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

Prof. Dr.-Ing. Carsten Bormann
TZI – Universität Bremen
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/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 WGSS

• 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 WGSS 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)

### 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