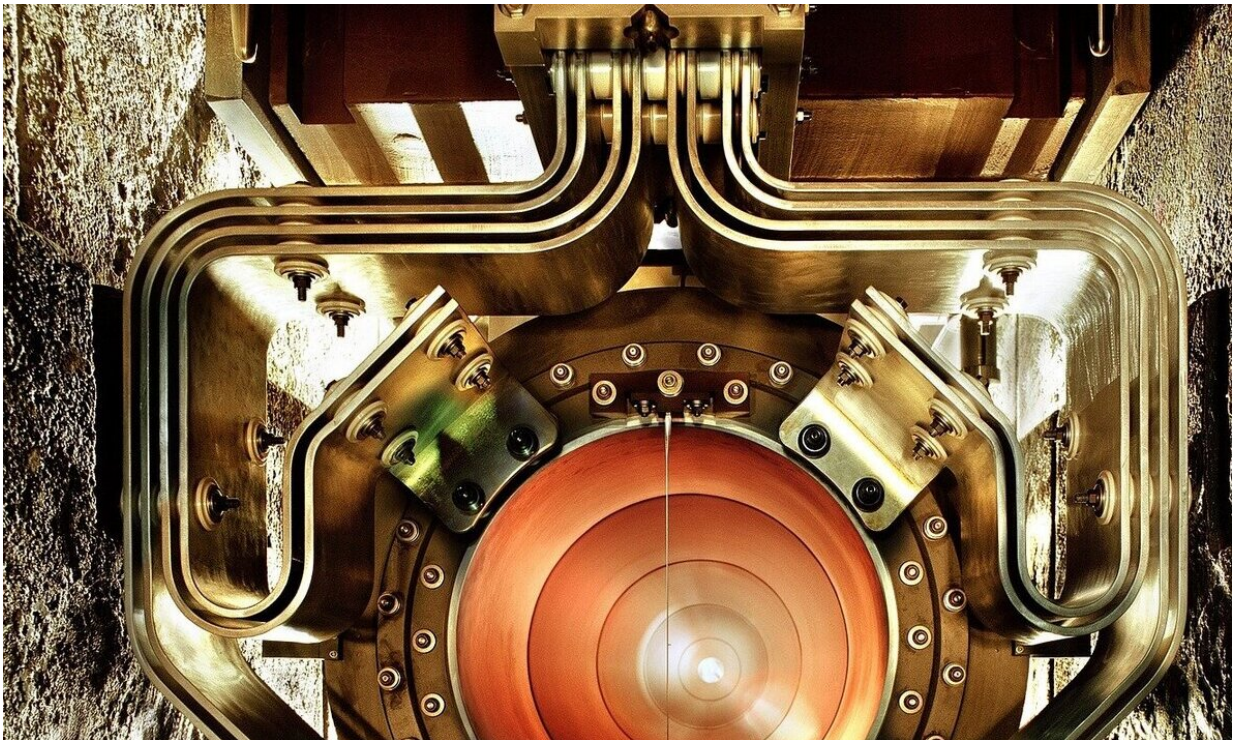


# White Rabbit, a CERN-born technology, sets a new global standard

July 2 2020, by Marzena Lapka

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Credit: Pixabay/CC0 Public Domain

[White Rabbit](#) (WR) is a technology developed at CERN to provide the LHC accelerator chain with deterministic data transfer, sub-nanosecond accuracy and a synchronization precision of a few picoseconds. First used in 2012, the technology has since then expanded its applications outside the field of particle physics and is now deployed in [numerous](#)

[scientific infrastructures](#) worldwide. It has shown its innovative potential by being commercialized and introduced into different industries, including telecommunications, financial markets, smart grids, the space industry and quantum computing.

CERN developed WR as an [open-source hardware](#) and it was initially adopted by other research infrastructures with similar challenges in highly accurate synchronization of distributed electronic devices. The R&D process and all the knowledge gained throughout its development has been made available [through CERN's Open Hardware Repository](#). This gives other organizations and companies the freedom to use and modify existing developments. Through the proactive engagement of CERN's Knowledge Transfer and Beam Controls groups, a larger group of companies and organizations contributed to the development of hardware, software, and gateware for WR switches and nodes. The WR ecosystem quickly grew to include several organizations, developing open hardware for widespread benefit. This [collaborative approach](#) brought improvements to the original concept, allowing CERN to also benefit from the new developments.

On 16 June, the WR technology was recognized by being included in the worldwide industry standard called [Precision Time Protocol](#) (PTP), governed by the IEEE, the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. The WR addition to the PTP standard, referred to as High Accuracy, increases PTP's synchronization performance by a few orders of magnitude, from sub-microsecond to sub-nanosecond.

"PTP is the first IEEE standard to incorporate a CERN-born technology. This is a major step for White Rabbit. It is already widely used in large scientific facilities and its adoption in industry is gaining momentum. Its incorporation into the PTP standard will allow [hardware](#) vendors worldwide to produce WR equipment compliant with the PTP standard and



consequently accelerate its dissemination on a larger scale," says Maciej Lipinski, an electronics engineer at CERN, who led the [WR standardization effort](#).



Photos of the White Rabbit team and equipment. Credit: CERN

**More information:** White Rabbit project repository:  
[www.ohwr.org/project/white-rabbit/wikis/home](http://www.ohwr.org/project/white-rabbit/wikis/home)

Provided by CERN

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