IoT management

CoMI with COOL

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History

• 2003 – IAB Network Management Workshop
  – RFC 3535 – overview
  – Operator management requirements – 14
• 2003 – NETCONF WG
  – RFCs 4741, 4742, 4743, 4744
• 2008 – NETMOD WG
  – RFCs 6241, 6242, 6243, 6244, 6020, 6021
• Today
  – IETF WG – LIME, L3SM, SUPA, I2NSF
  – Metro Ethernet Forum, IEEE, OpenDaylight
Device management (I/II)

- SNMP + MIB
- NETCONF
  - Protocol to “install, manipulate, and delete the configuration of network devices”
    - Cornerstone for SDN
  - Client-server
    - Schema is provisioned – on the air only data
- What is great?
  - Distinction between config / state data
  - Multiple configuration datastores (candidate, running, startup)
  - Transactions
  - Configuration testing
  - Streaming, playback of events
  - ...

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Device Management (II/II)

• **YANG**
  – RFC 6020
  – Data modeling language used to model configuration and state data
  – Data can be represented in different formats:
    • XML [RFC 6020]
    • JSON [draft-ietf-netmod-yang-json-10]
  – Example:
    • YANG module **ietf-interfaces** - RFC 7223

• **RESTCONF** [draft-ietf-netconf-restconf-10]
  – NETCONF uses RPCs
  – HTTP REST API
NETCONF/RESTCONF and constrained devices?

TCP + XML + long identifiers
Bringing RESTCONF to Constrained Devices

• Constrained Management Interface (CoMI)
  – Several iterations
    • Always strived to improve efficiency
  – YANG hashes as a good tradeoff complexity / efficiency
    • 5 byte identifiers – unmanaged

• Constrained Objects Language (CoOL)
  – Started as a way of increasing the efficiency of CoMI in some specific cases
    • In Yokohama (IETF94) presented significant progress generalizing the cases to complete solution
  – Get further efficiency and simplify protocol operations for increased compile-time complexity
    • 1 byte identifiers – managed
IETF 94
CoMI and COOL

• Two solutions
  – Some overlapping work
  – Some disjoint work
  – Some conflicting work

• WG decision
  – Cut into pieces
  – Work into building one coherent solution

• We worked hard!
  – Weekly meetings, average number of people – 5
  – No big issues left. We now have a registry and we’re already developing with it.

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IETF 95
CoMI with COOL

IETF 94

[I.D]-veillette-core-cool-00

[I.D]-vanderstok-core-comi-08
IETF 95
CoMI with COOL

IETF 94
[I.D]-veillette-core-cool-00
[I.D]-vanderstok-core-comi-08

IETF 95
New
[I.D]-turner-core-cool-problem-statement-00
[I.D]-veillette-core-yang-cbor-mapping-00
[I.D]-somaraju-core-sid-00
[I.D]-veillette-core-cool-01
[I.D]-vanderstok-core-comi-09
[I.D]-bierman-core-yang-hash-00

Consolidation

New

Completed
The work continues...
IETF 95
CoMI with COOL

New
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pyang
pyang with .sid support

Completed
The work continue...

Registry
Consolidation

New

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IETF 95
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**IETF 94**

- [I.D]-veillette-core-cool-00
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    - [I.D]-somaraju-core-sid-00
    - [I.D]-veillette-core-cool-01

- [I.D]-vanderstok-core-comi-08
  - [I.D]-vanderstok-core-comi-09
  - [I.D]-bierman-core-yang-hash-00

- pyang
  - pyang with .sid support

**IETF 95**

- [I.D]-turner-core-cool-problem-statement-00
  - The work continue...

- Completed

- The work continue...

- Consolidation

- YANG 1.1 support

- Registry

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IETF 95
CoMI with COOL

IETF 94

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pyang

pyang with .sid support

Consolidation

The work continue...

Completed

YANG 1.1 support

Registry

New

The work continue...

Completed

Registry

Registry

Completed

New
Next steps

- Continue work on consolidating problem statement and function set documents
- IANA and registry deployment
- Running code!
  - Open-source implementation of CoMI with COOL server
- Biweekly meetings
  - Welcome to join!
Take away

• CoMI and COOL are now 90% a single solution
  – Some editorial work necessary
  – The two teams are now one – join us

• There is a registry for numbers
  – Full NETCONF for 1 byte

• We’re happy with the work on I-D.veillette-core-yang-cbor-mapping and consider it ready for reviewing
Thank you!

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