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Recommendations for Creating IANA-Maintained YANG Modules

Abstract

This document provides a set of guidelines for YANG module authors
related to the design of IANA-maintained modules. These guidelines
are meant to leverage existing IANA registries and use YANG as
another format to present the content of these registries when
appropriate.

This document updates RFC 8407 by providing additional guidelines
for IANA-maintained modules. Also, this document updates RFC 8126 by
providing additional guidelines for writing the IANA considerations
for RFCs that specify IANA-maintained modules. This document does
not change anything written in RFC 8407 and RFC 8126.

Status of This Memo

This Internet-Draft is submitted in full conformance with the
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1. Introduction

IANA maintains a set of registries that are key for interoperability. The content of these registries are usually available using various formats (e.g., plain text, XML). However, there were some confusion in the past about whether the content of some registries is dependent on a specific representation format. For example, Section 5 of [RFC8892] was published to clarify that MIB and YANG modules are merely additional formats in which the "Interface Types (ifType)" and "Tunnel Types (tunnelType)" registries are available. The MIB [RFC2863] and YANG modules [RFC7224][RFC8675] are not separate registries, and the same values are always present in all formats of the same registry.

Also, some YANG modules include parameters and values directly in a module that is not maintained by IANA while these are populated in an IANA registry. Such a design is suboptimal as it creates another source of information that may deviate from the IANA registry as new values are assigned or some values are deprecated.

For the sake of consistency, better flexibility to support new values, and maintaining IANA registries as the unique authoritative source of information, when such an information is maintained in a

registry, this document encourages the use of IANA-maintained
modules.

Section 3 updates the guidelines in [RFC8407]. Also, Section 4
updates [RFC8407] and [RFC8126] by providing guidance for writing
the IANA considerations for RFCs that specify IANA-maintained
modules.

2. 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.

This document makes use of the terms defined in Section 2 of
[RFC8407].

3. Guidelines for IANA-Maintained Modules

When designing a YANG module for a functionality governed by a
protocol for which IANA maintains a registry, it is RECOMMENDED to
specify an IANA-maintained module that echoes the content of that
registry. This is superior to including that content in an IETF-
maintained module.

When one or multiple sub-registries are available under the same
registry, it is RECOMMENDED to define an IANA-maintained module for
each sub-registry. However, module designers MAY consider defining
one single IANA-maintained module that covers all sub-registries if
maintaining that single module is manageable (e.g., very few values
are present or expected to be present for each sub-registry). An
example of such a module is documented in Section 5.2 of [RFC9132].

An IANA-maintained module may use identities (e.g., [RFC8675]) or
enumerations (e.g., [RFC9108]). The decision about which type to use
is left to the module designers and should be made based upon
specifics related to the intended use of the IANA-maintained module.
For example, identities are useful if the registry entries are
organized hierarchically, possibly including multiple inheritances.
It is RECOMMENDED that the reasoning for the design choice is
documented in the companion specification that registers an IANA-
maintained module. For example, [RFC9244] defines an IANA-maintained
module that uses enumerations for the following reason:

"The DOTS telemetry module (Section 10.1) uses "enumerations" rather
than "identities" to define units, samples, and intervals because
otherwise the namespace identifier "ietf-dots-telemetry" must be
included when a telemetry attribute is included (e.g., in a
mitigation efficacy update). The use of "identities" is thus
suboptimal from a message compactness standpoint; one of the key
requirements for DOTS messages."

Designers of IANA-maintained modules MAY supply the full initial
version of the module in a specification document that registers the
module or only a script to be used (including by IANA) for
generating the module (e.g., an XSLT stylesheet as in Appendix A of
[RFC9108]). When a script is used, the Internet-Draft that defines
an IANA-maintained module SHOULD include an appendix with the
initial full version of the module. Including such an appendix in
pre-RFC versions is meant to assess the correctness of the outcome
of the supplied script. The authors MUST include a note to the RFC
Editor requesting that the appendix be removed before publication as
RFC. Initial versions of IANA-maintained modules that are published
in RFCs may be misused despite the appropriate language to refer to
the IANA registry to retrieve the up-to-date module. This is
problematic for interoperability, e.g., when values are deprecated
or are associated with a new meaning.

Note: [Style] provides XSLT 1.0 stylesheets and other tools for
translating IANA registries to YANG modules. The tools can be
used to generate up-to-date revisions of an IANA-maintained
module based upon the XML representation of an IANA registry.

4. Guidance for Writing the IANA Considerations for RFCs Defining IANA-Maintained Modules

In addition to the IANA considerations in Section 3.8 of [RFC8407],
the IANA Considerations Section of an RFC that includes an IANA-
maintained module MUST provide the required instructions for IANA to
automatically perform the maintenance of that IANA module. These
instructions describe how to proceed with updates to the IANA-
maintained module that are triggered by a change to the
authoritative registry. Concretely, the IANA Considerations Section
SHALL at least provide the following information:

*An IANA request to add a note to the page displaying the
 information about the IANA-maintained module that new values must
 not be directly added to the module, but to an authoritative IANA
 registry.

*An IANA request to add a note to the authoritative IANA registry
 to indicate that any change to the registry must be reflected
 into the corresponding IANA-maintained module.

*Details about the required actions (e.g., add a new "identity" or
 "enum" statement) to update the IANA-maintained module to reflect
 changes to an authoritative IANA registry. Typically, these
 details have to include the procedure to create a new "identity"
 statement name and sub-statements ("base", "status",
 "description", and "reference") or a new "enum" statement and
 sub-statements ("value", "status", "description", and
 "reference").

*A note that unassigned or reserved values must not be present in
 the IANA-maintained module.

*An indication whether experimental values are included in the
 IANA-maintained module. Absent such an indication, experimental
 values MUST NOT be listed in the IANA-maintained module.

*An instruction about how to generate the "revision" statement.

A template for the IANA Considerations is provided in Section 4.1
for IANA-maintained modules with identities and Section 4.2 for
IANA-maintained modules with enumerations. Authors may modify the
template to reflect specifics of their modules (e.g., Multiple
registries can be listed for a single IANA-maintained module, no
explicit description (or name) field is listed under the
authoritative IANA registry).

The following templates are to be considered in addition to the
required information that is provided in Section 3.8 of [RFC8407].

4.1. Template for IANA-Maintained Modules with Identities

This document defines the initial version of the IANA-maintained
"iana-foo" YANG module. The most recent version of the YANG module
is available from the "YANG Parameters" registry [IANA-YANG-
PARAMETERS].

IANA is requested to add this note to the registry:

   New values must not be directly added to the "iana-foo" YANG
   module. They must instead be added to the "foo" registry.

When a value is added to the "foo" registry, a new "identity"
statement must be added to the "iana-foo" YANG module. The name of
the "identity" is the lower-case of the name provided in the
registry. The "identity" statement should have the following sub-
statements defined:

"base":
        Contains 'name-base-identity-defined-in-foo'.

"status": Include only if a registration has been deprecated or
    obsoleted. IANA "deprecated" maps to YANG status "deprecated",
    and IANA "obsolete" maps to YANG status "obsolete".

"description": Replicates the description from the registry.

"reference": Replicates the reference(s) from the registry with the
    title of the document(s) added.

Unassigned or reserved values are not present in the module.

When the "iana-foo" YANG module is updated, a new "revision"
statement with a unique revision date must be added in front of the
existing revision statements.

IANA is requested to add this note to [reference-to-the-iana-foo-
registry]:

    When this registry is modified, the YANG module "iana-foo" must
    be updated as defined in RFCXXXX.

4.2. Template for IANA-Maintained Modules with Enumerations

This document defines the initial version of the IANA-maintained
"iana-foo" YANG module. The most recent version of the YANG module
is available from the "YANG Parameters" registry [IANA-YANG-
PARAMETERS].

IANA is requested to add this note to the registry:

    New values must not be directly added to the "iana-foo" YANG
    module. They must instead be added to the "foo" registry.

When a value is added to the "foo" registry, a new "enum" statement
must be added to the "iana-foo" YANG module. The "enum" statement,
and sub-statements thereof, should be defined:

"enum": Replicates a name from the registry.

"value": Contains the decimal value of the IANA-assigned value.

"status": Is included only if a registration has been deprecated or
    obsoleted. IANA "deprecated" maps to YANG status "deprecated",
    and IANA "obsolete" maps to YANG status "obsolete".

"description": Replicates the description from the registry.

"reference":

>   Replicates the reference(s) from the registry with the
>   title of the document(s) added.

Unassigned or reserved values are not present in the module.

When the "iana-foo" YANG module is updated, a new "revision"
statement with a unique revision date must be added in front of the
existing revision statements.

IANA is requested to add this note to [reference-to-the-iana-foo-
registry]:

>   When this registry is modified, the YANG module "iana-foo" must
>   be updated as defined in RFCXXXX.

5. IANA Considerations

This document does not require any IANA action.

6. Security Considerations

This document does not introduce new concerns other than those
already discussed in Section 15 of [RFC8407].

7. Acknowledgements

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for sharing more context that led to the design documented in
[RFC9108].

Thanks to Andy Bierman for the comments. Lou Berger suggested to
include more details about IANA considerations.

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[Style]   IANA YANG, "IANA YANG", <https://github.com/llhotka/iana-yang>.

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