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Binary Encoding for NETCONF
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Abstract

This document describes a method by which a NETCONF [[RFC6241](#)] client and server can negotiate an alternate form of encoding.

This document updates [RFC 6241](#).

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[1.](#) Introduction

NETCONF [[RFC6241](#)], by default, supports XML encoding for its payload. However, XML can be very verbose, specially for operational data. That combined with parsing of tags leads to slow processing of the data. This document proposes a mechanism by which clients and servers can negotiate an alternate form of encoding, e.g. binary encoding, and use that to exchange data. Binary encoding can reduce the physical size of the data exchanged, in some cases by as much as 66%, and improve the time that is required to process the data, while preserving the original data.

Several binary encoding mechanisms have been proposed, including CBOR [[RFC7049](#)]. This document does not advocate any particular binary encoding format. Instead, it leaves it up to the negotiation between client and server to decide the form of encoding. For an example of how to encode YANG in CBOR format, see CBOR Encoding of Data Modeled with YANG [[I-D.ietf-core-yang-cbor](#)].

[1.1.](#) Definitions and Acronyms

[2.](#) Protocol Negotiation

NETCONF clients and servers exchange a hello as part of establishing a connection. As part of the hello exchange, each of them advertises

their set of capabilities. This draft suggests advertisement of the following additional capability.

[2.1.](#) Encoding

[2.1.1.](#) Overview

The :encoding capability indicates what encoding format each side is willing to support. If the client and server are capable of supporting multiple forms of encoding, they can list each of them. There is no need to include xml in the list, as that is supported by default.

[2.1.2.](#) Dependencies

When using this capability, any binary encoding needs the underlying transport to be 8-bit clean, and which preserves message boundaries when dealing with arbitrary binary data. This requires use of Chunked Framing mechanism as described in NETCONF over SSH [[RFC6242](#)].

[2.1.3.](#) Capability Identifier

The :encoding capability is identified by the following capability string:

```
urn:ietf:params:netconf:capability:encoding:1.0?format={name, ...}
```

The :encoding capability URI MUST contain a "format" argument assigned a comma-separated list of formats supported by the device. For example:

```
urn:ietf:params:netconf:capability:encoding:1.0?format=cbor,gpb,thrift
```

[2.1.4.](#) New Operation

[2.1.4.1.](#) <activate>

Description:

After each side has exchanged capabilities, a client can initiate a request to switch to a new encoding format using the <activate> operation.

Parameters:

encoding:

The <activate> operation instructs the server to switch to the new binary format. If the server does not support the new binary format or is unable to switch to the new binary format for any reason, it MUST fail with the <error-tag> value of "not-supported" and keep the existing encoding format it is using.

If the system does not have the :encoding capability, the <activate> operation is not available. If there is a desire to fall back to default encoding of XML, the client needs to terminate the existing connection and establish a new connection.

Positive Response:

If the device is able to satisfy the requests, an <rpc-reply> is sent that contains an <ok> element.

Negative Response:

An <rpc-error> element is included in the <rpc-reply> with the <type> element set to "not-supported". The <error-tag> element must be set to "server-error".

Example:

```
<rpc message-id="101"
  xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
  <activate>
    <encoding>cbor</encoding>
  </activate>
</rpc>

<rpc-reply message-id="101"
  xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
  <ok/>
</rpc-reply>
```

3. Security Considerations

4. IANA Considerations

This document registers a URI in the IETF XML registry [[RFC3688](#)]. Following the format in [RFC 3688](#), the following registration is requested to be made:

4.1. NETCONF Capability URNs

IANA registry "Network Configuration Protocol (NETCONF) Capability URNs" needs to be updated to include the following capability.

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Capability Identifier

:encoding

urn:ietf:params:netconf:capability:encoding:1.0

5. Acknowledgements

6. References

6.1. Normative References

- [RFC3688] Mealling, M., "The IETF XML Registry", [BCP 81](#), [RFC 3688](#), DOI 10.17487/RFC3688, January 2004, <<https://www.rfc-editor.org/info/rfc3688>>.
- [RFC6241] Enns, R., Ed., Bjorklund, M., Ed., Schoenwaelder, J., Ed., and A. Bierman, Ed., "Network Configuration Protocol (NETCONF)", [RFC 6241](#), DOI 10.17487/RFC6241, June 2011, <<https://www.rfc-editor.org/info/rfc6241>>.
- [RFC6242] Wasserman, M., "Using the NETCONF Protocol over Secure Shell (SSH)", [RFC 6242](#), DOI 10.17487/RFC6242, June 2011, <<https://www.rfc-editor.org/info/rfc6242>>.
- [RFC7049] Bormann, C. and P. Hoffman, "Concise Binary Object Representation (CBOR)", [RFC 7049](#), DOI 10.17487/RFC7049, October 2013, <<https://www.rfc-editor.org/info/rfc7049>>.

6.2. Informative References

- [I-D.ietf-core-yang-cbor] Veillette, M., Pelov, A., Somaraju, A., Turner, R., and A. Minaburo, "CBOR Encoding of Data Modeled with YANG", [draft-ietf-core-yang-cbor-06](#) (work in progress), February 2018.

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