HbbTV App Testing- Challenges and Solutions

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About Eurofins Digital Testing

• The Leading Digital Media Testing Company
• ISO17025 Accredited
• 162 people in UK, Belgium and Hong Kong
• Formed in June 2015 combining Digital TV Labs and Testronic Labs
• Part of €5billion Eurofins Group
• HbbTV Board Member and Registered Test Centre
• Main contributor to HbbTV Association Official Test Suite
• Built test suites and run test services for France TNT2, Spain TDT, Germany Media Broadcast, Australia and New Zealand Freeview Plus and Freeview Play
HbbTV Challenges

“OLD WORLD”

Proprietary Middleware
Operator owns STB
Interoperability by heavy testing
Head-end “camping”
Small number of devices

“NEW WORLD”

Lots of different devices
Typically Horizontal market
No control of platform
Interoperability challenge
What is Interoperability?

- HbbTV’s big advantage is many devices
- HbbTV big disadvantage is many devices

Interoperability means:
- Same App works on all devices
- App developer writes app once. No “If device = x do y”
- App developer does not need to debug the TV
- App developer can update the app with confidence

Interoperability means:
- Lower costs of app development
- Lower costs of manufacturers
- Lowers churn
- Consumer gets what he expected
- Happier customers
- Reduces time to market

Things just work!!
Interoperability Headache

Estimate 50+ manufacturers of HbbTV Devices.
Interoperability Headache Plus

2014

Low-End Platform

2015

Mid-End Platform

2016

High-End Platform
Not all Manufacturers are Equal

App Developers Select Main Devices
In many markets manufacturers are under no compulsion to run the HbbTV Test Suite

Some national/operator platforms enforce testing & certification, including apps.

Dr Jekyll Manufacturers
- Care about brand and quality
- Will run and pass the HbbTV Test Suite
- Also do their own App testing

Mr Hyde manufacturers
- Low margin and costs
- No thorough HbbTV testing (recent test >40% failure rate)

Common Issues – DASH, Ad Insertion, GIF animation and general performance, DRM, state transitions

Conclusion:
Devices are very variable!
TV App Ping Pong

App Developer: Is my App or is it the TV?

TV Manufacturer: Is my TV or is it the App?
• Some apps
  • don’t implement the spec correctly, or do things not included in spec (e.g. downloadable fonts)
  • do things in spec not well covered in HbbTV Test Suite (e.g. stateful applications)
  • depend on wider eco system (dynamic content from multiple sources, CDN for video etc)

• Security: increasingly high profile and a major concern for consumers.

• Can and do test against apps
  • in recorded streams (not necessarily current – what if they change)
  • sometimes live (if not geo-blocked or whitelisted…)
    • e.g. Eurofins Ligada iSuite comes with a Live app test suite

• Manuf. end up doing a lot of debugging e.g. (among others)
  • Wrong mime type in HTTP response header from server
  • Incorrect (missing?) error handling, leading to applications hanging
  • Application not XHTML compliant
  • Failing to stop broadcast video while playing OTT content
  • Incorrect use of SetFullScreen() API when app launches, giving incorrect aspect ratio for broadcast video
  • Applications requesting more keys than necessary on start-up
  • Error on web server meaning that broadcast video was completely covered by a white square

• If problems can’t be resolved then blacklisting (by app, or tv) = lost revenue
- App can conditionally run on devices
- Device can conditionally run apps!
- HbbTV app can access UserAgent String
  - Different HbbTV versions support
  - Reject untested devices
  - Different app version for low end devices
  - Reject known problem devices
  - BUT not as robust as using device certificates
- Device certificates
  - Device tested and certificates enable access to the platform
  - e.g. Freeview Play
HbbTV is not just HTML on a TV

HbbTV is a sub-set of HTML5

HbbTV has API extensions

- AIT Stream Launching
- DSM-CC Apps
- Restricted Memory footprint
- Life cycle management
- Performance variation of platforms
- Operator mandated optional functionality
HbbTV App Testing Options

• **Standard Web HTML App test tools/approaches don’t work**
  • No WebDriver support
  • Need AIT Stream launcher
  • Unable to test stream dependent features
  • Automation hard: IR blaster, screen capture and analysis

• **HbbTV Application Testing Approaches**
  • Do nothing – let the customer find the bugs 😞
  • Use a PC simulator
  • PlugFests
  • Manual testing “receiver zoo” and Live App test suite
  • Black box testing – S3 type automation
  • Static analysis testing
  • Software instrumentation tools
• Run HbbTV app on PC adapted browser
• Eg Mozilla plug-in FireHbbTV from ATOS
• Disadvantages:
  • Test platform is not the same as deployment platform(s)
  • Some APIs/capabilities not implemented
  • Unable to test stream dependent features
  • Risk of false positives and false negative test results
HbbTV PlugFests

- Run by HbbTV Association (and others in country)
- Open to non-HbbTV members
- Variety of participants
  - Manufacturers
  - App developers
  - Operators/broadcasters
  - Service providers
- Particularly good for early access technologies (eg HbbTV2.0)

Also
- Wiki resource for app developers:
- HbbTV “Improving Interoperability Task Force”:
  - https://member.hbbtv.org/kws/groups/IITF
• HbbTV Application Validation Tools
  – Static syntax web tool
  – Check that applications are only using HTML/JavaScript/CSS which is supported by the HbbTV Specification
  – Checks usage of OIPF JavaScript APIs
  – Checks that any files, including media objects, referenced by or contained within the application are accessible
  – Free service
  – Eurofins Validator http://ligada-validator.com/
  – IRT http://hbbtv-live.irt.de/validator/
HbbTV App Testing Zoo

- Single site for HbbTV device testing
- Check App on wide range of devices and debug
- App developers and broadcasters typically have mini zoo
- Eurofins has a large ‘zoo’ of HbbTV devices – iDTVs and STBs
Automation Testing for STB and iDTV
• Uses HDMI and screen capture
• OCR and image recognition
• Advantage: non-intrusive
• Disadvantage: High capital investment
• Typical test case costs $300+ each to develop

Example: Eurofins TestWizard
• ScriptStudio productive scripting environment
• RobotManager for test execution control
• Integrated script debugger
• Platform and Device independent
• Detailed reporting and logging
• Multi-device scheduling
• Used by Kabel Deutschland
Problem: HbbTV Application Testing is largely a manual exercise
  • Most TV device browsers don’t support WebDriver
    • Standard HTML test tools such as Selenium don’t work

Solution: Sengo HbbTV App Testing Tool
  • Instrumented approach
    • Intercepts URL and adds test agent to HbbTV app
    • No specialist hardware needed and low cost
    • Test across multiple platforms quickly and easily
    • Works on any app (live, in development, locally served or public)
    • Can analyse DOM to check app execution, performance, player state...
    • Uses web and mobile industry standard Selenium test script
    • Pixel level image capture and analysis not yet supported

http://www.eurofins-digitaltesting.com/test-tools/sengo/
Uses Selenium: scripts may be written in many languages

JavaScript

Python

Ruby

etc.

See our demonstration!
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