Multimedia Terminal Architecture: An Inter-Operable Approach

Maria Teresa Andrade
INESC Porto, Portugal
(on behalf of Beilu Shao, EPFL)
Outline of the Presentation

- Problem Statement
- Challenges and Opportunities
- Proposed Solution
- Terminal Middleware Architecture
- Digital Item Browser Architecture
- Conclusion
- Acknowledgement
Heterogeneity

different types of core and access networks

diversity of content formats

DVB-T/S/C/H, UMTS, GPRS, cable, ADSL, dial-up, ...

diversity in client devices
Challenges and opportunities

Universal Media Access (UMA) concept
- benefits from the use of open and common formats;
- useful and complete descriptions about the context of usage;
- new forms of presenting and allowing the consumption of the content.

MPEG-21
- a complex and complete open framework to address the UMA requirements, among which
  - Digital Item “model” (DID, DIDL, DII)
  - Digital Item Adaptation tools (DIA)
  - Rights Expression Language (REL)

Still, many decisions to take on how to use and combine available tools
Approach

• Modular approach
  ◦ software “agents”:
    • collecting relevant contextual information
    • dealing with DRM
    • presenting the content
    • playing/reproducing the content
    • monitoring perceived quality
  ◦ middleware acting as the “glue” and coordinating actions with server

• Distributed, services-oriented strategy

• Content presented and interacted with as MPEG-21 Digital Items
Approach
Approach

server multimedia service

ENTHRONE terminal @ server side

ENTHRONE terminal @client
Terminal Architecture

- Distributed architecture based on Browser

![Diagram showing the distributed architecture with components such as IDIP Server, WDI Browser, WEB Browser, Webservice Server, TDM Server, TCP/IP Socket, TDM Client, QoS Player Server, Generic Adaptation Modules, UCD, UED, Video Audio Decoders, Media Player, QoS Probe, and Renderer. The network flow is indicated with HTTP request (over IP) and video (over IP/RTP/UDP).]
Approach for content presentation

• Client–Server distributed architecture
  ◦ optimized processing and distribution of load
  ◦ enabling different graphical interfaces

• Service–oriented architecture
  ◦ based on Web Services technologies
  ◦ promoting interoperability
  ◦ enabling software re-usability

• Web–oriented strategy
  ◦ user–friendly
  ◦ working in off–the–shelf software
DDI Browser: Distributed approach

- Architecture overview

Terminal Device

Generic Web Browser (IE, Mozilla, etc.)

DDI Web Services API

GDI Renderer

DIP server

MPEG-21 DDI Browser
DDI Browser Web-based strategy

- DIDL
  - Container
    - Container
      - Item 3
      - Item 4
    - Item 1
    - Item 2

- HTML
  - home page
    - Web page with menu list
    - Web page 1
    - Web page 2
    - Web page 3
    - Web page 4
Seamless presentation on different platforms

- using off-the-shelf Web browsers
Alternatives for graphical generation

- Separation between GUI generation and processing
  - same processing module with different GUIs

**Diagram:**
- Generic Web Browser (IE, Mozilla, etc.)
- Custom GDI Renderer (e.g., Java application)
- WDI Browser
- DDI Web Services API
- DIP server
- User terminal server
- WDI Browser
- Server side
- DDI Browser
- Client side
Terminal middleware

- TDM, Terminal Device Manager
  - providing device independence
  - binding together the different functionalities offered by the ENTHRONE terminal
  - appropriately routing the data
  - filtering the communication with the server
  - logging events
TDM

- provides to the DDI Browser functionality for the complete presentation of MPEG-21 DIs, supporting the use cases:
  - search for Digital Items
  - get a requested Digital Item
  - select a Digital Item for consumption
  - verification and purchase of licenses
  - play the selected Digital Item
Alternatives given the distribution and separation of graphical/processing
Conclusion

• Supporting inter-operability of multimedia terminal through digital item browser

• Optimized architecture with client–server distributed architecture, Web oriented applications, Web services communication interface

• Modular terminal architecture, offering multiple functionality for UMA, bind via the terminal middleware
Acknowledgements

- ENTHRONE II Project: EU Framework Programme 6 for Research and Development (IST–507637)
- ENTHRONE Partners
Thank you very much for your attention!