



Agenda

- Digital TV overview
- Some Demos: Middleware requirements
- DTV Reference Model
- Ginga: NCL (Lua)
- Final Remarks

Digital TV

An Overview

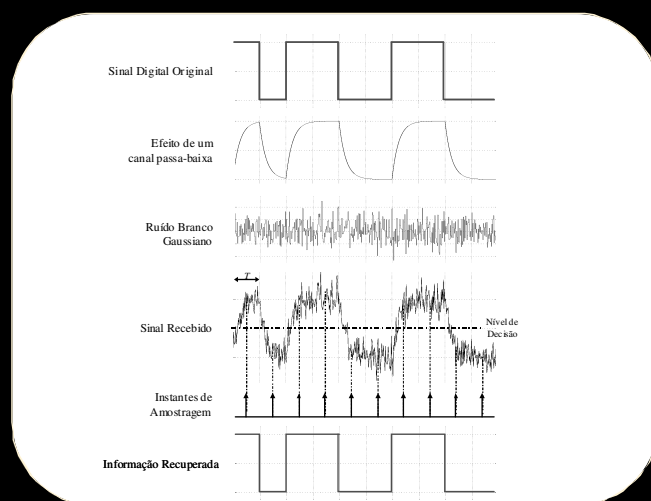


NCL

Copyright © 2012 TeleMídia



Noise Effects



4

NCL

Copyright © 2012 TeleMídia



Interference



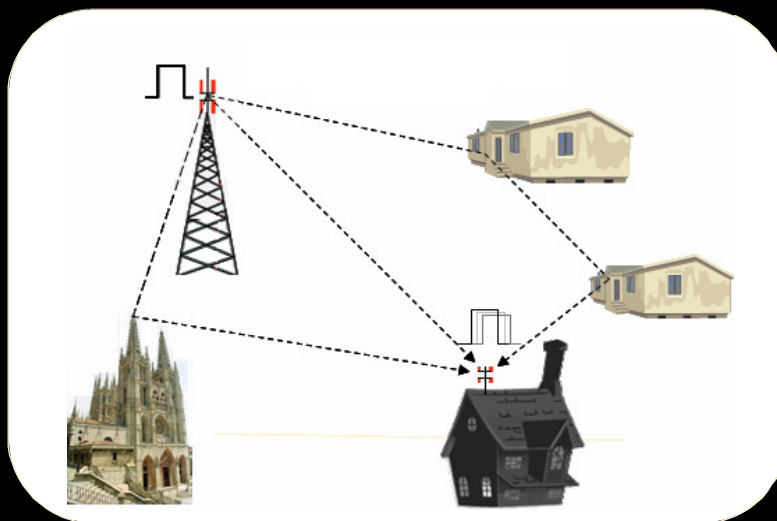
5



Copyright © 2012 TeleMídia



Multiple Path



6



Copyright © 2012 TeleMídia



Qualidade da Imagem - ITU-R BT. 500-11

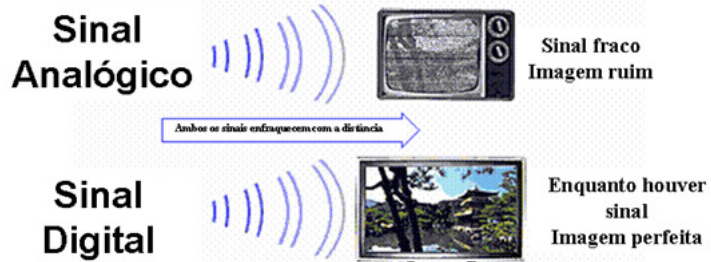


 Universidade Presbiteriana Mackenzie

SBTVD

DMMB-T

Digital TV



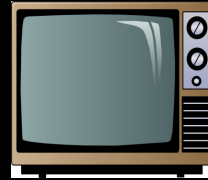
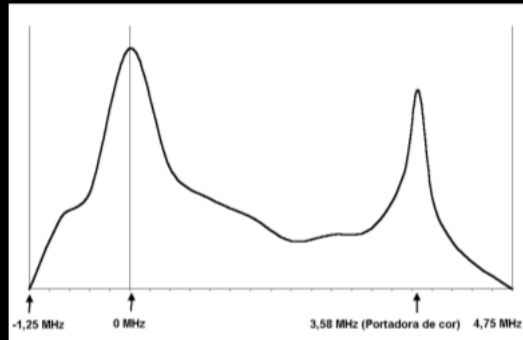
8



Copyright © 2012 TeleMídia

Bandwidth: 6MHz



19,3 Mbps

9

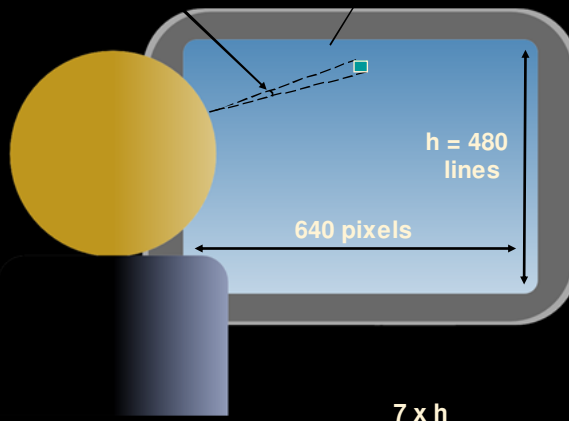


Copyright © 2012 TeleMídia



1' minute

Picture Element
(pixel)



10



Copyright © 2012 TeleMídia

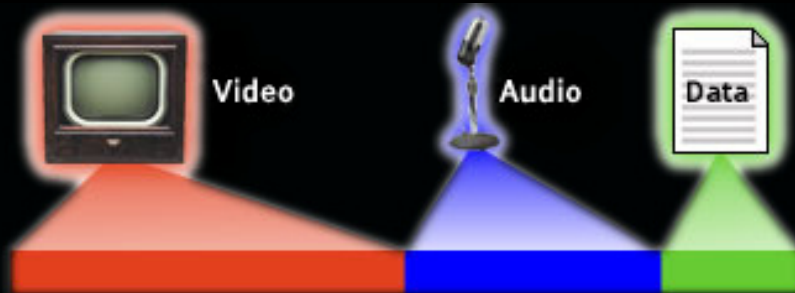


Some possibilities in 6 MHz



19,3 Mbps

Digital TV



Some alternatives in 6 MHz



19,3 Mbps

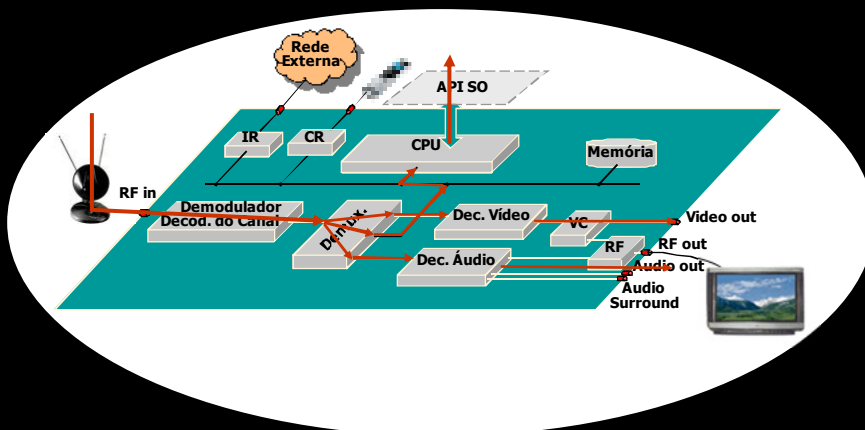
13



Copyright © 2012 TeleMídia



Receiver



14



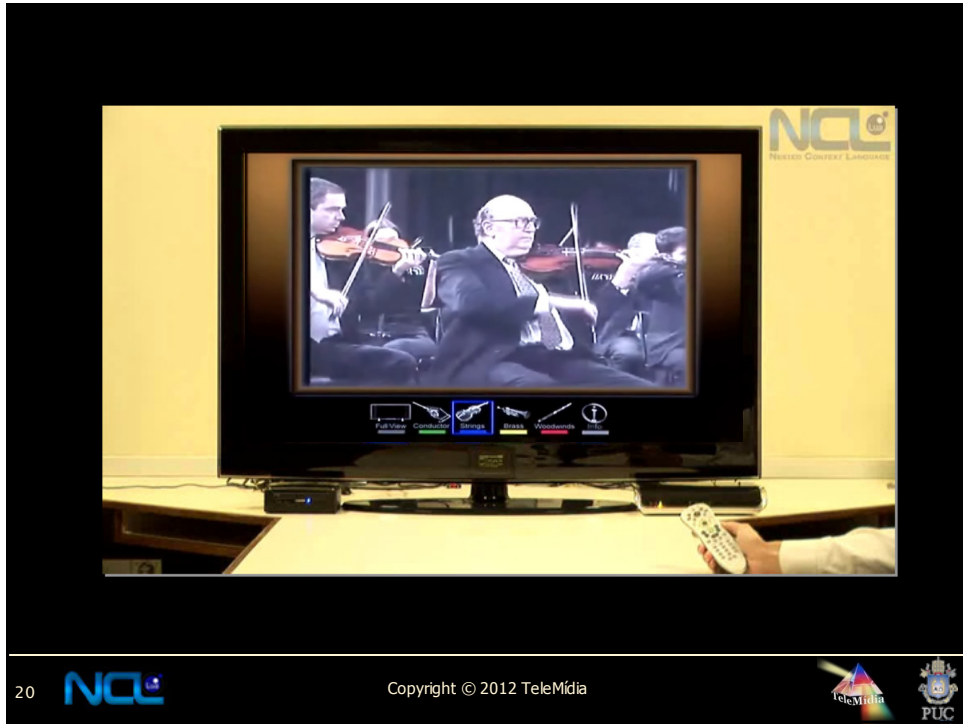
Copyright © 2012 TeleMídia



Type of Applications









Application Types

- Additional content **without any semantic relationship** with the TV program (main video)
- Additional content **related with the TV program**, but **without any synchronization** with the main video
- Additional content **related with the TV program and synchronized** with the main video
- Interactive narratives

23



Copyright © 2012 TeleMídia



Additional Support

- Interactive channel
- Multiprogramming
- Multiple exhibition devices

24



Copyright © 2012 TeleMídia

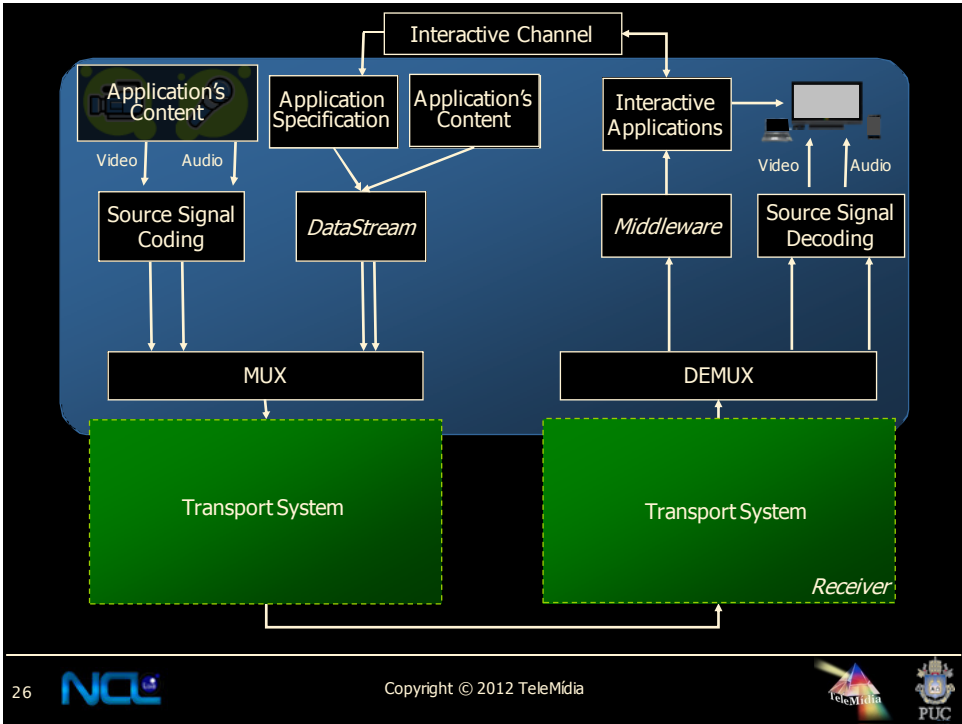


DTV Reference Model



NCL

Copyright © 2012 TeleMídia

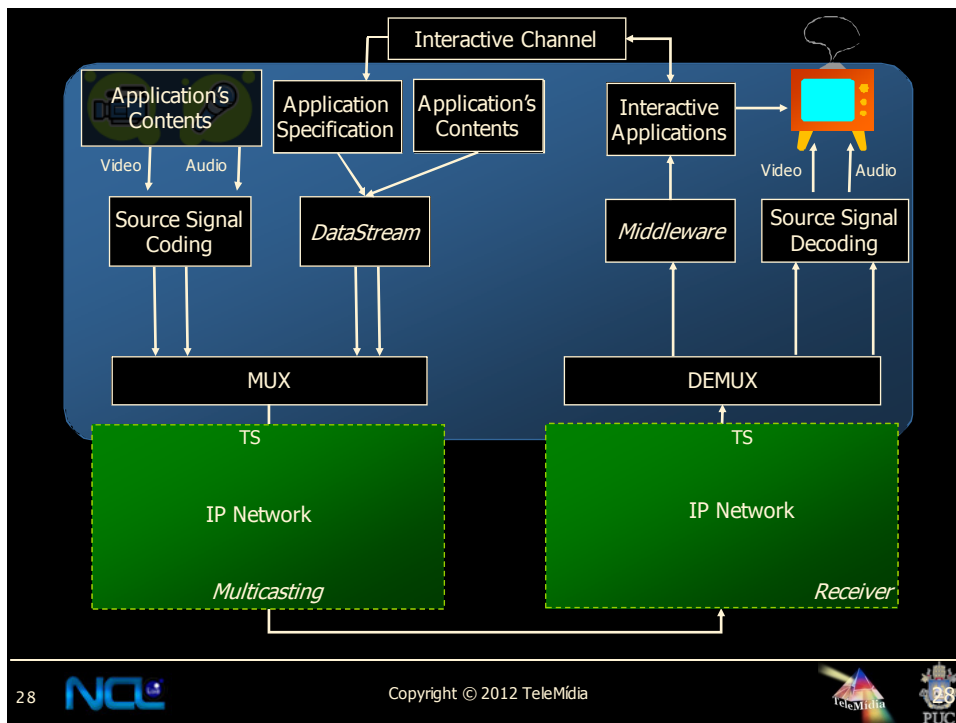
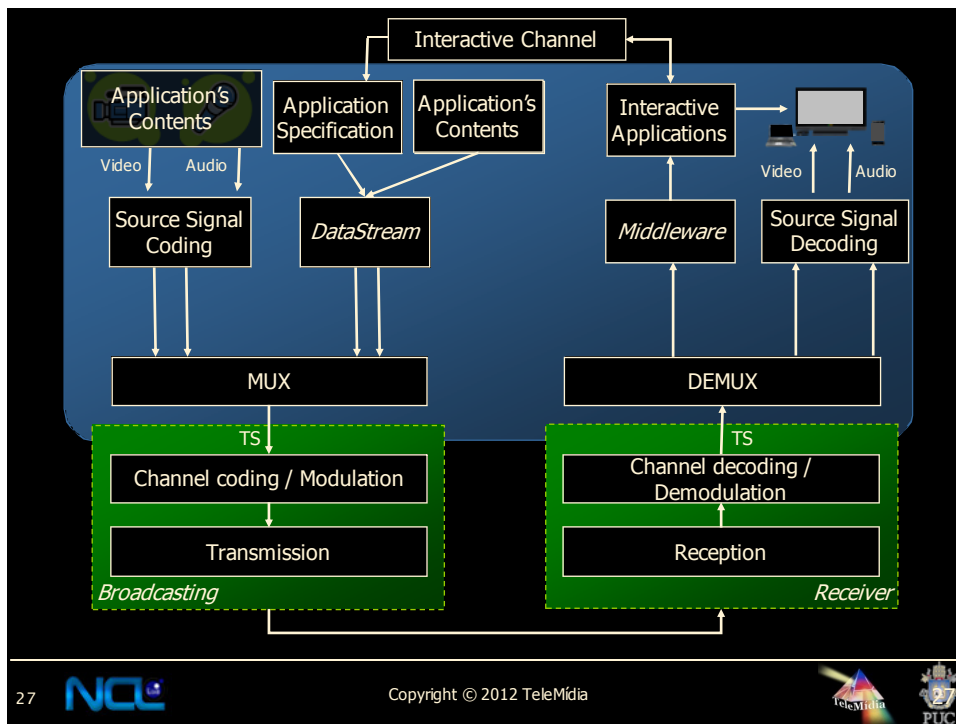


26

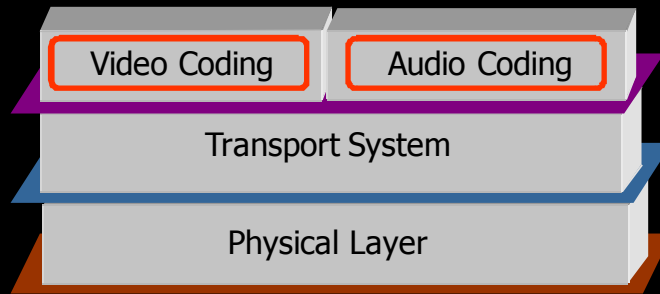
NCL

Copyright © 2012 TeleMídia





Reference Model



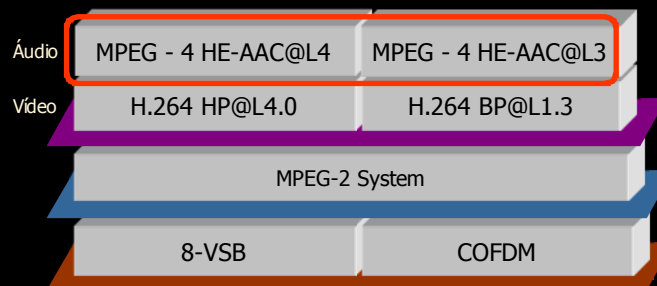
29



Copyright © 2012 TeleMídia



Reference Model



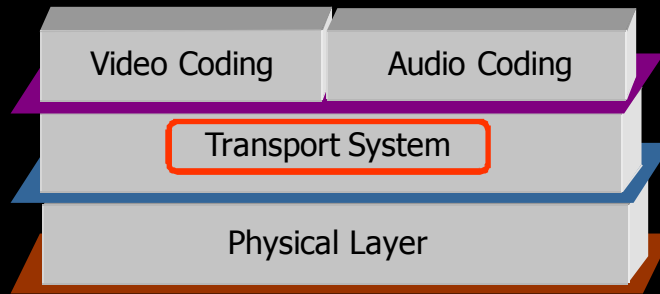
30



Copyright © 2012 TeleMídia



Reference Model



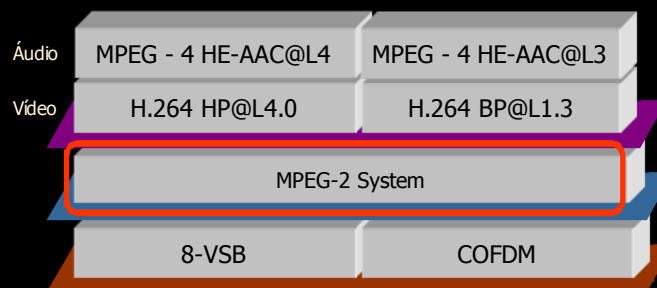
31



Copyright © 2012 TeleMídia



Reference Model



32



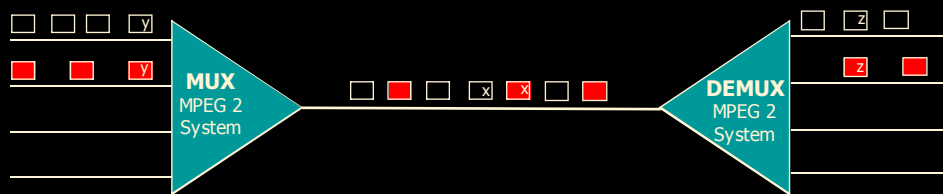
Copyright © 2012 TeleMídia



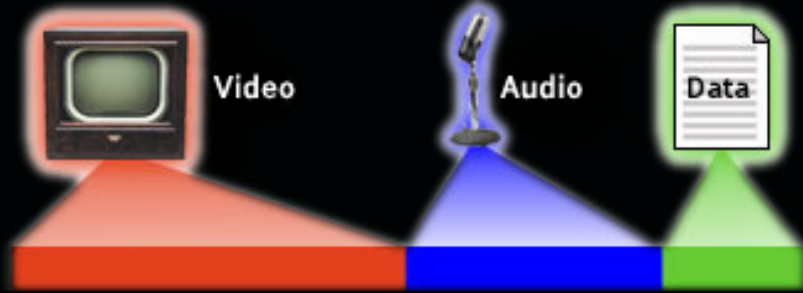
Digital TV



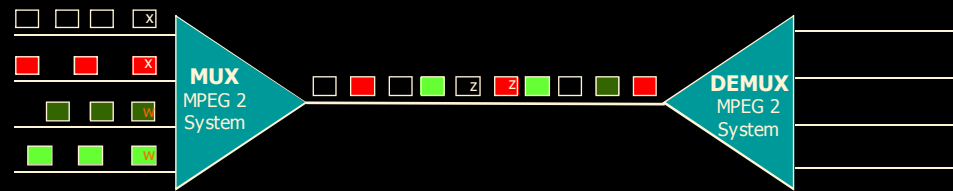
Multiplexing with Time Stamps



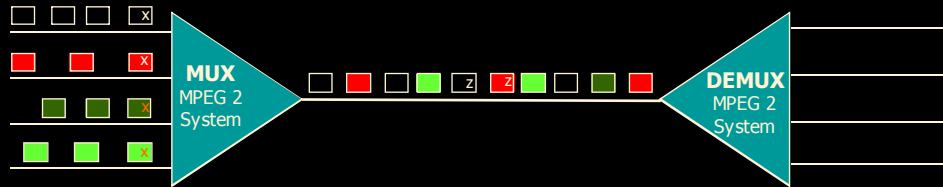
Digital TV



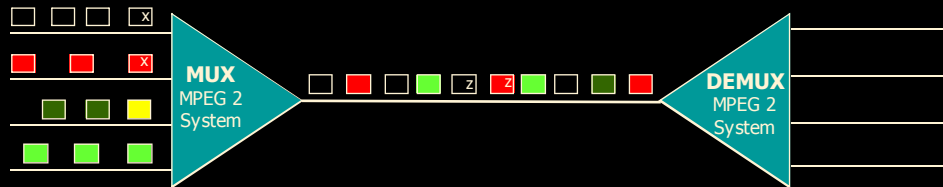
Multiplexing with Time Stamps



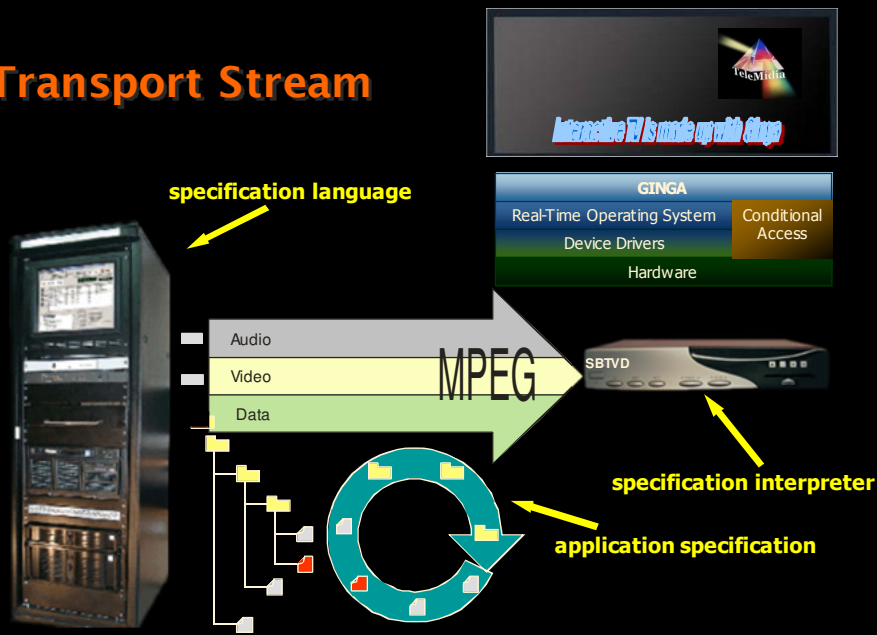
Multiplexing with Time Stamps



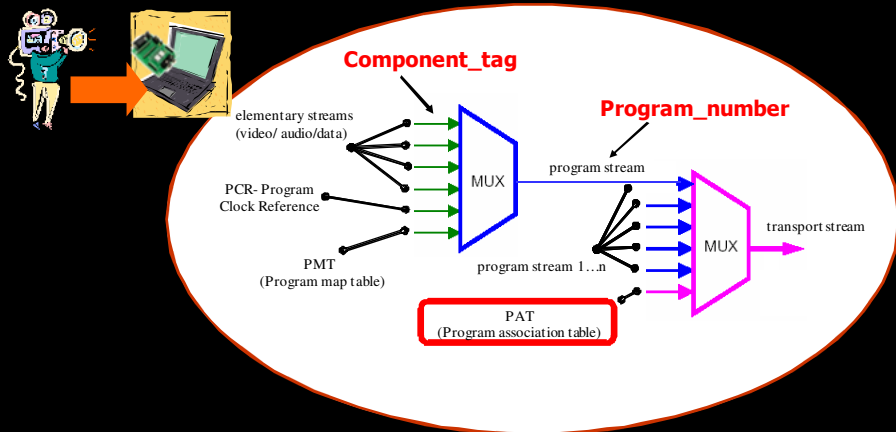
Asynchronous Transport



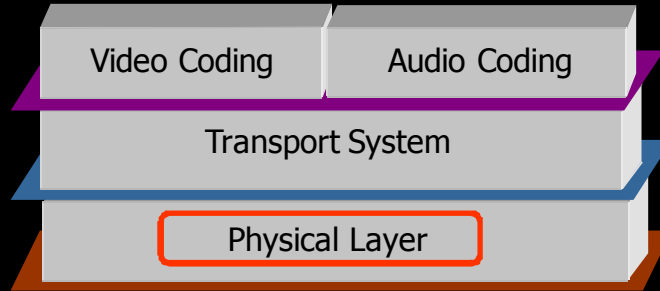
Transport Stream



MPEG-2 System



Reference Model



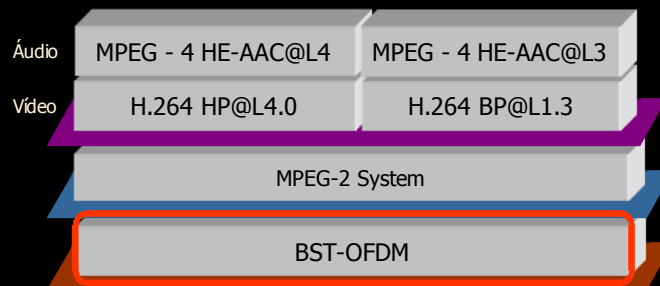
41



Copyright © 2012 TeleMídia



Reference Model

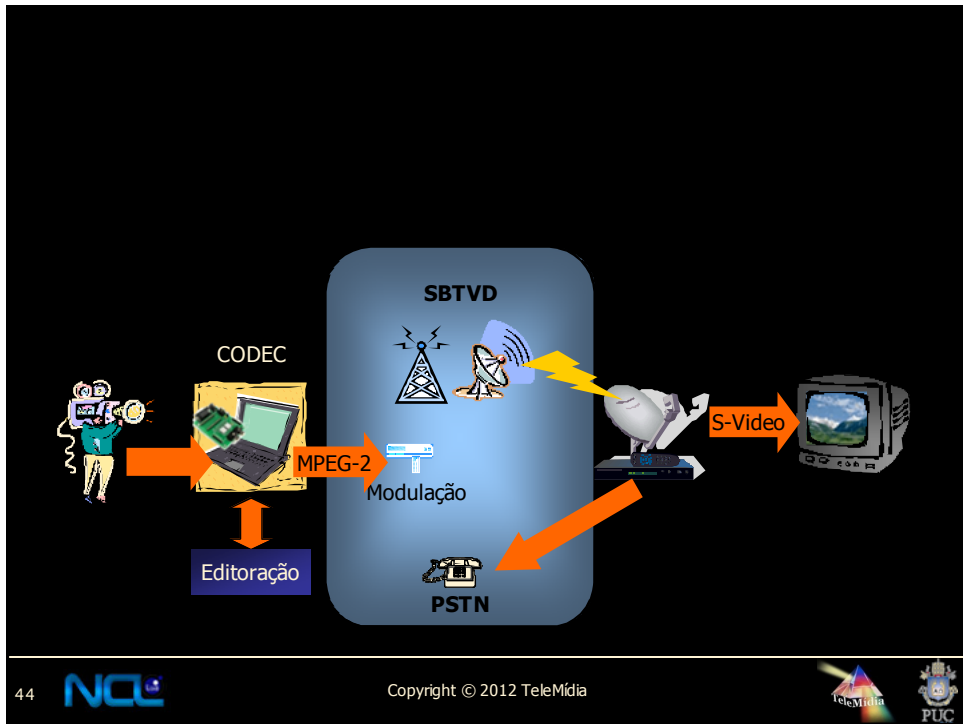
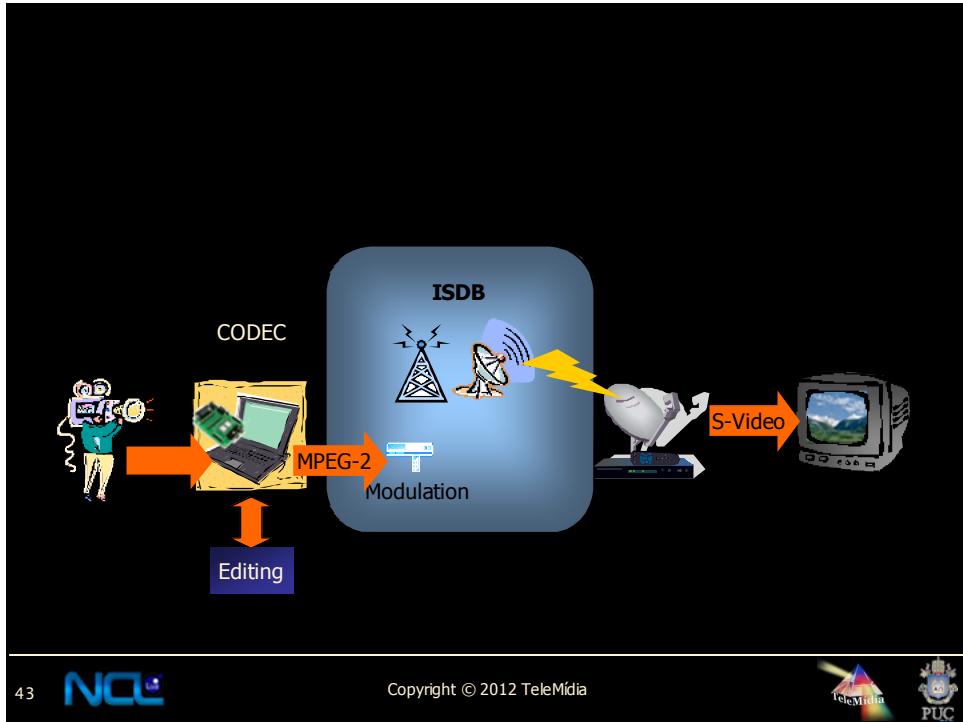


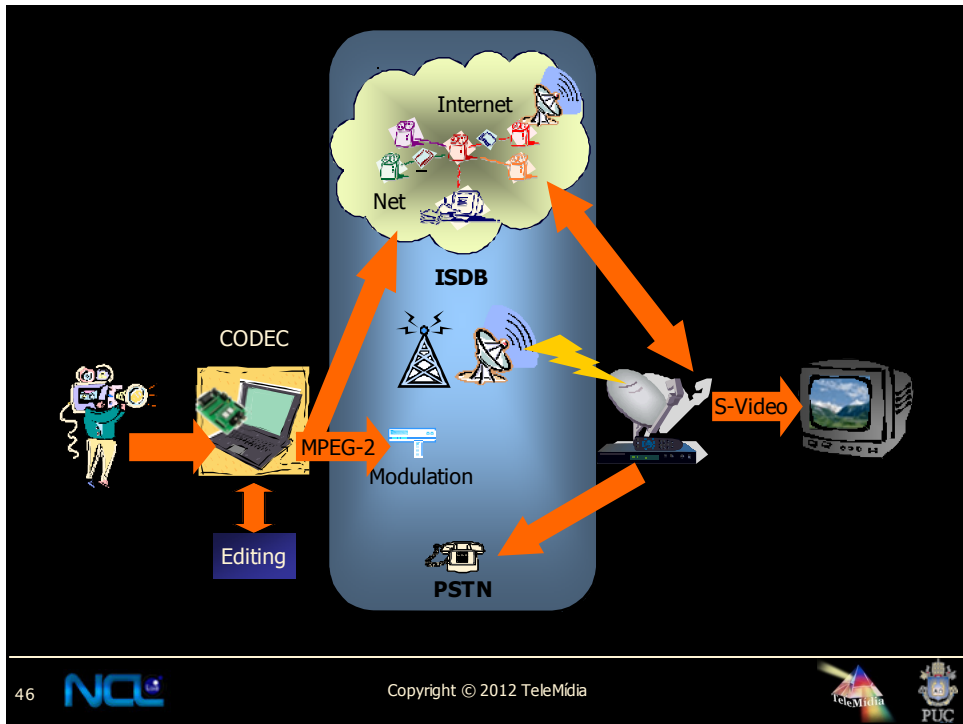
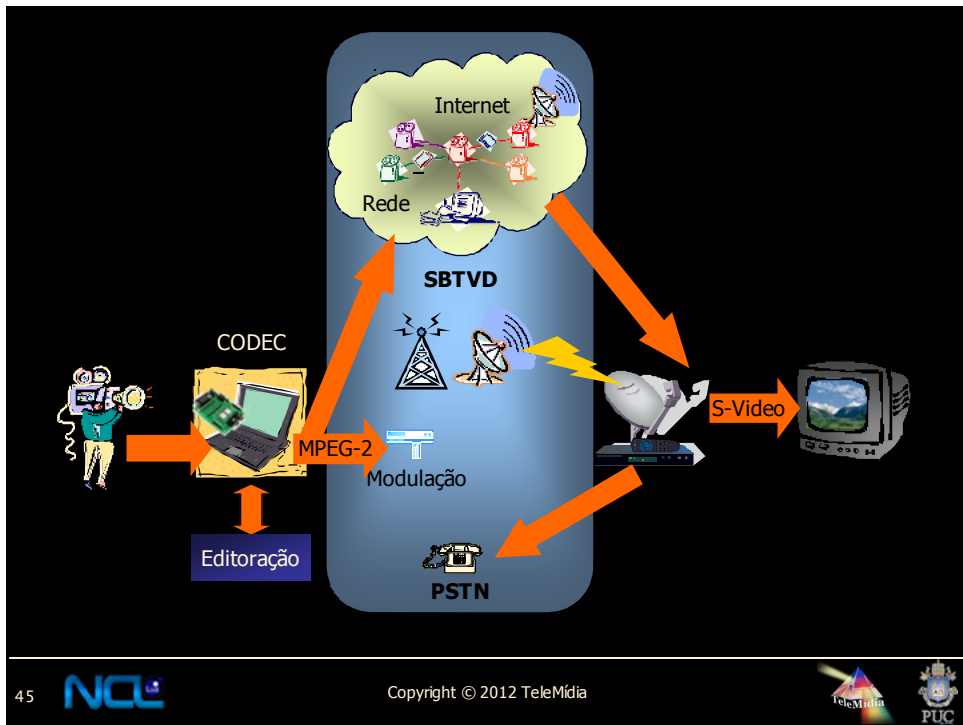
42



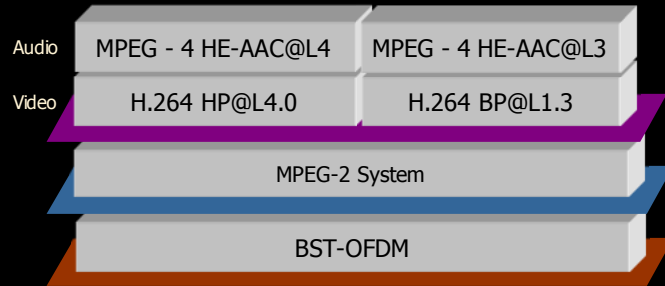
Copyright © 2012 TeleMídia







Reference Model



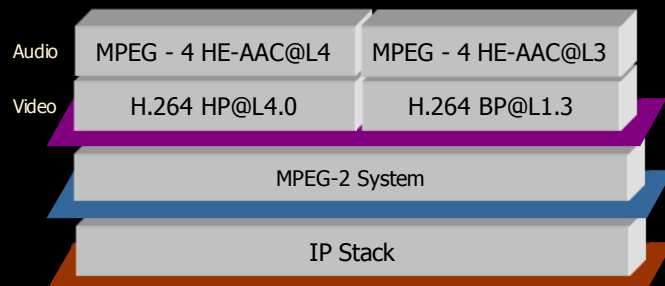
47



Copyright © 2012 TeleMídia



Reference Model

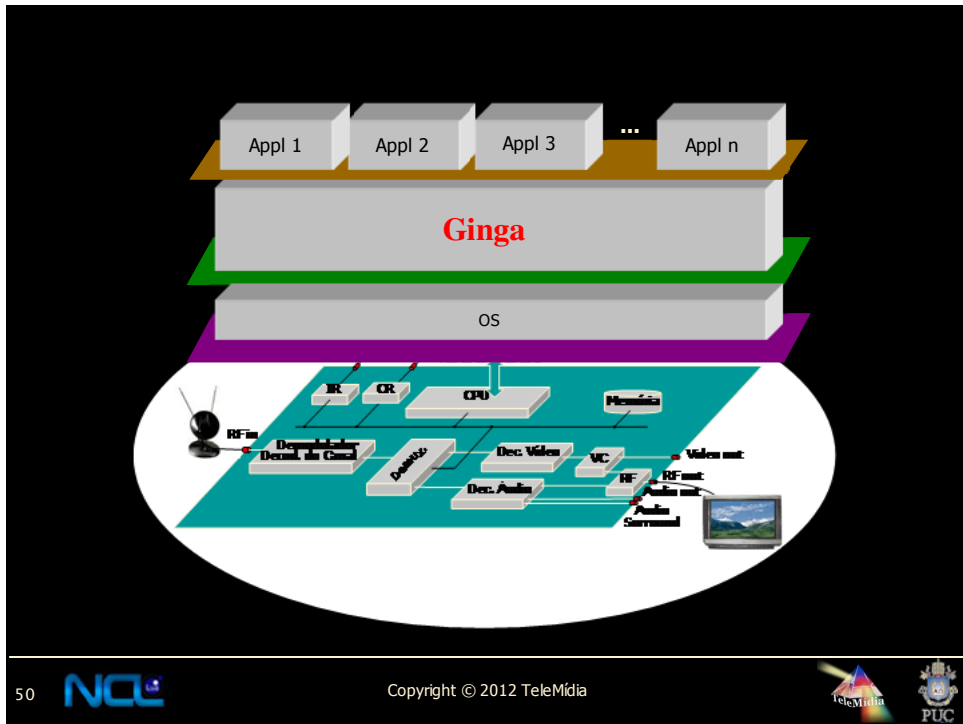
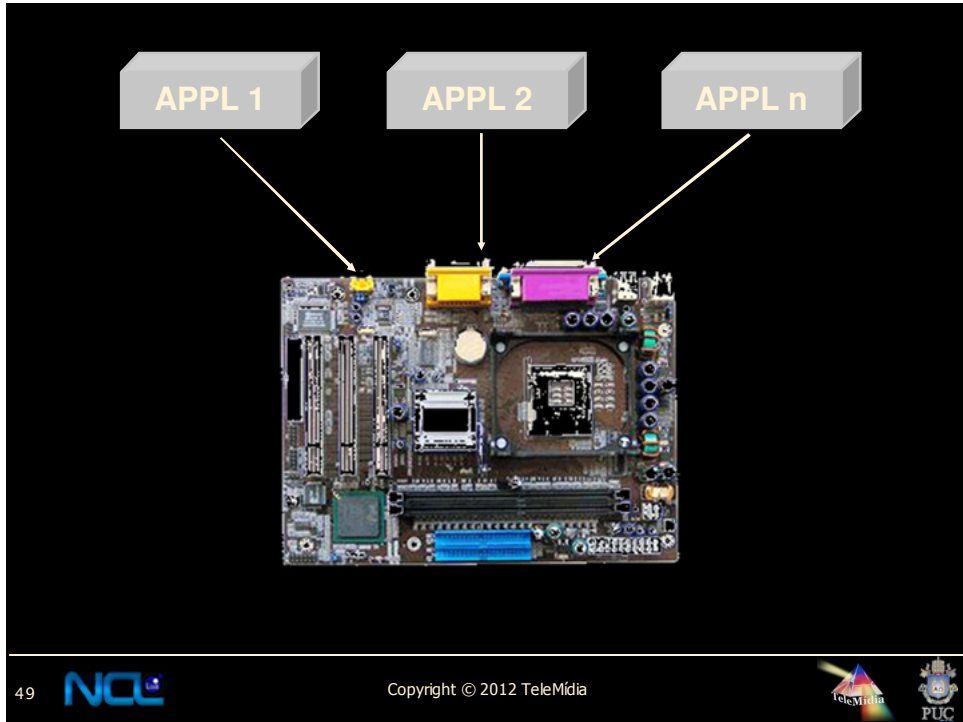


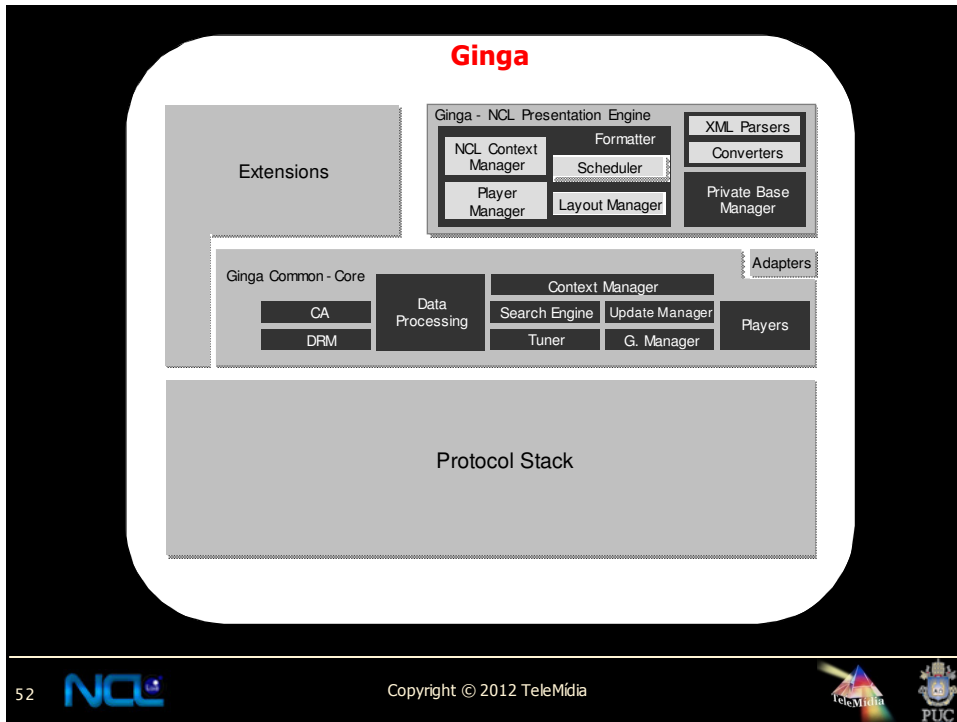
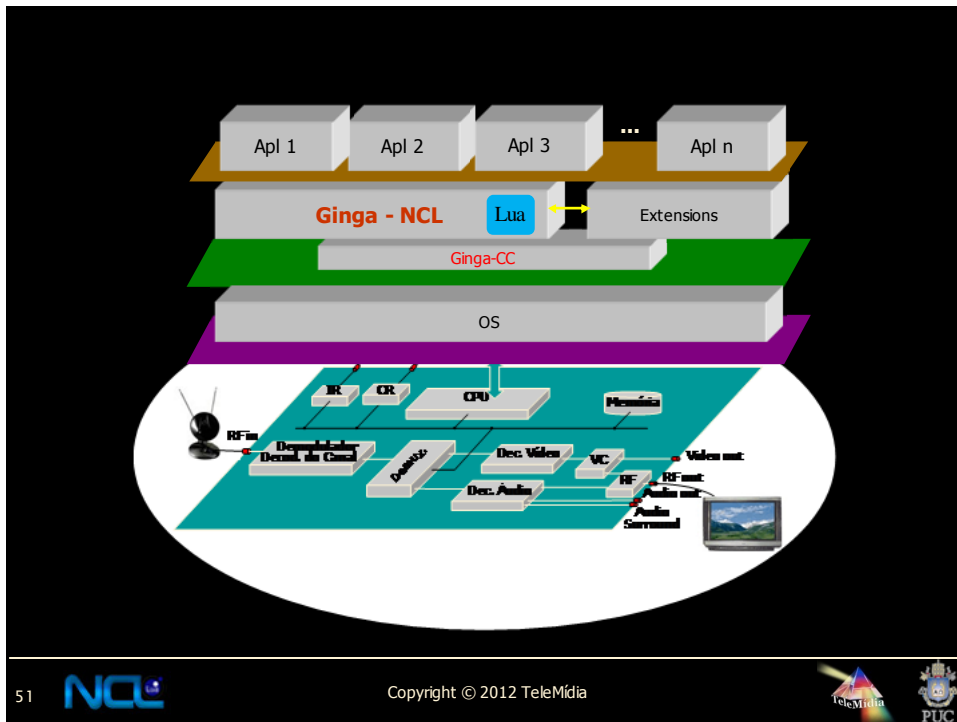
48

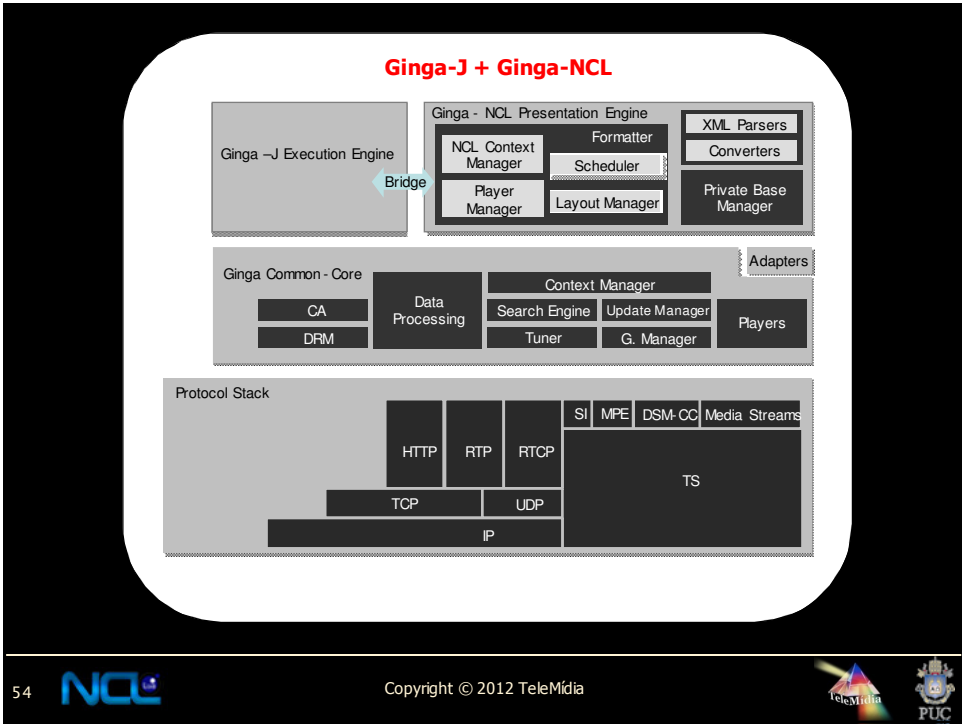
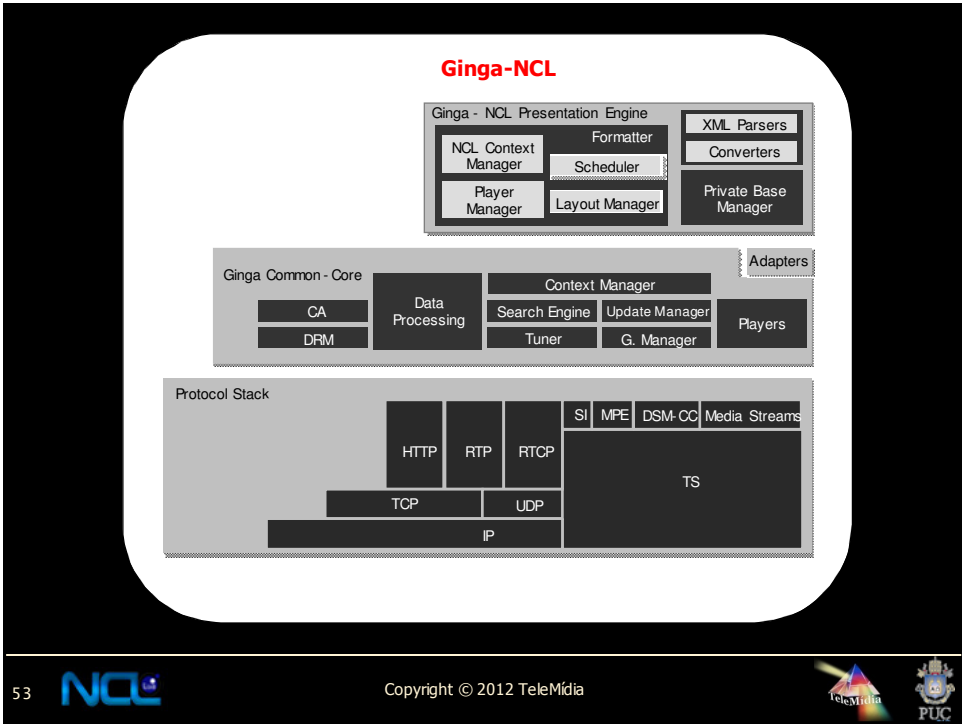


Copyright © 2012 TeleMídia

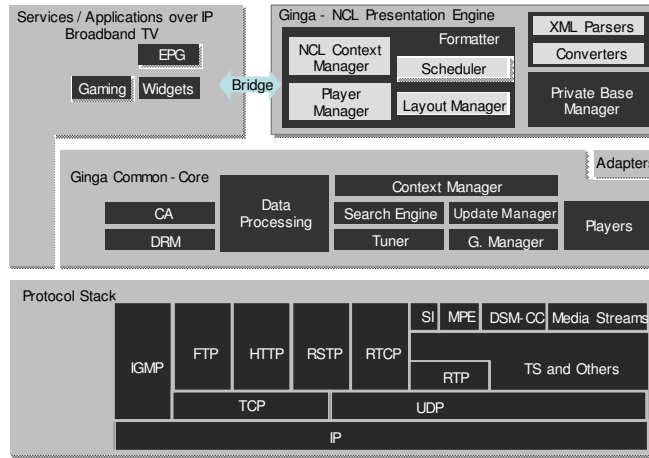








Broadband TV + Ginga-NCL



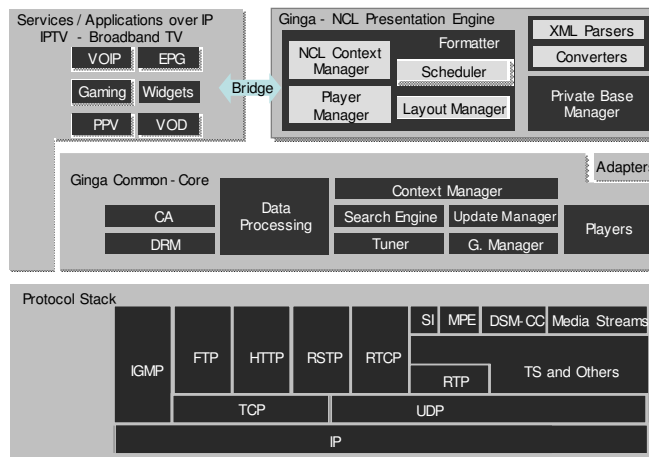
55



Copyright © 2012 TeleMídia



IPTV + Ginga-NCL

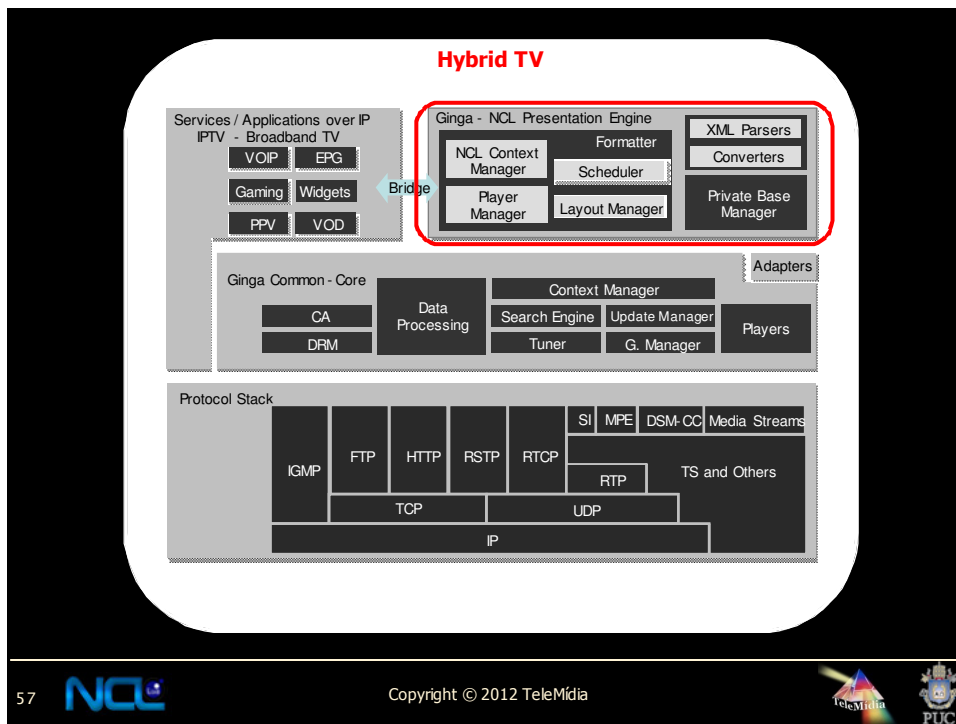


56



Copyright © 2012 TeleMídia





Middleware Requirements

Synchronization



59



Copyright © 2012 TeleMídia



Interactivity



60



Copyright © 2012 TeleMídia



Interactivity

61

NCL

Copyright © 2012 TeleMídia

TeleMídia PUC

TV is not a Computer

- Broadcast transmission
- Viewers are usually far from the screen and interact via remote control devices
- Usually more than one viewer

Viewer interaction must be treated as just an example of temporal synchronization

62

NCL

Copyright © 2012 TeleMídia

TeleMídia PUC

TV is not a Computer

- Broadcast transmission
- Viewers are usually far from the screen and interact via remote control devices
- Usually more than one viewer
- Video based applications

Structure-based synchronization

63



Copyright © 2012 TeleMídia



TV is not a Computer

- Broadcast transmission
- Viewers are usually far from the screen and interact via remote control devices
- Usually more than one viewer
- Video based applications

Multiple Exhibition Devices

64



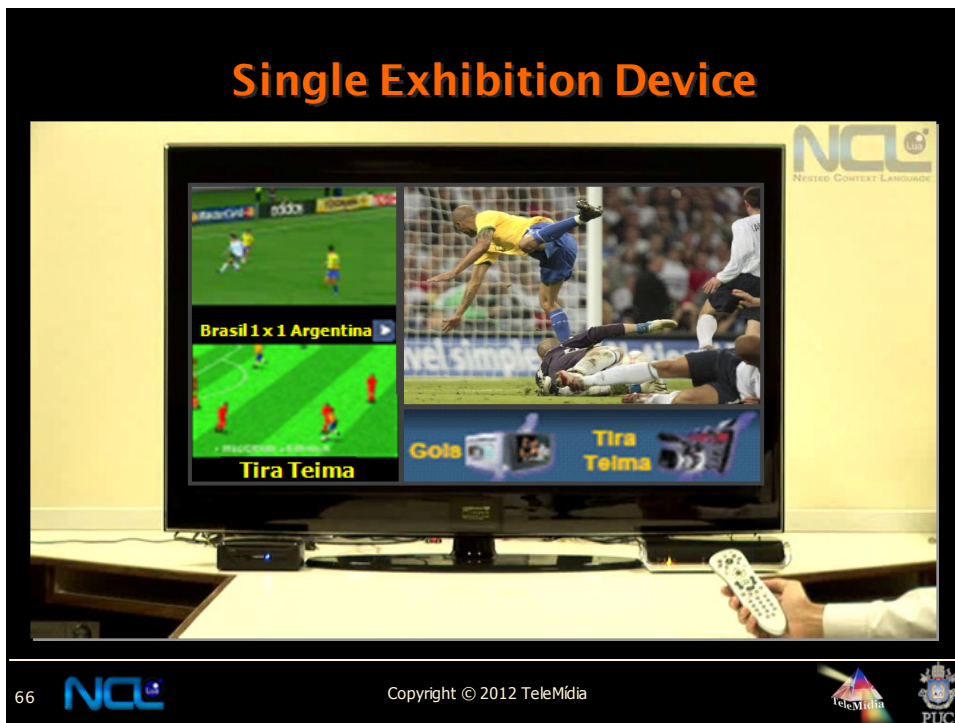
Copyright © 2012 TeleMídia



Single Exhibition Device



Single Exhibition Device



Multiple Exhibition Devices



Multiple Exhibition Devices



Adaptation



Adaptation



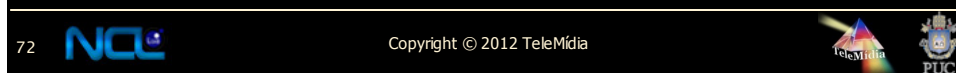
Adaptation






Content and Presentation Adaptation

- Presentation device
- User profile
- User location

Adaptability



	TV	TV (assinatura)	Tel. Fixo	Celular	Computador	Computador + Internet	Nunca usou computador	Nunca usou a Internet
TOTAL	98%	20%	37%	87%	45%	38%	42%	47%
Área Urbana	99%	23%	42%	91%	51%	43%	37%	42%
Área Rural	95%	4%	10%	69%	16%	10%	67%	75%
Classe A > R\$ 12.440,00	100%	85%	93%	100%	98%	96%	5%	6%
Classe B	100%	45%	69%	97%	84%	76%	15%	17%
Classe C	99%	15%	35%	91%	45%	35%	39%	46%
Classe DE < R\$ 2.480,00	94%	2%	9%	70%	8%	5%	72%	79%

73  Dados de 2011, publicado em 06/2012 pelo CGI.br  

Specification Language

- Simple to be understood and learned
- Lightweight
- Powerful

Programming Paradigms

- Imperative (procedural)
 - algorithm specification: “how to do”
 - more expressiveness
- Declarative
 - specification: “final intention”
 - highest level specification

75



Copyright © 2012 TeleMídia



Specification Language

- Simple to be understood and learned
- Lightweight
- Powerful
- **Declarative DSL language**

76



Copyright © 2012 TeleMídia



NCL Nested Context Language

- The Brazilian innovation in the ISDB System:
 - NCL (Nested Context Language) declarative language
 - Its script NCLua language
 - Its engine: Ginga-NCL *middleware*.
- ITU-T H.761 Recommendation for IPTV services
- ITU-R BT 1691-1 Recommendation for Terrestrial DTV

77



Copyright © 2012 TeleMídia



Functionalities – Declarative support to:



- Media synchronization
 - Interactivity as a particular case
- Adaptability
- Different distribution networks
- Multiple exhibition devices
- Live edition



78



Copyright © 2012 TeleMídia



79 **NCL** Copyright © 2012 TeleMídia  

80 **NCL** Copyright © 2012 TeleMídia  

Declarative X Imperative

Declarative

Imperative



81



Copyright © 2012 TeleMídia



Declarative X Imperative

Declarative

Imperative



82



Copyright © 2012 TeleMídia



Declarative X Imperative

Declarative

Imperative



83



Copyright © 2012 TeleMídia



State of the art – Declarative *Middleware*

- Focus on interactivity
 - Synchronization and adaptability by using scripts (procedural)

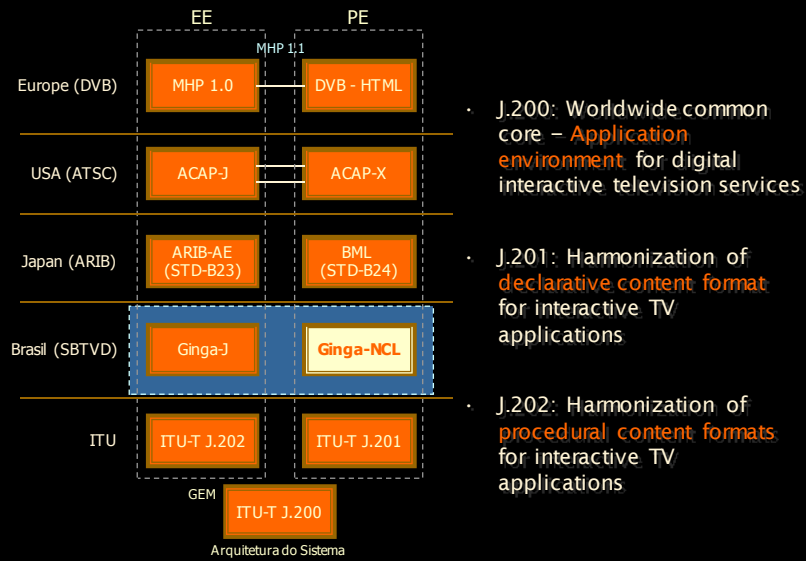
84



Copyright © 2012 TeleMídia



DTV Middlewares



85



Copyright © 2012 TeleMídia



Declarative X Imperative



86



Copyright © 2012 TeleMídia



Why NCL?

NCL

NCL – Nested Context Language

- Synchronization support
 - Structure-based synchronization
 - Interactive channel support
- Multiple device facilities
- Support for content and presentation adaptation
- Live editing support
- **NCL is free software**

Declarative X Imperative

Declarative Imperative



NCL

89



Copyright © 2012 TeleMídia



Declarative X Imperative

Declarative Imperative



Scripting languages
ECMAScript
Lua

System languages
Java
C

90



Copyright © 2012 TeleMídia





Efficiency?
Footprint?

Problem dependent

Script
+ easy to use



System

91 **NCL** Copyright © 2012 TeleMídia  

Script X System

Script

System

92 **NCL** Copyright © 2012 TeleMídia  

Script X System



93



Copyright © 2012 TeleMídia



Script X System



94



Copyright © 2012 TeleMídia



Ginga Options

Lua

Java



Small to medium complex tasks: Lua

High complex tasks: Java

95



Copyright © 2012 TeleMídia



Opções Ginga

Lua

Java



96



Copyright © 2012 TeleMídia



Why Lua?



97



Copyright © 2012 TeleMídia



Why Lua?



- ✓ Lua is Simple and Powerful
- ✓ Lua is Portable
- ✓ Lua is Embeddable
- ✓ Lua is Fast
- ✓ Lua is Robust
- ✓ Lua is Free Software

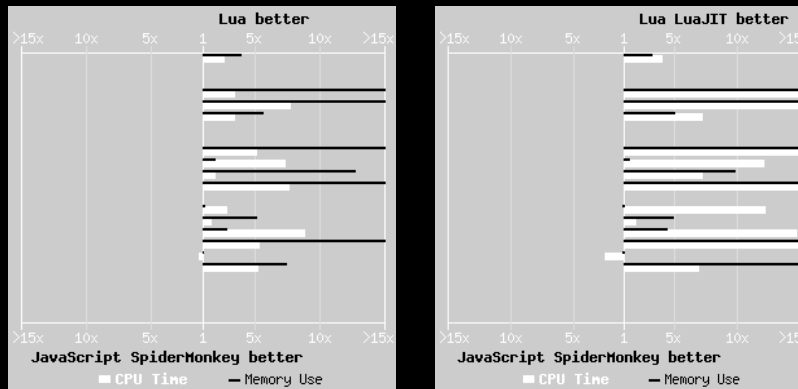
98



Copyright © 2012 TeleMídia



<http://shootout.alioth.debian.org>



JavaScript SpiderMonkey = 936 Kbytes
Lua = 120 Kbytes
LuaJIT = 150 Kbytes

99



Copyright © 2012 TeleMídia



Alguns Jogos Usando Lua

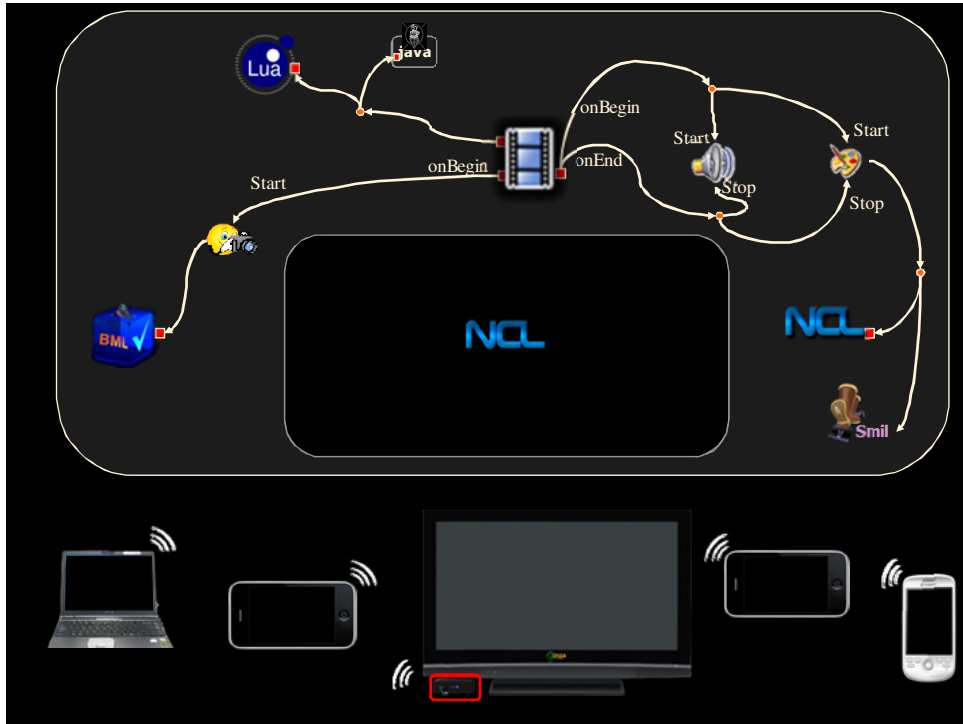


100



Copyright © 2012 TeleMídia






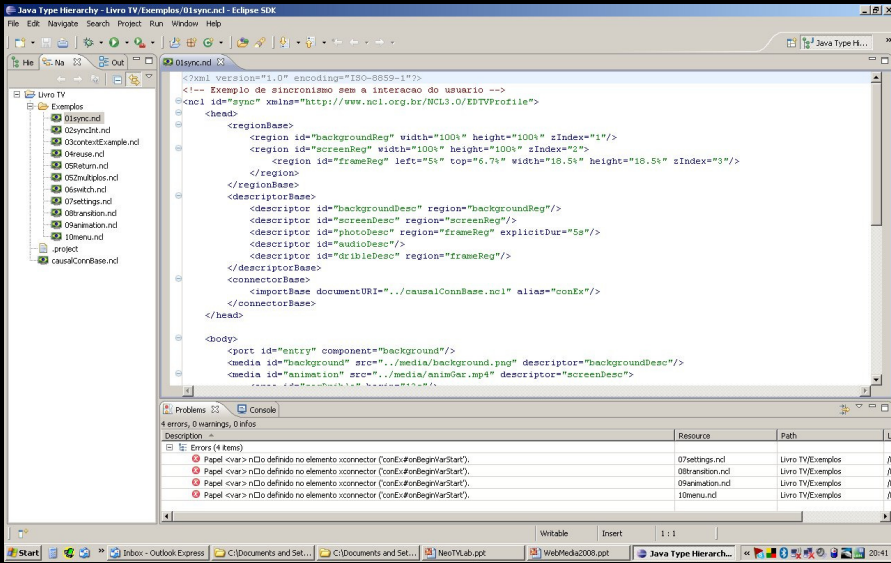
Final Remarks



Copyright © 2012 TeleMídia

NCL Eclipse



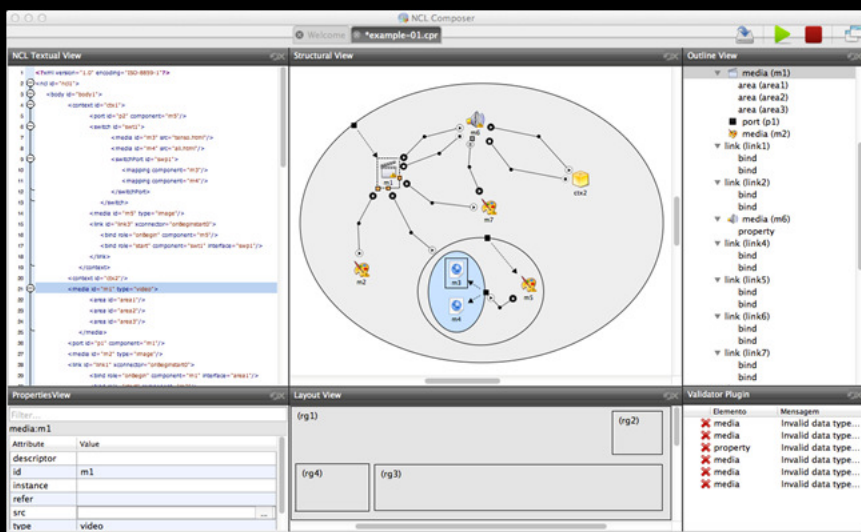
103



Copyright © 2012 TeleMídia



NCL Composer



104



Copyright © 2012 TeleMídia



Player Ginga-NCL



Copyright © 2012 TeleMídia



Ginga-NCL is free software



106



Copyright © 2012 TeleMídia



Ginga Communities



107 

Copyright © 2012 TeleMídia



Ginga-NCL Reference Implementation

- C++ Language
 - Linux platform
 - High performance
 - Hard to embed



108 

Copyright © 2012 TeleMídia



Ginga4Windows



109 

Copyright © 2012 TeleMídia



Ginga4MAC



110 

Copyright © 2012 TeleMídia



Ginga-NCL Virtual Set-top Box

NCL
Nexted Context Language

Your Ginga-NCL Set-top box is ready for action!

Quick hints:

- From your host operating system, use SSH to open a text console. The STB's IP address is shown below.
- User is "root"; Initial password is "telemidia"
- Upload your NCL applications and media to the /misc/ncl30 directory, via SFTP or SCP
- Use the /misc/launcher.sh script to run your NCL application
Example: /misc/launcher.sh /misc/ncl30/sample03/sample03.ncl
- Use the following keymap:
- **Have fun!**

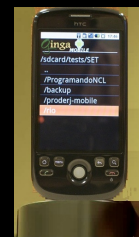
IP:192.168.127.129

TeleMídia
middleware
Ginga
TV Interativa se faz com Ginga!

VMware Player

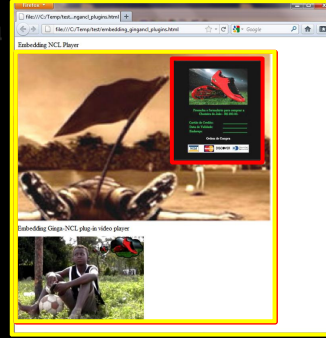
Ginga -NCL para IPTV

- IPTV: Recommendation H.761
 - Symbian
 - Android



Pesquisa em Linguagens e Players

- Interoperabilidade: *Liaison* ITU-T/W3C
 - NCL como linguagem de cola
 - NCL como plug-in Web



Plug-ins Ginga

Ginga

Ginga

Broadband (IP) TV

NCL Evolution



NCL

Copyright © 2012 TeleMídia



NCL 4.0

- NCL 4.0
 - Higher level abstraction for relationship definitions
 - Better support to context aware applications
 - Support to multimodal interfaces

116

NCL

Copyright © 2012 TeleMídia



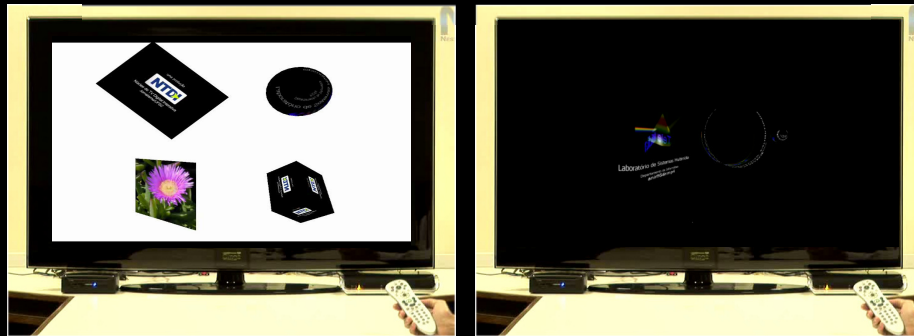


NCL 4.0

- NCL 4.0
 - Higher level abstraction for relationship definitions
 - Better support to context aware applications
 - Support to multimodal interfaces
 - Support to 3D objects
 - Multiple devices
 - Social media

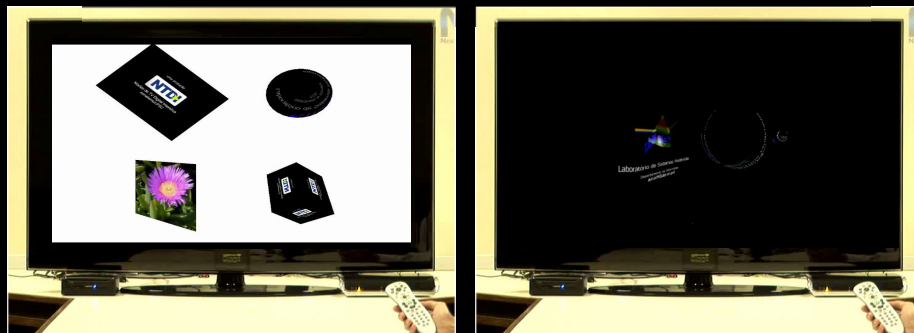
118 NCL Copyright © 2012 TeleMídia TeleMídia PUC

NCL 3D Profile

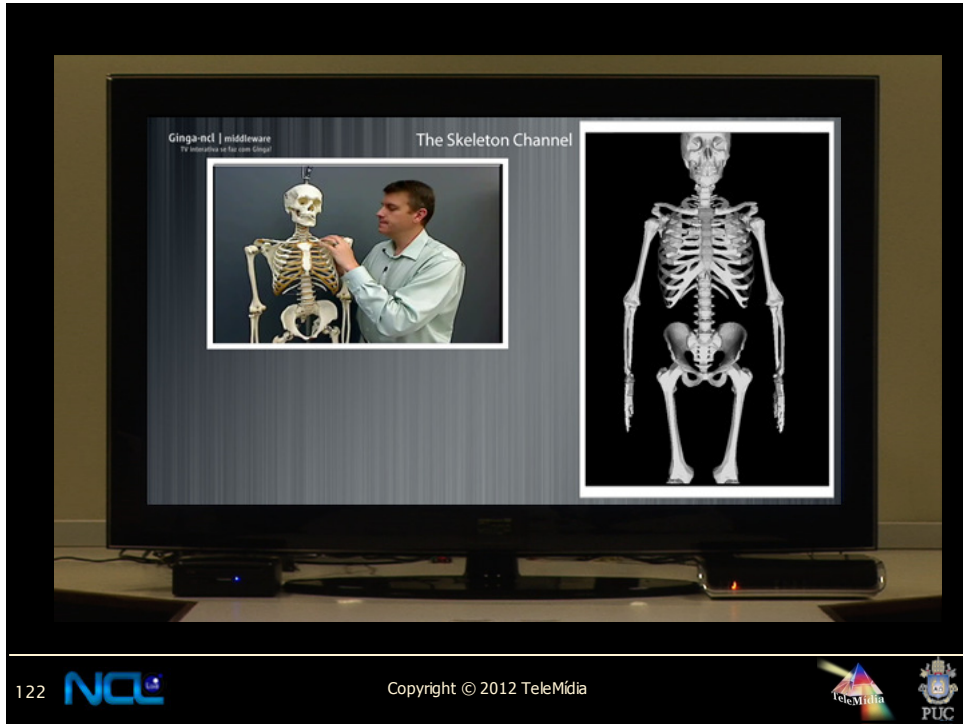
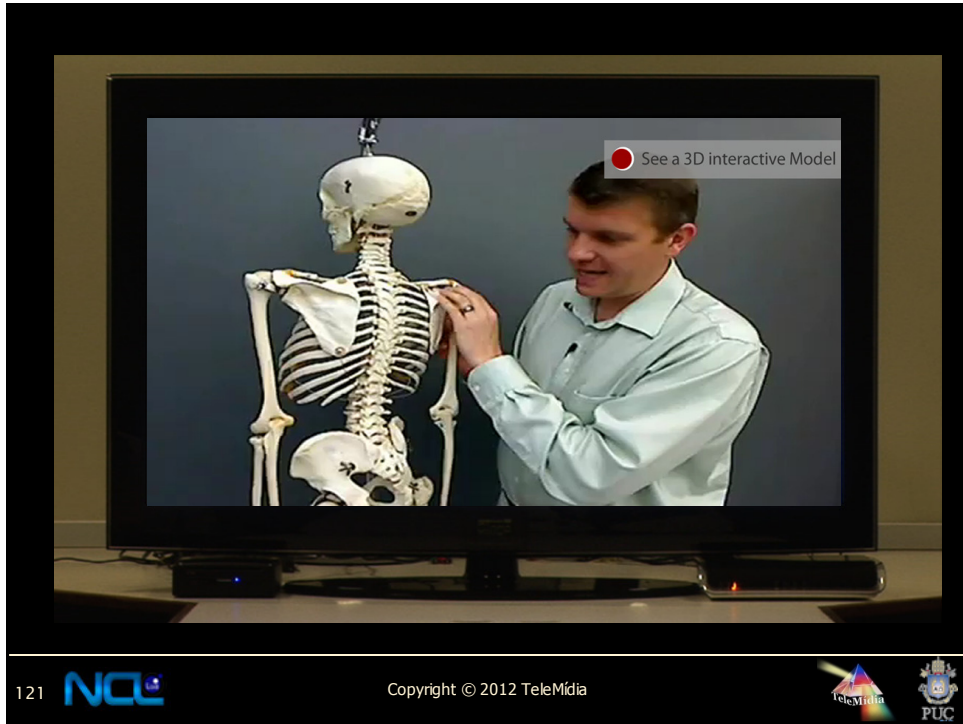


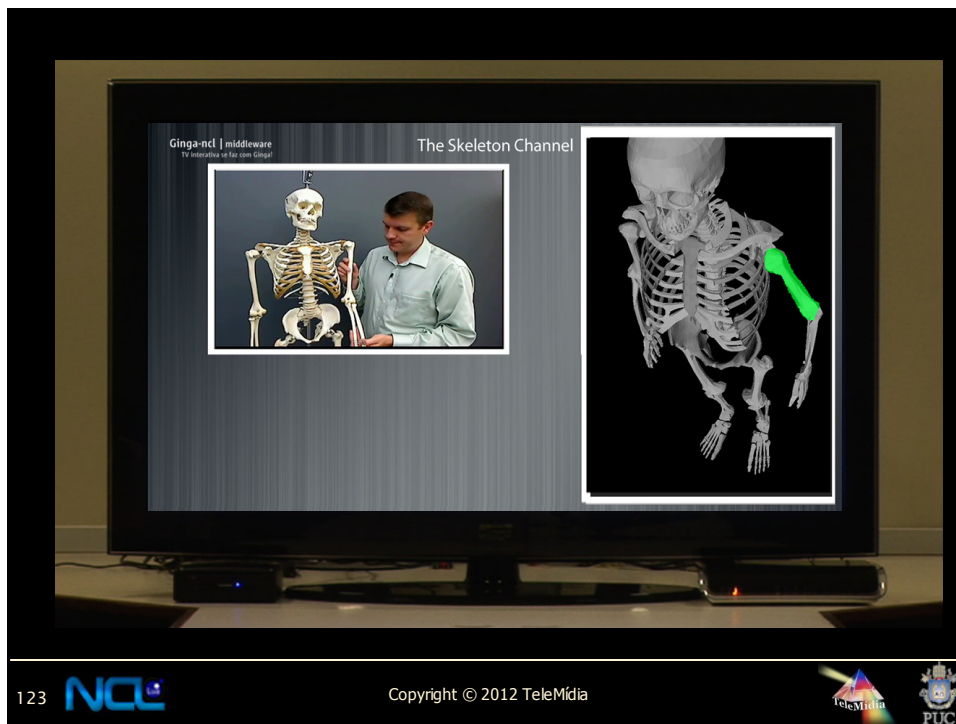
- Today NCL only allows media object exhibition on two dimensional rectangular regions.
- The next step is to allow defining media object presentation on 3D surface.

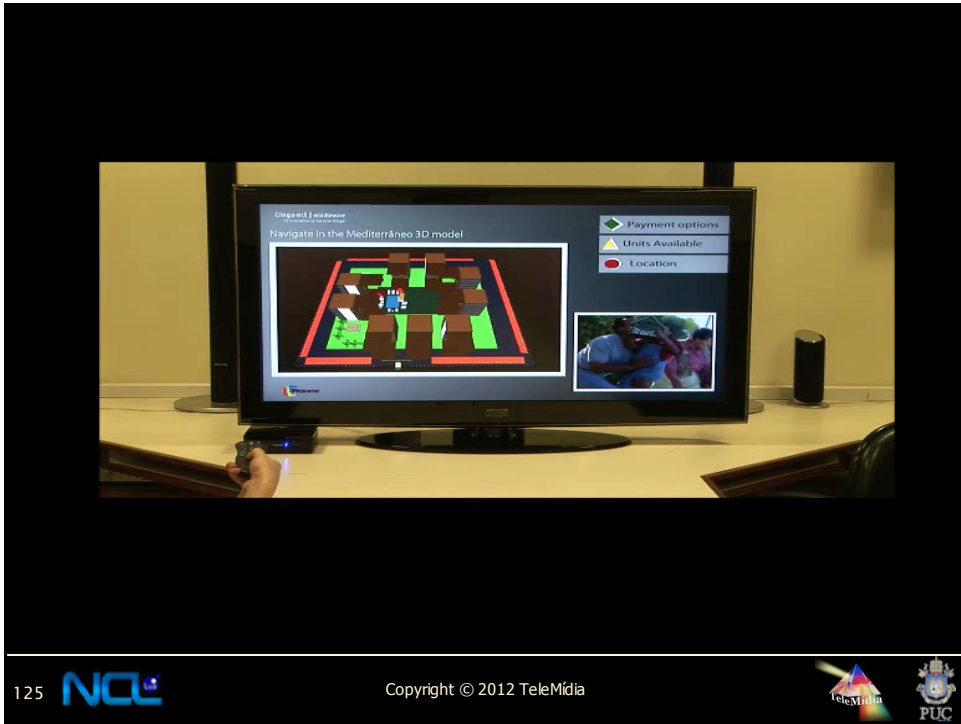
NCL 3D Profile



- As a glue language NCL should also be able to embed 3D objects, specified in another 3D language, like X3D.
- This 3D objects should be able to relate with other 2D and 3D objects, in the same or different 3D world.
- Moreover, the presentation should take profit of the multiple device facility of NCL in a true virtual environment, moving social applications one step ahead.







Digital TV only if with Ginga



<http://www.ncl.org.br>

<http://www.softwarepublico.gov.br>

<http://clube.ncl.org.br/>

<http://www.ginga.org.br>

<http://www.telemidia.puc-rio.br>

127 **NCL**

Copyright © 2012 TeleMídia

