Multimedia Digital Home: Advances and Latest Applications

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Transforming Technology Innovation Into Business Success
Outline

• Market Outlook and Opportunities
• Enabling Technologies
• Interesting Applications
• ASTRI Technology Overview
Market Trends in New Millennium – Consumer drives the demand

- Broadband Access & Home Network
- 130 millions of broadband home subscribers, and in rapid growth
- Home networking doubles by 2008 with Ethernet and WiFi dominant

- Intelligent Digital Consumer Electronics
- Wired or Wireless Multimedia Enabled Multi-purpose
- Music, video and images can be transmitted, accessed and shared over networks

- 3C Convergence Triple Play
- Emerging business opportunities for technology and product innovations

- Miniature & Mobility
- Consumers demand features and convenience anytime, anywhere
Multimedia Digital Home
Hot Spot for IDCE

Broadband Services:
Cable, xDSL, Satellite

Home Media Networking
MPC, STB or HMC

Home Office
active interaction
productivity

HomePlug
Zigbee
USB

Home Automation
& Control

Entertainment
home theatre
games
passive entertainment

Information
Appliances
mobile
data, voice, audio
exchange

Optical
Port

A/V
Cables

1394

Serial
Port

Bluetooth
IrDA

ASTRI
Hong Kong Applied Science and Technology
Research Institute Company Limited

Temperature
Voice over WLAN: A Billion Dollar Market by 2006 from iLocus

10.3% of all broadband subscribers will utilize Broadband IP Telephony by the end of 2008 (In-Stat/MDR)

Mobile Multimedia Services will grow significantly

2000 Total EUR 340 billion
2006 Total EUR 820 billion


Triple play intensifies among Telco’s, cable and ISP

IP/DSL Set Top Box Worldwide Revenue

Source: In-Stat/MDR, 7/04
Huge Market Opportunities for Intelligent Digital Consumer Electronics

Worldwide market for multimedia consumer devices will reach **$188 billions** by 2006. Portable or mobile multimedia consumer devices is the **fastest** growing sector.

### Annual Shipments of Network-Capable CE:

- **Fixed and Mobile**

**Source:** Multimedia Networks in the Home: Analysis and Forecasts © 2003 Parks Associates
Key Technology Initiatives
Intelligent Digital Consumer Electronics & Services

- Multimedia Communication
- Pervasive Services
- Portable Media
- Mobile Hotspot
- 3G
- WiMAX
- Wi-Fi
- Digital Broadcasting
- Personal Digital Media Player
- Content Sharing
- Home Media
- Home

Community Buildings / Airports

Multimedia Communication
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SIP: Universal IP Communications

- An Internet-Centric Application Layer Signaling Protocol
- Used to manage multimedia sessions. Applicable to voice, video, games, etc.
- Adopted by Microsoft, telecoms and enterprises
- Work started in 1996. Henning Schulzrinne: “a once-in-century opportunity to redesign the telephone network”.

<table>
<thead>
<tr>
<th></th>
<th>H.323</th>
<th>SIP</th>
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<tbody>
<tr>
<td>Scalability</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Architecture</td>
<td>Tightly Defined, Centralized</td>
<td>Flexible, Distributed</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>User Mobility</td>
<td>No</td>
<td>Inherent (Adopted by 3GPP)</td>
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<tr>
<td>Extensibility</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Applicability</td>
<td>Voice and Video</td>
<td>Voice, Video and Data</td>
</tr>
<tr>
<td>Easy of Deployment</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Market Maturity</strong></td>
<td><strong>Entrenched Players</strong></td>
<td><strong>New Playing Field</strong></td>
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H.264/MEPG4 AVC: More Efficient Compression

- Jointly defined and supported by both media and communications industry
- Enabling delivery of entertainment quality video over wired or wireless networks

### Performance comparison for 90-minute DVD-quality movie

<table>
<thead>
<tr>
<th></th>
<th>MPEG-2</th>
<th>MPEG-4 (ASP)</th>
<th>MPEG-4 (H.264)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandwidth Required (Mbps)</td>
<td>4.0</td>
<td>1.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Storage Utilization (MB)</td>
<td>2700</td>
<td>1282</td>
<td>2700</td>
</tr>
<tr>
<td>Download Time (Minutes)</td>
<td>386</td>
<td>235</td>
<td>139</td>
</tr>
</tbody>
</table>

**DVD Disc**

**CD-RW**

(1) Download time at 700 Kbps
Digital Life Network Alliance (DLNA)

- Introduced in June 2003 as the Digital Home Working Group (DHWG)
- Delivering an **interoperability framework** of design guidelines based on open industry standards to complete the cross-industry digital convergence.
- Cross-industry organization of leading consumer electronics, computing industry and mobile device companies:
  - Fujitsu, Gateway, HP, Intel, IBM, Kenwood, Lenovo, Matsushita Electric (Panasonic), Microsoft, NEC CustomTechnica, Nokia, Philips, Samsung, Sharp, Sony, STMicroelectronics and Thomson.
- Other Research Institute as members:
  - [Korea Electronics Technology Institute](http://www.keti.re.kr/)
  - [Industrial Technology Research Institute](http://www.itri.org.tw/)
  - [Institute For Information Industry](http://www.iii.org.tw/)
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Multimedia Communications
Home Video PBX

- Video Phone STB connected to TV
- Multiple STB at home, controlled by a slim IP PBX
- Make calls to and receive calls from video phones.
- Potential application add-on: video streaming, video surveillance, baby-monitor, etc
- Primary PBX features supported: conferencing, call-transfer, Intercom, call-pickup, follow-me, alternate video/audio source, etc.
Multimedia Communications
Peer-to-Peer Home Network

- Private network for friends and family
- Long distance toll by-pass with optional PSTN interface
- Roaming at peer site to access home network
- P2P for private multimedia content sharing
- Resource sharing
IP TV over DSL

H.264 Encoder
MPEG2 Encoder / Trans-rater
Content Sources

IP Encapsulator

Support 300+ TV Channels

ISP Platform

EPG Data

Broadband

Multicast DSLAM

Mediation Device + CAU

Copper Loops

ADSL Modem

PC

Consumer Home

H.264 IP STB

EPG Server

Internet

Video Distribution

Encryptor

IPC TV over DSL

Copper Loops

Modem

MPEG2 Encoder / Trans-rater

Broadband Video Distribution

Internet

PC

Content Sources
Home Media Networking: Home Content

- Living Room
  - Internet Connection
  - HMC
  - DVD Player

- 2nd Floor
  - AP

- Walls

- Walls

- Bed Room
  - Wi-Fi
  - Software Player
HOME Media Networking: Portable Content

- Server
- Network
- Portable content
- ADSL Modem
- PC
- WiFi AP
- 264 decode
- H.264 Player
- HMC content controller
- HMC
- DVD
- CCTV
- TV
- Home
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ASTRI Achievement: Secure Voice over IP

- SIP Stack and Platform
  - ASTRI own IP
  - Commercial grade
  - Light weight and high performance
  - SIP interoperability conformance
- SIP Director
  - SIP conformance testing tool
- Session Security Control
  - A framework for secure and reliable IP telephony service
  - ASTRI patentable algorithms
  - Cost effective implementation
  - Block hacker intrusions
ASTRI Achievement: H.264/MPEG4 AVC
Real-time D1 Resolution Imbedded Codec on Single Chip

Function time allocation in JM50c H.264 encoder

- Intra Prediction 34%
- Inter Prediction 2%
- Interpolation 58%
- DCT 2%
- SAD 1%
- Other 3%

Function time allocation in optimized H.264 encoder

- Intra Prediction 16%
- Inter Prediction 9%
- Interpolation 20%
- DCT 12%
- SAD 8%
- Other 35%
ASTRI Achievement: Product Platforms

Living Room | Walls | Walls | Bed Room
---|---|---|---
2nd Floor

Internet Connection
AP
DVD Player
Bed Room

Software Player
Wi-Fi

LAN / WAN
Router & Firewall
PSTN Gateway
EMX
Legacy PBX
PDA
Digital Phones
Analog Phones

Prof. Encoder
Content Sources
IPEncapsulator
Encryptor

Broadband
Media Server
Media Server
Application
SIP Phones
Remote access Client

Large and Medium Enterprise
ASTRI will form a R&D Center for Consumer Electronics this year and Aims to

Create IP for Key Enabling Technologies

Bring Intelligent Digital Consumer Electronics and Digital Home Applications to a New Frontier

Transform HK/PRD Industry from Low Cost Manufactures to Product Innovators
Thank You
Home Networking

- **Cellular**
  - 2G -> 2.5G
  - 3rd Generation Mobile Sys

- **WMAN WiMAX**
  - 802.16 / 802.20

- **WPAN Bluetooth**
  - Zigbee 802.15.4
  - UWB 802.15.3a

- **WLAN Wi-Fi**
  - IEEE 802.11x

- **Data Rates (Mbps)**
  - 0.01, 0.1, 1, 10, 100, 1,000
Key Enabling Technologies

- Applications
  - DRM, P2P, …

- Interoperability
  - UPnP, MHP, …

- Multimedia Kernel
  - H.264, WM9, AAC, JPEG2000, …

- Imbedded System
  - Linux, WinCE, …

- Application Layer Protocols
  - SIP, RTP, RTSP, …

- Home Networking
  - 802.11x, UWB, …
Imbedded System Technology

- One of the most potential software strengths to grow in China
- Fully leverage China as the world-wide manufacturing center.