

White Paper:

Accurate Time Essential for Video Surveillance Applications

As video surveillance hardware becomes IP-based, systems are able to take advantage of the network to improve efficiency and performance. Time synchronization, in which all the clocks in cameras, recording equipment, and computers have the same time, is simple to implement on the network. It utilizes a standard protocol and a network appliance known as a time server. What's more, the time server can be legally traceable to a time authority. The result is low-cost investment protection for the video system deployment.

Introduction

Security professionals thrive in a “What if?” world. What if a security system deployment is not synchronized? An employee in a major corporation clearly compromises corporate security, but the legal department declines to prosecute. Why? Because the physical security system shows him entering the area several minutes after a particular event was logged on the computer network. Time synchronization could have preempted this problem.

Assuming clocks in electronic devices are set correctly, they are inherently inaccurate because they drift. The risk of re-setting clocks at infrequent intervals, in separate systems, with different times compounded by normal clock drift is unnecessary and is a legal liability. A municipality came under public scrutiny and threat of lawsuit for inadequate response to a medical emergency. The time stamp on video shows a man collapsing at one time, but the 9-1-1 call was made much later. It was determined subsequently that the video recorder was manually set incorrectly.

A few years ago, 9-1-1 call centers were facing these types of lawsuits for allegedly not responding to emergencies in reasonable amounts of time. Time-stamped records, especially those logged on voice recorders, are often subpoenaed in court cases. It is imperative that these time records be legally traceable to a national standards authority. Synchronizing clocks to traceable time has proven to be a successful defense of time stamped evidence.

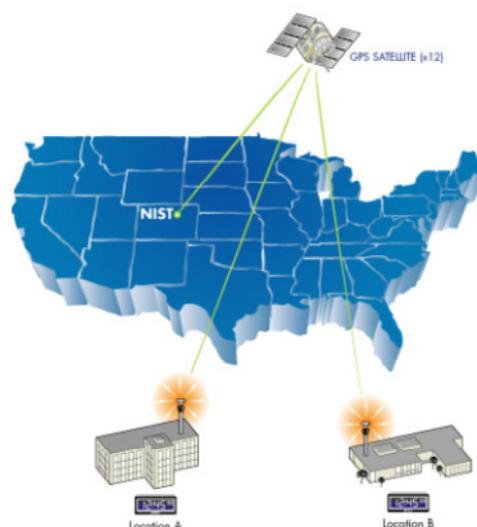
Best practices for the use of video surveillance have been published by The Scientific Working Group for Imaging Technology (SWGIT) as *Recommendations and Guidelines for the Use of CCTV in Security Systems for Commercial Institutions*. For security system data to hold up in a court of law, one must demonstrate the ability to accurately re-create the events surrounding a particular action. Accurate time stamping is essential for event reconstruction. The SWGIT recommendations specify the use of Network Time Protocol (NTP) for IP-based systems and GPS-based timing equipment as an industry-standard time synchronization method.

Legal issues aside, synchronizing clocks greatly improves the efficiency of operations for both the end user and the system integrator. Applications work as expected, interoperability is ensured, and the costs of troubleshooting and manually re-setting clocks are eliminated. Unsynchronized clocks lead to finger pointing. Synchronized clocks offer peace-of-mind for every IP video deployment.

Synchronization to Legally Traceable Time

Time, as measured by the second, is one of the seven legally-defined units of measure. Since the Treaty of the Meter of 1875, time has been coordinated worldwide. Today, official time, known as Coordinated Universal Time (UTC), is measured by vibrations of the cesium atom, an extremely accurate time constant. (UTC replaced Greenwich Mean Time [GMT] in 1972.) UTC is kept by national metrology institutes like the National Institute of Standards and Technology (NIST) in Boulder, Colorado. In order to synchronize clocks to accurate time, traceability to NIST is required.

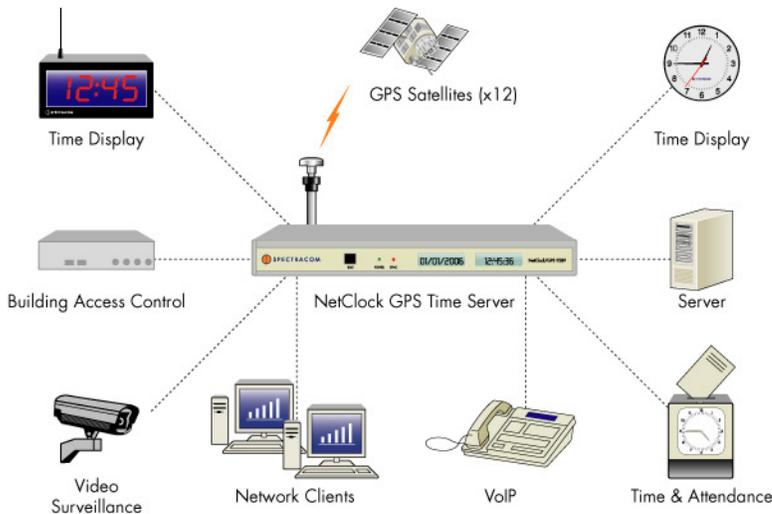
Implementing a NIST-traceable time synchronization system is made easy thanks to the Global Positioning System (GPS). GPS provides a secure and cost-effective way to provide a traceable time synchronization source to a facility. The GPS system includes 24



satellites carrying onboard atomic clocks. The U.S. Naval Observatory monitors the satellites' clocks and locks them to UTC for accuracy and traceability to national and international standards. We are all familiar with the use of GPS to provide driving directions. These systems use accurate time and the principle of triangulation to calculate the three-dimensional position anywhere on earth. The same GPS signal can also be used to synchronize a local "master clock" that is used to distribute time to every clock in the system.

Distribution of Network Time

Synchronization of security device clocks is a simple process for IP-based systems. Network Time Protocol (NTP) is an "open source" time synchronization distribution standard sponsored by the Internet Engineering Task Force. Client software for NTP is widely available for virtually any operating system and is typically preinstalled in IP-cameras, DVRs, computers, etc. Configuring an NTP client is straightforward once the network has a master clock — also known as a time server.



Time servers are available for general use on the Internet. The major benefit is they are free. Their primary liability is their use requires and an open port in the firewall and free sources of time cannot be guaranteed, nor traceable. What's more problematic, however, is they require continuous internet connectivity so they can't be used in closed security systems. In any implementation, using a time source "outside the network" is a liability and should be considered only after thorough risk analysis.

A GPS time server provides an integrated solution that enables accurate time stamps for video surveillance systems as well as access control systems, time and attendance, alarms, and other elements of the network infrastructure (routers, firewalls, etc.). Legally traceable timestamps provide necessary evidence and validation of events for

legal proceedings. For reliability and security, the time server synchronizes to the precision time code from GPS satellites. They operate safely behind the firewall to synchronize all elements of network hardware and software (including system logs) down to the millisecond over LANs or WANs, anywhere on the planet.

Improved Cyber Security

The convergence of security systems to the network does not distinguish between protecting physical assets and protecting data assets. An integrated security program requires regular review and analysis of network activity. System logs and the log files created by firewalls and intrusion detection systems are vital to the reduction of cyber security threats. If a network is not synchronized and all the computer clocks keep a different time, it becomes almost impossible to detect and analyze malicious activity on the network. Time synchronization allows analysts to determine accurately the effect of an intrusion so it can be dealt with efficiently.

Expanded Functionality. Network Security. Peace of Mind.

A GPS-based time server, such as the Spectracom NetClock® system, is a low cost and high reliability network element that offers worry-free network time synchronization. It tracks up to twelve satellites simultaneously for precise synchronizing to atomic clocks traceable to national and international standards. Installation and operation is simple; set-up and reporting are web-enabled. A NetClock time server can be accessed, under appropriate security policies, anywhere within a network. Features include browser-based remote diagnostics, configuration and control, and flash memory for remote software upgrades. Remote control and monitoring can also be done through SNMP and Telnet.

Installing a GPS time server on your network establishes the essential hub for integrated security systems. In addition to the Ethernet capability for IP networking, a NetClock time server features specialized time outputs for stand-alone devices like voice recorders, display clocks, fire alarms, and much more.

Conclusion

In the world of security professionals, establishing time synchronization is becoming more crucial if efficiencies and economies of scale of network convergence are to be realized, and as cyber threats to security continue to emerge. A GPS time server answers the growing need for accuracy, reliability, and traceability in mission critical systems across IP networks.

References

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- 2) The Scientific Working Group for Imaging Technology (SWGIT): <http://www.theiai.org/guidelines/swgit/index.php>
- 3) NTP Public Services Project: <http://ntp.isc.org/bin/view/Main/WebHome>
- 4) NIST Time and Frequency Division: <http://tf.nist.gov/>

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May 19, 2011 - WP02-101 (C)