

Chasing the White Rabbit: Why Time Synchronization in OT Systems is a lot harder than it seems

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Format: 20 minute presentation, plus written paper

OWWA Program Tracks: Automation

Short Abstract for Program (50 words)

Just like in Alice's Wonderland, time plays a vital role in any OT (operational technology) system. This includes such as SCADA, DCS, MEP and other high-availability operations focused systems. Accurate timestamps are needed to effectively log process-data, log alarms/events, produce reports, and perform numerous system functions. This talk provides an overview and best practices for keeping time synchronized in today's critical OT systems.

Long Abstract (250 Words)

In modern utilities, SCADA (supervisory control and data acquisition) systems are a critical tool for both operations and compliance. SCADA systems enable operators to remotely view, monitor, and control a wide range of critical utilities, such as water/wastewater, oil, gas and electricity. SCADA systems also perform an important datalogging role by logging process data, alarms/events and operator actions. Many sectors will also have stringent regulatory datalogging, process control and auto-shutdown requirements.

With all the datalogging that the SCADA systems must do, it is therefore very important that SCADA systems are always using the correct time and date. Furthermore, for distributed SCADA Systems – such as those that use multiple PLCs, network switches/routers, multiple servers and dataloggers – it is vitally important that time is always correct and properly synchronized throughout the entire SCADA system.

This talk provides an overview of the many technologies that are used to maintain accurate time synchronization across a SCADA system. It begins with a technical explanation of time, and how time standards are maintained on a national and international scale. It then talks about how to select a reference time source that is appropriate to the needs of a SCADA system. Pros and Cons of several time sources and their associated costs are compared. Then the concept of a time server, and associated time synchronization protocols, is discussed. The talk concludes by sharing the best practices that were used to design the time synchronization strategy used by the SCADA system at a medium sized water utility in Southwestern, Ontario, Canada.

Learning Objective 1

Understand why time synchronization in a SCADA system is so important.

Learning Objective 2

Understand the various types of “time sources” that can be used for time synchronization in a SCADA system.

Learning Objective 3

Learn about best practices when implementing a time synchronization scheme within a SCADA system’s various components.

About the Speaker



Graham Nasby, P.Eng, PMP, CAP holds the position of Water SCADA & Security Specialist at City of Guelph Water Services, a public water utility located in Guelph, Ontario, Canada. Prior to joining Guelph Water, he spent 10 years in the engineering consulting community after completing his B.Sc.(Eng) at the University of Guelph. He is senior member of the International Society of Automation (ISA) and co-chair of the ISA112 SCADA System Standards Committee. In 2021, Graham was the recipient of the ISA’s society-level Standards Leader of the Year Award. Contact: graham.nasby@grahamnasby.com