

RF-X



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RF-X Quick Start Guide

RF-X is a seamless, automatic, zero-delay video switcher designed to work with multiple Bolt or Ranger receivers (RX) connected to the same transmitter (TX). Bolt and Ranger embed signal quality data into their SDI outputs, and RF-X uses that data to ensure that the highest quality picture is always present on its 12G-SDI output. When working with other sources, RF-X acts as a failover switcher. Video switching is instant and seamless, adding robustness and redundancy for the most demanding jobs.



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What's Included

- RF-X video switcher
- 18W AC Adapter (2-pin) with international adapters

Physical Properties



- Front
- | | |
|------------------------------|-------------------------------------|
| 1 - Power Button | 4 - Status LEDs |
| 2 - OLED front panel display | 5 - SDI input buttons 1-6 |
| 3 - Navigation buttons | 6 - SDI-over optical (SFP) button 7 |



- Rear
- | | |
|--------------------------|---|
| 7 - 10/100/1000 Ethernet | 11 - SDI Multiview output |
| 8 - USB-C (Ethernet) | 12 - SDI Input/Output via Optical (SFP) |
| 9 - SDI In 1-6 | 13 - DC Input 10-32V (20W) |
| 10 - SDI Output (main) | |

Power and Connect

1. Connect power to RF-X using the included A/C adapter
2. Connect up to 6x 12G-SDI outputs from Bolt/Ranger RX to RF-X's inputs
3. Connect SDI-over-Fiber via SFP connector. See below for more information about RF-X fiber optic support

General Operation

RF-X is designed to operate automatically, switching between inputs based on signal quality values embedded in the SDI output from a Bolt or Ranger RX. If signals without quality data are present, auto-switching still occurs if the active signal is interrupted.

Synchronized sources

RF-X's primary operation mode is to automatically switch between synchronized Bolt/Ranger sources. Synchronized sources are two or more Bolt/Ranger RXs paired to the same TX. For more information about pairing or operating Bolt/Ranger, please see their associated user guides, linked below. Before using Bolt/Ranger with RF-X, please make sure its firmware is up to date.

When synchronized sources with embedded video quality data are detected, RF-X's OLED front panel will indicate the connected inputs, and display the current signal quality (1-99%) below its respective input.

LEDs above the input buttons will illuminate white for all sources. The currently active source (the one being routed to the output) is indicated by a blinking white LED.



During normal operation, it is common for the active source to switch frequently if the RX units have similar signal quality.

When using all synchronized sources (with embedded video quality data), there is no user interaction required, RF-X will always output the best signal.

Note: RF-X supports both 3G-SDI level A and B signals as inputs, but synchronization between multiple 3G level B sources is not supported. When using a camera or video source that only supports level B outputs, you can convert the signal to level A using the Bolt/Ranger RX.

Other sources

In addition to synced sources, users can connect additional non-synchronized or non-Teradek video sources to RF-X. RF-X indicates which sources are connected but not synced to the active input with an orange LED. Connected, unsynchronized inputs will still be indicated on the OLED with no \ over the icon. You can use the buttons on the front of the RF-X to manually select an unsynchronized source for monitoring. See 'Sync Groups' for more information on synchronized and unsynchronized sources.

When using other sources besides Bolt/Ranger RX, RF-X acts as a failover switcher, allowing for seamless output from multiple redundant synchronized signals. If no signal quality data is present, -- is displayed underneath the input indicator.



Sync Groups

If a single RF-X is used with Bolt/Ranger RX units connected to multiple TX, the different TX/RX sets can be thought of as a Sync Group. For example, with 2 sets of 1:2 (TX to 2 RX) Bolts, and all 4 receivers connected to RF-X, you would have two sync groups, one for each TX. The active sync group will be indicated with white LEDs, and all the inactive groups will be represented by orange LEDs. You can switch between groups by pressing the button for one of the non-active groups' inputs.

Video Output

RF-X has three video outputs, the Primary SDI output, a configurable multi-view output, and SDI over optical fiber using an SDP module.

- **Primary SDI output** - Outputs the currently active input video signal
- **Multi view output** - Configurable between 1080p, 4k30 (UHD), and 4k60 (UHD). The Multi-view output layout is configurable, from Auto, to a 2, 3, 4, 5, 6, or 7 image composite view. Output settings can be configured via the front panel or web UI
- **SDI-over-optical fiber (SFP)** - The optical fiber output duplicates the primary SDI output. When using multiple RF-X devices connected together via SFP, the output can be disabled to prevent video from looping back through the system.

Multi view operation

The configurable Multi view output has a number of options to support different applications. These options can be configured either on the front panel, or via the web UI. See the following sections for more info.

- **Multi view switch** - You can set the multi view output to enabled or disabled. When disabled, the multi view SDI output duplicates the primary output video

- **Multi view format** - The multi view output format is configurable between 1080p60, 4k30 (UHD), and 4k60 (UHD)
- **Multi view inputs** - Select between Auto, 2, 3, 4, 5, 6, or 7 inputs for the multiview screen. When set to Auto, RF-X outputs multi view in a layout with the same number of tiles as the highest connected SDI input. For example, if you set the multi view inputs to Auto, and connect one video signal to input 5, the multi view output will display a 5 input layout with video only in the 5th panel. All inactive signals are shown as gray rectangles.

Front panel display operation

RF-X has a simple navigation menu that can be operated with the 5 navigation buttons.

Navigation

- **Up/Down** - navigate up and down from the main status screen to view the video format and quality for each video input
- **Center/Right** - Pressing the center or right buttons will open the menu. Use the Up/Down buttons to navigate the menu and confirm selections
- **Left** - Use the left button to exit menus

Menu

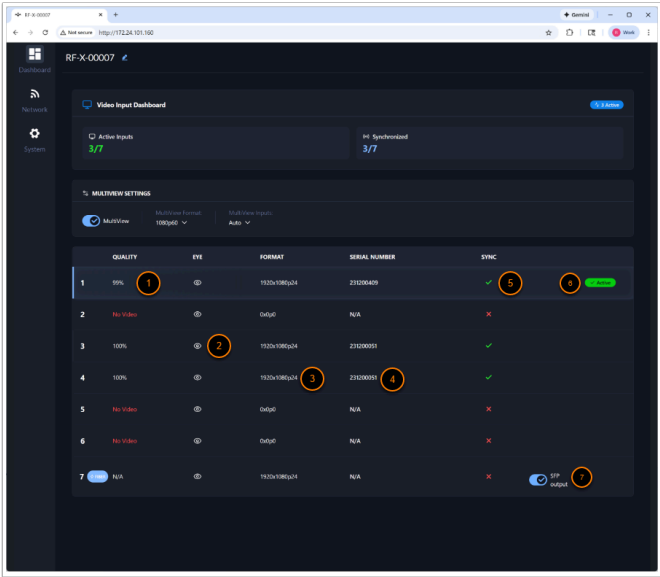
- **Network** - Contains Statuses and settings for RF-X's Wired Ethernet network port
- **Input/Output** - This menu contains options for the multi view and SFP output
- **System** - The System menu allows you to view device serial number, firmware, and regulatory information, and has options for Factory and Password resets

Web Interface

RF-X has a built in web interface that can be used to control the device remotely when it is connected to a network, or directly to a computer via USB-C. To access the web interface, first connect RF-X to an Ethernet switch connected to a network with your computer. You can view RF-X's Ethernet IP address - and change settings if needed - by navigating to the Network Settings menu using the front panel. Finally, open the web UI by entering RF-X's IP address into your favorite web browser.

You can connect using a USB-C cable by plugging it directly into your computer and navigating to <http://172.16.2.1>. Note that 172.16.2.1 is the default USB-C IP address, but that address and range can be configured in the Network section of the web UI.

Dashboard



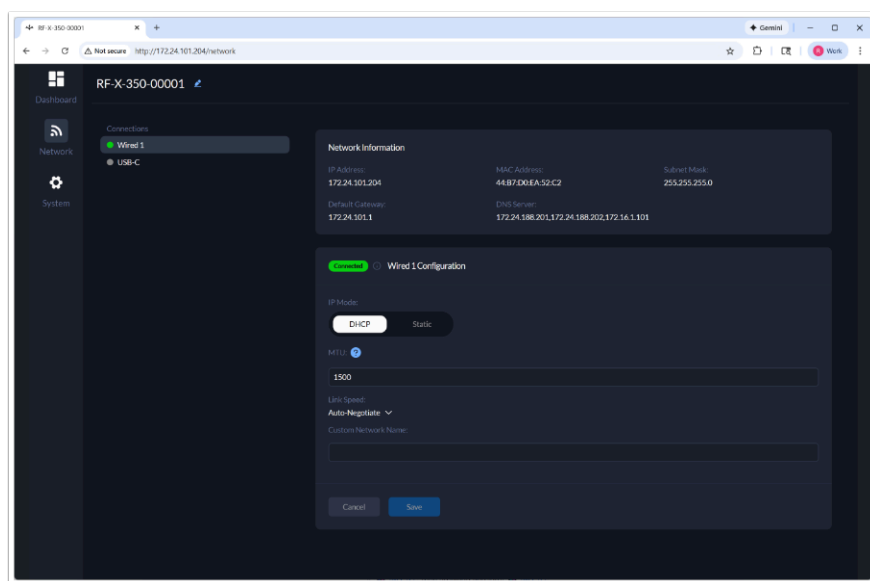
RF-X's Web UI main page displays all of the device's video statuses and controls, including the Active and synced inputs, multiview settings, and the following:

1. **Video Quality** from Bolt/Ranger SDI signal (N/A if no signal data is present)
2. **SDI Eye pattern** viewer - click to view the signal's eye pattern, which indicates the SDI signal strength/integrity. The bigger the eye pattern is, the better the signal.
3. **Video Format** (N/A if not detected)
4. **Serial Number** of the connected Bolt/Ranger
5. **Sync** indicator
6. **Active signal indicator** (row is also highlighted)
7. **SFP output** control - By default, the optical SFP port operates as an SDI input and output, you can disable the output when using multiple RF-X units connected via fiber. This is generally done on all RF-X units except the first device in the chain, to prevent video from looping back to an upstream RF-X.

Clicking the row for any connected input will make that input video active for 10 seconds for preview purposes. You can cancel the preview by clicking an X that appears next to the Active indicator.

Network

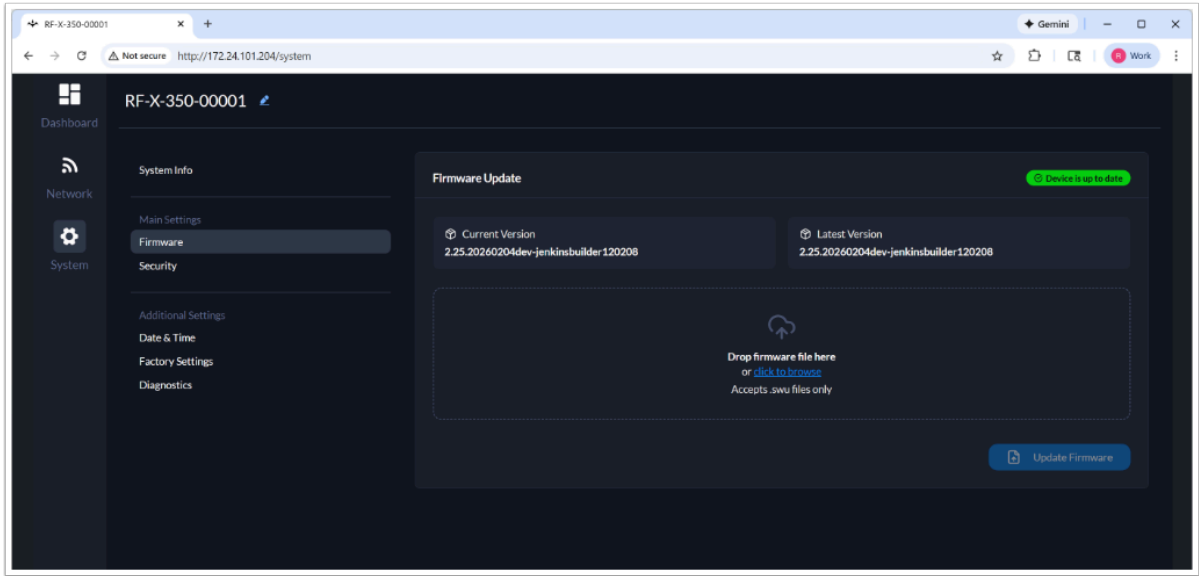
RF-X's Network configuration page allows you to view statuses and configure the Wired Ethernet and USB-C network connections. Both interfaces are fully configurable for use with simple on-set to complex studio-wide networks.



System

The System settings page contains all of RF-X's non-video configuration. The following menus are available:

- **System Info** - displays the device serial number and has a soft reboot button
- **Firmware** - This page shows the current firmware version and allows you to check for updates or upload firmware from your computer
- **Security** - Allows you to set a password or configure HTTPS encryption
- **Date & Time** - Contains NTP time zone settings
- **Factory Settings** - Allows you to reset the device
- **Diagnostics** - If you run into problems you can generate diagnostic reports which our support technicians can use to view detailed system information and logs



Other Resources

- [RF-X Technical Specifications](#)
- Bolt 6 user manual: [Bolt 6](#)
- Ranger user manual: [Ranger Micro](#) | [Mk II](#)

RF-X Technical Specifications

RF-X Auto Video Switcher

RF-X is a seamless, zero-delay video switcher designed to work with multiple Bolt or Ranger receivers (RX) connected to the same transmitter (TX). Bolt and Ranger embed signal quality data into their SDI outputs, and RF-X uses that data to ensure that the highest quality picture is always present on its 12G-SDI output. When working with other sources, RF-X acts as a failover switcher. Video switching is completely seamless, adding robustness and redundancy for the most demanding jobs.

RF-X Auto Switcher	
VIDEO	
Video Inputs	6x 12G-SDI SMPTE 2082-1 standard/75 Ω (BNC x 1) 1x 12G-SDI over optical fiber (SFP). SFP Module sold separately
Video Outputs	2x 12G-SDI SMPTE 2082-1 standard/75 Ω (BNC x 1) 1x 12G-SDI over optical fiber (SFP). SFP Module sold separately

SDI Ancillary Data Support	Full metadata pass through for all ancillary data
Color Sampling	YCbCr 4:2:2, 10-bit
Delay	<0.001sec
Supported Resolutions	4Kp23.98/24/25/29.97/30/50/59.94/60 1080p23.98/24/25/29.97/30/50/59.94/60 1080psf23.98/24/25/29.97/30 1080i50/59.94/60 720p50/59.94/60
Input Cross Conversion	N/A
Output Video Processing	Configurable multi view output
Other Tools	N/A

AUDIO

Audio Format	48kHz 24-bit PCM
Audio Input	Embedded SDI Audio Input
Audio Output	Embedded SDI Audio Output

PHYSICAL ATTRIBUTES

Dimensions	8.7 x 6.9 x 1.7 inch (221 x 175 x 44 mm) (Including connectors)
Weight	Approx. 1.9lbs. (855g)
Construction	Aluminum chassis, temperature-controlled low-noise fan cooled

INTERFACES

Configuration Interface	OLED front panel with Joystick Navigation, Feature-rich Web UI for local device management
Desktop App	Bolt Manager app (OSX and Windows)
Mobile App	Bolt App (iOS and Android)
USB Interface Functionality	Upgrade via USB-C, 5-pin locking connector CCU

Bluetooth Compatibility	Yes
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NETWORK

Ethernet	1x 10/100/1000 BASE-T Gigabit Ethernet (RJ45), USB-C
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POWER

Power Input	2-Pin locking connector 10-32 VDC
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Battery	N/A
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Nominal Power Consumption	18 Watts
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Operating Temperature	0~40 deg-C
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GENERAL

Mounting	Sized for 1/2-width 1U rack shelf, brackets available for mounting two (2) side-by-side
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