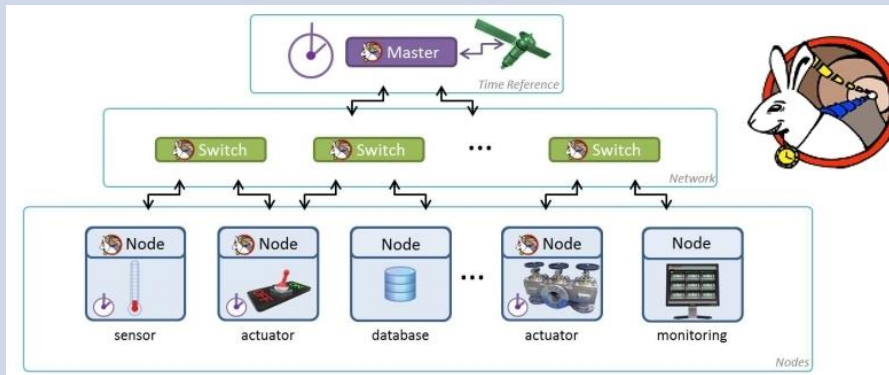


White Rabbit provides sub-nanosecond accuracy and picoseconds precision synchronisation for large distributed systems. It allows you to precision time-tag measured data and trigger data taking in large installations while using at the same time the same network to transmit the data.

The IEEE1588 Precision Time Protocol has incorporated White Rabbit in its 2019 revision.



Characteristics

- Sub-nanosecond synchronisation
- Can connect thousands of nodes
- Typical distance of 10 km between nodes
- Ethernet-based gigabit rate
- Reliable data transfer
- Fully open hardware, firmware and software
- Commercially available from many vendors

<https://white-rabbit.web.cern.ch>

- The technology was developed in 2008 to renovate the CERN control and timing system. Since then, it has expanded beyond this initial application.
- One of the reasons for such expansion is the open source paradigm used in the project for the development of hardware, gateware and software. Another reason is the compatibility with standards.

The technology is already being deployed outside academic settings (and its role as an enabler of new technologies explored) in, for example:

Financial Sector

Deutsche Börse, Spanish Stock Exchange, 1,350 km fibre optic link in the US between trading centres

www.deutsche-boerse.com/dbg-en/products-services/ps-technology/ps-connectivity-services/ps-connectivity-services-time-services

<https://sevensols.com/case-studies/>

Telecommunication Sector

Next generation networks for mobile operators

www.opnt.nl/news/accurate-time-synchronization-in-live-network-vodafone/

Future Quantum Communication Networks

<https://www.opnt.nl/news/qutech-opnt-surf-and-kpn-join-forces-to-build-a-quantum-network/>

OPNT commercialises White Rabbit Technology: <https://www.opnt.nl/>

Strengths

- Picosecond synchronisation
- Compatible with existing standards (enables hybrid networks)
- Robust and reliable synchronisation
- Scalable and modular

Weaknesses

Given the success of the technology and its large community of users, there are insufficient resources to provide all the support that could ideally be provided. This challenge is being addressed.

Opportunities

- An increasing number of applications require picosecond synchronisation
- Over-reliance on satellite timing signals require reliable alternatives for time distribution

Threats

Patented extensions of the core technology can in some cases limit the development of the open source core technology. This challenge is being addressed.

The hardware design for the White Rabbit switch is licensed under the CERN Open Hardware Licence. More information about CERN Open Hardware Licence here:

<https://ohwr.org/project/cernohl/wikis/home>

Most of the associated software is available under the GNU LGPL licence, whilst for some specific cases, depending on how it is compiled, a GNU GPL licence applies.

- For further information, the contact point is

Amanda Díez Fernández

amanda.diez.fernandez@cern.ch

European Organization for Nuclear Research

CERN

Esplanade des Particules 1,

Geneva, Switzerland

Companies selling White Rabbit Technology:

<https://ohwr.org/projects/white-rabbit/wiki/wrcompanies>