Location Services

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Location Service Project Proposal

- Purpose and intent of the project

- The Location Service will provide a common interface that allows devices to provide various location related services to the proximal network. Four such services have been identified: presence, proximity, location and containment.

- These services will enhance scenarios proposed in the Living Scenarios project as well as other Allseen programs by providing events and triggers to deploy such scenarios.

- This proposal is appropriate for devices as motion sensors, beacons, cameras, mobile phones, wearables, etc…

- This proposal is technology neutral it attempts it is designed for all kinds of transports, Bluetooth LE, Cellular, Zigbee, LTE, NFC, Wireless

- This project will support both the service/client (core) and the publish/subscribe (data driven) paradigm.

Presence Service

- The Presence service will provide presence information about other known or unknown entities.

- The Presence service will allow a device to determine if another object is present on the proximal network.

Proximity Service

- Provide distance information about other items

- Allow a device to know its distance with respect to a location

- The proximity service will allow the query for devices within the proximal network to be read.

- The proximity service will allow the distance between two devices to be read

- The proximity service will provide notifications of a new device entering or leaving the proximity fence.

- The proximity service will provide notifications of a change in distance of a device within the proximity fence.

Location Service

- The Location Service will provide Location information (GPS, GIS, 4G location service) of a device on the network

Containment Service

- The containment service will provide information on whether a device or object is within a proscribed area.

Technology Transparency

- Allow the developer to seamlessly integrate various kinds of location technologies into their application.

  – Precision. Different technologies provide different degrees of precision. The spectrum goes from cellular (miles), to WiFi (yards), to BLE (feet), and finally to NFC(inches). Given the current nature of AllJoyn we can assume that the devices share the same WiFi, which means we might be initially focusing on BLE and NFC.

  – Interaction Modality. BLE-enabled devices listen for signals from wireless transmitters (BLE Beacons). Interaction is passive. NFC, on the other hand, requires that the user of the device actively initiate the engagement. While BLE supports a one-to-many interaction, NFC supports a one-to-one interaction. BLE requires that the device respond to what is similar to a notification, while NFC requires that the device control the timing and engagement.

Technology Transparency

– Privacy and Security Issues. Given the different natures of BLE and NFC there are differences in this area. BLE is more intrusive since a device can be configured to continuously monitor a consumer's movement as he moves in and out of range of a beacon. NFC is less intrusive since movement can only be monitored based on the tags that have been engaged.

Scenarios

- Geo-fencing: understanding whether the device has entered or exited a distance range. Geo-fencing might involve both proximity and containment, depending on the application's needs. Some times it might be enough to know if the device has entered the proximity range of a beacon (e.g., the proximity range of a store's entrance). Some times we might want to know if the device has actually entered the store, meaning that it has actually entered a specific room.

- Hand-off like capabilities: allowing applications to pass their engagement with a user to another device. This will require proximity, but may also require location and/or containment. For example, the hand-off might only make sense within a specific context (e.g., I am at home, in the office, etc.).

Scenarios

- Detailed Indoor Navigation: in this case we want an application to be able to track a device's movement within a specific indoor location with varying degrees of precision. This may require various kinds of joint use of proximity, location and containment features, depending on the specific needs. Indoor navigation might combine passive and active user interactions, since the could be tracked passively in a room, while going from one room to the next might require an active engagement (e.g. to open an NFC-based locked door).

- Intention Discovery: can we use location services (together with other things) to infer a user's intentions? This might be something to start researching for the future.

Dependencies, Project Name, Working Group

- Dependencies
  - AllJoyn Core and Base services such as About interface

- Proposed Project Name
  - Proposed name for the project : "Location Service Framework
  - Proposed name for the git repository : "device_services/location_services"

- Proposed Working Group
  - This project should be under "Device Services" Working Group

Committers and Contributors

- Maintainer – TBD

- Committers
  - Brad Kemp - Beechwoods Software,
  - Sam Guinea - Politecnico di Milano

- Contributors
  - Rodney Hess, Scott Knowlton, Carol Howard, Andrew Phillips -Beechwoods Software,
  - Valerio Panzica (MIT)
  - Various Students - Politecnico di Milano,
  - Open to any interested party

Proposed Schedule

- Project Plan
  - High-level system description document : January 2015
  - AllJoyn interface specifications : February 2015
  - High-level design (HLD) documents for foundational components : April 2015
  - Foundational component implementations for Linux : July 2015
  - Certification test suite : September 2015
  - Reference controller applications for Android & iOS : September 2015
  - First official release : October 2015