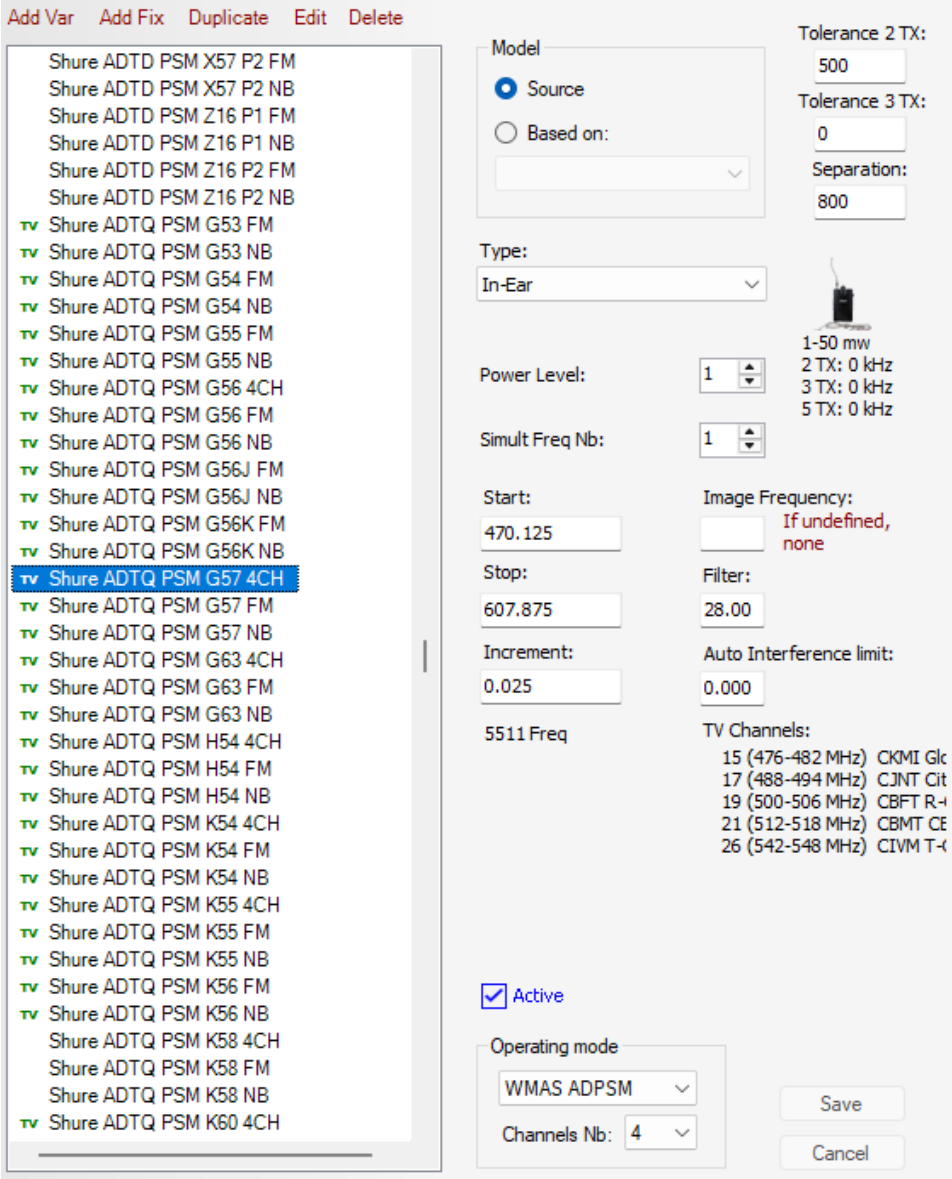
The Shure Axient Digital PSM series supports four transmission modes: Wideband multichannel, narrowband, analog FM and standard.

The “Multichannel Wideband” mode is new and uses WMAS, allowing the transmission of four stereo audio channels on the same frequency.

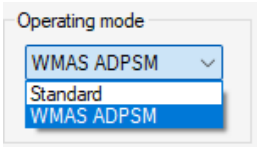
It goes without saying that the bandwidth used is greater than that of a standard device, but less than using four separate frequencies.

Definition of an ADPSM device

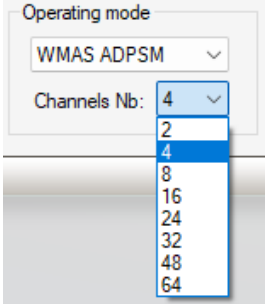
The device list editor has been adapted to this new operating mode:



The operating mode can be defined by:



As well as the number of audio channels in WMAS ADPSM mode:



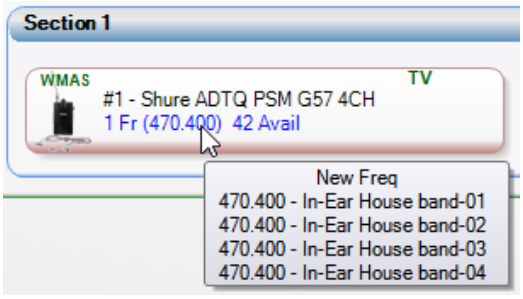
The parameters used are those recommended by Shure in standard mode.

For the moment, Shure uses only two ADPSM models: the 2-channel stereo ADTD and the 4-channel stereo ADTQ.

The frequency bands used are quite like those of standard devices.

Using an ADPSM device

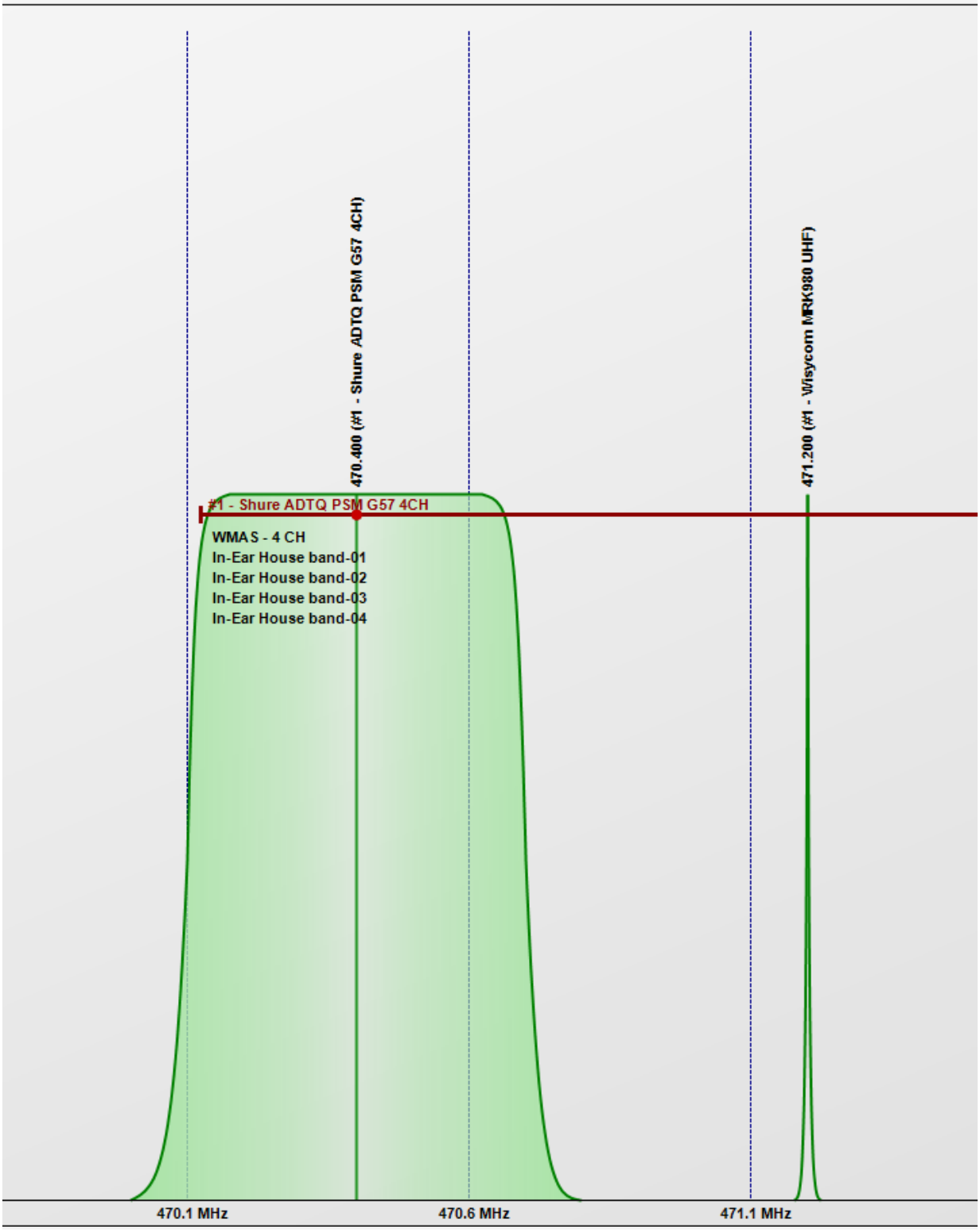
If we add a Shure ADTQ PSM G57 4CH to EazyRF, we get:



No	Description	1 Freq (4 A)
1.1	In-Ear House band-01	470.400 14
1.2	In-Ear House band-02	470.400 14
1.3	In-Ear House band-03	470.400 14
1.4	In-Ear House band-04	470.400 14

The four audios are on the same frequency, and we see an indicator to illustrate the locking of these, if we change the value of the frequency, it changes for the 4 audios.

The "Intermodulations" module displays a representation of the spectrum occupied by a frequency using WMAS mode compared to a standard frequency.



It should be noted that the value of an ADPSM frequency must be aligned with a TV channel. It must start at least 400 kHz from the start frequency of a channel and end at least 400 kHz from the end of the channel. It is not possible to program a frequency that overlaps two channels, EazyRF handles these restrictions.

Equipment Module

The Equipment Module allows you to assign ADPSM equipment to the Shure Wireless Workbench 7.4 and later file:

In Ear (6)							
Model	ID	Band	Channel	Name	Freq	EazyRF devices	EazyRF Freq
ADTD PSM 4CH	ADTD 1	G57 (470.125 - 607.875)	Ch 1	Spare-5	471.200	#1 - Shure ADTD PSM G57 4CH	471.200 - Spare-5
ADTD PSM 4CH	ADTD 1	G57 (470.125 - 607.875)	Ch 2	Spare-6	471.200		471.200 - Spare-6
ADTQ PSM 4CH	ADTQ 1	G57 (470.125 - 607.875)	Ch 1	Band-01	470.400	#1 - Shure ADTQ PSM G57 4CH	470.400 - Band-01
ADTQ PSM 4CH	ADTQ 1	G57 (470.125 - 607.875)	Ch 2	Band-02	470.400		470.400 - Band-02
ADTQ PSM 4CH	ADTQ 1	G57 (470.125 - 607.875)	Ch 3	Band-03	470.400		470.400 - Band-03
ADTQ PSM 4CH	ADTQ 1	G57 (470.125 - 607.875)	Ch 4	Band-04	470.400		470.400 - Band-04

Devices List

The list of Shure ADPSM devices is available on the website. To perform the update, simply use the function: Options / Devices / Update and click on the “Additional Devices” command (bottom left). The new devices are available in the Shure ADPSM file. See user manual section 10.6 for detailed operation.

Sennheiser Spectera

Sennheiser has developed a new WMAS mode device with a capacity of 64 audio channels (32 inputs, 32 outputs) using two wideband RF carriers (6 or 8 MHz) in the UHF or 1G4 band. This device transmits and receives multiple audio signals simultaneously.

Currently there is only one handheld receiver/transmitter available, the Spectera SEK, in the UHF or 1G4 band. This bidirectional bodypack allows audio reception (IEM/IFB) and mic/line audio transmission.

The Spectera base can transmit in both UHF or 1G4 bands, but the transceivers in only one.

The user must have a license for use (included with purchase) and it is only valid in one country.

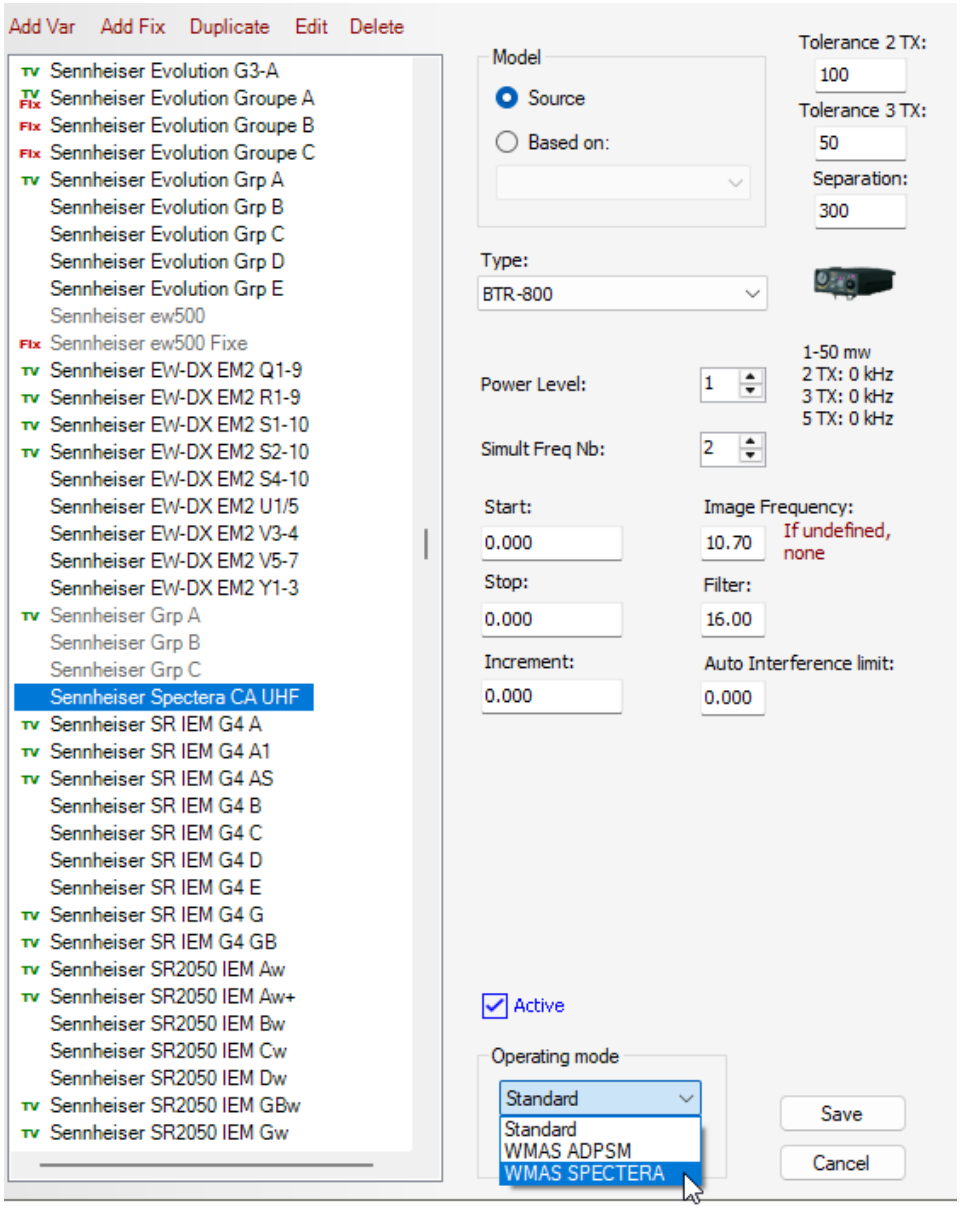
The Spectera occupies a wide RF bandwidth and does not generate intermodulations like a TV transmitter.

EazyRF supports Spectera in the same way as TV channels, i.e. the user must determine which channels to use. EazyRF allows you to select a channel from a scan file data, which makes it easier to use.

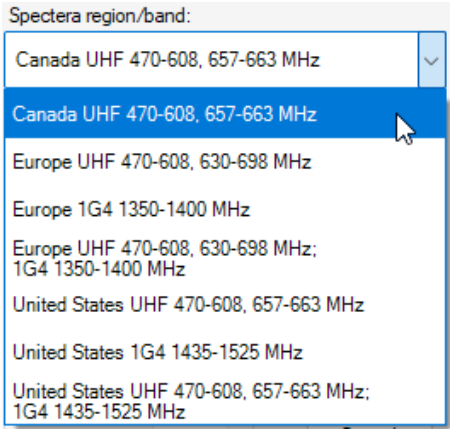
EazyRF's Spectera support is very similar to TV channel management, you don't calculate the frequencies used, you assign them. And EazyRF takes care of not allocating frequencies in these frequency bands.

Definition of a Spectera device

A new operating mode has been added to the equipment list editor:

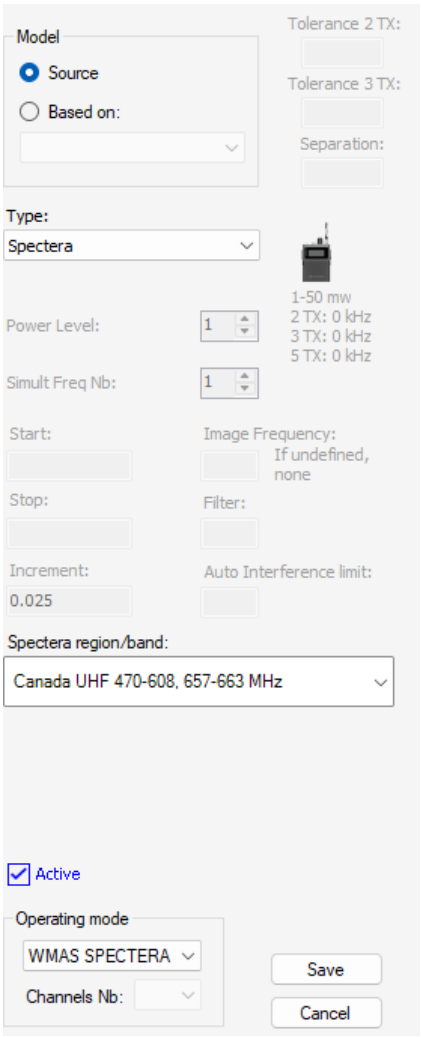


After selecting the WMAS SPECTERA operating mode, a region and frequency band selection appears:



Sennheiser offers 12 license zones (countries and regions), EazyRF only covers Canada, USA and Europe. Since Sennheiser's SEK transceiver only covers one frequency band (UHF or 1G4), a preselection was chosen by EazyRF. Please note that the 1G4 band is not available in Canada.

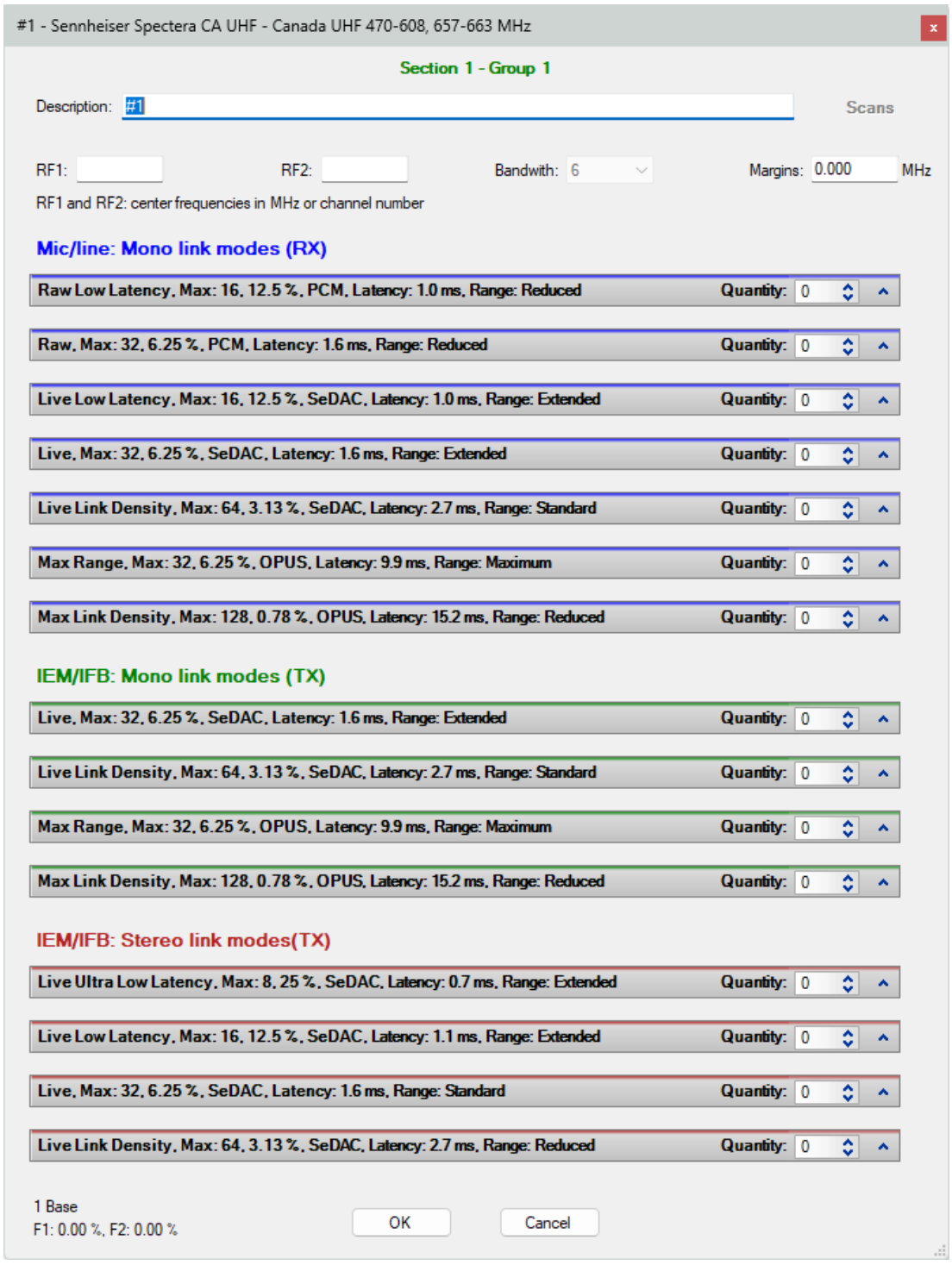
All standard device settings are disabled because they do not apply:



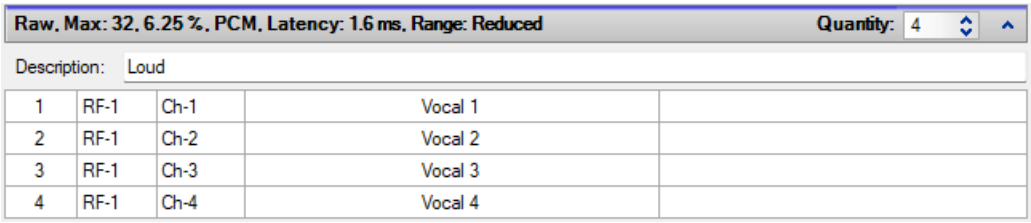
Using a Spectera device

The Sennheiser Spectera offers 7 reception modes (mic/line), 4 transmission modes (IEM/IFB) mono and 4 other stereo modes.

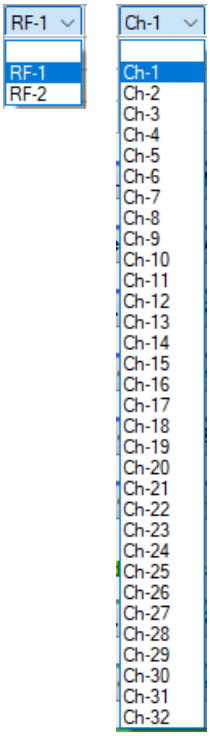
When adding a Spectera device, a window allows you to define the desired mode and the number of channels:



After defining the number of channels, the relevant area opens to allow information to be entered:



You can define the RF frequency used (1 or 2), the channel (1 to 32), the description and a comment.



As with the “Description” column, the ‘RF’ or “CH” column can be duplicated or incremented, with these differences: the left mouse button opens the drop-down selection box, so the right mouse button must be used. In addition, the RF column can only be duplicated, while the Ch column can only be incremented.

To increment, use Ctrl + Alt and to duplicate, Alt only.

Note that each transmission mode has a limited number of usable channels.

Transmit frequencies

The use of a Spectera in the UHF band comes with restrictions depending on the regulations of each country. The main use of the UHF band remains the transmission of television signals. Therefore, it is necessary to follow the rules of the transmission mode of each country.

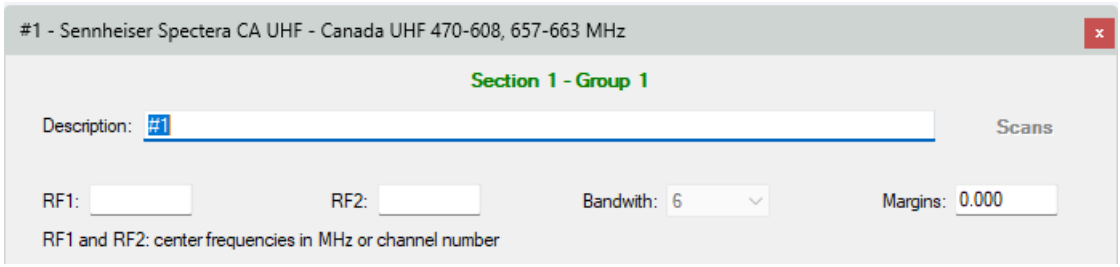
In Canada and the USA, TV signals occupy a 6 MHz band. In Europe, they are mainly transmitted on 8 MHz channels, with a few exceptions.

Even though the Spectera can transmit on frequencies that vary in increments of 0.025 MHz, Sennheiser has opted to use it consistently with TV channels.

In North America, the maximum bandwidth used by the Spectera is 6 MHz. In Europe, regulations allow the use of a 6 or 8 MHz band.

So, for use in UHF mode, the values of the transmission frequencies (or channels) will be based on the alignment of TV channel frequencies.

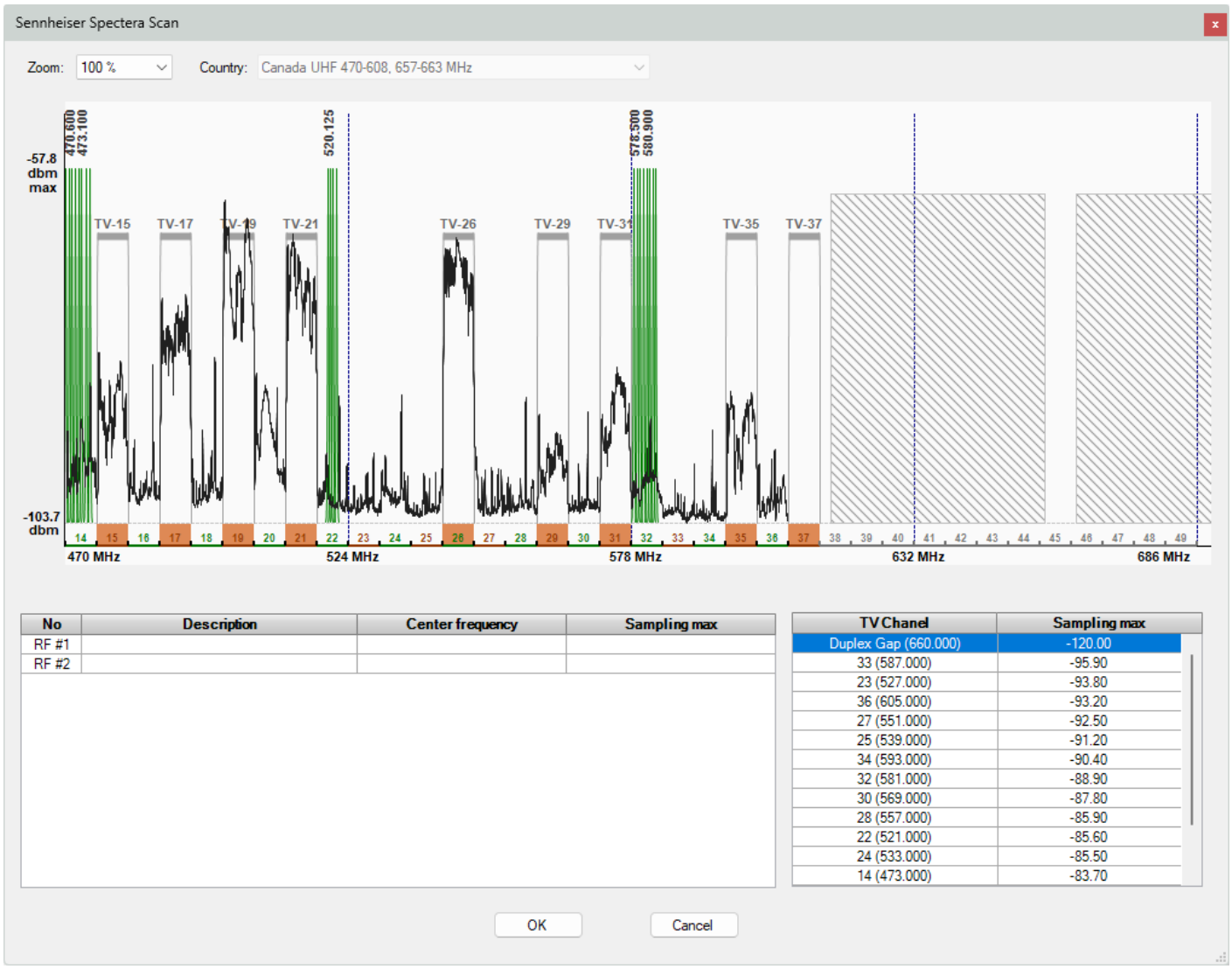
Enter F1 and F2 frequencies:



EazyRF uses the median value of a TV channel's bandwidth, so for channel 14 in North America (470-476 MHz), the frequency value is 473 MHz. The entry is simplified, whatever value is entered between 470 and 476, it will be adjusted to 473 MHz. You can also enter a channel number to display its frequency, in this case 14 will give 473 MHz.

In North America, the "Duplex Gap" (657-663 MHz) can also be used.

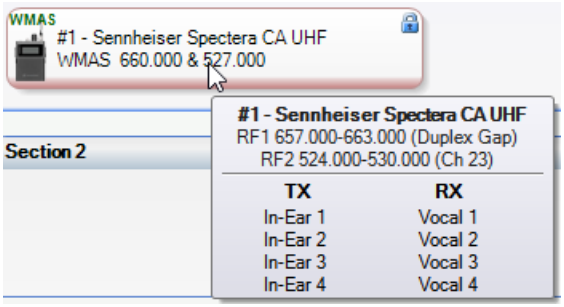
A value can also be assigned from the document or group scan file:

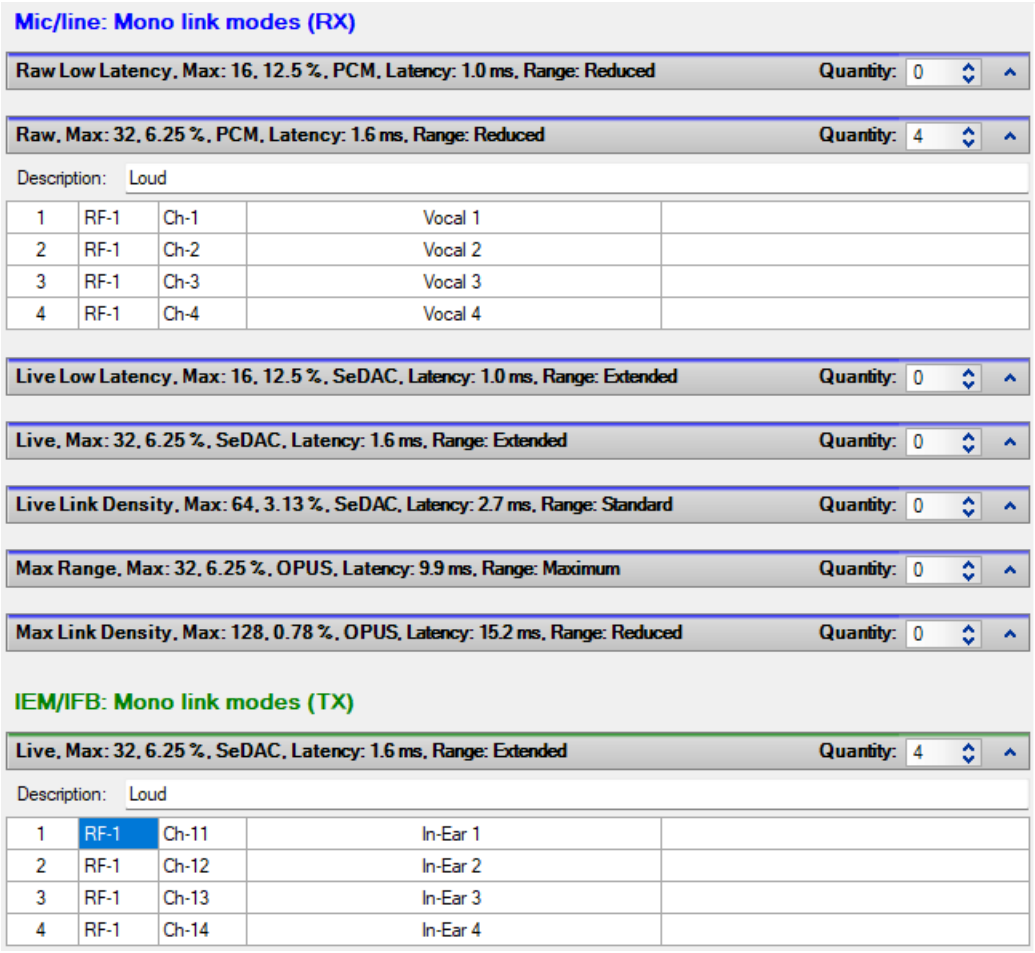


EazyRF makes an evaluation of the sampling level for each unused TV channel and ranks the list in ascending order of the maximum values found. Simply drag a selection onto the F1 or F2 frequency table.

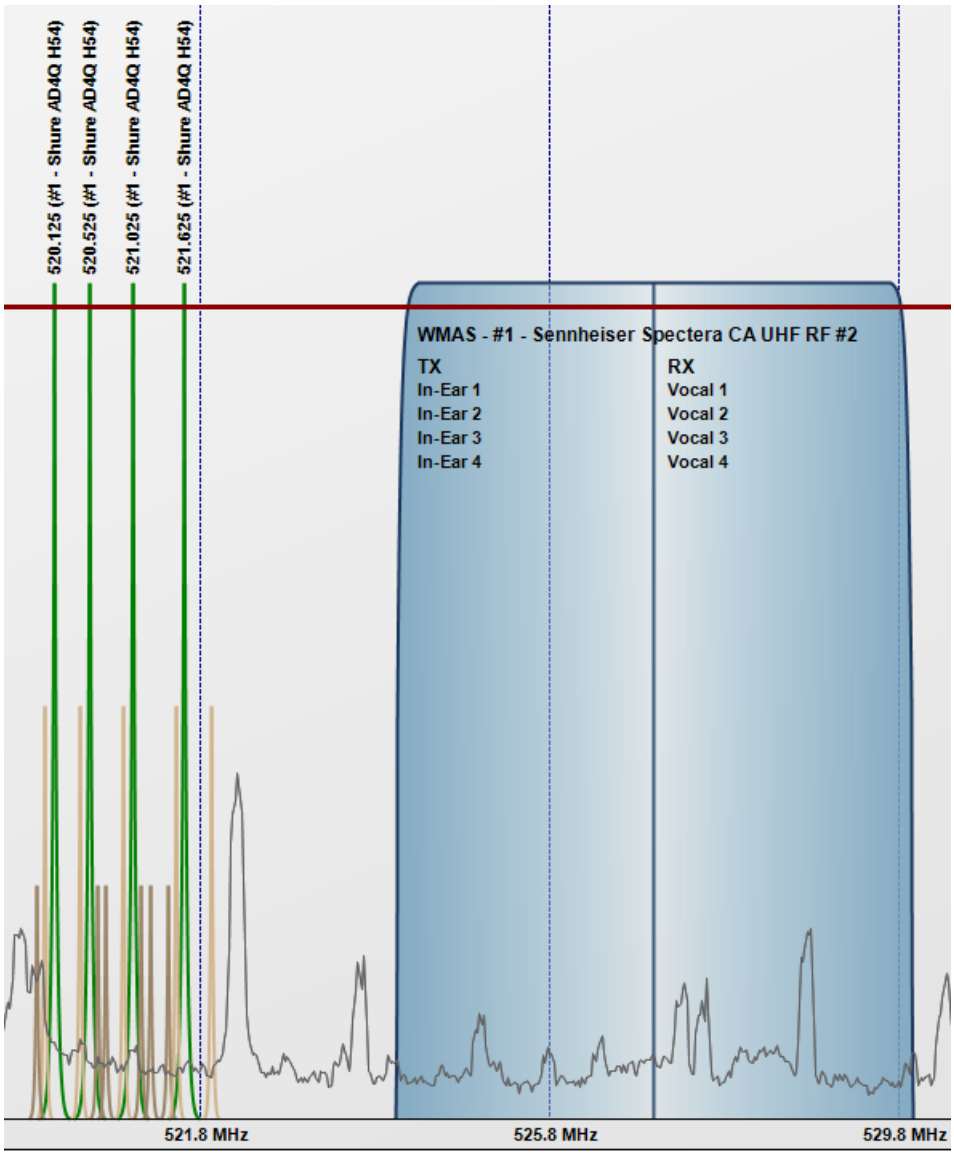
Using a Spectera device

If we add a Sennheiser Spectera Canada UHF, we get this after defining RF1 and RF2 and using a few channels:





And in the “Intermodulations” view:



And the report:

Group 1			
Section 1			
#1 - Sennheiser Spectera CA UHF RF1 657.000-663.000 (Duplex Gap), RF2 524.000-530.000 (Ch 23)			
RX: Raw Loud			
Vocal 1	RF-1, Ch-1	RF-1, Ch-2	Vocal 2
Vocal 3	RF-1, Ch-3	RF-1, Ch-4	Vocal 4
TX: Live Loud			
In-Ear 1	RF-1, Ch-11	RF-1, Ch-12	In-Ear 2
In-Ear 3	RF-1, Ch-13	RF-1, Ch-14	In-Ear 4

Devices list

The list of devices for Canada UHF, USA UHF, USA 1G4, Europe UHF and Europe 1G4 is available on the website. To update, simply go to Options / Devices / Update and click on the “Additional devices” command (bottom left). The new devices are available in the Sennheiser Spectera file. See section 10.6 of the user guide for detailed instructions.