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YANG Schema Item iDentifier (SID)
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Abstract

YANG Schema Item iDentifiers (SID) are globally unique 63-bit unsigned integers used to identify YANG items. This document defines the semantics, the registration, and assignment processes of SIDs. To enable the implementation of these processes, this document also defines a file format used to persist and publish assigned SIDs.

Status of This Memo

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[1.](#) Introduction

Some of the items defined in YANG [[RFC7950](#)] require the use of a unique identifier. In both NETCONF [[RFC6241](#)] and RESTCONF [[RFC8040](#)], these identifiers are implemented using names. To allow the implementation of data models defined in YANG in constrained devices and constrained networks, a more compact method to identify YANG items is required. This compact identifier, called SID, is encoded

using a 63-bit unsigned integer. The limitation to 63-bit unsigned integers allows SIDs to be manipulated more easily on platforms that might otherwise lack native 64-bit unsigned arithmetic. The loss of a single bit of range is not significant given the size of the remaining space.

The following items are identified using SIDs:

- o identities
- o data nodes (Note: including those parts of a YANG template as defined by the 'yang-data' extension.)
- o RPCs and associated input(s) and output(s)
- o actions and associated input(s) and output(s)
- o notifications and associated information
- o YANG modules, submodules and features

It is possible that some protocols use only a subset of the assigned SIDs, for example, for protocols equivalent to NETCONF [[RFC6241](#)] like [[I-D.ietf-core-comi](#)] the transportation of YANG modules SIDs might be unnecessary. Others protocols might need to be able to transport this information, for example protocols related to discovery such as Constrained YANG Module Library [[I-D.ietf-core-yang-library](#)].

SIDs are globally unique integers, a registration system is used in order to guarantee their uniqueness. SIDs are registered in blocks called "SID ranges".

Assignment of SIDs to YANG items can be automated. For more details how this could be achieved, please consult [Appendix B](#).

SIDs are assigned permanently, items introduced by a new revision of a YANG module are added to the list of SIDs already assigned.

[Section 3](#) provides more details about the registration process of YANG modules and associated SIDs. To enable the implementation of this registry, [Section 4](#) defines a standard file format used to store and publish SIDs.

2. Terminology and Notation

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 [[RFC7950](#)]:

- o action
- o feature
- o module
- o notification
- o RPC
- o schema node
- o schema tree
- o submodule

The following term is defined in [[RFC8040](#)]:

- o yang-data extension

This specification also makes use of the following terminology:

- o item: A schema node, an identity, a module, a submodule or a feature defined using the YANG modeling language.
- o path: A path is a string that identifies a schema node within the schema tree. A path consists of the list of schema node identifier(s) separated by slashes ("/"). Schema node identifier(s) are always listed from the top-level schema node up to the targeted schema node. (e.g. "/ietf-system:system-state/clock/current-datetime")
- o YANG Schema Item iDentifier (SID): Unsigned integer used to identify different YANG items.

3. ".sid" file lifecycle

YANG is a language designed to model data accessed using one of the compatible protocols (e.g. NETCONF [[RFC6241](#)], RESCONF [[RFC8040](#)] and CoRECONF [[I-D.ietf-core-comi](#)]). A YANG module defines hierarchies of data, including configuration, state data, RPCs, actions and notifications.

Many YANG modules are not created in the context of constrained applications. YANG modules can be implemented using NETCONF [RFC6241] or RESTCONF [RFC8040] without the need to assign SIDs.

As needed, authors of YANG modules can assign SIDs to their YANG modules. In order to do that, they should first obtain a SID range from a registry and use that range to assign or generate SIDs to items of their YANG module. The assignments can then be stored in a ".sid" file. For example how this could be achieved, please refer to [Appendix C](#).

Registration of the ".sid" file associated to a YANG module is optional but recommended to promote interoperability between devices and to avoid duplicate allocation of SIDs to a single YANG module. Different registries might have different requirements for the registration and publication of the ".sid" files. For diagram of one of the possibilities, please refer to the activity diagram on Figure 1 in [Appendix C](#).

Each time a YANG module or one of its imported module(s) or included sub-module(s) is updated, a new ".sid" file MAY need to be created. All the SIDs present in the previous version of the ".sid" file MUST be present in the new version as well. The creation of this new version of the ".sid" file SHOULD be performed using an automated tool.

If a new revision requires more SIDs than initially allocated, a new SID range MUST be added to the 'assignment-ranges' as defined in [Section 4](#). These extra SIDs are used for subsequent assignments.

For an example of this update process, see activity diagram Figure 2 in [Appendix C](#).

4. ".sid" file format

".sid" files are used to persist and publish SIDs assigned to the different YANG items of a specific YANG module. It has the following structure.


```
module: ietf-sid-file
  +--rw module-name?          yang:yang-identifier
  +--rw module-revision?      revision-identifier
  +--rw sid-file-version?     sid-file-version-identifier
  +--rw dependency-revision* [module-name]
    | +--rw module-name      yang:yang-identifier
    | +--rw module-revision  revision-identifier
  +--rw assignment-ranges* [entry-point]
    | +--rw entry-point      sid
    | +--rw size             uint64
  +--rw items* [namespace identifier]
    +--rw namespace          enumeration
    +--rw identifier          union
    +--rw sid                 sid
```

The following YANG module defined the structure of this file, encoding is performed using the rules defined in [[RFC7951](#)].

```
<CODE BEGINS> file "ietf-sid-file@2020-02-05.yang"
module ietf-sid-file {
  namespace "urn:ietf:params:xml:ns:yang:ietf-sid-file";
  prefix sid;

  import ietf-yang-types {
    prefix yang;
  }
  import ietf-restconf {
    prefix rc;
  }

  organization
    "IETF Core Working Group";

  contact
    "Michel Veillette
    <mailto:michel.veillette@trilliant.com>

    Andy Bierman
    <mailto:andy@yumaworks.com>

    Alexander Pelov
    <mailto:a@ackl.io>";

  description
    "Copyright (c) 2020 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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This version of this YANG module is part of RFC XXXX (<https://www.rfc-editor.org/info/rfcXXXX>); see the RFC itself for full legal notices.

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.

This module defines the structure of the .sid files.

Each .sid file contains the mapping between the different string identifiers defined by a YANG module and a corresponding numeric value called SID.";

```
revision 2020-02-05 {
  description
    "Initial revision.";
  reference
    "[I-D.ietf-core-sid] YANG Schema Item iDentifier (SID)";
}

typedef revision-identifier {
  type string {
    pattern '\d{4}-\d{2}-\d{2}';
  }
  description
    "Represents a date in YYYY-MM-DD format.";
}

typedef sid-file-version-identifier {
  type uint64;
  description
    "Optional attribute that gives information about the .sid file
    version.";
}

typedef sid {
  type uint64;
  description
```



```
"YANG Schema Item iDentifier";
reference
  "[I-D.ietf-core-sid] YANG Schema Item iDentifier (SID)";
}

typedef schema-node-path {
  type string {
    pattern
      '/[a-zA-Z_][a-zA-Z0-9\-\_\.]*:[a-zA-Z_][a-zA-Z0-9\-\_\.]*' +
      '(/[a-zA-Z_][a-zA-Z0-9\-\_\.]*(:[a-zA-Z_][a-zA-Z0-9\-\_\.]*)?)?)*';
  }
  description
    "Identifies a schema-node path string for use in the
    SID registry. This string format follows the rules
    for an instance-identifier, as defined in RFC 7959,
    except that no predicates are allowed.

    This format is intended to support the YANG 1.1 ABNF
    for a schema node identifier, except module names
    are used instead of prefixes, as specified in RFC 7951.";
  reference
    "RFC 7950, The YANG 1.1 Data Modeling Language;
    Section 6.5: Schema Node Identifier;
    RFC 7951, JSON Encoding of YANG Data;
    Section 6.11: The instance-identifier type";
}

rc:yang-data sid-file {
  container content {
    description
      "A Wrapper container that together with the rc:yang-data extension
      marks the YANG data structures inside as not being intended to be
      implemented as part of a configuration datastore or as an operational
      state within the server.";
    leaf module-name {
      type yang:yang-identifier;
      description
        "Name of the YANG module associated with this .sid file.";
    }

    leaf module-revision {
      type revision-identifier;
      description
        "Revision of the YANG module associated with this .sid file.
        This leaf is not present if no revision statement is
        defined in the YANG module.";
    }
  }
}
```



```
leaf sid-file-version {
  type sid-file-version-identifier;
  description
    "The version number of the .sid file. .sid files and the version
    sequence are specific to a given YANG module revision.
    This number starts at zero when there is a YANG module update.
    This number can distinguish updates to the SID file which are the
result of
    new processing, or the result of reported errata.";
}

list dependency-revision {
  key "module-name";

  description
    "Information about the revision of each YANG module that the module
in
    'module-name' includes used during the .sid file generation.";

  leaf module-name {
    type yang:yang-identifier;
    mandatory true;
    description
      "Name of the YANG module, dependency of 'module-name', for which
      revision information is provided.";
  }
  leaf module-revision {
    type revision-identifier;
    mandatory true;
    description
      "Revision of the YANG module, dependency of 'module-name', for
which
      revision information is provided.";
  }
}

list assigment-ranges {
  key "entry-point";
  description
    "SID range(s) allocated to the YANG module identified by
    'module-name' and 'module-revision'.

    - The SID range first available value is entry-point and the the last
    available value in the range is (entry-point + size - 1).
    - The SID ranges specified by all assignment-rages MUST NOT
overlap.";

  leaf entry-point {
```

```
type sid;  
mandatory true;  
description  
    "Lowest SID available for assignment.";
```

```
    }

    leaf size {
        type uint64;
        mandatory true;
        description
            "Number of SIDs available for assignment.";
    }
}

list items {
    key "namespace identifier";
    description
        "Each entry within this list defined the mapping between
        a YANG item string identifier and a SID. This list MUST
        include a mapping entry for each YANG item defined by
        the YANG module identified by 'module-name' and
        'module-revision'.";

    leaf namespace {
        type enumeration {
            enum module {
                value 0;
                description
                    "All module and submodule names share the same
                    global module identifier namespace.";
            }
            enum identity {
                value 1;
                description
                    "All identity names defined in a module and its
                    submodules share the same identity identifier
                    namespace.";
            }
            enum feature {
                value 2;
                description
                    "All feature names defined in a module and its
                    submodules share the same feature identifier
                    namespace.";
            }
            enum data {
                value 3;
                description
                    "The namespace for all data nodes, as defined in YANG.";
            }
        }
    }
    description
```



```

    "Namespace of the YANG item for this mapping entry.";
}

leaf identifier {
    type union {
        type yang:yang-identifier;
        type schema-node-path;
    }
    description
        "String identifier of the YANG item for this mapping entry.

        If the corresponding 'namespace' field is 'module',
        'feature', or 'identity', then this field MUST
        contain a valid YANG identifier string.

        If the corresponding 'namespace' field is 'data',
        then this field MUST contain a valid schema node
        path.";
}

leaf sid {
    type sid;
    mandatory true;
    description
        "SID assigned to the YANG item for this mapping entry.";
}
}
}
}
<CODE ENDS>
```

This document defines a new type of identifier used to encode data models defined in YANG [RFC7950]. As such, this identifier does not contribute to any new security issues in addition of those identified for the specific protocols or contexts for which it is used.

This document registers one YANG module in the "YANG Module Names" registry [[RFC6020](#)]:

- ```
o name: ietf-sid-file
```



- o namespace: urn:ietf:params:xml:ns:yang:ietf-sid-file
- o prefix: sid
- o reference: [[THISRFC]]

## **6.2. Create new IANA Registry: "SID Mega-Range" registry**

The name of this registry is "SID Mega-Range". This registry is used to record the delegation of the management of a block of SIDs to third parties (such as SDOs or registrars).

### **6.2.1. Structure**

Each entry in this registry must include:

- o The entry point (first SID) of the registered SID block.
- o The size of the registered SID block. The size MUST be one million (1 000 000) SIDs.
- o The contact information of the requesting organization including:
  - \* The policy of SID range allocations: Public, Private or Both.
  - \* Organization name
  - \* URL

The information associated to the Organization name should not be publicly visible in the registry, but should be available. This information includes contact email and phone number and change controller email and phone number.

### **6.2.2. Allocation policy**

The IANA policy for future additions to this registry is "Expert Review" [[RFC8126](#)].

An organization requesting to manage a SID Range (and thus have an entry in the SID Mega-Range Registry), must ensure the following capacities:

- o The capacity to manage and operate a SID Range Registry. A SID Range Registry MUST provide the following information for all SID Ranges allocated by the Registry:
  - \* Entry Point of allocated SID Range



- \* Size of allocated SID Range
- \* Type: Public or Private
  - + Public Ranges MUST include at least a reference to the YANG module and ".sid" files for that SID Range.
  - + Private Ranges MUST be marked as "Private"
- o A Policy of allocation, which clearly identifies if the SID Range allocations would be Private, Public or Both.
- o Technical capacity to ensure the sustained operation of the registry for a period of at least 5 years. If Private Registrations are allowed, the period must be of at least 10 years.

#### **6.2.2.1. First allocation**

For a first allocation to be provided, the requesting organization must demonstrate a functional registry infrastructure.

#### **6.2.2.2. Consecutive allocations**

On subsequent allocation request(s), the organization must demonstrate the exhaustion of the prior range. These conditions need to be asserted by the assigned expert(s).

If that extra-allocation is done within 3 years from the last allocation, the experts need to discuss this request on the CORE working group mailing list and consensus needs to be obtained before allocating a new Mega-Range.

#### **6.2.3. Initial contents of the Registry**

The initial entry in this registry is allocated to IANA:

| Entry Point | Size    | Allocation | Organization name | URL      |
|-------------|---------|------------|-------------------|----------|
| 0           | 1000000 | Public     | IANA              | iana.org |



### **6.3. Create a new IANA Registry: IETF SID Range Registry (managed by IANA)**

#### **6.3.1. Structure**

Each entry in this registry must include:

- o The SID range entry point.
- o The SID range size.
- o The YANG module name.
- o Document reference.

#### **6.3.2. Allocation policy**

The first million SIDs assigned to IANA is sub-divided as follows:

- o The range of 0 to 999 (size 1000) is "Reserved" as defined in [[RFC8126](#)].
- o The range of 1000 to 59,999 (size 59,000) is reserved for YANG modules defined in RFCs. The IANA policy for additions to this registry is "Expert Review" [[RFC8126](#)].
  - \* The Expert MUST verify that the YANG module for which this allocation is made has an RFC (existing RFC) OR is on track to become RFC (early allocation with a request from the WG chairs as defined by [[RFC7120](#)]).
- o The SID range allocated for a YANG module can follow in one of the four categories:
  - \* SMALL (50 SIDs)
  - \* MEDIUM (100 SIDs)
  - \* LARGE (250 SIDs)
  - \* CUSTOM (requested by the YANG module author, with a maximum of 1000 SIDs). In all cases, the size of a SID range assigned to a YANG module should be at least 33% above the current number of YANG items. This headroom allows assignment within the same range of new YANG items introduced by subsequent revisions. A larger SID range size may be requested by the authors if this recommendation is considered insufficient. It is important to



note that an additional SID range can be allocated to an existing YANG module if the initial range is exhausted.

- o The range of 60,000 to 99,999 (size 40,000) is reserved for experimental YANG modules. This range MUST NOT be used in operational deployments since these SIDs are not globally unique which limit their interoperability. The IANA policy for this range is "Experimental use" [[RFC8126](#)].
- o The range of 100,000 to 999,999 (size 900,000) is "Reserved" as defined in [[RFC8126](#)].

| Entry Point | Size    | IANA policy      |
|-------------|---------|------------------|
| 0           | 1,000   | Reserved         |
| 1,000       | 59,000  | Expert Review    |
| 60,000      | 40,000  | Experimental use |
| 100,000     | 900,000 | Reserved         |

#### [6.3.3](#). Initial contents of the registry

Initial entries in this registry are as follows:



| Ent<br>ry<br>Poi<br>nt | Siz<br>e | Module name                          | Document reference                       |
|------------------------|----------|--------------------------------------|------------------------------------------|
| 100<br>0               | 100      | ietf-comi                            | [ <a href="#">I-D.ietf-core-comi</a> ]   |
| 110<br>0               | 50       | ietf-yang-types                      | [ <a href="#">RFC6991</a> ]              |
| 115<br>0               | 50       | ietf-inet-types                      | [ <a href="#">RFC6991</a> ]              |
| 120<br>0               | 50       | iana-crypt-hash                      | [ <a href="#">RFC7317</a> ]              |
| 125<br>0               | 50       | ietf-netconf-acm                     | [ <a href="#">RFC8341</a> ]              |
| 130<br>0               | 50       | ietf-sid-file                        | RFCXXXX                                  |
| 150<br>0               | 100      | ietf-interfaces                      | [ <a href="#">RFC8343</a> ]              |
| 160<br>0               | 100      | ietf-ip                              | [ <a href="#">RFC8344</a> ]              |
| 170<br>0               | 100      | ietf-system                          | [ <a href="#">RFC7317</a> ]              |
| 180<br>0               | 400      | iana-if-type                         | [ <a href="#">RFC7224</a> ]              |
| 240<br>0               | 50       | ietf-voucher                         | [ <a href="#">RFC8366</a> ]              |
| 245<br>0               | 50       | ietf-constrained-voucher             | [I-D.ietf-anima-constraine<br>d-voucher] |
| 250<br>0               | 50       | ietf-constrained-<br>voucher-request | [I-D.ietf-anima-constraine<br>d-voucher] |

// RFC Ed.: replace XXXX with RFC number assigned to this draft.

For allocation, RFC publication of the YANG module is required as per [[RFC8126](#)]. The YANG module must be registered in the "YANG module Name" registry according to the rules specified in [section 14 of \[RFC6020\]](#).

#### 6.4. Create new IANA Registry: "IETF SID Registry"

The name of this registry is "IETF SID Registry". This registry is used to record the allocation of SIDs for individual YANG module items.



#### **6.4.1. Structure**

Each entry in this registry must include:

- o The YANG module name. This module name must be present in the "Name" column of the "YANG Module Names" registry.
- o A link to the associated ".yang" file. This file link must be present in the "File" column of the "YANG Module Names" registry.
- o The link to the ".sid" file which defines the allocation. The ".sid" file is stored by IANA.
- o The number of actually allocated SIDs in the ".sid" file.

#### **6.4.2. Allocation policy**

The allocation policy is Expert review. The Expert MUST ensure that the following conditions are met:

- o The ".sid" file has a valid structure:
  - \* The ".sid" file MUST be a valid JSON file following the structure of the module defined in RFCXXXX (RFC Ed: replace XXX with RFC number assigned to this draft).
- o The ".sid" file allocates individual SIDs ONLY in the SID Ranges for this YANG module (as allocated in the IETF SID Range Registry):
  - \* All SIDs in this ".sid" file MUST be within the ranges allocated to this YANG module in the "IETF SID Range Registry".
- o If another ".sid" file has already allocated SIDs for this YANG module (e.g. for older or newer versions of the YANG module), the YANG items are assigned the same SIDs as in the other ".sid" file.
- o If there is an older version of the ".sid" file, all allocated SIDs from that version are still present in the current version of the ".sid" file.

#### **6.4.3. Recursive Allocation of SID Range at Document Adoption**

Due to the difficulty in changing SID values during IETF document processing, it is expected that most documents will ask for SID allocations using Early Allocations [[RFC7120](#)]. The details of the Early Allocation should be included in any Working Group Adoption call. Prior to Working Group Adoption, an internet draft authors can



use the experimental SID range (as per [Section 6.3.2](#)) for their SIDs allocations or other values that do not create ambiguity with other SID uses (for example they can use a range that comes from a non-IANA managed "SID Mega-Range" registry).

After Working Group Adoption, any modification of a ".sid" file is expected to be discussed on the mailing list of the appropriate Working Groups. Specific attention should be paid to implementers' opinion after Working Group Last Call if a SID value is to change its meaning. In all cases, a ".sid" file and the SIDs associated with it are subject to change before the publication of an internet draft as an RFC.

During the early use of SIDs, many existing, previously published YANG modules will not have SID allocations. For an allocation to be useful the included YANG modules may also need to have SID allocations made.

The Expert Reviewer who performs the (Early) Allocation analysis will need to go through the list of included YANG modules and perform SID allocations for those modules as well.

- o If the document is a published RFC, then the allocation of SIDs for its referenced YANG modules is permanent. The Expert Reviewer provides the generated SID file to IANA for registration. This process may be time consuming during a bootstrap period (there are over 100 YANG modules to date, none of which have SID allocations), but should quiet down once needed entries are allocated.
- o If the document is an unprocessed Internet-Draft adopted in a WG, then an Early Allocation is performed for this document as well. Early Allocations require approval by an IESG Area Director. An early allocation which requires additional allocations will list the other allocations in it's description, and will be cross-posted to the any other working group mailing lists.
- o A YANG module which references a module in a document which has not yet been adopted by any working group will be unable to perform an Early Allocation for that other document until it is adopted by a working group. As described in [[RFC7120](#)], an AD Sponsored document acts as if it had a working group. The approving AD may also exempt a document from this policy by agreeing to AD Sponsor the document.

At the end of the IETF process all the dependencies of a given module for which SIDs are assigned, should also have SIDs assigned. Those dependencies' assignments should be permanent (not Early Allocation).



A previously SID-allocated YANG module which changes its references to include a YANG module for which there is no SID allocation needs to repeat the Early Allocation process.

Early Allocations are made with a one-year period, after which they are expired. [RFC7120] indicates that at most one renewal may be made. For the SID allocation a far more lenient stance is desired.

1. An extension of a referencing documents Early Allocation should update any referenced Early Allocations to expire no sooner than the referencing document.
2. The [RFC7120] mechanism allows the IESG to provide a second renewal, and such an event may prompt some thought about how the collection of documents are being processed.

This is driven by the very generous size of the SID space and the often complex and deep dependencies of YANG modules. Often a core module with many dependencies will undergo extensive review, delaying the publication of other documents.

[RFC7120] also says

Note that if a document is submitted for review to the IESG and at the time of submission some early allocations are valid (not expired), these allocations should not be expired while the document is under IESG consideration or waiting in the RFC Editor's queue after approval by the IESG.

#### **6.4.4. Initial contents of the registry**

None.

## **7. Acknowledgments**

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## [Appendix A](#). ".sid" file example

The following ".sid" file (ietf-system@2014-08-06.sid) have been generated using the following yang modules:

- o ietf-system@2014-08-06.yang
- o ietf-yang-types@2013-07-15.yang
- o ietf-inet-types@2013-07-15.yang
- o ietf-netconf-acm@2012-02-22.yang



o iana-crypt-hash@2014-04-04.yang

```
{
 "assignment-ranges": [
 {
 "entry-point": 1700,
 "size": 100
 }
],
 "module-name": "ietf-system",
 "module-revision": "2014-08-06",
 "items": [
 {
 "namespace": "module",
 "identifier": "ietf-system",
 "sid": 1700
 },
 {
 "namespace": "identity",
 "identifier": "authentication-method",
 "sid": 1701
 },
 {
 "namespace": "identity",
 "identifier": "local-users",
 "sid": 1702
 },
 {
 "namespace": "identity",
 "identifier": "radius",
 "sid": 1703
 },
 {
 "namespace": "identity",
 "identifier": "radius-authentication-type",
 "sid": 1704
 },
 {
 "namespace": "identity",
 "identifier": "radius-chap",
 "sid": 1705
 },
 {
 "namespace": "identity",
 "identifier": "radius-pap",
 "sid": 1706
 },
 {

```



```
 "namespace": "feature",
 "identifier": "authentication",
 "sid": 1707
 },
 {
 "namespace": "feature",
 "identifier": "dns-udp-tcp-port",
 "sid": 1708
 },
 {
 "namespace": "feature",
 "identifier": "local-users",
 "sid": 1709
 },
 {
 "namespace": "feature",
 "identifier": "ntp",
 "sid": 1710
 },
 {
 "namespace": "feature",
 "identifier": "ntp-udp-port",
 "sid": 1711
 },
 {
 "namespace": "feature",
 "identifier": "radius",
 "sid": 1712
 },
 {
 "namespace": "feature",
 "identifier": "radius-authentication",
 "sid": 1713
 },
 {
 "namespace": "feature",
 "identifier": "timezone-name",
 "sid": 1714
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:set-current-datetime",
 "sid": 1715
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:set-current-datetime/
 current-datetime",
```



```
 "sid": 1716
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system",
 "sid": 1717
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system-restart",
 "sid": 1718
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system-shutdown",
 "sid": 1719
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system-state",
 "sid": 1720
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system-state/clock",
 "sid": 1721
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system-state/clock/boot-datetime",
 "sid": 1722
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system-state/clock/
 current-datetime",
 "sid": 1723
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system-state/platform",
 "sid": 1724
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system-state/platform/machine",
 "sid": 1725
 },
}
```



```
{
 "namespace": "data",
 "identifier": "/ietf-system:system-state/platform/os-name",
 "sid": 1726
},
{
 "namespace": "data",
 "identifier": "/ietf-system:system-state/platform/os-release",
 "sid": 1727
},
{
 "namespace": "data",
 "identifier": "/ietf-system:system-state/platform/os-version",
 "sid": 1728
},
{
 "namespace": "data",
 "identifier": "/ietf-system:system/authentication",
 "sid": 1729
},
{
 "namespace": "data",
 "identifier": "/ietf-system:system/authentication/user",
 "sid": 1730
},
{
 "namespace": "data",
 "identifier": "/ietf-system:system/authentication/
 user-authentication-order",
 "sid": 1731
},
{
 "namespace": "data",
 "identifier": "/ietf-system:system/authentication/user/
 authorized-key",
 "sid": 1732
},
{
 "namespace": "data",
 "identifier": "/ietf-system:system/authentication/user/
 authorized-key/algorithm",
 "sid": 1733
},
{
 "namespace": "data",
 "identifier": "/ietf-system:system/authentication/user/
 authorized-key/key-data",
 "sid": 1734
}
```



```
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/authentication/user/
 authorized-key/name",
 "sid": 1735
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/authentication/user/
 name",
 "sid": 1736
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/authentication/user/
 password",
 "sid": 1737
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/clock",
 "sid": 1738
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/clock/timezone-name",
 "sid": 1739
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/clock/timezone-utc-offset",
 "sid": 1740
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/contact",
 "sid": 1741
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/dns-resolver",
 "sid": 1742
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/dns-resolver/options",
 "sid": 1743
 }
]
}
```



```
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/dns-resolver/options/
 attempts",
 "sid": 1744
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/dns-resolver/options/
 timeout",
 "sid": 1745
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/dns-resolver/search",
 "sid": 1746
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/dns-resolver/server",
 "sid": 1747
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/dns-resolver/server/name",
 "sid": 1748
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/dns-resolver/server/
 udp-and-tcp",
 "sid": 1749
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/dns-resolver/server/
 udp-and-tcp/address",
 "sid": 1750
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/dns-resolver/server/
 udp-and-tcp/port",
 "sid": 1751
 },
 {
 "namespace": "data",
```



```
 "identifier": "/ietf-system:system/hostname",
 "sid": 1752
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/location",
 "sid": 1753
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/ntp",
 "sid": 1754
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/ntp/enabled",
 "sid": 1755
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/ntp/server",
 "sid": 1756
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/ntp/server/
 association-type",
 "sid": 1757
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/ntp/server/iburst",
 "sid": 1758
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/ntp/server/name",
 "sid": 1759
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/ntp/server/prefer",
 "sid": 1760
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/ntp/server/udp",
 "sid": 1761
 }
```



```
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/ntp/server/udp/address",
 "sid": 1762
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/ntp/server/udp/port",
 "sid": 1763
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/radius",
 "sid": 1764
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/radius/options",
 "sid": 1765
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/radius/options/attempts",
 "sid": 1766
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/radius/options/timeout",
 "sid": 1767
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/radius/server",
 "sid": 1768
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/radius/server/
 authentication-type",
 "sid": 1769
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/radius/server/name",
 "sid": 1770
 },
 {

```



```
 "namespace": "data",
 "identifier": "/ietf-system:system/radius/server/udp",
 "sid": 1771
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/radius/server/udp/
 address",
 "sid": 1772
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/radius/server/udp/
 authentication-port",
 "sid": 1773
 },
 {
 "namespace": "data",
 "identifier": "/ietf-system:system/radius/server/udp/
 shared-secret",
 "sid": 1774
 }
]
```

## [Appendix B](#). SID auto generation

Assignment of SIDs to YANG items can be automated, the recommended process to assign SIDs is as follows:

1. A tool extracts the different items defined for a specific YANG module.
2. The list of items is sorted in alphabetical order, 'namespace' in descending order, 'identifier' in ascending order. The 'namespace' and 'identifier' formats are described in the YANG module 'ietf-sid-file' defined in [Section 4](#).
3. SIDs are assigned sequentially from the entry point up to the size of the registered SID range. This approach is recommended to minimize the serialization overhead, especially when delta between a reference SID and the current SID is used by protocols aiming to reduce message size.
4. If the number of items exceeds the SID range(s) allocated to a YANG module, an extra range is added for subsequent assignments.



5. The "dependency-revision" should reflect the revision numbers of each YANG module that the YANG module imports at the moment of the generation.

In case of an update to an existing ".sid" file, an additional step is needed that increments the ".sid" file version number. If there was no version number in the previous version of the ".sid" file, 0 is assumed as the version number of the old version of the ".sid" file and the version number is 1 for the new ".sid" file. Apart from that, changes of SID files can also be automated using the same method described above, only unassigned YANG items are processed at step #3. Already existing items in the SID file should not be given new SIDs.

Note that ".sid" file versions are specific to a YANG module revision. For each new YANG module or each new revision of an existing YANG module, the version number of the initial ".sid" file should either be 0 or should not be present.

Note also that RPC or action "input" and "output" data nodes MUST always be assigned SID even if they don't contain data nodes. The reason for this requirement is that other modules can augment the given module and those SIDs might be necessary.

## **Appendix C. ".sid" file lifecycle**

Before assigning SIDs to their YANG modules, YANG module authors must acquire a SID range from a "SID Range Registry". If the YANG module is part of an IETF draft or RFC, the SID range need to be acquired from the "IETF SID Range Registry" as defined in [Section 6.3](#). For the other YANG modules, the authors can acquire a SID range from any "SID Range Registry" of their choice.

Once the SID range is acquired, the owner can use it to generate ".sid" file/s for his YANG module/s. It is recommended to leave some unallocated SIDs following the allocated range in each ".sid" file in order to allow better evolution of the YANG module in the future. Generation of ".sid" files should be performed using an automated tool. Note that ".sid" files can only be generated for YANG modules and not for submodules.

### **C.1. SID File Creation**

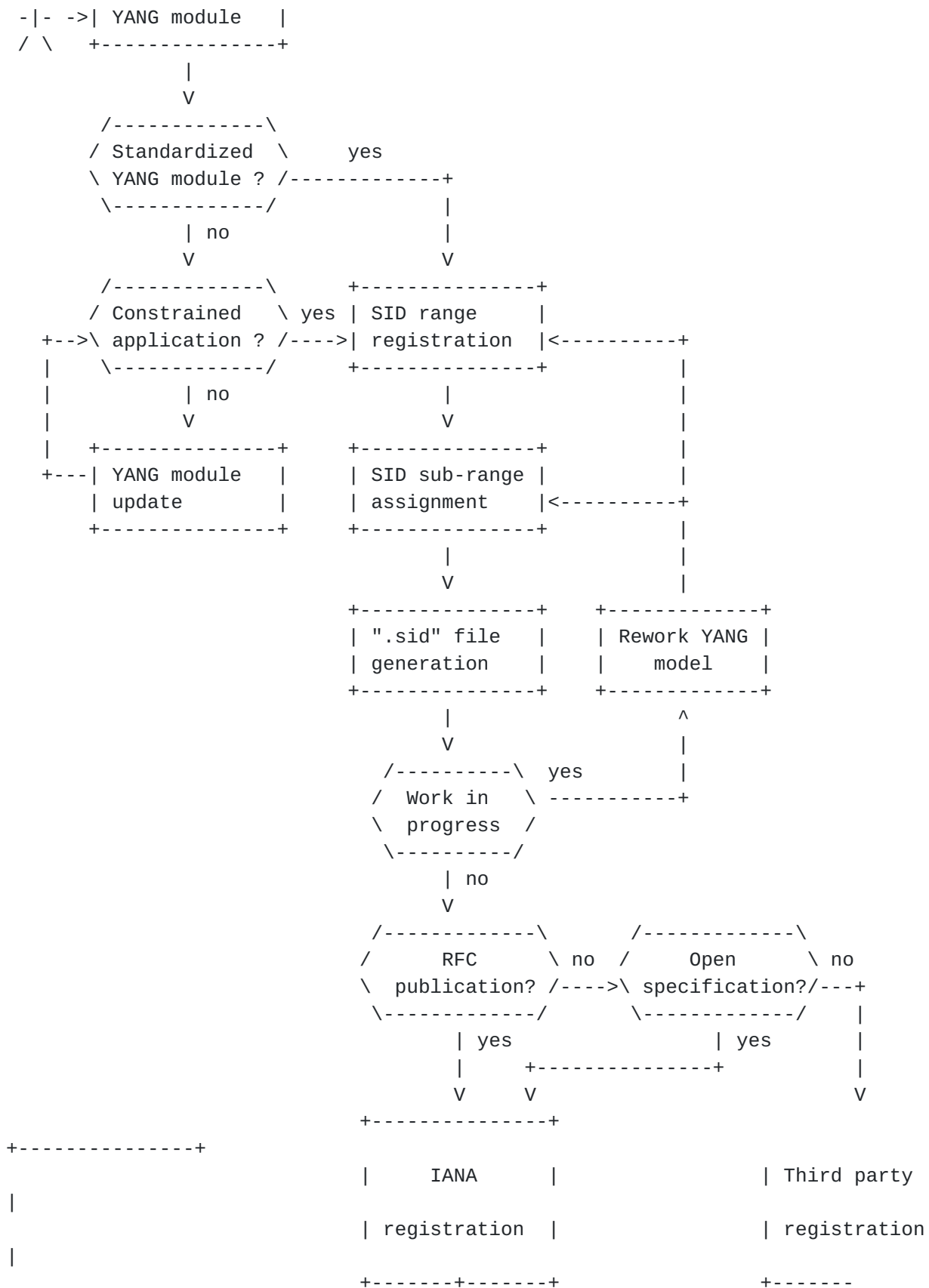
The following activity diagram summarizes the creation of a YANG module and its associated ".sid" file.

```

+-----+
0 | Creation of a |

```





+-----+

|  
+-----+  
V

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[DONE]

Figure 1: SID Lifecycle

### **C.2. SID File Update**

The following Activity diagram summarizes the update of a YANG module and its associated ".sid" file.

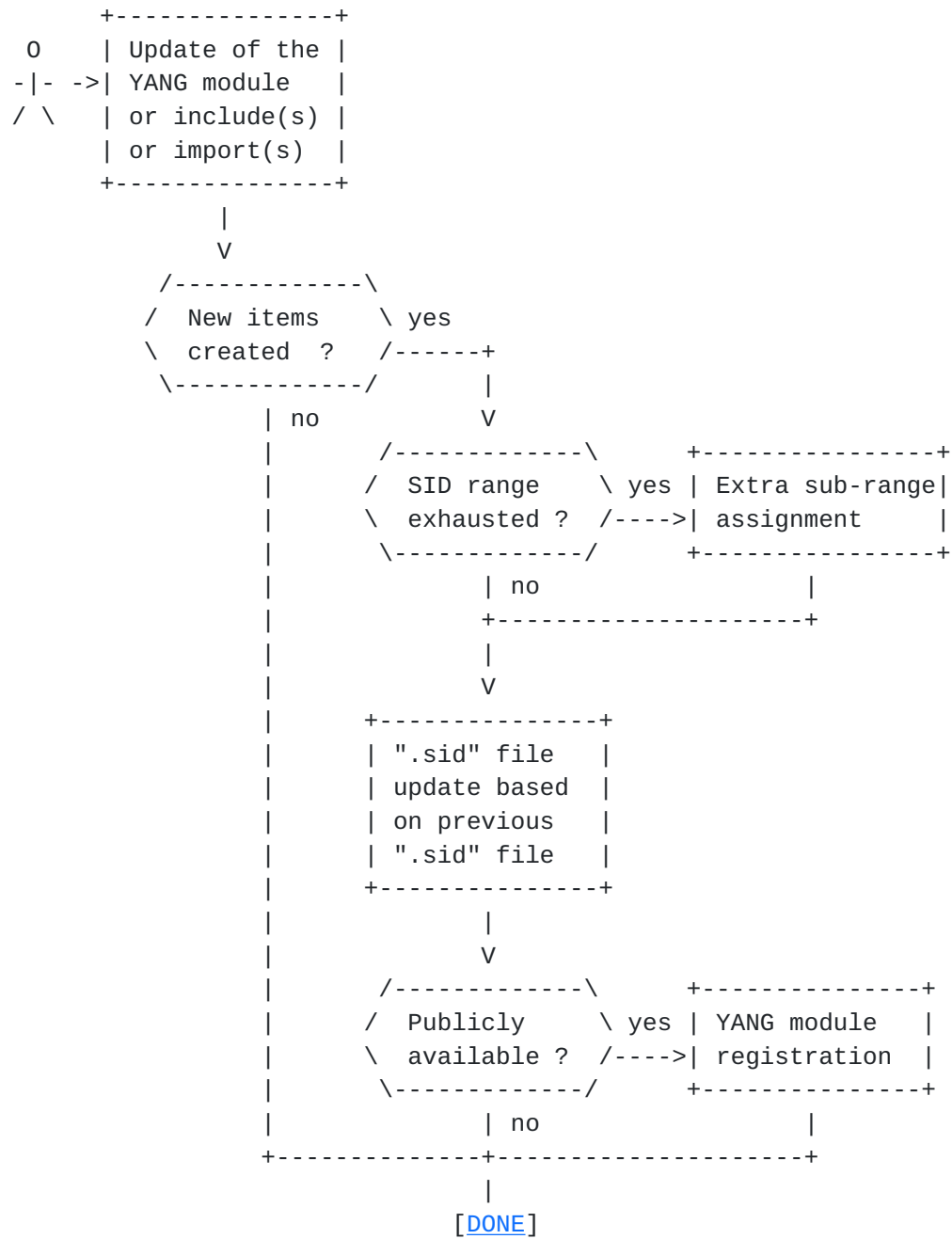


Figure 2: YANG and SID file update

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