CoRE Working Group
Internet-Draft
Intended status: Standards Track
Expires: 3 July 2026

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30 December 2025

YANG-CBOR: Allocating SID ranges for PEN holders
draft-ietf-core-yang-sid-pen-06

Abstract

YANG-CBOR (RFC 9254, "Encoding of Data Modeled with YANG in the Concise Binary Object Representation (CBOR)") defines YANG Schema Item iDentifiers (YANG SID), globally unique 63-bit unsigned integers used to identify YANG items. RFC 9595 ("YANG Schema Item iDentifier (YANG SID)") defines ways to allocate these SIDs on the basis of IANA registries.

The present specification employs these SID allocation mechanisms to allocate ranges with 100000 SIDs (representation size 64 bits) each for each of the holders of IANA-registered Private Enterprise Numbers (PENs) < 1000000, as well as ranges with 10000 SIDs (representation size 32 bits) each for each of the holders of PENs < 100000.

// The present revision 06 is a resubmission of -05 with "Intended
// Status: Standards Track", after IESG discussion pointed into this
// direction.

About This Document

This note is to be removed before publishing as an RFC.

Status information for this document may be found at https://datatracker.ietf.org/doc/draft-ietf-core-yang-sid-pen/.

Discussion of this document takes place on the CoRE Working Group mailing list (mailto:core@ietf.org), which is archived at https://mailarchive.ietf.org/arch/browse/core/. Subscribe at https://www.ietf.org/mailman/listinfo/core/.

Source for this draft and an issue tracker can be found at https://github.com/core-wg/sid-pen.

Status of This Memo

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1. Introduction

YANG-CBOR [RFC9254] defines YANG Schema Item iDentifiers (YANG SID), globally unique 63-bit unsigned integers used to identify YANG items. [RFC9595] defines ways to allocate these SIDs on the basis of IANA registries.

The present specification employs these SID allocation mechanisms to allocate ranges with 100000 SIDs (representation size 64 bits) each for each of the holders of IANA-registered Private Enterprise Numbers (PENs) < 1000000, as well as ranges with 10000 SIDs (representation size 32 bits) each for each of the holders of PENs < 100000.

IANA [is requested to allocate/has allocated] a mega-range with 100 billion SIDs (representation size 64 bits), for the SID numbers 300000000000 to 399999999999.

IANA also [is requested to allocate/has allocated] a mega-range with 1 billion SIDs (representation size 32 bits), for the SID numbers 3000000000 to 3999999999.

Private Enterprise Numbers (PENs) are registered in [IANA.enterprise-numbers] in a low-threshold, low-overhead registration process. At the time of writing (~ 37 years after creating this registry), around 65000 PENs are registered. In this document, the registrant for a PEN is referred to as the "PEN holder".

The present specification makes the following SID ranges available to certain (current or future) PEN holders for allocation in a scheme defined by the holder:

* The holder of a PEN pppppp (< 1000000) can use the SID numbers 3pppppp00000 to 3pppppp99999.

* The holder of a PEN ppppp (< 100000) can also use the smaller SID numbers 3ppppp0000 to 3ppppp9999.

2. Example

[RFC5612] has allocated Enterprise Number 32473 "for use in examples in RFCs, books, documentation, and the like".

If this Enterprise Number had an actual PEN holder, the present specification would confer control to it over the SID ranges:

* 3*032473*00000 up to 3*032473*99999, and

* 3*32473*0000 up to 3*32473*9999.

(The plaintext form of this document shows "*" characters around the digits conveying the PEN, which are shown in *boldface* in the typographic forms.)

As Enterprise Number 32473 is intended to be used in documentation, the SIDs in the two SID ranges listed here for the documentation PEN are consequently also available for use in documentation.

3. Discussion

This allocation provides an extremely-low-threshold (zero-interaction) way for PEN holders to get number space for the YANG SIDs used in their YANG modules. If a PEN is not already available to the entity needing such number space, it can be obtained in a very low-threshold process. Employing this number space is, however, not always the approach to recommend to a module author:

* In the larger of the two spaces, each SID number needs a representation size of 64 bits ("64-bit SIDs"). (This larger representation size of the absolute value of the SID is of comparatively little consequence due to the delta-encoding used for SIDs in YANG-CBOR.)

* For the holders of PENs < 100000, there additionally is a smaller space where each SID number needs a representation size of 32 bits ("32-bit SIDs"). PEN numbers that have access to this space (PEN < 100000) are likely to run out before or around 2040; the expectation is that by that time there will be enough opportunities to request SID ranges within mega-ranges allocated by other registrants that this mechanism is less needed.

* This space has no infrastructure to discover the YANG module behind a SID. Of course, each PEN holder can provide such infrastructure, but even then the problem remains of how to find that infrastructure for a SID. (Search engines may mitigate this somewhat.) On the other hand, in some cases this relative obscurity may be exactly what a PEN holder wants to achieve by using this mechanism.

  If obscurity is not the intention, one or both of the following approaches are encouraged:

  - The PEN holder can provide a public repository where their YANG models can be found alongside the applicable SID files. Such a repository may be easy to set up using a popular git forge such as, at the time of writing, GitHub.

- Implementations that employ PEN-based SIDs can facilitate information discovery by providing [I-D.ietf-core-yang-library] or another form of YANG library [RFC8525].

Relying on the PEN registry might theoretically trigger a land-grab by prospective writers of YANG modules. However, PENs have been around for decades (see Section 3.1.4 of [RFC1065], which continues to be in force with no technical changes as Section 3.1.4 of RFC 1155 [STD16]), and such a land-grab has not occurred for the other allocations implicitly provided by obtaining a PEN.

4. IANA Considerations

// RFC Ed.: throughout this section, please replace RFC-XXXX with the
// RFC number of this specification and remove this note.

As per Section 6.3 of [RFC9595], in the "YANG-SID Mega-Ranges" registry within the "YANG SIDs" registry group [IANA.yang-sid], this document allocates two mega-ranges, one with 1billion SIDs ranging from 3000000000 up to 3999999999 (32-bit representation size), and one with 100billion SIDs ranging from 300000000000 up to 399999999999 (64-bit representation size), as summarized in Table 1.

Entry Point	Size	Allocation	Org Name	URL
3000000000	1000000000	Private	IANA	https://rfc-editor.org/info/rfcxxxx
300000000000	100000000000	Private	IANA	https://rfc-editor.org/info/rfcxxxx

Table 1: YANG-SID Mega-Range Allocations for use by PEN holders

IANA is requested to mark the following ranges as reserved for documentation:

* 303247300000 up to 303247399999

* 3 324730000 up to 3324739999

An additional contact for the allocation is: IETF CORE Working Group (core@ietf.org) or IETF Applications and Real-Time Area (art@ietf.org).

The allocation policy inside the mega-range is "private" (see Section 6.3.2 of [RFC9595]). The URL is that of the present specification.

The management of the SID block of 100000 SIDs each, ranging from 3pppppp00000 to 3pppppp99999, is delegated to the PEN holder for PEN pppppp (i.e., the PEN holder for pppppp controls SID 3pppppp00000 to 3pppppp99999).

Similarly, the management of the SID block of 10000 SIDs each, ranging from 3ppppp0000 to 3ppppp9999, is delegated to the PEN holder for PEN ppppp (i.e., the PEN holder for ppppp controls SID 3ppppp0000 to 3ppppp9999).

Section 6.3.2 of [RFC9595] requires an organization that requests an entry in the "YANG-SID Mega-Ranges" registry to ensure the technical capacity to manage the SID ranges within those mega-ranges for a period of at least 10 years (Private ranges). The individual SID ranges within the mega-ranges allocated in this document are assigned through the registration of PEN numbers. The technical capacity to ensure the sustained operation of the PEN number registry is derived from the demonstrated capacity of IANA to maintain this registry as well as the importance of a functioning PEN number registry in other contexts.

5. Security Considerations

Section 5 (Security Considerations) of [RFC9595] applies, as well as Section 8 (Security Considerations) of [RFC9254]. In particular, the fact that a certain Private Enterprise Number appears in a SID is not an indicator of provenance, i.e., it does not guarantee that the SID or underlying YANG model actually does originate from the holder of that PEN. The requirement to ascertain the authoritative source of this information, as discussed in the above security considerations, remains.

6. References

6.1. Normative References

[IANA.enterprise-numbers]
IANA, "Enterprise Numbers",
<http://www.iana.org/assignments/enterprise-numbers>.

[IANA.yang-sid]
IANA, "YANG SIDs",
<https://www.iana.org/assignments/yang-sid>.

[RFC9254] Veillette, M., Ed., Petrov, I., Ed., Pelov, A., Bormann, C., and M. Richardson, "Encoding of Data Modeled with YANG in the Concise Binary Object Representation (CBOR)", RFC 9254, DOI 10.17487/RFC9254, July 2022, <https://www.rfc-editor.org/rfc/rfc9254>.

[RFC9595] Veillette, M., Ed., Pelov, A., Ed., Petrov, I., Ed., Bormann, C., and M. Richardson, "YANG Schema Item iDentifier (YANG SID)", RFC 9595, DOI 10.17487/RFC9595, July 2024, <https://www.rfc-editor.org/rfc/rfc9595>.

6.2. Informative References

[I-D.ietf-core-yang-library]
Veillette, M. and I. Petrov, "Constrained YANG Module Library", Work in Progress, Internet-Draft, draft-ietf-core-yang-library-03, 11 January 2021, <https://datatracker.ietf.org/doc/html/draft-ietf-core-yang-library-03>.

[RFC1065] McCloghrie, K. and M. Rose, "Structure and identification of management information for TCP/IP-based internets", RFC 1065, DOI 10.17487/RFC1065, August 1988, <https://www.rfc-editor.org/rfc/rfc1065>.

[RFC5612] Eronen, P. and D. Harrington, "Enterprise Number for Documentation Use", RFC 5612, DOI 10.17487/RFC5612, August 2009, <https://www.rfc-editor.org/rfc/rfc5612>.

[RFC8525] Bierman, A., Bjorklund, M., Schoenwaelder, J., Watsen, K., and R. Wilton, "YANG Library", RFC 8525, DOI 10.17487/RFC8525, March 2019, <https://www.rfc-editor.org/rfc/rfc8525>.

[STD16] Internet Standard 16,
<https://www.rfc-editor.org/info/std16>.
At the time of writing, this STD comprises the following:

Rose, M. and K. McCloghrie, "Structure and identification of management information for TCP/IP-based internets", STD 16, RFC 1155, DOI 10.17487/RFC1155, May 1990, <https://www.rfc-editor.org/info/rfc1155>.

Rose, M. and K. McCloghrie, "Concise MIB definitions", STD 16, RFC 1212, DOI 10.17487/RFC1212, March 1991, <https://www.rfc-editor.org/info/rfc1212>.

Acknowledgments

This document was inspired by the discussion of the authors of [RFC9254] and [RFC9595] on how to handle Rob Wilton’s feedback.

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