Major League Baseball Advanced Media

Passion fills the seats at the ballpark, writes the victory songs, keeps the television on until the last out, and dials the friend's number to talk about a great play. And passion is never satisfied.

Situation

Always scouting for promising new ways to deliver more excitement to its fans, Major League Baseball spotted the Internet's potential early. In June 2000, following a unanimous vote of the 30 club owners, MLB Advanced Media (MLBAM) was established to create the most comprehensive Major League Baseball resource on the Internet. As part of a wide-ranging technology review in early 2008, MLBAM executives concluded that they needed to upgrade their live streaming infrastructure to deliver the video quality and interactivity that their fans wanted, while meeting the business's stringent operational requirements.

Opportunities and Challenges

Though the sports industry represents a massive market opportunity for streaming live game content on the web (U.S. revenues from domestic online sports video will increase from US $762 million in 2007 to $2.3 billion in 2012, according to Screen Digest), some leagues have approached online distribution tentatively, often limiting the amount of live content that they stream for fear of taking away from traditional TV viewership.

MLBAM, however, chose to pursue a much more aggressive strategy, based on the belief that enhancing its fans' online experience would increase viewership, ratings, and revenue throughout the industry. And this strategy has worked. According to Bob Bowman, chief executive at MLBAM, "Somehow the strategy of putting [baseball games] on every device that has a plug or a battery has worked for the business partners. Even more important, it's worked for our fans."[1]

MLBAM continued to pursue an ambitious goal: make the annual stable of 2500 Spring Training, Regular Season, and Post-Season Major League Baseball games available to every fan on any type of device. To realize this vision, MLBAM required technology partners with both the expertise and the same level of commitment to customer success that it has for satisfying fans' passions for baseball action. It found such a partner in Inlet Technologies, now part of Cisco.

MLBAM had the following six objectives for its streaming infrastructure overhaul:

1. Greatly improve the quality of all live game streams, including delivering a 640x360 stream, which is the current standard definition 16:9 television resolution, and eventually expand to a 1280x720 high-definition (HD) stream.
2. Offer multiple streams of each game at varying bit rates, dynamically adjusting which stream the viewer sees, based on current network conditions, optimizing the end-user experience.

[1] Business Week, August 29, 2008, MLB's Real Competitive Advantage - How baseball is using cutting-edge technology to rake in millions on the Internet, Jay Yarow.

3. Help ensure that any new encoding system would work smoothly within its internal, purpose-built provisioning workflow.
4. Allow editors to grab game footage for immediate publication while the game was still being recorded.
5. Eliminate much of the technical complexity of delivering multiple feeds to each viewer, allowing the end user to watch multiple games simultaneously.
6. Invest in a hardened and reliable platform that would be compatible with future technologies and would allow MLBAM to implement new technologies on the same installed hardware base.

Solution and Benefits

MLBAM decided to deploy the Cisco© Media Processor streaming solution to produce broadcast-quality video for MLB.TV, a live, out-of-market subscription product. In 2009, using H.264 in the Adobe Flash format, MLBAM produced multi-platform video at up to 3.0 megabits per second, a true 720p HD quality stream, up from just 700 kilobits per second two years before. This further represents a dramatic enhancement of video quality and overall user experience for MLB.TV subscribers. The Cisco Media Processors work in concert with Swarmcast's Autobahn Live, which transforms video streams into standard HTTP traffic to leverage the global internet infrastructure. To achieve the highest quality user experience, Autobahn Live blends multiple CDNs simultaneously, improving the quality, reliability, and scale of MLBAM's live video.

Cisco Media Processors offered MLBAM several key advantages over alternative solutions, including:

- Multiple formats in one appliance. Cisco Media Processor supports simultaneous streaming in VC-1, Flash VP-6, and H.264 from the same appliance, so MLBAM was not exclusively committed to any particular format decision. After starting with VC-1, MLBAM has now moved to H.264, with no new hardware required to support this transition.
- Support for HD. The flexibility of the Cisco Media Processor platform allowed for an easy transition to HD broadcasts, without requiring a complete overhaul of MLBAM's architecture.
- Enhanced pre-processing. To provide best-in-class output, Cisco Media Processor allows multiple pre-processing options, including adaptive complexity balancing, scaling, cropping, de-interlacing, inverse telecine, and adaptive image filtering.
- Multiple bit rates and archiving. Cisco Media Processor can stream and archive multiple bit rates in separate streams. It can also create an archive file asset from any or all of these streams simultaneously.

MLBAM's Cisco Media Processor infrastructure has helped MLBAM grow its online video business, helping it average more than 50 million unique users to the site per month in 2008 (Omniture). With its new infrastructure, MLBAM produces as many as 90 live streams per day, equating to more than 10,000 hours of live baseball over the 2009 season, at adaptive data rates ranging from 400k up to 3.0 Mb. Now that's passion!

TV 2.0

The new Cisco Media Processor infrastructure also helps MLBAM leverage the full interactive potential of the Internet, creating real-time highlights without the need for additional transcoding. Cut directly from the live archive, highlights can be viewed immediately after a key play has occurred on the field. MLBAM also relied on Cisco to implement a customized interface that allows fans to simultaneously view videos of multiple games in play. Users can click on a game and immediately begin viewing in full screen mode without degradation or buffering.

Cisco also helps MLBAM monetize its streams by inserting ad markers into the stream, so when a game goes to commercial, the video player can insert localized or nationalized URLs pertaining to the ad. This feature has helped MLBAM improve advertising revenues.

The Spinnaker infrastructure has also met MLBAM's stringent reliability requirements. "Through our MLB.TV subscription service, we make a commitment to baseball fans that they'll find their favorite team online all season, so we need our video streaming infrastructure to be available 24/7," says Joe Inzerillo, senior vice president, multimedia and distribution, MLBAM. "Cisco Media Processor has been solid as a rock, and the management interface makes it easy to keep it humming along."

Following the implementation of Cisco Media Processor, MLBAM has enjoyed significant benefits: online viewership is up, and operational costs are down. Reportedly, MLBAM receives about $450 million in revenues a year, about half of that coming from fans who pay $110 a season to watch games live over the Internet, with the rest generated by advertising, online ticketing, e-commerce, and sponsorship.

The MLBAM Solution: Tech Talk

MLBAM sought to reduce the footprint of its streaming plant while increasing the number and quality of streams that it generates. Cisco Media Processor addressed this need. The Cisco Media Processor's 1U eight-processor core design allows MLBAM to employ all of these features while operating with less than 50 percent of the resources of its previous plant. The Media Processor system is also very easy to maintain and requires only nominal management or oversight.

To accomplish the visual improvements that MLBAM requires, Cisco's flexible architecture supports an easy migration to H.264 and Flash and 720p HD streaming, without requiring a major change of infrastructure.

To integrate Cisco Media Processor into the MLBAM workflow, Cisco employed a Java Message Service (JMS) messaging system used natively in MLBAM.XML messaging is useful for a variety of purposes, such as host management, task monitoring, and even commercial insertion. Each of these functions can be controlled and managed through a rich yet simple messaging protocol.

The combination of Cisco Media Processor's scheduling features and XML messaging allowed the MLBAM development team to build a central web-based management application that operators use at the beginning of each day to schedule Cisco Media Processors to start encoding prior to games.

Additionally, MLBAM took advantage of this same messaging system to create an elegant monitoring system that is both simple and highly effective. The system reports on four states: stopped, provisioned, encoding, and unknown. Each encoder is queried and returns its state back to the monitoring application. From this exchange, MLBAM can easily identify the status of each of its systems within the encoding plant.

This same messaging system also allows MLBAM to insert scripts directly into the program stream. This script insertion mechanism dynamically changes the video device environment and provides additional features and contextual experience to the MLBAM fan base, such as detailed player statistics. This feature helps MLBAM monetize its streams by inserting ad markers onto the screen, so when a game goes to commercial, the video device can insert localized or nationalized URLs pertaining to the ad.

Another custom feature that Cisco created for MLBAM was the “highlight cutting service,” which allows editors to extract specific clips from a game immediately after the event takes place and while the game is still being archived. By using the time code, the cutting service allows editors pick a start point, end point, file name, and a destination to copy and deliver that portion of the game to be trimmed and prepped for customer delivery. This feature allows fans to see game highlights almost immediately after the play has occurred on the field.

Figure 1. MLB.TV’s stunning picture, live integrated stats, and full user control make fans forget they are watching online and rejoice in the power of TV 2.0.

Figure 2. Fans can select from a variety of viewing modes. In this view, users can select the picture-in-picture feature to watch multiple games or live game highlights in the MLB.TV device.

Figure 3. A glimpse of the Cisco Media Processor installation at the MLB.com facilities.

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Printed in USA C78-675924-00 06/11