EXECUTIVE SUMMARY

Worldwide, mobile communications traffic and especially, mobile video traffic, is rapidly increasing. Mobile video has the highest growth rate of any video application category.

According to the Cisco Visual Networking Index, a forecast of global internet and mobile traffic from 2010-2015, “Mobile video traffic is increasing …. Mobile video traffic was 49.8 percent of total mobile data traffic at the end of 2010, and will account for 52.8 percent of traffic by the end of 2011.”

In the same forecast from Cisco, it is estimated that “Globally, mobile video traffic will grow 35-fold from 2010 to 2015, a compound annual growth rate of 104%. Mobile video will generate 66 percent of mobile data traffic by 2015.”

The Compound Annual Growth Rate (CAGR) for global mobile video traffic is illustrated in the following graph:

HIGHLIGHTS

Mobile video traffic is increasing exponentially.

Video-capable tablets and smart phones dominate the mobile device market.

Mobile operators face significant technical challenges in delivering video to mobile devices.

MobiTV, the leader in the mobile video market, solves these challenges with the MobiTV converged media platform and innovative FMP4 technology.

This paper describes how the FMP4 technology solves the challenges of delivering mobile video to multiple screens.
THE CHALLENGE OF MOBILE VIDEO
With the proliferation of video-capable tablets and smart phones, consumers expect to be able to watch their favorite televised shows and live events anywhere. Naturally, mobile carriers and other service providers want to include mobile video as part of their media offering. These operators face a number of technical challenges in delivering high-quality mobile video, including:

- Convergence, or multi-screen delivery, for a TV Anywhere experience
- Content formats for a variety of mobile devices
- Unpredictable, fluctuating bandwidth for both wired and wireless networks
- Performance and scalability requirements
- Content security

With years of experience in the mobile video industry, MobiTV now offers a converged media platform as a solution to the challenges for delivering mobile video. MobiTV’s converged media platform is an end-to-end managed service platform for the authentication, delivery and playback of multimedia across multiple screens.

The FMP4 solution includes both the fragmented MP4 file format and the media distribution system for generating and delivering fragmented video streams. Fragmented MP4 files and the supporting media distribution system are a core component of MobiTV’s converged media platform.

MOBITV’S RICH CUSTOMER EXPERIENCE
Customers want the responsiveness of conventional TV viewing combined with the convenience of viewing whenever and wherever they want on their mobile, tablet, and PC devices. The FMP4 solution, when deployed in conjunction with MobiTV’s client-side technology, provides a rich customer experience with the following features:

- **Convergence** – MobiTV’s converged media platform with fragmented MP4 technology allows users to pause both live, VoD and recorded video at any time and resume watching on a different device without missing anything. To support convergence, MobiTV converged media platform includes a Network DVR component for pausing and resuming recorded programs. The structure of the fragmented FMP4 files records the point in the program when it is paused and allows the program to be resumed at the same place and for the same user account on any device.
- **Fast media start up** – Due to FMP4’s video stream fragmentation technology and the server’s intelligent management of the fragmented files, users experience very fast start up times that are usually under 1 second and comparable to, or can be faster than, tuning to a channel on a television set.

- **Fast channel change** – Users want to be able to freely channel surf to locate their desired content. With FMP4 technology, switching between live channels and/or video-on-demand content can be achieved in 1-2 seconds.

- **Time-shifting and place-shifting** – Unlike conventional TV viewing, the MobiTV converged experience lets the user pause the video and resume at a later time, or continue viewing on a different device with the appropriate video quality for that device and network. Time-shifting and place-shifting is possible with both VoD content, live broadcasts, and recorded content.

- **Policy-driven media delivery** – Configurable policies for how, when, and where content is delivered provide operators with the ability to optimize network resources.

- **Wide selection of clients** – The MobiTV media player is available on hundreds of devices, including mobile phones, tablets, PCs, and set top boxes, on all major operating systems.

**MOBITV’S BENEFITS FOR OPERATORS**

Operators have been faced with the challenge of providing a multi-media service offering that supports multiple device types, platforms, feature sets and potentially millions of concurrent users for peak events. MobiTV’s FMP4 solution is built to scale with the operator’s service by providing the following:

- **Secure content delivery** – MobiTV’s DRM solution offers cross-platform support. MobiTV’s DRM delivers secure, encrypted fragmented MP4 streams to authorized users. The DRM solution is integrated into the fragmented MP4 files and supports multiple business models including: conditional access (CAS), content expiry, content sharing, and forward lock.

- **Scalable integration with Content Delivery Networks (CDNs)** - The FMP4 solution is distributed across a standard HTTP/TCP (World Wide Web) network. Thus it travels through the standard TCP port (80), which is freely accessible across Wi-Fi networks and rarely blocked by firewalls. The use of standard HTTP caches and proxies simplifies distribution through the CDN. Distribution via CDN provides better performance, availability, scalability, and redundancy. The FMP4 solution provides a multi-faceted approach to efficiently scale from small groups of users to millions of concurrent users watching a worldwide live event.

- **Dynamic advertising insertion** – VoD content accepts pre-, post-, and mid-rolls. The specific advertisement clip played is dynamically chosen at playback based on pre-defined targeting parameters. Ad insertion is rule-based, so operators can reduce or eliminate overexposure to multiple views of the same clip.
• **End-to-end media delivery** – The MobiTV components work together to ingest, transcode, protect, manage, deliver and playback high quality audio and video services, enabling carriers to provide a superior customer experience at a fraction of the cost of multi-vendor solutions. The FMP4 solution provides a distribution method that can be used for all media, device and network types.

**FMP4 IN A NUTSHELL**

Fragmented MP4 is MobiTV’s preferred file format for streaming video using standard web servers and HTTP networks. With fragmented MP4 files, the same delivery mechanism can be used for all content types across all networks while achieving a high quality of service. By using HTTP as the transport protocol, fragmented MP4 distribution is compatible with most Content Delivery Networks to provide a scalable, flexible, and cost-effective solution. Additionally, DRM can be applied to all assets, whether they are live, on demand, or downloaded files for local playback. Fragmented MP4 files may be streamed to client devices using the MobiTV media player or native decoders. When the device does not support fragmented MP4, MobiTV can also deliver content in RTSP/RTP format.

Fragmented MP4 is based on the MPEG-4 (part 12) standard file format, with proprietary methods developed by MobiTV for network distribution. A fragmented video stream offers many advantages over other delivery methods, including use of standard HTTP/TCP networks, a single server access for fast startup and channel changes, adaptive streaming for efficient use of available bandwidth, use of DRM for secure content, and more.

MobiTV’s fragmented MP4 format is designed to be transmitted over standard HTTP/TCP protocols to produce a stateless video distribution method. With no overhead required for maintaining session data, HTTP allows more bandwidth to be used for the video signal, resulting in improved quality. Fragmented MP4 works together with the MobiTV media player or native decoders to perform many functions, including: bandwidth adaptation, policy enforcement for media delivery, integration with DRM libraries, and content decryption. The MobiTV media player runs on hundreds of mobile devices and PCs, on all major operating systems.

MobiTV’s fragmented MP4 format is based on the industry standard ISO/IEC 14496-12:2005, Base Media File Format specification. This specification for coding audio/visual objects describes smaller, fragmented files with H.264 video codec support. The H.264 codec is a widely-used industry standard for video compression. It provides optimal video quality at substantially lower bit rates than previous standards. MobiTV currently supports Baseline and Main compression profiles of the H.264 encoding standard.
MOBILE VIDEO DISTRIBUTION METHODS
The table below compares the most prevalent video streaming solutions, in particular the Bandwidth Adaptation and Security components. MobiTV’s adaptive streaming with fragmented MP4 provides a complete solution for bandwidth adaptation and content security.

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MOBITV MEDIA PLAYER
The media player is MobiTV’s platform-independent client software that decrypts and renders the fragmented MP4 video stream, and also manages the DRM licenses. The MobiTV media player is available for mobile phones, tablets, PCs, and set top boxes, on all major operating systems.

The MobiTV media player resides on the mobile client to enhance quality of service. The media player fetches fragmented MP4 files by URL, compiles the fragments into a coherent stream, and then supplies the compiled video stream to a decoder. The primary responsibilities of the media player are as follows:

- Maintain and monitor the network connection – The media player controls the mobile client’s connection to the HTTP network. It monitors the network bandwidth for adaptive streaming. After each fragment is downloaded, the media player assesses the size of the fragment and the
time required to download. The media player downshifts to a lower bitrate if needed, or if there is enough bandwidth available it will upshift to a higher bitrate.

- Compile fragmented MP4 files – The media player compiles the fragmented MP4 files into a coherent stream for the decoder.

- Decrypt DRM-protected content – For content that is protected with DRM, the media player receives license information regarding digital rights and decrypts the content.

SECURING FRAGMENTED MP4 CONTENT WITH DRM

The MobiTV DRM solution provides strong protection over the content rights for live, streamed VoD, and downloaded media. MobiTV DRM supports a multi-level security model that combines service authentication and authorization with content encryption and license management.

MobiTV’s DRM solution is integrated into fragmented MP4 file structure and distribution technology. Built on AES and RSA standards, it is a cross platform solution which is approved by content providers for Android, iOS, WinPhone7 devices, and Linux/Windows/Mac PCs. The protection, distribution, monitoring, license renewal, and content metering features are part of the end-to-end solution, which allows enforcement of stronger controls.

For more information, contact MobiTV for a detailed whitepaper describing our DRM solution.

ADVERTISING MANAGEMENT

The MobiTV platform provides an Ad Manager that works in conjunction with fragmented MP4 files and the media distribution system to insert advertisements dynamically into the content stream. With advertisement insertion at the delivery point, a content provider can distribute video advertisements that are personalized for the user. In VoD files and recorded content, advertisements can be rotated to avoid duplication when a user watches the same program multiple times.

DEPLOYMENT OPTIONS

The MobiTV converged media platform scales to an operator’s needs by enabling flexible deployment options. Operators may choose from the following deployment approaches:

- Fully-hosted managed service: Full end-to-end managed service from content ingestion to media distribution and client playback. Fully hosted managed services are managed directly by MobiTV from our data centers.

- Remotely-hosted managed service: The MobiTV converged media platform is installed in an operator’s data center, but the software is remotely managed by MobiTV. This leverages an operator’s existing integration with live encoders, EPG providers, and content management systems. With this model, operators can utilize their existing infrastructure hardware, or MobiTV can procure the necessary hardware on the operator’s behalf.

- Deploy, Operate, and Transfer model: MobiTV performs the initial installation and configuration of the converged media platform, manages the service remotely for an agreed upon period of time, and then eventually transfers ownership to the operator.
CONCLUSION
MobiTV's fragmented MP4 format is a next generation video streaming technology that provides many advantages to previous streaming technologies such as RTSP and Progressive Download. Some of these advantages are:

- Optimized and efficient delivery of live, on-demand, and downloaded content
- Adaptive streaming for optimal quality over any network
- Seamless video experience across 2G/3G/4G/Wi-Fi network transitions
- Seamless delivery from a CDN using standard HTTP
- Cross-platform DRM solution approved by all major content providers
- Full multi-screen convergence experience on mobile, tablet, or PC
- Policy-based media distribution provides control over network utilization

By delivering the video over standard HTTP networks, MobiTV can leverage CDNs and other efficient network configurations. With minimal capital investment required, mobile operators and television studios can deliver video to most mobile devices.