REACHING OUTWARD – STREAMING AND PODCASTS

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SOLOTECH

OVERVIEW

- Why Broadcast
- Capturing Audio and Video
- Syncing It All Up
- Transmitting To The World
- Copyright Issues
- Review Highlights
- Q&A

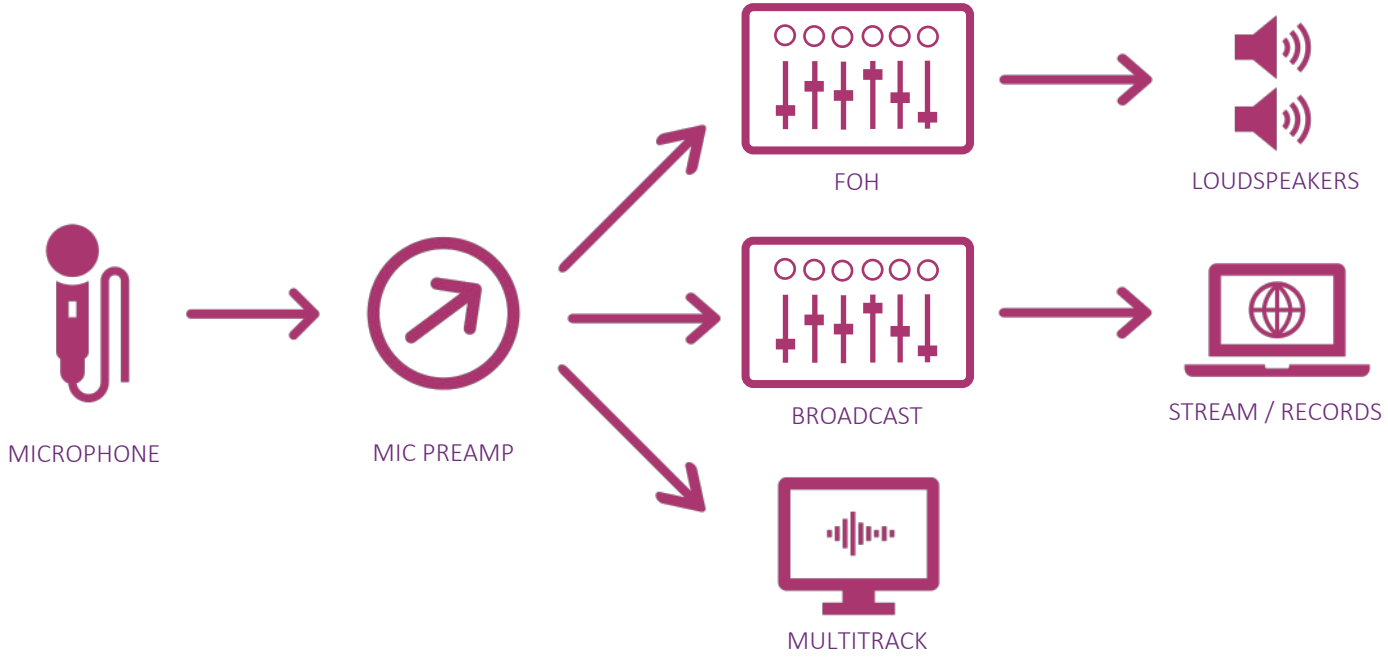
WHY BROADCAST

The internet allows us the to connect across the street and across the globe

- Allows people to stay connected to the congregation when they are out of town or homebound
- It can be a tool for encouragement and training throughout the week
- Gives visitors a chance to “check you out” before they attend
- Allows churches with original content to share it with the congregation and other believers around the world (music, videos, sermons, studies, etc.)

CAPTURING AUDIO

SIGNAL FLOW

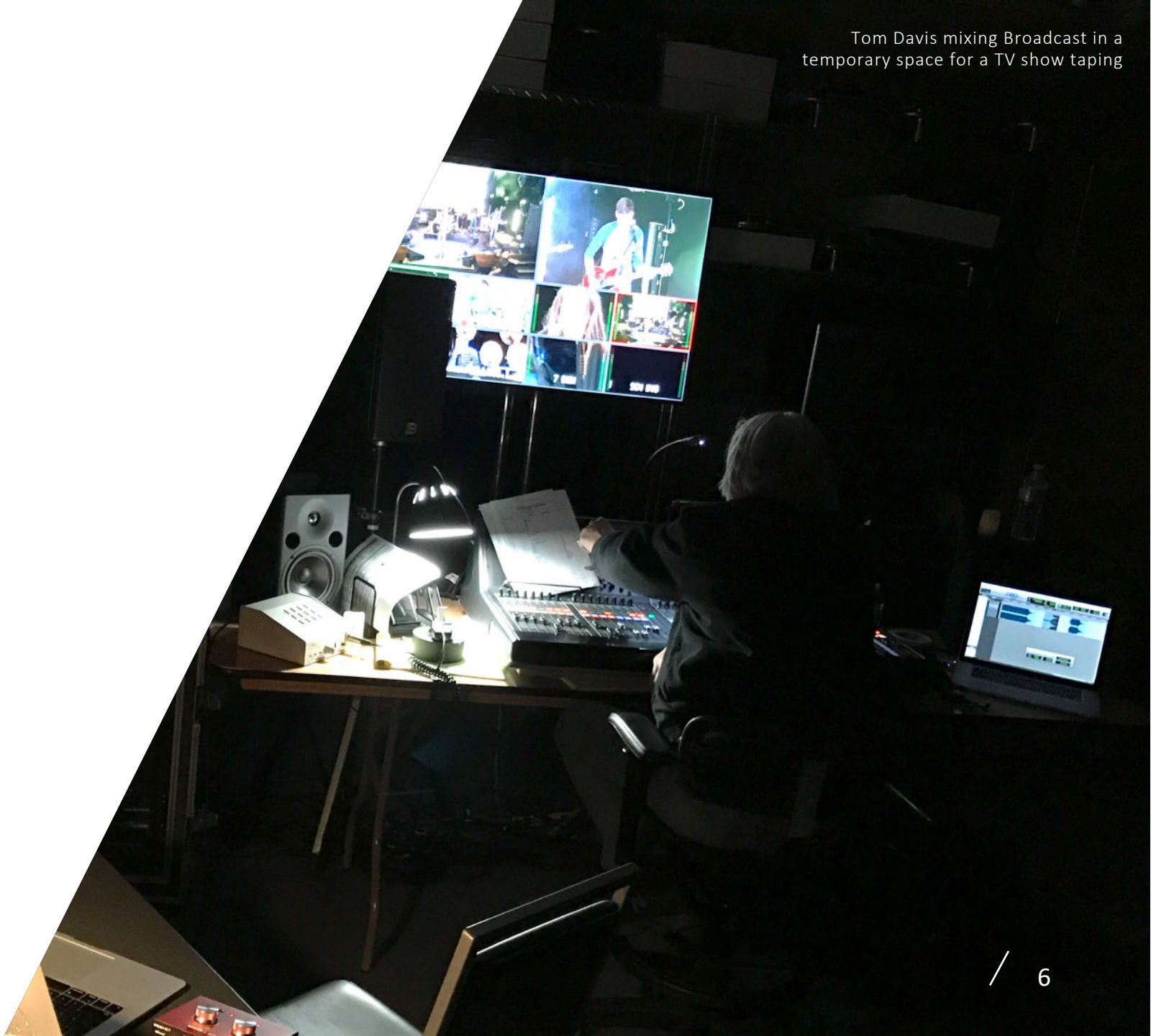


Traditionally, there would be a microphone “splitter” on stage that would split the mic signals to a mic preamp at each destination. With the advent of digital systems in live sound, most events and installs will “share” the mic pres, allowing for higher quality sound distribution to each destination.

BROADCAST MIXER

A dedicated position for mixing live inputs for a remote audience.

In smaller productions, this position often monitors the multitrack audio as well.



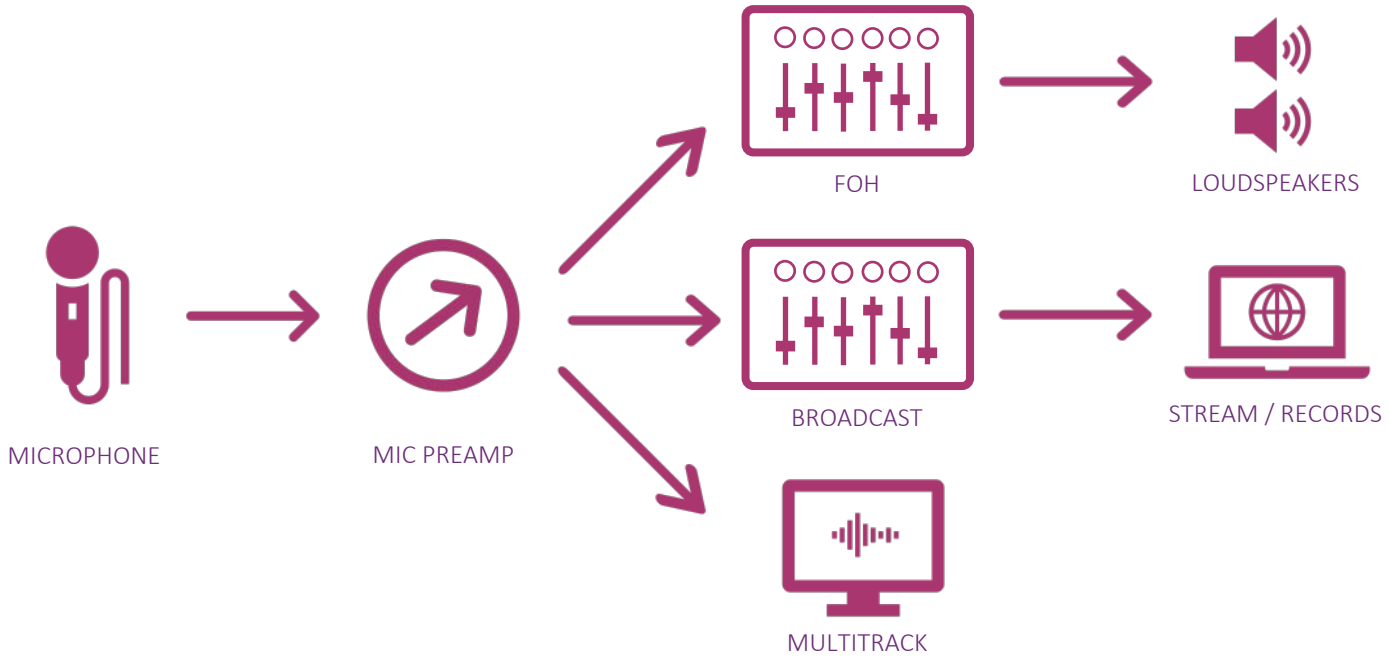
Tom Davis mixing Broadcast in a temporary space for a TV show taping

BROADCAST MIX TIPS

Great broadcast mixes are made in pre-production and rehearsals

- Setup a separate, isolated space for the broadcast mixer
- Mind the room!
- Spend time pre-dialing your mixes with multitracked audio files of previous services
- Transitions suffer the most when the engineer is removed from the live room. They lose the energy of a service when they aren’t in the room.
- Video monitoring is now a requirement so the engineer can see what is happing in the space
- Bring your remote audience into the space with the broadcast secret weapon: Audience Mics!

AUDIO SIGNAL FLOW



FRONT OF HOUSE (FOH) MIXER

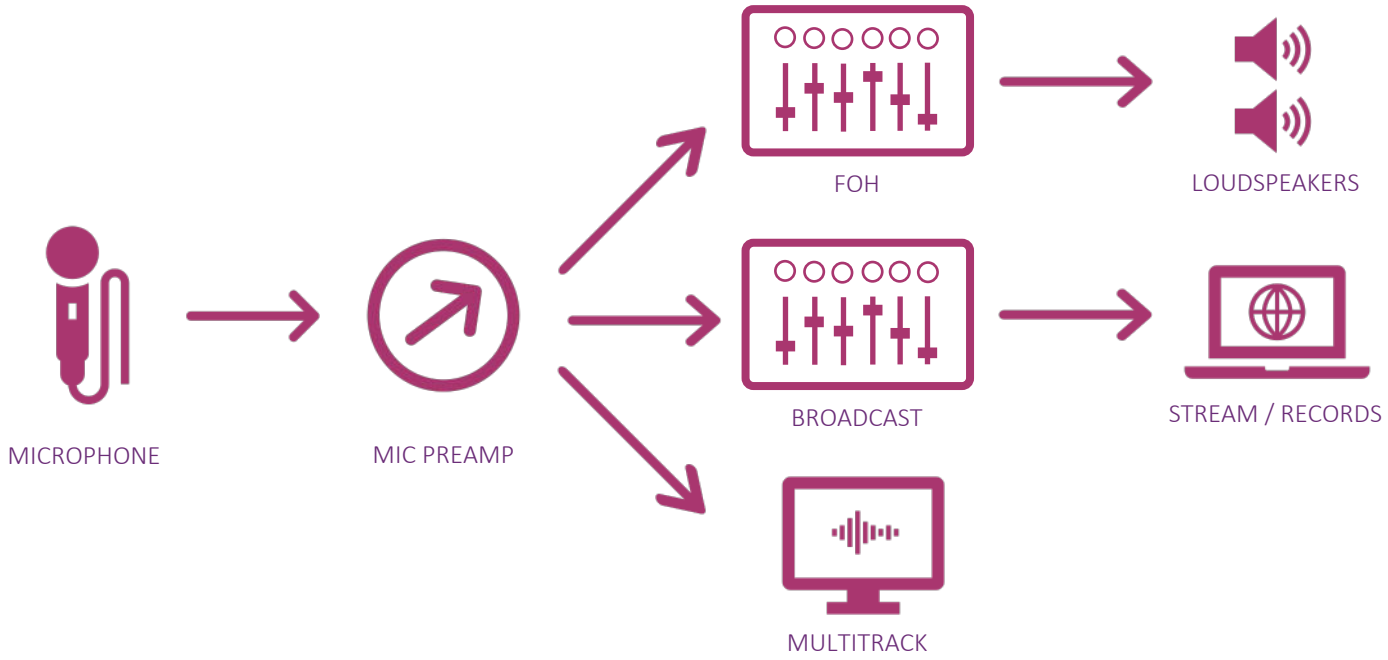
A dedicated position for mixing live inputs for a local audience in the room.

FOH MIX AND BROADCASTING

FOH “Board” mixes rarely translate well if bussed 1-to-1 to a remote audience. If you must:

- Setup your Broadcast Bus on a stereo aux, post-fade.
- The aux mix allows for independent adjustments, helping to dial in a mix for the remote audience
- Post-fade setting ensures the mix will still follow fader and mute parameters
- Audience Mics are a must!
- The only way to improve the quality of this mix is to listen back later and determine what adjustments to the aux mix need to be made to match the FOH mix decisions

SIGNAL FLOW


MICROPHONE
MIC PREAMP
FOH
LOUDSPEAKERS
BROADCAST
STREAM / RECORDS
MULTITRACK

MULTITRACK

Recording/capturing multiple tracks of audio for later remixing

This is most common in the studio world but has long been a part of live production for concerts and events

Capturing audio for a TV show taping in a temporary space

MULTITRACKING TIPS

Capture as many inputs as you can afford. You'll need more than a typical FOH mix

- Ensure your records are "clean" without artifacts. While a pop or noise will be immediately forgotten by live listeners in a room, it will be immortalized in your recordings!
- Audience Mics, Audience Mics, Audience Mics
- Do testing with your computer hardware to ensure it will be able to keep up while recording the many tracks you'll want to capture
- Consider setting up a backup multitrack rig
- Use MTC to write timecode to your recorded BWAV files for syncing up with the video later

REMIX MULTITRACKED AUDIO FOR VARIOUS USES

1 ENTIRE SERVICE FOR DISTRIBUTION AND ARCHIVE

- Mix engineer remixes and syncs the audio and video
- Upload services to websites and social media
- Create archives for other edits and later use
- Provide multiple formats – WAV, MP3, Compressed Video, DVD Files

2 EXPORT THE SERMON

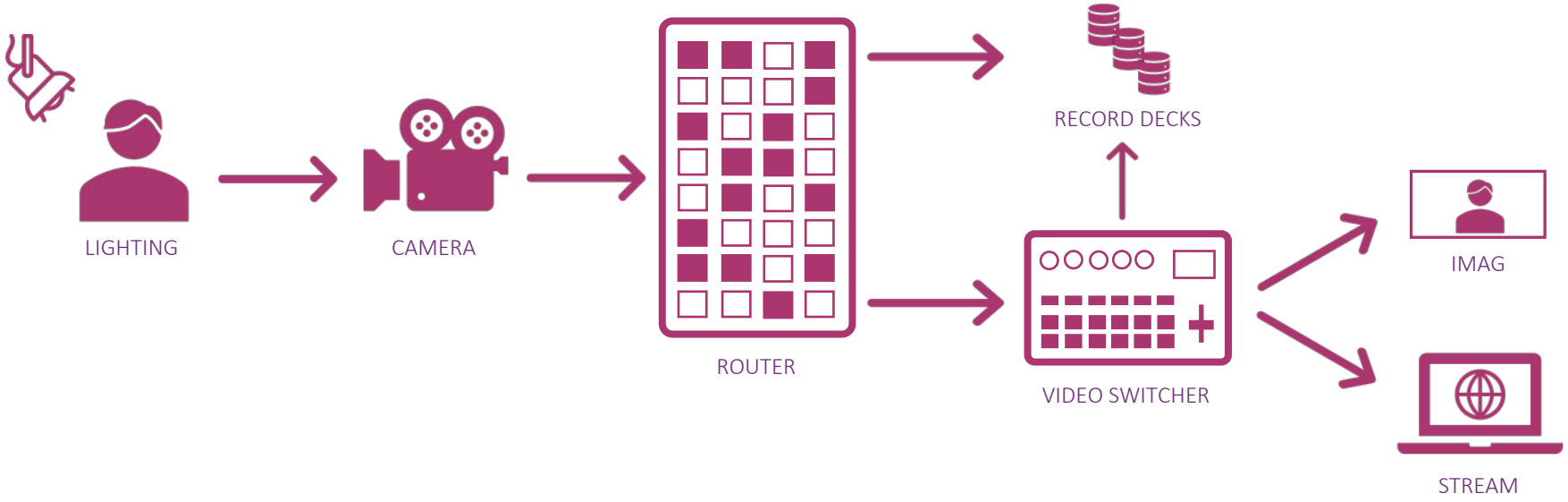
- Create an audio file of just the sermon
- Sync it to video for social media and ministry use
- Create audio only versions for podcasts and CDs

3 EXPORT MUSIC CUTS

- Create a mix of a song
- Export to audio and upload to the service with music charts and rehearsal tracks
- Export audio and video to upload to social media

CAPTURING VIDEO

VIDEO SIGNAL FLOW

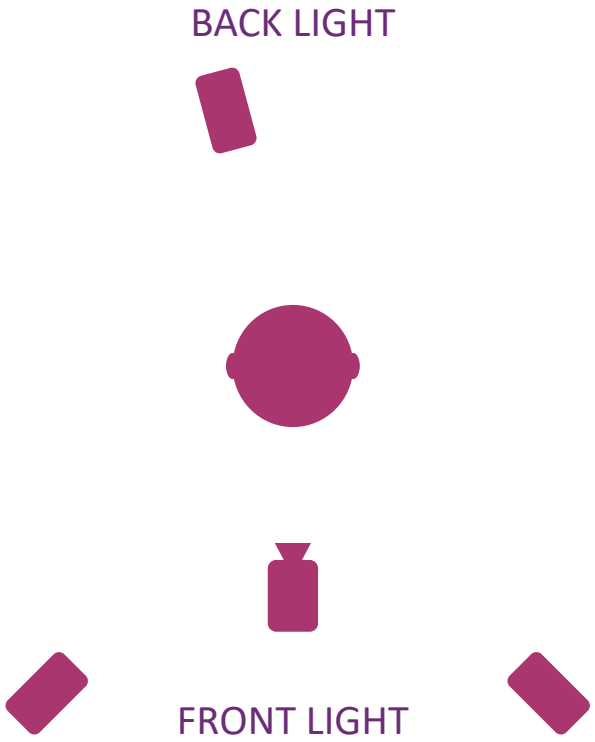


THE IMPORTANCE OF LIGHTING

You can have the greatest camera system in the world, but if you lighting isn’t right, everything will look bad on camera

Pastor Whitman filming a TV spot for the Church on 68 in Greensboro, NC

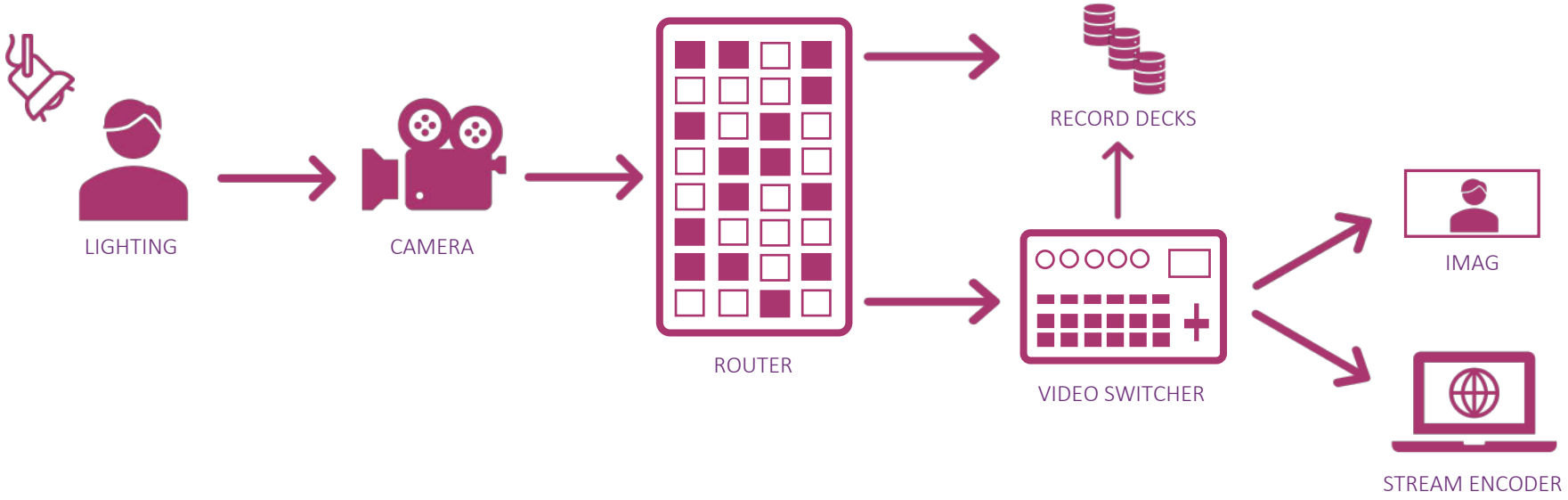
KEYS TO GOOD LIGHTING



Ensure the subject is evenly lit from the front and back across the presentation area with Three-point Lighting

- Light the subject from the front with Front Light using the Key and Fill technique
- Provide an even Back Light behind the subject to make them standout from the background
- Be sure your backgrounds aren't too bright

VIDEO SIGNAL FLOW



VIDEO SYSTEM HARDWARE TERMINOLOGY

- CAMERA: Converts the light into an electronic video signal
- ROUTER: Helps facilitate the distribution of video signals around a facility
- SWITCHER: Uses Mix Effects (ME) to switch the video signals to a video buss
- RECORD DECK: Hardware device that records video onto a hard drive
- ENCODER: Captures and formats the video signals for transport and use in other devices or mediums
- IMAG: Image Magnification is used to make a subject larger so viewers can see it from further away

VIDEO SYSTEM RECORDING AND STREAMING

- Camera operators shoot the services with manned, PTZ, and fixed cameras
- A line cut is generated by the operator (Video Director) by switching between these shots to feed the IMAG and/or the streaming encoder
- Lower Thirds can be added to a line cut by using Down Stream Keyers (DSK)
- Often a separate Clean Feed is used to pick off the video before the DSK and is sent to the Primary Recording Deck to allow clips to be edited and reused in the future with the branding of a lower third
- For more flexibility in post-production, camera feeds can be Isolated (ISO) and sent to their own record decks, like an audio multitrack

CHOOSING THE RIGHT VIDEO HARDWARE

Start with 1 manned camera, the best camera you can possibly afford. Begin teaching your volunteers how to operate and follow the pastor and lead singers. This is the most important shot and it should be treated as such.

Adding more cameras helps to create dynamics for your viewers. PTZ cameras are a great way to add cameras without being obtrusive. Beware, however, of the desire to have one person run all the PTZs. This often leads to stale and uninteresting shots.

Add POV cameras on movable tracks. These are a great and inexpensive way to add more shots. Using a moving track keeps the shot going, helping to avoid boring, static shots.

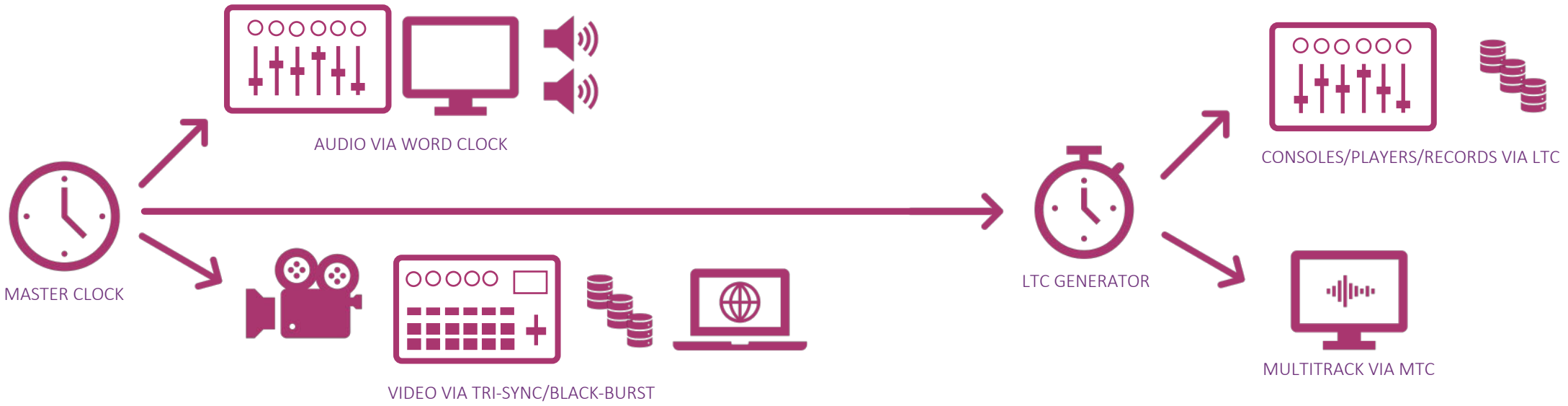
Choose a quality switcher that will fit your needs. Large scale productions need many inputs and lots of MEs via a dedicated switcher. With only 2 or 3 inputs, a software option may be appropriate for the budget when starting out.

Don’t forget your record decks. Capturing high quality video is very important when editing and re-encoding for other sources down the road.

The encoder becomes very important when trying to stream. Much more on this later.

SYNCING IT ALL UP

MASTER SYNC SIGNAL FLOW



MASTER CLOCK

Generates a clocking signal for the entire audio and video system to keep them in sync

SYNCING AUDIO AND VIDEO

In digital systems, sync is the most vital aspect for proper system operation

- Master clock needs to be able to provide both audio and video reference
- Master clock needs to be VERY high quality since it is synchronizing the audio and video systems
- SMPTE Timecode is used to keep a record of WHEN an event took place in time (HH:MM:SS:Frames) and is used to line up audio and video files in post-production
- A Linear Timecode (LTC) Generator outputs SMTPE Timecode as an audio signal which can be read by most audio and video devices
- MIDI Timecode (MTC) is a MIDI representation of LTC and is used to get LTC “into” a BWAV file in a DAW.

SYNCING AUDIO AND VIDEO (CONTINUED)

- Word Clock signals sync digital audio devices so that each sample of audio sounds at the same time
- Tri-Sync and Black Burst (also know as Genlock) are video sync signals that ensure each frame of video is shown at the same time
- Many video switcher systems employ Frame-Syncs which delay all the video and attempt to re-sync them so that each can be played back together. Frame-syncs are handy, but increase the latency of the video system and do nothing to ensure video and audio are synced together
- Video switchers must have all sources synced together in order to switch between the sources without glitches

ALIGNING LIVE AUDIO AND VIDEO

Once the audio and video sources are synced, they'll play at the same time relative to the master clock. However, because video devices must do a lot of processing, most systems have a significant latency when compared to audio. While the systems are in sync, the video system is likely a few frames behind the audio and we must be prepared to deal with this.

- Professional video systems usually publish the system latency of the devices in frames or lines
- We should convert frames to samples (or ms) to delay the audio back to the video using: Samples per Frame = Sample Rate / Frames per Second (FPS)
- 48,000Hz [Cycle Per Sec] / 60 FPS = 800 Samples per Frame
- We can convert samples to ms as needed by using the formula: 1000 / (sample rate / number of samples) = ms
- 1000 / (48000/800) = 16.6667 ms per frame
- In a live venue, 30-50ms probably won't make much of a difference to the viewer since there is so much else happening
- To a viewer watching at home, 30-50ms would be very distracting! So we need to delay our audio feeds to match the video before we broadcast it.

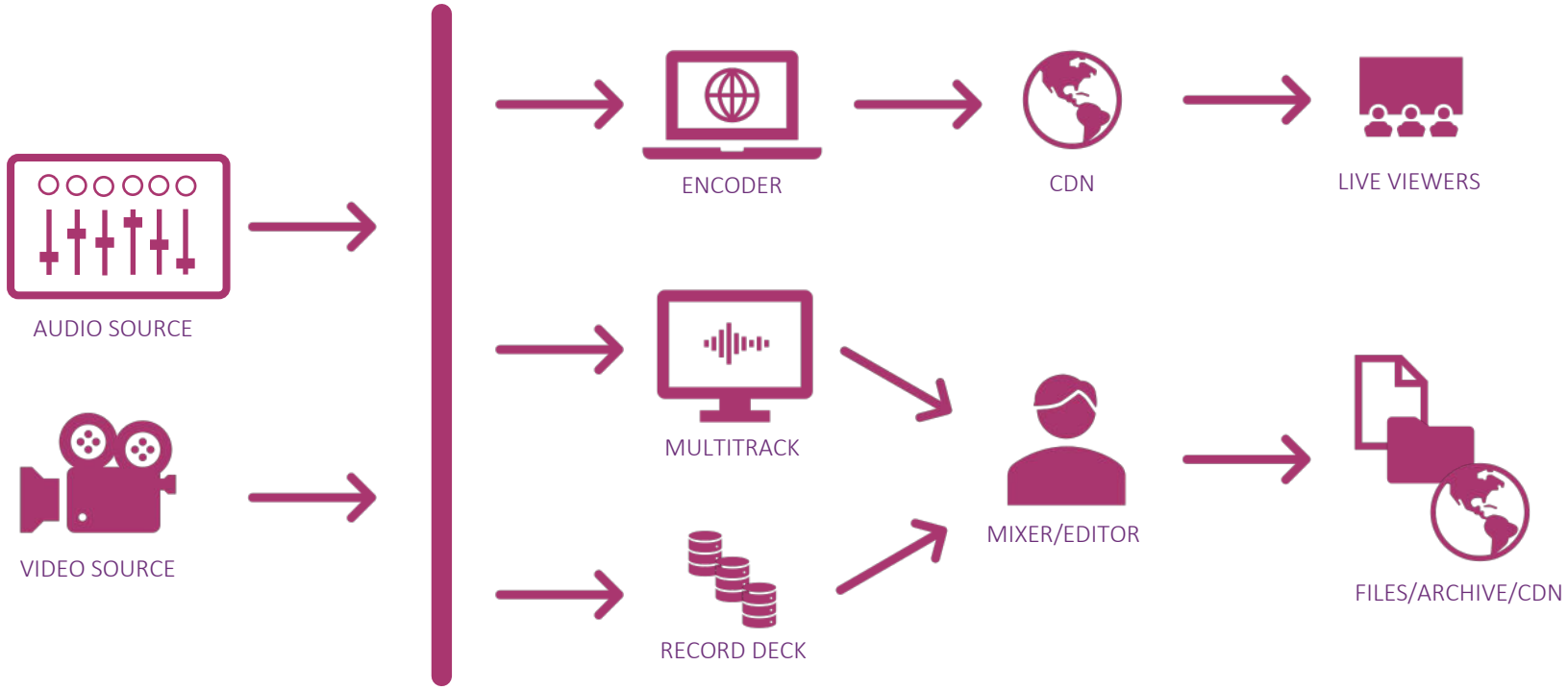
ALIGNING AUDIO AND VIDEO IN POST

We go to great lengths to ensure everyone is in time and has a reference so that our jobs are easy in post

- If we have striped LTC to our audio and video files, and they can stay in sync with each other (master clock) we can easily align them on a video editor or DAW timeline
- Insert the files via the Timecode location and they'll appear on the timeline, perfectly aligned at the start!
- If we didn't have timecode, we would have to align the files visually – just like the old movies did with clap boards
- You could reference a snare hit or a guitar strum to visually line up the audio video if you didn't have timecode

TRANSMITTING TO THE WORLD

TRANSMISSION SIGNAL FLOW



CONTENT DELIVERY NETWORK (CDN)

A CDN is a distribution of servers around the world that store and deliver content over the World Wide Web to users

Screen capture from a live stream of Concord worship leaders transitioning between songs on a Sunday Morning

DELIVERING CONTENT TO THE WORLD

CDNs allow content creators to distribute their live and recorded content to viewers around the world

- Popular CDNs include Facebook Live, YouTube, Livestream, Vimeo, Apple Podcast, Soundcloud and others
- Each CDN will have different format requirements to stream/upload to them and the sources must be optimized in the encoders (real-time and post-processed)
- Encoders for live transmission may be standalone hardware (AJA, Black Magic, Ross, others) or computer software (WireCast, Boxcast, Livestream Studio, others)
- Encoders for post-processing are typically built into the editor and you select your settings when exporting the files

CONSIDERATIONS FOR HARDWARE VS SOFTWARE ENCODERS

HARDWARE ENCODERS	SOFTWARE ENCODERS
• Standalone devices for a dedicated task	• Feature rich, many have switcher capabilities built in
• Highly reliable	• Real time view of streaming stats and interactions with viewers
• One-touch streaming	• Feature updates are easy to install like any other software
• Require firmware updates to have access to new features and services	• Can be more expensive as they require both a capture card and a computer to host the application
• Monitoring of the stream and quality typically must be done by a third-party application	• Reliability is based on the computer's ability to run the software and support the hardware

QUESTIONS TO CONSIDER WHEN USING A CDN

- What’s my internet upload and download speed?
- Do they meet the CDNs requirement for streaming?
- Is my connection reliable? What about when the building is full of people?
- Are there limits on the size of a file or time I can stream?
- Who owns the content I upload?

COPYRIGHT ISSUES

COPYRIGHT COMPLIANCE FOR STREAMING

While you may have a license to print, perform, or even record music in your church – this does not mean you can broadcast it across the world. May churches choose to only broadcast or upload the sermon to stay compliant. But, worship through music is a very important component of the overall worship experience in most denominations. How can we facilitate extending the full worship experience to those who are remote? **CCLI offers an add-on to their copyright services to cover streaming music.**

Church Copyright License Pricing

Select the Church Copyright License that best represents your ministry.
Optional Rehearsal and Streaming coverages enable sharing and podcasting.
Or simply pick the one-time Event License you need for your special event.

		Optional license add-ons		
Copyright License		Streaming	Rehearsal	Event License
Size	Base Cost (Annually)	Additional (Annually)	Additional (Annually)	One-time Cost
AH: 1–24	$62	$63	$89	$35
A: 25–99	$133	$66	$114	$56
B: 100-199	$222	$69	$141	$90
C: 200-499	$302	$93	$166	$123
D: 500-999	$423	$122	$218	$172
E: 1,000-1,499	$516	$176	$270	$208
F: 1,500-2,999	$638	$236	$322	$257
G: 3,000-4,999	$722	$293	$426	$288
H: 5,000-9,999	$911	$349	$530	$364
I: 10,000-19,999	$1,092	$461	$530	$438
J: 20,000-49,999	$1,452	$573	$530	$581
K: 50,000-99,999	$2,177	$854	$530	$872
L: 100,000-199,999	$3,674	$1,135	$530	$1,471
M: 200,000+	$5,917	$1,697	$530	$2,367

REVIEW HIGHLIGHTS

REVIEW HIGHLIGHTS

Setup a broadcast mix position to improve the mix for your remote viewers. This will also make it possible to export highlight clips from a sermon or music cut and quickly post on a Sunday afternoon to build on the momentum of the morning service.

If you must use a FOH mix, spin up your aux. Don't forget to make it stereo and post fade. It's also useful to apply some processing on the bus to make the level more even across the sections for the remote viewer.

Multitrack your services. This will allow you to remix them later for the best possible experience for those who go back to re-watch.

Make sure your lighting is ready for video. The only way to have a chance at good video is great lighting.

Make wise decisions on video hardware selection. Did I mention how important that main camera is?

Ensure your audio and video are in sync. The Master Clock is the most important device in the signal chain. Don't forget to use LTC/MTC for lining up the files later.

One CDN is not right for everyone; investigate your options. Review all the costs, connection requirements, and compatibility with your encoder before taking the plunge.

Stay compliant with copyright law. CCLI has made it very easy for us, so no excuses!

TIPS AND TRICKS

Hire a local engineer or student to remix your services

- Provide them with the multitracks to remix, the hard drive with the raw video files, and a login to your CDN.

- Ask them to remix the audio and send back:
  - Full Service WAV
  - Sermon WAV (also get a 44.1kHz version if your going to CD)
  - Sermon MP3 (for podcasting)

- Ask them to sync up the remixed full service audio with the raw video, export and send back:
  - Full Service High-Quality
  - Full Service encoded for CDN
  - Sermon encoded for CDN
  - Any music cuts you may want for CDN

QUESTION AND ANSWER

AES WORSHIP SOUND ACADEMY 2020

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