CCNx Publisher Clock Time Versioning draft-mosko-icnrg-ccnxtimeversion-02

Abstract

This document specifies the use of a timestamp as a name segment in a CCNx Name as a versioning specifier. It defines the name segment label, encoding, and semantics.

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1. Introduction

This document specifies the use of a subset of RFC 3339 (Klyne, G. and C. Newman, “Date and Time on the Internet: Timestamps,” July 2002.) [RFC3339] UTC timestamp in a CCNx Name as a version identifier. We restrict the use of RFC 3339 to only using UTC time with the 'Z' notation, not relative offsets from UTC.

This document updates CCNx Messages in TLV Format (Mosko, M., Solis, I., and C. Wood, “CCNx Messages in TLV Format (Internet draft),” 2016.) [CCNMessages]. It introduces a new CCNx Name Segment TLV type.

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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 (Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels,” March 1997.) [RFC2119].

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2. Protocol Description

A timestamp in a CCNx Name name segment indicates an ordering on names based on the UTC timestamp. The timestamp is encoded as an RFC3339 UTC string in the 'date-time' format, for example "1985-04-12T23:20:50.52Z". This format allows a memcmp() of two strings to determine their time ordering (see Section 3 (Comparing timestamps)).

The timestamp MUST use the format of RFC 3339 Sections 5.6-5.7 with the restriction that it MUST use the 'Z' UTC signifier and MUST NOT use the 'time-numoffset' format.

The timestamp MAY have fractions of a second, as per RFC3339. The fractions MUST use the '.' separator, as specified in RFC 3339 Section 5.6. This restriction is to ensure that memcmp() ordering is maintained.

The use of a timestamp in a Name to denote a version SHOULD NOT assume global time coordination and SHOULD NOT be used to denote ordering or causation between multiple publishers.

If multiple publishers -- with different clocks -- write to the same namespace, the name SHOULD include a name segment prior to the timestamp that indicates the publisher. For example, one could include the publisher's KeyId, or any globally unique string between the publishers.

A name segment timestamp MUST use the UTC 'Z' notation, not a '+' or '-' offset (the 'time-numoffset' token in RFC 3339). This restriction is to ensure that timestamps may be ordered simply by a direct comparison (see Section 3 (Comparing timestamps)).

An example Name using this format is "ccnx:/Name=parc/Name=file.pdf/Time=1985-04-12T23:20:50.52Z".

A publisher assigns a timestamp to indicate the time ordering of the prior Name name segments. It does not imply any specific temporal meaning such as the time of content creation or the time of Content Object signature. It is simply used to order a set of objects. An application MAY adopt such a semantic to the timestamp as an application-specific specification.

Type	Name
'Time'	UTC Timestamp, in RFC 3339 human-readable format.

Table 1: Name Segment Label

Type	Symbol	Name	Description
%x0012	T_TIME	UTC Timestamp	UTC timestamp RFC 3339 'Z' format.

Table 2: CCNx Name Types

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3. Comparing timestamps

The TLV length of the timestamp MUST be at least 20 octets to be compliant with RFC 3339, and thus with this specification.

As per RFC 3339, the string format for two timestamps MAY be compared via memcmp() up to the minimum string length minus 1 (to trim the terminal 'Z'). If the two timestamps are equal, up to the minimum length, then the shorter string is less than the longer string. Because we require UTC time zone with the 'Z' notation, the only time two strings may be of different lengths is when one includes milliseconds, so the rule here is correct.

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4. Acknowledgements

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5. IANA Considerations

This memo includes no request to IANA.

This draft introduces a new value in the CCNx Name Segment type registry.

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6. Security Considerations

An entity parsing a T_TIME name segment is not required to parse the segment for validity in formatting to only compute ordering. Because the format allows a direct memcmp() and the length of the string is available via the TLV length, there should be no vulnerability to mis-formatted values. Other uses of the timestamp should ensure the format conforms to RFC 3339 'Z' format.

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7. References

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7.1. 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.

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7.2. Informative References

[CCNMessages] Mosko, M., Solis, I., and C. Wood, “CCNx Messages in TLV Format (Internet draft),” 2016.

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