INOmini 645

FM/RDS SiteStreamer™ II

Installation & User Guide

INOVONICS
BROADCAST

www.inovonicsbroadcast.com

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Section I

INTRODUCTION

Product Description

The Inovonics family of SiteStreamers™ receive local broadcast stations off-air and stream program audio and signal metrics over the Internet to any worldwide location. This allows station personnel to monitor programing and transmission issues when away from the station or traveling.

The INOmini 645 is Inovonics' second-generation FM/RDS SiteStreamer™. Its browser interface permits total remote operation and audio monitoring, and displays signal parameters, audio levels and RDS data. Failure alarms are logged and can be dispatched instantly by email or text messaging.

Product Features

Features of the SiteStreamer™ include:

- Tunes all current FM frequencies: 76.0MHz-108.0MHz.
- Easy setup and operation, remote control of all operational features, full SNMP support and simple remote firmware updates when issued.
- HE-AACv2 audio streaming via the dynamic Web inter–face for up to 10 simultaneous listeners; independent UDP streaming for 'skimmers' or audio loggers.
- RF signal, program audio and RDS alarms with logging, plus instant alarm text and email messaging to alert designated personnel immediately.
- Decodes all RDS groups; shows RDS block error rate and RDS group statistics.
- Analog AUX inputs allow monitoring the audio pro–gram source remotely. Independent AUX stream permits A/B audio monitoring of source and air signal.
- Accurate front-panel and remote Web-interface program audio level metering.
- Front-panel headphone jack.

Product Specifications

Tuning Range: 76.0MHz–108.0MHz in 100kHz steps.

Antenna Input: 75-ohm (F)

Receiver Sensitivity: ≤10µV for 50dB monaural SNR

Audio Response: ±1dB, 30Hz–15kHz; selectable 75µs/50µs de-emphasis

Program Line Input: Active-balanced (XLR) left/right analog AUX inputs accept program peak levels between –15dBu and +15dBu; AUX stream concurrent with off-air audio stream.

Headphone Jack: Front-panel 3.5mm (TRS) with menu-enabled volume control.

Network Connection: LAN (RJ45) jack accepts universal TCP/IP connection to Local Area Network, and via router to the Internet. Full SNMP support and internal MIB file.

Alarms: Off-Air Audio Loss, AUX Input Audio Loss, Low Signal, Pilot Loss, RDS Loss, RDS PI Error, RDS RT Not Updated; all alarms have adjustable parameters. Alarms are logged and and are able to send text or email messages instantaneously.

Power Requirement: 12VDC at 350mA (2.1mm x 5.5mm coaxial connector); a universal inline switchmode power supply is provided.

Mounting Options: An optional rack adapter accepts up to three INOmini modules in a 1U, 19-inch rack space and is supplied with blanking panels and 'daisy chain' power cabling. The 645 may also be fastened to any convenient surface with two small screws.

Size and Weight: 1.6"H x 5.5"W x 5.5"D; 4 lbs. shipping weight.

Section II

INSTALLATION AND CONNECTION

Unpacking and Inspection

Inspect for shipping damage immediately upon receipt of the equipment. If damage is found or suspected, notify the carrier at once, and then contact Inovonics.

We recommend that you set aside the original shipping carton in the event that return for Warranty repair is required. Shipping damage sustained as a result of improper packing for return may invalidate the Warranty!

Warranty Registration

Please complete the Warranty Registration process. Not only does this assure coverage of the equipment under terms of the Warranty (printed inside the back cover of this manual), but the user will receive any specific service and modification instructions, including software/firmware updates. Register online at:

https://www.inovonicsbroadcast.com/
support/productregistration

Mounting

The 645 SiteStreamer is packaged in a compact 'clamshell' chassis that defines the standardized module in the INOmini series of products. The 645 may simply be set on top of an existing piece of rack-mounted equipment, as long as at least 1U of panel space is left open *above* the rack-mounted 'host' to access the unit. Alternatively, a pair of mounting holes on the chassis base allow the 645 to be fastened to generic equipment rack shelves with two #4 screws.

An optional INOmini 1U rack-mount kit is available from Inovonics. The rack kit can hold up to three INOmini modules and is supplied with blanking panels for unused spaces, plus two 'daisy-chain' power cables so that two or three INOmini modules can share a single power supply, current capacity permitting.

AC Mains Power

All Inovonics INOmini modules are supplied with an outboard, inline switching-type power supply compatible with any destination mains voltage. The actual power consumed by the 645 SiteStreamer is 350mA at 12 volts DC. A second DC connector on the rear panel allows 'daisy-chaining' INOmini modules. This means that two or more units may be fed from the same AC supply, but with the obvious caution that the total input power specification of a given assortment of INOmini modules must not exceed the current rating noted on the power supply label.

Radio Frequency Interference (RFI)

Although we have anticipated that SiteStreamer products will often be co-located with broadcast transmitters and other equipment, please do practice reasonable care in locating the unit away from *abnormally* high RF fields.

The Front-Panel Display and Menu Knob

The front-panel MENU knob scrolls the LCD through the various viewing and programming options. Section III of this manual explains the easy setup and various operating options of the 645.

Headphone Jack

The front-panel headphone jack will accommodate stereo headphones with a 3.5mm stereo plug of virtually any impedance. When headphones are plugged in, the LCD menu will automatically bring up to the `Headphone Vol` screen. The front-panel knob adjusts the listening level, and when the volume has been set at a comfortable point, push the knob to return to the previous menu.

Rear Panel Connections

ANTENNA The 645 antenna input is a US-standard 75-ohm F connector. Adapters to other RF connector formats are readily available, as are premade cables of various lengths.

ANALOG LINE INPUTS	These 'AUX' XLR female inputs accept stereo program audio at program peak levels between –15dBu and +15dBu. Levels may be adjusted from the front panel or remotely.
	VERY IMPORTANT: AUX inputs have limited headroom and will clip approximately 3dB above the 0dB metering mark. For consistency in loudness when switching monitoring between the off-air signal and the AUX inputs, these analog inputs should be hard-limited, just as the off-air signal is hard-limited to ±75kHz FM deviation. Adjust the front-panel AUX Input Ref: or Web interface AUX Ref (dBu): controls to avoid input clipping.
LAN PORT	This RJ45 jack accepts traditional TCP/IP and UDP connections to a router or server, and from there to the Internet.
+12VDC POWER I/O	Two paralleled 'coaxial' power connecters allow 'daisy-chaining' INOmini modules. Two short 'pigtail' power patch cables are provided with the Inovonics INOmini rack adapter.
	The 645 draws 350mA. Check the label on the power supply to make sure that it is rated to accommodate all modules it must support.
	These power connectors are locking, and the mating plugs do pull out rather easily. A Ty-Wrap® will secure the cables to the plastic anchor above the power jacks if this proves a problem.

Section III

SITESTREAMER™ II SETUP

Initial setup of the 645 SiteStreamer is most conveniently performed using a computer, once communications is established. A few basic setup functions are also available using the front-panel knob, and you well may have to use this method to establish initial communications.

Front-panel LCD menu screens will be described in order, beginning with the 'home' screen at full counterclockwise rotation of the knob. Menus that can be edited will be identified as <u>editable</u> in the discussion subhead.

Flashing Alarms

The 645 has several alarms that indicate and log transmission fault conditions. Alarms are displayed locally by the front panel LCD flashing red and spelling-out the fault. Multiple alarms will display sequentially. Pushing or turning the knob gives you a 10-second respite from the flashing so that you can navigate among menus and access setup options that are available from the front panel.

Menu Navigation Basics

The menu tree is really quite intuitive. Quite simply: 1) *turn* the knob to navigate from one menu to the next, 2) *push* the knob to enter any menu that allows editing from the front panel, 3) *turn* the knob to choose an option or to set a value, and then 4) *push* again to accept the selection and return to menu navigation.

The callouts for menu items that can be edited will blink at a rapid rate when you push the knob. Don't confuse *blinking* callouts with a *flashing*-red-screen alarm mentioned above.

Each 645 SiteStreamer menu screen will be discussed separately and in order, except that the last menu is discussed first, as it could conceivably be a show-stopper!

Locked Menus (Menu Screen 13 - <u>editable</u>)

To guard against inadvertent menu editing or casual tamper-
ing, the very last menu in
the sequence allows the
user to lock the knob out
of the editing mode. If

```
Menus:Locked
```

you find that when you push the knob you are unable to enter
an <u>editable</u> menu, scroll all the way to this very last menu
screen. Push the knob and the word `Menus` will begin blink-
ing. Turn the knob to select `Menus:Unlocked`. Push the
knob again to set this selection, and then navigate back to
whatever screen you had been trying to edit. You may go
back and relock the menus when you're finished.

Tuning the Radio (Menu Screen 1 - <u>editable</u>)

When power is applied to the 645, a product-identifying
'splash screen' pops-up
on the LCD. Within a few
seconds this will revert to
Menu Screen 1 shown
here.

```
FREQ:  88.1    FM:S
2B6B   KKJZ    RF..ıl
```

To tune the radio, push the knob and `FREQ` will begin to blink.
Turn the knob to set the receive frequency, and then push
the knob again to return to menu navigation.

The top line of Menu Screen 1 shows the frequency of the
station and whether the current reception mode is `FM:S` (ste-
reo), `FM:B` (blended stereo), or `FM:M` (monaural). The second
line shows the RDS PI code, the station's 'digital address.' In
the US and Canada, you will see station call letters that the PI
codes actually derived from. `RF..ıl` bars give a coarse indica-
tion of incoming signal level.

Carrier Strength and Alarm (Menu Screen 2 - <u>editable</u>)

The `RF` bargraph on the
upper line of this menu
screen shows the incom-
ing signal level, the `RF`

```
RF 35:ıllllllllllll
LOSIG:    | |
```

numerical value in dBµV at the antenna connector.

The editable `LOSIG:` scale has a pair of tic marks off to the
right. These refer to the RF Low Signal alarm, which is best
set up using the Web interface, as alarm on/off timing pa-
rameters are not addressable from the front panel.

To set trip levels (only), push the knob; `LO` and the left tic
mark will begin blinking. Turn the knob to position the left
tic mark anywhere beneath the `RF` bargraph (the correspond-
ing dBµV numerical value is given too). When the `RF:` bar-
graph falls below this point during normal receiver opera-
tion, it initiates a carrier-loss alarm.

As a starting point, you might set the carrier-loss trigger
point about half the way down from the top of the `RF` bar-
graph as shown in the illustration. This should allow for typ-
ical signal fading over the receive path, but will still alert the
user to a valid carrier loss or transmitter power problem.

Push the knob again and `HI` and the right tic mark will blink.
Turn the knob to set the tic mark to a point that the carrier
level must rise to and remain above to reset the alarm, per-
haps a few segments above the left tic mark. Push the knob
again to set these points in memory and release the menu.

Again, `LOWSIG` alarm settings are best accessed through the
Web interface, along with the setup of other fault alarms that
can dispatch email and text messages. These alarms are de-
tailed beginning on Page 22.

Signal-to-Noise and Multipath (Menu Screen 3)

This screen displays two additional signal-quality measure-
ments. Numerical values correspond to the number of bar-
graph segments.

`SN` is a first-order approximation of the signal-to-noise qual-
ity of the tuned RF signal. This measurement takes several
signal quality factors into account. Although the displayed
numerical value is expressed in dB, this measurement should
still be considered a relative, "more is better" indication as it
does not relate to any standardized notation.

Likewise, `MP` represents multipath (signal reflection) effects
that the received signal encounters on its trip to the receiver.
Multipath degrades audio program quality with noise and
other audible artifacts. Although the numerical value is ex-
pressed in percent, this measurement also should still be
considered only a relative, "less is better" indication.

The `RF`, `SN` and `MP` numerical values do make handy metrics
when installing a rooftop antenna. In locating and aiming the
antenna, do everything you can to maximize `RF` and `SN`, and
to minimize `MP`.

Monitor Source Switching (Menu Screen 4 - <u>editable</u>)

The 645 not only monitors the FM off-air broadcast, but can monitor and simultaneously meter the level of a stereo analog program audio feed applied to rear-panel XLR connectors. This would, for example, enable A/B comparison between the air signal and the program audio feed to the exciter.

The primary and default `Source:` monitoring mode is the `Radio` signal received off-air. Push the knob and turn it to switch to the `AUX Input` analog program source.

```
Source:AUX Input
Ref: +10.0
```
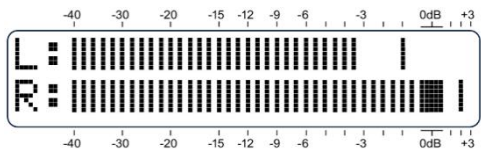
The rear-panel jacks accommodate left and right channel stereo program audio at *peak* (not 'nominal' or 'VU') line levels between –15dBu and +15dBu. Press the knob a second time and `Ref` will blink. Turn the knob to match the peak level of your program signal. In the illustration, the program audio applied to the rear-panel jacks has a peak level of +10dBu.

<u>NOTE</u>: The `AUX Input` channel clips just 3dB above the adjusted `Ref:` figure. Set up as shown, program peaks exceeding +13dBu would distort! It is assumed that audio fed to the rear-panel jacks will be peak-limited. Do not neglect this headroom limitation in your `Ref:` setting.

Program Audio Metering (Menu Screen 5)

Menu Screen 5 gives a very accurate bargraph readout of program audio levels. This is a peak-responding meter with a floating peak-hold function.

100% monaural modulation is denoted by the large block opposite the 0dB marking on the panel. The meter resolves +1, +2 and +3dB above 0dB, and from 0dB down in 0.5dB steps to –6dB, and then in 1dB steps to –20dB, and finally in 2dB steps to –40dB.

0dB represents ±75kHz carrier deviation for monaural off-air audio. A 400Hz mono test tone would take both meters to the 0dB point. Receiver de-emphasis must necessarily be factored into the reading at higher frequencies, and of course the 19kHz stereo pilot consumes the top 1dB of stereo broadcast modulation. Aggressively-processed program audio will peak the bargraphs consistently to about –1dB.

Networking Mode and IP Address (Menu Screen 6 - <u>editable</u>)

The IP networking mode and address are set on this Menu Screen. Push the knob and `Mode` will blink. Select either `DHCP` or `Static IP` as dictated by your network configuration. When `DHCP` is selected, the IP address is automatically assigned by the router/server and cannot be changed manually.

```
Mode:DHCP
192.168.0.100
```

Select `Mode:Static IP` and push the knob again to enter a fixed IP address manually. The first existing address group will begin to blink. Turn the knob to dial-in the required number. Continue to press the knob and dial-in numbers until all four IP address fields are filled. Push the knob a final time to commit all selections to memory and release the menu.

```
Mode:Static IP
192.168.000.100
```

HTTP Port (Menu Screen 7 - <u>editable</u>)

The default port assignment here is the commonly-used Port 80, which will show on the second line of Menu Screen 7.

To change this port assignment, push the knob to enter the setup field as described for `Mode:` setup. Leading zeroes will display; push the knob repeatedly to reach each digit you need to reset. When the last digit is set, press the knob one final time to commit the selection to memory and release the menu.

Gateway, Subnet Mask, Primary DNS (Menu Screens 8, 9, 10 - <u>editable</u>)

These three screens are available only when `Mode:Static IP` is selected under Menu Screen 6. The `Gateway:`, `Subset Mask:` and `Primary DNS:` are entered manually in exactly the same manner as `Static IP:` addressing was described under Menu Screen 6.

MAC Address (Menu Screen 11)

The MAC (Media Access Control) address of any piece of hardware with IP connectivity is a factory-set fixed value unique to that specific hardware. Menu Screen 11 displays the `MAC Address:` of your individual SiteStreamer and cannot be changed.

Headphone Monitoring (Menu Screen 12 - editable)

A front-panel PHONES jack offers convenient audio monitoring for SiteStreamer setup and casual listening. Plugging a pair of headphones into the front-panel jack automatically brings up LCD Menu Screen 12. `Headphone Vol` will begin blinking and the panel knob may be adjusted for a comfortable listening level.

The LCD shows an arbitrary numerical value and a bargraph representation of the headphone volume. Once volume is set, push the knob to save the setting to memory and to return the screen to the last menu on display.

SITESTREAMER™ II WEB INTERFACE
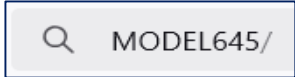
Connecting Locally

Connect both the INO-mini 645 and a computer to your local network. We'll assume DHCP operation for this exercise.

Go to Menu Screen 6 and jot-down the IP address that your router/server has assigned.

```
Mode:DHCP
10.0.0.6
```

Typing the IP address into a browser will give you access to the 645. Alternatively, on your LAN you may also type the Hostname and / (a forward slash) into your browser address bar. (See Hostname: on Page 27.) The default Hostname for the 645 is MODEL645, so you can address it we have here.
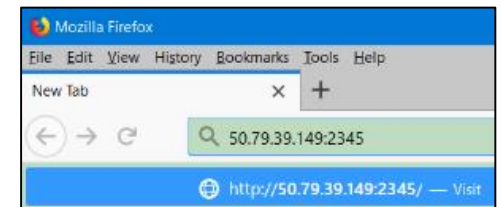
```
Q   MODEL645/
```

Remote (Internet) Access

To access it from the Internet, the 645 must be assigned a static IP address. If your router makes DHCP assignments for other equipment on the network, just assign a static IP that is outside the router's DHCP range.
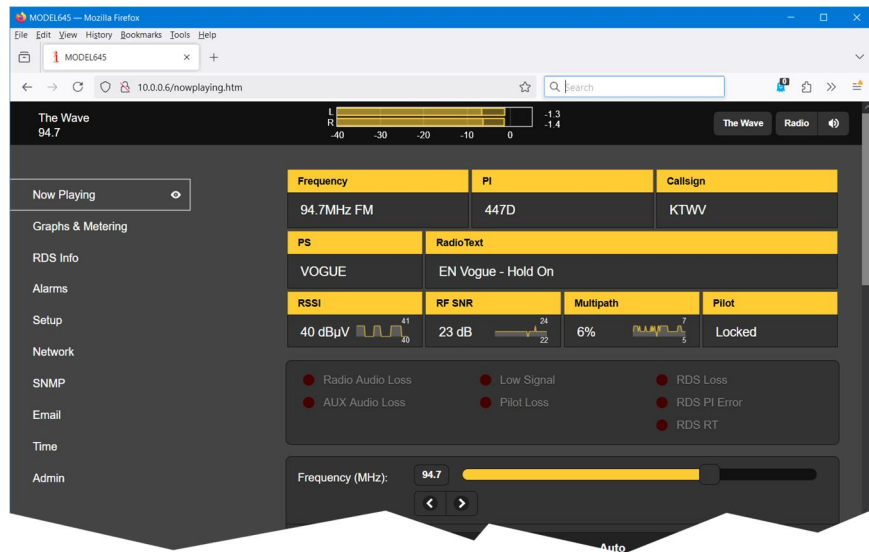
If your Internet Service Provider (ISP) assigns you a static IP address to your LAN, it's a relatively simple matter to address the 645 externally. Your router does first require to be set up for port forwarding. Then you simply type the IP address and port number into your browser as pictured here.

But if your ISP issues a *dynamic* IP, which is quite often the case, this mandates 'Dynamic DNS' operation using the services of an IP-forwarding provider. This is an operation you should entrust to your IT department, though explanations and instructions are available from multiple Web resources.

Now Playing

Open a browser window on your computer and type the IP address of the 645 into the browser's address bar. In short order the main Now Playing Web interface page will appear on your screen.

Webpage Header

A header at the top of the page and the Menu list on the left are common to all Web interface pages. The header shows the tuned frequency, audio level metering, station presets (when programmed), the monitoring source and remote listening button. All 645 screens are described individually as listed in the Menu on the left-hand side of the screen.

Remote Listening

Click the loudspeaker icon in the header to monitor audio through your computer or device browser. The default source is the off-air Radio signal, shown on the button to the left of the loudspeaker icon. Click that button to select the AUX stream to monitor. Level metering in the header follows the monitoring selection.

Encoding, decoding and buffering time (latency) of the listening audio will depend in large degree on the connection path and network quality. Latency may be several seconds, even locally on your LAN. This listening utility has been included more to confirm the presence of audio than to perform a critical assessment of off-air audio quality. Keep in mind that listening audio and its level metering may be well out of sync.

RDS Info

In addition to the incoming frequency, the Now Playing Web screen also presents basic RDS RadioData information.

PI is a hexadecimal identifier specific to this station, the station's "digital address" as it were. The PI code is derived from the station's callsign in the US and Canada, elsewhere Callsign will be blank.

PS, the Program Service Name, is an 8-character field where station call letters or 'street name' will display on any RDS radio faceplate. The PS field is often made 'dynamic' to scroll song artist and title information as in the example.

Radio Text is a 64-character field that is displayed by some, but not all radios. This field is generally used to convey program information, such as artist and title, but may also be used for station information (Website, phone, promos, etc.) or even advertising tie-ins. Additional RDS data are displayed on the RDS Info Webpage, discussed on Page 21.

Radio Metrics

The next row of data pertains to qualities of the incoming off-air signal. The first three are accompanied by a small rolling graph that displays the measurement over the past 30 seconds. Graph scaling adapts to represent high and low values over the 30-second time period.
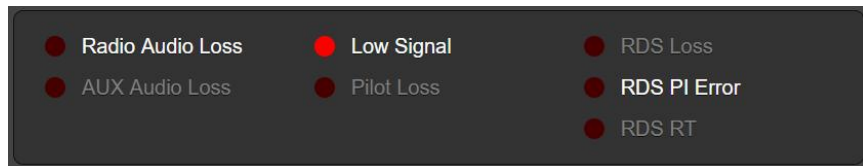
RSSI is the same measure of signal strength labeled RF on front-panel Menu Screen 2. The numerical value is signal level in dBμV at the antenna terminal.

RF SNR is described on Page 10, and labeled SN on front-panel Menu Screen 3. The same goes for Multipath, shown as MP on front-panel Menu Screen 3. Both metrics are detailed on Page 10.

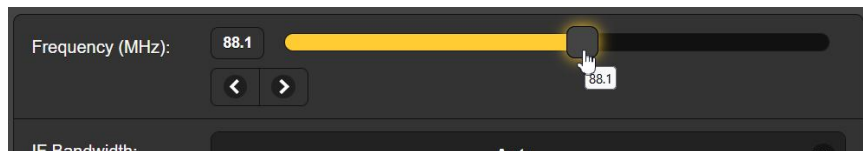Pilot will be either Locked or No Lock.

Fault Alarms

A field of simulated red LEDs alert the user to various alarm conditions. Alarm explanations and setup procedures begin on Page22.

Alarms that have been user-enabled will show a bright white callout here, and the 'LED' will glow when the alarm is tripped. Alarms that have not been enabled are grayed-out.

Radio Setup

The receiver may be tuned remotely in four ways.

1: Grab the 'slider' with your mouse and, holding down the mouse button, drag the slider back and forth as suggested in the illustration.

2: Highlight the slider (single click) and then use keyboard ▶ and ◀ cursor keys to step the frequency up and down.

3: Click the on-screen ❯ and ❮ buttons to step tuning up and down.

4: Highlight and overtype the Frequency (MHz): number with a valid FM channel frequency and press Enter.

Saving stations as Preset Stations is discussed shortly.

IF Bandwidth: is selectable to help mitigate specific reception issues. The default setting here is Auto, which automatically factors-in reception metrics to maintain the widest passband. Click the bar to reveal a pull-down menu to select the bandwidth manually as propriety demands. Bandwidth settings are saved in memory, *specific to the station being received,* when that station is saved as a preset.

Audio Cutoff: is another variable that can be called into play, again to help lessen noise or other reception-related issues as a particular station may demand. An Auto setting gives the widest audio response consistent with poor reception conditions. Again, a pull-down menu allows stricter response curtailment. Audio Cutoff: settings are saved in memory, *specific to the station being received,* when that station is saved as a preset.

Stereo: has a pull-down menu for manual selection of three reception modes: Stereo, which is the default; Blend, which gradually blends from stereo to mono reception as signal conditions deteriorate; and Mono (forced-monaural). Stereo: settings are saved in memory, *specific to the station being received,* when that station is saved as a preset.

Station Presets

Stations are saved as Presets by tuning-in the desired frequency, making reception-related selections and assigning various alarms for that station, and then clicking the Save as New button. You will be prompted to enter a 'friendly ID' for that station, an identifier that will also show in the header when that station is tuned.

When a Preset is tuned, and any changes are made to alarm or reception-related settings, the station ID on each Webpage header will revert to Not a Preset. You will also be prompted to click the Save Changes (Preset - -) bar. If you do not save the changes, those changes will be lost and the memory will revert to whatever values had previously been saved.

Alternatively, you may Save as New after making changes. For example: if you wanted one preset for the station in stereo with a full complement of alarms, and then another for the station in monaural, perhaps with one or more alarms disabled. Remember, alarms and other setup parameters are saved with that station in Preset Stations memory.
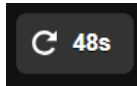
StationRotation™

StationRotation describes a function of the 645 that allows sequencing through any or all of the saved Preset Stations entries in the order listed, and at a rate selected by the user. This might allow a station group engineer to receive alarms from any of a number of stations in a given market.

NOTE: Placing the 645 in StationRotation will inhibit manual tuning! Front-panel station selection will be inhibited and Now Playing and Alarms setup sections will be grayed-out and unavailable.

There is a checkbox ahead of each entry in the list of Preset Stations. Check the box of any and all stations you wish to place in sequenced reception.

Begin StationRotation by setting Enable: to On. You need also to program the Rotation Time (Sec):. This takes some thought, as there are alarm setup considerations when using this feature. Alarms with Time On (Sec): and Time Off (Sec): settings will have to be factored into the Rotation Time (Sec): figure. See the Alarms discussion beginning on Page 22.

The Status: display gives a second-by-second countdown of remaining rotation time. This countdown also appears in the header of each Webpage when Station Rotation is enabled, as shown here.

Graphs and Metering

The Graphs & Metering Webpage gives high-resolution metering presentations of audio levels. The fast-acting level meters include a peak-hold function, and the held peaks are also displayed numerically in dB to the right of each bargraph.
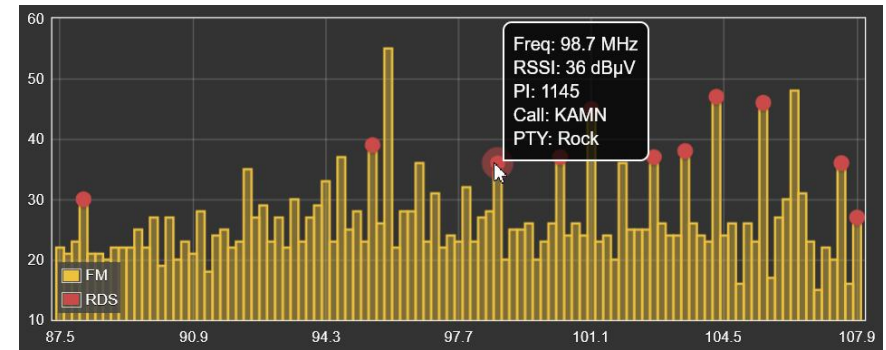
The Radio meter is a peak-responding readout of the off-air stereo audio. Left and Right channel levels and L+R (stereo sum) and L-R (stereo difference) values are presented in real time. Keep in mind that the audio streamed from the 645 may encounter significant delay, so don't expect correlation between visual metering and the streamed audio.

AUX channel levels are shown in similar fashion and simultaneously with the Radio channel. The AUX channel has limited headroom, thus program peaks should never exceed 0 (zero) on the AUX level meters. Although AUX meter scaling extends to 5 (+5dB), they will top-out at 3, +3dB being the internal headroom limit.

The BandScanner™

The BandScanner is a useful utility of the 645 that displays the RF spectrum of the FM broadcast band.

The 645 offers two Scan Range: settings: 87.5-107.9MHz and an 'expanded' FM band: 76-108MHz. Also, the scan Step Size: may be set to 100kHz or 200kHz. The closer intervals may yield a slightly better visual, but would be essential in countries with 100kHz channel spacing. The finer, 100kHz step setting will take longer to scan.

A typical FM band scan plot is pictured here. Figures at the left of the plot represent the RSSI in dBμV at the antenna terminals. This level scaling is adaptive, changing automatically to accommodate the highest signal level in the monitored market.

In the example scan above, stations show up as vertical yellow lines poking-up above the noise floor. With Scan Type: set to RSSI + RDS, red dots sit atop the lines of stations that have an RDS presence.

As you hover-over a line with your mouse, station info pops-up, as shown in the example above. Stations without RDS will display only the frequency and signal level. Click on a line and the 645 will immediately tune to that frequency.

Following an RSSI +RDS scan, stations will be tabulated below the display, arranged by frequency and including RDS PI, PTY, Callsign and RSSI information.

Frequency	PI	Callsign	PTY	RSSI
88.1	2B6B	KKJZ	Jazz	36
92.3	1EA9	KFOJ	None	32
96.7	4B01	KWIZ	None	39
97.9	2D23	KLAX	None	

The band scaning process will interrupt measurements and mute audio monitoring during the scanning cycle. Alarms are inhibited for the duration of the scan.

RDS Info Webpage

The RDS Info Webpage gives a complete accounting of all RDS data groups. The upper part of the RDS Info screen decodes and displays RDS information.

PS	PI Code	Callsign
104.3	137A	KBIG

RadioText	32 / 64
104.3 MYfm Poker Face Lady Gaga	

RT+1	RT+2

PTY	PTYN	Time
Adult Hits		

M/S	DI	TP	TA
Speech	Mono	Off	Off

Here, the PS, PI Code, Callsign and RadioText are duplicates of what's shown on the Now Playing page.

RT+1 and RT+2 are special identifiers used by some stations for 'song tagging' and advertising tie-ins. The station in the example does use RT+ tags, but none are active at the moment.

PTY identifies the format of the station as Adult Hits, with no further PTYN format refinement by this station.

If the station were transmitting local clock time, this would show in the Time box. Many stations choose not to send time data rather than risk sending incorrect time or conflicting DST or UTC offsets. Listeners of car radios become irate when their clocks are reset to the wrong time. (Time setup is described on Page 30.)

M/S, DI, TP and TA are RDS 'flags,' all part of RDS system housekeeping. *Wikipedia* gives a comprehensive overview of all RDS features, or you may refer to the appropriate RDS or RBDS Standard.

Statistical information on all RDS data groups is tabulated in the lower section of the RDS Info Web interface screen.

The 645 SiteStreamer calculates RDS Block Error Rate along with the percentage of RDS system resources devoted to each data group. Our example station is using RDS to good advantage using only a few of the data groups.

RDS Block Error Rate							
0.64%							
0A	24.88%	0B	0%	8A	0%	8B	0%
1A	0%	1B	0%	9A	0%	9B	0%
2A	69.40%	2B	0%	10A	0%	10B	0%
3A	1.74%	3B	0%	11A	0%	11B	0%
4A	0%	4B	0%	12A	3.98%	12B	0%
5A	0%	5B	0%	13A	0%	13B	0%
6A	0%	6B	0%	14A	0%	14B	0%
7A	0%	7B	0%	15A	0%	15B	0%

Alternative Frequencies	0	Open Data Applications	1
		12A	0x4BD7 (RadioText+)

In this example the station has no rebroadcast 'translators, so the Alternative Frequencies List is empty. The Open Data Applications usage lists the 12A group for RadioText+ use.

Alarm Basics

The Alarms setup area is a very useful and important aspect of the 645 Web interface, but requires some forethought.

The time-stamp feature for email alarm notifications and the Alarm Log depends on an internal RTC (Real Time Clock) synchronized with Internet time. A proper time zone offset and DST relationship are maintained by the RTC, and correct time setup should be confirmed before alarm setup is considered complete. RTC setup is detailed on Page 30.

Several 645 alarms have common threshold and timing setup requirements. Thresholds have two points to set. The first is the 'low' threshold point that the measured value must fall *below* to trigger an alarm, and then a second 'high' threshold

point that the measured value must *return to* for the alarm to reset. This creates hysteresis in the alarm level settings, preventing 'chattering' as a metered value wobbles around the set points, even if the two thresholds set with only a small difference.

The other common alarm parameter is 'on' and 'off' timing; that is, how long the metered value must remain *below* the low threshold point before an alarm is triggered, and then how long it must remain *above* the high threshold for the alarm to reset. These settings will depend entirely on whether you want to be apprised of a short-term fault, or if the condition has to remain for a greater number of seconds before it is considered valid and the alarm is triggered.

Audio and Low Signal Alarms

Both *level* and *time* alarm criteria apply to the Radio Audio Loss, AUX Audio Loss and Low Signal alarms. These three alarms display a grayed-out dynamic bargraph measurement of the current metric to guide you in establishing threshold points.

An example setup of the Radio Audio Loss alarm panel is shown below. Refer back a few paragraphs if you missed the explanation of alarm level and time criteria, otherwise setup should be obvious.

1. The Alarm: has been enabled by clicking the On button.

2. The grayed-out, off-air audio program peak Level (dB): is indicated in real time as consistently hovering near 100% modulation.

3. Threshold On (dB): has been set to -30, meaning that the program peak level must fall *below* -30 to qualify as a level that is too low.

4. Moreover, The Time On (Sec):, set here at 20, means that the program peak level *must fall and <u>remain</u> below* -30 (dB) for 20 seconds to actually trigger the alarm.

5. Threshold Off (dB): has been set to -15, meaning that the program peak level must rise *above* -15 (dB) to qualify as a valid, working modulation level.

6 Moreover, The Time Of (Sec):, set to 5, means that the program peak level *must stay above* -15 (dB) for 5 seconds for the alarm to reset.

AUX Audio Loss alarm setup is exactly the same as for the Radio Audio Loss alarm just described.

Low Signal alarm programming has the same level and time criteria as the audio level alarms, but features an added Mute: function to silence the off-air audio during a low signal alarm condition. When Mute: is turned On, a Low Signal alarm will initiate an Audio Loss alarm when the station goes completely off the air. When Mute: is turned Off, only the 'dead air' of an unmodulated carrier will trigger an Audio Loss alarm... the ubiquitous no-station 'FM hiss' will most likely prevent the Audio Loss alarm from triggering.

Pilot Alarm

The Pilot Loss alarm monitors the presence of the 19kHz FM stereo pilot. With the Alarm: On, this alarm triggers when the pilot goes missing for the programmed Time On (Sec.): period, and resets when the pilot returns for the Time Off (Sec.): setting.

RDS Alarms

The RDS Alarm is triggered by either a missing RDS subcarrier (RDS Loss: On), or an incorrect PI code (PI Error: On). A PI error occurs when the station is 'hijacked,' or a translator receiver takes the notion to pull-in the wrong station. Simply copy-and-paste your station's Current PI: into the PI Code: box and Save. This alarm will then trigger when the received PI differs from that of your station. Both RDS alarms use common Time On (Sec): and Time Off (Sec): settings.
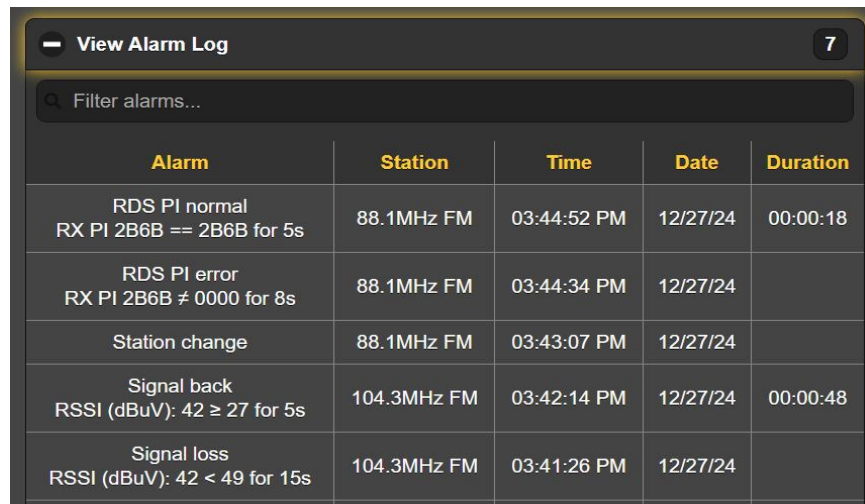
Dynamic RadioText can appear 'stuck' when a current message is not updated with new text. When the RDS RadioText

Not Updated alarm is set to Alarm: On, the alarm will be triggered if the message does not get updated within the timeframe specified by Time On (Min):.

Alarm Logs

The 645 logs all alarms, each with the station identified, the nature of the alarm, and with date, time and duration stamps. The logging utility can send emails Daily, Weekly or Monthly as a small .csv file attachment. It can also send an alert when it has reached a certain memory capacity. The log is capable of holding an almost-infinite number of alarm events, but you may wish to go in and clear it every now and then.

Once the alarm log has accumulated some events, open the log by clicking the **+** next to View Alarm Log at the bottom of the screen. This brings the log contents onto your screen.

— View Alarm Log				7
Q Filter alarms...				
Alarm	**Station**	**Time**	**Date**	**Duration**
RDS PI normal RX PI 2B6B == 2B6B for 5s	88.1MHz FM	03:44:52 PM	12/27/24	00:00:18
RDS PI error RX PI 2B6B ≠ 0000 for 8s	88.1MHz FM	03:44:34 PM	12/27/24	
Station change	88.1MHz FM	03:43:07 PM	12/27/24	
Signal back RSSI (dBuV): 42 ≥ 27 for 5s	104.3MHz FM	03:42:14 PM	12/27/24	00:00:48
Signal loss RSSI (dBuV): 42 < 49 for 15s	104.3MHz FM	03:41:26 PM	12/27/24	

A particularly useful feature of the alarm utility is its ability to send instant notifications, by email message and/or by text message to a cell phone, and send any notification selectively to appropriate station personnel. Setup of this feature is covered under the Email Notifications subheading on Page 29.

Miscellaneous Setup

The Setup Webpage lists a number of miscellaneous setup items that don't fall into major categories.

Under Radio you choose a couple of location-dependent options. Receiver De Emphasis: of 75µs or 50µs, for North

America or Europe, respectively, and RDS/RBDS: system selection of RDS (Europe) or RBDS (North America). These are 'global' settings, in that they are not saved selectively in Preset Stations memory.

AUX Settings consist solely of a single level-scaling adjustment. A separate and independent program feed applied to the LEFT and RIGHT channel ANALOG LINE INPUTS on the 645 rear panel must be scaled in level to remain below the streaming codec clipping point. Set the AUX Ref (dBu): adjustment slider so that its associated numerical readout matches the input program peak level. For example, if your input audio peaks at +10dBu, you would set the AUX Ref (dBu): slider to 10. When this condition is properly met, the grayed-out AUX Level (dB): meter should rarely, if ever, exceed 0 (zero). This is important, as the codec clips only 3dB above the indicated zero level.

Stream settings first address the streaming codec, which currently complies with HE-AACv2 protocols. Sample Rate: may be set either to 44.1kHz or to 48kHz, per system requirements, and Bitrate (kbps): to any figure between 18 and 64 kilobits per second as dictated by network quality and conditions.

The HTTP/Icecast Stream has two setup options. Audio Latency: allows the user to introduce additional delay in the program audio streaming path. While it may seem counterintuitive, additional delay may help overcome deficiencies of an uncertain network connection. Rather than allowing network latency to degrade packet transmission, building-in an intentional delay of a few seconds gives the system time to reassemble the data with fewer errors, sacrificing just a few seconds of listening delay.

Although the 645 is able to accommodate as many as 10 simultaneous HTTP/Icecast Stream Web listeners, the number of listeners may be truncated in the interest of better streaming service to fewer authorized listeners. The Max Listeners: slider can be set between 0 and 10.

The 645 can accommodate casual listening without Web interface privileges. To permit others to just listen to the stream, without being able to make settings changes, simply type the full IP address of the 645 (including a specific port number) into a browser address bar, followed by /stream. For example: http://50.250.276.100:1567/stream. Nevertheless,

competent hackers could probably see through this ruse and access the Webpages and their setup options.

An independent UDP Stream is available concurrently with the HTTP/Icecast Stream for sending audio to remote equipment, such as loggers and 'skimmers.' The Transport: format can be either ADTS or ADTS in MPEG-TS. Data are sent to the IP Address: and Port: indicated when Enable: is set On.

Once modified, Stream settings must be saved by clicking on the Save bar. This does reset the utility, however, disconnecting any current Web listeners, who then must log back on.

Network Setup

The Network Webpage displays the current networking setup. Some entries are 'grayed-out' when the 645 Mode: is under automatic DHCP assignment. When using a Static IP, however, this Web interface is a far user-friendlier means of entering networking parameters than from the SiteStreamer's front panel.

Hostname: is the 'friendly' name of the 645 that shows up on the browser tab, in various networking locations, and remote browser address bars. This can be changed as required to differentiate from another 645 on the network, usually in conjunction with an alternate HTTP Port: assignment.

SNMP Operation

SNMP (Simple Network Management Protocol) allows other TCP/UDP/IP equipment to communicate directly with the 645, and for the 645 to be able to initiate an alarm on the network. The SNMP setup field is shown on the following page.

The 645 will interface directly with a network controller, known as the SNMP 'Manager.' The 645 includes an embedded ASCII text file called a MIB (Management Information Base). In setting up for SNMP operation, download the MIB file from the 645, and then upload to the SNMP Manager.

The default mode for SNMP is Disabled. This inhibits communication between the 645 and SNMP gear. A pull-down menu shows operating choices.

Mode: Read Only allows the 645 SiteStreamer to be interrogated by the SNMP Manager so that 645 settings, metering, RDS data and alarms can be read and integrated with other equipment on the network.

Mode: Read & Write further allows the SNMP Manager to send commands to the 645, permitting other equipment to change the station and adjust any other setup options.

SNMP 'Communities' serve as passwords for this function. Go into the Read Community: and Write Community: boxes to enter text that is specified for the read/write strings on the SNMP Manager monitoring device.

The default SNMP Ports, SNMP Port 161 and Trap Port 162, are customary assignments for the majority of SNMP operations. These may be changed as required by typing-in new values.

When the SiteStreamer initiates an alarm, rather than being queried or polled for one, the alarm is known as a 'trap.' You may enter three local network IP addresses as Trap Destinations, each corresponding to other devices on the LAN that need to be apprised of 645 fault alarms.

NOTE: Once all SNMP Settings are complete, or following changes to any individual one, execute a Save.

The MIB File

The MIB File is a small text (.txt) file that is read by the SNMP Manager (network controller). To download and read this file yourself, click: Download MIB; it's in plain text and may be read with Windows Notepad. Copy, save and use the file in the usual Windows manner.

NOTE: This has been an abbreviated discussion of SNMP operation. SNMP is a complex utility managed exclusively by whatever SNMP Manager (monitoring equipment) is employed. Refer to all instructions supplied with, and for, the SNMP Manager hardware and/or software in setting-up the 645.

Email Notifications

The 645 SiteStreamer can send email or text mobile-phone notifications of reception or programming faults to one or more recipients. Which alarms go to whom is explained in this subsection.

NOTE: The time-stamp feature for email notifications and the Alarm Log depends on a network connection to sync with Internet time, along with setting the proper time zone and other options. See Page 30.

You need to set up an actual 'personal' email account for the 645, and the procedure is just like setting up any conventional email account. Information to be entered here depends on the provider you choose. When you apply for the account, much of this information will be assigned to you. Consult your IT professional for setting up email accounts if need be.

Under SMTP Server:, enter the provided outgoing mail server info (e.g.: smtp.gmail.com), the required Port: number and whether TLS: is On or Off.

From: is the 'friendly' name that identifies your SiteStreamer to the email or text recipient. You could use station call letters, or something like Streamer Alarm. User: is the full email address of the unit. You'll want to assign a Password: to the account.

You can enter up to ten potential email recipients, typing-in their full email addresses. These recipients will be numbered, and each may be assigned individualized alerts.

Email addresses typically take the form of the upper example here. If instead you wish to send a text message to a recipient's mobile phone as a text, the entry may look like the second image. In the second example the alarm notifications are being directed to a Verizon subscriber's phone. Further information on these naming protocols is available on the Web, or you can check with the wireless carrier to confirm the proper addressing style for Internet texting delivery.

When all recipients have been entered, click Save. You may also click Send Test Email, which will memo-message all recipients to confirm proper communications setup.

Notifications setup is easy. Once recipients are listed under SMTP Settings, select the email and/or text message recipient from the pull-down list and check the alarms for that person to receive. When finished, click Save at the bottom

In this example, the station Chief Engineer will receive email notifications of Radio Audio Loss, Low Signal and RDS Loss conditions. Other personnel can be programmed to receive emails or mobile texts for these same or any combination of other alarm conditions

Timekeeping

Open the Time Web interface screen to set up the internal timekeeping functions. Correct timekeeping is essential for

time-stamping alarm notifications and for meaningful Alarm Log listings.

Select your offset from UTC (Universal Coordinated Time) with the Time Zone (Hours): slider. When this is set correctly, local time will show at the top of the window. You may make allowance for Daylight Saving Time: here as well. Choose Off to disregard DST altogether, On for fulltime DST, or Auto to accept seasonal changes automatically from the Time Server.

The Time Server defaults to a Web-based time authority pool, but you may enter an alternative Server: if desired. Status: indicates the Last sync: (internet time update), which also shows that Internet communications is working properly,

Be sure to click: Save to commit timekeeping choices to memory.

The Admin Screen and Passwords

The Security heading under Admin allows you to set up a password tier for the 645 SiteStreamer Web interface. A Web Admin Password (Read/Write): is required to do 645 setup and make any subsequent changes or adjustments. A Web User Password (Read Only): allows that user to look at, but not change, the Webpages.

Type the Web Admin (Read/Write): password into that field and click: Save. You'll get a pop-up window asking for login credentials; leave the Usename field blank and type your Password into its field, and then click Sign In. At that point you may create a Web User Password (Read Only): entry in similar manner. Click Save when finished.

A password can be changed or purged, simply by overtyping or clearing the entry and doing a Save.

If you lose or forget your password, you'll have to perform a 'hard reset' from the front panel of the unit (see below). This will purge all setup and other information from memory. To obviate the inconvenience of having to set the unit up from scratch, we recommend periodically downloading and saving a Hardware Profile, which retains all the setup data and can be uploaded back to the unit.

NOTE: There are password ramifications to the Hardware Profile setup-recovery process that you will need to follow. The old, lost password is part of the Hardware Profile that you have previously saved. If that profile were immediately

loaded into the 645, you'd be back where you started, still locked-out and needing to do another Hard Reset. See the final paragraphs under The Hardware Profile to purge passwords from the file.

Hard Reset

A hard reset can be performed only from the front panel of the 645. It will purge all setup information from memory. Please see the Hardware Profile discussion that follows to save settings and restore them to the 645.

To perform a hard reset, hold down the front-panel MENU knob while power-cycling the unit. Remember: this restores the SiteStreamer™ to 'factory-fresh' condition; you will lose all setup information.
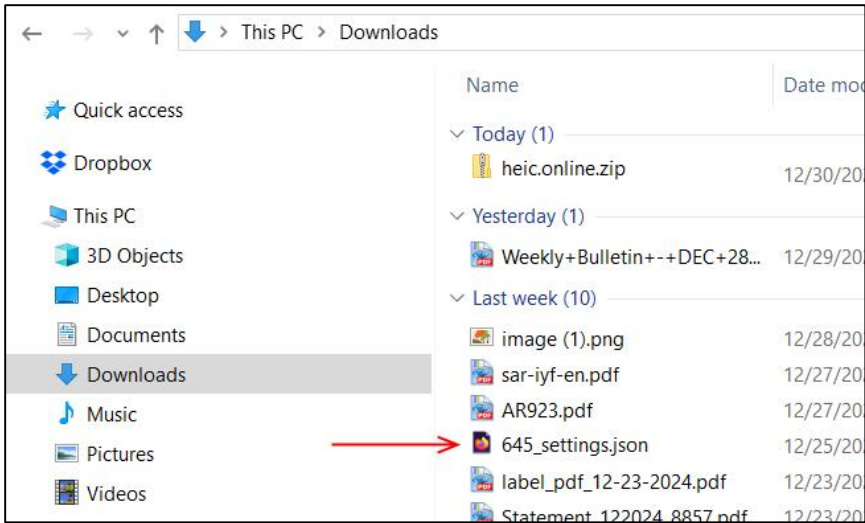
The Hardware Profile

The entire 645 SiteStreamer setup, which includes receiver setup choices, alarm parameters, alarm notification preferences, SNMP options and passwords, may be saved to your computer as a small text file. The Hardware Profile is useful for restoring a previous setup or for 'cloning' a second unit for backup service.

Under Configuration on the Admin Webpage, click Download Hardware Profile to save the profile to your system. Depending on your browser and version, the file will normally be saved to a Downloads folder unless you are asked for a specific 'save to' location. The file has a default name of 645_settings.json.
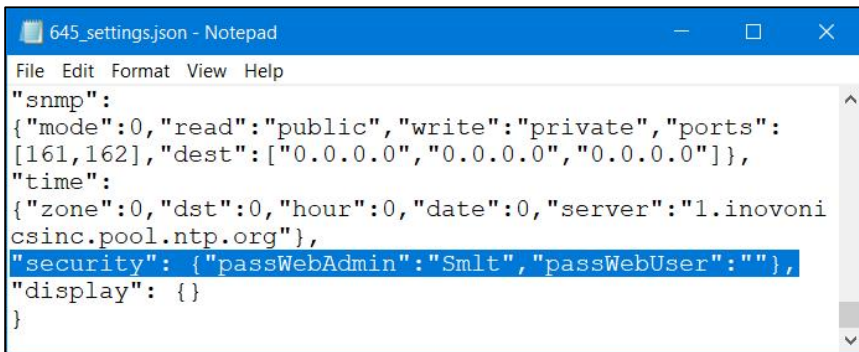
To upload a saved Hardware Profile to your SiteStreamer, first click: Browse… to locate the saved profile on your computer, and then click Upload Hardware Profile. This will replace all setup parameters that are currently loaded and running in your unit.

Here are the steps required to eliminate the old password from the Hardware Profile.

1. Locate the .json Hardware Profile file that you want to upload back into your 645. This may either still be in your Windows Downloads folder, or a folder set-aside for incidental data files, probably looking something like the following illustration:

2. Right-click the file and then click Open with > Notepad.

3. Scroll to the very bottom of the file and locate and highlight the line of text beginning with `"security":`, just as that line is highlighted below:

4. Delete the highlighted line of text.

5. At the top of the Notepad window, Click File > Save, and then close Notepad.

Now you may upload the Hardware Profile without fear of being locked out.

Section V

UPDATING THE SITESTREAMER™ II

The Firmware Updater

The 645 SiteStreamer hosts operating files that may easily be updated by the user in the field. These files are the primary firmware that controls the functions, memories and Webpage interface of the unit.
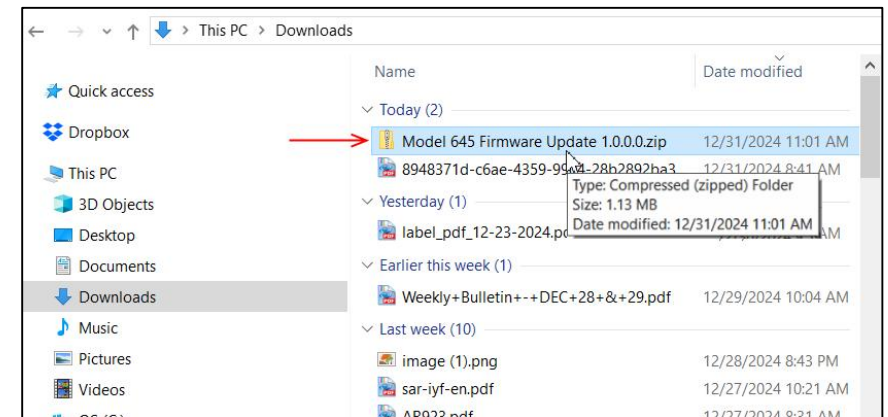
A built-in 'bootloader' utility allows firmware to be updated whenever Inovonics issues changes to add features, to improve performance, or otherwise to expand the usefulness of the product. Inovonics supplies firmware updates free of any additional charges.

Warning

A firmware update *may* restore the 645 to factory defaults, in which case *all settings and presets would be overwritten!* The changelog, included with the firmware update, will indicate whether this is a danger or not. Always save a Hardware Profile (Page 32) before proceeding with an update. This will retain all user setup parameters that can be restored afterward.
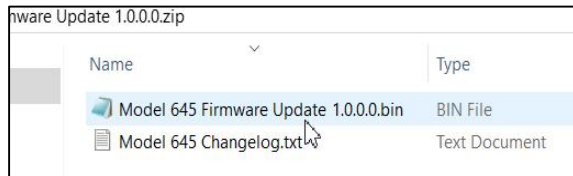
Update Files

A firmware update will be supplied as a small .bin file, part of a ZIP-file update folder
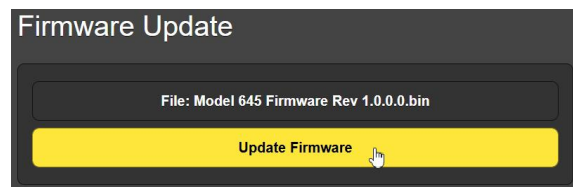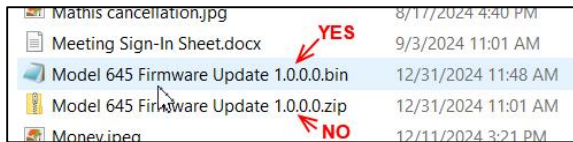
When downloaded from the Inovonics website, the ZIP file should reside in your Windows system Downloads folder as shown on the previous page, where the update is highlighted and indicated with a red arrow.

Either 'Save as' or drag the update ZIP folder to your Windows Desktop, and then double-click the ZIP folder. This will unzip the folder, revealing the .bin update file, plus a changelog text file and perhaps other information pertinent to this update.

Drag the .bin update file out of the ZIP folder and place it at another spot on your Desktop.

Now bring up the 645 Admin page and scroll down to the Firmware Update section. Click Select Firmware File… , which will open a Windows Explorer window.

In this window, navigate to the Desktop and locate the .bin file you have just placed there. Double-click this .bin update file. It should then show up in the Firmware Update pane as illustrated here. Now click Update Firmware and the entire process should be completed in about one minute.

From the Admin Webpage you may bring a copy of this manual up on your screen. You can also check the Serial Number: and Firmware Rev.: of your 645, and even view the Uptime:, or how long your unit has been running since the last boot-up.

TECHNICAL MATTERS

Firmware Version

With 645 powered-up, hold the knob down for 3 seconds or so. The menu screen you have been viewing will be replaced by the 645 Firmware screen. This shows the firmware version installed in your unit, information that may prove important when communicating with the factory.

LCD Tint Options

With the 645 Firmware screen showing, turn the knob once more and you'll find a utility to change the background color of your front-panel LCD display. Push and turn to change the R: (red), G: (green) and B: (blue) values. The factory defaults are 70, 30, and 10, respectively.

Turn back to the 645 Firmware screen and push the knob again to return to the normal menu sequence.

'Under the Hood'

The 645 SiteStreamer is compact and sophisticated, utilizing mostly surface-mounted (SMD) components. Many of these are application-specific, and all of them impossibly tiny. This makes servicing the unit in the field a difficult proposition at best. For these reasons, and also because of the small format of this manual, we have dispensed with schematic diagrams, servicing instructions and a listing of component parts.

Having said that, our policy has always been one of 'full disclosure.' We feel that, unless we are doing something nefarious (or acting in the interest of national security!), there should never be a reason to hide information from the user. With a clear conscience, and upon request, we will cheerfully provide additional documentation and divulge all but the very darkest secrets concerning any Inovonics product.

![i] INOVONICS WARRANTY

I **TERMS OF SALE:** Inovonics products are sold with an understanding of "full satisfaction"; that is, full credit or refund will be issued for products sold as new if returned to the point of purchase within 30 days following their receipt, provided that they are returned complete, and in "as received" condition.

II **CONDITIONS OF WARRANTY:** The following terms apply unless amended *in writing* by Inovonics, Inc.

A. The Warranty Registration Card supplied with the product *must* be completed and returned to Inovonics, or the Warranty registered online at www.inovonicsbroadcast.com, within 10 days of delivery.

B. The Warranty applies only to products sold "as new." It is extended only to the original end-user and may not be transferred or assigned without prior written approval by Inovonics.

C. The Warranty does not apply to damage caused by misuse, abuse, accident or neglect. This Warranty is voided by unauthorized attempts at repair or modification, or if the serial identification tag has been removed or altered.

III **TERMS OF WARRANTY:** Inovonics, Inc. products are warranted to be free from defects in materials and workmanship.

A. Any discrepancies noted within THREE YEARS of the date of delivery will be repaired free of charge, or the equipment will be replaced with a new or remanufactured product at Inovonics' option.

B. Parts and labor for factory repair required after the three-year Warranty period will be billed at prevailing prices and rates.

IV **RETURN OF GOODS FOR FACTORY REPAIR:**

A. Equipment will not be accepted for Warranty or other repair without a Return Authorization (RA) number issued by Inovonics prior to its return. An RA number may be obtained by calling the factory. The number should be prominently marked on the outside of the shipping carton.

B. Equipment must be shipped prepaid to Inovonics. Shipping charges will be reimbursed for valid Warranty claims. Damage sustained as a result of improper packing for return to the factory is not covered under terms of the Warranty and may occasion additional charges.

Revised Sept. 2011