

# Interactive Worship Over IP



## SHARING THE WORD THROUGH STREAMING VIDEO

By Jeff Woiton

*People watching a live streamed service are often surprised by the quality of the streamed video and audio. With the lights dimmed, it is hard to tell that the pastor, projected at full height, is not there in person.*

People increasingly access information through television, the Internet, and other media outlets. Accessing and using technology in innovative ways is becoming the norm, and growing ministries can tap new technologies to reach more people in more places, and at the same time provide a compelling experience.

Today's IP-based video streaming solutions give houses of worship the ability to provide their members with a richer, more interactive worship experience and extend the reach of their message throughout their campus, across the country, or around the world. As ministries expand, they can choose to deliver praise and worship by video streamed over low-cost IP networks instead of, or in addition to, building new facilities.

### Planning Considerations

Before launching into multi-site expansions, churches need to address a number of issues, including choice of cameras, lighting options, and the cost of IP network connections. Nothing consumes bandwidth like video and since bandwidth is usually sold based by transmission rate, it's important to factor in the monthly expense. Selecting a video transport solution that provides the best quality at the lowest transmission rate is key to keeping transmission costs low. The right system quickly pays for itself by the bandwidth savings alone.

Also, the type of worship you offer can become a consideration. Youth-oriented "rock concert" worship involving fast motion, quick cuts, and flashing lights requires more bandwidth than a more traditional sermon where the pastor is just walking and talking.

## Point-to-Point Streaming

The most basic application is simple point-to-point video delivery, with one site sending video and audio and the other receiving. This often represents the first phase of a church's multi-site strategy, and it's useful in handling seasonal overflow. In a nutshell, a standard video signal goes into an encoder, becomes compressed, and is translated into a streaming format. The signal is then transmitted across the network to the decoder which turns it into an image on a large-screen display or a projector.

Point-to-point video delivery over IP is ideal for churches whose sanctuaries are too small to accommodate their entire congregation, because the service can be broadcast, in real time, to another area of the church, such as a chapel or a kids' area. The same video can also be distributed to an off-site venue, where church members can gather to take part in the service at a more convenient location.

## Superior Control Over Multi-Point Streaming

Point-to-multipoint video delivery takes streaming a step further. It distributes video from the main campus to any number of satellite campuses which enables, for example, one well-known or charismatic

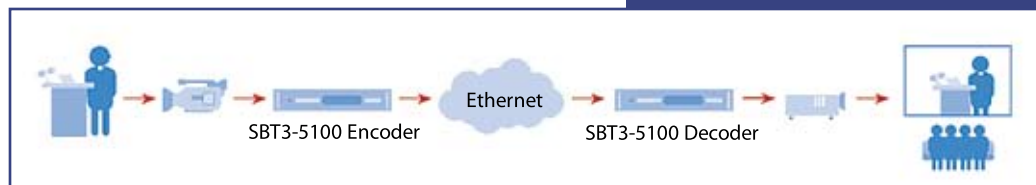
pastor to deliver his message to members in other facilities, cities, and regions.

With an encoder at one end—connected to an internal network or a much larger commercial network—and one or more decoders at the other end, a church can transmit the service next door or thousands of miles away. IP networking makes the distances between churches insignificant. Congregations can watch the entire service as they would watch a movie or, as is more common, hold their own praise and worship locally but receive their teachings from a central source. Such services will conduct prayer, music, and announcements at their own site and then receive the message as a live or delayed video stream.

B can pull that video and play it out at will. Either option is possible, offering superior control for a seamless service at

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*Diagram courtesy of Streambox.*



## Live or Delayed Streaming

With one main site transmitting video, any of the downstream sites can record the stream to a file, and then play out the video according to the timing of their own services. If, for example, services are held simultaneously, but a musical performance at a downstream site runs long, a streaming solution with "store-and-forward" functionality can be used to play out video when the time is right, whether it be 10 seconds, 10 minutes, or 10 hours later.

With an operator at each end of the system, church A can encode the sermon and push video out to church B for real-time viewing, or the operator at church

each venue. High-quality video transport systems will ensure that audio and video remain in sync, regardless of when they're played out.

## Bridging Congregations with Interactive Streaming

Two churches can also create an interactive worship environment by connecting the sites through a simultaneous, bi-directional flow of video. For example, the choir at one site can offer music during one portion of the service, and a speaker from the other site can present a reading, and so on. In this case, a low-latency (low-delay), high-quality streaming solution is critical to maintaining smooth communication and giving the service a

streamlined feel for church members at both sites.

The ability to stream audio and video over IP can also add to the quality of church services by providing a window into the congregation's mission and outreach work. Portable streaming solutions enable church missionaries to beam images back to the church, illustrating for members how their contributions make a difference in other parts of the world. Live video updates from missionaries abroad, shown during worship, demonstrate how valuable church member involvement and support can be. In this case, portability, ease of use, and compatibility with worldwide standards are important concerns.

## A Back Seat for Technology

The primary goal of these video transport methods is to deliver the message without drawing attention to the technology behind the message. By investing in superior streaming technology, the church can ensure that video quality will stand up even when images are magnified for a large theater-sized screen.

With advances in video technologies, congregations are savvy enough to recognize inferior technology when they see it. With video being displayed on screens that are 20 to 30 feet in height, even the slightest imperfections—such as motion artifacts or dropped frames—are noticeable. It's similar to watching a movie in the theater. The story has the power of drawing you in, but any technical glitches can potentially ruin the experience. On the other hand, seamless technology has the potential for facilitating a great experience and engaging the entire congregation.

People watching a live streamed service are often surprised by the quality of the streamed video and audio. With the lights dimmed, it is hard to tell that the pastor, projected at full height, is not there in person. A combination of technology and simple stagecraft help make the pastor's message leave a lasting impression.

## Maximizing Impact and Efficiency

Video streaming offers one of the most cost-effective means of reaching out to congregations, whether the setting is a traditional or contemporary worship service. Traditional services often focus on the pastor as he or she addresses the congregation, whereas contemporary services tend to feature faster motion, more lighting effects, and more elaborate staging and music.

The dynamic action and greater motion complexity in contemporary services require greater bandwidth for smooth delivery over IP than is necessary for traditional worship. Indeed the quality of the video viewing experience is directly related to the reliability of the network connection. Churches looking into video streaming solutions should be cognizant of the performance and reliability of the video transport solution, as well as the network connection they select, as both factors will greatly impact the video images that their members see. Therefore, a commercial grade network is highly recommended for mission critical applications.

## Picking the Right Feature Set for the Job

Forward Error Correction (FEC) is a built-in feature in some video transport systems. It deals with the effects of

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transient network conditions, which can cause packets within the stream to be dropped and cause dropped frames in the video. Content delivered over the public Internet is especially vulnerable, given the Internet's unpredictable traffic patterns and volume.

Robust FEC enables the recovery of packets and reconstitution of the video stream so rapidly that people in the pews won't notice any hiccups—such as skipping, jumping, or stuttering. User-selectable latency settings of one second or less enable the FEC to do its job without compromising the quality of the video image, particularly in interactive worship

settings where two sites send and receive simultaneously. High-quality video streaming solutions give users the flexibility of adjusting latency—and time allowed for FEC—to achieve the required quality.

Different streaming systems offer different options for audio. In addition to the video, some churches will send up to 48 channels of unmixed audio for mixing on site; others will mix the audio down to six channels or less. The audio can then be mixed at the downstream venue to match the acoustics of the space.

Churches should also make plans for the video delivery model they wish to use: point-to-point or point-to-multipoint, and unicast or multicast. Churches looking to send video to more than one site need to decide if they want to send the same stream to all sites (multicast), or if they want to send video on a one-to-one basis (unicast). A multicast stream represents a fixed amount of bandwidth on the network, regardless of the number of sites that connect. A unicast stream involves delivery of specific content to each site, with each stream adding to the network load.

Options for delivery can be influenced by the type of network the church selects. The network choice will also dictate connectivity cost. The network can be a private LAN on the church campus, a Virtual Private Network (VPN), or even the public Internet. Establishing service with an external provider can take weeks or even months, making network evaluation and selection a priority early in the planning process.

## Looking Ahead to New Quality Standards

The planning phase should also include a discussion of plans for high-definition

video. HD streaming is certainly an option and provides the best image quality, along with the greatest challenges. Any church considering multi-site HD streaming will need to look at HD infrastructure and equipment costs, added transmission costs, and revamped staging and production workflows. Everything is bigger in HD—the user experience as well as the church's A/V budget.

In standard definition (SD) or HD, a flexible, configurable, and easy-to-use streaming solution is the most appealing to both the congregation and the staff who operates and maintains the system. It gives churches the luxury of selecting what works best for them in their particular worship environment. For each worship service, using audio and video presets

means that the operator can simply turn the system on, start streaming, and let the video transport system do its work.

Technology has the power to transform lives, and houses of worship are poised to take advantage of innovative ways of getting their message out while being good stewards in service.

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