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Copper SFP Transmission Scheme for White Rabbit Network

White Rabbit is a deterministic Ethernet-based network for general purpose data transfer and sub-nanosecond time synchronization in large distributed systems, which has been used for the new control system of the injector chain at CERN. White Rabbit mainly uses optical fiber and LC optical fiber connector for data transmission between White Rabbit devices. The commercial off-the-shelf copper SFPs are not suitable for White Rabbit Network. Considering the low cost of copper cable compared to fiber and the extremely short working distance of passive SFP copper cable or direct attach cable (DAC), we develop a new copper SFP transmission scheme for White Rabbit Network. The new copper SFP scheme has the special copper SFP and only uses two twisted pairs of copper wire of Cat-7 cable for data up-link and down-link, which is compatible with 1000Base-X standard. And the other two twisted pairs of copper wire could be used for remote power supply. Test results show that the data transmission works as expected and the timing synchronization accuracy is also at sub-nanosecond level, when the transmission distance is much longer than passive SFP copper cable. When environment temperature changes within a certain range, data transfer still works well and timing drift still meets requirements.

Minioral

Yes

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No

Are you a student?

Yes

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