## Updating the NTP Registries

## Abstract

   The Network Time Protocol (NTP) and Network Time Security (NTS)
   documents define a number of assigned number registries,
   collectively called the NTP registries. Some registries have wrong
   values, some registries do not follow current common practice, and
   some are just right. For the sake of completeness, this document
   reviews all NTP and NTS registries.

## Notes

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

   This document is a product of the NTP Working Group. Source for this
   draft and an issue tracker can be found at https://github.com/
   richsalz/draft-rsalz-update-registries.

   RFC Editor: Please update 'this RFC' to refer to this document, once
   its RFC number is known, through the document.

## Status of This Memo

   This Internet-Draft is submitted in full conformance with the
   provisions of BCP 78 and BCP 79.

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   Task Force (IETF). Note that other groups may also distribute
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   Drafts is at https://datatracker.ietf.org/drafts/current/.

   Internet-Drafts are draft documents valid for a maximum of six
   months and may be updated, replaced, or obsoleted by other documents
   at any time. It is inappropriate to use Internet-Drafts as reference
   material or to cite them other than as "work in progress."

   This Internet-Draft will expire on 28 March 2022.

**Table of Contents**

## 1.  Introduction

   The Network Time Protocol (NTP) and Network Time Security (NTS)
   documents define a number of assigned number registries,
   collectively called the NTP registries. Some registries have wrong
   values, some registries do not follow current common practice, and
   some are just right. For the sake of completeness, this document
   reviews all NTP and NTS registries.

   The bulk of this document can be divided into two parts:

     *First, each registry, its defining document, and a summary of its
      syntax is defined.

     *Second, the revised format and entries for each registry that is
      being modified is specified.

## 2. Existing Registries

This section describes the registries and the rules for them. It is intended to be a short summary of the syntax and registration requirements for each registry. The semantics and protocol processing rules for each registry -- that is, how an implementation acts when sending or receiving any of the fields -- is not described here.

### 2.1. Reference ID, Kiss-o'-Death

[RFC5905] defined two registries; the Reference ID in Section 7.3, and the Kiss-o'-Death in Section 7.4. Both of these are allowed to be four ASCII characters; padded on the right with all-bits-zero if necessary. Entries that start with 0x58, the ASCII letter uppercase X, are reserved for private experimentation and development. Both registries are first-come first-served. The formal request to define the registries is in Section 16.

[RFC5905], Section 7.5 defined the on-the-wire format of extension fields but did not create a registry for it.

### 2.2. Extension Field Types

[RFC5906] mentioned the Extension Field Types registry, and defined it indirectly by defining 30 extensions (15 each for request and response) in Section 13. It did not provide a formal definition of the columns in the registry. [RFC5906], Section 10 splits the Field Type into four subfields, only for use within the Autokey extensions.

[RFC7821] added a new entry, Checksum Complement, to the Extension Field Types registry.

[RFC7822] clarified the processing rules for Extension Field Types, particularly around the interaction with the Message Authentication Code (MAC) field.

[RFC8573] changed the cryptography used in the MAC field.

The following problems exists with the current registry:

  *Many of the entries in the Extension Field Types registry have swapped some of the nibbles; 0x1234 is listed as 0x1432 for example. This document marks the erroneous values as reserved.

  *Some values were mistakenly re-used.

## 2.3.  Network Time Security Registries

[RFC8915] defines the NTS protocol. Its registries are listed here
for completeness, but no changes to them are specified in this
document.

Sections 7.1 through 7.5 (inclusive) added entries to existing
registries.

Section 7.6 created a new registry, NTS Key Establishment Record
Types, that partitions the assigned numbers into three different
registration policies: IETF Review, Specification Required, and
Private or Experimental Use.

Section 7.7 created a new registry, NTS Next Protocols, that
similarly partitions the assigned numbers.

Section 7.8 created two new registries, NTS Error Codes and NTS
Warning Codes. Both registries are also partitioned the same way.

## 3.  Updated Registries

The following general guidelines apply to all registries updated
here:

  *Every entry reserves a partition for private use and
   experimentation.

  *Registries with ASCII fields are now limited to uppercase
   letters; fields starting with 0x2D, the ASCII minus sign, are
   reserved for private use and experimentation.

  *The policy for every registry is now Specification Required, as
   defined in [RFC8126], Section 4.6.

The IESG is requested to choose three designated experts, with two
being required to approve a registry change.

Each entry described in the below sub-sections is intended to
completely replace the existing entry with the same name.

## 4.  IANA Considerations

## 4.1.  NTP Reference Identifier Codes

The registration procedure is changed to Specification Required.

The Note is changed to read as follows:

  *Codes beginning with the character "-" are reserved for
   experimentation and development. IANA cannot assign them.

The columns are defined as follows:

  *ID (required): a four-byte value padded on the right with zero's.
   Each value must be an ASCII uppercase letter or minus sign

  *Clock source (required): A brief text description of the ID

  *Reference (required): the publication defining the ID.

The existing entries are left unchanged.

## 4.2.  NTP Kiss-o'-Death Codes

The registration procedure is changed to Specification Required.

The Note is changed to read as follows:

  *Codes beginning with the character "-" are reserved for
   experimentation and development. IANA cannot assign them.

The columns are defined as follows:

  *ID (required): a four-byte value padded on the right with zero's.
   Each value must be an ASCII uppercase letter or minus sign.

  *Meaning source (required): A brief text description of the ID.

  *Reference (required): the publication defining the ID.

The existing entries are left unchanged.

## 4.3.  NTP Extension Field Types

The registration procedure is changed to Specification Required.

The reference should be [RFC5906] added, if possible.

The following Note is added:

  *Field Types in the range 0xF000 through 0xFFFF, inclusive, are
   reserved for experimentation and development. IANA cannot assign
   them. Both NTS Cookie and Autokey Message Request have the same
   Field Type; in practice this is not a problem as the field
   semantics will be determined by other parts of the message.

The columns are defined as follows:

   *Field Type (required): A two-byte value in hexadecimal.

   *Meaning (required): A brief text description of the field type.

   *Reference (required): the publication defining the field type.

The table is replaced with the following entries.

| Field Type | Meaning | Reference |
|---|---|---|
| 0x0002 | Reserved for historic reasons | This RFC |
| 0x0102 | Reserved for historic reasons | This RFC |
| 0x0104 | Unique Identifier | RFC 8915, Section 5.3 |
| 0x0200 | No-Operation Request | RFC 5906 |
| 0x0201 | Association Message Request | RFC 5906 |
| 0x0202 | Certificate Message Request | RFC 5906 |
| 0x0203 | Cookie Message Request | RFC 5906 |
| 0x0204 | NTS Cookie | RFC 8915, Section 5.4 |
| 0x0204 | Autokey Message Request | RFC 5906 |
| 0x0205 | Leapseconds Message Request | RFC 5906 |
| 0x0206 | Sign Message Request | RFC 5906 |
| 0x0207 | IFF Identity Message Request | RFC 5906 |
| 0x0208 | GQ Identity Message Request | RFC 5906 |
| 0x0209 | MV Identity Message Request | RFC 5906 |
| 0x0302 | Reserved for historic reasons | This RFC |
| 0x0304 | NTS Cookie Placeholder | RFC 8915, Section 5.5 |
| 0x0402 | Reserved for historic reasons | This RFC |
| 0x0404 | NTS Authenticator and Encrypted Extension Fields | RFC 8915, Section 5.6 |
| 0x0502 | Reserved for historic reasons | This RFC |
| 0x0602 | Reserved for historic reasons | This RFC |
| 0x0702 | Reserved for historic reasons | This RFC |
| 0x2005 | Reserved for historic reasons | This RFC |
| 0x8002 | Reserved for historic reasons | This RFC |
| 0x8102 | Reserved for historic reasons | This RFC |
| 0x8200 | No-Operation Response | RFC 5906 |
| 0x8201 | Association Message Response | RFC 5906 |
| 0x8202 | Certificate Message Response | RFC 5906 |
| 0x8203 | Cookie Message Response | RFC 5906 |
| 0x8204 | Autokey Message Response | RFC 5906 |
| 0x8205 | Leapseconds Message Response | RFC 5906 |
| 0x8206 | Sign Message Response | RFC 5906 |

| Field Type | Meaning | Reference |
|---|---|---|
| 0x8207 | IFF Identity Message Response | RFC 5906 |
| 0x8208 | GQ Identity Message Response | RFC 5906 |
| 0x8209 | MV Identity Message Response | RFC 5906 |
| 0x8302 | Reserved for historic reasons | This RFC |
| 0x8402 | Reserved for historic reasons | This RFC |
| 0x8502 | Reserved for historic reasons | This RFC |
| 0x8602 | Reserved for historic reasons | This RFC |
| 0x8702 | Reserved for historic reasons | This RFC |
| 0x8802 | Reserved for historic reasons | This RFC |
| 0xC002 | Reserved for historic reasons | This RFC |
| 0xC102 | Reserved for historic reasons | This RFC |
| 0xC200 | No-Operation Error Response | RFC 5906 |
| 0xC201 | Association Message Error Response | RFC 5906 |
| 0xC202 | Certificate Message Error Response | RFC 5906 |
| 0xC203 | Cookie Message Error Response | RFC 5906 |
| 0xC204 | Autokey Message Error Response | RFC 5906 |
| 0xC205 | Leapseconds Message Error Response | RFC 5906 |
| 0xC206 | Sign Message Error Response | RFC 5906 |
| 0xC207 | IFF Identity Message Error Response | RFC 5906 |
| 0xC208 | GQ Identity Message Error Response | RFC 5906 |
| 0xC209 | MV Identity Message Error Response | RFC 5906 |
| 0xC302 | Reserved for historic reasons | This RFC |
| 0xC402 | Reserved for historic reasons | This RFC |
| 0xC502 | Reserved for historic reasons | This RFC |
| 0xC602 | Reserved for historic reasons | This RFC |
| 0xC702 | Reserved for historic reasons | This RFC |
| 0xC802 | Reserved for historic reasons | This RFC |
| 0x0902 | Reserved for historic reasons | This RFC |
| 0x8902 | Reserved for historic reasons | This RFC |
| 0xC902 | Reserved for historic reasons | This RFC |

Table 1

## 5.  Acknowledgements

The members of the NTP Working Group helped a great deal. Notable contributors include.

*Miroslav Lichvar, Red Hat

*Daniel Franke, Akamai Technologies

*Danny Mayer, Network Time Foundation

*Michelle Cotton, IANA

## 6.  Normative References

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