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**32 CHANNEL 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

**32 CHANNEL NETWORK VIDEO RECORDER WITH AI SEARCH**

1. **GENERAL**
   1. **SUMMARY**
      1. Section includes a 32 channel network video recorder with AI search.
      2. Product - A 32 channel network video recorder which is ONVIF compliant, with support for H.265, H.264, and MJPEG compression and recording bandwidth of 400 Mbps.

## 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. **REFERENCES**
     1. 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
        34. VA – Video Analytics
        35. PnP – Plug and Play
        36. ARB – Auto Recovery Backup
     2. Reference Standards
        1. Network - IEEE
           1. 802.3 Ethernet Standards
           2. 802.1x Port-based Network Access Control
        2. Video
           1. ISO / IEC 23008-2:2013, MPEG-H Part2 (ITU H.265, HEVC)
           2. ISO / IEC 14496–10, MPEG-4 Part 10 ( ITU H.264)
           3. ISO / IEC 10918 – JPEG
           4. ONVIF – Profiles S
        3. Emissions
           1. FCC-47 CFR Part 15 Subpart B and ICES-003, Class A
           2. EN 55032:2015/AC:2016-07
           3. EN 61000-3-2:2014
           4. EN 61000-3-2:2013
           5. AS/NZS CISPR32:2015
           6. VCCI-CISPR 32:2016
        4. Immunity
           1. EN 61000-4-2:2009
           2. EN 61000-4-3:2006/A1:2008/A2:2010
           3. EN 61000-4-4:2012
           4. EN 61000-4-5:2014/A1:2017
           5. EN 61000-4-6:2014/AC:2015
           6. EN 61000-4-11:2004/A1:2017
           7. EN 50130-4:2011/A1:2014
        5. Safety
           1. UL listed
           2. CE EN 50581:2012 (hazardous substances)
     3. Definitions
        1. JBOD - a collection of hard disks that have *not* been configured to act as a redundant array of independent disks (RAID) array.
        2. 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.
        3. 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.
        4. 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.
        5. Dynamic fps - Dynamic assignment of frames per second 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 failures and stream it to the storage device after recovery.
        7. Dynamic Event – New event function of cameras is available without software update.
  2. **SUBMITTALS**
     1. Product Data
        1. Manufacturer’s printed or electronic data sheets
        2. Manufacturer’s installation and operation manuals
        3. Warranty documentation
  3. **QUALIFICATIONS**
     1. Manufacturer shall have a minimum of five years’ experience in producing IP video equipment.
     2. Installers shall be trained and authorized by the Manufacturer to install, integrate, test, and commission the system.
  4. **DELIVERY, STORAGE AND HANDLING**
     1. Deliver the product in the manufacturer’s original, unopened, undamaged container with identification labels intact.
     2. Store the product in a temperature environment specified in section 2.04 Detailed Specification, protected from mechanical and environmental conditions as designated by the manufacturer.
  5. **WARRANTY, LICENSING AND SUPPORT**
     1. Manufacturer shall provide a limited 3 year warranty for the product to be free of defects in material and workmanship.

END OF SECTION

1. **PRODUCTS**
   1. **EQUIPMENT**
      1. Manufacturer: Hanwha Techwin

http://www.hanwha-security.com/

* + 1. Model PRN-3200B2
    2. Alternates:
  1. **GENERAL DESCRIPTION**
     1. The 32 channel Network Video Recorder (“NVR”) shall record video and audio from up to 32 network video cameras to a hard disk and enable playback of video and audio.
     2. The manufacturer shall be responsible for rigorous testing of NVR’s reliability. The manufacturer shall provide a list of compatible hard disks that have been tested to guarantee reliable recording. The list shall be available in the manufacturer’s home page.
     3. The NVR shall provide auto recovery backup (ARB) to transfer video that is recorded on network camera’s SD cards during failures to the hard disk drive. The NVR shall allow users to set transfer speed or bandwidth dedicated for ARB in three levels; low, middle, high. If the bit-rate of video to be transferred exceeds the set bandwidth, then the NVR shall transfer video in the order of channel number until all transfer is finished or the video becomes more than 24 hours old based on NVR’s current time. The NVR with ARB shall be able to handle the following failures.
        1. Network disconnection between cameras and NVR
        2. Unexpected shutdown of NVR
     4. The 32 channel NVR shall receive text data from external devices and overlay it on live as well as recorded video. It shall also provide search for text data and list all video with previews that is relevant to the search queries. The text shall include but not limited to the following.
        1. Text from PoS devices, namely the texts printed on the receipt of transactions
        2. Text from automatic number plate recognition software
        3. Text from automated teller machines (ATM)
     5. The NVR shall provide a remote monitoring environment for video and audio over the network using a remote computer. The remote monitoring software shall allow users to receive live streams, search for recoded videos, and configure devices.
     6. P2P Service: The NVR shall provide easy configuration of mobile viewer. The mobile viewer shall be freely available and connection shall be established by simply scanning QR code from a mobile device.
     7. Dynamic event: New event function of cameras is available without NVR software (FW) update.
     8. 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.
           1. If 32 or fewer cameras are searched or discovered, each camera will be automatically registered and current camera information (fps, days of recording) will be displayed.
           2. If more than 32 cameras are searched or discovered, the NVR shall provide the ability to selectively register up to 32 cameras.
        2. The NVR shall support WiseStream and Dynamic GOV, a smart codec used by WiseNet IP cameras. The smart codec shall produce visually equal video quality while reducing storage required.
        3. Recording and playback functions:
           1. Support recording from CIF up to 32 MP per channel
           2. 400 Mbps network camera recording throughput
           3. Simultaneous playback capability up to 32 video channels in local and 32 video channels in network
           4. H.265, H.264, and MJPEG compression support
           5. View status of connected storage hardware
           6. Set recording schedules
           7. Set up triggered recording based on:

sensor (input) detection

camera event

video loss detection

* + - * 1. Available recording settings by channel for standard and event-based recording types:

Profile (codec)

resolution

frame rate

bitrate control

pre-event and post-event record duration

I-frame and full frame recording

* + - * 1. Available actions upon reaching full HDD storage capacity (with automatic notifications to users):

stop recording

overwrite

auto delete

* + - * 1. Search recorded data by time, event, text, ARB events, or smart search. Smart search shall include search options for

Virtual line (in/out/both)

Enter/exit

* + - 1. Storage
         1. 10TB HDDs in JBOD configuration for 1 array.
         2. USB connection for memory/storage device for video clip backup and settings export
      2. Live view:
         1. Live, remote monitoring using Windows Network Viewer or Manufacturer supplied viewer
         2. Configure and exercise functions for connected PTZ cameras, including functionality with compatible USB joystick
         3. Capture and save snapshot images
         4. Record current video in BU, SEC format (EXE format from GUI mode) from Local UI and AVI format from Webviewer
      3. Remote access:
         1. Multicast or unicast

Simultaneous unicast access by up to 10 users

Simultaneous multicast access by up to 20 users

Simultaneous search access by up to 3 users

* + - * 1. Mobile device:

Supported platforms: Android, IOS

Supported remote users:

Live unicast: 10

Live multicast: 20

Playback: 3

* + - * 1. Dynamic DNS (DDNS) support
      1. High Definition (HDMI) local dual monitor outputs for live viewing, playback, & backup functions
      2. ONVIF Profile S compliance
  1. **NVR SOFTWARE**
     1. 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.
     2. 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 live video channels in various layouts or sequence configurations.
        2. Hallway view mode for hallway view cameras.
        3. Status displays:
           1. camera channel/profile status for Record/Live/Remote

model

connection status

IP address

codec

resolution

frame rate

bitrate

type : CBR/VBR

bitrate

bitrate range

* + - 1. Start/stop recording
      2. Search recorded video
      3. Play recorded video
      4. Freeze live video
      5. Audio on, off, and mute
      6. Event monitoring
      7. Digital zoom
      8. Camera PTZ controls
      9. Manual recording
      10. Image (snapshot) capture
    1. The NVR software shall provide setup screens which provide access to the following configuration settings and functions:
       1. System
          1. date and time
          2. user passwords and permissions
          3. system information
          4. software upgrade
          5. system logs
          6. event logs
          7. backup logs
       2. Cameras
          1. image preview of video
          2. profile information
          3. compression information
          4. protocol information
          5. model information
          6. IP address
          7. connection status
          8. total amount of data received by channel
          9. auto or manual search and register
          10. select and setup ONVIF protocol operation
          11. add, delete, and edit camera profile
          12. adjust settings:

camera name

resolution

frame rate

bitrate

brightness

backlight

exposure

day/night

defog

focus

mirror and flip

motion detection

* + - * 1. apply settings to groups of cameras
        2. live streaming settings
      1. Recording
         1. setup recording schedule by day and time per channel
         2. record settings per channel

all frames, key frames, or no record

data limit per channel

pre and post event recording times

include audio

* + - * 1. set recording profile per channel:

codec

resolution

frame rate

bitrate

* + - * 1. HDD full capacity options – stop, overwrite
        2. Event configuration

Alarm input

video loss

Camera event

Sensor

MD

Video Analytics

Defocus

Audio

AI metadata(AI search) with Wisenet AI camera

Dynamic event

* + - 1. Storage media and devices
         1. display working status, including current rate of recording, recording loss rate, and cumulative losses
         2. storage use and capacity information
         3. HDD temperature information
         4. HDD alarm notifications
      2. Monitor
         1. Dual HDMI video output on local

HDMI 1: 3840 x 2160 (30Hz)

HDMI 2: 1920x1080 (60Hz)

* + - * 1. configure display parameters
      1. Text device
         1. channel allocation
         2. encoding type and delimiting characters
         3. network port
         4. event configuration

keyword entry

dollar value trigger

* + - 1. Network
         1. address settings per physical port
         2. bandwidth limits
         3. software ports and protocol
         4. multicast parameters
         5. DDNS
         6. UPnP
         7. security:

IP filtering

SSL encryption and certificates

802.1x parameters

* + - * 1. NTP server
        2. SMTP e-mail settings
        3. SNMP settings
        4. live stream selection
        5. DHCP server settings
      1. Notifications
         1. event types
         2. intervals
         3. recipients
    1. The NVR software shall provide Search and Playback functions as follows:
       1. Search by:
          1. time
          2. event
          3. text
          4. backup device
       2. Playback
          1. play forward and reverse at normal or accelerated speeds, frame by frame, and next record
          2. go to first and go to last functions
          3. color-coded timeline with play head scrub bar
          4. set audio on or off
          5. initiate backup
    2. The NVR shall have a built in web server which supports browser-based configuration from a PC.
       1. Acceptable browsers: Internet Explorer, Google Chrome 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:
          1. display layout configuration
          2. 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:
          1. system settings
          2. backup and restoration of configuration settings to a file
          3. camera configuration settings and functions
          4. recording
          5. storage media and devices
          6. monitor
          7. text device
          8. network
          9. events and notifications
          10. search and playback
       4. Minimum client requirements
          1. Acceptable Operating Systems: Windows XP, Vista, 7, 8, 10, Mac OS X (10.9, 10.10, 10.11)
          2. Acceptable browsers: Microsoft Internet Explorer, Microsoft Edge, Google Chrome, Apple Safari
    3. The NVR provides AI search function when connecting Wisenet camera.
       1. AI based object detection Person, Face (Wisenet AI camera), Vehicle, LP,
       2. AI based IVA LPR (Wisenet AI, P/X camera)
       3. AI based bestshot attribute metadata
  1. **DETAILED SPECIFICATIONS**
     1. Display
        1. Network camera input Max. 32ch
        2. Resolution CIF up to 32 MP
        3. Protocols SUNAPI, Onvif
     2. Decoding
        1. Local dual display HDMI 1 : 3840 x 2160 (30Hz)

HDMI 2 : 1920 x 1080 (60Hz)

* + - 1. Layout Local Monitor : 1/ 2V/ 3V/ 4/ 8/ 9/ 13/ 16/ 25/ 36/ Sequence

Webviewer : 1/ 2H/ 2V/ 3V/ 4/ 6/ 8/ 9

* + - 1. Resolution 32M(15fps, H.265 Only), 12M(30fps, H.265 Only), 8.3M(120fps),

1080p(480fps), 720P(960fps), D1(1920fps)

* + 1. OS Embedded Linux
    2. Recording
       1. Compression H.265, H.264, MJPEG, WiseStream(H.265, H.264)
       2. Channel capability 32
       3. Recording bandwidth Up to 400 Mbps
       4. Resolution CIF up to 32 MP
       5. Mode Normal, Dual Stream, Schedule(Continuous/Event), Event (Pre/Post),

Bookmark

* + 1. Events and Response Actions
       1. Triggers:
          1. Alarm input
          2. Video loss
          3. Camera event

Sensor

MD

Video Analytics

Defocus

Audio

* + - * 1. Dynamic event
      1. Response Actions:
         1. e-mail
         2. event push
         3. PTZ preset
         4. Alarm out
         5. Buzzer
         6. Monitor out
    1. Playback (Search)
       1. Playback BW RAID mode Max. 64Mbps (32ch simultaneously)

Non RAID mode Max. 32Mbps

* + - 1. User Max. 4 (Local 1, remote 3)
      2. Simultaneous playback Max. 80ch
         1. Local 32ch
         2. Remote 16ch per user (up to 3)
      3. Fisheye Dewarping CMS
      4. Mode Date & Time(Calendar), Event list, Text Search, Smart Search
      5. Resolution CIF ~ 32MP (Up to H.264 9MP, H.265 32MP)
      6. Playback control Fast/Slow Forward / Backward, Move one step Up / Down
    1. Storage
       1. HDD slot SATA 8ea(Max. 80TB, non-RAID mode), Hot swap
       2. Supported HDD Up to 10TB
       3. External iSCSI
       4. RAID RAID-5/6(Single, 1 Array)
    2. Backup
       1. File backup BU/Exe(GUI), JPG/AVI(Network-webviewer)
       2. Function Multi channel(Up to 32CH) Play, Date-Time/Title display
    3. Network
       1. Connectivity: RJ-45 3EA (LAN/WAN, 1Gbps)
       2. Protocols IPv4, IPv6, TCP/IP, UDP/IP, RTP (UDP), RTP (TCP), RTSP, NTP,

HTTP, DHCP (Server, Client), SMTP, ICMP, IGMP, ARP, DNS, DDNS, uPnP, HTTPS, SNMP, ONVIF (Profile-S), SUNAPI(Server, Client)

* + - 1. DDNS Hanwha DDNS
      2. Security features IP address filtering, User access Log, 802.1x, Encryption

Device certificate (Hanwha Techwin Root CA), Signed firmware

* + - 1. Transmission BW Max. 400Mbps
    1. Audio
       1. Channel capability 32 ch
       2. Compression G.711, G.726, AAC(16/48KHz)
       3. Audio Communication 2 way
    2. Max remote user Search(3), Live Unicast(10), Multicast(20)
    3. Web viewer
       1. Supported OS Windows 10, Mac OS 10.13
       2. Supported browser Google Chrome, Microsoft Edge, Mac Safari
    4. Viewer SW SSM, Webviewer, Smart Viewer, Wisenet mobile,

Support SDK/CGI (SUNAPI) for integration to 3'rd party VMS

* + 1. Functions
       1. Camera register Auto, Manual
       2. Camera setup IP address, Add profile edit, Bitrate, Compression, GOP, Quality,

Camera MD, setup (4, 8 point polygon),

Camera video setup (Simple focus, Brightness/Contrast, Flip/Mirror, IRIS,

WDR, D&N, SSNR, Shutter, SSDR, DIS), Fisheye Dewarping Mode,

Hallway View Setup, Camera Webpage

* + - 1. PTZ control Via GUI, Webviewer, SPC-2000
      2. PTZ preset 300 presets
      3. Smart phone Wisenet mobile 2.0 or higher
         1. Supported model iOS, Android OS
         2. Protocol RTP, RTSP, HTTP, CGI(SUNAPI)
         3. Control Live 16CH(Multi-Profile Support), Playback 4CH
         4. Max. user Search(3), Live Unicast(10)
      4. Redundancy
         1. Failover N+1
         2. ARB Support
      5. Easy configuration P2P (QR code)
    1. Intelligent Analysis
       1. AI search/Attribute
          1. Object Attribute Person, Face (with Wisenet AI camera), Vehicle, License Plate
          2. LPR English, Number (Wisenet AI, P/X Camera)
    2. Interface
       1. Front indicator HDD, Alarm, Power, Record, Backup, Network
       2. HDD key lock
       3. HDMI 2 port support (Playback/Setup 🡪 HDMI1)

HDMI1 : 3840x2160 30Hz

HDMI2 : 1920x1080 60Hz

* + - 1. Audio out 1ea
      2. Ethernet RJ-45 3EA (LAN/WAN, 1Gbps)
      3. Alarm In 8ea, out 4ea
      4. USB 4EA(Front 2 x USB 2.0, Rear 2 x USB 3.0)
    1. System
       1. Log Max. 100,000 (System Log, Event Log each)
       2. System control Mouse, Web, Controller (SPC-2000)
       3. Language English, French, German, Italian, Spanish, Russian, Turkish, Polish,

Dutch, Swedish, Czech, Portuguese, Danish, Rumanian, Serbian,

Croatian, Hungarian, Greek, Norwegian, Finnish, Korean, Chinese,

Japanese, Thai, Vietnamese

* + 1. Environment
       1. Operating Temperature 0°C to +40°C(32℉ to 104℉)
       2. Operating Humidity 20% ~ 85% RH
    2. Electrical
       1. Power input 100 ~ 240 VAC ±10%; 50/60 Hz, 2.1A
       2. Power Consumption Max. 205W (with HDD 10TB 8ea)
    3. Mechanical And Environmental
       1. Color / Material Black / Metal
       2. Dimensions (WxHxD) 438 x 86 x 434.9 mm
       3. Weight Approx. 9.1Kg (20.1 lb, HDD not included)

END OF SECTION

1. **EXECUTION**
   1. **INSTALLERS**
      1. Contractor personnel shall comply with all applicable state and local licensing requirements.
   2. **PREPARATION**
      1. The network design and configuration shall be verified for compatibility and performance with the camera(s).
      2. Network configuration shall be tested and qualified by the Contractor prior to camera installation.
      3. All equipment shall be tested and configured in accordance with instructions provided by the manufacturer prior to installation
      4. 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).
      5. 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. **INSTALLATION**
      1. 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.
      2. Before permanent installation of the system, the Contractor shall test the system in conditions simulating the final installed environment.
   4. **STORAGE**
      1. The hardware shall be stored in an environment where temperature and humidity are in the range specified by the Manufacturer.

END OF SECTION