

T2TRG: Thing-to-Thing Research Group

IETF 103 Work meeting, November 9, 2018, Bangkok, TH

Chairs: Carsten Bormann & Ari Keränen

Note Well

- You may be recorded
- The IPR guidelines of the IETF apply:
see <http://irtf.org/ipr> for details.

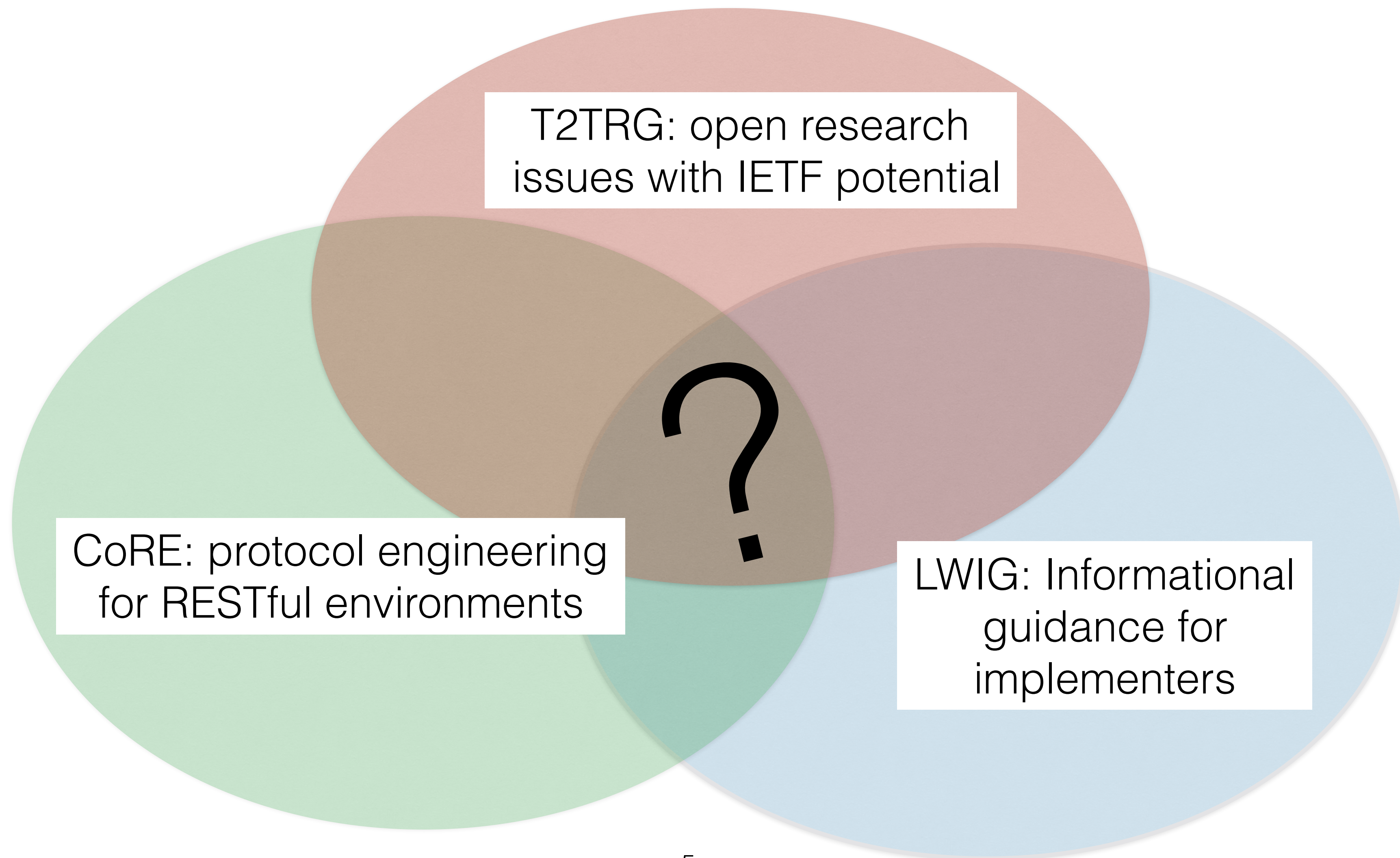
Administrivia (I)

- Pink Sheet
 - Note-Takers
 - Off-site (Jabber, Hangout?)
 - <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/2018-11-bangkok>

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?



Time	Presenter(s)	Topic
8:30	Chairs	Welcome & Short Introduction. T2TRG/IETF work.
8:40	Various	Plenary
	Jungha Hong	Problem Statement of IoT integrated with Edge Computing
	Erik Nordmark	Computing at the Edge
	Thorsten Dahm	Automated IoT Security
	Mohit Sethi	Enabling Network Access for IoT devices from the Cloud
		Additional security topics (if there's time; alternatively in security breakout):
	John Mattsson	CBOR certificates
	Syed Muhammad Sajjad	An Architecture for Collaborative Security and Proactive Defense against IoT Botnets
9:40		Breakout planning
9:50		Break for breakouts
10:00	Various	Breakouts (see below)
12:00		Plenary (discussion, next steps)
		Consolidating results from the breakouts
		Consolidating results from the hypermedia discussions
13:20		meeting ends

Breakouts 10:00-12:00

- COIN Side meeting: Boromphimarn 3
- Separate Edge Computing breakout?
- Security Breakout: Boromphimarn 4
- Hypermedia/CORAL breakout?
- 2, 3, 4: Parallel and/or sequential?

Backup slides

Problem Statement of IoT integrated with Edge Computing

- New challenges for IoT services originated from the changes in the IoT environment
- Edge computing as an emerging technology in IoT
- Use cases of Edge computing in IoT (two demo videos)
 - Smart constructions utilizing EdgeX
 - Real-time control system by Rotary Inverted Pendulum system

Friday: Computing at the edge

draft-nordmark-t2trg-computing-edge-00

Look at edge computing from a compute perspective (cpu, memory, storage, connectivity) to determine network needs

Consider e.g., applications deployed in cloud (as containers or VMs) and what it would mean to deploy them at the edge





Automated IoT Security

- Automating Risk Analysis, Vulnerability Assessment → Secure Configuration
- Automating continuous monitoring and audit

Solving the mismatch between

- The security capabilities and settings with which IoT devices are designed / manufactured / deployed
- The actual security requirements of the IoT devices in different environments over time

CoRAL

The Constrained RESTful Application Language

Klaus Hartke

CoRAL is a *hypermedia representation format* for the hypermedia model described in draft-hartke-core-apps:

- **Links**

change *application state*.

“{context} has a {link relation type} resource at {target URI}, which has {target attributes}”

- **Forms**

change *resource state*.

“To ¹³{form relation type} the {context}, make a {method} request to {target URI}”

CoRAL aims to reduce the cost of hypermedia:

- **Reduce size of representations**

- Encode links and forms in a compact, binary format
- Use numbers instead of strings
- Use sensible default values

Most links and forms can be expressed in a few bytes

- **Reduce number of roundtrips**

- Embed a representation of the link target and forms manipulating the link target at the link source

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- **Simplify implementations**

- Same option concept as CoAP

This simplifies URI parsing and reference resolution a lot

CoRAL

A language for the description of typed connections between resources on the Web ("links") and possible operations on such resources ("forms") as well as simple resource metadata for automated software agents.

- * Data and interaction model
- * Compact, binary format
 - suitable for constrained environments
- * Lightweight, textual format
 - easy to read and write by humans

CoRAL Examples: Textual format

- Interchange format is binary (CBOR)
 - Could use CBOR diagnostic notation to discuss
 - “Ready to munch” format (including CIRIs) gets tedious quick
- Instead: Use separate textual format
 - **Danger:** textual format can shape thinking away from actual data
 - **Danger:** textual format can acquire “syntactic processing” that is not actually part of the binary format
 - **Danger:** hand-made examples [<https://github.com/t2trg/wishi/blob/master/slides/hand-made-examples.pdf>]
 - Keep these dangers in mind → textual format best way to discuss

```
<!-- HTML5 -->
<link rel="stylesheet" href="/style.css">
<link rel="icon" href="/favicon.png">
<link rel="license" href="/license">
```

```
// CoRAL
stylesheet </style.css>
icon </favicon.png>
license </license>
```

link relation type

link target (IRI)

// representation of <coap://robbie.robot/>

```
id      354675 ← link target (literal)
name    "Robbie the robot"
likes   <coap://susie.robot/>
likes   <coap://nikki.robot/> {
  likes <coap://chris.robot/>
}
```

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link from nikki to chris



// representation of <coap://susie.robot/>

id 827446

name "Susie"

power-led </leds/power1>

power-led </leds/power2>

status-led </leds/status>

headlight </leds/head> {

update -> PUT <> [accept "example/boolean"]
}

form relation type

method

submission IRI

```
// representation of <coap://susie.robot/tasks>

item </tasks/1> {
    description "Pick up the kids"
}
item </tasks/2> {
    description "Return books to the library"
}
create 20→ POST <> [accept "example/task+coral"]
```


// representation of <coap://susie.robot/tasks/3>

description "Take out the trash"

collection </tasks>

update -> PUT </tasks/3>

delete -> DELETE </tasks/3>