ALLSEEN ALLIANCE

An Open Source project building the framework for the Internet of Things (IoT)

March 2015

The AllSeen Alliance is a Collaborative Project at The Linux Foundation that enables the widespread adoption of billions of products working together in an interoperable "Internet of Everything" through the open AllJoyn framework, a thriving technical community and a vibrant ecosystem.
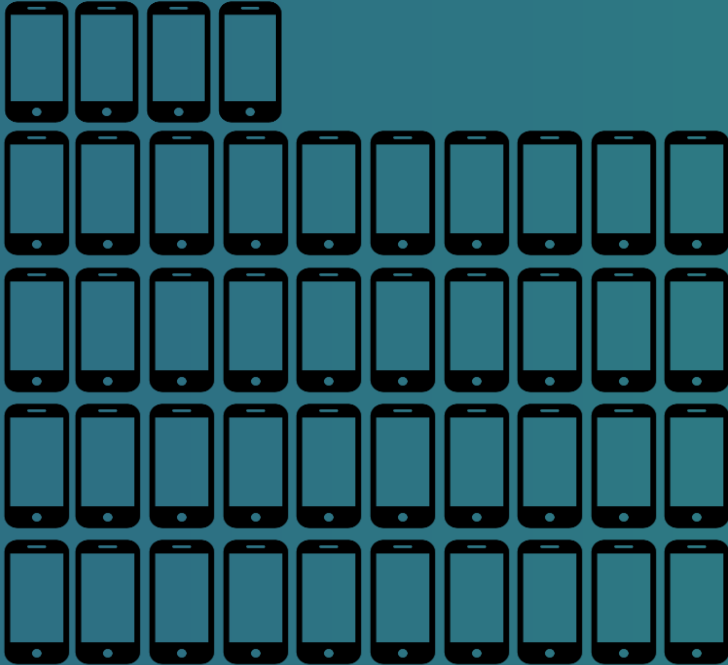
www.allseenalliance.org

Mobile – The largest technology platform
~3.7 billion unique subscribers

7.4 B
connections

7.2 B
people

Source: GSMA Intelligence, January15; UN, November 2013
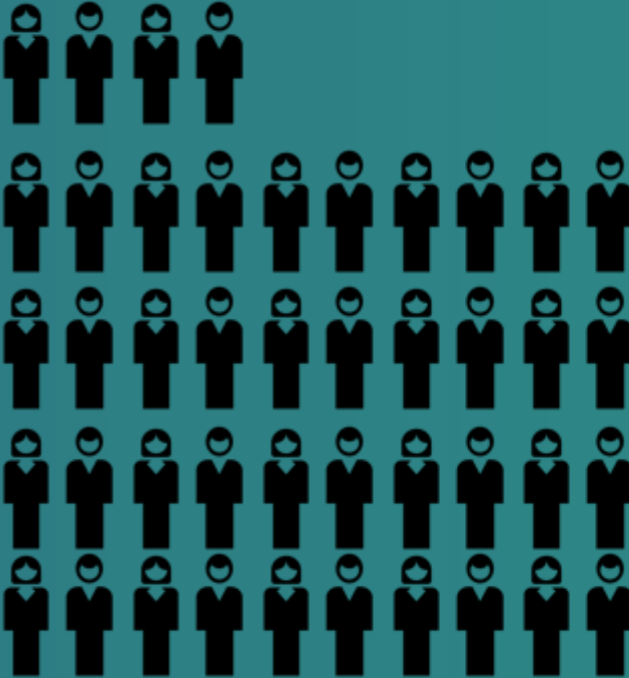
# Mobile is about to be dwarfed by the Internet of Everything…

A massive surge in connected things has already begun

- By 2020, 40.9 billion things will be connected*
  - Via Wi-Fi, wire line, cellular, and proximal networks
  - Benefiting billions of people worldwide
  - 75% of the growth between today and the end of the decade will come from non-hub devices

- IoT is Transforming:
  - Industry
  - Infrastructure
  - Media
  - Education
  - Work
  - Recreation
  - Family
  - Daily life

The Problem with the Internet of Things Today

- A different app for every device.
- Integration is difficult.
- Devices can't interact locally.
- Cloud connections abound.
- Rich scenarios can't easily be build.
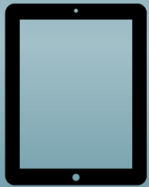
App Overload !

5
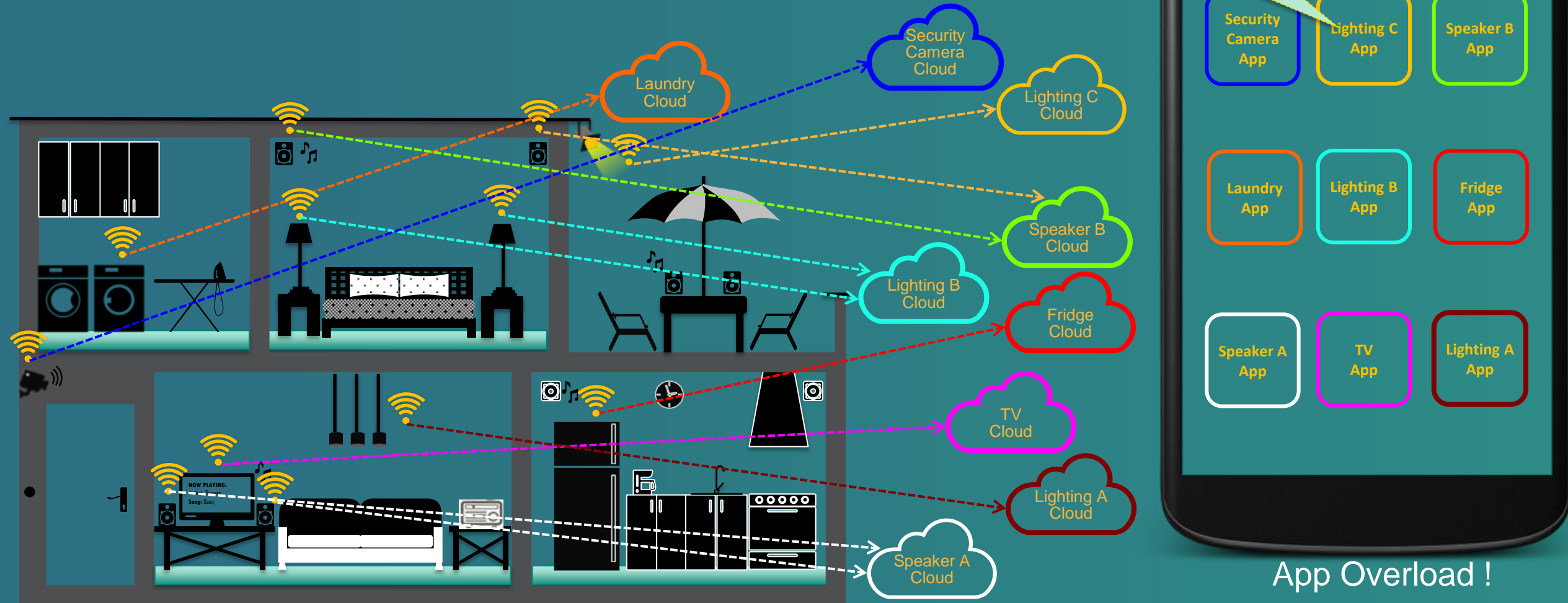
Ubiquitous connectivity promises to make devices "smart"

But _ONLY_ if they speak the same language

hello world!

당신은 내 말 들려?

Tem alguém aí?

♒♏●●◆□□♒♒

100010101011

Computing devices

Consumer goods and appliances

Home

Auto
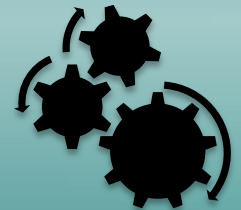
Industrial

Devices that can't connect across brands, categories, and operating systems will be left out

AllJoyn framework lets smart things work together

Connect, manage and interoperate across brands, categories, bearers, transports and OS

hello!

AllJoyn framework

Computing devices

hello!

AllJoyn framework

Consumer goods and appliances

hello!

AllJoyn framework

Home

hello!

AllJoyn framework

Auto

hello!

AllJoyn framework

Industrial
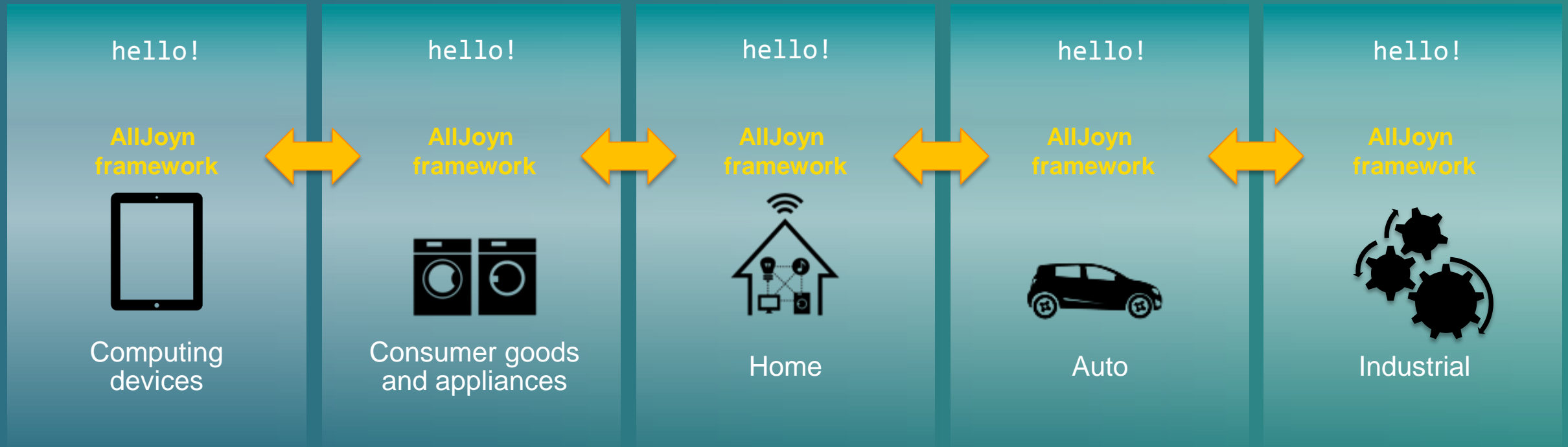
Exposing smartphone APIs enabled new experiences that no one had ever thought of before

MICROPHONE

TOUCHSCREEN

ACCELEROMETER

GPS

GPU

DSP

GYRO

The AllJoyn framework exposes the capabilities of connected devices in the much the same way.

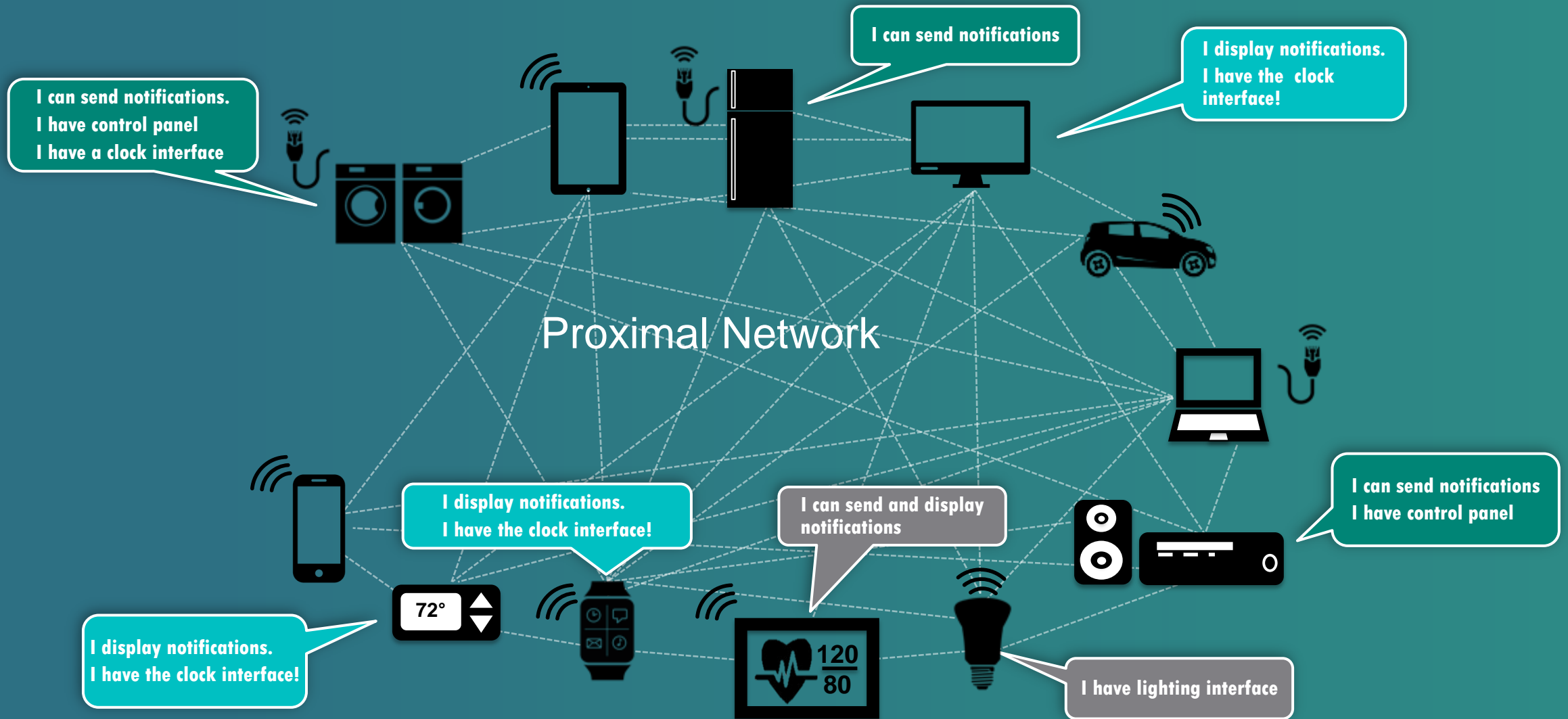A single protocol allowing products and apps to expose their capabilities and interact with other devices and apps.

DISPLAYS

SPEAKERS

CLOCKS

COOL

HEAT

TVs

LOCK DOORS

LIGHT BULBS

GARAGE DOOR

SENSORS

PICTURES

VIDEO

DRAPES

The AllJoyn software framework is a collaborative open source project of the AllSeen Alliance

AllJoyn enabled devices describe their capabilities via service interfaces on a virtual bus.

Proximal Network

The AllJoyn software framework is a collaborative open source project of the AllSeen Alliance

AllJoyn Gateway Agent provides remote access, management and privacy controls for all AllJoyn enabled devices and apps

Troubleshooting TV

Wash finished,

My WiFi video picture quality is poor. Help!

Cloud/Managed Services

Adjust TV configuration

Close garage door

Proximal Network

Starting backup

Set Away mode

Check Washer

Set Away mode

Play radio so it sounds like someone is here

Check Washer

Temp set to 65°F

Away scene set

Remote AllJoyn Apps

11

The AllJoyn software framework is a collaborative open source project of the AllSeen Alliance

The problems that AllJoyn solves…
in an open interoperable way
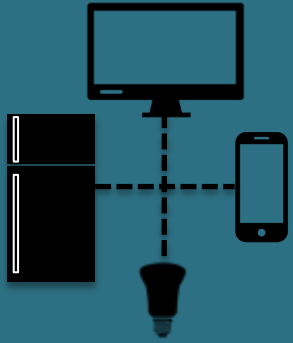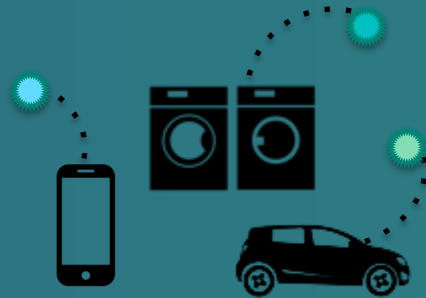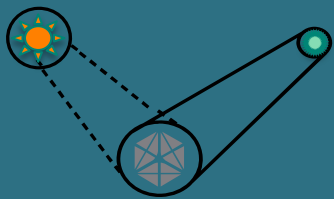
DISCOVER
nearby devices

IDENTIFY
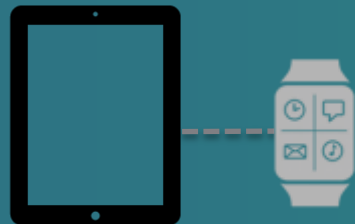services running
on those devices

CONTROL
devices near and far

MANAGE
remote and local

INTEROPERATE
across OS, device
& manufacturer

ADAPT
to devices coming
and going

SPAN
diverse
transports
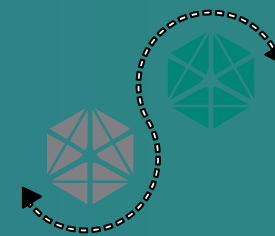
EXCHANGE
information

SECURE
against bad
actors

Why the AllJoyn proximal network topology matters

"Someone's at the door"

"Laundry is ready!"

"Someone's at the door"

"Coffee is done"

AllJoyn Gateway Agent

"Someone's at the door"

"Laundry is ready!"

NOW PLAYING:
Artist: Flowers
Song: Daisy

"Coffee is done"
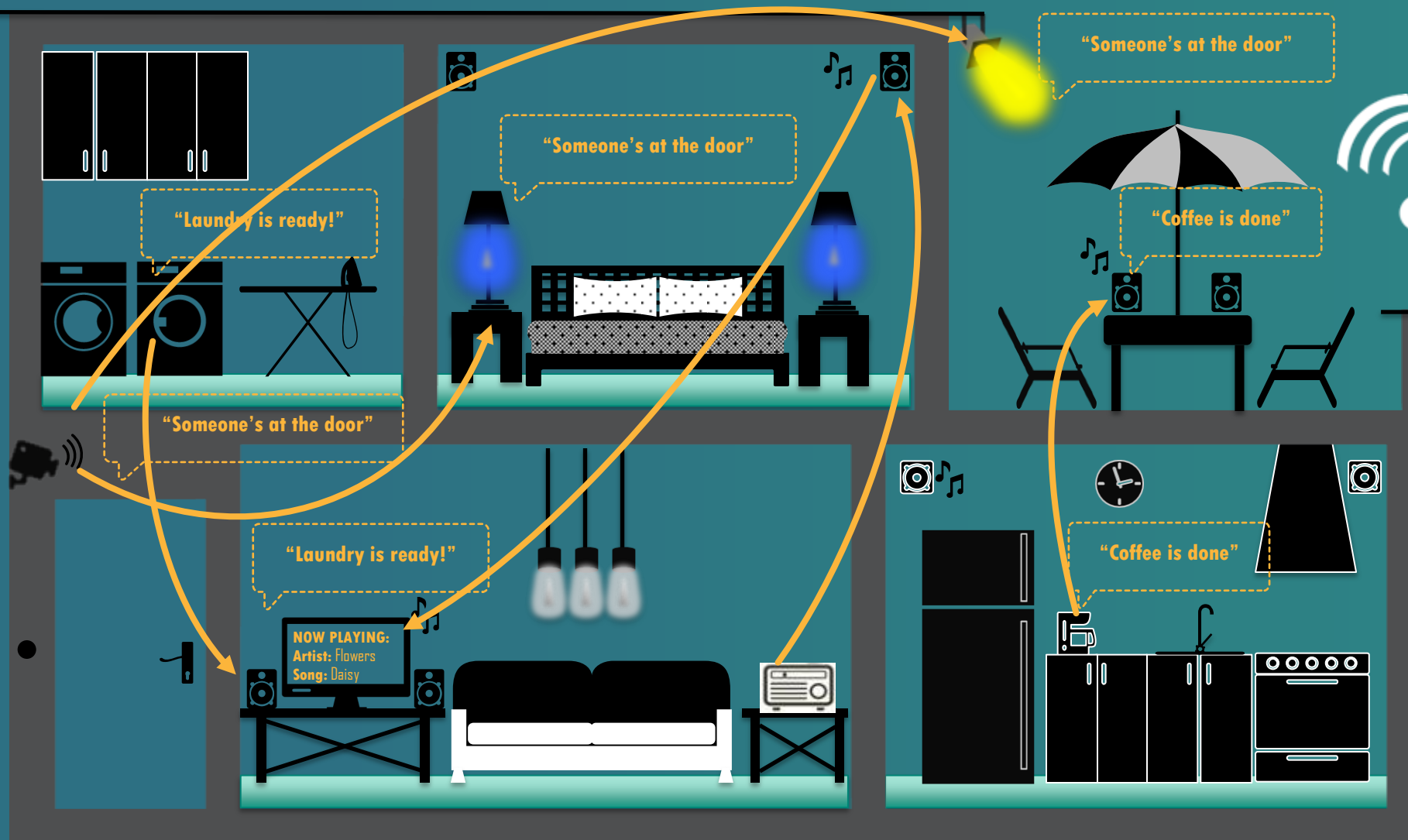
- Direct communication via the AllJoyn framework is fast, efficient, and secure.

- No need to go out to the cloud to talk to the device right next to you!

- The AllJoyn Gateway Service delivers secure, unified remote access, manageability and privacy.
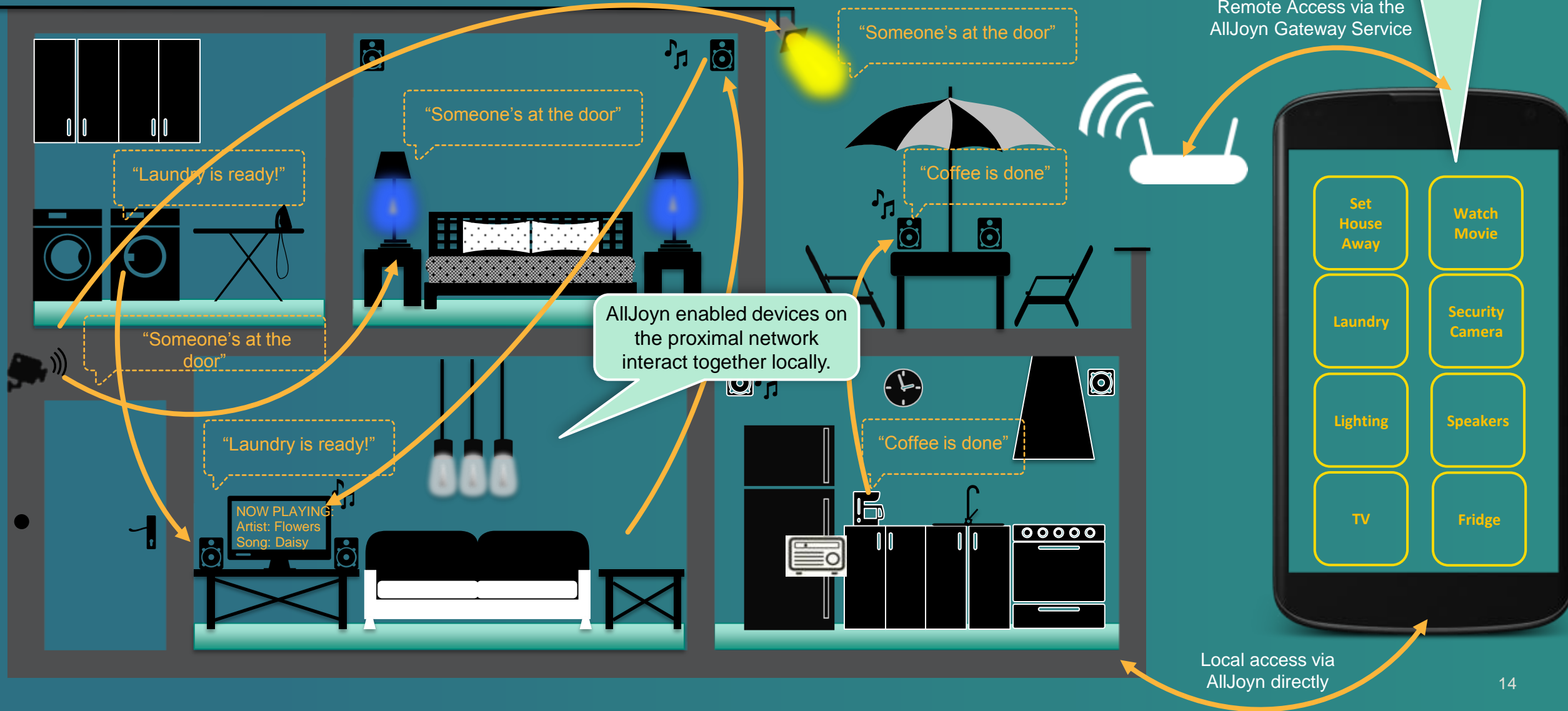
Why The Internet of Things Has To Be Open Sourced

"Companies will win over Internet of Things not in the boardroom, but on the command line. The consortium that gets excellent code to market first, with a community that provides great documentation and an inviting atmosphere, will win. So far, only AllSeen has done that, with code available for download today."

Matt Asay VP Mobile at Adobe, via readwrite.com

What is the AllSeen Alliance?

- A nonprofit **consortium** dedicated to enabling the widespread adoption of products, systems and services that support the Internet of Things through an open environment, vibrant ecosystem and thriving technical community.

- A **community** enabling hardware manufacturers and software developers to create interoperable products that can discover, connect and communicate directly with other devices, systems and services regardless of brand.

- The host and developer of the collaborative AllJoyn **open source project**, an industry-supported software and service framework.

Why Build an Alliance?

- The Internet of Things is emerging
  - Things are getting smarter
  - Everything is getting connected
  - Wireless or wired, over a variety of protocols and bearers
- Still needed: A shared framework and common language for communication
  - Smart things need to be able to recognize, communicate, and interact with each other
  - Regardless of manufacturer, type of device, OS or embedded software, connectivity type, or compute resources available
- The Alliance's codebase is here and in real products today
  - Open source communication platform for the Internet of Things
  - Core System Services for any device/OS/HW/OEM
    - Onboarding, Notifications, Control Panel, Configuration, Audio, Lighting
  - Showcase applications speed development and customization
  - Creates new and exciting experiences with our environment and the things we use every day

Architecture

AllJoyn Software Framework: High-level architecture

A comprehensive software framework lets devices and applications communicate

AllJoyn Devices and Apps
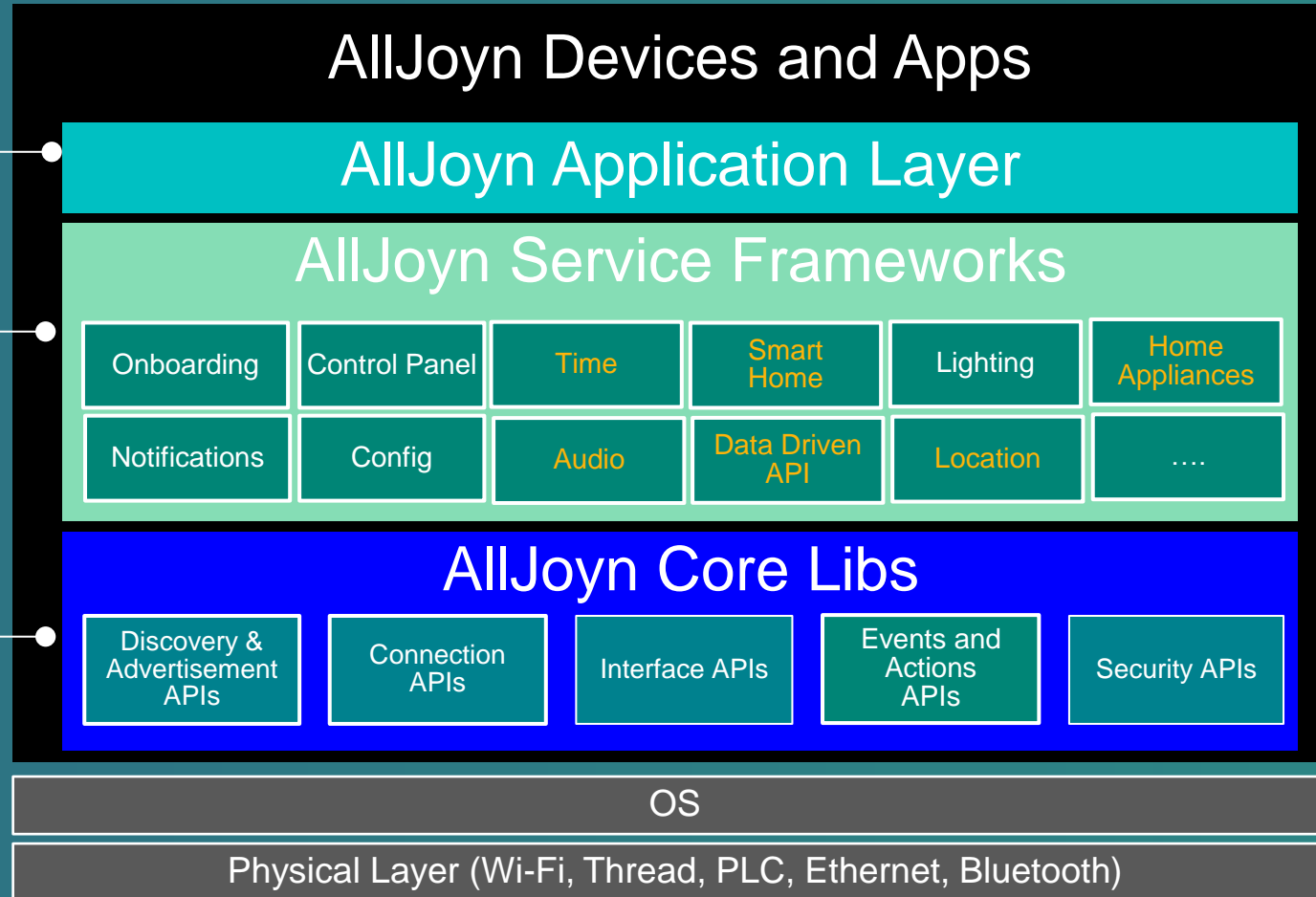
AllJoyn App Layer
- Defines the User experience

AllJoyn Application Layer

AllJoyn Service Frameworks
- Interoperable, cross-platform modules for common IoE functionality
- Defines common interfaces between devices

AllJoyn Service Frameworks

Onboarding	Control Panel	Time	Smart Home	Lighting	Home Appliances
Notifications	Config	Audio	Data Driven API	Location	....

AllJoyn Core Libs
- Provides ability to find and connect to devices to do interesting things.
- Core libraries interact with the AllJoyn Router
- Provides access control and encryption

AllJoyn Core Libs

Discovery & Advertisement APIs	Connection APIs	Interface APIs	Events and Actions APIs	Security APIs

OS

Physical Layer (Wi-Fi, Thread, PLC, Ethernet, Bluetooth)

AllJoyn Gateway
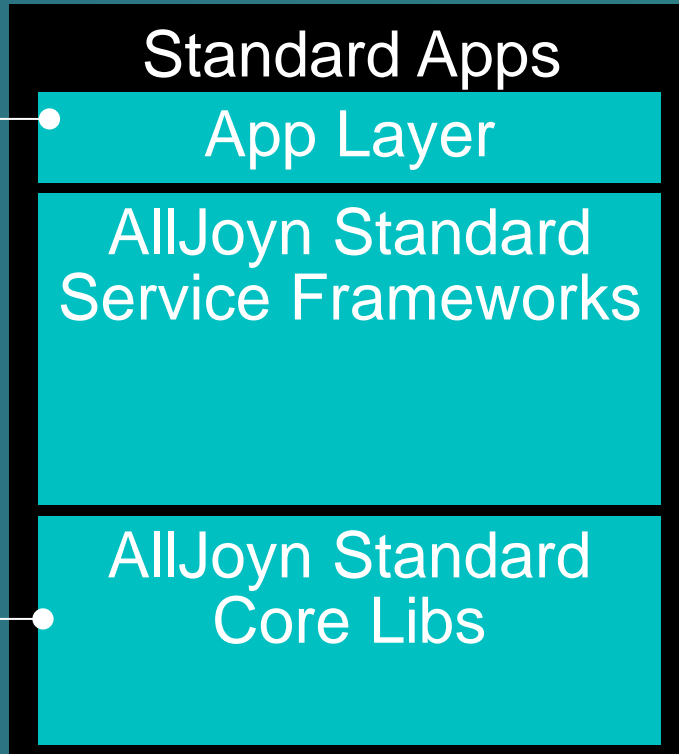- Remote access
- Remote management
- Privacy controls

AllJoyn Router
- Manages communications between devices and apps
- Dynamic network management

Two Versions of the AllJoyn Framework To Choose

Standard App Layer
- App dev or OEM writes this

Standard Core Libraries
- Multiple bindings, runs on HLOS

Standard Apps

App Layer
AllJoyn Standard Service Frameworks
AllJoyn Standard Core Libs

Thin Apps

App Layer
AllJoyn Thin Service Frameworks
AllJoyn Thin Core Libs

Thin App Layer
App Dev or OEM writes this

Thin Core Libraries
- C bindings, runs on RTOS
- Thin Apps using Thin Core requires an AllJoyn Router in the network

AllJoyn Router

HLOS

RTOS

AllJoyn Gateway

Physical Layer (Wi-Fi, Thread, PLC, Ethernet, Bluetooth)

AllJoyn Router
- AllJoyn Router can be bundled with a Standard App or run standalone
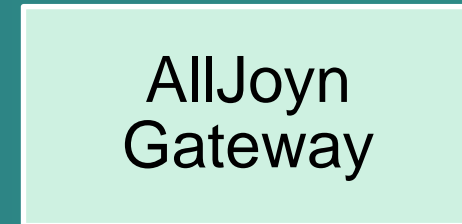
AllJoyn Gateway
- Standalone or bundled
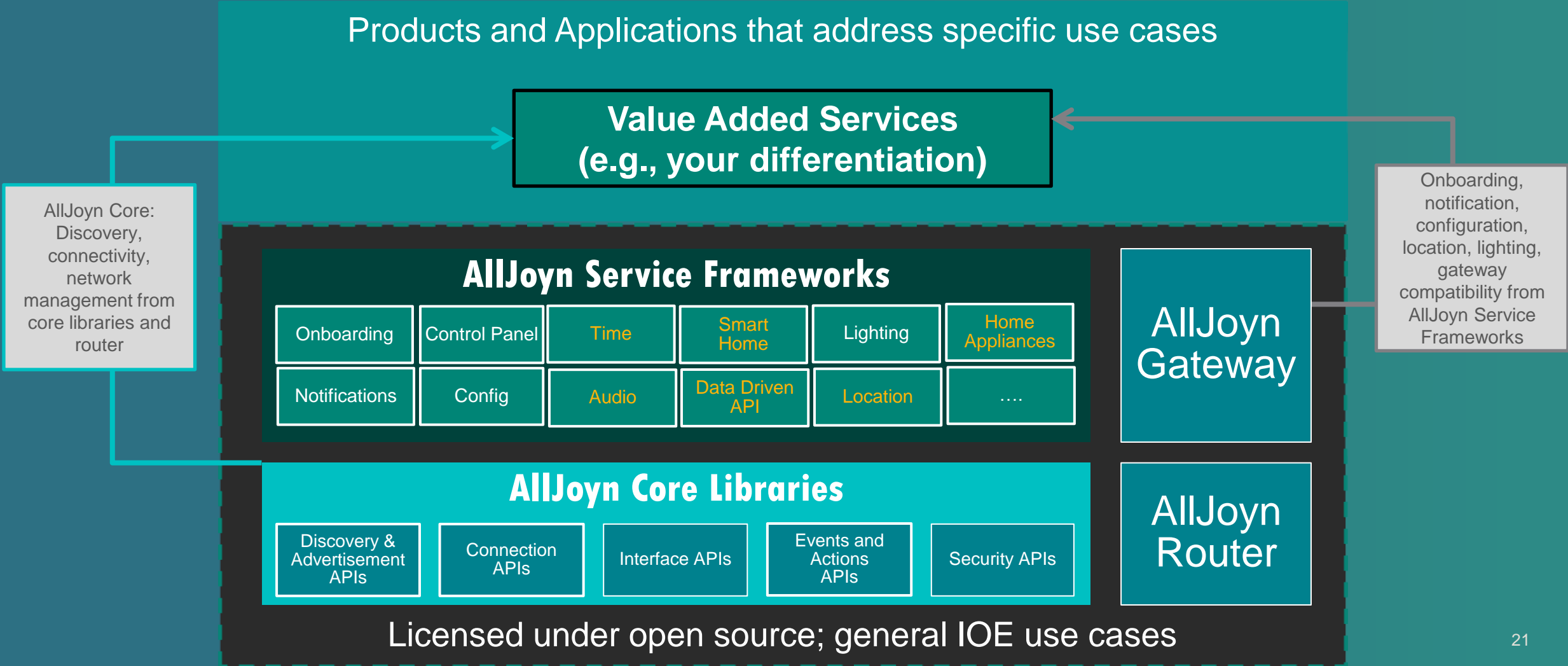
The AllJoyn software framework is a collaborative open source project of the AllSeen Alliance

Open source building blocks for value added services
Use AllJoyn Core Library and Service Frameworks to create differentiated offerings

Products and Applications that address specific use cases

**Value Added Services
(e.g., your differentiation)**

AllJoyn Core: Discovery, connectivity, network management from core libraries and router

Onboarding, notification, configuration, location, lighting, gateway compatibility from AllJoyn Service Frameworks

AllJoyn Service Frameworks

Onboarding	Control Panel	Time	Smart Home	Lighting	Home Appliances
Notifications	Config	Audio	Data Driven API	Location	....

AllJoyn Core Libraries

Discovery & Advertisement APIs	Connection APIs	Interface APIs	Events and Actions APIs	Security APIs

AllJoyn Gateway

AllJoyn Router

Licensed under open source; general IOE use cases

AllJoyn Mesh of Stars
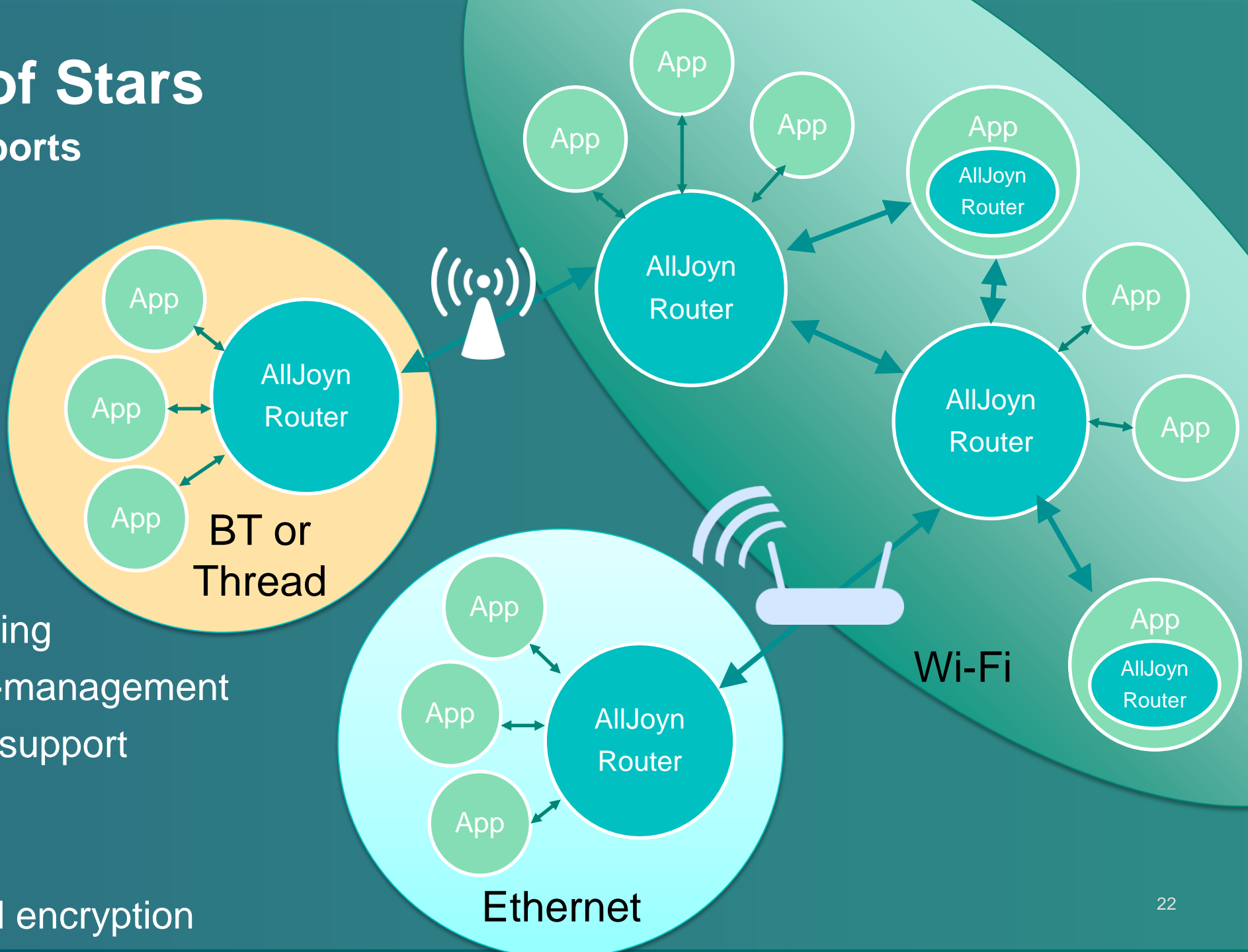## Spans Network Transports

Bridges
- Interconnect transports

Router nodes
- Discovery/advertising
- Presence/session-management
- Publish/subscribe support

Leaf nodes
- Application code
- Authentication and encryption

App
App
App
AllJoyn Router

BT or Thread

App
App
App
AllJoyn Router

App
App
App
AllJoyn Router

App
AllJoyn Router
App
App
App
App
AllJoyn Router
App
AllJoyn Router

Wi-Fi

Ethernet

Find out More

For More Information

- Alliance Wiki: https://wiki.allseenalliance.org
  - Documents, downloads, and developer tools
  - Source Code, release overviews, roadmaps
  - Training & Service Framework details
  - Working Groups, New Proposals & meeting minutes

- Forums: https://ask.allseenalliance.org/questions

- Certification: https://allseenalliance.org/certification

- Releases & Roadmaps: https://wiki.allseenalliance.org/release/overview

- Public Mail Lists: https://lists.allseenalliance.org/mailman/listinfo

- Showcase: https://allseenalliance.org/showcase

- Monthly Newsletter: https://allseenalliance.org/news-and-events/newsletters

Marketing/PR

- AllSeen Alliance Blog https://allseenalliance.org/news-and-events/blogs
  - blog from members to showcase member diversity and thought leadership in the community.

- Monthly newsletter https://allseenalliance.org/news-and-events/newsletters
  - continue to showcase the success of the Alliance

- PR / Speakerships
  - to assert thought leadership to demonstrate the pervasiveness and relative maturity of AllSeen to alternative efforts.

- Social media

The AllSeen Alliance is creating
the Internet of Everything…
Will You Participate?

Please contact
Philip DesAutels or Brett Preston
for questions and next steps:
[pdesautels**@linuxfoundation.org**](mailto:pdesautels@linuxfoundation.org)
[bpreston**@linuxfoundation.org**](mailto:bpreston@linuxfoundation.org)
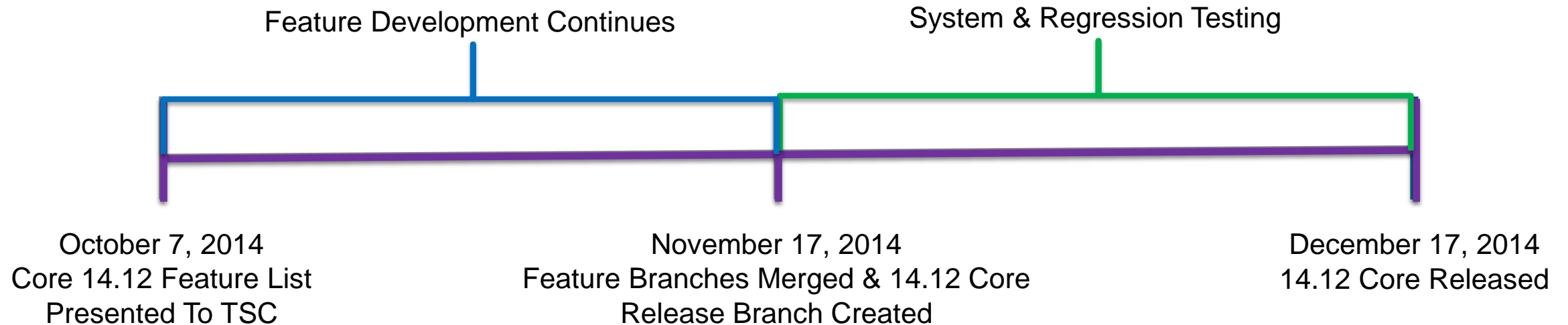
AllSeenAlliance.org

Release Roadmap

Software Releases (core + base services)

- Three releases in 2014: 14.02, 14.06 and 14.12. 2 Releases in 2015: 15.04 and 15.10

- 6 month release cadence for "core" and Base Services
  - More time for feature development and testing between releases
  - Give working groups flexibility about when to release code based on a specific core release

- Release 14.02
  - First AllSeen Alliance release – mostly stability and bug fixes

- Release 14.06
  - Added ECC-based authentication algorithms
  - Migration to MDNS for discovery
  - Events and Actions support

- Release 14.12
  - First major collaboration on core

- Release 15.04
  - Extending the security model

Core release 14.12

- Collaborative effort between QCE, Technicolor, Microsoft and others…
  - First major collaboration on AllJoyn core!

- Features include
  - UDP transport for router-node to router-node communication
  - Improved support and optimizations for publish/subscribe use cases

Feature Development Continues

System & Regression Testing

October 7, 2014
Core 14.12 Feature List
Presented To TSC

November 17, 2014
Feature Branches Merged & 14.12 Core
Release Branch Created

December 17, 2014
14.12 Core Released

How Can You Participate?

It isn't just code contributions!

Working Group Participation

- Working Group calls are open and usually recorded
  - Download recording and presentations
  - Catch up on the technical discussion
  - Great good way to learn where you might be able to contribute

- Project maintainers welcome technical input
  - Quality and completeness of interface definitions
  - Consistency of APIs
  - Feedback is most useful before coding begins

Working Groups

- Analytics and Telemetry

- Base Services

- Compliance and Certification (C&C)

- Connected Lighting

- Core Working Group

- Data-Driven API

- Developer Tools

- Gateway Agent

- Smart Home

- Location Based Services

Seven of these are working groups that formed since the Alliance started!

Many Ways To Participate and Collaborate

- Contribute code to existing projects

- Critical code review

- Propose new projects around a center of interest, expertise, or need

- Testing, testing, testing

- Build automation and documentation

- Listen in and provide feedback in Working Group Meetings

- Sponsor and participate in hackathons

Contribute to existing projects

- Sample programs
  - Developers always appreciate well document sample code
  - A way to contribute without fear of breaking anything

- Test code
  - Test coverage is always a challenge – more tests $\rightarrow$ better quality releases
  - Stress tests

- Implement new language bindings for core and service APIs
  - Python
  - Go
  - Ruby
  - Swift

Code review

- Critical review for security vulnerabilities
  - Buffer overflow
  - Unsafe access and uninitialized values
  - Use of dangerous constructs.
- Best practices
  - Clean understandable API design
  - Well structured modular code
  - Code comments and other documentation
- Performance, stability, scalability
  - Thread-safeness
  - Algorithms

File Jira tickets!

Some Ideas for Project Proposals

- Automotive
  - Green field opportunity for member companies to show leadership

- Services for describing and discovering indoor location
  - Maybe a manageable project for a smaller team

- Home Appliance Services
  - Generic functionality that crosses device categories
  - Functionality for specific appliance categories

- Energy management
  - Mapping existing protocols e.g. SEP2.0 into AllJoyn

- Integrate new transports into core
  - Thread, Zigbee, Z-Wave, etc.

Testing

- Test resources are always in short supply
- The more testing better quality the release
  - Download build test master and feature branches
  - If you want to know where the need is ask the project maintainers
- If you find issues file Jira tickets
  - A bug not found will be a bug not fixed

Build Automation and Documentation

- We need people with experience with build automation
  - Jenkins   Automated build system
  - Jira   Bug and issue tracking
  - GIT   Source code control
  - Gerrit   Code review and process automation

    allseen-infrastructure@lists.allseenalliance.org.

- And documentation:
  - Keeping technical documentation up to date
  - Help with organization of the WiKi

    allseen-tech-documentation-website@lists.allseenalliance.org

Collaboration Highlights

Lighting Service Framework

- Collaborative development effort between LIFX and QCE

- Release 1.0 on November 15th 2014

- Release included:
  - Lamp Service
  - Lighting Controller Service
  - Sample Applications for Android and iOS

Gateway Agent

- Collaborative development effort between Affinegy and QCE

- First release based on 14.06 core scheduled for December 2014

- Release includes:
  - Gateway Management App
  - TR-069 client
  - XMPP connector plug-in
  - Package manager
  - Control application (Android)
  - Reference implementation for OpenWRT

Security 2.0

- Four-way collaborative effort between Microsoft, QCE, Technicolor, and Symantec

- Provides fine-grained control of operations devices are permitted to perform
  - End-to-end encryption
  - Permission rules used ECC and signed manifests allow/deny access

- Architecture finalized and high-level design completed October 2014
  - Coding underway and contributions being submitted

- Security Manager
  - Service to provide support for key management and permission rule

The AllSeen Alliance is creating the Internet of Everything… *Will You Participate?*

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Philip DesAutels or Brett Preston
for questions and next steps:
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bpreston**@linuxfoundation.org**

AllSeenAlliance.org

Thank You

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