Setup Guide

Contents

Introduction

Thank you for purchasing the Teradek Bond. Bond allows you to stream video from a Cube encoder over up to five cellular modems for live broadcasting from any location with cell coverage. Set up involves installing and running Sputnik (detailed in the separate **Sputnik Installation and Configuration Guide)**, and following the three main steps outlined in this guide.

- Connect and power your devices
- Connect to Cube and Bond
- Configure Bond and Sputnik Streaming

For more information about the available configuration options, please refer to the **Cube Reference Guide** available on the USB drive included with Cube.
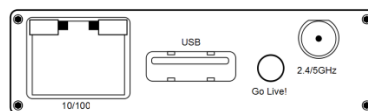
Connect and power your devices

1. Getting started
    1. Begin by connecting the included USB cable between Cube's USB port and the mini-B USB port on Bond.
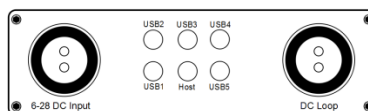
Bond back plate:

Cube back plate:

    2. To power Bond, connect the included AC adapter (or accessory power cable, sold separately) to Bond via the 2 pin LEMO connector marked '6-28 DC Input.'

Bond front plate:

3. To power Cube from Bond, connect the included or 2 pin to 2pin (for Cube x55 encoders) 2 pin to 4 pin (for Cube x00/x50 encoders) power cable from Bond's 'DC Loop' to Cube's LEMO connector marked '6-28 DC Input.'

Cube front plate (Cube 155 encoder shown):
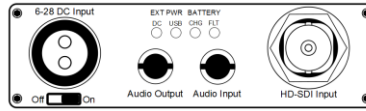
4. Connect your video source to Cube via BNC cable (SD/HD-SDI, 1xx models) or HDMI cable (2xx models).
5. Attach the antenna(s) to Cube (if applicable) via the threaded RP-SMA connector.
6. Use the included hot shoe mount and/or ¼" screw to mount Cube and Bond to your camera, tripod mount, or other accessory mount, if desired.
7. Once Cube has booted, verify that the 'ENC' and 'VID' LEDs are green, indicating video is successfully detected.

For more information about Cube's physical connections and power options, please refer to the full Cube reference manual (available on the included USB drive).

Connect to Cube and Bond

Initial set up for wireless-equipped Cubes (x50 models) can be done via Cube's Ad Hoc wireless network. For Cube models without wireless (x00 models), connect an Ethernet cable between Cube and your computer. For other network configurations, please refer to the Cube Reference Guide.

1. Ad Hoc instructions
   1.1. Connect video and power to your Cube Encoder (see the previous section).
   1.2. On your computer, open your wireless networking utility.
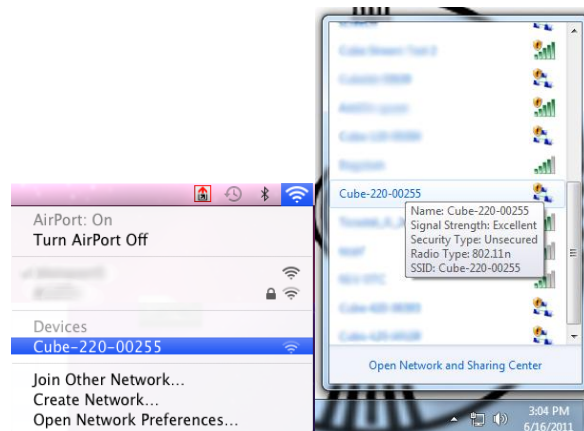
1.3. Choose your Cube from the list of WiFi devices in your area and connect to that network.
2. Log in to Cube
    2.1. Launch TeraCentral (included on the USB drive), and click the 'Configure Settings' button next to your Cube's listing. Your web browser will open to Cube's web UI.
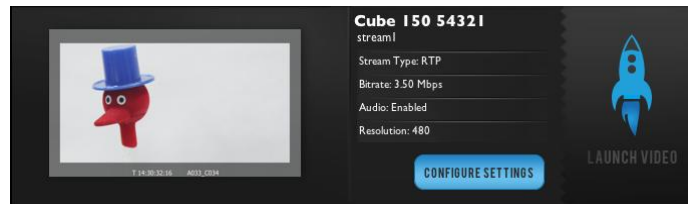
2.2. If the Wizard appears, click 'Skip the Setup Wizard.'
    2.3. Log in to Cube with the username 'admin' and password 'admin.' Cube's Dashboard will appear.
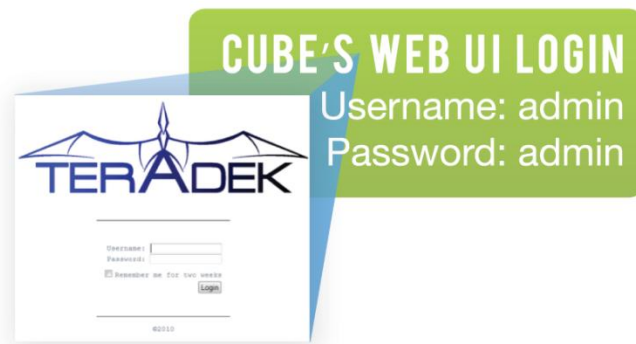
Configure Bond and Sputnik Streaming

Configuration options for the Bond and Sputnik streams are located on the 'Video Setup'->'Stream Settings' page. We recommend setting up your Sputnik server before proceeding with this configuration. For instructions on installing and running Sputnik, please refer to the separate "Sputnik Installation and Configuration Guide." The Bond and Sputnik configuration options are only displayed when Bond is connected to Cube.

PLEASE NOTE: A software license must be installed on your Cube to activate the Bond configuration options. If you purchased your Cube with Bond this license should be pre-installed. If Bond is purchased separately, please contact Teradek to obtain the license.

1. Configure Sputnik Settings
    1.1. These settings specify the Sputnik server location and parameters for the between Bond and Sputnik.

1.2. Sputnik Host Address: The destination IP address or hostname of your Sputnik server.

1.3. Sputnik Listening Port: The TCP port that Sputnik is accepting connections on. Default value is 5111, and this setting must match the port configured at the Sputnik Server.

1.4. Adaptive Internet Streaming Settings:

    1.4.1.Max Buffer Length (default 4000 milliseconds) – This value controls the maximum length of Sputnik's buffer. Smaller values will result in lower end-to-end latency at the expense of video stability.

    1.4.2.AI Streaming – Setting the AI Streaming to 'Enabled' allows the stream bitrate to dynamically adjust with varying network conditions.

    1.4.3.Max Bitrate – The maximum bitrate allowed when AI Bitrate is enabled. This value can be matched to your destination's downstream bandwidth or set to limit the bitrate in less-than-ideal coverage areas.

2. Configure your Stream Application

    2.1. Use these settings to configure the video stream from Sputnik to your destination.

    2.2. **Livestream (Live Internet Streaming)** – Cube and Bond offer native integration with Livestream for live event broadcasts and turnkey remote content distribution. Depending on your needs, Livestream offers multiple free or paid membership options. A Livestream account is required to use this feature.

        2.2.1.Enter your Livestream username, password, and channel short name. Click 'Verify Login' to check that Cube can contact Livestream and that your login information is valid. NOTE: the channel short name is case sensitive.

        2.2.2.Check any options you would like to apply to your channel.

Livestream Account Settings

Username: teradek

Password: ●●●●●●●●

Channel (short name): example

Verify Login

Create a Livestream Account (Free or Premium)

Livestream Channel Settings

☑ Automatically go live when broadcasting

☐ Enable streaming to mobile devices

☑ Record my live streams

☐ Automatically add recordings to on-demand library

☐ Automatically add recordings to auto-pilot

Aspect Ratio: 16:9 ▾

2.2.3. Click 'Apply.'

2.2.4. Once the settings have been applied, you can start or stop your broadcasts by clicking the 'Start/Stop Broadcast' button, or by holding the 'Go Live!' hardware button on Cube for approximately 1 second (ENC LED blinks to indicate when Cube is starting/stopping).

2.3. **RTMP** streaming allows you to stream to your own custom server or CDN. Configuration for RTMP requires a destination server URL and a stream name, and allows Cube to push video content directly to the destination.
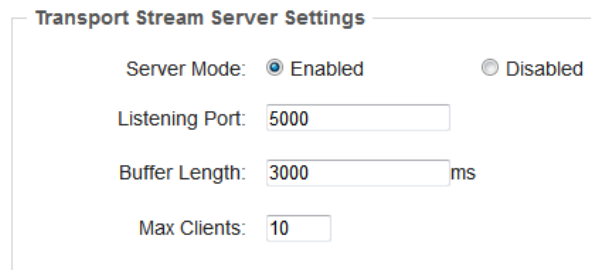

2.3.1. Configuration:

    2.3.1.1.   Enter the server URL. Depending on where you are streaming to (local server or CDN), this will look something like rtmp://server.address:1935/live. This will vary by platform, so check with them to get the proper address. Often the server URL is found with FMLE instructions or contained in a downloadable XML file.

    2.3.1.2.   Enter the stream name. This varies by platform, but should be found somewhere near the server URL.

    2.3.1.3.   Select enabled or disabled for auto-start broadcast. If enabled, Cube will attempt to start a broadcast whenever it starts up.

    2.3.1.4.   Click 'Apply.' You can start/stop the stream by clicking the buttons on the Stream Settings page or by holding the 'Go Live!' button on Cube for ~1 second.

2.3.2. User Agent/Authentication. If your service provider requires User name/Password authentication, enter your credentials in the 'RTMP Authentication' field. In most cases, the 'User Agent' field must be set to 'FMLE/3.0' if using authentication.

2.4. **MPEG Transport Stream** – Transport Stream is useful for video backhaul applications. In this mode, Cube and Bond stream to Sputnik, and Sputnik sends video to a specified unicast or multicast address. In addition, Sputnik can act as a server and listen for connection requests to the stream. The MPEG transport stream protocol is used in many broadcast applications and is also supported by many IPTV set top boxes. The transport stream license can be purchased online at http://store.teradek.com and is required to use this feature.

2.4.1. Configuration: To enable transport stream, select 'MPEG Transport Stream' for the stream Mode. Sputnik can act as a transport stream server and listen for connection requests, or it can push to a specified destination.

2.4.2. When **Transport Stream Server** is enabled, Sputnik listens for connection requests and sends video via TCP to connected clients.
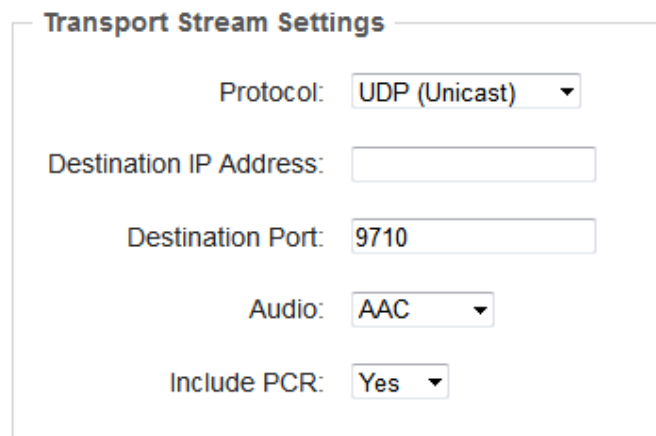

2.4.2.1.   Listening port – Select the TCP port you wish to use for connecting to Sputnik.

2.4.2.2.   Buffer Length – This is the maximum length of time (in milliseconds) that Sputnik will store video if it cannot be immediately sent.

2.4.2.3.   Max Clients – Specify the maximum number of clients able view the stream simultaneously.

2.4.3. **Transport Stream Push** allows you to specify a destination for Sputnik to push the stream to. Enable this by entering your destination IP address and port. Select your audio codec (AAC or MPEG2). Note that the destination IP address must be reachable by your Sputnik server.

2.4.3.1.   Protocol options: TCP is recommended when streaming over the internet or a WAN. For streaming over a local network, UDP can be used to avoid the additional network overhead of TCP. On a local network, use 'UDP (Unicast)' if streaming to a single decoder, or 'UDP (Multicast)' when streaming to multiple decoders over a multicast-capable network.

2.4.3.2.   Using transport stream: If your transport stream is being sent to a computer, a program such as VLC can open the stream by opening the URL listed on the Stream

Settings page. For example, if streaming to a computer with IP address 192.168.1.100 over port 9710, enter *udp://@192.168.1.100:9710* in VLC's 'Open Network' dialogue. For multicast streams, simply replace the unicast IP address with the multicast IP address. Please refer to following section for instructions on configuring your decoder to work with transport stream.

2.4.4. **Decoder Configuration** Begin by selecting 'MPEG Transport Stream' under 'Decoder Mode' on the Video Setup ->Decoder Settings page.

2.4.5. Stream Protocol: Select UDP, TCP, Multicast, or TCP Pull.

    2.4.5.1.   UDP: This value should match the value configured on your encoder. UDP streaming requires less network overhead but does not guarantee that video data will arrive intact on lossy networks.

    2.4.5.2.   TCP: This value should match the value configured on your encoder. TCP streaming ensures data will arrive at its destination, but requires more network overhead and may impact performance when bandwidth is limited.

    2.4.5.3.   Multicast: When using multicast, an additional 'Host' field is displayed for the multicast IP address.

    2.4.5.4.   TCP Pull: This mode can be used with Teradek Bond and Sputnik when Transport Stream Server is enabled.

2.4.6. Host (if applicable): enter the multicast IP address specified on the encoder (for multicast), or the IP address or hostname of your Sputnik server for TCP Pull.

2.4.7. Port: Select the port configured on the encoder. The default for listening modes (UDP, TCP, Multicast) is 9710. The default port for TCP Pull is 5000.

2.4.8. Jitter Buffer: The jitter buffer, when enabled, improves stream quality when network conditions are inconsistent (e.g. when streaming over the internet). The jitter buffer is a

configurable buffer that stores video temporarily before playing it, providing better video stability at the cost of latency. For best results, set the 'Jitter Mode' option to 'Fixed Delay,' and then configure the buffer length in milliseconds.

2.4.9. Caching: Set this equal to or greater than the encoder's caching value. Default is 300ms. See **Error! Reference source not found.** (page **Error! Bookmark not defined.**) for more information.

2.4.10. Audio Codec: Select the same value configured on the encoder, either AAC or MPEG2.

Network Configuration and Status LEDs

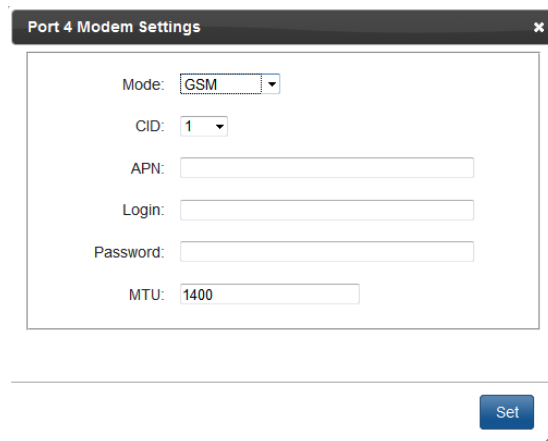Bond's network configuration is located under the 'Teradek Bond' tab on the 'Network'->'Configuration' page.

For most users, Bond's network configuration should be left to 'Auto' for all 5 Ports when using officially supported modems. Each port in 'Auto' mode will detect and initialize any supported modem when it is plugged in so that a variety of modems can be used interchangeably.

To manually configure each of Bond's modem ports, simply select your modem from the drop down list under 'Configuration.' This is useful if, for example, you wanted to restrict your Bond to only work with a particular modem (for usage reasons or otherwise).

If your modem is currently available in the Configuration drop down, you may still be able to enable it using the 'Custom' modem option. When 'Custom' is selected, a window pops up to allow manual configuration of your modem.

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Custom configuration typically requires carrier and device specific settings for the device Mode, APN, and often a Login and Password. These settings can often be found online or through the cellular service provider. An up-to-date list of currently supported modems is located in the Frequently Asked Questions section of http://forum.teradek.com .

Status LEDs

Bond's front plate contains 6 status LEDS – 5 for the USB modems, and one for the USB Host interface between Cube and Bond.
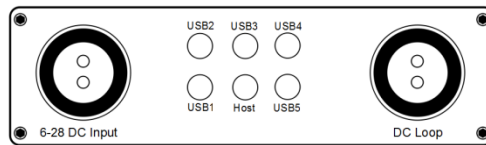
These LEDs correspond to each of the USB ports on Bond as shown below.

The LED operation works as follows:

Host LED

- Off: No Power
- Solid Orange: Booting
- Blinking Orange: Upgrading
- Solid Red: No connection to Cube
- Solid Green: Ready and connected to Cube

USB LED

- Off: No Modem
- Solid Orange: Connecting to Internet
- Solid Green: Connected to Internet
- Solid Red: Disconnected from Sputnik server

- Blinking Green: Streaming to server, blinking speed is relative to connection speed. The LED for a modem with a faster connection will blink more quickly than the LED for a slow modem.
- Blinking Orange: Poor connection stability. Modem is still connected to the server, but its contribution to the stream has been minimized.