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H.264 EMBEDDED DIGITAL VIDEO RECORDER

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 20 00 Video Surveillance

28 23 00 Video Management System

28 23 29 Video Surveillance Remote Devices and Sensors

Notes to Specifier:

1. Where several alternative parameters or specifications exist, or where, the specifier has the option of inserting text, such choices are presented in **<bold text>**.
2. Explanatory notes and comments are presented in **colored** text.
3. Include related sections as appropriate if embedded digital video recorder system is integrated to other systems
4. CSI MasterFormat 2016 incorporates numerous significant changes affecting electronic safety and security. This document is written to provide flexibility in using either format, although adoption of MasterFormat 2016 is encouraged. The following is a guide to the MasterFormat numbers relevant to the product referenced in this specification.
4. MasterFormat 2014 Specification Category:

28 23 29 - Video Surveillance Remote Devices and Sensors

H.264 EMBEDDED DIGITAL VIDEO RECORDER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Product - The Network Video Recorder with Ethernet connectivity system for video surveillance, including design, supply, installation, and commissioning.
- B. *Related Requirements*
 - 1. Section 26 05 00: Common Work Results for Electrical, for interface and coordination with building electrical systems and distribution.
 - 2. Section 28 05 13: Conductors and Cables for Electronic Safety and Security, for cabling between system servers, panels, and remote devices.
 - 3. Section 28 05 28: Pathways for Electronic Safety and Security, for conduit and raceway requirements.
 - 4. Section 28 23 13: Video Surveillance Control and Management Systems.
 - 5. Section 28 23 16: Video Surveillance Monitoring and Supervisory Interfaces.
 - 6. Section 28 23 23: Video Surveillance Systems Infrastructure.
 - 7. Section 28 23 29: Video Surveillance Remote Devices and Sensors.

1.02 REFERENCES

- A. Reference Standards: Provide systems that meet or exceed the requirements of the following publications and organizations as applicable to the work of this Section.
 - 1. Conformity for Europe (CE).
 - 2. Electronic Industry Association (EIA).
 - 3. Federal Communications Commission (FCC).
 - 4. Restriction of the Use of Certain Hazardous Substances (RoHS).
 - 5. Underwriters Laboratories Inc. (UL)

1.03 SYSTEM DESCRIPTION

- A. The Network Video Recorder with Ethernet connectivity shall require minimal training for the end user. The unit shall be operated like a conventional multiplexer and VCR with local display monitors for live and playback viewing while the system continues to record new images for 1-16 IP cameras, up to 5MP in resolution. It shall be an integrated security system, capable of time division multiplexing and real time recording multiple cameras, storing their digitized and compressed images on local hard drives for fast search and retrieval either locally at the unit, or from a remote workstation using a Graphical User Interface (GUI).
- B. In addition, the network video recorder shall have local ethernet input to power and control up to 16 IP cameras. The PoE ports shall power the cameras and offer direct camera network management from the system.
- C. The system shall provide automated alarm handling. Upon receipt of an alarm, the system shall be able to automatically change display and record speed, provide relay output operation, PTZ control, and send an email alert. During investigations, it shall be possible to search and retrieve stored video data by date, time, camera, and alarm.
- D. The network video recording system shall use H.264 compression, include from 3 TB to 24 TB of hard disk drive internal storage. It shall have simultaneous HDMI/VGA and CVBS composite outputs, with two USB ports and an internal 10/100/1000 Gbps network adapter as standard equipment.

1.04 SUBMITTALS

- A. General: Submittals shall be made in accordance with the Conditions of the Contract and Submittal Procedure Section.
- B. Manufacturer's Product Data: Submit manufacturer's data sheets indicating systems and components proposed for use, including instruction manuals.

- C. Shop Drawings: Submit installation drawings, including connection diagrams for interfacing equipment, list of connected equipment, and locations for major equipment components. Shop drawings shall indicate surrounding construction as provided for the Project.
- D. Project Record Drawings: Indicate location of equipment and wiring on project record drawings. Submit an electronic version of the project record drawings not later than Substantial Completion of the Project.
- E. Operation and Maintenance Data: Submit manufacturer's operation and maintenance data customized to the system installed. Include operator manuals.

1.05 QUALITY ASSURANCE

- A. Qualifications: Manufacturers shall have a minimum of 10 years full time experience in manufacturing and maintaining digital video recorder systems. Manufacturer shall provide toll-free technical assistance and support available Monday thru Friday, 8:00AM to 8:00PM EST. Installers shall have a minimum of 2 years of experience installing similar systems and shall be acceptable to the manufacturer of the digital video recorder system.
- B. Regulatory Requirements:
 - 1. Emissions: FCC, Part 15, Class A; CE (EN 55022).
 - 2. Immunity: CE (EN 50130-4).
 - 3. Safety: UL/CSA 60950-1; CE (EN 60950-1).
- C. Power Requirements: Input voltage shall be 12 V DC, 9 A.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Deliver products in manufacturer's labeled packages.
- B. Storage and Protection: Store and handle products in accordance with manufacturer's requirements in facility where environmental conditions are within recommended limits.

1.07 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with environmental requirements and recommendations of manufacturer for proper installation of products.
- B. Temperature Criteria: Do not install digital video recorder system unless temperature is between 14° 41° F (5° C) to 104° F (40° C).

1.08 WARRANTY

- A. Manufacturer's Guarantee: two years for parts and labor from the manufacture date code under normal use and service for the digital video recorder system, 5 years for hard drives.

END OF SECTION

PART 2 PRODUCTS**2.01 EQUIPMENT**

- A. Manufacturer: Digital Watchdog, Inc.
16220 Bloomfield Avenue. Cerritos,
California USA 90703 USA
Phone: (866) 446-3595
Web: www.digital-watchdog.com
E-mail: dw-tech@dwcc.tv
- B. Models DW-VP16xT16P
- C. Alternates:
- | | |
|---------------|-----------------------|
| DW-VP163T16P | 3TB internal storage |
| DW-VP164T16P | 4TB internal storage |
| DW-VP166T16P | 6TB internal storage |
| DW-VP169T16P | 9TB internal storage |
| DW-VP1612T16P | 12TB internal storage |
| DW-VP1618T16P | 18TB internal storage |
| DW-VP1624T16P | 24TB internal storage |

2.02 SYSTEM COMPONENTS

- A. Specified Product: the Network video recorder (NVR) system shall function as a standalone unit. It shall not require the use of a personal computer, special monitors, or other peripheral devices for either programming or operation. Live and recorded playback of video images shall display on conventional CCTV monitors or LCD monitors.
- B. The NVR shall be capable of displaying onscreen text and menus in more than one language. This shall be user-selectable via the menu system.
- C. Status LEDs
1. Power: A steady green light indicates the recorder is working correctly.
 2. Station: STA light is on when the system is being accessed remotely.
 3. Record: REC indicator blinks red when data is being read from or written to the HDD. A steady red light indicates an HDD exception or error.
 4. Network status: Flashing indicates a normal network connection. No light indicates that it is not connected to a network.
- D. Cabling: The recorder shall be provided with a built-in power supply to prevent susceptibility to power spikes, surges, harmonics, and other common electrical disturbance phenomena associated with the installation environment.
- E. PoE Power Sources:
1. The network video recorder shall include built-in PoE ports for cameras
 - a. 16CH local PoE inputs
 2. The PoE camera interfaces shall use RJ45 connectors and shall support a data connection of 10 Mb or 100 Mb
 3. The PoE budget per port shall be self-adaptive. The user must be able to adjust the budget manually.
 4. A PoE port shall support up to 30 W maximum.
 5. The total budget for the 16-channel recorder it shall be 200 W.

6. There will be a dynamic tracking of the PoE power consumption. This will be visualized in the OSD and via the web GUI.

2.02 OPERATIONAL REQUIREMENTS

A. Hardware:

1. That NVR shall provide up to 16 PoE video inputs.
2. The NVR shall provide HDMI and VGA output at up to 1920x1080 resolution.
3. The NVR shall provide a CVBS composite output at D1 resolution.
4. The NVR shall provide 1920 x 1080 (1080p) real-time recording resolution.
5. The NVR shall use H.264 image compression.
6. The NVR shall offer the following recording resolutions:
 - a. 16-channel:
 - 1.) 480 x 240: Max 30fps per channel, total 360fps.
 - 2.) 960 x 240: Max 30fps per channel, total 360fps.
 - 3.) 960 x 480 / 720p: Max 30fps per channel, total 360fps.
 - 4.) 1920 x 1080 / 1080p: Max 30fps per channel, total 360fps.
 - 5.) 3MP: total 360fps.
7. The NVR shall provide as standard equipment 2 USB ports and an internal 10/100/1000 Gbps network adapter.
8. The NVR shall support operation using the IR remote control, external keyboard or USB mouse.
9. The NVR front panel shall include the following items:
 - a. USB port for saving video clips to external storage devices.
 - b. LED status indicators, including indicators for power, hard disk drive activity, and network activity.
10. The NVR rear panel shall include the following items:
 - a. PoE video inputs
 - b. RCA audio inputs and audio output.
 - c. RS-485 PTZ control interface.
 - d. Alarm inputs and relay outputs, NO/NC.
 - e. BNC monitor output.
 - f. HDMI monitor output.
 - g. VGA monitor output.
 - h. USB port for connecting a mouse.
 - i. RJ-45 10/100/1000 Base-T Ethernet port.
 - j. Low voltage DC power supply jack.
11. The NVR shall be preconfigured with a DHCP-enabled IP address and subnet mask for quick integration within existing IT structures.
12. The NVR shall have log view screens to show the entire system status at a glance.
13. The NVR shall support Auto Install to do the following:
 - a. Automatically detect loss of video sync, with onscreen indicators. If video loss is detected during recording, the NVR will warn by onscreen message, sending a message to remote, sounding a buzzer, and switching a relay.
14. The NVR shall be one and a half units of rack space in height (1.5U) and capable of being rack mounted (EIA 19-inch standard), with rack mount hardware that was designed by the manufacturer to support the units.
15. The NVR shall provide PTZ dome control—including multiple pan, tilt, zoom, and focus speeds, iris control (including return to auto-focus), programming presets, and viewing presets—through the RS-485 port.
16. The NVR shall support alarm sensor in and relay out functions, motion detection, and video loss detection, and shall include alarm monitoring software.
17. The NVR shall include a system log that records and displays information relating to alarm events, reboots, and other system information. The user shall have the ability to export the log information.
18. The NVR shall be equipped with self-diagnostic functions, including S.M.A.R.T. disk health check.
19. The NVR shall adjust for Daylight Saving Time changes, with no loss of video when the clock advances forward one hour. When the clock is adjusted backward when Daylight Saving Time ends, the NVR shall record both hours, allowing the user to select which hour to play back.

20. The NVR shall include a user management console that allows the administrator to create, edit, and delete user accounts.
- B. Network Video Recorders Features:
1. The NVR shall support Digital Zoom in a user defined area in both live and playback.
 2. The NVR shall include a bandwidth throttle to ensure that images and system messages are delivered as quickly as possible within network bandwidth limits.
 3. The NVR shall prevent unauthorized program tampering through the use of at least sixteen users and passwords, with settings including:
 - a. Local user privileges
 - b. Remote user privileges
 - c. Local play privileges
 - d. Remote play privileges
 - e. Remote view privileges
 4. The NVR shall display video in full screen or multi-screen format, with the camera number, a user-definable camera name, and the camera's recording/alarm status displayed for each camera.
 5. The NVR shall support continuous, event, and combined continuous/event recording that is user-configurable by channel, and shall support manual recording overrides of the recording schedule.
 6. The NVR shall include playback controls that allow the user to play back recorded video forward or backward at multiple speeds.
 7. The NVR shall include backup viewer software that allows the user to play back exported video in its proprietary format on a PC.
 8. The NVR shall allow the user to perform index-based searches of recorded video.
 9. The NVR shall support adjustments to the picture resolution, brightness, contrast, color, motion sensitivity, and images per second during recording, and these settings shall be user-configurable by channel.
 10. The NVR shall display status icons on the connected monitors. Camera status icons shall be used for each camera. There shall be an icon for:
 - a. Alarm detection by the camera channel
 - b. Recording of the camera channel
 - c. Motion detection by the camera channel
 - d. There will be a message in case of video loss for each channel
 11. The NVR shall allow the user to select whether the hard drive recording should automatically overwrite data (starting with the oldest data first), or if recording will stop when the hard drive is filled.
 12. The NVR shall have image quality settings that are adjustable on a per-camera basis by the end user, including the following:
 - a. CIF, D1, 1.3MP, 2.1MP, 5MP
 - b. Streaming bandwidth: by User (128-16384 Kb), 16 Mb, 8 Mb, 4 Mb, 3 Mb, 2 Mb, 1.75 Mb, 1.5Mb, 1.25 Mb, 1 Mb, 896 Kb, 768 Kb, 640 Kb, 512 Kb, 448 Kb, 384 Kb, 320 Kb, 256 Kb, 224 Kb, 192 Kb, 160 Kb and 128 Kb
 13. The NVR shall support camera bandwidth of up to 80/160/256/320 Mbps for incoming camera connections
 14. The NVR shall support from one to thirty seconds of pre-alarm recording, and shall include this buffer to the beginning of all recorded alarms.
 15. The NVR shall allow the user to manually or automatically customize the record rates per camera for events and motion detection.
 16. The NVR shall allow the installer to setup a sub stream for streaming Video and Audio over Network without affecting the record rate, quality, and resolution of recorded video.
 17. Multiscreen
 - a. The NVR shall be a multiplex type unit, allowing simultaneous recording, playback, and live multiscreen viewing at the unit, with no need for additional hardware.
 - b. The NVR shall provide the following displays in live mode: full screen, sequencing, 4-way, 6-way, 8-way, 9-way, or 16-way.
 - c. The NVR shall incorporate the following display options:
 - 1.) Title display enable/disable, per channel
 - 2.) Time/date formatting
 - 3.) Time/date enable/disable, per channel

- d. The NVR shall provide image update rates for live and record modes of up to 30 fps per channel.
 - 1.) The NVR shall have three monitor outputs as follows:
 - The NVR can use the BNC, HDMI and VGA outputs independently.
 - a.) One analog Multiscreen output
 - i. Composite video, BNC connector
 - ii. Shall display event video
 - b.) One digital Multiscreen output
 - i. HDMI connector
 - ii. Shall be able to display all cameras live or in sequence mode
 - iii. Shall display live, playback, and programming functions
 - c.) One analog multiscreen output
 - i. VGA connector
 - ii. Shall display live, playback, and programming functions
 - iii. Shall be able to display all cameras live or in sequence mode
- 18. Video motion detection
 - a. The NVR shall support the following video motion detection, with on-screen indications when motion is occurring:
 - b. Motion detection, which shall be treated as an event and follow the event encoding settings.
 - 1.) The NVR shall support an onscreen setup scale to determine the optimum sensitivity setting for each camera input.
 - 2.) The NVR shall have 396 zones per camera, arranged in a 22 by 18 grid.
 - 3.) The NVR shall have 7 levels of sensitivity.
- 19. Alarms
 - a. The NVR shall support up to 4 alarm inputs, programmable as normally open or normally closed from within the menus.
 - b. The NVR shall have a fully programmable additional audible device to alert the user to alarms, motion detection, and video loss occurrences or operation failure.
 - c. The NVR shall support alarm latching with two settings, which shall be manually set or programmable from the menus as follows:
 - 1.) Manual acknowledge – When an alarm is activated, the NVR shall be manually acknowledged to reset the COS back to normal condition.
 - 2.) Timed out – the alarm shall automatically reset after a user-defined elapsed time.
 - d. The NVR shall have automatic full screen associated alarm display that shall change as incoming alarms continue to arrive. As additional alarms arrive, the display monitor shall sequence between the cameras in alarm.
 - e. The NVR shall provide status relays that shall link to alarms, motion detection, and video loss.
 - f. The NVR shall have an alarm history display capable of showing the last 100 alarms received by the system.
 - g. The NVR shall be supplied with push-in wire terminal connections to facilitate easy connection of alarms and other input/output signals.
- 20. Ethernet communications
 - a. The NVR shall support LAN/WAN Ethernet access.
 - b. The NVR shall support Ethernet bandwidths of 100 Mbps or 1000 Mbps.
 - c. The NVR shall support simultaneous Ethernet access by not less than 16 workstations connected to the LAN/WAN.
 - d. The NVR shall be provided with a Graphical User Interface (GUI) software for remote playback and viewing that shall support the Windows 7, 8 and 10 operating systems and full searching capabilities. It shall be possible to remotely set up the NVR unit using the remote viewing software.
 - e. The NVR shall provide remote operation and configuration through remote viewing software, a web client, and mobile device applications (Apple and Android).
 - f. The NVR's remote viewing software shall include, at a minimum, the following functions:

- 1.) Viewing live video.
 - 2.) Searching recorded video.
 - 3.) Exporting still images (in JPEG format) and video clips (in PSF format).
 - 4.) Controlling PTZ cameras.
 - g. The NVR shall not stop recording during any Ethernet access.
 - h. The NVR shall allow the user full programming of Ethernet parameters, including the following:
 - 1.) DHCP (enable/disable)
 - 2.) DDNS
 - 3.) IP address
 - 4.) Default gateway
 - 5.) Sub-net mask
 - 6.) HTTP port
 - 7.) Main port
- C. Archiving
1. The NVR shall support archiving of recorded images through USB memory stick.
 2. The NVR shall support archiving of recorded images through eSATA to an external eSATA HDD.
 3. The NVR shall support archiving of recorded video and audio data through eSATA to an external eSATA HDD.
 4. The NVR shall have an option to select the type of archiving device connected, when interfaced to the devices specified or approved equals.
 5. The NVR shall support selective archiving.
 6. The NVR shall have an on-screen progress indicator when selective archiving or restoration operations are accessing the archive device.
 7. The NVR shall have an override mode that may be enabled or disabled, preventing any video that is older than a user-defined period from being viewed or archived, when the unit is used in jurisdictions that mandate a finite storage time. Automatic Delete Mode shall be programmable from 0 to 60 days.
- D. Recorder hard drives
1. The NVR shall record video on a hard drive. No videotape or videotape recorders shall be required.
 2. The NVR shall offer the following internal hard disk drive (HDD) storage options:
 - a. 3TB
 - b. 4TB
 - c. 6TB
 - d. 9TB
 - e. 12TB
 - f. 18TB
 - g. 24TB
 3. The utilized hard drives shall support the latest SATA technology including SMART reporting.
 4. The utilized hard drives shall be especially developed for the Digital Video Archiving Industry.

2.03 SYSTEM HARDWARE

- A. The network video recorder shall have the following mechanical specifications:
1. Unit Dimensions (D × W × H): 11.02" x 9.65" x 1.89" (280 x 245 x 48mm).
 2. Unit Weight: 5.56lbs (2.52kg).
 3. Construction:
 - a. Housing: Steel chassis.
 - b. Finish: Black matte finish.
- B. The digital video recorder shall have the following electrical specifications:
1. Voltage: 12 V DC.

2. Power Consumption: 200W, 8.3A.
- C. The network video recorder shall be designed to meet the following environmental conditions:
 1. Operating Temperature: 41° F (5° C) to 104° F (40° C).
 2. Relative Humidity: 20% to 90%, non-condensing.

2.04 MANUFACTURER SUPPORT

- A. Manufacturer shall provide customer service, pre-sales applications assistance, after-sales technical assistance, access to online technical support, and online training using Web conferencing.
- B. Manufacturer shall provide technical assistance and support by means of a toll-free telephone number at no extra charge Monday thru Friday, 8:00AM to 8:00PM EST.

END OF SECTION

PART 3 EXECUTION**3.02 INSTALLERS**

- A. Contractor personnel shall comply with all applicable state and local licensing requirements.

3.03 PREPARATION

- A. The network design and configuration shall be verified for compatibility and performance with the camera(s).
- B. Network configuration shall be tested and qualified by the Contractor prior to camera installation.

3.04 INSTALLATION

- A. Contractor shall follow all Manufacturer published installation procedures and guidelines.
- B. Before permanent installation of the system, the system shall be factory tested in conditions simulating the final installed environment
 - 1. A report indicating successful test results shall be produced.

3.05 STORAGE

- A. The H.264 embedded digital video recorder system shall be stored in an environment where temperature and humidity are in the range specified by the Manufacturer.

END OF SECTION