



Background

Movidity is bringing the future of multimedia to the mobile world, today.

Until now, light weight client devices such as cell phones and PDA's relied on traditional bit streaming technology to access both Video on Demand (VoD) and Audio on Demand (AoD) services over cellular or other low bandwidth networks. While bit streaming and associated servers and players are prevalent on broadband networks, their use on low bandwidth / variable quality networks and constrained mobile devices is, at best, challenging.

2G and 2.5G cellular networks do not offer the bandwidth and quality of service to make bit streaming viable for VoD services. While offerings exist today in the form of television delivered to the handset, the effect is somewhat underwhelming. Low frame rates, choppy, interrupted video and persistent out-of-sync audio/video result in a poor user experience - one which severely affects the "stickiness" of such an offering.

THE FUTURE OF MULTIMEDIA MOBILITY

Movidity has created a breakthrough in multimedia mobility.

Movidity is so unique, it's been called a disruptive technology. While an entire industry has revolved around the outdated paradigm of bit streaming, Movidity has been busily creating and perfecting the science of advanced multimedia delivery for a mobile world.

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Movidity leverages highly advanced mathematical algorithms, innovative video processing, and a new, unique transmission method to provide high quality Video and Audio-on-Demand, along with two-way interactive capabilities, to wireless mobile clients such as cell phones and PDA's

Indeed, the unique application of various technologies and inventive thinking of our engineers and scientists have earned Movidity numerous pending patents in various fields.

Movidity is a system of software elements that perform multimedia transcoding, distribution, and transmission to mobile devices running a Movidity "player".

Movidity's technological leap over bit streaming and conventional media players is dramatic; "underpowered" devices such as basic Java enabled cell phones (normally unable to run multimedia) are now capable of rendering continuous video over a 2.5G network, with satisfying quality.

TODAY'S REALITY

The 2G and 2.5G cellular mobile networks of today are less than ideal for multimedia use. Audio, and in particular, video, place significant demands on wireless networks including bandwidth, latency, error rates, etc.

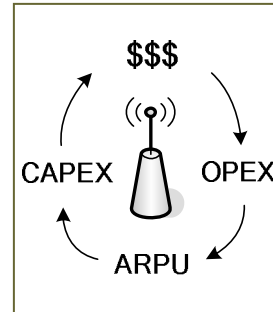
Added to this is the burden placed on mobile devices themselves – typically cell phones and PDAs. The real-time decoding, processing and displaying of multimedia content can tax the limited hardware capabilities of these platforms.

By and large, battery life and overall (selling) cost are key design parameters of mobile devices. In order to meet these requirements, one normally finds limited CPU processing, restricted memory size, slower memory access and constrained video capabilities in these devices.

While 3G networks hold the promise of alleviating a number of network centric issues, their slow and expensive rollout, along with the inefficient nature of streaming technology seriously degrades the ROI on such costly infrastructure.

High performance mobile devices that can support superior quality video and audio through streaming technology can be relatively expensive – often outside the budget of most consumers, thereby putting multimedia out of their reach.

“Movidity is bringing the future of multimedia to the mobile world, today”



Movidity helps to alleviate the challenges of the wireless financial cycle.

STREAMING – THE OLD WAY

Today, bit streaming is the current standard method of transmitting continuous audio and / or video to cell phones and PDA's over wireless networks.

In this model, a user typically subscribes to a service offering from a wireless carrier (or perhaps an enterprise media service), downloads a “player” application to their device (or uses an embedded player), and then selects a media stream to view / listen.

The media stream is normally being sent from a dedicated streaming server, using a particular set of protocols over the network. In cases of limited deployment, the implementation of streaming services is manageable. However, when considering the current explosion of media content, global mobility of users and the scalability needs of most enterprises and wireless carriers, building out streaming infrastructures can be onerous and rather expensive.

The added burdens that streaming imposes on both network infrastructure and mobile device can be considerable, including the requirement for predictive motion correction in video decoding, adaptive encoding for varying channel bit rates and

the need for the MMS (Multimedia Messaging Services) protocol (across the cellular network). Simply put, streaming technology is an old approach to a new medium.

MOVIDITY – THE NEW WAY

Movidity is distinctly different. From the unique transmission model, to the compact, high performance player, Movidity unleashes the true potential of multimedia mobility by removing the barriers of other legacy technology.

As with media streaming products, Movidity is a system of software components that encodes, transmits, and plays media. But that's where the similarities end.

Movidity does not use a bit streaming model. Nor does it use dedicated streaming servers, special protocols, or re-adapted / embedded media players.

Instead, Movidity was engineered from the ground up to provide the best media experience possible, especially when dealing with resource constrained mobile environments.

MEDIA TRANSMISSION

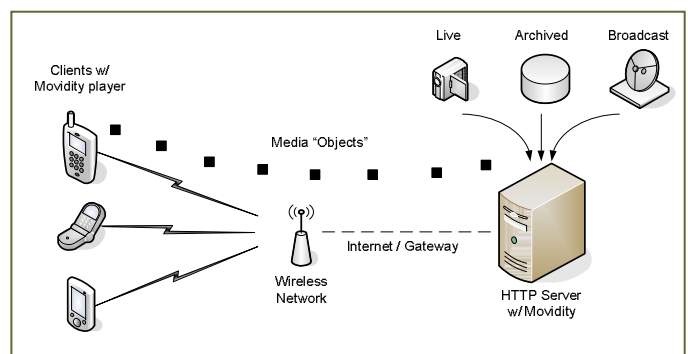
As noted, the Movidity transmission model does not involve bit streaming. Rather, it depends on the asynchronous transmission of "media objects."

What's an object? In the simplest sense, it's somewhat like a web page, or a package of data. With Movidity's patented methods, multimedia is encoded into what appears as a

series of HTTP pages of data that are fetched and decoded by the Movidity player. This is not to be confused with "HTTP streaming", which is simply another variation of streaming technology. Since video and audio are transmitted as discrete sets of objects, there's no channel model and no overhead for error correction as in bit-streaming. The simple and ubiquitous HTTP protocol (via the Internet) is all we need! Alternatively, Movidity can also use the standard TCP/IP protocol (via any port) for transmission of objects (which in this case are carried as segments of TCP data payload).

Consider the possibilities – Movidity's solution turns a basic web server (or Linux server with TCP/IP) into a powerful multimedia distribution engine. A simple, but staggering fact; practically all the web servers in existence today, along with the enormous infrastructure of web enablement technologies (caching, load balancing, SSL, etc.) can now easily serve multimedia – from the web server sitting under your home office desk, to the largest ISP infrastructures.

Movidity's breakthrough capability of bridging



Movidity media objects are passed from a standard HTTP server (with Movidity) to wireless clients using the Movidity player.

traditional Internet and mobile services using such widely distributed and cost effective resources spans the value spectrum from personal empowerment to extreme-scale multimedia broadcast distribution.

With our groundbreaking approach, only Movidity can offer such performance, ease of implementation, low CAPEX / OPEX and favorable ARPU driving factors.

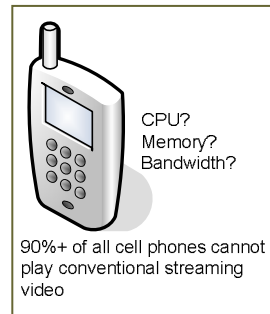
MEDIA PLAYER

Not only does Movidity use a paradigm breaking transmission model, but it offers superior multimedia performance at the same time.

Currently, high quality video and audio standards such as MPEG4 and AAC tend to be relegated to media players running on PC's (connected to broadband bandwidth), or embedded in mobile devices. Movidity delivers this capability thru a high performance Java "midlet", which remotely installs on the mobile device and uses underlying J2ME.

While other mobile media players rely on re-purposed streaming underpinnings, the Movidity player is a marvel of integrated engineering. At under 25KB in size, it manages all aspects of object transmission, interfaces with underlying hardware, decodes, renders and plays true MPEG4 video and AAC audio – on a Java enabled cell phone over a 2.5G network – *with up to double the video frame rate of streaming alternatives.*

In a recent review of the Movidity player by a leading mobile microprocessor provider, the resident test engineers stated "*it is by far the*



Movidity breaks through the barriers that severely limit traditional streaming technology.

highest performing media player we have ever tested, frame rate and otherwise"

The Movidity player is self-adjusting, performing over three dozen individual optimizations for the local device environment, some of which include recognizing/managing bandwidth conditions, adapting to device processing capabilities, identifying/optimizing video display capabilities, etc. The optimized frame rate and synchronized audio quality delivered through this intelligence provides a superior multimedia experience.

The player includes advanced capabilities such as pause, rewind and fast-forward (for archived media) along with menuing for easy media selection.

Movidity Technology

Movidity is system of high performance software components that encodes, transmits, and plays multimedia content. While Movidity is tailored for the demands of a mobile environment, it can be used across all type of client devices, including PC's. A delicate balance between each component creates a holistic system enabling the advanced functionality of Movidity.

MOVIDITY OBJECT SERVER

The Object Server is the first component within the Movidity system. The Object Server is responsible for several functions, including:

- Encoding video & audio
- Storing encoded media
- Managing transmission
- Licensing

Video and audio content (both live and stored in various original formats) are encoded into Movidity Media Objects (performed by the integrated Movidity Transcoder). The Object Server tags the objects and either delivers them immediately (in the case of live media) or stores the objects (archiving) for later use.

When a client requests a media segment, the Object Server queues the objects and manages their transmission in concert with the Movidity Media Player, continuously adjusting a variety of parameters to ensure quality levels with the given hardware and communications environment.

MOVIDITY EDGE SERVER

The Movidity Edge Server is typically used in large environments where either a number of Object Servers are required for dedicated high rate / multichannel content transcoding, or where many points are required for wide scale content distribution.

The Edge Server essentially accepts a flow of Media Objects (from the Object Server) and redirects them to clients.

MOVIDITY INDEXING SERVER

The Movidity Indexing Server is typically used in larger environments where a number of Media Servers are required for wide-scale content distribution. The Indexing Server performs the following:

- Coordinates distribution of media across Media Servers
- Central point management
- Tracks distributed license usage
- Consolidates reporting

In cases where large geographies, multiple networks or varied content require multiple Media Servers, the Indexing Server co-ordinates the distribution of Media Objects along with providing single point management across multiple Media Servers. Distributed licensing control and consolidated reporting is also accomplished by the Indexing Server.

MOVIDITY MEDIA PLAYER

The Media Player is the client-end software that runs on the mobile device. The Media Player interfaces with the underlying device hardware and performs the following:

- Optimizes functionality based on hardware and network capabilities
- Manages Media Object transmission
- Decodes, renders, plays media
- Manages two way interaction

The Media Player is a Java midlet that runs atop J2ME enabled devices with CLDC 1.0 and MIDP

2.0 API's (DoJa / J2ME is also supported for DoCoMo i-mode networks). The midlet is downloaded over the network from the Media Server. Media selection is via a simple menu generated at the Server and controlled by joystick and/or keypad controls on the mobile device.

The Media Player features a unique DVR functionality; users can pause, fast-forward, or rewind both archived and live media on-the-fly. DVR time indexing provides an easy on-screen reference to view the media timeline, allowing the user to select the point-in-time to view a particular media segment.

MOVIDITY LICENSING

The Movidity system includes all components⁽¹⁾ and is available in various CAL license packs, which provide concurrent client access for as little as two to thousands of users. Additional licenses are easily added as installations scale in size. A license subscription / revenue sharing model for service / content providers is also available.

The Object Server, Indexing Server and Edge Server can all be installed onto a single server machine (for limited deployments) ^(a), or spread across hundreds of servers for global deployments supporting hundreds-of-thousands of clients.

^aPersonal Mobile Empowerment version includes Object Server only, Installation is allowed only on one machine.

System Requirements⁽¹⁾

Movidity Object Server:

- Linux (Kernel 2.4+)
- Apache Web Server ⁽²⁾
- Pentium 3 (or equivalent), 1.5 GHz⁽³⁾
- 512 MB RAM
- 30MB (Server) + 18MB/hr archived content

Movidity Edge Server:

- Linux (Kernel 2.4+)
- Apache Web Server ⁽²⁾
- Pentium 3 (or equivalent), 1.5 GHz⁽³⁾
- 512 MB RAM
- 30MB (Server)

Movidity Indexing Server:

- Linux (Kernel 2.4+)
- Pentium 3 (or equivalent), 1.5 GHz
- 256MB RAM
- 30MB (Server)

Movidity Media Player (on mobile devices):

- Java 2 Micro Edition (J2ME)
- Mobile Information Device Profile (MIDP) 2.0
- Connected Device Limited Configuration (CLDC) 1.0
- DoJa / J2ME (for DoCoMo i-mode)
- ARM Jazelle DBX / RCT acceleration⁽⁴⁾ (optional)

¹ Minimum requirements

² TCP/IP (any port) is also supported via basic Linux server. Future releases to support MS Windows

³ Multiple live media streams (transcoded on-the-fly) will require increased processing and memory

⁴ The Movidity Media Player can optionally leverage platforms using the ARM processor line with Jazelle acceleration technology.

