Research Notes - Time and Date in Network Management

Table of Contents

Standards

Standards are defined by Standard Defining Organizations (SDO). They can be normative (have to be followed) or not normative (e.g. recommended, informational, best common practice, etc.). Each SDO uses their own taxonomy and their own *word* for standards. ISO for instance calls them standard, ITU calls them recommendation, and IETF calls them Request For Comment (RFC). Which standards are normative depends on the subject area or domain, rather than where they are defined. Some exception to this rule apply. For instance, ISO international standards are often adopted by country SDOs and the BIPM defines the standard system for units used world-wide. For network management, we should consider the following SDOs and their standards being normative:

- ISO, e.g. for time and other aspects
- ITU, for telecommunication (T series) and radio (R series) standards
- IETF, for standards used in the Internet
- 3GPP, for mobile network standards
- ETSI, for European mobile network standards
- W3C, for standards used in the World Wide Web (WWW) and related technologies
- BIPM, for standard units (in the case of time: second)
- IEC, e.g. for terminology
- IEEE, for standards on various network technologies

SDOs that might not be normative, yet standardize important aspects of or for network management, include:

- OMG, namely SBVR and its time and date specifications
- TINA, namely modeling and management aspects of telecommunication
- ATM Forum, for standards of the ATM network
- TM Forum, for network and service management standards such as eTOM and SID

- OASIS, mainly for web-services

- EIA/TIA, for electronic and telecommunication standards

- MEF, for information models, Ethernet, and network standards

Other relevant specifications can come from open source communities and related organizations. Those standards are often protocols, data models, or Application Programming Interfaces (API). Here we can find several ways how standards are established. For instance, the Java Community Process defines and agrees on Java Specification Requests (JSR), API specifications. Sometimes, an open source project that does focus on a specific domain becomes very popular (or even dominant). An example for this is *moment.js*, a JavaScript time library. The list of open source standards can never be complete, and some relevant standards might be missing.

In many occasions, companies can define relevant standards as well. For the purpose of this note, companies such as Apple, IBM, and Microsoft have created time and date standards used in their platforms (e.g. operating systems or hardware), which became defacto-standards at least within the company's eco-system. This is especially the case for databases, which play an important role in network management.

Sometimes, countries or state organizations develop technologies that become a standard. One example is the Global Positioning System (GPS), originally developed in the USA for its military. Once opened for civil use, GPS became the de-facto standard for many different applications.

ISO: *Data elements and interchange formats - Information interchange - Representation of dates and times*, 2004

- Author: ISO

- Reasons to read: the standard for time specifications in a 24-hour time keeping system and dates using the Gregorian calendar

- Links: ISO, PDF, ISO-8601-2 Draft, PDF, Matchematics of ISO Calendar   skb: yaml src, Biblatex

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ITU: *Standard-frequency and time-signal emissions*, 2002

- Author: ITU

- Reasons to read: standard for Coordinated Universal Time (UTC), normative for all ITU recommendations

- Links: ITU   skb: yaml src, Biblatex

ITU: *Standard-frequency and time-signal emissions*, 2013

- Author: ITU

- Reasons to read: standard termonology for time in ITU recommendations

- Links: ITU   skb: yaml src, Biblatex

G. Klyne et al.: *Date and Time on the Internet: Timestamps*, 2002

- Authors: G. Klyne, C. Newman

- Reasons to read: standard for date and time in the internet, as a restricted form (profile) of ISO 8601

- Published: IETF Standard, July 2002

- Links: IETF   skb: yaml src, Biblatex

P. Resnick: *Internet Message Format*, 2008

- Author: P. Resnick

- Reasons to read: standard for time in internet messages, i.e. email

- Published: IETF Standard, October 2008

- Links: IETF   skb: yaml src, Biblatex

Time Frameworks, Calculus

James F. Allen: *Maintaining Knowledge about temporal Intervals*, 1983

- Author: James F. Allen

- Reasons to read: Allen Intervals for temporal calculations (temporal algebra)

- Published: Communications of the ACM CACM, Volume 26 Issue 11, Nov. 1983, Pages 832-843

- Links: DOI, PDF   skb: yaml src, Biblatex

Thomas A. Alspaugh: *Software Support for Calculations in Allen's Interval Algebra*, 2005

- Author: Thomas A. Alspaugh

- Reasons to read: operations using the Allen's Intervalls and interval algebra

- Publisher: Institute for Software Research, University of California, Irvine

- Links: PDF, Online   skb: yaml src, Biblatex

Online Resources

Steffen Thorsen: *Time and Date*, 1995

- Author: Steffen Thorsen

- Reasons to read: the ultimate website for time and date information, tools, and news

- Links: Online   skb: yaml src, Biblatex

Gilbert Healton: *The Best of Dates, The Worst Of Dates*, 2002

- Author: Gilbert Healton
- Reasons to read: history, standards, programming help for time and date
- Links: Online   skb: yaml src, Biblatex

Claus Tøndering: *The Calendar FAQ*, 1996

- Author: Claus Tøndering
- Reasons to read: everything about calendars
- Links: Online   skb: yaml src, Biblatex

Appendix A: Copyright, License, Attribution

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