

Operator Privileged Application Layer

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Abstract— The Operator Privileged Application Layer (OPAL) is a set of JavaScript APIs used by a smart TV application to access several TV functionality such as tuners, PVRs and broadcast metadata. OPAL was designed to allow operators to deploy applications on smart TV platforms with privileged properties like home screen prominence. Using well established industry standards namely OIPF Declarative Application Environment specification [1] and ETSI TS 102 796 v 1.2.1 [2], OPAL was designed to interoperate out of the box allowing for maximum application portability between different CE manufacturers. With appropriate commercial agreements in place, OPAL can be deployed in two modes a full and cooperative mode.

I. INTRODUCTION

There is a growing trend in the digital TV industry for an “operator as an application” model, where service providers offer their services directly through an integrated digital television (IDTV). Enhanced IDTV performance, packed with rich technical features together with the ubiquitous availability of HTML browsers allowed such model to become increasingly viable. Key to the ongoing success of this model is the creation of a common interface between the IDTV and the application, enabling applications to be portable across wide range of television models from different manufacturers.

Existing operators using this model have integrated their applications using the manufacturer’s specific interfaces. Moreover, such services are often limited to IP based services and not hybrid (IP and DVB) television services. There has been some standardisation in this area, mainly based around the Open IPTV Forum (OIPF). OIPF DAE specification allows HTML applications to access television functionality such as tuners, PVRs and EPGs. However, the specification is complex and encompasses a wide range of use cases, therefore a simplified profile is not only recommended but a necessity. To date a clear profile for “operator as an application” has not been established. Freesat has used its experience in launching the <free time> service, an advanced HTML hybrid TV guide and its close relationship with television manufacturers to develop the Operator Privileged Application Layer (OPAL) specification. OPAL is a profile and extension of OIPF

DAE 1.2 defining the required interfaces to support a privileged operator hybrid application running on consumer electronics devices (e.g. IDTVs and set-top boxes). OPAL will provide service providers the opportunity to deliver consistency across a range of TV platforms.

II. APPLICATIONS

A. Privileged Applications

Freesat has defined the concept of a privileged application that is provided a high-level of control of the IDTV, under appropriate commercial terms and consumer opt-in. A privileged application executes on a web browser using standard web technologies (i.e. HTML, JavaScript, CSS, XML). The scope of an operator-privileged application would typically cover:

- Channel browsing banner overlaying live broadcast (i.e. showing now and next program information)
- Full screen multi-day guide (possibly backwards as well as forwards) with direct access via a dedicated remote control keys
- On-demand content access
- Content search across EPG and on-demand applications
- Advanced content discovery (e.g. recommendations, editorial picks etc.)

An operator-privileged application may also access other applications (without a privileged status) to extend the service functionality or content

offering; for example, accessing on-demand players from 3rd party providers.

B. Application Profiles

There are two profiles of OPAL

- Full
- Cooperative

The Full profile is where the operator application takes full control of the CE devices user interface and all features, including home menus, settings and user profiles. The Cooperative profile is where the operator application works cooperatively with the CE devices native interface. With a cooperative model the service provider and the CE vendor can retain an appropriate level of prominence. Figure 1 shows the software stack for the Full profile.

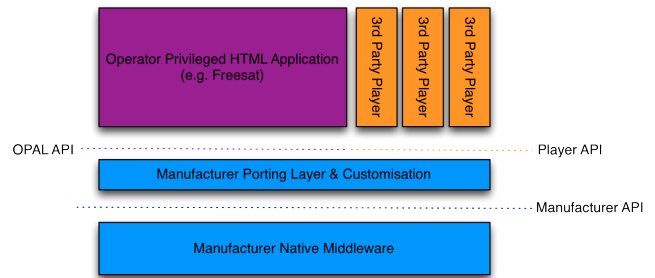


Figure 1: OPAL Application Model (Full Profile)

Figure 2 shows the software stack for the Cooperative model.

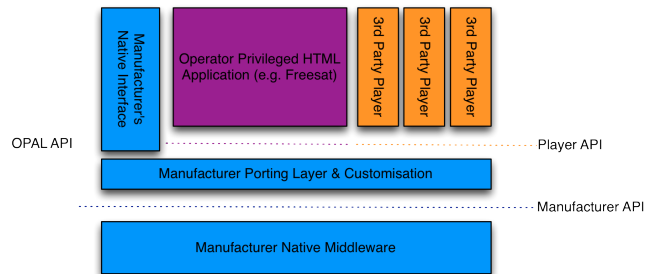


Figure 2: OPAL Application Model (Cooperative Model)

III. BROADCAST/WEB APIS COMPONENTS

The following OIPF broadcast APIs were used and enhanced within OPAL:-

1. Device setting and configuration
2. Platform settings and configuration
3. video/broadcast object – tuner control
4. ChannelLists and Channel objects
5. Metadata Search over EITp/f and EITsch
6. PVR and TimeShift interfaces
7. ParentalControl
8. Programme object
9. Broadcast/Broadband metadata

Additionally the following HTML5 Web APIs were profiled:-

1. HTML5 media elements with Media fragments and MSE
2. Web Storage

3. XHR and CORS requests
4. Use of Encrypted Media Extensions for interfacing with DRM systems

IV. FUTURE DIRECTION

We are exploring further developments to OPAL through extending our specifications to include solutions using the following technologies:

1. Using <video> tag for broadcast video
2. Seamless switching and control between broadcast video and TimeShift video
3. Better support for PVR APIs within HTML5 Media APIs
4. Indexed Database APIs for data management
5. The use of Web Workers for enhanced performance
6. MSE/EME and DASH for seamless advert insertion across diverse content types (free/paid, short/long form)

V. REFERENCES

- [1] Open IPTV Forum, "Release 1 Specification, Volume 5 - Declarative Application Environment V1.2," OIPF, September 2012.
- [2] ETSI TS 102 796 V1.2.1 Hybrid Broadcast Broadband TV, November 2012.