Introduction

RF Guru is a program that will help you manage and coordinate frequencies for your space. In most cases you'll get a good set of frequencies that are free of Intermod and are out of TV Antenna and other safety bands. It will also document your pack assignments and print out labels for all of your RF equipment. On larger systems where you're running out of Intermod free frequencies, RF Guru will help you select which packs should be placed on the lead actors and which packs shouldn't be on stage at the same time.

Not only are we now working with RF Microphones for actors, we're also adding In Ear Monitors, COM Headsets and a variety of other RF devices. And that's just in your space, what about the theatre next doors?

We may not be able to eliminate all Intermod problems, but we should be at least able to manage it.

So this is where RF Guru comes in. There are two modes of operations that it can help you with. Straight forward Intermod testing and our own Maximizer feature.

Kinds of Interference

Before we jump into the program, just a side note on the types of interference RF Guru is watching out for.

Carrier Frequency conflicts
- These are frequencies that could overlap another Carrier Frequency. For example, if you have two packs tuned to 506.1, then they are in conflict. In addition there is a "Range" around the Carrier Frequency that is watched for. If the Carrier Range is 0.2, then RF Guru will determine a conflict if a frequency is within +- 0.2 of the other Carrier Frequency. Some systems are more tolerant than others so the Carrier Range could be different based on manufacturers specifications.

Other Systems
- These are other systems or frequencies that are known to be present in your space. These could be your neighbors next doors or an existing installed system like an hearing impaired system.

TV Channels
- These are the antennas of TV channels that are broadcasting in your neighborhood. They can be looked up by zip code, city or latitude/longitude. They also change daily.

Intermod
- This is the type of interference that is the most complex to test for. Actually, it's pretty easy – just simple math – however the math grows exponentially with some systems needing hundreds of thousands of calculations to determine the best frequencies to use.

  For the sake of a simple example, take these two frequencies 200 and 300. Assume the RF Pack isn't capable of filtering (more on that later) and move those two packs close to each other. They will produce a 3rd Order frequency of 100 (plus some more). If you're lucky enough to have another RF Pack using 100, then you'll likely have some interference. Well, simple, just change your pack from 200 to 250 and you're set… maybe. 250 and 100 produce a 3rd Order frequency of 175, so if your other pack is set to 175 you'll have problems.

  So you can see that selecting the right frequencies is important, as changing just one frequency in your system could cause a cascade of other problems. RF Guru is designed not to grab the

first possible frequency in a system, but to determine a combination of frequencies to use that will produce the least amount of conflicts. Good thing computers are good at math.

Menus

RF Guru has two main menus with a number of sub menu items. They are File and Help.

File Menu

- New Production – starts a New Production Wizard to create your production.
- Open Production… – opens an existing production from your computer
- Save Production – saves the current opened production
- Close Production – closes the current opened production
- Print Production – prints reports for the production including all venues.
- Print Selected Venue – prints reports for the currently selected Venue.
- Add Venue… – for shows that tour, multiple venues will be in one production.
- Copy Selected Venue – copies the currently selected Venue to a new Venue. Useful when you are creating a new venue but want to use all the current equipment already assigned. TV Channels and Other Systems will not be copied.
- Delete Selected Venue – deletes the currently selected venue.
- Export Selected Venue – exports the data for the currently selected venue to a CSV file that can be edited or used in Excel or other programs that can import a CSV file.
- Production Properties… – brings up a dialog to change the location of where files are stored.
- Recent Productions – will list the last 5 most recent opened productions
- Exit – closes RF Guru

Help Menu

- Support – opens a browser window and loads the Stage Research support site.
- Check for Updates – checks for a new update on the Stage Research server
- License Manager – opens the license manager dialog to update, transfer or unregister licenses
- About RF Guru – displays a dialog box with information about RF Guru

RF Guru Main Screen

RF Guru has a tabbed interface with a number of tabs on the left side of the screen. They are Production, Venues, My System, Other Systems, TV Channels, Visual and Results.

Production – where you edit the Name of the Production, Client, Report Header information a show logo and the description of the show.

Venues – a single location or multiple locations if this is a tour

My System – where you select the devices you are planning on using in your system and enter in the number of devices needed for each system. From this RF Guru will calculate the best frequencies to use.

Other Systems – these are the systems next doors or rouge frequencies that you know are to be stayed away from.

TV Channels – these are the TV Antenna frequencies that are broadcasting in your area.

Visual – a visual representation of what your systems looks like and the spacing of frequencies

Results – where a system is presented to you after you Maximize a system or an Intermod Test

Tab | Production

Production – where you edit the Name of the Production, Client, Report Header information a show logo and the description of the show.

Most of these fields are self-explanatory, and all are available to the report writer. Client or Producer is stored in the master RF Guru database and the Production file. As you build more and more shows, the database of Client or Producer will grow so you can just select from existing contacts. The Show Logo can be edited by right clicking on the image box or by dragging and dropping an image.

Tab | Venues

Venues – a single location or multiple locations if this is a tour

	Venue	Date From	Date To	Country	Type	Location
		Description				
>	King George	7/9/2012	7/29/2012	USA	Maximizer	TV Antennas by City : Chicago, IL

Left sidebar tabs: Production, Venues, My System, Other Systems, TV Channels, Visual, Results

Here is where you would setup a specific Venue or stop on a tour. Tour dates and Venue name are useful on reports. Country will be used by RF Guru to determine what TV Antenna frequencies are used in that specific country. Type will indicate what kind of Test this is, either an Intermod Test or a Maximizer. Location will indicate where this venue is located by city, zip-code or latitude/longitude depending on what was selected when building this test.

Tab | My System

My System – where you select the devices you are planning on using in your system and enter in the number of devices needed for each system. From this RF Guru will calculate the best frequencies to use.

	Group	RF Devices	Receiver	# Needed	# Available
>	⊟	Lectrosonics SM (512.000-537.500)	☐	12	255
			▣		

Right grid (Model / Band / Note):
- Manufacturer: Audio-Technica
- Manufacturer: Audix
- Manufacturer: ElectroVoice
- Manufacturer: HME
- Manufacturer: Lectrosonics
- Manufacturer: Samson
- Manufacturer: Sennheiser
- Manufacturer: Shure
- Manufacturer: Sony
- Manufacturer: Stage Research
- Manufacturer: Telex
- Manufacturer: Trantec

Here is where you'll select the devices you want to use and build your system. The Model grid on the right is a database of all RF Equipment. If you are unable to find the specific gear that you want to use, you may also click on the "Build a Custom Model…" button to add to the master database.

Group is a text field that you can use to assign specific packs to a group. Examples of groups are RF, ICOM, IEM, MALE, FEMALE, LEADs, etc., whatever you want them to be.

RF Devices are the devices you will drag into the Systems grid from the Model grid. For example, if you know you want to rent some Lectrosonics Block 20 gear, you would find that device in the Model grid and drag it into the Systems grid. Only one device of the same type can be added to the Systems tab but you can select how many packs you need for each system.

Receiver tells RF Guru that the device you are setting a frequency for is a receiver and is typically set from the data in the database. Receivers on stage will not create Intermod w/ transmitters in the same space so they are handled differently. Receivers are typically IEMs (In Ear Monitors).

Needed is where you tell RF Guru how many packs you need from this system and # Available are the number of frequencies this system can be tuned to. RF Guru will select the best combination of useful frequencies from all systems up to the # Needed. In some cases this will produce results

that have conflicts, however you'll see what systems need to be managed in the Results tab so conflicting systems are not used at the same time.

Clicking on the Advanced Features check box will open additional columns in the Systems grid.

Systems					Advanced				Advanced Features
Group	RF Devices	R...	# N...	# Av...	Filter +/-	Fixed Filter	Carrier Range	3rd	5th
⊞ ▾	Lectrosonics SM (51...	☐	12	255	1000	☐	0.2	0.1	0.1
		⊟				⊟			

Filter +/- tells RF Guru that this system is capable of filtering out frequencies that can inject themselves into the antenna that produce Intermod. This value is in MHtz.

There are two kinds of filters, Fixed and Dynamic with most systems supporting Fixed.

A Fixed Filter is based on the Band the system is capable of tuning. For example, if the system can tune 400 to 500 w/ a filter of +/-50, then frequencies lower than 350 or higher than 550 will not combine with this system to create Intermod.

A Dynamic Filter is based on the Tuned Frequency. For example, if you tune the pack to 450 and it has a Dynamic Filter of +/- 50, then frequencies lower than 400 or higher than 500 will not combine with this frequency to create Intermod.

Dynamic Filters are desirable as they float around the tuned frequency, however are found only on the most costly systems.

Carrier Range is how close another frequency can get to the primary frequency. For example, if you have a frequency of 502 w/ a Carrier Range of .2, then another frequency can be as close as 501.8 or 502.2.

3rd Order Range is how close a 3rd Intermod product can come to this primary frequency. 3rd Order Intermod is weaker than the Carrier (Fundamental) Frequency so these products can come closer to the primary frequency.

5th Order Range is similar to the 3rd Order Range but weaker so they could come closer.

Note: A filter value of 1000 is NO filtering.

Tab | Other Systems

Other Systems – these are the systems next doors or rouge frequencies that you know are to be stayed away from.

Production			
Venues	Frequency	Venue	
My System			
Other Systems			
TV Channels			
Visual			
Results			

Copy Selected Venue to the list below

Frequency is the Carrier frequency that is either next doors or you can detect it in your space. If you run a frequency scan, this is where you would enter the Carrier frequencies that you find.

Venue is a text field that you can use to label what the frequency is.

If you are using RF Guru to coordinate frequencies in two spaces next to each other, you can use the "Copy Selected Venue to the list below." For example, you have two venues next to each other. You create a frequency list for Venue A and have built your system.

Then create a new Venue B, select your Devices, then in this Tab | Other Systems select Venue A and "Copy Selected Venue to the list below". Venue B will now have the list of frequencies you used in Venue A. Continue to coordinate your system and you'll have two venues that take in account frequencies for each space.

Tab | TV Channels

TV Channels – these are the TV Antenna frequencies that are broadcasting in your area.

Country: USA   Search for TV Antennas   TV Antennas by City : Chicago, IL.

Channel	Virtual	Cut	Band Low	Band Hi	kW ERP	Call Sign	Service	Distance
12	2	☐	204.000	210.000	3.2	WBBM-DT	DT	1.4
14	14	☐	470.000	476.000	0	Safety	LM	.6
15	15	☐	476.000	482.000	0	Safety	LM	.6
19	9	☐	500.000	506.000	645	WGN-DT	DT	.4
21	20	☐	512.000	518.000	98.9	WYCC-DT	DT	1.4
27	26	☐	548.000	554.000	160	WCIU-TV	DT	.4
29	5	☐	560.000	566.000	350	WMAQ-DT	DT	.4
31	32	☐	572.000	578.000	690	WFLD-DT	DT	.4
36	62	☐	602.000	608.000	50	WJYS-DT	DT	.4
37	37	☐	608.000	614.000	1000	Astro	TV	1.0
38	66	☐	614.000	620.000	137.09	WGBO-DT	DT	1.4
41	41	☐	632.000	638.000	0	Safety	LM	.6
43	38	☐	644.000	650.000	200	WCPX	DT	.4

Here is where you will "Search for TV Antennas" for your location by zip code, city or latitude/longitude. The FCC Antenna database changes daily and can be updated when you are searching for new antennas. If you are in a location that currently doesn't support the lookup of antenna by zip code, city or latitude/longitude, you still can enter the TV stations and have RF Guru automatically calculate the Band Low, Band Hi, and other frequencies used for that station.

NOTE: If you are in a country that broadcasts digital TV, put DT in the "Service" column. This instructs RF Guru to stay out of the entire band. If you're still broadcasting analog, then place TV in the Service column. RF Guru will then find holes in the band to try to use.

Tab | Visual

Visual – a visual representation of what your systems looks like and the spacing of frequencies.
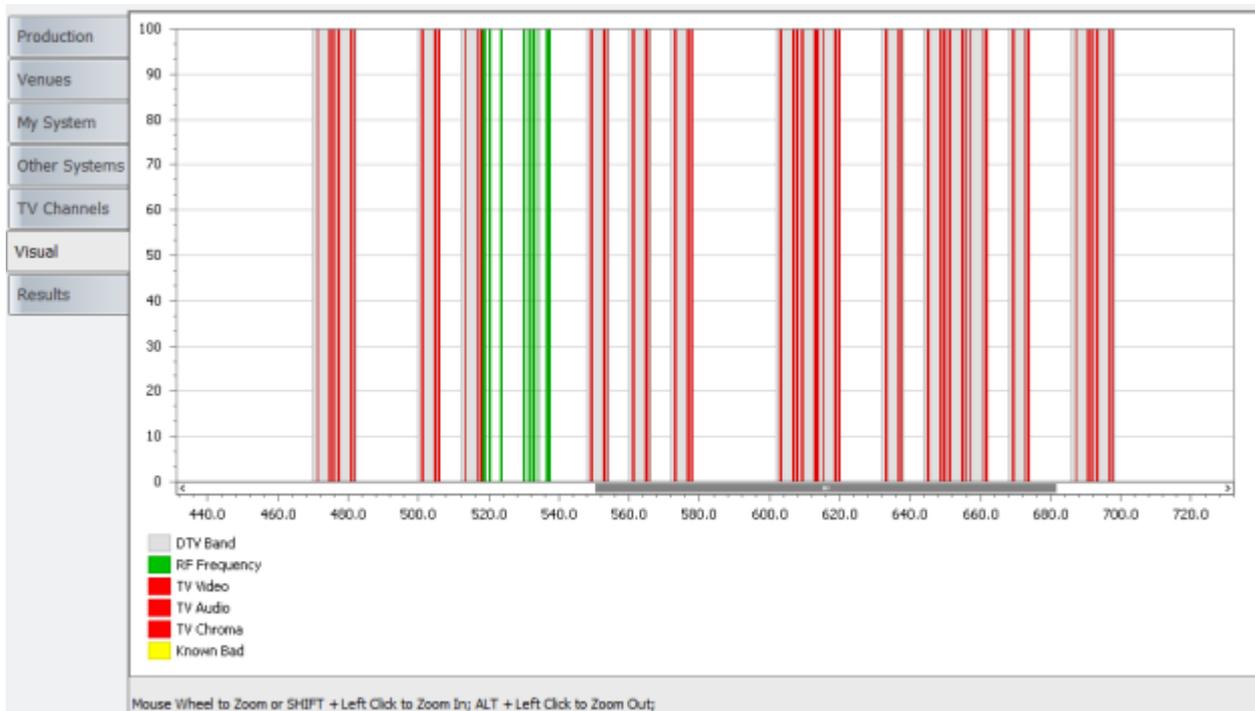
Tab | Results

Results – where a system is presented to you after you Maximize a system or an Intermod Test

Depending on whether you ran an Intermod Test or a Maximizer, the results will work slightly different where an Intermod Test will allow you to add/remove, and change the frequencies. A Maximizer will report the results of the frequencies to use.

Results Grid

- Group is a text field that you can use to assign specific packs to a group. Examples of groups are RF, ICOM, IEM, MALE, FEMALE, LEADs, etc., whatever you want them to be.
- # is the number of the pack and will be printed on the label.
- Name could be the name of the person or the role they are playing or the name of this device.
- Frequency is the frequency to assign to this pack.
- RF Device is the device and model
- # Needed is the number of devices needed from this system. You cannot edit this field here.
- CH (Channel) is the channel assignment for some microphones or can be anything you want
- TV Channel is the TV channel this microphone is broadcasting in.
- Antenna is the ¼ length of the Antenna for the pack
- Cut is a check box field of whether you want to cut the device from your system or not.
- Updated is a check box field that will be checked if you updated anything on this device. Useful when tracking changes or needing only to print new labels of what has changed.
- Spare is a check box field that will be checked if you have not assigned the pack to anyone.

Details Panel

- Pack – a drop down text edit box that you can type in the type of pack this device is
- Mic Type – a drop down text edit box that you can type in the type of mic element
- Placement – a drop down text edit box that you can type in where the mic element is located
- # is the number of the pack and will be printed on the label.
- Name could be the name of the person or the role they are playing or the name of this device.
- Full Name – the real name of the actor from the global address book
- Notes – free form text field for notes.
- Swapped – this check box will indicate whether this frequency was swapped. For example, if you assigned a frequency in Chicago to a pack, then had to change that frequency in Cleveland, the check box will be checked.
- Picture – when an actor is selected from the global address book, an addition field will appear for a photo.

Tab | Results

Some additional advanced features to explore with RF Guru
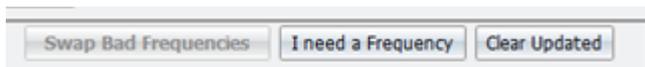
When building a tour you'll likely use the same gear and need to move it from city to city. RF Guru will allow you to copy a venue into a new venue and select a new set of "Other Systems" and "TV Channels" for that location. After you rebuild your new venue it's possible that some of the frequencies you selected for city A will not work in city B. RF Guru will track these changes and if detected will enable the "Swap Bad Frequencies" button. By clicking that button, you can quickly swap the details from a previously assigned pack (name, #, actor, photo, notes, etc.) to a new pack.

After completing your build and programming all your packs, if you discover you just need one more frequency, instead of rebuilding and possibly having to reprogram all your RF gear, click on "I need a Frequency". RF Guru will attempt to find a new frequency for your system taking in

account all the potential problems. It's likely that you'll be able to easily grab one or two frequencies without problems, however after some time you'll run into problems and may just have to rebuild your system.

Test Settings and Visual Results

When preforming the coordination of your frequencies, RF Guru will use the different test settings selected to build the results. On the results page you can slide the "Test Level" slider to the left or right to see where problems might occur. You will also notice that sliding the "Test Level" the values in the Filter, Carrier, 3rd and 5th edit boxes change.

Why do we provide these details? When you first built your system, you told RF Guru what parameters to use. If you're building a very complex system you might have slide the "Test Level" slider to "More Frequencies". Now that you have results that look clean, you can slide the slider a bit to the "Less Intermod" side and RF Guru will show you the combinations of frequencies that could have problems. This is a tool that will help you determine what packs are assigned to what actors.

Take these results:

The first device is selected (Look for the >). Also notice two colors – pink and red. The frequency of the device that is currently selected is in some way associated to all the other devices in RED. The devices that are in PINK also have a problem, but you need to select a device to see what other devices it affects.

Also notice the + sign. You can click on that to see what combinations of devices are problematic so you can avoid those combinations on stage.