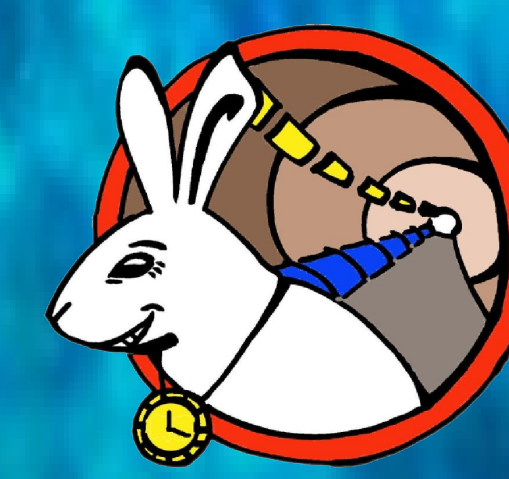




Managing Your Timing System as a Standard Ethernet Network

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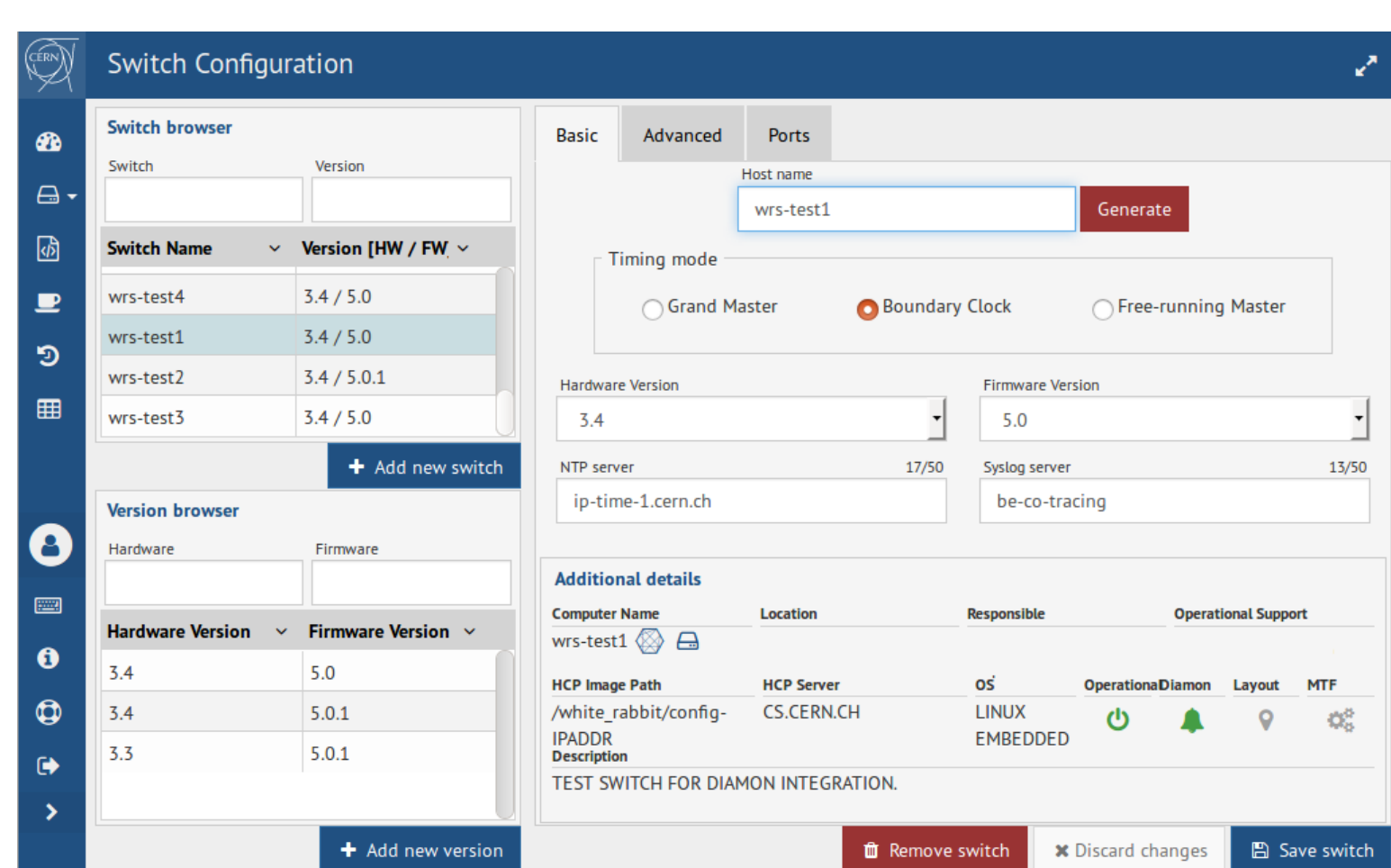
Introduction

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

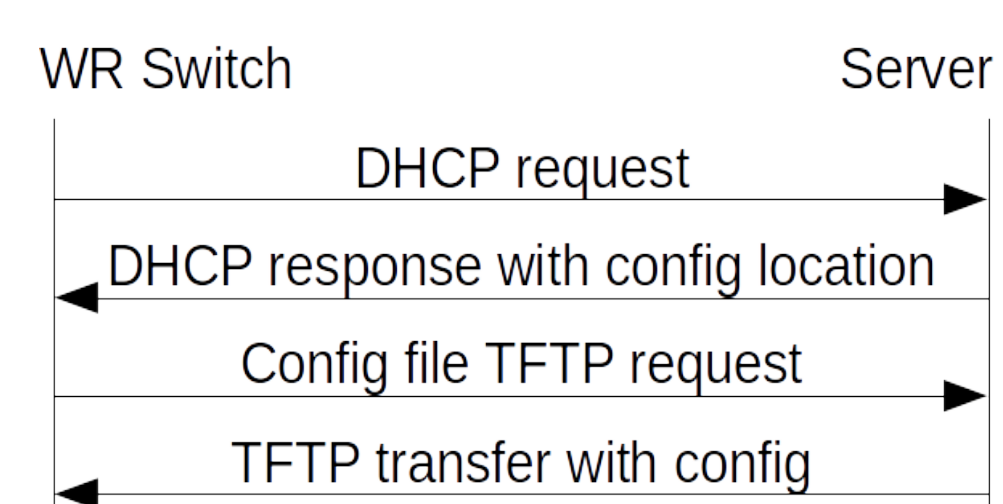
The White Rabbit network is an extension of Ethernet which achieves subnanosecond timing accuracy by implementing both layer 1 syntonization and an extension of the IEEE 1588-2008 (Precise Time Protocol, PTP) standard. Layer 1 syntonization enables reference frequency distribution among devices in a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



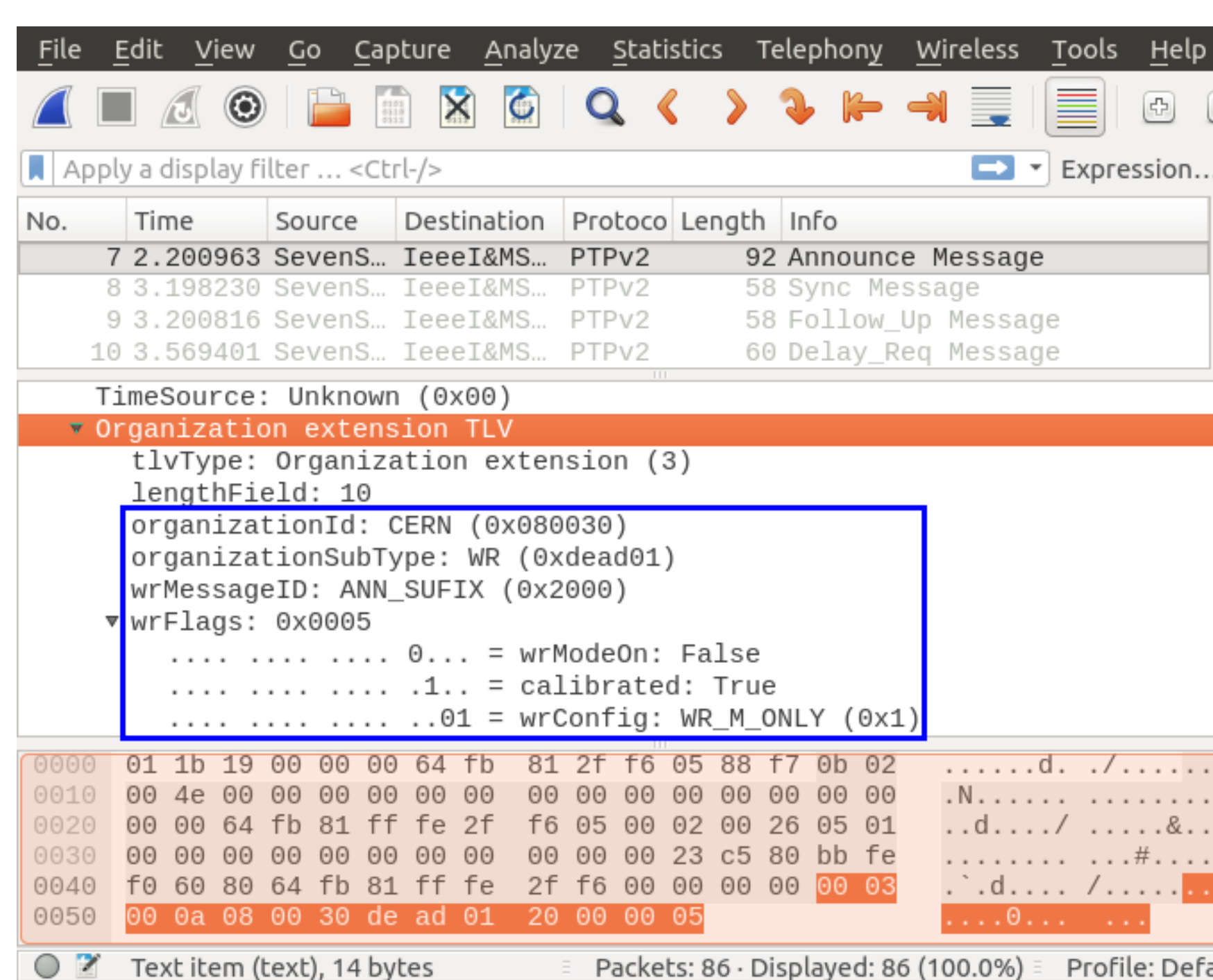
White Rabbit Switch configuration in CCDE.

DHCP and TFTP



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

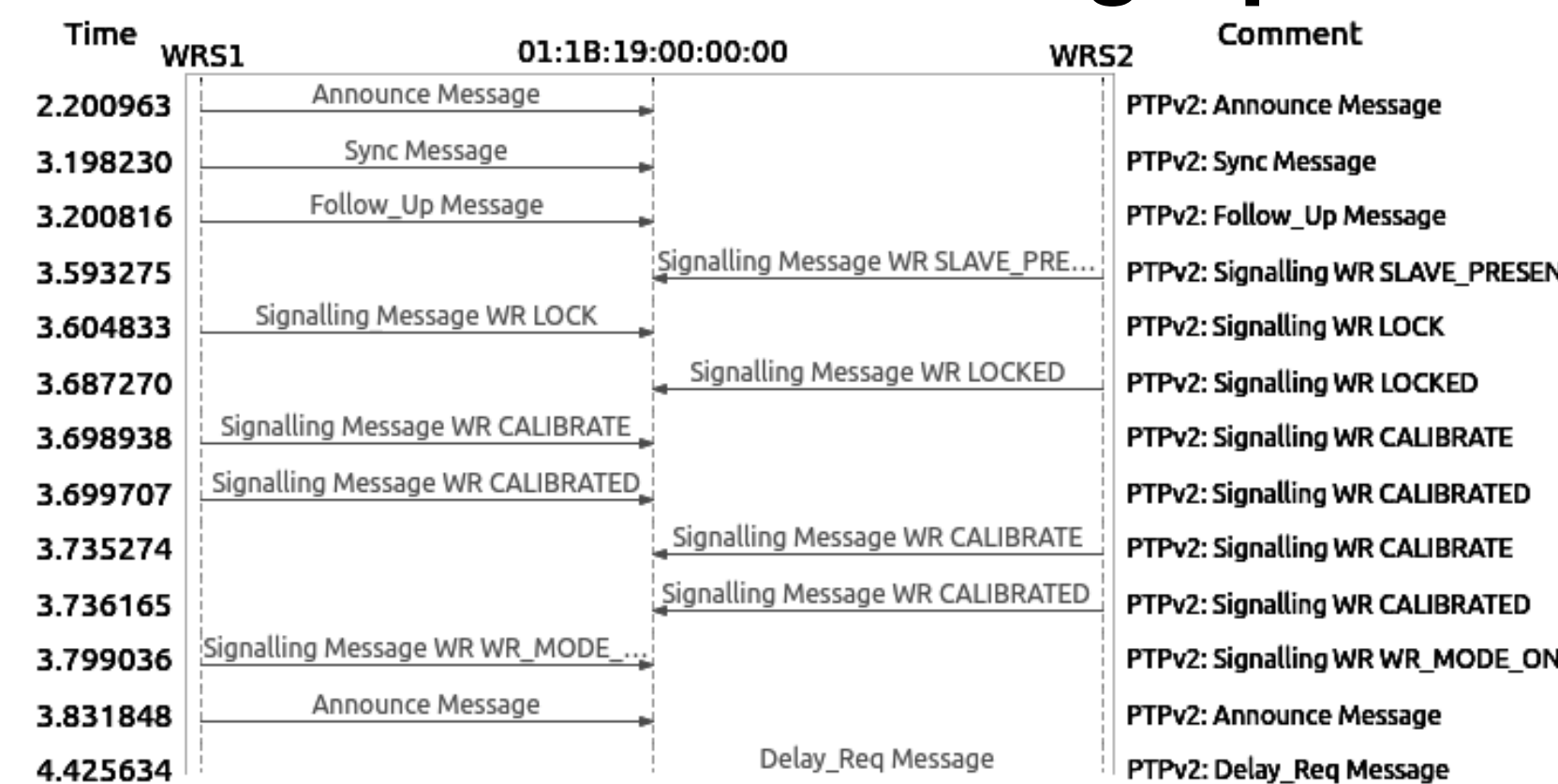
Wireshark – dissection



Dissected White Rabbit announce frame

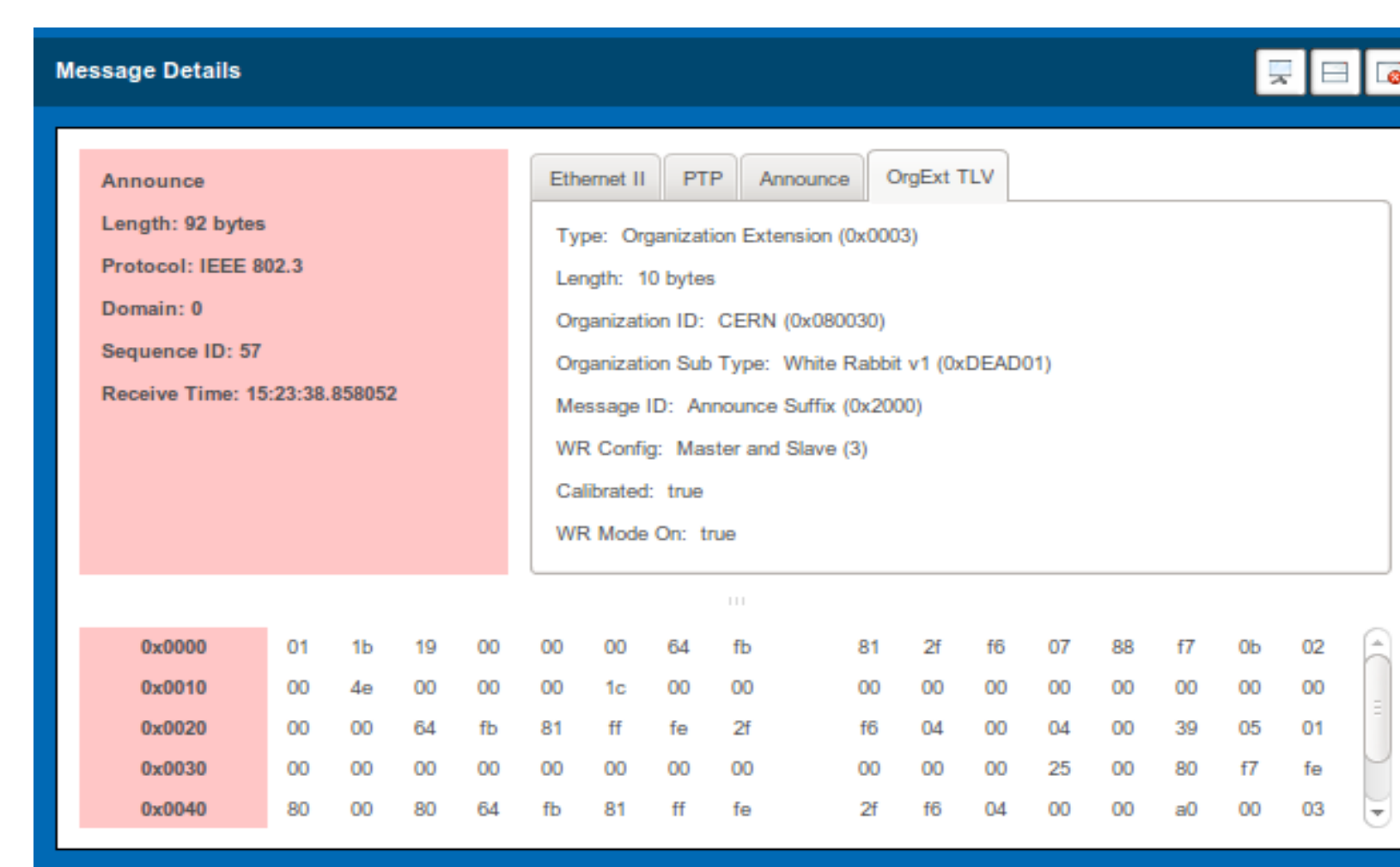
Diagnostics

Wireshark – flow graph



Flow graph of White Rabbit frames

PTP Track Hound



Dissected White Rabbit announce frame

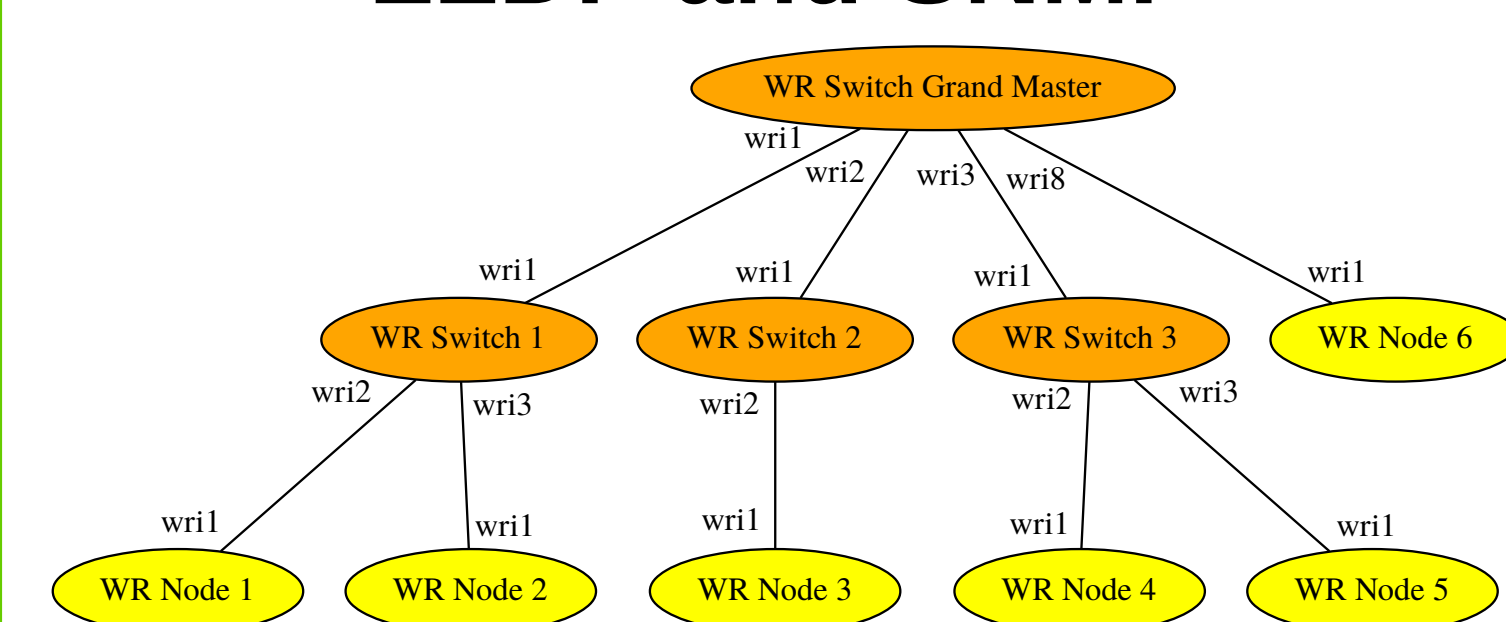
Nagios

Service Status Details For Host '2.WRS.1'

Host	Service	Status	Last Check	Duration	Attempt	Status Information
2.WRS.1	1 General Status	OK	2017-09-17 23:51:42	17d 7h 7m 8s	1/1	SNMP OK - 1
2.WRS.1	1.1 On Status	OK	2017-09-17 23:51:42	17d 7h 7m 8s	1/1	SNMP OK - 1
2.WRS.1	1.1.1 Boot Success	OK	2017-09-17 23:51:42	17d 7h 7m 20s	1/1	SNMP OK - 1
2.WRS.1	1.1.2 Temperature Warning	OK	2017-09-17 23:51:42	17d 7h 7m 24s	1/1	SNMP OK - 2
2.WRS.1	1.1.3 Memory Free	OK	2017-09-17 23:51:42	17d 7h 7m 40s	1/1	SNMP OK - 1
2.WRS.1	1.1.4 CPU Load	OK	2017-09-17 23:51:42	17d 7h 7m 3s	1/1	SNMP OK - 1
2.WRS.1	1.1.5 Disk Space	OK	2017-09-17 23:51:42	17d 7h 7m 34s	1/1	SNMP OK - 1
2.WRS.1	1.2 Timing Status	OK	2017-09-17 23:51:42	17d 7h 7m 36s	1/1	SNMP OK - 1
2.WRS.1	1.2.1 PTP Status	OK	2017-09-17 23:51:42	17d 7h 7m 40s	1/1	SNMP OK - 1
2.WRS.1	1.2.2 RPL Status	OK	2017-09-17 23:51:42	17d 7h 7m 40s	1/1	SNMP OK - 1
2.WRS.1	1.2.3 Slave Link Status	OK	2017-09-17 23:51:42	17d 7h 7m 24s	1/1	SNMP OK - 1
2.WRS.1	1.2.4 PTP Timing	OK	2017-09-17 23:51:42	17d 7h 7m 24s	1/1	SNMP OK - 1
2.WRS.1	1.3 Networking Status	OK	2017-09-17 23:51:42	17d 7h 7m 40s	1/1	SNMP OK - 1
2.WRS.1	1.3.1 SFP Status	OK	2017-09-17 23:51:42	17d 7h 7m 34s	1/1	SNMP OK - 1
2.WRS.1	1.3.2 Endpoint Status	OK	2017-09-17 23:51:42	17d 7h 7m 58s	1/1	SNMP OK - 1
2.WRS.1	1.3.3 Secure Status	OK	2017-09-17 23:51:42	17d 7h 7m 34s	1/1	SNMP OK - 1
2.WRS.1	1.3.4 RTU Status	OK	2017-09-17 23:51:42	17d 7h 7m 40s	1/1	SNMP OK - 1

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.

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.

