Custom Media Players & Live Broadcast

for Adobe Flash platform

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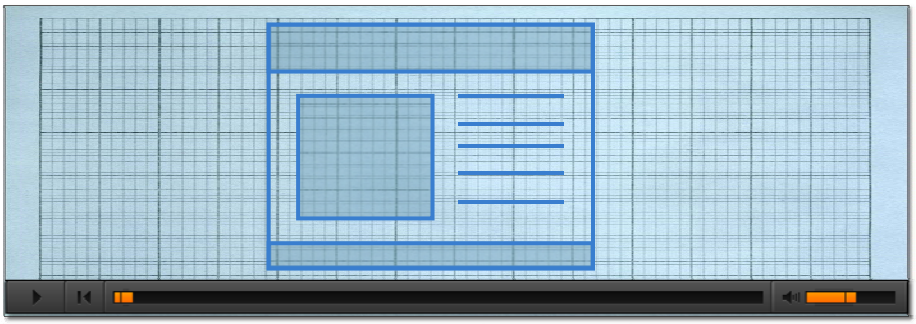
The next 3 hours of your life

9:00 – 10:15	Anatomy of a Video player for Adobe Flash and Adobe AIR
10:30 – 10:35	Introduction to Live Video with Flash
10:35 – 11:00	SPECIAL GUEST
11:00 – 11:45	Live Video Broadcasting with Flash
11:45 – 12:00	Sneak Peaks from Adobe



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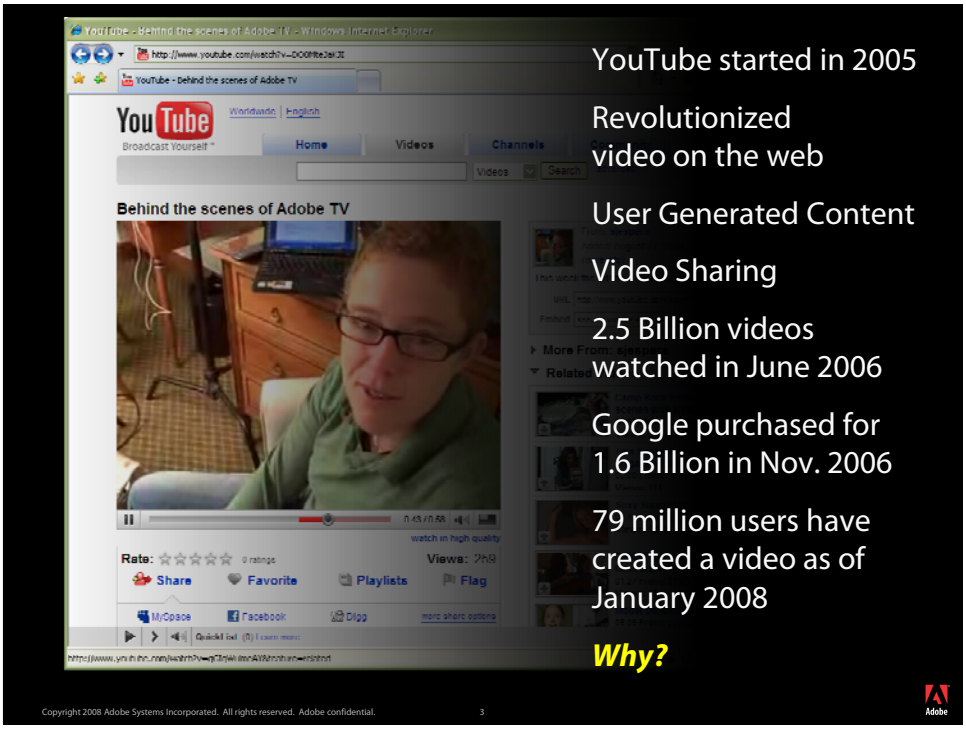

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Video playback in Flash

- Developers and designers changed the way the world looks at video
- Reach of the Flash platform was the launching pad
- High quality video in Flash player 8 (circa 2006)
- Above 80% penetration in less then 12 months

Media Consumption has changed

- High Quality Video 2006
- Lots of Content 2007
- Great Experience 2007
- Engaging and Social 2008
- Accessible Anywhere 2008

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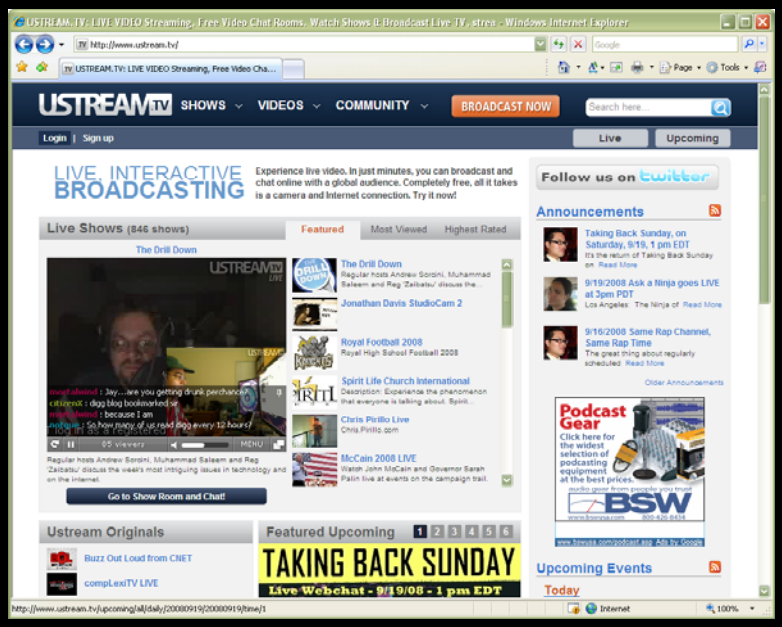

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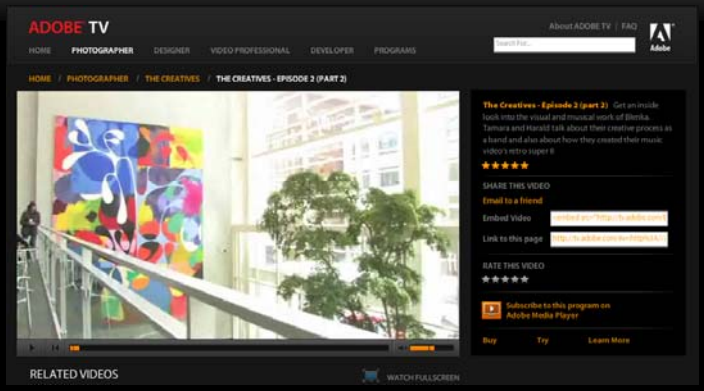
Media Players do a lot more then play video

www.adobe.tv



- Basic playback controls
- Full Screen mode
- Automatic Bit rate shifting
- Rating system
- Video Sharing
  Embed / Deep link/ Email
- Feed Subscription / Syndication
- Tracking and Logging
- Monetization
- Advertising
- Searching and Discovery

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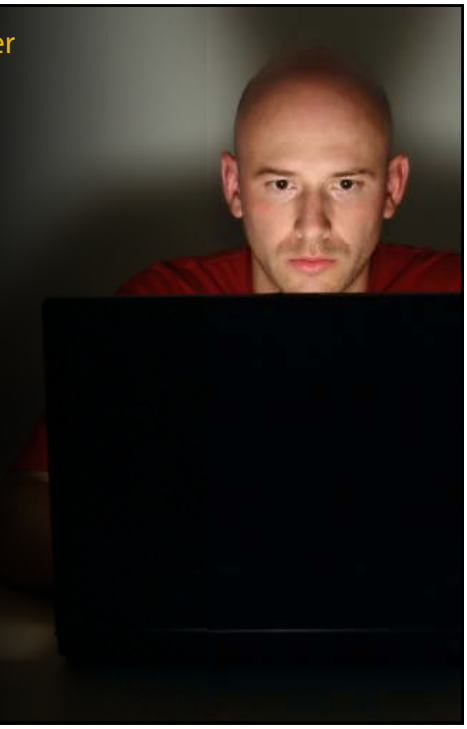
Common tasks for the Media player

- Play the media
- Track the media
- Discover media

- Protect the media
- Watch multiple media
- Monetize the media

- Generate new content
- Share + Syndicate media
- Interact with the media
- Mash up the media



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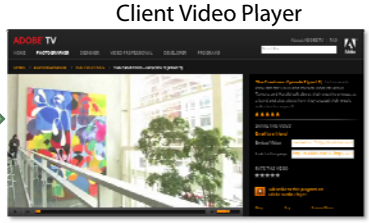
Basic Media player flow

Video Asset

Streaming Server

Client Video Player



- The basic flow of video playback is
  - Video player requests media
  - Server Delivers media
  - Video player renders media

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The Modern video player has many more roles

Authentication
Error Handling
Tracking/Logging
Advertising
Cue Points
Playlists

Accessibility
Stream Management
Multiple Bitrates
Interactive Features
Content Protection
HTML Interface
User Interface
Internet Sharing
Connection Management

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Roles of the Media Player

Basic Delivery (circa 2005)

- Connection Management (connect/disconnect)
- Stream Management (play/pause/seek/volume)
- User Interface (Buttons/Frame/Fullscreen)

Beyond Basics

- Authentication
- Error Handling
- Tracking
- Cue Points
- Accessibility

Other things the player can do

- Integrated Advertising
- Remote Controls
- Content Protections
- Playlist
- Live Controls
- Picture in Picture
- Interactive Features
- Internet Sharing
- Mulitple Camera Angles
- Mobile delivery

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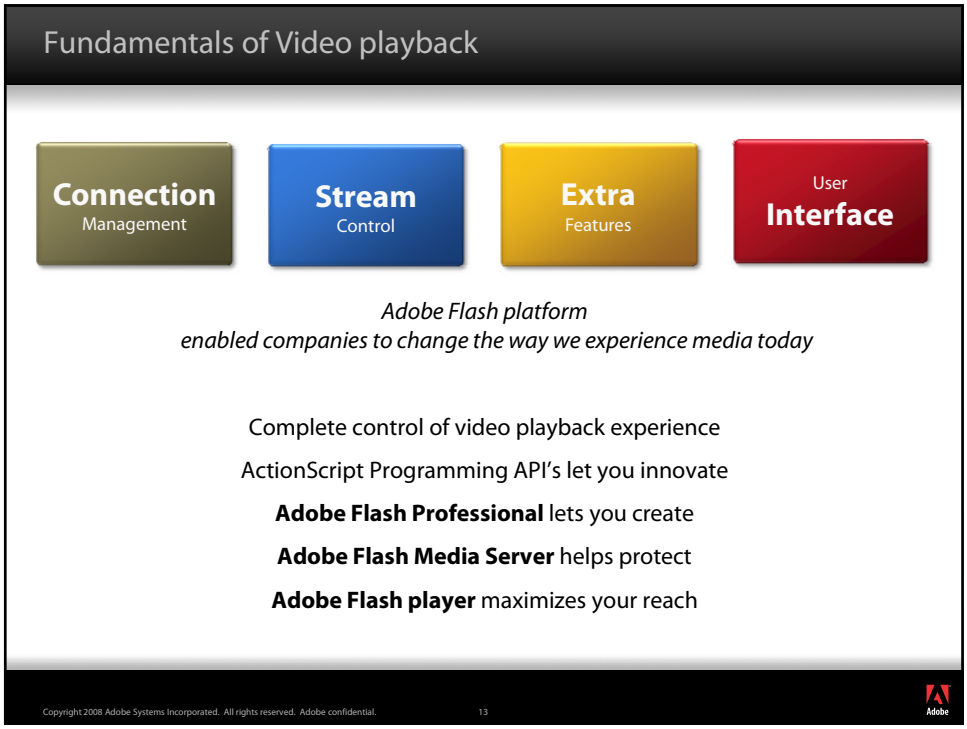

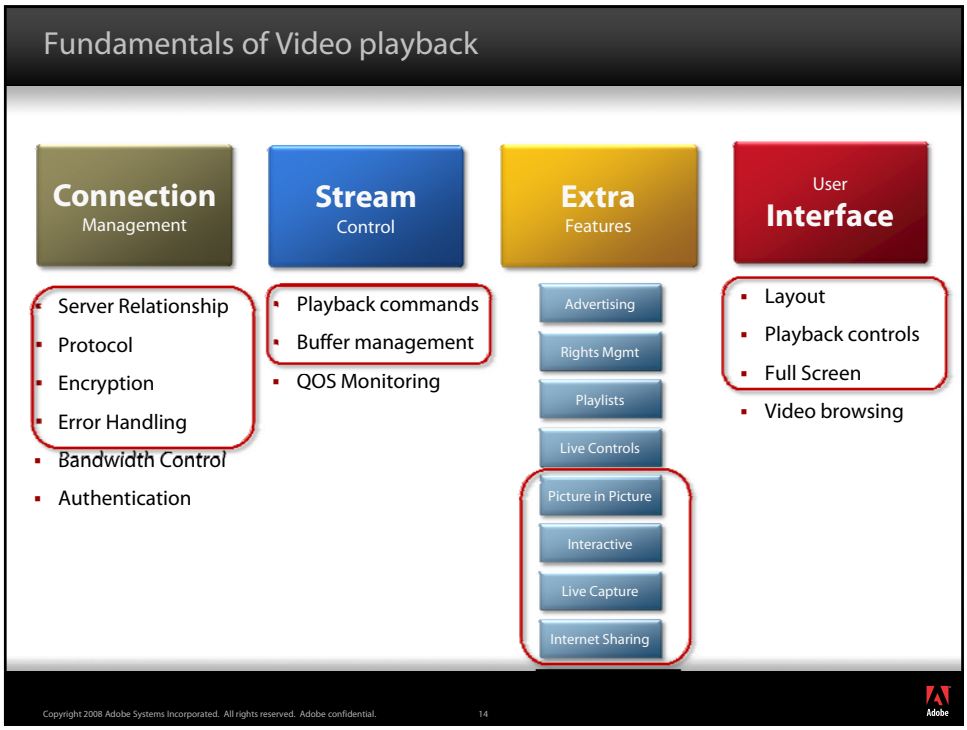

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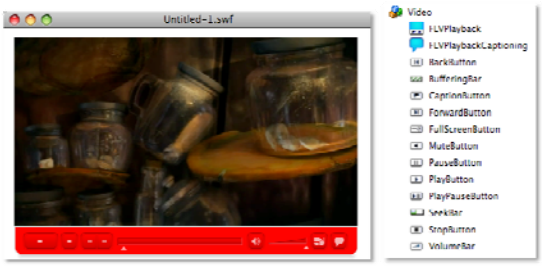
Flash Professional CS3 + Video

- Encode video into FLV / F4V
- Drag and Drop Media player
  - Connection Management
  - Stream Control
  - User Interface
  - Stream from Flash Media Server
  - Play from a web server
- Embed into the Flash SWF
- Build your own
  - User Interface
  - ActionScript



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Basic Connection Management

Connection Management

Step 1: Connect to Flash Media Server

- ActionScript 3 class: **flash.net.NetConnection**
- URI: **rtmp://[server]/[application]**

Step 2: Wait for connection to be accepted + monitor connection

- ActionScript 3 event: **flash.events.NetStatusEvent**

Step 3: Setup the Stream controller

- ActionScript 3 class: flash.net.NetStream
- Stream Name: "video.flv"

Stream Control

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Flash Media URLs

Connection Management

- URL's are not the same as Web or Progressive Download URLs
- Many publishing systems / CDNs use single URL strings that include
  - Server
  - Stream Name
  - Authentication
  - Other parameters
- URL Parsing is done in ActionScript and broken into
  - Connection
  - Stream Name /Source
  - Authentication details

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URL Structures for Flash Streaming

Connection Management

- Basic URL
  - rtmp://172.16.4.128/vod/mystreamname
- H264-based or MP3-based URL
  - rtmp:// 172.16.4.128/vod/mp4:mystreamname
  - rtmp:// 172.16.4.128/vod/mp3:mysound
- FLVPlayback (Source)
  - rtmp:// 172.16.4.128/vod/mp4:mystreamname.f4v
  - http://webserver.com/myPlaylist.smil
- Application instances
  - rtmp:// 172.16.4.128/vod/_definst_/mp4:mystreamname
- Stream folders
  - rtmp:// 172.16.4.128/vod/_definst_/folder/mp4:mystreamname
- Query-based Authentication
  - rtmp:// 172.16.4.128/vod/mp4:mystreamname?token=234h234jkh&account=kt

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Flash Media Connection Events

Connection
Management

ActionScript Events let you monitor connection status changes

- **flash.events.NetStatusEvent**
  - "NetConnection.Connect.Closed"
  - "NetConnection.Connect.Failed"
  - "NetConnection.Connect.Success"
  - "NetConnection.Connect.Rejected"
  - "NetConnection.Connect.AppShutdown"
  - "NetConnection.Connect.InvalidApp"

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Stream Control

Stream
Control

- Manage the stream playback
- Multiple streams can be delivered through a single connection
- Basic stream commands:
  - Play
  - Pause
  - Seek
- Manage the Buffer
- Monitor properties of the stream
  - Time
  - Current Frame per Second
- Manage a playlist
- Publish a live stream

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Controlling the Stream

Stream
Control

Step 1: Connect the Stream to the Connection

- ActionScript 3 class: **flash.net.NetStream**

Step 2: Set the Buffer Size

- NetStream.bufferTime

Step 3: Use the NetStream.play() commmand

- NetStream.play([streamname], [start], [length],[reset playlist])
  - eg: NetStream.play("myVideo",0,-1,true);

Step 4: Attach commands to the User Interface

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Flash Media Stream Events

Stream
Control

ActionScript Events let you monitor stream status

- **flash.events.NetStatusEvent**
  - NetStream.Buffer.Empty; NetStream.Buffer.Full; NetStream.Buffer.Flush
  - NetStream.Play.Start NetStream.Play.Stop NetStream.Play.Failed
  - NetStream.Pause.Notify NetStream.Unpause.Notify
  - NetStream.Seek.Failed NetStream.Seek.InvalidTime NetStream.Seek.Notify
  - NetStream.Play.StreamNotFound
  - NetStream.Play.InsufficientBW

- New events for H.264 containers
  - NetStream.Play.FileStructureInvalid
  - NetStream.Play.NoSupportedTrackFound

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Media Player User Interfaces

User
Interface

DESIGNER

DEVELOPER

The workflow between Design and Develop in Adobe Tools makes it easy to create new interactive experiences

Designers build experiences with Professional Tools

Developers program with a feature rich programming language

DEMO – Workflow between Products

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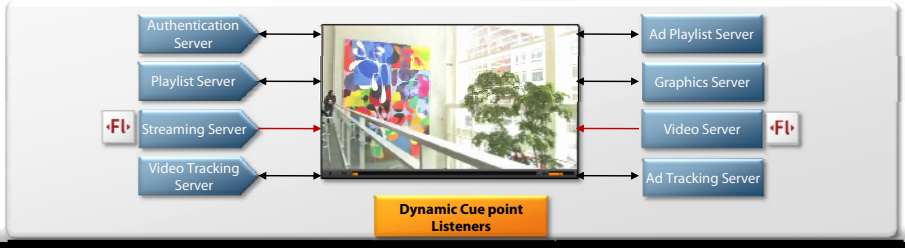
Advertising

Extra
Features
Advertising

- Many external servers/services are required
  - Content
  - Tracking
  - playlist
- Video player connects based on
  - Time code
  - Timer
  - Dynamic Cue Points (ad insertion points)
- User Interface reacts to data messages



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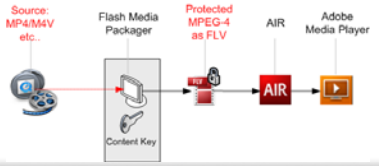
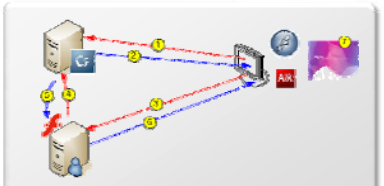
Access Control / Rights Management

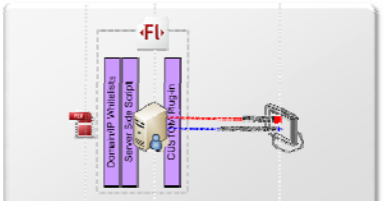
Extra
Features
Rights Mgmt

- Access control can occur
  - Before the streaming connection is requested
  - During streaming connection
- Real time Encryption
  - Unique feature of Flash Media Server (RTMPE)
  - Protects the content delivery
- SWF Verification
  - Protects the playlist and the media
- Rights Management (Adobe AIR only)





Standard Token-based Access Control



Custom Access Control solutions

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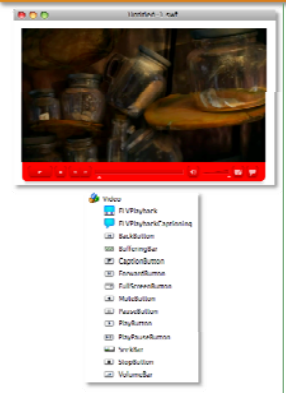
Pre-built Video players for Flash and AIR

FLVPlayback Component Adobe Flash Professional	**OPEN VIDEO PLAYER INITIAITIVE** http://www.openvideoplayer.com	**JW FLV MEDIA PLAYER 4.1** http://www.jeroenwijering.com



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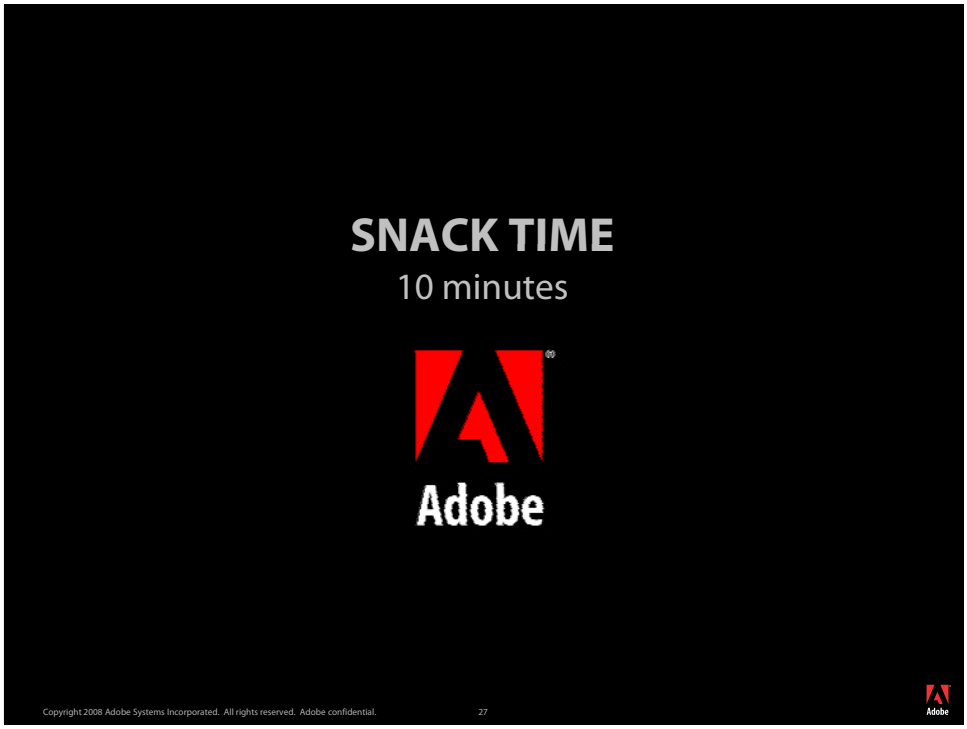

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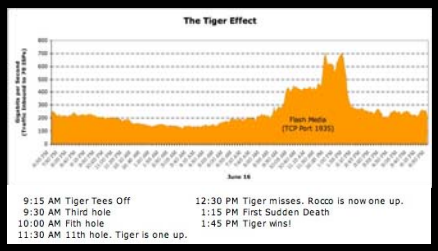
Media consumption has changed



- **Explosive growth in live video in 2008**
- Big League Sports
- Broadcast Simulcast
- Online-only
- Conferences
- Concerts
- Examples include
  - PGA Golf, NFL, MLB, Euro 2008, Olympics
  - Operation My Space
  - Oprah

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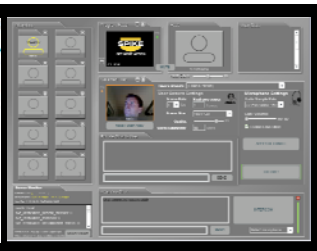

User Generated Live Content

- Next generation of UGC
- Video captured with Flash player / Adobe Flash Media Live Encoder
- Rich publishing controls
- Massive reach
- Millions of dollars being invested
- Social Media driven
- Major Broadcast adoption

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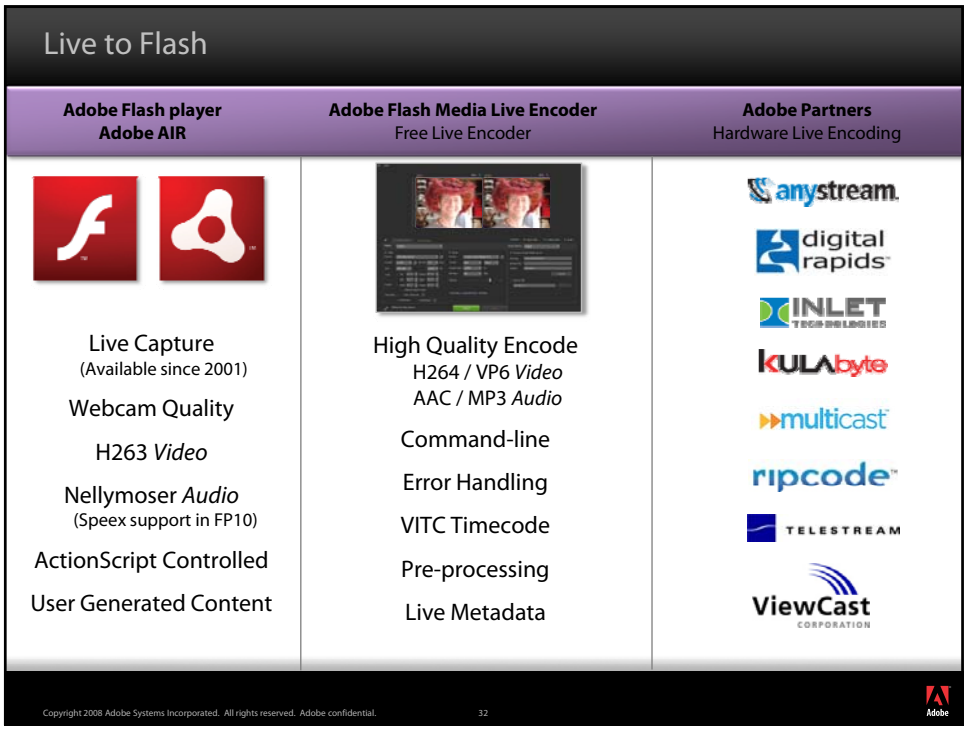

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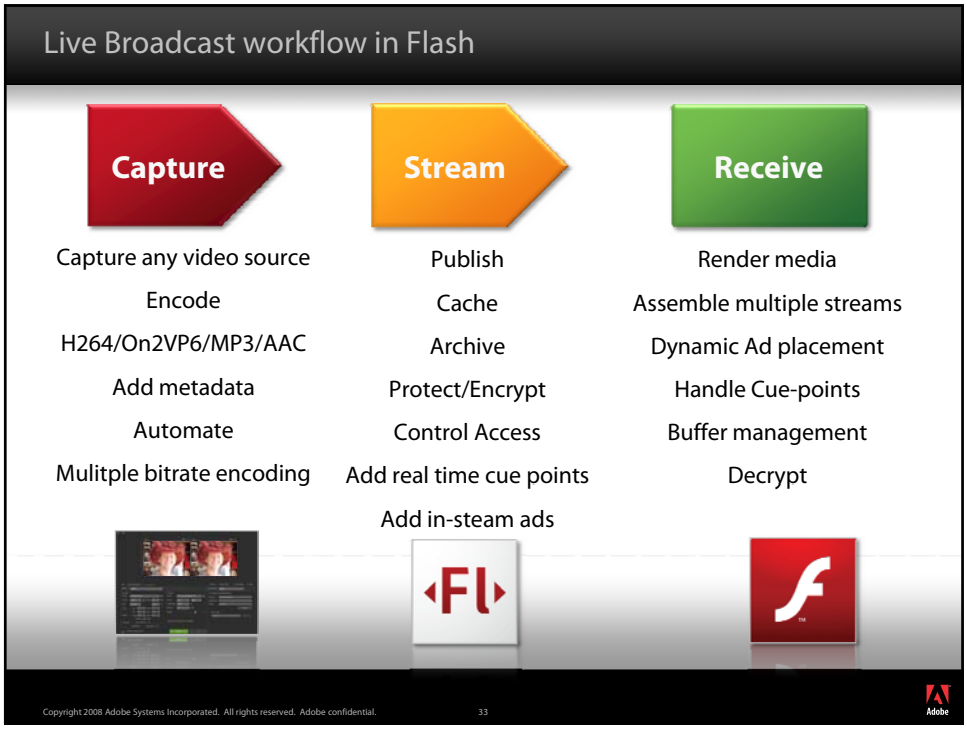

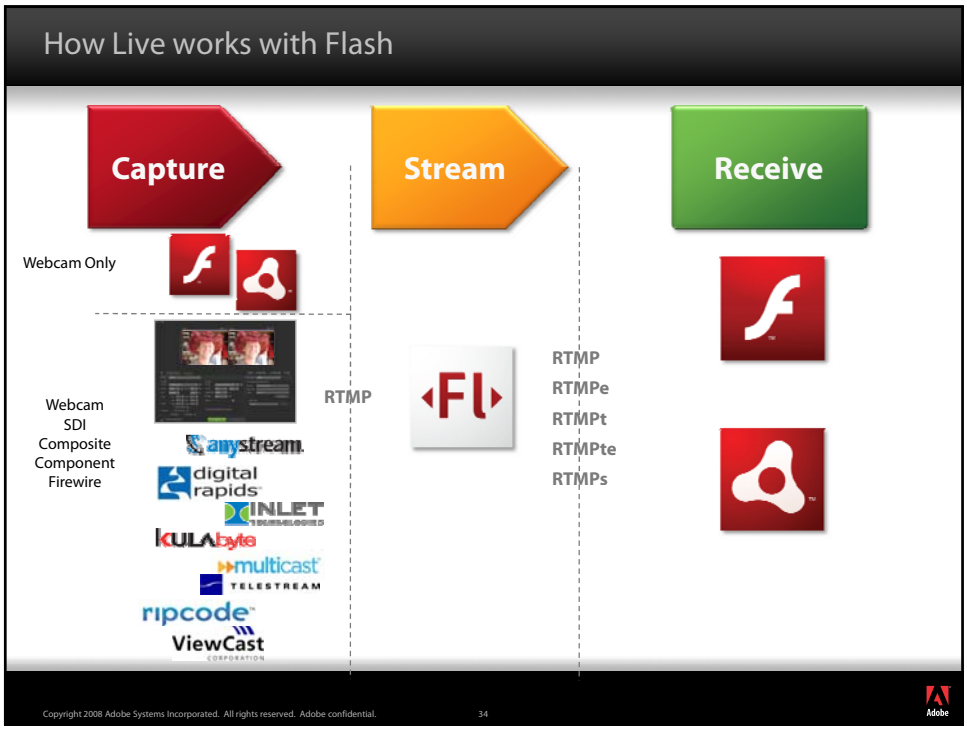

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Live Publishing with Flash Player / AIR

Capture

The Connection Management Process is the exact same as playback

Step 1: Connect to Flash Media Server

- ActionScript 3 class: **flash.net.NetConnection**
- URI: **rtmp://[server]/[application]**

Step 2: Wait for connection to be accepted + monitor connection

- ActionScript 3 event: **flash.events.NetStatusEvent**

Step 3: Setup the Stream controller

- ActionScript 3 class: flash.net.NetStream

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Live Publishing with Flash Player / AIR

Capture

The Stream Control Process is the very similar to playback

Step 1: Connect the Stream to the Connection

- ActionScript 3 class: **flash.net.NetStream**

Step 2: Capture the Camera / Microphone

- ActionScript 3 class: **flash.media.Camera**; **flash.media.Microphone**
- **Camera.get();**
- **Microphone.get();**

Step 3: Attach the inputs to the NetStream

- NetStream.attachVideo(Camera)
- NetStream.attachAudio(Microphone)

Step 4: Use the NetStream.publish() commmand

- NetStream.publish([streamname], "[live|record|append]")
  - eg: NetStream.publish("myVideo","record");

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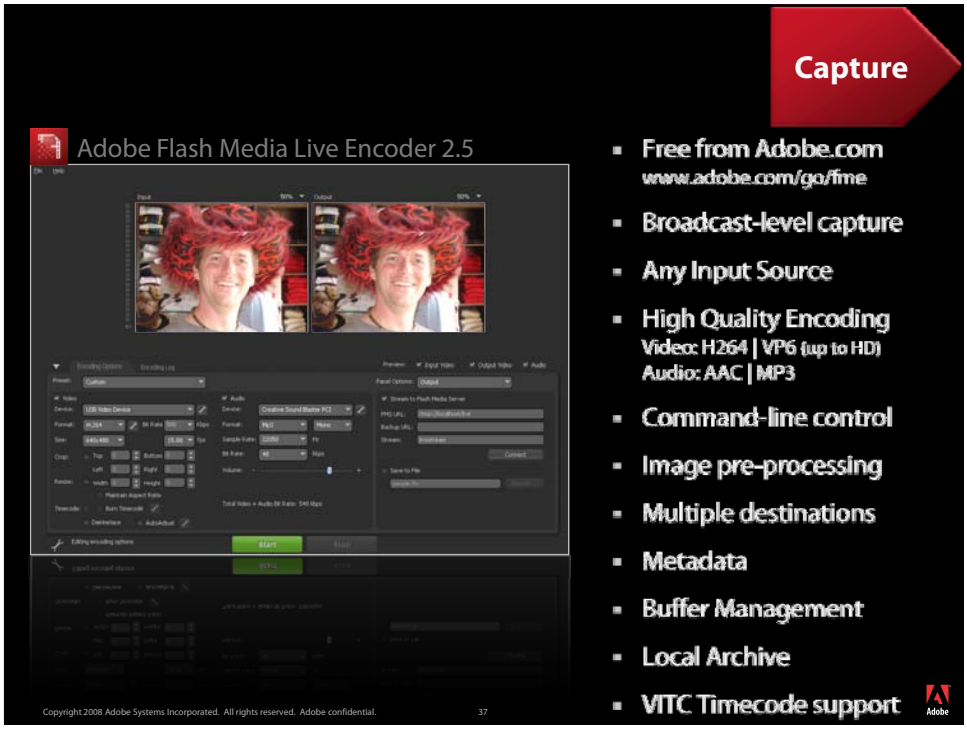

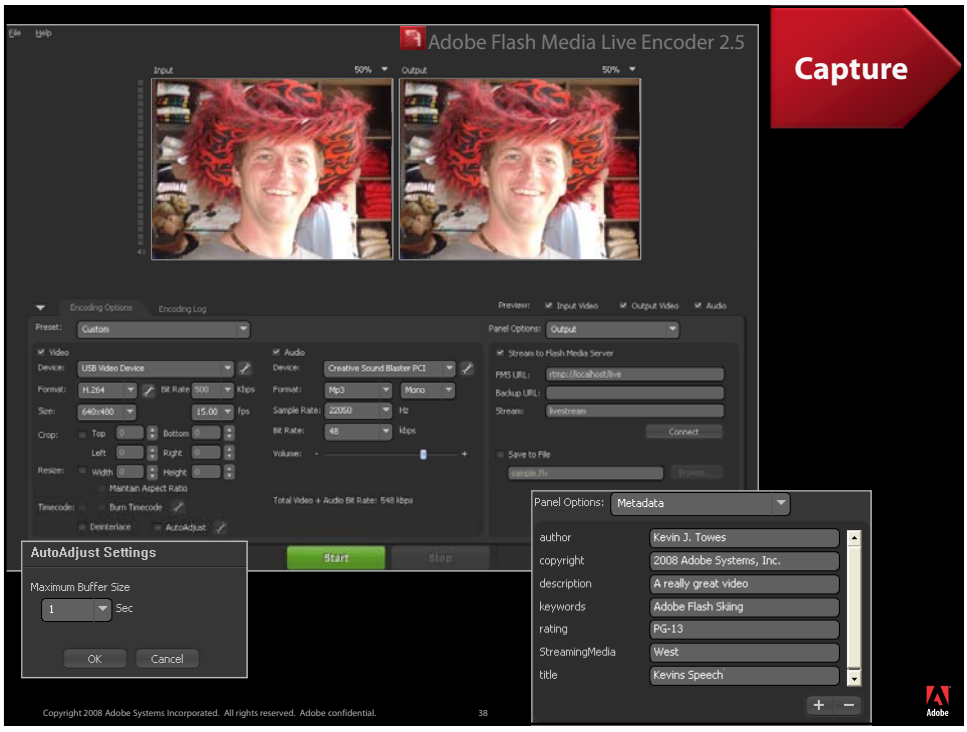

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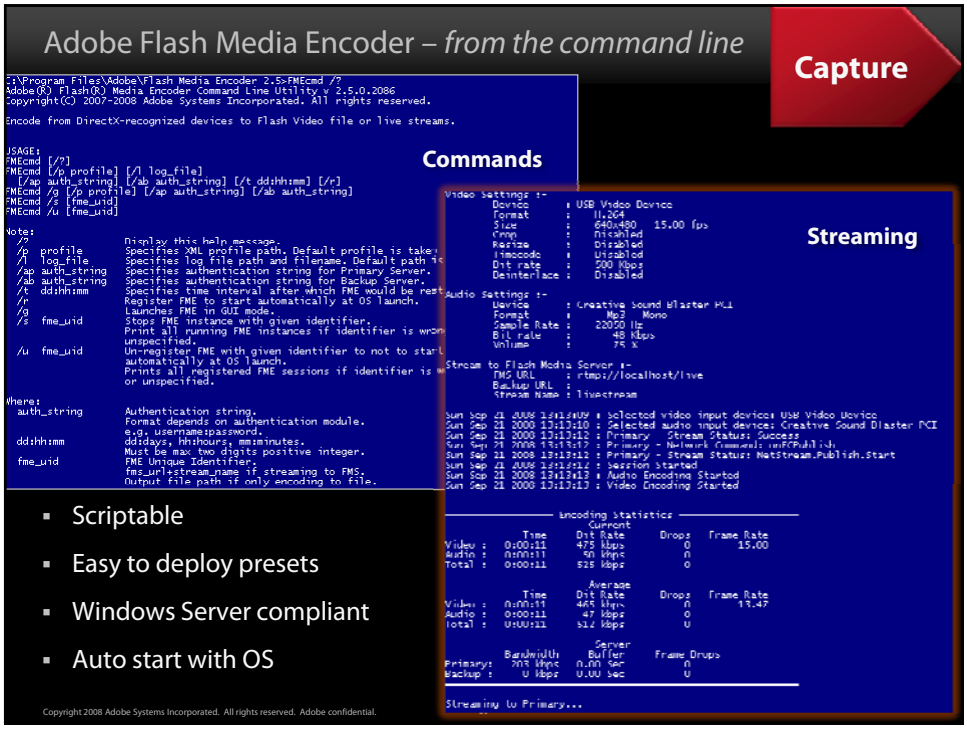

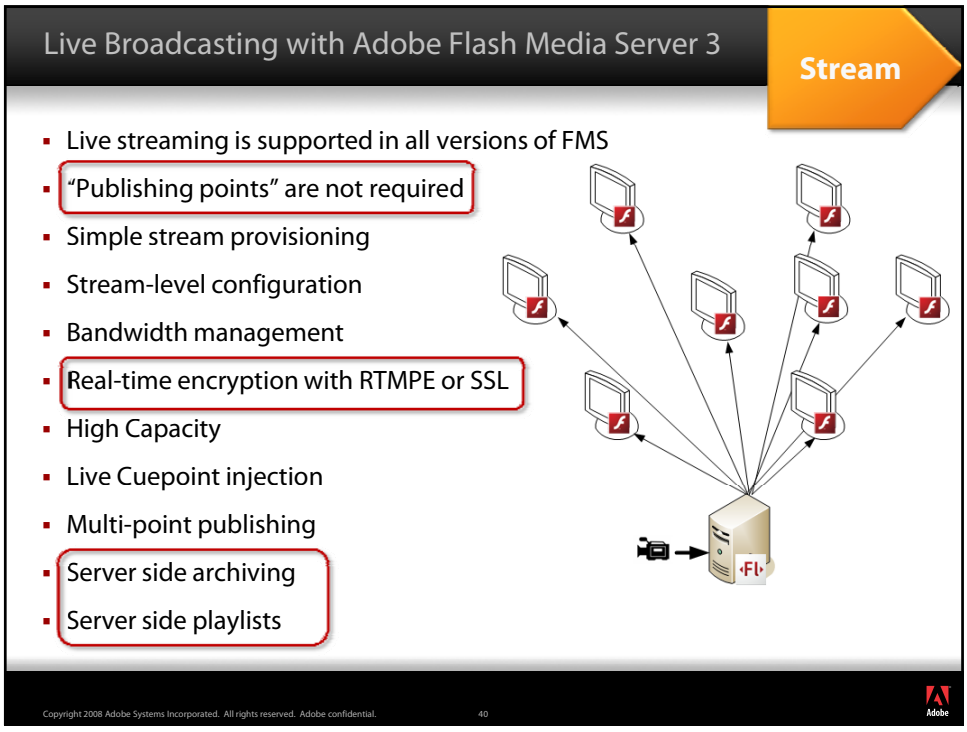

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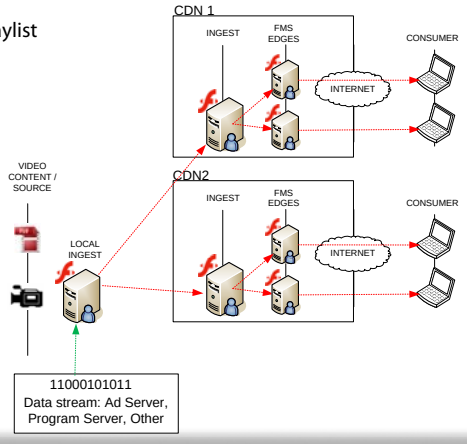
FMS as a live source

Flash Media Server can act as a live source

- **Server side playlist**
  - Allow you to use pre-recorded content and stream it live
  - Requires Server Side ActionScript and a playlist
- **Multipoint publish**
  - Republish an existing live stream
  - Insert real-time metadata into the stream
  - distribute to multiple servers / CDNs

DEMO (Time Permitting)



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Changes in the Media player

Receive

The Stream playback process is similar except the play command

Step 1: Connect the Stream to the Connection

- ActionScript 3 class: **flash.net.NetStream**

Step 2: Set the Buffer Size

- NetStream.bufferTime

Step 3: Use the NetStream.play() commmand

- NetStream.play([streamname], [start], [length],[reset playlist])
  - eg: NetStream.play("myLiveVideo",-1,-1,true);

Step 4: Attach commands to the User Interface

- "start" parameter can be a "-1" to play a pre-recorded if live is not available
- Default: "-2" will play a live stream and wait to become available

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Flash Professional CS3 + Live Broadcasts

Receive

- FLVPlayback will work with Live Broadcasts
- Set the “isLive” property to “true” using ActionScript

Output | Compiler Errors | Actions – Frame

```
1  flvPlayback.isLive = true;
2
```

- The AS2 Component is configured in the component inspector

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