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C. Hopps
Deutsche Telekom
L. Berger
LabN Consulting, L.L.C.
D. Bogdanovic
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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. 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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Table of Contents

1. Introduction	2
2. Conventions Used in This Document	3
3. Tag Values	3
3.1. IETF Standard Tags	3
3.2. Vendor Tags	3
3.3. User Tags	3
3.4. Reserved Tags	4
4. Tag Management	4
4.1. Module Definition Association	4
4.2. Implementation Association	4
4.3. Administrative Tagging	4
5. Tags Module Structure	4
5.1. Tags Module Tree	4
5.2. Tags Module	5
6. Other Classifications	7
7. Guidelines to Model Writers	7
7.1. Define Standard Tags	7
8. IANA Considerations	8
8.1. YANG Module Tag Prefix Registry	8
8.2. YANG Module IETF Tag Registry	8
9. References	10
9.1. Normative References	10
9.2. Informative References	10
Authors' Addresses	10

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 a YANG module [RFC6020] which provides a list of module entries to allow for adding or removing of tags as well as viewing the set of tags associated with a module.

This document defines an extension statement to be used to indicate tags that SHOULD be added by the module implementation automatically (i.e., outside of configuration).

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

Section 7 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", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

3. Tag Values

All tags begin with 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. No further structure is imposed by this document on the value following the standard prefix, and the value can contain any yang type 'string' characters except carriage-returns, newlines and tabs.

3.1. 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.

3.2. 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 include extra identification in the tag to avoid collisions such as using the enterprise or organization name following the "vendor:" prefix (e.g., vendor:example.com:vendor-defined-classifier).

3.3. User Tags

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

3.4. Reserved Tags

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

4. Tag Management

Tags can become associated with a module in a number of ways. Tags may be defined and associated at module 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.

4.1. Module Definition Association

A module definition can indicate a set of tags to be added by the module implementer. These design time tags are indicated using the module-tag extension statement. If the module definition will be IETF standards track, the tags MUST also be IETF standard tags (Section 3.1). Thus, new modules can drive the addition of new standard tags to the IANA registry, and the IANA registry can serve as a check against duplication.

4.2. Implementation Association

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

4.3. Administrative Tagging

Tags of any kind can be assigned and removed with using normal configuration mechanisms.

5. Tags Module Structure

5.1. Tags Module Tree

The tree associated with the "ietf-module-tags" module follows. The meaning of the symbols can be found in [RFC8340].

```
module: ietf-module-tags
  +--rw module-tags
    +--rw module* [name]
      +--rw name          yang:yang-identifier
      +--rw tag*          tag
      +--rw masked-tag*   tag
```

5.2. Tags Module

```
<CODE BEGINS> file "ietf-module-tags@2018-10-17.yang"
module ietf-module-tags {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-module-tags";
  prefix tags;

  import ietf-yang-types {
    prefix yang;
  }

  organization
    "IETF NetMod Working Group (NetMod)";
  contact
    "NetMod Working Group - <netmod@ietf.org>";

  // RFC Ed.: replace XXXX with actual RFC number and
  // remove this note.

  description
    "This module describes a mechanism associating tags with YANG
    modules. Tags may be IANA assigned or privately defined.

    Copyright (c) 2018 IETF Trust and the persons identified as
    authors of the code. All rights reserved.

    Redistribution and use in source and binary forms, with or
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    forth in Section 4.c of the IETF Trust's Legal Provisions
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    (https://trustee.ietf.org/license-info).

    The key words 'MUST', 'MUST NOT', 'REQUIRED', 'SHALL', 'SHALL
    NOT', 'SHOULD', 'SHOULD NOT', 'RECOMMENDED', 'MAY', and
    'OPTIONAL' in the module text are to be interpreted as described
    in RFC 2119 (https://tools.ietf.org/html/rfc2119).

    This version of this YANG module is part of RFC XXXX
    (https://tools.ietf.org/html/rfcXXXX); see the RFC itself for
    full legal notices.";

  // RFC Ed.: update the date below with the date of RFC publication
  // and RFC number and remove this note.

  revision 2018-10-17 {
    description
```

```
    "Initial revision.";
    reference "RFC XXXX: YANG Module Tags";
}

typedef tag {
    type string {
        length "1..max";
        pattern '[a-zA-Z_][a-zA-Z0-9\-\_]*:[\S ]+';
    }
    description
        "A tag value is composed of a standard prefix followed by any type
        'string' value that does not include carriage return, newline or
        tab characters.";
}

extension module-tag {
    argument tag;
    description
        "The argument 'tag' is of type 'tag'. This extension statement is
        used by module authors to indicate the tags that SHOULD be added
        automatically by the system. As such the origin of the value
        for the pre-defined tags should be set to 'system'.";
}

container module-tags {
    description
        "Contains the list of modules and their associated tags";
    list module {
        key "name";
        description
            "A list of modules and their associated tags";
        leaf name {
            type yang:yang-identifier;
            mandatory true;
            description
                "The YANG module name.";
        }
        leaf-list tag {
            type tag;
            description
                "Tags associated with the module. See the IANA 'YANG Module
                Tag Prefix' registry for reserved prefixes and the IANA 'YANG
                Module IETF Tag' registry for IETF standard tags.

                The operational view of this list is constructed using the following
steps:

                1) System added tags are added.
                2) User configured tags are added.
```

```
        3) Any tag that is equal to a masked-tag is removed.";
    }
    leaf-list masked-tag {
        type tag;
        description
            "The list of tags that should not be associated with this
            module. This user can remove (mask) tags by adding
            them to this list. It is not an error to add tags to this
            list that are not associated with the module.";
    }
}
}
}
<CODE ENDS>
```

6. 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.

7. Guidelines to Model Writers

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

7.1. Define Standard Tags

A module can indicate using module-tag extension statements a set of tags that are to be automatically associated with it (i.e., not added through configuration).

```
module example-module {
    ...
    import module-tags { prefix tags; }

    tags:module-tag "ietf:some-new-tag";
    tags:module-tag "ietf:some-other-tag";
    ...
}
```

The module writer can use existing standard tags, or use new tags defined in the model definition, as appropriate. For standardized

modules new tags MUST be assigned in the IANA registry defined below, see Section 8.2 below.

8. IANA Considerations

8.1. 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.
user:	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.

8.2. 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.

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	[RFC8199]

	vendor.	
ietf:rfc8199-user	A module defined by the user.	[RFC8199]
ietf:hardware	A module relating to hardware (e.g., inventory).	[This document]
ietf:software	A module relating to software (e.g., installed OS).	[This document]
ietf: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 such as syslog, TACAC+, SNMP, netconf, ...).	[This document]
ietf:network-service	A module relating to network service (e.g., a network service protocol such as an NTP server, DNS server, DHCP server, etc).	[This document]
ietf:oam	A module representing Operations, Administration, and Maintenance (e.g., BFD).	[This document]
ietf:routing	A module related to routing.	[This document]
ietf:signaling	A module representing control plane signaling.	[This document]
ietf:lmpp	A module representing a link management protocol.	[This document]

Table 1: IETF Module Tag Registry

9. References

9.1. Normative References

- [I-D.ietf-netmod-rfc6087bis]
Bierman, A., "Guidelines for Authors and Reviewers of YANG Data Model Documents", draft-ietf-netmod-rfc6087bis-20 (work in progress), March 2018.
- [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>>.
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- [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>>.

9.2. Informative References

- [RFC8340] Bjorklund, M. and L. Berger, Ed., "YANG Tree Diagrams", BCP 215, RFC 8340, DOI 10.17487/RFC8340, March 2018, <<https://www.rfc-editor.org/info/rfc8340>>.

Authors' Addresses

Christan Hopps
Deutsche Telekom

Email: chopps@chopps.org

Lou Berger
LabN Consulting, L.L.C.

Email: lberger@labn.net

Dean Bogdanovic

Email: ivandean@gmail.com