

Intelligent Transportation Systems and ITS Standards

Standards are critical to the development of effective products and services. When properly implemented, they help businesses to expand national, regional and international markets. Costs and time to market for products and services can be reduced resulting in a competitive advantage. The U.S. DOT ITS Standards Program is working toward the widespread use of standards to encourage the interoperability of ITS systems. CohuHD is committed to building cameras that meet or exceed industry standards. This paper discusses the most important standards for traffic management, their benefits, and how CohuHD products comply with those standards.

ITS standards are designed to promote interchangeability and interoperability. ITS (Intelligent Transportation Systems) advocates advanced communications-based information, electronics technologies, and applications that improve the safety, security and efficiency of the nation's transportation system. The standards that apply to these technologies are voluntary (not mandated by law), consensus-based, and open (not proprietary and available for anyone to use).

ITS standards define how ITS systems, products, and components can interconnect, exchange information, and interact to deliver services within a transportation network. These standards establish communication rules, not design standards. The use of standards assures transportation agencies that components from different manufacturers will work together. Results include greater efficiency, improved mobility and safety, and compatibility and interoperability within the industry. Some ITS standards are adopted around the world.

Benefits of Using ITS Standards Compliant Devices

- Promoting interchangeability and interoperability.
- Avoiding early obsolescence.
- Providing a choice of vendors. Freedom from dependence on a particular manufacturer whose products are only compatible with other devices from that manufacturer.
- Inter-jurisdictional coordination. Agencies within the same jurisdiction can benefit by combining resources for joint procurement.
- Significant reduction in deployment costs.

National Transportation Communications for ITS Protocol (NTCIP)

NTCIP is a family of communications standards for transmitting data and messages between computer systems used in Intelligent Transportation Systems (ITS). NTCIP compliant devices exchange and interpret data through common communications interfaces. This allows for interoperability and interchangeability between computers and electronic traffic control equipment from different manufacturers. The NTCIP standards describe electronic communication over a wide variety of communication media, including serial, dial up, network and wireless applications. Many countries have adopted NTCIP standards for their video communications devices. Brazil has mandated that any ITS devices or software deployed in the country on a federal road must meet NTCIP standards. South Africa has deployed NTCIP-conforming equipment on its roads. Most of the Persian Gulf countries that have a strong infrastructure (Saudi Arabia, United Arab

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Emirates, Qatar, and Bahrain) are requesting NTCIP central system software for their countries' ITS infrastructure.

Benefits of NTCIP Standards Compliant Devices

- Consistent interface with the Central System, which eases deployment.
- More cost effective and less time consuming upgrades to the system.
- Vendor unique features can be added to the standardized core functions.

NTCIP 1205: Objects for CCTV Camera Control

The NTCIP standards used in ITS Systems have Management Information Bases (MIBs) for each type of device. The MIBs are used by equipment manufacturers, system integrators, and agencies that deploy NTCIP-conforming equipment. Each MIB is a controlled document that is managed by NEMA. Electronic versions of the MIBs are available from the NEMA FTP site at <http://www.ntcip.org/library/MIB/>.

The MIB for Closed-Circuit Television (CCTV) is referred to as NTCIP 1205. The MIB is a text document that defines all of the functions that are implemented by each type of device. For a CCTV camera, the functions include commands such as pan, tilt and zoom. The MIB text file is compiled into a machine readable format that can be used by the target processor. In the case of a camera, the compiled MIB runs on a processor inside the camera. The same MIB can be compiled for use on the processor of a client machine in which an operator can issue camera control commands. Thus, by defining the commands for a device in a standard MIB, interoperability can be achieved between any device and any control software meeting the standard.

NTCIP Guide

An overview of NTCIP is provided by a NEMA document titled the NTCIP Guide. The Guide covers a number of areas including basic understanding, procuring NTCIP devices and systems, and matching agency needs with NTCIP devices. The guide provides an overview of the NTCIP family of protocols and profiles; it also covers system design, implementation, and basic testing concepts.



Figure 1
CohuHD 3960HD during Temperature Test

NTCIP 1250 over Internet Protocol (IP) Communication

The NTCIP standards were originally developed during the 1990's. At that time, virtually all CCTV devices were controlled via Point-to-Multi-Point (PMPP) serial connections. In this scenario, either an RS-232 or RS-422 serial port operating at 9600 baud was the only communications option available. NTCIP is normally used for device setup or to obtain statistical data from devices such as Message Signs or Traffic Controllers.

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For devices of this type, the message turnaround time is not very important. However, for real-time control of a CCTV device, the turnaround time for commands such as pan, tilt and zoom can make control difficult due to the latency caused by the bulky nature of NTCIP. As a result, the 9600 baud serial connection made real-time device control possible, but not practical for CCTV devices.

The proliferation of IP-based video cameras made it possible for NTCIP to become practical for real-time control because the speed of network communications eliminates any issues caused by the length of the control and response messages. A typical NTCIP message for CCTV is roughly 50 to 55 bytes, which takes very little time to transmit at today's network communication rates.

National Electrical Manufacturers Association (NEMA) TS2 Standards

NEMA TS2 standards were established by the National Electrical Manufacturers Association to define safe traffic control equipment. Section 2 of the standards contains the environmental and testing requirements, including guidelines for temperature (-34 to 74°C), humidity (8% to 90% RH, noncondensing), vibration (0.5 g @ 5 to 30Hz), and shock (10G's for 11ms).

Ingress Protection (IP) Standards

One of the most important specifications for the traffic industry is IP67 standard regarding contaminant intrusion. As defined in IEC 60529, the IP Code (Ingress Protection Rating, sometimes also interpreted as International Protection Rating) classifies and rates the degrees of protection provided against the intrusion of solid objects, accidental contact, dust, and water in mechanical casings and with electrical enclosures. In IP67 the first digit designates the level of protection against dust intrusion, and the second against water intrusion. IP67 standard states that enclosures are to be totally protected against dust, and against the effect of water immersion between 15 cm and 1 m, no ingress permitted. CohuHD camera enclosures containing optics are sealed to the IP67 standards.

Conformance of CohuHD cameras to NTCIP, NEMA TS2, and IP67 standards

CohuHD i-Series cameras (i-dome and i-View II) feature the exclusive CohuHD multi-protocol control firmware which meets NTCIP 1250 standards. This allows incorporation of CohuHD cameras into an existing control system of other major manufacturers. For traffic management video systems, i-View II can also be configured with NTCIP control language. All camera and positioner functions are controlled by the integrated receiver/driver, operable via RS-422 or RS-232 serial communications with digital position feedback. WinMPC controls camera and positioner functions. Traffic management professionals can install i-view II for immediate NTCIP 1205 compatibility. Helios Video systems include NTCIP 1205 transmitted through IP communication protocol in order to provide standardized interoperability of 3rd party systems equipment.

By complying with the IP67 standard, CohuHD products satisfy NEMA requirements for environmental protection and assure customers of high quality. Furthermore, for years, CohuHD cameras have been built to surpass the IP67 level. Camera barrels are pressurized with dry nitrogen. Sealing and pressurization are the key features of CohuHD cameras that enable them to typically last 10-20 years in outdoor environments.

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CohuHD camera systems are designed to conform to NEMA TS2 requirements and pass environmental tests on shock, vibration, temperature, humidity, transients, and voltage. Figure 1 illustrates a CohuHD camera during NEMA TS2 tests.

CohuHD Cameras Meet and Exceed ITS standards

CohuHD is able to offer camera systems that can communicate with any Traffic Device in NTCIP protocol. By integrating NTCIP standards into the CohuHD i-Series and Helios product lines, CohuHD offers compatibility with products from multiple vendors supporting ITS systems. CohuHD cameras are designed for use in harsh operational environments. They comply with NEMA TS2 requirements for temperature, power, shock and vibration, as well as IP67 environmental standards. Cameras withstand the severe cold of Alaska, the heat of the deserts in Saudi Arabia, the humidity of Florida and Brazil, and the salt air on ships around the world. CohuHD is committed to providing high quality intelligent transportation solutions to customers.

About CohuHD Costar™

[CohuHD Costar™](#) is a leading manufacturer of high-definition video surveillance camera systems designed for the performance requirements associated with critical infrastructure applications and is now part of [Costar Technologies, Inc.](#)

CohuHD Costar solutions integrate the latest high-definition video imaging and compression technologies into our ruggedized camera products. CohuHD Costar is a high-value, solutions provider for monitoring in the most critical, sensitive environments. We focus on providing the most reliable, rugged, outdoor PTZ cameras in the market.

For more than 50 years, we have manufactured in the U.S. the most reliable, rugged video cameras available.

For more information on CohuHD's products, please visit www.cohuHD.com. Follow us on youtube.com/cohuhd, twitter.com/cohuhd, linkedin/company/cohuhd, and facebook.com/cohuhd.