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JavaTM in the Brazilian Digital TV: Interactivity and Digital Inclusion on TV



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Highlights of the session

- > Demonstrate the techniques implemented in the Brazilian System of Digital Terrestrial TV, using Java™
- > Facilitate digital and social inclusion through Digital TV
- > Inform the business that could be originated from the broad adoption of the Digital TV standard by the industry, as well as its use by the population

Agenda

- > Introduction and History
- > Brazilian DTV Statistics and Background
- > Brazilian DTV Architecture
- > Digital TV Middleware
- > Ginga Middleware and Architecture
- > Ginga-NCL
- > Ginga-J
- > JavaME Support
- > Java Media Framework
- > JSR-927 Java TV API 1.1
- > Java DTV
- > SBTVD && Java DTV
- > Java DTV Packages
- > Java TV + Java Card
- > Business Opportunities in Digital TV
- > Demonstrations
- > References
- > Questions?



Introduction and History



> Brazilian Digital TV

- November, 2003: Federal Act establishes the creation of a digital TV system in Brazil with the objectives, composition and members attributions of each committee
- SBTVD (*Sistema Brasileiro de TV Digital Terrestre*)
 - Brazilian System of Digital Terrestrial TV
- June, 2006: Federal Act defines the implantation of Digital TV in Brazil based on standard ISDB-T and the respective changes determined by the study groups

Introduction and History

- > Brazilian Digital TV
 - Brazilian Forum for Digital TV
 - Define specifications and propose appropriate solutions to the Brazilian reality
 - Train human resources and disseminate the SBTVD in Brazil, South America and other countries
 - January, 2017: Eclipse of Analogical TV in Brazil



Brazilian DTV Statistics

> Social and Economic Aspects

• Market Profile

- 190 Millions of habitants
- 18% of the population has Internet access
- 72% of Brazilian homes have mobile phones
 - 178 Millions of mobile phones
- 97% of Brazilian homes have TV
 - 90% receive only via terrestrial broadcasting
 - 50% work only with internal antenna
- TV: means of communication with greater penetration
- Source of data : *CETIC.br*
 - Brazilian Research Center on IT and Communication



Brazilian DTV Statistics

- > Digital Inclusion through Digital TV
 - Interactivity resources provided by the platform
 - T-Learning for basic and high school
 - T-Gov participation
 - Academic T-Learning



Brazilian DTV Background

> Digital TV Standards

- USA Standard
 - ATSC – Advanced Television Systems Committee
 - Weaker in mobility
- Europe Standard
 - DVB – Digital Video Broadcasting
 - Allows mobile transmission through the mobile operator
- Japan Standard
 - ISDB-T – Integrated Services Digital Broadcasting-Terrestrial.
 - Enables mobile transmission directly by the mobile stations.



Brazilian DTV Background

> Brazilian Digital TV Standard

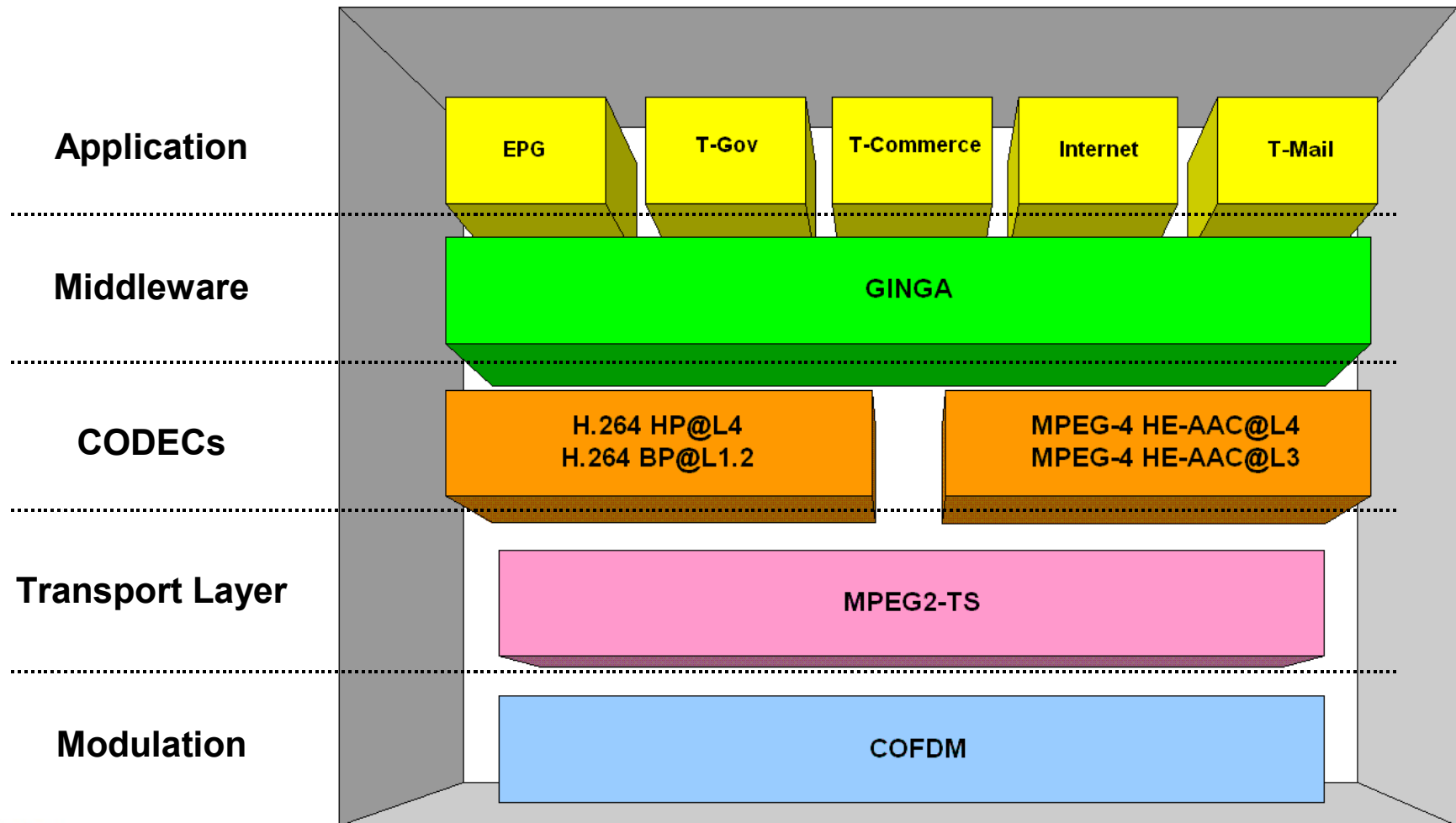
- High definition (Full HD), mobility and portability
- Multi-programming and interactivity
- ISDB-T (Japan) with modifications in the middleware, in the compression layer of audio and video, and in the transport layer
- Transport layer: MPEG-2
- Compression of audio and video: MPEG-4 (H.264)
- Middleware: Ginga-NCL and Ginga-J



Brazilian DTV Architecture

- > Project: Brazilian System of Digital Terrestrial TV (SBTVD – Sistema Brasileiro de TV Digital Terrestre)
- > Technical Specification: ISDTV-T (International Standard for Digital Television Terrestrial)
- > Based in the Japanese standard ISDB-T

Brazilian DTV Architecture



Digital TV Middleware

- > It is an intermediary layer of software that allows the development of interactive applications for Digital TV hardware platform independent of the terminal to access (set-top boxes)

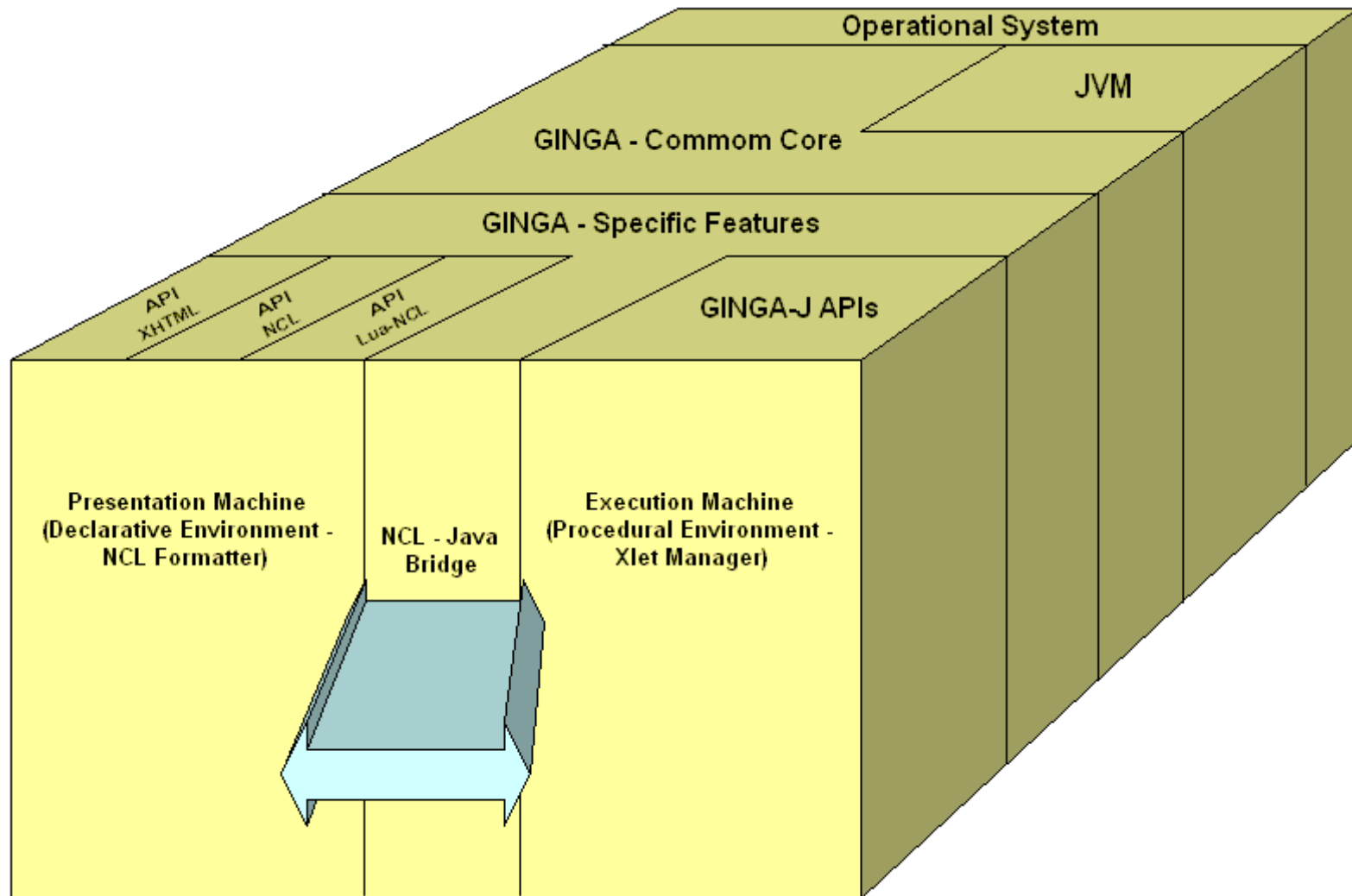


Ginga Middleware



- > SBTVD's Middleware
- > Two subsystems that enable the application development for interactive digital TV as the project requirements
- > Ginga-NCL
 - Support for declarative programming, fast and effective for the presentation layer
- > Ginga-J
 - Support for procedural programming (algorithms) and implementation of more complex applications

Ginga Architecture



Ginga-NCL

- > Provides the presentation infrastructure for declarative applications
- > Presentation machine to interpret applications written in Nested Context Language (NCL) and Lua
- > NCL: documents based on XML
- > Lua: provides the NCL's procedural requirements



Ginga-NCL

> NCL Code Example

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<ncl id="exemplo01" xmlns="http://www.ncl.org.br/NCL3.0/EDTVProfile">
  <head>
    <regionBase>
      ...
    </regionBase>
    <descriptorBase>
      ...
    </descriptorBase>
  </head>
  <body>
    ...
  </body>
</ncl>
```

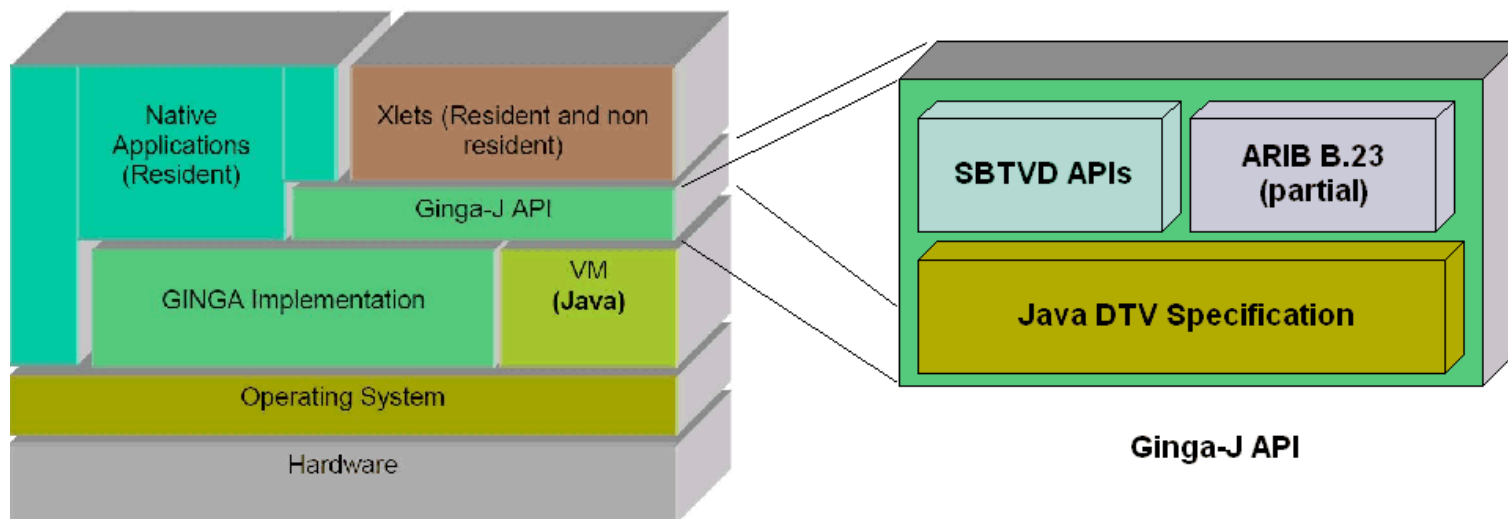
Ginga-J

- > Provides the execution infrastructure for interactive applications in Digital TV written in Java
- > More advanced services that are not supported by the declarative environment like transactions, access to databases and others



Ginga-J

- > All the advantages of the Java environment within the Digital TV platform
- > Integrates mature APIs as Java TV and JMF, with other new APIs adapted to the SBTVD context



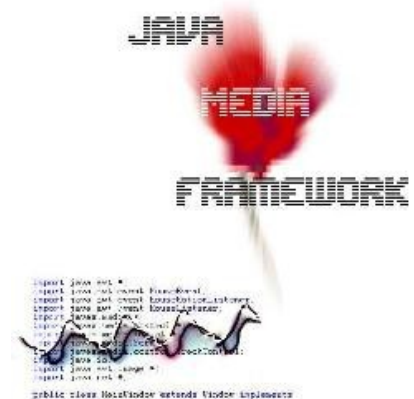
JavaME Support



- > Connected Device Configuration (CDC) 1.1
 - Basis for the Java ME devices that have a microprocessor and ample memory
- > Foundation Profile (FP) 1.1
 - Support resource-constrained devices without a standards-based GUI system
- > Personal Basics Profile (PBP) 1.1
 - PBP is a superset of FP that support resource-constrained devices with a standards-based GUI framework

Java Media Framework

- > API for multimedia applications developed in Java
- > Provides support for the codecs needed to capture, playback and distribute applications with audio and video
- > It also contains other features necessary to multimedia applications as support to the network, protocols, control and others



JSR-927 Java TV API 1.1



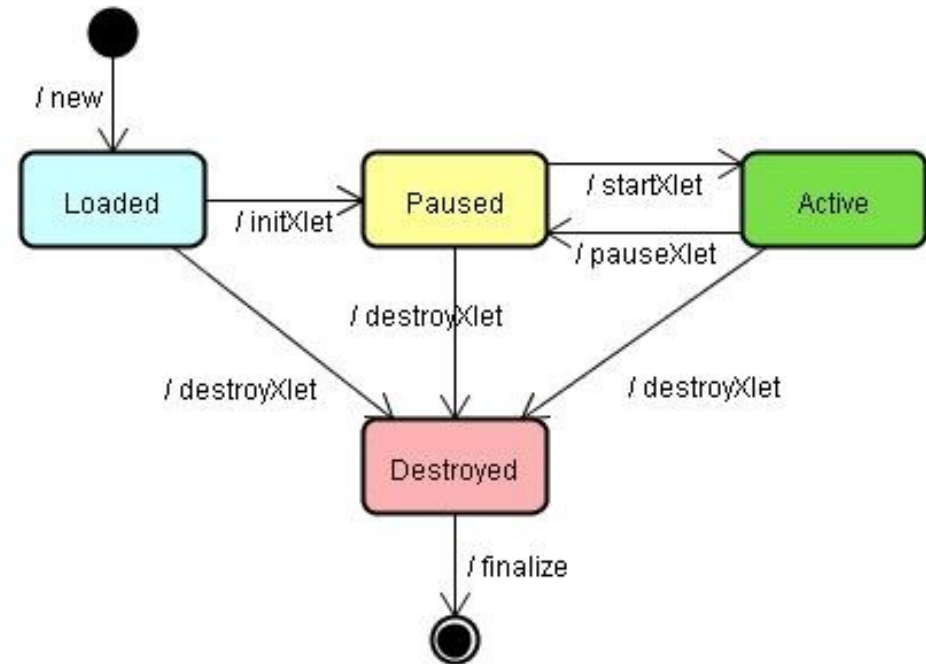
- > Basic API in the development of interactive applications for use in set-top box and Digital TV
- > Implemented in most of the patterns of interactive Digital TV around the world
- > Based on components called Xlets
- > Provides:
 - Access to the service information database;
 - Content selection;
 - TV-specific media player control;
 - Access to data that is broadcast with TV signal.

JSR-927 Java TV API 1.1

> Packages

- `javax.tv.*`
 - `graphics`
 - `locator`
 - `media`
 - `net`
- `service.*`
 - `guide`
 - `navigation`
 - `selection`
 - `transport`
- `util`
- `xlet`

> Xlet life cycle

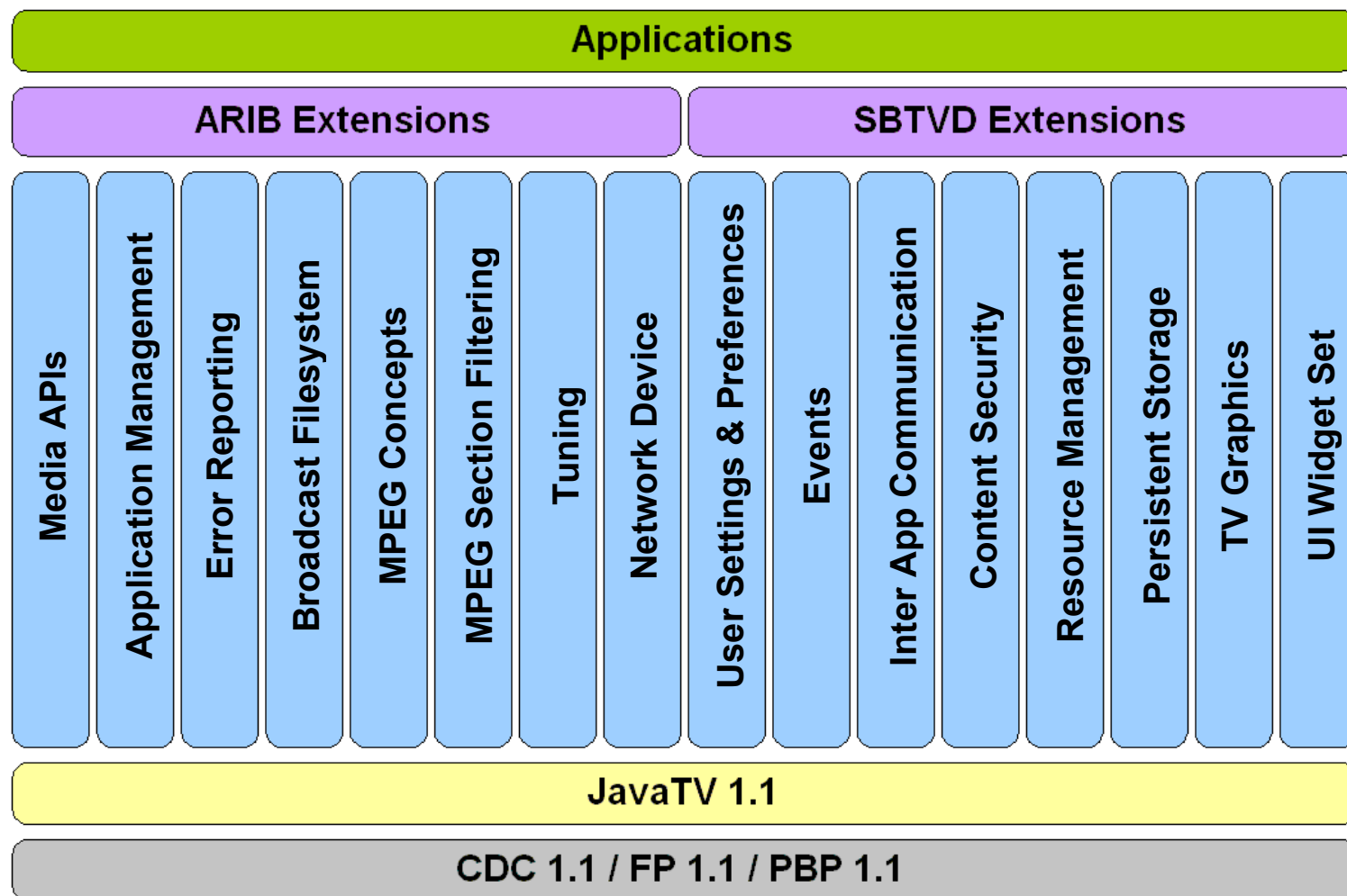


Java DTV

- > API developed in a joint effort between SBTVD Forum and Sun Microsystems Inc.
- > Replaces the features of GEM (Globally Executable MHP – ITU): DVB, HAVi, DAVIC
- > Advanced GUIs using LWUIT
- > Open-source
- > Reference Implementation



SBTVD & Java DTV



Java DTV Packages

> com.sun.dtv.*

- application
- broadcast
- filtering
- io
- locator
- media
- net
- platform
- resources
- service
- ui
- smartcard
- transport
- test
- tuner

> com.sun.lwuit.*

- animations
- events
- geom
- layouts
- list
- painter
- plaf
- util

Java TV + Java Card

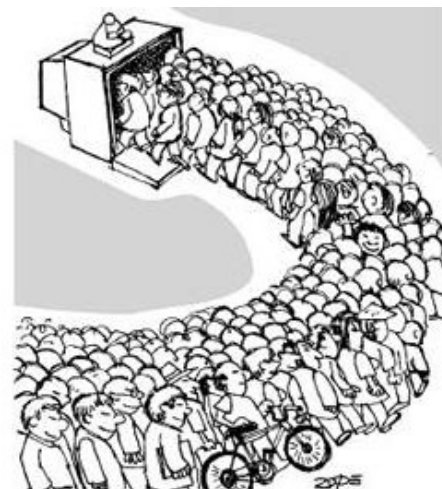
> Home Area Network

- Mobile Phones, PDAs, Computers, JavaME Devices, Java Card Devices, etc.
- Ginga device module loaded and started
- Cable Interface Communication
 - USB / UTP / RJ-45 / RJ-11 / Coaxial
- Over-the-air Communication
 - Mobile Networks, 3G, Wi-Fi, Bluetooth, Infra-red
 - TV and Device with bi-directional communication
 - [Devices] N — 1 [TV]
 - Sound/Video: export and import between devices and TV



Business Opportunities in Digital TV

- > T-Learning
- > T-Government
- > T-Bank
- > Direct and Contextual Marketing
- > T-Sales on Demand and on Time
- > Video-conference
- > Immersion Games (3D Video and Home-theater)
- > Family and Personal TV Customizations
- > Digital TV Searching (Google @ DTV ?)
- > explore your limits!



Demonstrations



References

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- Study Groups with Brazilian Government Investment
<http://sbtvd.cpqd.com.br>
- Brazilian Forum for Digital TV
<http://www.forumsbtvd.org.br>
- ANATEL - Brazilian Telecommunications Agency
<http://www.anatel.gov.br>
- Brazilian Electronic Government - ITC Homes 2008
<http://www.governoeletronico.gov.br/anexos/pesquisa-tic-domicilios-2008>
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<http://www.cetic.br>



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<https://javatv-developers.dev.java.net>
- Java.net: Emphasis on business development of Java ME technologies
<https://javamecdc-group.dev.java.net>
- Book: Morris, Steven; Smith-Chaigneau, Anthony – ***Interactive TV Standards*** – Elsevier Press

*The public is who decides how
you will watch TV, depending
on where and with whom it is.*

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Thank You



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