Integrated broadcast-broadband (IBB) systems

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ITU International Symposium on the Digital Switchover
“A milestone for Digital Terrestrial Television”
ITU Headquarters, Geneva, 17 June 2015
What is an IBB system?

- “IBB” stands for “Integrated Broadcast-Broadband”
- Hybrid system combining broadcast and broadband technologies
  - Efficient delivery of high quality content over broadcast channels
  - Personalized and interactive services over broadband channels
- TV-sets are much more than a receiver for broadcast TV.
- Advances of broadband networks have made modern, rich and personal services possible.
Advances of broadband networks

- High speed
  - HDTV and beyond services over the Internet are available.

- Increased servers’ processing power
  - Heavy processing, e.g., personal recommendation
  - Cloud computing
  - Combination with web-based services, e.g., SNS

- Inter-devices communication
  - Direct communication between devices (main and second devices)
  - Via relaying servers
Inter-devices communication

Communication via relay server
- Application level solution
- Communication from anywhere
- Powerful servers may be needed

Direct inter-devices communication
- System level solution
- Device discovery needed
- Can be fast

Relay Server

IBB receiver

Broadband network

Second screen device
Typical IBB system structure

- **Broadcaster**
  - Broadcast
  - Program related metadata, etc.
  - Servers
- **Service Provider**
  - Web services for Apps.
  - Servers
- **Receiver**
  - Application
  - Receiver functions
  - API
  - API call
  - Device collaboration
  - Companion Devices
  - App.
  - App.
- **Network**
  - Communication by Apps.
IBB application types

- Defined based on application life cycle (when to start/stop), providers, and delivery means

- Service associated applications
  - Broadcast centric applications, part of IBB DTV service
  - Tuned by a user at an arbitrary time
    - Application control signals are required, e.g., in Service Information
    - Synchronization between main service and apps. is needed.

- Stand-alone applications
  - Resident or downloaded applications, not part of IBB DTV service
  - Widgets, third-party applications, etc.
Application examples (1) - Basic -

Application Launcher

Electronic Programme Guide (EPG)
Application examples (2) Second screen
Application examples (3) Barrier-free TV

News via broadcast – signer via Internet

Text Services adjustable in size and colour contrast
Application examples (4) Synchronized

Stream-stream sync

Stream-graphics sync
Application examples (5) UHDTV

- VOD
- Game
- Score board
- Map
- Subtitles
- SNS
Requirements

- Recommendation
  ITU-R BT.2037-0 (07/2013)
  - General requirements of IBB systems

- Recommendations
  ITU-R BT.2053-0 (02/2014) /ITU-T J.205
  - Technical requirements for IBB systems
  - Various aspects of IBB systems including App. types and App. control are analyzed and defined
ITU text for IBB systems (2)

- Recommendation
  ITU-T J.206
    - Reference architecture of IBB systems

- Recommendations
  ITU-R BT.[IBB-SYSTEM]
  /ITU-T J.acf-spec
    - IBB systems specifications
      - HbbTV 1.5 and 2.0
      - Hybridcast 2.0
      - HTML5 based smart TV platform
    - Information for system selection

- Information of several IBB systems including HbbTV, Hybridcast, HTML5 based smart TV platform, and Ginga
## Comparison of system features (1)

<table>
<thead>
<tr>
<th></th>
<th>HbbTV</th>
<th>Hybridcast</th>
<th>HTML5 based smart TV platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification</td>
<td>ETSI TS 102 796 V1.2.1 (V1.5) V1.3.1 (V2.0)</td>
<td>IPTVFJ STD-0010 IPTVFJ STD-0011 ARIB STD-B62</td>
<td>TTAK.KO-07.0111/R1</td>
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<tr>
<td>App. environment</td>
<td>CE-HTML (V1.5)</td>
<td></td>
<td>HTML5</td>
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<tr>
<td>App. delivery</td>
<td>Broadcast</td>
<td>Broadband</td>
<td>-</td>
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<tr>
<td>App. control signal</td>
<td>Broadcast</td>
<td>Broadcast</td>
<td>Broadband</td>
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<td></td>
<td>-</td>
<td>Broadband</td>
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<tr>
<td>Trigger signal</td>
<td>Broadcast</td>
<td>Web socket and W3C server sent event</td>
<td>-</td>
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<tr>
<td>Service associated apps.</td>
<td>Supported</td>
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## Comparison of system features (2)

<table>
<thead>
<tr>
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<th>HbbTV</th>
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<th>HTML5 based smart TV platform</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Broadcast protocol</strong></td>
<td>MPEG2-TS</td>
<td>MMT</td>
<td>-</td>
</tr>
<tr>
<td><strong>Broadband protocol</strong></td>
<td>HTTP, HTTPS, MPEG-DASH</td>
<td>RTP</td>
<td>RTSP</td>
</tr>
<tr>
<td><strong>Video format</strong></td>
<td>SVC (for broadband)</td>
<td>MPEG-2 Video, HEVC</td>
<td>MPEG-2 Video</td>
</tr>
<tr>
<td><strong>Audio format</strong></td>
<td>MPEG-4 HE AAC, E-AC3</td>
<td>MPEG-2/4 AAC, AIFF-C</td>
<td>MP3, AC-3, MPEG-4 AAC, MPEG-4 HE AAC</td>
</tr>
<tr>
<td><strong>Protocol for second screen</strong></td>
<td>Web socket</td>
<td>Proprietary with standardized APIs</td>
<td>Web socket</td>
</tr>
</tbody>
</table>
Conclusion

- IBB system: a broadcast-centric solution for Connected TV
  - Seamlessly combines TV broadcast services with services delivered via broadband
  - Provides the features and functionality required to provide feature rich broadcast and internet services
  - Offers improved accessibility to TV for people with disabilities

- Spread of IBB capable receivers
  - New IBB services will be developed by utilizing various IBB functions.

- ITU-R Recommendations and Report
  - Developed by Study Group 6 in collaboration with ITU-T SG 9