IPTV and Digital Signage
The Ultimate Visitor Experience Solution for Sports and Entertainment Venues

VITEC
VIDEO INNOVATIONS

White Paper
Overview

For some sports and entertainment venues, making the decision to upgrade from an RF CATV-based television system to an IPTV network might make all the sense in the world, whereas for others it might seem like an unjustifiable move considering the cost and effort. This paper is intended to help venue operators and teams understand what is involved in making the transition to IPTV, highlighting the benefits of doing so and the unique requirements for getting it right.

The Game Experience

There is nothing like being at a game, especially when your team is winning. The goal for sports teams and venues is to create a truly memorable experience that fans cannot get sitting in their living rooms watching on TV. Such an experience comes not only from great game play but also from great game presentation. Game presentation is the art of creating a unique visual and auditory experience that supports and enhances the game play. Effective game presentation uses all the resources at the venue’s disposal to deliver a one-of-a-kind fan experience and drive revenue opportunities.
Game presentation has focused primarily on the in-bowl experience (the experience people have while sitting in their seats in the arena, as opposed to at home), which in recent years has meant a tremendous increase in the quantity and size of LED video scoreboard displays in both professional and collegiate sports venues. Those resources (the displays) are certainly important to making the in-bowl experience more appealing than ever before.

What about the rest of the venue?

To maximize fan experience and revenues, teams are extending the game presentation beyond the bowl, engaging fans with service and technology throughout the venue. One of the most effective ways to accomplish this is to use one of a venues’ greatest assets — their TVs.

The Venue Television Experience

By and large the most common infrastructure for delivering television content within a public sports venue is a traditional cable TV (CATV) system, which relies on coaxial cable distributed to TV locations throughout the venue. In addition to offering a standard lineup of cable TV channels, venues can also use CATV to create or "modulate" one or more of their own internal channels to provide “closed-circuit,” low-delay content such as the scoreboard program or game broadcast feeds from the truck. This model has successfully provided a basic television viewing experience in venues for decades.

However, with the advent of digital and HD television, the home-television experience has changed dramatically. Advanced features like an interactive programming guide, picture-in-picture, DVR, and video-on-demand are available to fans at home; all they need is a set-top box supplied by the service provider for each TV. Venues that use the traditional CATV model have been challenged to provide the same level of user experience at the venue that fans and staff can get at home with their modern TV service. There are a few reasons for this:

- The bulky, hard-to-mount size and additional monthly cost of each set-top box (STB)
- The inability for most of the advanced features to work with the venue’s internal channels
- The challenges of adding and balancing distribution nodes/channels/TVs on a CATV system
As a result of those shortcomings, premium-suite customers and back-of-house users have come to expect a subpar experience on their in-venue televisions, especially compared to what they can get at home.

Not only does CATV keep venues from delivering a modern, satisfactory user experience, but it also limits their ability to use their TVs as part of a comprehensive sales/advertising strategy. Therefore many venues have not considered their TVs as valuable digital assets.

The Venue Advertising Experience

Because changing out backlit ad panels, Trivision signs, and rolling ad panels is labor-intensive and expensive, traditional venue advertising models were based on fixed signage with generic, season-long (or longer) creative content.

The digital era for venues began with the advent of LED video boards and then fascia ribbon displays during the late 90s. These displays allowed venues to deliver visually dynamic video/audio content and partner branding within the seating bowl during an event.

Digital signage outside the bowl has been limited. It is normally just a specialty- or kiosk-based ad deployment in high-traffic areas, usually involving some type of interactive feature but not the live game. These systems are typically single-purpose and proprietary.

For many venues the extent of digital signage ends there. The rest of the building remains unchanged, with fixed signage, a few digital kiosk signs, and a traditional CATV system tuned to the game broadcast or scoreboard program feed. In other words, the TVs are just TVs.

Though there is a comfortable simplicity with a basic CATV system for many venues, the inherent opportunities to enhance the fan experience and substantially increase revenues through IP distribution are driving the transition from CATV to IPTV and digital signage.
Just What Is IPTV for a Sports Venue?

For starters, IPTV in a sports venue is much more than a TV service that delivers video streams across a venue’s IP network to TVs. It is the ability to deliver a high-quality television viewing experience while at the same time creating highly effective sponsorship inventory by turning every display into a digital asset. It is IPTV with digital signage.

A comprehensive IPTV/digital signage system in a sports venue makes it possible to extend the bowl experience to every area of a venue by presenting appealing sponsored content that supports the most engaging content of all — the game. It turns every display into an asset that people will connect with and dwell on.

The bottom line is that an effective IPTV/digital signage system can help turn a sports and entertainment venue into a powerful marketing machine.

The Digital Display

The potential of a true IP-based digital display endpoint is almost limitless. For today’s sports and entertainment venues, the digital display serves two necessary functions.

1. **Television viewing**
   First and foremost, the digital display must be a TV, and viewing should be as good as or better than the home viewing experience — which means different things for different applications:
   - For concourse displays, it means superior picture quality and no or low latency in the game feed, with the ability to display game-in-progress or score/clock information.
   - For premium customers/suites and back-of-house displays, it means easy-to-use remote control, quick channel-changing, programming guides, and interactive features like DVR and video-on-demand functionality.
   - For club, hospitality, and meeting spaces, it means hassle-free integration of external inputs such as laptops and third-party control devices like AMX, Crestron, etc.

2. **Digital signage**
   When each display is considered an asset within a larger digital strategy, venues can expand the value and amount of their digital inventory, thereby increasing sponsorship revenue. Digital signage enables:
Targeted advertising with fast, direct activation
Direct interactive experiences with the display
Dynamic integration/parsing and display of any external data sources such as game stats, social media, RSS feeds, XML, SQL, spreadsheets, and text files
Extension of the in-bowl experience to every area of a venue, which gives fans the confidence to leave their seats and enjoy amenities without missing any action or info
Event-specific way-finding, directional information, and emergency messaging
Dynamic and enticing menu displays, which can significantly increase food and beverage sales

Unique Requirements of an IPTV/Digital Signage System for Sports Venues

The ideal IPTV/digital signage solution combines a superior TV-watching experience with dynamic advertising and data presentation, all happening simultaneously. Deploying this type of system throughout a sports venue is especially challenging. Why? Because thousands of people watching a real-time sports event on hundreds of TV’s while being at that event creates some very unique requirements:

Low latency – Latency in this case refers to the time delay between seeing and hearing the action on TV versus seeing and hearing the action in real time on the field. Because a live game has tremendous sound, an excessive delay in the TV broadcast can be awkward for viewers. That’s why low latency is a critical requirement. Less than 500 milliseconds of end-to-end latency across all devices is preferred.

The challenge with many IPTV/digital signage deployments is achieving minimal latency with maximum image quality throughout the entire encoding, distribution, and decoding process. Higher quality and bandwidth efficiency usually come with greater latency, which typically does not matter in other environments. Not so in this case, which makes this challenge unique to sports venues.

Synchronized playback – If multiple displays are visible from one location, each player must decode and play back all streaming and graphical content in sync, with zero latency in image presentation between players. Synchronized playback is a requirement unique to sports venues because the scale of the deployments typically means a minimum of two and as many as 50 displays might be viewable by one person at any time. With so many displays
visible in one location, any unintentional change or drift in screen content can be visually disconcerting, causing disengagement from the displays. On the other hand, an intentional synchronous change of screen content across many displays can create a dynamic visual opportunity, or moment of engagement, that draws immediate attention to the screen.

Synchronized playback can be a challenge for sports venues because digital signage solutions are not usually designed for this application. Instead, they are usually created for retail deployments, wherein there is no need for simultaneous live video streaming and local graphics playback across multiple displays. Therefore software and hardware is often not optimized to synchronize content playback across a LAN.

**Robust edge displays/players** – Due to the variety of environmental conditions within stadiums and arenas, it is critical that the displays and players be robust. Unique conditions include:
- Full or partial outdoor exposure to the elements (cold, heat, sunlight, moisture, dust)
- Heat, grease, and smoke exposure in concession stands
- Mounting location heights in excess of 10 feet requiring a vertical/boom lift or scaffolding to access
- Common edge device hardware requirements include:
  - Small chassis footprint for manageable mounting behind display
  - Fan-less chassis and flash-based storage
  - Requiring minimal physical attention once installed
  - Ability to be powered off/on across the network
  - Ability to have full functional control of the display via RS-232, IP, and CEC protocols with a minimum number of connections
  - Ability to display multiple layers of animated content while efficiently decoding one or more IPTV streams

**Intuitive system administration and content management**
There are two critical management tools and user interfaces required for effective administration of a venue’s IPTV/digital signage system.

- **Network player management** – the ability to quickly monitor, troubleshoot, and fix every player for network connectivity and playback functionality. Unique requirements include:
  - Immediate alerting of network connectivity or RS232 issues
  - Ability to troubleshoot and fix issues remotely whenever possible
  - Ability to simultaneously monitor large groups of players for connectivity, playback synchronicity, and content integrity
  - Flexible or ad-hoc grouping of players for content and administration management purposes
**Content Management** — the ability to easily manage, modify, and display all graphical, streaming, and data-centric content to any player or group of players. Unique requirements include:

- Easy creation and modification of channel lineup
- Customizable channel and programming guide
- Intuitive and flexible screen layout/template-building tools
- Drag-and-drop management of content into various playlists
- Manual, timed, data-driven, or externally trigger-able playlists
- Dynamic character/text generation
- Ability to integrate/parse/display external data files and streams

**Effective non-event-day functionality** — Sports stadiums and arenas are increasingly functioning as multipurpose venues that provide convention, meeting, and hospitality services outside of game days. Efficient utilization of the IPTV/digital system and venue displays is critical for these types of events. Unique requirements include:

- Easy management of hospitality and meeting space content for customer branding and laptop presentations
- 24/7 scheduling and automation of content and display functions by zone, group, or individual display
- Easy television viewing and error-free integration with third-party AV control systems such as Crestron, AMX, etc.

**Efficient scalability** — Deploying from 200 to more than 3,000 displays/players in one building on one local area network, all while meeting the above requirements, is a major undertaking. Unfortunately, as some failed or unsatisfactory sports-venue deployments have shown, efficient scalability can be an undervalued consideration.

Many IPTV/digital signage system vendors have large-scale deployments of thousands of players across national or global wide area networks, but few have succeeded or even attempted to achieve those same numbers within one large public-assembly building with the aforementioned requirements.
Typical IPTV/Digital Signage System Deployments

There are three basic deployment models to consider for IPTV/digital signage.

1. **Traditional channel-based model** — This system distributes IPTV channels to basic STB decoders or directly to IPTV decoding televisions. This model is appropriate for any deployment that has a limited amount of unique event-related IPTV/digital signage channels and areas of the building within which those channels are played.

Example: Two game channels, each with a unique rotation of ads inserted within that channel and played across two or three areas of the venue.

**Benefits:**
- Provides cost-effective distribution of your game and a basic inventory of advertising content simultaneously
- STBs provide limited dynamic digital signage capability
- Requires each unique combination of TV channel and digital signage content to be encoded together and distributed as a channel
- Limited in sales-model flexibility, unique channel scale, and end-user channel-changing without affecting digital signage playback

2. **One-to-one digital media player model** — This system is deployed with an advanced digital media player (DMP) at every display, each with the capacity to play back dynamic signage content and multicast IPTV streams. In other words, this model pushes all advertising content to each media player, which then plays back that content locally and simultaneously with any selected IPTV channel.

This model is appropriate for deployments requiring many zones and groups of displays, creating segmented areas of unique content within a venue.

**Common examples of unique content zones are:**
- **Concourse levels** — General, Premium, and Club levels, each with unique targeted ad content rotations
- **Sponsor areas/destinations** — Clubs, bars, and specialty areas, each receiving exclusive digital branding
- **Private suites/hospitality suites** — Commonly requiring custom or one-time digital branding per suite
- **Concessions** — The variety and number of concession stands commonly require unique menus for each stand
The one-to-one DMP model provides the greatest flexibility for sales-model development and creativity, but it can also be the most expensive. It typically requires costly Windows- or Linux-based PCs as digital media players at every display location. Furthermore, this model can require greater support and maintenance to ensure optimal performance of all PCs, as well as a longer and more sophisticated implementation period.

Benefits:
- Generally provides for more advanced/dynamic digital signage content creation, such as:
  - Comprehensive and dynamic screen layout or template creation
  - Multiple full-motion graphics integrated with the IPTV game program simultaneously
  - Advanced conditional playback rules per group, screen, region, or content item
  - Flexible data and game-stat integrations that drive fan engagement with sponsor brands
  - Advanced signage content management (traffic) and playback reporting
  - Segmentation opportunities for sponsors to reach a broader range of audience with specific targeted messaging
  - Individual interactive experiences created per display, particularly in suites

3. Blended/hybrid model — This type of deployment clearly identifies content areas/zones of a venue and the appropriate STB or DMP deployment type required for each area.

The intention here is to reduce costs while maintaining an advanced and dynamic digital-signage look — a goal that is achieved by deploying a head-end DMP encoded as a channel and distributed to STB display areas (which require only a single IPTV/digital signage content layout for the entire event), then deploying one-to-one DMPs in all display areas that require multiple groups of advanced digital signage content.

Examples:
- All concourse-level displays showing the same content can be basic STBs fed via an encoded DMP, providing an advanced digital signage channel without the need for costly DMPs at each display.
- Sponsor areas/destinations — Clubs, bars, and specialty areas, each receiving exclusive digital branding, would deploy DMPs.
- Concessions — This example depends on the menu variety and quantity of unique concession stands. If there are only two to four menu display options, a channel-based STB deployment might be appropriate across all concessions. If there are many unique concessions, a one-to-one DMP deployment is best.
Private suites/hospitality suites — There are commonly two to seven or more displays in a suite. Determining the value and amount of digital inventory needed in a suite will determine the deployment type. Some venues decide not to place any digital signage ads on suite displays, instead keeping them as simple TVs. In that case the best option is a channel-based STB solution with advanced TV-viewing features such as a custom branded channel guide, video-on-demand, and personal video recorder (PVR) functionality. Other venues keep one or two suite displays as TVs, while the remaining displays serve as IPTV/digital signage displays, which require a one-to-one DMP deployment to allow customers to change channels without affecting the digital signage.

Clearly there are many deployment options and capabilities when considering an IPTV/digital signage solution for a venue. Doing a few primary things upfront will help ease the system-selection process.

- Upgrade your IT infrastructure with a robust Layer 3 switch network capable of handling more than your total number of required IPTV/digital signage displays.
- Determine a baseline IPTV sales model by deciding how aggressively you want to create and sell digital inventory on the IPTV/digital signage system. Understanding how to segment your venue into display zones/groups and each screen into unique content areas will significantly help with system selection, design, and cost.
- As part of an overall digital strategy for the team/venue, define a content design plan for the IPTV/digital signage system. Key considerations:
  - The value to the organization of full-motion graphic ad content versus still-image ad content
  - The value of integrating game, league, and fantasy stats onto the screens, and the degree to which you would do so
  - The realistic level of creative design and labor necessary for what you would consider a successful execution
The VITEC Solution

Understanding the unique technical and operational requirements for successfully operating an IPTV/digital signage network in a sports and entertainment venue is key to developing an effective and reliable solution. VITEC is a proven leader in mission-critical, high-quality, low-latency encoding, making its cost-effective EZ TV IPTV solution the right choice for sports-venue customers aiming to deliver a superior IPTV/digital signage experience.

Television Viewing

With EZ TV IPTV, sports customers such as the NBA’s Orlando Magic can now give suite owners or back-of-house users a television viewing experience that’s similar or arguably better than they can get at home. VITEC’s EZ TV IPTV solution gives the Orlando Magic:
System Administration

Powerful system-administration tools match VITEC’s best-in-class user experience. VITEC’s IPTV and broadcast monitoring tools allow sports customers to quickly and cost-effectively analyze, monitor, and log all of their IP streams and baseband video sources for quality and compliance. These tools also provide powerful real-time analytics reporting on quality of service and end-user channel usage. This data is helpful in determining the most effective channel lineup to provide within a venue.

The STB Manager tool provides sports customers the ability to confidently monitor and manage every EZ TV player on the IPTV network for connectivity and functionality.

Digital Signage

Understanding the sports venue market means that VITEC also understands the importance of effective digital signage. EZ TV 8.0 introduces sophisticated digital signage resources to the VITEC IPTV Solution. Maximizing the capabilities of the cutting-edge Amino AmiNET IPTV set-top boxes, VITEC’s solution combines powerful features from a small, cost-effective, 100 percent ASIC-based endpoint with an embedded OS. Advanced features include low-latency decoding of up to two full-HD IP streams; up to seven layers of graphics, text, and dynamic data; PoE for efficient deployments; and TV controls over serial and HDMI.
VITEC’s IPTV Solution operates a downstream-based digital signage architecture. In this setup, each digital signage media player that is encoded is considered a channel within the IPTV architecture. The administrator can decide which digital signage channel will be displayed on what display. The cost benefits of this setup is significant: Digital signage media players cost between $800 - $2,000 per box while VITEC’s Amino STB is about a third of that price. If there are a significant number of displays within the facility and the number of digital signage channels required are low, then encoding a digital signage player as a channel is a cost-effective alternative. An organization is able to deploy low-cost VITEC STBs on the displays within the venue, while the expensive digital signage media player can be limited to the number of channels required. Lambeau Field, home of the Green Bay Packers in Green Bay, Wisconsin, has employed this model, saving hundreds of thousands of dollars.

Additional benefits of the downstream architecture include:
- The entire digital signage system can be managed by EZ TV
- The system allows for administrators to easily switch between digital signage channel and IPTV channel

Conclusion

The television viewing experience within sports and entertainment venues needs to go beyond what fans can get at home. IPTV with digital signage creates new opportunities to do exactly that. It enhances the fan experience and substantially increases revenues by turning every display into a digital asset that people will connect with and dwell on. IPTV with digital signage offers superior picture quality, low latency in the game feed, and synchronized playback that creates a dynamic visual that commands immediate attention. It also takes into consideration the environmental, administration, and content management needs, and provides additional features that support convention, meeting, and hospitality services outside of game days.

Deploying 200 to more than 3,000 displays/players in one building on one local area network, all while meeting the above requirements, is a major undertaking, and that’s where VITEC comes in. VITEC is a proven leader in mission-critical, high-quality, low-latency encoding, making its EZ TV IPTV solution the right choice for sports-venue customers aiming to deliver a superior IPTV/digital signage experience. The overall architecture of the VITEC IPTV solution is undeniably reliable, from its powerful, military-grade encoding platform to its use of rugged and dependable Amino set-top boxes modified specifically for EZ TV. VITEC EZ TV enhances the fan experience through best-in-class television viewing and creates new opportunities for fan engagement through digital signage and mobile streaming. It is a cost-effective and dependable solution uniquely suited to sports-venue deployments of any scale.
Diagram Sketch of a Generic IPTV/Signage Installation

- **TV Trucks Feeds**
- **In-House Feeds**
- **Signage / Menu Boards**
- **Cable / Satellite / Off-Air TV Content**

- **High-Density IPTV HD/SD Encoding**
- **TV Programming Data, Social Network Feeds Scoreboard Data**
- **Video On Demand**
- **IPTV Middleware & Digital Signage**

- **LAN**

- **STB**
- **STB**
- **STB**

- **COMMON AREAS**
- **LUXURY SUITES**
- **CONCESSIONS**
- **STAFF / VIP / Premium Seats**
Thank you to Orlando Magic and Amway Center for their great cooperation and support.