Introducing Open Time Server

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Agenda

- Concept
- OTS Reference Architecture
- Time Cards
- Performance
- Building an eco-system
- Call to action
Introduction

- PTP distributes accurate timing over Ethernet Networks with hardware timestamping
- PTP requires a Time Server to distribute time information to devices over the network

Open Time Server
opencompute.org/wiki/Time_Appliance_Project

Spines & Cores
Transparent Clocks

ToRs
Transparent Clocks

OPEN POSSIBILITIES.
Traditionally, Time Servers are considered off-the-shelf closed-source commodities. Typical deployments require only a handful of such appliances, making R&D for advanced features hard to justify. Often, you are limited by the feature set provided from the manufacturer.

The Open Time Server (OTS) reference architecture democratizes the entire suite of hardware, software and management tools to build such appliances with off-the-shelf components and open TAP software.

By using the latest NIC technologies, the OTS provides unprecedented scalability and heightened security.
Software

Appliance

Open Time Server

Time Card

NIC

COTS Server

Drivers

Monitoring

Tools

Mgmt.
Building a Time Appliance
OTS Reference Architecture

- opentimeserver.com
- Open, scalable and validated architecture for DC and Edge
- Marketplace Link

HPE DL830

Time Card

NVIDIA ConnectX-6 Dx
OTS Reference Architecture

- Antenna
- GNSS Receiver
- High Stability Oscillator
- Clock Processing FPGA
- Host CPU
- NIC with PPS out (and/or) in
- Time Card

Connections:
- ToD from GNSS Receiver to Time Card
- PPS from GNSS Receiver to Clock Processing FPGA
- Discipline from High Stability Oscillator to Clock Processing FPGA
- PCIe from Clock Processing FPGA to Host CPU
- PCIe from Host CPU to NIC with PPS out (and/or) in
- PCIe from NIC with PPS out (and/or) in to Clock Processing FPGA
FlexSMA Hardware

Time Card SMAs will support multiple input and output functions

Inputs
- 10MHz or PPS for Disciplining, Timestamper

Outputs
- 10MHz, PPS from FPGA or Oscillator or GNSS

All four SMAs can support input and output
- Up to 4 PPS Outputs
- Up to 4 PPS External Timestamp Inputs
We Are Building a Software Eco-System

**ptp4u** – PTP for Unicast
- Open source Meta implementation for hyper-scale PTP Grandmaster
- Supports over 1,000,000 of clients with detailed telemetry

**Clientgen** – PTP Client Traffic Generator
- Open source Meta implementation for large PTP client traffic generation
- Simulating ~100,000s of clients with latency and telemetry tracking
  - [github.com/opencomputeproject/Time-Appliance-Project/tree/master/Software/Experimental/clientgen](https://github.com/opencomputeproject/Time-Appliance-Project/tree/master/Software/Experimental/clientgen)
Time Cards

Concept of Time Card

Meta’s Cesium Time Card

Meta’s Rubidium Time Card

NVIDIA’s NIC + Time Card

Intel’s Time Card

OPEN POSSIBILITIES
Call to Action

- Visit www.opentimeserver.com
  fork the project

- Time Appliances article
  engineering.fb.com/2021/08/11/open-source/time-appliance
Open Discussion