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CBOR Encoding for HTTPS-based ~~Transport for~~ 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 provisions of BCP 78 and BCP 79.

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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 a GET request<sup>s</sup>, 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 ~~mentioned~~ defined in section 1 of [I-D.draft-ietf-netconf-https-notif-15]

~~CBOR offers an efficient and compact representation of YANG notifications.~~

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

- \* 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:

```
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)

75726E3A696574663A6361706162696C6974793A68747470732D6E6F7469662D726563656
97665723A656E636F64696E673A6A736F6E # "urn:ietf:capability:https-notif-
receiver:encoding:json"
  78 35                             # text(53)

75726E3A696574663A6361706162696C6974793A68747470732D6E6F7469662D726563656
97665723A656E636F64696E673A786D6C # "urn:ietf:capability:https-notif-
receiver:encoding:xml"
  78 36                             # text(54)

75726E3A696574663A6361706162696C6974793A68747470732D6E6F7469662D726563656
97665723A656E636F64696E673A63626F72 # "urn:ietf:capability:https-notif-
receiver:encoding:cbor"
```

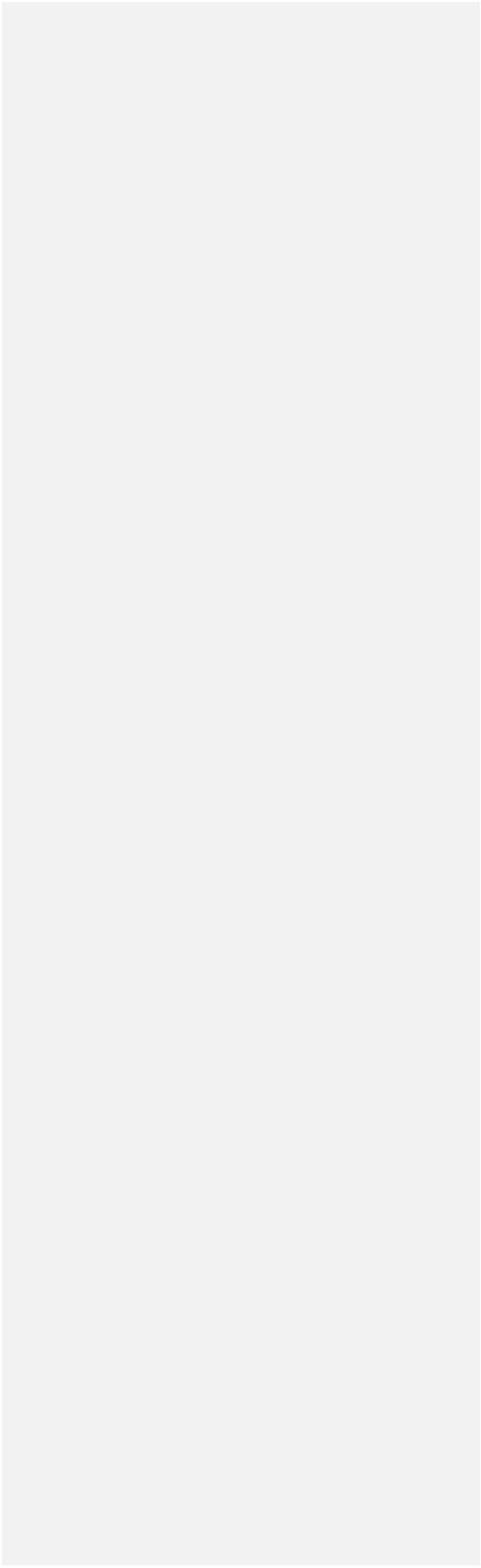
4.3. Relay Notification request

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:



```

{
  "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)
    6965746662D68747470732D6E6F74696663A6E6F746966669636174696F6E # "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:

```
{
  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:



```
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 than the ones mentioned in [RFC9254] and [I-D.draft-ietf-netconf-https-notif-15] (An HTTPS-based Transport for YANG Notifications)

**Commented [TG1]:** Suggest to rewrite this section to „Implementation Status“ according to <https://datatracker.ietf.org/doc/html/rfc7942>. List all the implementations and their test and results achieved. When published as RFC, the „Implementation Status“ section will be removed.

## 7. IANA Considerations

This document requests the ~~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.

## 8. References

### 8.1. Normative References

- [I-D.draft-ietf-netconf-https-notif-15]  
Jethanandani, M. and K. Watsen, "An HTTPS-based Transport for YANG Notifications", Work in Progress, Internet-Draft, draft-ietf-netconf-https-notif-15, 1 February 2024, <<https://datatracker.ietf.org/doc/html/draft-ietf-netconf-https-notif-15>>.
- [I-D.ietf-netconf-http-client-server]  
Watsen, K., "YANG Groupings for HTTP Clients and HTTP Servers", Work in Progress, Internet-Draft, draft-ietf-netconf-http-client-server-28, 6 June 2025, <<https://datatracker.ietf.org/doc/html/draft-ietf-netconf-http-client-server-28>>.
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- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/rfc/rfc8174>>.
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- [RFC8949] Bormann, C. and P. Hoffman, "Concise Binary Object Representation (CBOR)", STD 94, RFC 8949, DOI 10.17487/RFC8949, December 2020, <<https://www.rfc-editor.org/rfc/rfc8949>>.
- [RFC9254] Veillette, M., Ed., Petrov, I., Ed., Pelov, A., Bormann, C., and M. Richardson, "Encoding of Data Modeled with YANG in the Concise Binary Object Representation (CBOR)", RFC 9254, DOI 10.17487/RFC9254, July 2022, <<https://www.rfc-editor.org/rfc/rfc9254>>.

## 8.2. Informative References

- [RFC3553] Mealling, M., Masinter, L., Hardie, T., and G. Klyne, "An IETF URN Sub-namespace for Registered Protocol Parameters", BCP 73, RFC 3553, DOI 10.17487/RFC3553, June 2003, <<https://www.rfc-editor.org/rfc/rfc3553>>.

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