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
  - …

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.

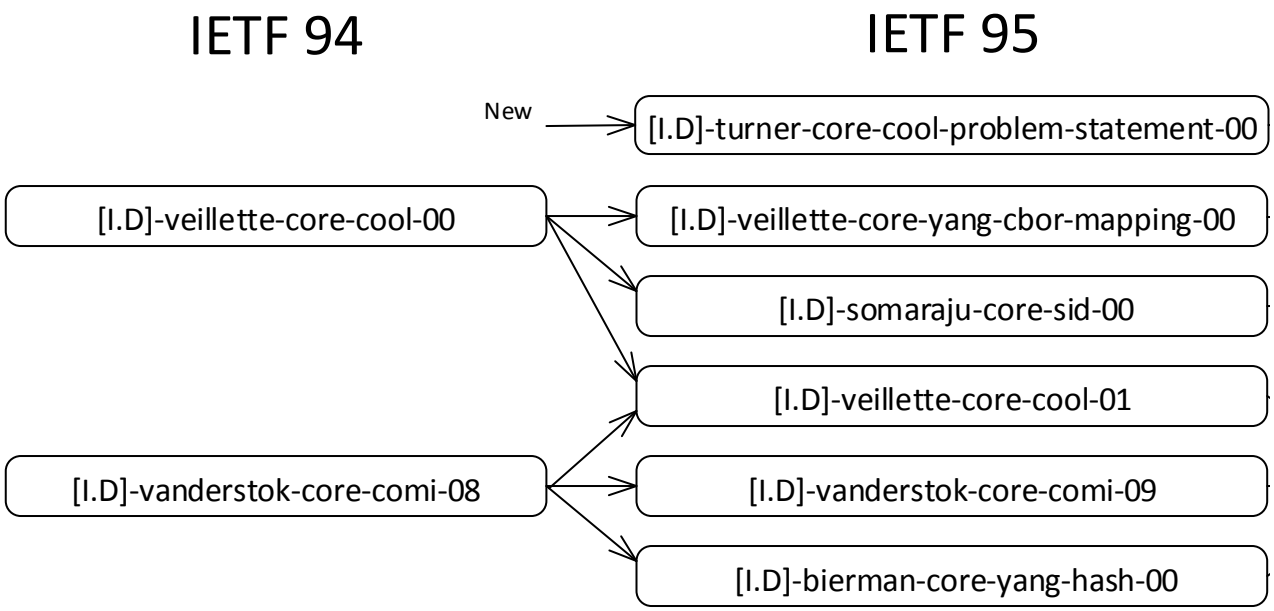
IETF 95
CoMI with COOL

IETF 94

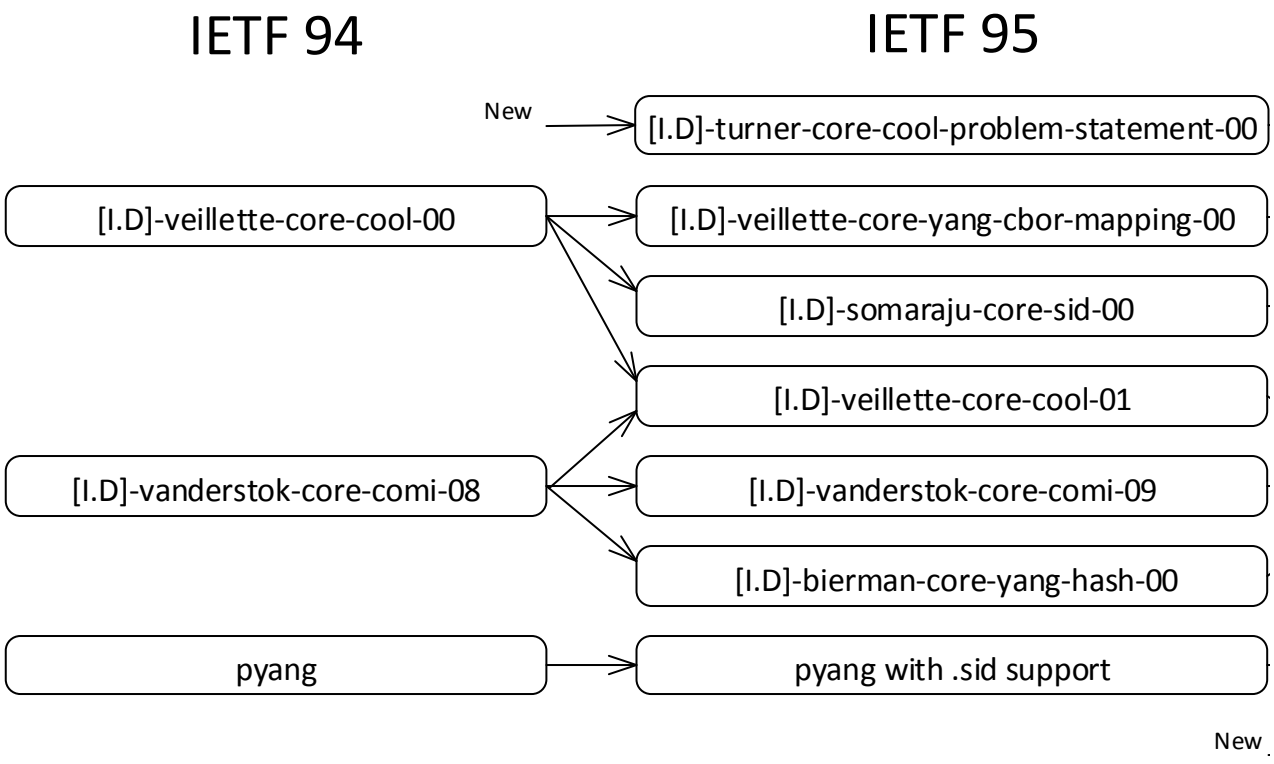
[I.D]-veillette-core-cool-00

[I.D]-vanderstok-core-comi-08

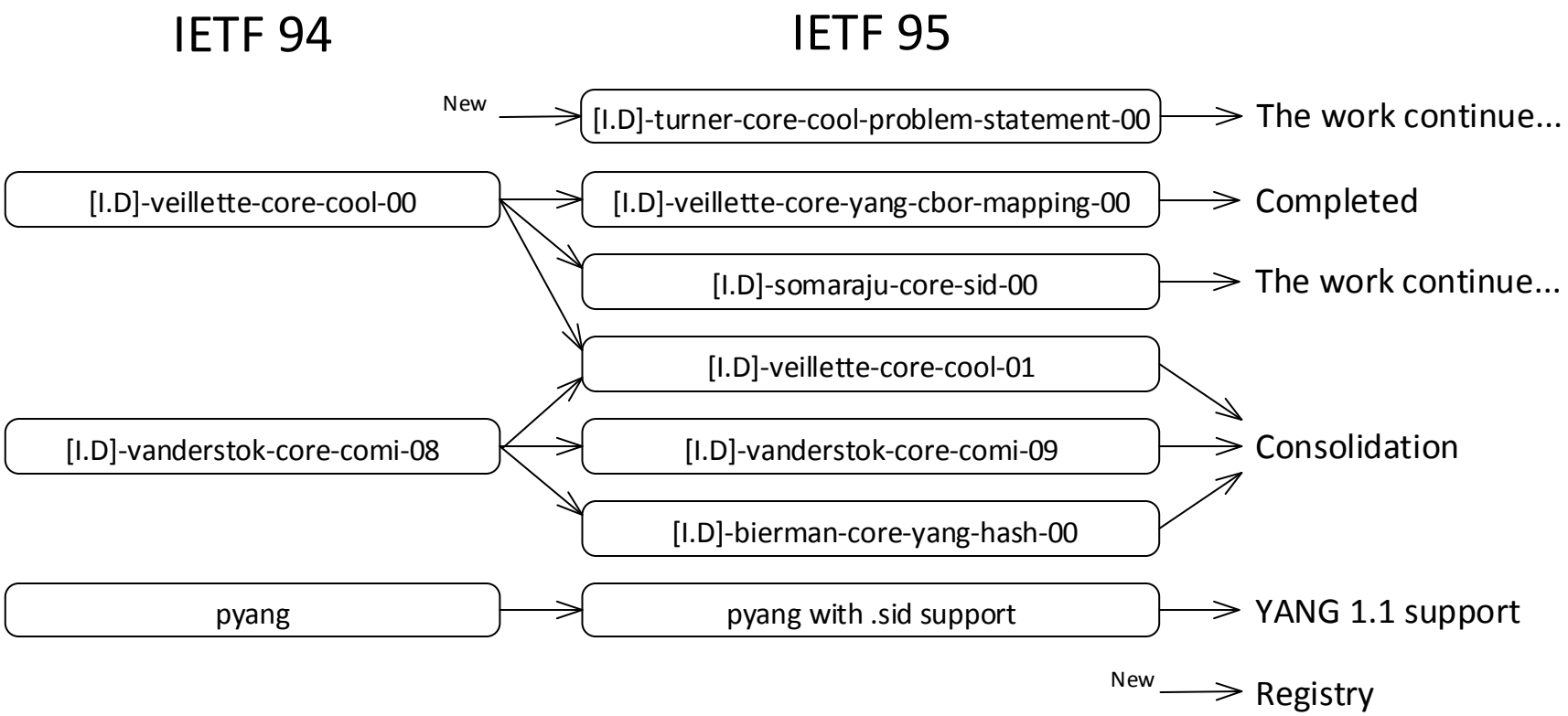
IETF 95
CoMI with COOL



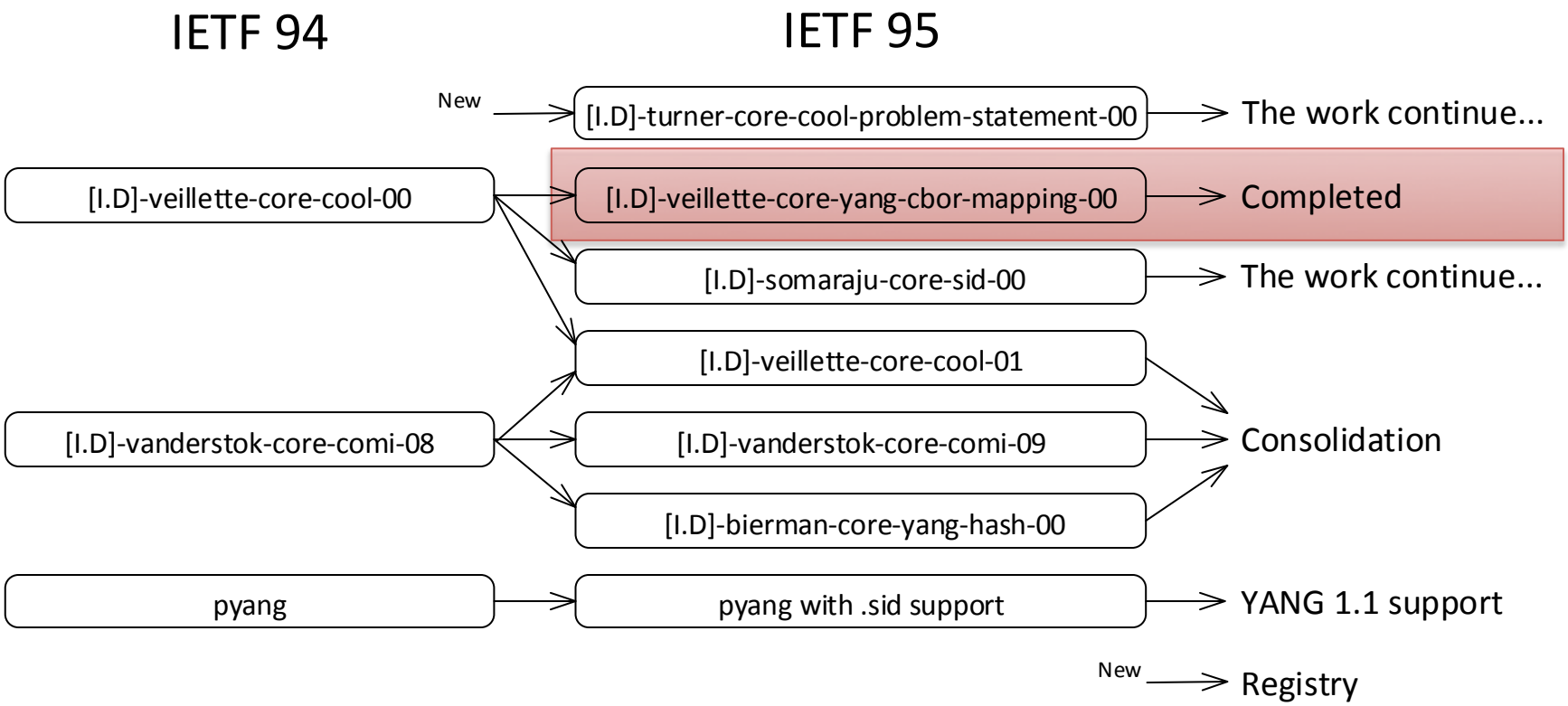
IETF 95
CoMI with COOL



IETF 95
CoMI with COOL



IETF 95
CoMI with COOL



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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