Expanding the Horizontal of Web

-Sony's Position Paper for the 3rd W3C Web and TV workshop -

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The paper describes a proposal how to extend the horizontal of Web. Thanks to the web technologies standards, the ecosystem of web has been expanding and the web accessible devices have also become diversified. Web is accessible not only by PC, but also mobile-phones, tablet devices, TV, so on. The state-of-art HTML5 and the companion web technologies will accelerate the trend to make web ubiquitous. W3C Web and TV IG is one of the ubiquitous web domain activities which discuss the requirements and potential solutions to ensure that the web will function well with TV. The IG has been discussing, so called, home network API, which enables user-agents interact with the home networked AV devices, e.g. DLNA devices, via home network. Sony believes that this concept of the API will be able to expand the horizontal of web, that is, connecting web services to the various type of devices, AV devices, home appliance, home security, home automation via the hub device, e.g. HTML5 enabled TV and smart phone. The scope of this concept is not limited to the home network, but any type of device in the world would be connected to web services. In this paper, we explain our view on how the API could expand the horizontal of web and the requirements of the API.

I. INTRODUCTION

Ubiqutous web is not a new idea and the W3C ubiquitous has been focusing on the vision and developing the technologies to enable web access for anyone, anywhere, anytime using any device. We share the vision and agree on the statement of Mr. Philips Hoschka, W3C Ubiquitous Web Domain leader.

"The Web is becoming more and more pervasive as an applications platform, and effective standards are crucial for reducing the costs of deploying applications across a wide range of devices and environments, whether in the office, at home or on the move. The Ubiquitous Web will provide people with access whenever and wherever they find themselves, with applications that dynamically adapt to the user's needs, device capabilities and environmental conditions. " -- Philipp Hoschka, Ubiquitous Web Domain Leader [1].

In the last September, the 1st Web on TV Workshop held in Tokyo, Japan. Sony made a presentation, "Web applications interact with Home networked devices – TV as the hub in the home "[2]. Our suggestion is to standardize API which enables Web applications to interact with home networked device. The API is tentatively named "Networked Device Connection API. (See Fig.1).
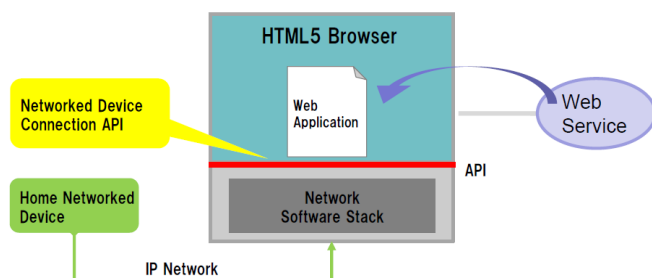

Fig. 1. Networked Device Connection API.

The proposal focuses on UPnP/DLNA devices as networked devices and indicates some use cases that TV with HTML5 browser enables mash-up of web services and home networked devices. Our idea is how to invoke non- web devices into the echo system of web. In other words, it is how to expand the horizontal of web.

In the W3C Web and TV Interest Group, the Home Network Task Force has been created in April and discussing use cases and requirements along with W3C members which have similar idea with us. As different as one's fingerprints, each member has a different view on the home network API. In this paper, Sony would like to highlight our vision on the ubiquitous web and the view on the API of local network discovery and message exchanges.

II. APPROACHES ON UBIQUITOUS WEB

We think of the following three approaches to make web ubiquitous. We think that app approaches are valid, however, we would like to high-lighten the 3rd approach since it is what we would like to realize with the "Networked device Connection API.

1) Let various types of device connect to web services.

HTTP is the core protocol of web and XML is the core format of web. To connect various types of devices to web services, it would be necessary to define a new XML schema specific to applications and services of the device-type. Alternatively, a new light-weight framework or formats/protocols may be necessary for devices which have low CPU performance and low memory resources. In this case, the gateway may be deployed in between.

This approach is very straightforward. However, there is some concern that is not leveraged by the device with HTML5 browser.
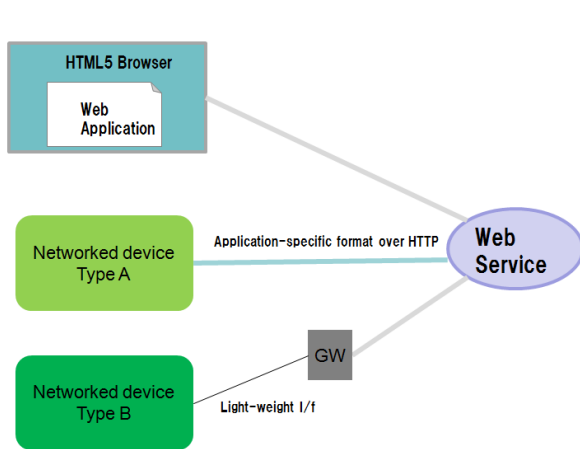
Fig2. Let various types of device connect to web services

2) Let various types of device support the web browser

HTML5 browser is not just for UI presentation but a application platform. To make various types of device supporting HTML5 browser, it would be nice to define device specific APIs (Browser Javascript APIs) to enable applications to access functions and/or resources of the devices.

This approach would be beneficial if the networked device has much CPU performance and memory resources and device have unique functions.
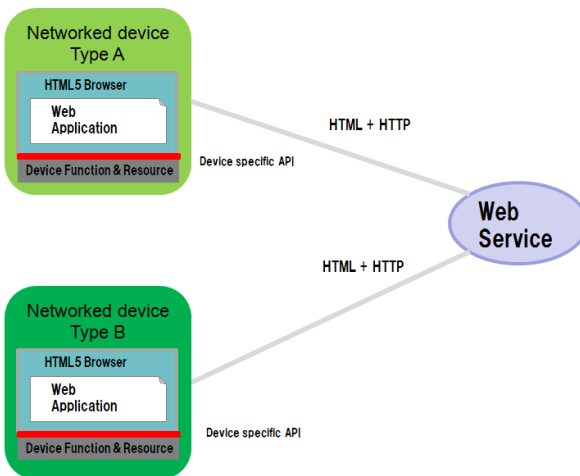

Fig3. Let various types of device support the web browser.

3) Let web applications communicate devices locally.

This approach seems to be a kind of mixture of the above two approaches. The networked device is not connected to the web service directory, but via the device with the HTML5 browser. The communication between a web application and the network devices is service/application specific. To realize this, the HTML5 browser needs to be extended to support Network Device Connection API which enables local discovery and message exchange with the networked device.
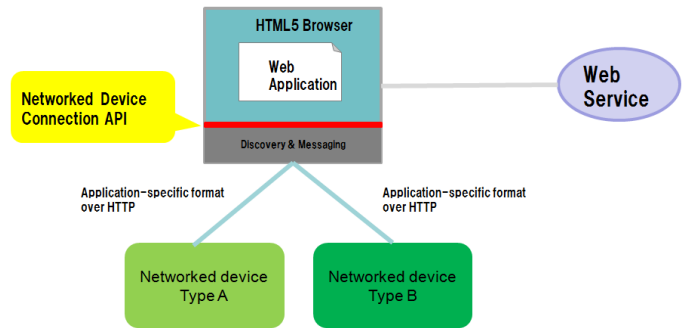

Fig.4 Let web applications communicate device locally

III. PROPOSAL ON THE API

To realize the Networked Device Connection API, we think of the following in terms of W3C standards..
- General service discovery and messaging APIs should be standardized
- Network protocols for the APIs should be specified

In terms of the solutions, it would be reasonable to align with the UPnP Device architecture [3], though the goal is not just to enable web applications to control UPnP/DLNA AV devices, but also to enable Web applications communicates with various networked device, The following are our idea about the solutions.

A. Local Discovery

UPnP Device Discovery should be used.

B. Message Exchange

XMLHttpRequest [4] should be used. SOAP is specified as control message of UPnP. However, web application can generates a SOAP message and send it via XMLHttpReuqest. In addition, the XMLHttpRuequest would be generally used to communicate an http server on the networked device.

IV. SECURITY & PRIVACY

Security and Privacy are critical issues.

Discovery on the local network should be performed under end use consent. The HTML5 browser has to be show a dialog message to indicate an application try to discover service on the local IP network.

An XMLHttpReuqest message to the networked devices has to be restricted. The HTML5 browser should maintains the while list of the networked device under the end user control.

.In addition to such security & privacy measurements by the HTML5 browser, vendors of networked devices should consider malicious attacks within local network. Home network is not safe. The attackers may not only be virus software installed in PC, but also application installed into smart phone may be attackers to the home networked device.

In the case of DLNA devices, some vendors have already implement MAC address filtering control to enable end users to grant access to the networked device. Device vendors have to consider security issues on malicious attacks seriously.

V. CONCLUSION

In this paper, we explain our view on the proposal about Networked Device Connection API. Thanks to the state-of-art HTML5 and the companion web technologies, smart phones, tablet device, TV will support the HTML5 browser as a application platform. With the Networked Device Connection API, the web services will be leveraged to communicate the network devices, e.g. AV devices, home appliance, home security device, home automation device, etc. and we hope that it will be ended up to expanding horizontal of web.

REFERENCES

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Updated file date: October 15, 2008; http://upnp.org/specs/arch/UPnP-arch-DeviceArchitecture-v1.0.pdf

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