Network Configuration B. M. Chittapragada

Internet-Draft S. Bhat

Intended status: Standards Track V. T. Rao

Expires: 8 January 2026 H. Arshad

M. P. Tahiliani

National Institute of Technology Karnataka, Surathkal

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CBOR Encoding for HTTPS-based YANG Notifications Transport

draft-chittapragada-netconf-https-notif-cbor-02

Abstract

This document extends [I-D.draft-ietf-netconf-https-notif-15] by

introducing CBOR encoding for YANG notifications over HTTPS transport in

addition to the existing JSON and XML encoding schemes.

About This Document

This note is to be removed before publishing as an RFC.

The latest revision of this draft can be found at

https://MeherRushi.github.io/draft-chittapragada-netconf-https-notif-

cbor/draft-chittapragada-netconf-https-notif-cbor.html. Status

information for this document may be found at

https://datatracker.ietf.org/doc/draft-chittapragada-netconf-https-

notif-cbor/.

Discussion of this document takes place on the Network Configuration

mailing list (mailto:netconf@ietf.org), which is archived at

https://mailarchive.ietf.org/arch/browse/netconf/. Subscribe at

https://www.ietf.org/mailman/listinfo/netconf/.

Source for this draft and an issue tracker can be found at

https://github.com/MeherRushi/draft-chittapragada-netconf-https-

notif-cbor.

Status of This Memo

This Internet-Draft is submitted in full conformance with the

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1. Introduction

CBOR offers an efficient and compact representation of YANG.

This document introduces a CBOR encoding scheme for event

notifications over HTTPS by using the framework proposed in

[I-D.draft-ietf-netconf-https-notif-15] which supports transfer of

YANG notifications over HTTPS using JSON and XML encoding schemes.

In [I-D.draft-ietf-netconf-https-notif-15], the capabilities HTTP-

target resource allows a publisher to retrieve supported encoding

formats via GET requests, while the relay-notification resource

enables the publisher to send YANG notifications via POST requests.

These requests and responses use different content types based on the

selected encoding scheme. This document defines support for using

CBOR encoding as defined in section 1 of

[I-D.draft-ietf-netconf-https-notif-15]

Examples of the GET and POST request and reply encoded in CBOR are

also provided.

2. Conventions and Definitions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",

"SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and

"OPTIONAL" in this document are to be interpreted as described in

BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all

capitals, as shown here.

3. Terminology

This document uses the following terms defined in Section 2,3 and 4

of [I-D.draft-ietf-netconf-https-notif-15]:

\* Capabilities Resource

\* Relay-Notification

\* Event Notification

The following term(s) are defined in Subscription to YANG

Notifications [RFC8639]:

\* Publisher

\* Receiver

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\* Subscribed Notifications

The following term(s) are defined in Encoding of Data Modeled with

YANG in the Concise Binary Object Representation (CBOR) [RFC9254]:

\* Diagnostic Notifications

\* YANG Schema Item iDentifier (or "YANG SID" or simply "SID"):

63-bit unsigned integer used to identify different YANG items.

4. CBOR Encoding of the notification(s)

YANG notifications can be encoded in CBOR using Names or SIDs in

keys. Notifications encoded using names is similar to JSON encoding

as defined in Section 3.4 and 4.3 of

[I-D.draft-ietf-netconf-https-notif-15]. Notification encoded using

YANG-SIDs replaces the names of the keys of the CBOR encoded message

with a 63 bit unsigned integer. In this case, the term 'SID' is

defined in Section 3.2 of [RFC9254], and the keys of the encoded data

use SID value as mentioned in 4.3.2 of this document.

4.1. Capabilities Request

The publisher sends a request to the receiver to learn its

capabilities. In the below example, the “Accept” states that the

publisher wants to receive the capabilities response in CBOR but if

not supported then in XML or JSON in that order.

GET /some/path/capabilities HTTP/1.1

Host: example.com

Accept: application/cbor, application/xml;0.9, application/json;q=0.5

4.2. Capabilities Response

If the receiver is able to reply using “application/cbor” and

assuming it is capable of receiving JSON, XML and CBOR encoded

messages the response would look like this

4.2.1. CBOR using names as keys

Diagnostic Notation:

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HTTP/1.1 200 OK

Date: Tue, 4 March 2025 20:33:30 GMT

Server: example-server

Cache-Control: no-cache

Content-Type: application/json

{

"receiver-capabilities": {

"receiver-capability": [

"urn:ietf:capability:https-notif-receiver:encoding:json",

"urn:ietf:capability:https-notif-receiver:encoding:xml",

"urn:ietf:capability:https-notif-receiver:encoding:cbor"

]

}

}

CBOR Encoding:

A1 # map(1)

75 # text(21)

72656365697665722D6361706162696C6974696573 # "receiver-capabilities"

A1 # map(1)

73 # text(19)

72656365697665722D6361706162696C697479 # "receiver-capability"

83 # array(3)

78 36 # text(54)

75726E3A696574663A6361706162696C6974793A68747470732D6E6F7469662D72656365697665723A656E636F64696E673A6A736F6E # "urn:ietf:capability:https-notif-receiver:encoding:json"

78 35 # text(53)

75726E3A696574663A6361706162696C6974793A68747470732D6E6F7469662D72656365697665723A656E636F64696E673A786D6C # "urn:ietf:capability:https-notif-receiver:encoding:xml"

78 36 # text(54)

75726E3A696574663A6361706162696C6974793A68747470732D6E6F7469662D72656365697665723A656E636F64696E673A63626F72 # "urn:ietf:capability:https-notif-receiver:encoding:cbor"

4.3. Relay Notification request

The publisher sends an HTTP POST request to the "relay-notification"

resource on the receiver with the "Content-Type" header set to either

"application/cbor" in case the receiver is CBOR capable and a body

containing the notification encoded in CBOR.

4.3.1. CBOR encoding using names as keys

POST /some/path/relay-notification HTTP/1.1

Host: example.com

Content-Type: application/cbor

Diagnostic notation:

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{

"ietf-https-notif:notification": {

"eventTime": "2013-12-21T00:01:00Z",

"example-mod:event" : {

"event-class" : "fault",

"reporting-entity" : { "card" : "Ethernet0" },

"severity" : "major"

}

}

}

Cbor Encoding:

A1 # map(1)

78 1D # text(29)

696574662D68747470732D6E6F7469663A6E6F74696669636174696F6E # "ietf-https-notif:notification"

A2 # map(2)

69 # text(9)

6576656E7454696D65 # "eventTime"

74 # text(20)

323031332D31322D32315430303A30313A30305A # "2013-12-21T00:01:00Z"

71 # text(17)

6578616D706C652D6D6F643A6576656E74 # "example-mod:event"

A3 # map(3)

68 # text(8)

7365766572697479 # "severity"

65 # text(5)

6D616A6F72 # "major"

6B # text(11)

6576656E742D636C617373 # "event-class"

65 # text(5)

6661756C74 # "fault"

70 # text(16)

7265706F7274696E672D656E74697479 # "reporting-entity"

A1 # map(1)

64 # text(4)

63617264 # "card"

69 # text(9)

45746865726E657430 # "Ethernet0"

4.3.2. CBOR encoding using SIDs as keys

Diagnostic Notation:

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{

2601: {

1: "2013-12-21T00:01:00Z",

"example-mod:event" : {

"event-class" : "fault",

"reporting-entity" : { "card" : "Ethernet0" },

"severity" : "major"

}

}

}

The above is assuming the YANG module for event notifications has a

corresponding .sid file with these entries

"item": [

{

"namespace": "module",

"identifier": "ietf-notification",

"sid": "2600"

},

{

"namespace": "data",

"identifier": "/ietf-notification:notification",

"sid": "2601"

},

{

"namespace": "data",

"identifier": "/ietf-notification:notification/eventTime",

"sid": "2602"

}

]

CBOR Encoding:

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A1 # map(1)

19 0A28 # unsigned(2600)

A2 # map(2)

01 # unsigned(1)

74 # text(20)

323031332D31322D32315430303A30313A30305A # "2013-12-21T00:01:00Z"

71 # text(17)

6578616D706C652D6D6F643A6576656E74 # "example-mod:event"

A3 # map(3)

68 # text(8)

7365766572697479 # "severity"

65 # text(5)

6D616A6F72 # "major"

6B # text(11)

6576656E742D636C617373 # "event-class"

65 # text(5)

6661756C74 # "fault"

70 # text(16)

7265706F7274696E672D656E74697479 # "reporting-entity"

A1 # map(1)

64 # text(4)

63617264 # "card"

69 # text(9)

45746865726E657430 # "Ethernet0"

4.4. Relay Notification Response

The response on success is "204 (No Content)". In case of corrupted

or malformed event, the response is an appropriate HTTP error

response.

5. Scope of Experimentation

CBOR encoding may be tested against JSON and XML to evaluate requests

per second, data transfer rate, and overall network efficiency.

Bandwidth constraints can be applied using traffic control to analyze

CBOR encoding efficiency under different network conditions.

6. Security Considerations

Addition of the CBOR encoding introduces no specific security

exposures or risks other that the ones mentioned in [RFC9254] and

[I-D.draft-ietf-netconf-https-notif-15] (An HTTPS-based Transport for

YANG Notifications)

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7. IANA Considerations

This document requests the IANA registry to include an additional

entry to the proposed initial assignments in the “Capabilities for

HTTPS Notification Receivers” registry within the YANG Notifications

registry group(defined in [RFC3553]) as requested in the draft

[I-D.ietf-netconf-http-client-server]. The following entry is added

:

Record:

URN: urn:ietf:params:yang-notif:https-capability:encoding:cbor

Reference: RFC XXXX:An HTTPS-based Transport for YANG Notifications

Description: Identifies support for CBOR-encoded notifications.

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Authors' Addresses

Bharadwaja Meherrushi Chittapragada

National Institute of Technology Karnataka, Surathkal

Email: meherrushi2@gmail.com

Siddharth Bhat

National Institute of Technology Karnataka, Surathkal

Email: siddharth.bhat10@gmail.com

Vartika T Rao

National Institute of Technology Karnataka, Surathkal

Email: vartikatrao@gmail.com

Hayyan Arshad

National Institute of Technology Karnataka, Surathkal

Email: hayyanhamnah@gmail.com

Mohit P. Tahiliani

National Institute of Technology Karnataka, Surathkal

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Email: tahiliani@nitk.edu.in

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