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YANG Module Tags  
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Abstract

This document provides for the association of tags with YANG modules. The expectation is for such tags to be used to help classify and organize modules. A method for defining, reading and writing a modules tags is provided, as well as an augmentation to YANG library. Tags may be standardized and assigned during module definition; assigned by implementations; or dynamically defined and set by users. This document provides guidance to future model writers and, as such, this document updates [I-D.ietf-netmod-rfc6087bis].

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## 1. Introduction

The use of tags for classification and organization is fairly ubiquitous not only within IETF protocols, but in the internet itself (e.g., #hashtags). Tags can be usefully standardized, but they can also serve as a non-standardized mechanism available for users to define themselves. Our solution provides for both cases allowing for the most flexibility. In particular, tags may be standardized as well as assigned during module definition; assigned by implementations; or dynamically defined and set by users.

This document defines two modules. The first module defines a list of module entries to allow for adding or removing of tags. It also defines an RPC to reset a modules tags to the original values. The second module defines an augmentation to YANG Library [RFC7895] to allow for reading a modules tags.

This document also defines an IANA registry for tag prefixes as well as a set of globally assigned tags.

Section 9 provides guidelines for authors of YANG data models. This section updates [I-D.ietf-netmod-rfc6087bis].

## 2. Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

Note that lower case versions of these key words are used in section Section 9 where guidance is provided to future document authors.

## 3. Tag Locations

Each module has only one logical tag list; however, that tag list may be accessed from multiple locations.

We define two tag list locations. The first location is used for configuration and is a top level list of module entries where each entry contain the list of tags. The second read-only location is through the yang library under the module entry.

## 4. Tag Prefixes

All tags have a prefix indicating who owns their definition. An IANA registry is used to support standardizing tag prefixes. Currently 3 prefixes are defined with all others reserved.

### 4.1. IETF Standard Tags

An IETF standard tag is a tag that has the prefix "ietf:". All IETF standard tags are registered with IANA in a registry defined later in this document.

### 4.2. Vendor Tags

A vendor tag is a tag that has the prefix "vendor:". These tags are defined by the vendor that implements the module, and are not standardized; however, it is recommended that the vendor consider

including extra identification in the tag name to avoid collisions (e.g., vendor:super-duper-company:...).

#### 4.3. Local Tags

A local tag is any tag that has the prefix "local:". These tags are defined by the local user/administrator and will never be standardized.

#### 4.4. Reserved Tags

Any tag not starting with the prefix "ietf:", "vendor:" or "local:" is reserved for future standardization.

### 5. Tag Management

Tags can become associated with a module in a number of ways. Tags may be defined and associated at model design time, at implementation time, or via user administrative control. As the main consumer of tags are users, users may also remove any tag, no matter how the tag became associated with a module.

#### 5.1. Module Definition Association

A module definition SHOULD indicate a set of tags to be automatically added by the module implementer. These tags MUST be standard tags (Section 4.1). This does imply that new modules may also drive the addition of new standard tags to the IANA registry.

#### 5.2. Implementation Association

An implementation MAY include additional tags associated with a module. These tags may be standard or vendor specific tags.

#### 5.3. Administrative Tagging

Tags of any kind can be assigned and removed with normal configuration mechanisms. Additionally we define an RPC to reset a module's tag list to the implementation default.

Implementations MUST ensure that a modules tag list is consistent across any location from which the list is accessible. So if a user adds a tag through configuration that tag should also be seen when using the yang library augmentation.

Implementations that do not support the reset rpc statement (whether at all, or just for a particular rpc or module) MUST respond with an

YANG transport protocol-appropriate rpc layer error when such a statement is received.

#### 5.3.1. Resetting Tags

The "reset-tags" rpc statement is defined to reset a module's tag list to the implementation default, i.e. the tags that are present based on module definition and any that are added during implementation time. This rpc statement takes module identification information as input, and provides the list of tags that are present after the reset.

### 6. Tags Module Structure

#### 6.1. Tags Module Tree

The tree associated with the tags module is:

```
module: ietf-module-tags
  rpcs:
    +---x reset-tags
      +---w input
        |   +---w name          yang:yang-identifier
        |   +---w revision?    union
      +--ro output
        +--ro tags*            string
```

#### 6.2. Tags Module

```
<CODE BEGINS> file "ietf-module-tags@2017-10-25.yang"
module ietf-module-tags {
  yang-version "1";
  namespace "urn:ietf:params:xml:ns:yang:ietf-module-tags";
  prefix "mtags";

  import ietf-yang-types {
    prefix yang;
  }

  import ietf-yang-library {
    prefix yanglib;
  }

  // meta
  organization "IETF NetMod Working Group (NetMod)";

  contact
    "NetMod Working Group - <netmod@ietf.org>";
```

```
description
  "This module describes a tagging mechanism for yang module.
  Tags may be IANA assigned or privately defined types.";

revision "2017-10-25" {
  description
    "Initial revision.";
  reference "TBD";
}

grouping module-tags {
  description
    "A grouping that may be used to classify a module.";

  leaf-list tags {
    type string;

    description
      "The module associated tags. See the IANA 'YANG Module Tag
      Prefix' registry for reserved prefixes and the IANA 'YANG
      Module IETF Tag' registry for IETF standard tags";
  }
}

grouping yanglib-common-leafs {
  description
    "Common parameters for YANG modules and submodules.
    This definition extract from RFC7895 as it is defined as
    a grouping within a grouping.

    TBD is there a legal way to use a grouping defined within
    another grouping without using the parent? If so, should change
    to that.";

  leaf name {
    type yang:yang-identifier;
    mandatory true;
    description
      "The YANG module or submodule name.";
  }
  leaf revision {
    type union {
      type yanglib:revision-identifier;
      type string { length 0; }
    }
    mandatory true;
    description
      "The YANG module or submodule revision date.
```

```
        A zero-length string is used if no revision statement
        is present in the YANG module or submodule.";
    }
}

list module-tags {
    key "name revision";
    description
        "A list of modules and their tags";
    uses yanglib-common-leafs; // uses yanglib:common-leafs;
    uses module-tags;
}

rpc reset-tags {
    description
        "Reset a list of tags for a given module to the list of module
        and implementation time defiend tags. It provides the list of
        tags associated with the module post reset.";

    input {
        uses yanglib-common-leafs; // uses yanglib:common-leafs;
    }

    output {
        uses module-tags;
    }
}
}
<CODE ENDS>
```

## 7. Library Augmentation

A modules tags can also be read using the yang library [RFC7895] if a server supports both YANG library and the augmentation defined below. If a server supports ietf-module-tags and the YANG library it SHOULD also support the ietf-library-tags module.

The tree associated with the defined augmentation is:

```
module: ietf-library-tags
  augment /yanglib:modules-state/yanglib:module:
    +--ro tags*   string
```

## 7.1. Library Augmentation Module

```
<CODE BEGINS> file "ietf-library-tags@2017-08-12.yang"
module ietf-library-tags {
  // namespace
  namespace "urn:ietf:params:xml:ns:yang:ietf-library-tags";

  prefix ylibtags;

  import ietf-yang-library {
    prefix yanglib;
  }
  import ietf-module-tags {
    prefix mtags;
  }

  // meta
  organization "IETF NetMod Working Group (NetMod)";

  contact
    "NetMod Working Group - <netmod@ietf.org>";

  description
    "This module augments ietf-yang-library with searchable
    classification tags. Tags may be IANA or privately defined
    types.";

  revision "2017-08-12" {
    description
      "Initial revision.";
    reference "RFC TBD";
  }

  augment "/yanglib:modules-state/yanglib:module" {
    description
      "The yang library structure is augmented with a module tags
      list. This allows operators to tag modules regardless of
      whether the modules included tag support or not";

    uses mtags:module-tags;

  }
}
<CODE ENDS>
```



## 8. Other Classifications

It's worth noting that a different yang module classification document exists [RFC8199]. That document is classifying modules in only a logical manner and does not define tagging or any other mechanisms. It divides yang modules into 2 categories (service or element) and then into one of 3 origins: standard, vendor or user. It does provide a good way to discuss and identify modules in general. This document defines standard tags to support [RFC8199] style classification.

## 9. Guidelines to Model Writers

This section updates [I-D.ietf-netmod-rfc6087bis].

### 9.1. Define Standard Tags

A module SHOULD indicate, in the description statement of the module, a set of tags that are to be associated with it. This description should also include the appropriate conformance statement or statements, using [RFC2119] language for each tag.

```
module sample-module {
  ...
  description
    "[Text describing the module...]"

    RFC<this document> TAGS:
    The following tags MUST be included by an implementation:
      - ietf:some-required-tag:foo
      - ...
    The following tags SHOULD be included by an implementation:
      - ietf:some-recommended-tag:bar
      - ...
    The following tags MAY be included by an implementation:
      - ietf:some-optional-tag:baz
      - ...
    ";
  ...
}
```

One SHOULD only include conformance text if there will be tags listed (i.e., there's no need to indicate an empty set).

The module writer may use existing standard tags, or use new tags defined in the model definition, as appropriate. New tags should be assigned in the IANA registry defined below, see Section 10.2 below.

## 10. IANA Considerations

### 10.1. YANG Module Tag Prefix Registry

This registry allocates tag prefixes. All YANG module tags SHOULD begin with one of the prefixes in this registry.

The allocation policy for this registry is Specification Required [RFC5226].

The initial values for this registry are as follows.

prefix	description
ietf:	IETF Standard Tag allocated in the IANA YANG Module IETF Tag Registry.
vendor:	Non-standardized tags allocated by the module implementer.
local:	Non-standardized tags allocated by and for the user.

Other SDOs (standard organizations) wishing to standardize their own set of tags could allocate a top level prefix from this registry.

### 10.2. YANG Module IETF Tag Registry

This registry allocates prefixes that have the standard prefix "ietf:". New values should be well considered and not achievable through a combination of already existing standard tags.

The allocation policy for this registry is IETF Review [RFC5226].

The initial values for this registry are as follows.

[Editor's note: many of these tags may move to [I-D.ietf-rtgwg-device-model] if/when that document is refactored to use tags.]

Tag	Description	Reference
ietf:rfc8199:element	A module for a network element.	[RFC8199]
ietf:rfc8199:service	A module for a network service.	[RFC8199]
ietf:rfc8199:standard	A module defined by a standards organization.	[RFC8199]

ietf:rfc8199:vendor	A module defined by a vendor.	[RFC8199]
ietf:rfc8199:user	A module defined by the user.	[RFC8199]
ietf:device:hardware	A module relating to device hardware (e.g., inventory).	[This document]
ietf:device:software	A module relating to device software (e.g., installed OS).	[This document]
ietf:device:qos	A module for managing quality of service.	[This document]
ietf:protocol	A module representing a protocol.	[This document]
ietf:system-management	A module relating to system management (e.g., a system management protocol).	[This document]
ietf:network-service	A module relating to network service (e.g., a network service protocol).	[This document]
ietf:oam	A module representing Operations, Administration, and Maintenance.	[This document]
ietf:routing	A module related to routing.	[This document]
ietf:routing:rib	A module related to routing information bases.	[This document]
ietf:routing:igp	An interior gateway protocol module.	[This document]
ietf:routing:egp	An exterior gateway protocol module.	[This document]
ietf:signaling	A module representing control plane signaling.	[This document]
ietf:lmpp	A module representing a link management protocol.	[This document]

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Table 1: IETF Module Tag Registry

## 11. References

### 11.1. Normative References

- [I-D.ietf-netmod-rfc6087bis]  
Bierman, A., "Guidelines for Authors and Reviewers of YANG Data Model Documents", draft-ietf-netmod-rfc6087bis-14 (work in progress), September 2017.
- [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>>.
- [RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", RFC 5226, DOI 10.17487/RFC5226, May 2008, <<https://www.rfc-editor.org/info/rfc5226>>.
- [RFC7895] Bierman, A., Bjorklund, M., and K. Watsen, "YANG Module Library", RFC 7895, DOI 10.17487/RFC7895, June 2016, <<https://www.rfc-editor.org/info/rfc7895>>.
- [RFC8199] Bogdanovic, D., Claise, B., and C. Moberg, "YANG Module Classification", RFC 8199, DOI 10.17487/RFC8199, July 2017, <<https://www.rfc-editor.org/info/rfc8199>>.

### 11.2. Informative References

- [I-D.ietf-rtgwg-device-model]  
Lindem, A., Berger, L., Bogdanovic, D., and C. Hopps, "Network Device YANG Logical Organization", draft-ietf-rtgwg-device-model-02 (work in progress), March 2017.

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