Applying COSE Signatures for YANG Data Provenance

draft-lopez-opsawg-yang-provenance-02

D. López, A. Pastor (*Telefónica)*

A. Huang Feng (*INSA-Lyon*)

H. Birkholz (Fraunhofer SIT)

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News on Prov·e·nance | nō͞oz än ˈprävən(ə)ns |

- Four different *enclosing methods* considered
  - As a result of the discussion within the group
  - Draft restructuring
  - Specific considerations on recursion
- Promising PoC results
  - Hoping to have a fully operational demonstrator by IETF 120
- Authors incorporated
- And a number of fixes, here and there

- To be introduced to NETMOD

Enclosing Methods – Provenance Elements

1. Add a leaf element containing a provenance signature
   - One and only one in the enclosing element
   - Anywhere

2. Include a provenance signature in NETCONF Event Notifications and YANG-Push Notifications
   - `ietf-notification-provenance` augmentation within the `ietf-notification module`

```
module: ietf-notification-provenance
    augment-structure /inotif:notification:
      +-- notification-provenance?   iyangprov:provenance-signature
```

```
module: ietf-notification
  structure notification:
    +-- eventTime                              yang:date-and-time
    +-- inotifprov:notification-provenance?    iyangprov:provenance-signature
```

```
module: ietf-platform-manifest
  +--ro platforms
  +--ro platform* [id]
  +--ro platform-provenance? provenance-signature
  +--ro id string
  +--ro name? string
  +--ro vendor? string
  +--ro vendor-pen? uint32
  +--ro software-version? string
  +--ro software-flavor? string
  +--ro os-version? string
  +--ro os-type? string
  +--ro yang-push-streams
  |  +--ro stream* [name]
  |     +--ro name
  |     +--ro description?
  +--ro yang-library
  + . . .
  .
  .
  .
```

Enclosing Methods – Metadata

3. Include a provenance signature as metadata in YANG instance data
   - In YANG instance data files, for data at rest.

```
module: ietf-yang-instance-data-provenance
  augment-structure instance-data-set:
    +--provenance-string?   provenance-signature
```

4. Include provenance signatures as YANG annotations
   - Not requiring modification of existing YANG schemas

```
md:annotation provenance-string {
          type provenance-signature;
          description
            "This annotation contains a digital signature corresponding
             to the YANG element in which it appears.";
        }
```

The Recursion Issue

- The draft only allows a provenance signature for a given enclosure
- But they can be recursive
  - Inner non-leaf elements in method 1
  - Within the `notificationContent` in method 2
  - Within each `content-data` in the `instance-data-set` in method 3
  - As part of the element the annotation applies to in method 4
  - Even combined at different recursion levels
- The rules for (detached) signature generation and verification are intended to support this
- Making recursive provenance validation
  - Data aggregation
  - Specific validation of relevant children

What Comes Next

- Poposal to be discussed in NETMOD
  - Comments and suggestions
  - Moving the draft there?
- Immediate work to do
  - Address sections TBD
  - Continue gathering implementation experience
- Propose adoption as soon as an operational demonstrator is available
  - Wherever…