Motivation (1/2)

- **Internet of Things (IoT) Devices at Home**
  - Lots of IoT devices are populated at home.

*Source: Wulian Smart Home, http://smarthome01.com/2013/12/18/smart-home-make-a-better-life/*
Motivation (2/2)

- **Naming for IoT Devices**
  - DNS naming for IoT devices facilitates the usage of IoT devices.

- **E2E Management of IoT Devices over IPv6**
Target Application for Smart Home

Current AllJoyn for IoT Devices

- Home IoT Device List
  - Smart TV
  - Refrigerator
  - Airconditioner-1
  - Airconditioner-2
  - Airconditioner-3
  - Robot Cleaner

New AllJoyn for IoT Devices

- Visual Display of IoT Devices

- Hard to identify IoT Devices
- Easy to identify IoT Devices

- Long Time for Device Search
- Instant Time for Device Search

- Current AllJoyn for IoT Devices

- New AllJoyn for IoT Devices

- Application Extension
  - Mall (e.g., Wallmart and Best Buy) and Factory (e.g., GM and Hyundai)
Limitation of IPv6 Stateless Autoconfiguration

IPv6 Stateless Autoconfiguration for IoT Devices
- Prefix Information, Default Gateway, and MTU
  • Neighbor Discovery for IP version 6 (RFC 4861)

- IPv6 Address
  • IPv6 Stateless Address Autoconfiguration (RFC 4862)

- Recursive DNS Server Addresses & DNS Search List
  • IPv6 Router Advertisement Options for DNS Configuration (RFC 6106)

- Missing?
  • DNS Name Autoconfiguration for IoT-Device DNS Name
  Ø DNS Configuration for IoT Devices can be automated without
  the intervention of a network administrator (or home users).
DNS Name Autoconfiguration (1/2)

- IoT Device’s DNS Name **Generation**

  Refrigerator generates its DNS name as `refrigerator1.samsung_RH269LP.refrigerator.home`

  **DNS Search List:** `.home`

  [Diagram of network components including DHCPv6 Server, Access Point, Router, IPv6 Host, and Refrigerator, showing RA Option (DNS Search List) and DHCP Option (DNS Search List) connecting to Refrigerator.]
DNS Name Autoconfiguration (2/2)

- IoT Device’s DNS Name Registration

My DNS name is refrigerator1.samsung_RH269LP.refrigerator.home

What is your DNS Name?

Remote Control by DNS Name

NI Query (DNS Name Collection)

NI Reply (DNS Name)

IPv6 Host

Refrigerator

DHCPv6 Server

IPv6 Network

Access Point

Router

Smartphone
Location-Aware DNS Name Autoconf

Smart TV’s DNS name becomes
smart_tv1.samsung_HG32NA470PFXZA.smart_tv.living_room.home

Smart TV is known to be located at Living Room by Localization.

Localization:
\((s_x, s_y) = \text{circumcenter}(x_1, y_1, x_2, y_2, x_3, y_3)\);

\((s_x, s_y)\) belongs to Living Room.
Security Considerations

- **DNS Name Collection** is based on **Node Information (NI) Protocol**.

- **Security issues** are the same as **NI Protocol** in RFC 4620.
Discussion

- Thanks for your attention.
- Any Comments or Questions?