T2TRG: Thing-to-Thing Research Group
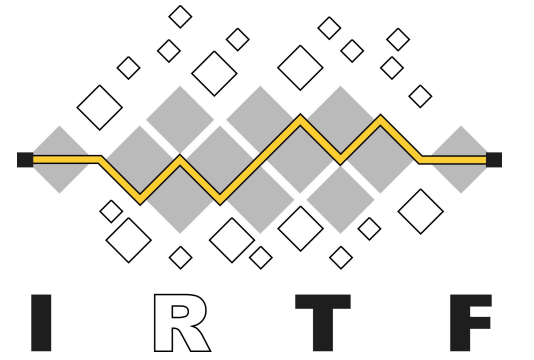
Summary meeting before IETF 108, online, 2020-07-16

Chairs: Carsten Bormann & Ari Keränen

# Note Well

- You may be recorded

- Be nice

- The IPR guidelines of the IETF apply:
  see **http://irtf.org/ipr** for details.

Note Well – Intellectual Property

- **The IRTF follows the IETF Intellectual Property Rights (IPR) disclosure rules**
- By participating in the IRTF, you agree to follow IRTF processes and policies:
  - If you are aware that any IRTF contribution is covered by patents or patent applications that are owned or controlled by you or your sponsor, you must disclose that fact, or not participate in the discussion
  - The IRTF expects that you file such IPR disclosures in a timely manner – in a period measured in days or weeks, not months
  - The IRTF prefers that the most liberal licensing terms possible are made available for IRTF Stream documents – see RFC 5743
  - Definitive information is in RFC 5378 (Copyright) and RFC 8179 (Patents, Participation), substituting IRTF for IETF, and at https://irtf.org/policies/ipr

Note Well – Privacy & Code of Conduct
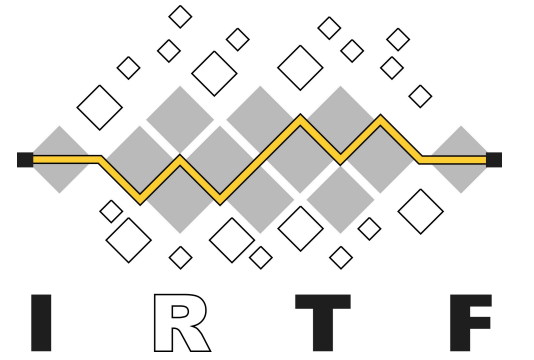
- As a participant in, or attendee to, any IRTF activity you acknowledge that written, audio, video, and photographic records of meetings may be made public

- Personal information that you provide to IRTF will be handled in accordance with the Privacy Policy at https://www.ietf.org/privacy-policy/

- As a participant or attendee, you agree to work respectfully with other participants; please contact the ombudsteam (https://www.ietf.org/contact/ombudsteam/) if you have questions or concerns about this

- See RFC 7154 (Code of Conduct) and RFC 7776 (Anti-Harassment Procedures), which also apply to IRTF

Goals of the IRTF
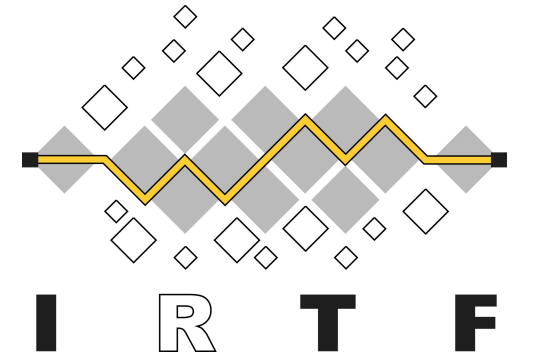
- The Internet Research Task Force (IRTF) focuses on longer term research issues related to the Internet while the parallel organisation, the IETF, focuses on shorter term issues of engineering and standards making

- **The IRTF conducts research; it is not a standards development organisation**

- While the IRTF can publish informational or experimental documents in the RFC series, its primary goal is to promote development of research collaboration and teamwork in exploring research issues related to Internet protocols, applications, architecture, and technology

- See "An IRTF Primer for IETF Participants" – RFC 7418

Administrivia (I)

- Blue sheet (sign your name in the CodiMD notes)

- Note-takers

- Off-site (Jabber)

  - **xmpp:t2trg@jabber.ietf.org?join**

- Mailing List: **t2trg@irtf.org** — subscribe at: **https://www.ietf.org/mailman/listinfo/t2trg**

- Repo: **https://github.com/t2trg/2020-07-summary**

Agenda

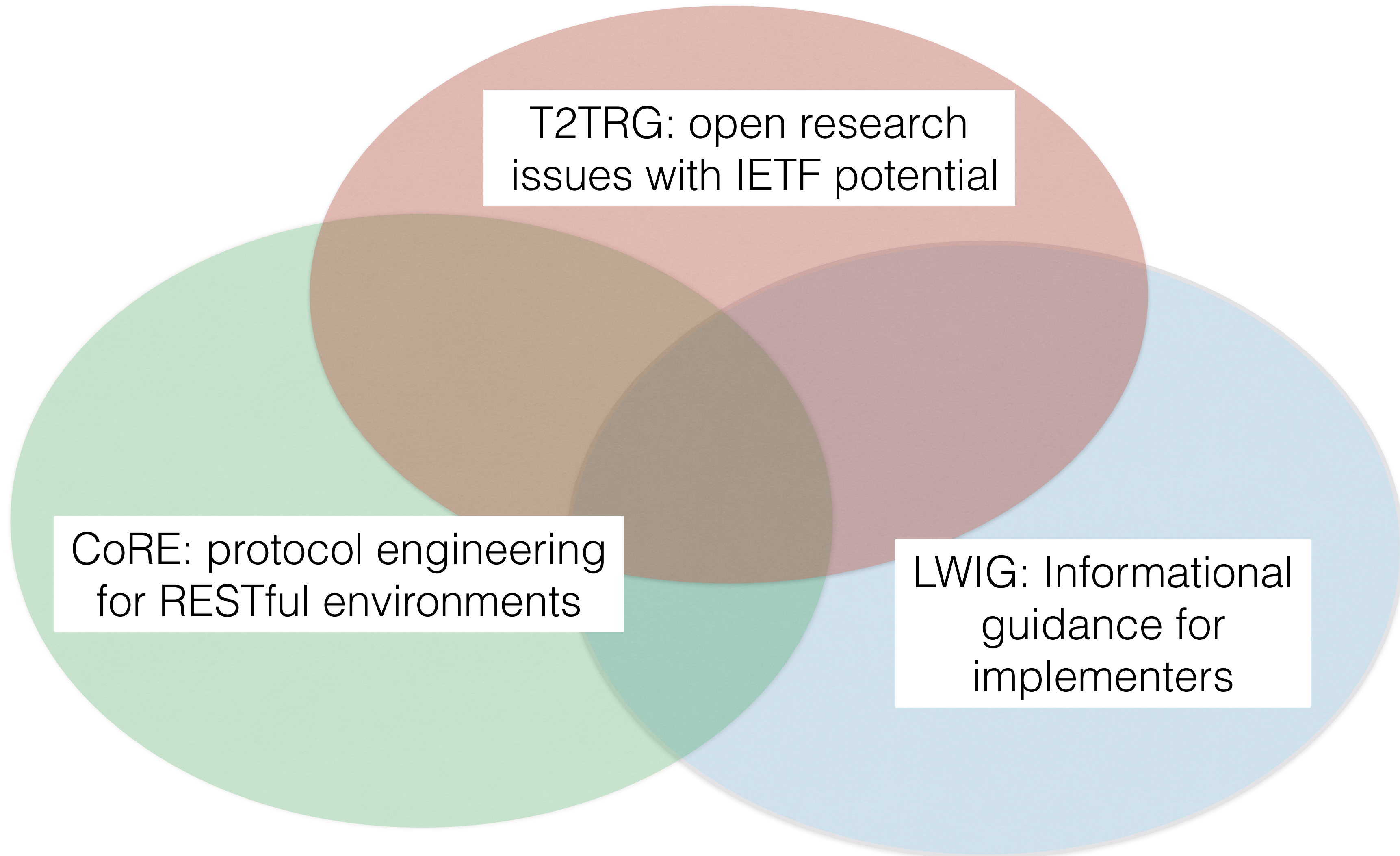| Time (UTC)	Who	Subject
14:00	Chairs	Intro, RG status, upcoming meetings and activities
14:10	Chairs	Reports from WISHI, WoT Helsinki
14:20	Matthias Kovatsch	OPC UA NETCONF binding experiment notes
14:35	Carsten Bormann	Intro: Industry Updates (focus for this meeting)
14:40	Michael Richardson	IoTSF update
14:50	Michael Koster	ZigBee/CHIP update
14:55	Michael Koster	OneDM update
15:05	Travis Shanahan	OMA DMSE/IPSO update
15:15	Wouter van der Beek	OCF update
15:20	Michael McCool	W3C update for new charter period
15:35	Carsten Bormann	ASDF BOF
15:45	Xavier Foy	IoT Edge Challenges and Functions
15:55	Chairs	Wrap-up

T2TRG scope & goals

- Open research issues in turning a true "Internet of Things" into reality

  - Internet where low-resource nodes ("things", "constrained nodes") can communicate among themselves and with the wider Internet

- Focus on issues with opportunities for IETF standardization

  - Start at the IP adaptation layer

  - End at the application layer with architectures and APIs for communicating and making data and management functions, including security

IRTF and IETF

IRTF
(Research)

IETF
(Engineering)

T2TRG: open research issues with IETF potential

CoRE: protocol engineering for RESTful environments

LWIG: Informational guidance for implementers

Next meetings

- Regular <u>WISHI</u> calls
  - E.g., Azure DTDL discussion 2020-07-30
  - Probably pausing in August, picking up in September again

- Online meetings with OCF / OMA SpecWorks (LwM2M&IPSO)/W3C WoT?
- Topic-based meetings on selected OneDM- and ASDF related issues?
- IETF 109 (TBD, decision in August)
- Really co-locating with academic conferences again from 2021?

RG Doc Status

- "RESTful Design for IoT": TBD affordances & discovery, more terms, re-scoping?

- "IoT Edge Challenges and Functions": short update today, in RG adoption call. Need more reviewers!

- Not today:

  - Secure Bootstrapping for IoT

  - YOUPI (describing binary data in legacy formats)

  - CoRE apps, collections part from CoRE interfaces

  - Layer 3 considerations?

- Ramping up: WISHI notes (see <u>WISHI wiki</u>, e.g. terminology rosetta stone)

Work on IoT Semantic/Hypermedia Interoperability (WISHI)

- Four online meetings with variety of topics

  - Semantics technology landscape

  - OpenAPI/AsyncAPI and CoRE/WoT technologies

  - SDF standardization & ASDF BOF

  - W3C WoT TD templates & OneDM SDF

  - WoT Discovery

  - Identifiers, References, Paths, and Pointers (& JSON Path standardization)

WoT "Helsinki" meeting

- Half-day online meeting with the W3C Web of Things (WoT)

  - originally planned f2f in Helsinki

- Topics: use cases, lifecycle, discovery, PoCs, OneDM/TD integration, hypermedia controls in TDs

OPC/UA

Industry Updates

Carsten Bormann

This is a Research Group!
Why Industry Updates?

- To stay relevant, we need to understand what is going on in industry and other (non-IETF) Standards Development Organizations (SDOs).

- Those developments are often hard to understand for an engineer, when all one has is the marketing speak from the press release.

- Hidden behind that may be interesting technical innovations, which pose research questions that are worthy of being investigated.

- So we'll have short segments (usually 5–10 min) that highlight those technical nuggets, but also organizational news that we can use.

IoTSF

Industry Updates
Zigbee/CHIP
One Data Model

T2TRG Summary Meeting

July 16, 2020

Project Connected Home over IP

- Google, Apple, Samsung, Amazon, Comcast, many others in Zigbee Alliance

- New specification for Smart Home interoperability on IP networks: WiFi, Thread, IP-over-BLE

- Open source stack (Apache 2.0) based on contributions of working code

- Open source data models based on ZCL (BSD)

- Simple demo operational 2Q 2020

- Target for device certification 2021

One Data Model (OneDM)

- Liaison organization of SDOs, vendors, and experts

- Initiated by Zigbee in the fall of 2018

- Zigbee, OCF, OMA, Bluetooth mesh, and associated vendors, energy and microgrid verticals

- Phase 1 - Federated data model language (DSL) and meta-model, based on features that can express all other IoT data models

- Common classes of affordances with semantic type definitions

OneDM (2)

- Playground repository with contributions and examples of definitions from OMA, OCF, Zigbee, and Bluetooth mesh

- All definitions are contributed under the BSD 3-Clause license

- Phase 2 - Data Model consolidation from diverse SDOs and using diverse transfer layer protocols

- Opening of the liaison group to broad participation based on open source – language and models

- Public-facing website and content

OMA

Things2Things Research Group report out

Specification release

- New version of Specifications (V2.2.0) has been released on 7 July
- This version includes
- OCF Cloud API for Cloud Services
  - Enabling integration of clouds
- Full scope of communications :
- Specifications are recognized ISO/IEC specifications

- More info: https://openconnectivity.org/developer/specifications/
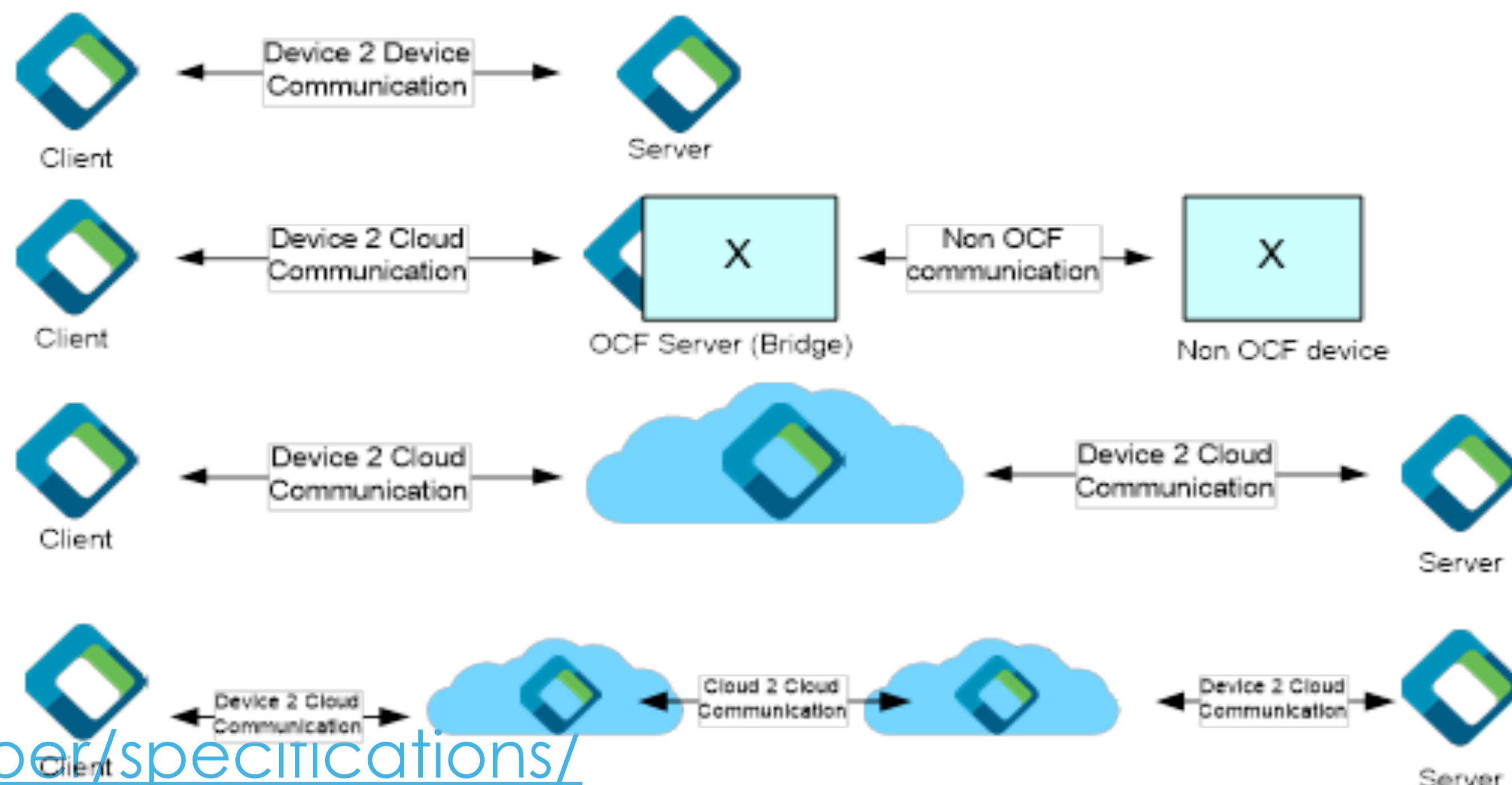
Open source implementation of OCF

- Open source available for all specifications
- Code running on the device: Iotivity
  - https://iotivity.org/
  - https://github.com/iotivity/iotivity-lite
- Code running in the cloud: gOCF
  - https://gocf.dev/
  - https://github.com/go-ocf/cloud

OCF Core Framework

- OCF Core Framework: The infrastructure that enables secure IP communication of the vertical defined application.
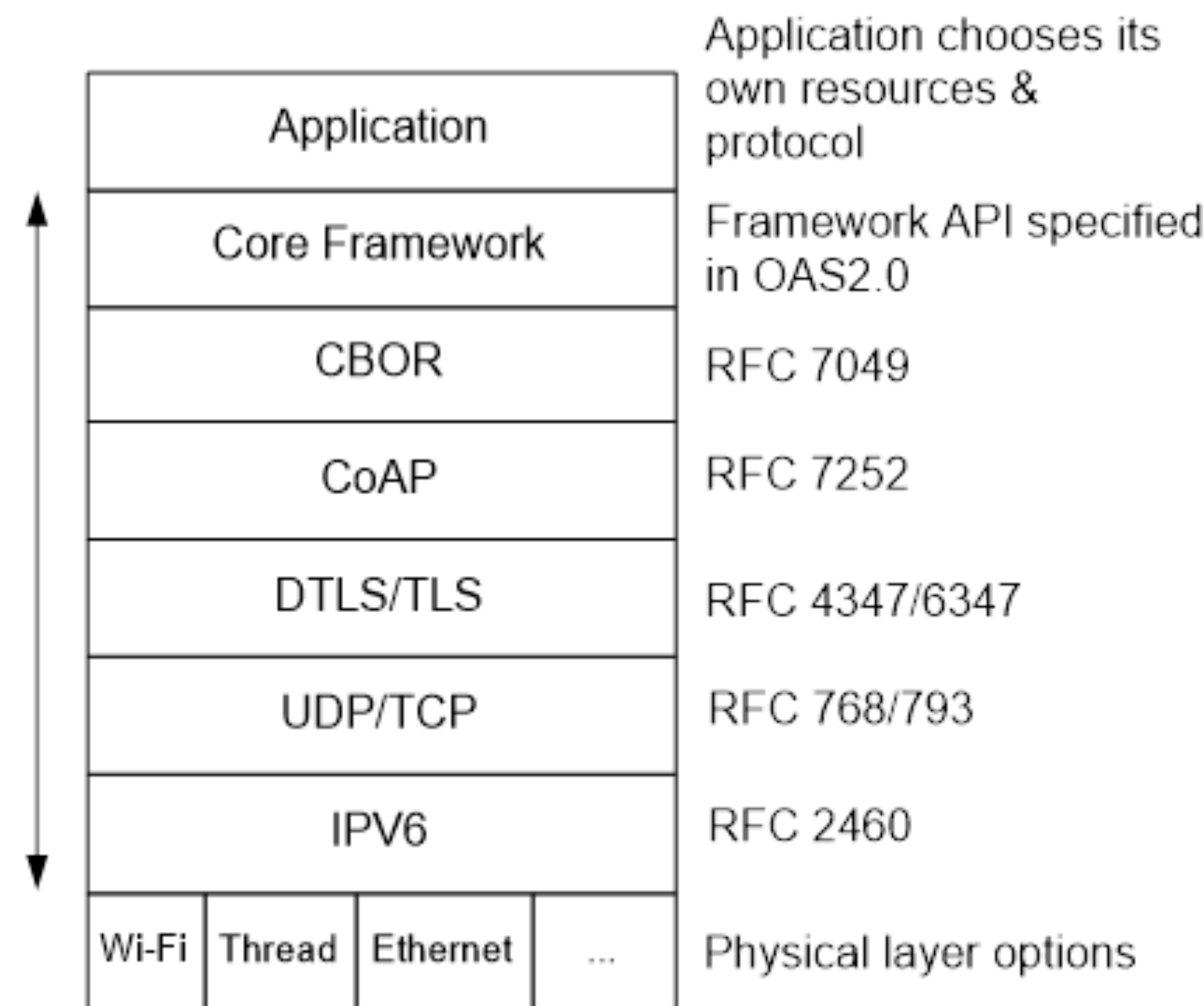- **What does it solve:**

The OCF Core Framework enables vertical agnostic secure IP communication by means of a standardized framework.

More info:

https://openconnectivity.org/technology/core-framework/

OCF
Core
Framework
ISO/IEC 30118

| Layer	
Application	Application chooses its own resources & protocol
Core Framework	Framework API specified in OAS2.0
CBOR	RFC 7049
CoAP	RFC 7252
DTLS/TLS	RFC 4347/6347
UDP/TCP	RFC 768/793
IPV6	RFC 2460
Wi-Fi | Thread | Ethernet | ...	Physical layer options

OCF Security

- The OCF specification's security-first approach brings it into close alignment with several of the security guidelines from government and industry.

Security Requirements Overview Per Baseline

More info: https://openconnectivity.org/technology/ocf-security/
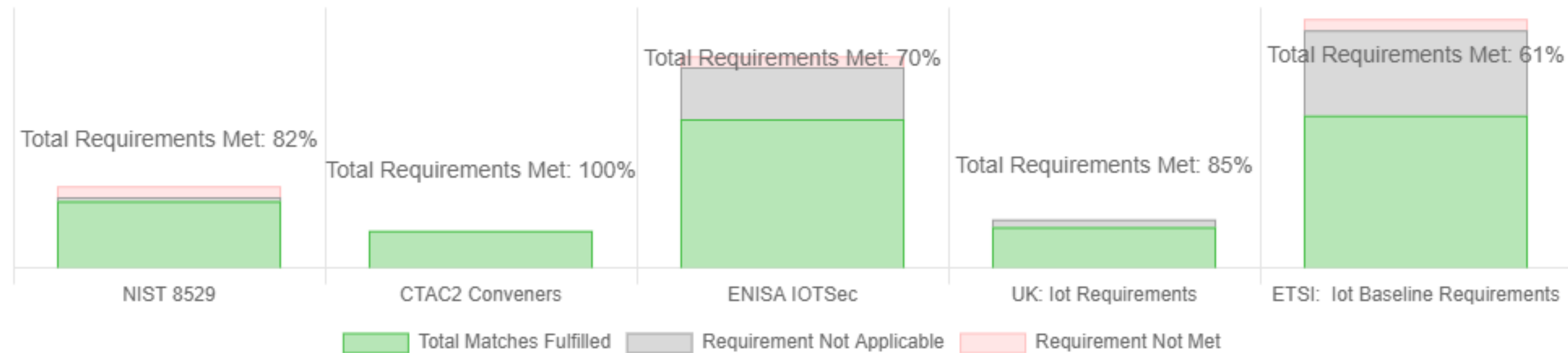
External Cooperation with other standards

- IP-BLiS
  - Cooperation towards alignment on IP for Building Automation
  - https://www.ipblis.org/
- OneDM
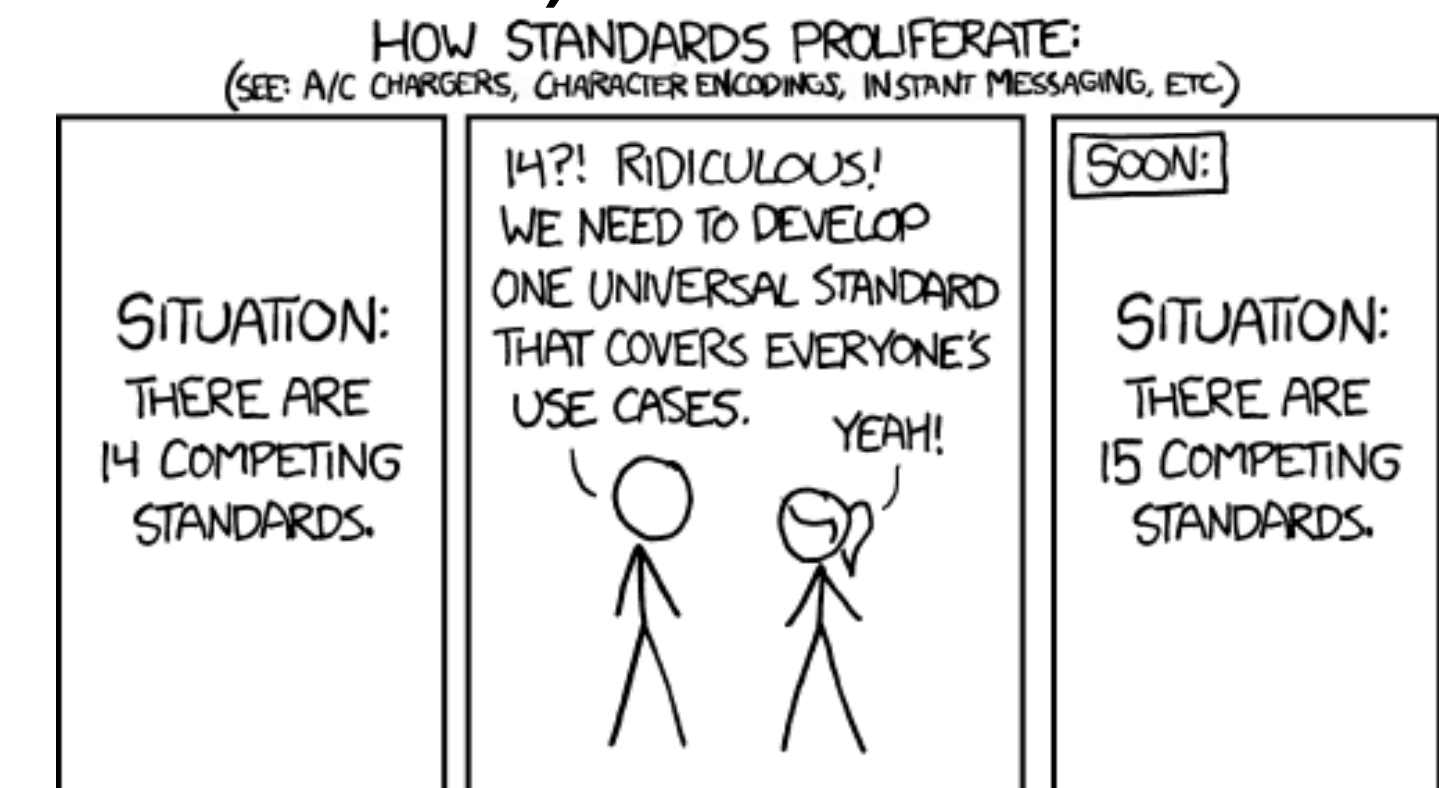 - Cooperation on data model alignment
  - https://onedm.org/

W3C

ASDF BoF outlook

Carsten Bormann, T2TRG pre-IETF 108 summary meeting
2020-07-16

OneDM coming-out 2020-07-13

- OneDM — "One Data Model" (https://onedm.org)
  was started as a **liaison** process 2018, after ZigBee "hive" meeting

- Liaison: Not xkcd 927, but a forum for SDOs (and large vendors) to
  cooperate about harmonization

  - SDOs often operate under NDAs

- OneDM ran under NDAs for a year

- 2020-07-13: OneDM decided to have its coming out… **onedm.org**

HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)

SITUATION: THERE ARE 14 COMPETING STANDARDS.

14?! RIDICULOUS! WE NEED TO DEVELOP ONE UNIVERSAL STANDARD THAT COVERS EVERYONE'S USE CASES. YEAH!

SOON:

SITUATION: THERE ARE 15 COMPETING STANDARDS.

What has OneDM achieved so far?

- Agreement on a **legal model**:

  - Like the IETF did for a long time, OneDM doesn't exist as an organization (OCF did help occasionally where that was inconvenient)

  - contributions and output are BSD-3-clause **open-source** licensed: Liberal copyright license; everyone keeps their trademarks and patents

- Agreement on a basic common **specification format**: **SDF** 1.0

  - **This** is what the BOF is about

- Collected a couple hundred contributed **data models** in SDF from 4 SDOs (Bluetooth, OCF, OMA, ZigBee; other SDOs in the pipeline)
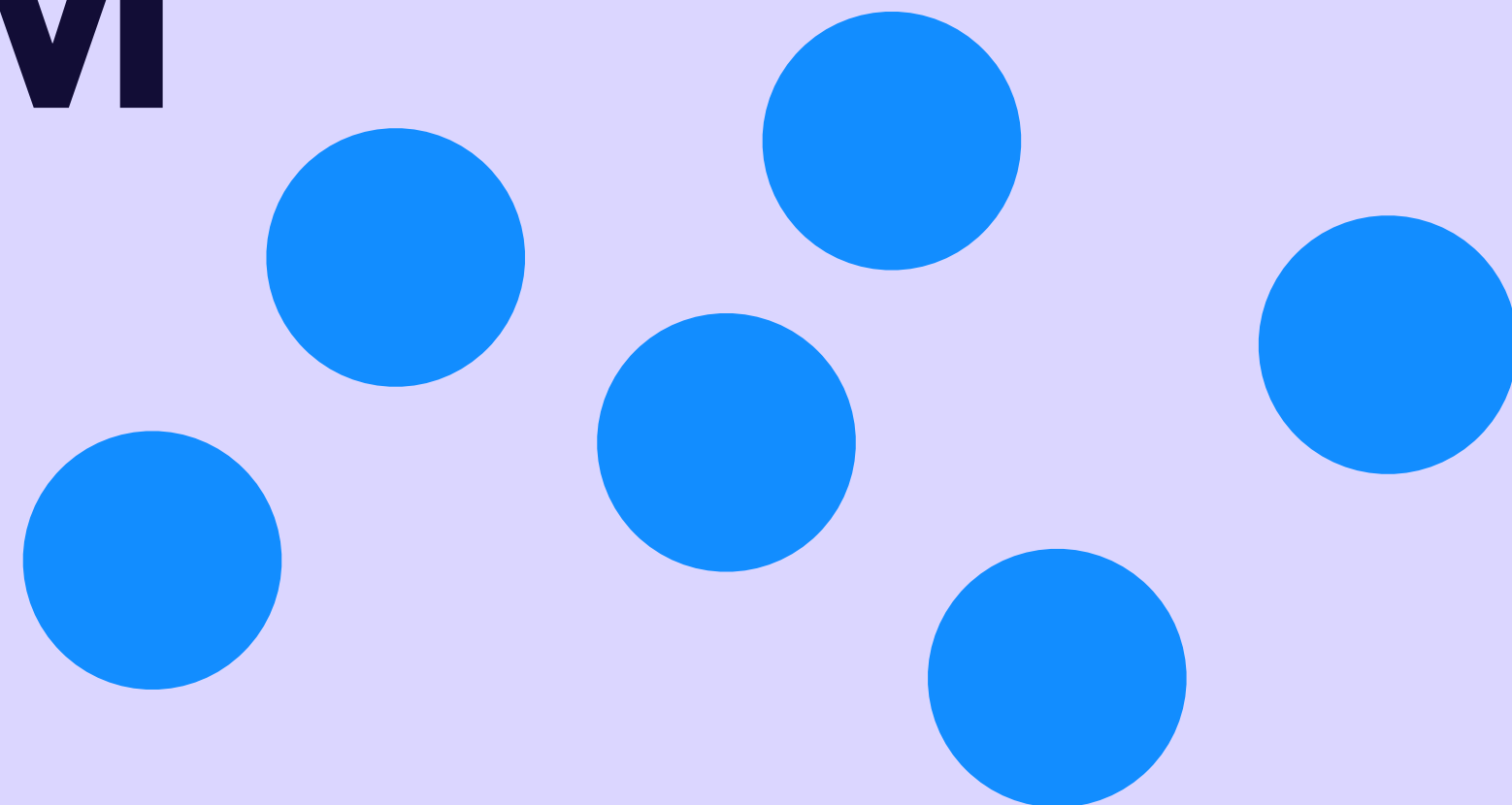
SDF

**SDF RFC-to-be
(the red star)**

IETF
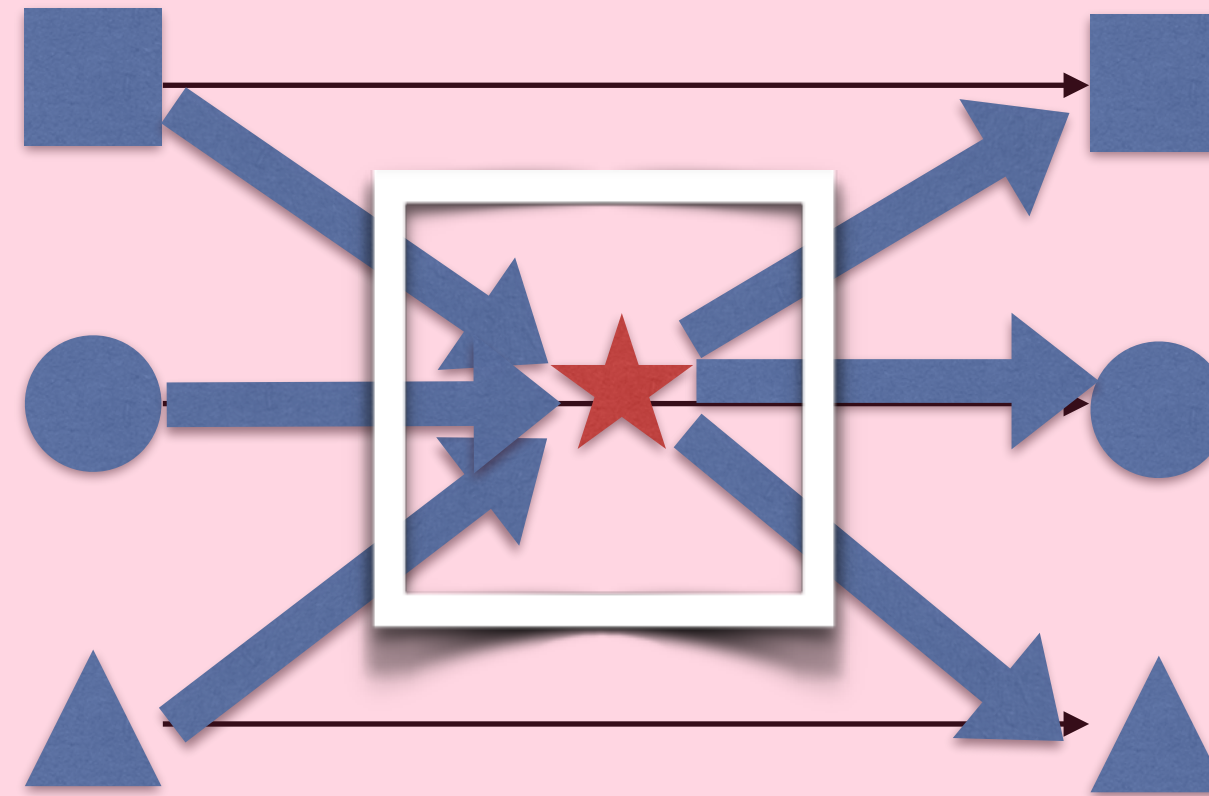
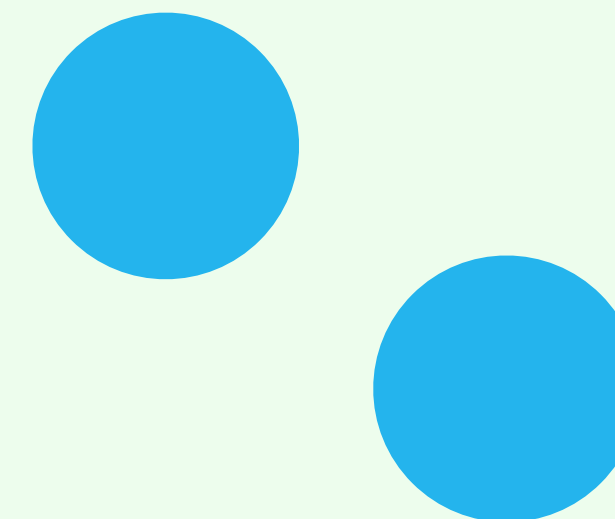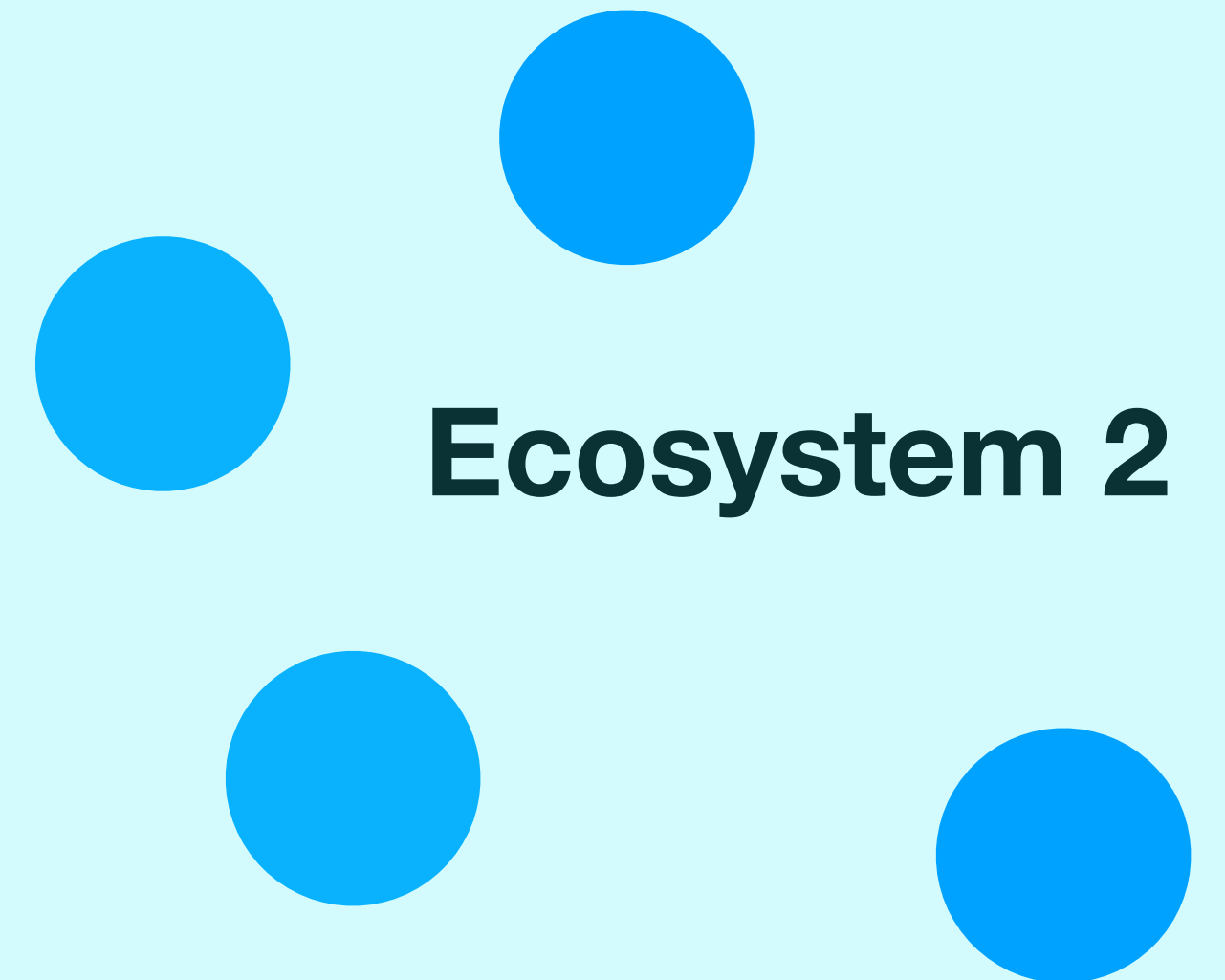# OneDM

Ecosystem 1

Ecosystem 2

**Harmonized
Data
Models**

ASDF BoF 2020-07-28

- ASDF: A Semantic Definition Format

- Non-WG forming BOF

- Inform IETF about what has happened

- Check everything is in place for forming an ASDF WG afterwards

IoT Edge Computing Challenges and Functions

https://tools.ietf.org/html/draft-hong-t2trg-iot-edge-computing-05

J. Hong, Y-G. Hong, X. de Foy, M. Kovatsch, E. Schooler and D. Kutscher

Virtual T2TRG Meeting, July 2020

History of the Draft

- draft-hong-iot-edge-computing-01 (IETF 103)
  - Draft was presented along with two demo videos of use cases for IoT Edge computing (smart construction and real-time control system)

- draft-hong-iot-edge-computing-02 (IETF 104)
  - In a discussion on Edge and IoT in the T2TRG meeting, this draft was considered a possible starting point for a group document. New co-authors joined.

- draft-hong-t2trg-iot-edge-computing-00 (IETF 105)
  - Draft was integrated with *Survey and gap analysis, a* presentation made in T2TRG at IETF 100

- draft-hong-t2trg-iot-edge-computing-01 (IETF 106)
  - Focus changed from use case examples to Edge function analysis.
  - Draft changed from showing one Edge architecture to a range of models. Did not promote/preclude a particular model.

- draft-hong-t2trg-iot-edge-computing-02/3 (IETF 107)
  - Reorganized the draft
  - Extended the background section and the list of functions

- draft-hong-t2trg-iot-edge-computing-04/05 (IETF 108)
  - Addressed comments impacting content and structure
  - Completed section 4 with additional text on distributed model and research challenges
  - Call for adoption on -05

Update 1/2

Updates addressing comments (Thomas, Ari)

- Improvements to section 3 *IoT challenges leading towards EC*
  - *Resilience to intermittent services* now also includes enabling a cloud service to access a device currently asleep
  - Hiding traffic patterns from devices is another privacy application of IoT edge computing

- Improvements to the document structure
  - Removed the appendix (it was moved to draft-defoy-t2trg-iot-edge-computing-background for reference)
  - Moved the *overview of IoT edge computing* section later in the draft, to improve flow (and cleaned up its references to the appendix)
  - Made editorial fixes in revision -05 based on Ari's comments

Update 2/2

Updates that were planned since IETF 107

- Completed sections 4 (IoT Edge Functions) and 5 (Security Considerations)
    - Added an example of distributed IoT Edge Computing next to the general model
    - Added research challenges associated with IoT edge functions
    - Filled security section 5 with positive and negative impacts of edge computing

- Many editorial changes were also made to improve clarity and flow

Quick Overview

1. Introduction

2. Background

- IoT, cloud computing, edge computing, use cases

3. IoT Challenges Leading Towards Edge Computing

- Time sensitivity, uplink cost, resilience to intermittent connectivity, privacy and security
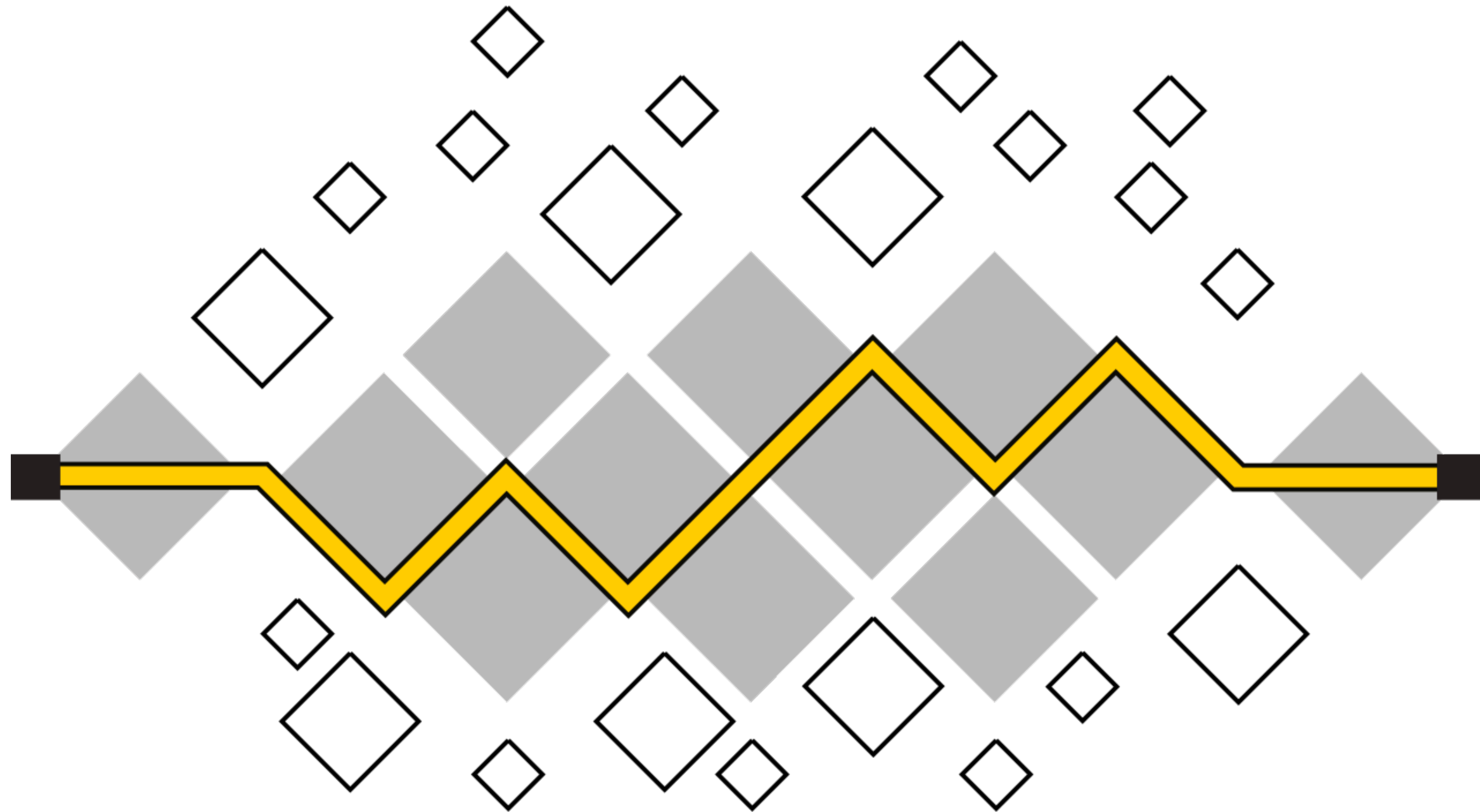
4. IoT Edge Computing Functions

- Overview of existing use of IoT edge computing, general model
- Functions/components
  - OAM components: virtualization management, resource discovery and authentication, edge organization and federation
  - Functional components: external APIs, communication brokering, in-network computation, edge caching, other services
  - Application components: IoT end devices management, data management
- Simulation and emulation environments

5. Security Considerations

Conclusion

- We believe the draft is complete from the co-authors' standpoint:

  - It introduces IoT edge computing and describes reasons why it is needed for IoT

  - It describes a simple architecture model, major functions, and associated research challenges

  - It provides context for future work in this area in IRTF

- A good review helped fixing some issues with the flow and reduce the size of the draft significantly.

- The draft is now proposed for adoption by the RG.

  - If you are interested, please review and provide feedback on the list.