Simple WoT Architecture for small connected device

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Traditional Web Architecture

Presentation purpose
(for human interaction)

URI/IRI

Client

Request

HTTP(S)

Response

Server

RESTful

Web Connectivity

Web Resources
More things are connecting to the Internet than people — Cisco’s Internet Business Solutions Group (IBSG) predicts some 25 billion devices will be connected by 2015, and 50 billion by 2020.

Source: Ericsson AB, "Infrastructure Innovation - Can the Challenge be met?," Sept 2010
Changes - Emerging Open Source Hardware
But, Web Technology for Small Connected Things?

Half of connected devices will be small IoT devices (how we can bring those devices into the web ecosystem)

We need to consider these small devices
Characteristics of Small Connected Thing

- Connectivity
  - Locally, Globally
  - Wired, Wireless

- Controllability
  - One way, Two way
  - Immediately, …

- Interactivity
  - Interaction ability – screen, sound, light …

- Limitations
  - Low Computing power
  - Device capability
  - Non-screen
Simple WoT Architecture

Control purpose
(for automatize interaction)

Client/Server
Small device
Request
HTTP(S)
Response
Client/Server
Small device
Small device
Web Resources

RESTful
Web Connectivity

What kind of request?
What kind of response?
Do we need to use HTML/CSS markup?
which kind of web client do we need?
Web Architecture for Non-screen Devices

User Interaction: JavaScript + Web APIs

Absence of Presentation Layer

Transport: HTTP, HTTPS, SPDY (WebSocket, WebRTC, RESTful...)

Resources: Web Resource URIs (Service, Content, Site)
Consideration Point

- We need to make considerations for things (as small connected devices)
  - How we can bring those things into the web ecosystem

- New client/server technology for things (small devices)
  - Redefine of architecture model - Web Client & Server
    - Do we need to use HTML/CSS markup?
    - Do we need the user agent (for presentation purpose) in small device environment
    - Which kind of web client do we need?
  - Web Application Framework for Things

- How can we standardize the APIs for WoT
  - Generic IO, Sensor, System APIs

- Do we need to consider new connectivity model for WoT
  - Lightweight protocol? – WebSocket, MQTT, CoAP
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Other issues

- Robustness issues
  - Device Management, Settings, Monitoring, Fault Tolerant

- Security / Privacy issues for Things
  - Authentication, Authorization, Trust, Identification

- Network related issues
  - caching, cloud, NAT/Firewall, offline access

- ...