Adobe MAX 2010
Enterprise Live Video with Multicast and P2P
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ABOUT REALEYES
- FMS Solutions Partner & Reseller
- FMS Community Advisory Board Member
- Video Experience
  - Infrastructure
  - Encoding
  - Delivery
  - Application Development
  - Consulting

WHAT WE’LL COVER
- Live in the Enterprise
- P2P Overview
- Next Generation P2P & Flash
  - Delivery
  - Deployment
- Conclusion
- Q&A
**LIVE IN THE ENTERPRISE**

- GOAL
- CHALLENGES
- SOLUTION

**LIVE IN THE ENTERPRISE**

- **BROADCAST**
  - live event broadcasts, streaming TV, pay per view model

- **GOVERNMENT**
  - town hall meetings, presidential address

- **EDUCATION**
  - live sporting events, guest speakers, curriculum

- **ENTERPRISE**
  - training, CEO address, quarterly business reviews, product updates

- **SOCIAL MEDIA**
  - interactive applications, gaming, advertising

- Easy publishing workflows
- Simple content protection
- Massive reach with multi-protocol
- Consistent experience with Flash Player
- Innovative multi-user experiences
The Goal
• Scalable (2 to Millions)
• Cost Effective
• Use Existing Infrastructure
• Manage Network & Bandwidth Utilization
• High Availability

• Full Reach & Multi-Screen

SAMPLE – FMS 4 P2P (Browser, Desktop & Mobile)
•
The Challenges

- Historically – limitations of Unicast
- Deployment
- Monitoring
- Reach
- Experience

The Solution/s

- Flash Media Server: Interactive & Enterprise
- HTTP Streaming
- Multicast
- Customization at the Server Side Script Layer (SSAS)
- Clustering
- Custom Reporting Modules
P2P: What does it do

- Allows multiple Flash Players to speak directly to each other
- Can be one-to-one or a group meshed together
- Automates sharing of data in an optimal network path
- Can be used for Audio, Video, and Data
- Provides scalability in some scenarios without standard incremental cost
**P2P: How does it work**

- Works off the RTMFP protocol
- UDP instead of TCP
  - Transmission-time prioritization
  - UPD Inherent Lossiness
- 128 bit AES Encryption
- Generally Requires Flash 10.1
- Server provides rendezvous to connect users
  - Also can manage bootstrapping and group optimization

**NOTE:** Unicast supported as well over RTMFP

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**Understanding Groups**

- Provides the communication mechanisms for media and data across an associated set of clients
- Virtual group of multiple Flash Player 10.1 clients
- Enhanced optimization of communication
- Scalability
GroupSpecifier: Creating a P2P Group

- Used to create & manage ‘groups’
- Generates a groupspec String used in conjunction with the NetStream (media) and NetGroup (data)
- Defines capabilities and security of a ‘group’

Exp:
G:01012105282b91e08fd50a38f030dbbdee7898d36d523605d94d9dd6e50b298e47844be010c160e666d732e6d756c7469636173742e6578616d706c65011b00070ae000fe75300415656565

SAMPLE: Working with RTMFP

- Connect
- Groupspec
- Live video
Multicasting Audio & Video

- One stream shared amongst many viewers
- Utilizes peer-assisted network - groups
- Excellent for live one-to-many or few-to-many
- Does not require server side streaming infrastructure
- Utilizes complex mesh of peers for pull/push data chunking for optimized delivery of media
- Reduced latency
- High Scalability
- Automatically optimizing delivery via priority neighbors

Application Level Multi-casting

- Application Level Multi-casting
- Publisher
- Subscriber
- FMS 4 Enterprise
- Rendezvous Traffic
- Data Traffic
- Subscriber
- Subscriber
- Subscriber
NetStream Multicasting

- **multicastAvailabilitySendToAll**: Boolean
  For RTMFP connections, specifies whether peer-to-peer multicast fragment availability messages are sent to all peers or just one peer.

- **multicastAvailabilityUpdatePeriod**: Number
  For RTMFP connections, specifies the interval in seconds between messages sent to peers informing them that the local node has new peer-to-peer multicast media fragments available.

- **multicastFetchPeriod**: Number
  For RTMFP connections, specifies the time in seconds between when the local node learns that a peer-to-peer multicast media fragment is available and when it tries to fetch it from a peer.

- **multicastInfo**: NetStreamMulticastInfo
  [read-only] For RTMFP connections, returns a NetStreamMulticastInfo object whose properties contain statistics about the quality of service.

- **multicastPushNeighborLimit**: Number
  For RTMFP connections, specifies the maximum number of peers to which to proactively push multicast media.

- **multicastRelayMarginDuration**: Number
  For RTMFP connections, specifies the duration in seconds that peer-to-peer multicast data remains available to send to peers that request it beyond a specified duration.

- **multicastWindowDuration**: Number
  For RTMFP connections, specifies the duration in seconds of the peer-to-peer multicast reassembly window.
P2P with IP Multicast Hardware

- Doesn’t require any server
  - Unless wanting to ingest from Unicast
- Same functionality
  - No server required (can help)
  - Network hardware utilizations
  - Supports vp6 an vp4
- Many existing network devices may support this
- Can be a major benefit for private enterprise networks
- Connecting:
  - NetConnection.connect("rtmfp:");

Considerations

- Firewall traversal
- Network Topology
- Bandwidth
NEXT GENERATION ENTERPRISE

- FMS 4 Enterprise
- Delivery
- Scalability
- High Availability

Flash Media Server 4 Enterprise

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDP</td>
<td>IP Multicast, Unicast, Peer Assisted, Multicast Fusion</td>
</tr>
<tr>
<td>TCP</td>
<td>HTTP Dynamic Streaming VOD, HTTP Dynamic Streaming Live</td>
</tr>
<tr>
<td>TCP</td>
<td>RTMP, RTMPE, RTMPT, RTMPS SSL</td>
</tr>
</tbody>
</table>
FMS4: End-to-End Streaming Solution

- Out of box server solution with vod, live & multicast
- Easy client configuration with the Multicast Config Tool
- High quality Live publish from FMLE 3.1
- Easy deploy with OSMF 1.5
  - Custom
  - FMS 4 Player
  - Strobe

DEMO: Multicast Configuration Tool

- FMS 4 Player
- Custom OSMF Player
DEPLOYMENT: Scalability

- All about understanding your network
- Segmentation
  - Group Based – Single Server
  - Location Based – Single/Multiple Servers
  - Network factors: VPN, etc.
- Multi-location challenges
- Hardware & Software capabilities
DEPLOYMENT: Scalability

- Flash Media Enterprise Server: **Fusion**
  - Provides best of both worlds:
    - IP Multicasting & Application Level Multicasting
  - Creates a bridge between hardware & software users
  - Valuable for VPN situations in corporate infrastructure
    - On location uses hardware
    - Off location uses software
  - Priority is given to IP Multicasting
    - Can directly feed Application Level members as neighbor
Demo: Fusion

- Multicast Config Tool
- AS:
  
groups.spec.multicastEnabled = true;
groups.spec.serverChannelEnabled = true;
groups.spec.ipMulticastMemberUpdatesEnabled = true;
groups.spec.addIPMulticastAddress("[ADDRESS]", [PORT] );

DEPLOYMENT: Scalability

- Scalable multicast deployments with multiple servers
- Server to Server:
  
  - Server based connections with SSAS
  
  - Unicast from Origin to Origin
    - Pull vs Push
  
  - Origin > Edge not really applicable
    - Origin [Enterprise] > Edge [Interactive]
Flash Media Live Encoder

Server is a Member/Publisher

FMS 4 Enterprise

RTMFP Group

FMS 4 Enterprise

RTMFP Group

Unicast

FMS 4 Interactive/Enterprise

Unicast

Server is a Member/Publisher

SAMPLE: Server to Server with Multicast Integration
High Availability Strategies

• Connection Management
  • Fail over (RTMFP > RTMP > RTMPT > HTTP)
    • Attempt a connection to one protocol
    • Apply a timeout limit
    • If failed or timed-out try over with new protocol
  • [SAMPLE]

Monitoring

• Basic server monitoring still applies
• Does not provide any details for P2P groups
• NetStreamInfo Class contains QoS Data for the stream
  • Accessed via NetStream.info
• NetGroupInfo Class contains QoS Data for the group
  • Accessed via NetGroup.info
• Detailed P2P QoS data available to connected members
  • Servers can be connected members
  • Monitoring/Tracking - client or server members
Managing Peers

- Client Authentication
  - Managed Groupspec
  - FMS Authorization/Access Plugins
    - LDAP
  - SSAS
    - Basic User Access List
    - HTTP User Authentication
- Client
  - NetGroup Authentication
  - HTTP User Authentication

CONCLUSION: FMS 4 ENTERPRISE

Powerful enterprise solution that offers high scalability, low impact, and provides the infrastructure to maintain high availability.
Multicast on the Adobe Flash Platform

**UNICAST**
*Public & Internal streaming*
- HTTP / RTMP Dynamic Streaming
- Maximum Reach
- Real Time protection
- Server/Client relationship
- RTMP Tunneling over HTTP

**APPLICATION MULTICAST**
*Massive live delivery (public)*
- Peer 2 Peer technology
- Flexible and massive scale
- No hardware requirements
- Low cost delivery
- Rendezvous servers required

**IP MULTICAST**
*Internal enterprise streaming*
- UDP Broadcast
- Hardware-assisted
- No Server required
- Limited external reach

**ADOBE MULTICAST FUSION**
*Internal enterprise streaming with Peer Assist*
- Delivery higher quality of service
- Increase reach
- Hardware + software assisted
- Rendezvous servers required

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**Flash Media Server 4**

<table>
<thead>
<tr>
<th>Key Problems Solved</th>
<th>Key Functionality</th>
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<tr>
<td>Enterprise Deployment Options</td>
<td>Multicast</td>
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<tr>
<td>Reach beyond Multicast</td>
<td>Multicast Fusion</td>
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<td>Social Media Video communication</td>
<td>Application Level Multicast (P2P)</td>
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<td>Streaming over HTTP</td>
<td>HTTP Dynamic Streaming</td>
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<td>Slow switching between bitrates</td>
<td>Fast Switching</td>
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<tr>
<td>Multi-camera sync</td>
<td>Absolute TimeCode</td>
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<tr>
<td>High upfront costs</td>
<td>Free Operating Systems</td>
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<tr>
<td>Higher performance</td>
<td>64 bit support</td>
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<tr>
<td>Easy player development</td>
<td>OSMF: Flash Media Playback</td>
</tr>
</tbody>
</table>
Q&A
...if there is time.

IN CLOSING
Did I talk fast enough?
RESOURCES

- http://cc.rtmfp.net
- http://www.delicious.com/yosaburo/cirrus
- http://www.delicious.com/yosaburo/rtmfp
- http://www.delicious.com/yosaburo/p2p