Constrained RESTful Environments WG (core)

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- **We assume people have read the drafts**
- **Meetings serve to advance difficult issues by making good use of face-to-face communications**
- **Note Well: Be aware of the IPR principles, according to RFC 8179 and its updates**

üBlue sheets
üScribe(s)

Note Well

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- https://www.ietf.org/privacy-policy/ (Privacy Policy)

Agenda Bashing

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Monday (120 min)

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- **18:10–18:15 Intro, Agenda**
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- **18:58–19:10 FASOR: Alternative Congestion Control**

Advertisements

- DNSSD: Thu 09:30..12:00 Duluth
- (see also cluster agenda on mailing list)

- OCF/T2TRG coordination call Wed 11..12 (please ask chairs)

draft-ietf-core-links-json: Status

- JSON version of 6690-to-be — avoid need for another parser
  - Started Feb 2012, added CBOR variants mid-2015
- Focus was: roundtrippable with RFC 6690
  - Inherit limitations of RFC 6690 (e.g., percent-encoding)
- Submitted to IESG on 2017-04-02: Lots of feedback
- Re-focus:
  - Still cover all of RFC 6690
  - Be more general, don’t inherit the limitations
- Lots more input from CorE-RD, W3C WoT TDir work, related concepts in OCF spec
- Discussions will go on in hallways this week

draft-ietf-core-cocoa: Status

- Submitted to IESG
  - Responsible AD here: Mirja Kühlewind (TSV AD)
  - Great AD feedback
- Authors need to generate new version (this week?)
- Should go though normal process then

- CoCoA is not the end-all of congestion control work for CoAP
- Proposed new work: draft-jarvinen-core-fasor
  (Thu, if we have time)

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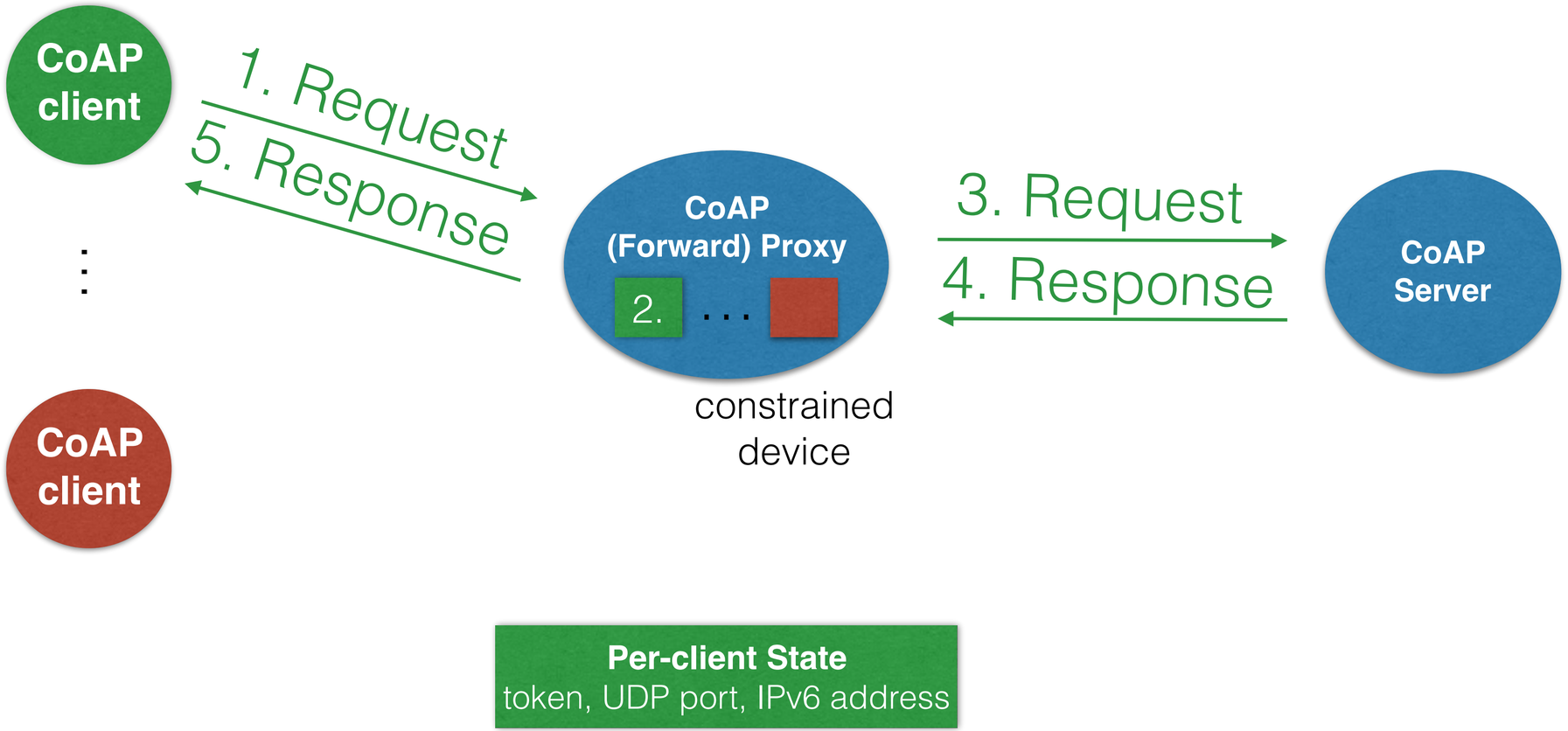
‘Stateless-Proxy’ CoAP Option

Mališa Vučinić

IETF 98 - CoRE Working Group

DoS Susceptibility of the Proxy



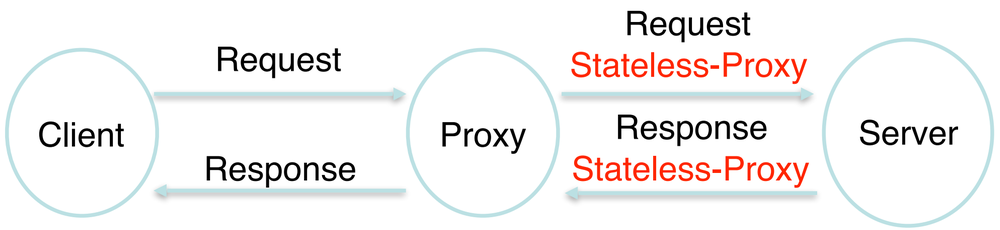
Stateless-Proxy Option

- New CoAP option carrying state between Proxy and Server

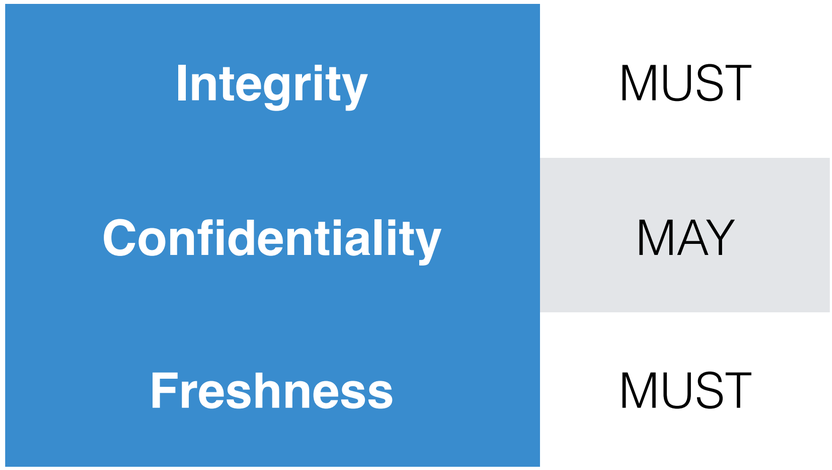
No.	C	U	N	R	Name	Format	Length
TBD	x		x		Stateless-Proxy	opaque	1-255

C=Critical, U=Unsafe, N=NoCacheKey, R=Repeatable

Figure 2: Stateless-Proxy CoAP Option



Security Properties



- Proxy generates a key known only to itself and uses it to protect the option value
- Pitfall of the option: Empty CoAP ACK does not carry any options so the proxy doesn't know where to forward it. Can we mandate the option to be present in the empty ACK?
- For more information: https://datatracker.ietf.org/doc/draft-ietf-6tisch-minimal-security/

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Object Security for Constrained RESTFUL Environments

OSCORE

draft-ietf-core-object-security-13

Göran Selander, Ericsson
John Mattsson, Ericsson
Francesca Palombini, Ericsson
Ludwig Seitz, RISE SICS

IETF 102, CoRE WG, Montreal, Jul 16, 2018

Status (v-13)

- Main changes: Clarifications and further details based on the comments received by IESG and other Post LC reviews
- In particular in the new Appendix D – Overview of security properties
- Increased protection of certain CoAP options and motivation for lack of protection of certain options
- Additional clarifications and simplifications of processing

- Up-to-date comments on the wiki: https://github.com/core-wg/oscoap/wiki

V-13 Changes In Detail

- Observe is now additionally Inner, which enables the endpoints to verify each others intent and simplifies the specification, at the cost of making some of the proxy processing out of scope. Observe processing is separated.
- No-Response is now essentially Inner, following a review byJim Schaad
- Uri-Host/Port processing is clarified in a separate subsection
- A corresponding change of the analysis of unprotected header fields was made in appendix D

V-13 Changes In Detail

- HTTP processing updated based on comments from Martin Thomson
- CoAP-to-CoAP Forwarding Proxy description is expanded
- ID Context added to the security context and key derivation. Such a parameter was already in use by Group OSCORE and 6TiSCH Minimal Security and they can now apply this in a common way
- Updated deployment examples, test vectors (appendices B and C), and references

Next Steps

- Update based on recent review comments
- Continue IESG evaluation
- Interop-testing the next version

Secure group communication for CoAP

draft-ietf-core-oscore-groupcomm-02

Marco Tiloca, RISE SICS
Göran Selander, Ericsson
Francesca Palombini, Ericsson
Jiye Park, Universität Duisburg-Essen

IETF 102, CoRE WG, Montreal, July 16th, 2018

Updates from -01 (1/3)

- Major revision:
  - Based on discussions at IETF 101
  - Aligned with latest *draft-ietf-core-object-security*

- Section 1.1 – “Terminology”
  - Removed “Multicaster” and “Listener”
  - Now simply “Client” and “Server”, or “Sender” and “Recipient”
  - The old “Pure listener” is now called “Silent server”

- Section 2 – “OSCORE Security Context”
  - Group Identifier (Gid) stored as the “ID Context”
  - “ID context” defined in *draft-ietf-core-object-security*

Updates from -01 (2/3)

- Section 3 – “The COSE Object”
  - Format of ‘external_aad’ consistent with *draft-ietf-core-object-security*

- Section 4 – “Message Processing”
  - Major rewriting for plain alignment with *draft-ietf-core-object-security*
  - Now pointing at exact steps of the OSCORE message processing
  - Only the Gid is used for context retrieval, regardless the IP address

- Section 7 – “Security Considerations”
  - Section 7.2 – “Uniqueness of (key, nonce)” // The same holds from OSCORE
  - Section 7.3 – “Collision of Group Identifiers” // Not impairing security

Updates from -01 (3/3)

- Appendix C – “Example of Group Identifier Format”
  - Clarified practical implications in case of collisions
  - A recipient may go for trial & error, until the right context is found
  - Favorable to discourage collisions with appropriate Gid sizes
  - Thanks to Esko Dijk for the good discussion!

- Appendix D.2 – “Provisioning and retrieval of public keys”
  - Updates for alignment with *draft-palombini-ace-key-groupcomm*

- See full list of updates in Appendix G.1

Implementation

- Plans for a Java version in Californium
  - Build on the current OSCORE implementation
- OSRAM Innovation
  - Developed in C
  - MediaTek LinkIt Smart 7688
  - Aligned with individual submission at IETF99
- Proof-of-concept for Contiki OS
  - Wismote (MSP430; TI CC2520)
  - SmartRF (MSP430; TI CC2538)
  - Aligned with individual submission at IETF99
  - https://github.com/tdrlab/mcast

Related activity

- *draft-tiloca-ace-oscoap-joining-04*
  - Referred by Appendix D.3

- Join an OSCORE group using the ACE framework
  - Joining node → Client
  - Group Manager → Resource Server
  - Message formats aligned with *draft-palombini-ace-key-groupcomm*

- Renaming for consistency
  - “Multicaster” → ”Requester” , as in *oscore-groupcomm*
  - “Pure listener” is the “silent server” of *oscore-groupcomm*
  - Kept “Listener” and “Pure listener” to avoid confusion with ACE roles

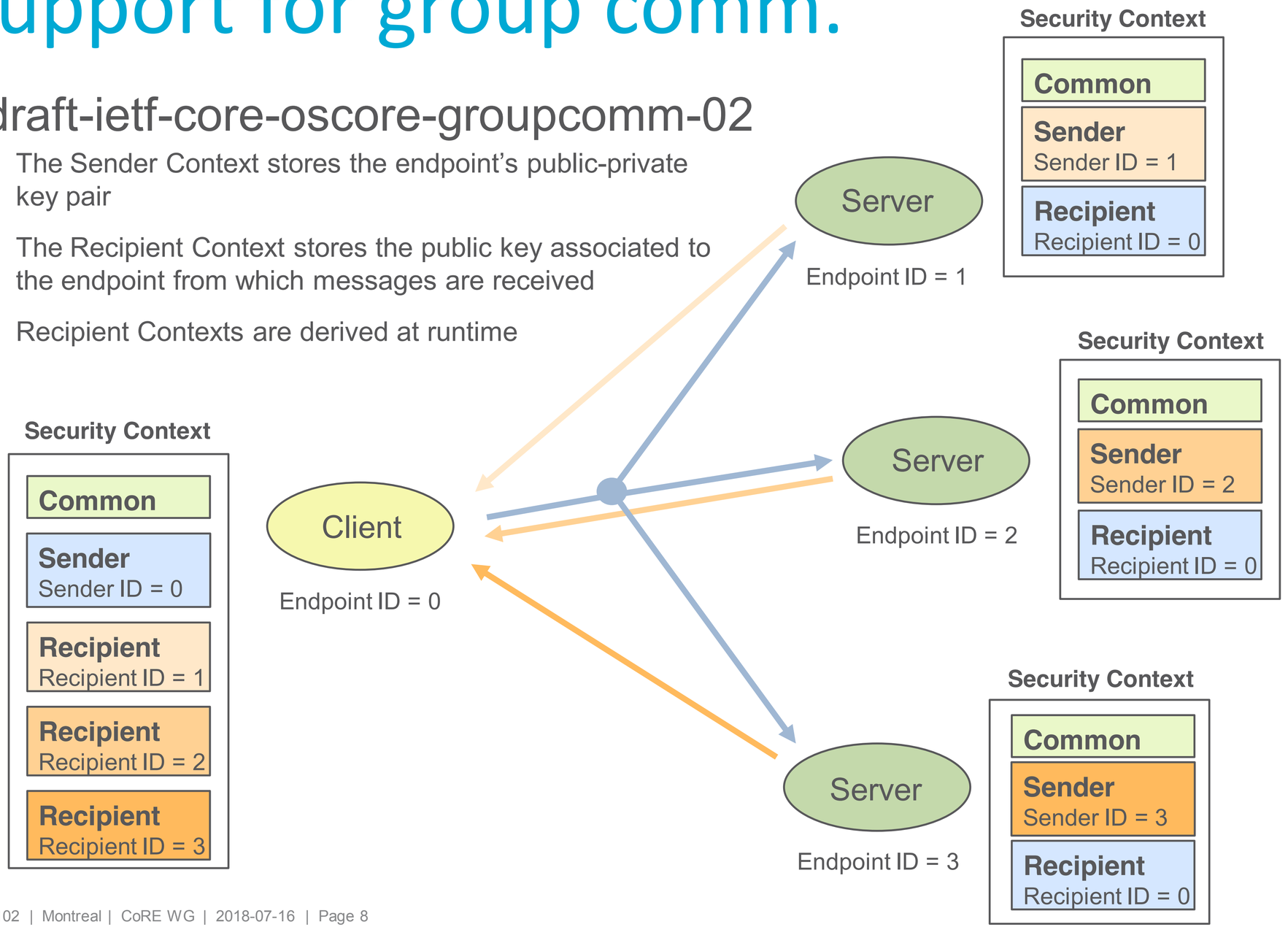
Thank you!

Comments/questions?

https://github.com/core-wg/oscore-groupcomm

Support for group comm.

- draft-ietf-core-oscore-groupcomm-02
  - The Sender Context stores the endpoint's public-private key pair
  - The Recipient Context stores the public key associated to the endpoint from which messages are received
  - Recipient Contexts are derived at runtime



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Resource Directory

Peter van der Stok, Carsten Bormann, Michael Koster
Christian Amsuess

IETF 102 - CoRE Working Group

URI

URI syntax: scheme://authority/path/?query#fragment

URI reference is a URI or relative reference (no scheme component)

scheme://authority part is needed as prefix to relative reference

Resolving a URI reference against Base URI results in target URI
RFC8288

Relative references available in /.well-known/core
“hosts” relation from RFC6690 links scheme://authority part
to relative references

Maintain link semantics from host to RD

Registration Base URI: Base URI without /.well-known/core

Base URI

GET coap://[2001:db8:f0::1]/.well-known/core
</t>;rt=temp;ct=0;rel="hosts";anchor="/foo"

Relative URI, /t, resolves to absolute target against Base URI

coap://[2001:db8:f0::1]/t

Resource LOOKUP returns absolute target
GET coap://directory/rd-lookup/res?rt=temp

<coap://[2001:db8:f0::1]/t>;rt=temp;ct=0;
anchor="coap://[2001:db8:f0::1]/foo"

The link context is:

- Value of the anchor=context parameter in link specification
- With no anchor=, context is the base URI

Registration Base URI

Registration Base URI:

- Base URI with /.well-known/core stripped
- Value of base=Registration Base URI in link specification

Stored in Resource directory Registration

IN LOOKUP:

- Registration Base URI prefixed to relative reference
  to return absolute reference
- Otherwise absolute reference is returned

RFC 6690 and RFC 8288

RFC6690: anchor is used as Base URI against which relative target is resolved
RFC8288: anchor is immaterial to resolution

RFC6690: without anchor, context is target URI with paths stripped off.
RFC8288: context is given by Base URI

Modernized Link format to avoid ambiguities:

- Relative target URI always resolved against Base URI
- Anchor= context
- When no anchor, Base URI is context

Other improvements to RD text

- domain -> sector (maintained d=)
- con= -> base= (registration context -> registration base URI)
- rt-types: core.rd-ep and core.rd-gp introduced
- Simple registration more concrete and reworded
- Lookup: return of resolved references.
- It not exposed in lookup (ambiguous result)
- Registration update clarified

TODO

- React to reviews (thanks for the many we received Jim)
- Remove ambiguous unclear text

WGLC

Yes, please,

We think that no structural changes are needed any more

Discovery Mapping

CoRE Link Format <-> DNS-SD RRs

draft-ietf-core-rd-dns-sd

Kerry Lynn, Peter van der Stok, Michael Koster, Christian Amsüss
2018-07-16, IETF 102 CoRE WG, Montréal

Why? (Use Cases)

- Support alternate methods of discovery in heterogeneous environments (e.g. HTTPS clients and CoAPS servers)
- Support hierarchical discovery in large environments (e.g. many K's of points)
  - DNS-SD for coarse-grained discovery
  - CoRE Link Format for fine-grained discovery
- Discovery bootstrapping (i.e. locating Resource Directories)

DNS-Based Service Discovery [RFC6763]

- A conventional use of existing DNS RRs and message formats to support service discovery:

DNS Resource Record	Binding
PTR	<ServiceType> to service instance name
SRV	Service instance name to host, port (end-point)
TXT	Arbitrary key=value pairs (e.g. "path=/lamp/1”)
A, AAAA	Host name to IP address

- Expand the definition of *service* to include REST API entry point (e.g. in multi-function devices)
- Service instance names are of the form:

  <Instance>.<ServiceType>.<Domain>

New/Required Link Target Attributes

- exp, hint that information about this resource should be exported
- ins=, instance name in UTF-8 format
- rt=, resource type (federated namespace?)
- if=, semantic tag or link to interface description

Link-format to DNS-SD mapping

Link Format	DNS-SD
Resource Instance (ins=)	<Instance>
Resource Type (rt=)	<ServiceType>
<uri>	TXT path=/{relativeURI}
Interface Description (if=)	TXT if={anyURI}
Other attribute (key=value)	TXT key=value

TBD:

- Domain name (the DNS zone where the records are created)
- Host name (if it doesn't already exist) for naming AAAA RRs

Link Format -> DNS-SD Example

CoRE query

REQ: GET coap://[ff02::1]/.well-known/core?exp

RES: 2.05 "Content" (from [fdfd::1234]:5678)
</sensors/temp/1>;exp;ct=50;rt="oic.r.temperature";
ins="indoorTemp"; if="oic.if.s",

Resulting RRs

_oic._udp.example.com. IN PTR indoorTemp._oic._udp…

r-temperature._sub._oic._udp… IN PTR indoorTemp._oic._udp…
indoorTemp._oic._udp… IN TXT txtver=1
indoorTemp._oic._udp… IN TXT path=/sensors/temp/1
indoorTemp._oic._udp… IN TXT if=oic.if.s
indoorTemp._oic._udp… IN SRV 0 0 5678 node1234...
node1234.example.com. IN AAAA fdfd::1234

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Draft-ietf-core-dev-urn-02

Arkko, Jennings & Shelby

A Uniform Resource Name (URN) namespace for hardware device identifiers.

Potentially useful in applications such as in sensor data streams and storage, or equipment inventories.

Complements other similar identifiers NIs (RFC 6920), UUIDs (RFC 4122), IMEIs (RFC 7254) etc. Supports, e.g., MAC and EUI-64, identifiers.

urn:dev:mac:0024befffe804ff1

Version -02

- For aligning the usage across the world:
    - **Folded in the “urn:dev:os:” and “urn:dev:ops:” sub-branches from OMA** LwM2M specifications
    - Three levels of “private” device identifiers
- Other changes made as a consequence of the above:
    - **Changed the “org:” sub-branch** to use “-“, not “:” to separate the PEN and the rest of the identifier (to align with the above)
    - A few other **syntax changes**, including allowing %-encoding

The Private Device Identifier Spaces

- Three levels of “private” device identifiers
- My organisation (org:), my serial number (os:), my product and serial number (ops:)

  urn:dev:org:32473-blaablaa

  urn:dev:ops:32473-Refrigerator-12345

  urn:dev:ops:32473-Refrigerator-12345

Questions

- The **unification** with suggested OMA types seems necessary — **do we agree**?
- However, OMA used OUIs, not PEN numbers
    - Easy if you already have an OUI, but otherwise acquiring one is costly, **change to PEN**?
- The OMA and IETF draft syntax style for os/ops/org was different, which leads to another desired change
- Do we have **usage of org/os/ops that would be affected**?

FETCH & PATCH with SenML

IETF 102, Montréal, CA

draft-keranen-senml-fetch-01

Ari Keränen & Mojan Mohajer

Updates since -00

- Re-using the base SenML media types (no need to register new ones)
- Wild-card feature left for future documents
- Focus on iPATCH instead of PATCH
- Security considerations: single FETCH/(i)PATCH can impact multiple resources; should be careful with access control
- Appending and deleting with iPATCH (next slide)

Add/Append/Replace/Delete with (i)PATCH

- Add: when no existing record with matching name the Patch record is added
  - Need to clarify that time is not mandatory
- Append: name matches but different time
- Replace: name (and time if in the target and patch records) matches
- Delete: match like above but with value set to null
  - Base SenML does not have null values so this should work
- Considerations
  - No need for op-codes. If later need, we can define new media type.
  - Can't add a time to a Record without time with a single Patch operation

TBD

- Clarify PATCH operations
- Rename "FETCH/PATCH Record/Pack" to "Fetch/Patch Record/Pack" to differentiate from the PATCH/iPATCH methods
- Ready for WG adoption?

IANA registry maintenance for SenML

- The usual fare.
- Except:
  - Every new field name needs a change to the XML schema
  - This then needs a new name for reference from EXI (“a” now)
- Who does this work?
- Most registrants are not interested in EXI
  - Example: LWM2M registration of “vlo”
- What the draft says: accumulate changes
  - The next new registrant that cares about EXI does all the changes so far
  - Weirdness: the schema in effect at any time could be in an obscure document…

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Marketing message: "CoRECONF"

Note:
You can mix and match
(to a certain extent)

CoMI update

draft-ietf-core-comi-03

Andy Bierman

Michel Veillette

Peter van der Stok

Alexander Pelov <a@ackl.io>

Draft status

Actions from last time:
- Official Hackathon @ IETF 102

Draft	Version
ietf-core-yang-cbor	6
ietf-core-sid	4
ietf-core-comi	3
veillette-core-yang-library	3

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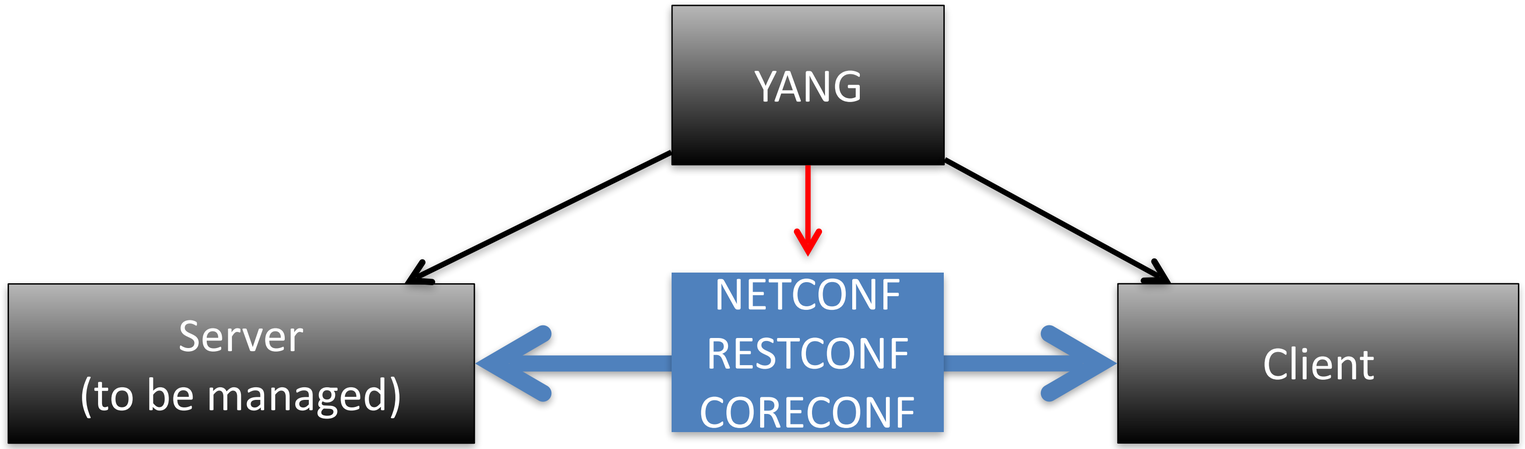
CORECONF

Like NETCONF & RESTCONF

The YANG protocol family



XML	JSON	CBOR
RPC	REST / RPC	REST / RPC
HTTP	HTTP	CoAP (CoMI)
TCP	TCP	UDP
IP	IP	IP
NETCONF	RESTCONF	CORECONF

What we have today

- Example SID Registry
  - http://comi.space

- Existing implementations
  - GoLang: server + client
  - C: server + client
  - 2 more partial proprietary implementations

- Interoperability
  - Virtual interop @ Hackathon IETF100 (FETCH with ietf-system) – existing implementations
  - Hackathon IETF101 – Semantic interoperability
  - Example implementation (client+server) accessible for everyone
    - F-Interop

Hackathon IETF 102

What we wanted to achieve

- **Open-source Python-based examples**
  - **Help people boot-strap implementations**
- Full open-source Python implementation
  - Client
- **Document our work**

What got done

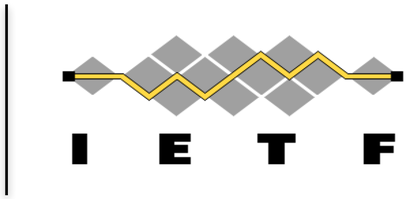
- Developed base examples working on various OS (Lin/Mac)
- Clearly identified development process for CoMI
  - **Independent development of YANG-CBOR & CoAP**
  - Compatible with commercial / open-source NETCONF/RESTCONF servers
  - Identified next steps for a C implementation
- Started YDK-based CoMI client implementation

https://etherpad.tools.ietf.org/p/comi
https://github.com/Acklio/pycomi

YANG-CBOR + SID

- Reviews
  - Juergen Schoenwaelder
  - Robert Wilton
- Minor changes / improvements suggestion
- One more significant
  - Always return top node, so that delta SIDs can be resolved unambiguously by only looking at the payload

Top node



1721

```
REQ: GET example.com/c/a5

RES: 2.05 Content (Content-Format: application/yang-value+cbor)
{
    +2 : "2014-10-26T12:16:51Z",    / current-datetime SID 1723 /
    +1 : "2014-10-21T03:00:00Z"     / boot-datetime SID 1722 /
}
```

Existing:

Pros:

- more compact

Cons:

- requires additional processing step
- may render debugging more difficult

```
REQ: GET example.com/c/a5

RES: 2.05 Content (Content-Format: application/yang-value+cbor)
{
  1721 : {
    +2 : "2014-10-26T12:16:51Z",    / current-datetime SID 1723 /
    +1 : "2014-10-21T03:00:00Z"     / boot-datetime SID 1722 /
  }
}
```

a5 in URI-safe Base64

Proposed:

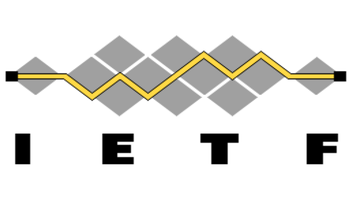
Pros:

- Easier debugging
- Straightforward processing

Cons:

- 4-5 bytes more / response

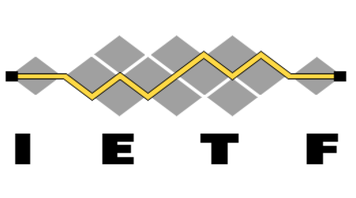
Conclusion



- YANG-CBOR + SID ready to ship after this IETF
  - Application in RESTCONF, CORECONF
  - Two reviews from NETMOD
  - WGLC

- Same for CoMI
  - One or two reviews from CORE are welcome
    - During WGLC?

- Action points IETF 103
  - Hackathon for open-source implementation
  - YANG of Things BOF



Thanks!

Concise YANG Telemetry

(on adding YANG Datastore Subscription & YANG Subscribed Notifications Capabilities to CoRECONF/CoMI)

@IETF 102 July'18

Henk Birkholz {henk.Birkholz@sit.fraunhofer.de}

&

Eric Voit {evoit@cisco.com}

Datastore Subscriptions & YANG (the thing formally called Push)

- Once Notifications were just about “Control Plane”…
- Now, they can have a variety of characteristics, have a “hard-coded” format… composing Events, Alarms or maybe even Incidents (currently exploring that scope) OR they can be about changes of Data Node Value of your favorite YANG Datastore
- Also, they now provide the capabilities to convey security-related information, diffusing in the Security Area domain (featuring levels of visibility and resilient subscriptions)
- I.e. there is an early draft to look at: https://datatracker.ietf.org/doc/draft-birkholz-yang-core-telemetry/

SID+keys really make things easier

- CoAP operations on a CoMI store that enable have the potential of actually being lightweight, resilient and intuitive
- E.g. a subscription on a datastore using a subtree expression could be realized simply using a Get+Observe on a SID in /c that is representing an intermediary node of a module
- YANG RPC can be used via POST/iPATCH. The response including a new key (subscription-id) that will also be populating stream resource /s as a sub-resource
- There is chance (currently exploring this option) to create a concise filter expression that is not a… naive transformation of an XPATH expression

Thursday (60 min)

- 18:10–18:15 Intro, Agenda
- 18:15–18:20 DOTS heads-up (DOTS chairs)
- 18:20–18:34 Stateless-Proxy option (6TiSCH -- moved)
- 18:34–18:46 Housekeeping cluster (AK, CB)
- 18:46–18:58 Other WG drafts (MK) /candidates (BS)
- 18:58–19:10 FASOR: Alternative Congestion Control

Too Many Requests Response Code for CoAP

IETF 102, Montréal, CA

draft-ietf-core-too-many-reqs-02

Ari Keränen <ari.keranen@ericsson.com>

Background

- CoAP client can cause overload in server with too frequent requests
- How can server tell client to back off
- HTTP error code 429 “Too many requests”
- Solution: register 4.29 for CoAP
  - With MaxAge to indicate when it’s OK to request again
- Originally part of CoAP Pub/sub Broker draft; also OCF interest

Changes since IETF 101

- Added a hint that action payloads can be used by the server to guide clients about next actions
- Instead of only "same request" also "similar requests" can be suppressed with too-many-requests response code
  - "Client SHOULD NOT repeat similar request until Max-Age times out"

Same vs. Similar request

- Input from Abhijan B: extends use to e.g., stream transfer pattern use cases (see T2TRG STP draft)
- "same request": same method and target resource
- "similar request": same method and **related** target resource
  - E.g., resources are part of same collection
- Up to application what is "similar enough"
  - Could be part of application specification
  - Future documents may define action payloads to guide client on this

draft-ietf-core-multipart-ct

- Continuation of draft-fossati-multipart-ct of 2012 vintage:
  - Join request/response bodies into a single combined one
  - keep information about the constituent content-formats
- 2018: Ported to the CBOR age
- ```
  multipart-core = [* multipart-part]
  ```
- ```
  multipart-part = (type: uint .size 2, part: bytes / null)
  ```
- Use case: Needed by EST-over-coaps

- Are we done?

draft-bormann-core-proactive-ct

- There is a threshold for using CoAP in place of HTTP:
  - Get the content-format numbers for the media types needed
- There are < 2000 media types, > 65000 content format numbers
- Why don’t we just register them **proactively**?
  - Deliberately wasting some hundreds of code points, just in case.
- Draft contains proposed procedure, and discussion of limitations
- Where it doesn’t work, no change from today.
- Where it works, can use CoAP out of the box with existing media types

- Do we want to do this? (If yes, is the draft ready for adoption?)

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All times are in time-warped EDT (UTC–04:00)

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