Upgrading from Windows Media to the next-generation Microsoft Media Platform

Chris Knowlton
Senior Product Manager
Microsoft Media Platform
Agenda

• Overview of MS media technologies, old and new
• Case Study – putting the new technologies in action
• Enterprise Video Management – seamless transition from Windows Media to newer technologies
Microsoft Media Platform

Acquire → Encode → Deliver & Manage → Consume

Microsoft Lync
Microsoft Expression Encoder 4
Windows Media Encoder 9 Series x64 Edition
Windows Media Services 2008
Windows Media Player
Windows Server IIS Media Services 4.0
Microsoft Silverlight
SharePoint 2010
First Generation Microsoft Media

• What Microsoft video streaming looked like in 2003:
  • Content was encoded with WM Encoder 9 in WM Format (ASF) using WMV and WMA codecs
  • Protected with WM Rights Manager
  • Streamed from WM Services (Windows Server 2003) to Windows Media Player ActiveX control over RTSP
• Enjoyed in amazing 320x240 resolution at whopping 15 fps
• Great for its time, but the world changed
What Changed?

• Rich Internet media applications replaced media player plug-ins (WMP, Real Player, QuickTime)
• Growth of social media, explosion of UGC video
• User Internet connection speeds increased
• CDN coverage, number of HTTP caches increased
• Media delivery over HTTP: cheaper, scalable, reliable
• Video industry started converging around H.264 and AAC
• Smart mobile devices and 3G/4G networks emerged
• Cross-browser, cross-platform reach became requirement
Second Generation Microsoft Media

- Microsoft has responded to the changing streaming media landscape with Silverlight, IIS Media Services, PlayReady, Expression Encoder, IE9 and Windows Azure
  - Cross-browser, cross-platform media applications
  - HTTP-based media delivery
  - Codec agnostic, platform agnostic content protection
  - Cloud computing and services
- Work great together yet modular enough to create an open ecosystem and form flexible, scalable solutions
Introducing...

- **Microsoft Media Platform**
  - An umbrella brand for a group of Microsoft products and frameworks which together form Microsoft’s state-of-the-art media delivery solution

- **Why?**
  - A formal acknowledgment of our informal media platform
  - Easier to collectively identify a group of vertically integrated but also autonomous media products
  - Better brand recognition
  - Better aggregation of technical resources
New Web Portal

- [http://www.microsoft.com/mediaplatform](http://www.microsoft.com/mediaplatform)
Microsoft Media Platform Components

**Services**
- Windows Server IIS Media Services
- Windows Azure

**Tools**
- Microsoft Expression Encoder
- Microsoft PlayReady

**Clients**
- Microsoft Silverlight
- HTML5
- iOS 4
- PlayReady Client Porting Kits

**Frameworks**

<table>
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<tr>
<th>Microsoft® Media Platform</th>
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<tr>
<td>Video Editor</td>
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</tbody>
</table>
Full Microsoft Workflow Example

- **Encode**
  - Smooth Streaming
- **Protect**
  - IIS Transform Manager
- **Deliver**
  - Windows Server (IIS Media Services)
- **Distribute**
  - Windows Azure CDN
- **Watch**
  - Microsoft Silverlight

**PlayReady**
Open MMP Workflow Example

Encode → Protect → Deliver → Distribute → Watch

PlayReady

Smooth Streaming

digital rapids

BUYDRM

Windows Server

Level(3)

iOS 4
Core Scenarios

• Enterprise
  • On-demand training
  • Live executive broadcast
  • Programmed broadcast

• Internet
  • News & entertainment (with ads)
  • Music & movie services (subscription, PPV, wireless)
  • Internet-based Radio/TV stations (with ads)
  • Radio & television rebroadcasts
  • Live broadcasts (news, sporting events)
What’s New

PRODUCT UPDATES
Expression Encoder


- Expression Encoder 4.0 SP1
  - SP1 released in January 2011

- New SP1 features
  - CUDA-based hardware accelerated H.264 encoding
    - Pro version only
  - HE-AAC encoding for mobile devices
  - Live screen capture
  - Improved deinterlacing
  - and more
Demo

EXPRESSION ENCODER 4
IIS Media Services

Internet Information Services (IIS)

Windows Server

- Smooth Streaming
- Live Smooth Streaming
- Smooth Multicast
- Content Protection/DRM
- Transform Manager
- Advanced Logging
- Application Request Routing
- Bit Rate Throttling
- Web Playlists
Delivery Methods

Adaptive Streaming

Multicast Streaming

Progressive Download

Packet

Traditional Streaming

Play

Seek

Pause

550 kbps @ 01:04
400 kbps @ 01:06
700 kbps @ 01:08

Movie
Traditional Streaming Pros & Cons

• Benefits of Traditional Streaming
  • Responsive User Experience
    • Users can pause, seek, fast-forward, rewind with ease
  • Effective use of bandwidth
    • Send only the content your users watch
  • Rich Logging and Monitoring
    • Know what your users are watching at all times

• Challenge of Traditional Streaming: Higher TCO
  • Packets do not make use of HTTP caching networks
  • Must deploy streaming edge servers to scale out
Progressive Download Pros & Cons

• Benefits of traditional progressive download
  • Broad reach
    • No need for streaming code in the player
    • Gets through all firewalls
  • Optimized, cost-effective global delivery
    • Cacheable by existing HTTP caches
    • Distributed worldwide by CDN HTTP infrastructures

• Challenges
  • Limited user experience – no... live streaming, instant start, instant seeking, or interactivity
  • Wasted bandwidth (user downloads 100%, watches 20%)
  • No visibility into viewer behavior & experience
Bit Rate Throttling

• Save bandwidth with Progressive Download
  • Send only the bits your viewers watch
• How Bit Rate Throttling works...
  • Detects bit rate for 11 common media formats
  • Delivers at encoded bit rate, w/ a fast-start burst
  • Allows configuration for media & other data
• Use to manage download rate for documents
  • Keep server responsive for application requests
demo

BIT RATE THROTTLING
Web Playlists

• Prevent deep-linking to protect content value
  • Enforce ad consumption for ad-funded video

• How Web Playlists work...
  • SMIL-based server-managed playlist generates a client playlist w/obfuscated URLs
  • Enforce policy around skip and seek
  • Use IIS Manager UI or custom programming to create and manage static and dynamic playlists
Advanced Logging

- Logging for progressively downloaded media content
  - IIS7 provides server-side logs & logging infrastructure
  - Silverlight delivers client-side logs to IIS7
- Logging for traditional and Smooth streaming
  - Compatible with WMS logging and third party tools
  - Customizable – only log a custom subset of fields
  - Extensible – add custom fields
- Enables key scenarios...
  - Logging to bill customers for content delivered (CDNs)
  - Use of existing 3rd-party & custom reporting (e.g. Skytide)
  - Viewer statistics (e.g. how much was actually watched)
Smooth Streaming

• Adapt quality in real-time to ensure optimal, uninterrupted playback
  • Reduce TCO by using cacheable requests/responses
  • Minimize files on disk (1 / bit rate) for manageability

• **Expression Encoder 4** allows everyone to...
  • Choose a Silverlight player from built-in templates
  • Easily encode media ready for **Smooth Streaming**
  • Publish directly to an IIS server or CDN
  • Choose either VC-1/WMA or H.264/AAC
  • Apply Microsoft PlayReady DRM
demo

SMOOTH STREAMING

http://www.iis.net/media/demo
Live Smooth Streaming

• Goal: Bring HD video with HTTP caching scalability and TCO to live events that were previously served only by traditional stateful streaming

• Features of Live Smooth Streaming:
  • Uses ISO-standard fragmented MP4 from many encoders
  • Support for CDN ingest, origin, and edge architectures
  • Network PVR (Seek, Pause, Rewind, Late Joiners, Slow-mo)
  • Support for multiple camera angles to choose from
  • Captioning and subtitling support
  • Multiple audio track support
  • Analytics and advertising support
# Live Streaming – WMS vs. IIS

<table>
<thead>
<tr>
<th>Live Streaming Features</th>
<th>WMS 2008</th>
<th>IISMS 4</th>
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<tbody>
<tr>
<td>Unicast HTTP streaming from WM encoders</td>
<td>✔</td>
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<tr>
<td>Client-side logging</td>
<td>✔</td>
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<tr>
<td>Broadcast streaming from files</td>
<td>✔</td>
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<tr>
<td>High Availability content sourcing (encoder failover)</td>
<td>✔</td>
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<tr>
<td>Archiving of live streams</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Multiple-bit-rate streaming (Intelligent vs. Smooth)</td>
<td>✔</td>
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<tr>
<td>HTTP Streaming</td>
<td>✔</td>
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<tr>
<td>RTSP Streaming</td>
<td>✔</td>
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<tr>
<td>UDP streaming</td>
<td>✔</td>
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<tr>
<td>Broadcast proxying</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Multicast streaming</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Play While Archiving (late joiner feature)</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Standard HTTP proxying and caching</td>
<td>✔</td>
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<tr>
<td>Full Network DVR</td>
<td>✔</td>
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<tr>
<td>Built-in PlayReady DRM</td>
<td>✔</td>
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<tr>
<td>Low-Latency Streaming</td>
<td>✔</td>
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</tbody>
</table>
IIS Media Services 4.0

- http://www.iis.net/media
- IIS Media Services 4.0
  - Released in December 2010
- New features in 4.0
  - Dynamic repackaging of Live Smooth Streaming to Apple HTTP Live Streaming format (assuming H.264/AAC)
    - Encode once, deliver to Windows, Mac, WP7 and iOS
    - Supports live DVR, archiving, AES encryption for iOS devices
  - Low-Latency Live Smooth Streaming
    - Reduces end-to-end latency below 2 seconds
Demo

LIVE SMOOTH STREAMING TO IPAD
IIS Transform Manager

• Transform Manager 1.0 Beta
  • Officially released today, April 9th
• Features
  • Automated transcoding using Expression Encoder or 3rd party encoders
  • Automated transmuxing from Smooth Streaming VOD to Apple HTTP Live Streaming
  • PlayReady packaging of Smooth Streaming VOD content
  • Transmuxing from plain MP4 files to Smooth Streaming
Windows Azure CDN

• Smooth Streaming VOD service coming to Windows Azure CDN
• Technology preview (CTP) by May 2011
• What is it?
  • Turnkey service for delivery of Smooth Streaming video on demand by the worldwide Windows Azure Content Delivery Network
• Pay-as-you-go service
  • Simply upload Smooth Streaming-encoded video file to your Azure Storage account in a public, CDN-enabled blob container that is marked for Smooth Streaming
Smooth Streaming Client Porting Kit

- C/C++ based client SDK for enabling Smooth Streaming playback on non-Silverlight platforms
  - Mobile devices, consumer electronics, etc.
  - Assumes H.264/AAC codecs and local decode hardware
- Comcast adopted Smooth Streaming PK + PlayReady PK to deliver protected Smooth Streaming to their Xfinity TV app on the Apple iPad

Availability
- Now available for licensing
- Send inquiries to sspkinfo@microsoft.com
Silverlight

- [http://www.silverlight.net/getstarted/](http://www.silverlight.net/getstarted/)
- Silverlight 5
  - SL5 Beta available now!
- New media features in Beta
  - Hardware (GPU) accelerated H.264 decoding
  - Variable play speed (trick play)
- New media features in RTW
  - DRM key rotation
  - Remote control support
## Silverlight, Windows Media Player

<table>
<thead>
<tr>
<th>Windows Media Player 12</th>
<th>Silverlight 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pros</strong></td>
<td></td>
</tr>
<tr>
<td>• &gt;13 years of product development</td>
<td>• Highly customizable, rich UI</td>
</tr>
<tr>
<td>• Full Windows Media feature support</td>
<td>• Interactive video display</td>
</tr>
<tr>
<td>• Can be embedded in Windows apps</td>
<td>• Windows, Mac, Linux</td>
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<tr>
<td>• WMS RTSP support</td>
<td>• .NET support (C#, VB, JScript)</td>
</tr>
<tr>
<td>• Library management</td>
<td>• Better dev &amp; design tools</td>
</tr>
<tr>
<td>• Portable device integration</td>
<td>• Smooth Streaming support</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td></td>
</tr>
<tr>
<td>• Windows only</td>
<td>• More secure DRM (PlayReady)</td>
</tr>
<tr>
<td>• Difficult to customize UI, controls</td>
<td>• Consistent playback experience</td>
</tr>
<tr>
<td>• Static video rectangle</td>
<td>• Self-sufficient browser plug-in</td>
</tr>
<tr>
<td>• Only JScript, VBscript for web devs</td>
<td>• No default player experience</td>
</tr>
<tr>
<td>• Inconsistent playback experience (OS version, codecs, hardware, drivers)</td>
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</tr>
</tbody>
</table>
Internet Explorer

- Internet Explorer 9
  - Released in March 2011
- Supports HTML5 `<video>` and `<audio>` tags
  - Native H.264/AAC/MP4 support
- IIS Media Services’ Bit Rate Throttling feature – great for HTML5 video/audio delivery
  - Natively supports MP4 bit rate throttling
  - Can be configured for WebM format too
HTML5 Video/Audio

- HTML5 is important for interoperability, but still in Working Draft stage
  - Expected to reach Candidate Recommendation in 2012
- `<video>`/<audio> specification currently lacks specifics on
  - Codecs, file formats, transport protocols, live streaming, content protection
- HTML5 does not specify any HTTP adaptive streaming
- Apple HLS is not part of the HTML5 specification even though it’s supported in Safari/iOS `<video>` tag
- MPEG and 3GPP are currently standardizing HTTP-based adaptive streaming: MPEG-DASH and 3GPP-AHS
  - Smooth Streaming likely to align with MPEG/3GPP standards when final
Adaptive Streaming Standardization

HTTP Live Streaming (HLS) → Publish → First Informational Draft
May 2009

IIS Smooth Streaming → Publish
Under Community Promise (royalty free)

Smooth Streaming Transport Protocol
Protected Interoperable File Format
Sept 2009

Digital Entertainment Content Ecosystem

Conference

Liaison relationship

Publish

Liaison relationship

HTTP Adaptive Streaming (HAS)
Sept 2010

Licensed by ISO

Liaison relationship

Adaptive HTTP Streaming (AHS)
March 2010

Liaison relationship

Dynamic Adaptive Streaming over HTTP (DASH)
Draft International Standard – February 2011

Publish

MPEG - ISO/IEC JTC1/SC29 WG11

Publish

14496-12 ISO Base Media File Format
Draft Amendment - February 2011

W3C Web and TV Workshop - Microsoft
Microsoft Media Platform

FRAMEWORKS
Frameworks

- Microsoft Media Platform frameworks are the glue that holds together individual pieces of the end-to-end media solution
- They save time, development cost, nerves
MMP Player Framework
formerly Silverlight Media Framework

- [http://smf.codeplex.com](http://smf.codeplex.com)

- Player Framework 2.5 now available
  - Stereoscopic 3D Video support
    - Red-cyan anaglyph plug-in provided with Player Framework
    - NVIDIA 3D Vision active shutter plug-in provided by NVIDIA
  - Extensible architecture

- Advertising support
  - MAST – for ad sequencing and targeting
  - VAST 2.0 – for ad definitions and tracking
  - VPAID 1.1 – for playback of ads
MMP Content Manager

• [http://mmpcm.codeplex.com](http://mmpcm.codeplex.com)
• To be released Q2 2011
• What is it?
  • A lightweight content management system for managing live and on-demand Smooth Streaming events
• Features
  • Asset management based on SharePoint platform
  • On-demand transcoding based on IIS Transform Manager
  • Live event management: pub point and encoder control
  • Integrated ad insertion and cloud-based video editing
MMP Video Editor
formerly Silverlight Rough Cut Editor

- http://archive.msdn.microsoft.com/VideoEditor

- Video Editor 1.0 SP1
  - Released in January 2011

- New features in SP1
  - Enhanced setup experience
  - Updated for SL4 and Smooth Streaming Client 1.5
  - Integrated Composite Stream Manifest generation
  - CSM compression
  - Improved CPU performance
MMP Audience Insight

- http://audienceinsight.codeplex.com
- MMP Audience Insight 1.0 Preview
  - To be released in Q2 2011
- What is it?
  - SaaS framework for scalable, cost-effective, real-time insight into digital media delivery
- Features
  - Real time aggregation and analysis of client telemetry
  - Silverlight client plug-in via Microsoft Silverlight Analytics Framework
  - Event analysis, insight, visualization and consumption
  - Core engine built on top of SQL Server StreamInsight
MMP Continuous Client

- MMP Continuous Client 1.0
  - To be released in Q2 2011
- A media experience that “remembers” where playback has been interrupted by storing information in the cloud and enables the user to resume playback where he/she has left off, be it on the same device or another.
- A Starter Kit to enable media companies to deliver this uninterrupted media experience either in the cloud or in their own data center
- Offers enhanced personalization and socialization features such as Bookmarks and Bookmark sharing
MMP Enhanced Movies

currently Silverlight Enhanced Movies

• MMP Enhanced Movies 1.1
  • To be released in Q2 2011

• A highly interactive movie playback experience that includes support for 3D video, Surround Sound, and deep content interaction

• Offers personalized advertising and socialization features to keep users engaged in the experience
Microsoft Media Platform Components

**Services**
- Windows Server
- IIS Media Services
- Windows Azure

**Tools**
- Microsoft Expression Encoder
- Microsoft PlayReady

**Clients**
- Microsoft Silverlight
- HTML5
- Smooth Streaming & PlayReady®
- Client Porting Kits

**Frameworks**
- Microsoft Media Platform
  - Video Editor
  - Content Manager
  - Player Framework
  - Audience Insight

*iStreamPlanet - advanced solutions for online media*
Broadcast Case Study

• Leveraging the Microsoft platform, iStreamPlanet is providing our broadcaster an on-premises solution that utilizes our centralized Video Workflow Automation Platform (VWAP) with Multiple Edge Nodes – allowing for scheduling, capture, editing and publishing content to desktops and mobile devices.

• Expression Encoder is sitting on Microsoft Windows 2008 Servers for both the centralized encoding and the edge nodes.

• Aspera allows for watch folders to sit on every encoder which propagates all newly created video assets from every station back to the central headquarters.

• Utilizing Video Editor, the broadcaster creates the Edit Decision List (EDL) and sends the EDL to the encoding cluster allowing for the creation of a new video asset in Microsoft IIS Smooth Streaming, as well as other formats pre-defined by the broadcaster.

• Once the broadcaster chooses the thumbnail from within Video Editor, those videos are transcoded and placed onto an Origin system for delivery to the broadcaster’s private CDN or via CDN of their choice.

• iStream also provided a Silverlight based player for in-page video playback that supports pre-roll advertising and include share links for social networks such as Facebook, Twitter, Digg, and Delicious.
VWAP Architecture
Why Video Workflow Automation?

The manual or old way:

- Manage each process from the Receiver/Decoder, Video Router, profiles on Encoder, and Publishing Points on the Media Server
- Manually manage and monitor the hardware prior to and during entire event. This includes if there is a failure, will have to reprogram new hardware and re-route video manually.
- When event is finished, need to manually stop encoders, adjust links and publish new VOD links

With Video Workflow Automation Platform (VWAP):

- The event is scheduled for a particular time and a particular signal.
- The timing and programming of all of the elements, including the ad markers where the ads can be inserted on-the-fly is automated.
- In the event of a failure, defective component removed and the new component is programmed and routed correctly.
- When event is finished the systems are shutdown and the links are switched over to the VOD assets without manual intervention
The combination of the MMP and VWAP enabled iStreamPlanet to solve for controlling critical components that enable live and VOD for the client. It provides scheduling, centralized and decentralized transcoding, editing capabilities for immediate publishing of national/local content, efficient use of the broadcasters internal private network, maximum end-user experience regardless of market or last mile limitations and lower operational costs.
Transitioning from WM to EE/Smooth Streaming Via Polycom Video Content Management Solutions

Chris Spanellis
Engineering Director
Polycom Video Content Management
Agenda

• Polycom Video Content Management Solutions
  • Use of Microsoft Technologies
  • Core Elements
  • Products
• Integration of Expression Encoder
  • Impact on Accordent product line
  • Impact on end user
  • Impact on rich media delivery
What is Enterprise Video?

• Live and on-demand video content created and viewed by widely distributed users
  • Studio Webcasting
  • Classroom Training
  • Virtual Meeting Room
  • User Generated Content

• Subject to uniquely enterprise requirements
  • Content Approval and Publishing
  • User and Content Security
  • Viewership Monitoring and Reporting
  • Network and Storage Management
Polycom VCM: Use of Microsoft Technologies

Enterprise Video Capture
- Accordent Capture Station™
- Accordent PresenterPRO™
- Accordent Lync Manager™

Video Content Management
- Accordent Media Management System™ (AMMS)
- AMMS Three-Tier Retention Management™

Portal Services
- AMMS SharePoint Integration
- AMMS Active Directory Integration

Rich Media Delivery
- AMMS CDN/WAN Op Integrations
- AMMS Native Windows Media Delivery

Microsoft Technologies
- .NET
- Silverlight
- Windows Media
- Windows Lync
- Microsoft Expression Encoder Pro 4

Microsoft Products
- SQL Server
- Windows Server
- Internet Information Services
- SharePoint Server 2010

Polycom

Microsoft
Polycom VCM: Core Elements

Enterprise Video Capture
Video Content Management
Portal Services
Rich Media Delivery

Enterprise Video Management Components

Capture Solutions for Each Video Use Case
Proactive Management Console for IT
Eliminate Content Silos for Viewers
Control Delivery Across Disparate Networks

Benefits
Enterprise Video Capture

Polycom Accordent PresenterPRO
Polycom Accordent Capture Station
Polycom RSS 4000 VTC Integrations
User-Generated Content Microsoft Lync Manager UCG

Distribution of Video Capture Points
Expression Encoder: Video Capture

• Accordent Capture Station – Live and VOD Smooth Streaming
  • Accordent Encoder Controller wraps the Expression Encoder
  • Receive live video feed
  • Use Expression Encoder to encode video stream (VC1 and/or H264 for iOS)
  • Output video stream to IIS publish point and captured images to web server

• Accordent PresenterPLUS – Edit and publish VOD Smooth Streaming files
Video Content Management

- Mass Content Ingest
- Full Content Approval Process
- Three-Tier Retention Management™
- Automatic Content Transcoding
Portal Services

- Style, Layout Profiles
- Content Categories, Library
- Dynamic Media Viewer
- Seamless SharePoint Integration

Accordent Media Management System™
Portal Accordent SharePoint Integration
Rich Media Delivery

- Live & On-Demand Multi-CDN Delivery
- AMMS Media Director
- AMMS Media Services Agent
- Built-in Integrations: Blue Coat, Cisco, Riverbed
Smooth Streaming: Impact on Rich Media Delivery

• Adaptive Bit Rate Streaming
  Better end user experience
  Streams delivered faster, less buffering time
  Better quality stream
  Optimizes bandwidth utilization
  Manages quality relative to scale

• Polycom may be one of only the only major UC players with a complete strategy for fully leveraging the Microsoft Media Platform
Enterprise Video Ecosystem

Capture Solutions

Video Conferencing

Camera + Encoder

Enterprise Video Management

Content Mgmt / Storage

Content Delivery Networks

Digital Signal

Video-Enabled Devices

Windows Azure

Limelight Networks

AT&T

Riverbed

Blue Coat

Cisco

Samsung

Motorola

BlackBerry

Windows Phone

EMC2

NetApp

IBM Business Partner
Accordent Media Services – Powered by Azure™

ON PREMISE

- Accordent PresenterPRO
- Accordent Capture Station
- Polycom RSS 4000
- User-Generated & Lync Content

OFF PREMISE

- Accordent Video Content Management
- Windows Azure VM
- Windows Azure Storage
- Windows Azure CDN

Microsoft
Facilitating the transition

• Help customers make a “smooth” transition
  • Keep using existing WM installations
    • How to use WM and Smooth Streaming together
    • Migrate gradually without replacing WM
  • Leverage Polycom to facilitate implementation of the Microsoft Media Platform (including Azure)
• Leverage Polycom’s focus on innovating with the latest Microsoft Media Platform technologies
  • Tap our R&D while you continue to focus on your business objectives
Summary

• Live and on-demand video
• From SharePoint storage and media servers
• Searchable
• SharePoint video portal
• Cross-platform playback
• MMP Content Manager
• Partners can help
Call to Action

• Learn more about the Microsoft Media Platform
  www.microsoft.com/mediaplatform
• Learn more about iStreamPlanet
  www.istreamplanet.com
• Learn more about Polycom VCM
  www.accordent.com