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# Open Interconnect Consortium

Introduction – Ni NDA @ T2TRG, IETF92

By Daniel Park @ Samsung

# • Executive Summary

- The Internet of Things requires easy discovery, and trusted and reliable connectivity between any “thing” and any other “thing”, from anywhere, across a variety of manufacturers, markets, and service providers.
- This need is best met by a single connectivity framework.
- No other industry effort is able to address the need.
- The Open Interconnect Consortium (OIC) is a group of industry leaders who are coming together to deliver this connectivity framework via a specification, an open source implementation and a certification program that will improve interoperability between the billions of devices making up the Internet of Things
- Initial open source code is available now; first spec release targeting Q1 2015
- Go to [www.openinterconnect.org/join](http://www.openinterconnect.org/join) to join and for more information

# • Content

- Open Interconnect Consortium Vision
- Goals & Strategy
- Open Interconnect Consortium
  - Members & Structure
  - Standards – Compliance – Marketing
  - Open Source Project
  - Roadmap
- Technology
- Backup



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# • Open Interconnect Vision

- Secure and reliable device discovery and connectivity across multiple OSs, platforms, and technologies is a foundational capability to enable the Internet of Things
- Industry consolidation around a common interoperable approach, across all vertical markets, is essential to enable scale
- OIC will ensure this “network of everything” becomes a reality by...
  - Delivering an industry standard specification & certification program
  - Enabling developers and manufacturers via an open source project
  - Taking an inclusive approach that embraces and provides interoperability across existing technologies
  - Ensuring an approach to IPR that reduced friction in the market

# Goals and Strategy

# • Why Open Interconnect Consortium?

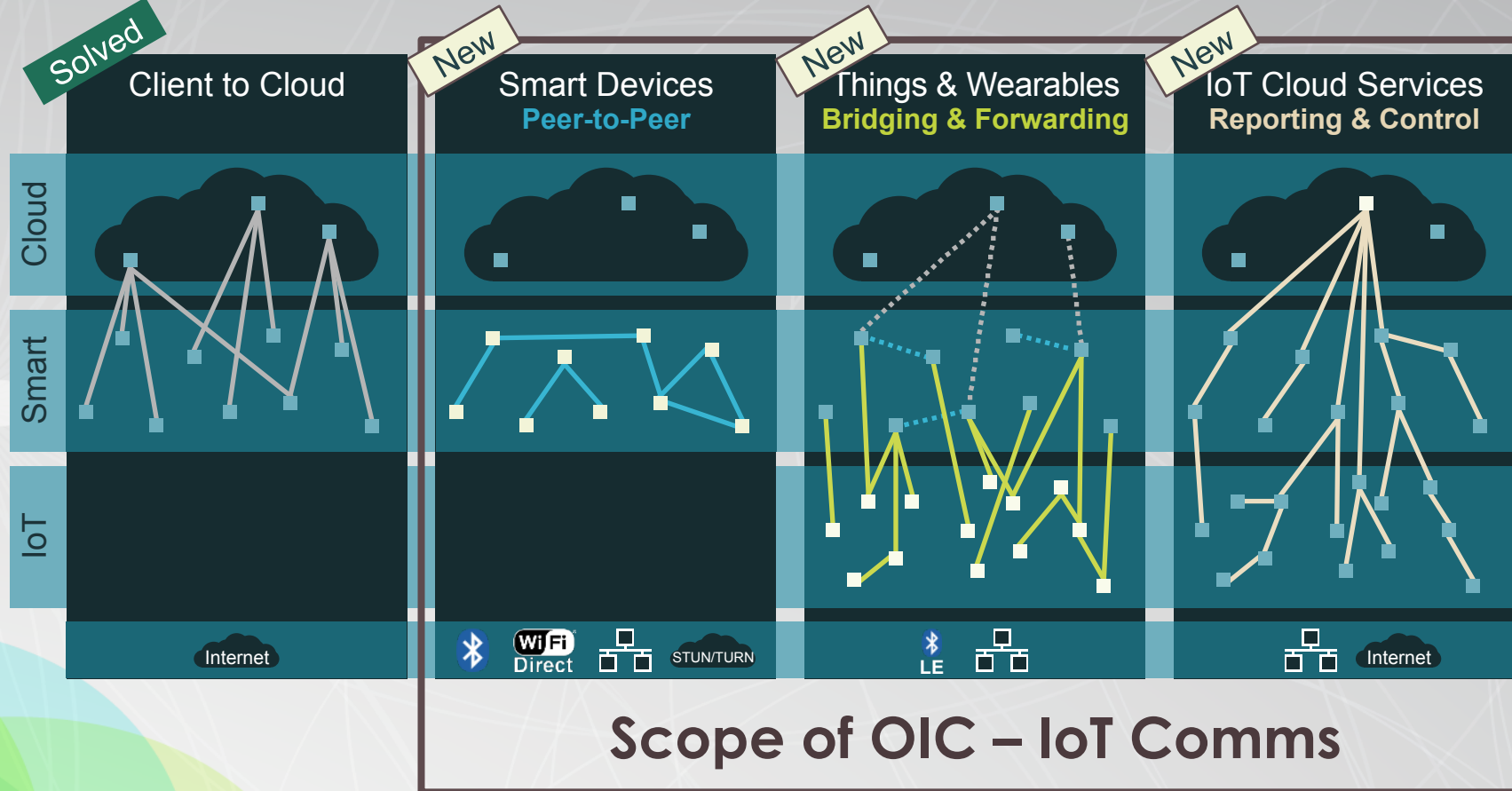
- Industry leaders have evaluated IoT connectivity alternatives found they do not meet the requirements due to...
  - Technical issues
  - Intellectual property rights issues
  - Organizational/structural issues
- Open Interconnect Consortium (OIC) is being formed
  - A broad industry spectrum of industry leaders focused on enabling the network of everything
  - A connectivity framework that abstracts out the complexity of IoT comms
  - Across vertical markets, because users, devices and use cases all span multiple vertical markets.
  - Standards development; because standards are required in many vertical markets
  - Open source; to provide a fast path to market for developers and manufacturers
  - A royalty free IPR policy; because this is a foundational capability
  - An inclusive approach to all relevant connectivity technologies



# • Goals

- Single solution covering interoperability across multiple vertical markets (Consumer, Enterprise, Industrial, Automotive, Health, etc...), OSs, platforms, modes of communication, transports and use cases
  - Common communications protocols for discovery and connectivity across multiple peer-to-peer transports
  - Common approaches for security and identity
  - Common service-level protocols, object models & developer APIs
- Promotes interoperability vs. closed solutions
- Promotes innovation and allows differentiation
- Delivers necessary connectivity from smart devices down to the smallest connected things and wearable devices

# • New Modes of Communication



We need a way to make IoT comms as easy for developers and manufacturers as connecting a client to a server in the Cloud.

**OIC will address the challenge of IoT comms**

 = Local Network / Same Subnet (Wi-Fi, Ethernet, etc...)



# • Strategy

- Unique combination of Standard & Open Source implementation
- Specification, certification & branding to deliver reliable interoperability
  - Connectivity framework that abstracts complexity
    - Easy to use for developers
  - Open specification that anyone can implement
  - IP protection & branding for certified devices (via compliance testing)
  - Service-level interoperability
- Open Source implementation to enable application developers and device manufacturers
  - Android, iOS, Windows, Linux, Tizen, VX Works, Contiki, single threaded RTOSs and more...
  - Many active contributors across the entire code base

“OIC is a standard & open source project that delivers “just-works” interconnectivity for developers, manufacturers and end users.”



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# • External Collaborations

- OPEN INTERCONNECT CONSORTIUM FORMS LIAISON WITH THE INDUSTRIAL INTERNET CONSORTIUM TO ACCELERATE IOT STANDARDS
- EEBUS INITIATIVE AND THE OPEN INTERCONNECT CONSORTIUM JOIN FORCES ON IOT STANDARDIZATION
- MORE...



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# Open Interconnect Consortium



# Members (as of Jan 2015)

## Diamond



## Platinum

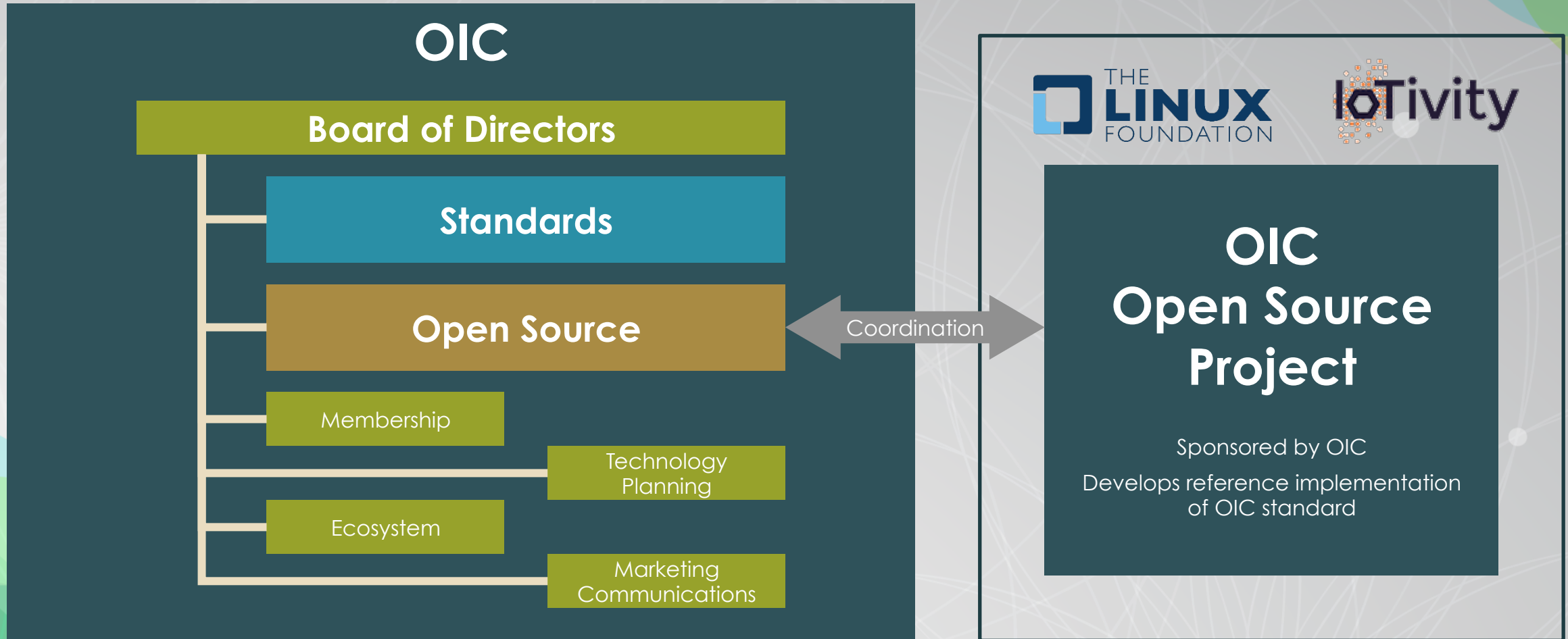


## Gold



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- High Level OIC Governance Structure



- OIC membership and participation
  - OIC is a non-profit entity governed by bylaws
    - Board of Directors has fiduciary responsibility (financial, legal, etc...)
    - Sets up Working Groups to accomplish OIC goals
    - Work/Task Group structure below BoD defined in “Operational Guidelines”, not bylaws
  - IoTivity.org hosted by the Linux Foundation
    - Independent governance and infrastructure, sponsored (funded) by OIC
    - Charter to provide reference implementation of OIC standard (but not limited to \*only\* a reference implementation)



# • Board of Directors

- Each Diamond member appoints one Director to the Board
  - Diamond members also appoint 1 Alternate, on joining
- 2/3rd board majority of current Diamond member appointed Directors required to accept new Diamond Members
- Every 2 years, starting 2 years after founding...
  - Diamond and Platinum Members vote to elect 2 additional (Platinum) Directors for 2-year term from list of candidates nominated by Platinum Members
- Board of Directors may set up Working Groups
  - Work group rules or flexibility concerning membership, participation, voting, leadership and the ability to set up Task Groups is determined by the BoD at time of formation



# • OIC Organisational Structure



# • OIC Intellectual Property Rights Policy

- OIC is a royalty free organisation
- Open Source – Apache 2.0
  - Copyright & patent coverage for submitted code
- Standard – RANDZ
  - Cross licensing of patent claims covering “Compliant Portions” of a member company’s certified products



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# Membership Costs & Benefits

- – Included / Guaranteed
- – Eligible, but must be elected/appointed
- 1 – For companies with annual revenue <\$5M

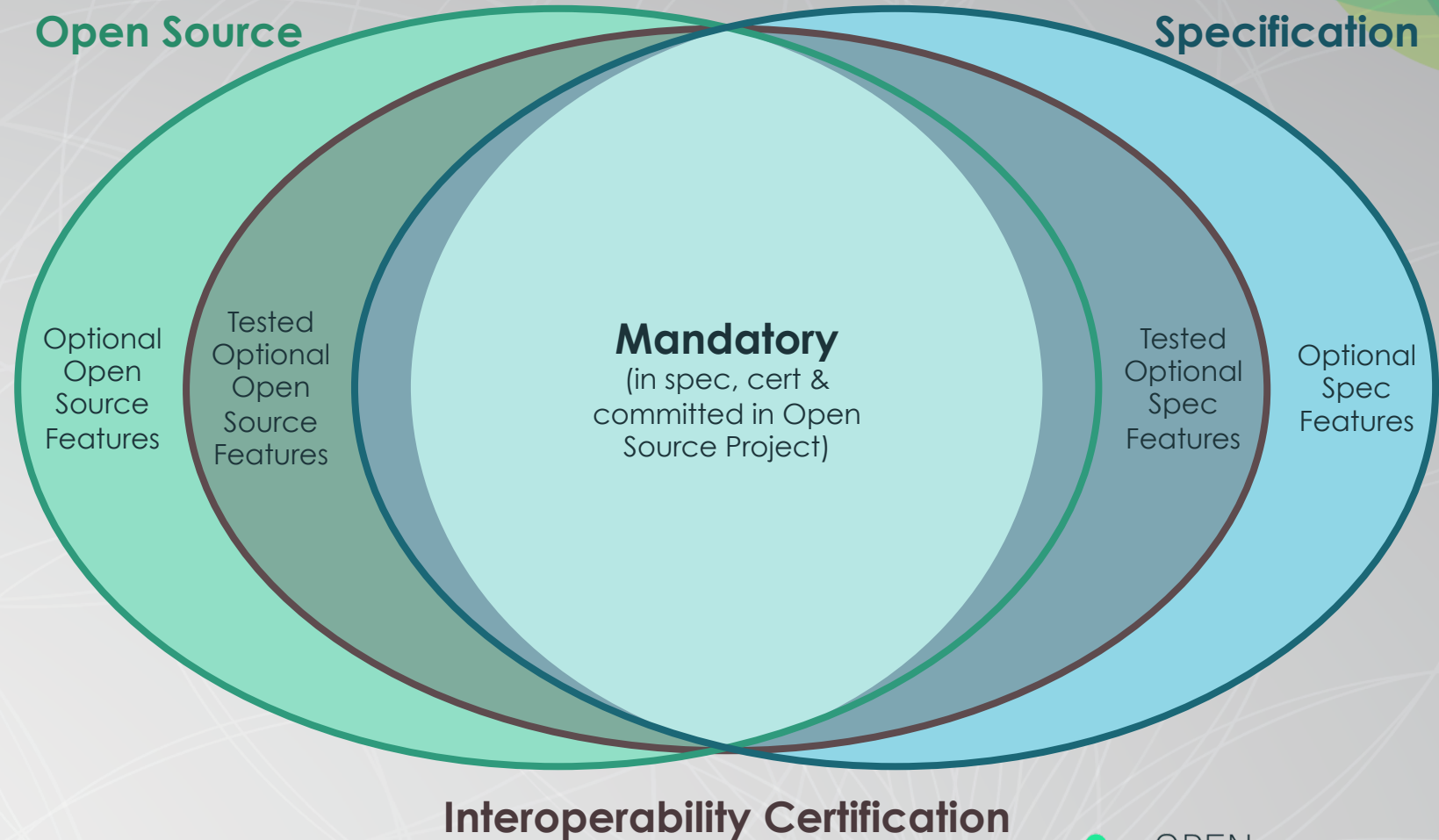
		Board	Open Source	Standards			
		Director	Use & Contribute to OS Project	Lead Work Group or Task Group	Vote	Participate	Certify Products (IP Pool)
Diamond	\$350K	●	●	○	●	●	●
Platinum	\$75K	○	●	○	●	●	●
Gold	\$1K <sup>1</sup> -\$10K		●			●	●
Individual Member	\$0		●			●	
Non-Member			●				





# • Compliance Testing & Certification

- Mandatory feature:
  - Defined in the specification,
  - Released in open source, and
  - Mandatory in the Interoperability certification program.
- All other features are optional
  - Note: some features that are in both the specification and open source may be still be optional





# Summary and Next Steps

- How You Can Use OIC Technology...
  - Use the code from [IoTivity.org](https://ioTivity.org)
    - Open to any individual or company
    - Code is available at [IoTivity.org](https://ioTivity.org) under the Apache v2.0 license
  - Join as a Gold member
    - Certify spec compliant apps and devices
    - Use OIC branding
    - Benefit from patent cross-licensing protection
    - Go to [www.openinterconnect.org](https://www.openinterconnect.org) for membership agreement, etc...



# • How You Can Participate in the OIC...

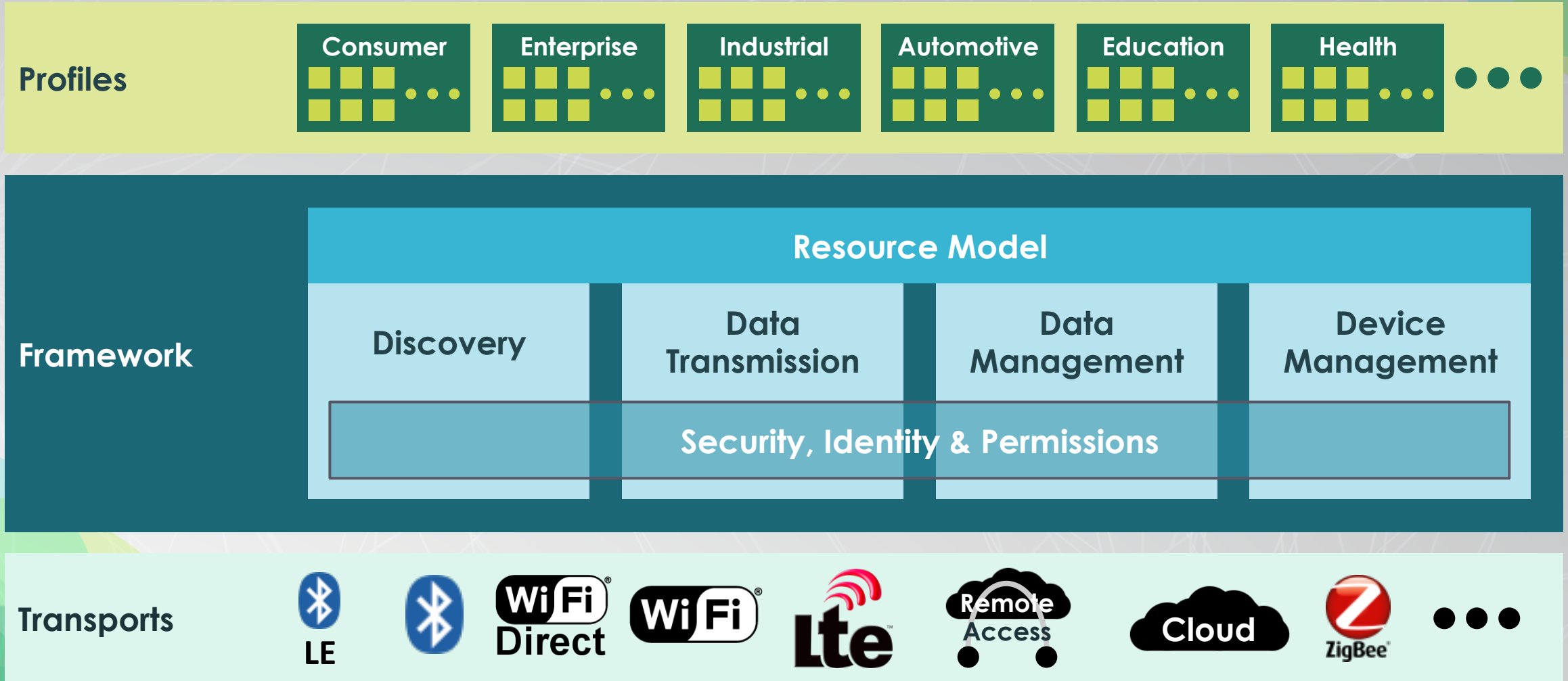
- Contribute code to [IoTivity.org](https://iotivity.org)
  - Open to any individual or member company
- Participate in standards development
  - Open to Gold and above member companies and Individual members
- Vote on standards development; lead Work and Task Groups
  - Open to Platinum and above member companies
- One Director appointed to Board by each Diamond member company
  - Plus, after two years, two directors elected from Platinum member companies' nominations



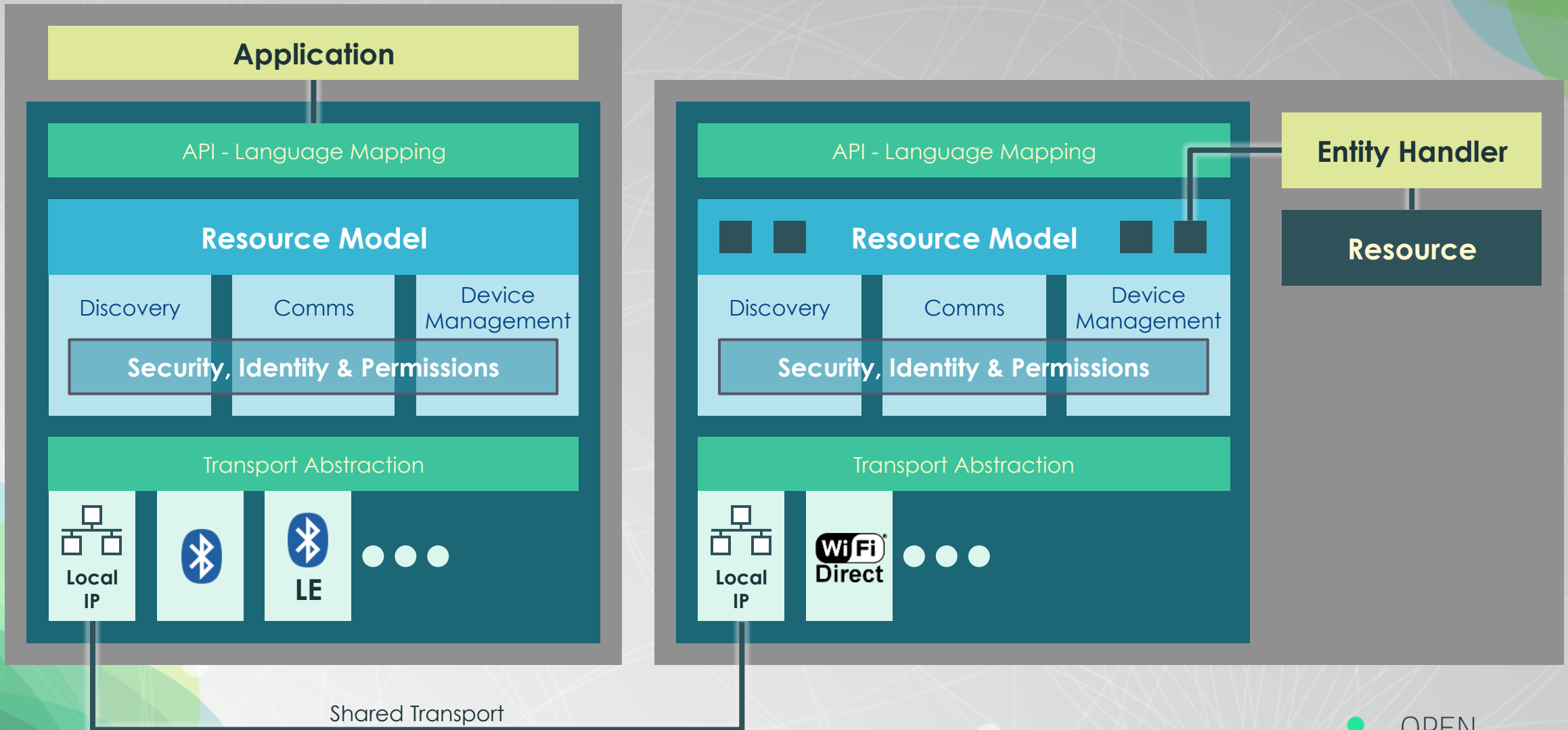
# Technical Overview



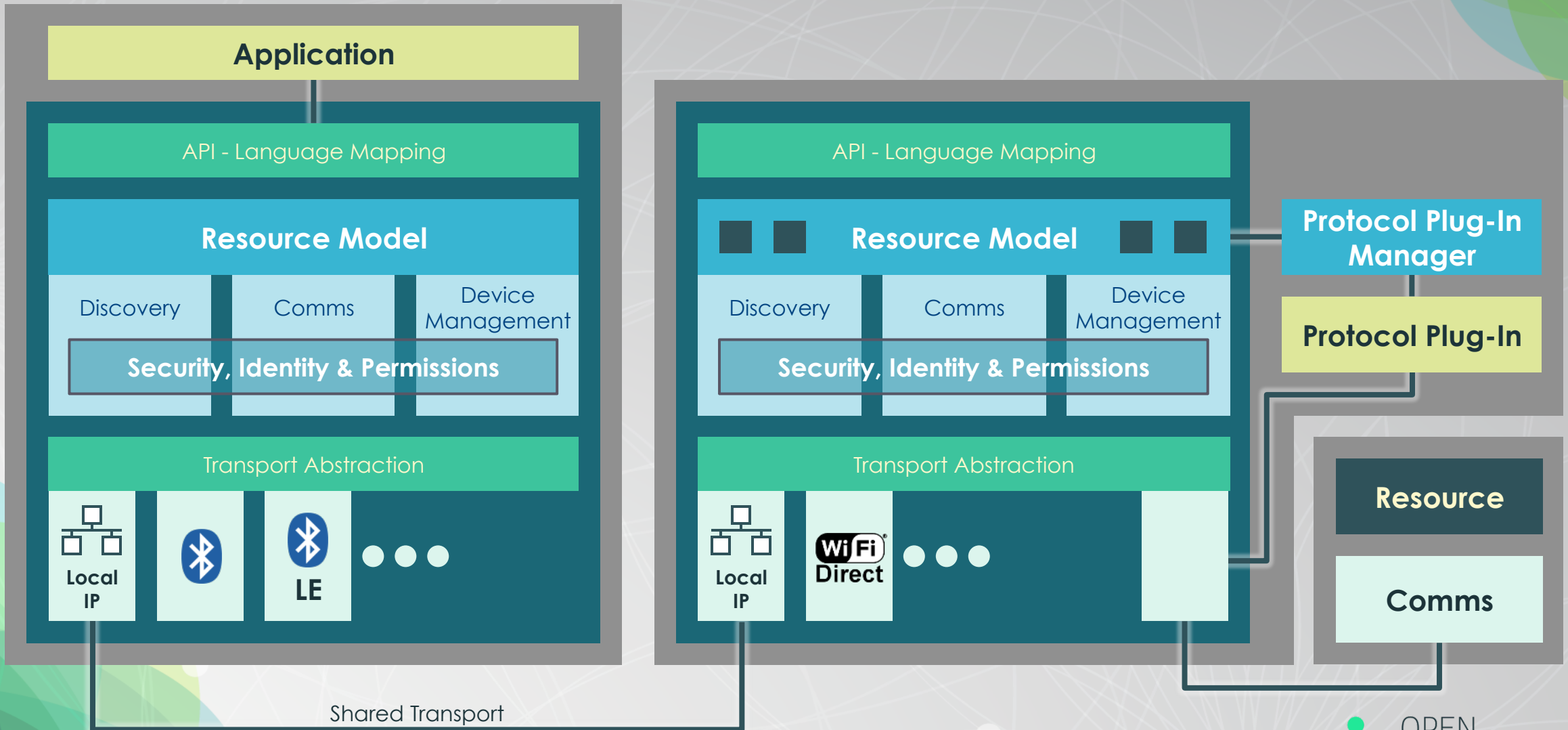
# Conceptual Framework



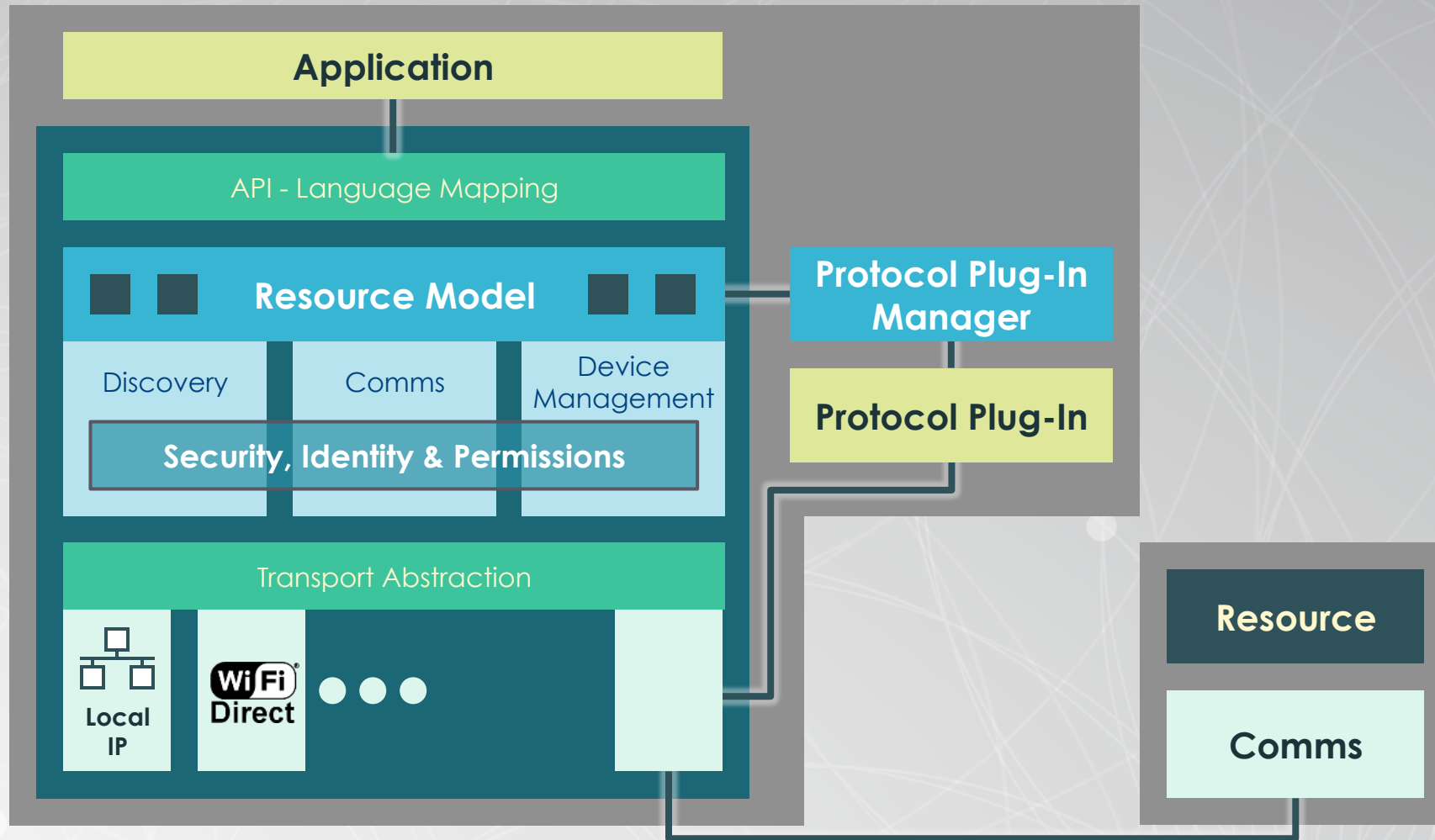
# • Accessing OIC Resources



# • Accessing Non-OIC Resources

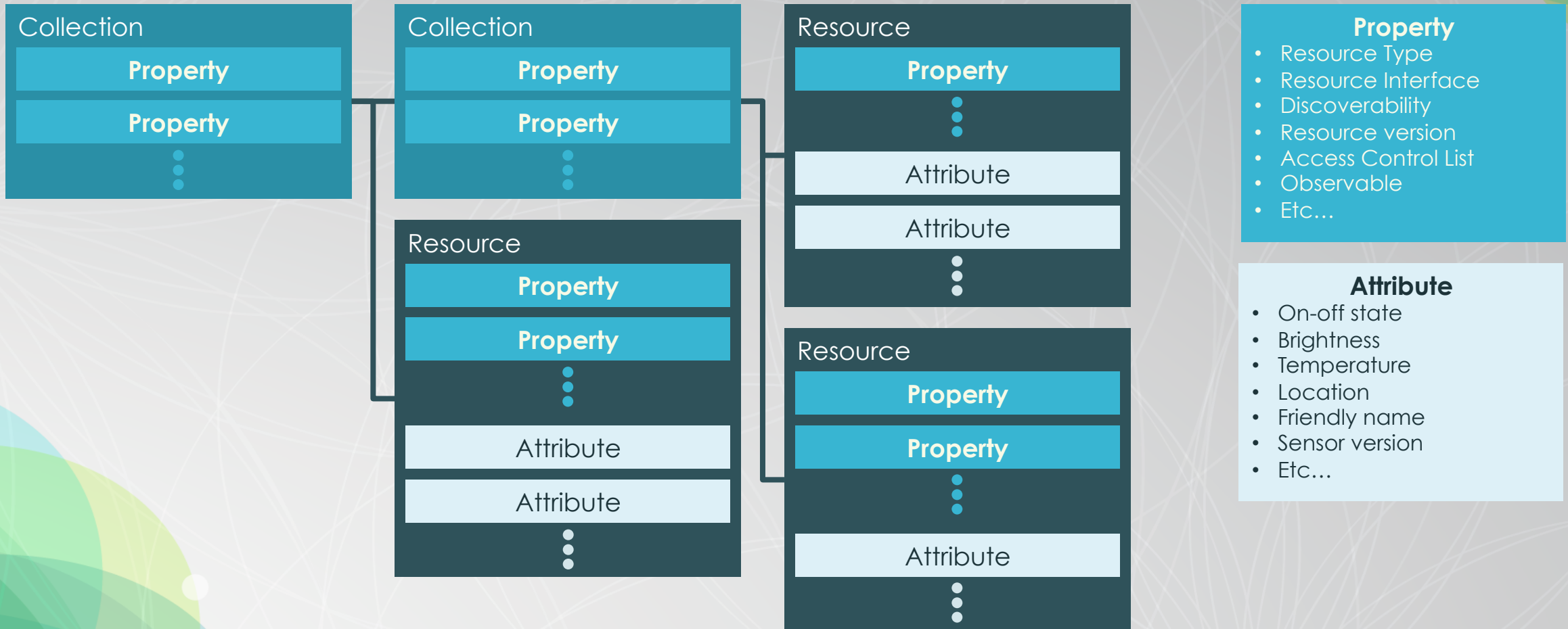


# • Protocol Plug-ins Add Immediate Value





# Resources and Structures



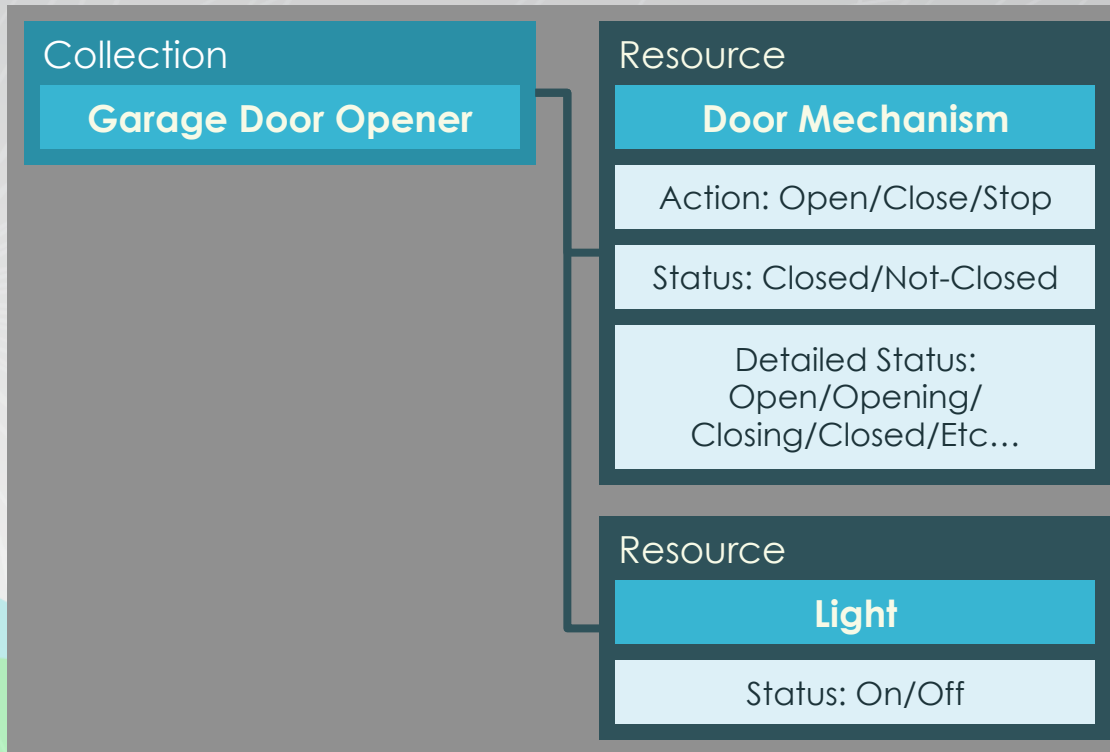
- Light Resource Examples

Resource
Light
Status: On/Off

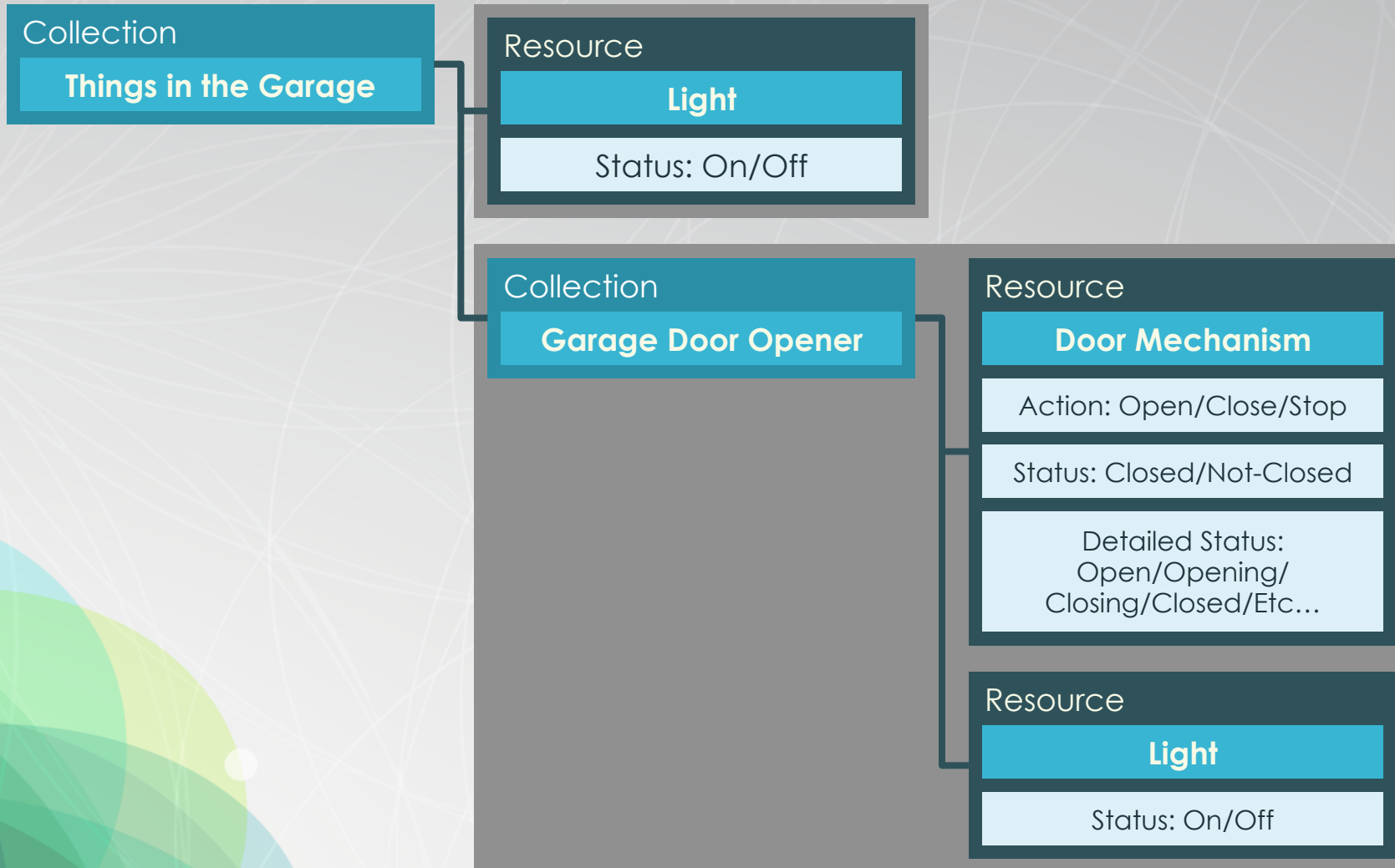
Resource
Light
Status: On/Off
Dimming: 0-100

Resource
Light
Status: On/Off
Dimming: 0-100
Hue: RGB
Hue: HSL
Colour Temp: K

# Garage Door Opener Resource Example

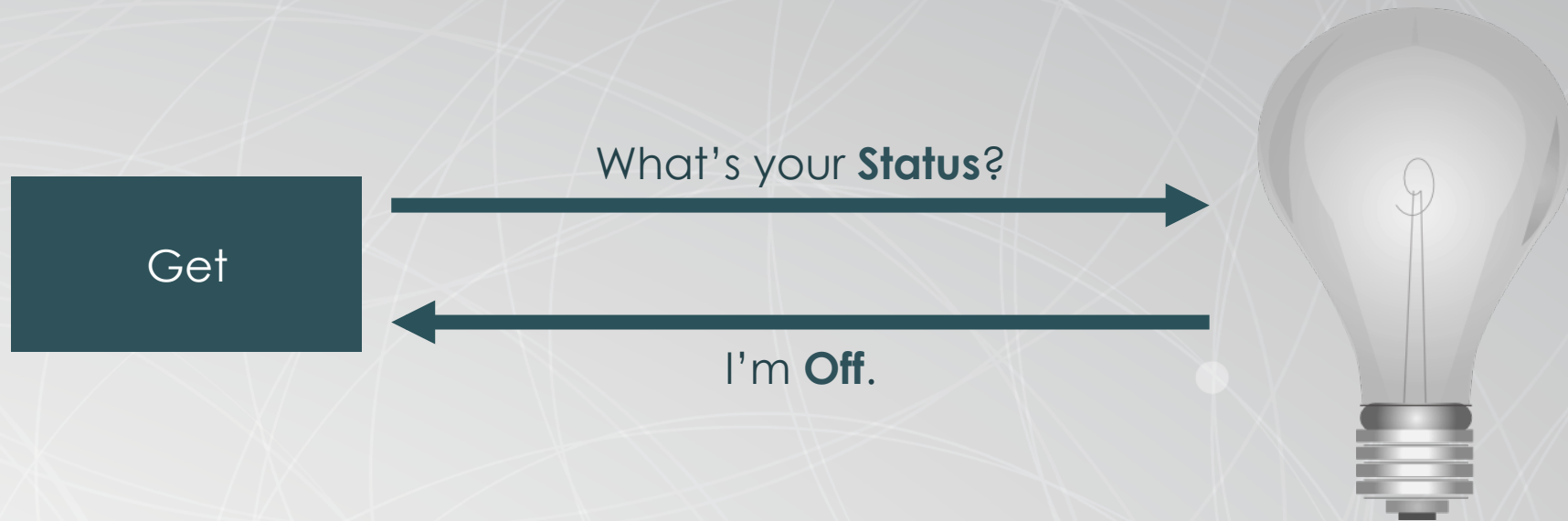


# • Grouping Devices

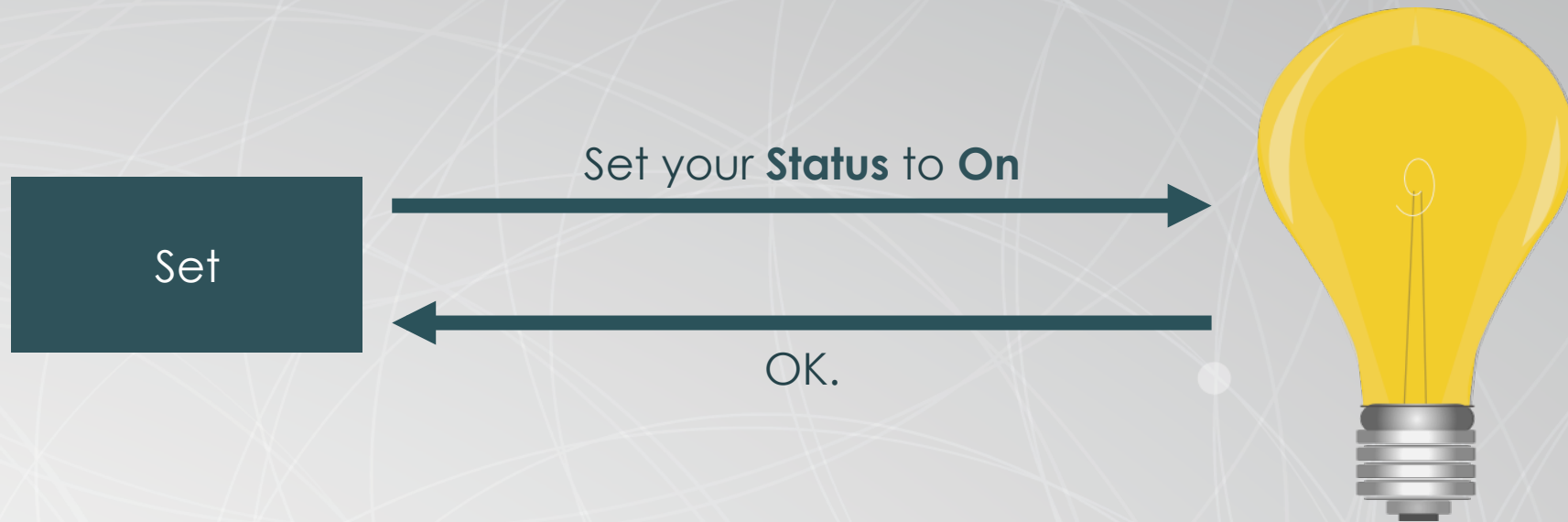




- Interacting with Attributes – Messaging



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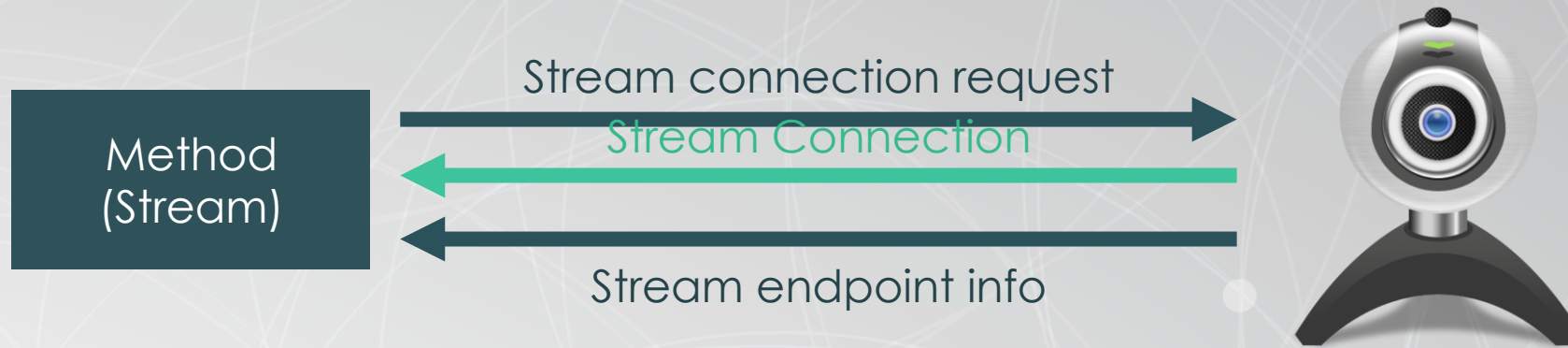


- Interacting with Attributes – Messaging



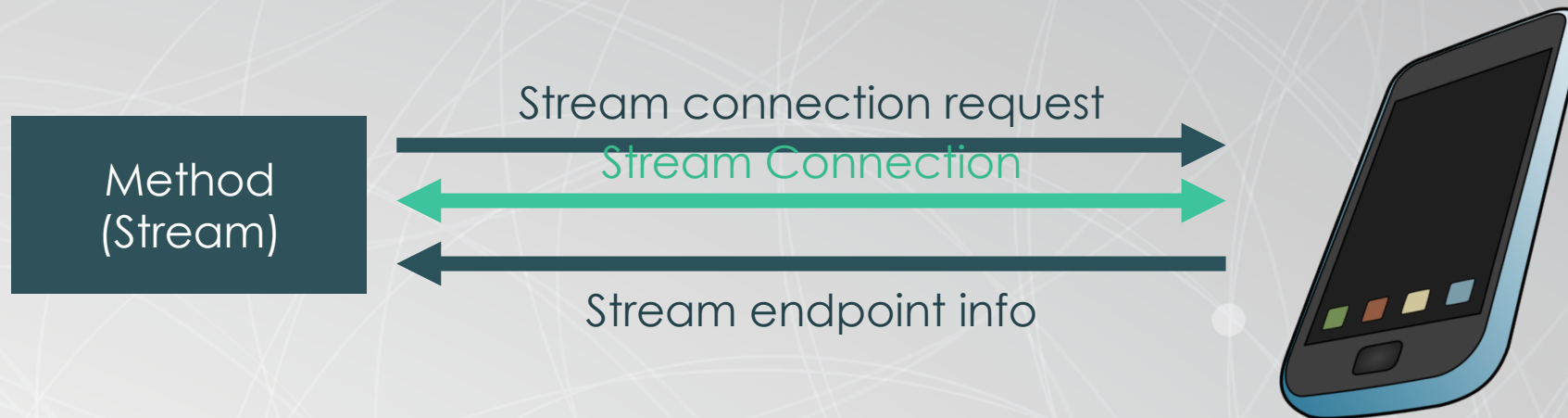


- Unidirectional Streaming





- Bidirectional Streaming



# Open Interconnect Consortium