



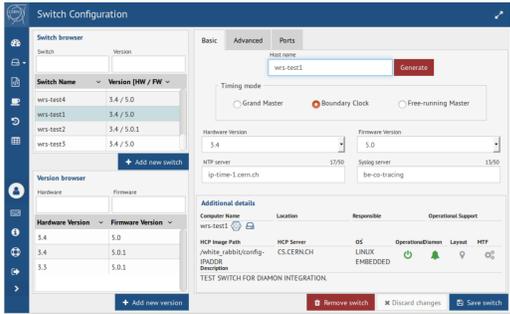
## Introduction

Timing networks are custom networks, with limited bandwidth and use of custom technologies. This limits the possibilities of using standard network tools and protocols.

## The White Rabbit Network

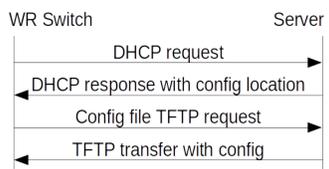
The White Rabbit network is an extension of Ethernet which achieves subnanosecond timing accuracy by implementing both layer 1 syntonization and an extension of the IEEE 1588-2008 (Precise Time Protocol, PTP) standard. Layer 1 syntonization enables reference frequency distribution among devices in a WR network. On the other hand, IEEE 1588-2008 is a packet-based-protocol which performs the time synchronization among WR nodes.

### Controls Configuration Data Editor (CCDE)



White Rabbit Switch configuration in CCDE.

### DHCP and TFTP



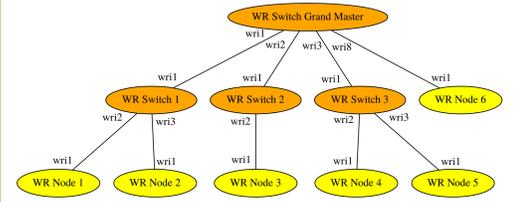
Simplified flow showing how the White Rabbit Switch retrieves its configuration.

### Nagios



General status objects of a White Rabbit Switch

### LLDP and SNMP

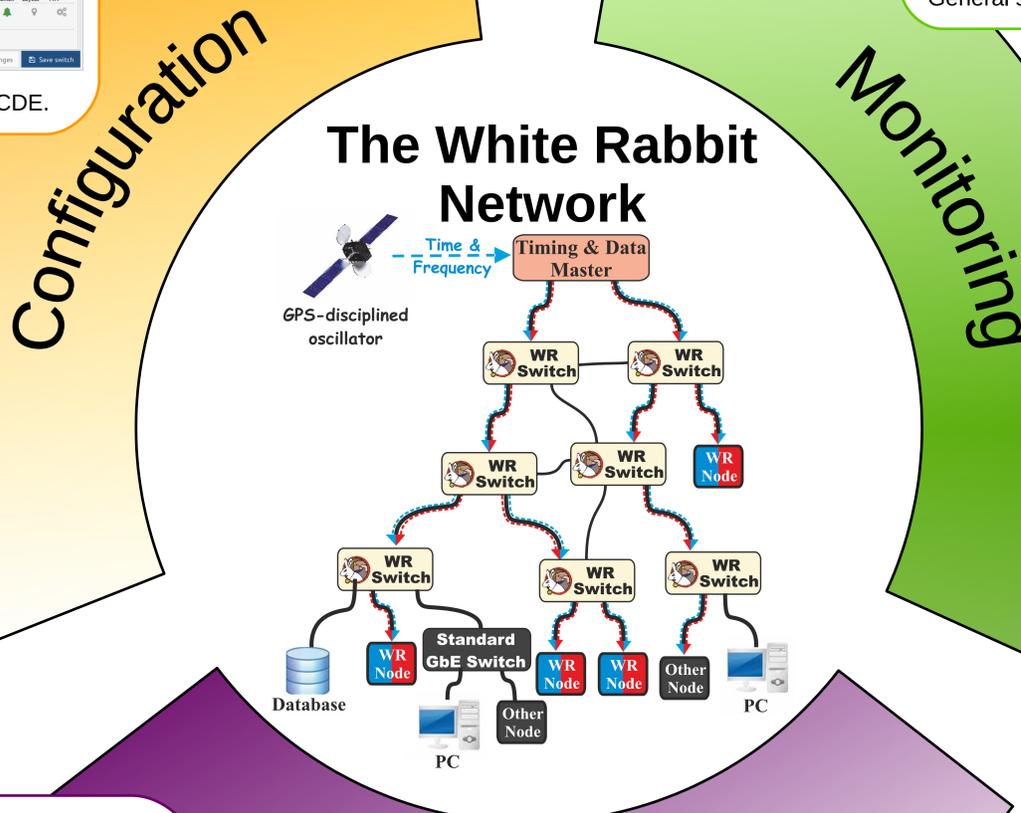


Network layout based on information gathered via Link Layer Discovery Protocol (LLDP).

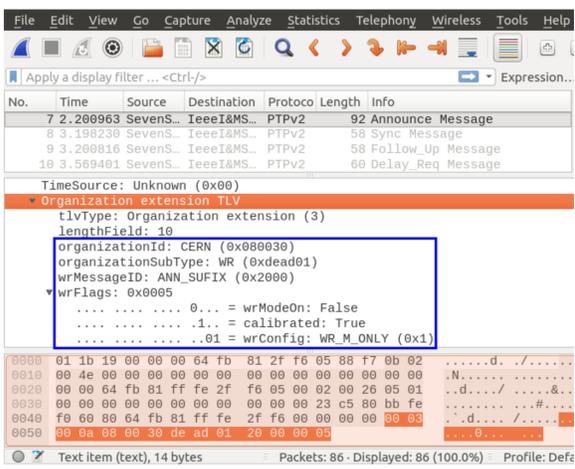
### Grafana



An example dashboard.



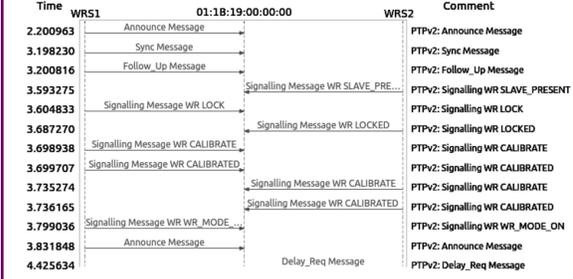
### Wireshark – dissection



Dissected White Rabbit announce frame

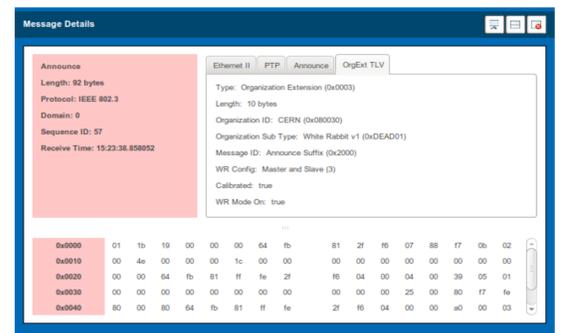
## Diagnostics

### Wireshark – flow graph



Flow graph of White Rabbit frames

### PTP Track Hound



Dissected White Rabbit announce frame

## Conclusions

Since timing networks based on WR provide data and synchronization distribution at the same time using Ethernet technology, timing networks can benefit from many already existing tools for management, monitoring and debugging. Using standard protocols like SNMP and LLDP can reduce the amount of required new development and reduce the risk of vendor lock-in for monitoring and management software. Introducing new users to WR network technology is much easier compared to custom networks, as it is based on already existing and well known tools. As these tools become more and more powerful, WR users benefit from even more advanced monitoring and diagnostics capabilities without any additional investment.

