



National Physical Laboratory

The NPL Internet Time Service

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Time & Frequency User Club meeting

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What is NTP?

- Most widely used method for time synchronisation across the internet
- Originally developed by Prof. David Mills at University of Delaware
- Defined formally in an internet standard, RFC 1305
- Based on exchange of single time-stamped packets between client and server
- Uses UTC as the reference time scale

NTP servers

- Servers are classified by STRATUM
 - Stratum 1 – synchronised by reliable external source of UTC (eg. atomic clock, GPSDO, radio time signal receiver)
 - Stratum 2 – currently synchronised by stratum 1 server(s)
 - Stratum 3 – currently synchronised by stratum 2 server(s)
 - And so on

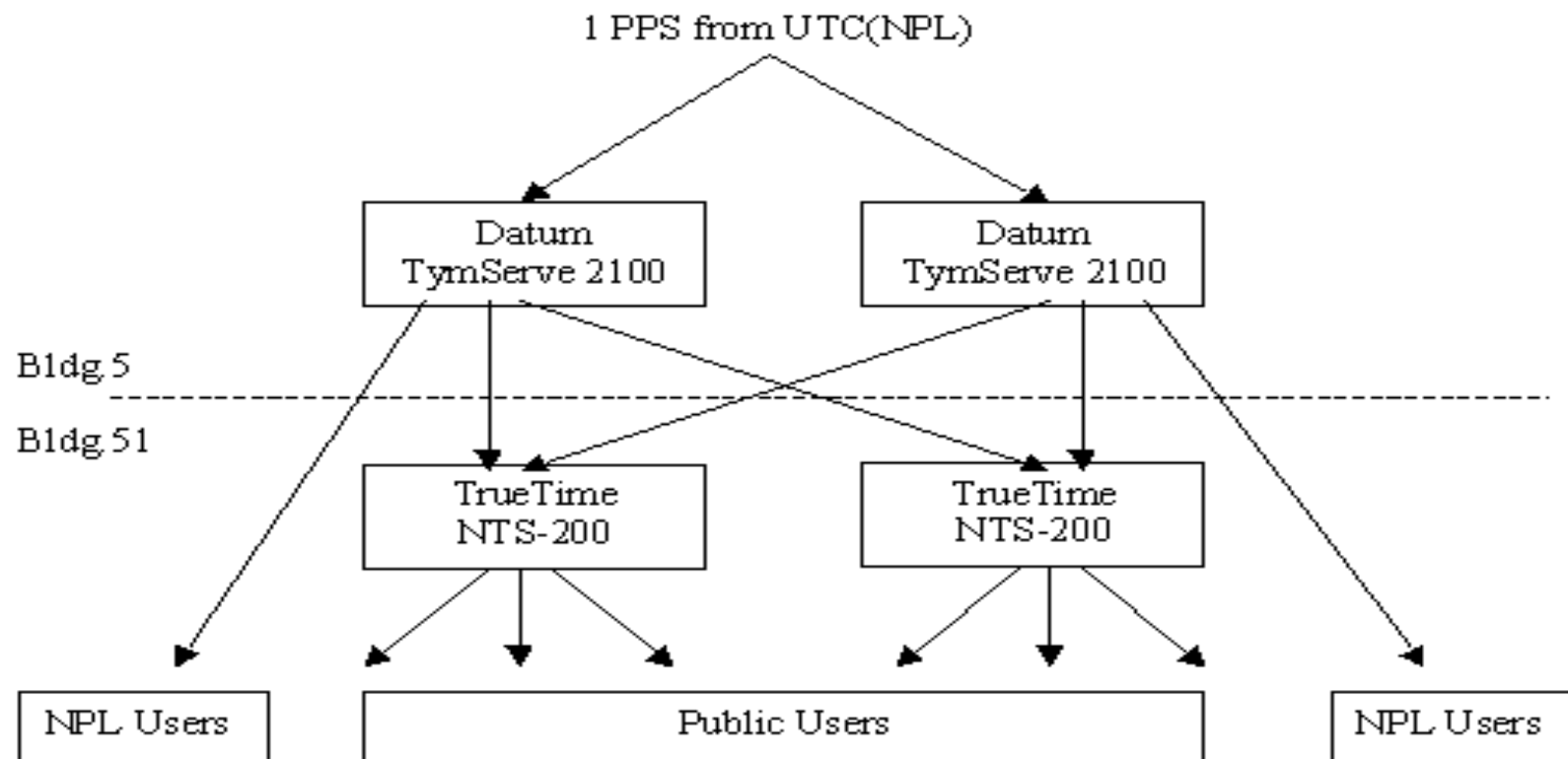
How does NTP work?

1. Client sends timed packet to server.
2. Server times receipt of packet.
3. Server sends timed packet to client.
4. Client times receipt of packet.
5. Client uses all four time-stamps to determine:
 - Round-trip time (assuming symmetric)
 - Time offset between client and server
 - Frequency offset between client and server

NPL's NTP servers

- NPL operates 4 NTP servers:
- 2 Datum (now Symmetricom) TymServe 2100 servers
 - Synchronised to 1 pulse-per-second signals from UTC(NPL), so stratum 1
 - Used within NPL for synchronisation of PCs
- 2 TrueTime (now Symmetricom) NTS-200 servers
 - Synchronised to the TymServe units by NTP, so stratum 2
 - Provide the public service outside NPL

NPL server interconnections



How to use the service - software

- Need to obtain client software
 - Many sources of suitable software, including freeware on the internet.
 - Built into MS Windows 2000 and XP
 - Or search for NTP in www.download.com

How to use the service - addresses

- Servers are normally contacted using their URL
- The NPL servers are at:
 - Server 1 : ntp1.npl.co.uk
 - Server 2 : ntp2.npl.co.uk

Comparison with NPL Telephone Time Service

- The Internet Time Service offers:
 - Compatible with all networked computers
 - Free of charge
 - Accurate to ~10 ms (dependent on network delay asymmetry)
- The Telephone Time Service offers:
 - No internet connection needed (security)
 - Provides UK local time (UTC/BST)
 - Provides DUT1
 - Accurate to ~50 ms (network delay dependent)

Summary

- NPL has an operational NTP service for computer synchronisation over the internet
- Please contact us if you have any comments or questions about the service:

time@npl.co.uk