



# Computer Network Time Synchronization: The Network Time Protocol on Earth and in Space, Second Edition

By David L. Mills

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## Computer Network Time Synchronization: The Network Time Protocol on Earth and in Space, Second Edition By David L. Mills

Carefully coordinated, reliable, and accurate time synchronization is vital to a wide spectrum of fields—from air and ground traffic control, to buying and selling goods and services, to TV network programming. Ill-gotten time could even lead to the unimaginable and cause DNS caches to expire, leaving the entire Internet to implode on the root servers.

Written by the original developer of the Network Time Protocol (NTP), **Computer Network Time Synchronization: The Network Time Protocol on Earth and in Space, Second Edition** addresses the technological infrastructure of time dissemination, distribution, and synchronization—specifically the architecture, protocols, and algorithms of the NTP. This system has been active in one form or another for almost three decades on the Internet and numerous private networks on the nether side of firewalls. Just about everything today that can be connected to a network wire has support for NTP.

This book:

- Describes the principal components of an NTP client and how it works with redundant servers and diverse network paths
- Provides an in-depth description of cryptographic and other critical algorithms
- Presents an overview of the engineering principles guiding network configuration

Evaluating historic events that have taken place since computer network timekeeping started almost three decades ago, the author details a number of systems and drivers for current radio, satellites, and telephone modem dissemination and explains how we reckon the time, according to the stars and atoms. The original 16 chapters of the first edition have been rewritten, updated, and enhanced with new material. Four new chapters cover new algorithms and previously uncovered concepts, including timekeeping in space missions.

**Praise for the first edition:**

"... For those that need an exhaustive tome on all of the minutiae related to NTP and synchronization, this is the source. ... definitive ... this book should be considered the last word on the topic."

?Ben Rothke on *Slashdot.org*

"... the bible of the subject... contains enough information to take you just as far as you want to go....Dr. Mills is the original developer of NTP."

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### **Editorial Review**

About the Author

**Dr. David L. Mills** is professor emeritus of electrical and computer engineering and computer and information sciences at the University of Delaware. He has been an active contributor for many years to the field of Internet technology, particularly computer network time synchronization. He is the original developer of the Network Time Protocol and has authored over 30 articles and technical reports on the subject, including the current operative standards documents. His doctoral degree in computer science was conferred by the University of Michigan in 1971. He is a member of the National Academy of Engineering and a Fellow in both the Association for Computing Machinery and the Institute of Electrical and Electronics Engineers.

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