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64 CHANNEL H.265 NETWORK VIDEO RECORDER

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

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.

Important: See further notes on the following page.

Important Note to Security Systems Specifiers

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.

Primary Specification Area:**MasterFormat 2014:**

- 28 23 19 Electronic Surveillance
- 28 23 00 Video Surveillance
- 28 23 19 Digital Video Recorders and Analog Recording Devices

MasterFormat 2016:

- 28 05 00 Common Work Results
- 28 05 xx Storage Appliances for Electronic Safety and Security
- 28 05 xx.xx Network Video Recorders

Related Requirements:**MasterFormat 2014:**

- 27 20 00 Data Communications
- 28 23 13 Video Surveillance Control and Management Systems
- 28 23 16 Video Surveillance Monitoring and Supervisory Interfaces
- 28 23 19 Video Surveillance Remote Devices and Sensors
- 28 23 23 Video Surveillance Systems Infrastructure

MasterFormat 2016

- 27 15 01.xx Video Surveillance Communications Conductors and Cables
- 27 20 00 Data Communications
- 28 05 xx.xx PoE Power Sources for Electronic Safety and Security
- 28 05 xx Cyber Requirements for Electronic Safety and Security
- 28 05 xx Safety and Security Network Communications Equipment
- 28 2x xx IP Cameras
- 28 2x 00 Video Management System

64 CHANNEL NETWORK VIDEO RECORDER

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes a 64 channel network video recorder.
- B. Product - A 64 channel network video recorder, ONVIF compliant, with support for H.265, H.264, and MJPEG compression with resolution up to 4K and recording bandwidth of 400 Mbps.
- C. Related Requirements

Refer to MasterFormat notes at the beginning of this document to select requirements specific to the MasterFormat version being used in the specification.

1.02 REFERENCES

- A. Abbreviations
 - 1. ARP – Address Resolution Protocol
 - 2. DHCP - Dynamic Host Configuration Protocol
 - 3. DNR – Digital Noise Reduction
 - 4. DDNS – Dynamic Domain Name Server
 - 5. fps - frames per second
 - 6. GUI – Graphical User Interface
 - 7. HDD – Hard Disk Drive
 - 8. HTTP - Hypertext Transfer Protocol
 - 9. ICMP – Internet Control Message Protocol
 - 10. IGMP - Internet Group Management Protocol
 - 11. IP - Internet Protocol
 - 12. iSCSI – Internet Small Computer System Interface
 - 13. JBOD – Just a Bunch of Disks
 - 14. JPEG - Joint Photographic Experts Group
 - 15. MJPEG - Motion JPEG
 - 16. MP - Megapixel
 - 17. MPEG - Moving Pictures Experts Group
 - 18. NAS – Network Attached Storage
 - 19. NTP - Network Time Protocol
 - 20. POS – Point of Sale
 - 21. PPPoE – Pont to Point Protocol over Ethernet
 - 22. RAID – Redundant Array of Independent Disks (Drives)
 - 23. RTP - Real-Time Transport Protocol

24. RTCP – Real-Time Control Protocol
25. RTSP - Real-Time Streaming Protocol
26. SMTP - Simple Mail Transfer Protocol
27. SNMP – Simple Network Management Protocol
28. SSL – Secure Sockets Layer
29. TCP - Transmission Control Protocol
30. UDP - User Datagram Protocol
31. UPnP – Universal Plug and Play
32. VMS - Video Management System
33. PoS – Point of Sales

B. Reference Standards

1. Network - IEEE
 - a. 802.3 Ethernet Standards
 - b. 802.1x Port-based Network Access Control
2. Video
 - a. H.265
 - b. H.264
 - c. MJPEG
 - d. ONVIF – Profile S
3. Emissions
 - a. FCC-47 CFR Part 15 Subpart B Class A
 - b. EN 55022:2010, Class A
4. Immunity
 - a. EN 50130-4:2011
 - b. EN 61000-3-2:2006+A2:2010
 - c. EN 61000-3-3:2008
5. Safety
 - a. UL Listing

C. Definitions

1. CIF Resolution – 352 x 288 pixels
2. JBOD - a collection of hard disks that have *not* been configured to act as a redundant array of independent disks (RAID) array.
3. GOV (Group of Video object planes) - A set of video frames for H.264 and H.265 compression, indicating a collection of frames from the initial I-Frame (key frame) to the next I-Frame. GOV consists of 2 kinds of frames: I-Frame and P-Frame.
4. WiseStream – Smart Codec that controls quantization parameter in H.265 and H.264 to efficiently manage bitrate of the video stream and reduce the storage required.
5. Dynamic GOV – Dynamic assignment of GOV length based on the complexity of the scene to efficiently manage bitrate of the video stream and reduce the storage required.
6. ARB (Auto Recovery Backup) – Automatic backup mechanism that enables WiseNet cameras to store videos on to SD card during the network failure and stream it to the storage device after the network is recovered.

1.03 SUBMITTALS

- A. Product Data
 - 1. Manufacturer's printed or electronic data sheets
 - 2. Manufacturer's installation and operation manuals
 - 3. Warranty documentation

1.04 QUALIFICATIONS

- A. Manufacturer shall have a minimum of five years' experience in producing IP video equipment.
- B. Installers shall be trained and authorized by the Manufacturer to install, integrate, test, and commission the system.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver the product in the manufacturer's original, unopened, undamaged container with identification labels intact.
- B. Store the product in a temperature and humidity environment specified in Section 2.04, Mechanical and Environmental, protected from mechanical and environmental conditions as designated by the manufacturer.

1.06 WARRANTY, LICENSING AND SUPPORT

- A. Manufacturer shall provide a limited 3 year warranty for the product to be free of defects in material and workmanship.

END OF SECTION

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Manufacturer: Hanwha Techwin
<http://security.hanwhatechwin.com/>
- B. Model PRN-4011
- C. Alternates: None

2.02 GENERAL DESCRIPTION

- A. The 64 channel Network Video Recorder ("NVR") shall record video and audio from up to 64 network video cameras to a hard disk array of 1 - 12 HDD's and enable playback of video and audio from the hard disk array.
- B. The NVR shall provide a remote monitoring environment for video and audio over the network using a remote computer.
- C. The NVR shall have the following further general properties:
 - 1. Camera search and discovery: The NVR shall have the capability to search the network for connected compatible cameras.
 - a. If 64 or fewer cameras are searched or discovered, each camera will be automatically registered and current camera information (fps, days of recording) displayed.
 - b. If more than 64 cameras are searched or discovered, the NVR shall provide the ability to selectively register up to 64 cameras.
 - 2. The NVR shall support WiseStream and Dynamic GOV, a smart codec used by WiseNet IP cameras to efficiently manage bandwidth.
 - 3. The NVR shall support dual monitor out. Dual out is available in both clone mode and expand mode.
 - 4. The NVR shall support ARB and N+1 failover for redundancy.
 - 5. Recording and playback functions:
 - a. Support recording from 352 x 288 (CIF) up to 4000 X 3000 (12 MP) per channel
 - b. 400 Mbps network camera recording throughput
 - c. Simultaneous playback capability up to 16 video channels available in both local and remote.
 - d. H.265, H.264, and MJPEG compression support
 - e. View status of internal connected storage hardware with alarm features in case of malfunctioning.
 - f. Set recording schedules
 - g. Set up triggered recording based on:
 - 1.) sensor (input) detection
 - 2.) camera event
 - 3.) video loss detection
 - h. Available recording settings by channel for standard and event-based recording types:
 - 1.) compression type
 - 2.) resolution
 - 3.) images per second

- 4.) quality
- 5.) data transfer limit
- 6.) pre-event and post-event record duration
- 7.) I-frame and full frame recording
- i. Available actions upon reaching full HDD storage capacity (with alarms):
 - 1.) stop recording
 - 2.) overwrite
- j. Search recorded data by time, event, or heat map
- 6. Storage
 - a. Up to 12, hot-swap 8TB HDD's in RAID 5 and RAID 6 configuration.
 - b. Up to 12, 8TB HDDs in JBOD configuration.
 - c. Support for Network Attached Storage (iSCSI)
 - d. USB connection for memory/storage device for video clip backup and settings export
 - e. Automatic backup based on schedule set in SSM (Techwin's VMS).
- 7. Live view:
 - a. Live, remote monitoring using Windows Network Viewer or Manufacturer supplied viewer
 - b. Configure and exercise functions for connected PTZ cameras, including functionality with compatible USB and network joystick and VMS.
 - c. Capture and save snapshot images
 - d. Record current video in AVI format
 - e. Record current video in SEC format with measures to prove authenticity of video.
- 8. Remote access:
 - a. Multicast or unicast
 - 1.) Simultaneous unicast access by up to 10 users
 - 2.) Simultaneous multicast access by up to 20 users
 - b. Mobile device:
 - 1.) Supported platforms: Android, IOS
 - 2.) Supported remote users:
 - a.) Live unicast: 10
 - b.) Live multicast: 20
 - c.) Playback: 3
 - c. Dynamic DNS (DDNS) support
- 9. VGA and High Definition (HDMI) local monitor outputs live viewing, playback, & backup functions
- 10. ONVIF Profile S compliance
- 11. Alarm connections: 4 inputs (terminal block); 1 alarm reset, 4 outputs (terminal block),
relay out 1 (NO/NC/COM), relay out 2 ~ 4 (NO/COM)

2.03 NVR SOFTWARE

- A. The NVR shall have a built in server which provides access for authorized users to live view of connected cameras, NVR recording and playback functions, and NVR configuration settings.
- B. The NVR software shall provide a monitoring screen which displays live camera video and simultaneously provides same-screen access to the following functions:

1. Screen mode, allowing set up and display of up to 64 live video channels in 1, 4, 9, 16, 25, 36, 34, or sequence configurations.
2. Hallway view mode for 2 or 3 channels.
3. Status displays:
 - a. camera live status
 - 1.) model
 - 2.) connection status
 - 3.) IP address
 - 4.) compression
 - 5.) resolution
 - 6.) frame rate
 - 7.) quality
 - b. camera record status
 - 1.) bit rate
 - a.) record bit rate
 - b.) input bit rate
 - c.) bit rate limits
 - 2.) configured video profile
 - 3.) input/record frames per second
4. Start/stop recording
5. Search recorded video
6. Play recorded video
7. Freeze live video
8. Audio on, off, and mute
9. Event monitoring
10. Digital zoom
11. Camera PTZ controls
12. Manual recording
13. Image (snapshot) capture
- C. The NVR software shall provide setup screens which provide access to the following configuration settings and functions:
 1. System
 - a. date and time
 - b. user passwords and permissions
 - c. system information
 - d. software upgrade
 - e. system logs
 - f. event logs
 - g. backup logs
 2. Cameras
 - a. image preview of video

- b. profile information
 - c. compression information
 - d. protocol information
 - e. model information
 - f. IP address
 - g. connection status
 - h. total amount of data received by channel
 - i. auto or manual search and register
 - j. select and setup ONVIF protocol operation
 - k. add, delete, and edit camera profile
 - l. adjust settings:
 - 1.) camera name
 - 2.) resolution
 - 3.) frame rate
 - 4.) quality
 - 5.) bit rate
 - 6.) brightness
 - 7.) backlight
 - 8.) exposure
 - 9.) day/night
 - 10.) defog
 - 11.) focus
 - 12.) mirror and flip
 - 13.) motion detection
 - m. apply settings to groups of cameras
 - n. live streaming settings
3. Recording
- a. setup recording schedule by day and time per channel
 - b. record settings per channel
 - 1.) all frames, key frames, or no record
 - 2.) data limit per channel
 - 3.) pre and post event recording times
 - 4.) include audio
 - c. set recording profile per channel:
 - 1.) compression
 - 2.) resolution
 - 3.) frame rate
 - 4.) quality
 - d. HDD full capacity options (with alarms)– stop, overwrite
 - e. Event configuration

- 1.) sensor operation
- 2.) Camera events, including motion detection and video analytics
- 3.) video loss detection
- 4.) alarm output parameters
4. Storage media and devices
 - a. display working status, including current rate of recording, recording loss rate, and cumulative losses
 - b. storage use and capacity information
 - c. HDD temperature information
 - d. connect/disconnect iSCSI device
 - e. HDD alarm notifications
 - f. RAID mode settings and status
 - g. recover RAID array
5. Monitor
 - a. select VGA or HDMI video output
 - b. configure display parameters
6. Text device (including PoS devices, number plate recognition, and ATM texts)
 - a. channel allocation
 - b. encoding type and delimiting characters
 - c. network port
 - d. event configuration
 - 1.) keyword entry
 - 2.) dollar value trigger
 - 3.) blacklist and whitelist of number plates with alarm outputs (available upon request)
7. Network
 - a. address settings per physical port
 - b. bandwidth limits
 - c. software ports and protocol
 - d. multicast parameters
 - e. DDNS
 - f. UPnP
 - g. security:
 - 1.) IP filtering
 - 2.) SSL encryption and certificates
 - 3.) 802.1x parameters
 - h. NTP server
 - i. SMTP e-mail settings
 - j. SNMP settings
 - k. live stream selection
 - l. DHCP server settings
8. Notifications

- a. event types
 - b. intervals
 - c. recipients
- 9. Output relay settings
- D. The NVR software shall provide Search and Playback functions as follows:
 - 1. Search by:
 - a. time
 - b. event
 - c. text (including PoS, number plate recognition, and ATM texts)
 - d. backup device
 - 2. Playback
 - a. play forward and reverse at normal or accelerated speeds, frame by frame, and next record
 - b. go to first and go to last functions
 - c. color-coded timeline with play head scrub bar
 - d. set audio on or off
 - e. initiate backup
- E. The NVR shall have a built in web server which supports browser-based configuration from a PC.
 - 1. Acceptable browsers: Internet Explorer, Google Chrome, Mozilla Firefox, and Apple Safari
 - 2. The web viewer shall provide a monitoring screen which displays video from registered cameras and simultaneously provides same-screen access to the following functions:
 - a. display layout configuration: 1, 4, 9, 16, 25, 32, 64, sequence
 - b. additional display functions as available with direct connection to the NVR server
 - 3. The web viewer shall provide the same functionality as available when directly connecting to the NVR server with respect to the following:
 - a. system settings
 - b. backup and restoration of configuration settings to a file
 - c. camera configuration settings and functions
 - d. recording
 - e. storage media and devices
 - f. monitor
 - g. text device (including PoS devices, number plate recognition, ATM texts)
 - h. network
 - i. events and notifications
 - j. output relay settings
 - k. search and playback
 - 4. Minimum client requirements
 - a. Acceptable Operating Systems:
 - Windows 7, 8, 10, Mac OS X (10.8 or above)
 - b. Acceptable browsers:
 - Microsoft Internet Explorer, Mozilla Firefox, Google Chrome, Apple Safari

2.04 DETAILED SPECIFICATIONS

A. Video

1. Compression: H.265, H.264, MJPEG
2. Smart codec WiseStream (H.264, H.265)

B. Recording

1. Channel capability: 64 channels
2. Bit Rate: Up to 400 Mbps
3. Resolution range: 352 x 288 - 4000 X 3000

C. Events and Response Actions

1. Triggers:
 - a. alarm (NO or NC contact) input
 - b. video loss
 - c. event defined by camera
2. Response Actions:
 - a. Record
 - b. E-mail
 - c. activate PTZ preset
 - d. alarm (NO or NC contact) output
 - e. Beep output

D. Playback

1. Number of simultaneous channels: 16
2. Bandwidth: 32 Mbps

E. Storage

1. Internal
 - a. Number of HDD's: 1 – 12
 - b. Capacity per HDD: 1 – 12 TB hot swappable in RAID configuration
 - c. RAID configurations: RAID 5 / RAID 6
2. External
 - a. Acceptable types:
 - 1.) NAS iSCSI up to 384 TB for extended storage
 - 2.) USB HDD/Flash drive for backup of video clips, firmware update, settings backup/restore, log export

F. Network

1. Connectivity: 1000 Base-T Ethernet, 4 x RJ-45 connectors, fiber optics cable
2. Protocols supported:
 - a. Transmission Control Protocol (TCP), Internet Protocol (IP) v4 and v6, User Datagram Protocol (UDP)
 - b. Configuration: Dynamic Host Configuration Protocol (DHCP)
 - c. Web services: Hypertext Transfer Protocol (HTTP), Secure HTTP (HTTPS)
 - d. Network services: Address Resolution Protocol (ARP), Domain Name System (DNS), Internet Control Message Protocol (ICMP), Network Time Protocol (NTP), Simple Network Management Protocol (SNMP v1/2c/3 – MIB-2), Universal Plug and Play (UPnP)

- e. Media: Real-Time Transport Protocol (RTP), Real-Time Control Protocol, Real-Time Streaming Protocol (RTSP)
- f. Multicast: Internet Group Management Protocol (IGMP)
- g. Notifications: Simple Mail Transfer Protocol (SMTP)
- h. Remote Access: Point-to-Point Protocol over Ethernet (PPPoE)
- 3. DDNS – The NVR shall support DDNS services offered by the Manufacturer and other publicly available service offerings.
- 4. Security features:
 - a. user password protection with group restrictions
 - b. IP address filtering - list of allowed or blocked IP addresses
 - c. HTTPS(SSL) login authentication
 - d. User access log
 - e. 802.1x authentication
 - f. Restriction of all network access/web viewer access
- 5. Discovery - Manufacturer shall offer a discovery program to identify all devices of his manufacture on the network, as well as ONVIF Profile S conformant devices.
- G. Alarm/sensor interface:
 - 1. Input (4) : NO or NC, selectable. Terminal block
 - 2. Output (4) : NO or NC, selectable. Terminal block
 - 3. Alarm Reset (1)
 - 4. Relay out 1: NO, NC, or COM
 - 5. Relay out 2: NO or COM
- H. Audio
 - 1. Direction: Bi-directional
 - 2. Channel capability: 64 channels
 - 3. Compression: AAC (16/48KHz), G.711, G.726 selectable
 - 4. Output: Line level (RCA)
- I. Electrical
 - 1. Power: 100 – 240 VAC +-10%, 50/60 Hz, 1.5~3A (Dual SMPS)
 - 2. Power Consumption: 250 W maximum (853 BTU with 12 x HDD)
- J. Mechanical And Environmental
 - 1. Dimensions (W x H x D): 17.17 in. x 5.2 in. x 17.72 in. (436.0 mm x 132.0 mm x 450.0 mm)
 - 2. Weight 11kg (24.3lb without HDD)
 - 3. Temperature:
 - a. Operating and storage: 0° C to 40° C (32° F to 104° F)
 - 4. Humidity: 20 - 85%, non-condensing

END OF SECTION

PART 3 EXECUTION

3.01 INSTALLERS

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

3.02 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.
- C. All equipment shall be tested and configured in accordance with instructions provided by the manufacturer prior to installation
- D. All firmware found in products shall be the latest and most up-to-date provided by the manufacturer, or of a version as specified by the provider of the Video Management Application (VMA).
- E. All equipment requiring users to log on using a password shall be configured with user/site-specific password/passwords. No system/product default passwords shall be allowed.

3.03 INSTALLATION

- A. The contractor shall carefully follow instructions in documentation provided by the manufacturer to insure all steps have been taken to provide a reliable, easy-to-operate system.
- B. Before permanent installation of the system, the contractor shall test the system in conditions simulating the final installed environment.

3.04 STORAGE

- A. The hardware shall be stored in an environment where temperature and humidity are in the range specified by the Manufacturer.

END OF SECTION