OMWeb

Open Media Web

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Standardisation Workshop report 2

June 2011

Standardisation Workshop Report 2

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[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the grant agreement

[2] The home page of the website should contain the generic European flag and the FP7 logo which are available in electronic format at the Europa website (logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm ; logo of the 7th FP: http://ec.europa.eu/research/fp7/index_en.cfm?pg=logos). The area of activity of the project should also be mentioned.

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1 SUMMARY

This document reports on the W3C Workshop W*eb and TV* held in Berlin in February 2011. There were 114 attendees with 65 papers received. The workshop contributed to the launch of a new W3C Web and TV Interest Group. This group was created to provide a forum for Web and TV technical discussions, to review existing work, as well as the relationship between Web and TV services, and to identify requirements and potential gaps that standardisation may need to address.

2 INTRODUCTION

The standardisation work package of the OMWeb project addresses the aim to "Increase European Standards Activities in Web-based Networked Media". The workshop on Web and TV held in February 2011, co-organized by OMWeb and Webinos[3], and the work that has followed from it, have gone a long way to achieving that aim. It attracted 114 attendees — more than 50% from European organizations — and kicked-off discussions on standardization needs to enable convergence between Web and TV.

TV has started to connect to the Web, driven by business opportunities that take advantage of devices connected to the home network as well as user preferences and social interactions to enhance the overall experience of watching TV. Similarly, the possibility to attract premium video content to the Web has led Web technologies to evolve and consider TV requirements.

The convergence thus needs to happen both ways, requiring the collaboration between traditional actors of the TV world (e.g. broadcasters, content providers, TV and set-top box manufacturers), actors of the Web (e.g. browser vendors and companies that have started to use the Web to deliver media content such as Netflix) and organizations seeking to standardize technical solutions at various levels such as HbbTV, EBU, ITU-T, Open IPTV Forum, UK DTG, etc.

This workshop was organized to bring these actors into the discussion, and share perspectives, requirements, and ideas to ensure that emerging global standards meet their needs.

This document reports on the proceedings of the Berlin workshop[4] and highlights main updates since then. Accepted position papers and slides presented at the workshop are listed in Appendix.

This workshop is the second one in a series of regional workshops organized by W3C on Web and TV. A first workshop was held in Tokyo in September 2010[5] and a third workshop is to take place in September 2011 in the US.

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[3] Secure Web Operating System Application Delivery Environment, FP7 EU project, http://webinos.org

[4] http://www.w3.org/2010/11/web-and-tv/

[5] http://www.w3.org/2010/09/web-on-tv/

3 REPORT ON THE PROCEEDINGS

This section is an edited and updated version of the report first published on the W3C Website immediately after the event.

Executive Summary

During the wrap-up session, workshop co-chairs provided a draft list of topics as starting point for discussion. Active discussion helped improve the list. Votes were held on possible next steps for most items.

There was consensus to use the Web and TV Interest Group to centralize and coordinate discussions on topics relevant to the Web and TV space, through the group's public mailing-list <public-web-and-tv@w3.org>, where candidate topics for the creation of task forces within the group may be suggested. Task forces that are supported by IG participants will be created to move these topics forward. Possible outcomes for each Task Force are: the creation of a new Working Group, new requirements for existing Working Groups, identification of work that is satisfactorily done outside W3C and has industry-wide consensus.

Workshop chairs suggest the following conclusions as a list of candidate topics for possible task forces or monitoring activities within the Web and TV IG:

- **Adaptive streaming over HTTP**: The IG needs to assess whether the MPEG DASH specification may be licensed on a royalty free basis for integration as a core Web technology, through discussions with 3GPP and MPEG DASH working group members. Due to timing constraints, Web and TV IG chairs prepared and sent a first letter to 3GPP members on DASH as a workshop outcome. Discussions on adaptive streaming integration should include potential support for DRM.

- **Home networking**: Device discovery and real-time communications between devices are pre-requisites for most home networking scenarios. As mentioned during the wrap-up session, the draft charter of the Web Real-Time Communications working group was under review by the W3C Membership as of 28 February 2011. Device discovery is also being discussed for inclusion in the next charter of the Device APIs and Policy (DAP) Working Group. The Web and TV IG should monitor and coordinate these discussions. A working group dedicated to device discovery and/or higher level functionalities for second-screen scenarios may need to be chartered if these groups do not address home networking scenarios requirements.

- **Metadata**: The Web and TV IG should propose a vision on metadata and work on a roadmap for convergence between W3C developments and industrial developments or television and radio standardisation activities.

- **Accessibility**: The Web and TV IG welcomes participants with expertise on accessibility as early as possible. The IG should see if and how to harmonize WCAG 2.0 with various accessibility regulations from the TV world, and explore how works on multi-modal interactions and Accessible Rich Internet Applications (WAI-ARIA) enable the design of applications that work on heterogeneous devices.

- **Profiling / Testing**: The Web and TV IG should work with the working groups responsible for the definition of standards that may need profiling (HTML and CSS WG in particular) to address specific requirements from TV actors. Workshop participants are strongly encouraged to contribute to the testing effort on Web technologies they need.

- **Extensions to HTML5**: Several functionalities have been discussed at the workshop (support for multiple tracks, secure device identification, support for « trick modes » (common video playback functions, e.g. pause, play, fast forward, fast rewind, slow forward, slow rewind, jump to previous or future frame) and recording, synchronization of video content, needs for specific content metadata). The Web and TV IG should monitor and coordinate ongoing works in other groups (HTML, DAP, WebApps, external organizations) and suggest new APIs of functionalities to be addressed by existing or newly dedicated working groups.

Introduction

The purpose of the workshop was (1) to hold technical discussions on presumed several important topics for smarter integration of Web and TV that based on the analysis of the key use cases and important requirements we had already gathered in the first workshop in September 2010, and (2) to arrange the workshop result suitable for being easily fed into the Web and TV Interest Group (see the charter of the Web and TV IG), e.g. to suggest it creating specific task forces and so on.

Main topics planned for the workshop were:

- HTML5 and TV

- Standardization Needs

- Accessibility

- Hot Topics:

- Integrating P2P and the Web for TV content distribution

- Role of DRM for Web and TV (including overview of ongoing work on interoperable and open DRM systems that work across devices)

- (Micro-) Payment for Web and TV

- Support for "second screen" scenarios

Please see the call for participation[6] for details.

Figure 1 – Workshop participants

The workshop attracted 114 attendees from various industries including broadcasters, Telecom companies, cable operators, OTT (over the top, video delivered over a network that is not offered by that network operator) companies, content providers, device vendors, software vendors, standardization organizations, Web application providers, researchers, and Governments. Numerous attendees came from outside Europe, especially from the US and Japan. The US attendees consisted mainly of IT companies, cable operators and OTT companies. As for Japan, the attendees consisted mainly of broadcasters, CE manufactures and Telecom companies. Please see the list of attendees for details.

At the beginning of the workshop, we held an introductory session with the aim of setting the scene.

During the workshop, we had eight sessions consisting of brief presentations of the attendees' position papers followed by dedicated discussions on the topics. The topics for the sessions were:

- Web&TV: Use cases and Technologies

- Second-Screen Scenarios

- Panel on HTTP Adaptive Streaming

- Content Protection

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[6] http://www.w3.org/2010/11/web-and-tv/

- Metadata / Semantic Web

- HTML5 and TV: Gap Analysis

- Accessibility

- Profiling / Testing

The geographical distribution of the presenters were:

- **Europe**: BBC, Condition-ALPHA, EBU, Ericsson, Fraunhofer, Irdeto, Opera, ParisTech, Philips, Matroska, MPEG DASH, NoTube project and UK DTG

- **US**: CableLabs, Cisco, Connected Media Experience, Intel, Microsoft, MIT, Netflix and Qualcomm

- **Japan**: NTT, NTT-Communications and Tomo-Digi

- **Korea**: KAIST and LG

Topics were approached from various points of view. Popular topics were:

- Dynamic Adaptive Streaming over HTTP (e.g. MPEG-DASH and 3GPP-DASH)

- Royalty issues related to video technologies (e.g. codecs and streaming technologies)

- Hybrid broadcast broadband (including HbbTV, DVB, DTG, and DTV/IPTV in Japan)

- Second-Screen Scenarios (e.g. API for remote control, and synchronization of screens)

- HTML5 Extension (e.g. ISSUE-152 in HTML-WG, and API for DASH manifest/metadata/representation)

- Social TV

- Accessibility

- Relation between existing TV related technologies and W3C groups (e.g. relation between DLNA and the DAP WG)

- Profiling/Testing (esp. from the viewpoint of CE devices)

- Metadata

Main workshop discussions

HTTP adaptive streaming

Most players of the Web and TV world who need to stream video on the Web require some adaptive mechanism to quickly react to network fluctuations and ensure a smooth user experience while watching videos.

The panel on HTTP adaptive streaming showed convergence of interests towards the MPEG DASH specification as a key enabler for video streaming on broadband connections. There was a long debate on the patent policy under which this specification could eventually be released. W3C standards follow a royalty-free patent policy and the potential adoption of DASH for use as a core Web technology would require this solution to be licensed on similar terms.

There was strong support among workshop participants for the IG to get back to 3GPP and MPEG DASH members and assess whether MPEG DASH may be licensed on a royalty-free basis for integration within HTML. As 3GPP members held a meeting the week after the workshop, the Web and TV IG chairs prepared and sent a heads-up message to 3GPP members to express the interest of workshop participants in adopting DASH as a core Web technology and working on its integration within HTML, provided licensing can be made compatible with W3C patent policy.

Integration within HTML may require exposing new functionalities in the browser, such as QoS (Quality of Service) counters, control of the adaptive streaming process, and access to the streaming manifest. The Web and TV IG should prioritize and discuss these needs in a second step.

Content protection

Most video/audio content providers intend to implement some form of content protection to make copying difficult, if not impossible.

The discussion showed that content protection always involves some proprietary solution that cannot be easily integrated in an open stack of technologies and that should not be standardized at this stage.

That being said, parts of the mechanisms used to protect content may still be up for standardization. In particular, a common encryption algorithm would allow separating the choice of the delivery platform (technical decision) from the choice of a DRM system (business decision).

The IG should evaluate this possibility, probably in relation with discussions on HTTP adaptive streaming. While a complete integration of DRMs in HTML is not deemed necessary, additional functionalities may need to be exposed within the browser to enable support for DRM content, e.g. extensions to the canPlayType()

method to report on protected content support or secure device identification to increase protection efficiency.

Second-screen scenarios

Second or Multi-screen scenarios come with a variety of use cases, from using a second device as TV remote controller to shopping, gaming and other interactive scenarios where the TV set drives content on a second screen or gets driven by some second screen.

To work on the Web, these scenarios require some form of real-time synchronization between devices at the browser level. This synchronization is in scope for the Web Real-Time Communications working group, chartered in May 2011. Interested W3C Members are encouraged to contribute to this new working group.

For multi-screen scenarios to work smoothly, device discovery must be possible from within a Web browser to actually pair devices together. DLNA comes to mind for home networking scenarios. The Device APIs and Policy (DAP) Working Group is currently looking into re-chartering, and the possibility to work on some form of device discovery mechanism is being discussed on the public public-device-apis@w3.org mailing-list and may also prove to be of interest for workshop participants. The Web and TV IG should serve to centralize interest for this topic coming from the Web and TV community, follow these discussions, and react accordingly, e.g. by discussing the creation a working group dedicated to device discovery if this topic ends up not being addressed by the groups mentioned above.

On top of synchronization and device discovery, Web browsers may need to expose additional functionalities such as an API or events dedicated to remote controllers. The Web and TV IG will need to refine requirements, see how these needs fit with ongoing efforts in e.g. the Web applications working group, and agree on next steps.

Metadata / Semantic Web

The session on metadata was the occasion to review different aspects of the technology and its use in Web and TV environments.

The requirements for metadata exposed in the different presentations touched different complementary areas such as what is needed to:

- discover services

- reference/identify and describe content (including profiles per application or media type)

- expose this information (manifests on web pages, data for widget consumption, reuse by middle-ware solutions, etc.) and convince content

providers it is for their benefit (provide open access to metadata is vital for visibility)

- consume content across a variety of platforms and media (access and transactions)

- develop social interactivity and simplify user access

Several solutions/implementations have been mentioned, including Connected Media Experience, DVB and TV-Anytime, and Hikari-TV implementing the ITU-T specifications for IPTV.

Based on the discussions held during the workshop, the Web and TV Interest Group should probably take on the following actions:

- Review the technologies currently used for hybrid web-TV solutions and do a gap analysis with the activities in W3C

- Coordinate metadata related developments including HTML5 activities on the use of the video tag and its attributes, RDFa in HTML, the Ontology for Media Resources developed by the Media Annotations Working Group, Media Fragments URI developed by the Media Fragments Working Group.

- Propose a vision on metadata and a roadmap for convergence between W3C developments and industrial developments or television and radio standardisation activities

- Collect and publicise best practices

Extensions to HTML5

A number of organizations external to W3C have worked on extending existing Web standards to meet requirements for connected TVs in hybrid broadcast/broadband scenarios. These organizations include HbbTV, DVB, and DTV/IPTV in Japan.

Some of these extensions may need to be taken up as core Web technologies, for instance support for trick modes (common video playback functions, e.g. pause, play, fast forward, fast rewind, slow forward, slow rewind, jump to previous or future frame), recording, and downloading content, or control of the active video channel in a broadcast environment.

Extensions are of various kinds, from the introduction of new markup attributes or new DOM events to new API functionalities or specific ontologies, or to mechanisms to synchronize video with other content.

The Web and TV IG should discuss with other organizations, and determine priorities as well as starting points for potential standardization efforts within W3C.

The HTML working group has an open issue (ISSUE-152) on support for multiple audio/video tracks within HTML5 that impacts many actors of the TV world. Since this issue is to be resolved by 22 April 2011, interested workshop participants are encouraged to raise their concerns directly on the HTML mailing-list if their point of view has not already been taken into account.

Accessibility

Most participants pointed out that, in many ways, accessibility in the TV industry has been much better than accessibility on the Web, partly thanks to regulations that companies must comply with to sell TV products.

Accessibility needs to be taken into account right at design time and not as an after thought. While sometimes considered by companies as a regulatory requirement, participants observed that adaptive accessibility can often be leveraged in non-accessible contexts, be it only to watch a movie with subtitles in a sound-sensitive environment.

In particular, accessibility was shown as important for the design of multi-modal applications that work on various kinds of devices. Works on Accessible Rich Internet Applications (WAI-ARIA) and multi-modal interactions were mentioned as candidate technologies to target heterogeneous environments.

The need to harmonize the Web Content Accessibility Guidelines 2.0, that serve as recommendations for making Web content more accessible, and various existing regulations from the TV world was also pointed out.

The Web and TV IG should seek to include experts in accessibility in discussions as soon as possible.

Profiling / Testing

In the most simple scenario, users pay for a consumer electronic device once and stick with it during several years. Firmware updates incur high costs on the manufacturer and/or operator's side, and are usually restricted to critical ones. This means that specifications implemented in consumer electronic devices need to be extremely stable. This stability contrasts with what often happens on the Web where software updates get distributed much more easily on an automated basis.

HTML5 introduces a number of features that are useful from the point of view of the TV world (e.g. support for video/audio) but HTML5 is not a W3C standard and cannot be considered as stable yet. The need to develop comprehensive test suites to ensure interoperability was stressed out. A few days after the workshop, the W3C confirmed the roadmap for HTML5, setting advancement to Last Call for the HTML5 specification for May 2011, and to final Recommendation by 2014, insisting on the testing effort as key for the success of the specification.

Similarly, consumer electronic devices are much more limited in terms of computing power. Material that is only a few years old is often obsolete from a performance's perspective. Companies that want to agree on a common platform need to subset and/or profile existing specifications to meet their requirements both in terms of hardware constraints and time-to-market.

Discussion on whether profiles need to be specified at W3C is still open. W3C standards were compared to « tool-kits » where standards are designed to be orthogonal and extensible on purpose. Profiles that do not subset specification but impose a particular set of specifications (usually coupled with specific extensions) may best be left to external organizations. On the contrary, subsets of specifications need to be discussed with the working groups that are responsible and own the copyright of the underlying specifications (e.g. the HTML Working Group or the CSS Working Group).

Wrap-up discussions

The following list of topics was discussed and refined during the wrap-up session. Straw polls were held on some of these topics, represented in the « Support » column below.

Not all of the topics could be addressed during the wrap-up session for lack of time. This rough and incomplete list is to serve as input for the Web and TV Interest Group.

Work item	Next item	Support
HTTP Adaptive Streaming	IG to check on MPEG DASH RF commitment. Integration within HTML in new WG, as second step.	+30 roughly -2
Content Protection	Common encryption algorithm, support for key exchange, canPlayType() extension, capacity to play protected content.	
Support for multi-track	Feedback to HTML5?[7]	+15 roughly
Secure device identification		2 volunteers to take the lead -2

_____

[7] Support was added to HTML5 after the workshop based on feedback

Support for trick modes, recording, downloading content	Work item in new DAP charter (or separate group)?	+25 roughly
Support for home networking	Work item in new DAP charter (or separate group)?[8] Needs fine-tuning.	+25 roughly -1 (privacy related issue)
Support for real time communications	Possible Web Real-Time Communications WG[9]	
Profiling	IG discussion	
Testing	Testing framework?	
Synchronization of video content		

The Web and TV IG provides the necessary forum for discussion to move these topics forward. This does not mean that all these topics will be necessarily addressed by the Web and TV IG, as the IG can but address what its participants commit to work on. Workshop participants and companies willing to push a specific topic are strongly encouraged to join the Web and TV IG. Information on participation in the Web and TV IG is available on the Web and TV Interest Group's home page.

In the public list, all workshop attendees are encouraged to suggest and discuss topics suitable for the Interest Group.

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[8] The Home Networking Task Force (http://www.w3.org/2011/webtv/wiki/HNTF) was created in the Web and TV IG after the workshop
[9] Web RTC WG created in May 2011, http://www.w3.org/2011/04/webrtc/

4 WORKSHOP IMPACT

Exchanges at the workshop highlighted the need to continue the discussions in the Web and TV Interest Group, launched during the workshop. A W3C Interest Group is a forum for discussion on a topic. One of the main goals of the Web and TV IG is to identify use cases and requirements that are mandatory to enable the convergence between Web and TV technologies. While an Interest Group does not develop Web standards, it is a first step towards standardisation in contexts such as Web and TV where very different stakeholders need to agree on needs and priorities. Standardisation efforts, done in other groups within W3C, derive from use cases and requirements, once highlighted.

As discussions on Web and TV cover a wide range of topics, the Web and TV Interest Group is organized in task forces set to work on a more focused topic.

The **Home Networking task force** discusses requirements to enable Web applications to expose services and/or to access services present on devices of the home network. This includes the discovery and playback of content available on those devices. Discussions are ongoing as of June 2011, but already led to a device discovery API being proposed for standardisation in the new charter of the W3C Device APIs Working Group[10]. It is a proposal at this stage. Based on discussions among the task force and more generically speaking among W3C Members, this deliverable may be moved to a possible new working group dedicated to enabling home networking scenarios.

The **Media Pipeline task force** was recently proposed to identify APIs and extensions to HTML5 that are needed to support commercial video provider requirements, including script access to parameters of adaptive bit rate algorithms and enhancements to metadata track elements to support professional use cases.

Additional task forces are expected in the upcoming months to address other topics discussed at the workshop.

On top of task forces and actual results, the Web and TV Interest Group also serves as a central hub where members of the TV ecosystem that have comments on Web standards under development but are not yet familiar with the W3C can share their concerns. These comments can then be dispatched to the appropriate working group within W3C. For instance, support for multi-track had been singled out during the workshop as a top priority need for any commercial company willing to serve TV-like video on the Web and has since been integrated in HTML5 partly based on feedback from TV companies.

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[10] http://www.w3.org/2009/dap/

5 CONCLUSION

The convergence of Web and TV creates a whole range of exciting new business opportunities. However, the interoperability of the wide range of devices and services that compose the Web and TV ecosystem is paramount for the convergence to be a success. Technology standards that will enable a smooth integration of the Web on TV and of TV on the Web need to be developed on a global scale.

The W3C Web and TV workshop, co-organized by OMWeb and Webinos in Berlin in February 2011, attracted a wide range of companies and organizations willing to work on solutions. Given the number of players and possible topics involved, discussions clearly highlighted the need to agree on use cases, requirements and priorities before moving on to actual standardisation efforts.

The Web and TV Interest Group provides the necessary forum and the entry point for TV stakeholders within W3C. Initial work on home networking scenarios should quickly shift to standardisation development within an existing working group or through the creation of a dedicated working group. Initial exchanges on other topics such as extensions to HTML5 to support commercial video provider requirements are promising.

APPENDIX: WORKSHOP PROCEEDINGS

The program of the workshop is included as appendix together with papers and slides for each topic. Papers and slides are in the order of the program. The minutes of the workshop, recorded in the IRC channel during the workshop, complete the set of documents below.

The program, minutes, and all papers and slides are publicly available on the Web at http://www.w3.org/2010/11/web-and-tv/).

Introduction
Setting the Scene

Introduction to the Second W3C Web and TV Workshop

Photo credit: Berlin Panorama by lunamtra, some rights reserved.

Date and Location
8-9 February 2011
Hosted by Fraunhofer-FOKUS, Berlin, Germany

Speaker
Francois Daoust <fd@w3.org>

Slides
http://www.w3.org/2011/Talks/0208-web-and-tv-fd/

The workshop has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement n°248687 (Open Media Web) and n°257103 (webinos).

Workshop Sponsors

The W3C

- **Web Standards**
  (X)HTML, CSS, XML, SVG, PNG, XSLT, WCAG, RDF, etc

- **Consortium**
  320 members, from industry and research

- **World-wide**
  Offices in many countries (Brazil, China, India, Morocco, etc)

- **W3C Team**
  Technical expertise

- **A well-tried Process**
  to make consensus emerge

- **Clear IPR rules**
  Royalty-Free Patent Policy

- **One Web!**
  Global, on any device, for everyone

Workshop Goals

Second W3C workshop on Web and TV (first in Tokyo in September 2010).

- Share on Convergence of Web and TV
- Discuss use cases, requirements from different viewpoints
- Discuss existing solutions, see what's blocking
- Identify gaps in Web standards
- Assess level of interest
- **Agree on concrete next steps**

Possible Next Steps

	Web and TV Interest Group	Specific Working Group
Charter	Broad, discussion forum	Tight and precise on a specific topic
Inputs	Generic requirements and use cases, priorities, ideas	Technical drafts, fine-grained requirements and use cases, tests
IPR Commitments	None	Royalty-free patent policy
Deliverables	Reports, guidelines, tools, roadmaps, coordination with existing WG, new WG charters, etc	**Standards**, reports, guidelines, tools, etc
Participation Mode	Proceedings are public Reserved to W3C Members (+ Invited Experts)	Proceedings are usually public Reserved to W3C Members (+ Invited Experts)
Work Commitment	Medium, 1 day per week	High, 1 day per week 2 days per week for Chairs and Editors

Note: The Web and TV Interest Group already exists!

Workshop Figures

- **64 papers** submitted
- **30 PC** members
- **27 papers** to be presented
- **50/50 time share** for presentation and discussion
- **8 sessions** focused on technical topics

Agenda

Day 1 — Tuesday 8 February 2011	
09:00 - 09:50	*Setting the scene*
09:50 - 10:45	*Session 1 / Web&TV: Use Cases and Technologies*
11:15 - 12:45	*Session 2 / Second-Screen Scenarios*
14:00 - 15:30	*Session 3 / Panel on HTTP Adaptive Streaming*
16:00 - 17:30	*Session 4 / Content Protection*
Day 2 — Wednesday 9 February 2011	
09:00 - 10:30	*Session 5 / Metadata / Semantic Web*
11:00 - 12:30	*Session 6 / HTML5 and TV: Gap Analysis*
14:00 - 14:45	*Session 7 / Accessibility*
14:45 - 15:30	*Session 8 / Profiling / Testing*
16:00 - 17:00	*Wrap-up, Next Steps, and Action Items*

Sponsors & Support

Logistics

IRC

- IRC server: **irc.w3.org**
- Port number: **6665**
- Channel: **#webtv**
- Web client: **http://irc.w3.org/**
- Guide: http://www.w3.org/Project/IRC/

Minutes

- minutes taken on IRC will be published.
- off the record comments possible using **/me**

Twitter

- Hash tag **#w3ctv**

Web and TV IG
Brief Introduction

Web and TV IG Co-Chairs
8 February 2011

W3C WORLD WIDE WEB
consortium

The origin:
Tokyo workshop - 2-3 Sep. 2010

W3C WORLD WIDE WEB
consortium

Tokyo Workshop

Workshop Agenda

http://www.w3.org/2010/09/web-on-tv/agenda.html

Workshop Summary:

http://www.w3.org/2010/09/web-on-tv/summary.html

- gathered various opinions/requirements from stakeholders
- 144 participants including broadcasters, browser vendors and device vendors
- simultaneous translation service for English, Korean and Japanese to encourage global discussion

Workshop Conclusion

- create an Interest Group to discuss the details of the use cases and requirements presented during the workshop

W3C WORLD WIDE WEB
consortium

The present :
Web and TV Interest Group (1/2)

IG Mission

- Charter:
  http://www.w3.org/2010/09/webTVIGcharter.html
- provide a forum for Web and TV technical discussions
- review existing work, as well as the relationship between services on the Web and TV services
- identify requirements and potential solutions to ensure that the Web will function well with TV

W3C WORLD WIDE WEB
consortium

The present :
Web and TV Interest Group (2/2)

Finalizing the chartering procedure

- Get started officially soon
  - W3C Management approved the official launch of the IG
  - The group starts TODAY !

Organization of the IG (1/2):
Co-Chairs working together

Four co-Chairs from various stakeholders

- Yosuke Funahashi (Tomo-Digi)
- Masahito Kawamori (NTT)
- Hyeonjae Lee (LG)
- Giuseppe Pascale (Opera Software)

Two Team Contacts:

- François Daoust (W3C)
- Kaz Ashimura (W3C)

Organization of the IG (2/2):
basic tools and methodology

- **Tools for collective intelligence**
- Public mailing list
- Public wiki (to create deliverables)
  - Re-organized topics list
- Topics from the Berlin workshop should be also added to this list
- Issue tracker Weekly news letters from co-chairs
- **Agile methodology**
- SCRUM (light weight agile project management)
- Light weight task forces

Relation between various Web+TV
activities: IG and workshops

- **Thank you!**

Fraunhofer FOKUS Interest in W3C Web on TV Workshop

Christian Fuhrhop
        Fraunhofer FOKUS

Participant's interest

The FOKUS Competence Center Future Applications and Media (FAME) researches and develops in the fields of Rich Media and Convergence in NGN and non-NGN IPTV environments, Human-Centric Applications for multimodal Interaction and multi-device experience, Intelligence Functions as Recommendation Systems and Communitie Services as well as Service Integration and Collaboration for mobile middleware solutions and mashup services.

The main research focus is on the design and implementation of open service infrastructures. These include features as Human-Centric Applications, Service Personalization, Media Profiling, Telco Service Control and IPTV integration, Convergence, Electronic Content Guides as well as Rich Communication and interactive content approaches for IPTV.

Point of View

Currently there are a number of approaches to get web technology on TV, from minimalist approaches that just provide 'some sort of browser' on a set-top box to complete widget shop, storage and execution environments, or a full declarative application environment for IPTV services.

And there are clearly a number of issues that are specific to TV use, such as the synchronization of applications with linear broadcasts and the possibility of broadcast distribution of widgets as part of the broadcast signal.

While a certain amount of experimentation is expected during the early phases of any technology, many approaches seem to be oblivious to developments in other domains, especially the mobile domain.

Additionally, current approaches seem to be based on the assumption that the current TV usage won't change significantly.

It is assumed that the TV will continue to be primarily used for video viewing and Web on TV will mainly be to provide nicer teletext. Which is possibly about as true as assuming that mobile phones will be just used for phone calls and 'Web on Mobiles' is primarily a way to synchronize calendars and contact lists? And maybe look up weather and news.

It is assumed that TVs are operated with a button remote control and that needs to be reflected in a Web on TV standard. But mobile phones have finger navigation, stylus navigation, virtual keyboards, numeric keypads, mini keyboards, single touch screens, multi touch screens... While not all of them are usefully employed for web browsing on mobiles, no specific input method was 'built into' the standard.

It is assumed that TVs are at the low end of computing power and any significant increase of CPU, memory or graphics power would be cost prohibitive. Which might be true if all that is on offer is better teletext (where users are fairly unlikely to pay another $200 for smoother graphics), but what if someone provides a TV high-definition equivalent of World of Warcraft or Farmville?

The overlap between application areas and device domains decreases. Video is watched on smart phones, the set-top box plays MP3 files, a 'new mail' reminder pops up on the phone and the user switches on the laptop to answer it. The phone builds a Skype connection to the TV. I use the EPG on my Android to program the set-top box at home. There are few 'domain
specific' applications anymore, while the number of applications that either are present on all sorts of devices, perform different parts of functions of one application on different devices or allow the continuation of an application started on one device on another device is increasing . So should we really define 'domain specific' standards?

And while users might not replace a TV set as often as they do replace their smart phones, the in-built capability of TV sets will become less important over time. The TV set itself may just become a HD display unit with 'Web on TV' being provided by a game console, set-top box, connected blu-ray player or dedicated entertainment computer.

Suggestions

We need to get out of the habit of seeing TVs as a monolithic world of its own. 'Web on TV' from a PlayStation or an Apple TV box will differ in input devices and hardware capabilities from built-in CE-HTML.

Unless we want to have different fixed standards for all types of configurations, we need to define a standard that allows adaption to different kinds of input and output configurations and capabilities.

And we need a standard that stays as close to the Web development in other domains as possible. For example, writing a specific HTML/XHTML version into a TV standard might simplify the situation in the TV domain in the short term, but will widen the gap to other domains in the long run.

The difference between the domains becomes increasingly harder to define. If I use the Opera browser on my Wii to watch web pages on my TV, am I using 'Web on TV'? Or is that 'Web on a very slow desktop computer with no keyboard, but with fixed window size'? Should there be a standard for that?

It seems more sensible to have a basic W3C standard for the Web with additional profiles, features, regulations for specific devices and situations than making a 'standards snapshot' and branching off from current developments.

Slide 1

![Fraunhofer FOKUS]

Fraunhofer
FOKUS

Stephan Steglich
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Feb 8th, 2011

Slide 2

Welcome to Fraunhofer FOKUS
local arrangements…

- Internet Access: wLan (fokus-guests / w3cweb / w3cfokus)

- Microphones

- Presenters laptop available (please upload your slides before your session! via USB stick)

- IRC: irc.w3.org:6665 #webtv

- Drinks & Food (in the breaks) next room

- Social Event: Dinner 19:00 / Bus transfer from FOKUS: 18:30 / 18:45!
  - (but you can also walk 800m)

2

Feb 8th, 2011

Slide 3

Fraunhofer Institute for Open Communication Systems (FOKUS)

- FOKUS has been founded 1988 in Berlin, Germany
- 260 employees: scientists, students, technicians originating from 25 nations
- FOKUS is the Telecom R&D institute within the Fraunhofer Society
  - Fraunhofer Society is the biggest German R&D organisation, total # of 17.000 employees)
  - 57 institutes in total, 15 institutes in ICT

- FOKUS works since 22 years on convergence of IT, telecoms, internet and home entertainment and performs applied research and development projects
- Performs strategic studies, solution concepts, system integration and prototype development
- Strong cooperation with universities & establishment of spin offs (e.g. iptel.org., TwonkyVision, …)

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Feb 8th, 2011

Slide 4

FAME – Future Applications and Media
Intelligent services & applications: any time – any place – any form

- **Future Web Technologies** → Future Web Lab
  - Mobile Web, Multi-devices, Multimodal interaction
  - Semantics and context-awareness and reasoning
  - Mobile Cloud, distributed applications and services
  - Mashups and composite services

- **IPTV, Hybrid TV & Rich Media Interaction** → HybridTV Lab
  - Media clients and enablers for managed and unmanaged IPTV
  - Non-linear smart interactive content
  - Content guides and metadata management
  - Video streaming, service control, telco integration

- **Recommendation Systems** → Social Web Lab
  - Personalization and recommendations
  - Social media and social network management

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Feb 8th, 2011

Milestones

- **2007:** Providing the first **ETSI TISPAN Telco IPTV end-to-end test bed**
  - IPTV Session Management Application Server, ECG, User Profile
  - Managed IPTV various value-added services implementations
- **2009: Open IPTV Forum (OIPF) platform and infrastructure reference implementation**
  - FOKUS presented the first OIPF R1 reference implementation on the OIPF's booth at IBC 2009
    -> *FOKUS Open IPTV Ecosystem & Media Client Suite*
- **2009: OIPF InteroP TV #1:**
  - 1st Open IPTV Forum Interoperability Event hosted by FOKUS
- **2009: BONDI reference implementation**
  - Camera, location API -> *FOKUS Mobile Web Runtime 2*
- **2009: Microsoft Mediaroom Test bed**
  - Mediaroom Application development
- **2010: Hybrid & OTT TV Lab**
  - CE-HTML & HbbTV applications, HTML5, W3C Widgets on TV
  - *FOKUS Media Web Runtime*
- **2010: NIMS PoC: OIPF end to end prove of concept deployment in Singapore**
  - Overall PoC coordination and provisioning of dedicated OIPF compliant components
- **2010: Setup & coordination of FP7 Integrated Project webinos**
  - Secure WebOS Application Delivery Environment
- **2010: MEGASTORE launch @ IFA 2010**
  - App deployment for various devices and platforms
- **2010: White Label CE-HTML Portal Solution and test suite**

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Feb 8th, 2011

Web and TV
A special case?

- Current approaches often attached to the past
  - TV is primarily for watching videos
  - Examples are always the same applications
    - VoD
    - Teletext (News/Weather/Sports pages)
    - EPG
  - Done that on MHEG-5, done that in MHP, in Open TV…
  - Standards focus strongly on current input/output devices
    - fixed screen size
    - cursor navigation
    - coloured buttons
    - low computing / rendering power

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Feb 8th, 2011

Web and TV
A special case?

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    - fixed screen size
    - cursor navigation
    - coloured buttons
    - low computing / rendering power

Learn from mobile phones!

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Web and TV
A special case?

- Current approaches often attached to the past
  - TV is primarily for watching videos
  - Examples are always the same applications
    - VoD
    - Teletext (News/We… …ges)
    - EPG

The same way that mobile phones
are for making phone calls?

That led to WAP…

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Slide 9

Web and TV
A special case?

- Current approaches often attached to the past
  - TV is primarily for watching videos
  - Examples are always the same applications
    - VoD
    - Teletext (News/Weather/Sports pages)
    - EPG
- Done that on MHEG-5, do... MHP, in Open TV...
- Standards focus strongly on ... input/output devices

> Are the primary mobile phone applications (even the web based ones) currently contact lists and calendars?

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Slide 10

Web and TV

> Phones need to handle different screen sizes and even changing orientation. Can't be that hard to do...

- ... the past
  - ... deos
  - ... applications
    - ...ws/Weather/Sports pages)
    - EP...
- Done ... EG-5, done that in MHP, in Open TV...
- Standards focus strongly on current input/output devices
  - fixed screen size
  - cursor navigation
  - coloured buttons
  - low computing / rendering power

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Slide 11

Web and TV
A special case?

> Phones have full keyboards, cursor keyboards, numeric keyboards, joysticks, pens, touch screens, multi touch...

    - EPG
- Done that on MH... ...that in MHP, in Open TV...
- Standards focus stro... ...urrent input/output devices
  - fixed screen size
  - cursor navigation
  - coloured buttons
  - low computing / rendering power

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Slide 12

Web and TV
A special case?

> Even now TVs offer control by smart phones and pointer devices

    ...E...
- Done that on ... ...done that in MHP, in Open TV...
- Standards fo... ...y on current input/output devices
  - fixed screen...
  - cursor navigation
  - coloured buttons
  - low computing / rendering power

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Slide 13

Web and TV
A special case?

> True now and will be true as long as
> better teletext is all there is to offer.
> Put what if someone sells a TV that can play
> World of Warcraft (HD)? Or even Farmville (HD)?
> Users pay for phones that can handle Angry Birds…

- Standards focus strongly o͟n ͟t input/output devices
  - fixed screen size
  - cursor navigation
  - coloured buttons
  - low computing / rendering power

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Slide 14

Summary (and hopefully fuel for discussion):

- **Don't rely too much on the future being just a nicer looking past**

- **Don't take technical criteria too serious**
  - The can change quickly
  - Cover them in profiles or recommendations
  - Don't make them part of core standards

- **Plan for strong features of the domain**
  - TV viewing is often social
  - TV screens can typically be seen by more than one person
  - in most homes with VDSL, TVs are probably the devices with the fastest Internet connection

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Slide 15

Our approach: Project on cross platform applications - webinos

- Envisions web based cross platform applications

- Virtual devices cloud

- Develop key enablers for the future WebOS to drive portability and secure use of web applications across platforms (mobile, fix, TV, car)

- 22 core partners from 9 countries (more than 50% industry)

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Slide 16

HTML 5 Mediaclient @ FOKUS Future Media and Applications Lab after session 4 (17:30) → Tour starts at reception

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Dr. Stephan Steglich

Head of Competence Center
Future Applications and Media

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FOKUS Mobile Web Runtime & BONDI

- extension to common Web browsers
- exposes host and cloud services via the JavaScript Runtime Environment to applications
- standards and standard recommendations (such as **BONDI**, **W3C**) are applied
- active contributions to OMTP's BONDI project (camera API, geolocation API)

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Feb 8th, 2011
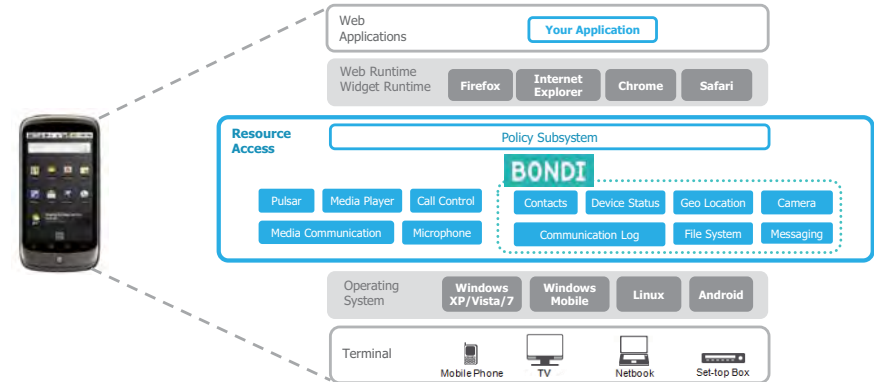
Web, TV & Open Standards

Giuseppe Pascale, Opera Software

The Web, Today

"Open" Standards are the foundation of the Web

- Any expert can contribute to the design
- Widely reviewed and accepted
- Royalty Free

Why Open?

- All "users" are equal
- High-quality peer-reviewed specification
- Foster creativity & diversity
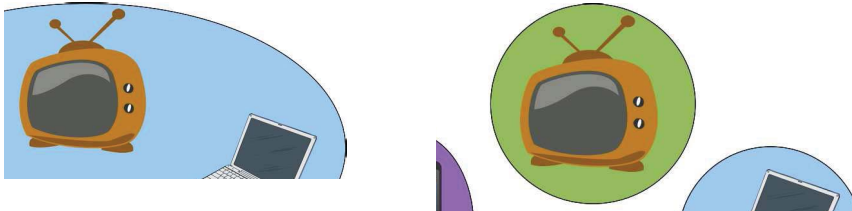
The Web, Tomorrow

How will the Web look tomorrow?

The Web, Tomorrow

How will the Web look tomorrow?
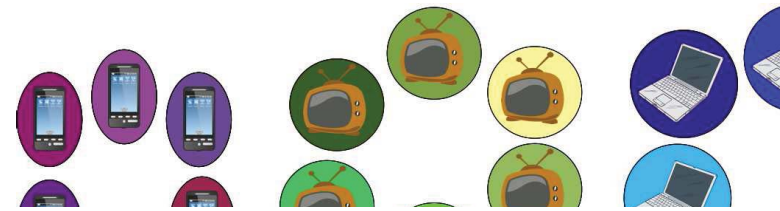
The Web, Tomorrow

What language does the Web speak?
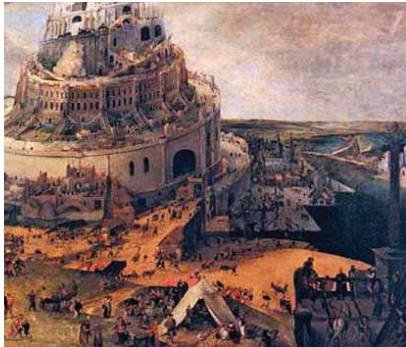
The Web must speak one language

Many Industry groups use "Web Standards"

- Profiles
- Extensions

Two common problems

- Outdated References
- Incompatible implementations

How to avoid fragmentation?

- Cooperation at/with W3C
- Testing

Testing

Publish → Implement Specification → Certification → Market
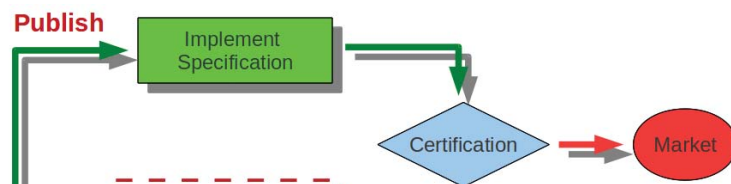
No dialog betwen implementers/spec editors/test authors

Participatory Design
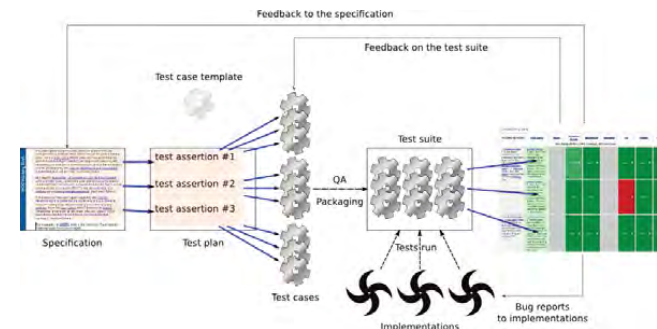
Testcases are an integral part of the specification (not an accessory)

Testing

Test suites must be "Open"

- Accessible to everbody
- Widely Review
- Published togheter with the specification

"Open" tests help to

- Reduce compatibility issues
- Spot ambiguities or error in the specification
- Understand the specification

Thanks for listening

Giuseppe Pascale, Opera Software

Session 1
Web&TV: Use Cases and Technologies

```
-----------------------
Name, organization and contact details
-----------------------
Name: Yosuke Funahashi
Organization: Tomo-Digi Corporation
E-mail: yfuna@tomo-digi.co.jp


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Participant's interest
-----------------------


As of November, 2010, the number of household television sets in use
is already exceeds 97 million in Japan. Since almost all digital TV
sets have browser capability (based on XHTML1.1), a universal service
using browsers on TV is getting more and more viable all over the
land. Now digital TVs are taking the center of digital home networks,
and it is expected that they will be used not only as a receiver for
digital broadcasting but also as a central server for variety of
entertainment and essential information for everyday life. Also it is
strongly desired that TV sets will be better integrated with Web
technologies, e.g., HTML5 and get even richer presentation capability.

We believe our knowledge and expertise on digital TV broadcasting
technology in Japan should be useful to this workshop and we should be
able to provide various use cases based on our long-term experience.
We are very interested in what kind of roles our expertise on digital
broadcasting would play in the context of Web standardization.


--------------
Point of View
--------------


1. TV and publicness
--------------------


In case of natural disasters, usual infrastructures for communications
like telephones and mobile phones might not be available. So
providing disaster information is one of the very important roles
of broadcasting as a public service. We would like to introduce
various use cases of public TV network services in Japan.


2. Design Pattern for Interactive TV Programs
---------------------------------------------


There are already variety of Interactive TV Programs in Japan and they
form a wealth of use cases of Web and TV services with browser on TV
devices. Detailed analysis of them shows us that we can classify
those use cases and the classification leads us to the notion of
Design Pattern for Interactive TV Programs. We would like to
introduce some of design patterns as abstract use cases.
```

3. Essential APIs for realizing Web and TV services with broadcasting
----

W3C already has several specifications regarding APIs to treat
audio-visual resources on the Web, e.g. HTML5 video tag, Media
annotations, Media fragments and so on. But from the perspective of
broadcasting, they seem to lack some essential APIs for realizing Web
and TV services with broadcasting, especially APIs to treat dynamic
aspect of broadcasting signals. We would like to introduce some
specific APIs suggestion with typical use cases that require those
APIs. For example,

- URIs for resources in MPEG2 transport stream;
- Event model for synchronization of browser's behavior with the
  change of the state of TV programs.

4. Metadata requirements for smarter contents management, distribution
   and delivery

W3C already has the Media Annotations, i.e. an ontology and API
designed to facilitate cross-community data integration of information
related to media objects in the Web, such as video, audio and images.

The Media Annotations is a great work, but we believe that to extend
it with the viewpoint of broadcasting will make it more fruitful
because in broadcasting industries metadata form a large and
complicated value chain, from metadata automatically created in
digital video cameras (e.g. latitude, longitude and the information
from gyro sensors) to delivered metadata to CE devices which provide
richer user experiences (e.g. better presentation of contents and
smarter recommendation).

We would like to introduce several use cases that can be realized if
we have smarter value chain as a result of collaboration of the web
technologies and expertise in broadcasting.

5. Use cases from the perspective of TV as a client device for eGov
----

e-Government has been and continues to be a long-term challenge in
many countries, both from the viewpoint of data that governments
provide to the Web and broadcasters, and from the viewpoint of CE
devices sufficiently easy to use and attractive for users to keep
using.

Regarding governments' data, the eGov activity in W3C has been
bringing semantic web technologies to public sector, and it
gradually starts to influence the business in private sector.

Regarding CE devices, smart phones and slate devices seem now bringing
e-Gove applications and services to life.

In such circumstances, to study smarter TV from the perspective of a client device for eGov will bring us new use cases, and those use cases will lead us to the smarter design of both future TV and future eGov.

We would like to introduce our trial consideration on future TV and future eGov.

6. Collaboration between broadcasting and communication technology -IPTV-
----

To implement actual IPTV services, it is very important to clearly define (1) the interface between IPTV middleware, e.g., DRM (Digital Rights Management), and browsers and (2) ECG (Electronic Content Guide) metadata. We would like to introduce several use cases based on our IPTV service experiences in Japan, and see what possible future services could be beyond our experiences.

TELECOM ParisTech's Interest in Second W3C Web and TV Workshop

Participant's Interest

TELECOM ParisTech is a French "Grande Ecole" in Paris, i.e. a small university dedicated to Telecommunications and teaching at graduate and PhD levels. TELECOM ParisTech laboratories are part of INSTITUT TELECOM Recherche. TELECOM ParisTech today has a faculty of about 150 full-time staff (full professors, associate and assistant professors), over 200 part-time lecturers and a student body of about 1000 students.

The Multimedia group of the Signal and Image Processing Department is:
- involved in HbbTV development, testing and promotion, through its participation in a French project called openHbb.
- involved with/implementer of W3C widgets, and extensions for widget communication within the home network (MPEG-U: interface with discovery, communication and agent-like mobility across devices).
- involved with/implementer of SVGT1.2 and other presentation standards in the open source platform GPAC.
- involved with W3C and other standards for the past 15 years.

Initially focused on multimedia scene representation, the team expanded its interest to a more general "service" perspective, with service as seen by the user, i.e. a coherent set of functionality for the user.

Point of View

Here is a set of requirements we work with:
- It should be possible to build text-based and graphics-based service interfaces. This should be non-controversial: use HTML+CSS for text apps, SVG for graphics apps.
- Services should be available as widgets, be compatible with W3C Widgets. The extra technology to make HbbTV compatible with W3C Widgets (PC and Interface) is comparatively very small, actually.
- A service should be available on any device, even if the service is about e.g. TV. A user should be able to vote on her TV (with a remove control), but also on her mobile, especially if there are more viewers. One way to achieve this is by solving another requirement: it should be possible to create a service as a constellation of cooperating elements (widgets) running of possibly multiple devices (distributed services). In the example of the TV vote, there should be one widget on each voting phone and one widget on the TV to collect and send the votes back. This implies communication between widgets.
- It should be possible to build services with data from any origin, broadband or broadcast or local. The user should be not be aware of these differences, and it should be possible to implement innovative business models on the complementarities between delivery modes. A widget should work the same way whether it is used during the broadcast, or when used with catch-up TV.
- The user should also be able to switch devices at any time without loosing the context of the current service, for nomadic use, or for a better user interface. For example, the program guide may be easier to browse on a tablet, even if the data still comes from the TV.
- To be able to deal with a dynamic set of available devices, the environment should provide discovery and service protocols. Discovery is necessary to deal with dynamic networks, to remove the need for the author of a service to know the address of a subservice in advance, as well as to deal with devices coming in or going out of the home network. You should be able to vote even if you are at a friend's home.
- A service should behave the same, whether it is provided by hardware, by a native application, or by a widget. This is to be inclusive about the type of device that can be integrated in the home environment.
- It should be possible to build services on top of other services, so as to easily create mash-ups, as well as multiple interfaces for the same service.
- Even if we may have technology preferences, it should be possible to replace any chosen technology by an equivalent, without breaking the service model: replace a discovery protocol with another, a scripting language by another, a format by another, etc. The service model needs to be future-proof.

We are working on implementing (in code and in standards) the missing parts to realize this global vision of service, intuitive for the user: intuitive network setup, intuitive user interface, intuitive switching of devices maintaining the service context… At the moment, our choice of standards is: (x)HTML, CSS, ECMA-Script,

SVGT1.2, W3C Widgets (PC and Interface), HbbTV (with its dependencies on DVB signalling, MPEG-2 TS and DSM-CC, OIPF DEA, CE-HTML), UPnP/DLNA, MPEG-U for the discovery and communication of widgets, RTP/RTSP for streaming. We use open source projects GPAC and WebKit. We work on authoring tools, servers and players. Examples of technology replacement we consider are: use BIFS for the presentation of 3D widgets, use HTTP streaming (MPEG DASH, 3GPP AHS) to replace RTP/RTSP, use Bonjour instead of UPnP…

We believe the W3C standards are a key to this vision of a coherent family of interoperable standards. Only W3C standards have the necessary breadth and momentum, but there is a need for significant adaptation to really take into account mobile and TV environments.

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Tel: +33145817733 - Mob: +33677843843 - Fax: +33145817144

Requirements for a Web and TV environment

Jean-Claude Dufourd
Telecom ParisTech
Institut Telecom

Overview

- **Context**
- **Requirements for a Web and TV environment**
- **Current implementations**
- **Standards**

Context: home around the TV

Connected picture frame

Connected TV

Mobile phone

Desktop computer

+ printer
+ new sensors
…

Laptop

Tablet

PDA
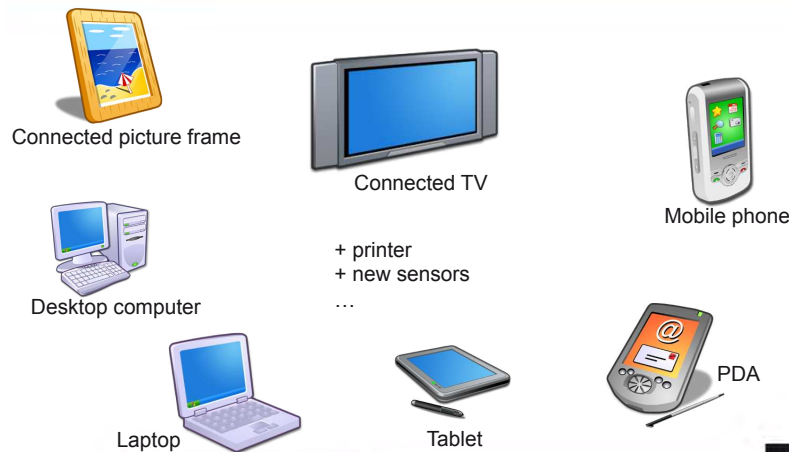
R1: Apps to run on all devices

Connected TV

Connected picture frame

Mobile phone

Common ground: HTML + CSS + ES
« Very close » to W3C Widgets
➔ OK

Desktop computer

Laptop

Tablet

PDA

R2: Apps to run on a dynamic network

Connected TV

Connected picture frame

No complex network setup

➔ Need a discovery and service protocol : UPnP/ Mobile phone
DLNA – Bonjour – WS Discovery – SIP-based …
Ex: see mobile phone pictures on TV, then display on
picture frame, then store on desktop.

Desktop computer

PDA

Laptop

Tablet

TELECOM ParisTech

R3: Services accessible from all devices

Connected TV

Connected picture frame

An EPG widget runs on TV only

Mobile phone

Desktop computer

PDA

Laptop

Tablet

TELECOM ParisTech

R3: Services accessible from all devices

Connected TV

Connected picture frame

An EPG widget runs on TV only
An EPG service, built on communicating widgets,
runs on any device   Mobile phone
➔ Distributed documents (pervasive, ubiquitous)
➔ Service adaptation by distribution

Desktop computer

PDA

Laptop

Tablet

TELECOM ParisTech

R3: Services accessible from all devices

Connected TV

Connected picture frame

An EPG widget runs on TV only
An EPG service, built on communicating widgets,
runs on any device   Mobile phone
➔ Distributed documents (pervasive, ubiquitous)
➔ Service adaptation by distribution

Desktop computer

PDA

Laptop

Tablet

TELECOM ParisTech

R4: Services to move to best device at any time

Connected TV
Connected picture frame
Mobile phone

Service starts on TV

Desktop computer

Laptop   Tablet   PDA

page 8   Telecom ParisTech   Web and TV, Feb 8-9, 2011

R4: Services to move to best device at any time

Connected TV
Connected picture frame
Mobile phone

Service starts on TV
Interactivity appears

Desktop computer

Laptop   Tablet   PDA

page 9   Telecom ParisTech   Web and TV, Feb 8-9, 2011

R4: Services to move to best device at any time

Connected TV
Connected picture frame
Mobile phone

Service starts on TV
Interactivity appears ➔ move to tablet

Desktop computer

Laptop   Tablet   PDA

page 10   Telecom ParisTech   Web and TV, Feb 8-9, 2011

R4: Services to move to best device at any time

Connected TV
Connected picture frame
Mobile phone

Service starts on TV
Interactivity appears ➔ move to tablet
Tablet gets preempted ➔ move to office
Keeping current service state

Desktop computer

Laptop   Tablet   PDA
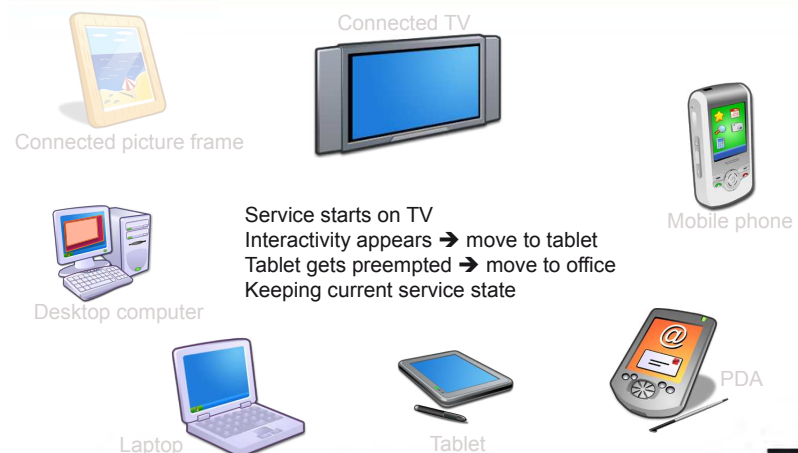
page 11   Telecom ParisTech   Web and TV, Feb 8-9, 2011

R5: Native/widget/HW: no difference

Connected TV

Connected picture frame

Mobile phone

Why should it make any difference that one part of a service is hardware, native code, or widget ?

➔ Services as cooperation of any type of part
  ➢ Framework for native code behaving as a widget
  ➢ Compile widget to native code
  ➢ Native app « equivalent » of a widget

Desktop computer

PDA

Laptop

Tablet

TELECOM ParisTech

R6: No standard dependency

Connected TV

Connected picture frame

Mobile phone

True for network and codecs, why not for other stds:
- Widgets in HTML or SVG or BIFS (for 3D)
- Discovery with UPnP or Bonjour or SIP or WS Discovery
- HTTP streaming or RTP

Desktop computer

PDA

Laptop

Tablet

TELECOM ParisTech

Implementation

Connected TV

Connected picture frame

Mobile phone

GPAC and WebKit players

HbbTV (xHTML+CSS+ES+huge OIPF API +DVB+MPEG TS+DSMCC+codecs), SVG, W3C Widgets (PC + Interface), UPnP/DLNA, MPEG-U, RTP/RTSP

Desktop computer

PDA

Laptop

Tablet

TELECOM ParisTech

Standardization

Connected TV

Connected picture frame

Mobile phone

- « Smaller » profiles
- « Common » Device APIs, including capabilities
- Document discovery, communication and migration:
  - Declarative
  - Not just widgets

Desktop computer

PDA

Laptop

Tablet

TELECOM ParisTech

Thank you for your attention

■ Discussion…

Philips Interest in W3C Web and TV Workshop

Jon Piesing, Senior Technical Consultant, Philips Research

Participant's Interest

Philips NetTV was first introduced in 2009. It offers consumers an integrated experience combining the relaxed TV experience they're used to from TV with access to Internet delivered services from many content providers. NetTV was first introduced in high end TV sets but over time has been added to mid-range TV sets and to Blu-ray players. NetTV devices include a web browser supporting those elements from W3C specifications required by CE-HTML (CEA-2014). The integration between the browser and the TV environment is provided by elements from CE-HTML (for internet delivered video) and from the Open IPTV Forum (for integration with the broadcast, with downloaded content and with DRM). This selection is close to that required by HbbTV (ETSI TS 102 796) and is evolving to become fully compliant with that specification.

Point of View

Philips experience is that the use of web standards has been much more successful in enabling third party content and services for TV than any of the earlier TV-centric interactive technologies like MHEG-5 and MHP. There are however many continuing challenges.
1) Most critical is the need for mature and stable specifications. The retail business models used for TV sets are incompatible with regular and repeated software updates to track changing specifications. Integration and testing costs have to be funded as well as the cost of the updates themselves. A particular concern with the HTML 5 specification is that it's very hard to understand which parts of it are stable and which are not.
2) One key factor in achieving a stable specification is test suites, pages, streams and other test materials. Most relevant are aspects of HTML 5 which were not in HTML 4 or which have changed from HTML 4 and CSS 2D and 3D. Producing multiple sets of test materials for the same technical specification is a waste of time and money and will make things much harder for implementers where they need to pass all of them.
3) Another challenge is the diversity and duplication of technologies to solve the same problem. PCs can support this diversity of technologies since anyone (e.g. a service provider) can deploy native code to the device in order to implement the technology of their choice. This is typically not the case for TVs and similar devices which ideally support only one solution for the same problem.

Suggestions

Use of new web technologies in retail TV products requires pragmatic, stable, mature and realistic selections to be made from the W3C specifications. CEA-2014 achieves this for existing web technologies but for newer technologies the focus seems to be shifting elsewhere, e.g. to the Open IPTV Forum and activities building on it like HbbTV and the UK DTG CTV work. Some involvement of the W3C in this should be discussed. Developing and/or validating test materials for these newer technologies should be part of the same discussion.

APIs and other mechanisms for HTML and JavaScript to access TV features and functions is another area of interest. A lot of work has been done on this topic in the Open IPTV Forum, work which is being adopted in other places such as HbbTV (being deployed in Germany and expected to be deployed in France) and the UK DTG CTV specification. These APIs are part of a complete integrated system definition which includes codecs, system formats, metadata and DRM including the integration between these and HTML / JavaScript. It would be desirable if any W3C work on APIs to access TV features and their integration with codecs, system formats, metadata and DRM could build on these specifications (and test specifications / materials) rather than duplicating it.

PHILIPS
sense and simplicity

Use of Web Technologies in TV Standards in Europe

Jon Piesing
Philips Research
February 8, 2011

PHILIPS

Summary

- TV Standards in Europe using Web Technologies
  - Scope
  - Examples
- Web Technologies Used
- Incremental extensions to web technologies
- Other System Components
- Web technologies as components of non-standard solutions

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Scope

- Typically these standards are a (mostly) complete system description – not just a presentation technology
- They include;
  - Still image formats
  - Video and audio codecs, system layers
  - Broadcast and broadband transport protocols
    - Both for the presentation technology and for video/audio
  - Rules for starting and stopping applications / services / .. including signalling in the broadcast to drive these rules
  - Security
    - Trust models for applications
    - Content protection (incl. but not limited to DRM)
- Historically big debates about the goal
  - Making existing web content work on TV
  - Use of web technologies to create TV focussed services
  - Or something in between

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Examples

- DVB-HTML
  - Developed by DVB in 2000/2001 as an alternative to / alongside Java in their Multimedia Home Platform
  - Not widely adopted - used in some MHP deployments for basic teletext services (e.g. Telenet in Belgium, Poland, ..)
- Open IPTV Forum Declarative Application Environment (DAE)
  - Developed in 2008/9
  - Starts from CEA-2014 as used for remote UI in DLNA
    - Includes more W3C specifications than CEA-2014 revision A
    - Most of the incremental extensions defined by CEA are omitted
    - Uses the CEA-2014 A/V <object> for presenting on-demand video since it pre-dates the HTML 5 Media Tags
  - Defines new <object> types and JavaScript APIs for many TV functions
  - More detailed presentation later in this workshop

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Examples

- HbbTV
  - Developed in 2009
  - Combines a selection from OIPF specifications with a selection from the broadcast transport and signalling spec used by DVB-HTML
  - Ruthless focus on simplicity and time to market
  - Being deployed in Germany, will be deployed in France in 2011
  - Adopted as ETSI TS 102 796 in June 2010
- UK DTG Connected TV
  - Developed in 2010/11
  - Very large intersection with HbbTV but includes more from OIPF
  - Includes advanced graphics (CSS3, HTML5 Canvas, …)
  - Includes more than one application running at one time & (Web) Notifications
  - More detailed presentation later in this workshop

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Web Technologies Used

- DVB-HTML
  - Based on "XHTML Modularization", ECMA-262, CSS 2 (aligned with CSS-TV), DOM-2 (core, views,style, events)
- OIPF DAE
  - Based on XHTML 1.0, CSS 2.1, ECMA-262 3rd edition, pieces of DOM-0, DOM-2 (core, events, HTML, views), XMLHttpRequest
  - Optional SVG 1.2
  - HTML 5 Media Tags, W3C widgets, others added in release 2
  - More detailed presentation later in this workshop
- HbbTV
  - Same web technologies used as mandatory ones in OIPF release 1
- UK DTG CTV
  - Includes all mandatory web technologies in OIPF
  - More detailed presentation on extensions later in this workshop

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Incremental Extensions to Web Technologies

- DVB-HTML
  - Application lifecycle, synchronising to video, dvb-tv media type, @dvb-viewport, Key Events, custom HTML DOM, custom CSS DOM
- OIPF DAE
  - Broadcast TV, video presentation, channel lists, favourite lists, …
  - Recording / download of TV content, management and playback
  - Parental access control & exchange of messages with DRM agent
  - Application lifecycle, query device capabilities, communication services
- HbbTV
  - Selection from OIPF release 1
  - Additional support for synchronising to video
- UK DTG CTV
  - Selection from HbbTV / OIPF release 1
  - UK specific extensions to OIPF

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Other System Components

- Broadcast
  - AVC and MPEG-2 video codec
  - HE-AAC, MPEG-1 L2 and perhaps Dolby E-AC3 audio codecs
  - DVB/EBU subtitles
  - MPEG-2 transport stream as a container format
  - Carriage of files of an application through the broadcast
  - Linkage from a TV channel to specific applications/pages/....
- Broadband
  - Same video, audio, subtitle and container formats as broadcast
    - Perhaps minus the legacy MPEG-2 video and audio codecs
    - Perhaps MP1 L3 and/or WAV added as stand-alone audio formats
  - MP4 files as a container, both fragmented and unfragmented
  - Broadband video streaming protocol

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Other System Components

- Security
  - Trust models for applications
    - Either fine grained (DVB-HTML, OIPF) or coarse (trusted or not – HbbTV / CTV)
    - How does an application become trusted?
  - Content protection
    - DRM
    - Device authentication
    - Encryption of content between the service provider and the device without the burden of DRM

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Web technologies as components of non-standard solutions

- Many non-standardised solutions include web technologies as one part of a solution where other aspects are non-standard.
  - Details are frequently proprietary
- There are several HTML 4 + JavaScript deployments
  - Many IPTV operators use a browser to provide either
    - The operator's UI and/or
    - 3rd party applications
  - Virgin Media in the UK use the old Liberate solution based on HTML 3.2.
    - Their EPG is rumoured to be entirely written in JavaScript – not really HTML.
  - Some (not all) of the CE manufacturer "Connected TV" solutions include a browser. Some are closer to standards than others.

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Session 2
Second-Screen Scenarios

Position paper for Web & TV.

Kensaku KOMATSU
Innovative IP Architecture Center, NTT Communications Corporation
e-mail: kensaku.komatsu@ntt.com

Perspective of this paper

Support for "second screen" scenarios

Overview

My proposal's goal is to serve comfortable integrated web and tv service on second screen (*note1*). Second screen senario can produce large benefit of stakeholders (customer, broadcast provider, program sponsor and so on). It can also provide more confortable service and easily access web content related to TV programs and sponsor. I believe that HTML5 and related specs help to realize sophisticated personalized service.

note1: it means not TV device but portable devices sorts of iPad, Android

Why second screen necessary?

I believe that "second screen" scenario can create more confortable life in home. In the case of living-room, family are watching the same broadcast service. Children likes to see and play BML(*note2*) content, such as related game and quize related to the TV program. At that time, parents sometimes feel a little stress. For example, if father likes the program and he wants to concentrate to watch it. Mother may want to see shopping information related to the TV program. So, to satisfy all members, second screen is necessary.

note2: Broadcast Markup Language

In "second screen" senario, I suppose that above issues are solved. In this senario, TV device in the living room can display only TV program, while children playing game with his device. Also, mother is able to enjoy watching items related to the program.

I understand that "second screen" senario is currently available. For example, mother can enjoy watching TV using search engine. But searching service on the internet requires spending lots of time to find one's target. This situation

makes hard to cencentrate with TV program. As a result, additional information (e.g. sponsors content) may be misunderstood. Additionally to say, communications in home also be decreased.

Proposal and technical requirement.

To solve above situation, I propose that program-related content is desplayed on second screen automatically. It means content will be synchronized to TV program timeline(like today's BML achieved). Additionally to say, it also requires ability to manage each content manually like gadget services. Automatic personalize features based on one's viewing log'll also be required. To access to sponsor's site precisely, site's thumbnail and other banner will be also displayed automatically on it(this senario includes targeting advertisement).

I'll show lists of technical requirement below. I try to annotate current related spec discussed in W3C, such as "HTML5" and related spec.

- Server push model : To deliver synchronized service to customer, server has to push content according the timeline of the program. Some HTML5 related spec will be adequate to realize it (WebSocket or Server-Sent Events).
- To bind program's detail and other items (shopping, travelling etc.), meta data of content or some text base capture data will be required. Current HTML5's editor's draft includes those feature called WebVTT, but it'll require more investigation.
- To provide personalize services, some storage feature is required to store one's viewing log under privacy consideration. HTML5 related spec has those feature. (WebStorage, IndexedDB)
- To provide better customers experience, location detecting feature'll be required (for example annotate service to buy items nearest shop). HTML5 related spec has those feature. (Geolocation)
- To realize gadget services in lower-cost, standard social gadget container system'll be required. There seems to be lots of liaisons with other organizations.
- To handle content data with lower cost, standard messaging protocol may be necesarry.

A Consideration about
"Second Screen Senario"

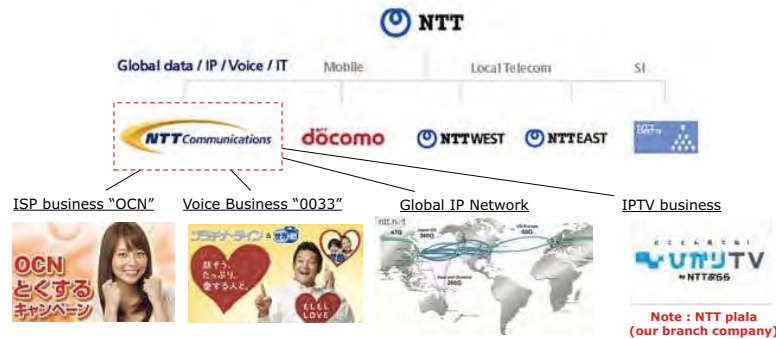Kensaku KOMATSU
NTT Communications Corporation
Innovative IP Architecture Center

Agenda

✓ Corporate Profile

✓ Target and Objective

✓ Use case consideration

✓ Proposals

✓ Technical Requirements

02/08/11   2

Corporate profile

- Established in 1999 (one of the branch company of NTT holdings)
- Providing ISP (includes Web) services mainly in Japan
- Providing IPTV service in Branch company (NTT plala)

ISP business "OCN"   Voice Business "0033"   Global IP Network   IPTV business

Note : NTT plala
(our branch company)

02/08/11   3
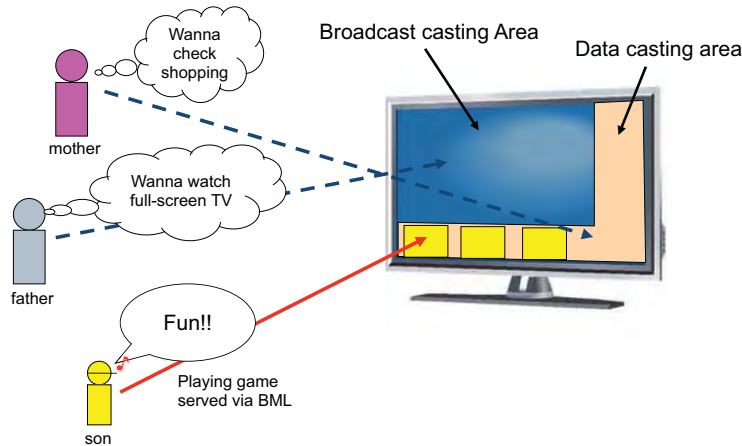

Target and objective

Target of this presentation

- **Second Screen**
    -**Smartphone, Tablet, PC, portable game, …**

Objectives

- **Make families happy**
- **Increase the effectiveness of broadcast program and sponsor's advertisement**

02/08/11   4
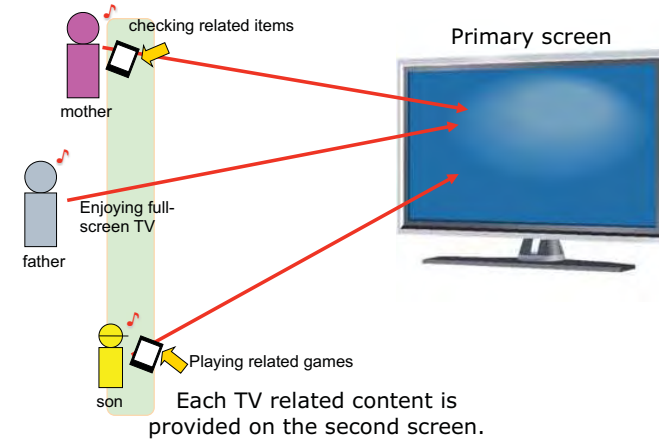
Use case : One sunday morning

Broadcast casting Area

Data casting area

mother
Wanna check shopping

Wanna watch full-screen TV

father

Fun!!

Playing game served via BML

son

Hard to satisfy all member's demands in only one screen.

02/08/11   5

Yes! Second screen can do it!!

checking related items

Primary screen

mother

Enjoying full-screen TV

father

Playing related games

son

Each TV related content is provided on the second screen.

Second screen enables all families satisfied.

02/08/11   6

Recently, part of second screen scenario is realized, but...

- TV program and PC's screen are separated.
- User has to access content manually.
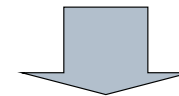
Hard to concentrate on TV.

02/08/11   7

Problem and direction.

Problem

Social perspective : **Getting hard to communicate w/ each families.**

Business perspective : **Decrease of the effectiveness of TV and sponsor's adv.**

Direction

Easy to access TV related content.

02/08/11   8

How to solve?

NTT Communications

Easy access
Automatically push content synchronized with TV program.

To satisfy each member's demand
Each content may be personalized

To make increase of the effectiveness of sponsor's adv
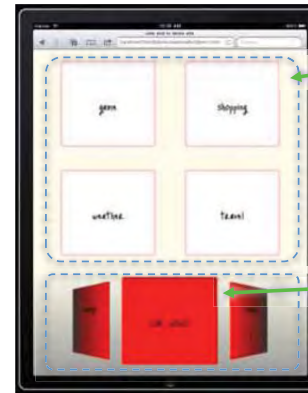**Sponsor's banner or item automatically appears in second screen, synchronized with TV (BTA will also be fine☺)**

02/08/11   9

Service image (an example)

NTT Communications

Providing personalized services on second screen!!

Content Widgets
(Game, Shopping, Weather, Travel …)
-Content is automatically changed.
-Synchronized w/ TV show
-Manually selective
-Gadget w/ recommendation'll be fine.

Sponsor's link
(Banner to site, direct link to EC …)
-Automatically appear
-Synchronized w/ commercial and TV senario.
-Targeting AD based on user's logs on second screen device.

02/08/11   10

Technical requirement 1/ 2

NTT Communications

Synchronizing with TV program is a key factor
-**Push technology**
-**Server-Sent Events, WebSocket**

-**Data format (describing time-line data)**
-**Need discussion**

-**Protocol to communicate with each screen**
-**Need discussion**

02/08/11   11

Technical requirement 2/ 2

NTT Communications

To enable personalizing, and raise the effectiveness of sponsor's content.
-**Store technology for preset data and user's logs**
-**WebStorage**

-**Location sensing technology for providing localized information (e.g. nearest store selling items)**
-**GeoLocation**

To create services.
-**Widget functionalities**
- **W3C widgets**

-**Graphical and Favorable UI**

02/08/11   12

Conclusion

I proposed that making user's access of TV related content easy is important in second screen scenario.

Based on the proposal, we presented some technical requirements.

I believe that second screen scenario makes all stakeholder's current situations better.

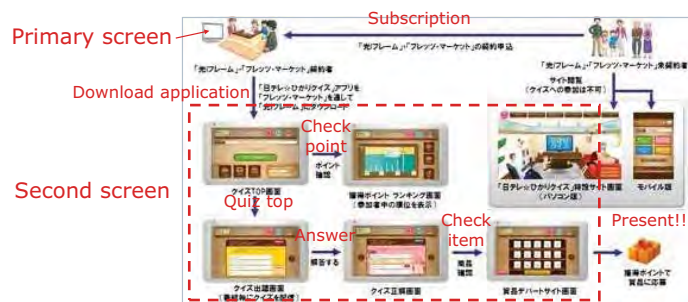02/08/11   13

Thank you!

CONTACT:
KENSAKU KOMATSU
kensaku.komtau@ntt.com

NTT Communications Corporation
Innovative IP Architecture Center

Reference

NTT Mediacross,Inc.,NIPPON TELEVISION NETWORK CORPORATION, and NIPPON TELEGRAPH AND TELEPHONE EAST CORPORATION are now providing trial service (Quiz synchronized to TV show is also displayed at second screen ☺)

Refer：http://www.nttmc.co.jp/news/20110114.html

02/08/11   15

Position letter about WEB on TV group

For a couple of years, [Irdeto](), as a security and technology provider for TV operators, has seen how Internet technologies have migrated to typical TV-centric devices like Set Top Boxes.

In particular, with our middleware and broadband content management products allowing video distribution across different devices from STBs, laptops and PCs to mobile devices and tablets, we have experimented with many client-side technologies, like Java, HTML, Flash or Silverlight. Our job is not an easy one with so many technologies, considering the interoperability between non standard technologies, different browser implementations and the obvious need to protect and secure the content.

The rise of multi-screens has been boosted by the popularity of tablets. Together with the advent of cloud-based media platforms, it makes us support a single key technology to ensure the best user interface, thin clients, with the most compliancy and consistency across these screens. That's why we have chosen to adopt HTML 5 as our prime solution on any screen.

With 40 years experience in the TV industry an impressive track record of active standardization activity and a firm belief in industry consensus and open standards, Irdeto sees this new group "Web on TV" as the best attempt to date to push for standardization, key aspects of our entertainment business, which we further illustrate with two specific cases.

-        Regardless the device we use, or how we are using it, or where the content is coming from, at the end of the day we are talking about playing back content on a screen; that means access to a media player embedded in the OS of the device and accessible via JavaScripts. We would like to ask this group working on different solutions to allow extended usage of this media player as supporting full trick-play modes (play, pause, backward, forward, freeze, slow mention...) but also media management (download, record, list records...).

-        More and more the TV screen is at the heart of the home network, thanks to the support of standards like DLNA. We would like to ask this group to work on, or support the standardization of means to allow content discovery, identification and routing, via JavaScript. This would allow an easier development of mediacenter-like applications in HTML and reduce specific development costs.

These two specific cases are now considered in our industry as key, allowing us to build an enhanced TV experience using web technologies and web data. This work must also be in perspective with some other groups like HbbTV, Canvas, or RVU to ensure that we are not increasing the ongoing technology fragmentation.

Calin Ciordas - Dr. ir. Researcher (cciordas@irdeto.com)
Cédric Monnier – Sr Director, Product Marketing (cmonnier@irdeto.com)

ir.deto

Second W3C Web and TV Workshop
"Technology Defragmentation"

W3C

W3C Workshop
Berlin, February 8th, 2011

Cédric Monnier – Sr Director, Connected Platforms
cmonnier@irdeto.com

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ir.deto
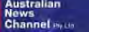
About us

- Founded in 1969 by Ir. Pieter den Toonder
- More than 1000 employees, over 500 customers
- Dual headquarters: Amsterdam and Beijing
  - 25 offices around the world
- Part of Naspers, multinational media company
  - 10.000 employees, USD $3.7B revenue in FY10
- Protect and enable digital assets
  - Content : video, games, maps, eBooks
  - Software: applications, APIs, OSS
  - Platforms : devices, servers
- Over 1 billion software instances protected

---

ir.deto

A Sample of Customers

Pay-TV Operators

VIASAT — On demand movies, (Satellite, Europe)

FOXTEL — On demand, catch-up TV (Cable & satellite, Australia)

astro — On demand, catch-up TV (Satellite, Malaysia)

MULTICHOICE — On demand (Satellite, Africa)

sky — BSkyB - News and Sport (Satellite, UK) Sky DE - Sport (Satellite, Germany)

ABS-CBN — (Satellite, Philippine)

Other Content Providers

Channels and programs

Sports

OTT

maxdome (German, owned by Seven Senses)

FETCH TV (U.K.)

NETFLIX

Adobe

BOXEE

---

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Top Reasons For A Multi-Screen Strategy

- Increase brand value and revenue
  - Leverage same compelling content, syndicate sites/ partners
- Reduce subscriber churn with value-added services
- Defend against piracy on broadband networks
  - Protect and distribute content on all platforms

Game console, SmartPhone, DVB-H Phone, connected TV, iPad and other e-reader, PC, hybrid STB, DTT + hybrid STB ?

Enabling Broadband Television –
Web TV, Mobile TV, OTT TV and more

- Tablets, such as iPad
- Connected TVs
- IP or hybrid set-top boxes
- Mobile devices, such as iPhone and smartphones
- Technology segmentation
- PC and Mac
- Digital signage
- Game consoles
- ?
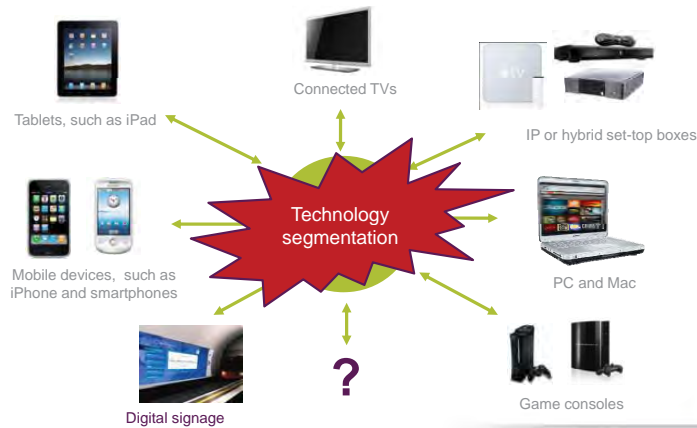
Typical Multi-Screen Solutions

- For Movies
- For Catch-Up TV
- For Sports
- For News
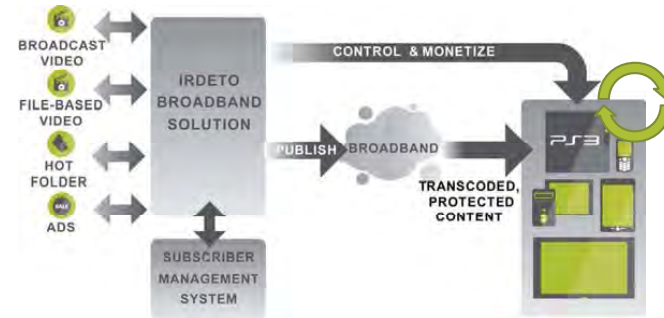
Foxtel – On Demand, Catch-up TV

Objective –
Extend brand and reduce churn with on-demand and catch-up TV for broadcast subscribers

Requirement –
Time to market, ease of integration in ecosystem

Solution –
Irdeto Broadband solution for content management:

Mature and operationally superior , chosen by BSkyB (sister company) and Viasat

* A detailed case study presentation available

- Foxtel Download
- VOD to STB
- Winter Olympics 2010 live online streaming

Astro – On Demand, Catch-up TV, Sports

Objective –
Offer VOD and catch-up TV to PCs and mobile devices to extend brand, reduce churn; support STBs in the future

Requirement –
- Acquire content from live and production sources
- Manage a large content library
- Secure the content
- Provide the consumer experience
- Service subscribers and non-subscribers via PPV
- Launch online service with World Cup (6/2010)

Solution –
Irdeto Broadband solution:
A "Media Hub" to acquire, manage, secure, publish, distribute and monetize content on different platforms

* A detailed case study presentation available

Viasat – From Satellite to Online TV

Objective –

Offer on demand and catch-up TV via Internet to existing and new customers

Requirement –

Flexible content management:
- Different user profiles, payments (free, rentable, packaged), geo-restriction, languages, currencies

Solution –

Irdeto Broadband solution:
- Metadata ingestion and management,
- Powerful search APIs driving entire web site in 4 languages
- Payment gateway and SMS integration

Viasat On Demand For Mobile Devices

Sky Deutschland iPad Application
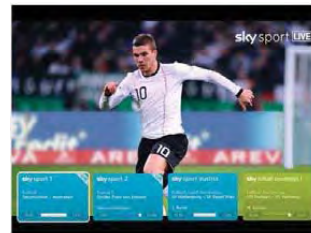
- Live Sports on 4 channels
- Video Highlights On Demand
- News
- Standings & Statistics

- Free all summer to SkySports subscribers, now 12 euros/mo
- Is painting Sky as innovative
  - Getting generally good reviews.
  - iPhone users (majority) feeling left out!

Page 11

Maxdome – First on PC…

Now on Connected TV and STB

Slide 1

High level overview – three components

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1:Content management
Enable content
Add DRM rights
Ad-enabled

2: Microsoft adaptive streaming platform
3rd party

3: Player Application
3rd party application with robust and renewable PlayReady DRM client based on Irdeto Active Trust

Broadcast

Broadcast delivery

Slide 2
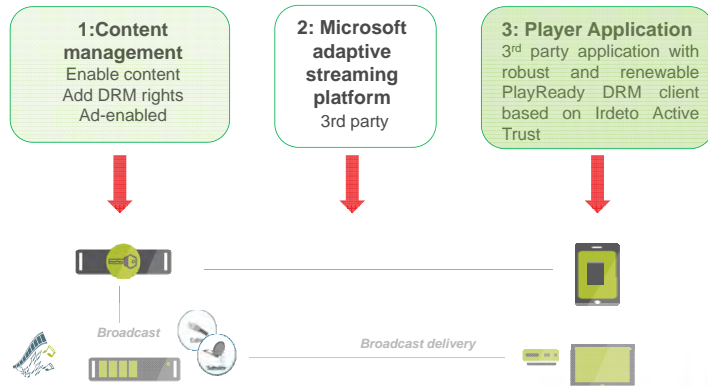
What did we learn ?.....life's hard!

irdeto

- Multi screen means.... Multi issues
  - Multiple **rendering and execution engines**: Flash, Silverlight, Java, HTML, iOS native, CE-HTML, …
  - multiple **platforms**: iOS, Android, proprietary, SmartTVs, HbbTV…
  - Multiple **UI technologies**, high quality, SVG, openGL, JavaScript libraries, …
  - Multiple **media players** with no standards API for such basic features like trick modes, remote control and Content discovery (DLNA, Bonjour, WS Discovery,..)
  - Multiple way to **deliver videos** (download, adaptive streaming…)
  - Multiple way to discover/get applications: app stores, portals, URL…
- What does it mean?
  - Huge technology **fragmentation**…
  - Explosion of **costs** for porting application to devices
  - High **complexity** to have consistent UI across devices
  - High **costs** in maintenance and upgrade
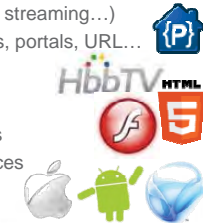
Slide 3

Our needs…

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- Make it silly simpler!
  - We need to reduce rendering technologies, thus we do commit on HTML5 and Flash
  - Extensions needed to facilitate video handling from javascript
    - <video> must allow trick modes, content discovery
  - Good graphic capabilities using <canvas>
  - We need common API for home networking features
  - We had widgets notion, standardized, should we have a standard for TV app and stores?
- Samsung had sold 2M TV apps, competition on the same pace, Android market will come to GoogleTV
  - Should we let de-facto standards lead the future or make real ones?

Slide 4

irdeto

THANK YOU!

Expression of Interest in Participating in the Workshop
: Rich User Experience through Multiple Screen Collaboration

Jaejeung Kim, Howon Lee

KAIST Institute for Information Technology Convergence

jjkim@itc.kaist.ac.kr, hwlee@itc.kaist.ac.kr

Participant's Interest

Our primary research interests are multiple screen collaboration services and web based service oriented architectures to provide the users with rich user experience, especially on the methodologies for realizing so-called nomadic UI or UI migration. We believe the future Web TV with complex content and interactive applications rendered on a single screen could be more efficiently consumed by distributing them across multiple screens. The standardized markups and protocols based on the web technology are the way to realize such environment.

We have designed numerous future user scenarios where a Web TV collaborates with the "second screen or more" to both overcome the limitation of the single display content and to provide richer user experience. We studied various standard specifications from W3C WEBAPPS[1] working group to MWBP[2] working group's recently published recommendations, OIPF's CE-HTML[3], and IETF's protocols[4] were also investigated. We found that there exists a great need of supplementation in bits parts of each standard sector. It would be a good opportunity for us to share our scenarios and results to provide some insights to the participants as well as discuss possible standardization needs for the Web TV.

Point of View

Our point of view is that the Web TV is a highly lean-forward media, which engages the audience actively both indoors and outdoors. The distinctive characteristics of the traditional TV would remain, along with the new features of accessibility. For example, TV itself was static media in terms of the hardware. However if the content is able to migrate to another portable display device, it becomes dynamic media. This "seamless migration" has been mostly standardized by W3C SMIL[5] and DVB-H[6] seamless handover. But Web TV requires beyond the "media

migration". It may incorporate web pages and application migration or even the simultaneous use of both the TV and the second screen.

The content or web applications accessed from the Web TV will be rendered to the user at a certain level of UI, just like a conventional web page from a browser. We are convinced that if the UI is designed to be fragmented and can be directed to another display device, it can flexibly distribute and compound contents to any web accessible device. This enables incorporating multiple displays for a single TV program or application and provides the user with richer user experience. Followings are some examples.

Example of Interest

#Purchasing a product during a TV program

Assume there are two people watching a TV program on the single Web TV. One wants to purchase the product shown on the TV. He can press the "purchase" button on the screen, but the pop-up menu or the window may hinder the visual of content the other audience is watching. Moreover, if the purchase procedure continues on the TV, the personal information such as the credit card number may be exposed to the public. This issue can be handled by migrating the "purchase UI" onto his personal device.

#Content sharing and posting

While a family is watching a TV program, one gets curious about the TV character. He personally searches on his smart phone and finds the TV character's profile description with a photo and many other search results. Then he selects the profile description and photo section or frame from his mobile web browser and "posts" to the Web TV to visually share with rest of the family. One of the family members likes the photo and "retrieves" the photo onto his personal device.

Concluding Remark

The requirements for supporting above scenarios are as follows:

- The web application or web page structure based on the (tentatively) UI migration markup language

- UI migration protocols defined with a API (both manual and automated migration)

- Session management for the set of inter-linked devices

- UI migration security and policy

We have designed multiple scenarios on the TV centric UI migration and partly implemented a prototype based on our own markup language called PDML(Pervasive Display Markup Language). It enables UI fragmentation and annotating the attributes of each UI fragments for the migration and rendering behavior. We expect to share our ideas and contribute to the W3C Web and TV members.

Introduction about us

We are a research center at KAIST, fully funded by the Ministry of Knowledge Economy (MKE) Korea, as well as Korea Communication Commission(KCC). We are participating in Korean government's various future technology roadmap planning including the smart screen and mobile service technology sectors. Current research is focused on the future pervasive display services for multiple screen collaboration.

References

[1] http://www.w3.org/2008/webapps/

[2] http://www.w3.org/2005/MWI/BPWG/

[3] http://www.openiptvforum.org/docs/Release2/OIPF-T1-R2-Specification-Volume-5-Declarative-Application-Environment-v2_0-2010-09-07.pdf

[4] http://datatracker.ietf.org/wg/

[5] http://www.w3.org/TR/2008/REC-SMIL3-20081201/

[6] http://www.dvb-h.org/

Second W3C Web and TV Workshop, Berlin

Rich User Experience through Multiple Screen Collaboration

2011. 02. 08

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KAIST Institute for Information Technology Convergence

KI ITC KAIST IT융합연구소
KAIST Institute for Information Technology Convergence

Assumptions

Web TV?

- General large size display with the **capability of web browsing**
- Content will be more complex, **beyond video**(web pages, web applications etc)
- Located within the sight, but **not within the reach**
- Not a PC(Personal Computer) but a **PC(Public Computer)**

How to control such complex contents at a distance?
How to efficiently represent content to the audience?
Can the second screen settle above problems?

2

More Assumptions

Second Screen?

- Personal hand held device with a display, network module, and computing capability (**possibly smart phones, smart pads etc**)
- Able to connect with the Web TV **to perform as a remote controller** or an **additional information display**

3

Second Screen Scenario #1

Second Screen as a controller

- When watching the traditional TV content, like a video, the main function requirement would be tuning the channel and the volume up and down.
- However for a convergent content like YouTube, searching and selecting videos wouldn't be easy with the traditional remote control.
- Recently, smart TVs comes with a keyboard and a track pad for the better control, but the display is too far to see what you are typing and have to AIM the mouse from a 10-feet distance

<traditional remote control>   <smart phone remote control>   <keyboard & track pad>

4

Second Screen Scenario #1

Possible Approach: Web Fragmentation & Migration to the second screen

Web Fragments

UI Buttons

Second Screen Scenario #1

Fragmented page structure

Selected fragment

Touch select

Fragmentation Mode

Selected fragment rendered

Second Screen Scenario #2

Second Screen as a content separator

- While one is watching a TV program on the Web TV, the other wants to purchase the product on the show.
- He presses the "purchase" button on the Web TV to continue his purchase procedure.
- Such action might both distract others & expose private information to the public
- He activates "UI migration mode" and the purchase procedure may continue on his "second screen"

Second Screen Scenario #3

Collaborative content sharing through the second screen

- TV as a hub for a family talk and content sharing
- Two family gathered around the TV to share information for family trip planning
- A member takes out his smart phone to share the web site introducing the travel sight and "posts" the webpage on the TV canvas
- Another member looks up the sight and finds a great photo to share, sends the photo to the TV
- Multiple content objects and web pages are visually shared on the Web TV

Demo Video
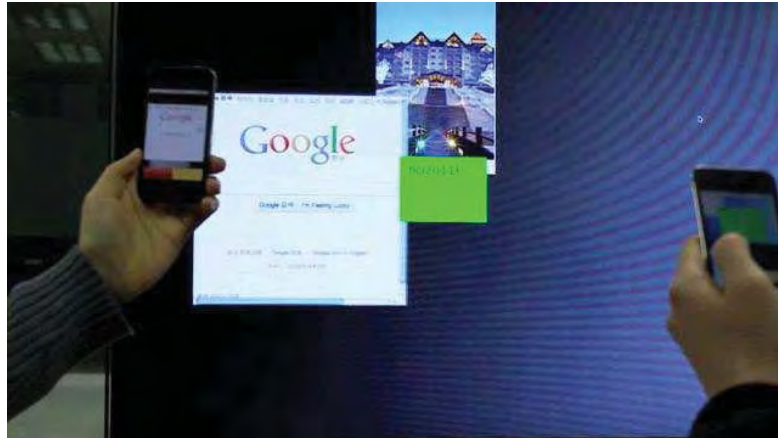
9

Requirements

Device discovery

- An open and widely accepted standard protocols are required (e.g. DLNA/UPnP)

Web fragmentation

- The web application or web page needs to be structured by a mark-up/annotation
- Or should undergo a web fragment parser with a fragment detection algorithm
- The browser need to support web fragment rendering engine(or a plug-in)

UI migration

- Session management is required for not only stream video migration but also web page/application session

10

Issues and Discussion

Dependency

- Current scenarios are device free, but browser dependent

Second screen authorization

- Two or more users might manipulate a single content at the same time using their own second screen

Synchronization among screens

- While on screen content changes, the rest of the screen would remain unchanged unless the subject sends a notification
- There is a tradeoff between the frequent refresh of the webpage and system performance

Web fragment level content filtering

- It is possible to filter hazardous content (e.g. violence) which the Web TV might play in the public by the fragment markup

Standardization needs?

11

Thank You

12

Session 3
Panel on HTTP Adaptive Streaming

Interoperability and the Large-scale Growth of Broadband Video
W3C Web and TV Workshop, 8-9 February 2011

John C. Simmons – Media Platform Architect Microsoft Corporation

Muriel Deschanel (Standards Program Manager) and John Simmons (Media Platform Architect) from Microsoft Corporation would like to participate in the upcoming W3C Web and TV workshop and present the position paper below. John Simmons will be the presenter.

Abstract

The explosive growth of broadband video and Internet-enabled embedded devices is transforming the Internet. There is a need to define cross-platform, broadband video standards, supporting adaptive HTTP streaming, common encryption and DRM-interoperability, and support for these new standards should find expression in HTML5.

The Video Transformation of the Internet

We are witnessing the explosive growth of broadband video consumption, and this growth is transforming the Internet.

Broadband video as percentage of Internet traffic

Cisco has reported that by 2014, the sum of all forms of video (TV, video on demand, Internet video, and peer-to-peer) will exceed 91 percent of global consumer traffic and that for the first time in the last 10 years, peer-to-peer traffic will not be the largest Internet traffic type, surpassed by Internet video.

When Wired magazine published "The Web is Dead. Long Live the Internet", they included a Cisco fill-diagram showing the proportion of total United States Internet traffic by category from 1990 to 2010. The article's conclusions about the web are dubious, but the chart is accurate and illustrative of the impact broadband video consumption is having on the Internet (see figure 1).
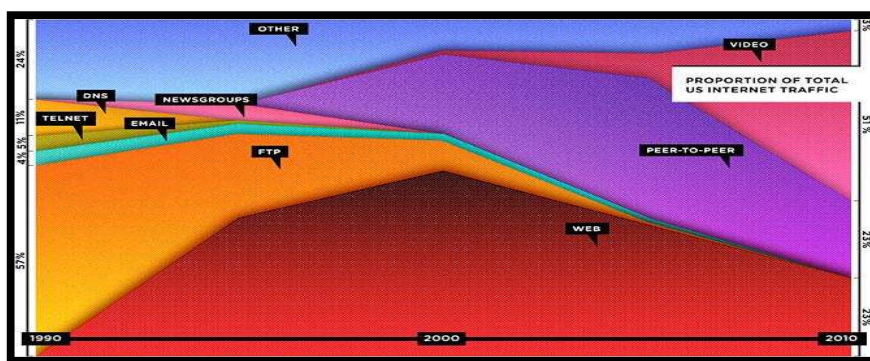
Figure 1 Proportional Representation of total US Internet Traffic, 1990-2010

2011-01-13   Microsoft Corporation   1

Broadband video and primetime television

Consumer patterns of broadband video consumption are converging with that of traditional broadcast television consumption. Sandvine has reported that:

> *"...Netflix represents more than 20% of downstream Internet traffic during peak times in the U.S. -- and is heaviest in the primetime hours of 8 to 10 p.m."*

Broadband video and mobile devices

Figure 2 is from a Cisco report, showing that by 2014, smartphones and portables will account for 91 percent of all mobile data traffic, and video will account for 66 percent of that traffic.
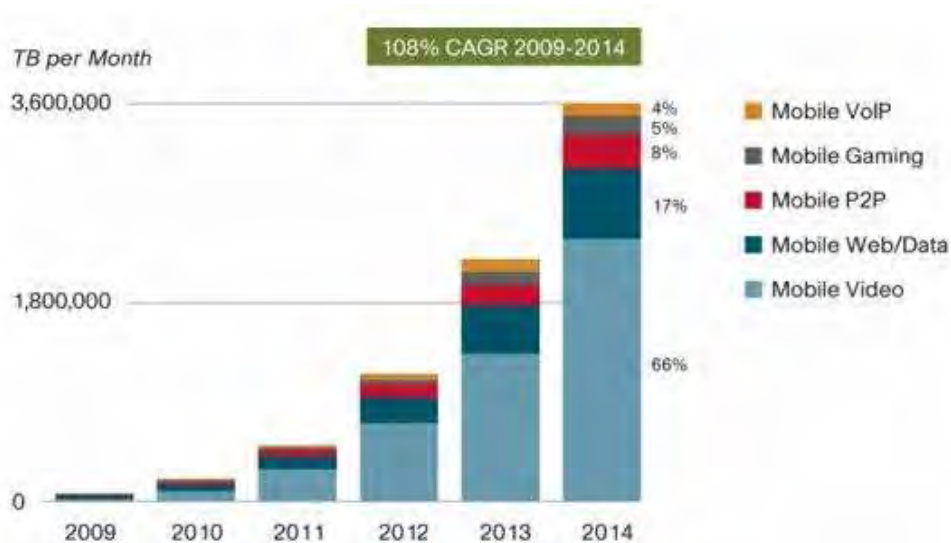
Figure 2 Mobile data growth (Cisco)

Note the significant percentage of this growth which is coming from broadband video. This directly relates to the need for cross-platform broadband video standards.

> *The growth of broadband video across multiple device form factors is having a transformative effect on the Internet. To manage and facilitate this growth requires industry adoption of cross-platform standards for broadband video.*

Broadband Video Standardization

In 2008 Microsoft began an internal project to discuss what standards were needed to facilitate innovation and the large scale growth of broadband video.

This project, codenamed "Athens", found

- The diversity of encoding formats hampers broadband video delivery to embedded platforms and make monetization of long tail content difficult

- Adaptive HTTP streaming is of critical importance for a quality consumer experience of video delivered over an unmanaged network.

- Content protection will remain important for video delivery, and that - for a variety of business and technical reasons – multiple DRM technologies will coexist. As a result, DRM-interoperability is an absolute must.

DRM-interoperable Container Format

The Athens team developed the "Protected Interoperable File Format" (PIFF), which included a proposed common scrambling or encryption algorithm. This is a fragmented movie code point of the ISO Base Media File Format (ISO/IEC14496 Part 12), with new boxes defined to facilitate DRM interoperability.

Based on the argument that a royalty free DRM-interoperability container format would facilitate innovation, we received approval to release the PIFF specification under Microsoft's Community Promise Agreement.

We also proposed the PIFF container format to the Digital Entertainment Content Ecosystem (DECE) industry forum, where it was adopted as the basis of their Common File Format (CFF), utilizing the PIFF common encryption algorithm ('cenc').

Adaptive HTTP Streaming Standard

To facilitate broad industry innovation on an adaptive HTTP streaming standard, Microsoft also published the "Smooth Streaming Transport Protocol" (SSTP) – the protocol used by IIS smooth streaming - under the Microsoft Community Promise.

Subsequent to the published SSTP specification the 3rd Generation Partnership Project (3GPP) developed an "Adaptive HTTP Streaming" (AHS) specification; and a liaison agreement between the Open IPTV Forum (OIPF) and the 3GPP led to the creation of an OIPF "HTTP over Adaptive Streaming" (HAS) specification.

Because of the fragmented adaptive HTTP streaming market, both proprietary and attempted standards and because a single standard is needed for mobile, PC and televisions –Microsoft worked with participants in both the 3GPP and OIPF to harmonize and extend these designs in MPEG, leading to the "Dynamic Adaptive Streaming over HTTP" (DASH) specification. We believe DASH has a good chance of becoming the umbrella spec that unifies the industry in multimedia delivery over Internet.

The MPEG DASH specification should be issued as a draft international standard by February 2011.

Digital Rights Management Standardization

The word "open" is one of the most commonly misappropriated words in the English language, especially as it relates to industry standard agreements. This is most evidently true when the standard in question is for digital rights management. This is because digital rights management systems always contain a proprietary component.

A digital rights management system can be thought of as consisting of the following five components:

- A detailed encryption algorithm
- Specification(s) on how to apply encryption to particular digital object(s)
- A rights expression language
- A key management system
- A licensing regime with compliance and robustness rules

Standardization of some of these components can be very difficult (see Figure 3).

The Licensing Regime

The licensing regime is always present, and always proprietary. It is always present because without a licensing regime, there are no legal means of forcing a client implementation to honor the digital rights management rules.

The Key Management System

The key management system embodies the mechanism for controlling a client implementation. Without it revocation and renewability cannot be enforced. In fact, the key management system for an open standard DRM like OMA DRM incorporates a licensed (proprietary) component or "hook IP" from the licensing entity – in this case CMLA. As a consequence, standardizing the key management system in a way which is broadly adopted, though not impossible, is extremely difficult.

The Rights Expression Language

The rights expression language (REL) has a tight relationship to the licensing regime compliance rules, so standardizing the REL in a way that will be adopted by the industry is not impossible, but difficult.
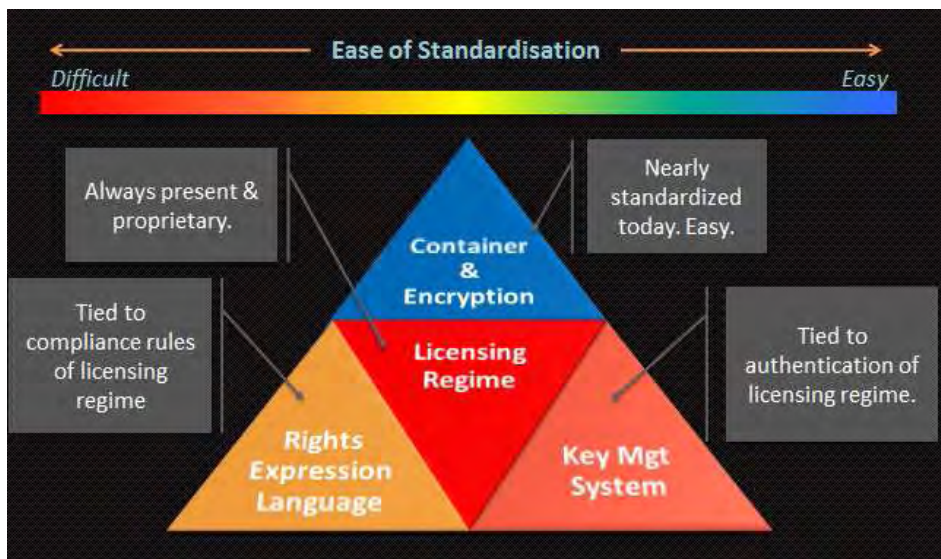
Figure 3 Digital Rights Management Standardization

The Encryption Algorithm

Only the encryption algorithm itself and the application of it to a particular video format are easy to standardize. This is the reason why efforts are underway in multiple industry fora to define a common scrambling or encryption algorithm for broadband video – such as the DVB CPT, DECE, and in MPEG.

References

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"Sandvine Internet Report: Average is Not Typical",
http://www.sandvine.com/news/pr_detail.asp?ID=288

Cisco Visual Networking Index: Global Mobile Data Traffic 2014,
http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white
_paper_c11-520862.html

2011-01-13   Microsoft Corporation   5

Adaptive HTTP Streaming Standardization

The role of adaptive streaming standardization activities in defining broadband television standards

W3C Web and TV Workshop
8 February, 2011

John Simmons
Media Platform Architect
Microsoft

Broadband Television Standard Elements
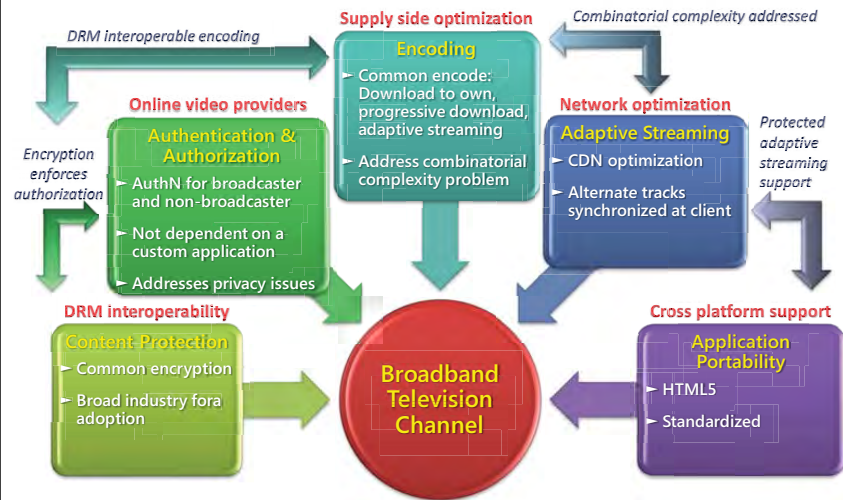
Encoding & Adaptive Streaming Standardization

Microsoft & MPEG DASH Licensing

❖ For conformant implementations of the final MPEG DASH specification, Microsoft plans to make its necessary patent claims available under the MPEG patent policy's royalty-free RAND licensing option.

❖ Any patent licensing commitment to MPEG DASH implementations will not interfere with or change the terms of any other licensing programs.

Adaptive HTTP Streaming Standardization

Adaptive streaming standardization activities and their importance to broadband television

THANK YOU

8-Feb-2011   W3C Web and TV Workshop - Microsoft   5

Digital Rights Management Standardization

The role of DRM interoperability schemes in defining broadband television standards

W3C Web and TV Workshop
8 February, 2011

John Simmons
Media Platform Architect
Microsoft

Broadband Television Standard Elements
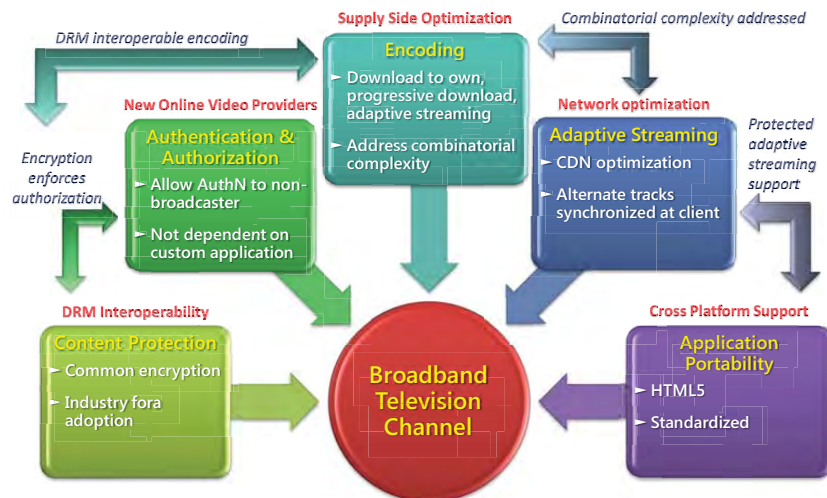
8-Feb-2011   W3C Web and TV Workshop - Microsoft   7

Digital Rights Management Standards

The problem space
➤ Non-interoperable ecosystems
➤ Encoding inefficiencies
➤ DRM-free not an option for high value video
➤ Industry will not settle on a single DRM

Solution attributes
➤ Protected adaptive bitrate streaming
➤ DRM interoperability
➤ Common three- (multi-) screen support
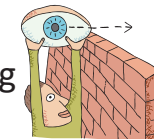
2010-04-22   Draft - Microsoft Confidential   8

Why is DRM Standardization so Difficult?

Implementations are always proprietary, so how to make interoperable?

Ease of Standardisation

Difficult → *Easy*

- Always present & proprietary.
- Nearly standardized today. Easy.
- Tied to compliance rules of licensing regime
- Tied to authentication of licensing regime.

Encryption

Licensing Regime

Rights Expression Language

Key Mgt System
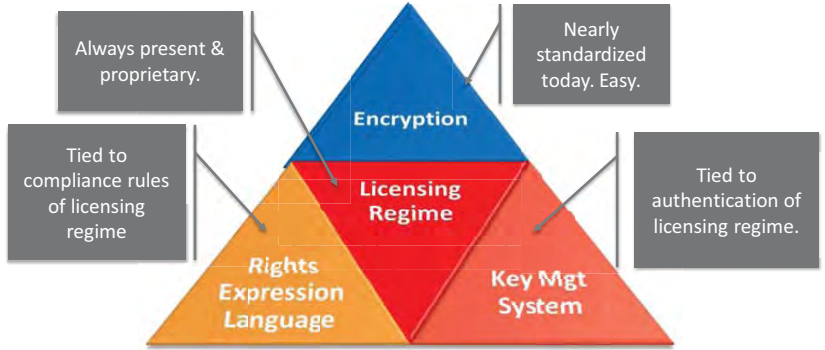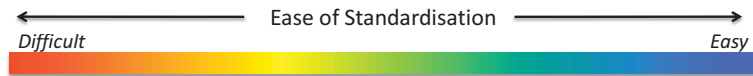
DRM Standardization Through Standardized Encryption

1) HW friendly
2) Software friendly
3) Software friendly with IPR hook.

IPTV Content Scrambler

Call for Proposal
25 November 2010

DVB Digital Video Broadcasting

Proposed 15 January 2011

Publish Under Community Promise (royalty free)

Microsoft

Microsoft Interoperability

Contribute

Protected Interoperable File Format
Sept 2009

Digital Entertainment Content Ecosystem

Liaison

ISO International Organization for Standardization

MPEG - ISO/IEC JTC1/SC29 WG11

14496-12 ISO Base Media File Format
Draft Amendment - January 2011

Publish

Common File Format
Estimated. Q1 2011

14496-12 ISO Base Media File Format
Final Draft Amendment - ~ July 2011

❖ A standard encryption algorithm is the best way to achieve DRM-interoperability. This leaves the business decision of the DRM technology to use outside the standard.

❖ For broadband television, this standard needs to be compatible with an adaptive streaming standard.

Digital Rights Management Standardization

DRM interoperability and its importance to broadband television

THANK YOU

Position Paper: The Convergence of Video on IP and HTTP

Bruce Davie   Richard Maunder

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January 6, 2011

"Convergence" has been both an industry buzzword and something of a holy grail for many years. We define convergence to be the ability to carry widely diverse services, which at one time required specialized, service-specific infrastructure, on a single network. Voice services are now well along such a converged path thanks to the success of voice over IP, and video is heading the same way.

Convergence of many services onto a single network provides two broad classes of benefits. The first class relates to cost reduction. Network operators often focus on the immediate cost savings of consolidating a set of diverse offerings onto a common infrastructure, with attendant reduction in capital and operational costs. However, we believe a more significant long term benefit comes from the potential for greater innovation and cross-fertilization between services. For example, voice over IP applications benefit from the ability to treat voice as another form of data that can be managed via an email program or Web interface. This cross-fertilization enables new services that were not previously possible, or even envisaged, in siloed systems.

A closer examination of video suggests that the convergence of video onto IP networks, while advanced in some respects, is far from complete. While it is certainly true that a great deal of video runs over IP, today there are different architectural approaches for enterprise and service provider networks; different technologies used for "linear" (live) and "nonlinear" (e.g., video on demand) content; a diverse, constantly shifting, set of video codecs, container and DRM options; and differences in the delivery of content in "over-the-top" environments (e.g., Hulu, YouTube, iPlayer) versus managed environments, such as the IPTV services offered by broadband service providers. We believe that the historically high bandwidth and processing requirements for digital video have caused every video environment to be treated as a "special case", and that this poses a potential impediment to realizing the full benefits of convergence.

Recent technological developments could lead to a new level of unification in the video space. One such development is the trend towards the use of HTTP and "adaptive" streaming techniques. Initially targetted towards over-the-top, nonlinear content, adaptive streaming is quickly showing promise for live content and managed networks as well. However, this trend raises some important questions and challenges. Of particular importance to the W3C community is that adaptive streaming over HTTP to

1

date has been developed in a proprietary manner, with comparable but incompatible approaches from a variety of vendors. While there are benefits to allowing for innovation in the development of adaptive streaming techniques, the lack of a standard adaptive streaming approach may also hinder adoption (some devices will be unable to play some content) or add cost to systems (end devices need to understand multiple protocols, content delivery systems need to store multiple container formats). Just as with the debate over default codecs for HTML5 video, there may be room for debate as to how much of adaptive streaming needs to be standardized or whether some sort of default should be recommended. We are interested in discussing the options in this space. It will also be necessary to determine whether the W3C is the appropriate place for any standardization, as a number of other standards bodies have shown signs of interest in the problem area.

2

The Grand Unification of Video

Bruce Davie
Richard Maunder

{bsd,rmaunder}@cisco.com

Overview

- Even though Video over IP isn't that new, the shift to Video over HTTP is of major importance
    - Adaptive HTTP-based streaming enables common technology for "managed" and "unmanaged" (over the top) services
    - Capitalize on scale, ubiquity and cost benefits of HTTP
- Ability to support live & on-demand, managed & unmanaged on common infrastructure offers many benefits
    - Lower costs
    - Greater opportunities for innovation, cross-pollination
- Standardization is essential
    - At the same time, allow room for innovation/differentiation
    - Leverage other groups' work as appropriate
- Role of W3C may include standards, reference implementation

---

Example Video Delivery Architecture
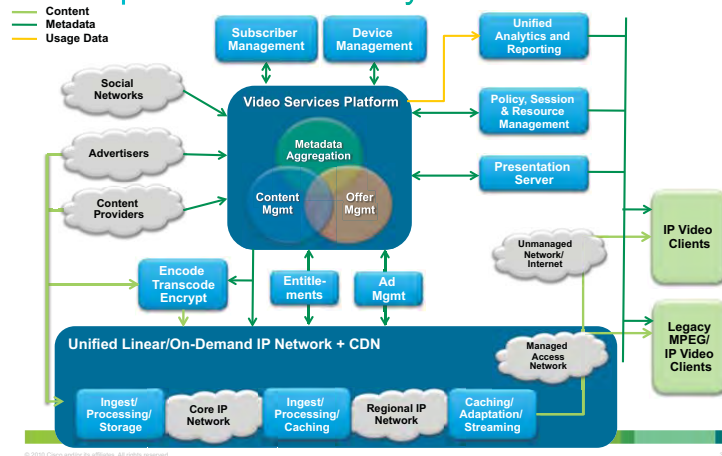
Importance of HTTP Adaptive Streaming

- HTTP adaptive streaming optimized for "difficult" environments
    - Not just variable network conditions, also diverse device capabilities
    - Suitable for more controlled conditions (managed networks & devices)
- Using common technology for managed, unmanaged, live and on-demand would be a big step forward
    - Today we have separate infrastructure for each environment ➔ higher costs
    - Siloed infrastructure and services hampers innovation
- With a common, web-based infrastructure we can:
    - Leverage innovations in other spaces, e.g. web services, social networks etc
    - Leverage new devices (tablets, phones etc.)
    - Develop innovative applications e.g. N-screen, "Social TV", etc
    - Build applications that span service types

Need for Standards

- Most deployed adaptive streaming currently proprietary and lacking modularity
  - This adds cost in many places (caching infrastructure, IP network, application development, etc.)
  - May be impediment to development & adoption of new apps/services (e.g. due to content unavailability on some devices)
- Specific standardization issues:
  - Container (with appropriate features, multi-DRM support, codec independence)
  - Manifest file format
  - Adaptation algorithms (need to allow diversity here cf. TCP congestion control algorithms)
  - HTML5 support
- MPEG DASH covering much of this
- HTML5 clearly W3C item
- Reference Implementation?

5

Summary

- We view the development and standardization of HTTP-based adaptive video as very important – a key enabler for better video applications and services, and a cost reducer
- We'd like to see W3C
  - Bless existing standards or define suitable subsets of them
  - Fill gaps in existing standards
  - Consider reference implementation, maybe test tools?

6

Dynamic Adaptive Streaming over HTTP – Design Principles and Standards

Thomas Stockhammer
Qualcomm Incorporated

ABSTRACT

In this paper, we provide some insight and background into the Dynamic Adaptive Streaming over HTTP (DASH) specifications as available from 3GPP and in draft version also from MPEG. Specifically, the 3GPP version provides a normative description of a Media Presentation, the formats of a Segment, and the delivery protocol. In addition, it adds an informative description on how a DASH Client may use the provided information to establish a streaming service for the user. The solution supports different service types (e.g., On-Demand, Live, Time-Shift Viewing), different features (e.g., adaptive bitrate switching, multiple language support, ad insertion, trick modes, DRM) and different deployment options. Design principles and some forward-looking considerations are provided.

1. INTRODUCTION

Internet access is becoming a commodity on mobile devices. With the recent popularity of smart phones, smartbooks, connected netbooks and laptops the Mobile Internet use is dramatically expanding. According to recent studies [6], expectations are that between 2009 and 2014 the mobile data traffic will grow by a factor of 40, i.e., it will more than double every year. Figure 1 shows that the video traffic will by then account for 66% of the total amount of the mobile data. At the same time mobile users expect high-quality video experience in terms of video quality, start-up time, reactivity to user interaction, trick mode support, etc., and the whole ecosystem including content providers, network operators, service providers, device manufacturers and technology providers need to ensure that these demands can be met. Affordable and mature technologies are required to fulfil the users' quality expectations. One step into this direction is a common, efficient and flexible distribution platform that scales to the rising demands. Standardized components are expected to support the creation of such common distribution platforms.
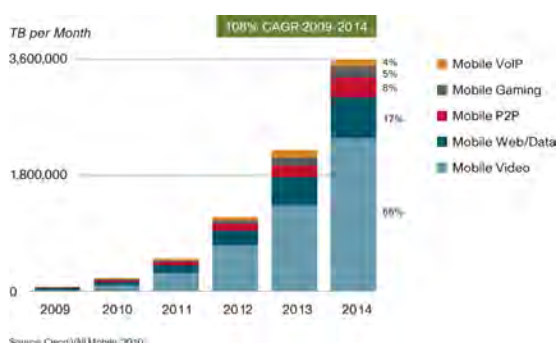
Figure 1 Video Will Account for 66 Percent of Global Mobile Data Traffic by 2014 (Source [7], Figure 2)

Traditional streaming generally uses a stateful protocol, e.g., the Real-Time Streaming Protocol (RTSP): Once a client connects to the streaming server the server keeps track of the client's state until the client disconnects again. Typically, frequent communication between the client and the server happens. Once a session between the client and the server has been established, the server sends the media as a continuous stream of packets over either UDP or TCP transport. In contrast, HTTP is stateless. If an HTTP client requests some data, the server responds by sending the data and the transaction is terminated. Each HTTP request is handled as a completely standalone one-time transaction.

Alternatively to streaming, progressive download may be used for media delivery from standard HTTP Web servers. Clients that support HTTP can seek to positions in the media file by performing byte range requests to the Web server (assuming that it also supports HTTP/1.1 [3]). Disadvantages of progressive download are mostly that (i) bandwidth may be wasted if the user decides to stop watching the content after progressive download has started (e.g., switching to another content), (ii) it is not really bitrate adaptive and (iii) it does not support live media services. Dynamic Adaptive Streaming over HTTP (DASH) addresses the weaknesses of RTP/RTSP-based streaming and progressive download.

2. DESIGN PRINCIPLES

HTTP-based progressive download does have significant market adoption. Therefore, HTTP-based streaming should be as closely aligned to HTTP-based progressive download as possible, but take into account the above-mentioned deficiencies.
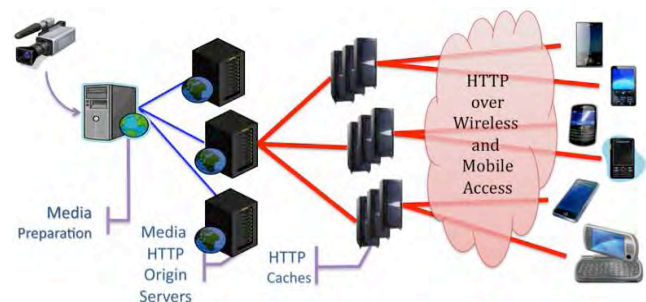
Figure 2 Example Media Distribution Architecture

Figure 2 shows a possible media distribution architecture for HTTP-based streaming. The media preparation process typically generates segments that contain different encoded versions of one or several of the media components of the media content. The segments are then hosted on one or several media origin servers typically, along with the media presentation description (MPD). The media origin server is preferably an HTTP server such that any communication with the server is HTTP-based (indicated by a

bold line in the picture). Based on this MPD metadata information that describes the relation of the segments and how they form a media presentation, clients request the segments using HTTP GET or partial GET methods. The client fully controls the streaming session, i.e., it manages the on-time request and smooth playout of the sequence of segments, potentially adjusting bitrates or other attributes, for example to react to changes of the device state or the user preferences.

Massively scalable media distribution requires the availability of server farms to handle the connections to all individual clients. HTTP-based Content Distribution Networks (CDNs) have successfully been used to serve Web pages, offloading origin servers and reducing download latency. Such systems generally consist of a distributed set of caching Web proxies and a set of request redirectors. Given the scale, coverage, and reliability of HTTP-based CDN systems, it is appealing to use them as base to launch streaming services that build on this existing infrastructure. This can reduce capital and operational expenses, and reduces or eliminates decisions about resource provisioning on the nodes. This principle is indicated in Figure 2 by the intermediate HTTP servers/caches/proxies. Scalability, reliability, and proximity to the user's location and high-availability are provided by general-purpose servers. The reasons that lead to the choice of HTTP as the delivery protocol for streaming services are summarized below:

1. HTTP streaming is spreading widely as a form of delivery of Internet video.

2. There is a clear trend towards using HTTP as the main protocol for multimedia delivery over the Open Internet.

3. HTTP-based delivery enables easy and effortless streaming services by avoiding NAT and firewall traversal issues.

4. HTTP-based delivery provides reliability and deployment simplicity due as HTTP and the underlying TCP/IP protocol are widely implemented and deployed.

5. HTTP-based delivery provides the ability to use standard HTTP servers and standard HTTP caches (or cheap servers in general) to deliver the content, so that it can be delivered from a CDN or any other standard server farm.

6. HTTP-based delivery provides the ability to move control of "streaming session" entirely to the client. The client basically only opens one or several or many TCP connections to one or several standard HTTP servers or caches.

7. HTTP-based delivery provides the ability to the client to automatically choose initial content rate to match initial available bandwidth without requiring the negotiation with the streaming server.

8. HTTP-based delivery provides a simple means to seamlessly change content rate on-the-fly in reaction to changes in available bandwidth, within a given content or service, without requiring negotiation with the streaming server.

9. HTTP-based streaming has the potential to accelerate fixed-mobile convergence of video streaming services as HTTP-based CDN can be used as a common delivery platform.

Based on these considerations, 3GPP had identified the needs to provide a specification for a scalable and flexible video distribution solution that addresses mobile networks, but is not restricted to 3GPP radio access networks (RANs). 3GPP has taken the initiative to specify an Adaptive HTTP Streaming solution in addition to the already existing RTP/RTSP-based streaming solutions and the HTTP-based progressive download solution.

Specifically the solution is designed

• to support delivery of media components encapsulated in ISO base media file format box structure,

• to address delivery whereas presentation, annotation and user interaction is largely out-of-scope,

• to permit integration in different presentation frameworks.

The 3GPP sub-group SA4 working on codecs and protocols for media delivery started the HTTP streaming activity in April 2009 and completed the Release-9 specification work early March 2010. The 3GPP Adaptive HTTP Streaming (AHS) has been integrated into 3GPP Transparent end-to-end Packet-switched Streaming Service (PSS). Specifically, 3GPP TS 26.234 [1] (PSS Codecs and Protocols) clause 12 specifies the 3GPP Adaptive HTTP Streaming solution, and 3GPP TS 26.244 [2] (3GP File Format) clauses 5.4.9, 5.4.10, and 13 specify the encapsulation formats for segments. The Release-9 work is now under maintenance mode and some minor bug fixes and clarifications were agreed during the year 2010 and have been integrated into the latest versions of 3GPP TS 26.234 and 3GPP TS 26.244.

The solution supports features such as

• fast initial startup and seeking,

• bandwidth-efficiency,

• adaptive bitrate switching,

• adaptation to CDN properties,

• re-use of HTTP-server and caches,

• re-use of existing media playout engines,

• support for on-demand, live and time-shift delivery services,

• simplicity for broad adoption.

3GPP has also sought alignment with other organizations and industry fora that work in the area of video distribution. For example, as the Open IPTV Forum (OIPF) based their HTTP Adaptive Streaming (HAS) solution [8] on 3GPP. 3GPP recently also addressed certain OIPF requirements and integrated appropriate features in the Release-9 3GPP Adaptive HTTP Streaming specification. Also MPEG's draft DASH solution is heavily based on 3GPP's AHS. Finally, 3GPP has ongoing work in Release-10, now also referred to as DASH. This work will extend the Release-9 3GPP AHS specification in a backward-compatible way. Close coordination with the ongoing MPEG DASH activities is organized.

3. 3GPP Adaptive HTTP Streaming

3GPP Adaptive HTTP Streaming, since Release-10 referred to as as 3GP-DASH, is the result of a standardization activity in 3GPP SA4 Figure 3 shows the principle of the 3GP-DASH specification. The specification provides

• a normative definition of a Media Presentation, with Media Presentation defined as a structured collection of data that is accessible to the DASH Client through Media Presentation Description,

- a normative definition of the formats of a Segment, with a Segment defined as an integral data unit of a media presentation that can be uniquely referenced by a HTTP-URL (possibly restricted by a byte range),
- a normative definition of the delivery protocol used for the delivery of Segments, namely HTTP/1.1,
- an informative description on how a DASH client may use the provided information to establish a streaming service for the user.
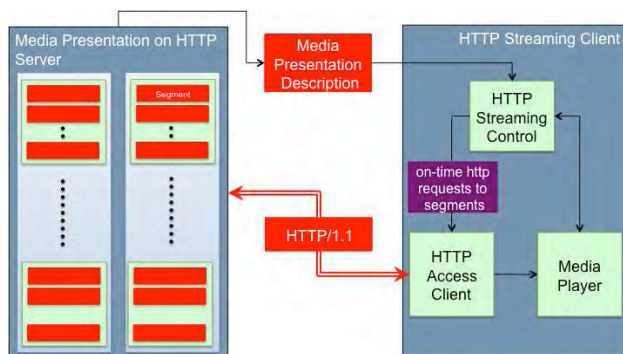

Figure 3 Solution overview – 3GP-DASH

DASH in 3GPP is defined in two levels:

1. Clause 12.2 in TS 26.234 [1] provides a generic framework for Dynamic Adaptive Streaming independent of the data encapsulation format for media segments.
2. Clause 12.4 in TS 26.234 [1] provides a specific instantiation of this framework with the 3GP/ISO base media file format by specifying the segment formats, partly referring to the formats in TS 26.244 [2].

This approach makes the framework defined in 3GPP extensible, for example to any other segment formats, codecs and DRM solutions.

3G-DASH supports multiple services, among others:

- On-demand streaming,
- Linear TV including live media broadcast,
- Time-shift viewing with network Personal Video Recording (PVR) functionalities.

Specific care was taken in the design that the network side can be deployed on standard HTTP servers and distribution can be provided through regular Web infrastructures such as HTTP-based CDNs. The specification also leaves room for different server/network-side deployment options as well as for optimized client implementations.

The specification also defines provisions to support features such as

- Initial selection of client- and/or user-specific representations of the content,
- Dynamic adaptation of the played content to react to environmental changes such as access bandwidth or processing power,
- Trick modes such as seeking, fast forward or rewind,

- Simple insertion of pre-encoded advertisement or other content in on-demand and live streaming services,
- Efficient delivery of multiple languages and audio tracks,
- Content protection and transport security, etc.

4. Ongoing Work in DASH

3GP-DASH defines the first standard on Adaptive Streaming over HTTP. Specific design principles have been taken into account that enables flexible deployments when using the formats defined in 3GP-DASH. Major players in the market, including those that offer proprietary solutions today, participated in the development of the specification. 3GP-DASH also serves as baseline for several other organizations, in particular the Open IPTV Forum and MPEG. Especially MPEG [7] is considering backward-compatible extensions to the 3GP-DASH specification to integrate additional media such as multiview or scalable video coding. Furthermore, initial efforts in interoperability testing have started. Currently there is great hope that the foundations laid in 3GP-DASH build the core package of an industry-standard for Dynamic Adaptive Streaming over HTTP (DASH).

One of the important aspects in MPEG and other fora will be a suitable definition of Adaptive Streaming Profile including media codecs, formats as well as selected options from the rich DASH specification. Envisaged profiles may focus on live services and On-Demand services, services targeting existing set-top boxes that for example are based on MPEG-2 TS processing, etc. In addition, prototyping and interoperability efforts are about to start.

5. ACKNOWLEDGMENTS

Many thanks to all the colleagues in 3GPP SA4 and MPEG DASH for the collaboration on the matter and their contributions to a hopefully successful and widely deployed standard.

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Dynamic Adaptive Streaming over HTTP – Design Principles and Standards

Thomas Stockhammer, Qualcomm

Why in 3GPP?
The Mobile Video Streaming Challenge

- ‣ The mobile video landscape
  - · Mobile Internet use is dramatically expanding
  - · Video traffic is growing exponentially & is a large fraction of the usage

- ‣ The challenges
  - · Mobile users expect high quality video **experience**
  - · Network operators need to offer quality experience affordably

39 times growth of mobile data
66% mobile video by 2014

Source: Cisco White Paper: Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2009-2014 Figure 2

Standardization Activities

- ‣ 3GPP completed specification work in April 2010 for Release-9.
- ‣ Forms basis for (is "compatible with")
  - ‣ Open IPTV Forum HTTP Adaptive Streaming (completed in Sep 2010)
  - ‣ 3GPP Release-10 DASH (completion target July 2011)
  - ‣ MPEG DASH (completion target August 2011)
- ‣ Alignment and compatibility has been a major objective, but at the same time new requirements and simplification had been taken on board
  - ‣ Formats, Codecs, Content Protection, Accessibility, 3D, etc.
- ‣ MPEG DASH ISO/IEC 23001-6 is now the master specification
  - ‣ Draft International Standard (DIS) 23001-6 available since yesterday
  - ‣ 5 months balloting period will start shortly
  - ‣ Parallel approval process for extensions to ISO base media FF to support DASH
  - ‣ Continuous coordination with 3GPP and other organizations (DECE, OIPF, etc.)
  - ‣ Conformance and Reference Software activities kicked off (see WD 23001-7)
- ‣ The good news: Converging standard for adaptive streaming on the way

3

(Some) DASH Design Principles

- ‣ DASH is not:
  - ‣ system, protocol, presentation, codec, interactivity, client specification
- ‣ DASH is an enabler
  - ‣ It provides formats to enable efficient and high-quality delivery of streaming services over the Internet
  - ‣ It is considered as one component in an e2e service
  - ‣ System definition left to other organizations (SDOs, Fora, Companies, etc.)
- ‣ It attempts to be very good in what is to be addressed by the standard
  - ‣ Enable reuse of existing technologies (containers, codecs, DRM etc.)
  - ‣ Enable deployment on top of HTTP-CDNs (Web Infrastructures, caching)
  - ‣ Enable very high user-experience (low start-up, no rebuffering, trick modes)
  - ‣ Enable selection based on network and device capability, user preferences
  - ‣ Enable seamless switching
  - ‣ Enable live and DVD-kind of experiences
  - ‣ Move intelligence from network to client, enable client differentiation
  - ‣ Enable deployment flexibility (e.g., live, on-demand, time-shift viewing)
  - ‣ Provide simple interoperability points (profiles)

4

What is specified – and what is not?

Media Presentation on HTTP Server

Segment

Media Presentation Description

Resources located by HTTP-URLs

HTTP/1.1

DASH Client

DASH Control Engine

on-time http requests to segments

HTTP Access Client

Media Engines
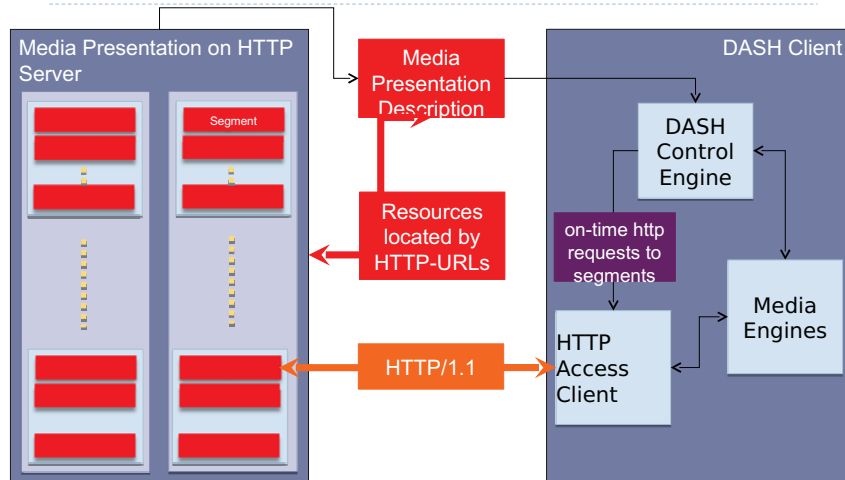
5

DASH Selected Feature list

- ‣ Live, On-Demand and Time-shift services
- ‣ Independency of request size and segment size (byte range requests)
- ‣ Segment formats
  - ‣ ISO base media FF and MPEG-2 TS
  - ‣ guidelines for integrating any other format
  - ‣ Are codec independent
- ‣ Support for server and client-side component synchronization (e.g., separate audio and video)
- ‣ Support for efficient trick mode
- ‣ Simple splicing and (targeted) ad insertion
- ‣ Definition of quality metrics
- ‣ Profile: restriction of DASH and system features (claim & permission)
- ‣ Content Descriptors for Protection, Accessibility, Rating, etc.
  - ‣ Enables common encryption, but different DRM (DECE-like)

6

Forward looking

- ‣ Do the homework
  - ‣ Specification completion in the next few months
  - ‣ Conformance, interoperability and reference software
- ‣ DASH is rich and simple at the same time
  - ‣ Understand more detailed market needs
  - ‣ Create profiles as considered necessary
  - ‣ Collaborate with system creators on how to integrate DASH
- ‣ Integrate it into the web – what is necessary?
- ‣ Get it deployed
- ‣ Everyone is invited - get involved in and excited about DASH

7

Thank you

DASH

Comments – Questions - Feedback

8

Matroska and Web Streaming

by Steve Lhomme, Matroska chaiman
slhomme@matroska.org
December 2010

In 2010, Matroska has become the container format used in the WebM project. Matroska has also been integrated in many different devices like TVs, cellphones, STBs, Blu Ray players, etc. So it is very likely to become an important brick of the video on the web. There are many features that makes Matroska very suitable for web streaming, for regular files, segmented streams (adaptive) and even live streaming. Some are already in use in WebM and some are not or little known.

I would like the opportunity to present Matroska in details to make sure that actors of video on the web, and in particular the ones working on TV/Web convergence know what they can already count on. And also show that Matroska is also usually the best choice of container for just about any use case.

Finally, Matroska is an open technology that was created from scratch with the same philosophy as W3C approved standard. It borrows ideas from XML as it's extensible easily and can elvove as new features are needed. And it is free or use and with many existing implementations in many forms and languages.

Matroska and Web Streaming

W3C - 8th February 2011

Steve Lhomme
Matroska Chairman
www.matroska.org

Summary

What is Matroska ?

- Audio/Video interleaved container
- Developped with technical inputs from many people online
- Completely open and royalty-free
- Initial specifications 8 years old
- Based on EBML, a binary XML (extensible and space efficient)
- More feature packed and efficient than MP4, AVI, MPEG TS, Ogg
- Used a lot for HD and subtitled content
- OSS Sources for about any language available (incl. JavaScript)

Matroska and WebM

WebM is a web specific profile of Matroska

Like XHTML Strict and Transitional (header change)

- Allows only VP8 (video) and Vorbis (audio) codec
- Missing chapters, metadata/tags, attachments, signature/encryption
- Can peek mature features of Matroska at any time

Hardware/Software support

**.mkv playback is widespread in the industry
Usually H.264/DivX with AC-3/DTS/AAC/Vorbis/MP3**

We have a validation tool for better compliancy

- In all computer video players internally or via free plugins
- WebM in Chrome, FireFox, Opera
- In connected TVs and Bluray players (Samsung, Sony, etc)
- In home media streamers (PopCorn Hour, WD TV, Roku, etc)
- In some cellphones (DivX certified or WebM in Android 2.3)
- Editing in open-source video editors

Stream Modes

2 modes read using the same parsers

- Fixed streams with a known end (MOV, AVI, MPG)
- Continuous streams with an unknown end (MPEG TS, Ogg)

Fixed files (HTTP, FTP or local)

One of the design goals was to make a format suitable for file streaming

- Very small header required before playback can start (< 1 KB)
- With the index at the front (< 25 KB for full movie) or No index
- Similar or smaller size as 3GPP/MP4 on codecs they support
- Much lower overhead than Ogg, MPEG TS, AVI
- Error resilient in case of transmission error
- Extensive Tags help the semantic web (like EXIF data on photo sites)

Live Streaming

Unlike XML it can have opened elements with no known end (infinite size)
<cluster>data... </cluster> <cluster>

**Allows sending data before the end of the 'chunk' is known
Perfect for low latency streaming
Demonstrated with WebM by Flumotion at GUADEC in July 2010**

Independent chunks of data allow for multicasting

Chain segments for streaming reconfiguration (16x9 to 4x3)

New features for the Web

The video world is moving to the web and at the same time adding new technologies

- Adaptive Streaming: key to mobile video & fluid on desktop
- Live Streaming: needs an adequate container (MPEG TS is feature limited and bandwidth hungry)
- Stereoscopic 3D: needs markers in the container (YouTube + WebM + NVIDIA + FireFox 4)
- DRM: remains intact after 3rd party remuxing
- Transparency: for better integration in the page design (planned for WebM)

Standardization

There is already an IETF like RFC for EBML
Already a de facto standard with all the industry support

We need a more formal standardization of the specifications endorsed by a recognized organization for broader industry use

The current specifications and specification notes should cover each field in detail and leave no room for misinterpretation

All work now supervised by a non profit organisation based in France

Questions

INTERNATIONAL ORGANISATION FOR STANDARDISATION
ORGANISATION INTERNATIONALE DE NORMALISATION
ISO/IEC JTC1/SC29/WG11
CODING OF MOVING PICTURES AND AUDIO

ISO/IEC JTC1/SC29/WG11 N11869
January 2011, Daegu

Source: **Convenor**
Title: Liaison to W3C on Dynamic Adaptive Streaming over HTTP (DASH)
To: W3C
Attachments: W11749 (DIS 23001-6), W11726 (14496-12/DAM 3)

ISO/IEC JTC 1/SC 29/WG 11 (MPEG) is pleased to announce that MPEG's Dynamic Adaptive Streaming over HTTP (DASH) has reached the Draft International Standard (DIS) status at the 95th MPEG meeting in Daegu and is currently under ballot. Attached please find the copies of DIS and the amendment 14496-12/DAM 3.

Some of our members made us aware of the Web and TV workshop that you will be holding and of their intention to attend it. We expect that they will present the purpose and scope of the DASH specification at your workshop.

We would like to draw your attention particularly to DASH's profiles defined in DIS and would welcome W3C to provide its needs and suggestions to improve them to better fit W3C's needs. Furthermore, MPEG welcomes W3C's technical requirements for future versions of the standard.

For your information, our future meetings are:
        - The Ad-hoc group meeting: March 20th, Geneva.
        - The 96th MPEG meeting: March 21st-25th, Geneva.

Second W3C Web and TV Workshop

Statement of interest

Jeroen Wijering, LongTail Video

Participant's interest

LongTail Video is the company behind the JW Player, the world's most popular open source embeddable video player. Roughly 10% of all online video streams run through a JW Player.

Additionally, we offer an online video platform for transcoding and delivery to multiple devices. About 2500 clients leverage this platform.

With about 5,000,000 page views, 5,000 forum posts and hundreds of code commits to our site every month, our community of mostly SMB publishers and web developers truly represents the "long tail" of online video.

Historically, the JW Player has been available for the Adobe Flash and Microsoft Silverlight platforms. Over the past few months, the player has taken large strides. We have added a fully featured HTML5 player, abstracted out the actual video playback (Flash/HTML5/Silverlight) from the user interface (CSS/HTML), and built a new API (JavaScript). We have done this because:

a) We are strong believers in the HTML5 <video> tag as an emerging standard for IP-based video delivery.

b) As both mobile devices and connected TV's become relevant to video publishers, we want to offer a single tool for delivering their videos to all relevant platforms and devices.

On the video platform side, we have taken similar steps, introducing WebM transcoding; iOS and Android SDKs; and integrations with Boxee, iTunes and Google TV.

We are interested in participating with this workshop to push forward the development of web video standards, particularly with regards to HTTP adaptive streaming. We believe these web standards should be the framework for delivering video to the big screen.

For our (1M+) customers, continued standardization is critical for making the publishing of their content to connected TV's affordable. At the same time, the success of a connected TV platform may very well depend upon the availability of the "long tail" content these publishers provide.

View points

Standardization of HTTP Adaptive Streaming

Existing HTTP adaptive streaming solutions from Microsoft, Adobe and Apple have proven it to be an extremely suitable technology for IP-based delivery of video to various devices. Standardization is now needed, so HTTP adaptive streaming can be implemented across as many devices and platforms as possible.

MPEG DASH may very well become this standard. In its current incarnation, it is still biased towards "Big Media", containing a plethora of features not needed by smaller video publishers. A well-defined baseline format will be an excellent solution. At the same time, MPEG DASH should actively support the WebM format (and vice versa) so the current H264/VP8 codec standoff does not also result in multiple adaptive streaming standards.

Uptake of HTTP adaptive streaming much depends upon the requirements and availability of server side tools. Adaptive streaming should be possible through either today's web servers (HTTP range requests?) or through small plugins to existing web servers (for rendering manifests and returning video fragments).

Advances in HTML5 <video>

The HTML5 <video> tag is, in its current state, mostly useful for displaying short clips. Several enhancements are required to make it suitable for a wider range of applications, and large-scale usage on connected TV's.

A mechanism for (temporarily) blocking scripting access to a certain <video> tag is important for ad-supported content, to prevent any pre, mid, or post roll advertisement from being skipped due to a few lines of JavaScript.

A baseline video encryption mechanism (e.g. at the video frame / audio sample level) and decryption key transmit protocol would be appreciated by publishers (PIFF?). Our customers do not require extensive, proprietary, and "unbreakable" DRM applications. Most solely want to avoid right-click-save-as scenarios and are not interested in running rights management software.

For both the streaming of long-form content, live events, and streaming to connected TV and mobile devices; adaptive streaming support in (or compatibility with) HTML5 <video> would be an instant solution. There are various ways to getting there:

a) Exposing QOS metrics and a Stream API to build adaptive streaming into JavaScript frameworks and "feed" fragments into a <video> element.

b) Allowing an adaptive streaming manifest file to be the @src of a video tag. An API for retrieving QOS metrics and level switches and forcing quality levels should be provided.

c) Offering <track> and <level> elements to build an adaptive streaming manifest in HTML. This can be married to the existing work on <track> for metadata tracks. The same API as mentioned under b) should be added.

There are pros and cons to each method. Backing (by word or code) or a prototype from at least one browser vendor is probably needed to move forward here.

Index

- About JW Player
- About Adaptive Streaming

- Discussion Points
- Success Factors

About JW Player

- Open-source, dual licensed videoplayer.
- 2005 Flash, 2008 Silverlight, 2010 HTML5 (much interest).
- 1M+ users; about 10% of internet streams.
- Used by WhiteHouse, IMDB, Cisco, NASA, PlayStation, Oscars, but...
- Small webstudios and publishers remain core userbase.
- *(5M pageviews, 10k forumposts, 100s commits each month)*

About adaptive streaming

- Existing solutions have proven it to be extremely useful.
- Especially for live streaming and for (mobile) devices.
- Apple HLS currently most widely used (b/c required on iOS).
- Not widely used yet (ecosystem in development).
- Solutions are 95% compatible, time for a standard...

Key decision points

- **General model**: 1 A/V stream or multiple; include text tracks?
- **Manifest format**: M3U8, DASH, DASH "Baseline"?
- **File format**: segmented or not; interleaved or not?
- **Video tag load**: through @src, API or nested elements (<track>, etc)?
- **QOS metrics**: what to track; what to expose?

Success factors

- Easy to understand by developers (Apple HLS is simple).

- Easy to deploy by developers (HTTP 1.1 webservers).

- Ecosystem support (transcoders, browsers, devices).

- Support for WebM (*DASH=open?).*
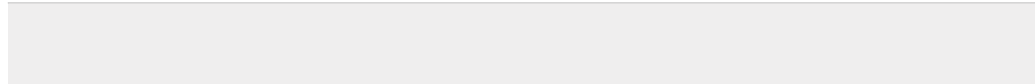
Session 4
Content Protection

Community Viewing meets Network Coding: New Strategies for Distribution, Consumption and Protection of TV Content

Position Paper

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Massachusetts Institute of Technology
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Our Interest in the Workshop

Network coding (NC) considers data as algebraic entities not just sets of bits. As such it assumes that digital traffic can be combined by addition and multiplication by other entities. While NC has been the topic of research in the last 10 years it is now receiving a lot of attention in the technology world as one enabler of the *Internet of Information Nodes*. In particular, since network codes do not need to be end to end, NC allows tailoring coding strategies to the dynamics and topology of the network and to the features of the receiver ecosystem. This is very beneficial when transporting video traffic over heterogeneous networks to a variety of end devices.

NC provides strategies for our team to better deliver video on the Internet. We address end-to-end aspects from video codecs to rendering and social viewing. As a result, our work has recently been highlighted in MIT News (network coding) and the MIT Technology Review TR10 (the ten technologies that will shape the world, for Social Television). Of particular interest for the W3C workshop are the aspects of our research that address new delivery mechanisms beyond traditional client-server architectures such as peer to peer and distributed storage, quality of experience (QoE) with device augmentation, network combining and layered content protection that socializes TV viewing. This creates the underlying network infrastructure that will deliver the next generation of video protocols like HTML5. Hence we believe that sharing our research with the workshop community and getting the feedback of the participants will be beneficial to all.

New Strategies for Content and Video-Centric Networking

The traditional television delivery systems are based on content being acquired and distributed to a single end device under the control of a single operator. As video moved onto the Internet and to wireless networks, this model is now obsolete. TV content is nowadays available from a variety of networks and operators and rendered via web technology on any device capable of supporting a browser. Moreover, the content is combined with ancillary content and extra features that could be inserted anywhere in the network. Because of the scarcity of wireless resources there are growing requirement for content to be shared locally without wasting bottleneck resources for digital rights management, retransmission of lost segments and other non-revenue generating traffic. In just a few years video delivery went from a linear value chain to a multidimensional one with growing complexity.

In this environment, NC allows to modify and/or store content in the network nodes, without tight controls and to add protection only where needed, thus freeing resources, and enabling peer-to-peer distribution with local features. In particular interest for peer-to-peer distribution over small community networks thus providing the "anti-cloud" is growing with the needs for greener networking and targeted and personalized services. With network coded video there is no need to know exactly where a piece of video is located: to regenerate a file there is only a need to gather "useful" combinations of content until there is enough degrees of freedom accumulated to allow decoding. These inputs can come from local as well as from remote locations and be combined with ancillary information when needed without added complexity. Hence there is a small trade between using a complex stateful implementation and some added acquisition and decoding delay. Our research, especially by using systematic coding has shown that coded approaches only incur small delays that are within the acceptable end-to-end requirements of video delivery networks.

But there are other ways to further reduce the delays. This is by "borrowing" resources from another network or from another path. In essence improving one network by using another. Our work has shown that file downloads durations can be greatly reduced by using a 4G network to "help" a WIFI network in times of high demands. Again, the relaxation of the tight controls on content location enables this to happen. It is important to note that other potential strategies to improve video distribution use the layered nature of video codecs but this is outside the scope of the workshop.

For the solutions highlighted above the NC is applied above the IP layer and below the TCP layer. We essentially define a layer 3 ½ of NC that does not interfere with TCP or IP operations but greatly reduces interruptions and maintains throughput (and goodput) especially over wireless networks. Simulation and implementation results will be presented at the workshop.

But getting the information to its destination is not sufficient for commercial success: content and content privacy need to be protected. We are investigating novel approaches to content protection in a social viewing perspective. Heavily encrypted approaches fail to meet the needs of both commercially produced content that needs protection when this content is shared amongst devices and "friends" and gets annotated and enhanced. One aspect of Network Coding that is yet to be fully exploited is how its algebraic structure inherently protects the encoded content. We propose an approach for distributed content verification without the need to contact a trusted authority. Our techniques build upon our earlier work on constructing homomorphic encryption. In addition since the encryption of the NC coefficients is very lightweight the decoding time is very short and significantly faster than traditional decryption. Finally in a peer-to-peer distribution networks while peers can help to disseminate NC video content they will not be able to decode it without the right key information.

Conclusion

We believe that our work is very much aligned with the "hot topics" section of the workshop as presented in the call for papers. We address peer-to-peer, digital rights management and wireless video distribution in the social and distributed video networking that characterizes the network environment that any new web television development will face.

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Biographies

Prof. Muriel Médard is a Professor in the Electrical Engineering and Computer Science at MIT. Muriel Médard is a Professor in the Electrical Engineering and Computer Science at MIT. She was previously an Assistant Professor in the Electrical and Computer Engineering Department and a member of the Coordinated Science Laboratory at the University of Illinois Urbana-Champaign. From 1995 to 1998, she was a Staff Member at MIT Lincoln Laboratory in the Optical Communications and the Advanced Networking Groups. Professor Médard received B.S. degrees in EECS and in Mathematics in 1989, a B.S. degree in Humanities in 1990, a M.S. degree in EE 1991, and a Sc D. degree in EE in 1995, all from the Massachusetts Institute of Technology (MIT), Cambridge. She has served as an Associate Editor for the Optical Communications and Networking Series of the IEEE Journal on Selected Areas in Communications, for the IEEE Transactions on Information Theory and for the OSA Journal of Optical Networking. She has served as a Guest Editor for the IEEE Journal of Lightwave Technology, for two special issues of the IEEE Transactions on Information Theory and for the IEEE Transactions on Information Forensic and Security. She serves as an associate editor for the IEEE/OSA Journal of Lightwave Technology. She is a member of the Board of Governors of the IEEE Information Theory Society. She has served as TPC co-chair of ISIT, WiOpt and CONEXT.

Professor Médard's research interests are in the areas of network coding and reliable communications, particularly for optical and wireless networks. She was awarded the 2009 Communication Society and Information Theory Society Joint Paper Award, the 2009 William R. Bennett Prize in the Field of Communications Networking , the 2002 IEEE Leon K. Kirchmayer Prize Paper and the Best Paper

Award at the Fourth International Workshop on the Design of Reliable Communication Networks (DRCN 2003). She received a NSF Career Award in 2001 and was co-winner 2004 Harold E. Edgerton Faculty Achievement Award, established in 1982 to honor junior faculty members "for distinction in research, teaching and service to the MIT community." In 2007 she was named a Gilbreth Lecturer by the National Academy of Engineering.

Dr. Marie-José Montpetit is research scientist at the Research Laboratory of Electronics at MIT focusing on network coding for video networking. She was previously an invited scientist at the MIT Media Laboratory where she is still involved in a class on converged video applications that got her a recent mention in the MIT Technology Review as a "TR 10" (the 10 technologies that will shape the future). Dr. Montpetit received a Ph.D. in EECS from the Ecole Polytechnique in Montreal, Canada. She is a member of the IEEE Standing Committee on DSP and a collaborator to the ETSI BSM working group on aspects of convergence. She was the recipient of the Motorola Innovation Prize in 2007 for the development of a multi-screen and multi-network video mobility system. Her work on converged video applications and multi-screen IPTV has gotten her many invited papers and keynote presentations. She is a reviewer for the European Union for proposal and projects in the wireless networking and future Internet fields as well as the editor of many journals and publications and has served on numerous conference program committees. Dr. Montpetit is a Senior Member of the IEEE.

Community Viewing meets Network Coding: New Strategies for Distribution, Consumption and Protection of TV Content

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Second W3C Web and TV Workshop

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- Henry Holtzman, MIT Media Lab

Disruptions and Challenges for Content Distribution

- Social and converged video experiences
  - "Social TV" Phenomenon
  - Redefine performance metrics
  - Add user behavior
- Heterogeneous and Mobile Technology Internet
  - Use the device and network ecosystem for best experience
  - Leverage Peer to Peer for community viewing
  - Stateless implementation for robustness
- Content-centric Networking
  - Combine storage and transmission
  - Address content protection and security with minimal disruption

2/18/11

3

Elements of Strategy

- Data are algebraic entities
  - Can be added, multiplied by factors etc.
- Combine analytical and user measurements for QoE
- Content protection is not just DRM
- Devices do not end at their shells
- Networks do not end at the gateways

Our research

- Goals:
  - Reduce delay and minimize interruptions for video and converged applications
  - P2P as a legitimate means of transmission
  - Content protection with a layered architecture
  - "Community" viewing and distribution
  - Enables multi-definition of "cost"
- Generic Principle:
  - Add network coding when/where appropriate

Example: Live Streaming

- Use case
  - User initially buffers a fraction of the file, then starts the playback
- QoE metric
  1. Initial waiting time
  2. Probability of interruption in media playback
- Heterogeneous access cost
  - Design resource allocation policies to minimize the access cost given QoE requirements

Example: TCP/NC results
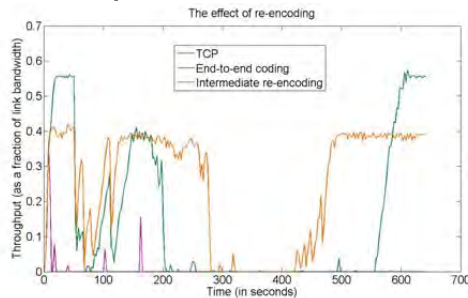
TCP	End-to-end coding	Re-encoding at node 3 only
0.0042 Mbps	0.1420 Mbps	0.2448 Mbps

Time average throughput (over 641 seconds)

(assuming each link has a bandwidth of 1 Mbps in the absence of erasures)

New Research

- Next generation "social TV" concepts
  - Use P2P and social consumption settings
  - Minimize disruptions and signaling overhead
  - Use multilayer video encoding
- Show that Network Coding can provide video content protection in a social viewing context
  - Video distribution among mobile users in close proximity (locality)

Use Case

- Peer to peer distribution:
  - Registered (premium) users see the content directly
    - Content protection keys derived locally
    - Unequal protection of network coded packets speeds up decryption of the video stream
  - Ad viewing is mandatory for non premium users
    - Contains the content keys
    - Can be local or server-based
  - Minimize the interaction with key distribution servers

Future Work

- Combine dissemination and protection
  - Protect protection to UGC and other ancillary information (including widgets) independently of the commercial content
- Analysis
  - Minimize the signaling in mobile CDN and community viewing examples
  - Favor stateless approaches for reliability and efficiency
  - Add network combining for added performance

Conclusion

- Our research aims at improving the quality of experience for distributed content and social viewing:
  - Device and network
  - Content protection and discovery
  - User behavior and expectations
- Promising results provided by combinations of architecture, network coding, content differentiation and user studies

Position paper for the Second W3C Web and TV Workshop

Tristan Ferne, Senior Development Producer, BBC
Matt Hammond, Research Engineer, BBC
Olivier Thereaux, Senior Technologist, BBC
George Wright, Head of Prototyping, BBC

The BBC is one of the largest providers of TV and radio content online, notably with its iPlayer (http://iplayerhelp.external.bbc.co.uk/help/information/about_bbc_iplayer) offering and involvement in various IPTV and hybrid TV and radio delivery initiatives. These efforts have led us to make a large majority of our broadcast content available on-demand on multiple platforms and we have been a consistent early and strong adopter of Web technologies to provide these services.

1- TV and Radio content on the Web

The public mission of the Corporation, to "enrich people's lives with programmes and services that inform, educate and entertain" involves providing quality content to all UK residents, regardless of ability or mode of access. Accessibility, with all its meanings, is crucial to us. We believe in making content accessible on a very large number of platforms and that the best way to achieve this is to make content available through open standards and interoperable technologies.

Also important to this question of accessibility is the need to protect rights holders. In the realm of web video and audio there is a common misconception that content protection can be achieved through streaming (because of a misunderstanding about whether streamed content is actually being downloaded to the users' hard drives). Most content providers currently opt to implement content protection through the usage of proprietary DRM systems and closed-source clients (such as Adobe Flash applications). The BBC itself is currently using such methods, a decision we have taken in order to reach as many people as possible in a simple manner while protecting the content we produce and broadcast, but we would see the benefit in having an alternative based on open standards (http://www.bbc.co.uk/blogs/bbcinternet/2010/08/html5_open_standards_and_the_b.html) and our research activities are actively exploring open and free standards for on-demand delivery.

The question of how to implement content protection and management enforcement systems in the current Web stack (HTML5 and the video API) is yet to be resolved successfully. The discussion so far in the W3C and other technical fora (see e.g. http://www.w3.org/Bugs/Public/show_bug.cgi?id=10902) recognises the industry's demand for content protection, but with no clear solution in sight. So far there appears to be reasonable agreement on the difficulty of building a content protection client entirely based on an open stack, and that content protection mechanisms may not be added to the specified HTML5 video playback implementation. According to the emerging consensus within the HTML5 community in and around the W3C, the most promising lead may be to provide a reliable mechanism for a client to state whether it supports a specific content protection scheme in a specific video format (see e.g. https://bugs.webkit.org/show_bug.cgi?id=47591), through a standard API method such as CanPlayType() (http://www.w3.org/TR/html5/video.html#dom-navigator-canplaytype).

2- TV and Web (linked) data

The BBC has vast experience in using, producing and contributing to the technologies
of linked data. As a producer and broadcaster of millions of hours of content it is
in our interest to ensure that this content is easy to address, describe and enrich.
We have thus had extensive involvement in the realm of linked data and the semantic
web. We were heavily involved in the work done by the TV-Anytime forum
(http://www.tv-anytime.org/), for which a structured data model to represent
programmes and services was built upon XML schema. And more recently the BBC has
also been developing RDF ontologies both for music (http://musicontology.com/) and
programmes (http://www.bbc.co.uk/ontologies/programmes/2009-09-07.shtml).

These ontologies and others are used in various sites built around linked data such
as BBC Programmes (http://www.bbc.co.uk/programmes), BBC Wildlife Finder
(http://www.bbc.co.uk/wildlifefinder/) and BBC Music (http://www.bbc.co.uk/music).
The BBC has also been a contributor to a number of other linked data projects;
supporting projects such as URIPlay (http://docs.atlasapi.org/spec/api/), a metadata
querying engine for video and radio, contributing code to the Totem media player
connecting to URIPlay and generating substantial amounts of original information for
Wikipedia and Musicbrainz from our work on BBC Music. Not only a provider of
semantic linked data, the BBC is also a heavy consumer of such data, for instance in
our BBC News and Sports website
(http://www.bbc.co.uk/blogs/bbcinternet/2010/07/bbc_world_cup_2010_dynamic_sem.html)
.

The BBC's interest in semantic web technologies comes from the value we see in both
consumption and production of linked data. We look forward to contributing to the
future of the semantic web and are eager to further explore needs specific to TV and
radio.

3- Beyond "Web on TV"

Web-based metadata around TV and radio content is only one of the many ways that web
standards can improve the interactivity of and around TV content. We believe there
are many ways the Web technology stack could be used or extended to create a better,
more interactive and connected television (and radio).

HTML-based widgets, for instance, are often mentioned when discussing the adoption
of Web technologies by the TV industry. They are, however, only a small fraction of
the added value Web standards can bring. While "Web on TV" offers interesting,
albeit controversial, prospects, we believe that Web standards, and in particular
the family of specifications around HTML5, have a greater role to play in the
television of the future.

Much of the BBC Research and Development's work in the area stems from the
opportunities to use the web and native applications on personal devices, such as
laptops and mobile phones, to access and control TVs, set-top boxes (STBs) and other
devices. Users will be able to benefit from the many accessible interfaces and
systems already available on most personal devices giving those with impairments
accessible and familiar UIs that are not limited by the existing UI of the TV. This
also opens up an exciting mode of control for all users and the possibilities of
second screen scenarios. We are working on web based APIs to enable this, and have
developed prototypes for STBs, phones and laptops demonstrating control,
synchronised playback of alternative audio, integration between websites and the STB

and speech-based interfaces. We are currently working with OEM manufacturers to encourage eventual implementation of these kinds of technologies.

We believe a single, standard and interoperable API for these features is desirable, and think that there is room to grow existing W3C work on device APIs to include TV-specific features such as making content portable and ubiquitous and to expand the existing device APIs for audio and video devices to cater for sound and image hardware access, recording and playback control, local storage, synchronisation and data exchange for second screen scenarios, etc.

The BBC is happy to see the W3C organise this second workshop on Web and TV and expresses strong interest in the topics and potential work which could result from this workshop. Our context, past and present work lead us to the following three questions as our initial input for the workshop:

Q1: How do we reconcile a mission to provide accessible, addressable and interoperable content with the current industry practice of protecting copyright through content protection and obfuscation? The BBC is eager to have other participants share their experience on the issue, and is willing to contribute to a solution which would allow reasonable content protection based on a standard, interoperable web technology.

Q2: What are the needs and best practices for standardisation of metadata around TV content? Is it desirable? What work has already been done by other participants in this area?

Q3: How can the W3C's existing work on device APIs extend to televisions, radios, set-top-boxes and other audio-video devices?

Adaptive HTTP streaming and HTML5

Mark Watson, Netflix Inc.

1   Introduction

1.1   Netflix background

Netflix is a leading provider of streaming video services in the US and Canada. We offer a service whereby subscribers can access 10,000s of movies and TV shows on-demand over the Internet for a low monthly subscription fee. Our streaming service was launched in 2007 and currently we delivered over twice as much content over the Internet than through our successful DVD-by-mail service. In late 2010, Sandvine estimated that 20% of US peak time internet traffic was from Netflix [1].

The service is available on a wide variety of devices: Windows and Mac OS computers, game consoles, set-top-boxes, BluRay players, televisions, mobile phones and a well-known tablet device.

Our proprietary streaming technology is based on the standard HTTP protocol. Content is delivered using several well-known Content Delivery Networks (CDNs) and our website, database, security and other services deployed largely on Amazon Web Services.

All our content is protected using Digital Rights Management technology, to ensure that the content is played back only on devices which meet security requirements approved by the content providers. Choice of DRM technology is determined by the end devices, so we must support multiple technologies.

Our user interfaces are increasingly implemented in HTML5 and in December we announced our desire to see open standards for adaptive streaming integrated into HTML5 [2].

1.2   The need for standards

Today, Netflix provides an SDK which must be integrated into a device in order to provide support for the Netflix service. We test and certify devices to ensure the SDK has been correctly integrated and that the device meets security requirements. This limits the number and types of devices on which our service can be made available.

A standard for adaptive streaming integrated into HTML5 would eliminate the need for service-specific software integration and so would be of great advantage both to device

manufacturers – who could more easily increase the number of services on their devices – and to service providers like ourselves, who could gain access to more devices.

This paper outlines our view on the requirements for such standards and the progress to date in other standards bodies such as MPEG and IETF.

2 Adaptive HTTP Streaming

High quality video streaming on the Internet requires adaptivity: that is, the service must adapt to the available bandwidth, which can vary significantly during a viewing session. We do not believe that network or transport layer technologies (e.g. Network Quality of Service) will change this fact any time soon. We believe Adaptive HTTP Streaming is the technology of choice for video streaming on the Internet.

2.1 General model and adaptive streaming manifests

At its core, adaptive HTTP streaming implies advertising to a client a set of available streams and having the client make choices as to which part of which stream to download when. Streams must be accurately time aligned to enable seamless switching.

The data in an adaptive streaming system can be modeled in two layers:
  • The "manifest" containing information about the available streams
  • The streams themselves

The information needed at the "manifest" layer is *just that needed to make the choices of which streams to select*. The information at the stream layer is *that needed to access and play the media once it has been selected*.

Figure 1 illustrates a general model for the manifest layer for on-demand services. Getting the general model right is important, whereas the specific encoding format for the manifest (e.g. XML, M3U8) is not.

In this model, *tracks* represent different time-aligned media associated with a presentation – for example audio, video, subtitles. *Streams* within a track represent alternative encodings of the exact same source media.

It is essential for services such as ours to store separate media types separately. The alternative (multiplexing audio and video into a single file) leads to a combinatorial explosion of streams as soon as multiple audio tracks (e.g. multiple languages) are considered.

In addition, it is essential that streams are stored unchunked. Splitting a stream into small chunks in time (i.e.
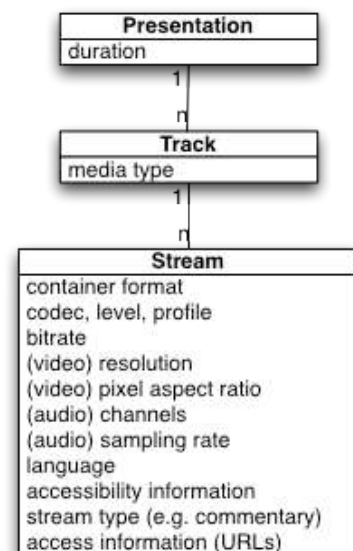

Figure 1: Streaming Manifest Model

10 seconds) results in billions of files, and does not scale or cache well.

Finally, it is valuable to include redundancy by storing each file at multiple locations (specifically in multiple CDNs.) This results in a data model where each stream has a set of URLs all pointing to an identical file containing the entire stream.

The MPEG DASH draft defines an XML manifest format including support for the model and features above. We believe this forms a good basis for a common adaptive streaming manifest format. We propose definition of a simplified profile of the MPEG DASH standard for on-demand streaming.

In IETF there has been no progress on standardizing adaptive streaming and in fact a proposal to establish an 'http streaming' working group has not received substantial support.

2.2   Media container formats

To be useful for on-demand adaptive HTTP streaming, a media container needs to store the media "progressively" – that is, all the information needed to playback any given portion in time of the stream should be gathered together in one place in the file.

Fragmented MP4 files and WebM files both meet this requirement (we use the former in our service).

As noted above, some form of index information is needed to enable the client to form partial HTTP requests. Specifically the index needs to map *time ranges* to *byte ranges*. MPEG is defining a new Segment Index Box within the ISO Base Media File Format (on which MP4 is based) for exactly this purpose. In WebM files the Cue data could fulfill this same purpose.

3   Digital Rights Management

Digital Rights Management is an essential component for delivering high quality commercial content over the Internet.

At Netflix, we support multiple DRM types, as appropriate for a specific device that we are streaming to. We do NOT suggest that W3C should standardize DRM technologies themselves. However, by standardizing on an encryption model, the role of the DRM System is limited to usage rights and key acquisition, and it becomes possible for a single file to be decrypted by multiple DRM providers.

3.1   Common Encryption

Several major DRM vendors have agreed to a common approach to encryption under the auspices of the DECE consortium, based on the Microsoft PIFF specification. Introduction of

this solution into the ISO Base Media File Format is being discussed. This enables a single file to be decrypted by clients supporting different DRM technologies.

3.2   Common Authentication and Authorization

Service authorization is a service-specific function. In the case of Netflix we must check that the user is a valid subscriber, that access to the content is within the terms of their subscription and that the particular device is authorized to view the content (for example HD content cannot be viewed on devices with weaker DRM implementations). This implies that the service must authenticate both the user and the device.

Device authentication requires access to DRM-independent device credentials which are securely bound to the physical device and the ability to construct cryptographic proof of possession of those credentials.

Having authorized a user to view a given piece of content on a given device, we can apply the DRM technology to ensure the content is available only to that device. This requires a secure binding between the DRM license transaction and the device identity.

We believe there is a need to standardize some basic tools, using well-known techniques, for managing secure device identity and binding this to the DRM operations such as license transaction in a DRM-independent way. This will enable development of services which are largely DRM-technology-independent which will be of great advantage to the industry as a whole.

4   HTML5 Integration

We believe that HTML5 should support a standard adaptive HTTP streaming protocol. This implies the following:
- Defining a standard manifest
- Providing support on the HTML5 media tags for track advertisement and selection
- Expose the additional states, events and parameters that exist in an adaptive streaming context on the media tags
- Providing support for security and DRM integration

4.1   Manifest format

Adaptive HTTP streaming also exists outside the context of HTML5, so it is desirable to agree on a manifest format which is not specific to HTML. The obvious approach is that a URL for a manifest file can be provided in the src attribute or <source> element of the <video> element.

4.2   Track advertisement and selection

A natural aspect of adaptive HTTP streaming is that many alternative time-aligned tracks may be available for a single content item, particularly including tracks providing different languages and providing for accessibility needs. Adaptive streaming particularly introduces the requirement for strict time alignment and the possibility of simple and seamless switching.

It is therefore necessary to have a way to advertise on the <video> tag the available tracks and provide controls to enable/disable tracks before and during playback.

4.3   Additional states, events and parameters

Adaptive streaming introduces the possibility of stream change events, which should be reported to the application. There may also be other state/event implications. Introduction of multiple URLs for the same file introduces some requirements for reporting on URL choices to support service level logging.

Many services, including ours, collect extensive quality metrics on user streaming sessions. MPEG DASH is working on high level definition of such metrics and integration into HTML5 should ensure that enough information is exposed to the application to report such metrics.

Adaptive streaming introduces an additional element of complexity in terms of the algorithms and heuristics. There needs to be a means for the algorithms and parameters to evolve. We believe that a pluggable heuristics engine and dynamic parameter provisioning are essential.

4.4   Security and Digital Rights Management

As described above, a standard method to integrate DRM technologies with HTML5 streaming is needed. It should be possible to provide features such as authentication and authorization in a service-specific way, using standard tools, rather than a proprietary DRM-technology-specific way.

5   Conclusions

In this paper we describe a number of areas where we believe additional standardization work is required to ensure that HTML5 can become a viable platform for commercial video services such as that offered by Netflix.

Specifically, we believe there is a need for:
- Agreement on a standard adaptive streaming model and manifest format
  - *We believe the MPEG DASH standard, or a simple profile thereof, fulfills the requirements for this*
- Agreement on one or more standard media container formats, and required features/profiles for adaptive streaming

- - o *Fragmented MP4 files, using the latest ISO Base Media File Format draft amendment, fulfill the requirements*
    - o *Some work is required to define how WebM files can be used in this context, but it is likely that the existing data structures can effectively support adaptive streaming*
  - Extension of the HTML5 media elements to support a defined adaptive streaming manifest format, track advertisement and selection and additional states, events and parameters required for quality metric collection and experimentation with adaptivity heuristics
  - Definition of a standard for DRM integration with HTML5, including simple tools for DRM-independent device authentication and authorization

References:

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[2]   http://techblog.netflix.com/2010/12/html5-and-video-streaming.html

Adaptive Streaming and HTML5

Mark Watson

8 February 2011

NETFLIX™

1

Netflix background

(just one slide)

- Subscription service in US and Canada
- Internet streaming and DVD-by-mail (US)
- Movies and TV shows
- 20M subscribers
- Most subscribers mostly stream
- Netflix traffic is 20% of the US internet at peak viewing (Sandvine report)
- 200+ Netflix-enabled devices
  - ~70% viewing on CE devices, ~30% PC & Mac

NETFLIX™

2

Netflix & standards

- *Today*: Netflix SDK integrated into each Netflix-enabled device
  - Adaptive HTTP streaming
  - Proprietary control protocols
  - Model-by-model certification process
- HTML5 is our UI platform-of-choice
  - Freedom to innovate is important for us
  - UI innovations drive usage and loyalty
- *Tomorrow*: HTML5 adaptive streaming
  - Removes SDK integration and certification expense
  - Expands the number of devices that can support our service

NETFLIX™

3

Adaptive streaming components

- Adaptive streaming model and manifest format
  - MPEG DASH meets our requirements
  - Basic On-Demand profile
    - Unmuxed A/V, byte range requests, fragmented mp4
- HTML5 integration
  - Multi-track advertisement and selection
    - Audio/subtitle languages, accessibility streams, director's commentary etc.
  - Events and metrics
  - **Support for protected content**

NETFLIX™

4

Protected content

- Requirements imposed by content owners
  - Users agree (in terms of service) not to store or re-distribute streamed content
  - Make it technically difficult for users to store or re-distribute streamed content
    - How difficult depends on "value" of content (HD vs SD, Movies vs TV, old vs new ...)
- Technical solutions
  - Stored and transported files are encrypted
  - Device robustness requirements
  - Secure key delivery

NETFLIX

5

Content protection functions

- Encryption/Decryption
  Common solution

- Authentication

- Authorization
  Should be service functions!

- Secure key exchange

- Rights expression and enforcement
  Primary focus of DRM

NETFLIX

6

Our proposal

- Standardize:
  - *Common encryption* (done?)
  - *Enablers* for Javascript implementation of secure Authentication/Authorization protocols
  - *Hooks* for integration of key exchange/rights technologies
- Don't standardize:
 - Specific key exchange/digital rights technology

NETFLIX

7

Advantages

- Stays clear of DRM commercial issues
- Brings "uncontroversial" functions into the open
  - Encryption
  - Authentication, authorization
- Narrows the scope of functions still within the DRM "black box"
- Enables open implementation of simple protection schemes
  - E.g., for privacy of user's own content, key could be provided directly from Javascript to video element
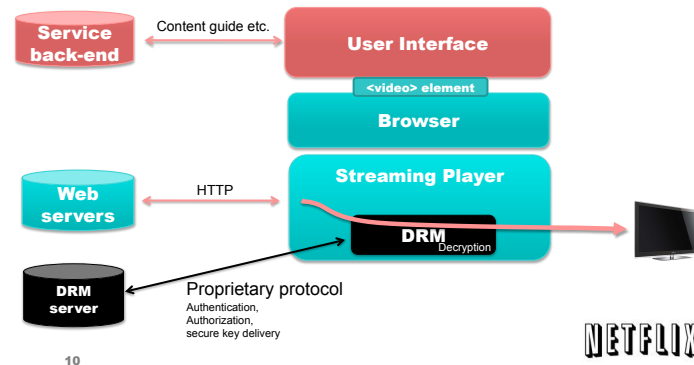 - Many applications e.g. privacy for user-generated content

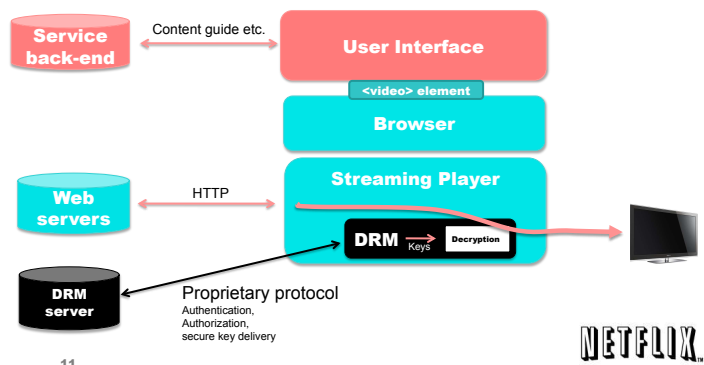**NETFLIX**

8

System Architecture
(unprotected content)
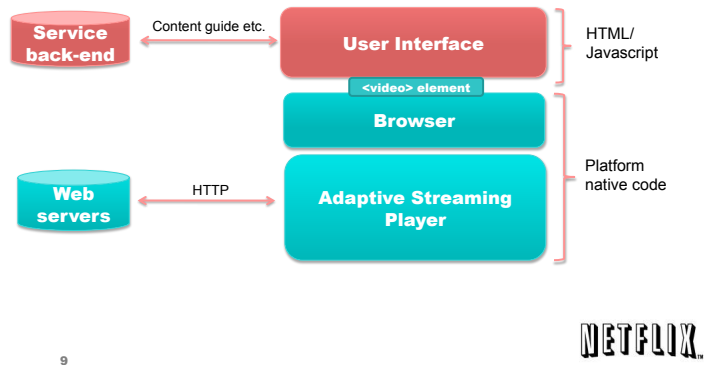
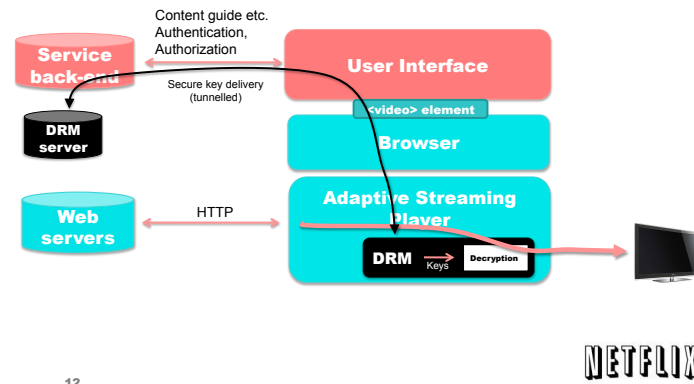Protected content
(*de facto* solution with today's standards)
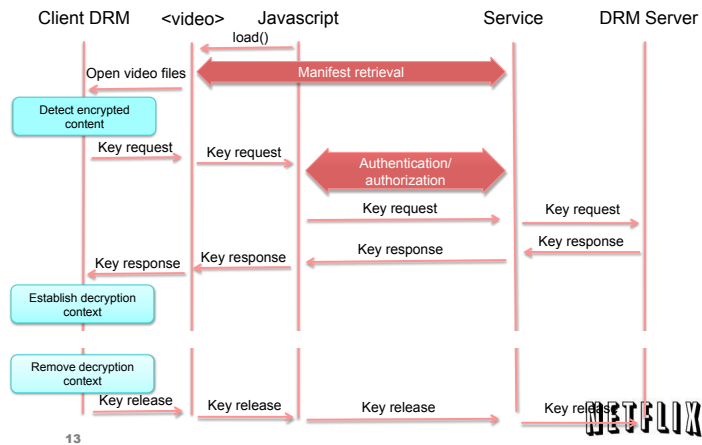
Protected content
(common encryption)

Protected content proposal

Message flow

Client DRM   <video>   Javascript   Service   DRM Server

load()
Open video files — Manifest retrieval
Detect encrypted content
Key request — Key request — Authentication/authorization
Key request — Key request
Key response — Key response
Key response — Key response — Key response
Establish decryption context
Remove decryption context
Key release — Key release — Key release — Key release

13

Possible video extensions

New events:
```
interface KeyRequiredEvent : public Event {
    readonly attribute DOMString protectionScheme;
    readonly attribute DOMString keyRequest;
};

interface KeyReleasedEvent : public Event {
    readonly attribute DOMString keyRelease;
};
```

Add to video element:
```
attribute DOMString keyResponse;
```

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Secure device identification

- Services need to authenticate *devices*
  - Authorization decisions may depend on device type
    - E.g. HD content is not available on devices without hardware security for the media pipeline
  - Subscription plans may limit number of devices in concurrent use
- We propose a new Javascript Device API for secure device identification
  - Like a "secure device serial number"
  - Privacy requirements similar to Geo-location API etc.

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Secure device identification API

- Access to API must be authorized by the user on a per-domain basis
  - Domain must be authenticated before giving access
    - i.e. https or signed widget
- Device stores keys and associated identifiers
  - Keys are never exposed
  - Identifiers and keys that are visible depend on the domain
  - Identifiers are different for each domain
  - Pre-shared keys + public-private key pairs
  - Identifiers may have certificates
- Device performs cryptographic operations on request
  - Generate a Message Authentication Code for a provided message
  - Verify a Message Authentication Code
  - Wrap/unwrap one key using another
  - Encrypt/decrypt messages

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Protected content summary

- Content protection is essential for some businesses
- Should be simplified for the web
  - Common encryption
  - Authentication and Authorization moved from DRM to the service layer
    - Uncontroversial technology. Should be service-specific.
  - Transparent tunneling of proprietary key exchange protocols
- Secure device identification is integral to authorization decisions
  - New Javascript Device API ?

NETFLIX

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Questions ?

NETFLIX

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Session 5
Metadata /
Semantic Web

Web Standards and Rich Media Experiences on CE devices

Gregg Kellogg (gregg@kellogg-assoc.com)
Technical Workgroup Chair, Connected Media Experience

Content owners require consistent implementation of web-standards across a range of devices in order to ensure the consistent experiences. Web standards, such as HTML5, CSS3 and Widgets, form a basis for delivering rich social experiences to allow consumers to experience their media wherever they are.

The Connected Media Experience (http://connectedmediaexperience.org) is a member standards organization established to promote technical standards for creating rich, connected media experiences for music, video and more. Experiences are designed with a minimum of different profiles to allow a given release to be effectively targeted to desktop, mobile, and television platforms. Key to being able to do this is consistent implementation of web technologies across these disparate platforms. Inconsistent and incomplete implementations of core technologies force content owners to target least-common-denominator technologies.

Positions

Content Owners expect that release formats will remain stable for a given level of implementation. The expectation is that of the DVD, which will reproduce a consistent experience in any conforming player. Having consistency in reproducing a web experience has long been problematic. For this to progress, key technologies must be completed along with conformance tests to encourage broad adoption. A release based on a given level of these technologies must continue to deliver a predicable and satisfying experience even as these technologies improve and mature.

The fact is, the ever-changing pace of standards has long been a fact of life for web developers, and websites must change frequently to support new devices and to continue to work properly with existing devices.

Slow Pace of Standards

CME makes use of over 50 cited standards in describing release format and packaging. Of these, most are still at the Working Draft level; some have been there for many years (e.g., CSS3 Values and Units 19 September 2006)! Others have advanced to Candidate Recommendation (e.g., CSS3 Basic User Interface Module 11 May 2004), but no further. Most of these specs are, in fact, implemented to one degree or another in modern browsers, but the fact that they are works in progress makes them inherently risky to depend on.

An examination of http://caniuse.com/ shows the relative state of browser technologies and how they are implemented across different browser implementations.

Summary	IE	Firefox	Safari	Chrome	Opera	iOS Safari	Opera Mini	Opera Mobile	Android Browser
Two versions back	6.0: 9%	3.0: 34%	3.2: 48%	6.0: 85%	10.5: 65%	3.2: 59%			
Previous version	7.0: 13%	3.5: 61%	4.0: 68%	7.0: 87%	10.6: 73%	4.1: 69%			2.1: 56%
Current	8.0: 29%	3.6: 70%	5.0: 81%	8.0: 89%	11.0: 74%	4.2: 71%	5.0: 38%	10.0: 51%	2.2~2.3: 60%
Near Future (early 2011)	8.0: 29%	4.0: 89%	5.0: 81%	9.0: 93%	11.1: 76%				
Future (mid/late 2011)	9.0: 61%	4.0: 89%	6.0: 90%	10.0: 93%	11.1: 76%				

Calculation of support for currently selected criteria

Semantic Media Content

CME uses an RDF Ontology to describe the content of releases. CME Manifests are marked-up using XHTML+RDFa 1.1 (Last Call Working Draft as of this writing). Releases are described using concepts derived from Music Ontology, FOAF, FRBR and, of course, Dublin Core. Wherever possible, established unique identifiers are used to uniquely identify resources (e.g., ISRC, GRid, ISAN, ISNI). The practicalities of publishing, and the relative state of adoption of these technologies by content owners complicates the use of curated URIs to identify all resources, although this is encouraged through the use of owl:sameAs relationships. Publishing necessities indicate the use of release-relative URIs for naming manifested media objects, such as particular audio and video assets, however this leads to duplication across different releases.
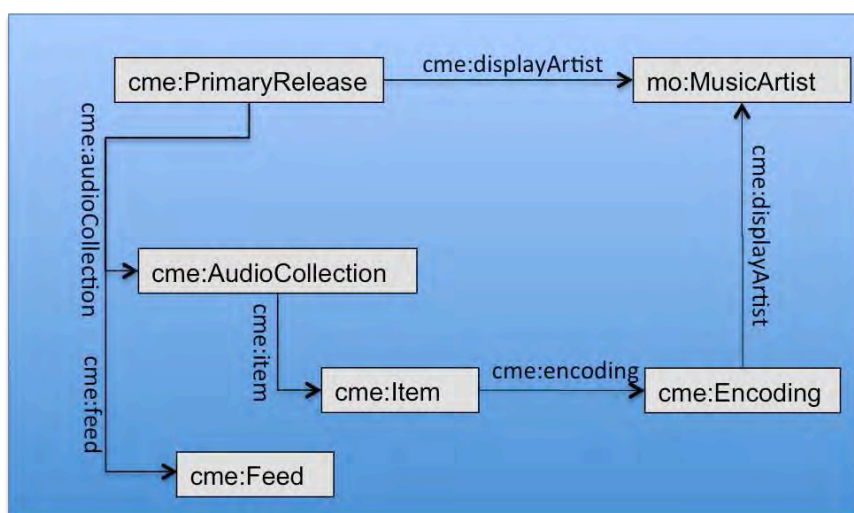
Release Packaging and Presentation

CME Releases are identified by a release URI, which directly corresponds to an XHTML+RDFa Manifest. Release assets may either be delivered as part of an original purchase, where they are integrated into a Media Library, or downloaded or streamed through the service provider supporting the Manifest URL.

Content Owners can only provide connected service for releases for a limited time period, so self-contained releases are important. Technologies such a W3C Widgets provide a useful vehicle for packaging necessary release content and allowing access to external URLs that would otherwise break browser sandbox rules. Unfortunately, the landscape for Widgets is uncertain, as different companies have created their own technologies, and the term "Widget" is not guaranteed to have the same meaning universally.

User Interface Navigation Paradigms

Televisions often come with much more restricted user interfaces than are available on mobile and desktop platforms. In the future, Microsoft Kinect-style interfaces may allow rich user interaction with a web presentation, but for the foreseeable future, content owners will need to consider the needs of a 12-foot 5-button remote on web layout. What are the standards to detect the input characteristics associated with a given platform?

Integration with Media Libraries

The nature of media releases is that they often describe content already existing in a users media library (e.g., iTunes). Furthermore, content owners are often restricted in their ability to repeatedly download purchased content, making the use of a media library as a means of synchronizing purchased content across client devices.

To date, there are no identified technologies to allow a web experience to utilize media in a standard media library. The W3C API for Media Resource is more concerned about consistent access to different video codecs, and not so much the ability to treat media library content as a kind of web-cache for media resources.

Connected Media Experience
Standards Setting Organization

Second W3C Web and TV Workshop

8-9 February 2011

Gregg Kellogg

gregg@kellogg-assoc.com
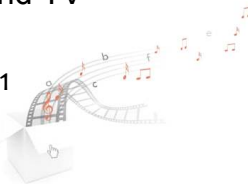
What is CME*?

- CME is an open standard for packaging digital content and the associated back-end services that together offer a compelling media experience

- A CME package is a collection of files (encodings), such as MP3 audio files, MP4 video files, JPG images, and more

- A CME package can include online assets and updates that are available to registered users. Registration is easy and users can log in through their existing social media accounts (e.g. Facebook, Twitter, OpenID)

- CME is intended for televisions, computers, mobile devices, and more. Files & data are separate from the user interface, which can be optimized per platform

- The platform supports User Generated Content (UGC) and customization of both the package contents and look & feel

- CME is intended to favor royalty-free IP where possible. Third party licenses may be required for parts of the specification

- More technical details can be found at: http://www.connectedmediaexperience.org/technicaloverview.html

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Why CME?

Consumers Want

- Deluxe features (lyrics, videos, photos, etc.)

- Aggregated related & relevant data/ assets – news, TV appearances, tour info, etc.

- A communal experience with other fans & the chance to connect with stars/artists

- Dynamic content

- No compatibility problems

- Online connectivity and interactivity

Artists & Content Owners Want

- Ability to offer high value packages with deluxe features

- Ability to establish and maintain relationships with fans

- Compelling benefits associated with legitimate content only

- Avoidance of format wars & incompatibility problems

- Support for new business models and release models (e.g. serialized track/ content releases)

- Backward compatibility and future proofing

3

CME is NOT…

- **A DRM** – Nor does it mandate DRM. Content owners can optionally limit online content to registered users, or include DRM content in a CME

- **Proprietary** – CME is available under RAND license to anyone. Where possible, it is based on existing open and free technology

- **Technology specific** – CME has minimum format, metadata, and UI requirements to ensure compatibility. However, any content format or user interface technology supported by the client can be used

- **A new codec** – CME uses familiar codecs, such as MP3 for audio

- **Only for albums** – CME is also intended for singles

- **Music-specific** – CME is designed to work with any type of digital content (e.g. film, television, video games)

- **An opaque monolithic file** – A CME package may expand into a directory

- **Tied to specific usage rules** – CME mandates no content policies

- **For big companies only** – CME is intended for use by indie bands/labels, small retailers, open source players, individuals, and more

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Who is Involved?

- The Connected Media Experience (CME) standards body is working on a voluntary technical standard for enhanced digital packages intended to redefine how consumers experience media

- CME is currently 23 companies and invited experts, with more members joining every month.

- Members are from a range of industries, including content, consumer electronics, and digital service providers

- The CME members are inviting media, technology, and e-commerce companies to join the standards body

CME Manifest (Notation-3)

```
@prefix cme: <http://cmx.org/spec/terms> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@base <http://cmx.example.com/releases/Various%20Artists-Happy%20Birthday/"> .
<releases/single> a cme:PrimaryRelease;
   dc:title "Happy Birthday - single"@en-us; cme:displayArtist _:VariousArtists;
   cme:parentalWarning "unspecified"; mo:grid "A1-a1788-aaaaaaaaaa-b"^^cme:GRid;
   dc:created "2009-04-30T06:15:51Z";
   cme:displayArtist <contributors/Various%20Artists>;
   cme:audioCollection [ a cme:AudioCollection;  dc:title "Songs"@en-us;
      cme:item
         [ a cme:Item; cme:itemNumber="1";
           cme:expression
             [ a cme:Audio; mo:isrc "aa-aaa-11-01789";
               cme:displayArtist _:VariousArtists
               cme:encoding <audio/HappyBirthday.mp3> ] ] ] .
_:VariousArtists a mo:MusicArtist; dc:title="Various Artists"@en-us .
<audio/HappyBirthday.mp3> a cme:Encoding;
   dc:title "Happy Birthday"@en-us;
   dc:format "audio/mpeg".
```
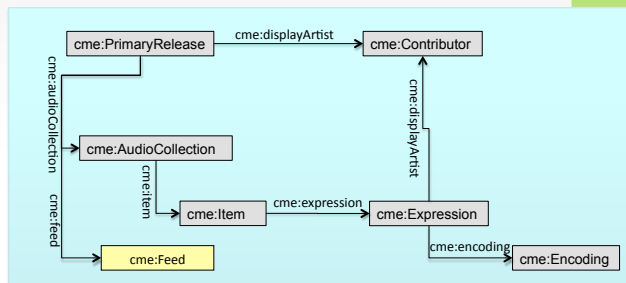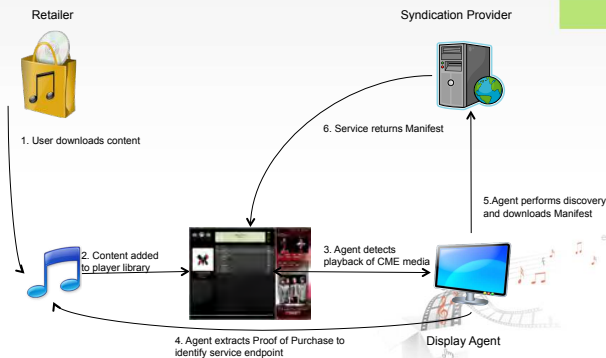
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Release Graph

Presentation Workflow

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8

Proof of Purchase (UITS)

Extract UITS Header from ID3 Tags

Perform discovery on CME URL

```
<uits:UITS>
 <metadata>
  <nonce>e2ca69945977dc3a</nonce>
  <Distributor>Test</Distributor>
  <Time>2009-04-09T17:45:55Z</Time>
  <ProductID type="GRID">
   A1-aaaaa-aaaaaaaaaa-b
  </ProductID>
  <AssetID type="ISRC">
   aa-aaa-11-11112
  </AssetID>
  <TID version="1">trans1</TID>
  <UID version="1">user1</UID>
  <Media algorithm="SHA-256">…</Media>
  <URL type="CME">
```

http://cme.example.com/releases/KingsOfLeon
```
  </URL>
 </metadata>
 <signature canonicalization="none"
keyID="cert.rsa" algorithm="RSA2048">…
</signature>
</uits:UITS>
```

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Multi-Platform

- PCs, Mobile, TV, Gaming, Auto, Embedded, …

- HTML5/CSS3/JS presentation platform
  - "High Definition" and "Mobile/Sidebar" profiles used to identify content, not presentation elements.
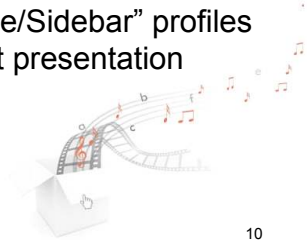
2/9/11

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Agent Architecture

HTML5 Container

Widget OAuth UITS/Discovery

Application Cache Device API
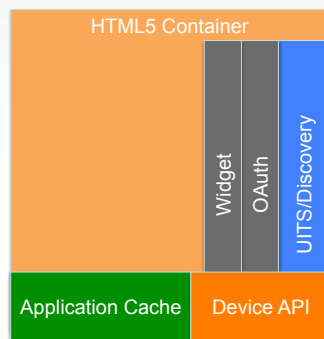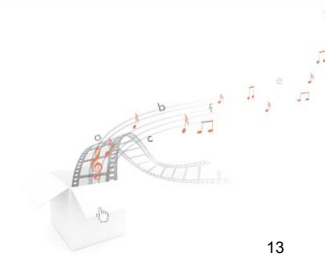
2/9/11

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Shared Access

- One user, multiple clients
- Shared Registrations between users
- Buy on PC, play on Mobile
- Buy on Mobile, play on PC

- Assets shared through Media Library
  - API Requirement to access/save into media library
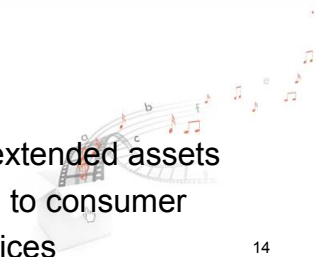
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Considerations for W3C

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Content Owner Perspective

- Expectation: DVD-like stability
  - runs in 2011 … still runs in 2021
  - however, new releases need exploit new features
- Limitations:
  - Content must be paid for
  - Limited support lifetime
  - Limited downloadability of extended assets
  - Expectation of lasting value to consumer
  - Transportable between devices

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Standards Perspective

- Standards must last for a long time
  - Backwards compatibility
- Desire to not invent, however …
  - Pace of standards slow (e.g., most HTML-spectrum specs still in WD status!)
 - Adoption not uniform

Summary
Calculation of support for currently selected criteria

	IE	Firefox	Safari	Chrome	Opera	iOS Safari	Opera Mini	Opera Mobile	Android Browser
Two versions back	6.0: 9%	3.0: 34%	3.2: 48%	6.0: 85%	10.5: 65%	3.2: 59%			
Previous version	7.0: 13%	3.5: 61%	4.0: 68%	7.0: 87%	10.6: 73%	4.1: 69%			2.1: 56%
Current	8.0: 29%	3.6: 70%	5.0: 81%	8.0: 89%	11.0: 74%	4.2: 71%	5.0: 38%	10.0: 51%	2.2-2.3: 60%
Near Future (early 2011)	8.0: 29%	4.0: 89%	5.0: 81%	9.0: 93%	11.1: 76%				
Future (mid/late 2011)	9.0: 61%	4.0: 89%	6.0: 90%	10.0: 93%	11.1: 76%				

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Semantic Requirements

- Need for Metadata
  - Accurately describe contents of release
  - Identify contributors and relationship to tracks
  - Reuse resources between releases
  - Convey interoperability information:
    - downloadsAllowed
    - requiresRegistration
    - unique identifiers (ISRC, GRid, …)
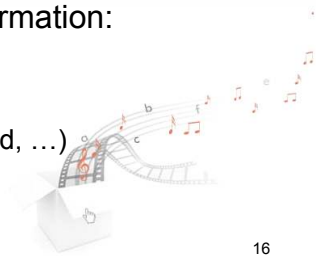
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Semantic Requirements

- Reuse of existing ontologies
  - Media Annotations re-creates basic properties such as *description* and *duration*. Why not use Dublin Core?
  - Advice: create Classes, re-use Properties
    - E.g, CME:Release requires dc:created by setting cardinality and format requirements
  - OWL Restrictions ensure appropriate data-types and property cardinality – Validation

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Semantic Requirements

- Collections in RDF are problematic
  - rdf:List not friendly to SPARQL queries
  - rdf:Container (e.g., rdf:Seq) not really semantic!
    - How do derive order without understanding of rdf:_n?
  - RDFa does not automatically create lists!
    - – obvious list creation
  - CME uses separate elements for collections
    - Pretty ugly, though!

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CME Collection Representation

```
<collections/Songs> a cme:AudioCollection;
   dc:title "Songs";
   cme:item
     [ a cme:Item cme:itemNumber "1"; cme:expression <audio/Bright_Lights> ],
     [ a cme:Item cme:itemNumber "2"; cme:expression <audio/Push> ] .

<li about="collections/Songs" typeof="AudioCollection">
 <h1 property="title">Songs</h1>
 <ol rel="item">
   <li typeof="Item">
    <span property="itemNumber" datatype="xsd:nonNegativeInteger">1</span>
    <ul rel="expression"><li about="audio/Bright_Lights" typeof="Audio">...</li></ul>
   </li>
   <li typeof="Item">
    <span property="itemNumber" datatype="xsd:nonNegativeInteger">2</span>
    <ul rel="expression"><li about="audio/Bright_Lights" typeof="Audio">...</li></ul>
   </li>
 </ol>
</li>
```

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Semantic Requirements

- Video has greater requirements for Metadata
  - Media Fragments offers a URI handle to describe sub-elements
  - Amount of semantic information expressed in a 2 hour movie may be enormous
  - Consider streaming RDF profile to synchronize semantic state with fragment.
    - SPARQL to service okay, what about embedded/offline?

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Video Markup

Scene 42: 42:01:00.00 – 43:01:00.00

Actor: **Chris Pine**
http://www.imdb.com/name/nm1517976/
Actor Timeline
Scenes with Actor

Character: **Spock**
http://en.wikipedia.org/wiki/Spock
Character Timeline
Scenes with Character

Object: **Vulcan Ears**
Purchase with 1-click on **Amazon**

Other standards issues

- UI Navigation profiles
  - How to adapt a specific presentation to the requirements of a given platform?
- Integration with Media Libraries
  - Gallery API is a start in the right direction
- W3C Widgets not universally implemented
  - Competing "standards" (Android, Mozilla, …)
  - Incremental updates

CME Navigation Profile

navigationProfile **of type** sequence<DOMString>, readonly

Communicated through JS API as defined by Agent.

Possible Profile values:
- mouse – basic mouse events
- multi-touch – onTouchStart, … (not standardized)
- gesture – onGestureStart, … (not standardized)
- arrow – onClick, opnFocus, onBlur, onChange
- keyboard – onClick, onFocus, …
- drag-drop – dragOver, dragEnter, drop

Release Properties

cme:Release = mo:Release
cme:PrimaryRelease = mo:ReleaseEvent

Properties:
cme:collection^{1-*} (cme:Collection)
cme:displayArtist^{1-*} (cme:Contributor)
cme:frontCover^{1-*} (cme:Image)
cme:feed (cme:Feed)
cme:parentalWarning$^{0-1}$ (cme:ParentalWarningType)
cme:presentation^{1-*} (cme:Presentation)
cme:registrationSharing$^{0-1}$ (xsd:nonNegativeInteger)

dc:issued$^{0-1}$ (xsd:dateTime)
dc:modified$^{0-1}$ (xsd:dateTime)
dc:rights (cme:RightsType)
dc:title^{1-*}
mo:genre^{0-*} (mo:Genre)
mo:grid$^{0-1}$ (cme:GRidType)
mo:label^{0-*} (mo:Label)
owl:sameAs$^{0-1}$ (owl:NamedIndividual)

Expression Properties

cme:Expression = frbr:Expression
   cme:Image
   mo:MusicalExpression
       mo:PublishedLyrics
       mo:Signal
           cme:Audio
           cme:Video
   cme:Document = foaf:Document

Properties:
cme:collection$^{1\text{-}*}$ (cme:Collection)
cme:displayArtist$^{1\text{-}*}$ (cme:Contributor)
cme:encoding$^{1\text{-}*}$ (cme:Encoding)

cme:frontCover$^{1\text{-}*}$ (cme:Image)
cme:feed (cme:Feed)
cme:parentalWarning$^{0\text{-}1}$
   (cme:ParentalWarningType)
cme:lyrics$^{0\text{-}1}$ (mo:PublishedLyrics)
dc:issued$^{0\text{-}1}$ (xsd:dateTime)
dc:modified$^{0\text{-}1}$ (xsd:dateTime)
dc:rights (cme:RightsType)
dc:title$^{1\text{-}*}$
mo:genre$^{0\text{-}*}$ (mo:Genre)
mo:isrc$^{0\text{-}1}$ (cme:ISRCType)
mo:label$^{0\text{-}*}$ (mo:Label)
owl:sameAs$^{0\text{-}1}$ (owl:NamedIndividual)

Encoding Properties

cme:Encoding = frbr:Manifestation

Properties:
cme:displayProfile$^{0\text{-}*}$ (cme:ProfileType)
cme:channels$^{0\text{-}1}$ (xsd:integer)
cme:duration$^{0\text{-}1}$ (xsd:duration)
cme:height$^{0\text{-}1}$ (xsd:nonNegativeInteger)
cme:location$^{0\text{-}1}$ (cme:LocationType)
cme:payloadHash$^{0\text{-}1}$ (xsd:string)
cme:requiresProofOfPurchase$^{0\text{-}1}$
   (xsd:boolean)
cme:requiresRegistration$^{0\text{-}1}$
   (xsd:boolean)
cme:resolution$^{0\text{-}1}$ (cme:ResolutionType)

cme:sampleRate$^{0\text{-}1}$ (xsd:decimal)
cme:size$^{0\text{-}1}$ (xsd:nonNegativeInteger)
cme:width$^{0\text{-}1}$ (xsd:nonNegativeInteger)
dc:description$^{0\text{-}*}$
dc:format^{1} (dc:FileFormat)
dc:title$^{1\text{-}*}$

Conditon-ALPHA Interest in the Second W3C Web and TV Workshop

Alexander Adolf
        Owner

Our Interest in the Topic of the Workshop

We think that W3C is hitting the "sweet spot" for this topic at this time. Technology advancements like HTML5 and CSS3, along with the data rates offered by ISPs in the two-digit Mbit/s range, finally have reached the tipping point for allowing to make multimedia services available on all communications infrastructures. Many video services are accessible on the Web (see [DVB BlueBook A145 "Internet TV Content Delivery Study Mission Report"](#)), TV has landed on computers ([Apple TV](#), [Hulu](#), [Elgato EyeTV](#), [Plex](#), [Boxee](#)), and the Web begins to arrive on TV sets and set-top boxes ([HbbTV](#), [Google TV](#) and [Yahoo! TV](#)).

As a technology and strategy consultancy mainly active in the broadcast industry, we have long been waiting for this moment. Since the early 2000's we have been promoting the idea of everything on IP, and IP on everything. The time had not come then, but we believe it has arrived now. All the tools are in place now (see previous paragraph).

Our Point of View

We are convinced that both worlds, the IP world, and the broadcast world, have elements to offer to each other that are key to creating attractive multimedia services for consumers. Both, lean-back and lean-forward use cases will have a place in the connected TV world. Consumers do not care how services are delivered to their homes. Today, consumers still often have to make a choice, however. When choosing a video service offering as part of an xDSL subscription, this generally implies nothing much else than an IP service, complemented by a VoD portal. When choosing a video service offering as part of a broadband cable subscription, this generally implies nothing much else than live TV broadcast (be it analogue or digital) complemented by an IP service. A third dimension is added to this picture by pure content portals like iTunes, YouTube, etc.

We strongly believe that a technological cross-fertilisation of the broadcast and on-line sectors can help each of the sectors gain momentum. The broadcast sector can get access to rich, sophisticated, interlinked and searchable content descriptions as they are already available on the Web. The on-line sector can get access to distribution architectures that allow multi-million audiences to be dependably served at minimal cost.

We foresee two main areas of work in this convergence process:

- **Metadata Architecture**: The content descriptions must be independent of the service delivery.
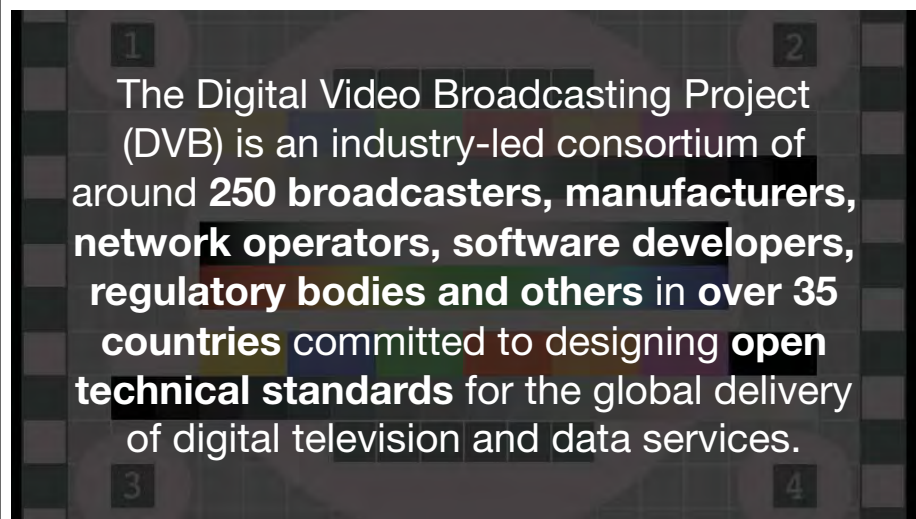
- **Service Delivery Architecture**: The delivery of multimedia services must be dependable, scalable and economically viable even for the largest audiences.
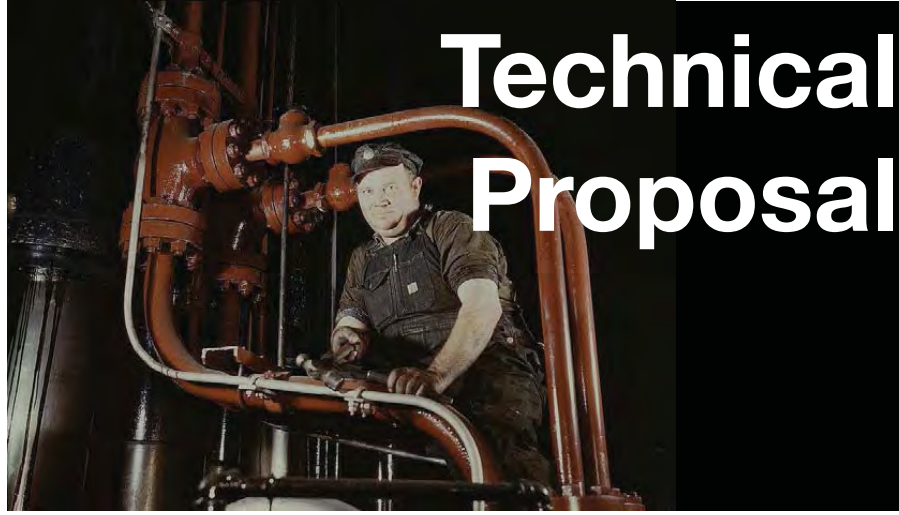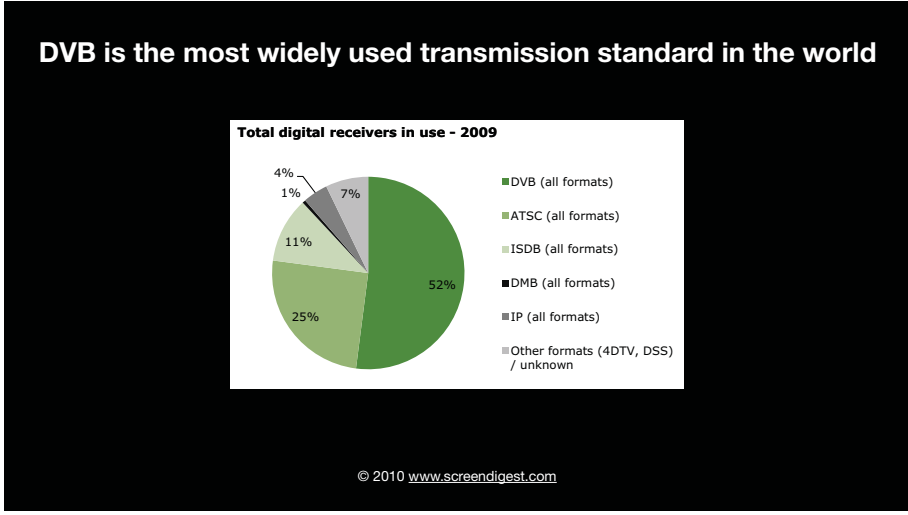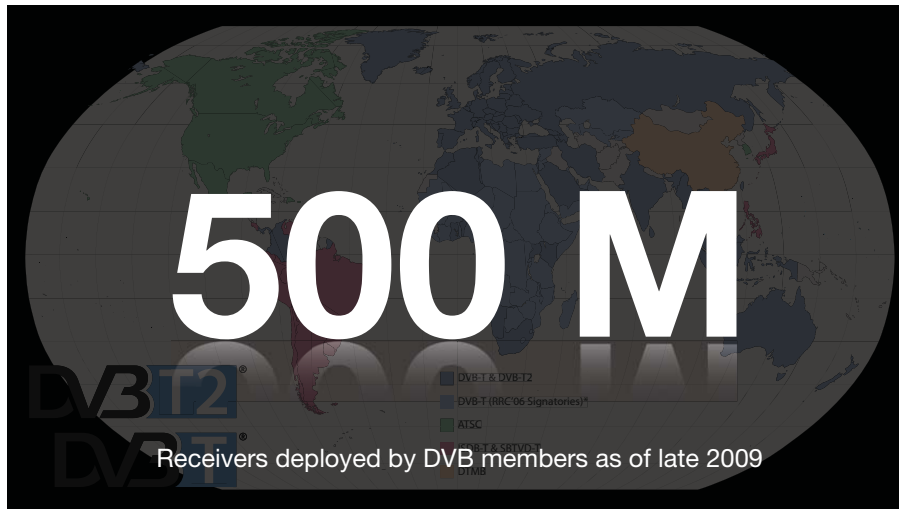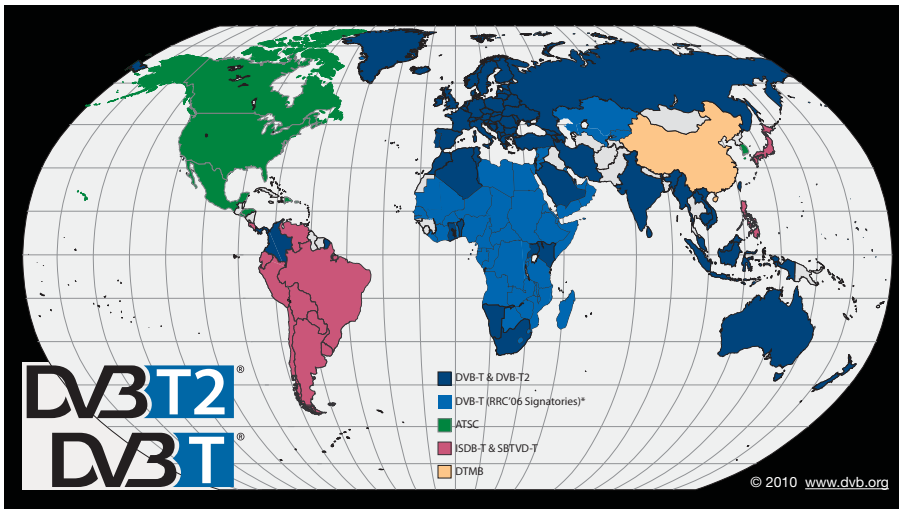
In a first step, a metadata solution could be devised, that uniformly can describe content available in broadcast, and on-line. This will allow to hide the source of the content from the viewer, and allow hybrid terminals to manage the delivery of the content in a least-cost routing fashion (when only few people watch sth., it could be delivered via IP, otherwise via broadcast). In a second step, multimedia services can ultimately be provisioned only for IP. **Everything on IP, and IP on everything.** Modern broadcast bearers like e.g. DVB-S2 (satellite), DVB-T2 (terrestrial), DVB-C2 (cable) and the future DVB-NGH (next-generation handheld) are already capable of carrying IP datagrams directly. This should be taken advantage of.

What We Can Contribute

We look forward to participating in the Workshops to explore and define next steps which are appropriate for the connected TV community. We have 15+ years of track record in standardisation of digital broadcast, esp. in DVB, and also in MPEG. We would be happy to share our knowledge about the broadcast sector, and assist the community in combining the best elements of both worlds to create an exciting and convincing TV solution.

Then, standardisation is also about credibility. There have been various attempts of both, the Web community and the broadcast industry, to come up with a solution that would be accepted in both sectors. With little success, as we all know. We are convinced that participation of key players from both sectors is of paramount importance for achieving credibility and acceptance in both communities, and ultimately in making the resulting technology a success. W3C for sure is the right key player from the on-line community. In the first workshop, quite a couple of key players from the CE and broadcast industries were present. We think that further to this, involvement of the key players from the broadcast side, i.e. of DVB (with over 500 million DVB terminals deployed by DVB members) and of MPEG (The source of codec and transport technologies with a unique standing in both sectors) would be called for. Condition-ALPHA with our long history in broadcast standardisation would be happy to inform the Web community of these broadcast technologies, make suggestions on their best use on the Web, and assist in liaising with broadcast SDOs as appropriate. Mr. Alexander Adolf is chairing DVB's technical WG on metadata for over 10 years, and he would be looking forward to contributing his expertise also specifically in this area.

Second W3C Web and TV Workshop

Session 5
Metadata & Semantic Web

Metadata and Service Delivery Architecture

First of all:

Good morning

And thanks for inviting me!

About DVB

The Digital Video Broadcasting Project (DVB) is an industry-led consortium of around **250 broadcasters, manufacturers, network operators, software developers, regulatory bodies and others** in **over 35 countries** committed to designing **open technical standards** for the global delivery of digital television and data services.

500 M

Receivers deployed by DVB members as of late 2009

DVB is the most widely used transmission standard in the world

Total digital receivers in use - 2009

4%	
1%	7%
11%	
25%	52%

- DVB (all formats)
- ATSC (all formats)
- ISDB (all formats)
- DMB (all formats)
- IP (all formats)
- Other formats (4DTV, DSS) / unknown

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Technical Proposal

Service Discovery and Selection

Content Guide

Slide 1

A **federated and distributed** CRID resolution service (much like DNS) with a **first level local component** in the client, and which **allows for security and authentication**.

CRID

Content
Reference
IDentifier

Slide 2

Service Discovery and Selection

Content Guide

Slide 3

DVBIPTVI
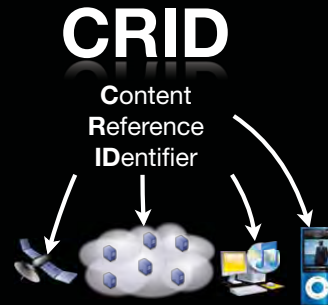
Service Discovery Bootstrap

1
Query   **_dvbservdsc._tcp.**_DHCP_opt15_domain_
DNS SRV **_dvbservdsc._udp.**_DHCP_opt15_domain_
default port is dvbservdsc (port number 3937)

2
Join   **224.0.23.14 (DvbServDisc on IPv4)**
multicast **FF0X:0:0:0:0:0:0:12D (DvbServDisc on IPv6)**
on port dvbservdsc (port number 3937)

3
Query   **_dvbservdsc._tcp.services.dvb.org**
DNS SRV **_dvbservdsc._udp.services.dvb.org**
for service location resource record (SRV RR)
(tcp yields HTTP servers, udp yields multicast addresses)

Slide 4

DVBIPTVI

Service Discovery Bootstrap

HTTP

```
GET /dvb/sdns request HTTP/1.1 CRLF
Host: host CRLF
```

Multicast Address

Discovery records transported in DVBSTP protocol

Rationale for the Complexity
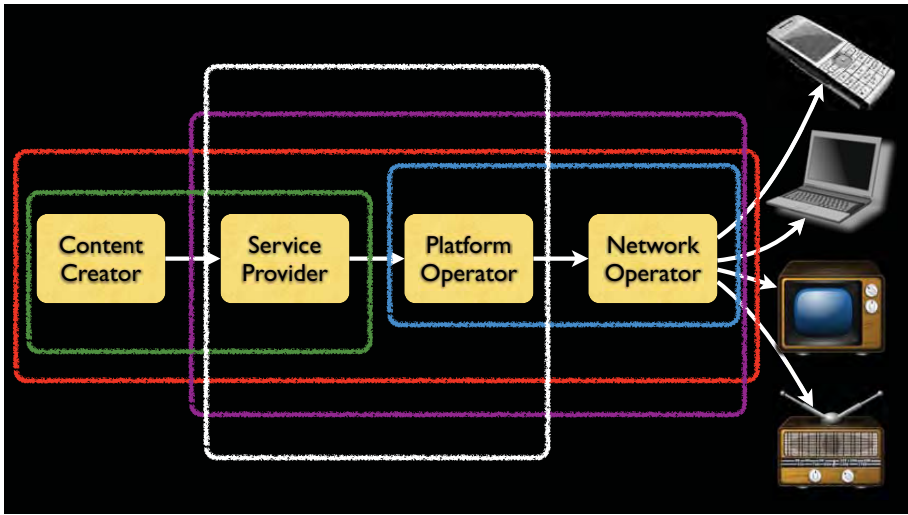
Standards Making Proposal

I don't think that DVB will really want to start working on a **full Internet TV solution**

Neither will W3C, or DVB or anyone else succeed in developing such a solution **alone**.

It's too big a task

We will need to **team up** between DVB, MPEG, W3C (and maybe others)
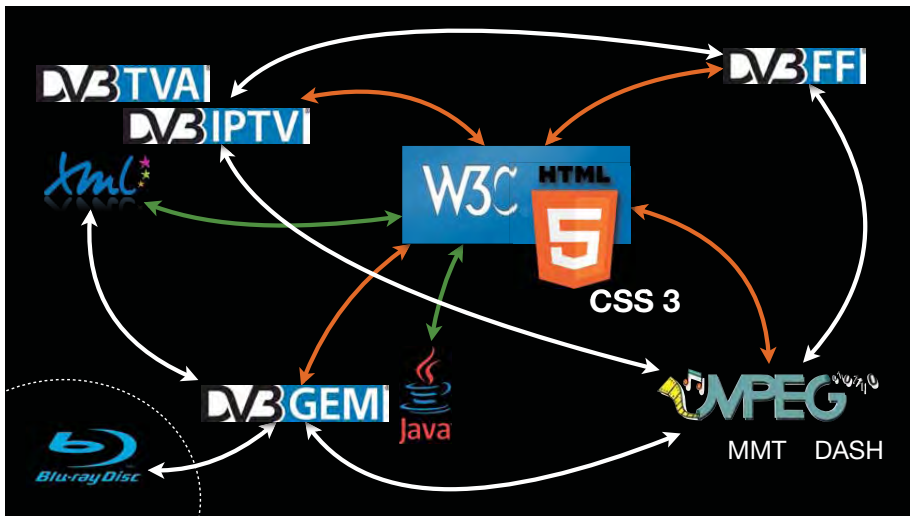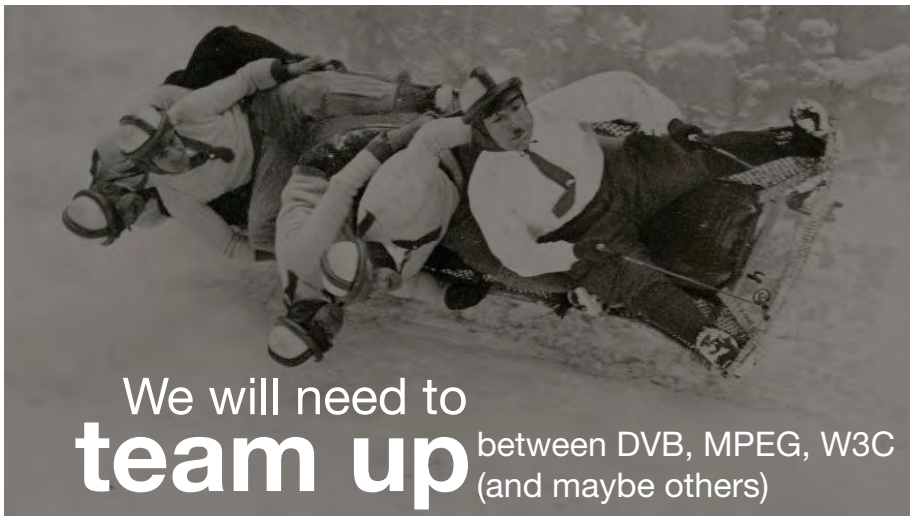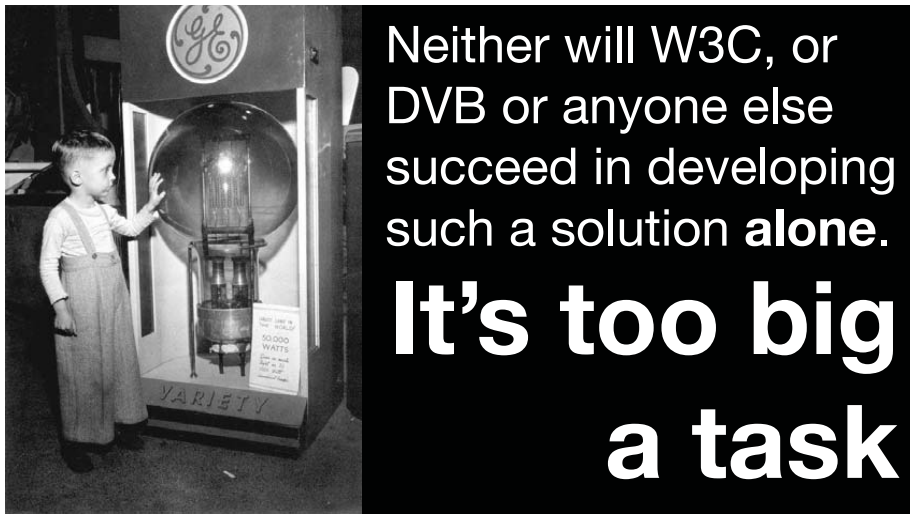
alexander.adolf@me.com
www.condition-alpha.com
@c_alpha

Thank you very much
for your attention!

Photo Credits

- **Slide 4:** video by user Jamila1987 on **You Tube**
- **Slide 7:** iPod Nano (c) 2009 Apple Inc.
- **Slide 9:** (c) 2005 by user Dawn Endico on **flickr**
- **Slide 10:** iPod Nano (c) 2009 Apple Inc.
- **Slide 18:** (c) 2009 by user Stéfan on **flickr**
- All other Photos: from The Commons on **flickr**

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A Statement of Interest for Web and TV Workshop--NTT on Service Discovery

Katsuhiko Kawazoe and Tatsuto Murayama

Research and Development Planning Department, NTT Corporation

{k.kawazoe, t.murayama}@hco.ntt.co.jp

In the first workshop on Web on TV in Tokyo held on 2,3 September 2010, it was pointed out by some participants that TV is not only a display device for broadcasting, but also a general purpose display device for various entertainment and information.   Pursuing this trend against the backdrop of the current digital media, it is clear that conventional concept of the Web, where the web content is displayed on a PC with the user interface such as a mouse, itself has to be redefined.   The discussion of this new concept of the Web is pertinent especially given that recent popularity in tablet type of display devices and connected TV sets, where the conventional mouse mouse is no more the predominant means of interacting with the device.   User's action can be transmitted in various means, such as by touch or by motion. Sometimes the user may not need to do anything to have interactivity -- sort of a "push-type" of interactivity can easily be envisaged.

This means that the new Web and TV, as a general information interface device, and the standard thereof, are relevant to various digital media and content delivery such as digital booklet, digital kiosk, and even digital signage and billboard, where information is "pushed" with additional interactivity provided by user's interaction.

The latter is especially relevant since it is not clear how the current W3C standards, such CSS and HTML5, can handle the cases where the user does not have an explicit pointing device, but nonetheless "interacts" with the display.

This is also relevant to the way the user discovers and acquires content and service—what is often called "service discovery". The web typically provides a "pull" way of service discovery, while broadcasting has typically been "push", from the user's perspective. This process of service discovery and content acquisition are especially important for the web and TV standard as a general information provider. People should be equipped with a seamless means of finding content and service on a TV device just as they do with the conventional TV broadcasting.

The mechanism of service discovery and content acquisition has long been discussed and has been standardized for IPTV services. ITU-T Recommendation H.770 provides the framework for service discovery for IPTV that is harmonized with other standards such as TV-Anytime, which is also encoded in ITU-T Rec.H.750.   This standard ensures an open standard approach to service discovery over IP networks.   The fact that the Web consists of millions, if not billions, of web-pages and content, makes it mandatory that the mechanism of service discovery be standardized, because it is unclear yet how the "search" capability will be provided on TV.

In this regard, the requirement such as the following should be taken into account:

The new Web and TV standard should provide a means to find services and content that is harmonized with a standard such as ITU-T Rec. H.770.

We hope that W3C, especially as a result of this workshop on Web and TV, will take this into account and provide relevant standards to meet the requirements of the new Web and TV.

[1]   ITU-T Rec.H.770 "Mechanisms for service discovery and selection for IPTV services"

[2]   ITU-T Rec. H.750 "High-level specification of metadata for IPTV services"

[3] TV-Anytime Forum http://www.tv-anytime.org (also at http://tech.ebu.ch/tvanytime)

Service Discovery
~ from IPTV Standards

NTT Cyber Solutions Laboratories
Kiyoshi Tanaka
2011/2/9

IPTV Forum Japan

◆ Activities
1. To develop technical specifications related to IPTV services
2. To maintain and update technical specifications related to IPTV services
3. To disseminate technical specifications related to IPTV services
4. To cooperate in testing, etc. for the commercial application of technical specifications related to IPTV services
5. To promote the use of IPTV services and conduct public relations

◆ Members
➤ 54 member companies
➤ NTT, KDDI, Softbank, TV-Asahi, TV-Tokyo, Tokyo Broadcasting System, Nippon Television Network Corp., NHK (Japan Broadcasting Corp.), Fuji Television Network, Inc., Sony Corp., Panasonic, Hitachi, Ltd., etc.

p. 1

IPTV in Japan

◆ Watch the video clip of IPTV Forum Japan!

p. 2

HIKARI TV

◆ IPTV Service provided by NTT Plala
◆ IPTV Forum Standard-based, open platform
◆ Attractive content (HD content, FTA, etc.) taking advantage of FTTH/NGN
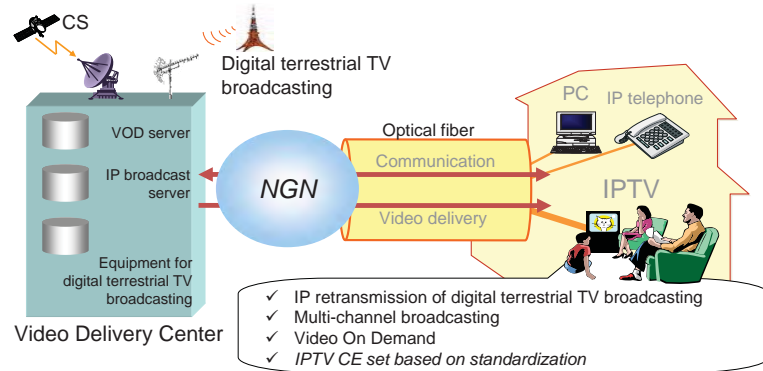◆ Managed Service for proper Security and QoE

Dynamic Service Guide

HIKARI TV Menu

Linear TV Channel Service

Video On Demand

Karaoke

Premium Pay-Per-View

Interactive Portal (My Page)

p. 3

HIKARI TV Service with IPTV standards

NTT

1. Delivers high-definition video content
2. IP retransmission of digital terrestrial and BS TV broadcasting

CS
Digital terrestrial TV broadcasting
PC IP telephone
VOD server
IP broadcast server
Optical fiber
Communication
NGN
IPTV
Video delivery
Equipment for digital terrestrial TV broadcasting
Video Delivery Center

- ✓ IP retransmission of digital terrestrial TV broadcasting
- ✓ Multi-channel broadcasting
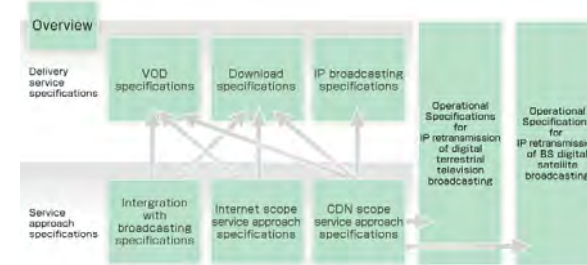- ✓ Video On Demand
- ✓ *IPTV CE set based on standardization*

p. 4

IPTV Forum Specifications

NTT

- ◆ Standards for implementing **open** IPTV services as well as technical specifications for receivers
- ◆ IPTV Forum Specifications are harmonized with Digital TV Broadcasting Service Spec.
  - ➢ i.e. manufacturing Common TV sets for DTV and IPTV
  - ➢ e.g. Data Broadcasting Markup Language

p. 5

The ITU-T Rec./draft and IPTV Forum Spec.

NTT

◆ IPTV Forum Specifications are also harmonized with ITU-T international standards.

Recommendation Number	Recommendation Title	SG	Correspondence to Forum specifications
Y.1910 (Y.iptv-arch)	IPTV Architecture	SG13	Chapter 1, Chapter 2 (each spec.)
Y.1901 (Y.iptv-req)	IPTV Requirements	SG13	Chapter 1, Chapter 2 (each spec.)
Y.Sup5 (-)	IPTV service use case	SG13	Chapter 1, Chapter 2 (each spec.)
H.701 (H.IPTV-CDER)	Content Delivery Error Recovery for IPTV services	SG16	FEC comparable portion
H.750 (H.IPTV-MD)	Metadata for IPTV	SG16	Chapter 7 (CDN-scope specification)
H.770 (H.IPTV-SDC)	Mechanisms for service discovery and selection for IPTV services	SG16	Chapter 5 (CDN-scope specification)
H.762 (H.IPTV-MAFR.2)	Lightweight Interactive Multimedia Environment (LIME)	SG16	Chapter 6 (CDN-scope specification)
Q.3030 (Q.Iptvsa)	IPTV Related Protocols	SG11	Chapter 4 (each spec.)
X.1191 (X.iptvsec-1)	IPTV security-related function requested items and architecture	SG17	Chapter 6 (IP broadcasting) Chapter 7 (VOD specification)
H.721 (H.IPTV-TDES.2)	IPTV Terminal Device: Basic Model	SG16	Chapter 3 (each spec.)

p. 6

Standard IPTV System Structure

NTT

H.264/AVC HD
LIME (H.762) Broadcast VOD CAS/DRM
(SNI)
Service Discovery (H.770)
NGN
Multicast QoS Unicast QoS
(UNI)
IPTV based on the Standard (H.721)

p. 7

ITU-T H.721: Basic Terminal Model

NTT

- ◆ Initiated by Contribution from *IPTV Forum Japan*
- ◆ Many inputs from DVB and ATIS-IIF.
- ◆ Defines Terminal supporting VoD and Linear TV
- ◆ Targeted at Embedded TV sets in the retail market as well as STB
- ◆ Managed network model (agnostic as to IMS)
- ◆ Network attachment and Service Discovery compliant with H.770
- ◆ FEC for Error Recovery, compliant with H.701
- ◆ Supports Portal service as well such as H.762 (LIME)
- ◆ Implemented and deployed

p. 8

HIKARI TV Terminals with ITU-T H.721

NTT

- ◆ NTT's "HIKARI TV" service is delivered to standard-based terminals, compliant to ITU-T H.721 and IPTV Forum Japan's specification.
- ◆ These terminals are available in the retail market in Japan
- ◆ Customer can buy a TV or PC at a shop, connect to NW, and receive an IPTV service

| STB | TV set | PC |

PM-700
(HIKARI-TV STB)

Panasonic VIERA

NEC VALUESTAR

SHARP AQUOS

PM-1000
(HIKARI-TV PVR)

TOSHIBA REGZA

TOSHIBA Qosimo
dynabook

p. 9

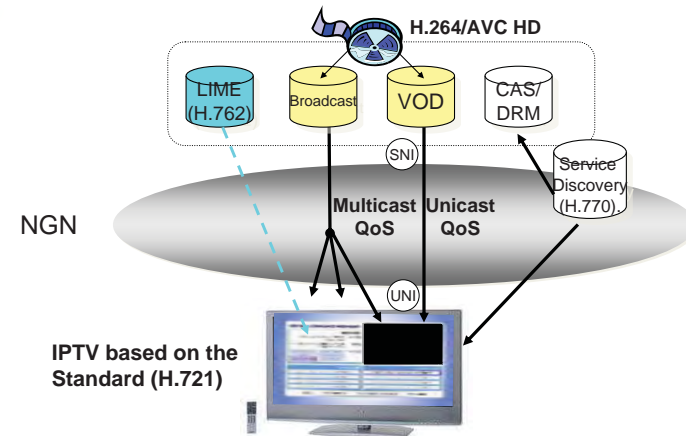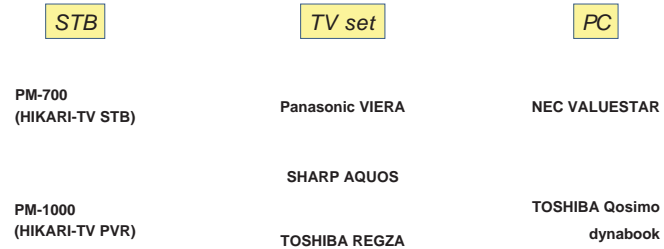## The ITU-T Rec./draft and IPTV Forum Spec.

NTT

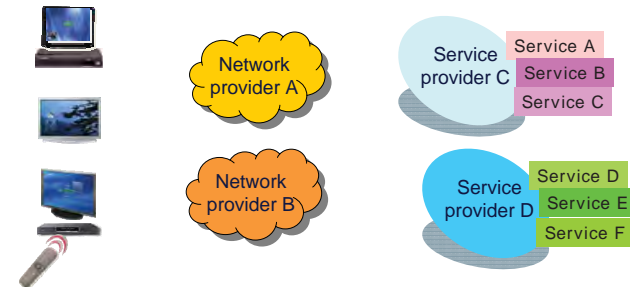- ◆ IPTV Forum Specifications are also harmonized with ITU-T international standards.

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H.721 (H.IPTV-TDES.2)	IPTV Terminal Device: Basic Model	SG16	Chapter 3 (each spec.)

p. 10

Why is service discovery needed?

NTT

- ◆ In an open environment, there are multiple service providers available over each network.
- ◆ Each service provider provides different services such as Linear TV, Content Guide, etc.
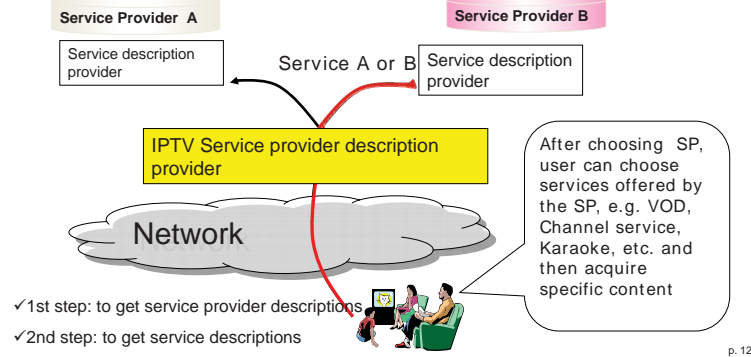- ◆ How to discover them when you come back home with a new IPTV Terminal device?

Network provider A

Network provider B

Service provider C — Service A / Service B / Service C

Service provider D — Service D / Service E / Service F

p. 11

Service Discovery NTT

- ◆ General Framework for discovering and selecting service providers and services
- ◆ Allows user to enjoy various services and service providers easily

Service Provider A

Service Provider B

Service description provider

Service A or B

Service description provider

IPTV Service provider description provider

Network

After choosing SP, user can choose services offered by the SP, e.g. VOD, Channel service, Karaoke, etc. and then acquire specific content

✓1st step: to get service provider descriptions

✓2nd step: to get service descriptions

p. 12

ITU-T H.770: IPTV Service Discovery NTT

- ◆ ITU-T H.770 defines:
  - ➢ service provider description locations & delivery protocols
  - ➢ service provider description
  - ➢ service description locations & delivery protocols
  - ➢ service description
- ◆ Based and harmonized with DVB and ATIS
- ◆ With some extensions for:
  - ➢ delivery protocols (FLUTE)
  - ➢ Portal URL, Purchase URL
- ◆ A profile of (retail service provider model) ITU-T H.770 (such as the one specified by IPTV Forum Japan) is already implemented and deployed in "HIKARI TV" IPTV service.

DVB Digital Video Broadcasting

ATIS Alliance for Telecommunications Industry Solutions

p. 13

Service Discovery and the Web NTT

- ◆ How is a service found on the Web?

Discussion of "Web and TV" must include the mechanism of "service provider discovery" and "service discovery", which harmonized with the existing standard, such as ITU-T H.770.

- ➢ What is the metadata for Service Discovery for the TV on Web?
- ➢ How is the metadata processed?
- ➢ What are the mechanism for accessing the service and content on the Web after its discovery
- ➢ Are the current web protocols sufficient or do we need more?
- ➢ How can we manage the web?

p. 14

APIs and URLs for Social TV

Dan Brickley[1], Libby Miller[2], Mo McRoberts[3], and Vicky Buser[4]

[1]Vrije Universiteit, Amsterdam; NoTube Project
[2]BBC R&D; NoTube Project
[3]Project Baird
[4]BBC R&D; NoTube Project

Integration of TV and the social web is already happening – and moving in an interesting direction. People are increasingly using online social networks to talk about TV, predominantly via second screens. This trend began without any specific tools to support it, but as TV and the Web converge, there is a risk of fragmentation of audiences for programmes over multiple applications, devices, and websites. If these silos are created, consumers, manufacturers, developers, and the creators and owners of content will all lose out.

We propose that the rethinking the role of metadata as an advertisement for programmes, allowing API access to TV devices, and using URLs for programme identification are three techniques that would lower costs and foster creativity, and thereby benefit consumers.

1 Social networks are where the integration of Web and TV is already happening

For broadcast TV, social networks are where the integration of Web and TV is already happening. There is evidence to suggest that a high proportion of the conversations in social media are around what people are watching on TV[1]. During prime-time scheduling in the UK and US, Twitter trending topics are often TV-related, and this Twitter activity can influence what people decide to watch. For example, people reported watching The Eurovision Song Contest on the basis of what was being said about it on Twitter, even though they wouldn't normally have watched it[2].

2 Silos are being created

There are many new and upcoming TV or TV-like devices becoming available, for example internet-connected TVs (such as Samsung TVs with Yahoo widgets enabling you to access your social network), and set top boxes such as the Boxee Box, Apple TV and GoogleTV.

Increasingly, specific applications are being created to control and allow interaction with various kinds of applications and devices on the second screen, such as the MythTV, XBMC and Boxee iPhone and Android remote controls.

Apple's iPhone App Store contains dozens of media directory applications - from TV guides to movie recommenders - but the vast majority of these are incapable of interacting with home or Web players for this content. The Radio Times TV guide, for example, has an impressive feature list: you can search, bookmark,

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[1]For example: a YouGov/Deloitte report published in August 2010 found that 42% of those UK adults who use the Internet while watching television do so to discuss or comment on the programmes they are watching at the time (http://today.yougov.co.uk/consumer/television-going-social). Similarly, a Twitter survey (conducted by BBC Audience Research) in August 2010 found that 49% of UK Twitter users in the sample said they used Twitter regularly when watching TV.

[2]`http://www.broadstuff.com/archives/1696-Eurovision-songs-sound-better-on-Twitter.....html`

1

personalise, rate shows, and share via Facebook and Twitter. However, it can't turn over the TV, or book a recording.

Many applications have been (and continue to be) made for specific programmes or events. For example, Channel 4's game show 'The Million Pound Drop' includes an online element that lets users play along live as the show progresses[3]. Other examples include ITVLive during the World Cup - an experimental but very popular service[4] PickLive for playing along during football matches [5] and the programme specific Seven Days application [6].

No one company is currently winning in all of these areas - in fact each is winning in different areas. The end result of all of this is that silos are being created, such that people need a specific piece of hardware or software to participate in the creative applications that are being developed and released. Nevertheless they continue to use the Web - in the guise of the "Social Web" - to talk about broadcast TV.

2.1 Audiences, Manufacturers, Developers, Programme Makers and Content Owners all Lose

Silos impose barriers upon participation, making it more difficult for people to talk about what they are watching in a meaningful way - and so by extension, for broadcasters to monitor the conversations which are ongoing. If potential members of the audience for a programme have to use the same hardware, or download the same application, or be on the same social network to participate, for most programmes they simply will not do it, and the potential value to them and to the rights holders in terms of increased audiences, engaged audiences, and feedback, is lost. Manufacturers and developers have to take a risk on which formats and protocols to support and reducing the time they can spend on creative solutions to consumer interests and problems.

3 Key problems for social TV application developers

There are a number of common problems encountered by developers making applications for TV.

(a) How do we know what the person is watching?

Determine, either from the "playback" device or by other means, and identify in the wider context of large volumes of TV programmes (both broadcast and on-demand), what exactly is being watched in the form of some kind of unique identifier.

(b) How do we locate additional information about the programme?

Given a unique identifier for a programme (or, often, a "broadcast event"), there must be some mechanism to use this identifier to locate additional information about the programme: information which is not typically broadcast along with the programme itself.

(c)How do we locate apps or Web pages related to it?

Once a mechanism exists to locate rich information about a programme, it is an extension of this idea to provide a mechanism it allow programme-specific applications to be launched, or Web pages to be navigated to. Appropriate use of "Web applications" allow the process to be streamlined: delivering complex applications using Web technologies without the friction of a typical locate-download-install-launch process.

(d) How can we manipulate it?

Beyond identifying a programme, a rounded "second screen environment" needs to provide a way for second screen users to manipulate the content, providing APIs and protocols for playback control, interaction

---

[3] http://www.channel4.com/programmes/the-million-pound-drop-live/articles/game
[4] http://paidcontent.co.uk/article/419-the-new-live-tv-how-real-time-social-media-are-upgrading-the-box/
[5] https://picklive.com/
[6] hhttp://sevendays.channel4.com/

with applications presented on the "first" screen, and so on.

NoTube and Project Baird have been working on various experimental and interim solutions to some of these problems, including 'NOWP' (enabling a device to determine what's "now playing" on a receiver); 'TVDNS' (mapping broadcast-domain-specific identifiers to DNS domain names which may be used for service discovery, based on techniques developed by the RadioDNS project [7]); a metadata resolver (advertised via TVDNS, and providing a mechanism for translating identifiers received over the air to URLs which can be resolved to obtain rich metadata); and a remote control prototcol ('Buttons'). These are prototypes intended to demonstrate ways of solving genuine problems with dealing with broadcast TV for social application developers.

4   Three parts of a longer-term solution

Rethink the role of metadata

Use metadata as an advert for the content that can flow out into the public Web in search of viewers, rather than a precious resource to be parcelled out and sold. By making it public, and in open formats and licenses, the metadata can be a tool to draw users in via applications made by third parties. While there are of course rights issues around TV metadata, they are nothing compared to the problems around content. Metadata is the scaffolding around which the future of TV on the Web will be built. For connected TV to reach its full potential, metadata needs to flow freely.

The BBC Backstage work with TV-Anytime showed that when application developers have access to this kind of data they can make very creative applications: the Backstage e-book[8] has the details.

Create URLs for the content items

Part of making metadata an advert for the content is helping people easily share information about it. Using an URL for a programme gives it life before, during and after broadcast, allowing interest in it to circulate through social networks. Being easily sharable it becomes something that people can link to on the social Web to allow others to understand what they are talking about. The BBC's /programmes service (which aims to provide a unique URL and metadata for every BBC programme) has enabled people to coherently identify programmes which are on now or upcoming, even if they are not yet available on the BBC's on-demand service, iPlayer. Another UK broadcaster, Channel 4, has also seen the benefit of having URLs suitable for sharing for their programmes.

Once this role for metadata is understood and the programme has a unique URL, identifying a specific programme becomes trivial, and applications can add specific value. Adding resolvable *machine-processible* URLs (such as JSON or RDF) allows developers to find more information about a programme and present it suitably to the end user. Ideally, many of the values of metadata fields will also be URLs, creating links to other resources such as Wikipedia and IMDB, and enabling aggregated matching and discovery based upon topics and themes.

In principle, this metadata could be extended to relate instances of programmes in a cross-broadcaster fashion: perhaps a programme-maker might assign its own URI for a production, which is then referenced by the broadcaster-provided metadata. Not only would this allow for a degree of inheritance if desired (that is, the broadcaster-provided metadata overrides that provided by the programme-maker), but also allow applications – such as those concerned with conversations about a programme on the Social Web – to relate the different conversations together which relate to each broadcaster's provision of the programme. This is especially salient in the case of international distribution, in particular where a programme is broadcast in many regions in a short space of time. The Web is global, after all.

Agree on open APIs for controlling the TV and getting access to metadata from it

---

[7]http://radiodns.org/
[8]http://www.bbc.co.uk/blogs/researchanddevelopment/2011/01/bbc-backstage-ebook-retrospect.shtml

3

The final piece of the puzzle is to allow other applications to access and control the TV playing device, application, or web page. Whether using a second screen or looking at widgets on a TV screen, to be interesting and useful to audiences, an application needs to be able to identify what is currently playing and to allow the user to easily manipulate what they can see. So together with access to metadata, and availability of URLs for content items, this needs information about what the device is showing available to other devices or applications in a well-documented, open fashion, and allow other devices to control what is being shown, change channel, play / pause, and similar conventional remote functions.

The core need here is to establish simple, usable mechanisms for both content identification and user identification/authentication, alongside standards-based communications channels between 'controlling' and 'controlled' devices. Specific APIs for services such as scheduled recording, media annotation and search would operate within this environment, and be accompanied by supporting APIs amongst Web services. For example, a smartphone-to-TV API could be used to bookmark, tag or annotate content, while a Web-based OAuth API could be used to allow the user to share those otherwise private activity streams with other sites and services.

4.1 Audiences, Manufacturers, Developers, Content Owners and Makers all Benefit

What are the benefits of having unique URLs for programmes, open metadata, and an API to the TV?

Benefits to Audiences

With these features, audiences could expect diverse, attractive and accessible software and hardware remotes, and fewer remotes keep track of (physical or software). They should see many more creative applications for viewing what they may be able to watch on their TV via their phone, tablet or laptop, and simpler, faster text entry via other devices to their TVs.

They could expect simpler access to information about programmes that they can share using their favourite social application, better programme-specific applications, and better second screen TV applications providing more interesting and relevant information about programmes; and better recommendations based on defragmented statistical information about watching behaviour.

They should be able to use data provided from social media to find interesting things to watch even when they do not themselves participate in social media, because of the ability to identify what is being watched over large populations in real time.

Benefits to Content Producers

Content producers should expect a less fragmented audience, more participation and interest, and the ability to track aggregate usage of content and market that content over its lifecycle, from broadcast to on-demand to archive.

Benefits to Manufacturers and Developers

Open and well-documented APIs to support, rather than complex, secret multiple ones, meaning more time to focus on creative solutions to the problem of finding what to watch.

5 Challenges and Conclusions

To an extent these changes are already happening. Boxee, XBMC, MythTV have HTTP APIs to their content and Boxee makes an effort to find URLs to identify the content. People are already using social applications to talk about TV. Our three principles suggest ways in which W3C could influence the future of TV in ways that benefit audiences as well as companies involved. There are significant challenges around preserving the privacy of consumers and helping them understand what privacy risks they face, but W3C is well-placed to consider these.

4

Because the interactions between the different aspects of this picture involve so many disparate parties, it's not clear that solutions which account properly for the different use-cases will emerge naturally – nor, arguably, should they. Will a consumer electronics manufacturer coordinate with the developer of a website? Or a broadcaster with a open source project which allows low-end PCs to function like set-top boxes?

We believe, therefore, that the W3C should encourage and foster the development of the APIs, protocols and other specifications needed to overcome these challenges and realise the aim of a truly coherent ecosystem bringing together TV and the Web.

5

APIs and URLs for Social TV

Dan Brickley <danbri@danbri.org>
NoTube Project & Vrije Universiteit, Amsterdam

with Libby Miller, Mo McRoberts, Vicky Buser

a joint W3C position paper from NoTube & Project Baird

W3C Web & TV Workshop, Berlin, Feb 2011

Today

- From me...
  - 3 requirements from Linked Social TV
  - Via motivating scenarios & examples
  - Suggestions for W3C next steps
- A few words from a like-minded special guest (Matt Hammond of BBC)
- Coffee!

(who am I?)

- In W3C community since 1997
- Joined W3C team to help start Semantic Web project, RDF specs and groups
- 2006/7 Libby's 'Widget / social' team at Joost.com startup - TV re-built in the Web
- NoTube project, also recently co-chaired W3C SocialWeb Incubator Group

The 3 Requirements

Achievable, inter-dependent and foundational

- Let metadata flow widely - *advertising content*, rather than be a hidden asset
- Identify and *link* content with useful URLs(*)
- Open APIs to control TV and link devices

* CRIDs are great, but people share HTTP URLs

see also CRID resolver demo services.notu.be

Scenario-led analysis
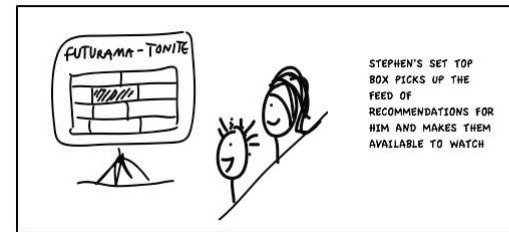
TV - not as a device, but as a part of people's lives

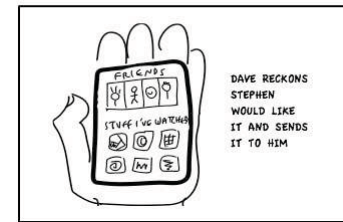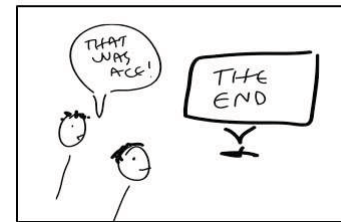World Wide Web - not just a technology component

but as a *linked information network...*

...and as something that *connects billions of people*
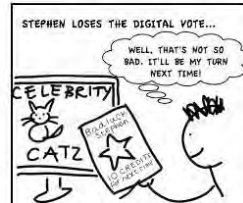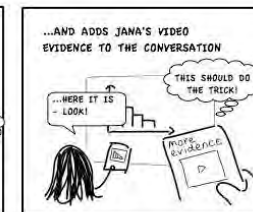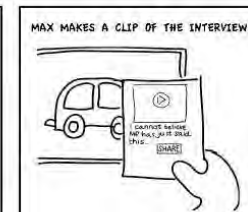
... and we noticed

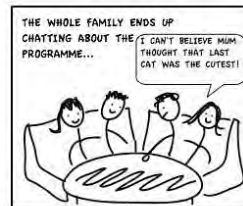- Nobody says, "I want to see recommendations from other people who bought the same TV as me"

- Nobody says, "I want to learn a new interface and controller for every device I use"

- Or "I wish watching TV was more like using a computer."

Prototypes and demos

From Widgets to APIs and the second screen

(and third, fourth, and fifth...)

(and sometimes no screens at all...)

Experiments with pairing protocols

eg. QR Codes ("xmpp:bob.notube@gmail.com/tv1234")

2nd screen archive browser on a tablet computer

Custom 2nd screen apps (OAuth/Twitter for 'social')

NoTube Network: Your friend LIBBY MILLER suggests DR WHO, starting soon on BBC1

(scope: can a table be a 'remote control'?)

(scope: is a projector a 'TV'?)

Observations

- Second screen APIs have huge potential

- Standard protocols needed (HTTP, XMPP?)

- Useless without content identifiers, free-flow of metadata

- "Social TV" is happening online *anyway* (even if people didn't care to connect their TV's ethernet cable)

Linked TV data

Connecting Archive.org films via Wikipedia to IMDB, Rotten Tomatoes, Facebook and to other users...

(24 hour collab with Kingsley Idehen)
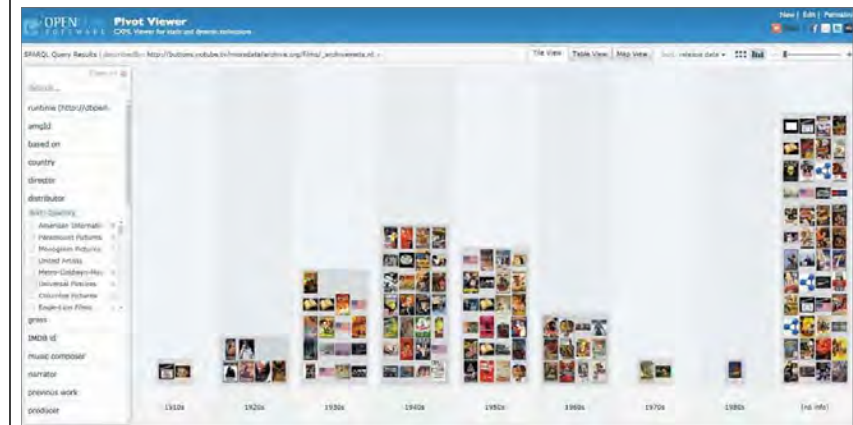
We linked Archive.org video URLs to Wikipedia/DBpedia URLs

We can visualize and navigate content using info from Wikipedia.

Now, whenever Wikipedia is improved, so is Archive.org.

And not just the "content" but related entities...

Microsoft Pivot Viewer - laptop as 2nd screen

"Show films by distributor, in the 1940s"
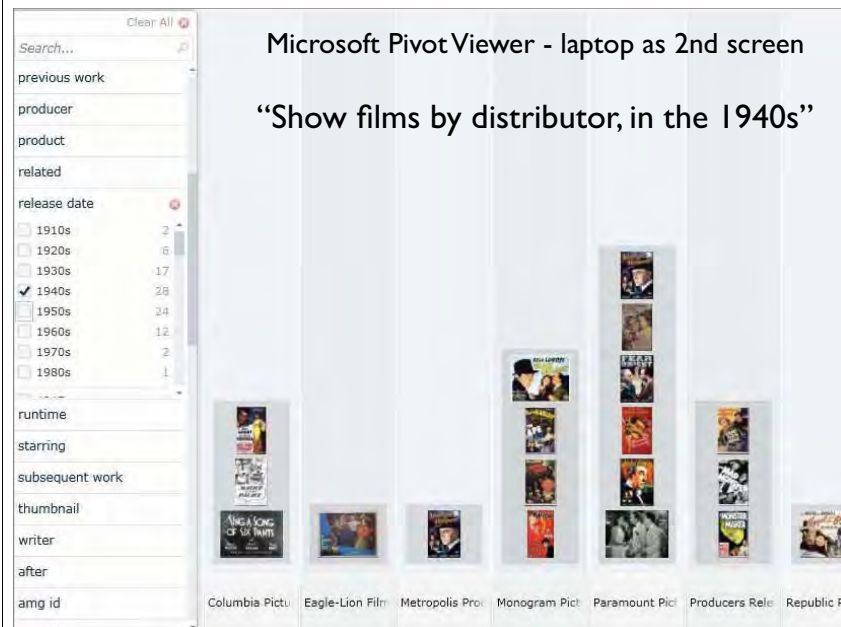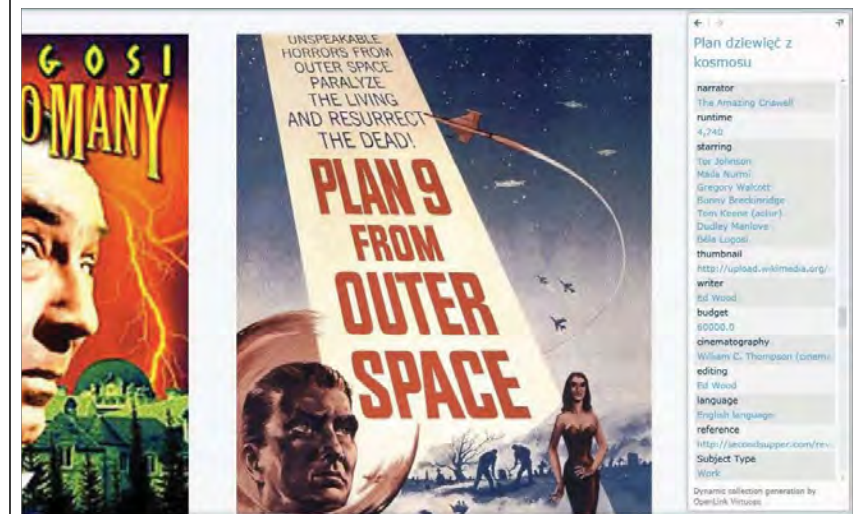
(via Pivot embedded in OpenLink's RDF/SPARQL db)

Each entity of interest gets an URL, a page, some descriptive metadata...

...and more links by URL

URLs + public metadata:

RDFa in IMDB and RottenTomatoes HTML

Aggregated by Facebook

Conclusions & next steps

- This is not rocket science: URLs make the Web

- URL links are a foundation for Social TV

- Linking documents is easier than linking devices

- Protocol work deserves a Working Group

- Best Practices Note: collect via Interest Group

And speaking of remotes...

(see Matt's slides here)

Last week's examples

- Al Jazeera's Egyptian Twitter coverage

- Linking content with URIs

(these last slides not used...)

Livestation streaming app embeds a Twitter client

I posted a screenshot of Al Jazeera quoting someone talking about Egypt:

"I'm not rich or poor,
not muslim or christian,
white or black, I'm
neither from
the north or south.
I am EGYPTIAN!"
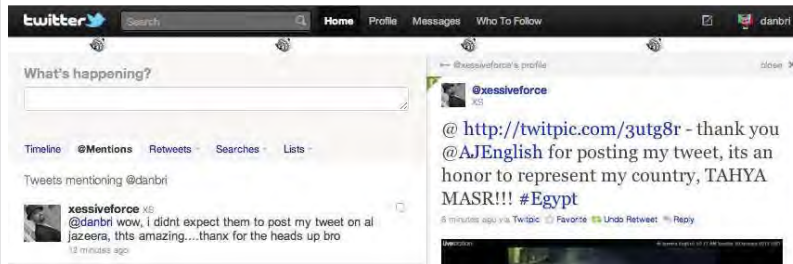
...he noticed, and was happy, and shared this back with @AJEnglish

Universal Control API

Reaching out beyond the Set Top Box

Matt Hammond
matt.hammond@rd.bbc.co.uk
BBC R&D

Universal Control

Don't build every accessibility feature into the television or set-top-box … UI will always be a compromise.

Instead the box serves an API for controlling its functions. Leave the UI up to the client.

Expose identifiers, metadata, state.

Past year: devising an API and building prototypes

Enables much more than accessibility: multi-screen / multi-device apps and integration with web content.

Universal Control

RESTful web API. XML. Discovery mechanisms.

Data model:
- **Content** (video, audio, interactive apps)
- **Sources** (channels, streaming services, home servers ...)
- **Outputs** (displays)
- **Acquisitions** (booked recordings, scheduled downloads …)
- **Application Extension Mechanism**

"Universal" for TVs, internet radios, media centres, ...

Not about streaming the media or exporting the TV UI.

MythTV Server … iPhone client
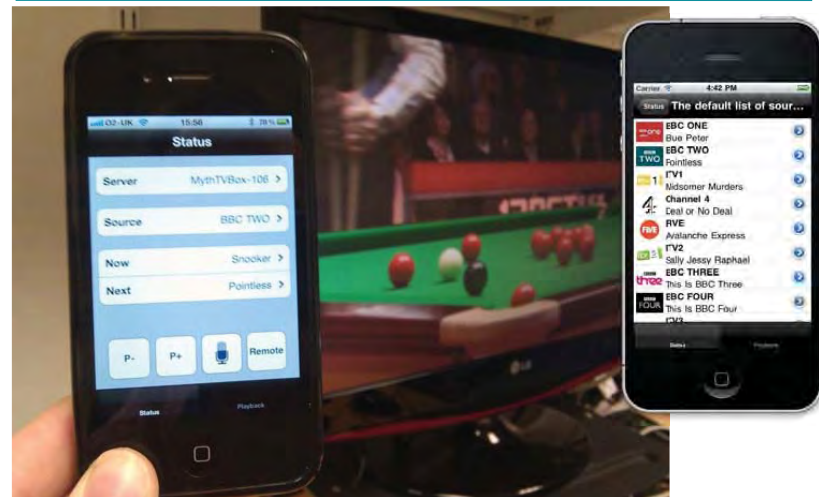
Integrating with the web

Homepage knows what you are watching.

TV Listings page could offer to book recordings?

Synchronised dual-screen content

The user can jump to different points in the programme by touching the timeline.

Which device is the 2nd screen?

"Director's Commentary" app

Someone with poor eyesight can listen to time-synchronised audio-description while still viewing as a shared experience with the rest of the family.
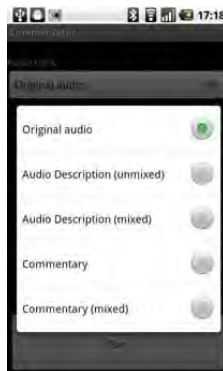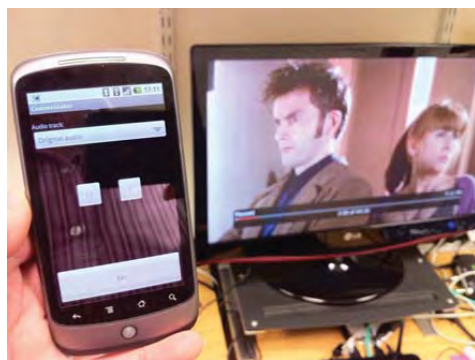
Where do we take this?

Is this group interested in standardising this kind of API?

Our draft specs will be publicly available from Friday as R&D white-papers at: **http://www.bbc.co.uk/rd**

Will also be submitted as member submission to W3C

matt.hammond@rd.bbc.co.uk

Session 6
HTML5 and TV:
Gap Analysis

The Open IPTV Forum's Declarative Application Environment – An Overview

Jan Lindquist jan.lindquist@ericsson.com
Nilo Mitra, nilo.mitra@ericsson.com

Abstract

This paper addresses the state of the art in one of the identified workshop topics, namely the "Survey of existing work in Web-like technology for TV services". The Open IPTV Forum's (OIPF) Declarative Application Environment (DAE), which offers a browser environment to network applications, is briefly reviewed. It is being implemented in many retail TVs by major manufacturers.

Introduction

The OIPF's DAE has been designed keeping in mind the differences in the user interface (e.g., screen size, pointing devices etc.) between traditional browser usage, such as that on PCs/laptops, and that available to the TV. The OIPF defines functionality for control of on-demand media, remote control functions including key events and spatial navigation, control of IP and broadcast tuners, PVR management and others from a CEA-2014-A compliant browse, which includes a presentation environment based on CE-HTML and CSS

The DAE provides to service providers and content providers the capabilities of the terminal device so as to allow access to the following types of services (described very generically):

- Information services which are often associated with a content item and with which the user interacts (e.g., voting)
- Control of local and network-based PVR capabilities
- Support of network-based or local Content Guides, through JavaScript APIs that access the appropriate metadata
- Support of scheduled content delivered via IP multicast or via a DVB-S/C/T receiver
- Support for various forms of content download, including deferred download, background download and progressive download with HTTP adaptive streaming
- Integration with various communications services such as display of caller id, network notifications, instant messaging and chat
- Interaction with content protection systems for acquisition of rights for playback of protected media
- Support of service discovery and scanning of scheduled content

Architecture

The following figure shows the logical architecture of the DAE.
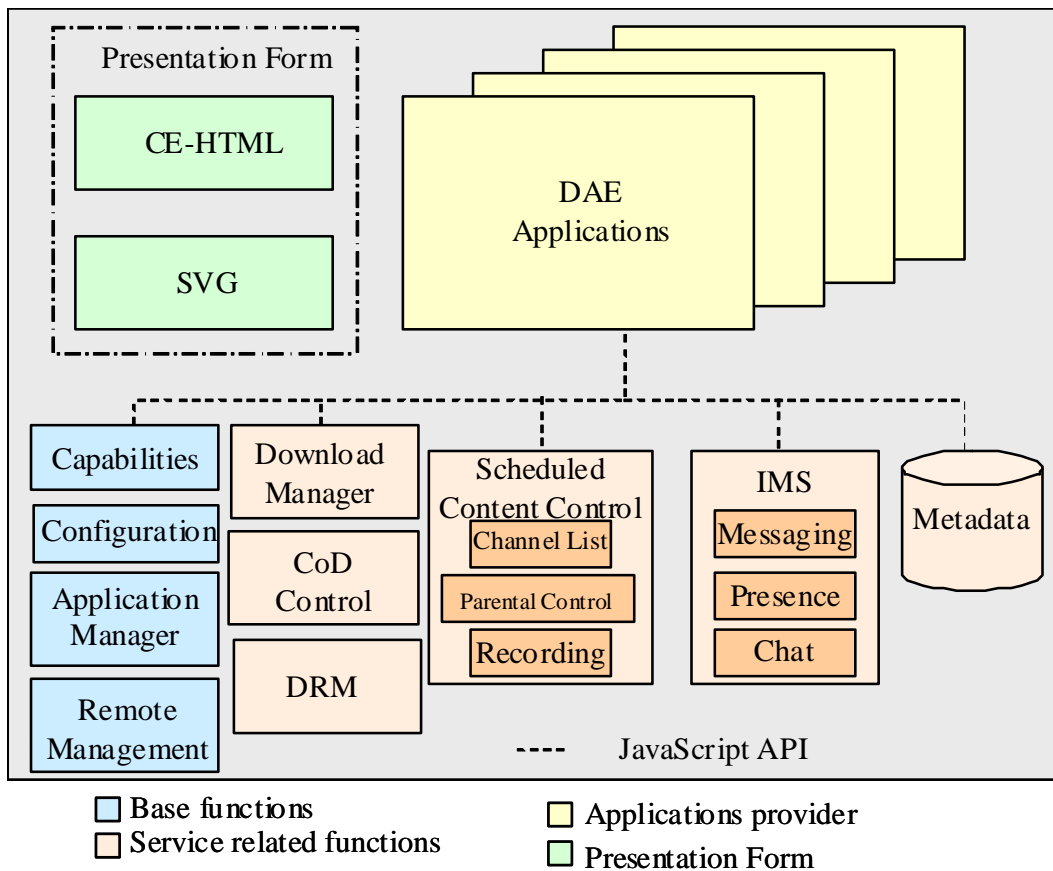
Two presentation environments are currently defined for the DAE – the first being what is called CE-HTML, which is the CEA's selection of the W3C's XHTML, CSS TV 1.0, DOM level 2 and XMLHttpRequest with some restrictions described by the referencing specification. The second presentation environemnt is Scalable Vector Graphics (SVG), based on SVG Tiny 1.2, either embedded within a CE-HTML document or as a standalone document.

DAE applications can make use of various functions, which are exposed by various Javascript objects, whose purpose is indicated in the following table:

High-level Function [which can include several embedded objects]	**Description**
Application Manager	Overall application management, behavior and tasking such as Support for multiple simultaneous applications, inter-application communication and application signaling

Capabilities	Access to the terminal's capability description
Configuration	Access to device configuration and user settings.
Remote Management	Access device diagnostics and perform remote management including trigerring upgrades
DRM	Integration with video and audio objects for communication with content protection systems and acquisition of content rights for protected content
CoD Manager	Control of presentation of unicast media, recordings and downloaded media items, including trick play as well as access to catalogues of on-demand content
Download Manager	Basic initiation of media download for protected and unprotected content as well as management of the media download queue and downloaded items
Scheduled Content	Control of broadcast video presentation including trick play & time-shifting & synchronization of applications to video
Parental Control Manager	Control of the parental control functionality in the receiver & PIN management for access control
Channel List Management	Discovery and management of channel lists and favorite lists, including channel scanning
Recording Management	Scheduling of local and network recordings and storage and retrieval of bookmarks
Metadata Management	Support for searching program guide information & VoD content catalogues

Possible Future Directionsfor the integration of the Web and TV

The following points are a list of different directions that could be taken for ensuring that the integration of Web and TV reach the expectations of all concerned parties.

1. Profiling of the web related standards to avoid duplications of methods.

2. Establish performance requirements. Simply having support of the latest standard does not ensure that the platform has the proper performance.

Possible areas for future OIPF-W3C collaboration

The following points are a list of possible areas of W3C collaboration with the OIPF.

1. Align the <video> tag for both HTML5 and SVG video control.

2. Define clear boundaries for other standard forums to extend W3C standards where it is necessary.

3. Create a new interface for the control of play out of time-shifted content.

Open IPTV Forum (OIPF) DAE Objects and <video> extensions

Presentation by

Jan Lindquist

Overview

› OITF Reference Architecture & High Level Functions

› DAE Sample APIs

› Comparison of HTML5 <video> and DAE video objects

› Reaching Expectations

› W3C Collaborations

OITF Reference Architecture
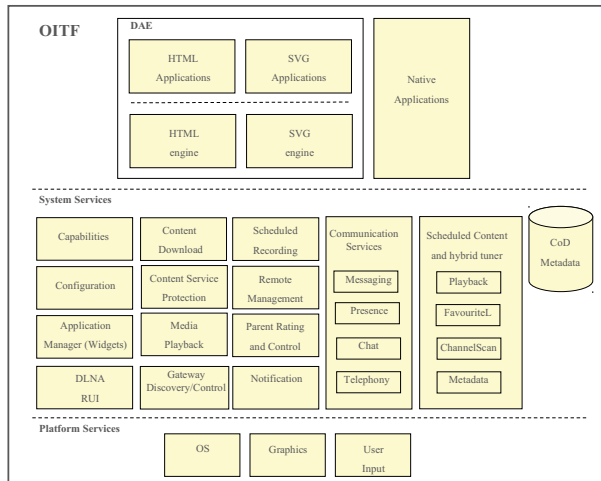
High Level Function

High-level Function [which can include several embedded objects]	Description
Application Manager	Overall application management, behavior and tasking such as Support for multiple simultaneous applications, inter-application communication and application signaling
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Recording Management	Scheduling of local and network recordings and storage and retrieval of bookmarks
Metadata Management	Support for searching program guide information & VoD content catalogues

---

Extension for playback

```
interface {
    const COMPONENT_TYPE_VIDEO = 0;
    const COMPONENT_TYPE_AUDIO = 1;
    const COMPONENT_TYPE_SUBTITLE = 2;
    function onSelectedComponentChanged( Integer componentType );
    AVComponentCollection getComponents( Integer componentType );
    AVComponentCollection getCurrentActiveComponents( Integer componentType );
    void selectComponent( AVComponent component );
    void unselectComponent( AVComponent component );
}
interface AVComponent {
    readonly Integer componentTag;
    readonly Integer pid;
    readonly Integer type;
    readonly String encoding;
    readonly Boolean encrypted;
};
interface AVVideoComponent : AVComponent {
    readonly attribute float aspectRatio;
};
interface AVAudioComponent : AVComponent {
    readonly String language;
    readonly Boolean audioDescription;
    readonly Integer audioChannels;
};
interface AVSubtitleComponent : AVComponent {
    readonly String language;
    readonly Boolean hearingImpaired;
};
typedef Collection<AVComponent> AVComponentCollection
```

AVComponentCollection **getComponents**()

void **selectComponent**()

function **onSelectedComponentChanged**()

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Extension AV Control for buffering

```
interface {
    function onReadyToPlay() ;
    Boolean readyToPlay ;
    function onRepresentationChange(Integer bandwidth, Integer position) ;
    function onPeriodChange(Integer bandwidths[], Integer position) ;
    readonly Integer availableRepresentationsBandwidth [ ] ;
    readonly Integer currentRepresentation ;
    readonly Integer maxRepresentation ;
    readonly Integer minRepresentation ;
    readonly StringCollection supportedStrategies ;
    Integer getAvailablePlayTime( Boolean fromPlayPosition ) ;
    Boolean setBufferingStrategy( String name ) ;
    Boolean setRepresentationStrategy(Integer maxBandwidth, Integer
        minBandwidth, Integer position) ;
}
```

readonly Integer **availableRepresentationsBandwidth** [ ]

function **onRepresentationChange**(Integer bandwidth, Integer position)

function **onPeriodChange**(Integer bandwidths[], Integer position)

Content Service Protection

```
interface {
    function onDRMMessageResult( String msgID, String resultMsg,
        Integer resultCode ) ;
    function onDRMSystemStatusChange( String DRMSystemID ) ;
    function onDRMSystemMessage( String msg, String DRMSystemID ) ;
    String sendDRMMessage(String msgType, String msg, String
        DRMSystemID) ;
    Integer DRMSystemStatus( String DRMSystemID ) ;
}
```

Integer **DRMSystemStatus**(String DRMSystemID)

String **sendDRMMessage**(String msgType, String msg,
String DRMSystemID)

function **onDRMMessageResult**(String msgID, String resultMsg,
Integer resultCode) ;

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Configuration

```
interface LocalSystem {
    const OFF = 0;
    const ON = 1;
    const PASSIVE_STANDBY = 2;
    const ACTIVE_STANDBY  = 2;
    const PASSIVE_STANDBY_HIBERNATE = 2;
    readonly String deviceID ;
    readonly Boolean systemReady ;
    readonly String vendorName ;
    readonly String modelName ;
    readonly String softwareVersion ;
    readonly String hardwareVersion ;
    readonly St...
    readonly Int...
    readonly Int...
    readonly Int...
    readonly St...
    readonly Bo...
    readonly Bo...
    readonly Int...
    readonly Int...
    readonly Int...
    function on...
    Integer vol...
    Boolean mute ;
    readonly AVOutputCollection outputs ;
    readonly NetworkInterfaceCollection networkInterfaces ;
    readonly TunerCollection tuners ;
    readonly Integer tvStandard ;
    readonly Integer pvrSupport ;
    Boolean setScreenSize( Integer width, Integer height ) ;
    Integer setPvrSupport( Integer state ) ;
    Boolean setPowerState( Integer type ) ;
    Boolean setDigestCredentials( String protocol, String domain, String username, String password ) ;
    Boolean clearDigrstCredentials( String protocol, String domain ) ;
}
```

readonly String
deviceID ;

readonly AVOutputCollection **outputs** ;

Boolean **setDigestCredentials**(String protocol, String
domain, String username, String password) ;

Boolean **clearDigrstCredentials**(String protocol, String
domain) ;

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General Video

	A/V Control Object	Broadcast object	HTML5 IDL attributes	Comments
General	Number width	Integer width	video.videoWidth	
	Number height	Integer height	video.videoHeight	
	readonly Boolean fullScreen	readonly Boolean fullScreen	NS	Not in HTML5 because of security issues
	setFullScreen (Boolean fullscreen)	void setFullScreen(Boolean fullscreen)	NS	Not in HTML5 because of security issues
	focus ()		window.focus()	
	Object onfocus	function onfocus	onfocus	
	Object onblur	function onblur	onblur	
	Object onFullScreenChange	function onFullScreenChange	NS	Not in HTML5 because of security issues

Component control

	A/V Control Object	Broadcast object	HTML5 IDL attributes	Comments
Volume	Boolean setVolume(Number volume)	Boolean setVolume(Integer volume)	float media.volume	The HTML5 value is in a range between 0 and 1, whereas the DAE visual objects are between 0 and 100
			boolean media.muted	
			boolean media.controls	true if the user agent should provide its own set of controls
			onvolumechange	
		Integer getVolume()	float media.volume	
Components (ex. subtitles, languages)	AVComponentCollection getComponents(Integer componentType)	AVComponentCollection getComponents(Integer componentType)	NS	Subtitles and media annotations not currently in HTML5 (but proposals exist)
	AVComponentCollection getCurrentActiveComponents(Integer componentType)	AVComponentCollection getCurrentActiveComponents(Integer componentType)	NS	
	void selectComponent(AVComponent component)	void selectComponent(AVComponent component)	NS	
	void unselectComponent(AVComponent component)	void unselectComponent(AVComponent component)	NS	

Playback Control

	A/V Control Object	Broadcast object	HTML5 IDL attributes	Comments
Playback control	String data			video.url
	readonly Number playPosition	readonly Integer playPosition	attribute float currentTime; (get)	
			readonly attribute float startTime;	
	readonly Number playTime		readonly attribute float duration	
	readonly Number playState		readonly attribute boolean paused; readonly attribute boolean ended;	
	readonly Number error		attribute int media.error and error / abort events	
	readonly Number speed	readonly Number playSpeed	attribute float defaultPlaybackRate; attribute float playbackRate;	
	Boolean play (Number speed)	Boolean resume() Boolean pause()	void play(); void pause(); attribute boolean autoplay; attribute boolean loop;	Recording aspects not covered
		Boolean setSpeed(Number speed)	attribute float playbackRate;	
	Boolean stop ()	void stopRecording()	NA (no recording support)	Stop functionality can be implemented with pause();currentTime=0;

Playback Control cont

	A/V Control Object	Broadcast object	HTML5 IDL attributes	Comments
Playback control		Boolean stopTimeshift()	NA (no recording support)	
	Boolean seek (Number pos)	Boolean seek(Integer offset, Integer reference)	attribute float currentTime; (set)	The HTML5 values are in seconds, whereas the DAE values are in milliseconds.
	function onPlaySpeedChanged(Number speed)	function onPlaySpeedChanged(Number speed)	events: ratechange durationchange	
	script onPlayPositionChanged(Integer position)	function onPlayPositionChanged(Integer position)	event: timeupdate	
	readonly Number playSpeeds[ ]	readonly Number playSpeeds[ ]	NS	

No Mapping in W3C

› Broadcast control
- Channel change, bind to current channel
- Activate circular buffer

› Recording
- Record now
- Offset
- Recording object

Reaching Expectations

The following points are a list of different directions that could be taken for ensuring that the integration of Web and TV reach the expectations of all concerned parties.

1. Profiling of the web related standards to avoid duplications of methods.
   › Work done by CEA-2014, OIPF, HbbTV
2. Establish performance requirements. Simply having support of the latest standard does not ensure that the platform has the proper performance.
   › Certification process

W3C collaborations

The following points are a list of possible areas of W3C collaboration with the OIPF.

1. Align the <video> tag for both HTML5 and SVG video control.
   - Not available when CEA-2014 selected which is base for DAE
2. Define clear boundaries for other standard forums to extend W3C standards where it is necessary.
   - Need to discuss how the boundary may look
3. Create a new interface for the control of play out of time-shifted content.
   - Jointly create an interface

Connected TV (CTV) Standardisation in the UK

Steve Morris (steve.morris@antplc.com)
Chair, UK DTG HTML Group

Introduction

The Digital TV Group (DTG) is the independent industry association for digital television in the UK. Today the Group represents over 150 broadcasters, platforms, manufacturers, technology providers, government departments, regulators, not-for-profit organisations and consumer groups. Since 1995, the DTG has provided a focal point for the digital television industry, bringing together key stakeholders to define detailed broadcast and receiver specifications and to provide regimes to measure conformance against brand requirements.

The Group publishes and maintains the technical specification for the UK's Freeview and Freeview HD platforms (the D-Book) and runs the digital television industry's test centre in the UK: DTG Testing. The DTG has published and maintained the D-Book for over a decade and the specification is updated annually to keep up with the pace of development in UK DTT. At present, interactive TV services are enabled via a profile of the MHEG-5 specification defined by the D-Book, with an HTML-based presentation technology currently being defined.

Connected TV standardisation

The DTG Council, executive and its members are currently developing the technical specification for UK Connected TV which will form part of the 7th edition of the D-Book. D-Book 7 will provide an industry agreed baseline implementation for Connected TV products and services that service providers such as YouView, Fetch TV, Lovefilm, Sky, Virgin Media and others can build on for trademark requirements to support their services.

The DTG has set up 7 Connected TV working groups drawing upon different areas of the specification: architecture, device, delivery, presentation, metadata, security and measurement. D-Book 7 will be published in March 2011, and will be followed by a Connected TV test and conformance regime to ensure market compliance.

Technical specifications

The Connected TV presentation group is focussing on three areas, an HTML-based presentation technology building on the HbbTV specification, a profile of Web standards for improved graphical capabilities (most notably HTML5 and CSS3) , and a framework to enable co-existence of HTML and MHEG-5 with other presentation technologies such as Flash.

In the interests of harmonization with other digital TV specifications, Connected TV is defined using the HbbTV specification as a baseline, with a number of additions to address Connected TV's more advanced requirements. These requirements fall into the following areas:

- Access to additional metadata about programmes, recordings and downloaded media content
- Metadata search
- Security
- Extensions to the application model to support multiple simultaneous applications

- Additional support for DRM and conditional access systems
- Support for linear IP services and adaptive streaming
- Improved graphics and animation capabilities
- User notifications

Many of these requirements are addressed by adding extra elements from the Open IPTV Forum's Declarative Application Environment (DAE) specification to those already selected by HbbTV. Other requirements are met through the inclusion of features from W3C specifications, such as the HTML 5 <video> element for compatibility with existing Web content and a subset of the W3C Web Notifications API. The Connected TV specification also defines additional APIs to address UK-specific requirements for metadata access.

HbbTV's graphical and animation capabilities are extended through the addition of a subset of HTML 5 and CSS 3 technologies. Two device profiles are defined, for basic and advanced devices. The basic profile includes support for 2D functionality that can be implemented on hardware platforms used in today's digital TV receivers. This includes:
- The HTML 5 Canvas element and 2D drawing context
- Elements of the CSS 3 Basic UI, Colour and Backgrounds and Borders modules
- Elements of the CSS 3 2D Transformations module
- Elements of the CSS 3 Transitions module

The advanced profile includes further support for 2D functionality, and includes 3D functionality as an option through the CSS3 3D transformations module. Support for WebGL is still under discussion.

Coexistence of presentation technologies

Deployment of HTML-based presentation engines in the UK market faces a unique challenge, in that coexistence with existing, widely-deployed presentation technologies is vital for the success of this work. Support for MHEG-5 is ubiquitous in UK receivers and MHEG-5 is widely used by broadcasters today. Connected TV defines a framework that enables HTML applications to coexist with applications written in MHEG-5 or other presentation technologies.

This framework not only includes mechanisms for signalling applications of different types, but also includes a definition of how applications share the display and user input (recognising that traditional PC-based approaches to application management are not suitable for the TV). Furthermore, it defines a model where applications may be closely related to a specific broadcast channel or event, or where they may be independent from any broadcast channel. This model includes managing when applications may be overlaid on broadcast video, in order to ensure the needs of broadcasters, device manufacturers, and application providers are all addressed.

Testing and validation

Development of a specification alone is not enough to ensure the success of that specification in a consumer market; testing and validation of implementations play a key part in ensuring consistency across devices and increasing the confidence of both consumers and content developers.

While the DTG is working on the development of test material for the DTV specification, it also recognises that co-operation between standards organisations to develop conformance test regimes is extremely important and is keen to explore the opportunities for standards development organisations to work together in this area. The harmonisation of standards means that elements from one standard may get used in many other places, and co-operation in developing tests ensures a common understanding of the what a "compliant implementation" means for products which may implement some or all of several different (but overlapping) standards.

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Connected TV Standardisation in the UK

Steve Morris, HTML Working Group Chair, UK Digital TV Group
2nd W3C Web and TV Workshop, Fraunhofer-FOKUS, Berlin | 8-9th February 2011

About the DTG

Independent industry body responsible for the technical development of UK digital terrestrial TV
- 155 member organisations
- Covers the entire value chain

Publishes and maintains the D-Book; the technical specification for digital terrestrial television (Freeview)
- Based on open industry standards
- Updated annually

digital **V**   Freeview   Freeview **+**   Freeview HD   Freeview **+**HD

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DTG Connected TV programme

Developing technical specification for UK Connected TV products and services
- Part A - the broadcast specification
- Part B - the hybrid Connected TV specification
- 7 DTG working groups responsible for defining part B

D-Book 7 will offer core specification for service providers to build trademarks on

D-Book 7 circulated December 2010

DTG Connected TV test service launching May 2011

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DTG Connected TV ecosystem

DTG
Digital TV Group
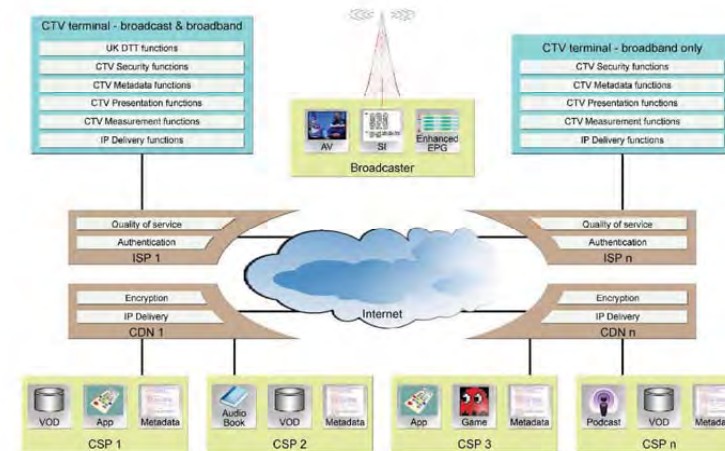
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The HTML working group

Defining a specification for HTML-based Connected TV applications

Key challenges:
- A specification that makes it easy to deploy receivers and applications
- Coexistence with existing Freeview standards
- A step-change in user experience over those existing standards
- A specification that other bodies can use as a foundation

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The CTV HTML application specification

HbbTV specification used as baseline
- A profile of OIPF already enjoying traction among receiver manufacturers

Adds the following extra features from OIPF:
- Support for multiple applications
- HTML5 video element for Web compatibility
- Delivery of linear services over IP & adaptive streaming
- Series recording using TV-Anytime metadata
- Additional metadata for recordings, downloads and EPG data
- Metadata searching for recordings, downloads and EPG data
- DRM status notification & discovery

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The CTV HTML application specification

CTV adds several features that are not defined in OIPF or HbbTV to meet requirements for the UK market

HTML5 and CSS3 features for richer graphical capabilities
- HTML5 canvas element (subset)
- CSS3 2D Transformations & Transitions modules (subset)
- Subsets based on performance on today's digital TV silicon

Notification API based on W3C

Additional ECMAScript APIs for DTG-specific metadata

Application lifecycle & coexistence with MHEG

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Connected TV challenges & opportunities

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Co-operation with other bodies

Core common technical specification is a key challenge

Partly addressed through choice of technologies
- Don't re-invent the wheel, unless you have to

Testing is key
- Not just common technologies, but common conformance & interoperability tests
- Save money and time – both developing tests and implementing products
- DTG is working with other standards bodies to progress this

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Thank you

Steve Morris, HTML Working Group Chair, UK Digital TV Group
2nd W3C Web and TV Workshop, Fraunhofer-FOKUS, Berlin | 8-9th February 2011

CableLabs Interest in W3C Web+TV Workshop

Bob Lund, Vice President – Advanced Network Technologies
b.lund@cablelabs.com

CableLabs® (www.cablelabs.com), on behalf of cable television operator members worldwide, develops technology and specifications for commercial television services to a wide array of digital platforms. Cable operators currently deliver video services to browsers via video plugins and wish to deliver program guides and applications with full video services to HTML5 browsers. CableLabs and its members are developing requirements that will allow the full range of cable television services to be brought to HTML5 user agents that will exist on set-top-boxes, connected televisions, mobile devices and other rich media consumer devices. These requirements have been submitted to standards organizations such as Digital Living Network Alliance (DLNA) and W3C.

The goal of CableLabs and its members is that these requirements are met by the worldwide standards defined for the web. To that end, CableLabs is excited by the prospect of sharing the work it has done to characterize how the web can be used to deliver commercial television services to all manner of devices. An example of this sharing is the CableLabs proposal to the HTML5 WG for extensions to support home network interfaces. There is great interest in participating in the W3C Web+TV workshop to:

- Share requirements common to multi-program video providers worldwide.
- Better understand web video provider goals.
- Share and develop ideas for HTML5 and associated W3C standards evolution to best meet the goal of delivering television services to browsers and other connected IP video devices. As an example, CableLabs would like to share and discuss proposals for home network access by a browser and how HTML5 timed tracks and media multitrack API can be used to provide television services.

Web and North American Cable TV

February 9, 2011
Clarke Stevens c.stevens@cablelabs,com

CableLabs
...Revolutionizing Cable Technology

North America Cable Goal

- Support one web delivery platform for commercial video services across all devices including television, set-top-box, personal computer and mobile devices.

2

North American Cable TV and the Web: Gap Analysis

Requirement	W3C Capability
Remote user interface (RUI)	HTML5, 2D Context, WebGL, Web open fonts, Web storage, Web sockets, remote control key codes in DOM3
Content advisories, client ad insertion, subtitles, media associated applications	Timed Tracks
Content protection	No direct W3C impact. Defined as part of DLNA media format guidelines for HTML RUI platforms
Tailor RUI server behavior to client capabilities	HTML5 appears to provide features to cover these requirements
Alternate audio program	JavaScript API for a Multitrack Media Resource (Issue 152)
Home network content access	No existing W3C spec. Need discovery and media playback APIs

3

HTML5 WG Bug (11326) Identified HN Access Req

1. JavaScript API for discovering home network servers that host applications providing content serving, playback, user interface and other services.
2. JavaScript API for control of services found in the home network.
3. User agent support to determine platform support for content transport protocols, codecs and content protection capabilities.
4. Security against unauthorized access to home network services.

> HTML5-WG recommendation was to work with browser implementers. To that end, CableLabs has developed an implementation on WebKit and is interested in working with browser vendors on implementation.

4

CableLabs' Prototype Implementation

- Port existing UPnP stack (Cyber Garage)
- UPnP WebIDL API to expose UPnP stack to JavaScript applications
- JavaScript UPnP control point
  - Local content discovery and UI presentation
  - UI for control of over UPnP devices in the home
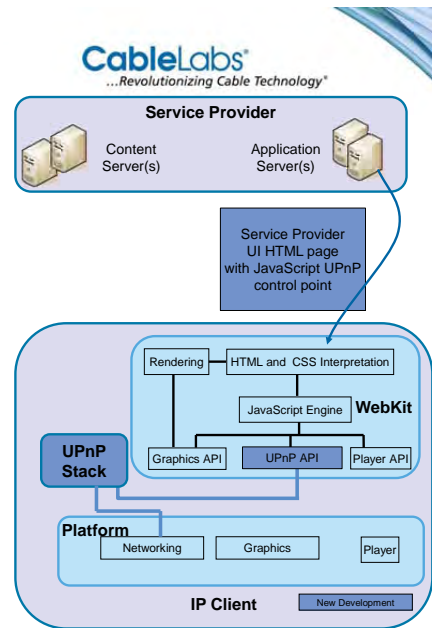
Service Provider

Content Server(s)   Application Server(s)

Service Provider UI HTML page with JavaScript UPnP control point

Rendering → HTML and CSS Interpretation

JavaScript Engine **WebKit**

UPnP Stack

Graphics API   UPnP API   Player API

Platform

Networking   Graphics   Player

IP Client   New Development

5

How It Works

Select a video to play and a player to play it on, then press "Play."

Select Video Aint No Rest For The Wicked

Select Player XBMC: Media Renderer (10.252.0.28)

Play   Pause   Stop

debug info

checking devices

Example HTML Application

- When the browser loads this HTML page, a JavaScript application on the client uses the developed API to search the home network for player devices and video sources with content.
- **Select Player** and **Select Video** causes a connection to be created from the source device containing the video to the player
- **Play, Pause** and **Stop** enable the RUI client to control playback from a remote device to another remote device.

6

Next Steps

- Work with browser vendors on implementation
  - Plan to open-source source working code under BSD-type license.
  - CableLabs is providing design information and source code it has created to interested browser vendors.
- Generalize for other home networking protocols
  - Currently working on generalizing for mDNS/DNS-SD (e.g. Bonjour)
- Need to address security
  - Be consistent with other Web services, e.g. geolocation and device API
  - User should "opt in" to allowing web page access to devices and content
    - Can an app discover devices
    - Can an app discover content (and which content)
    - Can an app play content

7

Informal Web and TV Workshop Poll

- Support HTML5 JavaScript API for selecting multiple audio/video tracks? (e.g. multi-track audio, etc.)

- Support W3C JavaScript API for local network device/service discovery?

Backup

9

Existing Implementation

- Clinkc UPnP stack (BSD like license)
- API implemented in WebKit
- API is defined using .idl file
- API is implemented with CyberGarage and Xerces libraries
- New JavaScript APIs are used to implement UPnP/DLNA
- Discovery control point implemented in HTML and JavaScript

UPnPCyberLink.idl
UPnPCyberLink.h UPnPCyberLink.cpp → Perl Processing → JSUPnPCyberLink.h JSUPnPCyberLink.cpp

JSUPnPCyberLinkCustom.h JSUPnPCyberLinkCustom.cpp → C++ Compiling

WebKit Code
Xerces Code
CyberLink Code → Linking

Remote User Interface
HTML Code → WebKit Browser
JavaScript Code

10
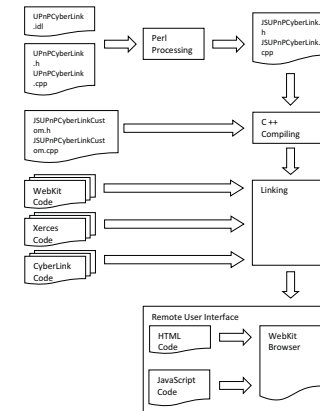
API Definition

.idl	UPnP	Zeroconf
Discovery		
Discover Devices	AutoIP	AutoIP
	Browse()/Search() to get device name, etc	mDNS name resolution
	DeviceAdded(); DeviceRemoved(); DeviceChanged()	mDNS; DNS Dynamic Update
Discover Services	Browse()/Search() to get services info for each device	DNS-SD to discover basic service info (device name, IP, domain, interface, service name & type)
	Service interfaces defined in UPnP and DLNA guidelines	Service interface discovery application specific
Service Control (Assign Methods & Attributes)	Device and service control defined by UPnP.	Device and service control vendor defined.
	New interfaces can be learned from XML (SOAP messages)	A priori information required.

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.idl Interface in WebKit

- Web interface definition language (IDL) used to define abstract interface
- Common abstracted interface can accommodate UPnP, Bonjour and other protocols
- IDL provides abstraction layer from source code language
- Development of common APIs will be interactive process

```
module core {
interface [
        DelegatingGetOwnPropertySlot,
        DelegatingPutFunction,
        CustomDeleteProperty,
        CustomGetPropertyNames,
        CustomDefineGetter,
        DelegatingPrototypePutFunction,
        CustomPrototypeDefineGetter,
    ] UPnPCyberLink {
        [Custom, V8OnInstance] void assign(in DOMString url);
        [Custom, V8OnInstance] void replace(in DOMString url);
        [Custom, V8OnInstance] void reload();

        // added UPnP functions
        [Custom] void myPlay(in int contentNumber, in int playerNumber);
        [Custom] void myPause(in int playerNumber);
        [Custom] void myStop(in int playerNumber);
        [Custom] void discoverDevices();
        [Custom] void deviceName(in int playerNumber);
        [Custom] void discoverContent();
        [Custom] void contentName(in int contentNumber);
        [Custom] void contentResource(in int contentNumber);

        // UPnP implementation attributes
        attribute [CustomSetter] DOMString numDevices;
        attribute [CustomSetter] DOMString deviceNumber;
        attribute [CustomSetter] DOMString isDevicesChanged;
        attribute [CustomSetter] DOMString numContentItems;
        attribute [CustomSetter] DOMString contentItem;
        attribute [CustomSetter] DOMString isContentChanged;

#if defined(LANGUAGE_JAVASCRIPT) && LANGUAGE_JAVASCRIPT
        [DontEnum, Custom, V8OnInstance, V8ReadOnly] DOMString toString();
#endif
    };
}
```

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Session 7
Accessibility

Name: Mark Magennis
Position: Director of the NCBI Centre for Inclusive Technology (CFIT), an initiative
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Tel: +353 1 882 1956

INTEREST
NCBI CFIT works on accessibility of web and TV, providing accessibility training,
auditing, user testing and general consultancy as well as doing campaigning and
advocacy work. We are active in the HTML5 and WAI Protocols and Formats WGs, are
currently developing a set of Universal Design guidelines for digital TV and are
involved in EU-funded research on the Universal Design of future ubiquitous internet
applications (web2.0, mobile and IPTV services).
We are interested in how the convergence of Web, TV and mobile technologies presents
opportunities for older people and people with disabilities, but also significant
threats of digital exclusion if designs fail to take account of their needs.

POINT OF VIEW
Universal digital inclusion is increasingly important for full social inclusion and
the wellbeing of individuals and of society as a whole. Use of the web and TV are
fast becoming essential for access to all aspects of life - employment, education,
information, entertainment, healthcare, shopping, social interaction and so on. The
Web/TV convergence will see a massive acceleration of this trend.
Older people and people with disabilities represent a large and increasing
proportion of society. For example, the UN estimates that by 2050 one in five people
worldwide will be over 60. In the EU, one in six (80 million) has a disability. The
proportion is usually higher in developing countries.
The switch from analogue to digital TV, and now the convergence of TV and Web,
brings more feature rich and therefore more complex interfaces, making usability and
accessibility more important but also more difficult to achieve. Many users of
Web/TV services will be new to web concepts, such as older people who until now have
been able to ignore the complications of the internet but have always relied on
television.
To maximise the user base for Web/TV services and to ensure full inclusion, it is
essential that Universal Design is put at the centre of all activities, including
the design of products and services and the development of standards.

SUGGESTIONS
There is a need to look at how Universal Design processes can be effectively adopted
and supported within the design and development of Web/TV products, services and
standards.
Designers of TV interfaces and content can benefit from learning about the
accessibility work that has been done on the Web. Designers of web-based services
can equally can benefit from the work that has been done on TV equipment
accessibility (remote control design, packaging, connectivity, etc.).
There is a good deal of legislation and regulation in the TV area already and it is
important to look at how this will apply to combined services and web content
accessed through TV.
There is a need to look at web/TV service requirements in their social context which
includes both communal living (for example where a family constitutes a single
'audience member' and includes one or more older persons or persons with
disabilities) and independent living (for example where a person with a disability
needs to have full unaided access to a service). Independent living will be a
particularly big future market, including remote monitoring, access to health
information, video telephony and other such services.

An important area to consider is how to develop cost effective and resource
efficient approaches to the production and delivery of essential audiovisual access
services - audio description for blind viewers, captions and sign language for deaf
viewers. HbbTV is attractive in this respect.

INCLUSIVE WEB/TV SERVICES

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WHAT AM I DOING HERE?

I'm a **Digital Inclusion** person

I'm a Web & TV **accessibility** person

NEED FOR INCLUSIVE WEB & TV SERVICES

EU: 1 in 6 has a disability

UN: 1 in 5 over 60 worldwide by 2050

Complex, feature-rich user interfaces

Unfamiliar to non-internet users

REQUIREMENTS: TV EQUIPMENT

Video demonstration of talking set top box
Go to www.youtube.com/watch?
v=OUEq7CDFxnE

REQUIREMENTS: TV CONTENT

Access Services

Captions (subtitles for deaf)
Sign language
Audio description

AUDIO DESCRIPTION

Example audio described DVD clip
"I Bought a Vampire Motorcycle"

Go to www.youtube.com/watch?
v=i2VXp0s0BLw&feature=related

WARNING: Contains strong language
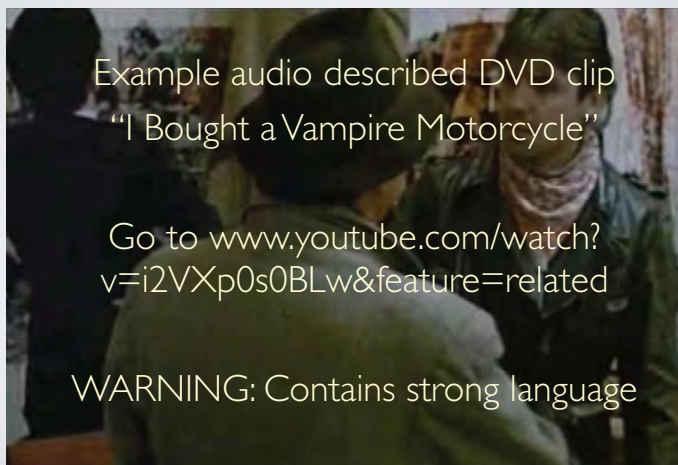
REQUIREMENTS: WEB SERVICES

Accessible web app user interface example
ODI media player at http://odi.dwp.gov.uk/player

REQUIREMENTS: TV INTERFACES

10 foot **inclusive** user interface

REGULATORY PRESSURE FOR DIGITAL INCLUSION

US: 21st Century Communications and Video Accessibility Act

EC: 2012 e-accessibility legislation plans

UN: Convention on the Rights of Persons with Disabilities

REGULATORY PRESSURE FOR DIGITAL INCLUSION

Legal and regulatory environments for Web/TV increasingly emphasise inclusion

STANDARDS: WEB

WCAG 2.0: Web Content Accessibility Guidelines (W3C WAI)

Technology independent
Could be applied to Web on TV, apps in general

STANDARDS: TV

IEC/ETSI: DVB access service delivery

ITC: Access services content and presentation

IEC: Text-To-Speech for DTV receivers

UK DTG D-Book: Remote controls, etc.

WHAT NEXT?
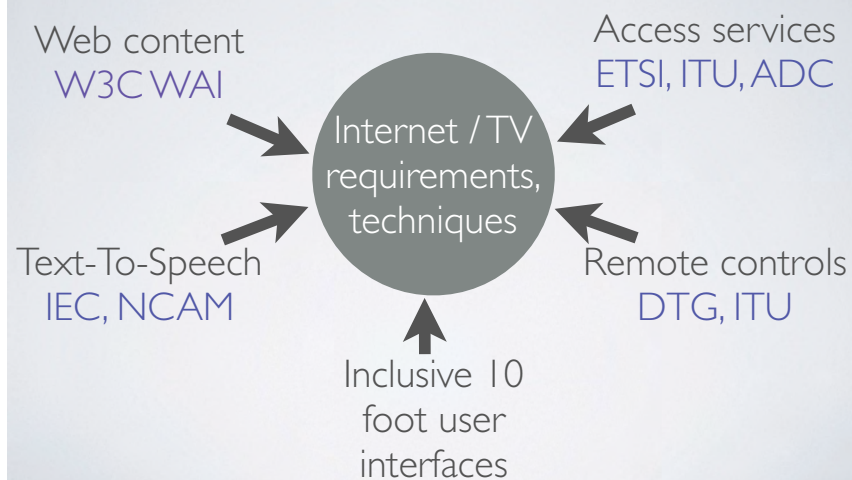
Web content
W3C WAI

Access services
ETSI, ITU, ADC

Internet / TV requirements, techniques

Text-To-Speech
IEC, NCAM

Remote controls
DTG, ITU

Inclusive 10 foot user interfaces

INCLUSIVE WEB/TV SERVICES

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GUIDE - Adaptive User Interfaces for Accessible Hybrid TV Applications

- A Position Paper for the Second W3C Web and TV workshop -

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Introduction

During the past years digital TV as a media consumption platform has more and more turned from a simple receiver and presenter of broadcast signals to an interactive and personalized media terminal, with access to traditional broadcast as well as internet-based services. Currently available TV panels offer integrated digital processing platforms, with access to standardized hybrid Web+TV (or Hybrid TV) portals (e.g. HbbTV [Mer10]). These portals do not only offer access to the internet and legacy web services (like web browser or proprietary portal views on YouTube, Flickr, FaceBook, etc.), but also specify content services that are immediately coupled to broadcast content that is rendered on the terminal device.

At the same time it is recognized that some user groups like disabled or elderly people still face problems when using the above mentioned services. Approximately half of the elderly people over 55 suffer from some kind of functional limitations or impairments (vision, hearing, motor and/or cognitive) [Arc08]. For them interaction, especially with PCs or other consumer electronics devices is sometimes challenging, although accessible ICT applications could make much of a difference for their living quality. They have the potential to enable or simplify participation and inclusion in their surrounding private and professional communities.

However, the availability of accessible user interfaces being capable to adapt to the specific needs and requirements of users with individual impairments is very limited. Although there are a number of APIs available for various operating systems (e.g. in Qt, Android, Windows) or application platforms (e.g. WAI-ARIA [Wai10] in web browsers, or Flash) that allow developers to provide accessibility features within their applications, today none of them offers features for automatic adaptation of multi-modal interfaces, being capable to automatically fit to the individual requirements of users with different kinds of impairments. Moreover, the provision of accessible user interfaces is still expensive and risky for application developers, as they need special experience and effort for user tests. Many implementations simply neglect the needs of elderly people locking out a large portion of their potential users.

Challenges

The area of digital TV broadcasting and related web-based services is growing fast, with the potential to serve billions of standard TV users and from now on also the web-savvy audience. It involves various stakeholders that together make possible innovation in the field. When trying to evolve and promote accessibility technology in the area of digital hybrid TV, it is necessary to bring together all people involved, and to understand their current requirements and roadmaps. Especially the developers (application developers, STB-/connected TV platform manufacturers, accessibility framework developers, software framework / middleware developers, web browser developers, service operators,

broadcasters) have to be integrated in this process. Since standardisation is crucial for wide uptake of accessibility solutions, a strong involvement of standardisation bodies (like W3C, ETSI, EBU, ITU, CENELEC, etc.) is also crucial for success. These entities can provide information on existing standards and guidelines, and support (pre-) standardisation in industry- or research consortia.

Most developers in the field are still not aware of software accessibility in general. There exist many accessibility software frameworks, that could already be integrated or used from within applications or software/hardware platforms, but they are only available for specific operating systems or specific middleware. Adding accessibility features to applications is still often perceived as "too expensive" and "too time-consuming" by developers and companies.

Further, most companies often do not have any expertise in user-centred design. They lack of resources to employ user design experts or maintain dedicated testing facilities, where test with real users can be conducted. In case of disabled users or elderly users with ageing-related impairments, there is the additional problem of user heterogeneity. Users can have various kinds and combinations of disabilities or impairments, at different levels. This makes it even more complicated when trying to cover at least the most important user sub groups.

An efficient alternative to testing with real users is exploitation of guidelines and best practices in the development process. There are many accessibility guidelines available for various application domains like for example communication services or access to web applications [Wca08]. Again, the general the problem seems to be that most developers are either not well-educated in user-centred design and are not aware of existing guidelines and documentation.

Nowadays there exist a multitude of user interface components that media consumers can use to control and navigate. Most classical devices like keyboard, mouse for PC and remote control for TV have been comprehensively evaluated and evolved over the years in their specific domain, but now are used in a completely different setup. For most users it is not acceptable to use a keyboard/mouse in front of the TV and to navigate in a standard web environment (e.g. browser + web page) with a remote control. Further, the classic input devices are today joined by new human machine interface technologies like speech control, speech synthesis, gesture & free-hands control, (multi-) touch or gyroscopic remote controls. This makes it more complicated at first for the developers, as they have to properly employ the UI technologies in their applications, and secondly for the end users, which have to become acquainted with it.

From the perspective of hardware platforms, different developments have to be considered. At first there are many dedicated set top boxes on the market, providing various kinds of applications and services (e.g. broadcast receiver, video on demand, games, hybrid TV). On the other hand, a trend of further integration can be seen on the side of the TV panel. Nowadays, TV panels have embedded processing platforms that can handle stream decoding, device configuration, user interface rendering, content management, web applications, etc. Obviously, it is also a matter of competition, as the TV panel manufacturers claim to provide all services on their own, and customers usually prefer to have all-in-one solutions, not making necessary further devices and extensions. A third aspect of hardware development is the nowadays increasing availability of server-side data-, computing- and service-provision (cloud computing). It is not yet clear, which services will in the future go into the cloud, due to high processing requirements, and which services will remain on the end user terminal. All these aspects have to be considered, when designing adaptive accessibility and user interface technology on Hybrid TV platforms.

Current Research

The challenge of accessible (hybrid) TV applications is nowadays addressed in various European research initiatives. Currently, the projects GUIDE [Gui10] and MyUI [My10] focus on the approach of adaptive user interfaces that consider capabilities of elderly or disabled users and automatically integrate and configure multi-modal interface technology with a suitable parameterisation. Of course

there are many other projects active in the area of eInclusion and eAccessibility for elderly people, like for example WAI-AGE (Dissemination of accessibility, standard harmonisation, education), DTV4ALL (Subtitles, audio description, audio subtitling and signing services), eACCESS+ (Web accessibility, self-service terminals, deployment of eAccessibility, stakeholder cooperation, etc.), eSeniors or CANVAS.

In this position paper we want to describe some ongoing research activities more in detail, while putting focus on the GUIDE project. The GUIDE ("Gentle user interfaces for elderly people") [Gui10] project follows the approach of adaptive multimodal user interfaces that can automatically adapt to the needs and preferences of elderly users with different kinds of mild ageing-related impairments (hearing, vision, motor, cognitive). As application and service platform, GUIDE puts a dedicated focus on connected TVs and set top boxes.

In order to support developers of hybrid TV applications, GUIDE will develop a software framework and application design tools that will allow developers to integrate advanced accessibility features into their applications with reduced development risk and costs, and without making necessary comprehensive tests with real users.

The GUIDE framework shall support the developer during application runtime. The GUIDE framework is basically an accessibility runtime. The central entity of the GUIDE framework, the GUIDE core, is the central logic in the GUIDE framework and fulfils several purposes. It is based on PERSONA [Fid08] framework technology and allows integrating various state of the art interface technologies such as visual gesture control, speech input and output, adaptive audio visual rendering or avatars. Further, the GUIDE core performs all kinds of multimodal adaptation of interface technologies, ranging from proper selection of a suitable mix of devices to personalized parameterisation. The GUIDE framework will be released as an open source framework that can be deployed on STBs and connected TV platforms by the manufacturers. It can be integrated with native application environments (C/C++), managed (JAVA, Flash) as well as browser-based (HTML, JavaScript) applications. In terms of standardised application environments, especially the HbbTV [Mer10] specification shall be supported. Not as a requirement for the GUIDE framework, but as a compatible environment. Applications and software frameworks can access GUIDE framework services via dedicated protocols and API specification. The goal is to make framework integration as efficient as possible, avoiding to affect the current development processes.

The GUIDE tool box will support the developers in the phase of designing and developing the application. Besides documentation and a comprehensive set of user interface (UI) components (like speech recognition, gesture control, etc.), the toolbox is based on a user simulation software. The simulator is for example able to render a view on the user interface for the developer, as it would be perceived by an elderly user with a specific impairment configuration. The developer can make modifications in order to optimize the user interface. The simulator allows simulating user interface perception for various groups of elderly users or impairment configurations. In order to provide developers with knowledge about user-centred design, the GUIDE toolbox will also contain guidelines for accessible hybrid TV applications and multi-modal user interface technology integration. These guidelines will be based on existing recommendations (e.g. by W3C-WAI [Wai10]), but also extend these to sufficiently cover the specific environment of TV applications and the requirements of elderly users.

The simulation tool and the multimodal adaptation layer of GUIDE will be based on a new user model that is being developed in the project. This model will describe the different impairments (vision, hearing, motor, cognitive) and combinations, and allow inference in order to adapt parameters of the user interface, analyze the user context and predict user behaviour. The GUIDE project is closely cooperating with related projects in the area of user modelling, to identify synergies and to prepare a common standard for user models. The European VUMS cluster (Virtual User Modelling & Simulation) has been established for this purpose and consists of the projects GUIDE, MyUI, VICON and VERITAS [Vum10].

The approach of user modelling and simulation in GUIDE [BisLan10] considers aspect like vision, motor capabilities or cognitive state of the user, and it is based on comprehensive testing with real elderly users [LaGoBi10]. In various interview, focus groups and surveys the needs and preferences of elderly users have been investigated, in order to extract the requirements for multi-modal adaptation, and to generate knowledge for the targeted developer guidelines. In the additional user trials, elderly impaired users test GUIDE UI mock-ups and application prototypes, or respond to simulated visualisations of the targeted multi-modal user interfaces. A central element of the trials is a dedicated user test application, which performs various multi-modal tests with the user, to estimate parameters of his impairment configuration, and to derive the user profile. Later this application will be integrated in the GUIDE framework, to allow application developers to easily integrate an initialisation step.

Once the initial user profile is known from the user enrolment (or initialisation) procedure, multi-modal adaptation of the user interface can be performed (see figure below).
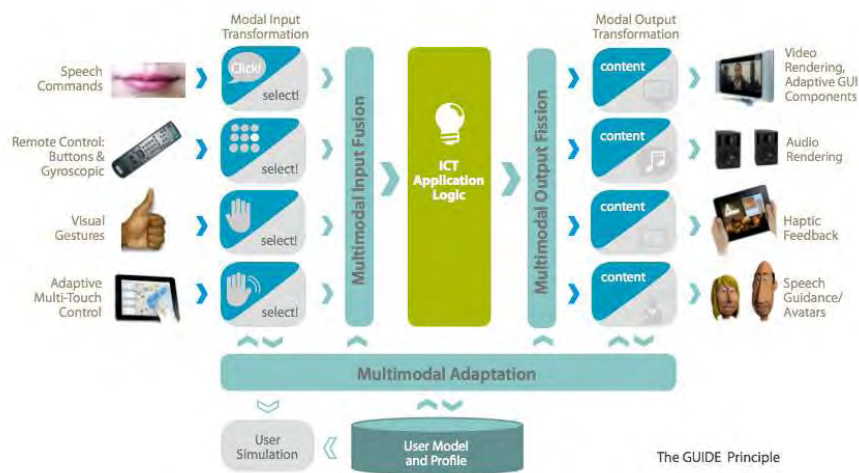
Figure 1: GUIDE approach to user interface integration and multi-modal adaptation.

Multi-modal adaptation of user interfaces in GUIDE considers both static as well as dynamic adaptation. Static adaptation mostly refers to selecting a previously defined user interface profile that is most suitable for the identified user group (or group of impairments). Dynamic adaptation also considers adaptation of the initial profile to the individual user, and also adaptation of user input in real-time (e.g. cursor smoothing for users with tremor).

Conclusion

Although hybrid TV services and applications have been on the horizon for the past 20 years, and now gradually become reality in the user's homes, there is a lot of work to be done, both in the industrial and the research area. Applications, user interfaces and platforms are not yet able to automatically adapt to the preferences, limitations and context of their users. This is especially the case for disabled and elderly users.

Considering the current situation described in this position paper, we can summarize the following statements.

- *Accessibility as a business opportunity:* The industry has to recognize that users with impairments are market-relevant user groups, generating corresponding revenue when enabling access to services and products. This is especially true for the growing group of elderly citizens.

- *Joint efforts:* All stakeholders from industry, research and public authorities have to collaborate effectively to remove the current barriers in development of accessibility.
- *Guidelines:* Currently there are already many guidelines and best practices available, offered by most of the standardisation bodies. Although the guidelines are already partly relevant (due to being designed for classic web content), but they have to be disseminated and accepted in the industry, and they have to be evaluated, maintained and extended by current research initiatives.
- *Dissemination & education:* Knowledge about users and user-centric design is available, but not yet sufficiently processed by research and standardisation bodies. It is necessary to make knowledge about user-centric design more recognized among developers in the industry.
- *Smart user interfaces:* Automatic adaptation of user interfaces has the potential to not simplify development of accessible applications, but making applications accessible to a heterogeneous group of users, with enormous variations in impairment levels and combinations. Adaptive user interfaces can be especially useful, where other Design-For-All approaches are limited. More research has to be funded in this area, as most problems are not yet solved, and basic questions on the further evolution of the platforms have not been answered.
- *Open Source:* Accessibility software frameworks have to be open source and freely available, to ensure wide uptake and efficient integration by the industry.

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[Qta10]   "Accessibility in Qt", http://doc.qt.nokia.com/qq/qq24-accessibility.html, 2010

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[Wca08]   Web Content Accessibility Guidelines (WCAG) 2.0, W3C Recommendation 11 Dec 2008

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GUIDE –
Adaptive Accessibility for
Web&TV Platforms

www.guide-project.eu

Christoph Jung, Fraunhofer IGD

christoph.jung@igd.fraunhofer.de

GUIDE project

- European research project
- Started February 2010

  33%
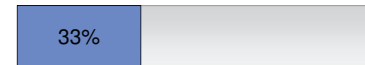
- Status:
  - User trials
  - Early technology prototypes
  - Requirements engineering and design

UNIVERSITY OF CAMBRIDGE

technicolor

Centro de Computação Gráfica

Fraunhofer IGD
(Project Coordinator)

ingema

UNIVERSIDADE DE LISBOA

vsonix

2   W3C Workshop Web & TV - Christoph Jung (Fraunhofer IGD)

Why do we need GUIDE?

- Inclusion of growing elderly society
- Impairments

- Web & TV
- User interface technology

- Application/service developers
- Platform providers

3   W3C Workshop Web & TV - Christoph Jung (Fraunhofer IGD)

Gaps

- Main gaps
  1. Elderly users have problems using TV-related applications and services.
  2. Lack of awareness and acceptance of accessibility in the industry.
  3. User-centred design is costly and time-consuming, due to user involvement.
  4. Accessibility APIs and assistive technologies are there, but not performing automatic adaptation to the user.
  5. Existing design guidelines may not fully cover Web&TV application scenarios and multi-modal interaction design.

4   W3C Workshop Web & TV - Christoph Jung (Fraunhofer IGD)

How can GUIDE help?

- User-centred design
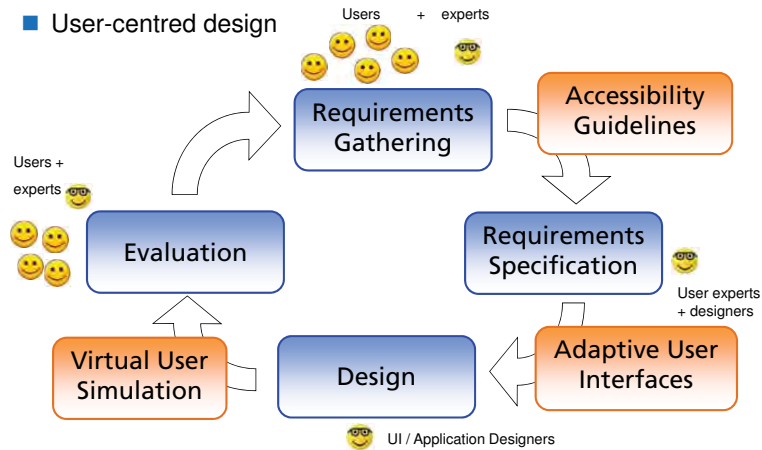
Users + experts

Requirements Gathering

Accessibility Guidelines

Users + experts

Evaluation

Requirements Specification

User experts + designers

Virtual User Simulation

Design

Adaptive User Interfaces

UI / Application Designers

GUIDE at all stages

1	2	3	4
In GUIDE:	**At design time:**	**On first usage:**	**During run-time:**
User trials, user modeling, requirements engineering	Design guidelines, User simulation	User initialisation	Adaptation

GUIDE at all stages

1	2	3	4
In GUIDE:	**At design time:**	**On first usage:**	**During run-time:**
User trials, user modeling, requirements engineering	Design guidelines, User simulation	User initialisation	Adaptation
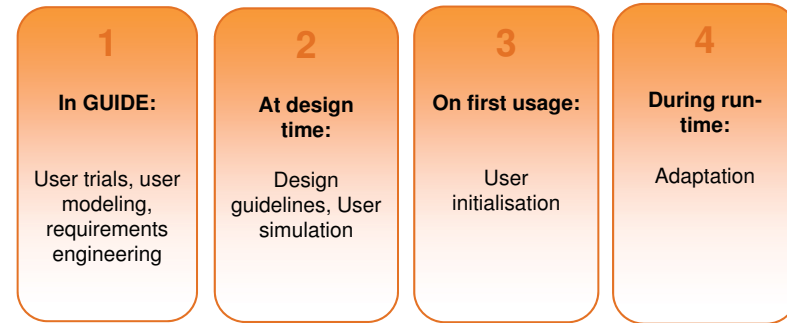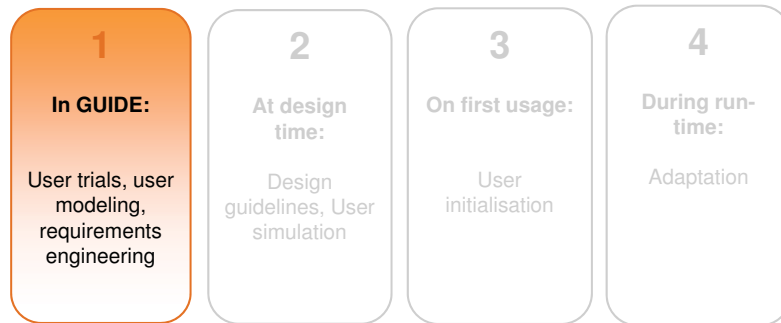
GUIDE at all stages

- **1) In the project:**
  - User trials/studies with elderly end users

User tests
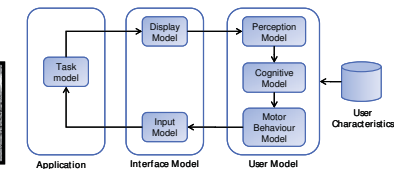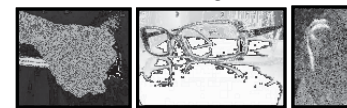
Focus groups (illustr.)

User interface mock-ups

- User modelling

Task model

Display Model

Perception Model

Cognitive Model

Input Model

Motor Behaviour Model

User Characteristics

Application Model

Interface Model

User Model

Slide 9

GUIDE at all stages

1	2	3	4
In GUIDE:	**At design time:**	**On first usage:**	**During run-time:**
User trials, user modeling, requirements engineering	Design guidelines, User simulation	User initialisation	Adaptation

Slide 10
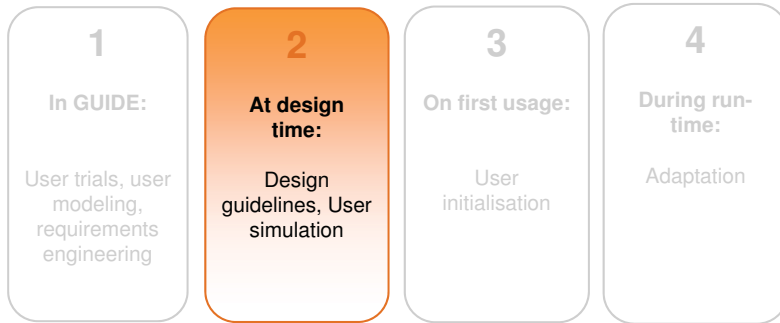
GUIDE at all stages

- **2) At design time**
  - User simulation: Renders UI with simulated impairments (vision, hearing, …)

Normal view — Simulated view (Wet Maccular Degeneration) — Simulated viewing trajectories

  - GUIDE "Handbook": Web repository of knowledge, guidelines, documentation, …

Slide 11

GUIDE at all stages

1	2	3	4
In GUIDE:	**At design time:**	**On first usage:**	**During run-time:**
User trials, user modeling, requirements engineering	Design guidelines, User simulation	User initialisation	Adaptation

Slide 12
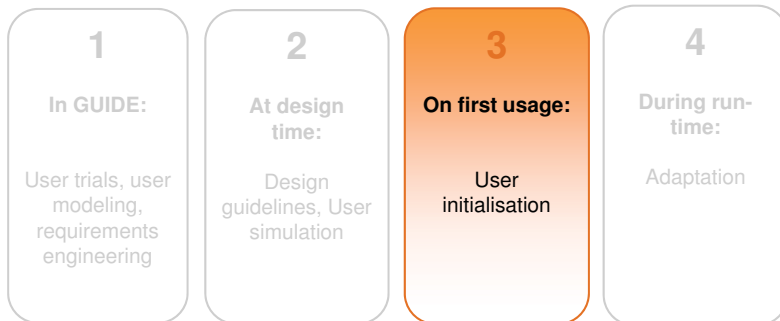
GUIDE at all stages

- 3) On first usage
  - User initialisation: Measure user capabilities & perferences
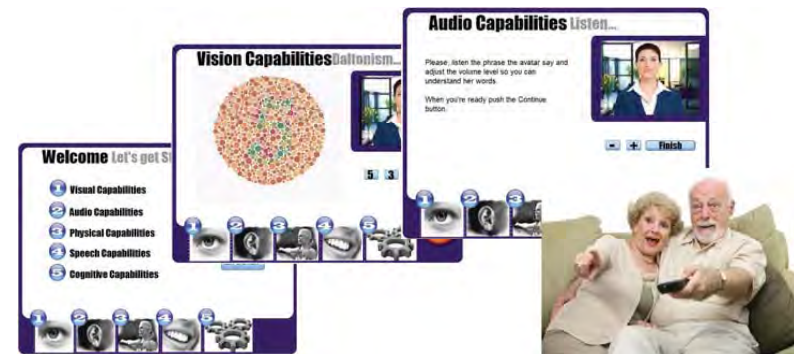
GUIDE at all stages

1	2	3	4
In GUIDE: User trials, user modeling, requirements engineering	**At design time:** Design guidelines, User simulation	**On first usage:** User initialisation	**During run-time:** Adaptation
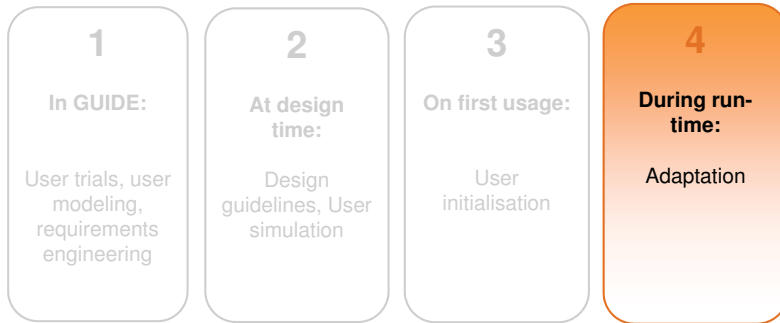
GUIDE at all stages

- 4) During run-time
  - Multi-modal adaptation as open source software framework
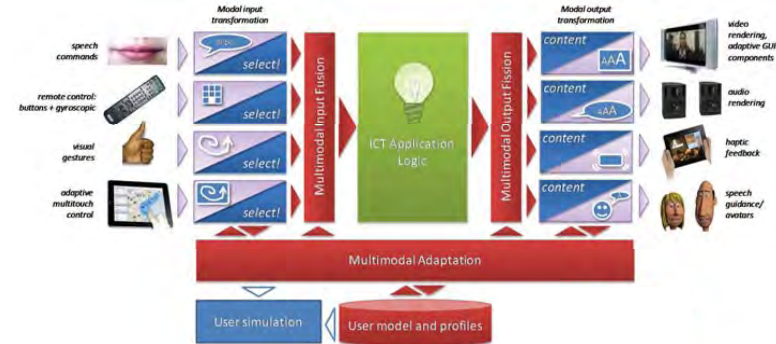
(Web-)Technology in GUIDE

- TV set top box by partner Technicolor
- Browser as application environment
  → Opera
- GUIDE adaptive software framework to be deployed on platform
- „Seamless" integration in existing dev processes
  - Link UIs<->Framework: UI Mark-up?
  - Link Web editor<-> Simulator
- Applications: Video conferencing, Home Automation, Content access, Tele-Learning
  - Evaluation
  - Developers tutorials & examples

Standards in GUIDE

- GUIDE Framework
  - Compliance to existing and emerging standards (HbbTV, HTML 5, etc.)
- Design guidelines
  - We have efforts allocated and are willing to generate pre-standardisation input!
  - On-going discussions with W3C-WAI
- User modeling
  - Cooperation with other European projects in the VUMS cluster (Virtual User Modelling & Simulation): http://www.vums-cluster.eu/
  - Standardisation of user models
  - Standardisation of user data and corresponding meta-data formats

What has to be done?

- Accessibility in industry
  - Dissemination: Awareness, comprehension, acceptance
  - Progress on guidelines (e.g. WCAG): Extensions, evaluations, …?
- Industry roadmap on platforms
  - Server-side vs. client processing?
  - Application/service environments?
- Web technology
  - Progress on standards ("HbbTV++", HTML 5, WAI-ARIA, …)
  - Clear roles/responsibilities of browsers, APIs, UIs, assistive technologies
- Applications
  - Identify and specify future application scenarios (N-Screen, Social TV, AAL, Seamless access, …)
  - Leverage adaptive accessibility in non-accessible technology & vice-versa
- Research
  - Advanced UI / applications semantics, meta data
  - Smart accessibility: Adaptation, personalisation, user modelling
  - Virtual users & simulation: Automatic testing & evaluation of UIs
  - Cloud-based ("server-side") accessibility services

Thank you!

Christoph Jung
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Session 8
Profiling / Testing

Intel's Interest in W3C Web on TV Workshop

Narm Gadiraju
Systems Architect, Digital Home Group, Intel Corporation

Participant's interest

Intel Corporation, a world leader in silicon innovation, develops technologies, products and initiatives to continually advance how people work and live. As a participating member of the consumer electronics (CE) ecosystem, Intel is interested in helping CE OEMs, content providers and service providers to bring the richness of the Internet to Television. In support of that goal, Intel is working with industry leaders to enable Smart TV experiences that go far beyond traditional Internet-connected consumer electronics devices. Smart TV helps consumers enjoy a virtually limitless array of Internet content, broadcast programming, personal media and a range of applications, all available on a single TV screen. From a silicon perspective, Intel has developed a line of system-on-a-chip (SoC) products targeted to digital TVs, optical media players and advanced set-top boxes, all of which are optimized for bringing internet content and applications to TV. Intel is interested in collaboratively working in the W3C to enable web standards that will accelerate the market adoption of a truly connected, immersive and 'smart' TV experience.

As a supplier of silicon products to both the IT and CE industry, Intel brings an exclusive viewpoint and technical competence in developing, enabling, and promoting robust platforms for the environments that W3C's future TV group is targeting. In W3C, Intel already participates in a number of HTML related Working Groups, such as the HTML WG, the Web Applications WG and the Device API and Policy WG. Furthermore, Intel is planning on participating in the TV WG upon formation and is very interested in any follow-on W3C efforts concerning web standards for TVs stemming from these workshops.

Point of View

The HTML5 suite of specifications creates exciting new opportunities to bring the power and opportunities of the Web to new devices. Intel is appreciative of the W3C's efforts in organizing this series of workshops on the Web on TV. The timing is perfect for the industry to collaborate on what's needed to bring the Web's potential to TV.

W3C has done an excellent job of meeting the needs for a wide variety of devices in its recommendations. The success of HTML5 in phones is a testament to being able to define specifications that work from phones to desktop computers. It is our belief that the best approach to a consistent web experience across multiple types of devices is to avoid

fracturing the web based on device type, but instead to meet requirements in a common specification. However, to accomplish this, there must be an awareness of the needs of different communities and potentially work specific to those communities. W3C working groups are the right places for that work to happen for the HTML space. Since we do not have a TV WG yet, the workshops and Interest Group appear to be an excellent place to start.

In the TV space, there are other industry efforts such as DLNA that depend on W3C specifications for defining rich TV user experiences. So to support this rich echo-system of standards W3C should address TV requirements for Web in these workshops until a dedicated TV WG is formed. A critical issue here is timing and the ability for other standards organizations to reference the key new HTML5 work. Many parts of the HTML5 suite are mature and are implemented fairly widely, but final specifications will take considerable time for test suite development. The model of early implementation of firmed up sections of drafts that has been so impressive in HTML5 presents challenges for use by other organizations. This is an area W3C should look into to avoid missed opportunities as other organizations need to make decisions about their own profiles and specifications.

Another important area that the future W3C TV WG should address is compliance to HTML specification. Unlike PC, in the TV space, the end user experiences must be smooth, predictable and showing errors on the screen is not acceptable. In order to develop Web Applications for TV with such stringent requirements, TV device's implementation of the browser must guarantee strict adherence to the HTML specification. We believe that such strict compliance could be accomplished effectively through a certification program developed by W3C.

Suggestions

We look forward to participating in the Workshops to explore and define next steps which are appropriate for the connected TV community and to explain Intel's vision of Smart TV. At a minimum, we see the need to establish a new group in W3C to continue the discussions after the Workshops. The formation of the TV Interest Group is a good start to examine issues of mutual interest for TV web standards and to help define potential actions for the various relevant W3C Working Groups. Other possibilities include a Web on TV Best Practices WG similar to the Mobile Best Practices WG or, if there are specific topics that need further exploration, incubator groups to further those narrowly defined efforts. In closing, we hope the result of these Workshops is the creation of a place in W3C for those with interest to help shape Web standards to make TV another vibrant part of the Web community.

Profiling, Testing and Certification

Narm Gadiraju
Intel Corp

1

Need for a TV Profile

- TV Profile
  - Set of HTML5, CSS, JavaScript features needed to create compelling TV User Experiences

- Current W3C Spec development focus has been:
  - PC, Smart-Phone, and Tablets
  - Single User Browsing and Interaction Model
  - 2ft User Interface with Keyboard, Mouse, Touch interfaces
  - Users are used to PC browsing experience, multiple windows and tabs, small fonts, downloading plugins, popup windows, bidirectional internet connectivity

- Need to consider TV viewing and browsing experience
  - 10ft User Interface and multiple users enjoying the TV experience
    - 10ft browsing and UI navigation pose new challenges
  - Limited capabilities of interacting devices, Remote Control
  - New interacting devices - Game Consoles, Smart-phones, Tablets
  - Service Provider and Content Providers UI requirements

2

Need for a TV Profile

- New Applications add new requirements
  - Watching free, premium content from Internet, IPTV
  - Advanced broadcasting usages in Japan
  - Social interaction – Video Telephony, SMS
  - Share and Enjoy content from other content sources (DLNA) from home
  - Remoted UI from other devices
    Web applications, App Store Support, Widgets

- Other Considerations
  - HTML5 only is not enough, need CSS, JavaScript available for application development
  - Other standards bodies that implement HTML technologies require TV profile from W3C – for example DLNA

3

Testing

- Test Suite Development
  - Need to happen along with Profile Development
  - Member Companies contribute tests
    - tests need to be freely available and royalty free
- Test Coverage
  - TV profile features
- Refine test suite during TV profile development
  - Test Suite regressions
  - Provide feedback to W3C (test logs, bug reports)
- Mature Test Suite to serve as a Certification Test Bed

4

Certification

- **Benefits of Certification**
  - Device Vendors
    - Advertise Enhanced Product Value to Consumers
    - Provide Application Developers a known base for creation of Web Applications
  - Users
    - Confidence that the device is capable of supporting their Web Applications
  - Software Developers
    - Enables Application Portability through a defined platform for TV centric Web Applications
    - Limits standards fragmentation
  - Service Providers
    - Deploy applications to different TVs, Enable App Stores

5

Certification

- Challenges
  - Developing a Compliance Program is not trivial
    - However industry cost of contributing to W3C test suite development is likely to be less than the cost of supporting untested and inconsistent implementations of W3C standards
    - Make test suite development part of TV Profile Development effort
  - Additional Overhead of Certification to Device Vendors
  - Administering Certification Program is an Overhead to W3C

- Suggestion
  - Keep it simple
  - Consider Self Certification
    - W3C to make the Certification Test Bed accessible to all vendors
    - Device Vendors run the W3C Cert Test Suite for Device under test
    - Submit test log to W3C for approval
    - W3C examines the test log and approves the Device

6

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sense and simplicity

Retail TV Products and the Need for a Stable Profile of Web Technologies

Jon Piesing
Philips Research
February 9, 2011

PHILIPS

Summary

- TV business models
- Focus of this presentation
- Consequences of business models on software updates
- Stable specifications
- Test suites, materials, ...
- Suggestions

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TV Business Models

- Many different business models for TV – all successful in their own way
  - No winner or loser
- Classical "vertical" pay TV
  - Operator defines specification for receivers, buys receivers from manufacturers and leases them to consumers
  - Typically subscription based
- "horizontal" retail TV
  - Industry defines specification for receivers
  - Manufacturers implement industry specification at their own risk
  - Typically no subscription
- "diagonal" models
  - May be specified by operator or partly by industry & partly by operator
  - Receivers purchased in retail with subsidy or cash-back by operator
  - Many variations on this theme

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Focus of this Presentation

- Focus of this presentation is "horizontal" retail TV and the unique requirements of that model
- In a purely horizontal model:
  - There's no network operator in charge to make the key decisions
  - The manufacturer gets income once when the consumer buys the TV and that's it
    - No revenue to the manufacturer after sale
  - Consumers own the device
    - May impose limits on what can be done by software updates
  - Typically no contract between consumer and service providers
    - User agreement (e.g. that particular applications are trusted) has to be obtained in other ways

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PHILIPS

Consequences of Business Models on Software Updates

- One place this has a big impact is software updates
  - All these devices have the potential for software updates
  - Software updates cost – payments to suppliers, integration, testing and distribution
- Even if suppliers provide updates for free & distribution is via internet, integration and testing have to be funded
  - In a horizontal retail model, that has to come from the income at the time of purchase
  - Software updates are typically limited to fixing critical bugs
- The business model won't support (say) 3-4 software updates per year for the (7-year) lifetime of a TV set
- It's not unique to TV - how many of today's Android 2.2 tablets will get upgraded more than 1 android version?

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Stable Specifications

- If devices will only be updated to fix bugs then stable specifications are very important
- If specifications change then the devices you sell today become tomorrow's legacy problem!
- Sometimes there's a very hard choice;
  - Reference something which is formally work in progress or
  - Invent your own solution or
  - Don't have the feature
  - If the market requires a feature then the last of these isn't an option
- Known issues include
  - HTML5 (media tags, cross document messaging, …)
  - Widgets
  - Specifications from UK DTG CTV – CSS3, Web notifications, ...
  - Cross-origin resource sharing

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Test Suites, Materials, ...

- Test pages, streams, files & other materials are an important aspect to achieving stable specifications
  - Both for informal testing by implementers and as part of certification programs in order to obtain a logo or trademark
- If different downstream specifications that are choosing from the W3C toolbox make their own test pages (etc.) this is;
  - A big waste of effort
  - A problem for implementers addressing >1 of downstream spec
- In our opinion, most relevant are:
  - aspects of HTML 5 which were not in HTML 4 or which have changed from HTML 4
  - CSS3 2D and 3D
    - Both functional correctness and minimum performance need to be addressed
    - Content developers need to be able to rely on a minimum level of performance when creating their services
- Integration of existing test materials into test automation frameworks may also be interesting

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Suggestions

- Organisations will be making selections from newer W3C specifications for TV and related markets
  - Like CEA did in CEA-2014 for the older W3C specifications
  - Having the W3C more aware of what's being selected could inform both sides and result in better, safer and more stable selections
- Co-operation on test materials should be explored
  - Developing and/or validating test materials for newer technologies
  - Integration of existing test materials into test automation frameworks
- A lot of work has already been done in device APIs for TV (e.g. OIPF)
  - Any W3C work in this field should build on these specifications (and test specifications / materials) rather than duplicating it
  - Consider if submitting some/all of the OIPF JavaScript APIs to W3C would be useful or just a waste of everyone's time
    - Perhaps some of the JavaScript APIs presented by Ericsson could also be used with the <video> object?

Background

W3C Work in Progress Referenced by OIPF

- W3C, "CSS Backgrounds and Borders Module Level 3", Working Draft 10 September 2008.
  - Used for border-*-radius
- W3C, "HTML5 - A vocabulary and associated APIs for HTML and XHTML, Working Draft 25 August 2009"
  - Used for cross document messaging and media tags
- Widgets
  - W3C, "Widgets 1.0: Access Requests Policy", Last Call Working Draft, 8 December 2009
  - "Widgets 1.0: Widget Interface", Candidate Recommendation, 22 December 2009
  - "Widgets 1.0: Digital Signature", Candidate Recommendation, 25 June 2009
  - W3C, "Widgets 1.0: Packaging and Configuration", Candidate Recommendation, 1 December 2009
  - W3C, "Web-Storage", Last Call Working Draft 22 December 2009

Conclusion
Wrap-Up, Next Steps, and Action Items

LG position paper to 2nd Workshop

HJ Lee, LG Electronics

LG is interested in W3C for getting single royalty free easy implementable solution for Smart TV business. We explained the pros and cons and showed general interest last Tokyo workshop.
To expedite and actively participate in this activity, we would like to be more specific at this workshop.

Regarding Web TV standards, CE industry has already discussed on various aspects very deeply outside W3C. CEA and ATSC in US, DVB, HbbTV and OIPF in Europe. W3C is rather late comer for the specific topic.

We already launched so called Web TV or Broadband TV or Smart TV, whatever it may be called and it's evolving very fast based on web standard or proprietary solution. Because of this fast evolution attribute, the success of this activity is a matter of time, not the matter of technical expertise to make advanced one. After successful baseline profiling to prevent fragmentation, further technical advancement could be accomplished.

For this purpose, LG has priorities for this activity.

1st :   Video application on HTTP adaptive streaming and DRM at HTML5 video tag.
2nd :   Interaction TV and other devices by extending javascript API in browser embedding object.
3rd : TV profiling for HTML tag, CSS attributes, javascript API.
4th : Security consideration of web technology that is vulnerable to malicious attack. (TV is the most stable device)
5th : Make a good developer guide for contents providers who are willing to give theirs on TV screen.

Setting Priorities and Next Steps
- from TV makers point of view

HJ Lee / LG Electronics

1

LG전자

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1. Historical Background

Web was introduced to the TV world 10 years ago.
Since then, we have gone through a lot of trial and error.
WebTV, Internet TV, Connected TV, Net TV, Apple TV, Yahoo TV, Google TV, Smart TV

TV makers have learned that trying to fit a PC into a TV set does not work.

PC	TV
Interactive, Active	Lazy, Passive Consuming
Creating	Time killing, Fun
Mouse, Keyboard	Remote
Personal	Family
Short distance	Long distance
Office	Living room
Full resource	Limited resource
Application	Video

Recently, TV makers are motivated by smart phone success, and have started to launch Smart TV's on a very large scale.

2

LG전자

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2. Current Technical Environment around TV

Various standard bodies try Web profiling/extensions for TV, while non-standard technologies from other devices are getting implemented on TV ⬜ A big chaos.

TV Control API
Home Network API

France, Germany, Hybrid TV Japan Activila

Internet + Broadcast
Hybrid TV

A/V play ,VOD
HTML tag Optimize

OIPF : DAE
(Declarative App. Engine)

Korea OHTV
(Open Hybrid TV)

US IETV
(Internet Enhanced TV)

CEA-2014A
(US CE-HTML)

"Web and TV"

Full fledged Discussion between browsers and TV

Standard

Non-standard

Smart TV

Silverlight

chrome web store

3

LG전자

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3. Difficulties for Smart TV Business and Suggestions to Overcome

Various web technologies are rushing into TV platforms recently.
But from the user's point of view, applications seem almost the same.

Content providers and TV makers need to support multiple solutions for seemingly same applications.
And, compared to PC's and smart phones, TV's hardware resources/performance is limited.

For these reasons, TV makers want to have a **single** solution.
We think W3C is the safest place to have a baseline platform because of its **RF** policy.
We need to prioritize to meet immediate market needs on the basis of practical possibilities.

The success of this activity is a matter of time, not a matter of technical expertise to make advanced one.
After successful baseline profiling that minimizes fragmentation, further technical advancement could be accomplished.

4

LG전자

4. Priorities and Next steps

1. Video application on HTTP adaptive streaming and DRM at HTML5 video tag.
  Next step : Formulate a task force within Web and TV IG (or jump start a WG)
  - handle RF issues with other SDOs (MPEG, 3GPP) and individual companies
  - elaborate on use cases to which extent we should go
    a. VoD only or include live feed
    b. No DRM or include DRM. If include DRM, to what extent?
    c. Manifest selection, codec selection, necessary JavaScript API
  - deadline by end of March, then decide on WG

2. Interaction between TV and other devices by extending JavaScript API.
  Next step : Formulate a task force within Web and TV IG (or jump start a WG)
  - handle RF issues with other SDOs (OIPF?)
  - elaborate use case for interaction TV and other devices
    a. other devices act as a controller for TV
        b. N-Screen content sharing between TV and other devices
  - deadline by end of March, then decide on WG

5

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4. Priorities and Next steps

3. TV profiling for HTML tag, CSS attributes, and JavaScript API.
  Next step : Formulate a task force within Web and TV IG
  - study other SDO's trial and extract common profiling requirements
  - elaborate on general Web TV use cases and identify which part will be profiled
    - deadline by end of March, then decide on WG

4 Security considerations of Web technologies that are vulnerable to malicious attacks (TV is the most stable device).
  Next step : Formulate a task force within Web and TV IG
  - elaborate on use cases that require robustness
    a. to prevent malicious code (exploit CPU/memory, cause hang, leak security)
        b. to prevent application security (illegal use of paid apps)
  - deadline by end of March, then decide on WG

6

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4. Priorities and Next steps

5. Make a good developer guide for content providers who are willing to give their content on TV screens
    Next step : After finalizing 1, 2, 3 and 4 at IG, work on the developer guide.

We hope all the necessary work including specification/profiling, implementation and test suite can be done in a 1 or 2 year time frame.

If we lose this window of time, the Web TV environment will become very chaotic.

As TV makers, we will actively contribute to these activities and kindly request cooperation from the web industry.

7

End of Document

8

Second W3C Web and TV Workshop
Wrapping up, Next Steps, Action Items

Photo credit: Berlin Panorama by lunamtra, some rights reserved.

9 February 2011
Francois Daoust <fd@w3.org>
http://www.w3.org/2011/Talks/0209-web-and-tv-wrapup-fd/

Workshop Sponsors

IPTV FORUM JAPAN
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Interest Group / Working Group

	Web and TV Interest Group	Specific Working Group
Charter	Broad, discussion forum	Tight and precise on a specific topic
Inputs	Generic requirements and use cases, priorities, ideas	Technical drafts, fine-grained requirements and use cases, tests
IPR Commitments	None	Royalty-free patent policy
Deliverables	Reports, guidelines, tools, roadmaps, coordination with existing WG, new WG charters, etc	**Standards**, reports, guidelines, tools, etc
Participation Mode	Proceedings are public Reserved to W3C Members (+ Invited Experts)	Proceedings are usually public Reserved to W3C Members (+ Invited Experts)
Work Commitment	Medium, 1 day per week	High, 1 day per week 2 days per week for Chairs and Editors

We need actual people to lead next steps!

Choices per Topic

Option 1: Do nothing

- Already addressed in a W3C Working Group
  ... or best addressed outside of W3C
- No concrete work item
  ... and/or no concrete agreement

Option 2: Refinement within the Web and TV IG

- Topic of interest
- Scope needs to be refined (requirements, use cases)
- Roadmap still unclear at this stage, needs to be discussed
- **Action items**:
  ↳ Who is willing to drive the work?
  ↳ Who is willing to participate?

Option 3: Create a Working Group, or re-charter an existing one

- Clear need
- Agreement to work on a W3C Web Standard within the room
- **Action items**:
  ↳ Who is willing to drive the work and draft a WG charter?
  ↳ Who is willing to participate?

Suggestions raised during the workshop

Work item	Next step	Support
HTTP Adaptive streaming	IG to check on MPEG DASH RF commitment. Integration within HTML in new WG, as second step.	+30 (roughly) -2
Content Protection	Common encryption algorithm Support for key exchange. canPlayType() extension Capacity to play protected content	
Support for multi-track support	Feedback to HTML5?	+15 (roughly)
Secure device identification		2 volunteers to take the lead on that. -2
Support for trick modes, recording, downloading content	Work item in new DAP charter (or separate group)?	+25 roughly
Support for home networking	Work item in new DAP Charter (or separate group)? To be precised.	+25 roughly -1 (privacy related issue)
Support for real time communications	Possible Web Real Time Communications WG	
Profiling	IG discussion	
Testing	Testing framework?	
Synchronization of video content		

Liaisons to act on: DVB, DLNA

Sponsors & Support

<u>Minutes of the</u>
<u>Workshop</u>

Minutes of Second W3C Web and TV Workshop / day 1

8-9 February 2011

Hosted by Fraunhofer-FOKUS, Berlin, Germany

Workshop Sponsors

FLIX

IPTV FORUM JAPAN
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Workshop Support

Web

The workshop has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n°248687 (Open Media Web) and n°257103 (webinos).

Check the Sponsorship program and become a sponsor for the Workshop.

Date: 08 Feb 2011
See also: IRC log

This page contains the minutes of the first day of the W3C Web and TV workshop that took place in Berlin on 8-9 February 2011. The minutes of the second day are available in a separate page.

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  - Dynamic Streaming over HTTP - design principles and standards, by Thomas Stockhammer (Qualcomm)
  - Advances in HTML5 <video>, by Jeroen Wijering (LongTail Video)
  - Matroska, by Steve Lhomme
  - MPEG DASH, by Iraj Sodagar (MPEG DASH chair)
  - Summary...

- Session 4: Content Protection
  - New Strategies for Content and Video-Centric Networking, by Marie-José Montpetit (MIT)
  - TV and Radio Content Protection in an open Web ecosystem, by Olivier Thereaux and George Wright (BBC)
  - Adaptive HTTP streaming and HTML5, by Mark Watson (Netflix)
  - Digital Rights Management Standardization, by John Simmons (Microsoft)

Attendees

Present
See the list of workshop participants.

Chairs
Francois Daoust (W3C)

Jean-Pierre Evain (EBU)
Giuseppe Pascale (Opera)
Stephan Steglich (Fraunhofer-FOKUS)

Scribes
Francois, Chaals

Introduction: Setting the scene

See <u>description of the session in the agenda</u> *for links to papers and slides*

W3C Overview, by Philipp Hoschka and Francois Daoust (W3C)

Slides: <u>Introduction to the Second W3C Web and TV Workshop</u>

[Intro by Philipp Hoschka]

ph: welcome! good material to dicuss at this workshop
... good rep of the industry
... this workshop is important to know from each other, to open your minds, ...
... francois will explain you what are the workshop goals, etc.

[François Daoust, workshop co-chair, gives intro]

fd: yes, open your mind!

[fd briefly introduces W3C]

[fd presents the PC members]

Intro by Stephan Steglich (Fraunhofer-FOKUS)

[Intro by Stefan, FhG Fokus]

stephan: Web and TV, is it a special case? Current approaches are often attached to the past
... the examples that are used are often limited and the same (e.g. EPG).
... SDOs focus on existing devices
... We should look to what happened in mobile devices.
... Typically, TV is primarily for watching videos matches the assessment that mobile phones are for making phone calls. That led to WAP. We should not redo the same mistake for TV.
... The comparison goes on, with different existing mobile form factors, different interaction methods (pens, joysticks, touch screens, etc)
... The assessment that power is missing is also not true anymore on mobile devices. This should happen on TV sets as well.
... Our assumption is that we should be looking at the past to predict the feature, and we should make use on specific key features that the TV has (social feature for instance).

... [possibility to do a lab tour at the end of the first day!]

Tokyo workshop, Web and TV Interest Group, by Masahito Kawamori (NTT)

<u>Summary of the first Web and TV workshop in Tokyo</u>

masahito: I'm one of the Web and TV IG co-chairs. Here is a brief introduction.
... Thank you for organizing this workshop.
... First workshop in Tokyo: about 140 participants, discussed on Web and TV, demos from Japanese broadcasters, and different discussions on Web and TV from various viewpoints.
... We had a good representation from different regions and different stakeholders.
... The summary can be found on the Web page:

masahito: We decided to create a Web and TV Interest Group. We changed the name from "Web on TV" to "Web and TV".
... We're trying to review existing works and standards as well as their relationship with Web technologies.
... It's important not to re-create the wheel.
... Very important to identify requirements and use cases for Web on TV and TV on Web.
... The IG is starting today.

See: <u>Charter of the Web and TV IG</u>

masahito: The IG provides tools for collective intelligence (public mailing-list, public wiki, issue tracker). We're adopting agile methodology such as SCRUM, to ensure progress.
... [presenting a timeline that shows the relationship between the workshops, the Interest group, internal W3C groups and external groups]
... From use cases and requirements, we'll clarify and classify knowledge that will be fed into existing groups or, if necessary, creating a new working group.
... Questions?
... We have already identified different groups to liaise or coordinate with. We do not know yet whether, for a particular item, we'll need to create a WG or can add the work item to an existing group

> < **dcorvoysier** > question was how will the Web & TV IG monitor its proposals towards other groups

Web, TV and Open Standards (and testing) by Giuseppe Pascale (Opera)

giuseppe: For me, an open standard is standard where everyone can contribute, that is widely accepted and that is royalty free to allow more innovation on top of it.
... There is a risk that tomorrow's Web is fragmented with many devices that do not talk to each other.
... Open standards are not the only thing you need.
... If everyone starts to speak his own "open standard", that's a problem.
... Profiles, extensions, outdated references, incompatible implementations all lead to create fragmentation
... Solutions: 1) cooperation at or with W3C. 2) Testing

... For testing: main problem is the lack of dialog between implementers, the spec editors, and the test authors.

... It's important that everything goes in parallel.

... An alternative approach is to write the specification in a way that is compatible with the extraction of test assertions.

... [image taken from methodology to write test cases note published at W3C]

Question: interoperability requires that you don't have incompatible profiles

... this relies on having real agreement about key concepts.

Giuseppe: My point comes before that...

... implementors look at and primarily develop against the test cases, so those have to be strongly aligned with the spec too or the spec becomes meaningless

Intro, by Jean-Pierre Evain (EBU)

jp: The largest broadcaster union in the world.

... The EBU joined W3C a few years ago. I have learned a lot of things about how W3C works. Which will help or not, we'll see.

... Primary topics:

... Adaptive streaming with lots of SDOs working on it.

... HTML5, when will it come?

... DRM, do we have solutions?

... What about a royalty-free codec? Skype possibly coming to MPEG with an RF codec

... RDFa, I'm a little puzzled with what gets done. I'm very much convinced by RDF. What needs to be done?

... Discussions about subtitles: TTML, WebSRT, something else? EBU agreed on something and then the rest of the community decided to go on with WebSRT.

... I'm a bit frightened to see a group with a broad focus since we don't really know what we want.

... How do we precise the scope of the group? What is the area in which W3C can really bring something?

... I can see too many groups with only few participants contributing, sometimes with opposite views and goals. No real coordination. That's also what I see in W3C.

... My expectations for this workshop is to hear more, try to identify what are the strengths of W3C.

... I'm not taking positions here.

[+1 heard in the room]

<div style="background-color:#a8c84a; text-align:center; font-weight:bold;">Session 1: Web&TV: Use Cases and Technologies</div>

Moderator: Masahito Kawamori (NTT)

See description of the session in the agenda for links to papers and slides

Wealth of use cases from DTV/IPTV in Japan and API suggestions from various

viewpoints, by Yosuke Funahashi (Tomo-Digi)

yosuke: I've been working on broadcasting since 1994.

... I'd like to give you an overview of what we do in Japan.

... From the viewpoint of devices, there are three kind of devices (PC, mobile phones, TV set)

... [demo of a video where users can send comments that get displayed on screen]

... Very popular in Japan

... DTV is now universal in Japan, with Web browsers.

... Lack of APIs mean we had to extend the standards

... All 127 broadcasters in Japan provide Web and TV services with the browsers.

... Specific: content is delivered via broadcasting, and the browser may be over the video.

... [DTV examples of portals in Japan (NHK, MX Tokyo) with widgets]

... Let's move to IPTV

... First, content is piped via the Internet (or CDN). There are several ways to deliver video contents (on demand, streaming, download).

... For shopping and social network services, both types are used

... [example of shopping: Tokyo Broadcasting System]

... Final example on Sports and Games shows: browser content is controlled by broadcast signal. The interaction is enhanced. The user experience as well.

... [demo of Figure Skate by TV Asahi]

... Finally, hot topics in Japan:

... - DTV and IPTV convergence.

... - active development on developing technologies on various devices.

... - switching from HTML4.01 to HTML5. Is it a good time?

Masahito: Thank you very much.

Requirements for a Web and TV environment, by Jean-Claude Dufour (ParisTech)

jcd: context I'm thinking about: the center is a connected TV. Around that, some computing devices and some non-computing devices.

... For instance connected picture frame is not a computing device, a laptop is.

... Apps should work on any device. I'm fairly optimistic on this.

... Common ground is "very close" to W3C Widgets: HTML + CSS + EcmaScript. Not much to do from there.

... Second requirement: Apps need to run on a dynamic network.

... There are various protocols to do this: we need a service discovery and protocol. There are many solutions (Bonjour, SIP-based, UPnP, etc).

... When your friend comes to your home, it should be discovered automatically to send images to e.g. a TV.

... Third requirement: Services need to be accessible from all devices.

... Right now, the program guide on TV (EPG) runs on TV, because it uses the Web TV API.

... You need to make sure the UI can run deported on a remote device, with communicating widgets.

... It's also service adaptation, as a new way to distribute services.

... Fourth Requirement: Services should be accessible from the best device at any time.

... You should be able to start a service on TV and continue on a second device, and so on.

... We need some way to keep the current state of the service.
... Fifth requirement: whether the app is native, a widget or hardware should not make a difference.
... In the ecosystem of the services, you should be able to use any type of app.
... There may be a need for a framework to compile widget to native code, and vice versa.
... Sixth requirement: There should be no standard dependency

> < *chaals* > [I don't see how fifth requirement is compatible with an open standard that lets you build across different hardware - in other words, it complicates everything incredibly]

jcd: For instance, widgets should be able to use HTML or SVG, same for discovery mechanism.

> < *HJLee* > I am with Chaals, maybe this issue will be discussed in long term base.

jcd: We've been building on HbbTV, SVG, W3C Widgets, UPnP/DLNA, MPEG-U, RTP/RTSP, with HbbTV that incorporates another set of standards.

> < *Danbri* > [re 5th, key thing is the network protocol; whatever speaks it can play; keeping state across migrations is nice thing for app creators but needn't be core STD]

jcd: What do we need for standardization?
... Please look at "smaller" profiles, because TV sets are constrained.
... Common Device APIs, and then some way to have document discovery, communication and migration (declarative, and not just widgets).

> < *MattH* > [play to web's strengths instead maybe - decouple components, have APIs for communicating with TV functionality, rather than exporting UIs]

Use of Web Technologies in TV Standards in Europe, by Jon Piesing (Philips)

jon: Standards is what I do for a living. Europe is my particular focus where I have expertise. I'm talking about the use of Web technologies in TV standards.
... I've been involved in most of these standardization activities, often as chair.
... Standards we have are mostly a complete system description, including codecsc, applications, signaling in the broadcast, security (e.g. content protection)
... They've been talks about what needs to be done: from making existing Web content work on TV to making TV use Web technologies, or something in between.
... DVB-HTML has been developed as an alternative to Java in 2000/2001. It hasn't been widely adopted. Another example is the Open IPTV Forum DAE, 2008/2009.
... video is integrated through the <object> tag as it predates HTML5.
... HbbTV basically takes a selection from OIPF specs with a selection from DVB-HTML.
... Focus is on simplicity and time to marke. It is being deployed in Germany, and will be in France in 2011.
... UK DTG Connected TV is a more recent example which has a lot in common with HbbTV, also with more support from W3C technologies.

> < *HJLee* > main difference from those stds we have here is this is THE 1st attempt of collaboration between web industry and TV industry.

jon: I thought I'd do a quick summary of which Web technologies are used in these different works
... [reviewing the examples, adding Web technologies names each time]
... All of these works include extensions, e.g. related to application lifecycle.
... There are other system components, for broadcast (AVC and MPEG-2, DVB/EBU subtitles, MPEG-2 TS, etc).
... and for broadband (same video, audio, subtitle and container formats as broadcast). MP4 files tends to appear, and we need a broadband video streaming protocol.
... For security, we need trust models for applications. The network operator may need to be the one who takes the trust decision. Content protections as well.
... I though I'd add a slide on non-standard solutions: they are many proprietary solutions as well, e.g. Virgin Media in the UK based on Netscape Navigator 4.

philipp: you've been involved in many standard efforts. Still, there are lots of different solutions worldwide used in different industry sectors. It's a bit different from how the Web works today. What do you think are the chances that TV converges to a single solution today? Is there an opportunity today?

jon: you might get some degree of convergence at a given time, and then things evolve, but the products you shipped two years ago are still around and cannot be upgraded.
... There's a huge legacy.
... The most you can achieve is convergence on a certain point in time which creates the "new legacy".

chaals: Jean-Claude, you said that we should not rely on any standard. I read it as meaning you need to write things a lot of different times.

jcd: maybe I wasn't clear. I'm thinking in terms of toolbox standards. HbbTV has done a good work plugging things together without doing any technical stuff.
... HTML is a toolbox standard. Trying to force a codec in HTML is mistake in my view.
... What W3C usually does is toolbox standards. HbbTV takes the standards and builds concrete profiles out of it.

jon: If you look at the way standards are defined, you have these toolbox standards. They try to include everyone's requirements. Not really time-based. More consensus based.
... You need industry standards that take ruthless decisions for time to market.

giuseppe: I also think that W3C is the right place to discuss the building blocks.
... When something is missing, when an extension is needed, it might make sense to push it back to W3C. I think that's missing.
... How can you do a subset of standard? That's not really done in W3C right now. How you can rely on standards without breaking things up?

masahito: Thank you all for your presentation.

[coffee break]

Session 2: Second-Screen Scenarios

See description of the session in the agenda for links to papers and slides

A Consideration about "Second Screen Scenario", by Kensaku Komatsu (NTT Communications)

kensaku: I'll introduce some use cases, a proposal and requirements.
... About NTT Communications, a branch of NTT, providing ISP and IPTV services.
... My target is second screen. That means smartphone, tablet, PC, portable game console.
... Our objectives are to increase the effectiveness of broadcast and make everyone happy.
... [example of a family use case on sunday morning]
... Family is watching a TV program together. Only one TV screen.
... People in the family may have different needs (fun, shopping, or simply watch TV).
... Impossible to satisfy everyone's need with only one screen.
... How to solve? We'd like some way to automatically push content that is synchronized with TV program. (BTA would also be fine).
... [example of what the user interface might look like on an iPad]
... Ads should be synchronized with TV commercials for instance.
... Technical requirements: some push technology (server-sent events, WebSocket). We need to discuss some data format, and of course protocol to communicate with each screen.
... We also need some way to store technology (WebStorage), and some location sensing technology (Geolocation API).
... Widget functionalities: W3C Widgets
... For GUI: some CSS3 would be good

Question: it seems to me that you have connections only one way. If I'm watching a video about e.g. Honda cars, and switch to different brands. I'd like some double synchronization to occur

scribe: Sometimes triggered by the TV, sometimes by the user

Question (BBC): we have a different approach where we extend the Web browser within the TV sets with APIs that allow to control TV program, and so on.

francois: you mention that a lot of technos are on their way... what is really missing then? the comm protocols or the APIs...

> < **MattH** > [+1 (Matt Hammond)]

kensaku: I have no idea about details of the protocol, but it is required, yes.

Technology Defragmentation, by Cedric Monnier (Irdeto)

cedric: We switched from broadcast to broadband
... Our core business is security.
... How to distribute lots of content to different devices.
... Customers are regular broadcasters, other content providers. At the end of the day, the question is how can we access the video?

... Everybody is moving to a multi-screens experience.
... For a content provider, that means new screens where content can be distributed.
... As of today, you have more and more different devices (game consoles, mobile devices, laptop, connected TVs, automotive)
... The technology is segmented. For a content provider, that's really a nightmare.
... Typical multi-screen solutions involve lots of different things. The ecosystem is really complex.
... Example of Foxtel.
... Example of Viasat: typical web-based for laptop-PC devices. Now moving to TVs and mobile devices.
... Same metadata to different devices. Developed with thematic consistency in mind.
... Because that ensures the brand is preserved.
... Example of Maxdome that was Silverlight-based and now runs on LG connected TV.
... From an end-user, it works, it's possible.
... But you need three components: Content management, some way to deliver the content (Microsoft Adaptive streaming - Jeroen Wijering (LongTail Video)?), and of course the video player on the client.
... At the end of the day, we learned that it's quite hard to target different devices because fragmentation is all over the place.
... Each platform is different.
... I don't even speak of media player.
... How do you handle standard actions such as play/pause/stop, trick-play modes?
... It's really a jungle.
... There's a huge technology fragmentation. That's an explosion of costs. People are waiting for new features. In terms of porting, it costs a lot.
... At the same time, you need to maintain consistency between the UIs.
... Our needs: make it silly simpler!
... we do commit on HTML5 and Flash. There are basic extensions that are needed to facilitate video handling from javascript (trick modes, content discovery)
... Widgets should be simple, no need to redo the same thing multiple times for different stores.
... So the question is: should we let de-facto standards become real standards or should we take the lead now?
... At the end of the day, I cannot change everything for a single player.
... Any volunteer to solve this issue?

philipp: Thanks a lot for the analysis of what is missing.
... One thing I did not understand about widgets.

cedric: It's not so easy to bind a widget to a channel for instance. We need some basic extensions to make it more friendly on TV sets.
... We are more talking about applications, something that has access to TV resources and has access to internal stuff on a secure way.

chaals: follow-up on that. Seems that we're not talking about widgets at all. Rather the APIs that are missing.

cedric: yes.

stephan: some approaches taken by BONDI, etc.

question: Could you elaborate on trick modes?

   < **danbri** > [I can't get my osx MacBook online here; see nothing in browser when connected to guest network. worked ok from iPad. Has anyone solved this?]

cedric: How can you express the different modes? We're doing low-level things (security, etc). We would like to have the application on top of that to be just HTML5.
... It's a bit of abstract APIs, right. It is highly bound to network protocols. There are some things that already exist in DLNA for instance.

Rich User Experience through Multiple Screen Collaboration, by Jaejeung Kim (KAIST)

jaejeung: KAIST institute is a research institute within KAIST.
... focus on second-screen in this presentation.
... Some assumptions first to scope things: general large size display with a browser, complex content including applications. It's a "public computer" at a certain distance.
... Questions are: how can we control such complex contents at a distance?
... Second screen can help. It can perform as a remote controller or as an additional information display.
... If the user cannot control the content at a distance, the user experience suffers.
... So the first scenario is to use the second screen as a controller.
... The usual remote control does not allow to search on e.g. YouTube. Smart TV that come with a keyboard and a track pad allow for better control, but the control is not so good at a distance.
... One possible approach is to use Web fragmentation of a Web page (example of a YouTube page).
... The fragmented page structure gets displayed on the second-screen. Then you can control zoom in/out from your smartphone to select the fragment you're interesting on.
... You can then navigate the content with a direct manipulation.
... Second scenario: second screen as a content separator, e.g. for purchase scenarios, not to disturb the main content.
... Third scenario: Reverse context, collaborative content sharing through the second screen. The TV is the hub for content sharing.
... [demo of this scenario into action]
... user can take annotations, write memos, control the position on the large screen, post Web pages, etc.
... Requirements: Device discovery. An open and widely accepted standard protocols is required (i.e. DLNA/UPnP). The Web fragmentation technique requires markup or annotation to introduce more semantics.
... For the UI migration, session management is required for video streaming but also for Web page / application session. I'm not sure this second use case has been standardized anywhere.
... Issues and discussion: Multiple devices and multiple users may want to control the same object. There needs to be some selection mechanism.
... Synchronization among screens is important. There's a trade-off that needs to be taken because of performance.

... Sensitive content could be filtered not to be displayed on e.g. kids displays.

   < **chaals** > [filtering by fragments sounds like content blockers, as standard in some browsers and a common extension in nearly all, combined with standard filtering]

jan_lindquist: I generally agree with the presentation. Televisions are not always IP connected. These scenarios assume IP connectivity to the network. Do we put a requirement, here?
... It changes the ways the issue is addressed.
... My opinion is we should, but what's your views on this?

jaejeung: yes, network connection was my basis assumption.

cedric: do we need connectivity? Yes. Does the TV need to be connected to the Internet? Not necessarily. It could be behind a home gateway.

kensaku: to provide interaction model, we need some bi-directional communication model.
... We need some concertation about scaling. How to set up a lot of users with a TV?
... Multicasting model would be helpful, I think.

Question: I think the question is for the entire workshop. My opinion is that it should not be an absolute requirement. Another scenario is broadcast-only scenarios.

scribe: Only push use case here.
... In our opinion, it should be considered as a profile.

chaals: middle-ground. High level of connectivity is important. What we can do is think of what we can with different levels of connectivity.
... Broadcast is one. Lots of networks you still pay by weight.
... How do we build applications that work across these networks as well is worthwhile.

jon: There are two variations. One category is TV sets that could but haven't, for various reasons (wifi available but no external broadband connection).

   < **chaals** > [Overheard: If you happen to live there, it isn't the middle of nowhere]

jon: If you remove Teletext, people in the middle of nowhere will scream.
... If you need to take that into account, you end up with a more complicated system.

   < **chaals** > [Thought: A lot of broadcasters are still publicly funded, and have legal obligations to provide services to all kinds of places with low connectivity]

   < **MattH** > [one-off closed trial : 2nd screen for live. no tv network connectivity : http://www.bbc.co.uk/blogs/researchanddevelopment/2010/11/the-autumnwatch-tv-companion-e.shtml]

jon: There is a huge difference between designing a system that can do something for people who do not have broadband and for those who have it by default.

GuillaumeBichot: numerous SDOs are working on different things. I think that for W3C, we should take this basic assumption to be able to progress.

MarkVickers: the Web model works very well for different connectivity models.
... the ability to deliver content over various networks.
... Web pages that link to each other can work just fine. You can put all things in cache. As

long as you stay in the cache (HTML5, etc), it works.
... The application model is the same.

yosuke: comment. In Germany, only 5% of TV is connected.
... You could use your phone for connectivity when TV is not connected.

jean-pierre: what will need to be done in W3C to help develop these applications?

< *chaals* > [Device APIs]

jon: I think that there is some stuff here that could be done, but not sure what.

danbri: one of the things technical analysis is going to bite us: people don't understand the difference between browsing and search engines, network connectivity doesn't mean a thing.

cedric: no connectivity or low-connectivity reminds me of broadcast (one-way). One possible solution is storage, e.g. having a NAS to store content.
... Lots of people are browsing catalogs on tablets. No connectivity.
... Trade-off between bandwidth and storage.

< *yosuke* > yosuke: If TV can communicate with smart phones locally, smart phones can compensate the lack of connectivity of TV. (Tethering)

[lunch break]

Session 3: Panel on HTTP Adaptive Streaming

Moderator: Francois Daoust (W3C)

See description of the session in the agenda *for links to papers and slides*

Adaptive HTTP Streaming Standard, by John Simmons (Microsoft)

john: Was reading 19th century predictions about how people would do TV... but they failed to anticipate a few things.
... We're a bit in that position today. So what is required?
... 1. Supply side optimisation. The expense of getting to different devices causes problems.
... encoding, adaptive stream, ...

jon: (i.e. network optmisation - or optimising to the current state of the network).
... Also related to combinatorial complexity - addressing multiple tracks etc
... and Cross platform support.
... 2. DRM interoperability - content protection, and wanting to minimise the amount of andvariety of DRM.
... 3. Authenticaion and authorisation, that is not tied to being a broadcaster.

< *danbri* > [ASIDE; * if you have problems connecting to the Network from OSX, try adding 193.174.153.1 under Prefs > Network > Advanced > DNS. ... it worked for me at least]

< *tvdude* > DIS of MPEG DASH available: http://dl.dropbox.com/u/1346434/ISO-IEC_23001-6-

DIS.doc

john: Apple published an adaptive bitrate streaming, and MS their smooth streaming and encoding under our "community promise" open license.
... MS contributed encoding tech to ultraviolet (a.k.a DECE), instead of them supporting multiple DRMs...
... 3GPP published another version of the same idea... which went to OIPF and became another variant...

john: There was a broad sense that we should harmonise these in some way. Other organisations were thinking of adopting these, or rolling their own...
... MS encouraged them to wait and get something together.
... They came into DASH which is being pushed to International Standard now...

< *tvdude_* > ultraviolet is the marketing name

john: with the participation of the various other players here.
... Key piece needed at the bottom of the stack is protected, DRM-interoperable adaptive streaming.
... MS Plans to make its necessary patent claims for final DASH specification available Royalty-Free under MPEG's relevant licensing option

john: This is a stake in the ground from Microsoft.
... This is simply for MPEG DASH. We hope others will contribute as Royalty Free, because this stuff is important to build an industry.

The Convergence of Video on IP and HTTP - The Grand Unification of Video, by Bruce Davie (Cisco)

BD: This talk has a long history.
... Converting video to HTTP is going to be very important in breaking down silos and can create a lot of benefits if we get standards right to take advantage of them.

BD: video over IP is old hat. New is adaptive streaming for robust delivery in diverse environments.
... works for all kinds of delivery.
... IPTV networks today are carefully optimised to a single job. The Web is an organic development that just runs wherever it can. Adaptive streaming lets us sit in that diverse environment and do video.

BD: HTTP has been tried and tested hard, and we know a lot about optimising it.
... Converging on infrastructure helps to reduce costs. More important is the enabling of greater innovation via cross-polliniation...
... We see innovation now phones are also web-capable application environments
... Standardisation is critical, and so is the tension between timely and too fast.
... lack of standards holds back deployment, but too-early standards holds back innovation.
... either way, bad resultto avoid is that money is spent on dealing with infrastructure problems instead of on making cool applications.
... AN example of what we deliver now is mixing unmanaged and managed networks. We really want all that to run on a common infrastructure.

BD: HTTP can do the job. Can do brilliantly in nice environments, and as well as possible in harder ones.

... So you can use it as the transport everywhere as a common infrastructure, which makes it easier to connect different systems.

... We need to develop the platform without trying to predict the next application, because we will mostly get the prediction wrong.

BD: Once you pick a piece, everything is tightly coupled. We have to have more modularity like we get with Ultraviolet.

... Maybe we need a known good baseline reference for adaptive streaming, so we can build better stuff...

... HTML5 needs to support adaptive streaming but not sure on the details ...

... Mabye clients pick codecs as well as bitrates. It is a thorny issue at the moment.

> < *HJLee* > Maybe next session Mark from Netflix shows possible HTML5 video tag implementation. let's see
>
> < *mark* > Thanks for the plug - I can't claim to have all the answers though

CMN: W3C doesn't so reference implementations traditionally, and I think it could be a big challenge structurally.

BD: It is a useful technique that helps people develop.

CMN: Their approach is to write lots of tests. Do you think that is roughly equivalent (I do)

BD: Probably... I am not an expert in W3C yet

FD: HTML5 allows pointing to a streaming manifest - is there anything else required?

BD: Not sure. The ability to do ff/rew etc is important.

JL: We have looked at doing this, and think that the events that are generated and passed should be looked at in this context by W3C.

BD: Performance metrics might need some attention - how well is the adaptation working?

Dynamic Streaming over HTTP - design principles and standards, by Thomas Stockhammer (Qualcomm)

TS: Streaming is important, but our specifications are currently developed for controlled environments.

... lot of the usage is actually video going over HTTP

> < *yosuke* > [note: Adaptive streaming is not the only one that needs ff/rew.]

TS: You can generate profiles from MPEG DASH (beyond the ones there are already)

(Scribe is not copying down stuff that can be read from the slides, assuming they will be published too)

TS: DASH doesn't try to replace HTTP etc, it enables them to be used in an implmentation.

TS: doesn't have to be delivered over HTTP, in principle.

... provides information describing how to access a version of data from the cloud.

... client is out of scope of the spec. It downloads as well as it can and delivers to a rendering engine.

... Deployment on CDNs with lots of small files creates problems. You can use byte-range requests instead.

> < *tvdude* > That was "Turbo Thomas" ;-)

FD: Is there some baseline for formats etc?

TS: DASH doesn't say so, but an industry organisation or company may restrict e.g. codecs...

Advances in HTML5 <video>, by Jeroen Wijering (LongTail Video)

JW: JWPlayer is open source video player.

... There are a lot of small companies using it, so we have a good understanding of what they need and want.

... Adaptive streaming is especially good for live streaming in aprticular.

... No nice toolsets yet for doing everything off the shelf.

JW: What to assess in QoS - streams available, enabled, ...

JW: Ease of use is important. HLS has some headaches, but it is easy to understand how it works.

... If you can explin it in 500 words, people will get it.

... No additional modules should be required, and ecosystem (i.e. variety of tools) are important

... There's a lot of interest from developers, so long as MPEG DASH is an open Royalty-Free format.

JW: FD, your question on HTML - it would be necessary to have the src= able tp point to the manifest, at least. That's the simplest.

... people will probably also want APIs for manipulating the manifest.

... singlanling avilability of tracks should be available as well.

FD: These are just extension APIs for video, right?

JW: Yes. And extend signal and allow control of switching heurisitcs - events being created when it's changing, and why it is doing so.

... enabling developer to control heuristics, e.g. setting parameters for different configurations...

... think the implementation is a lot harder than the specification.

CMN: Do you mean something other than being able to extract tracks from the DOM?

JW: Yes, because there are also tracks in the manifest - so if they should keep being in both places, there neds to be an API that handles that. This is not what HTML5 models at the moment.

TS: For stuff like audio, in particular, this makes the timing alignment really important.

JW: yeah, this needs to be dealt with, and is complex

MV (Comcast): Issue 152 in HTML5 - presence of multiplex text tracks - is something that is important. Can this group make decisions on what we need there?

FD: We can decide what we want but that is not a priori binding on HTML5 - you have to participate there to get the decision made.

JW: Allowing adaptive streaming manifest in HTML would solve a lot of issues with the relative poverty of HTML at the moment.

[chaals thinks that on the other hand the simplicity of current HTML model is a strength too, so trade-offs are implied whatever way we go]

[e.g. having text tracks in manifest and in html elements requires an API to deal with the two, etc...]

Matroska, Steve Lhomme

SL: WebM is based on Matroska.

SL: They (Google?) have already said taht they will pick up new features from matroska wherever those already exist rather than rolling their own
... we have added stuff over time, and we think it is very adaptable.
... already have working demos of 3D
... and people want transparency.

FD: You said it uses EBML. THere are other compressed formats - is there a chance to switch to EXI?

SL: I don't know the format, it might be possible.

PH: This is your spec for binary XML? Not the MPEG one?

SL: Never heard of the MPEG one. This is one we did.

HJL: Current situation for adaptive streaming - is there an implementation?

SL: I believe there are people who have done it, they are encoding per user and not using a manifest file.
... believe that MPEG DASH works like that.

FD: Without wrapping in e.g. DASH?

SL: Right.

MPEG DASH - Iraj Sodagar (MPEG DASH chair)

IS: We are pretty much complete, working with other organisations and think we are converging.
... invite this group and W3C to provide input.

... we have 5 month review, and the spec is being made available for download.
... It's not a long spec - so please read it.

HJL: Is it likely that other members will declare royalty free as MS did (e.g. today)?

IS: MPEG has pollicy allowing that or allowing RAND. I believe (personally) that several companies have intent to help make DASH royalty-free profile.
... W3C can provide input of the need for this.

HJL: how to get information fast enough

IS: ISO policy is for disclosure in forum, but think you will also hear that outside the forum, as MS did today.

SL: If some companies won't license Royalty-Free, what do we do?

IS: You can make a profile to avoid the encumbered parts.
... best to do this in MPEG...

SL: If MPEG DASH is RF does that provide a grant for using teh same technology in other things?

[tricky legal question. Default answer is 'probably not']

MW (Netflick): DASH explicitly allows use with different file formats - so in that case it is still DASH.

SL: Question was about codec...

IS: DASH doesn't specify the codec - you can use it with different ones.

Summary...

FD: Seems there is a clear need for adaptive streaming - it comes up in every discussion.
... We don't know yet if MPEG DASH will be royalty free.

TS: Royalty discussion is important. Being interested to get this broadly deployed, it would be very helpful to get a lot of feedback explaining that Royalty Free is a requirement and that under that condition there is a lot of real interest in deployment.

IS: Say what you are going to use in DASH - which settings, which features or profiles, as well as that you want it RF.
... That simplifies what is needed as a client, which simplifies the question of where patents cover necessary claims in the first place.

TS: We need clear instructions as to what the expectations are... people to talk to at a technical level.

HJL: From TV makers, we will have video applications as our core. So we are very sensitive about royalty-free
... for the time being, video applications will be our core.

GP: Since there is a broad scope I am not sure why that is so important for royalty-free.

IS: Having the analysis simplifies the process - you are asking participant companies to declare things as royalty-free

Guy Marechal: Audio CD development, mostly between Sony and Philips, had a model? where it was almost free- you got it for free, but a huge penalty if you made stuff incompatible. Maybe a model to look at?

JJ: Would it be helpful if key people from MPEG DASH particiapted in this effort?

IS: Certainly.

JS: There are a number of players who are active in both and I am sure that would be something they are eager to provide.

IS: DASH was about 8 meetings / year, 4050 companies particitating.
... quite a lot of collaboration even within MPEG

JJ: If we can do it collaboratively,can that help motivate a royalty free standard?

IS: Also, we've done a bunch of informal work on convergence.

MW: We're in the process of joining W3C. I think it makes sense for the W3C baseline request to be "make the whole thing royalty free"

JCD: I think there is someone else outside with a patent, and so long as they don't speak, we have nothing.

MW: That's always the case.

TS: Major contributors are working towards this direction... but there is no magic bullet. Everyone needs to do the work required

Jean-Baptiste Kempf (VideoLAN): At VideoLAN we get 2 or 3 letters a year from MPEG and same from 3GPP saying they will sue us over patents. What changed?

JS: MPEG-LA has no relationship to MPEG except the four letters

[adjourned]

Session 4: Content Protection

Moderator: Philipp Hoschka (W3C)

See description of the session in the agenda *for links to papers and slides*

New Strategies for Content and Video-Centric Networking, by Marie-José Montpetit (MIT)

[scribe missed first few minutes of talk]

marie-jose: TV is a very immersive experience.
... Users do not want to wait in that case.

... We'd like to leverage peer to peer for community viewing, not to have to go back to the same server when we're sharing the same piece of video.
... The elements of our strategy: data are algebraic entities, which can be added, multiplied by factors, etc. We want to combine analytical and user measurements for quality of experience.
... Content protection is often pointed out in the same sentence as DRM.
... It's not just that.
... We wanted to take into account the fact that devices collaborate with each other.
... The goals of our research right now is to reduce delay and minimize interruptions for video and converged applications.
... That relates to W3C needs I heard today.
... P2P is good. People might want their content to be protected as well (private, shared with friends).
... Social viewing experience requires filters.
... Example: live streaming. The playback is not just a series of packets.
... it's the linear combinaison of these packets.
... We could regularize the output of the buffer to be fairly constant.
... New research: about minimizing signaling overhead, using multilayer video encoding.
... We want to show that network coding can provide video content protection in a social viewing context. There's a demo on that in two weeks from now. Use case is peer to peer distribution with registrered usersd that see the content directly
... For non premium users, ad viewing is mandatory. Again, everything is done at the edge, locally.
... We're going to build on that demo and protect that information.
... We favor stateless approaches. P2P often requires to know what your neighbors have. There's a lot of state.
... Last thing is we'd like to add network combining to improve performance.
... We submitted this paper to show that there are things that get done below HTTP to improve QoE.

TV and Radio Content Protection in an open Web ecosystem, by Olivier Thereaux and George Wright (BBC)

olivier: You probably know us, if you're not living in the UK, for BBC news.
... Our focus on Web and TV is much broader than this. In the UK, the BBC iPlayer allows people in the UK to access content that is broadcasted.
... Stuff we produce but also content produced by other people.
... It's also offline. You can download a programme. That is something that is fairly important for us.
... We need to consider the un-connected use case.
... The BBC was one of the first broadcasters to be on the Web. We are renewing our involvement in W3C.
... Our public mission implies: openness, access for all.
... Right now, the technology of the player is proprietary.
... Could we do the same thing with open Web technologies?
... Yes for content we produce. However, we have an obligation for content protection for all other content.
... It's an industry demand, but also consumer demand for varied, quality programmes.

... Sure enough, there is a cultural evolution happening, but there is a "meantime".

... In this discussion on content protection, we'd like to stress out that there is no need for perfect content protection. Good enough protection is enough.

olivier: In practice, content protection means geographical, time-based, and copy should be difficult.

[yes, online agenda is up-to-date.]

olivier: When we're talking about DRM, we cannot just standardize DRM altogether.

... DRM involves a little bit of secrecy, by definition. For the good enough effect.

... We'd like to see the rest addressed by W3C. We want to be able to use HTML5 to interface with DRM-protected formats.

... There needs to be a way to say: this is HTML5 video and it is content protected.

... We could perhaps extend canPlayType() to address that use case.

... But we're open to other ideas.

MarkVickers: do you need more richer requirements with DRM?

george: it's really geographic and time.

MarkVickers: it's only a bunch of parameters for the can play/cannot play question.

Question (Cisco): geography, time. Do you need to control devices. Example of Google TV.

olivier: as far as I know, no.

... We're providing the iPlayer to any device that supports Flash (because that's the technology that we need right now).

... We do want to spread the content as wide as possible.

GuyMarechal: comment on the Cisco comment. Two'level approach for cryptography. The authentication of the equipment is made by a zero-knowledge approach.

... Then regular protection.

... This makes the control much more efficient. By the Way, Cisco's solution is free. You can use it.

Adaptive HTTP streaming and HTML5, by Mark Watson (Netflix)

mark: We're soon to be W3C Members.

... Netflix is a subscription service in US and Canada. 20 millions subscribers. Both Internet streaming and DVD-by-mail.

... About 200 devices that are Netflix-enabled.

... Today, we need to do a lot of work to get on all these devices.

... We have to certify those devices one by one.

... HTML5, we announced in the middle of last year, is our UI platform-of-choice.

... We can really measure the effect that it has on user experience. It's a major component for us.

... Tomorrow, if there's enough standards, we can stop SDK integration and certification expense. So we can expand to more devices.

... The list of requirements we have should be considered as input to the group.

... Two aspects to adaptive streaming.

... For the first part, we've been working in MPEG DASH.

... We haven't done the analysis on IPR stuff, but if we have, I expect we'd release this as RF.

... Basic on-demand profile is important.

... What we need for HTML5: multi-track advertisement and selection. Events and metrics might be useful.

... And obviously content protection.

... The requirements for content protection is imposed by content oweners.

... Users agree not to store or re-distribute streamed content in terms of service.

... We need to make it difficult for users to do so.

... Technical solutions involve encryption the whole content.

... and everything is secure.

... The DRM black box: content protection functions. Encyption/Decryption. Common solution.

... Secure key exchange, rights expression and enforcement is primary focus of DRM. Hard to standardize today.

... Authentication/Authorization should a service function.

... Our proposal is to standardize: common encryption (look at the MPEG stuff? Is it already done?)

... Enablers for Javascript implementation secure authentication/authorization protocols.

... We think that the specific key exchange technology should not be part of it.

... Advantages: we'd stay clear of DRM commercial issues, and we'd remove controversial functions from the open.

... [diagram of what it would mean, first for unprotected content, then for protected content]

... [message flow for Javascript hooks]

... We also need secure device identification as authorization decisions may depend on device type.

... We propose a new Javascript Device API for secure device identification, but there's some privacy issue (which may not be worse than giving up your geolocation)

... Strong binding between the code that is accessing the API and the domain name. You could think it in terms similar to accessing a smart card.

... These kind of security models exist.

... Content protection is essential for some businesses. Should be simplified for the Web.

philipp: thanks for this very detailed presentation and concrete proposal.

GreggKellogg: why do you feel that some device specific ID is required on top of user authentification?

mark: You need to do both. Device identification helps figure out whether the device has hardware-security or not, that kind of stuff.

philipp: Would it be sufficient to identify the device's type?

mark: At a high-level, yes, it would be sufficient.

... But there are other use cases where it is not, e.g. device revokation and simultaneous device limits.

Comment from the crowd: I would encourage W3C to have a very close look at Netflix' proposal.

Digital Rights Management Standardization, by John Simmons (Microsoft)

john: very similar views as Mark here.
... Starting with the slide I was showing before, and I would like to focus on DRM interoperability.
... We're focusing on common encryption, same as Mark, and industry fora adoption.
... The problem space: we have many non-interoperable ecosystems. Each DRM technology is using a different algorithm.

john: So that means a whole media stack that lock content. DRM-free is really not an option for high value video.
... And another problem is that the industry will not settle on a single DRM.
... There will be a handful of systems.
... Solution attributes: we think that it is very important that the protection works well with adaptive bitrate streaming.
... There has to be interoperability, and also a common multi-screen support. We have a panoply of screens to target, and we need some protection mechanism that goes through all of these devices.
... There are four components that are always present.
... First one is the licensing regime. It's always present and proprietary. There is no exception to that. Even the closest thing I know of to an open DRM system, OMA DRM, needs some trust authority.
... Next part is the key management system. There has been some attempts to converge on a solution.

john: One problem is that it is tied with licensing regime. So standardization is diffucult.
... Thirdly, there's a Rights Expression Language. You can standardize that but it's kind of difficult.
... It's tied to compliance rules of licensing regime, and that's very specific.
... We end up with a need to standardize the licensing regime if we go down that road.
... Finally, there's the encryption mechanism.
... That's relatively easy to do. You specify how to encrypt/decrypt something. That's been done in MPEG.
... The good thing is that it takes most of the DRM stuff to business stuff.
... In the project I mentioned before, we publish PIFF under a community promise, the equivalent of royalty free).
... Including the encryption/decryption mechanism.
... When we published that in 2009, we submitted that to Ultra Violet. They accepted that, and are to publish the Common File Format.
... The good thing is that it handles multiple tracks. You just need to have them as separate files on the server.

> **< dcorvoysier >** [DVB conditional access implementation: http://www.dvb.org/technology/standards/index.xml#conditional]

john: Our attempt was to see some optimization there.
... The Common File Format could be used outside of video content.

... Also, DVG issued a call for proposal for IPTV content scrambler that is software friendly.
... We submitted the same PIFF file as a proposal for the software friendly encryption (without the IPR hook).
... And then UV through a liaison with MPEG/ISO introduced some modifications.
... released last week.
... It includes the same encryption algorithm that has been proposed to DVB.
... Through standardization, we try to converge to a solution.
... Two take-aways: a standard encryption algorithm is the best way to achieve DRM-interoperability. This leaves the business decision of the DRM technology to use outside the standard.
... Once you take the DRM technology out of the standard, then you can create content to be distributed over the Internet without DRMs at all.
... Whatever the content providers uses, you don't have to go back and redo the content.

chaals: PIFF is based on H.264?

john: no, it's codec independent. In the encryption algorithm, there is some specific statements in the spec for H.264, but there's no dependency, no.

chaals: So I could make a video of me with a dog and distribute it to everyone without thinking about DRM.

john: yes, you could have the first 5 minutes of you and your dog in the clear, and the remaining 20 minutes available on a premium basis, protected by DRM.
... Having to produce another version each time is a pain.
... You could simply give them the same file.

giuseppe: we have been talking about video protection so far. No need for application protection? Not as important?

marie-jose: we're talking about video because it's a hot problem. If you can do it real-time, you'll be able to do a lot of other things.

francois: in the end, where does W3C fit in your presentation?

john: I'm not here to say that some specific direction is the way forward. We've heard several issues during the day.
... I'm raising issues, here.

[scribe disconnected during the last 3 minutes]

[End of minutes]

Minutes formatted by David Booth's scribe.perl *version 1.135 (*CVS log*)*
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Minutes of Second W3C Web and TV Workshop / day 2

8-9 February 2011

Hosted by Fraunhofer-FOKUS, Berlin, Germany

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This page contains the minutes of the second day of the W3C Web and TV workshop that took place in Berlin on 8-9 February 2011. The minutes of the first day are available in a separate page.

Contents

See the workshop agenda for details.

Attendees

Present
See the list of workshop participants.

Chairs
Francois Daoust (W3C)
Jean-Pierre Evain (EBU)
Giuseppe Pascale (Opera)
Stephan Steglich (Fraunhofer-FOKUS)

Scribes
Francois, Christian, Olivier, Chaals

Moderator: Jean-Pierre Evain (EBU)

See description of the session in the agenda *for links to papers and slides*

Web Standards and Rich Media Experiences on CE devices, by Gregg Kellogg (Connected Media Experience)

gregg: [presenting CME, goals, underlying technologies]
... Principle components: a manifest, HTML file containing the description of the content.
... The furniture would be aspects that are not necessarily described but implied by the ontology
... We're consolidating on a W3C widget package.
... [example of a generic media player on a PC]
... Track interactions, immersive type of experience with any type of presentation.
... Same package can be sent to multiple devices (mobile, TV).
... That's not to say that everything is uniform. One of the advantages of a semantic presentation is that we can describe things in a more virtual sense.
... Two profiles so far: a mobile profile and a high definition profile.
... Profiles rather describe different encoding, not displays.
... [example of a CME manifest in notation-3]
... Artists may have contracts with specific constraints on what can get on screen and what cannot.
... Different relationship can be described using the ontology
... Using unique identifiers enables external sources to reference CME-released tracks (example of DBPedia)
... Basic workflow: go to a retailer, buy content (MP3), the media player identifies content that may be CME through some ID3 tag, and performs discovery to enhance the presentation.
... The proof of purchase is extracted from the MP3 file
... [example of a proof of purchase with a signature]
... Multi-platform, presentation is based on HTML/CSS/Javascript
... The agent architecture is an HTML5 platform with a few specifics.
... One of our expectations is DVD-like stability (it needs to run in 2021).
... But there are some limitations such as the online support as a release may not come with support for a long period of time.
... Using widgets that provide persistent storage could be a solution.
... HTML5 is not yet done.

jp: Put in the context of Web and TV. First reaction is let's not forget radio, music.
... Maybe we can consider solutions in these other fields.

jp: The media annotations group has been done some stuff.

gregg: the media annotations is more a flat thing. We need more structured information.
... I already presented this work at last TPAC in the media annotations WG. Daniel Park is contributing to CME as well.

Metadata and Service delivery architecture, by Alexander Adolf (Conditon-ALPHA)

alexander: I've been working a long time in DVB.
... [worldmap of DVB land]
... Countries where DVB is already deployed and countries where there was a signed agreement on terrestrial frequencies.
... Time scale for these decisions: two times per hundred years.
... 500 millions receivers deployed by DVB members as of late 2009.
... TV is very huge.
... On total digital receivers in use: DVG is 52%, IP is 7%. It has momentum.
... Technical proposal: example of twitter feed with a link to the TV show
... Users click on the link, and get the show.
... It would be great, indeed.
... The scheme part is "crid". I'll get to that later on. The contextual menu should have three entries: Read more, watch and record.
... These 3 options call for two features: one is service discovery and selection. The other is content guide.
... Let's focus on the content guide. DVB has used TV-Anytime, based on XML.
... It's inherently Web-friendly.
... It allows for segmentation, and schedule, and uses CRID (Content Reference IDentifier)
... All features (title, director, ...) link to a CRID that identifies the content.
... This name then needs to be resolved: content you have, broadband accessible content or broadcast.
... The URI resolution process is one-step: DNS servers give you the address. CRID resolution process is multi-step.
... example of Olympics and news, with resolution process that take you to things that are more specific.
... We do not have such a resolution process as of today.
... We need a federated and distributed CRID resolution service with a first level local component in the client, and security and authentification.
... Content providers want to ensure that the content displayed is their content.
... Now the other part: service discovery.
... [example of a service discovery bootstrap]
... Two modes of delivery HTTP, where you do GET requests. If you get a DVB address, you do the other thing.
... Service discovery records already use XML.
... So why do we need this complexity?
... Service provider takes content from Content creators. Platform operator takes content from service provider. And the network operator delivers the content.
... Platform operator and network operator may be combined. Some people do everything, or almost everything.
... All combinaisons are possible.
... I could continue this for a long time. That's why it's important that we have fine-grained features.
... Standards proposal: I don't think that DVB will really want to start working on a full internet TV solution. They're a big player, but not to the point of stepping into other businesses.

... I think we will need to team up, between DVB, MPEG, W3C.
... W3C has HTML5 and CSS3. DVB has already created XML formats that could be added. There's a set of 10000 Java APIs that Blu-Ray has also adopted.
... As you all know, DVB has been working a lot with MPEG.
... We need more connection between W3C, DVB and MPEG.
... Interactivity with APIs is required.
... Conclusion: we can have a willing combinaison in implementing this. My goal is to have service compatibility.
... Services transported on different networks.
... I think that would be a winning team.

Question: consumer electronic in the US has something built on TV-Anytime.

thomas: why don't you use HTTP URLs?

alexander: how do you ensure that the metadata still corresponds to the content? Whatever operating environment you may have. I think we need that additional indirection.

jp: there are also DVB URIs.

thomas: Still, HTTP URLs are much more deployed than everything else.

alexander: in my view, the source in the video tag would be a CRID or a DVB URI.

mark: getting more info from a URI about other URIs is very much REST, common API functionality.

giuseppe: what about the rest of the world in the map you showed?
... For the audience that comes from the other parts of the world, do they share your views?

alexander: In mobile, we went from segmented standards to global standards. We're heading in the same direction for TV.

giuseppe: some requirements were identified from some region, are they valid elsewhere?

jp: that's what the IG is for. Join the discussion and IG, to reconciliate the URI resolution mechanism as well.

NTT on Service Discovery, by Kiyoshi Tanaka (NTT)

kiyoshi: IPTV Forum Japan has 54 members and develops specifications followed in Japan.
... I'll show a video originally intended for promotion, but it's a good starting point, I think.
... [video presentation of IPTV Forum Japan]
... Introducing IPTV with the example of Hikari TV.
... Screenshot of the menu on a TV screen. With a remote controller, you can interact with features.
... Two features: high-definition video delivery and IP retransmission of digital terrestrial contenct.
... Specifications are harmonized with digit TV broadcasting service, so we can manufacture TV that are both DTV and IPTV.
... They are also harmonized with ITU-T.
... There are many points in common.

... IPTV terminal is based on H.721.
... This model is implemented and deployed.
... Going back to service discovery. Why is it needed? Multiple service providers available over each network.
... You need some way to discover them when you use a new IPTV device.
... It allows users to enjoy various services and service providers easily. You need to get service provider descriptions for the user to select the appropriate service provider.
... ITU-T H.770 defines the various parts needed for that selection to happen. It is harmonized with DVB, as well as ATIS (Alliance for Telecommunications Industry Solutions).
... In the Web and TV, they must be some mechanism to discover service provider discovery and service discovery, harmonized with ITU-T H.770.

hj: are there providers in Japan that use the same specification?
... All the service providers use the same specification in Japan?

kiyoshi: service providers can use the standard, yes.

hj: could this be used outside of Japan?

kiyoshi: I don't know.

masahito: wearing my ITU-T. Developing countries in particular are adopting ITU-T right now.

> < **chaals** > [India, China, Singapore, Nepal... and many developing countries.]

jp: We have a proposal here to have the IG have a look at the specifications from ITU-T. Can W3C have access to H.770?

masahito: there is an official liaison between W3C and ITU-T.
... Everybody can download the PDF file of these specifications.

jp: ok, we need to ensure that the work flows in the right group

masahito: in Korea, some specifications of ITU-T have been adopted. TV-Anytime is being used there.

APIs and URLs for Social TV, by Dan Brickley (NoTube project & Vrije Universiteit)

danbri: going to present 3 requirements from linked social tv, and will try to reshape the requirements in terms of what W3C should do next.
... [some background on danbri, w3c, semantic web project, joost, social web group]
... We looked at different things that failed to build or were built to extract actual requirements.
... First thing: let metadata flow widely, advertising content rather than be a hidden asset. Second thing: it is very useful to identify content with useful URLs.
... The scenario we have in mind is not TV as a device. The Web is not just technology. It's a linked world with lots of people connected to it.
... We sketched a lot of scenarios.
... and we noticed that nobody says stuff like I wish wacthing TV was more like using a computer!
... We build some prototypes and demos. I love APIs too.
... Here is an example: you can use the Web to put stuff on top of others. Sometimes it's

useful, sometimes it's not.

... I've brought a few remote controls [showing a huge TV remote control]

... People who designed these things were not stupid, they had to resolve competing requirements.

... We tend to think that by hacking with free software and media center, we can experiment freely.

... We've made experiments with pairing protocols, for instance with QR codes and XMPP uris.

... [demos of prototypes with second-screen]

... We wanted to build things that are agnostic of the device you're using, the context you're in, etc.

... We need to take into account new devices such as multi-touch big tables.

... Second screen APIs have huge potential, standard protocols are needed. XMPP has some potential, but it's hard to address latency issues when you're going through e.g. Google.

... Things are useless without identifiers.

... Example of a demo that connect archive.org films via wikipedia to the rest of the world.

... Whenever one thing is improved, through links, the rest is improved as well.

... We've used Microsoft Pivot Viewer here.

... By using a URI to identify content, you can follow links and get deeper in the Web.

... If you look at the source of these two pages: you'll see RDFa with Facebook ontology.

... Conclusion: this is not rocket science (we know the Web is built from URLs). Linking documents is much easier than linking devices. You should be talking to each other more.

... Protocol deserves a working group. I would like to see best practices note discussed within the IG.

[Matt Hammond, BBC taking the stage]

matt: we think we should leave the UI up to the client, and expose the identifiers, metadata, state and a few APIs.

... What we've been building is a RESTful web API, based on XML.

... Discovery mechanisms are specified. Fairly high-level data model (content, sources, outputs, acquisitions, application extension mechanism). These kind of model applies not just for TV, but also for Internet radios or media centres.

... We've built a prototype using MythTV with an iPhone client.

... Accessibility is built-in.

... Things get interesting when you combine things with the Web, e.g. a personalized BBC page that provides info on what you're currently watching.

... Companion content in a second screen (synchronized) is a useful use case.

... We want to push this kind of API. Our draft will be publicly available from Friday, and will be submitted as a member submission to W3C

jp: I would be ready to sign the metadata freedom act, danbri ;)

<div align="center">

Session 6: HTML5 and TV: Gap Analysis

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Moderator: Giuseppe Pascale (Opera)

See description of the session in the agenda *for links to papers and slides*

DAE Objects and <video> extensions, by Jan Lindquist (Ericsson)

Overview of agenda ...

jan: [slide of OITF reference architecture]

... several extension to access tv related functionality, including widget management, DLNA RUI architecture, DRM, media playback, PVR, parental rating and communication services

(OITF = OIPF compliant terminal)

jan: scheduled content, including service discovery

[Slide with extensions for playback IDL]

jan: Classes for audio and video components (AVComponent) accessible from stream, allows selection of video / audio through javascript

... Events dispatched when new components available or components are removed

... Can be used for adaptive streaming

[Slide with extensions for buffering]

jan: Events and properties related to bandwidth availability (for adaptive streaming)

... Also events for when periods change (for example when changing channel)

[Slide on DRM (Content service protection) API extensions]

jan: Generic interface, without specifying specific DRM system solution

... High level interface, being notified when there are DRM events, and passing messages to the DRM system

... Jan is not suggesting W3C use these exact API:s, but hope to inspire the W3C in API design

[Slide on device Configuration API]

jan: deviceID property, to uniquely identify devices

... API for storing digest authentication credentials on a per-domain basis

[Slide on general video]

question Michael Lagally/Oracle: on the API slides for adaptive streaming - why expose the details of AS to the application, shouldn't it be contained on a system level?

JL: The intention is for the application get some kind of metrics for the content you provide. "Good to know" - like an icon to indicate that the quality has changed. Can improve user experience

M?: No way to influence the situation

JL: Yes there is a way to influence the buffering strategy through the interfaces

[Back to video slide]

jan: Two different embedded objects, one for video-on-demand, one for broadcast video

... Gap analysis / comparison between these objects and the HTML5 video element

... Pretty much in synch ... fullscreen still missing from HTML5?

... Components for audio and video (AVComponent as discussed earlier) are missing from HTML5, this is an area where W3C standardization would be welcome

... Semantics of what happens to streaming video when video playback is stopped, is not taken care of by HTML5

No mapping for channel changing (bind to current channel), circular buffer, and recording also not covered

[Reaching expectations slide]

jan: Establish performance requirements
... Certification process to ensure user experience
... W3C provides a toolkit, other groups provide a toolkit. Not the realm of W3C to get into underlying protocols like DLNA.

[W3C Collaborations slide]

jan: 1: Align the video tag for both HTML5 and SVG.
... 2: Need to establish boundaries: Who does what?
... 3: New interface for recording and control of play out of time-shifted content

Connected TV (CTV) Standardisation in the UK, by Steve Morris (UK DTG)

[Slide about DTG]

[Slide: DTG Connected TV programme]

SM: New section in DTG D-book, part B: for the hybrid case

[Slide on DTG ecosystem]

SM: phase 1: Terminals are hybrid, phase 2: Terminals will be broadband only (PC or iPad for example)

[Slide on HTML working group]

SM: Key challenges: Make it easy to use, coexistance with existing services, a step-change in user experience (UK users are used to DTV services), must be usable as a base for new specifications
... Based on HbbTV, plus new features which are required for UK
... Biggest new feature which is not from OIPF is improved graphical capabilities
... Advanced CSS3 (transformations and transitions) and HTML5 canvas elements
... Subsets to perform well on existing silicon
... Extensions to the application lifecycle, including coexistance with MHEG and other types of applications

[Slide on challenges and opportunities]

SM: users don't care where content comes from, why should applications force them
... Many benefits for users and services

[Slide on cooperation with other bodies]

SM: Not having to reinvent the wheel is key
... Common conformance and interoperability tests is very important
... Otherwise, ttm is simply slow
... DTG is working with other bodies, hope to see W3C as a partner in this
... Core technology is more than just a spec, also a common way of testing

chaals: Talked a lot about testing "noone reads the spec all the way through". How do we share tests for effectively? How to make sure test cases are handed back to spec implementers? To avoid fragmentation of conformance suites

SM: It's about who should a set of tests. In DTG, it builds on work from many bodies. It comes down to being able to say: "This is what we are using". Not necessarily about who implements tests where, but about defining the boundaries and knowing that you can reuse test cases from for example companies like CEA

chaals: Test cases are really hard work, if test cases were sent back to people who wrote the specs - the spec group can help review the test cases and that they are used in the same way. And help other groups get access to the tests.

SM: That is where everybody wants to end up, but because tests are expensive to make - companies who make them are not always willing to distribute them freely

Giuseppe: Lots of work has been done outside of W3C, but why done outside W3C?

Mark Vickers: Taken a very different approach on this nowadays, previously build on top of MHP. Had everything we needed for TV but doesn't make sense on other devices. Now we have services we want to run on other devices. From that POV the only solution is a single common platform. Gather requirements to see what the missing gaps in HTML to arrive at such a platform. This should happen in W3C. No reason to make TV-specific API:s, should be able to run on ot

Giuseppe: How do you envision this cooperation in practice?

JL: Create an API that can be used as an input, and reviewed by W3C groups, jointly working between the groups to arrive at an API.

Home Networking, by Clarke Stevens (CableLabs)

[Slide on web & North american cable TV]

CS: CableLabs is formed to bring together several cable companies to form common standards

(scribe was disconnected, sorry)

Trying to fill in gaps

CS: Opened bug 11326 in HTML5 bug tracker
... Now working on sample implementations to facilitate acceptance to specification

(This is regarding DLNA API in javascript)

[Slide on CableLabs prototype]

CS: Prototype based on WebKit and open source UPnP stack (CyberGarage), exposed functionality through javascript from WebIDL definitions
... Create a UPnP control point in javascript / HTML. Locate renderers and servers

JL: You have provided a UPnP framework, not services?

CS: Right, our approach has not been very comprehensive, interested in working with other partners to provide a more complete implementation

[Slide with prototype UI]

CS: Select your content, and your renderer, and you can control playback through the UI

[Slide on next steps]

CS: Work with browser vendors to implement prototypes
... CableLabs to provide as much information as possible to help other implementers
... Also interested in generalizing to other home networking protocols, like Bonjour
... Big concern is security, current interfaces do not have a sufficient security model
... Similar issues that apply to geolocation and device API
... "Opt-in" model

[Informal poll slide]

CS: Raise of hands - how many would support an HTML5 JS API for selecting multiple A/V tracks
... Raise of hands - how many would support a W3C JS API for local device discovery?

Both questions seemed about 1/3

CMN: Have you looked at Opera Unite? Allows you to serve media from a local server in the browser

http://www.opera.com/unite/

CS: Not familiar with that technology, sounds like it might be related

CMN: About raise-of-hands, how many people would actually *oppose* ?

françois daoust: You keep mentioning a UPnP API based on DLNA, can be done compatible but independent of underlying protocol. Concerns about DLNA being freely available

CS: Not aware of the exact license

dong-young: BONDI includes DLNA API, is your API in alignment with that?

> < *MattH* > [DLNA certification process/costs: https://certification.dlna.org/test-lab.html]

CS: Only in the sense that they are both based on DLNA, otherwise not. Open to collaborations with other interested parties to converge specs

MH: I contributed the BONDI API when it was alive. BONDI is kind of dead, moved to WAC, all API:s are contributed to DAAP in W3C. Discussion on CEA-2014-B which has defined a DLNA interface.

CS: Events have already overtaken CEA-2014-B

JonPiesing: Privacy concerns around the DLNA API in JS. How to design such an interface with an opt-in mechanism which doesn't make the user think that the UI is broken

JP: Especially difficult for TV viewers. Might be OK in an environment in subscription situation or similar, but otherwise difficult to design the interface

> < *Marcin* > DAP thread re DLNA: http://lists.w3.org/Archives/Public/public-device-apis/2011Feb/0023.html

MV (Mark Vickers): CEA-2014-B would need to be contributed to the W3C, until then W3C should work on one of its own

> < *chaals* > [/me hears an echo from Jon of what Danbri said. People aren't hoping that watching TV becomes more like using a computer... at least in terms of UX]

MV: The javascript API can be described in such a way that it does not need to bring in any DLNA IP

MV: Up to implementers to decide if it uses Bonjour or DLNA

Mark Watson: Exposing services can mean different things, how to expose them in a sufficiently agnostic way? Not straightforward on how these interfaces should be designed

CS: Gateway devices is one approach

JL: What is really the scope of the IG?

CMN: W3C is a lot of different WGs, meet in different ways, work in different ways. Members need to learn how to work inside them. The IG is neutral enough to do this, but it is not the place where requirements will be written.

Members of IG need to dive into the working groups and do the work

CMN: It is important to take those next steps and etner the working groups, this is where the actual work will get done

MV: What is the group for this (DLNA) kind of discussion?

CMN: DAP
... The right group and right time, and it needs people to get involved

GP: The point of the IG is to act as a starting point

MH: The DAP is now rechartering, if there is momentum hear today, it would be good to get input from people here and respond to Robins mail. This is a good time.

Tatsuya Igarashi: Is the DAP specific to mobile devices or can apply to TV and PC:s?

> < *francois* > Device APIs and Policy Working Group

MH: Originated from mobile world - now moving focus to other devices
... Somebody has to contribute from
... to the WG

CMN: Opera is a browser manufacturer in the DAP group, in our interest to make sure it

works for all use-cases
... And we do think it is worth supporting

TI: No strong opinion on who works on API, what about providing a framework for local applications, web applications group may be relevant

Current DAP is not exclusively for mobile phones, APIs are general enough to be used everywhere including TV

[Break for lunch]

Session 7: Accessibility

Moderator: Kazuyuki Ashimura (W3C)

See description of the session in the agenda for links to papers and slides

Universal Design Process, by Mark Magennis (NCBI)

mark: National Centre for Inclusive Technology.
... I felt like an elephant when I came here. What am I doing here?
... I'm a Web and TV accessibility person.
... There is a need for inclusive Web and TV services. Lots of presentation have mention users. Some have mentioned accessibility.
... I'm particularly interested in disabilities and aging.
... 1 in 6 person in EU has a disability for some broad definition by the EU
... From the UN, 1 in 5 will be over 60 by 2050.
... GUI are complex, and they are also being forced into people that are not Internet users to start with, whether they want it or not.
... [video demo of a smarttalk TV that reads EPG]
... other examples will be e.g. contrast-related.
... Access services require captions. Also audio description. Audio description gives you an oral description of a scene for people who cannot see.
... [video demo of oral description]
... [lots of blood seen on screen!]
... Accessible media player is key as well.
... The goal is to do a 10 foot inclusive user interface, using a remote control.
... There is some regulatory pressure. In the US, the 21st Century Communications and Video Accessibility Act mandate broadcasters to produce audio description for video content.
... In the EC, the commission has plans for a generic e-accessibility legislation.
... A lot of that is pushed by the UN convention on the rights of persons with disabilities.
... You can expect more regulatory pressure.
... On the Web, the big spec is WCAG 2.0.
... It's being adopted by national laws in some countries.
... It's technology independent so it can be applied to TV as well.
... On TV, you have lots of other standards, by ETSI for DVB access service delivery, ITC, IEC (text-to-speech for DTV receivers linked to the first demo I showed), and then the UK DTG D-Book addresses stuff such as remote controls.

... My suggestion here is to take all these existing standards and requirements and bring them together.
... All these organizations need to talk to each other to ensure that we create an inclusive platform.
... I'm here to learn than to tell you anything.

kaz: I'm also involved in voice activities in W3C. There is some standardization work on speech going on.
... Accessibility is in scope of the charter of the newly launched Web and TV IG.
... The TV IG will also work with these groups within W3C and external groups.
... I quite agree about the importance of speech-to-text for TV.
... What about using speech as input in next-generation TV?

mark: that's the one area I'm least familiar with.

philipp: on the learning part, we have a whole division that takes care of accessibility. One thing that this division does is reviewing all W3C specs that come out of other working groups.
... These issues are quite well represented in W3C.

mark: thanks for mentioning it. I was not aware of that.

GUIDE - Adaptive User Interfaces for Accessible Hybrid TV Applications, by Christoph Jung (Fraunhofer-IGD)

christoph: a brief overview of what we do in the GUIDE project. Specific focus on elderly users
... we need projects like GUIDE because of the growing elderly society, and there are a number of impairments that need to be taken into account.
... At the same time, user interface technology, speech recognition, touch interfaces, etc.
... Third aspect is content providers.
... Some major gaps we currently have to face: we perceive a huge lack of awareness and acceptance of accessibility in the industry.
... It is time consuming and costly to design things with user involvement.
... The APIs are there, the guidelines are there but may need to be completed with specific Web and TV requirements
... GUIDE can help because it replaces user-centric with improvements to accessibility guidelines, adaptive user interfaces, and tools to simulate user environment.
... At design time, we want to provide tools that simulate things such as visual impairment, or the time it takes for a user to go from one button to another one.
... The second thing that supports Web developers is the guidelines handbook.
... On first usage, we collect users data. Once we have collected their data and limitations, we can adapt their experience real time.
... Considering Web technology we use in GUIDE: set-top box by Technicolor, Opera browser.
... We want to seamlessly integrate in existing user interfaces.
... We're looking into markup languages to describe the UI. Wai-ARIA is being considered.
... We have a few applications for this concept: video conferencing, home automation, content access...
... We're into standardization. We carefully observe the developments in HbbTV and HTML5 here.

... We're also really active in the VUMS cluster in EU.

... Conclusion: we have to disseminate accessibility in the industry. We need progress on standards.

... We may need to define more precisely the roles and responsibilities of browsers, APIs, UIs, assistive technologies.

... For application, we need to identify and specify future application scenarios to extract requirements.

... I think we can also leverage adaptive accessibility in non-accessible technology.

... Research-wise, we need smarter accessibility, adapted to users. We'd like to automate the simulation process.

... Use of the cloud can be very helpful.

chaals: how many people know how to get accessibility of their products checked?

... [counting: 6 people in the room]

... How many people have an idea of the level of accessibility of their product.

... A couple, I see. That's good.

... We saw in the Tokyo workshop that broadcasters and TV manufacturers do very good stuff on accessibility.

... W3C has a way to review accessibility. It may not go well when disjoint groups of people come with different angle.

... Especially when accessibility comes late in the game and report problems with specs.

... There has been precedent in the W3C with tough situations.

... Please think of accessibility as a requirement at the very beginning.

... Otherwise it will bite you in the end.

... One of the things we need to look about in the Web and TV IG is what we can do in that field.

... the amount of captioning in TV is probably way above what exists on the Web today.

... This is more advertisement to listening to these guys, and that people like them or me will be looking into such considerations.

christoph: we had a meeting on Monday. We discussed how to disseminate accessibility. Regulation is one way.

... But it also has to bring something to the industries.

... If you provide services to elderly people, for instance, you can provide services to more people.

mark: quite often, what comes out from companies is that they don't see a business case, at least no improvement of business case.

... There is a lack of hard data to highlight the cost vs. benefits of going down the accessibility route.

christoph: Shadi mentioned on Monday that there is a WAI page that describes success stories.

> *< chaals >* [a reason for not generating the hard data is that it's quite hard to do the necessary research (it's hard to get data on the business case fo documenting the business case...)]

Comment in the room: User accessibility is going to be key for the future.

... I would like to see multimodal interfaces in the future. I don't understand why it's so difficult

to see the business opportunities.

MarkVickers: most of the accessibility features are useful for the whole customer base.

... Simple example is watching a video with the sound down.

christoph: that's a point I raised, accessibility is not limited to people with disabilities.

danbri: agree with the last comment.

... If we could make a working group in the Web and TV area, it would be good to have accessibility as a starting point.

... Working group on APIs for second-screen scenarios with accessibility, is that a good priority for you?

christoph: yes, that's one way to do it. People need to be more involved in W3C.

mark: not familiar with W3C work. Accessibility is horizontal stuff.

... They need to be integrated into the whole thing.

chaals: in the good days, W3C members send people to work on these matters, and take requirements into account. On the bad days, some groups do not even think about it.

... Having people available is difficult. Not everyone in the world is an expert in accessibility, and it's hard to find the right people.

... My expectations if we were to work on remote control API, there is experience around, as it's been done a decade away.

GeorgeWright: accessibility in TV has been incredibly better than on the Web. Accessible is tied to usability. The TV industry has got it somehow right.

> *< chaals >* [agree that in many ways the TV industry has actually done a better job than the web at large - I hope we bring all the best of that into the Web (not just the Web on TV)]

MattHammond: accessibility targets other usage contexts.

Session 8: Profiling / Testing

Moderator: Yosuke Funahashi (Tomo-Digi)

See description of the session in the agenda for links to papers and slides

yosuke: [introducing the session on profiling/testing]

Profiling, testing, certification, by Narm Gadiraju (Intel)

NG: need a TV profile - a set of HTML5, CSS features to create a compelling TV user experience

... today's specs are strongly focusing on PC, smartphones

... which has specific user input devices (keyboard and mouse, etc) and a specific mindset

... an experience with pop up windows and scrolling ads may be expected, or acceptable, when using a web browser on such devices

... this may not be true in the 10ft TV experience

... for one thing, there is often more than a single user

... hence a UI challenge

... service and content providers also come with UI requirements

... new applications bring new requirements.

... premium content, social interaction

... also the fact that content can be present / used on several devices

... mentions the confusion about the HTML5 term. Is it just HTML or HTML5, CSS, etc

... note there are other standard bodies implementing (or refering to) HTML specs

... now we have established need for a profile, let's talk about testing

... we need a test suite developed to check that the profile is suitable for the intent we have dertemined

... the test development need to happen with the development of the profile, with members contributing tests

... the test suite and features can be debugged during the TV profile development

... ensure maturity of the test suite, then it can be used as a basis for certification

... certification brings benefits to device vendors and other interested parties

... device vendors can advertise the enhanced value of their offering

... as a user, too, I can be more confident knowing that a device has been certified

... and I can confidently assume that the web applications of my choice will run on the device

... software developers too know they can develop for the platform

... finally, service providers would be able to develop services for several TV platforms and app stores

... certification does comes with challenges. cost and complexity of developing a compliance program are not trivial

... additional overhead

... my recommendation would be to keep the certification simple.

... e.g. through self-certification

... the tests could be made available to all, device vendors could then use the test suite for devices under test

... and submit test results for approval

... [end presentation]

[Q&A begins]

chaals: how do you know that web applications will actually follow the specs, in the context of the consumer being "confident that devices will run applications of their choice"?

NG: applications may not come directly from the TV, thinking more they could come from an app store or service provider
... (hence adding some form of control)
... but no guarantee

chaals: [questioning whether consumers actually care about certification]
... (anecdotal) evidence that developers don't get it right - the web is not made of stuff you could certify so dealing with stuff that is correctly done is not necessarily of any practical value
... mismatch with a certified/certifiable platform

> < *chaals* > [And after Apple came along and ignored all certification but insisted everything went through *their* certification, Android came and built a market that doesn't bother testing. And outsold Apple as a platform]

> < *chaals* > [Not questioning the value of test suites, BTW - agree that they help us all]

NG: question the assumption that the platform itself is not certifiable

[scribe missed part of answer]

James: there is some value for developer to know that the plaform may be certified

Question: is there some research at intel in the area of profiling or tests?

NG: our experience is mostly through our work in upnp and dnla

NG: UPnP has similar self-certification

Philipp Hoschka: say more about how you know self certification works?

NG: experience with UPnP. Don't have the numbers here but a lot of upnp devices certified
... can dig

PH: thank you, would be useful

> < *chaals* > [I *think* that Narm was questioning my assertion that the vast majority of web applications would not pass certification, but I could have misinterpreted]

> < *chaals* > [I should have been more explicit. The impliaction is that it may be more important to support market-leading apps like google, farmville, facebook (and mid-level stuff like banks) than it is to support correctly-written content - if it has little market appeal]

Stable profile in retail TV products, by Jon Piesing (Philips)

JP: "retail TV products and the need for a stable profile of web technologies"
... people need to understand the range of business models
... vertical pay TV, horizontal pay TV, diagonal models

JP: some subscription based, other not. many variations
... all valid, all have different requirements

JP: will focus on horizontal model
... specificity is that there is no network maker in control
... and manufacturers get income when consumers buy device
... and the consumer owns the device
... with no contract between consumer and service providers

JP: it has a major impact on software updates
... updates have a cost - payment to suppliers, integration, testing, and distribution
... typically, this means that there will only be small amount of software updates, critical ones
... this is not unique to TV
... gives the example of Android tablets system updates
... not a lot of updates coming once you buy a device
... this means we need very stable specs
... because if the spec changes, today's sold device is tomorrow's legacy problem
... examples of such issues and hard choices: HTML5, Widgets, UK DTG CTV specs - CSS3, Web

notifications
... there's no right answer
... need to stress key aspects
... test pages, streams and files
... downstream specs making their own test suites would be a waste of effort, and a problem for implementors
... most relevant for HTML5 (areas which differ from HTML4), CSS2D and 3D
... question of minimal performance whenever working with graphics
... interesting to explore integration of existing W3C tests into future framework
... suggestions
... organisations will be making (stable) selections from newer W3C specs for TV and related markets
... should explore cooperation on test materials
... note a lot of work on API already done by OIPF

[talk ends]

Open Test bed for Web and TV, by Martin Hahn (European Commission)

MH: we are thinking about whether it makes sense to fund open test bed for webtv
... asking the audience

[no feedback from the audience]

JL: So if someone takes e.g. HTML5 video, from a given working draft, that means that W3C should be careful about changing that bit afterwards.

[question was about dependency and cooperation between standard bodies]

JP: standard bodies have been cooperating and acting on issues in spec references for a long time. Just talk together

NG: mentions work done at DLNA, members of which will be bringing it to the table at some point

chaals: liaison between orgs happens through mail/conversation, not documents
... good question on whether OIPF docs are worth bringing to W3C. should be worthwhile and not too painful

Giuseppe Pascale: testing is as important as spec, yes; not sure it is role of W3C to take care of certification

chaals: would be happier if EU funded several test efforts, than one big official one

MH: european projects are only ever started based on needs from constituency

NG: notes that MH didn't leave the audience a lot of time to respond. too early to decide whether there is or not a demand for test framework at EU level

Jeff Jaffe, W3C: agree test is important - and hard. Let's get help where we can find it. How to use that help is the right question, not just a straw poll

Mark Vickers: the first thing would probably be to have W3C scope that work

... then decide whether to have centralised effort, distributed, etc
... we first need to know what the effort will be

Clarke Stevens: what about other industries, like PC industry, are they pushing for certification

Jeff: want to offer clarification on html5 testing effort
... no doubt that there is a need for robust test suite
... announced work at meeting in november
... starting to get test cases from the community, with browser vendors already contributing

> < **chaals** > [There is a push for more and better tests... but not for certification]
>
> < **chaals** > [test suites are living and dynamic so can update in the rhythm of web technology development... certification tends to be less flexible]

[Q&A ends]

[short break]

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Conclusion: Wrap-up, Next Steps, and Actions Items

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See <u>description of the session in the agenda</u> *for links to papers and slides*

Priorities from TV makers point of view, by HyeonJee Lee (LG Electronics)

hj: [summarizes differences between pc and tv
... The various standard bodies provide specifications and extensions for TV.
... Meanwhile, smart phones, new devices are getting on TV.
... So now, we are discussing the Web and TV in W3C.
... we'd like to make the discussion profitable for our customers.
... From the user's point of view, applications seem to be almost the same.
... But content providers and TV makers need to support multiple solutions. That's a huge waste of time.
... Also, TV is a constrained device.
... So, TV makers want to have a single solution.
... The W3C is the safest place to have baseline platform because the patent policy is clear and RF.
... We think the success of this activity is not related to the technical expertise. The most important criterion is the time to market.
... First thing we should try to do find a common baseline.
... First priority: video tag extensions for HTTP adaptive streaming and DRM.
... If we are successful to have the baseline of that technology, then the integration will be beneficial to everyone.
... To meet our schedule, I'd like to propose a task force within Web and TV IG.
... Second priority: multi-screen interaction with new Javascript APIs.
... Task force in the IG or a WG.
... Third priority: TV profiling. That's a controversial issue. I think we should have a task force

within Web and TV IG.
... Possibly give some initial input by end of March.
... Fourth priority: security considerations of Web technologies.
... TV is the most stable device at home.
... malicious code could exploit security holes.
... Fifth priority: Make a good developer guide for content providers.
... 16:9 expected ratio, navigation rules of TV remote controllers, etc.
... To be done later on in the IG.
... We hope that this can all be done in a 1 to 2 year time frame.
... If we lose this timeframe, we cannot prevent chaos.
... As TV makers, we will actively commit to these activities.

yosuke: comment on task forces within the Web and TV IG
... would like to hear from people which kind of TFs should be included in the IG

GP: Just to be clear, the presentation was to provoke discussion ...

JW: Would this be used to provide broadcast stuff, or just back end stuff.

Mark: Will be used for mainstream - all content

Summary of workshop discussions, by François Daoust (W3C)

FD: Here we want to assess the level of interest about different topics.

[FD explains the differences between working and interest groups, and what they can do]

FD: Important basic requirement is people to do the work.
... there are some ideas for task forces within the IG, there may be things we just don't act on, or we could create/recharter working group(s) if there are people to drive the work.
... Not that making a group requires people to be there, and some to drive the work of scoping.creating etc, writing the charter.

HTTP Adaptive Streaming

FD: IG can check on getting RF commitments - making a working group would just lose time.
... intergrating in HTML could require a new WG.

CMN: Why create a new Working Group to integrate stuff in HTML, given there is an existing one?

FD: If we can do it without touching the HTML5 spec that's better because that group has a clear roadmap.

MW: Regarding royalty free DASH it needs to be lear that it is the companies that we have to ask, not the SDOs. It would be valuable to send something from this meeting, to the 3GPP meeting next week.

FD: Any support

CMN: Yes. Support that it is a good idea.

[Moves that this meeting sends a formal request to 3GPP meeting requesting that IPR holders follow Microsoft in providing a royalty-free license to essential IPR]

Danbri seconded.

[Strong support, about 30 people, a couple of votes against]

Alexander Adolf: Warning that it is unlikely to be a resounding yes, since it is in the market already...
... DVB members will have questions back, so the discussion will go on.
... what is exactly the message to go there, what shape does the ongoing discussion take. Please send me a message I can broadcast to the DVB membership to help bring the fence down.

FD / GP: Message will be outcome of this meeting.

AA: What are your formal cooperation methods?

[Action FD to follow up with the request on how to do liaison]

JJ: Appreciate the metaphor of bringing down a wall in Berlin ;)
... suggest that when we write up the request that we amend the motion to be clear that it is for the web use case.

MV: Please track liaisons we should follow - DLNA as well as DVB

GP: Good that people want a clear view of how the proces works.

FD: Official statement has to come from the IG. This is a workshop minus a couple of participants.

MarkW: We should be clear that we don't expect to get back a statement from everybody. There will be a judgement call to make at some time. I think it is important to be precise. So it is useful to identify the W3C-side contacts who can engage in a discussion of what this means.

Iraj: For MPEG, if the IG asks for this it will be more effective that the workshop answering.

Support for additional functionalities

GeorgeWright: We need synchronisation of media.

FD: In what form?

GW: Not sure, but it needs to be listed as an explicit requirement.

JCD: Sometimes the best solution for something wouldn't necessarily be an API, but some other support for...

FD: So the workshop can make a request, and the IG can make its own request later - please join the IG, because it relies on its members, and bring this to the IG.
... Not sure what we need to work on in content protrection. Common Encryption doesn't seem to fit. SUpport for key exchange can be done, seems to be a valuable item.

Olivier Thereaux (BBC): Missing a liaison for the capacity to play content-protected video,

extension to `canplaytype()`.

> < *danbri* > [wonder if everyone here knows how to join the IG ... http://www.w3.org/TV/#tvig needs a bit of update ...]

> < *kaz_* > kaz: people can bring these ideas to the IG mailing list

?5: It is good to look at what people who are already using stuff from browser world actually do, when we are thinking about profiling.

FD: Not sure what next step in profiling is - think it is discussion in IG do figure out what we should be doing, reviewing what we already know, ...
... related, testing framework.

> < *danbri* > [http://www.w3.org/2010/12/webrtc-charter.html "API functions for establishing direct peer-to-peer connections, including firewall/NAT traversal " relates to the Remotes / 2nd Screen / "Trick modes" proposal]

?5: Think they are seperate topics.

scribe: all the acronyms are already using some form of web technoogy in their systems...

> < *MattH* > [+1 danbri's observation]

FD: Support for *

Olivier: You are missing things - you have play/pause/ff and there are far more things that people were demoing. Multi-device, multi-screen control and command would be better.

FD: If you generally think it needs to be merged into one exercise that makes sense.

OT: Re DAP charter, it may be currently too limited to a single device - we are talking perhaps about DAP, RealTime and maybe something else.

> < *kaz_* > [danbri, "how to join the group" is explained in the charter (http://www.w3.org/2010/09/webTVIGcharter.html), but yes, we can put it on the group page as well]

FD: DAP charter is currently under discussion. Since TV is a device in a broader scope it seems relevant and timely to incorporate these requirements in the new charter.

Tatsuya Igarashi (Sony): Why is DAP being rechartered?

FD: First, because their charter is about to expire. And being aware of that we want to enlarge the participation.

DanBri: Think there is a strong case for remote control / second screen work. It isn't classic DAP, we haven't done the requirements gathering yet, and it requires more thinking than we can do in the time here.

Clarke: Trick modes, downloading content. Trying to figure what DAP is doing. Seems like it has been focused on cell-phone related apps.
... wondering if this spread the scope too thin
... if we add it.

> < *danbri* > danbri: and that there is a protocol aspect, nat traversal aspect, plus the specific domain modelling work for doing specific APIs. but first we need to get these

> devices to have a communications channel; if that involves NAT-traversal, see the RTC draft charter, which includes exactly that.

FD: Don't want to have a really broad scope. If we don't want to see TV and mobile as verticals, we want to have device-agnostic stuff. The WG was created from mobile input, but looking at device-agnostic design.

SC: Strongly support that goal. Wonder if having different objectives for the API makes sense.
... on one hand, play content, do TV things, other objectives pretty far from that.
... if not a lot of commonality it makes sense to split groups perhaps

chaals: comparison of several groups (HTML, DAP, ...)
... I strongly agree, if DAP doesn't do device-agnostic stuff, ...
... this is about what we're trying to do, not how we're trying to do it
... it's important that this be the goal
... it may be we have sufficent for 2 groups
... not TV stuff, Mobile Stuff; it's not This Workshop ; DAP
... more like some DAP, some webapps, some from here might make sense in a new group, other leftovers might be redistributed

[Unanimous support for trick modes, downloading, etc., about 25 people]

[home networking has strong support (about 25 people) but an explicit concern is privacy and security]

CMN: Think that is a clear and important concern.

Jon Piesing: It's easy to find a solution that isn't very good but gets to market quickly, because doing the right thing takes too long.

Danbri: Seems like you are saying we might do something bad, so let's not do anything.

Jon Piesing: This has been addressed a number of times in a number of places without getting answers so far. It may not be soluble.

PH: This is a similar issue to what is being discussed in areas DAP is already working on - privacy, security, etc.

> < *danbri* > [I suspect we're talking past each other, because the 'proposal' is simply the text "Support for home networking"]

PH: think the issue is understood (if not the solution)

Jon Piesing: Getting agreement from a user on a smartphone is different from getting agreement on a TV.

FD: Support for multi-track (issue-152)

Jeroen: Multi-track is part of adaptive streaming, if you put adaptive streaming you will have HTML.
... multi-track. It's probably also tied intimately to content protection as a work item.

MarkV: Could be done. In my understanding of the current HTML process there is a window of this month that will allow putting multi-track, but no existing window to allow adaptive

streaming. SO think we should be pushing at least multi-track now ...
... adaptive streaming can be done seperately if necessary.

JW: Proposal currently being worked on is about text tracks. Not convinced that auio will be in browsers before adaptive streaming -think not in all browsers, anyway.

MarkW: Proposal posted yesterday in accessibility area has a deadline of 21 Feb before going to the HTML group. That is one item that it seems like it is progressing and could progress quickly.
... there are a couple of others, and a discussion about whether putting a resource manifest in the src attribute could be done quickly and would be beneficial.

Yosuke: We are looking for consensus on the result of this workshop. This is a global workshop, but not representative.
... IG has public mailing list, and results of this workshop will go there.
... At Tokyo workshop we voted on topics raised, and in summary there were high-priority items.
... We should be thinking here in the same way - check results of that workshop and this group, get consensus on the tasks and priority

FD: Yes. This is stuff to take to the IG... there is a possibility to move some things on a fast pace linked to existing standards work.

GP: There is no reality to us asking for things in priority, the real priority will depend on contributions.
... I don't think it is as important to reach an absolute consensus on what is important, we can see from how much work gets done.

FD: On these items, are there people ready to commit time?

[Olivier Thereaux and Danbri volunteer]

MarkW: wondering where secure device ID goes.
... volunteers to do work.

> **< yosuke >** yosuke: Please be a little bit careful about that what we are doing here is just making a consensus with the participants in Berlin workshop.

> **< danbri >** [re charter drafts, people should circulate them in the IG, or with W3C team, ... or whatever they prefer ?]

Jeroen: You wanted something like "get my ID"?

MarkW: Yes. Privacy, obviously, is an issue ...

Jeroen: You have a lot of information about the user...

MarkW: It is important to make sure IDs don't track across domains. The question is whether we should not even strat, or should start and include the security provisions as a requirement of the work.

Jeroen: Seems like you might want to turn off a user.

MarkW: I may block access to my service...

?A: This stuff has strong legal implications, and is very complicated compared to e.g. geolocation.

> **< yosuke >** yosuke: Because workshops are inevitably regionally flavored event. So we'd better treat these results as a good input to the discussion in the IG.

MarkW: Those concerns exist whether you use a standard or not, so the fact (agreed) that this group is not competent to solve them all doesn't affect whether it is done with a standardised technology.

FD: Real Time communication group is starting at W3C

MV: THink this has direct overlap with the home network question - and it should therefore be done there.

?F: We have broadcasters... HTTP adaptive streaming doesn't cover all use cases. Support for multi-cast over broadcasting/networks would be important

> **< yosuke >** And I'm slightly anxious about the fact that in this wrap-up session, the definition of the scope of each topic on the screen seems ambiguous. That's another reason we'd better deal with those items in the IG.

FD: Since we didn't discuss it in the workshop, it shouldn't be in the conclusions of the workshop. Please bring it to the IG :)
... And that is general. Nothing will get done if *you* don't do it.

Danbri: should we do stuff in public?

FD: Would encourage you to do that, but if you are uncomfortable feel free to contact team to talk about it, but please feel free to jump on the list in public.
... [we had very hot discussion on accessibility as well. So probably we should consider that item as well.] ... Thanks, gotta go now.

Closing Remarks, by Jeff Jaffe (W3C)

JJ: Good to summarise after the thing has ended and people have run to take a plane
... Thanks to everyone who helped and hosted and stuff.

[End of minutes]

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