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## **Factory Default Setting draft-ietf-netmod-factory-default-06**

### Abstract

This document defines a method to reset a server to its factory-default content. The reset operation may be used e.g. during initial zero-touch configuration or when the existing configuration has major errors, so re-starting the configuration process from scratch is the best option.

A new factory-reset RPC is defined. Several methods of documenting the factory-default content are specified.

Optionally a new "factory-default" read-only datastore is defined, that contains the data that will be copied over to the running datastore at reset.

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## [1.](#) Introduction

This document defines a method to reset a server to its factory-default content. The reset operation may be used, e.g. during initial zero-touch configuration [[RFC8572](#)] or when the existing configuration has major errors, so re-starting the configuration process from scratch is the best option. When resetting a datastore all previous configuration settings will be lost and replaced by the factory-default content.

A new factory-reset RPC is defined. Several methods of documenting the factory-default content are specified.



Optionally a new "factory-default" read-only datastore is defined, that contains the data that will be copied over to all read-write configuration datastores at reset. This datastore can also be used in <get-data> or <get-config> operations.

NETCONF defines the <delete> operation that allows resetting the <startup> datastore and the <discard-changes> operation that copies the content of the <running> datastore into the <candidate> datastore. However it is not possible to reset the running datastore, to reset the candidate datastore without changing the running datastore or to reset any dynamic datastore.

A RESTCONF server MAY implement the above NETCONF operations, but that would still not allow it to reset the running configuration.

The YANG data model in this document conforms to the Network Management Datastore Architecture defined in [[RFC8342](#)].

### **[1.1](#). Terminology**

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.

The following terms are defined in [[RFC8342](#)] and are not redefined here:

- o server
- o startup configuration datastore
- o candidate configuration datastore
- o running configuration datastore
- o intended configuration datastore
- o operational state datastore

The following terms are defined in this document as follows:

- o factory-default datastore: A read-only datastore holding a preconfigured minimal initial configuration that can be used to initialize the configuration of a server. The content of the datastore is usually static, but MAY depend on external factors like available HW.



## 2. Factory-Reset RPC

A new "factory-reset" RPC is introduced. Upon receiving the RPC the server resets the content of all read-write configuration datastores (e.g., <running> and <startup>) to their factory-default content. Read-only datastores receive their content from other datastores (e.g. <intended> gets its content from <running>).

Factory-default content MAY be specified by one of the following means in descending order of precedence

1. <factory-default> datastore, if it exists;
2. by vendors using a file in YANG Instance Data [[I-D.ietf-netmod-yang-instance-file-format](#)] format or some other format in vendor's website or other places where similar off-line documents are kept;
3. In some implementation specific manner;

For the server supporting zero touch bootstrapping mechanisms, the factory default configuration causes the bootstrapping process to execute, e.g., the server resets configuration to device's factory default configuration, for the version of operating system software it is running. In addition, the "factory-reset" RPC MAY also be used to trigger some other restoring and resetting tasks such as files cleanup, restarting the node or some of the software processes, setting some security data/passwords to the default value, removing logs, or removing any temporary data (from datastore or elsewhere), etc. When and why these tasks are triggered is not the scope of this document.

## 3. Factory-Default Datastore

Following guidelines for defining Datastores in the [appendix A of \[RFC8342\]](#), this document introduces a new datastore resource named 'factory-default' that represents a preconfigured minimal initial configuration that can be used to initialize the configuration of a server.

- o Name: "factory-default"
- o YANG modules: all
- o YANG nodes: all "config true" data nodes
- o Management operations: The content of the datastore is set by the server in an implementation dependent manner. The content can not



be changed by management operations via NETCONF, RESTCONF, the CLI etc. unless specialized, dedicated operations are provided. The contents of the datastore can be read using NETCONF <get-data> and <get-config> operations, and the RESTCONF protocol equivalents. The operation <factory- reset> copies the factory default content to <running> and, if present, <startup> and then the content of these datastores is propagated automatically to any other read only datastores, e.g., <intended> and <operational>.

- o Origin: This document does not define a new origin identity as it does not interact with <operational> datastore.
- o Protocols: RESTCONF, NETCONF and other management protocol.
- o Defining YANG module: "ietf-factory-default".

The datastore content is usually defined by the device vendor. It is usually static, but MAY change e.g., depending on external factors like HW available or during device upgrade.

On devices that support non-volatile storage, the contents of <factory > MUST persist across restarts.

#### **4. YANG Module**

This module imports typedefs from [[RFC8342](#)], and it references [[RFC6421](#)], [[RFC8341](#)].

```
<CODE BEGINS> file "ietf-factory-default.yang"
module ietf-factory-default {
  yang-version 1.1;
  namespace urn:ietf:params:xml:ns:yang:ietf-factory-default;
  prefix fd;

  import ietf-netconf { prefix nc ; }
  import ietf-datastores { prefix ds; }
  import ietf-netconf-acm { prefix nacm;}

  organization
    "IETF NETMOD (Network Modeling) Working Group";
  contact
    "WG Web:  <https://tools.ietf.org/wg/netconf/>
    WG List:  <mailto:netconf@ietf.org>

    Editor:   Qin Wu
              <mailto:bill.wu@huawei.com>
    Editor:   Balazs Lengyel
              <mailto:balazs.lengyel@ericsson.com>
```





```
Editor:  Ye Niu
        <mailto:niuye@huawei.com>;
description
  "This module defines the
  - factory-reset RPC
  - factory-default datastore
  - an extension to the NETCONF <get-config> operation to
    allow it to operate on the factory-default datastore.

  It provides functionality to reset a server to its
  factory-default content.

  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 (RFC 2119) (RFC 8174) when, and only when,
  they appear in all capitals, as shown here.

  Copyright (c) 2019 IETF Trust and the persons identified as
  authors of the code.  All rights reserved.

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  without modification, is permitted pursuant to, and subject
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  set forth in Section 4.c of the IETF Trust's Legal Provisions
  Relating to IETF Documents
  (http://trustee.ietf.org/license-info).

  This version of this YANG module is part of RFC XXXX;
  see the RFC itself for full legal notices.";

revision 2019-05-03 {
  description
    "Initial revision.";
  reference "RFC XXXX: Factory default Setting";
}

feature factory-default-as-datastore {
  description "Indicates that the factory default configuration is
    also available as a separate datastore";
}

rpc factory-reset {
  nacm:default-deny-all;
  description "The server resets the content of all read-write
    configuration datastores (e.g., <running> and <startup>) to
    their factory default content.";
}
```



```
identity factory-default {
  base ds:datastore;
  if-feature factory-default-as-datastore;
  description "The read-only datastore contains the configuration
  that will be copied into <running> and, if present, <startup>
  .";
}
augment /nc:get-config/nc:input/nc:source/nc:config-source {
  if-feature factory-default-as-datastore;
  description "Allows the get-config operation to use the
  factory-default datastore as a source";
  leaf factory-default {
    type empty ;
    description
      "The factory-default datastore is the source.";  }
}
<CODE ENDS>
```

## 5. IANA Considerations

This document registers one URI in the IETF XML Registry [[RFC3688](#)]. The following registration has been made:

URI: urn:ietf:params:xml:ns:yang:ietf-factory-default

Registrant Contact: The IESG.

XML: N/A, the requested URI is an XML namespace.

This document registers one YANG module in the YANG Module Names Registry [[RFC6020](#)]. The following registration has been made:

name: ietf-factory-default

namespace: urn:ietf:params:xml:ns:yang:ietf-factory-default

prefix: fd

RFC: xxxx



## **6. Security Considerations**

The YANG module defined in this document extends the base operations for NETCONF [[RFC6241](#)] and RESTCONF [[RFC8040](#)]. The lowest NETCONF layer is the secure transport layer, and the mandatory-to-implement secure transport is Secure Shell (SSH) [[RFC6242](#)]. The lowest RESTCONF layer is HTTPS, and the mandatory-to-implement secure transport is TLS [[RFC8446](#)].

The <factory-reset> RPC operation may be considered sensitive in some network environments, e.g., remote access to reset the device or overwrite security sensitive information in one of the other datastores, e.g. running, therefore it is important to restrict access to this RPC using the standard access control methods. [[RFC8341](#)]

The 'factory-reset' RPC can prevent any further management of the device if the session and client config is included in the factory-reset contents.

The operational disruption caused by setting the config to factory-reset contents varies greatly depending on the implementation and current config.

## **7. Acknowledgements**

Thanks to Juergen Schoenwaelder, Ladislav Lhotka, Alex Campbell, Joe Clarke, Robert Wilton, Kent Watsen, Joel Jaeggli, Lou Berger, Andy Bierman, Susan Hares to review this draft and provide important input to this document.

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## **9. References**

### **9.1. Normative References**

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.



- [RFC7950] Bjorklund, M., Ed., "The YANG 1.1 Data Modeling Language", [RFC 7950](#), DOI 10.17487/RFC7950, August 2016, <<https://www.rfc-editor.org/info/rfc7950>>.
- [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/info/rfc8174>>.
- [RFC8341] Bierman, A. and M. Bjorklund, "Network Configuration Access Control Model", STD 91, [RFC 8341](#), DOI 10.17487/RFC8341, March 2018, <<https://www.rfc-editor.org/info/rfc8341>>.
- [RFC8342] Bjorklund, M., Schoenwaelder, J., Shafer, P., Watsen, K., and R. Wilton, "Network Management Datastore Architecture (NMDA)", [RFC 8342](#), DOI 10.17487/RFC8342, March 2018, <<https://www.rfc-editor.org/info/rfc8342>>.

## **[9.2.](#) Informative References**

- [I-D.ietf-netmod-yang-instance-file-format]  
Lengyel, B. and B. Claise, "YANG Instance Data File Format", [draft-ietf-netmod-yang-instance-file-format-04](#) (work in progress), August 2019.
- [RFC8572] Watsen, K., Farrer, I., and M. Abrahamsson, "Secure Zero Touch Provisioning (SZTP)", [RFC 8572](#), DOI 10.17487/RFC8572, April 2019, <<https://www.rfc-editor.org/info/rfc8572>>.

## **[Appendix A.](#) Difference between <startup> datastore and <factory-default> datastore**

When the device first boots up, the content of the <startup> and <factory-default> will be identical. The content of <startup> can be subsequently changed by using <startup> as a target in a <copy-config> operation. The <factory-default> is a read-only datastore and it is usually static as described in earlier sections.

## **[Appendix B.](#) Changes between revisions**

Editorial Note (To be removed by RFC Editor)

v05 - 06

- o Additional text to enhance security section.
- o Add nacm:default-deny-all on "factory-reset" RPC.





- o A few clarification on Factory-default content specification.

v03 - 04

- o Additional text to clarify factory-reset RPC usage.

v02 - 03

- o Update security consideration section.

v01 - v02

- o Address security issue in the security consideration section.
- o Remove an extension to the NETCONF <copy-config> operation which allows it to operate on the factory-default datastore.
- o Add an extension to the NETCONF <get-config> operation which allows it to operate on the factory-default datastore.

v00 - v01

- o Change YANG server into server defined in NMDA architecture based on discussion.
- o Allow reset the content of all read-write configuration datastores to its factory-default content except <candidate>.
- o Add clarification text on factory-reset protocol operation behavior.

v03 - v00

- o Change draft name from [draft-wu](#) to [draft-ietf-netmod-factory-default-00](#) without content changes.

v02 - v03

- o Change reset-datastore RPC into factory-reset RPC to allow reset the whole device with factory default content.
- o Remove target datastore parameter from factory-reset RPC.
- o Other editorial changes.

v01 - v02

- o Add copy-config based on Rob's comment.



- o Reference Update.

v03 - v00 - v01

- o Changed name from [draft-wu-netconf-restconf-factory-restore](#) to [draft-wu-netmod-factory-default](#)

- o Removed copy-config ; reset-datastore is enough

v02 - v03

- o Restructured
- o Made new datastore optional
- o Removed Netconf capability
- o Listed Open issues

v01 - v02

- o -

v00 - v01

- o -

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