

HbbTV App Testing- Challenges and Solutions

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- 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

Pay-TV Operator



“OLD WORLD”

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

Connected TV
Operator/Broadcaster



“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!!



Estimate 50+ manufacturers of HbbTV Devices.

Interoperability Headache Plus

2016



2015



2014



Low-End Platform



Mid-End Platform

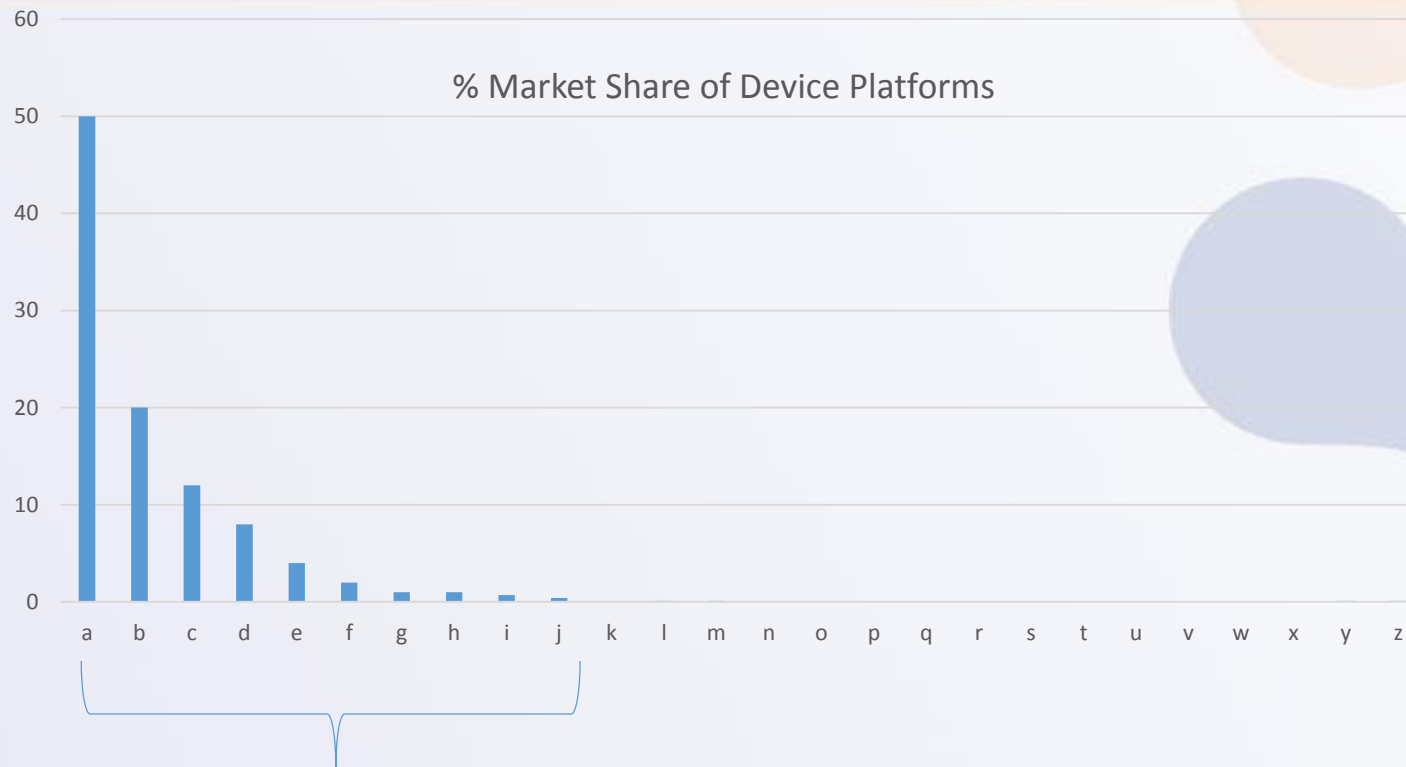


High-End Platform

HBBTV 2.0

HBBTV 1.5

HBBTV 1.1



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?

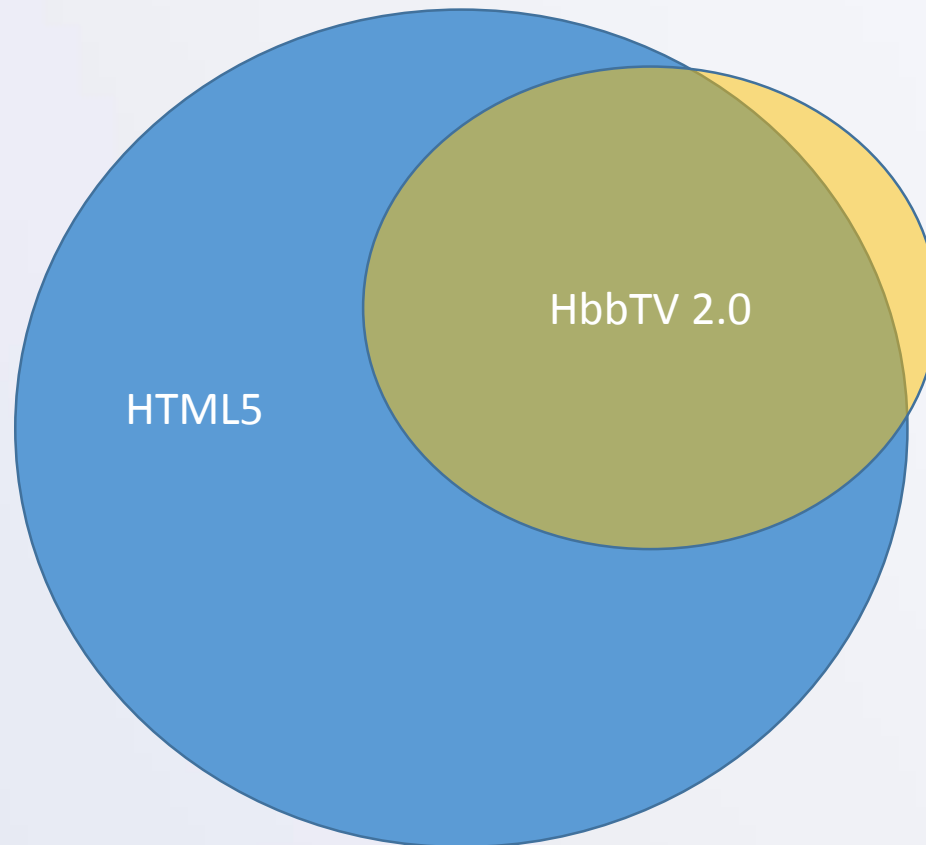
- Some apps
 - don't implement the spec correctly, or do things not included in spec (e.g. downloadable fonts)
 - do things in spec not well covered in HbbTV Test Suite (e.g. stateful applications)
 - depend on wider eco system (dynamic content from multiple sources, CDN for video etc)
- Security: increasingly 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. 



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

- **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)

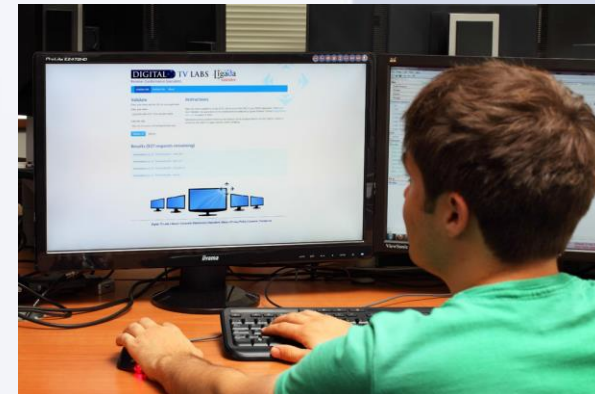


Also

- Wiki resource for app developers:
 - http://www.hbbtv-developer.com/site/wiki/index.php/HbbTV_Wiki
- 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



Black Box Testing

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



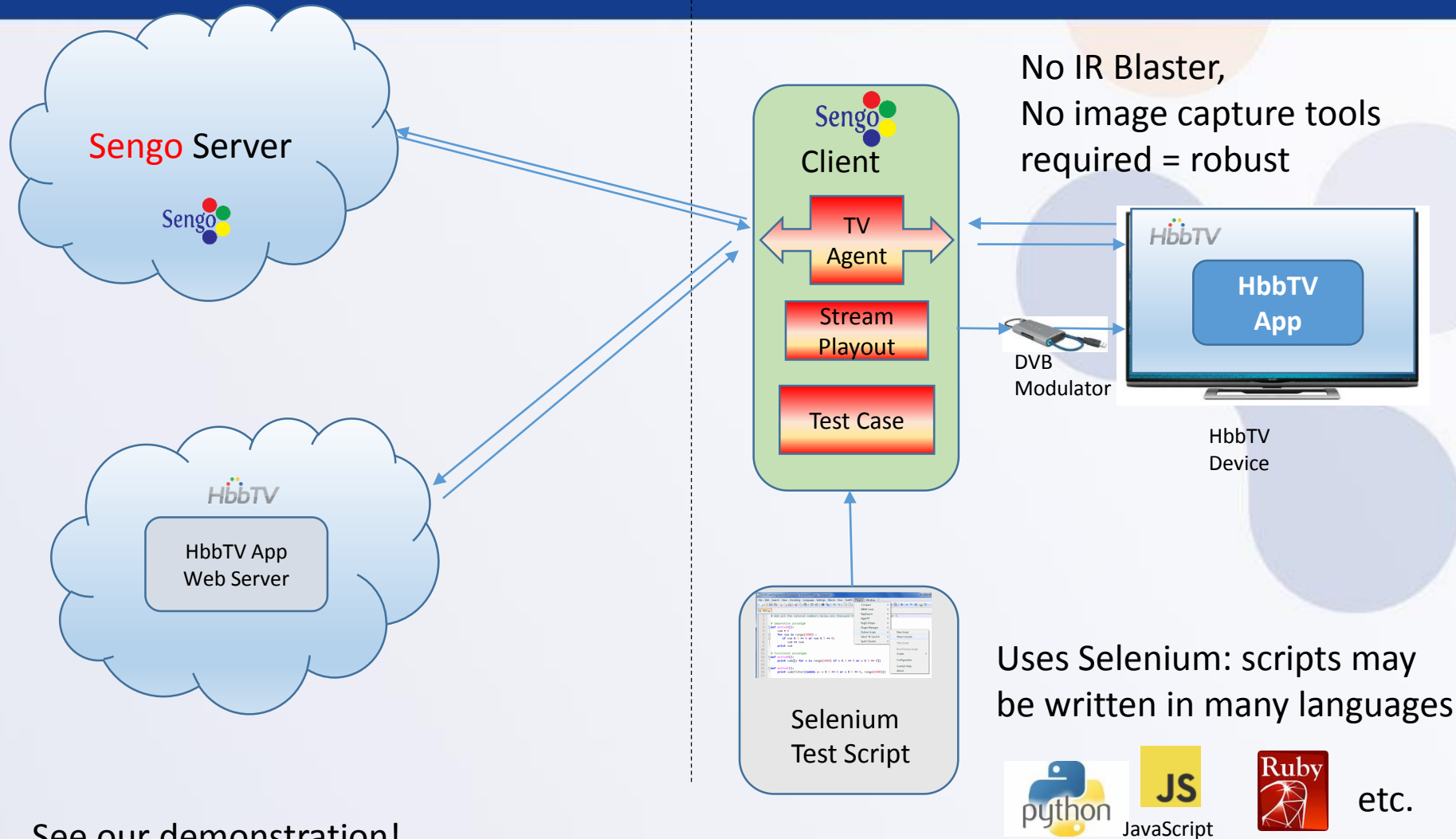
Problem: HbbTV Application Testing is largely a manual exercise

- 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





See our demonstration!

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