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Network Time Protocol I-Do Extension Field
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Abstract

The first implementation of NTPv4 was released in 2003. NTPv4 is defined by RFC 5905 [RFC5905]. It contains a public-key security protocol, Autokey, which is defined by RFC 5906 [RFC5906]. Until very recently, Autokey has been the only defined "user" of NTP packet Extension Fields. New proposals for extension fields are being written and there is currently no convenient way to learn if a remote instance of NTP supports any extension fields or not. This proposal contains a method to tell a remote instance of NTP what we (are willing to admit we) support, and ask what they (are willing to admit they) support.

Status of This Memo

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1. Introduction

The first implementation of NTPv4 was released in 2003. NTPv4 is defined by RFC 5905 [RFC5905]. It contains a public-key security protocol, Autokey, which is defined by RFC 5906 [RFC5906]. Until very recently, Autokey has been the only defined "user" of NTP packet Extension Fields. New proposals for extension fields are being written and there is currently no convenient way to learn if a remote instance of NTP supports any extension fields or not. This proposal contains a method to tell a remote instance of NTP what we (are willing to admit we) support, and ask what they (are willing to admit they) support.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

2. The I-Do Extension Field

The purpose of the I-DO EF is to provide information to the remote side about our capabilities.

If an incoming packet contains an unrecognized extension field, one of several things will happen. While that unrecognized extension field SHOULD be ignored, an implementation MAY choose to drop the

entire packet. If any extension field is present there ordinarily SHOULD be a MAC following the extension field, but an older conforming NTP implementation would assume that any EF MUST be followed by a MAC. Some extension fields are unable to be "signed" by a MAC, regardless of whether or not that MAC is a traditional MAC

or an extension field MAC. In the final case, the receiving system will interpret the unrecognized EF as a legacy MAC, and return a crypto-NAK.

If the remote system replies with a crypto-NAK, that is a good indication that it is running older software that does not recognize EFs and thinks we have sent an invalid MAC. In this case, we should behave accordingly with regard to the remote system.

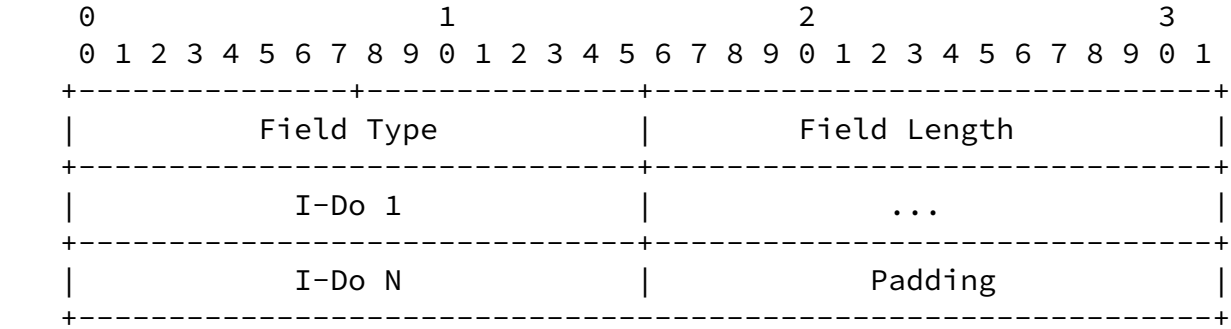
If the remote system replies without including an I-DO-RESPONSE EF, we at least know they can handle EFs, but they either don't understand I-DO or are not willing to tell us anything.

If the remote system replies with a packet that includes an I-DO-RESPONSE EF, then we SHOULD remember what they told us, and use that information appropriately.

In client/server mode, it makes sense for the client to send an I-DO to the server, and notice how the server responds. It likely does not make sense for the server to send an I-DO EF in response to a client request.

In symmetric mode, either side may initiate sending an I-DO EF, and the receiving side SHOULD reply with an I-DO-RESPONSE EF.

In broadcast mode, the broadcast server MAY send broadcast packets that include an I-DO EF, but note that if, counter to recommended practice, these packets are unauthenticated they MAY cause client machines to misinterpret the packet as having invalid authentication. In this situation, the broadcast server SHOULD alternate sending broadcast server packets with and without an I-DO EF, to insure that all clients receive time packets they will accept. Note that if, as recommended, broadcast packets are authenticated, a conforming client SHOULD have no difficulty in receiving a broadcast (mode 5) packet from a server that includes an I-DO EF.



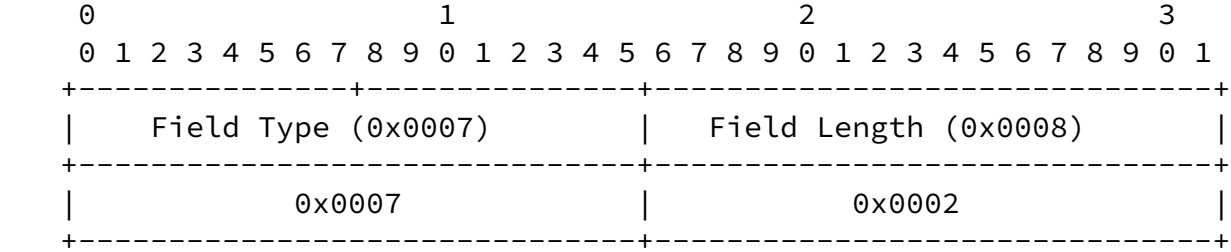
NTP Extension Field: REFID Suggestion

Field Type: TBD (Recommendation for IANA: 0x0007 (I-Do), 0x8007 (I-Do Response))

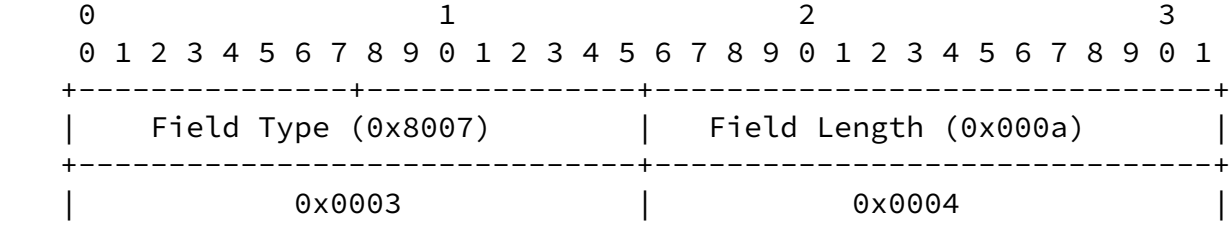
Field Length: as needed

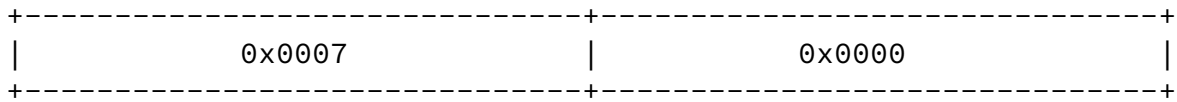
Payload: An enumeration of the supported base Field Types, followed by any padding, 0x0000, needed to fill the payload to the desired 32-bit boundary.

Example: A system that wants to advertise support for Autokey and I-Do, sending to a system that responds with support for I-Do, NTS, and MAC-As-Extension-Field



NTP Extension Field: I-Do





NTP Extension Field: I-Do Response

The sender of any I-Do extension field MUST send an extension field with a Field Type of 0x0007 (I-Do) and SHOULD include a payload with any 0x0000 padding values after enumerating the supported base Extension Field Types. If the responding system recognizes the I-Do extension field, its response MUST include an extension field with a Field Type of 0x8007 (I-Do Response), and SHOULD include a payload with any 0x0000 padding values after enumerating the supported base Extension Field Types.

Any system that receives an I-Do extension field as either an "offer" or a "response" SHOULD scan the entire payload looking for nonzero values that specify the capabilities of the remote association.

Any system that receives an I-Do "offer", 0x0007, SHOULD reply with an I-Do "response", 0x8007.

Any system that sends an I-Do "offer" or "response" may send as few or as many of its supported Field Types as it chooses. At any subsequent time, either side may re-negotiate the list of supported field types it is prepared to accept from the other system by sending a new I-Do extension field.

The most-recently received I-Do list replaces any previous I-Do list.

3. IANA Considerations

This memo requests IANA to allocate NTP Extension Field Types:

0x0007 (I-DO)

0x8007 (I-DO Response)

and I-DO types:

0xFFFE (I-DO Leap Smear REFIDs)

0xFFFF (I-DO IPv6 REFID hash)

for this proposal.

4. Security Considerations

Additional information TBD

5. Normative References

[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>.

[RFC5905] Mills, D., Martin, J., Ed., Burbank, J., and W. Kasch, "Network Time Protocol Version 4: Protocol and Algorithms Specification", RFC 5905, DOI 10.17487/RFC5905, June 2010, <https://www.rfc-editor.org/info/rfc5905>.

[RFC5906] Haberman, B., Ed. and D. Mills, "Network Time Protocol Version 4: Autokey Specification", RFC 5906, DOI 10.17487/RFC5906, June 2010, <https://www.rfc-editor.org/info/rfc5906>.

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