

NANOCONTROLLER[™]

Radio Remote Control Software Version 5.3



Software User Guide

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NANOCONTROLLER Users Manual

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We make every effort to ensure our documentation is as accurate and as complete as possible. In the event that you find any errors or omissions, please contact Customer Tech Support at (908) 852-3700, or via email a service@nucomm.com.

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NANOCONTROLLER Software User Manual

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1 Introduction

This document is a user manual for the NanoController Software. NanoController is a Remote Control Windows PC GUI (graphical user interface) used to control certain IMT and Nucomm products via their built-in RS-232 Serial or Ethernet interfaces.

The NanoController GUI may be referred to as the "NanoController," the "PC GUI," or just the "GUI" throughout this document. Due to the variety of controllable devices (transmitters, receivers, repeaters, encoders, decoders, etc), these units will be referred to either directly by product name or by using term such as "unit," "radio," or "product" as applicable.

The NanoController PC GUI remotely controls and configures modes of operation on various IMT and Nucomm devices. The GUI contains user-friendly screens with pushbuttons and menus for selecting features you wish to setup or program. The GUI also uses dialog boxes for selecting configurable options.

1.1 Manual Overview - The contents of this manual are as follows:

1.1.1 Chapter 2

Chapter 2 contains the NanoController connection and installation information.

1.1.2 Chapter 3

Chapter 3 describes Unit Interface operating instructions for Transmitters.

1.1.3 Chapter 4

Chapter 4 describes Unit Interface operating instructions for Receivers.

1.1.4 Chapter 5

Chapter 5 describes instructions for editing preset and frequency plan configuration files.

1.1.5 Chapter 6

Chapter 6 of this manual contains warranty and support information.

1.2 Glossary - The following terminology will be used throughout this document.

1.2.1 Preset

A standalone group of settings used to define the state of the entire unit. This includes RF, Audio and video settings. Presets are numbered and can be recalled by the user from the front panel (if unit is so equipped). NanoController has the ability to modify presets and choose the settings for each preset. Presets are not channels but can reference a channel in the frequency plan.

1.2.2 Frequency Plan

This defines the radio parameters and capabilities. The allowable tuning range of the unit along with discrete channels are defined here. This will allow the user to separate the band into logical channels and reference them in the presets. Customers can use the IMT default or order a unit with a predefined plan (at extra cost).

1.2.3 Default Frequency Plan

IMT chooses a default frequency plan for each unit model. If the customer does not define or purchase another custom plan the default plan is installed.

1.3 Compatibility

The NanoController GUI controls the following products:

- NANOTX
- NANOTX
- STx
- SRx
- VSTx
- VSRx
- X-TENDER
- MICROLITE
- MOBILE TACTICAL RECEIVER
- SKYMASTER
- MOBILCMDR
- DIRECT VU
- MOBILE VIEWER
- NEWSCODER 4

1.4 PC Minimum Requirements

The Windows PC GUI runs on a Windows PC. It connects to the product via the transmitter's RS-232 serial or Ethernet interface. The Windows PC minimum requirements are:

- Windows XP SP2, Vista SP1 32 bit, Windows 7 32Bit operating systems
- 512 MB RAM
- 1GHz Pentium or better
- RS-232 Serial Port Interface, USB Serial Port Converter, or Ethernet interface.

2 NanoController Connection

2.1 Connecting to the NanoController

2.1.1 Starting NanoController

On the PC, choose "IMT Software" in the Start > IMT software folder to open the "IMT NanoController" Remote Control PC GUI software. The Nano Controller Icon is placed on the desktop upon installation. Upon opening, the main window is displayed. The main window as shown below includes three menus:

- **Radio Controller** Used to select which type of product you wish to control.
- **Configurator** Used to edit Preset programming windows.
- Help Displays the GUI version.



Figure 2-1: GUI main window

2.1.2 Connecting to the Unit

2.1.2.1 Transmitter/Newscoder

Use the 7 pin Lemo (Power Cable) to DB-9 cable. If the computer does not have RS-232 use a USB to RS-232 adaptor.

2.1.2.2 Receiver Products

Connect the receiver to the computer using either a null modem cable with USB to RS 232 adaptor via the receiver's DB-9 connector or an Ethernet cable via the receivers Ethernet port. To use the Ethernet port the computer IP address has to be on the same subnet. The default unit IP address is **192.168.010.035**. When you pick the Ethernet COM, the NanoController will automatically find the receiver.

2.1.2.3 Radio Controller connection

Open the drop down port menu window as shown in Figure 3-2. Select the port needed to connect to the device. All transmitter products will connect a COM

port. All receiver products may be connected to a COM port or Network via the Ethernet port.

Nano Controller 5.3		
Radio Controller Configurator (0)	Help	
Ports :		
COM8		

Figure 2-2: COM menu

2.1.2.4 Start Search Menu

Selecting either a COM port or Network will bring up the Start Search menu. Select the baud rate, UserName, Password, and check the Store this setting and/or Keep Config in Sync if desired from the menu window. Refer to Figure 2-3.

- **Keep Config. in Sync** check box will automatically download the preset and frequency plan files. This is only necessary if you wish to reconfigure the presets or the frequency plan.
- **Store this setting** button will populate this menu the same way every time you boot up the NanoController until the inputs are manually changed.

Nano Con	roller 5.3	
adio Controller	Configurator (0) Help	
Start Sea	rch 🔀	
Baud Rate	9600	
Port	сома	
UserName	user	
Password	••••	
🔲 Keep Config	in Sync 🗹 Store this setting	
Search	Cancel	

Figure 2-3: COM port detection

2.1.2.5 Connection

Click "Search" and the program will automatically detect the connected unit and display the unit interface GUI (Device Controller).

3 **Transmitter Device Controller**

The following describes the unit interface in detail.

Nano Controller 5.3	telo			- 2 🛛
	n ap			
Device Controller				
VSTx 23VST-13-U2-C2-B-M	02-M05 » Status	Config User		
Preset Preset 2	Low AES OFF 14 dBm No Video Input	,		
Тх	Encode			
TX (Law Power)	Composite			
CH: 2- 2.200.000 MHz				
L-Aur	tio R-Audio			
COFDM 8.000MHz 6.032 Mbps	30 MIC:30			
Status:	A	COM8		



Figure 3-1: Unit Device Controller



Figure 3-2: Unit Description Block

3.1 Device Controller Unit Description Block

The Unit Description window contains the following information:

- Unit family (VSTX shown)
- Model number
- Serial number



Figure 3-3: Unit Interface Control Block

3.2 The User Interface Control Block

The User Interface control block is located on left side of the Device Control window. It is broken into three distinct sections:

- The Transmitter
- The Encoder parameters
- Transmitter statistics

3.3 The Transmitter Block

The transmitter block includes the following controls:

- **Preset button** allows user to select Preset. Indicates the frequency and preset selected.
- **RF Power button** allows user to select high or low power output levels. ("Standby" shown)
- **Channel button** Selects the channel and displays frequency set to (CH:2 2,200.000 MHz shown)
- **Modulation button** allows users to specify and monitors both modulation parameters and bit rates ("COFDM 8.000MHz 6.032Mbps" shown)

3.4 The Encode Block

The Encode block includes the following controls:

- **Input Source button** used to select type of video input used ("Composite" shown).
- Left and Right Audio control

3.5 Status Indicators

- **TX Power** power output displayed by combination bar graph and numerical readout.
- **AES Encryption** the AES block will display the encryption status as on or off.

3.6 Unit Status and Configuration Block

The Status and Configuration block is located on the right side of the Device Control window. The block contains three control buttons and one text block as shown below.



Figure 3-4: Unit Status and Configuration Block

3.6.1 Text Block

The text box will display live unit alarms. The potential alarms are as follows:

- "No Video Input"
- "Vin High Voltage"
- "Low Battery"
- "RF Unlocked"
- "Over Temperature"
- "Video Format Error"

3.6.2 Status Button

When pressed will display unit information including but not limited to the following:

- Model number
- Serial number

• Software version

3.6.3 Configuration Button

This allows the user to upload or download radio configurations and to access the preset and frequency plan files. A detailed explanation is given below.

3.6.4 Login Button

When pressed, the Login NanoController widow is opened. This window is used to logon at different access levels. There are two access levels:

- User Lets the user control the basic unit parameters on both the Unit Interface and the Configuration files.
- Administration Gives the user greater access to the Unit Interface and Configuration files.

¥Nano Con¹	troller 5.3		
Radio Controller	Configurator (0)	Help	
	Device Cont	roller	
	VSTx 23VST-13-U2 071753-635	2-C2-B-M02-M05 » Status Config User	
	Preset	Tx: Low AES OFF Alarm:	
	Preset 2	Login NanoController 🔀	
	Тх		
		User Name :	
		Password:	
	CU 0	Log in Cancel	
	2,200.000 MHz		
		L-Audio R-Audio MIC-30 MIC-30	
	COFDM 8.000MHz 6.032 Mbps		
S	itatus:	COMB	

Figure 3-5: NanoController Login Window

3.7 Transmitter User Interface controls

3.7.1 Preset Control

Pressing the preset control will produce a simple drop down menu as shown below.

🗖 Device Cont	iro	ller				_	
VSTx 23VST-13-U 071753-635	12-C 5	2-B-M02-M	105 »	Status	Config		User
Preset Preset 2 Save to Preset Preset 1 Preset 2 Preset 3 Preset 4		Tx: Low 14 d Enc	AES OFF IBm ode	Alarm: No Video Input	·		
Preset 5 Preset 6 Preset 7 Preset 8 Preset 9 Preset 10 Preset 11		L-Audio MIC:30	R-Audio MIC:30				
Preset 12							COM8
Preset 13 Preset 14							

Figure 3-6: Preset drop down menu

Select the desired preset needed. The 'Save to preset' option will automatically save the current parameter changes to the unit without having to download the configuration files. The NanoController will prompt you with the option of which preset to save to.

3.7.2 Transmitter Power Control

Simply click on one of the three desired RF Transmit power options from the drop down menu:

- **Standby** The RF output power is turned off in this mode. The unit can optionally be set within a preset to enter the Standby mode with the loss of video input.
- **TX (High)** Full output power
- **TX** (Low) Typically set to 6dB below full output power.

The RF Power Status block will indicate the power level out.

ontroller 5.3					
l <mark>er Configurator (0) H</mark> e	elp				
		_			
Contro Contro	oller				
VSTx 23VST-13-U2- 071753-635	C2-B-M02-M05 »	Status	Config	User	
Preset	Tx: Low AES OFF	Alarm: No Video Incut			
Preset 2		NO VIGEO INPUC			
Тх	Encode				
TX (Low Power)					
	Composite				
Standby					
TX (High)					
TX (Low)					
	L Audio D Audio				
COFDM 8.000MHz	MIC:30 MIC:30				
6.032 Mbps					
Status:				COM8	

Figure 3-7: RF Power drop down menu

3.7.3 RF Channel

The RF Channel area displays what frequency and channel are in use. Click the button and the Band/Channel Selection window will appear. The drop down menu is populated with the channels supplied in the frequency plan. Use the drop down menu to make any changes.

🗠 Nano Cor	ntroller 5.3				
Radio Controlle	r Configurator (0) Help				
	Cevice Controller				
	VSTx 23VST-13-U2-C2-B-M02-M05	Status	Config	User	
	Band/Channel Selection	Alarm: No Video Input	·		
	Band 1: Completed 21 channels				
	Band				
	Band: 1				
	Channel				
	\checkmark				
	Direct Fregency (KHz)				
	Bandwidth: 8.00 MHz				
	OK Cancel				
	Status:			COM8	

Figure 3-8: RF Channel selection window

3.7.4 Modulation Control

"COFDM" - The COFDM modulation control has two options on the drop down menu:

3.7.4.1 COFDM

Choosing the COFDM will open a menu as shown below:

OFDM Setting	gs		_	×
- Constellatio	n			
QPSK	16QAM	© 64QAN	1	
Code Rate				
I/2	© 2/3	o 3/4	o 5/6	7/8
Guard Inter	val			
I/32	© 1/16	1/8	1/4	
Bandwidth				
🔘 6 MHz	🔘 7 MHz	8 MHz		
Spectrum			Data D	
Normal	Invertee	d	Data Ra	.032 Mbps
	_			
Ok				Cancel

Figure 3-9: COFDM settings

The COFDM Modulation settings affect the data rate and error rates. Data rate requirements vary depending upon video applications. Follow the instructions in the section, "COFDM Modulation Settings – Reference Information" found later in this chapter to select which parameters to use in the COFDM Settings dialog box.

3.7.4.2 NB-COFDM

It chooses narrow band COFDM at either 1.25 or 2.5MHz. Choosing the NB-COFDM will open a menu as shown below:

NB-COFDM	Settings		×
Constellation			
⊙ QPSK			
Code Rate			
⊙ 1/2	0 2/3	0 3/4	
Guard Interval			
• 1/32	0 1/16	0 1/8	0 174
Bandwidth			
⊙ 1.25 MHz	🔘 2.5 MHz		
Spectrum		Data	Dete :
💿 Normal 🔘	Inverted	Data	0.943 Mbps
01	1		Casad
UK	J		Lancel

Figure 3-10: NB-COFDM settings window

3.7.5 Video Input Source

The Video Input has between one and four choices depending on product type. Simply select the desired video input source as shown below.



Note: The transmitter will automatically detect between composite and SDI.

Figure 3-11: Video Input drop down window

3.7.6 Left and Right Audio Control

The Audio Control window has the following parameters from which to choose:

- Audio Input
- Gain Level

3.7.6.1 Audio Level

The drop down menu allows you to select the following audio options:

- **OFF** Audio OFF
- Line Sets to line level audio
- **Tone** selects internal tone (1kHz)
- **Embedded** Sets audios to embedded
- MIC Sets to mic level audio
- MIC_PP Sets to mic level audio with microphone bias (5VDC)

3.7.6.2 Gain Level

The gain level is adjustable from -12 to + 50dBs in 1dB steps.

4 Receiver Unit Interface



Figure 4-1: Receive Device Controller window

4.1 Device Controller Unit Information Block

The same as the Transmitter (2.3.1)

4.2 The Receiver Unit Interface Block

The Receiver Unit Interface includes the following elements:

- **Preset Menu button** allows user to select Preset configurations.
- **RF Channel button** –Used to change channel and frequency.
- Modulation button allows user to select modulation modes.

The Unit Interface control buttons work in the exact same fashion as the transmitter.

4.3 The Receiver Statistic Window

The Receiver Statistics are displayed two distinct blocks.

4.3.1 Modulation/Decode

The Modulation and Decoder statistics are shown in the figure below:

Modulation	QPSK
Bandwidth	8 MHz
Code Rate	1/2
Guard Int.	1/32
Post Vit	9.9e-1
UCE	0

Figure 4-2: Modulation/decoder Statistics

Note: The Transmitter and Receiver must be set to the same bandwidth to decode video.

4.3.2 **RF Link Quality Statistics**

RF Link Quality statistics are located to the right of the column of the control buttons and displays three bar graphs and the corresponding numerical values. The three statistics displayed are as follows:

- RSL (Received Signal Level)
- MER
- Link Q (link quality is an IMT metric for determining quality of received signal)



Figure 4-3: RF Link Quality window

4.3.3 Unit Information and Configuration Window

The right half of the RX Controller window displays Alarms, Unit Information or Configuration Data (i.e. hardware and software version information). The block contains three control buttons and one text block as shown below.



Figure 4-4: Unit Information and Configuration Block

4.3.4 Text Box

The text box will display live unit alarms. The potential alarms are as follows:

- "Demod unlocked"
- "Vin High Voltage"
- "Low Battery"
- "RF Unlocked"
- "Over Temperature"
- "Video Format Error"

4.3.5 Status Button

When pressed will display unit information including but not limited to the following:

- Model number
- Serial number
- Software version

4.3.6 Configuration Button

The Config button allows the user to upload or download radio configurations and to access the preset and frequency plan files. Refer to chapter 5for unit configuration in details.

4.3.6.1 Login Button

The Login button displays the current access level. Selecting the login button activates the login window. There are two access levels:

- User Lets the user control the basic unit parameters on both the Unit Interface and the Configuration files.
- Administration Gives the user greater access to the unit's Unit Interface and Configuration files.

4.4 COFDM Modulation Settings – Reference Information

4.4.1 COFDM Guidelines

The COFDM Data Rate is determined by manipulating Guard Interval, Code Rate, Bandwidth and Constellation, per the COFDM Data Rate tables in the following section.

As a rule of thumb, select the COFDM parameters in this order:

- Use the lowest data rate required to pass the necessary data.
- Use the maximum Bandwidth allowed by your spectrum manager(s).
- Choose the minimum Constellation (i.e. Modulation System) setting that will allow the data rate required. For example, do not use 16QAM if enough data can be transmitted using QPSK.
- Adjust the GI (Guard Interval) and CR (Code Rate).

The GI, or "safety bits", enhances the ability to operate in multipath environments (around buildings, across water, etc.) by increasing the time delay between data segments. Increasing the GI (1/4 is the maximum setting) increases link robustness but reduces the overall data rate, as less time is made available for payload transmission. Conversely, moving the GI towards 1/32 (the minimum) decreases link robustness but allocates more bits to payload.

The CR controls how much error correction overhead is included in the data stream. To compensate for a poor link, moving the CR towards 1/2 (maximum error correction) increases link robustness as bits are re-allocated from payload to error correction. Moving the CR towards 7/8 (minimum error correction) allocates bits from error correction to payload.

4.4.2 COFDM Data Rate Tables

The tables in this section show the data rates available by modifying the COFDM parameters.

Note: When inputting ASI signals, the data rate should be set to approximately 1-2 Mbps above the ASI input rate.

Modulation	Code		Guard I	nterval	
System	Rate	1/32	1/16	1/8	1/4
				BW = 7 MH	Z
			Data Rate	e (Mbps)	
	1/2	5.27807525	5.12283713	4.8382355	4.35441213
	2/3	7.037433375	6.8304495	6.45098038	5.80588225
QPSK	3/4	7.917112	7.68425613	7.25735325	6.53161775
	5/6	8.7967915	8.53806188	8.06372525	7.25735325
	7/8	9.23663125	8.96496563	8.46691213	7.620221
	1/2	10.5561505	10.2456743	9.676471	8.70882425
	2/3	14.07486675	13.660899	12.9019608	11.6117645
16-QAM	3/4	15.834224	15.3685123	14.5147065	13.0632355
	5/6	17.593583	17.0761238	16.1274505	14.5147065

	7/8	18.4732625	17.9299313	16.9338243	15.240442
	1/2	15.83422575	15.3685114	14.5147065	13.0632364
	2/3	21.11230013	20.4913485	19.3529411	17.4176468
64-QAM	3/4	23.751336	23.0527684	21.7720598	19.5948533
	5/6	26.3903745	25.6141856	24.1911758	21.7720598
	7/8	27.70989375	26.8948969	25.4007364	22.860663
	T	11 4 1 PMIL D	1.141 D.4.1		

Table 4-1: 7MHz Bandwidth Data Rates

Modulation	Code		Guard I	nterval	
System	Rate	1/32	1/16	1/8	1/4
				BW =	6 MHz
			Data Rate	e (Mbps)	
	1/2	4.5240645	4.48248248	4.2334561	3.81011061
	2/3	6.03208575	5.854671	5.5294118	4.9764705
QPSK	3/4	6.786096	6.58650525	6.2205885	5.5985295
	5/6	7.540107	7.31833875	6.9117645	6.2205885
	7/8	7.9171125	7.68425625	7.2573533	6.531618
	1/2	9.048129	8.7820065	8.294118	7.4647065
	2/3	12.0641715	11.709342	11.058824	9.952941
16-QAM	3/4	13.572192	13.1730105	12.441177	11.197059
	5/6	15.080214	14.6366775	13.823529	12.441177
	7/8	15.834225	15.3685125	14.514707	13.063236
	1/2	13.5721935	13.1730098	12.441177	11.1970598
	2/3	18.0962573	17.564013	16.588235	14.9294115
64-QAM	3/4	20.358288	19.7595158	18.661766	16.7955885
	5/6	22.620321	21.9550163	20.735294	18.6617655
	7/8	23.7513375	23.0527688	21.77206	19.594854

 Table 4-2:
 6 MHz Bandwidth Data Rates

Modulation	Code		Guard I	nterval		
System	Rate	1/32	1/16	1/8	1/4	
				BW = 2.5 N	1Hz	
			Data Rate	e (Mbps)		
	1/2	1.88503				
QPSK						
	3/4	2.82754				
Table 4-3: 2.5 MHz Data Rates						

Modulation	Code		Guard Interval	
System	Rate	1/32		

		BW =1.25 MHz		
		Data Rate (Mbps)		
QPSK	1/2	0.94251		
	3/4	1.41377		
Table 4-4: 1.25 MHz Bandwidth Data Rates				

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5 Preset and Frequency Plan Configuration

5.1 Using the GUI Preset Configuration Window

5.1.1 Login

Login from the third tab in the Unit Information and Configuration block (shows "USER" in **Figure 5-1**). The tab will display the current login state. Pressing the login tab will activate the login unit. Enter the User and Password. Two levels are available:

- User Lets the user control the basic unit parameters on both the Unit Interface and the Configuration files.
- Administration Gives the user greater access to the Unit Interface and Configuration files. The Administrator can turn "on" or "off" the ability to program all available files.

5.1.2 Downloading Configuration Files

Choose Download Configuration from the drop down menu from the Config tab. The unit will now down load the Preset and Frequency Plan configuration files from the unit. The Config button will be olive green when the files have completed downloading or if the files have been downloaded previously.

Note: Skipped this step if the "Keep Config in Sync" box was checked when first booting up the NanoController.

Once the configuration files are downloaded, choose the desired file to upload to the NanoController as shown below.



Figure 5-1: Config File Menu

- Preset settings include all programmable options, including modulation parameters, frequencies and channels, and streaming video over Ethernet options, if available.
- Frequency plan includes the frequency plan and the channels.

5.2 Editing Transmitter Presets

5.2.1 Preset Tabs

Choose the set of fields you wish to edit. The Preset Tab number will correspond to the faceplate Preset button number, if present on your product. You can select multiple presets by using the following steps:

- Hold down the "control" key and click each tab to select multiple presets.
- Hold down the "shift" and click a tab to select a range of presets
- The fields that are not universally the same through all presets will be highlighted in green. A change to the field will transfer to all the selected presets.

5.2.2 Administrator control

The drop down menus to the right of each field allows the administrator to control the access of the field. Control of the inner fields is nested by the parent controls in the upper right corner of each section.

Radio Controller	Configurator (0)	Help						
Preset Number	18	Factory -	1 2 3	4 5 6	7 8 9	0 10 11 12	13 14 1	5 16 Factory
Encryption		Admin 👻						User 🔻
AES Mode	disable 🔹	Admin 👻	Preset Name	Preset 1	Admin 👻	Encoding		User 👻
AESKey			AES Key ID	1 -	Admin 👻	Service		Factory -
1 2 3	4 5		Input Source	Composite •	Admin 👻	Service ID	1	lleer v
AES Key		Admin 👻	Video Loss Mode	Bars 💌	Admin 👻	Service Name	NUCOMM	
Name	Key 1	Admin 👻	Spectrum	Normal 👻	Admin 👻	Service Provider	NUCOMM	User v
Length	256 👻	Admin 👻	RF Output		User 👻	Service Rate Mode	Auto	User v
Key	•••••	Admin 👻	TX Mode	TX •	User 🔻	Service Only Rate	1000000	User v
			Power Level	High 👻	User 👻			
Pedestal	On 👻	Admin 👻	Frequency Channel	1	User 🔻	Video		Admin
User Data		Admin -	Direct Freq Mode	false 👻	User 👻	Video PID	256	
PID	514	lleer 💌	Direct Frequency	5800000 🚔	User 👻	Video Standard	490:20.07	User •
Mode		User 🔻				Encoding Format	400/23.37 V	User V
Data Rate	9600 -	User 🔻	Modulation		Admin 👻	GOP	Simple -	
Latency	500	Admin 💌	Current Type	COFDM -	Admin 👻		Simple	User
Data Bits	8	Admin 🔻	COFDM		Admin 👻	Audio		
Parity	None	Admin 🔻	Constellation	160AM -		1 2		
Stop Bits	1 •	Admin 🔻	Code Rate	2/3	Admin 👻	Audio 1		Admin 👻
			Guard Interval	1/32		Audio PID	512	
Telemetry		Admin 👻	Bandwidth	8MHz 👻	Admin 🔻	Sample Rate		User V
PID	515	Admin				Bitrate	128kbps -	
Mode		Admin 🔹	Narrow Bandwidth CO	FDM	Admin -	Encoding Mode	MP1 v	Factory T
		/ dimit	Constellation	OPSK -		Channel		- dotory
Remote		lleer 💌	Code Rate		Admin	Left Right		
Address	1		Guard Interval	3/4 •		Channel Left		User 👻
Raud Rate		User 👻	Bandwidth	1.25MHz =		Input	Embedded	
Dobu Hore	9600 -	User 🔻		1.2314112		Line Gain		User V
						Mic Gain	30	User V
							139	

Figure 5-2: Preset Configuration Screen

5.2.3 Global Settings

These are setting that will affect every preset selection. The global settings are located on the right side of the preset menu. See the figure and tables below.

점 Radio Controller	Configurator (0)	Help
Encryption		Admin 🔽
AES Mode	disable 🔽	Admin 🔽
AESKey		
1 2 3	4 5	
AES Key		Admin 🔽
Name	Key 1	Admin 🔽
Length	256 🔽	Admin 🔽
Key		Admin 🔽
	L	
Pedestal	On 🔽	Admin 🔽
User Data		Admin 🔽
PID	514	User 🔽
Mode	Off 🔽	User 🔽
Data Rate	9600	User 🔽
Latency	500	Admin 🔽
Data Bits	8	Admin 🔽
Parity	None 🔽	Admin 🔽
Stop Bits	1	Admin 🔽
		Admin 🔽
PID	515	Admin
Mode	04	
		Admin
Remote		User 🔽
Address	1	User 🔽
Baud Rate	9600	User 🔽

Figure 5-3: Global Preset Settings

Field	Setting	Range
Encryption	AES Mode	Disable, bcrypt1, or bcrypt2
	AES Key Name	User selectable
	Length	128 or 256 bit
Encryption	AES Key	User selectable
Pedestal	On/Off	On/Off – Used for troubleshooting
User Data	PID	32 to 8190
	Mode	On, off, or data trigger
	Data Rate	1200, 2400, 4800, 9600, 19200,
		38400, 57600, and 115200
	Latency	0 to 1000mS (100mS increments)
	Data Bits	7 or 8
	Parity	Even, odd, or none
	Stop Bits	1 or 2

 Table 5-1:
 Transmitter and User Data Settings

Field	Setting	Range
Telemetry	PID	32 to 8190
	Mode	On or Off
Remote	Address	Factory Set
	Baud Rate	1200, 2400, 9600, 19200, 38400,
		57600, 115200

 Table 5-2:
 Transmitter Telemetry, Remote and Ethernet Settings

5.2.4 Preset and RF Settings

See figure and table below.

1 2 3	4 5 6	7 8 9
Preset Name	Preset 1	Admin 🔽
AES Key ID	Off 🔽	Admin 🔽
Input Source	Composite 🔽	Admin 🔽
Video Lo ss Mode	Black 🔽	Admin 🔽
Spectrum	Normal 🔽	Admin 🔽
RF Output		User 🔽
TX Mode	TX 🔽	User 🔽
Power Level	Low	User 🔽
Frequency Channel	1	User 🔽
Direct Freg Mode	false 🔽	User 🔽
Direct Frequency	2200000	User 🔽

Figure 5-4: Transmitter Preset and RF Output Settings

Field	Setting	Range	
Preset	Preset Name	Text	
Information			
	AES Key	On/Off	
	Input Source	Composite, Bars, or ASI	
	Video Loss Mode	Black, Bars, or Standby	
	Spectrum	Normal or Inverted	
RF Output	TX Mode	TX or Standby	
	Power Level	High or Low	
	Frequency Channel	1 to 255	
	Direct Freq Mode	true (on) or false (off)	
	Direct Frequency	RF Frequency	
Table 5-3: Transmit Preset and RF Output Settings			

Note: This is the admin screen. In the user screen, the user will have access to only the settings tagged "User"

5.2.5 Modulation Settings

See figure and tables below.

Modulation			Admin 🔽	
Current Type	COFDM		Admin 🔽	
Constellation	QPSK	~	Admin 🔽	
Code Rate	1/2	~	Admin 🔽	
Guard Interval	1/32		Admin 🔽	
Bandwidth	8MHz	~	Admin 🔽	
Narrow Bandwidth COFDM				
Constellation	QPSK		Admin 🔽	
Code Rate	3/4		Admin 🔽	
Guard Interval	1/32	~	Admin 🔽	
Bandwidth	1.25MHz		Admin 🔽	

Figure 5-5: Transmitter and Bandwidth Settings

Field	Setting	Range
COFDM	Constellation	QPSK, 16QAM, or 64QAM
	Code Rate	1/2, 2/3, 3/4, 5/6, or 7/8
	Guard Interval	1/4, 1/8, 1/16, or 1/32
	Bandwidth	6, 7, or 8 MHz
NB-COFDM	Constellation	QPSK, 16QAM, or 64QAM
	Code Rate	1/2, 2/3,3/4, 5/6, or 7/8
	Guard Interval	1/4, 1/8, 1/16, or 1/32
	Bandwidth	1.25Mhz or 2.5MHz

 Table 5-4:
 Transmitter Modulation and Bandwidth Settings

5.2.6 TX Encoding Settings

See figure and table below.

			User 🔽
Encoding			User 🔽
Service			Admin 🔽
Service ID	1	-	User 🔽
Service Name	NUCOMM		User 🔽
Service Provider	NUCOMM		User 🔽
Service Rate Mode	Fixed	\sim	User 🔽
Service Only Rate	3700000		User 🔽
Video			Admin 🔽
Video PID	256	-	User 🔽
Video Standard	480i29.97	~	User 🔽
PSF Mode	false	~	User 🔽
Encoding Format	480i	\sim	User 🔽
GOP	Simple	$\overline{}$	User 🔽

Figure 5-6: Transmitter Encoding and Video Settings

Field	Setting	Range
Encoding	Service ID	User selectable
	Service Name	User selectable
	Service Provider	User selectable
	Service Rate Mode	Fixed or Auto
	Service Only Rate	3.8Mbps to 10Mbps
Video	Video PID	1 to 8190
	Video Standard	Unit dependant
	PSF Mode	False (Off) or True (On)
	Encoding Format	Auto
	GOP	Low Latency, Simple, Long, Advanced

Table 5-5: Transmitter Encoding and Video Settings

5.2.7 Audio Settings

See figure and table below.

Audio		
1 2 Audio 1		Admin 🔽
Audio PID	512	
Sample Rate	48KHz	User 🔽
Bitrate	128kbps	User 🔽
Encoding Mode	MP1	Factory 🗸
Channel		
Left Right		
Channel Left		User 🔽
Input	Line	User 🔽
Line Gain	0	User 🔽
Mic Gain	40	User 🔽
L		
PCR PID	128	Admin 🔽
Tone Level	-10	Admin 🔽

Figure 5-7: Transmitter Audio Settings

Field	Setting	Range	
Audio	Audio PID	1 to 8190	
	Sample Rate	32khz, 44.1khz, or 48khz	
	Bitrate	64khz, 128khz, or 256khz	
	Encoding Mode	MP1 or AC3	
Channel Left	Input	Off, Line, Tone, MIC, or MIC+PP	
	Line Gain	0 to 50dB	
	Mic Gain	0 to 50dB	
	PCR PID	1 to 8190	
	Tone Level	-12dB to 50ddB	
Channel Right	Input	Off, Line, Tone, MIC, or MIC+PP	
	Line Gain	0 to 50dB	
	Mic Gain	0 to 50dB	
	PCR PID	1 to 8190	
	Tone Level	-12dB to 50ddB	

 Table 5-6:
 Transmitter Audio Settings

Note: Audio 2 tab not used

5.2.8 Uploading Preset Configuration Files

To upload the new preset configuration files to the unit follow the steps below:

- Click on the Config Tab and choose the "Save Package to Disk". This will send both the FreqPlan and Preset files as a package with an .imt file extension to a directory chosen by the user. This step does not have to be done to upload files to the unit.
- Click on the "Upload Package to Device" to send the FreqPlan and/or Preset files as a package to the unit. The NanoController will automatically load the files and reboot the unit. Follow all NanoController prompting during upload.

5.3 Editing Receiver Presets

The Preset screens for the RX are essentially the same as the TX with some minor differences. The screens that follow show the available settings.

🛯 Nano Control	ler 5.3 - [Pr	eset Viewe	r - User:admin (Access Level: Admin)]	_ 8 🗙
🞽 Radio Controller	Configurator (0)	Help		_ 8 ×
MODEL: 23/47SR-U3-B	3-VIP-M Serial No:	1000020820		
Current Preset ID	2	User 🔽	Presellnío	
Output Video		Admin 🔽	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 Factory	
Video Format	480i29.97	Admin 🔽	User	
Pedestal	Off 🔽	Admin 🔽	Preset Name Preset 1 Admin V Decoding User V	
·			RF Input User V PID Mode Manual V Admin V	
VIP Streaming		Admin 🔽	Band ID 0 User V PCR PID 128 Admin V	
Mode	BTSP 🔽	Admin 🔽	Frequency Channel 1 User Video Admin V	
RTSP		Admin 🔽	Video PID 256	
Multicast Address	225.1.1.1	A data ITA	AES Key ID 1 Admin	=
Multicast Port	10000	Admin 🖸	Modulation Admin Admin Admin	
Idle Session Timeout	60		Current Type COFDM V Admin V Audio PID 512	
Max Number Clients	20	Admin 🔽	COFDM Admin Source Decoder V User	
			Bandwidth BMH2 Channel	
Manual		Admin 🔽	Left Right	
Encapsulation	UDP-TS	Admin 🔽	Narrow Bandwidth COFDM Admin Channel Left User	
Destination Address	192.168.10.5	Admin 🔽	Bandwidth 125MHz Admin Gain 0 S User	
Destination Port	1234	Admin 🔽		
Grouping	7	Admin 🔽		
l				
Encryption		Admin 🔽		
AES Mode	bcrypt1 🔽	Admin 🔽		
AESKey				
1 2 3	4 5			
AES Key		Admin 🔽		
Name	Key 1	Admin 🔽		

Figure 5-8: Receiver Preset Settings Window

5.3.1 Receiver Global Settings

5.3.1.1 Video Out and Video over IP Settings

See figure and table below.

🗠 Nano Control	ler 5.3 - [H	Preset Viewe
점 Radio Controller	Configurator (0)) Help
MODEL: 23/47SR-U3-B	B-VIP-M Serial A	lo: 1000020820
Current Preset ID	2	User 🔽
Output Video		Admin 🔽
Video Format	480i29.97	Admin 🔽
Pedestal	Off 🔽	Admin 🔽
VIP Streaming		Admin 🔽
DTCD	RTSP 💟	Admin 💟
ni ər		Admin 🔛
Multicast Address	225.1.1.1	Admin 🔽
Multicast Port	10000	Admin 🔽
Idle Session Timeout	60	Admin 🔽
Max Number Clients	20	Admin 🔽
Manual		Admin 🔽
Encapsulation	UDP-TS	Admin 🔽
Destination Address	192.168.10.5	Admin 🔽
Destination Port	1234	Admin 🔽
Grouping	7	Admin 🔽

Figure 5-9: Receiver Factory, Output Video and VIP Streaming

Field	Setting	Range
Factory Information	Model and Serial	Factory set
	CurPresetID	Preset selected at bootup
Output Video	Video Format	*Enter format to scan first
	Pedestal	On/Off
VIP Streaming	Mode	Off/RTSP/Manual
RTSP	Multicast	Multicast address
	Multicast Port	
	Idle Sesion Timeout	Entered in seconds
	Max Number of clients	Enter Max of clients
Manual	Encapsulation	UDP-TS or RTP-TS
	Destination Address	Enter address
	Destination Port	
	Grouping	

 Table 5-7: Receiver Factory, Output Video and VIP Streaming Settings

*NOTE: The decoder will auto detect the format. The user has the ablity to enter a format to scan first for faster decoding.

5.3.2 Encryption Settings

See figure and table below.



Figure 5-10: Receiver Encryption Settings

Setting	Range
AES Mode	Disable/bcrypt 1/bcrypt 2
Name	Name of Key in 16 characters
Length	128 or 256
Key	1 to 5
	Setting AES Mode Name Length Key

 Table 5-8: Receiver Encryption Settings

Note: Up to 5 encryption keys may be entered

5.3.3 Remote and Ethernet settings

See figure and table below.

Remote		Admin 🔽
Address	1	Admin 🔽
Baud Rate	9600 🔽	Admin 🔽
Ethernet		User 🔽
DHCP Mode	false 🔽	User 🔽
IP Address	192.168.10.35	User 🔽
Subnet Address	255.255.255.0	User 🔽
Gateway Address	192.168.127.1	User 🔽

Figure 5-11: Receiver Remote and Ethernet Settings

Field	Setting	Range	
Domoto	Adress	Eastery salastable	
Remote	Address	Factory selectable	
	BaudRate	300, 600, 1200, 2400, 9600, 38400,	
		57600, and 115200 kbps	
Ethernet	DHCPMode	True (on) or false (off)	
	IP Address	User selectable	
	Subnet Address	User selectable	
	Gateway Address	User selectable	
Table 5-9: Receiver Remote and Ethernet Settings			

5.3.4 Receiver Preset Editing

5.3.4.1 RF, AES Encryption and Modulation Settings See figure and table below.

6	7 8 Admin 🔽
	Admin 🔽
	User 🔽
÷	User 🔽 User 🔽
	Admin 🔽
	Admin 🔽
$\mathbf{\sim}$	Admin 🔽
	Admin 🔽
~	Admin 🔽

Figure 5-10: Receiver Preset Info, RF Input, Decryption and Modulation Settings

Field	Setting	Range	
Preset Info	Preset Name	Name of preset in 16 characters	
RF Input	Band ID	0 to 1	
	FreqPreset	1 to maximum channel in freq plan	
Decryption	AES Key ID	Keys 1 to 5 selectable	
Modulation	Current ModulationType	COFDM or NB-COFDM	
COFDM	Bandwidth	6, 7, or 8MHz	
NBCOFDM	Bandwidth	1.25MHz or 2.5MHz	
Table 5-11: Receiver Preset Info. RF Input Decryption and Modulation Settings			

 Table 5-11: Receiver Preset Info, RF Input, Decryption and Modulation Settings

5.3.4.2 Decoding Settings

See figure and table below.

10 11 12	13	14 15 16 Facto
		User
Decoding		User
PID Mode	Manual	Admin 🔽
PCA PID	128	Admin 🔽
~ Video		Admin 🔽
Video PID	256	Admin 🔽
Audio		Admin 💟
Audio PID	512	User 🔽
Source	Decoder	User 🔽
Channel		
Left Right		
Channel Left		User 🔽
Gain	0	User 🔽

Figure 5-12: Receiver Video and Audio Decoding Settings

Field	Setting	Range
Decoding	PID Mode	Auto or Manual
	PCR_PID	32 to 8190
Video	Video PID	32 to 8190
Audio	Audio PID	32 to 8190
	Gain	0 to 50
	Low Delay Mode	1 (on) or 0 (off)

Figure 5-13: Receiver Video and Audio Decoding Settings

5.4 TX/RX Frequency Plan Editing Procedures

5.4.1 Band (Factory Set Only)

Band 0 refers to the lower frequency band and Band 1 refers to the higher frequency Band. Dual band is a receiver only option. All band parameters are factory level settings

5.4.2 Channel Tabs

Choose the set of fields you wish to edit. The Channel Tab number will correspond to the channel number in the frequency plan.

5.4.2.1 Field Options

- Use the up/down arrow button to the right of fields or input a value to enter your choice.
- The drop down menus on the right are used to control user access.

HODEL: 23/47SR-U3-B3-VIP-M Serial No: 1000020820 Plan User ✓ MaxNiBands 2 ↓ Factory, ✓ Band 0 1 ✓ Band 0 1 ✓ PhyBand 0 ↓ Factory, ✓ BandName S-Band Factory, ✓ BandName S-Band Factory, ✓ LowLimit 2200000 ↓ Factory, ✓ HighLimit 2400000 ↓ Factory, ✓ StepSize 1000 ↓ Factory, ✓ StartChnl 1 ↓ Factory, ✓ OlfsetOption 2 ↓ Factory, ✓ DirectFreq 0 ↓ Factory, ✓ IF_Freq 810000 ↓ Factory, ✓ HixHighLow true ↓ Factory, ✓ ILwypass false ↓ Factory, ✓ InvertedFlag true ↓ Factory, ✓ Channel 11 ↓ Factory, ✓	점 Radio Controller	Configurator (0)	Help
Plan User MaxNiBands 2 > Band 0 1 Band Admin 0 1 Band Admin PhyBand 0 BandName S-Band BandName S-Band Factory Factory BandName S-Band Factory Factory LowLimit 200000 StepSize 1000 StartChnl 1 1 Factory OlfsetOption 2 DirectFreq 200000 Factory PLLBypass Factory MixHighLow true InvertedFlag true Tal Factory CunPresetID 11	MODEL: 23/47SR-U3-B3	3-VIP-M Serial No:	1000020820
MaxNiBands 2 Factory Band 0 1 Band 0 Admin Image: Constraint of the state of the s	Plan		User 🔽
Band O 1 Band O Admin ♥ Phyßand O Factor, ♥ BandName S-Band Factor, ♥ LowLimit 220000 ↓ Factor, ♥ HighLimit 240000 ↓ Factor, ♥ StepSize 1000 ♥ Factor, ♥ StepSize 1000 ♥ Factor, ♥ StopChnl 21 ♥ Factor, ♥ OffsetOption 2 ↓ Factor, ♥ OffsetFreq 0 ↓ Factor, ♥ DirectFreq 220000 ↓ Factor, ♥ HE_Freq 81000 ↓ Factor, ♥ HighlighLow true ♥ Factor, ♥ MixHighLow true ♥ Factor, ♥ InvertedFlag true ♥ Factor, ♥	MaxNrBands	2	Factory 🗸
0 1 Band 0 Admin ▼ PhyB and 0 Factory ▼ BandName S-Band Factory ▼ BandName S-Band Factory ▼ LowLimit 2200000 Factory ▼ HighLimit 2400000 Factory ▼ StepSize 1000 Factory ▼ StartChnl 1 Factory ▼ OtfsetOption 2 Factory ▼ OtfsetFreq 0 Factory ▼ DirectFreq 200000 Factory ▼ IF_Freq 810000 Factory ▼ MintlighLow true ▼ Factory ▼ InvertedFlag true ▼ Factory ▼ CunPresetID 11 Factory ▼	Band		
Band 0 Admin ♥ Phy8 and 0 ↓ Factoly, ♥ BandName S.Band Factoly, ♥ LowLimit 2200000 ↓ Factoly, ♥ HighLimit 2400000 ↓ Factoly, ♥ StepSize 1000 ↓ Factoly, ♥ StartChnl 1 ↓ Factoly, ♥ StartChnl 21 ↓ Factoly, ♥ OtfsetOption 2 ♀ Factoly, ♥ DisetFreq 0 ↓ Factoly, ♥ DisetFreq 810000 ♀ Factoly, ♥ PLLBypass false ♥ Factoly, ♥ InvertedFlag true ♥ Factoly, ♥ CurPresetID 11 ♀ Factoly, ♥	0 1		
PhyBand 0 Factory BandName S-Band Factory, ~ LowLimit 220000 Factory, ~ HighLimit 2400000 Factory, ~ StepSize 1000 Factory, ~ StartChnl 1 Factory, ~ StopChnl 21 Factory, ~ OffsetOption 2 Factory, ~ DirectFreq 0 Factory, ~ PLLBypass false Factory, ~ MixHighLow true Factory, ~ InvertedFlag true Factory, ~ CunPresetID 11 Factory, ~	- Band 0		Admin 🔽
BandName S-Band Factory LowLimit 220000 Factory HighLimit 2400000 Factory StepSize 1000 Factory StartChnl 1 Factory StopChnl 21 Factory OtfsetOption 2 Factory DirectFreq 0 Factory IF_Freq 810000 Factory MintHighLow true Factory InvertedFlag true Factory CurPresetID 11 Factory	PhyBand	0	Factory 🗸
LowLimit 2200000 Factory HighLimit 2400000 Factory StepSize 1000 Factory StartChnl 1 Factory StopChnl 21 Factory OlfsetOption 2 Factory DirectFreq 0 Factory DirectFreq 200000 Factory FF_Freq 810000 Factory MixHighLow true Factory InvertedFlag true Factory CurPresetID 11 Factory	BandName	S-Band	Factory, 🗸
HighLimit 2400000 Factory StepSize 1000 Factory StartChnl 1 Factory StopChnl 21 Factory OlfsetOption 2 Factory OlfsetFreq 0 Factory DirectFreq 2200000 Factory IF_Freq 810000 Factory MixHighLow true Factory InvertedFlag true Factory CurPresetID 11 Factory	LowLimit	2200000	Factory 🗸
StepSize 1000 Factor, • StartChnl 1 Factor, • StopChnl 21 Factor, • OffsetOption 2 Factor, • OffsetFreq 0 Factor, • DirectFreq 200000 Factor, • IF_Freq 810000 Factor, • PLLBypass false Factor, • InvertedFlag true Factor, • CurPresetID 11 Factor, •	HighLimit	2400000 🌔	Factory 🗸
StartChnl 1 Factor, • StopChnl 21 Factor, • OffsetOption 2 Factor, • OffsetFreq 0 Factor, • DirectFreq 20000 Factor, • DirectFreq 81000 Factor, • PLLBypass false Factor, • InvertedFlag true Factor, • CurPresetID 11 Factor, • Channel Factor, • Factor, •	StepSize	1000 🗸	Factory 🗸
StopChnl 21 Factory OffsetOption 2 Factory OffsetFreq 0 Factory DirectFreq 2200000 Factory IF_Freq 810000 Factory PLLBypass false Factory MixHighLow true Factory InvertedFlag true Factory CurPresetID 11 Factory	StartChnl	1	Factory 🗸
OffsetOption 2 Factor, • OffsetFreq 0 Factor, • DirectFreq 220000 Factor, • DirectFreq 220000 Factor, • IF_Freq 81000 Factor, • PLLBypass false Factor, • MinHighLow true Factor, • InvertedFlag true Factor, • CurPresetID 11 Factor, • Channel Factor, • Factor, •	StopChnl	21	Factory, 🗸
OffsetFreq 0 Factor, • DirectFreq 2200000 Factor, • IF_Freq 810000 Factor, • PLLBypass false Factor, • MicHighLow true Factor, • InvertedFlag true Factor, • CurPresetID 11 Factor, •	OffsetOption	2	Factory, 🗸
DirectFreq 220000 Factory IF_Freq 810000 Factory PLLBypass false Factory MixHighLow true Factory InvertedFlag true Factory CurPresetID 11 Factory	OffsetFreg	0	Factory 🗸
IF_Freq 810000 Factory PLLBypass false Factory MixHighLow true Factory InvertedFlag true Factory CurPresetID 11 Factory Channel Factory Factory	DirectFreg	2200000 🌔	Factory 🗸
PLLBypass false Factory MixHighLow true Factory InvertedFlag true Factory CurPreseIID 11 Factory Channel Factory Factory	IF_Freq	810000 🄶	Factory 🗸
MixHighLow true Factor, InvertedFlag true Factor, CurPresetID 11 Factor, Channel Factor, Factor,	PLLBypass	false 🗸 🗸	Factory 🗸
InvestedFlag true Factory CurPresetID 11 Factory Channel Factory Factory	MinHighLow	true 🗸 🗸	Factory 🗸
CurPresetID 11 Factory V	InvertedFlag	true 🗸 🗸	Factory 💙
Channel	CurPresetID	11 🔶	Factor, 🗸
	Channel		
	0 1 2	3 4	5 6
Channel U Admin	Channel 0		Admin 🔽
Name 1 Admin	Name	1	Admin 🔽
Freq 2200000 🕞 Admin 🔽	Freq	2200000	Admin 🔽

Figure 5-14: Frequency Plan Window

Field	Setting	Range
Band	MaxNrBands	The number of bands available
	BandName	Name of band in 16 characters
	LowLimit	Factory set
	HighLimit	Factory set
	StartChnl	Factory set
	StopChnl	Factory set
	OffsetOption	Factory set
	OffsetFreq	Factory set
	Direct Freq	Band range in 1Mhz steps
	Inverted Flag	Factory Set
	CurrentPresetID	Preset value at bootup
Channel 1-16	Name	Name of Channel in 16 characters
	Freq	Channel Frequency (in kHz)
Table 5.12. Engeneration Settings		

 Table 5-12: Frequency Plan Settings

*Note: Channel 0 is not used.

6 **Proprietary Information and Disclaimer Notice**

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