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YANG Module Tags
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Abstract

This document defines two modules that support the association of tags with modules. Tags may be included in a module or associated with a module through the use of an augmentation to YANG library that is defined in this document. The expectation is for such tags to be used to help classify and organize modules. 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

(see #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 and

assigned during module definition; assigned by implementations; or dynamically defined and set by users.

This document defines two modules that support the association of tags with modules. The first module defines a grouping which contains a list of tags as well as rpc statements for changing the contents of the list. Tags are strings that are structured to enable the differentiation of globally assigned and non-assigned tags based on a fixed prefix. This document also defines an initial set of globally assigned tags.

The second module defined in this document defines an augmentation to YANG Library [[RFC7895](#)]. It uses (imports) the first module to provide a well known location for 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

Two tag list locations are defined. One location is within the module itself, and the other location is in the yang library under the modules entry. When a module includes tags, the same tag list may also be presented in yang library.

To add tags to a module, the module definition includes a tag list using the 'module-tags' grouping defined in this document. This list

MUST be added by a module author under container named "module-tags" at the root of their module.

[4.](#) Tag Prefixes

All tags have a prefix indicating who owns their definition. An IANA registry is used to support standardizing tag prefixes. Currently 2 prefixes are defined with all others reserved.

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[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.

[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 as associated at model design time, at implementation time, or via user administrative control. As the main consumer of tags are users, users may 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 standard 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 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.

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Implementations MUST ensure that a specific module's tags leaf list is consistent across any location from which the list is available. Specifically this includes in the module itself, per [Section 9.1](#), or in yang library, per [Section 7](#).

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 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@2017-08-12.yang"
module ietf-module-tags {
  yang-version "1.1";
  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 "2017-08-12" {
  description
    "Initial revision.";
```

```

    reference "TBD";
}

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

    leaf-list tags {
        type string;

        config false;

        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 wuthin
        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; }
        }
        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.";
    }
}

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;
    }

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

```

7. Library Augmentation

Tags can also be associated with a module using the yang library [[RFC7895](#)]. When a server supports both yang library and the augmentation defined below, a user can add, remove and search for tags for any module on the server regardless of whether the specific module included tag support in its definition or not. 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 [[I-D.ietf-netmod-yang-model-classification](#)]. 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 [[I-D.ietf-netmod-yang-model-classification](#)] style classification.

[9.](#) Guidelines to Model Writers

This section updates [[I-D.ietf-netmod-rfc6087bis](#)]. This document makes two recommendations to model writers,

[9.1.](#) Include Module Tags

The correct way to use the module-tags grouping is to include it in a standard location at the top level of your module, specifically contained within a container named "module-tags". This standard location allows searching module using a well-known xpath wildcard path. For example:

```
module sample-module {
  ...
  import ietf-module-tags {
    prefix mtags;
  }
  ...
  container module-tags {
    description
      "A list of classification tags associated with this
       module. The following predefined tags <MUST|SHOULD|MAY>
       be included by an implementation:
        - ietf:foo
        - ietf:bar
        - ...
      ";
    uses mtags:module-tags;
  }
  ...
}
```

The associated tree will look like:

```
module: sample-module
  +--rw module-tags
  |   +--ro tags*   string
  +--...
```

[9.2.](#) Define Standard Tags

A module should indicate, in the description of the "module-tags" container, the set of tags that are to be populated in the leaf-list for any implementation of the module. This description should also include the appropriate conformance statement or statements, using [\[RFC2119\]](#) language, for each tag.

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 must 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.

[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.

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[Editor's note: some of these tags are expected to move to [[I-D.ietf-rtgwg-device-model](#)] if/when this document becomes a WG document and that document is refactored to use tags.]

Tag	Description	Reference
ietf:area:art	Applications and Real-Time Area module.	[This document]
ietf:area:gen	General Area module.	[This document]
ietf:area:int	Internet Area module.	[This document]
ietf:area:ops	Operations and Management Area module.	[This document]
ietf:area:rtg	Routing Area module.	[This document]
ietf:area:sec	Security Area module.	[This document]
ietf:area:tsv	Transport Area module.	[This document]
ietf:element	A module for an element (*).	[This document]

ietf:service	A module for a service (*).	[This document]
ietf:hardware	A module for hardware.	[This document]
ietf:software	A module for software.	[This document]
ietf:protocol	A module representing a protocol.	[This document]
ietf:protocol:system-management	A module representing a	[This document]

	system management protocol.	
ietf:protocol:network-service	A module representing a network service protocol.	[This document]
ietf:protocol:routing	A module representing a control plane routing protocol.	[This document]
ietf:protocol:signaling	A module representing a control plane signaling protocol.	[This document]
ietf:protocol:oam	A module representing a Operations, Administration, and Maintenance protocol.	[This document]

ietf:protocol:lm	A module representing a link management protocol.	[This document]
ietf:protocol:routing:igp	An IGP protocol module.	[This document]
ietf:protocol:routing:egp	An EGP protocol module.	[This document]

(*) - see [[I-D.ietf-netmod-yang-model-classification](#)]

Table 1: IETF Module Tag Registry

[11.](#) References

[11.1.](#) Normative References

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Bierman, A., "Guidelines for Authors and Reviewers of YANG Data Model Documents", [draft-ietf-netmod-rfc6087bis-13](#) (work in progress), June 2017.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<http://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, <<http://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, <<http://www.rfc-editor.org/info/rfc7895>>.

11.2. Informative References

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Bogdanovic, D., Claise, B., and C. Moberg, "YANG Module Classification", [draft-ietf-netmod-yang-model-classification-04](#) (work in progress), October 2016.

[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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