

Intro to Live Streaming

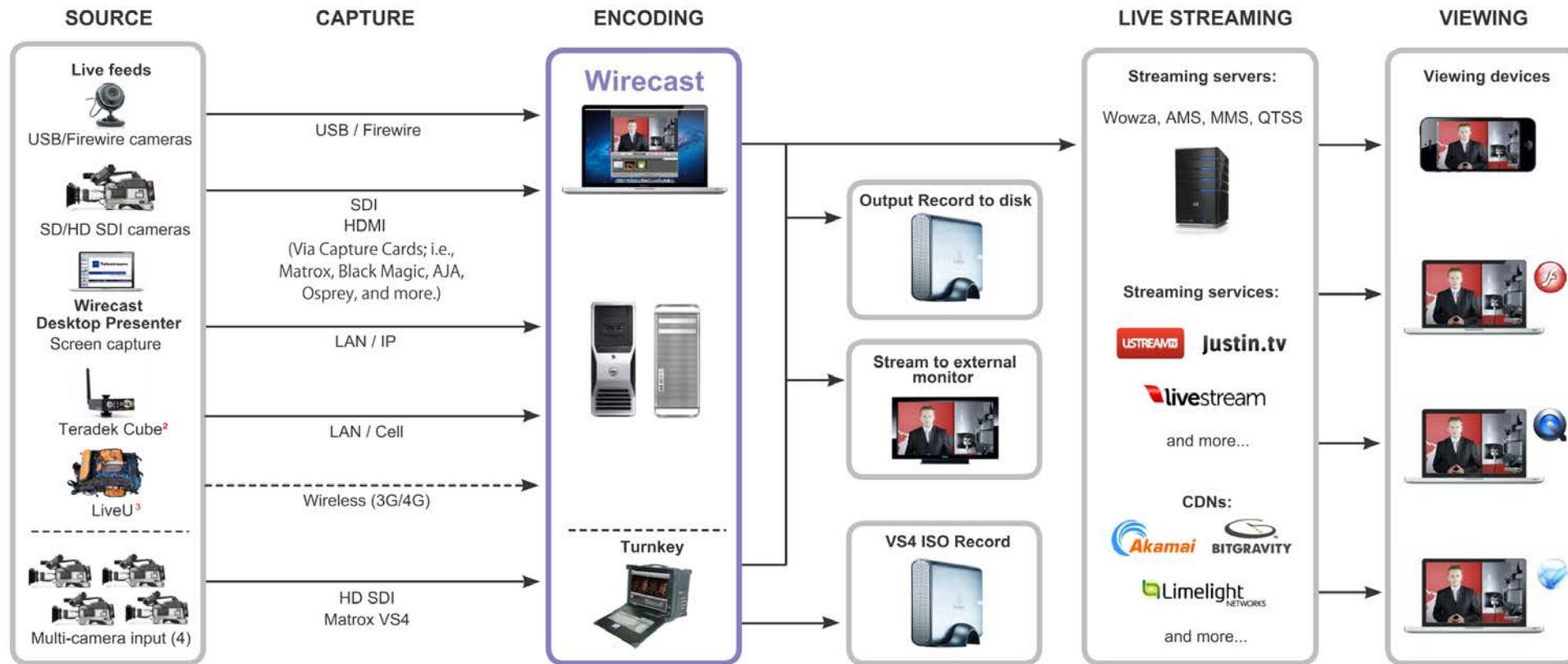
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Types of Live Streams

- Webcast/Screencast
- Single Camera (no switching)
- Multi-Camera (switcher)
- Live Linear



Live Streaming Workflow



¹ Optional in Wirecast, include in Wirecast Pro

² Wirecast Pro only

³ LiveU can be used as a source in Windows version only

Live Streaming Basics - Video Source

Good Quality Camera

3 Chip best option

Don't forget about audio!

Ideally mix room noise with
handheld/shotgun/lav for
better balanced audio



Live Streaming Basics - Acquisition

Video Switcher or Directly capturing?

- Multiple source or single?
- Mix audio and video if possible

Create single output or "broadcast"



Live Streaming Basics - Encoding

Two Options

- Encoding final delivery
- Encoding a mezzanine

All Real-time

Optimized to work with site bandwidth

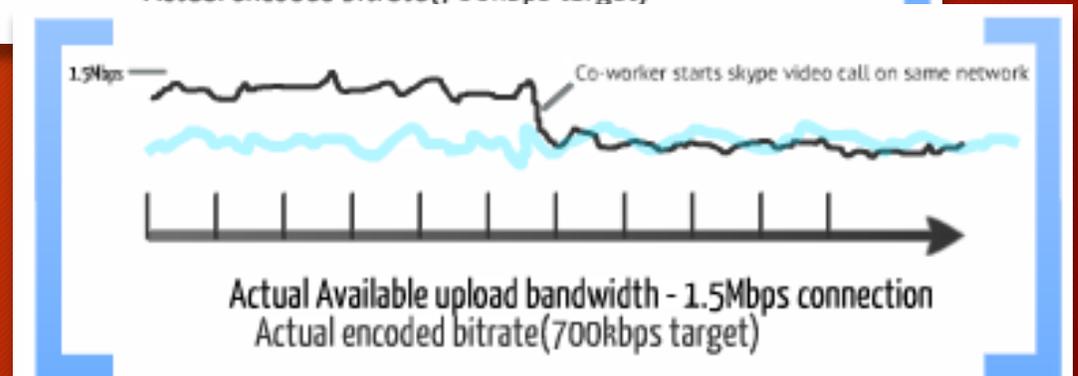
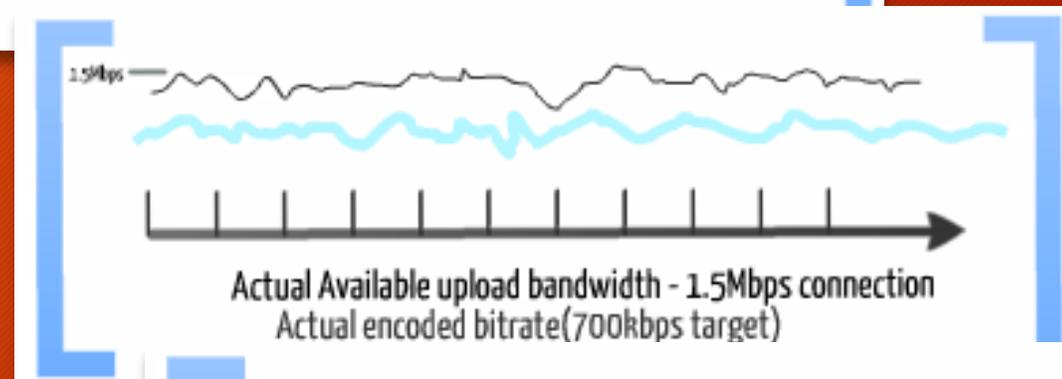
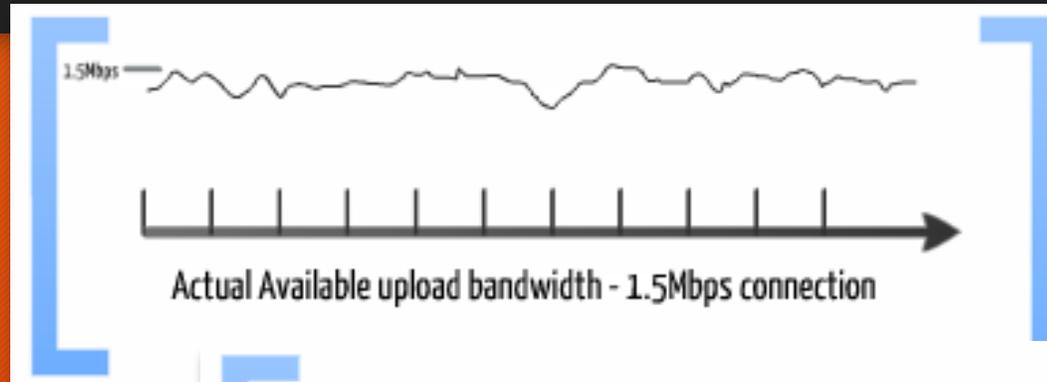


Live Streaming Basics - Connectivity

For an SD Stream 1.5Mbps upload bandwidth is needed

For HD Streams 4Mbps+ is needed

Available bandwidth will fluctuate so as a general rule, target bitrate should be set no higher than half of your available upload bandwidth.



Live Streaming Basics - Streaming

Small events may use dedicate server to publish streams (less than 100)

- May save some money, but costs in time spent managing servers

Several stream services are also now available

- Priced per minute processed usually (# minutes in plus # minutes out)
- May enable extra options like advertising or subscriber tools
- Some services have free/low priced option tat carries ads or branding



Learning the Lingo

Italiano
日本語
Deutsch shqip
Kreyòl
ayisyen
한국어
اردو
Français
Español
русский
Português
lingua
ελληνικά
हिन्दी
普通话

Encoding Terms

- **CBR (Constant Bit Rate) encoding**
The encoding software attempt to keep the total bits/second constant through the entire video. This makes the size of the file predictable and easier to stream. Most modern CODECs will allow you to set an upper threshold on the bit rate and allow the rate to drop when it is not required for quality to help reduce the amount of bandwidth used.
- **Variable bit rate encoding (VBR)**
A method of encoding video that first analyses the video and then compresses it. While it can take up to twice as long to encode the video, they are compressed at an optimal rate for the smallest file size. The variability in the data rate of the data stream does not make it appropriate for RTSP streamed content, but good for progressive download or video on CDs or other physical media.

Streaming Terms

- **Pull** - A Pull is a connection initiated by a streaming server to receive a broadcast from a designated encoder for re-distribution across a network.
- **Push** - A Push is a connection initiated by an encoder to a streaming server to receive a broadcast for re-distribution across a network. This requires a username and password.
- **Latency** - Latency refers to the amount of time taken for data to complete a return trip between two points.
- **ABR** - Adaptive BitRate Video Streaming - the protocol developed by apple and used for iOS (and many products)
- **RTMP** - Real Time Media Protocol - developed by Adobe used by Flash

Networking Terms

- **Port** - A Port is a channel used to communicate information over a network interface or protocol.
- **Port Forwarding** - Port Forwarding is the process used to negotiate a route through a firewall.
- **Bandwidth**
The amount of information that can be sent and processed per unit time. This is usually measured in kilobits per second (kbs) so for example a modem has a theoretical bandwidth of 56 kbs, while the slowest form of ethernet has a maximum bandwidth of 10,000 kbs (10 megabits) - remember that there are 8 bits in a byte of information, most files are measured in bytes (kilobytes, megabytes, etc.).

Connectivity Types

Wired Ethernet Connection

- Wired ethernet connections are preferred to wifi. It's important that your connection is not being shared by any other computers or devices that might compete for network resources, especially when upload bandwidth is limited. You're going to be a bandwidth hog!

Wireless Wi-Fi Connection

- Wi-Fi connections can be fine, but most Wi-Fi networks are shared with a lot of other people. If your available bandwidth gets too low, your stream will suffer in quality or halt altogether. Make sure you are able to have access to a dedicated Wi-Fi network that is not too congested.

3G or 4G Cellular Connection

- You can stream on a single 4G or LTE but its highly impractical. Cellular connections vary depending on your location and how many other people are using their cellular devices in that same location. Speeds and quality will be limited, so for high quality broadcasts, use Wi-Fi, wired connections or the bonded cellular product.

Bonded Cellular Connection

- The concept behind bonded cellular products is taking the power of 4 or more cell connections and combining them to make stronger data connection.

Three Types of Encoders

- Hardware
 - High powered, often expensive purpose built solution
 - Leverages specialized cards to accelerate encoding
- Software
 - Flexible, highly configurable solution
 - Leverages off the shelf CPU
- Appliance
 - Software encoding in a purpose built chassis
 - Highly tuned, combination of HW & SW

Hardware

Fast, efficient

Purpose built, Dedicate encoder

Range from card/chip to appliance form factor

Harder to update

Not as flexible

Highly variable in price

Not Practical for live streaming events

\$100-\$1000's



Software

Run on your HW - extremely flexible configurations/throughput

Low price point - good entry level options

Performance varies based on your configurations

\$500-1000



Appliance & Turnkey

Blend of SW & commodity HD in server or portable formfactor

Purpose built, fairly rugged

Lots of features/options - very flexible

Pretty well know performance specs

Appliances -> \$30K

Turnkey -> \$3500-7000



Streaming Considerations

- Mezzanine stream to a streaming service provides best performance & user experience for those starting out
- ABR is best for multi device playback, but harder to manage on site
 - RTMP mezzanine stream onsite to media server that packages/encodes ABR streams
- H.264 codec gets you the largest audience, but decide on settings/bit rates based on what your upload can support and your audience can consume
- Use locked down cameras if possible (versus handheld)

Ideal Bit Rates for ABR Resolutions (16x9)

Kbps	Height	Width
2500	1280	720
1800	960	540
1250	768	432
900	624	352
600	480	272
450	400	224
200	368	208

← Mezzanine

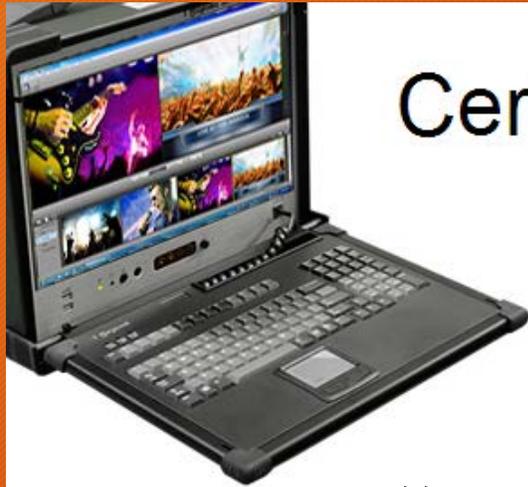
Building your own live studio

Shopping Cart

Items to buy now

		Price	Quantity
	Apple MacBook Pro ME665LL/A 15.4-Inch Laptop with Retina Display (NEWEST VERSION) - Apple Computer  In Stock <input type="checkbox"/> This will be a gift (Learn more) Delete · Save for later	\$2,599.99 You save: \$199.01 (7%)	1
	G-Technology G-RAID 4TB Dual External Hard Drive with USB 3.0, Firewire 400, Firewire 800 Interfaces and RAID 0 (OG02484) - G-Technology In stock. Usually ships within 3 to 4 days. Shipped from: TripleNet Pricing Gift options not available (Learn more) Delete · Save for later	\$286.44 You save: \$113.51 (28%)	1
	Fancierstudio 3000 Watt Digital Video Continuous Softbox Lighting Kit 9026S3 Fancierstudio - JRFOTO  Only 18 left in stock. Gift options not available (Learn more) Delete · Save for later	\$159.99	1
	Telestream Wirecast Studio: Live streaming production software(Mac) - Telestream; CD-ROM In Stock Shipped from: TubeTape Gift options not available (Learn more) Delete · Save for later	\$495.00	1
	Canon XA10 Professional Camcorder with 64GB Internal Flash Memory and Full Manual Control - Canon  In Stock <input type="checkbox"/> This will be a gift (Learn more) Delete · Save for later	\$1,699.00	1
	Audio Technica ATR288W VHF Battery-Powered TwinMic Microphone System - Audio-Technica  In Stock <input type="checkbox"/> This will be a gift (Learn more) Delete · Save for later	\$119.95 You save: \$130.05 (52%)	1
		Subtotal: \$5,360.37	

Certified Turnkeys from Telestream



Certified Turnkey Systems

Robust, portable, certified systems ready to use starting under \$5,000

[Purchase a Certified Turnkey System](#)



<http://www.telestream.net/wirecast/matrox-vs4.htm>

- ✓ Easily record all original video feeds (ISO)
- ✓ Full HD 1080p Live Streaming
- ✓ Green Screen, Virtual Sets and more...
- ✓ Audio Mixing and Monitoring
- ✓ Stream to any CDN
- ✓ Professional Connectivity

Other Considerations

- Know your strengths
 - Do what you can, outsource the rest
- Many hands make for light work
- Plan for bad things
 - Not only plan, but actually run through fire drills
 - “The” event is not the first time you’ve done everything
- Broadcast Bandwidth – do not exceed about 50% of your connectivity
- Redundancy, Redundancy, Redundancy
 - Back up encode solution, backhaul, publish points, etc
 - Record locally
- Specs are measured in months
 - Bandwidth requirements, consumer devices, & available gear all change about every 18 months