T2TRG: Thing-to-Thing Research Group

T2TRG/OCF meeting
November 10, 2017, Singapore, SG

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/2017-11-ocf**

Agenda (1)

Time	Topic	Who
8:00	Welcome and intro	Chairs
8:10	IoT at IETF/IRTF; status update and direction	Chairs
8:35	OCF status update and direction	Mark Trayer
9:00	Security	Chairs/Phil Hawkes
	— Object Security (OSCON, OSCOAP, OSCORE)	Francesca Palombini
	— Enabling end-to-end security	FP, Dave Thaler
	— Protecting the network, MUD	Eliot Lear
	— Using IETF ACE components in OCF?	Hannes Tschofenig
9:40	RESTful Interaction, links, forms	Chairs / Mark Trayer
	— synergy with IETF CoRE links work	Michael Koster
	— atomic measurements, batch interfaces	Herve Jourdain
	— CORAL and HSML	TBD/Chairs
10:15	Break	

Agenda (2)

10:35	Ubiquitous Discovery and Connectivity	
	— Use of RD to discover devices in a mesh (across a Border Router)	Mark Trayer
	— Cloud Strategy (IETF view), edge computing, big Internet	Chairs / Jieun Keum
	— IETF view on use of CoAP Native to Cloud etc	Chairs / Jieun Keum
	— IoT NAT traversal	Christer Holmberg
11:15	Progress of dependent work in the IETF	Chairs / Richard Bardini
	— CoAP over TCP	Carsten Bormann
	— CoAP URIs, coap-at://, protocol negotiation?	Jaime Jimenez
	— CoAP Pub-Sub, YANG Push/telemetry in COMI	Michael Koster/Henk Birkholz
	— Resource directory, links	TBD/Chairs
	— Review pipeline from OneIOTA.org to IETF IoT reviewers	Clarke Stevens
11:45	Closing recap and summary of next steps	(All)
12:05	Meeting ends. Lunch(*).	

16 agenda items in 160 min?

- Tasting menu!
  - We can spend more time where we find interest, less time on where things seem to be clear
- Some items are mostly reminders that we may need to be mutually aware about plans and objectives
- Can go into more detailed discussion offline once we know who the right people are for that

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

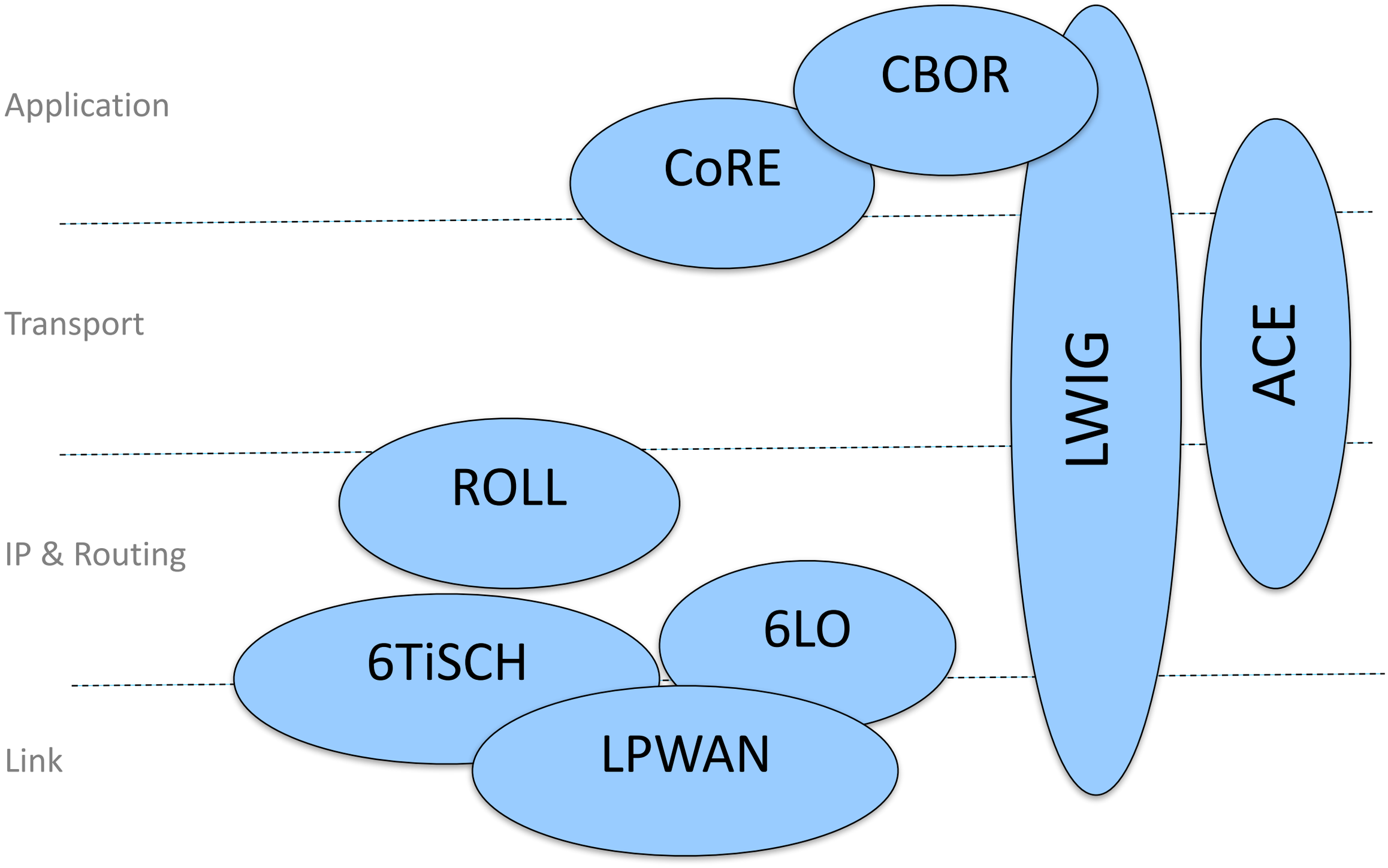
IoT @ IETF/IRTF

Status update and directions

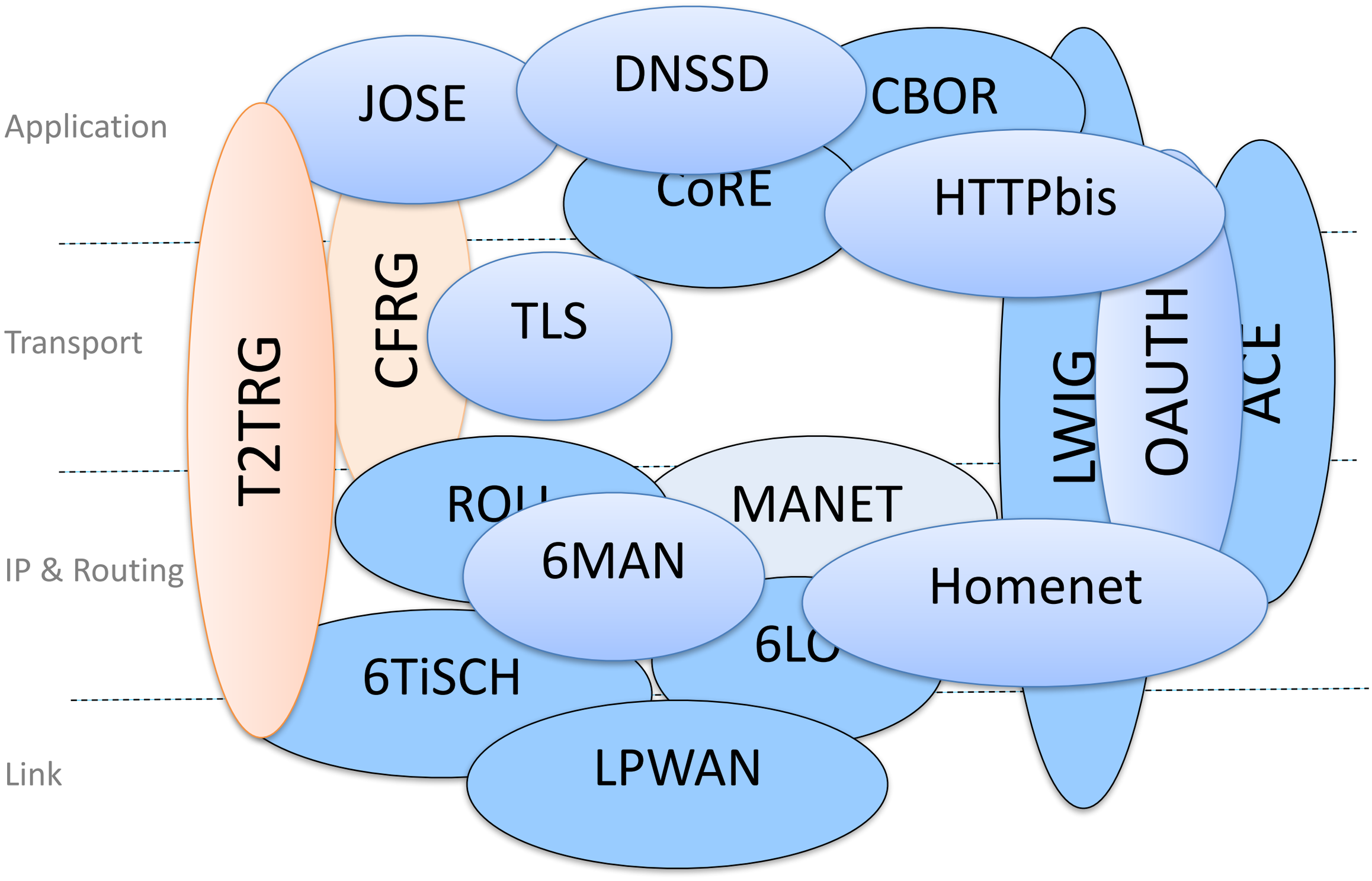
Recent Highlights

- Active work in semantic interoperability, data formats, and other “upper layer technologies”
  - T2TRG WISHI: Work(shop) on IoT Semantic/ Hypermedia Interoperability
- New IoT security related groups
  - Software Updates for Internet of Things (SUIT)
  - Trusted Execution Environment Provisioning (TEEP)

Primary Working Groups



Supporting Working/Research Groups



Constrained RESTful Environments

- CoRE WG is "providing a framework for resource-oriented applications intended to run on constrained IP networks"
- CoAP over TCP/TLS in final stages of IESG review
- SenML ready to publish
- OSCORE (OSCOAP) going for WG last call
- Finalizing Resource Directory
- CoAP pub/sub broker maturing
- CoMI work maturing
- New work on echo/request tag for attack mitigation
- Many drafts in the pipeline…

IPv6 over Networks of Resource-constrained Nodes

- 6lo WG is focusing on running IPv6 in IoT networks
- 6lo Neighbor Discovery (ND) improvements
  - 6LoWPAN ND update in WG last call
  - Securing ownership draft
  - Backbone router usage draft
- Bluetooth mesh, NFC, and WBAN work

IPv6 over the TSCH mode of IEEE 802.15.4e

- 6TiSCH WG is working on enabling IPv6 for the Timeslotted Channel Hopping (TSCH) mode of 802.15.4
- 6top protocol (enabling distributed scheduling in 6TiSCH networks) to IESG review
- Work on security framework and ACE use
- Architecture/terminology work ongoing

IPv6 Over Low-Power Wide Area Networks

- Enabling IPv6 connectivity for LPWANs and technologies to secure the operations and manage the devices and their gateways
- Overview document submitted to IESG
- Getting ready to ship IPv6 UDP compression and fragmentation (SCHC)
  - Relevant beyond LPWANs
- Working on CoAP compression

Routing Over Low power and Lossy networks

- The ROLL WG is focusing on routing issues with Low power and Lossy Networks
- “AODV-RPL use” and “updated use cases” in last call

Authentication and Authorization for Constrained Environments

- ACE WG is defining solutions for authentication and authorization to enable authorized access to resources hosted on resource servers in constrained environments
- Authentication/authorization framework
  - Profiles: OSCOAP, DTLS, (IPsec), …
- CBOR Web Tokens in second WGLC
- CWT proof of possession

Light-Weight Implementation Guidance

- LWIG WG is providing guidance on how to implement Internet technologies on the constrained devices
  - CoAP and TCP implementation guidance
  - Neighbor management policy
  - Updated version of “Terminology for Constrained-Node Networks”

Thing-to-Thing Research Group

- IRTF group investigating open research issues at IoT
- “State-of-the-Art and Challenges for the IoT Security” getting ready to publish
- “RESTful Design for IoT” adopted
- Work(shop) on IoT Semantic/Hypermedia Interoperability
- Edge computing for IoT on agenda

Object Security, OSCORE, e2e sec

Protecting the network, MUD

Security Workflows

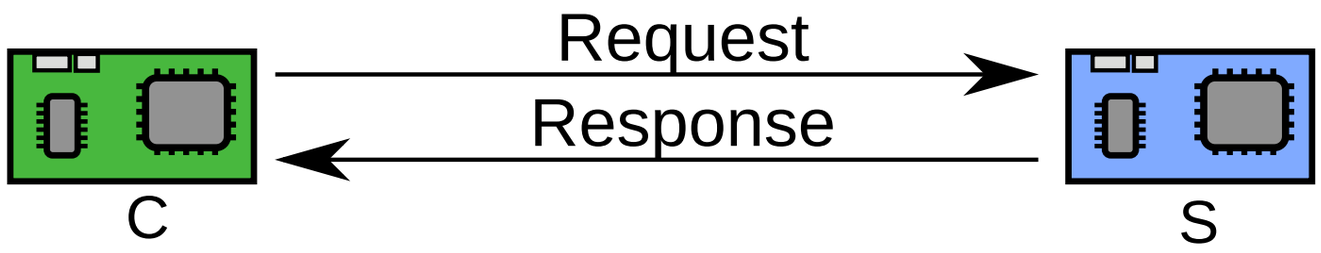
Using ACE in OCF?

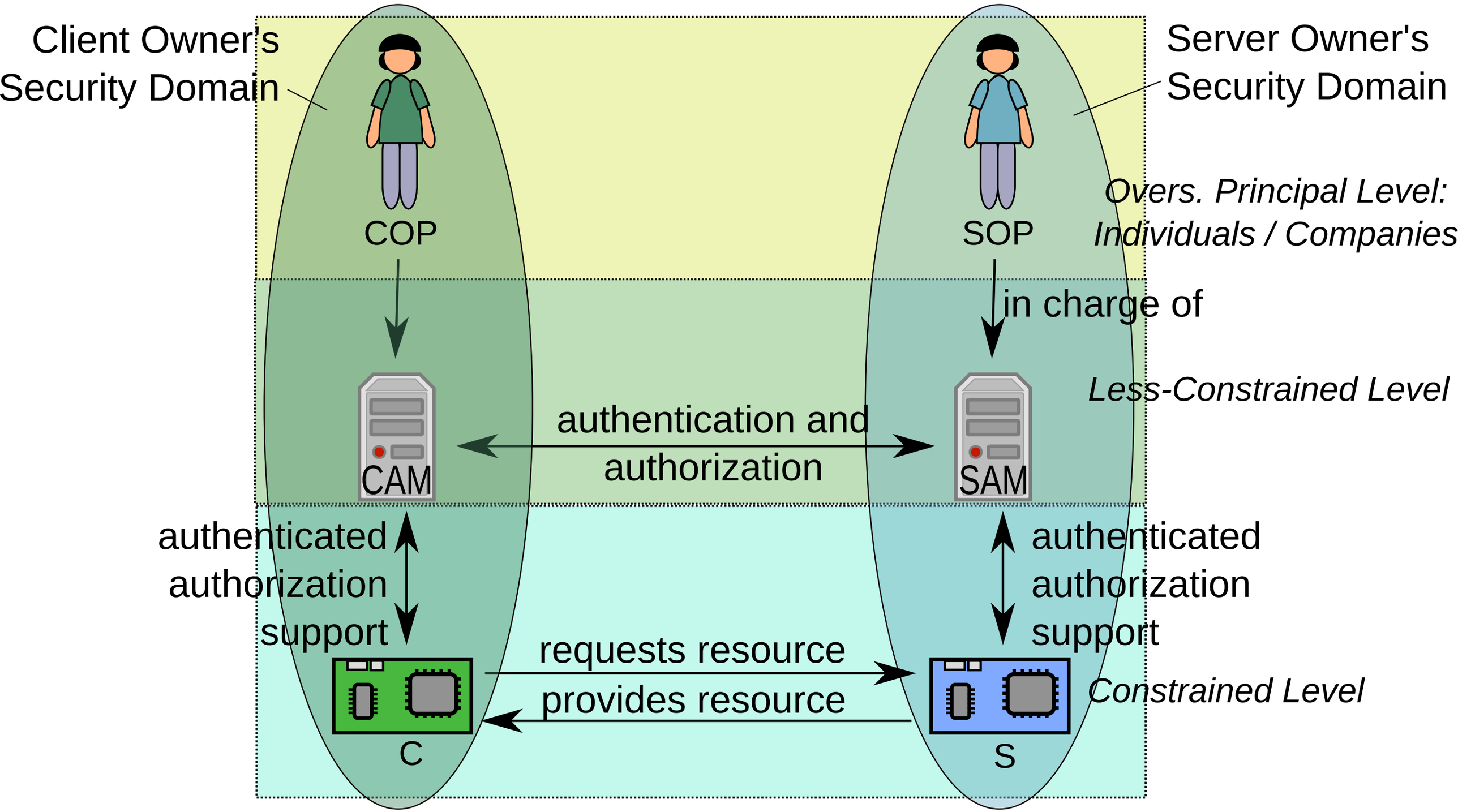
Protect the objectives right ✔

vs.

Protect the right objectives 

Now let's apply all this to constrained devices




Client Owner's
Security Domain
Server Owner's
Security Domain
COP
SOP
Overs. Principal Level:
Individuals / Companies
in charge of
Less-Constrained Level
CAM
authentication and
authorization
SAM
authenticated
authorization
support
authenticated
authorization
support
requests resource
provides resource
Constrained Level
C
S

Shaping the Security Workflows

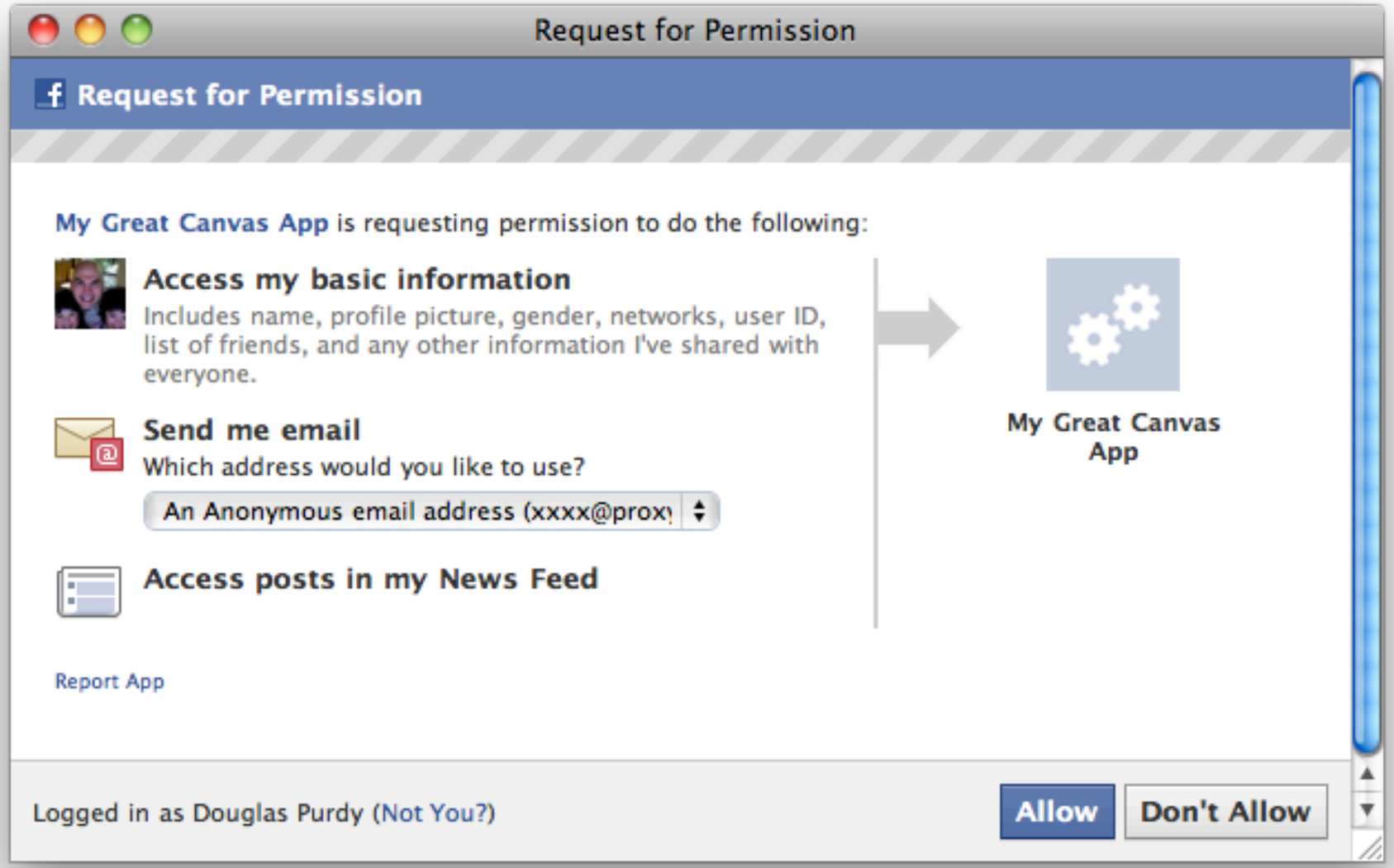
- Stakeholders, Principals
- Less-constrained nodes
- Constrained nodes
- Device Lifecycle
- Authorized, authenticated delegation

2014-05-05: ACE

- “Authentication and Authorization for Constrained Environments”

  - currently applying OAuth framework to IoT

ACE


Request for Permission
Request for Permission
My Great Canvas App is requesting permission to do the following:
Access my basic information
Includes name, profile picture, gender, networks, user ID, list of friends, and any other information I've shared with everyone.
Send me email
Which address would you like to use?
An Anonymous email address (xxxx@proxy
Access posts in my News Feed
My Great Canvas App
Report App
Logged in as Douglas Purdy (Not You?)
Allow
Don't Allow

ACE

- Authorization scenarios with user consent is one use case for ACE – but there are many more, see RFC 7744
- Selected OAuth 2.0 as a building block
- Working on various so-called profiles that map the ACE framework to underlying protocols, like CoAP, MQTT, etc.
- Details at https://tools.ietf.org/wg/ace/

RESTful Interaction, links, forms

Cloud strategy, Edge Computing, DINRG

CoAP native to cloud?

Types of access

- Regular “Telemetry” (cf. pubsub/telemetry slot)
  - CoAP has observe
    - Build on that?
- Configuration settings; special state requests
  - REST fits perfectly

Call-home vs. Client-Server

- CoAP generally assumes connectivity
  - Problems that can be solved at the IP layer are also solved there
- Great for IoT-focused networks, not so great for IoT add-ons to brownfield
  - Middleboxes ➔ traversal issues
  - CoAP-over-TCP, Thin ICE, …

Rendezvous problem

- How do parties that want to talk, find each other
- Classical solution: DNS (dynamic DNS)
  - Often not acceptable for privacy reasons
- Resource directory is another way
- “finding” now also includes finding and setting up information about and for authorization
- Do we need to do more in this space?

Who has the onus to re-rendezvous?

- Observe: Client!
  - No way for server to act on known connectivity changes
- Pubsub: Both publisher (server) and subscriber (client), but not broker
  - Assumption: broker is a rock in the surf

CoAP over TCP

Draft-ietf-core-tcp-tls-10

- Should now cover all IESG comments
  - Waiting for DISCUSS to clear
- Now implemented in libcoap master:
  - https://github.com/obgm/libcoap/pull/113
  - Possibly get some interop testing going tomorrow

Closing recap and summary of next steps