Audio Conference

Don’t forget to join the telephone audio portion of today’s event

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- **+1-706-634-6387** International
- Conf. Code: **9594693**

We’ll be starting at 8:00 AM Pacific, 11:00 AM Eastern

**Technical Support:**
888-865-7469 U.S. or Canada
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*0 on the teleconference

**Reminder:**
Please give the telephone operator the same name that you’ve used to log into the computer portion of today’s event
How to Participate

- To submit a text question, please type a message in to the window in your toolbar. If this window is not open, press the "Message" button.

- Please be sure to select "Leaders" from the "Send To" pull down menu. When complete, click "Send."
Bringing Mobile Video Applications To Market

*Techniques and Tools for Success*

November 2, 2004

NMS Communications
NMS at a Glance

- Founded in 1983, publicly traded since 1994
- Technology and solutions
- Designed into products deployed in 90 countries
- Major telecom operators, equipment and solution providers rely on NMS
20+ Years of Telecom Innovation

- Innovative, future-proof solutions
  - Rapid ROI

- Open Telecommunications
  - Deploy in any network — TDM to IP
  - Blade to system versatility; superior scalability

- Blue chip partnerships
  - Applications, content, integration
Bringing Mobile Video Applications To Market

Techniques and Tools for Success

Michael Katz
Director of Marketing,
Video Products

NMS Communications
Open Access™
System Building Blocks

- Comprehensive products for voice, data, and video services
- Price performance leadership
- Open interfaces, industry standards, any network — TDM to IP
- Packaging versatility, commercialized off-the-shelf components
Mobile Video Applications

- Mobile Video – Market Opportunity Summary
- Mobile Video – Standards Driven
- Mobile Operators Challenges
- Key Mobile Video Applications
- Case Study – NTT DoCoMo
- NMS Mobile Video Offering – Video Access
- Additional Resources
# Mobile Video Services

## A Market on Fire

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Market Conditions for Growth</th>
<th>Market Strategy</th>
</tr>
</thead>
</table>
| Mobile Video Services & Applications | - Service Providers demand new applications to drive ARPU and reduce churn.  
- Increasing deployments of new handset technology, improved 3G infrastructure enables applications  
- Consumers demand “Internet” like multimedia on their handsets | - Develop Mobile Video Solutions  
- Target 3G Mobile Users  
- Major Applications in, conversation G/W’s, video messaging and Streaming, Video conferencing |
Mobile Video Services Equipment
Market Opportunity, Size and Evolution

<table>
<thead>
<tr>
<th>TAM for</th>
<th>Mobile Video Applications &amp; Equipment Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>3G Subscribers (M)</td>
<td>8,000,000</td>
</tr>
<tr>
<td>3G-324M Gateways</td>
<td>$2,214,000</td>
</tr>
<tr>
<td>Video Messaging</td>
<td>$39,298,500</td>
</tr>
<tr>
<td>Video Streaming</td>
<td>$8,856,000</td>
</tr>
<tr>
<td>Video Conferencing</td>
<td>$3,136,500</td>
</tr>
<tr>
<td>Total TAM</td>
<td>$53,505,000</td>
</tr>
</tbody>
</table>

*Sources – IDC and NMS
Mobile Video Rollout

3G market adoption forecast

Japan leads 3G

Early rollouts in Europe

18 to 24 months

In the field

Generalization to other regions

2001 2002 2003 2004 2005 2006 2007 2008

Asia: Focus on 3G core services based on video conferencing functionality

Europe: Better than 2.5G Streaming and Messaging

USA: 2 years behind

(Source: Morgan Stanley WW wireless 4/03)
Standards Bodies

- **3GPP: Third Generation Partnership Project**
  - Technical specifications for third generation mobile systems based on GSM core networks. ARIB (Japan) CWTS (China) ETSI (Europe) T1 (USA) TTA (Korea) TTC (Japan) are members. [www.3gpp.org](http://www.3gpp.org)
  - Various specs including AMR, 26-xxx,

- **ITU-T: International Telecommunications Union-Telcommunications Standard Sector**
  - H.324M. 3GPP adopted and extended H.324M for use in 3G for conversational services and renamed it **3G-324M**.
  - H.263: video coding standard used in current video telephony systems adopted by 3GPP with restrictions (**H.263 baseline and H.263 profile 3**)
  - G.723.1: recommended speech codec

- **ISO/IEC MPEG: Moving Picture Expert Group**
  - MPEG-4 one of the video standards used by 3GPP with restrictions (**MPEG-4 simple profile level 0**)

- **IETF: Internet Engineering Task Force** [www.ietf.org](http://www.ietf.org)
  - IP Protocols

- **IMTC: International Multimedia Telecom. Consortium**
  - 3G-324M WG. Interoperability testing
3G-324M Components

- **Transport Layer**
  - Provided by multiplexer/demultiplexer
  - Merges audio, video, user data, system control into a single stream for transmission over the constant bit rate channel (CBR)

- **Call Control Layer**
  - Negotiating operational parameters for call/session, based on capabilities of end system involved (i.e., BW management)

- **Media codecs**
  - Compression algorithms

---

Out-band

In-band

TDM

Wireless Network I/F

H.223

Bearer Control
H.245

Audio
3GPP-AMR

Video
H.263/MPEG-4

Call Control
SS7, ISDN
3G-324M Standard

- 3GPP extended H.324 Annex C
  - 3G-324M established in Dec. ’99
  - Specified audio/video codecs
    - Mandatory: AMR and H.263 baseline
    - Recommended: MPEG-4 Simple Profile @ Level 0, H.263 Profile 3, G.723.1
  - Specified multiplexing scheme
    - Mandatory H.223 Level 2 (Annex B)
  - Added several clarifications
    - Described in TS 26.911

CIRCUIT SWITCHED VIDEO
## Mobile Video Services

<table>
<thead>
<tr>
<th>Video services</th>
<th>Characteristics</th>
<th>Technology</th>
<th>Application Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversational services (Point-to-Point, Multipoint)</td>
<td>Low latency, Real time, QoS, Full-duplex</td>
<td>3G</td>
<td>Location-based services, Business applications, Medical applications, Remote shopping</td>
</tr>
<tr>
<td>Video Messaging</td>
<td>High latency, Bi-directional, Half-duplex</td>
<td>2.5G/3G</td>
<td>Video email, Video greetings, Video IM</td>
</tr>
<tr>
<td>Video Streaming</td>
<td>High latency, Unidirectional, Half-duplex</td>
<td>2.5G/3G</td>
<td>Location-based services, Non-interactive games, Video/clips on Demand</td>
</tr>
</tbody>
</table>
Mobile Operators Challenge

Provide ever increasing revenues and profits for their respective shareholders.

To do this they need to

- Manage Average Revenue Per User (ARPU)
- Increase Minutes of Use (MOU)
- Create new “sticky” applications
- Deploy new technology to support the above (3G)
- Recoup the investment and expand market share against the competition
Mobile Video Services & Applications

- Conversational G/W
  - Target: IP Telephony G/W
  - NEP’s and App. Dev.
  - NMS Video Access
  - NMS Video Servers

SIP to Mobile Video G/W’s Streaming

- 3G Streaming Apps
  - Target: App. Dev.
  - NMS Video Access
  - NMS Video Servers

Video Messaging

- Video Messaging App.
  - Target: Existing Msg. App. Developers
  - NMS Video Access
  - NMS Video Servers

Video Conferencing

- Video Conf. App
  - Target: Conference App. Dev. Or Bureau
  - NMS Video Access
  - NMS Video Servers
NTT DoCoMo Case Study

FOMA Subscriber Growth

- FOMA’s subscriber base grew to over 5 million in July 2004, due to brisk sales of “9001” series handsets, etc.
- Acquired largest number of net additional 3G subscribers among all carriers in FY2004 first quarter.
- No. of FOMA subscribers is projected to reach 10.6 million by Mar. 31, 2005.

Graph showing subscriber growth from 2003/4 to 2005/3E.
Typical 3G FOMA Handset

DoCoMo FOMA
Height x width x thickness (folded):
102 x 50 x 27 mm
- Weight: Approx. 138 g. (4.6 oz.)

P900iV

It appears that those in the know, which is just about everyone in Japan in a major city under the age of 50, doesn't give a fig about a second-generation 2G phones, they want 3G FOMA with its bandwidth and sophistication and they want it fast! (July issue – 3G Wireless Watch – Japan)

- Side (CCD): Approx. 2 M pixels
- Front (CMOS): Approx. 100 K pixels
DoCoMo’s M-Stage V-Live

One-to-many video streaming service supports a variety of live and archived content over 64 Kbps circuit-switched data.

- DoCoMo’s V-Live Subscriber count (9/04) was 60,000 (1% of total subs).
- DoCoMo projecting 1M subs by March 2006.
- Open "Free Channel" content available to all V-Live subscribers includes music, sports, news, animation and more. Only a data transmission fee is charged.
DoCoMo Visual Net Conferencing

- Chat style / Detailed set up
detailed set up can specify where speaker’s seat/corner

- Can select loudest talker detection
single image only

- Go!Go! TeleDen’s:
$2.50 video phone usage discounts for 2 consecutive months.

- Packet data fee for Conference.
Call schedule set up and call member pre-registration free as of 10/1/04.
Mobile Video Example
DoCoMo i-Motion

Video clips (via IP) - motion picture with sound - sports highlights, promotional videos and news - maximum length ~40 seconds

Still frames with sound - famous movie scenes, news and graphics with sound files that have a maximum length of about 30 seconds

Information charges are between $1.50 to $3.00/ mo.

Plenty of i-Motion content sites are available
Key Mobile Video Applications

- 3G-324M-RTSP gateway
- Desktop video terminals
- Video streaming media server
- SIP video phones
- H.323 video phones
- Web content renderer
- Broadcast video feed

Media adaptation (MMS, web, ..)
Streaming:
- 3G-324M-H.323 gateway
- 3G-324M-SIP gateway

Conferencing:
- IETF/SIP
- 3GPP/SIP
- H.323 Video conferencing system

Messaging:
- Video mail system

= NMS inside
Keys to Mobile Video Success

- Existing application developers and NEPs choose to offer mobile video applications
- Use NMS Video SDK, Conversational Video G/Ws and Servers from NMS – the widest set of mobile video solutions in the mobile market
- Go-To-Market with Mobile Video Solutions tailored to Mobile Users needs

NMS Video Products =
Time to market =
Pathway to profits in the 3G market
Introducing - Video Access

- Open Access product ideal for cost-effective mobile video media solutions
  - First off-the-shelf mobile video enabling technology product in the industry
  - Natural extension of proven NMS media processing foundation
NMS Video Access SDK

- NA 2005-1 compatible API and Runtime supporting:
  - Video Gateway elements
    - 3G-324M, TDM to IP
    - H.223 Mux/Demux
  - Video Transcoding
    - Performs media transcoding on RTP streams
    - Supports MPEG4 simple profile and H.263 baseline
  - Video Messaging
    - APIs for messaging applications
    - Support of rich file formats
Video Access Architecture
Video Access - Configurations

- Video Access works in conjunction with NMS’ Natural Access™ development environment
  - Natural Access release 2005-1
  - Supports Windows 2000, Windows Server 2003, SPARC Solaris 9, Intel Solaris 8, and Red Hat Linux E3.0
- Field proven technology
  - Deployed in customer sites around the world for the last 4 years
- Runs on CG boards
  - CG 6000(C)
  - CG 6500C
  - CG 6565(C) (future)
NMS Video Products

- Video Access SDK Toolkit
  - Integrated within Natural Access 2005-1
  - Standardized Software and hardware components

- Video Servers
  - Provide turnkey solution to target market application
  - Platform for an application partner to offer the solution
  - Solutions sold by Application Developers to Service Providers

- Examples
  - H.324M to SIP Gateway with Portal support
  - Transcoder Server
  - Video Mail Server
NMS Video Server Family

Wireless Video GW
- 3G-324m to IP Conversion with SIP/SS7/ISDN call control

Media Adaption Server
- MPEG4 / H.263 Transcoding Unit, IP-based

Voice & Video Server
- IP Video Server with SIP Session Control

Gateway with Voice & Video Server
- Integrated 3G-324m GW and IP Media Server

www.nmscommunications.com
## NMS Reference Deployments

<table>
<thead>
<tr>
<th>Subsystem Type</th>
<th>Building Blocks</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>3G-324M Gateway to H.323</td>
<td>AMR NB vocoder, H.223 multiplex, H.263, MPEG4, H.245 control, H.323</td>
<td>Videophone</td>
</tr>
<tr>
<td>SIP/H.323 Video Conferencing Server</td>
<td>RTP forking, MPEG4 on RTP</td>
<td>IP and Mobile video conferencing</td>
</tr>
<tr>
<td>Messaging System for 3G-324M with media adaptation for MMS</td>
<td>H.223 multiplex, H.245 control, MPG4 play/ record from file or RTP, MMS media adaptation MP4 and 3GP support</td>
<td>Video mail, video messaging</td>
</tr>
<tr>
<td>3G-324M gateway to IP RTSP streaming</td>
<td>AMR vocoder, H.223 multiplex, H.245 control, MPG4/H.263 transcoding, RTSP</td>
<td>Stored and live video streaming</td>
</tr>
</tbody>
</table>
Summary

- NMS leverages the solid expertise in speech/audio processing developed in many years of presence in the market.
- Video components are an extension and built on proven existing NMS media processing technology.
- Carrier-grade components and servers.
- NMS has full range of video technologies:
  - Enabling technologies for OEMs.
  - To component subsystems as needed.
  - Video G/W’s and Servers.
Addition Web Resources

3G Networks & Standard Setting Organizations
- www.3gtoday.com
- www.3gpp.org
- www.itu.int/osg/imt-project
- www.itu.int/osg/imt-project/docs/What_is_IMT2000-2.pdf

UMTS and CDMA Networks
- www.umts-forum.org
Thank You!
For more information......

- Contact Michael Katz,
  Director of Marketing – Video Products
  - + 1 508 271 1103
  - Mike_Katz@nmss.com

- Upcoming NMS Web Seminars
  - December 7 – “Mobile Entertainment: Opportunities and Challenges” with the Yankee Group