IP Set Top Boxes
Past, Present and Future

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STB Evolution

- **1995**
  - < 1 MIPS
  - ~ 2 Mbytes
  - 0 GB Hard Disk
  - SD
  - 1 Channel
  - MPEG-2 Video
  - MP, AC-3, MPEG-2 Audio

- **2005**
  - > 300 MIPS
  - 32 - 64 MB
  - 160 GB
  - SD, HD, SIF, PIP
  - ~ 2 Channels
  - MPEG-2 Video, AVC/H.264, AC-3, MPEG-2 Audio, MP-3, AAC, AC-3+, AAC+
  - Encoding (PVR)

- **2010+**
  - > 1 GIPS
  - > 512 MB
  - > 1 Tera Bytes
  - Super HD (1920x1080x60p, D-Cinema)
  - Multiple Channels
  - Next Gen
  - Transcoding
Set Top Box

Not your father’s Set Top Box
Analog to Digital Transition - Phases

Time

Phase 1: New technology, old applications

Phase 2: Make money, drive down the cost
- Convert Most Analog to Digital (2000-2005)

Phase 3: Thinking out of the box
- Need for new technology
- Add new applications / services (2003 - )

New Technology
- High Level of Integration
- High MIPS/$
- High MB/$

New Capability
- 4X compression efficiency in last 15 years
- Higher BW Networks
- Video Storage

New Apps

New Demand

Joint ITU-T Workshop and IMTC Forum 2006 “H.323, SIP: is H.325 next?”
San Diego, 9-11 May 2006
DSL Reach Limitations

xDRL Downstream Performance

- ADSL2+ (20 dBm)
- ADSL+ (14 dBm)
- VDSL (14 dBm)

Rate (Mb/s)

Distance (26 AWG)

High Definition
Standard Definition
Standard Definition
Standard Definition
High Speed Data
IP STB Evolution

2000
- x86
- SD, SIF
- 1 Channel
- MPEG-4 ASP Video, MP-3

2003
- DSP
  - 300 MHz
- 16-32 MB
- 0 GB
- SD, SIF
- 1 channel
- MPEG-4 ASP, AVC, MP-3

2006
- CPU+Decoders
  - 400+ MIPS
- 32 - 128 MB
- 80 - 160 GB
- HD, SD, SIF
- ~ 2 Channels
- AVC, MP-3, AAC, AAC+, AC-3, AC-3+

2009+
- CPU+Decoders
  - > 1 GIPS
- > 512 MB
- > 1 Tera Bytes
- Super HD
  - (1920x1080x60p, D-Cinema)
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The VIP12xx Advanced IP Set-Top has a built-in Hard-Disk Drive (HDD) for DVR functionality. It supports applications like Multicast, VOD and DVR (watch and record).

The VIP12xx supports High Def. or Standard Def. (HD/SD) high-quality digital video. It also can support whole home DVR.

<table>
<thead>
<tr>
<th>Front Panel Interfaces</th>
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<tbody>
<tr>
<td>Power</td>
<td>✓</td>
</tr>
<tr>
<td>Status LEDs</td>
<td>✓ (3)</td>
</tr>
<tr>
<td>Control Buttons</td>
<td>✓ (7)</td>
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<tr>
<td>Remote Control</td>
<td>IR</td>
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<table>
<thead>
<tr>
<th>Memory / Performance</th>
<th>CPU</th>
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<tbody>
<tr>
<td>DRAM</td>
<td>128 MB</td>
</tr>
<tr>
<td>Flash</td>
<td>Option</td>
</tr>
<tr>
<td>CPU (MIPS)</td>
<td>400+</td>
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<table>
<thead>
<tr>
<th>Rear Panel Interfaces*</th>
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<tbody>
<tr>
<td>Ethernet</td>
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<tr>
<td>USB 2.0</td>
</tr>
<tr>
<td>Composite Video</td>
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<tr>
<td>L/R Audio</td>
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<tr>
<td>S-Video</td>
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<td>Optical SPDIF</td>
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<td>RF (ch.3/4)</td>
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<td>YPbPr</td>
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<tr>
<td>HDMI</td>
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<td>HPNA v.3</td>
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<tr>
<td>Power Supply</td>
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<tr>
<td>Integrated HDD</td>
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</tbody>
</table>

* Interfaces shown are for North-American models
What is IPTV / IP STB

- TV / STB with IP Address

IP       TV/STB

Connectivity       Entertainment Grade Content
IP STB
New Applications

• Place Shifting
  - Transcoding
  - Protocols
• Video Phone / VoIP
  - Encoding
  - Echo Cancellation
  - Voice Recognition

Transcoding

New Phy Layer
- Protocols
- Transcoding
IP STB Evolution - Applications

- 2000
  - On demand
    - Unicast

- 2005
  - On Demand
  - Watch TV
    - Multicast
  - Record TV

- 2010+
  - On Demand
  - Watch TV
  - Record TV
  - 2 Go TV
    - To (and from) other devices in Home
    - To other places
  - Mobile TV
  - Interactive TV
  - and Additional Non-TV stuff
    - Video/AudioTel.
    - Home Monitoring
    - ...

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Set Top Box

Not your father’s Set Top Box

Not even your Set Top Box you had when you left home