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S1: Network Functions on the Move
The Virtual Set-Top Box: On the Shift of IPTV Service Execution, Service & UI Composition Into the Cloud

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TELEKOM INNOVATION LABORATORIES

Agenda

- Background
- Virtual Set-Top Box
- Solution Approaches
- Locally vs. Cloud-rendered UI
- Key Challenges
- Summary & Outlook

Current vs. Future STB

Today:

- Proprietary closed content delivery platform
- High cost for set-top box acquisition and operation
- STB processing constraints
- Hardware deployment hassles
- Limited UI capabilities

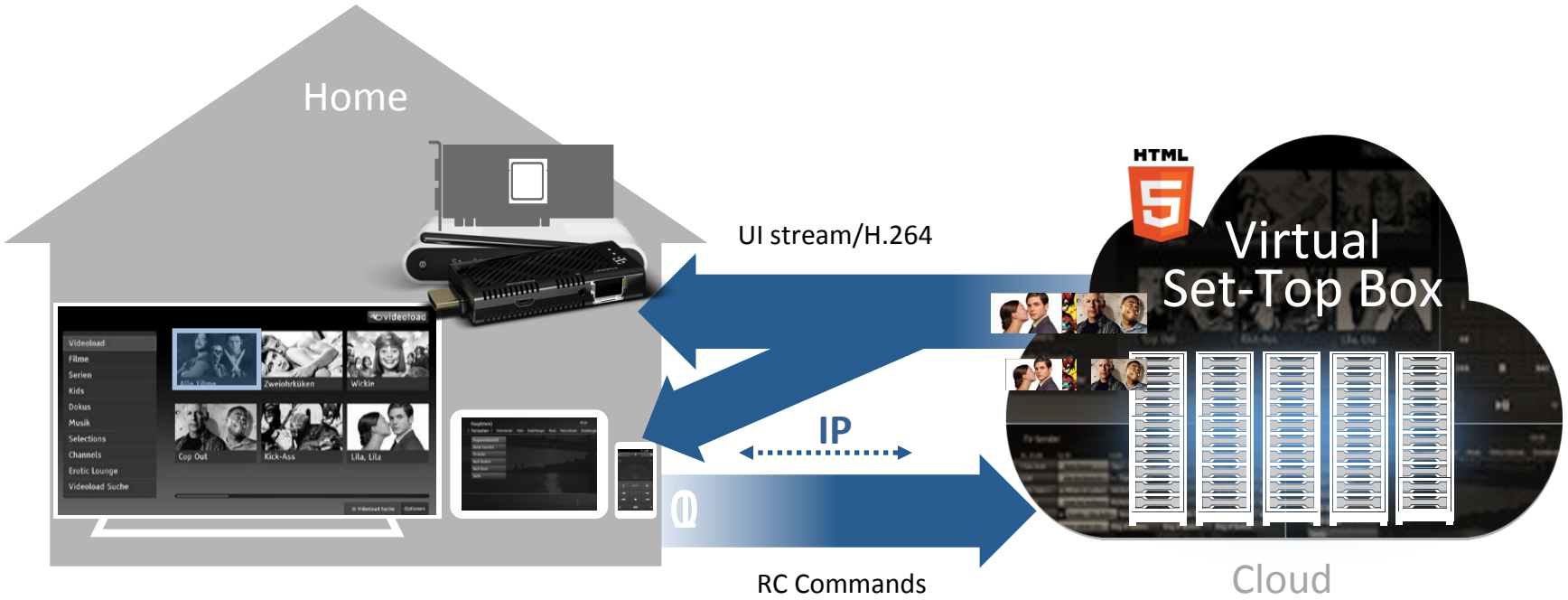
Restricted business options and service innovation due to the limited technical capabilities

Future Set-Top Box (STB):

- Playout of every content format, application and graphically rich TV UIs without performance penalties
- No expensive STB costs (inexpensive HDMI stick)
- No processing constraints (easy performance scaling via server based virtualization)
- Unified UI on every screen

Significant cost reduction potential regarding OPEX/CAPEX and flexible service innovation

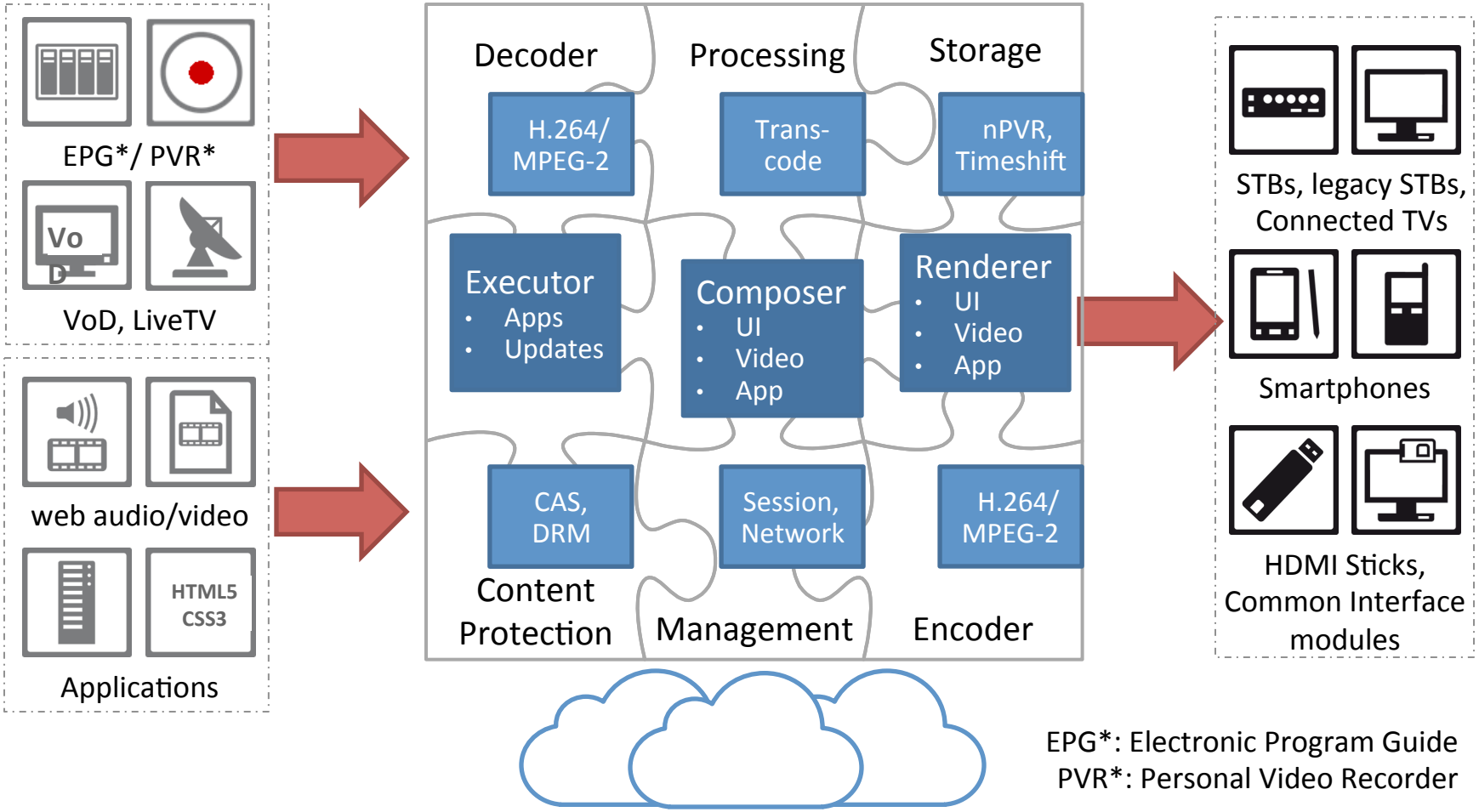
Virtual Set-Top Box Approach



Target Solution:

- Shift of most of STB middleware functionality (browser, …) to net-based media servers
- UI rendering, service execution and composition is network based
- Only H.264 capable decoding device needed for play-out
- Remote control command processing in the network

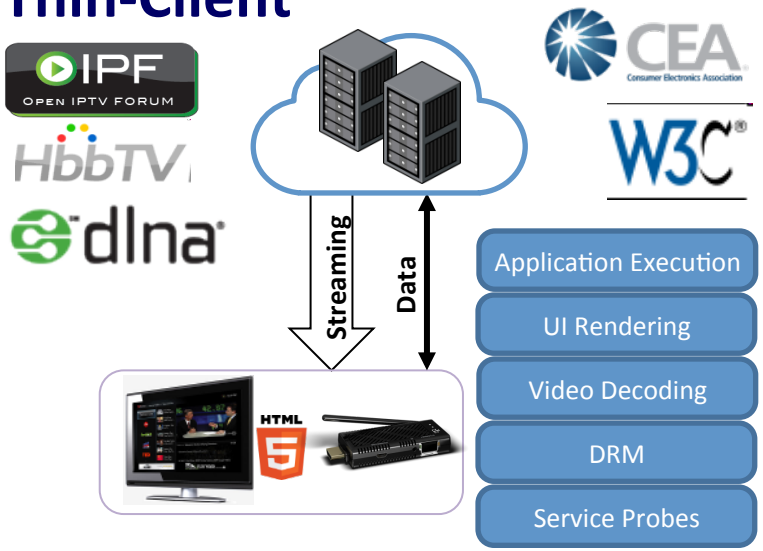
Virtual STB Functionality



EPG*: Electronic Program Guide
PVR*: Personal Video Recorder

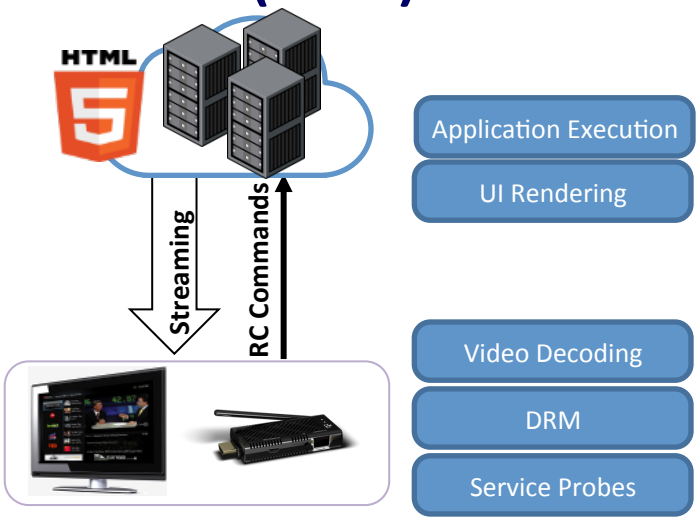
Thin vs. Zero Client

Thin-Client



- Browser based client (HTML5) and full Android/ Linux OS on HDMI stick
- Update management problems and costs as with a „traditional“ STB or media streaming box
- Main Advantage – available on the market.

Zero-Client (vSTB)

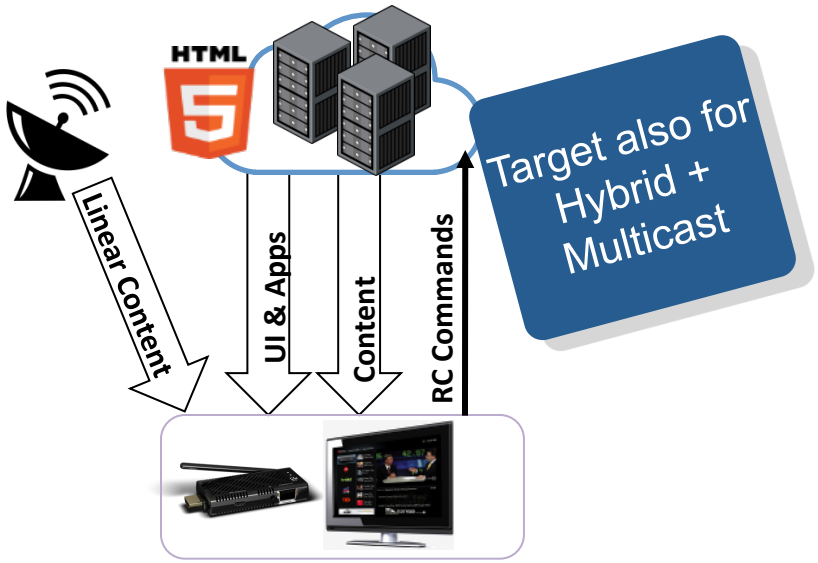


- Browser-less zero client on HDMI stick
- No significant client update problems
- Main Advantage – significant cost reduction on device and operations. Access to HTML/ web based eco-system for innovative application and services development

2013 — 2015 — time

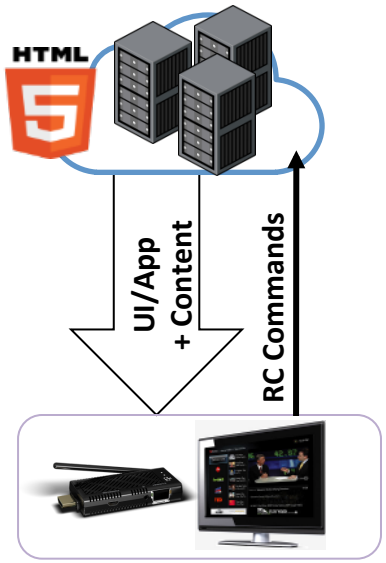
vSTB: Solution Approaches

Double Stream



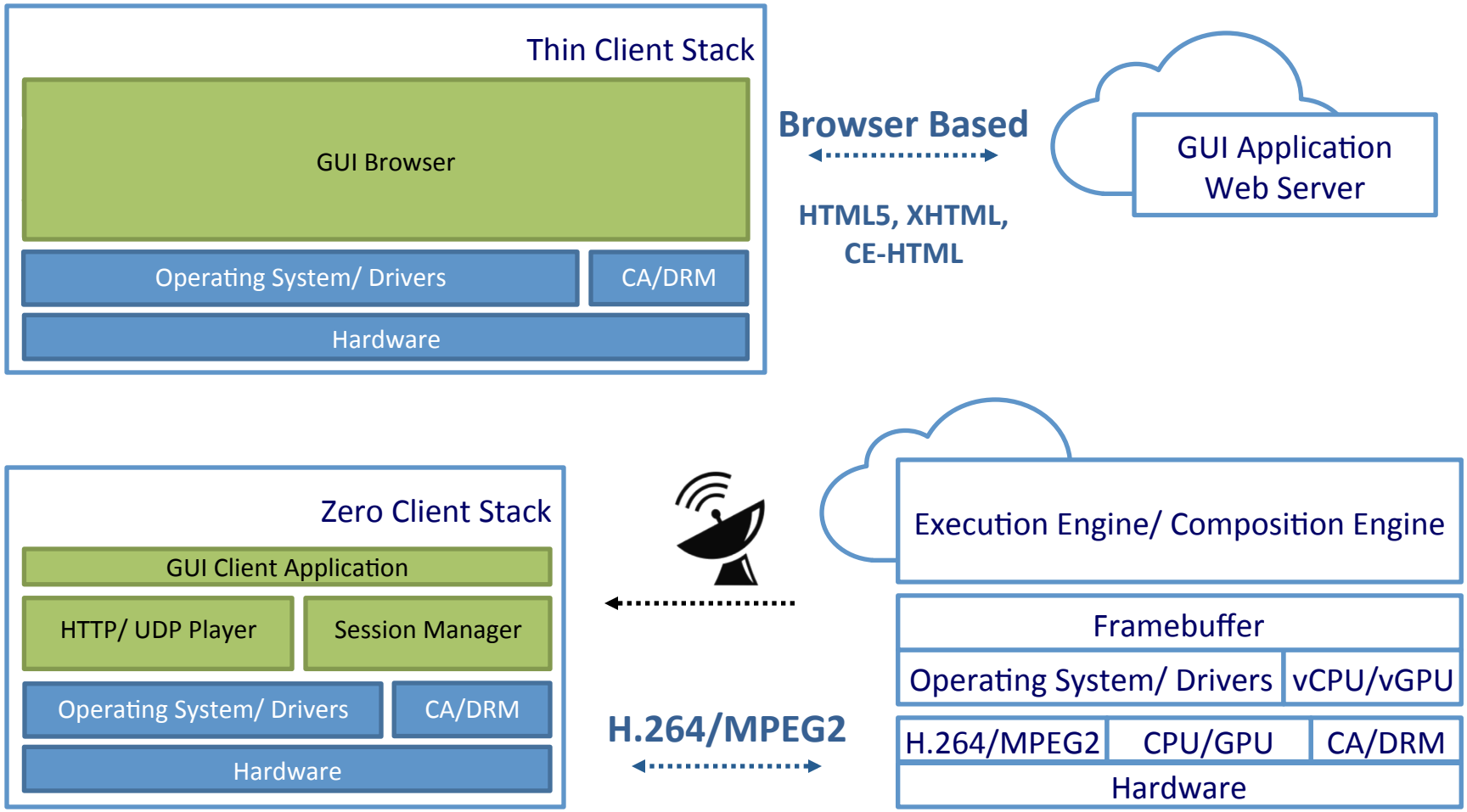
- Decoding box with dual DSP
- UI rendering on the server
- Composition of A/V streaming and UI in the STB
- Forwarding of RC commands via http

Single Stream

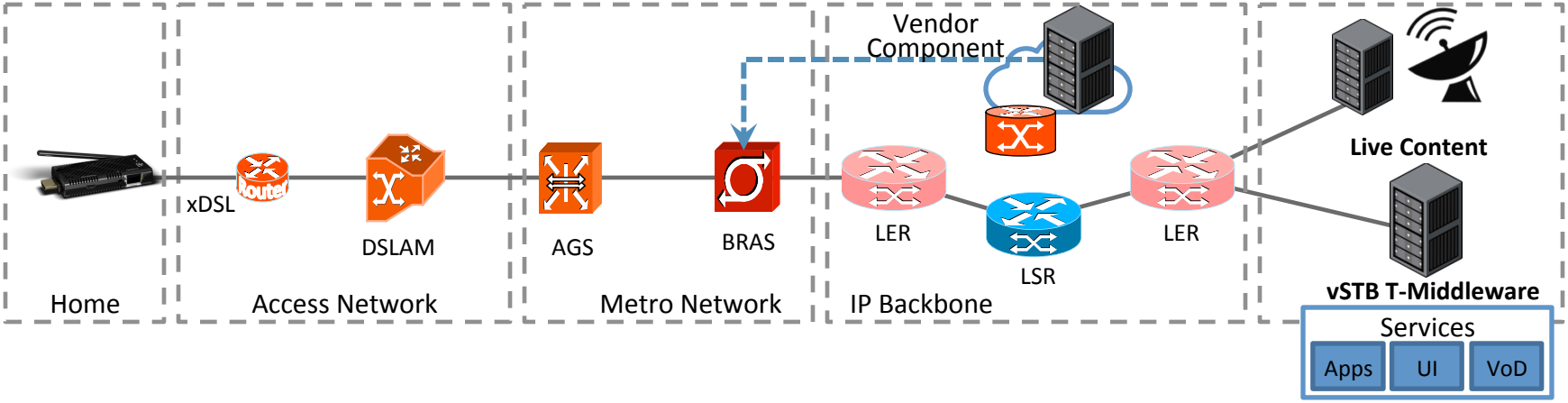


- UI rendering + service composition on the server
- GPU virtualization (VM for displays)
- Forwarding of RC commands via http
- Pure decoding box with H.264 decoding

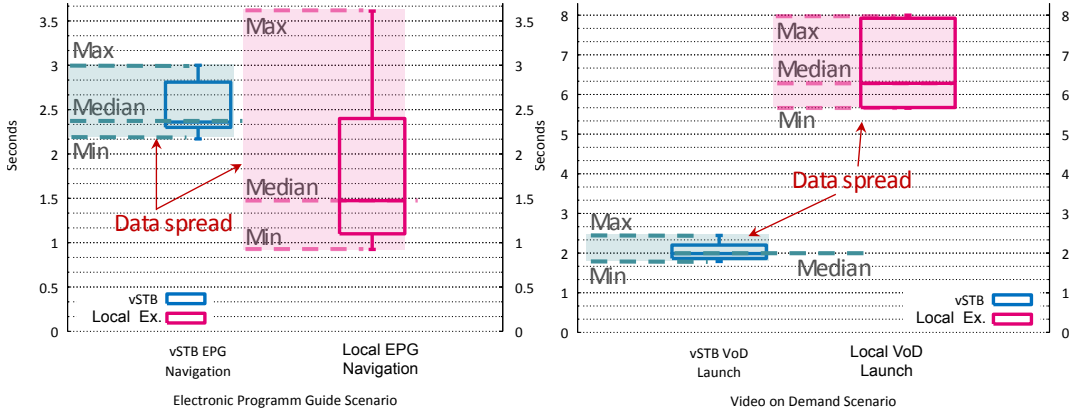
Client Stacks: today & future



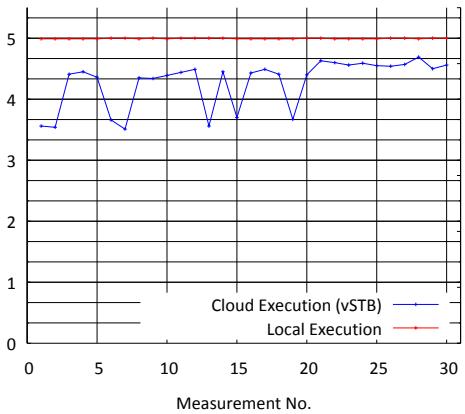
Locally vs. Cloud-rendered UI



Overall Latency*:



Video Quality*:



Cloud Execution: acceptable values for Overall Latency and Video Quality (MOS Value: Mean Opinion Score Value)

*Witbe Measurements

Key Challenges

Open Architecture & Standards/ Decoupling of main IPTV system components

Evaluation of a compromise between zero and thin client/ Evaluation of high performance CPU and GPU intensive server-side UI/UX generation

Service Composition: enablement and adaptation of services and combination of different services inside the cloud/ Services & Applications virtualization

Delivery of multiple Unicast connections into a single household/ Network optimization issues

Content protection on different user devices

QoS /QoE issues

Summary & Outlook

Start 2011	T-Labs have started to investigate the vSTB approach on technical and business dimensions in 2011.
PoC & Test	A feasibility study and lab proof-of-concept resulted in further investigations in form of lab trials and network testing under real world conditions
Implement	The next month will show when, how and where the described approach might be implemented.
Zero + Thin	The vSTB approach can be combined with „classical“ browser-based solutions and is therefore also a key candidate for migration scenarios or roll out for specific services (e.g. VoD, Apps, …)

The End

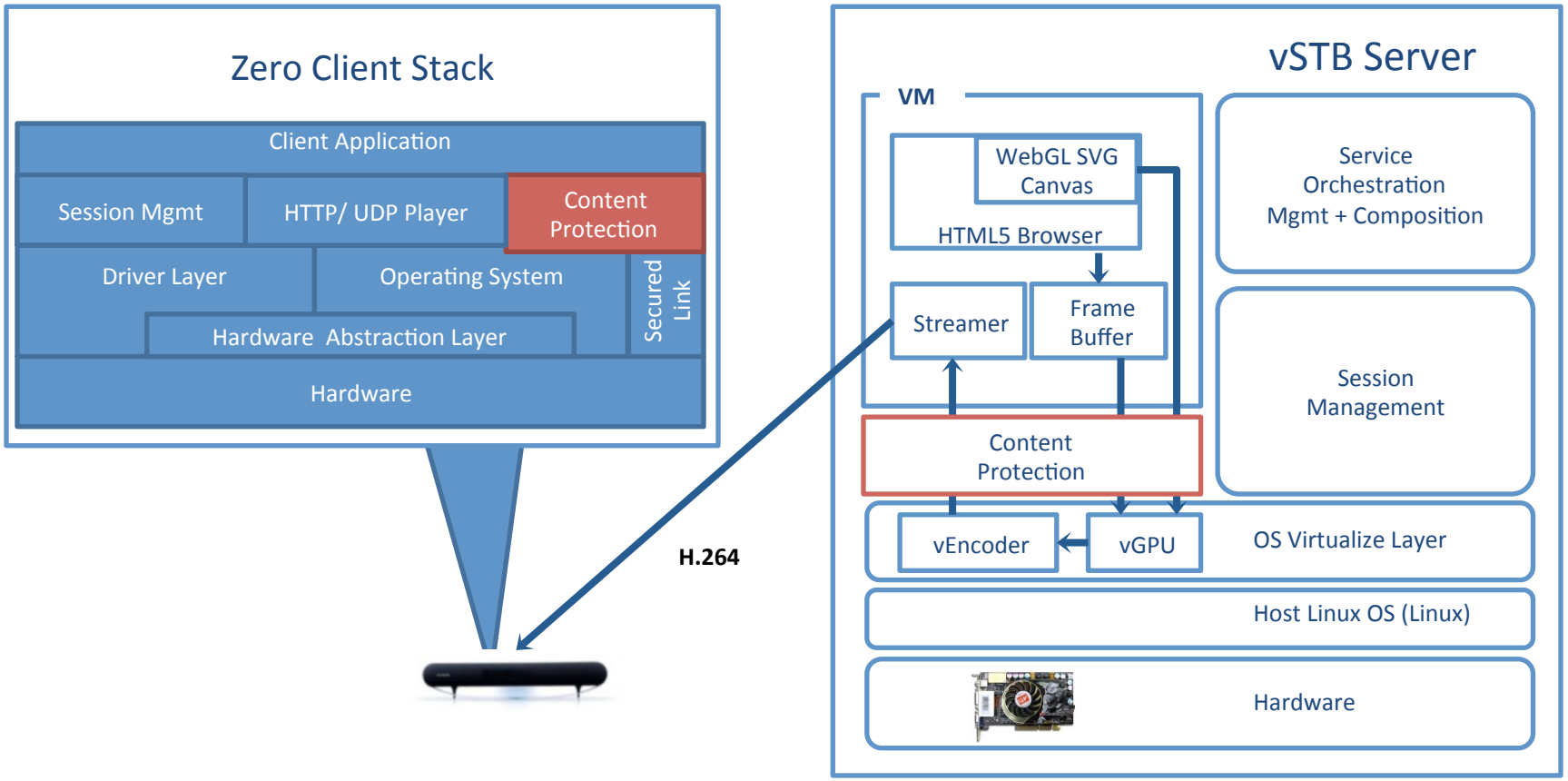
Alexandra Mikityuk

vSTB Innovations

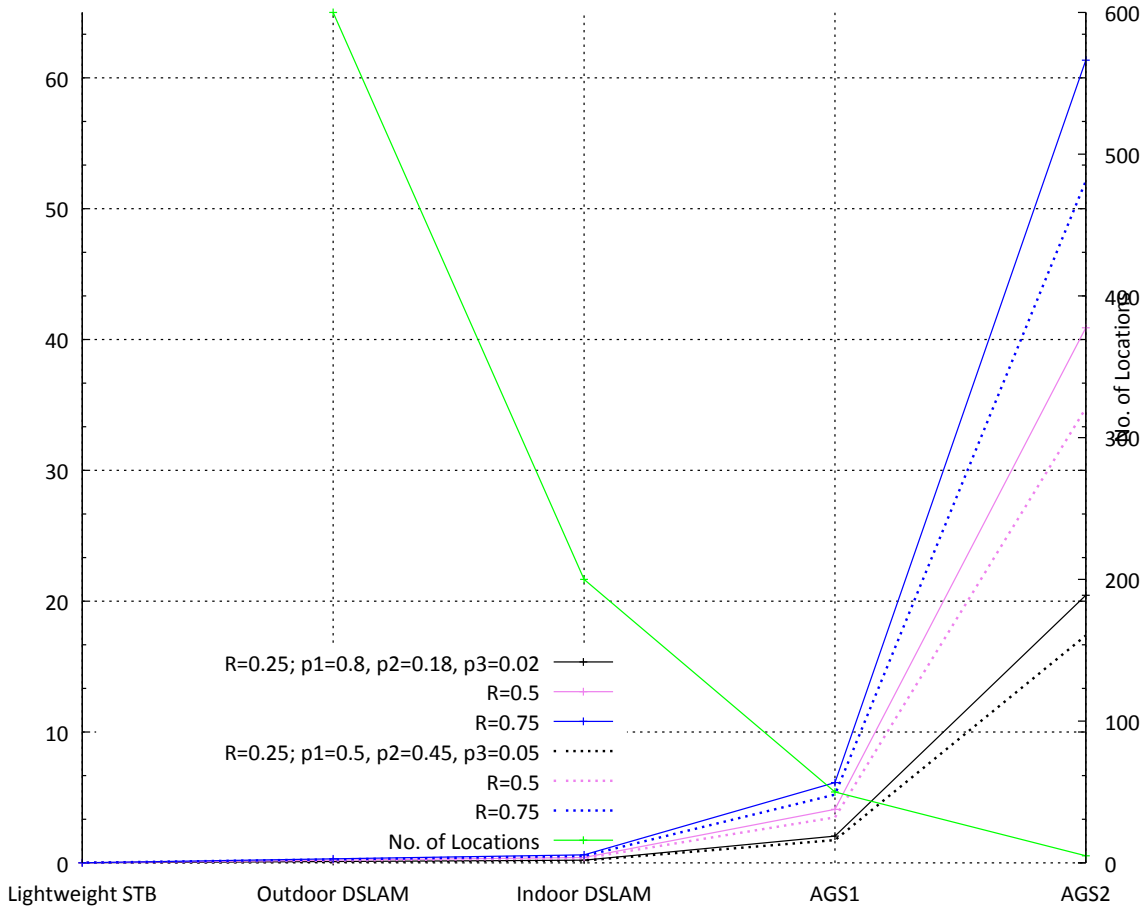
- Re-location of STB functionality to the Cloud
- CPE: standard H.264 decoding, group wide DRM and feedback channel to the Cloud/vSTB
- Services based on standard Web technologies (HTML5)
- Injection of vSTB → decoupling of main IPTV system components + openness of all interfaces
- ROI for existing IPTV middleware + easy future exchange of middleware (not an E2E change)
- Quick and cost-efficient scaling and new services launches via virtualized vSTB components

Prototypical HTML5 Services

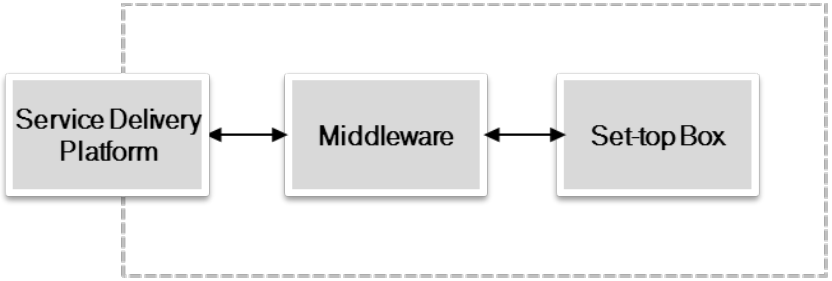
Content Protection

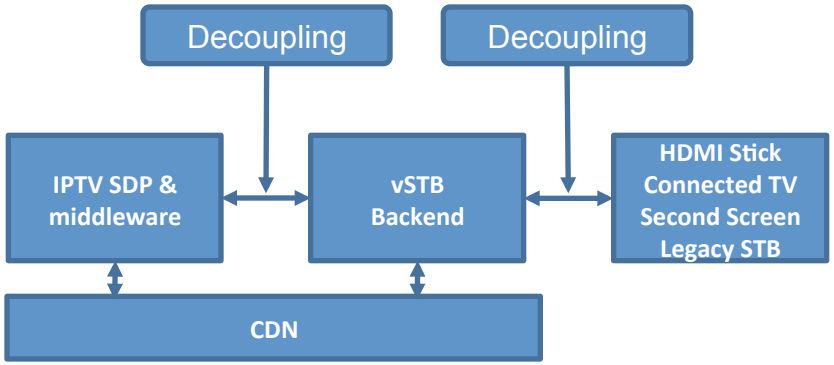


Bandwidth Consumption



Decoupling


Service Delivery Platform
Middleware
Set-top Box


Decoupling
Decoupling
IPTV SDP & middleware
vSTB Backend
HDMI Stick
Connected TV
Second Screen
Legacy STB
CDN