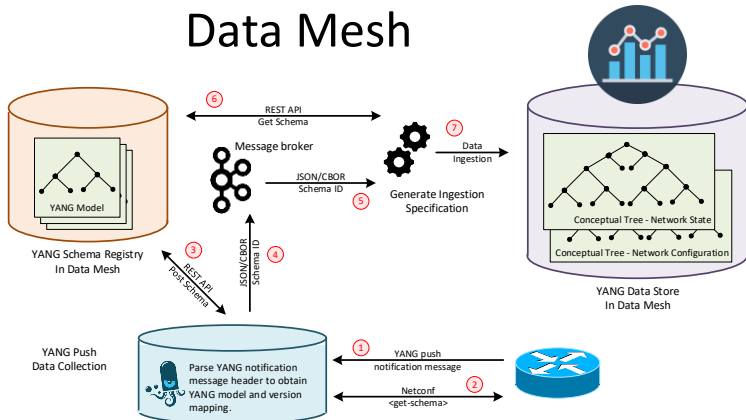


# Validate Configured Subscription YANG- Push Publisher Implementations NETCONF & NMOP WG



IETF 120  
July 27-28th, 2024  
Hackathon

# Hackathon – Plan, Software, Repo

## Plan

- Validate work in progress vendor YANG-Push publisher implementations.
- Configure RFC 8641 compliant YANG-Push configured subscription.
- Verify output in packet capture before YANG-Push receiver and after transformation.

## Software

- YANG-Push Publisher - Cisco IOS XR
- YANG-Push Publisher - 6WIND VSR
- YANG-Push Publisher - Huawei VRP
- YANG-Push Receiver - Pmacct

## Test Repository

- <https://github.com/network-analytics/ietf-network-analytics-document-status/tree/main/120/Hackathon>
- Contains
  - Packet capture on the wire
  - Netconf RPCs and YANG-Push JSON messages
  - Python script which performed test cases

# An Architecture for YANG-Push to Apache Kafka Integration

draft-netana-nmop-yang-kafka-integration

- Subscription to YANG Notifications  
[RFC 8639](#)
- Subscription to YANG Notifications for Datastore Updates  
[RFC 8641](#)
- UDP-based Transport for Configured Subscriptions  
[draft-ietf-netconf-udp-notif](#)
- Subscription to Distributed Notifications  
[draft-ietf-netconf-distributed-notif](#)
- Support of Hostname and Sequencing in YANG Notifications  
[draft-tgraf-netconf-notif-sequencing](#)
- Support of Versioning in YANG Notifications Subscription  
[draft-ietf-netconf-yang-notifications-versioning](#)
- Support of Network Observation Timestamping in YANG Notifications  
[draft-tgraf-netconf-yang-push-observation-time](#)
- YANG Library  
[RFC 8525](#)
- Augmented-by Addition into the IETF-YANG-Library  
[draft-linclanetconf-yang-library-augmentation](#)

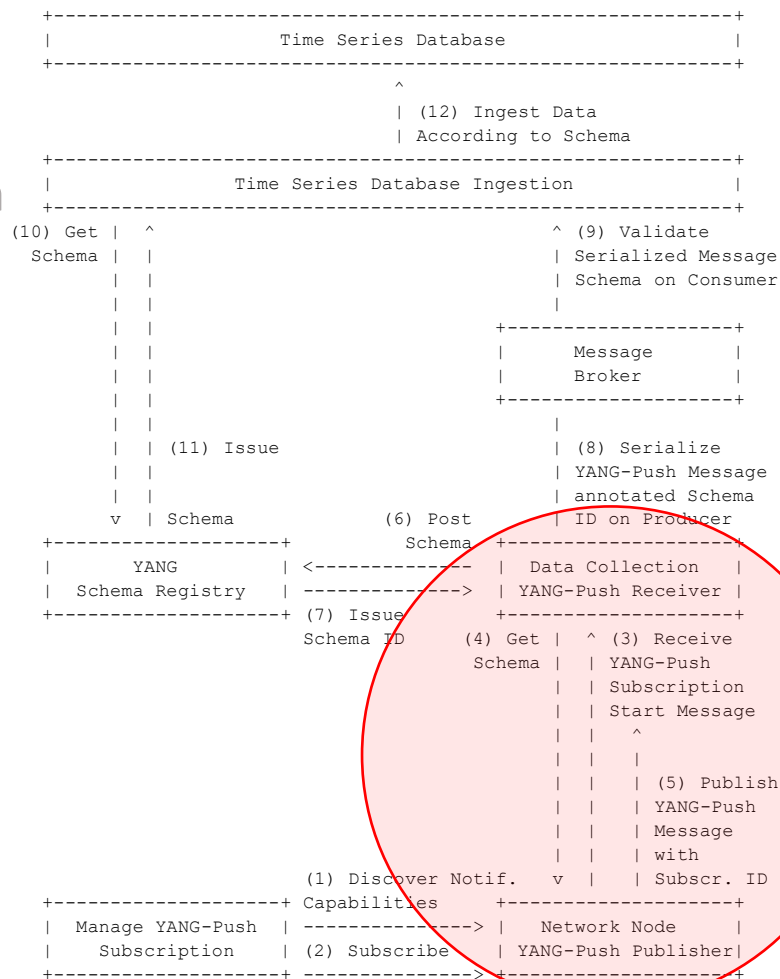


Figure 1: End to End Workflow

# Cisco – YANG-Push Notifications

## Push-Change-Update Notification

```
{
  "ietf-notification:notification": {
    "eventTime": "2024-07-19T15:01:30.175Z",
    "ietf-yang-push:push-change-update": {
      "id": 1,
      "datastore-changes": {
        "yang-patch": {
          "patch-id": "TODO - insert patch-id here",
          "edit": [
            {
              "edit-id": "1",
              "operation": "replace",
              "target": "/Cisco-IOS-XR-pfi-im-cmd-oper:interfaces/interface-
xr/interface[interface-name='Loopback12']",
              "value": {
                "Cisco-IOS-XR-pfi-im-cmd-oper:interface": {
                  "interface-name": "Loopback12",
                  "interface-handle": "Loopback12",
                  "interface-type": "IFT_LOOPBACK",
                  "hardware-type-string": "Loopback interface(s)",
                  "state": "im-state-admin-down",
                  "line-state": "im-state-admin-down",
                  "encapsulation": "loopback",
                  "encapsulation-type-string": "Loopback",
                  "mtu": 1500,
                  "is-l2-transport-enabled": false,
                  "state-transition-count": 10,
                  "last-state-transition-time": "1721401289960121958",
                  "is-dampening-enabled": false,
                  "bandwidth": "0",
                  "max-bandwidth": "0",
                  "is-l2-looped": false,
                  "loopback-configuration": "no-loopback",
                  "ip-information": {
                    "ip-address": "192.0.2.90",
                    "subnet-mask-length": 32
                  },
                  "fast-shutdown": false,
                  "if-index": 154,
                  "is-intf-logical": true,
                  "is-intf-type-management": false,
                  "is-intf-type-cpu": false
                }
              }
            }
          ]
        }
      }
    }
  }
}
```

## Subscription-Started Notification

```
{
  "ietf-notification:notification": {
    "eventTime": "2024-07-19T15:01:00.300z",
    "ietf-subscribed-notifications:subscription-started": {
      "id": 1,
      "stream-xpath-filter": "Cisco-IOS-XR-pfi-im-cmd-oper:interfaces",
      "transport": "transport",
      "encoding": "encode-json"
    }
  }
}
```

## Subscription-Terminated Notification

```
{
  "ietf-notification:notification": {
    "eventTime": "2024-07-19T15:03:58.590z",
    "ietf-subscribed-notifications:subscription-terminated": {
      "id": 1,
      "reason": "no-such-subscription"
    }
  }
}
```

# 6WIND - Subscription Started Notifications

```
{
  "ietf-notifications:notification": {
    "eventTime": "2024-07-09T13:26:53.295857916+00:00",
    "sysName": "daisy-ietf-ipf-zbl1843-r-daisy-58",
    "sequenceNumber": 855,
    "ietf-subscribed-notifications:subscription-started": {
      "id": 12345678,
      "ietf-yang-push: datastore": "ietf-datastores:operational",
      "ietf-yang-push: datastore-xpath-filter":
"/state/vrf/interface/physical[name='ens192']/counters",
      "transport": "ietf-udp-notif-transport:udp-notif",
      "encoding": "encode-json",
      "purpose": "send notifications",
      "ietf-distributed-notif:message-publisher-ids": [
        0
      ],
      "ietf-yang-push:periodic": {
        "period": 3000
      },
      "ietf-yang-push-revision:module-version": [
        {
          "module-name": "vrouter-interface",
          "revision": "2024-04-22"
        }
      ]
    }
  }
}
```

- **Support of Hostname and Sequencing in YANG Notifications**, [draft-tgraf-netconf-notif-sequencing](#), extends the NETCONF notification defined in RFC5277 with sysName, publisherId and sequenceNumber.
- **UDP-based Transport for Configured Subscriptions**, [draft-ietf-netconf-udp-notif](#), provides a UDP-based protocol for YANG notifications to collect data from network nodes.
- **Subscription to Distributed Notifications**, [draft-ietf-netconf-distributed-notif](#), extends YANG notifications subscription to allow metrics being published directly from processors on line cards.
- **Support of Versioning in YANG Notifications Subscription**, [draft-ietf-netconf-yang-notifications-versioning](#), adds the ability to subscribe to a specific revision or latest-compatible-semversion. Extends the YANG-Push Subscription State Change Notifications so that the receiver learns on top of xpath and the sub-tree filter also the YANG module name, revision and revision-label.

# Huawei - Subscription Started Notifications

```
{
  "ietf-notification:notification": {
    "eventTime": "2024-03-12T23:20:24Z",
    "ietf-subscribed-notification:subscription-started": {
      "id": 1,
      "ietf-yang-push:datastore": "ietf-datastores:operational",
      "ietf-yang-push:datastore-xpath-filter":
"/ifm:ifm/ifm:interfaces/ifm:interface",
      "ietf-yang-push-revision:revision": "2024-01-23",
      "ietf-yang-push-revision:module-name": "ifm",
      "ietf-yang-push-revision:revision-label": "1.0.0",
      "ietf-distributed-notif:message-observation-domain-id":
[1,2],
      "transport": "ietf-udp-notif-transport:udp-notif",
      "encoding": "encode-json",
      "ietf-yang-push:periodic": {
        "ietf-yang-push:period": 60000
      }
    }
  }
}
```

- **Support of Versioning in YANG Notifications**  
**Subscription**, [draft-ietf-netconf-yang-notifications-versioning](#), adds the ability to subscribe to a specific revision or latest-compatible-semversion. Extends the YANG-Push Subscription State Change Notifications so that the receiver learns on top of xpath and the sub-tree filter also the YANG module name, revision and revision-label.
- **UDP-based Transport for Configured Subscriptions**, [draft-ietf-netconf-udp-notif](#), provides a UDP-based protocol for YANG notifications to collect data from network nodes.
- **Subscription to Distributed Notifications**, [draft-ietf-netconf-distributed-notif](#), extends YANG notifications subscription to allow metrics being published directly from processors on line cards.

# 6WIND - Push Update Notifications

```
{
  "ietf-notifications:notification": {
    "eventTime": "2024-07-09T13:35:23.653892256+00:00",
    "sysName": "daisy-ietf-ipf-zbl1843-r-daisy-58",
    "sequenceNumber": 873,
    "ietf-yang-push:push-update": {
      "id": 68,
      "datastore-contents": {
        "vrouters:state": {
          "vrf": [
            {
              "name": "main",
              "vrouters-interface:interface": {
                "physical": {
                  {
                    "name": "ens192",
                    "counters": {
                      "in-octets": "63771919981",
                      "in-unicast-pkts": "363662364",
                      "in-discards": "63590",
                      "in-errors": "0",
                      "out-octets": "59850316180",
                      "out-unicast-pkts": "307798704",
                      "out-discards": "0",
                      "out-errors": "0"
                    }
                  }
                }
              }
            }
          ]
        }
      }
    },
    "ietf-distributed-notif:message-publisher-id": 0,
    "ietf-yp-observation-time:observation-time": "2024-07-09T13:35:23.654432588+00:00",
    "ietf-yp-observation-time:point-in-time": "current-state"
  }
}
```

- **Support of Hostname and Sequencing in YANG Notifications**, [draft-tgraf-netconf-notif-sequencing](#), extends the NETCONF notification defined in RFC5277 with sysName, publisherId and sequenceNumber.
- **UDP-based Transport for Configured Subscriptions**, [draft-ietf-netconf-udp-notif](#), provides a UDP-based protocol for YANG notifications to collect data from network nodes.
- **Subscription to Distributed Notifications**, [draft-ietf-netconf-distributed-notif](#), extends YANG notifications subscription to allow metrics being published directly from processors on line cards.
- **Support of Network Observation Timestamping in YANG Notifications**, [draft-tgraf-netconf-yang-push-observation-time](#), extends YANG-Push push-update notifications with observation-time and state-changed-observation-time.

# 6WIND - Push Change Update Notifications

```
{
  "ietf-notifications:notification": {
    "eventTime": "2024-07-09T13:47:56.887480682+00:00",
    "sysName": "daisy-ietf-ipf-zbl1843-r-daisy-58",
    "sequenceNumber": 900,
    "ietf-yang-push:push-change-update": {
      "id": 69,
      "datastore-changes": {
        "yang-patch": {
          "patch-id": "patch-1",
          "edit": [
            {
              "edit-id": "edit-1",
              "operation": "replace",
              "target": "/vrouters:state/vrf[name='main']/l3vrf[name='A9']/vrouters-
interface:interface/vrouter-loopback:loopback[name='Loopback-A9']/enabled",
              "value": {
                "vrouter-loopback:enabled": "false"
              }
            }
          ]
        }
      }
    },
    "ietf-distributed-notif:message-publisher-id": 0,
    "ietf-yp-observation-time:observation-time": "2024-07-
09T13:47:56.887798493+00:00",
    "ietf-yp-observation-time:point-in-time": "current-state"
  }
}
```

- **Support of Hostname and Sequencing in YANG Notifications**, [draft-tgraf-netconf-notif-sequencing](#), extends the NETCONF notification defined in RFC5277 with sysName, publisherId and sequenceNumber.
- **UDP-based Transport for Configured Subscriptions**, [draft-ietf-netconf-udp-notif](#), provides a UDP-based protocol for YANG notifications to collect data from network nodes.
- **Subscription to Distributed Notifications**, [draft-ietf-netconf-distributed-notif](#), extends YANG notifications subscription to allow metrics being published directly from processors on line cards.
- **Support of Network Observation Timestamping in YANG Notifications**, [draft-tgraf-netconf-yang-push-observation-time](#), extends YANG-Push push-update notifications with observation-time and state-changed-observation-time.



# YANG-Push Implementation Status

IETF 120

	6WIND VSR	Huawei VRP	Cisco IOS XR
RFC 8639 YANG-Push Subscription	x	x	
RFC 8641 YANG-Push Notification	x	x	x
draft-ietf-netconf-udp-notif	x	x	
draft-ietf-netconf-distributed-notif	x	x	
draft-ietf-netconf-yang-notifications-versioning	x	x	
draft-tgraf-netconf-notif-sequencing	x		
draft-tgraf-netconf-yang-push-observation-time	x		
RFC 7895 YANG Module Library		x	
RFC 8525 YANG Library	x		x
draft-lincl-netconf-yang-library-augmentation			



Red marked describes new capability at IETF 120

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