Mastering Wireless Presentation Systems

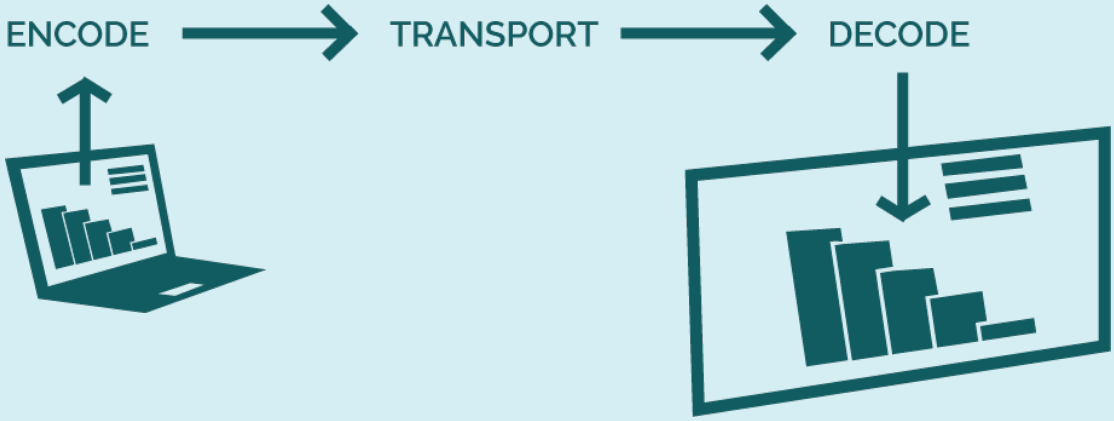
By Costa Lakoumentas
KLIK Communications

KLIK

Five years ago, “wireless presentation systems” represented a product category most of us had never heard of. Today, it seems as if it’s one of the hottest categories, with increasing demand from education, business and government clients—and a plethora of options from various vendors. Although many are looking for solutions, few are aware of how products compare with one another, or even how they work.

Regrettably, when you peel back the marketing-speak, little substantive information is available about how these systems work, the technologies they embody, and how you, as an AV professional, best can advise your clients on what’s right for them. This is part one of a two-part series that aims to demystify the category and arm you with the necessary knowledge to speak on the topic with authority.

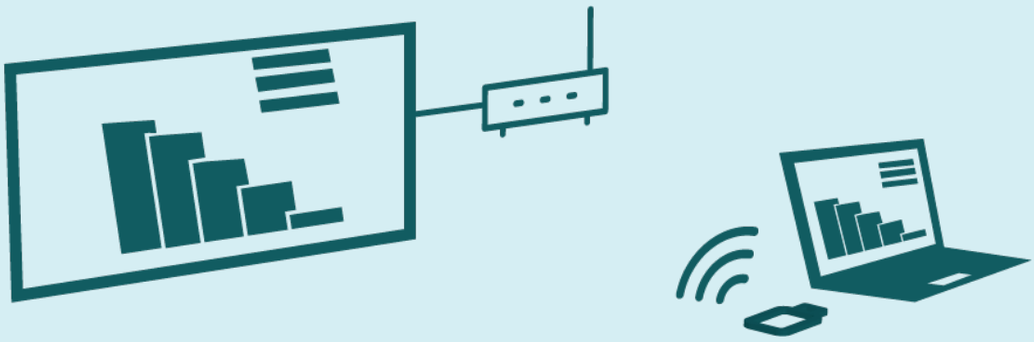
At its core, a wireless presentation system offers a computer, tablet or smartphone the ability to share the contents of its screen with another display, without a physical video connection between the two. The very point and purpose of such a system is to allow clients (users) to connect their device to the display without the restrictions and compatibility issues inherent in a cabled connection. For example, one MacBook Pro might have Mini-Display Port as its video interface, whereas another might employ USB-C.



1 The three building blocks of every screen-sharing wireless presentation system: encode, transport and decode.

To deliver video from a client device to a display wirelessly, a wireless presentation system must do three things: (a) package the video into transportable code (encode); (b) deliver the code to the receiver (transport); and (c) turn that code back into a video stream understood by the display (decode). Just how those three components are addressed will determine the system architecture and the consequent features and benefits of a complete system.

Developers and manufacturers have essentially taken three different approaches to building the current crop of wireless presentation systems. For the purpose of this discussion, we can refer to them as (a) hardware; (b) hybrid; and (c) software to describe how the encoding and decoding is performed. Most of the current crop of commercially available wireless presentation systems fall into one of those three architectural categories.



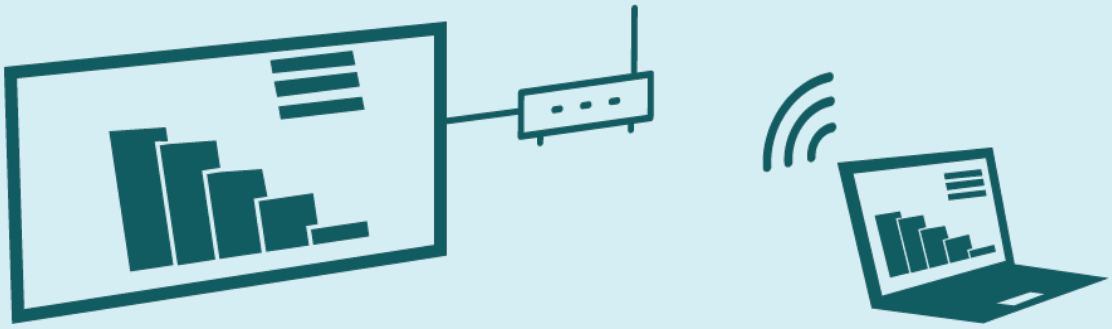
2 Hardware-based systems employ a hardware “transmitter” for point-to-point wireless video transmission between device and display.

Systems based on hardware architecture employ hardware encoders and dedicated hardware decoders, with proprietary transport protocols. Hybrid systems use a software encoder running on the client device and a dedicated hardware decoder at the far end, and they usually rely on TCP/IP for signal transport. Software-based systems use software encoding and decoding, requiring apps to run on client and server devices, while transporting signals over the LAN/WLAN.

Hardware systems are characterized by the use of an adapter (commonly known as a “dongle”) that plugs into the client device. Currently, there are two types of such adapters: HDMI and USB. The HDMI adapter includes encoding and transmission capabilities onboard, and it effectively converts the digital HDMI stream into data that is broadcast to the hardware receiver. The receiver decodes the data into video and sends it to the display. This version of a hardware-based wireless presentation system is the most client-agnostic, and it effectively operates like a “virtual” HDMI cable. It does require, however, that the device have a compatible HDMI output.

The other type of hardware system employs a USB connection to the client, which the operating system sees as an external display. As such, the user of the client device can choose to mirror or extend his or her main display, and even change resolution and other display settings. This approach is definitely more flexible than the HDMI adapter approach, but it’s also dependent on a physical USB port on the client device.

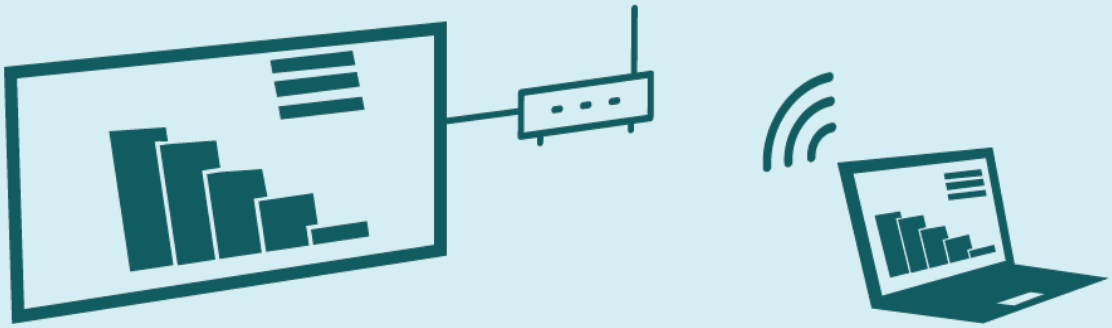
It should be noted that hardware-based wireless presentation systems do not use the facility Wi-Fi or wired infrastructure for signal transport; instead, they use proprietary RF links between encoder and decoder, which, incidentally, might or might not be based on Wi-Fi. This standalone feature of hardware systems can be a key selling point for applications in which access to the network is either not possible or not desirable.



3 Hybrid systems use the Wi-Fi radio already inside the device to transport the signal directly to the hardware receiver.

Equally popular are hybrid systems, in which the encoder runs as an app on the client device and the decoder resides in dedicated hardware attached to a display. Software encoding is accomplished using the client device's processor, as opposed to a separate piece of hardware; that eliminates the need for physical ports on the client device, but also increases processing demands. This approach allows for a more cohesive workflow between devices that have physical ports (computers) and those that do not (tablets, smartphones).

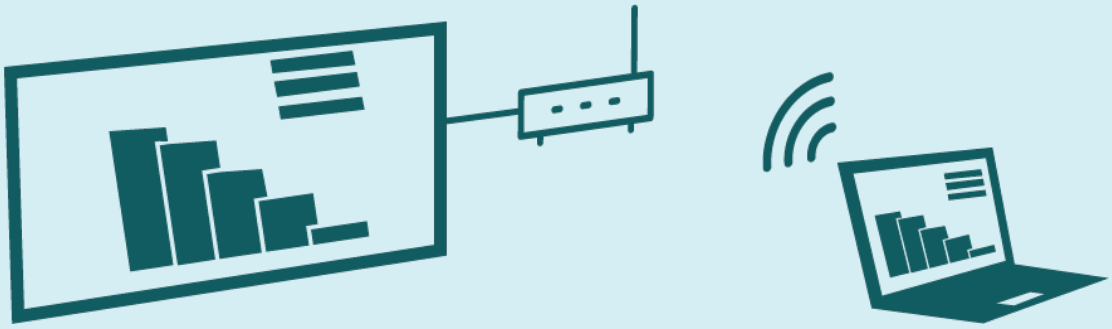
The encoding on hybrid systems is addressed in two ways—either through native streaming protocols, such as AirPlay and Miracast, or through a vendor-specific encoder. Support for native protocols broadens the user base because it doesn't require the user to install an app. On the other hand, app-based encoding often bundles additional features, such as password-restricted access and multi-user management. Some hybrid systems support both native and app-based encoding in the same system at the same time, further broadening compatibility while also retaining features for specific use cases.



4

A common deployment of hybrid systems is to route all signals over the WLAN, so that users continue to have access to network resources in addition to the presentation system.

Hybrid systems use the existing network infrastructure to transport the encoded signal from the device to the decoder. Most, although not all, hybrid systems offer three signal-transport options, from standalone operation to full network integration. In general, the hardware component can integrate with the LAN over an Ethernet drop or the WLAN through a client session, making the device accessible to all network users. In addition, some hybrid systems can act as an access point or a virtual AP, allowing users to make a Wi-Fi connection independent of the facility's network.



5 Software-based systems require no specialized hardware, using software for the codec and the existing network for transport.

Software-based systems do away entirely with dedicated hardware, replacing it with a software decoder running natively on a PC. The client device runs a software encoder—either a vendor-specific app or a native streaming protocol—and uses the existing network to transport the signal. This type of solution is available commercially as a system, or, in the case of Windows 10, it's built into the operating system. These systems allow for wireless presentation system deployment without hardware acquisition; however, they do require dedication of a suitable host as the receiver device.

Let's do a quick review of the three systems again, focusing on the benefits and challenges of each one.

Hardware systems are fast and easy to deploy because they require no software installation or network integration, and they work with almost any supported operating system version. They do require, however, that the device have a physical USB (or HDMI) port; for that reason, tablets, smartphones and PCs without physical ports require a software encoding solution.

Hybrid systems are hardware-agnostic and work on most devices (sometimes without installing an app). Plus, they are generally more cost effective, because there is no adapter (dongle) to connect to the client. However, because they use an existing wired or wireless network for transport, they can be more complicated to install, discover and connect with.

Software systems are easily deployable at scale because there is no new hardware introduced to the installation. As long as there's an available host connected to the display, clients can connect with software encoding and the LAN to which they're already connected. Their biggest drawback is that they require the dedicated use of a host, which can be costly or impractical.

Most of the current products in the wireless presentation system segment are built around one of the three system architectures described. Which solution is right for your (or your clients') application depends on a variety of factors, including design complexity, ease of configuration, client usability, data security, device support and cost. Thoughtful selection of the right architecture first—before considering brand or model—will likely lead to a more positive outcome in the deployment of a wireless presentation system.

In the second part of this article, we'll offer more "hands-on" details about deployment, configuration and troubleshooting of wireless presentation systems.

In the first part of this series, we described the essential functions of a wireless presentation system and defined the three system architectures around which most current systems are built. In this concluding part, we'll review the pros and cons of each system type as they pertain to usability, deployment and support.

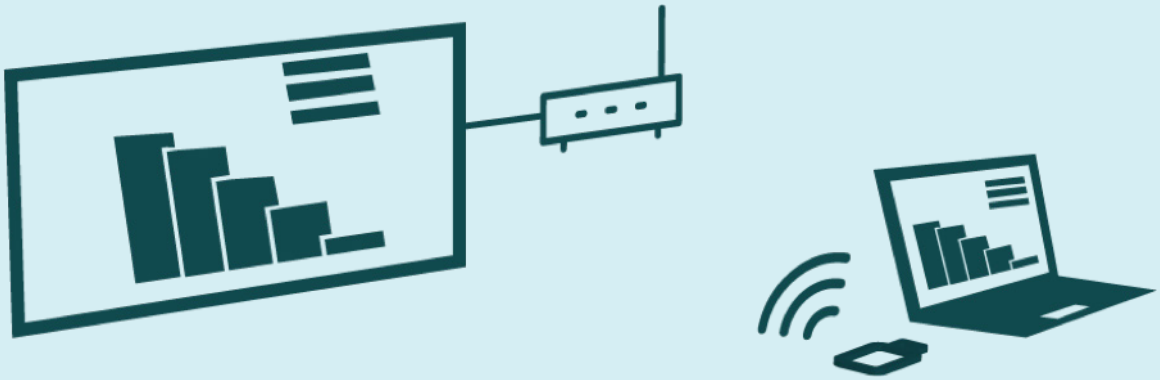
The ultimate goal of any wireless presentation system is to eliminate the video cable that runs from the display to the user's device. That cable, although sometimes inconvenient, hasn't always been a problem. Back when we all used laptops (and desktops) fitted with HD15 VGA connectors, getting connected to the display (or LCD panel) was simple: plug and play. With the proliferation of tablets, smartphones, Chromebooks and more than a dozen HD video-interface options, that approach is now solidly in the rear-view mirror.

With several choices in the wireless presentation system category, it can be tough to know where to start. Each of the solutions claims its own set of features and benefits, with a huge range in cost. Let's look again at the three system architectures, this time from the perspectives of integrators, system administrators and users.

With a full 12 different video display interfaces still in circulation, it's no wonder Wireless Presentation Systems are gaining in popularity.

Integration And Support Of Hardware-Based Systems

From an integration standpoint, hardware-based systems stand apart from all others; they're truly plug and play. Connect the "receiver" to the display, then plug the "sender" into the video source device and start to stream. No IP addresses, virtual LANs (VLANs), software or drivers needed (most of the time), as the wireless presentation system remains completely independent of any network infrastructure. Aside from some basic considerations related to RF signal transmission (range, obstacles, congestion), hardware systems can truly be termed "zero-configuration."



Hardware systems use a sender that plugs into the client device with either an HDMI or USB interface.

Because there are two types of hardware "sender" systems—those with HDMI interfaces and those with USB—the integrator has to consider which is the best fit for the user. HDMI senders are the least intrusive on the sending device, as they handshake just like any other HDMI sink device. On the other hand, they require two cables: one for video and another for power. Mostly, such devices are used to replace a video cable—where they can be a very cost-effective alternative to cable installation—as opposed to being for dynamic screen sharing in a meeting-room environment.

The USB "sender" is equally plug and play, providing that (a) the sending device has a USB Type-A socket and (b) the device is a PC that runs either Windows or Mac. Those two conditions could be showstoppers in an all-Chromebook environment, but it's less likely to be an issue in corporate applications. Because the USB connection negotiates a video session with the device's operating system (OS), this type of sender is more obtrusive with respect to the user's device; driver conflicts can, and do, occur.

Both types of hardware system are intuitive to use, and they require little or no training; that makes them user favorites. The HDMI sender is clearly intended for connection to the video output of a device, whereas the USB connection might not be as intuitive to the first-time user; nevertheless, in general, infrequent users report consistent satisfaction with this solution. Of course, if a user wants to use a device other than a PC (a tablet, a smartphone, a Chromebook, etc.), or a device that lacks HDMI and/or USB, they'll either have to look elsewhere or have to switch to a hybrid system architecture.

Integration And Support Of Software-Based Systems

Just as with hardware systems, those that employ only software for both sender and receiver come in a variety of configurations, underpinned by several different technologies. Some use proprietary software for sending, whereas others support existing technologies, such as AirPlay, Miracast or Chromecast. Likewise, on the receiving end, the server can require third-party software or rely on the native technology, as is the case with Windows 10 screen sharing.

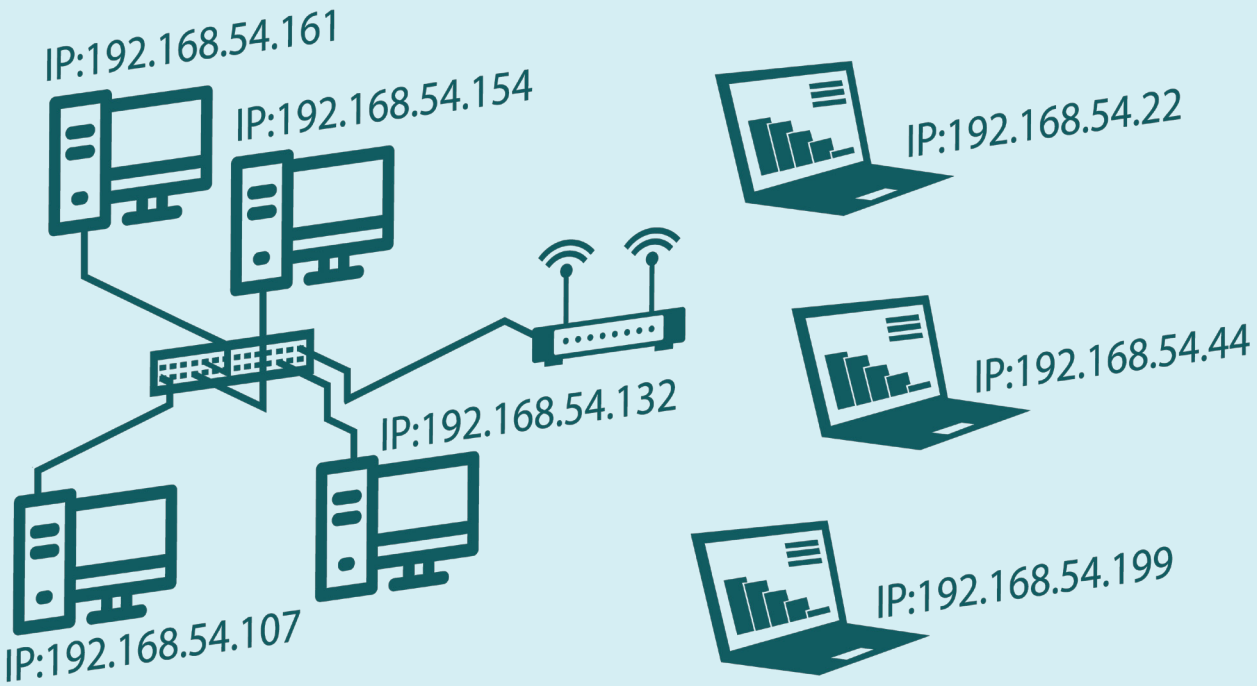
Software systems are commercially available but also built in to Windows 10 and Mac OSX.

Software presentation systems are generally the most intrusive, as they require client applications on user devices, as well as a server app on the receiver PC. Because they involve no hardware apart from the client's existing devices, there's little to no opportunity for a systems integrator; design and deployment is generally left to the organization's IT department. Design considerations include the regular wireless local area network (WLAN) protocols, as well as added concerns related to sub-netting, VLANs and network bandwidth.

As is the case with hybrid systems, the software-based sender can present a hurdle for first timers or infrequent users. First, the application has to be installed and properly configured, followed by the tweaks and changes applied to network settings, to ensure that sender and receiver can connect. Because of this start-up hurdle, software systems are best for applications hosting recurring sessions with regular users. Once the installation and configuration issues are sorted, users are generally satisfied with the operation of these systems, because they require no attached hardware and they can be platform agnostic.

Integration And Support Of Hybrid Systems

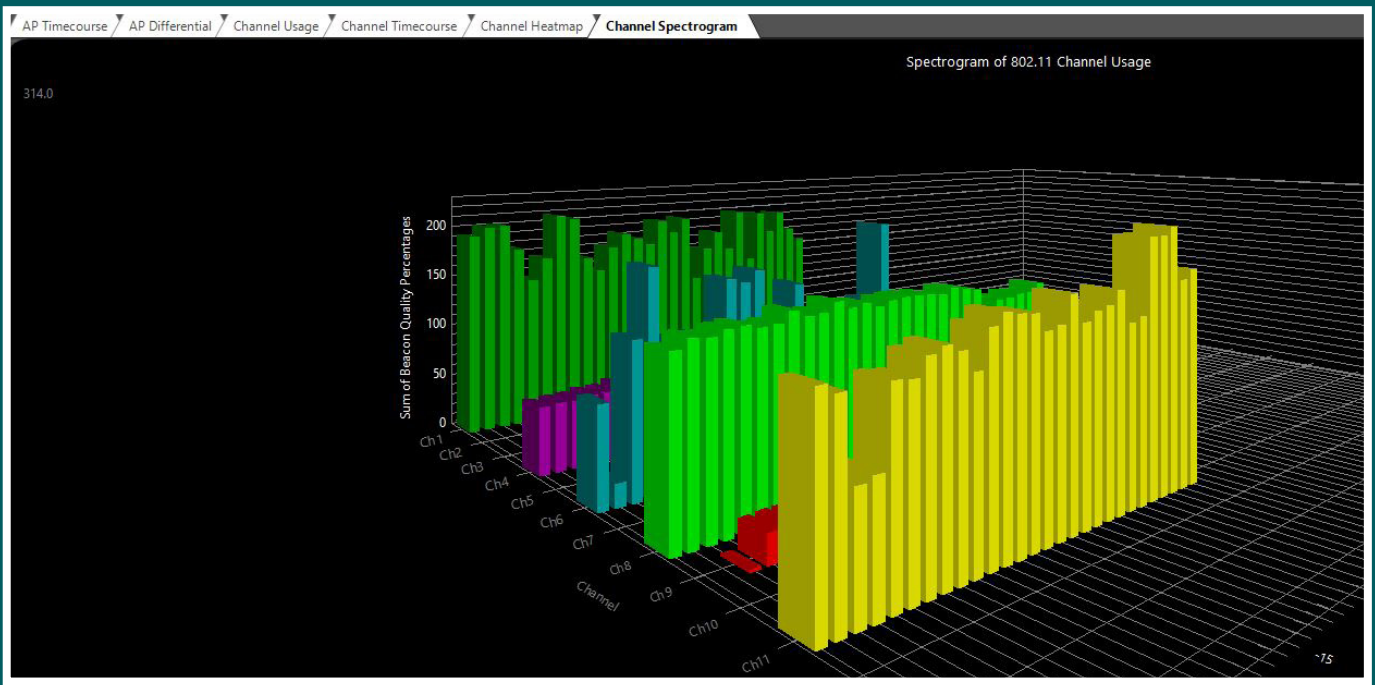
Hybrid systems fall somewhere in between software and hardware systems, with dedicated hardware at the display and a software sender on the client device. The software sender necessitates the use of device Wi-Fi for signal transport; hence, integration with the existing WLAN is almost always required. Although most manufacturers of such systems offer a “standalone” or “virtual access point” mode, most users find switching between wireless access points for screen sharing at best inconvenient and, at worst, simply not possible.



Software and Hybrid systems rely on the existing network, so a basic understanding of IP addressing, subnetting and other network concepts is essential.

System integration requires a thorough knowledge of general networking concepts, in addition to the direct support of a network administrator. Although small-office applications are straightforward, larger venues that have more complex networks raise issues of device discovery, LAN segmentation, access permissions and client lease times. This “heavy lifting” can prove daunting, and it can even sway the client to another type of system. The payoff for good planning, however, is high performance and low cost, along with broad device compatibility.

As with software systems, hybrid wireless presentation systems often support native streaming protocols in addition to their own, proprietary apps. Most systems support the stalwarts—AirPlay and Miracast—so even casual users or guests can connect from Windows, Mac, iOS and Android devices without having to install an app. Generally, the proprietary apps supplied for hybrid systems offer some measure of access control (password), along with added features, such as whiteboarding applications, file sharing and voting.



Before deploying any wireless system, take time to do a site survey using a Wi-Fi scanner application. Avoid congested wireless channels to ensure signal stability and consistent performance.

A hybrid solution is best deployed where regular users working on a variety of device platforms require frequent access to the display for screen sharing. In particular, organizations that support bring-your-own-device (BYOD) capability stand to gain the most, especially if the system both supports native streaming protocols and offers a proprietary solution. Although the network planning, configuration and management can appear daunting at first, most integrators likely already have the skills to deliver positive outcomes, working, in many cases, with the local network administrator.

Now that we've covered some of the technical strengths and weaknesses of all three types of wireless presentation systems, let's take a moment to reflect on the ultimate goal of such systems—connecting users to a screen with minimal effort and outstanding results. Which one of these systems is best from users' perspective depends entirely on their application, their existing infrastructure, their technical sophistication and, ultimately, their budget. Here are some basic rules of thumb:

Applications – Hardware Systems:

Applications hosting smaller numbers of meeting participants (fewer than six to eight) using managed PCs are best served by the "grab-and-go" of hardware systems that use a USB interface. Participants can pass around and share one or two senders, taking turns sharing their screens, without software installation and with minimal configuration (if any). Although hardware systems are among the more expensive wireless presentation systems, they deliver a convenience that many corporate and government users appreciate and value.

Applications – Software Systems:

Software systems scale easily, and they can readily accommodate large groups of meeting participants in venues that include lecture halls, civic government facilities, libraries and the like. Because these systems generally require the installation of a software app on the client device, they are best deployed in applications that host regular, recurring presenters. The cost of such systems can be attractive, provided that the venue has a suitable PC already installed to act as the server.

Applications – Hybrid Systems:

As with software systems, hybrid systems are best suited for applications that host the same users—from small teams to classrooms full of students—on a regular basis. Systems that support native streaming protocols offer a simple and unobtrusive means to support guests, often at the expense of enhanced features or access security. Proper integration requires some network configuration knowledge, but it also delivers a seamless user experience, while adding screen sharing to the existing suite of network applications, storage and access.

Costa Lakoumentas

Costa has been part of the audio, video and multimedia industry since 1981 in roles that include system designer, integrator, consultant, product developer and manufacturer. He has been associated with several professional brands, developed over 130 products, holds 8 patents and is the founder and CEO of KLIK Communications.

KLIK

KLIK Communications Inc.
16541 Redmond Way, C330
Redmond WA 98052

klik@klikboks.com

www.klikboks.com