



T2TRG: Thing-to-Thing proposed Research Group

Thing-to-Thing pRG (T2TRG) + W3C IG WoT joint meeting
Yokohama, JP, 2015-10-31..-11-01

Summary meeting 2015-11-04

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Note Well

- You may be recorded
- The IPR guidelines of the IETF apply:
see [**http://irtf.org/ipr**](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/2015-ietf94>**

Agenda

- 10:30..11:10 Summary of Halloween meeting
- 11:10..11:30 Chartering T2TRG

Thing-to-Thing Research Group (T2TRG)

- Investigate open research issues in:
 - turning a true “Internet of Things” into reality,
 - an Internet where low-resource nodes (“Things”, “Constrained Nodes”) can communicate among themselves and with the wider Internet, in order to partake in permissionless innovation.
- Focus: issues that touch opportunities for standardization in the IETF
 - start at the adaptation layer connecting devices to IP, and
 - end at the application layer with architectures and APIs for communicating and making data and management functions (including security functions) available.

W3C IG WoT

- W3C: The people who make the Web work
- IG: Interest Group
- WoT: Web of Things

- Natural Partner on the Application Layer

Why a Research Group now?

- First wave of IoT standards completed by the IETF
- IoT Consortia now forming to build infrastructure and industry agreements around those
- New requirements for research:
based on actual usage of the standards now available

Areas of Interest

- Understanding and managing the motivation for single-purpose silos and gateways; facilitating a move towards small pieces loosely joined (hence “thing-to-thing”); scaling the number of applications in a single network
- Deployment considerations; scaling considerations; cost of ownership
- Management and Operation of Things
- Lifecycle aspects (including, but not limited to, security considerations)
- Cooperation with W3C, e.g. on data formats and semantics

Areas of Interest (more explorative)

- Operating Things that have multiple masters/ stakeholders (including understanding role definitions of devices, owners, operators etc.)
- Exploring the duality of state- and event-based approaches
- Aspects of distribution (cf. “fog computing”); reliability and scalability considerations
- Containerization and other forms of mobile code

Other objectives

- Definition of “Benchmark” or Reference Environments:
 - to enable regular plugfests, and
 - as a basis for repeatable, comparable research.
- Description of practical, real world, cross domain applications of connected Things
- Taxonomy, technology survey and best practice documents
- Fostering collaboration with industry fora and other organizations on networking of things

Relationship to IETF WGs

- These objectives will be achieved making use of a close involvement between the IETF community and the T2TRG.
- For the IETF, some RG documents may simplify the generation of (or even serve as) use case documents or other informational references.
- Close contact will be maintained with the IETF's IoT-related WGs and its IoT directorate.

Relationship to IAB

- IAB workshops can be very successful in breaking ground
- 2011: Smart Object Workshop (Prague). [RFC 6574](#)
 - Also seminal for [RFC 7228](#)
- 2012: Smart Object Security (Paris). [RFC 7397](#)
 - Not an official IAB workshop
- Expect good cooperation with further IAB activities

Name, organization

- “Thing-to-Thing” is a homage to “end-to-end” RG
 - Not excluding device-to-cloud models
- Open membership
 - emulate DTNRG or ICNRG as a model

Previous Meetings

- @IETF92 (Dallas): Identified as main areas of interest: applied REST, Management protocols, Security
- @IETF93 (Prague): First joint meeting with W3C IG WoT; Focus on REST and Security

Halloween meeting

- 2015-10-31..-11-01, colocated with IETF94, adjacent to W3C IG WoT meeting in Sapporo (2015-10-29..-30)
- Joint meeting with W3C IG WoT:
 - (A) “REST as we know it” → “Beyond REST”
 - (B) Security and Lifecycle aspects in constrained nodes
- Focus on **common discussion**
- Do some RG administrative things at the end

Agenda

Sat

- 09:00–14:20 Overview, Talks
- 14:20–18:00 Breakouts (A/B)

Insert dinner here

Sun

- 09:00–09:30 Wrapup Breakouts
- 09:30–10:20 More Talks
- 10:20–12:00 Wrapup, outlook, planning
- 13:00–16:00 Breakouts, continued (A/B)

Wed

- 10:30–11:30 Summary meeting

T2TRG RESTful track (“A”)

Deliverables

- “RESTful Design for IoT Systems”
 - terminology, basic guidance & pointers
 - TBD: design patterns, resource design, etc.
 - draft-keranen-t2trg-rest-iot (1st version)
- “plugRESTs: lessons learned”
 - developing & testing hypertext-driven approach
 - draft-hartke-core-{apps,lighting} used as input

W3C & T2TRG work

- W3C Web of Things (WoT) IG, task forces: “Thing Description”, “Discovery”, “API and Protocols”
- T2TRG: “RESTful hyper-text driven apps”
- Sharing experiences and code
- Next joint plugfest/REST planned for late January

Topics Discussed

- Application state
- (Long running) actions with REST
- Links with values representations
- Partial changes for resources
- Conclusions from above: need more documented experience
 - but that's why we're here for

Learning from scenarios and plugRESTs

- Learn from the Big Web and apply Hypermedia/REST to the Internet of Things (IoT)
- What methods do transfer, where is IoT different: Learning by building and testing
- **<https://tools.ietf.org/html/draft-hartke-core-lighting-00>**: a simple application-level design applying principled RESTful hypermedia-driven style to a basic lighting scenario.
 - Gain experience in implementing strongly hypermedia-driven IoT applications
 - Document small but complete example for a hypermedia-driven IoT application
- Four parts:
 - Description – describe the attributes and capabilities of Things
 - Discovery – publish Thing descriptions and find other Things
 - Configuration – associate Things with each other (e.g., a switch with a lamp)
 - Operation – Things communicate and react to state changes
- You're welcome to join and participate in the first plugREST!

T2TRG security track (“B”)

W3C & T2TRG work

- W3C Web of Things (WoT) IG, interest group on “Security, Privacy and Resilience”
- Ongoing work on “Challenges”, “Requirements”, “Landscape of Means”
- Cross-pollination

Security considerations for the IoT

- starting from draft-garcia-core-security-06
- main contributors identified: Sandeep Kumar, Mohit Sethi, Jayaraghavendran K, Oliver Pfaff
- problems and guidelines (no completeness)
- cover lifecycle, ownership, stakeholders
- address recent IESG comments
- useful as a reference for security considerations sections in IETF standards

A Survey of Security Bootstrapping Approaches

- starting from draft-he-6lo-analysis-iot-sbootstrapping-00
- main contributors identified: Mohit Sethi, Carsten Bormann, Yizhou Li
- application security vs. network security
- per-solution characteristics
- Grouping of solutions? Identifiable categories?

Planned Next Meetings

- **~ Jan 25++: Joint meeting with W3C (France)**
- (possibly contribute to IAB workshop on semantic interoperability)
- (possibly join Apr 12-14 W3C IG WoT)
- **July: @IETF96**
- **August: Workshop at research conference?**
- (decide on fall/winter later)

Proposed Charter

- <https://github.com/t2trg/2015-ietf94/blob/master/t2trg-charter.md>