Smart Homes and the New Normal

Bruno Johnson | CEO | Cascoda | Vice Chair | Marketing and Communications Working Group | OCF

Julian Issa | Lead Analyst | Intelligent Home and Vision | Futuresource Consulting

Dr. Milind Gandhe | VP | Systems Business Unit | TATA Elxsi
Today’s Speakers

Bruno Johnson
CEO of Cascoda
Vice Chair of MCWG for OCF

Julian Issa
Lead Analyst of Intelligent Home and Vision for Futuresource Consulting

Dr. Milind Gandhe
VP of Systems Business Unit
TATA Elxsi
OCF Core Technology

The Secure IoT Framework

Bruno Johnson, CEO, Cascoda Vice Chair, MCWG, OCF
Introduction to OCF – Optimized for IoT

RESTful Core Framework

OS Independent

Certification Program

Constrained Devices

Best in Class Security
## OCF – High Level Goals

- Make it *easy for developers* to deal with the complexity of IoT communications
- Establish an architectural foundation that can achieve the necessary *scalability*
- Focus the architecture around *interoperability*
- Supports the needs of *multiple vertical markets* (since many use cases span multiple vertical markets)
- Provide a path towards future *consolidation* of standards
- Provide a *common data model* that developers can use to interface with all IoT devices and their underlying data
## Why OCF?

<table>
<thead>
<tr>
<th>OCF is among the largest industry-led efforts to develop a secure interoperability specification across the IoT ecosystem</th>
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<tbody>
<tr>
<td>OCF has many liaison relationships with other consortia and standards bodies active in the IoT space</td>
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<td>OCF represents industry coalescing around previously separate industry efforts</td>
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<tr>
<td>OCF is creating an open specification for secure, interoperable IoT, will certify compliant devices, and intends to serve as a trusted brand for consumers</td>
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<tr>
<td>OCF has endorsed security as a key element of its work, and has a dedicated security work group</td>
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</tbody>
</table>
Specifications developed by OCF, as well as the open source reference implementation (IoTivity), are publicly available.

OCF is an open consensus-based organization, anyone can obtain basic membership at no cost.

Decisions in OCF are made by consensus, with the participation of board and working group members.

We welcome the input of all stakeholders, including those with policy interests to ensure the public interest in IoT is addressed.

OCF Core Framework is established and can carry YOUR interaction and data models.
## OCF Key Concepts

<table>
<thead>
<tr>
<th>Dedicated and optimized protocols for IoT</th>
<th>Standards and Open Source to allow flexibility creating solutions</th>
<th>Certification testing for interoperability</th>
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</thead>
<tbody>
<tr>
<td>Specific considerations for constrained devices</td>
<td>Able to address all types of devices, form-factors, companies and markets with the widest possibility of options</td>
<td>Formal conformance testing for device validation to specifications</td>
</tr>
<tr>
<td>Fully compliant towards RESTful architecture</td>
<td>Open Source is just one implementation to solve a problem</td>
<td>Plugfest testing for product interoperability</td>
</tr>
<tr>
<td>Built-in discovery and subscription mechanisms</td>
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</table>
Adheres to most of the security base lines requirements

Security Requirements Overview Per Baseline

- **NIST 8529**
  - Total Requirements Met: 82%

- **CAC2 Conveners**
  - Total Requirements Met: 100%

- **ENISA IOTSec**
  - Total Requirements Met: 70%

- **UK: IoT Requirements**
  - Total Requirements Met: 85%

- **ETSI: IoT Baseline Requirements**
  - Total Requirements Met: 61%
Conformance & Certification

Conformance test – each device proves conformance to specifications

- **Device under Test**
- **Conformance Test**
- **Certificate Issue and Logo Licensing**

Certification Scope:
- **Mandatory** (in spec, cert & committed in Open Source Project)
- **Optional Open Source Features**
- **Tested Optional Spec Features**
- **Optional Spec Features**

Open Source Specification
Specifications

The specification that OCF creates are ISO/IEC adopted:

https://www.iso.org/standard/53238.html

The specifications of OCF are publicly available at:

https://openconnectivity.org/developer/specifications/
Data Modelling: How Things Fit Together

- **Single point of origin:** Version controlled Machine readable descriptions

- **RESTful descriptions**

**October 21, 2020**

OPEN CONNECTIVITY FOUNDATION
OCF & IoTivity

Innovative coordination – Specs and Open Source ready simultaneously
# IoTivity – Open Source

IoTivity is the independent open source implementation of OCF

**Open source License: Apache 2.0**

**Code runs on various platforms**
- Platform abstraction available
- Supported Platforms:
  - Windows10, Linux, Arduino, Android (iOS, MacOS)

**Code can work with different IP Phys**
- Wired ethernet, Wi-Fi, Thread

**Contains the OCF Core Framework**
- Define YOUR application on top

**Info:** [https://iotivity.org/](https://iotivity.org/)

**Usage of the code:** public GitHub repos

**Contributing to the code:** GitLab

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<table>
<thead>
<tr>
<th>IoT Applications</th>
<th>Standardized Data Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Building Automation</td>
<td>Security (Credentials, Access-control, (D)TS)</td>
</tr>
<tr>
<td>Smart Home</td>
<td>OCF Resource Model</td>
</tr>
<tr>
<td>Healthcare</td>
<td>Headless Configuration</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Device Stack</th>
<th>OCF Core Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>APIs and Language Bindings</td>
<td>Secure Ownership Transfer, Credential Provisioning, Access-Control</td>
</tr>
<tr>
<td>OCF Resource Model</td>
<td>Wi-Fi Easy Setup</td>
</tr>
<tr>
<td>Security (Credentials, Access-control, (D)TS)</td>
<td>Interop With Other Ecosystems; e.g. UPnP, Zigbee, etc.</td>
</tr>
<tr>
<td>IP Connectivity</td>
<td>OCF Cloud Support</td>
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<table>
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<tr>
<th>Network Interface</th>
<th>OCF Connectivity</th>
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</thead>
<tbody>
<tr>
<td>Wi-Fi</td>
<td>Device Commissioning</td>
</tr>
<tr>
<td>Thread</td>
<td>Headless Configuration</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Bridging Framework</td>
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<tr>
<td></td>
<td>Cloud Connectivity</td>
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**Operating System and Hardware Platform**

IoTivity Device Stack and Modules

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**Open source License:** Apache 2.0

- Platform abstraction available
- Supported Platforms:
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Development Support

<table>
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<tr>
<th>Getting started guide available</th>
<th>Code generation</th>
<th>CTT conformance test tool</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Simple</strong> steps to try out IoTivity and code generation of OAS2.0 defined models</td>
<td><strong>Code generation of OAS2.0 defined resources on top of the IoTivity Stack (C-code)</strong></td>
<td><strong>Available for OCF members only</strong></td>
</tr>
<tr>
<td><strong>Up and running within an hour</strong></td>
<td><strong>Functional the created code is a simulator, e.g. not attached to hardware</strong></td>
<td><strong>Has options to integrate in development environments</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Setting and retrieving values works on the wire</strong></td>
<td><strong>Selection of test cases that can be automatically run</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Test cases can be extended by others</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Uses the OAS2.0 defined resources for schema validation</strong></td>
</tr>
</tbody>
</table>
Development Support – Clients

**OTGC – Onboarding Tool – Generic Client**

- Linux and Android (maintained), other ports available on request (iOS, windows)
- Open source
- Graphical UI, e.g. a Boolean is represented as a toggle
- Using introspection
- Nice for demos!

**OCF device spy**

- Closed source, based on same code as CTT
- Windows only tool
- Interaction by inputting JSON payload (tool will encode/decode CBOR)
- Easy to use in development (when using the CoAP/CBOR/JSON defined resources)
Company overview

Dr. Milind Gandhe, VP of Systems Business Unit, TATA Elxsi
A **global** business group

with products and services in over **150** countries

over **720,000** employees and operations

in over **100** countries

group revenue of **$113 bn**

with **67.3%** generated in geographies other than India

global leader in several sectors

**MISSION**

To improve the quality of life of the communities we serve globally, through long-term stakeholder value creation based on Leadership with Trust

**10 BUSINESS VERTICALS**

- Information Technology
- Automotive
- Infrastructure
- Aerospace & Defense
- Telecom & Media
- Steel
- Consumer & Retail
- Financial Services
- Tourism & Travel
- Trading & Investment

**TATA TRUSTS: Giving back to Society**

OPEN CONNECTIVITY FOUNDATION
ENGINEERING SERVICES COMPANY that helps develop and sustain differentiated products and solutions through innovation and by focused technology management.

**Product & Digital Engineering**
- Product development lifecycle. Full development programs - architecture to maintenance

**Design & Design Thinking**
- ID, mechanical design and simulation. HMI and User Experience design

**Visual Content (VC)**
- Animations and multimedia content for events, product launches, advertising and marketing

**Systems Integration & Support (SIS)**
- Integration and installation of third-party solutions. Support and professional services

**LOCATIONS**
- BANGALORE (Headquarters), TRIVANDRUM, CHENNAI, PUNE, MUMBAI

**INDUSTRIES**
- Communications, Automotive, Aerospace & Defence, Medical, Healthcare & Lifesciences, Home appliances, Semiconductor, Rail & Marine, Broadcast & Media
DESIGN LED INNOVATION PARTNER

INNOVATION TOUCHPOINTS

- USERS
- Market Research
- R&D
- IoT & CONNECTED LIVING
- HARDWARE & EMBEDDED SW
- AI FOR EDGE DEVICES
- PRODUCT VALIDATION
- MFG. Support

INNOVATION CULTURE
Deliver solutions inspired by the changing needs of the consumer

### USER – CORE PRODUCT – TECHNOLOGY

<table>
<thead>
<tr>
<th>USER</th>
<th>CORE PRODUCT</th>
<th>TECHNOLOGY</th>
</tr>
</thead>
</table>
| - User scenario  
- Focus groups  
- Interviews  
- Gap analysis  
- Opportunity discovery | - Product roadmap  
- UX  
- Feature enhancements  
- Product analysis  
- Value engineering  
- Product validation | - Embedded product development  
- Wi-Fi, BLE, NFC and Zigbee  
- Application development, refactoring, platform migration & cloud infrastructure optimization  
- IoT & Cloud  
- Artificial intelligence |

### Design around future living –
Connected living solution

### Recognized Engineering R&D –
Connected tea maker

### AI Solution Deployment -
Auto oven configuration

### PARTNERSHIP

- Renesas  
- Open Connectivity Foundation

### SPECIALIZED INFRASTRUCTURE

- Prototyping Lab  
- Network test lab  
- Video test lab  
- Environment test lab  
- UX Design Studio  
- AI/ML Lab  
- Robotics

### INDUSTRY RECOGNITION

- iCX: Intelligent Customer Experience Management  
- AIVA: AI Based Video Analytics

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- OPEN CONNECTIVITY FOUNDATION

Global engineering center for home appliance OEM
Supporting customer in market expansion by creating differentiation through advance features and localization

<table>
<thead>
<tr>
<th>CONTRIBUTING AREAS</th>
<th>ENGAGEMENT GOALS</th>
</tr>
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<tbody>
<tr>
<td>• Accelerating introduction of IoT to home appliances&lt;br&gt;• Improving single item value by developing consumer centric feature&lt;br&gt;• Product differentiation by pursuing original local fit design&lt;br&gt;• Contribute to improvement of cost competitiveness</td>
<td>• Melding global tech with local design&lt;br&gt;• Researching India as a market&lt;br&gt;• Product innovation through simulation and digital technology&lt;br&gt;• Leveraging AI and IoT for best of the league solutions</td>
</tr>
</tbody>
</table>

**HIGHLIGHTS**
- Team: rapid scaling
- Cultural nuances and multi site collaboration
- Innovation workshops, technical conclaves

**PRODUCT LINES**

| DESIGN AND RESEARCH projects | 14 |
| AI, ROBOTICS, IOT projects | 22 |
| CAE, ENVIRONMENTAL SOLUTIONS projects | 16 |

OPEN CONNECTIVITY FOUNDATION
Thank you
Smart Homes and the New Normal

Julian Issa | Futuresource
WHAT IS HAPPENING IN THE SMART HOME?

Custom Home Electronics Specialists
- Crestron
- Control4
- Savant
- Lutron
- Russound

Appliance & System Suppliers
- Siemens
- NORTEK
- Panasonic
- LG
- Honeywell
- Whirlpool
- Samsung
- Bosch
- Legrand

Product Vendors
- Samsung
- Danalock
- Arlo
- August
- Nest
- Belkin
- Wink
- Schlage
- Ring
- Signify Philips
- Netatmo
- D-Link

Service Providers
- Orange
- Deutsche Telekom
- ADT
- Vodafone
- Centrica
- Comcast
- Xfinity
SECURITY AND MONITORING REMAIN THE DOMINANT SEGMENT

Global Smart Home Device Shipments By Type 2020

- Security & Monitoring: 59%
- Cameras: 40%
- Doorbells: 25%
- Hubs & Control: 17%
- Detectors: 18%
- Locks: 15%
- Climate Control: 9%
- Power: 8%
- Lighting: 9%
SMART SECURITY & MONITORING SALES IN 2020 WITH U.S.A THE MARKET LEADER

- North America: 52%
- EMEA: 20%
- China: 22%
- Latin America: 2%
- Rest of Asia Pacific: 4%
PANDEMIC IMPACT VARIES BY SEGMENT

Expected Y-on-Y global sales growth in 2020

- Detectors: 33% (Expectation pre-COVID), 44% (Current Expectation)
- Lighting: 39% (Expectation pre-COVID), 40% (Current Expectation)
- Locks: 42% (Current Expectation)
- Doorbells: 42% (Current Expectation), 34% (Expectation pre-COVID)
- Cameras: 21% (Current Expectation), 17% (Expectation pre-COVID)
SHORT-TERM BARRIERS TO BUYING SMART HOME DEVICES

Barriers to buying smart home devices
Among non adopters not considering to buy new smart home devices (France, Germany, UK & US)

- They are too expensive: 53%
- I can’t see a use for them: 37%
- I am concerned about security and privacy concerns if the device is connected to the internet: 31%
- I don’t have enough knowledge about smart home devices: 25%

Q13. What is the main reason for your lack of interest in purchasing a smart home device in the near future?
LONG TERM JOURNEY TOWARDS THE AMBIENT INTELLIGENT HOME

Visual Platforms

- Perception and interaction with graphically enhanced environments
- Visual and tactile
- Content focus

Conversational Platform

- Command and control → Natural dialogue
- Language, inflection and intonation
- Action focus

Ambient Intelligent User Experience

- Immersive, invisible and natural interaction
- Facilitates human and machine collaboration
- Contextual perception and interaction
- Multiple sensory channels and device modes
- Continuous across multiple services and different environments
Near-term Expectations:
- Smart Home as a Service model to become more prevalent
- Smart home devices becoming cheaper will be a key reason for continued growth
- Smart home device sales to return to pre-COVID expectations by 2022

Long-term Expectations:
- Conversational technology to change the way users interact with smart home devices
- Enhanced visual platforms will change the way users perceive the smart home
- Technology-literate people to people-literate technology
- New use cases, including assisted living and smart electrical vehicles, to emerge
Thank You!
Discussion

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