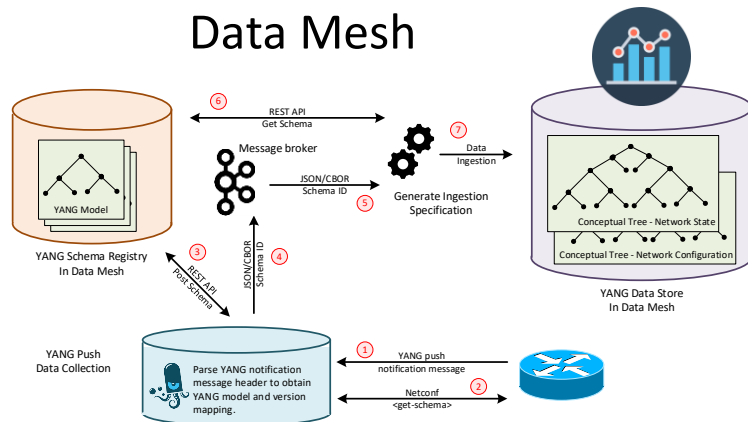


Validate Configured Subscription YANG- Push Publisher Implementations NETCONF & NMOP WG



IETF 121
November 2-3rd, 2024
Hackathon

Hackathon – Plan and Software

Test 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.

Development Plan

- MVP 1 – Basic Requirements (9)
- MVP 2 – Scale and Secure (3)
- MVP 3 – Optimizations (2)

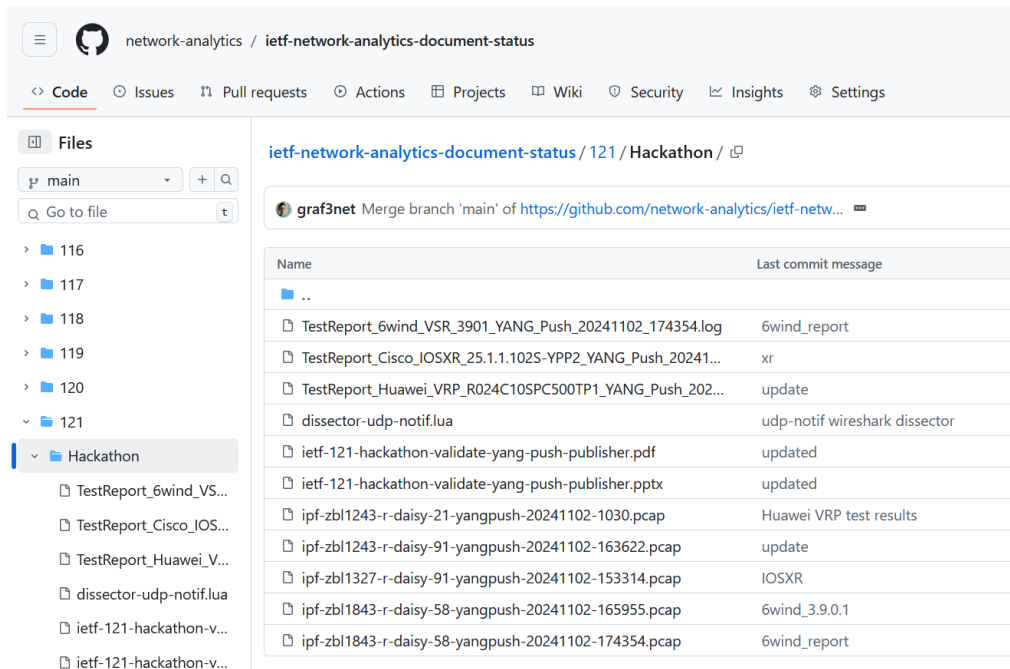
Software

- YANG-Push Publisher - Cisco IOS XR
- YANG-Push Publisher - 6WIND VSR
- YANG-Push Publisher - Huawei VRP
- YANG-Push Receiver – Pmacct
- YANG-Push Receiver – Netgauze
- udp-notif dissector - Wireshark

Hackathon – Repository

Test Repository

- <https://github.com/network-analytics/ietf-network-analytics-document-status/tree/main/121/Hackathon>
- Contains
 - Packet capture on the wire
 - Netconf RPCs and YANG-Push JSON messages
 - Python script which performed test cases



The screenshot shows the GitHub repository page for `network-analytics / ietf-network-analytics-document-status`. The left sidebar displays the file tree with the following structure:

- main
- Go to file
- 116
- 117
- 118
- 119
- 120
- 121
- Hackathon**
 - TestReport_6wind_VS...
 - TestReport_Cisco_IOS...
 - TestReport_Huawei_V...
 - dissector-udp-notif.lua
 - ietf-121-hackathon-v...
 - ietf-121-hackathon-v...

The main content area shows the commit history for the `121 / Hackathon` directory. The commit message for the selected commit is:

graf3net Merge branch 'main' of <https://github.com/network-analytics/ietf-network-analytics-document-status>

Name	Last commit message
..	
TestReport_6wind_VSR_3901_YANG_Push_20241102_174354.log	6wind_report
TestReport_Cisco_IOSXR_25.1.1.102S-YP2_YANG_Push_20241...	xr
TestReport_Huawei_VRP_R024C10SPC500TP1_YANG_Push_202...	update
dissector-udp-notif.lua	udp-notif wireshark dissector
ietf-121-hackathon-validate-yang-push-publisher.pdf	updated
ietf-121-hackathon-validate-yang-push-publisher.pptx	updated
ipf-zbl1243-r-daisy-21-yangpush-20241102-1030.pcap	Huawei VRP test results
ipf-zbl1243-r-daisy-91-yangpush-20241102-163622.pcap	update
ipf-zbl1327-r-daisy-91-yangpush-20241102-153314.pcap	IOSXR
ipf-zbl1843-r-daisy-58-yangpush-20241102-165955.pcap	6wind_3.9.0.1
ipf-zbl1843-r-daisy-58-yangpush-20241102-174354.pcap	6wind_report

An Architecture for YANG-Push to Apache Kafka Integration

draft-ietf-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-ietf-netconf-yang-library-augmentation](#)

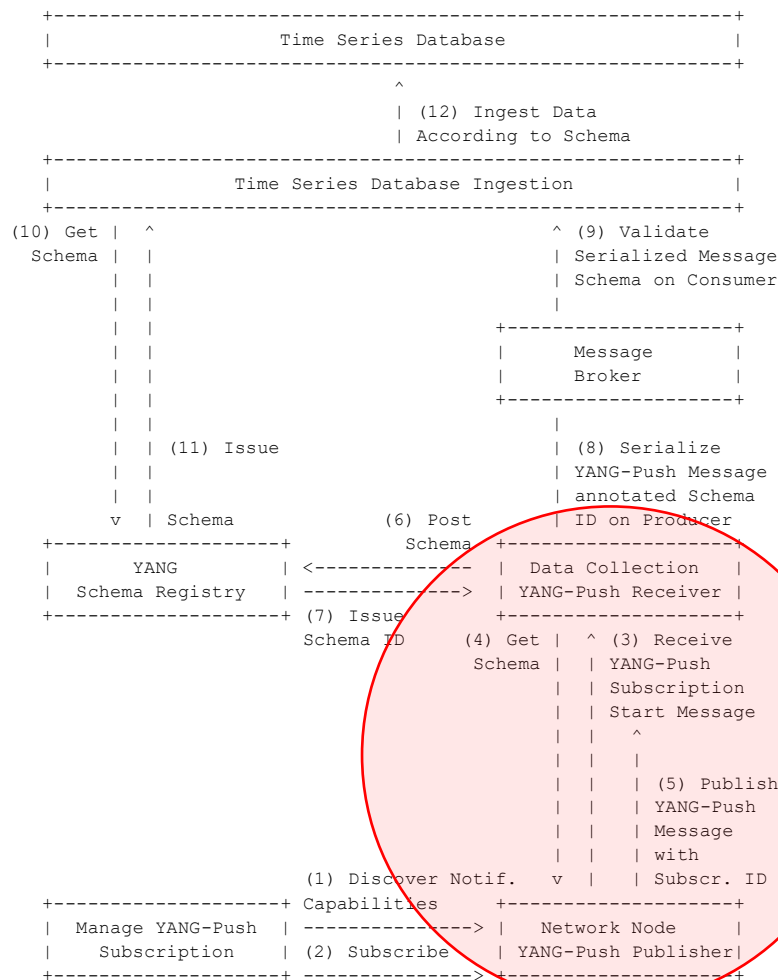


Figure 1: End to End Workflow

Cisco IOS XR – Subscription Notifications

Subscription-Started Notification

```
{
  "ietf-notification:notification": {
    "eventTime": "2024-11-02T14:38:22.598Z",
    "ietf-notification:sysName": "ipf-zbl1327-r-daisy-91",
    "ietf-notification:sequenceNumber": 13,
    "ietf-subscribed-notifications:subscription-started": {
      "id": 1,
      "ietf-yang-push:datastore": "IOS-XR",
      "ietf-yang-push:datastore-xpath-filter": "Cisco-IOS-XR-pfi-
im-cmd-oper:interfaces/interface-xr/interface[interface-
name='Loopback13']",
      "transport": "transport",
      "module-version": [
        {
          "module-name": "Cisco-IOS-XR-pfi-im-cmd-oper",
          "revision": "2024-02-29"
        }
      ],
      "encoding": "encode-json",
      "ietf-yang-push:periodic": {
        "period": 4500
      }
    }
  }
}
```

Subscription-Terminated Notification

```
{
  "ietf-notification:notification": {
    "eventTime": "2024-11-02T14:43:24.981Z",
    "ietf-notification:sysName": "ipf-zbl1327-r-daisy-91",
    "ietf-notification:sequenceNumber": 21,
    "ietf-subscribed-notifications:subscription-terminated": {
      "id": 1,
      "reason": "no-such-subscription"
    }
  }
}
```

Cisco IOS XR – Push Notifications

Push-Update Notification

```
{
  "ietf-notification:notification": {
    "eventTime": "2024-11-02T14:44:30.000Z",
    "ietf-notification:sysName": "ipf-zbl1327-r-daisy-91",
    "ietf-notification:sequenceNumber": 23,
    "ietf-yang-push:push-update": {
      "id": 1,
      "ietf-yp-observation:timestamp": "2024-11-02T14:44:30.000Z",
      "ietf-yp-observation:point-in-time": "current-accounting",
      "datastore-contents": {
        "Cisco-IOS-XR-pfi-im-cmd-oper:interfaces": {
          "interface-xr": {
            "interface": [
              {
                "interface-name": "Loopback13",
                "interface-handle": "Loopback13",
                "interface-type": "IFT_LOOPBACK",
                "hardware-type-string": "Loopback interface(s)",
                "state": "im-state-up",
                "line-state": "im-state-up",
                "encapsulation": "loopback",
                "encapsulation-type-string": "Loopback",
                "mtu": 1500,
```

Push-Change-Update Notification

```
{
  "ietf-notification:notification": {
    "eventTime": "2024-11-02T14:54:32.529Z",
    "ietf-notification:sysName": "ipf-zbl1327-r-daisy-91",
    "ietf-notification:sequenceNumber": 1,
    "ietf-yang-push:push-change-update": {
      "id": 1,
      "ietf-yp-observation:timestamp": "2024-11-02T14:54:32.517Z",
      "ietf-yp-observation:point-in-time": "state-changed",
      "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='Loopback13']",
              "value": {
                "Cisco-IOS-XR-pfi-im-cmd-oper:interface": {
                  "interface-name": "Loopback13",
                  "interface-handle": "Loopback13",
                  "interface-type": "IFT_LOOPBACK",
                  "hardware-type-string": "Loopback interface(s)",
                  "state": "im-state-admin-down",
                  "line-state": "im-state-admin-down",
```

Huawei VRP – Push Notifications

Push-Update Notification

```
{
  "ietf-notification:notification": {
    "eventTime": "2024-11-02T10:30:52Z",
    "ietf-notification-sequencing:sysName": "ipf-zbl1243-r-daisy-21",
    "ietf-notification-sequencing:sequenceNumber": 5,
    "ietf-yang-push:push-update": {
      "id": 1,
      "ietf-yp-observation:timestamp": "2024-11-02T10:30:52Z",
      "ietf-yp-observation:point-in-time": "current-accounting",
      "ietf-distributed-notif:message-publisher-id": 16974853,
      "datastore-contents": {
        "huawei-ifm:ifm": {
          "interfaces": {
            "interface": [
              {
                "name": "GigabitEthernet0/3/11",
                "mib-statistics": {
                  "receive-byte": "33448478274",
                  "send-byte": "20330971890",
                  "receive-packet": "75363920",
                  "send-packet": "103904697",
                  "receive-unicast-packet": "75340369",
                  "receive-multicast-packet": "23548",
                  "receive-broad-packet": "3",
                  "send-unicast-packet": "103904697",
                  "send-multicast-packet": "0",
                  "send-broad-packet": "0",
```

Push-Change-Update Notification

```
{
  "ietf-notification:notification": {
    "eventTime": "2024-11-02T10:38:52Z",
    "ietf-notification-sequencing:sysName": "ipf-zbl1243-r-daisy-21",
    "ietf-notification-sequencing:sequenceNumber": 69,
    "ietf-yang-push:push-change-update": {
      "id": 5,
      "ietf-yp-observation:timestamp": "2024-11-02T10:38:52Z",
      "ietf-yp-observation:point-in-time": "state-changed",
      "ietf-distributed-notif:message-publisher-id": 16974841,
      "datastore-changes": {
        "yang-patch": {
          "patch-id": 19,
          "edit": [
            {
              "edit-id": "edit1",
              "operation": "merge",
              "target": "/huawei-
ifm:ifm/interfaces/interface[name=GigabitEthernet0/3/9]/dynamic",
              "value": {
                "dynamic": {
                  "link-status": "down"
                }
              }
            }
          ],
        },
      },
    },
  },
}
```

Huawei VRP – YANG Library

RPC <get> Request

```
<?xml version="1.0" encoding="UTF-8"?>
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="2">
  <get>
    <filter type="subtree">
      <yang-library xmlns="urn:ietf:params:xml:ns:yang:ietf-yang-
library" />
    </filter>
  </get>
</rpc>
```

RPC reply

```
<?xml version="1.0" encoding="UTF-8"?>
<rpc-reply message-id="2" xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
  <data>
    <yang-library xmlns="urn:ietf:params:xml:ns:yang:ietf-yang-library">
      <content-id>3880047851</content-id>
      <module-set>
        <name>config-module</name>
        <module>
          <name>openconfig-acl</name>
          <revision>2017-05-26</revision>
          <namespace>http://openconfig.net/yang/acl</namespace>
          <deviation>huawei-openconfig-acl-deviations-OC-NE-M2K-B</deviation>
        </module>
        <module>
          <name>openconfig-interfaces</name>
          <revision>2021-04-06</revision>
          <namespace>http://openconfig.net/yang/interfaces</namespace>
          <deviation>huawei-openconfig-interfaces-deviations-OC-NE-M2K-B</deviation>
          <augmented-by>huawei-openconfig-qos-ext</augmented-by>
          <augmented-by>openconfig-vlan</augmented-by>
          <augmented-by>openconfig-platform-transceiver</augmented-by>
          <augmented-by>openconfig-platform-port</augmented-by>
          <augmented-by>openconfig-if-tunnel</augmented-by>
          <augmented-by>openconfig-if-ip</augmented-by>
          <augmented-by>openconfig-if-ethernet</augmented-by>
          <augmented-by>openconfig-if-aggregate</augmented-by>
        </module>
```


6WIND VSR – Subscription Notifications

Subscription-Started Notification

```
{
  "ietf-notifications:notification": {
    "eventTime": "2024-11-02T16:20:16.989632098+00:00",
    "ietf-notification-sequencing:sysName": "daisy-ietf-ipf-
zbl1843-r-daisy-58",
    "ietf-notification-sequencing:sequenceNumber": 11008,
    "ietf-subscribed-notifications:subscription-started": {
      "id": 12345678,
      "ietf-yang-push:datastore": "ietf-datastores:operational",
      "ietf-yang-push:datastore-xpath-filter":
"/state/vrf/13vrf/interface/loopback/enabled",
      "transport": "ietf-udp-notif-transport:udp-notif",
      "encoding": "encode-json",
      "purpose": "send notifications",
      "ietf-distributed-notif:message-publisher-ids": [
        0
      ],
      "ietf-yang-push:on-change": {
        "sync-on-start": true
      },
      "ietf-yang-push-revision:module-version": [
        {
          "module-name": "vrouter-loopback",
          "revision": "2024-04-22"
        }
      ]
    }
  }
}
```

Subscription-Terminated Notification

```
{
  "ietf-notifications:notification": {
    "eventTime": "2024-11-02T16:25:19.639303753+00:00",
    "ietf-notification-sequencing:sysName": "daisy-ietf-ipf-
zbl1843-r-daisy-58",
    "ietf-notification-sequencing:sequenceNumber": 11014,
    "ietf-subscribed-notifications:subscription-terminated": {
      "id": 12345678,
      "reason": "no-such-subscription"
    }
  }
}
```

6WIND VSR – Push Notifications

Push-Update Notification

```
{
  "ietf-notifications:notification": {
    "eventTime": "2024-11-02T16:25:20.795276882+00:00",
    "ietf-notification-sequencing:sysName": "daisy-ietf-ipf-
zbl1843-r-daisy-58",
    "ietf-notification-sequencing:sequenceNumber": 11016,
    "ietf-yang-push:push-update": {
      "id": 9,
      "datastore-contents": {
        "vrouters:state": {
          "vrf": [
            {
              "name": "main",
              "vrouters-interface:interface": {
                "physical": [
                  {
                    "name": "ens192",
                    "counters": {
                      "in-octets": "68993004950",
                      "in-unicast-pkts": "389889038",
                      "in-discards": "69240",
                      "in-errors": "0",
                      "out-octets": "65180577234",
                      "out-unicast-pkts": "330829342",
                      "out-discards": "0",
                      "out-errors": "0"
                    }
                  }
                ]
              }
            }
          ]
        }
      }
    }
  }
}
```

Push-Change-Update Notification

```
{
  "ietf-notifications:notification": {
    "eventTime": "2024-11-02T16:21:17.889933885+00:00",
    "ietf-notification-sequencing:sysName": "daisy-ietf-ipf-zbl1843-r-daisy-58",
    "ietf-notification-sequencing:sequenceNumber": 11010,
    "ietf-yang-push:push-change-update": {
      "id": 8,
      "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/vrouters-loopback:loopback[name='Loopback-A9']/enabled",
              "value": {
                "vrouters-loopback:enabled": "false"
              }
            }
          ]
        }
      }
    }
  }
}
```

Udp-notif - Segmentation

72	2024-11-02 15:48:52.036189	203.0.113.91	100.105.33.20	UDPBUCH.	636	20615	→ 10003	Len=592, JSON
73	2024-11-02 15:48:52.040739	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
74	2024-11-02 15:48:52.040770	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
75	2024-11-02 15:48:52.040780	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
76	2024-11-02 15:48:52.040789	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
77	2024-11-02 15:48:52.040944	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
78	2024-11-02 15:48:52.040974	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
79	2024-11-02 15:48:52.041195	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
80	2024-11-02 15:48:52.041551	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
81	2024-11-02 15:48:52.041573	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
82	2024-11-02 15:48:52.041583	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
83	2024-11-02 15:48:52.041875	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
84	2024-11-02 15:48:52.041910	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
85	2024-11-02 15:48:52.041922	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
86	2024-11-02 15:48:52.042223	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
87	2024-11-02 15:48:52.042247	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
88	2024-11-02 15:48:52.042257	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
89	2024-11-02 15:48:52.042408	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
90	2024-11-02 15:48:52.042422	203.0.113.91	100.105.33.20	UDPBUCH.	589	20615	→ 10003	Len=545, JSON
91	2024-11-02 15:48:52.048785	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
92	2024-11-02 15:48:52.050558	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234
93	2024-11-02 15:48:52.054794	203.0.113.91	100.105.33.20	UDPBUCH.	1278	20615	→ 10003	Len=1234

> Frame 90: 589 bytes on wire (4712 bits), 589 bytes captured (4712 bits)	0000 00 00 00 01 00 06 bc 4a 56 a8 be a2 00 00 08 00J V.....
> Linux cooked capture v1	0010 45 00 02 3d be dc 00 00 7e 11 b9 fa cd 00 71 5b	E.....q[
> Internet Protocol Version 4, Src: 203.0.113.91, Dst: 100.105.33.20	0020 64 69 21 14 50 07 27 13 02 29 06 4f 21 10 02 21	dll!P...jOll
> User Datagram Protocol, Src Port: 20615, Dst Port: 10003	0030 01 5c 01 23 00 00 00 04 01 04 00 23 77 2c 22 66	\.....q[
> UDP-Notif Protocol, Publisher: 3244032291, Msg ID: 4	0040 74 75 22 38 31 35 31 34 2c 22 73 75 62 2d 69 6e	tu"!S14,"sub-in
> 001. = Header Version: 1	0050 74 65 72 66 61 63 65 2d 6d 74 75 2d 6f 76 65 72	terface-mtu-over
> ...0. = Media Type Space: standard media types (0)	0060 65 65 61 63 22 38 30 2c 21 6c 32 20 74 72 61 6e	head!9,"12-tran
> ...0001. = Media Type: application/yang-data=json (1)	0070 73 70 6f 72 74 22 38 66 61 6c 73 65 22 6d 61 6e	port!f: else,"ba
> Header Length: 16	0080 66 64 77 69 64 74 68 22 38 31 30 30 30 30 30 30	ndwidth":1000000
> Message Length: 545	0090 30 2c 22 62 61 6e 64 77 69 64 74 68 34 2d 62 61	0,"bandw idth64-b
> Publisher ID: 3244032291	00a0 70 22 69 64 75 65 72 65 61 63 65 2d 6f 61 6d 65	it:"100 00000"},
> Message ID: 4	00b0 22 3a 22 54 65 6e 47 69 64 50 2f 30 2f 30 2f 30	"interf ace-name
> Option Type: Segmentation (1)	00c0 37 22 2c 22 69 6e 74 65 72 66 61 63 65 22 3a 22	"!,"tenci gto/0/0/
> Option Length: 4	00d0 65 6e 67 69 67 45 30 2f 30 2f 30 2f 30 2f 30 22	7","inte rface:"
> ...0000 0001 0001. = Segment Number: 17 (last)	00e0 54 6e 67 69 67 45 30 2f 30 2f 30 2f 30 2f 30 22	tenci gto /0/0/77"
> ...0000 0001 0001. = Segment Number: 17	00f0 54 70 65 22 38 30 22 49 46 64 54 54 45 45 46 47	"type": "DTI,EMG
> ...0000 0001 0001. = Segment Number: 17	0100 45 54 48 45 52 46 45 54 22 22 73 74 61 74 65	ETHERNET","State
> ...0000 0001 0001. = Segment Number: 17	0110 22 2c 22 69 6d 2d 73 74 61 74 65 2d 2d 61 64 6d	"!-in-st ate-admi
> ...0000 0001 0001. = Segment Number: 17	0120 6d 64 6f 77 6e 22 2c 22 61 63 74 75 61 6c 2d	n-down","actual
> ...0000 0001 0001. = Segment Number: 17	0130 71 74 61 75 22 38 30 22 6d 6d 73 74 61 74 65	lstate":"in-state
> ...0000 0001 0001. = Segment Number: 17	0140 20 61 64 6d 69 6e 2d 64 6f 77 6e 22 2c 22 69 6e	-admin-q own","li
> ...0000 0001 0001. = Segment Number: 17	0150 6e 65 2d 73 74 61 74 65 22 38 22 69 6d 2d 73 74	ne-state":"in-st
> ...0000 0001 0001. = Segment Number: 17	0160 61 74 65 2d 61 64 6d 69 6e 2d 64 6f 77 6e 22 2c	ate-admi n-down","
> ...0000 0001 0001. = Segment Number: 17	0170 22 61 63 74 75 61 6c 2d 6c 69 6e 65 2d 73 74 61	"actual_line-sta
> ...0000 0001 0001. = Segment Number: 17	0180 74 65 22 38 22 69 6d 2d 73 74 61 74 65 2d 61 64	"!-in-st ate-as
> ...0000 0001 0001. = Segment Number: 17	0190 6d 69 6e 2d 64 6f 77 6e 22 2c 22 65 6e 63 61 70	min-down","encap
> ...0000 0001 0001. = Segment Number: 17	01a0 73 75 6c 61 74 69 6f 6e 22 38 22 65 74 68 65 72	sulation":"ether
> ...0000 0001 0001. = Segment Number: 17	01b0 22 2c 22 65 6e 63 61 70 73 75 6c 61 74 69 6f 6e	"encap sulation"
> ...0000 0001 0001. = Segment Number: 17	01c0 2d 74 70 70 65 2d 73 74 72 69 6e 69 22 38 22 61	type-st ring":"A
> ...0000 0001 0001. = Segment Number: 17	01d0 52 50 41 22 2c 22 6d 74 75 22 38 31 35 31 34 2d	APA","mt u"!S14,
> ...0000 0001 0001. = Segment Number: 17	01e0 22 73 75 62 2d 69 6e 74 65 72 66 61 63 65 2d 6d	"sub-int erface-m
> ...0000 0001 0001. = Segment Number: 17	01f0 74 75 2d 6f 76 65 72 68 65 61 64 22 38 30 2c 22	tu-overh ead!0,"
> ...0000 0001 0001. = Segment Number: 17	0200 6c 32 2d 74 72 61 6e 73 70 6f 72 74 22 38 66 61	12-trans port!f: e
> ...0000 0001 0001. = Segment Number: 17	0210 6c 73 65 2c 22 62 61 6e 64 77 69 64 74 68 22 38	!sc,"bandw idth":
> ...0000 0001 0001. = Segment Number: 17	0220 11 30 30 30 30 30 30 2c 22 62 61 6e 64 77 69	100000000,"bandw
> ...0000 0001 0001. = Segment Number: 17	0230 64 74 68 34 2d 62 69 74 22 3a 22 31 30 30 30 30	idth64-bi t":1000
> ...0000 0001 0001. = Segment Number: 17	0240 30 30 30 22 7d 5d 7d 7d 7d 7d 7d 7d 7d 7d 7d	0000"}]]]]]]]

Frame (589 bytes)	Unnamed (21235 bytes)
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YANG-Push Publisher

- Huawei VRP
- 6WIND VSR
- Cisco IOS XR

YANG-Push Receiver

- Pmacct
<https://github.com/pmacct/pmacct>
- Netgauze
<https://github.com/NetGauze/NetGauze>

Tools

- Wireshark dissector
<https://github.com/network-analytics/ietf-network-analytics-document-status/tree/main/121/Hackathon>

YANG-Push Implementation Status

IETF 121 – MVP 1

	6WIND VSR	Huawei VRP	Cisco IOS XR	Open- Source
RFC 8639 YANG-Push Subscription	✓	P	P	
RFC 8641 YANG-Push Notification	✓	P	✓	
draft-ietf-netconf-udp-notif	✓	✓	✓	✓
draft-ietf-netconf-yang-notifications-versioning	✓	✓	✓	
draft-tgraf-netconf-notif-sequencing	✓	✓	✓	
draft-tgraf-netconf-yang-push-observation-time	✓	✓	✓	
RFC 7895 YANG Library		✓		
RFC 8525 YANG Library (NMDA)	✓		✓	
draft-ietf-netconf-yang-library-augmentation		P		✓
RFC 9196 System and Notification Capabilities				
draft-netana-netconf-notif-envelope				



Green marked describes new capability at IETF 121. "P" to partially implemented.

YANG-Push Implementation Status

IETF 121 – MVP 2

	6WIND VSR	Huawei VRP	Cisco IOS XR	Open- Source
draft-ietf-netconf-distributed-notif	✓	✓		
RFC 9254 CBOR				
RFC 6347/RFC 9147 DTLS				



Green marked describes new capability at IETF 121. "P" to partially implemented

YANG-Push Implementation Status

IETF 121 – MVP 3

	6WIND VSR	Huawei VRP	Cisco IOS XR	Open- Source
RFC 8641 on-change subscriptions	✓	✓	P	
draft-netana-netconf-yp-transport-capabilities				

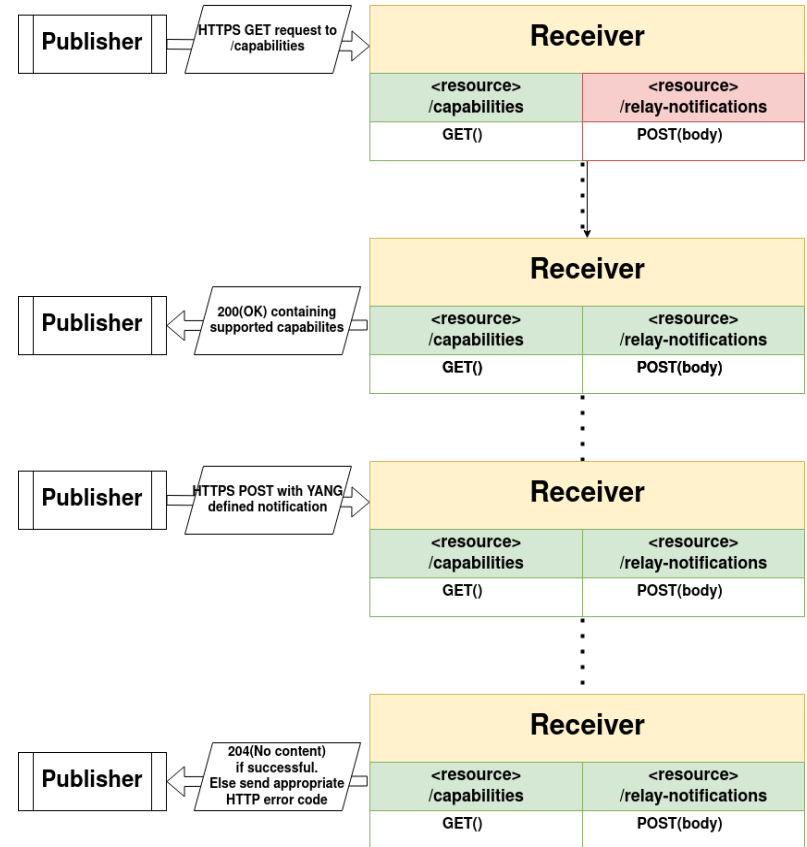


Green marked describes new capability at IETF 121. "P" to partially implemented

Implementation of An HTTPS-based Transport for YANG Notifications

draft-ietf-netconf-https-notif-15

- A protocol for **sending asynchronous event notifications** similar to notifications defined in **NETCONF Event Notifications** [RFC5277], but over **HTTPS**.
- Interactions will occur between a publisher which must be a "server" (e.g., a NETCONF or RESTCONF server) and a **receiver** (which **need not** be a NETCONF or RESTCONF server).
- **Extended Implementation in C [*]** : [github link](#)
- **Python Implementation** : [github link](#)
 - Flask : **synchronous** event handler (WSGI)
 - Fast API : **asynchronous** event handler (ASGI)
- Can be made multithreaded using Gunicorn
- Added **validation** for capability data at collector and relay notification from publisher either by integrating with **sysrepo** as a object datastore or using **libyang** for validation
- Added dynamic **response handling** based on request covering **edge cases**
- Team : Siddharth Bhat, Vartika T R, Hayyan A, Bharadwaja Meherrushi Ch, Prof Mohit P T ;Draft authors : Mahesh Jethanandani, Kent Watsen



* Purple marked describes extended implementation originally implemented by Alex Huang Feng.

* green marked describes implementation from scratch

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- Mathew Green – Cisco (remote)
- Samuel Gauthier – 6WIND (remote)
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- Liu Bin – Huawei (remote)
- Benoit Claise – Huawei
- Zhuoyao Lin - Huawei
- Ebben Aries – Juniper
- James Cummings - Nokia
- Paolo Lucente – Pmacct
- Holger Keller – DT
- Daniel Voyer – Bell Canada
- Alex Huang-Feng – INSA Lyon
- Yannick Buchs – Swisscom
- Thomas Graf – Swisscom
- Ahmed Elhassany – Swisscom (remote)
- Uwe Storbeck – Swisscom (remote)

