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AllSeen Alliance
Technical Steering Committee

Dear AllSeen Alliance Technical Steering Committee:

Haier, an AllSeen Alliance Premier member, would like to propose that the Alliance instantiate a Project and dedicated Working Group to develop smart home service framework for smart home related services.

Project Description:

- ***The purpose of the project***
  - Smart home has attracted more and more attentions mostly due to the dramatic rise of new smart appliances and applications for smart home continuing to increase. Many vendors in China are actively developing smart home system with centralized management features that home appliances acting as smart home clients connect to a centralized entity in the home acting as smart home server.
  - The smart home server in the smart home system provides a number of connected-home services for home appliances, including the following common services:
    - Appliances Centralized management: home appliances operating in the home are connected to and managed by the smart home server. Acting as the appliances manager, the smart home server has the ability to control the entrance of smart home. Users can manipulate the whole home appliances through the smart home server in a centralized management manner. Once the appliance service request from the user is received, the smart home server sends the request to the corresponding appliance. As diverse access technologies such as Wi-Fi, BT, Ethernet and PLC can be used for home appliances, to facilitate the centralized management of home appliances, it is useful if the centralized smart home server supports multiple access technologies.
    - Centralized security: appliance owners may share appliances functions/services with others under the protection of authority control. Appliance owners want to ensure that specific functions/services (e.g. temperature control for smart AC or on/off control for smart refrigerator) provided by their home appliances are not allowed for others to use. So that specific functions/services of a home appliance can be accessed and used by allowed users. Considering the constrained capabilities of home appliances, e.g. sensor based home appliances, it is not

appropriate to make every home appliance itself authenticate and authorize different accessing users. However, the smart home server with much richer capabilities is able to have some form of mandated control strategy for all appliances belonging to the appliance owner.

- Appliances notification agent: ability to alert the specific target receiver about the events generated by home appliances. Normally only the user's control terminal and the associated appliances need to receive and handle the appliance events, i.e., non-related devices don't need to be alerted. The smart home server can act as the notification agent to enable the directed event notification based on event subscriptions.
- Group control: the smart home server enables users to control bunch of home appliances in a group control manner. The user can send a single command for desired group appliances operation to the smart home server, and the smart home server can fan out the operation request to a group of home appliances simultaneously.
- Centralized appliances coordination: the coordination between multiple appliances is enabled by the smart home server that acts as the central coordinator. Multiple appliances coordinate with each other to achieve appliances automation by exchanging data through the smart home server. The user can configure specified rules of appliances coordination on the smart home server, the smart home server with the appliances coordination rules triggers related appliances to perform specific action execution.
- Data collection: to collect and record available appliances information. Big data analysis is one of the new growing domains for appliances management. The smart home server is a collection source for the home appliances usage information. The smart home server gathers appliance usage information that can be used by users or service providers to help the appliances owner better run home appliances.
- Logging: the smart home server supports the logging service for the smart home system.

- AllJoyn can promote smart home services development. In general, the distributed and centralized management smart home systems co-exist and can comprise the hybrid model of smart home system. The centralized management smart home is motivated mainly by the requirement of tight and centralized management of home appliances as expected. The smart home server as an introduction is not negating the distributed smart home, but to provide centralized management capabilities in the smart home system. This working group develops smart home service framework focusing on the centralized management aspects based on AllJoyn. The goal for the working group is to develop AllJoyn smart home service framework including both smart home client API and smart home server API. The application with UI is not included in the scope of the working group. Smart home app developers can develop their own application with preferred UIs.
- Note that smart home cloud becomes increasingly necessary for smart home. The focus of smart home service working group is on the centralized management of

proximal client appliances. The Gateway Agent API being developed by the Gateway Agent working group can be utilized to enable the cloud service connection for home appliances.

- ***Architecture diagram***
  - The AllJoyn smart home service framework includes AllJoyn smart home server API (AJSH-S) and AllJoyn smart home client API (AJSH-C). The device implements AllJoyn smart home server API acting as the central control and management point for home appliances operating in the home network that implement AllJoyn smart home client API. The following figure gives an example describing the smart home system enabled by AllJoyn smart home service framework.

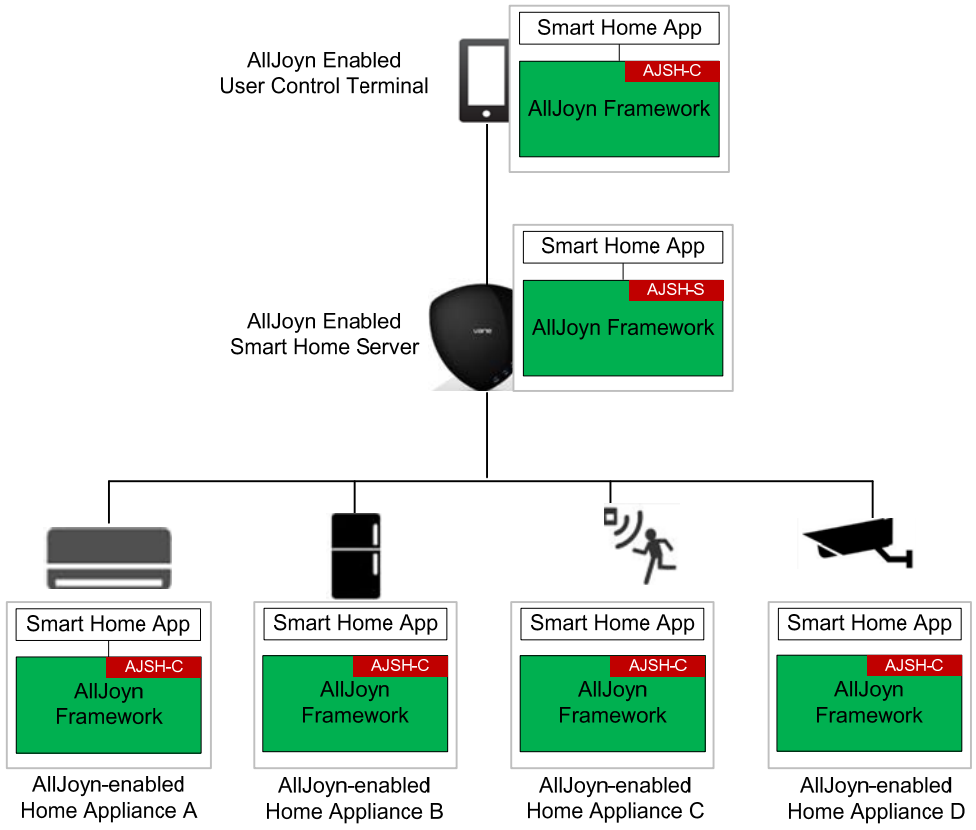

Figure 1-Smart Home System Enabled by AllJoyn Smart Home Service

  - As the example shown in the above figure, in the field network area, device A (AC), device B (refrigerator), device C (motion detection device) and device D (security surveillance camera) implement AllJoyn smart home client functionality. The interface between the user's control terminal (e.g. smart phones and tablets) and AllJoyn enabled smart home server is AllJoyn enabled. The user's control terminal implements AllJoyn smart home client functionality as well. Each home appliance is aware of the available AllJoyn smart home server and connected to the AllJoyn smart home server. By accessing to the AllJoyn smart home server, users can control home appliances in a centralized management manner. In addition, the AllJoyn smart home server provides the group control ability so as to facilitate multiple appliances control in an efficient way, e.g. to turn off all home appliances except refrigerator when the

user leaves home. The automated appliances coordination is enabled by the smart home server that acts as the central coordinator, e.g. when the motion detection device detects the person motion at the door, the AllJoyn smart home server can automatically trigger the security surveillance camera to snap a picture or record a video stream. The smart home server can enable multiple and complex appliances coordination without demanding any appliances coordination intelligence on the appliances side. From user's perspective, appliances with different functions can correlate with each other to work as a virtual home appliance. In this example, the AllJoyn smart home server can capture the appliance operation information and record such information. Besides, the smart home server is also responsible for the system logging, i.e. error information of home appliances can be output into specified log file by the AllJoyn smart home server.

- When the AllJoyn smart home server is deployed, the user's control terminal can listen for the announcement of the AllJoyn smart home server and connect with the AllJoyn smart home server to manage the AllJoyn smart home client appliances behind the AllJoyn smart home server. For the AllJoyn devices that don't implement AllJoyn smart home service framework, the user's control terminal still listens for the announcement of these devices. Hence the user's control terminal can connect and control the AllJoyn device directly.

- ***How will it benefit the community***
  - The AllJoyn smart home service framework fulfills users' requirements of centralized management of home appliances. It moves more complicated logic and implementation into the AllJoyn smart home server device and keeps the AllJoyn smart home client device simpler and at lower cost. Management of home appliances by a centralized smart home server device reduces the resource requirement on the home appliances, resulting in smart home deployment with reasonable cost.

Scope:

The goal of this working group is to design and develop smart home service framework based on AllJoyn. The interface between AllJoyn smart home server and AllJoyn smart home client needs to be designed and developed.

1. Appliances centralized management: the AllJoyn smart home server connects home appliances and provides the capability to manage home appliances in a centralized management manner. Once the appliance service request is received, the smart home server sends the request to the corresponding appliance.
2. Centralized security: to share appliances services under the protection of authority control through the smart home server. So that specific service of a home appliance can be accessed and used by allowed users. Note that this is not to replace standard AllJoyn security mechanism, but to provide a fine-grained and centralized control of appliance services accessing.
3. Group control: the smart home server provides the capability to control bunch of home appliances in a group manner.

4. Data collection: the smart home server acts as the data aggregation source to collect and record available appliances information.
5. Logging: the smart home server supports the logging service for the smart home system.
6. Notification agent: to deliver the appliances events generated by home appliances to specific target receiver. The smart home server can act as the notification agent to enable the directed event notification based on event subscriptions.
7. Centralized appliances coordination: the coordination between multiple appliances is enabled by the smart home server that acts as the central coordinator. The user can configure specified rules of appliances coordination on the smart home server, the smart home server with the appliances coordination rules triggers related appliances to perform specific action execution. Visualization of appliances coordination rules is needed for the consumer. Sample application can be provided to show how to manage appliances coordination rules.

As for the initial short release, the working group focuses on the first five identified functionalities. Other functionalities could be added for subsequent releases.

- ***Development stages***

Milestone	Target date
Smart Home Service Description	2014/07
Smart Home Service Framework (Source Code)	2014/07
Bug Fixes	2014/08

Dependencies:

- The project is dependent on the 14.06 release of AllJoyn Core and Base Service.

Project Name:

- ***Proposed name for the project***
  - The proposed name for the project is “Smart Home Service Framework”
- ***Proposed name for the git repository***
  - The proposed git repository is “services/smarthome”

Proposed Working Group:

- We propose that the smart home service framework project become a new working group. The proposed name for the working group is “Smart Home”

Committers and Contributors:

- ***Maintainer***
  - Jun Zhang, Standard Operation Manager, Haier
- ***Committers***
  - Guodong Xue, Director, Haier

- Milton Wang, Vice Director, Haier
- Zhao Ru, Standard Development Manager, Haier
- Jun Zhang, Standard Operation Manager, Haier
- Yonghua Li, Vice Professor, BUPT
- Yu Yang, Engineer, BUPT
- Linghan Li, Engineer, BUPT
- Kun Zheng, Engineer, BUPT
- Yanmei Liu, Engineer, BUPT
- Lei Qi, Engineer, BUPT
- Ruopei Guo, Engineer, BUPT
- Fangzhou Liang, Engineer, BUPT
- Zhanzhi Du, Engineer, BUPT

- ***QA and test resources***
  - QA and test resources from both Haier and BUPT will be made available to this Project.

Initial Contribution:

- Initial contribution will be a general description of AllJoyn Smart Home Service Framework.

Proposed Release Schedule:

- The first release is planned for 2014/08. The project will provide the first release as slipstream release and then align with the official release cadence.

Thank you for your consideration and review of this proposal.

Sincerely,
Jun Zhang
Haier