Hanwha Techwin is a global leading supplier of solutions for IP and analog video surveillance. Building on the company's history of innovation, Hanwha Techwin is dedicated to providing systems solutions with the highest levels of performance, reliability and cost-effectiveness. Hanwha Techwin is committed to the continued development of innovative systems products for professional security applications.

For additional information, visit http://www.hanwha-security.com/

**15 MP MULTI-SENSOR 180 / 220˚ PANORAMIC CAMERA**

**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 20 00 Electronic Surveillance

28 23 00 Video Surveillance

 28 23 29 Video Surveillance Remote Devices and Sensors

MasterFormat 2016:

 28 20 00 Video Surveillance

 28 2x xx Surveillance Cameras

 28 2x xx IP Cameras

**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 Digital Video Recorders and Analog Recording Devices

 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 Storage Appliances for Electronic Safety and Security

 28 05 xx.xx Network Video Recorders

 28 05 xx Cyber Requirements for Electronic Safety and Security

 28 05 xx Safety and Security Network Communications Equipment

 28 2x 00 Video Management System

**15 MP MULTI-SENSOR 180 / 220˚ PANORAMIC CAMERA**

1. **GENERAL**
	1. **SUMMARY**
		1. Section includes a 15 MP MULTI-SENSOR 180 / 220˚ PANORAMIC CAMERA
		2. Product - A 15 MP MULTI-SENSOR PANORAMIC camera with multi-streaming (H.265, H.264 and MJPEG) capability

## 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. AGC Auto Gain Control
			2. AES Advanced Encryption Standard
			3. API Application Programming Interface
			4. ARP Address Resolution Protocol
			5. AWB Auto White Balance
			6. BLC Back light compensation
			7. CBR Constant Bit Rate
			8. CVBS Composite Video Blanking and Sync
			9. DHCP Dynamic Host Configuration Protocol
			10. DNR Digital Noise Reduction
			11. DNS Domain Name Server
			12. DDNS Dynamic Domain Name Server
			13. DSCP Differentiated Services Code Point
			14. fps frames per second
			15. FTP File Transfer Protocol
			16. GOV Group of Video
			17. GUI Graphical User Interface
			18. HD High Definition
			19. HTTP Hypertext Transfer Protocol
			20. HTTPS Secure HTTP
			21. ICMP Internet Control Message Protocol
			22. IGMP Internet Group Management Protocol
			23. IP Internet Protocol
			24. IR Infrared
			25. JPEG Joint Photographic Experts Group
			26. LAN Local Area Network
			27. LED Light Emitting Diode
			28. LDC Lens Distortion Correction
			29. LPR License Plate Recognition
			30. MJPEG Motion JPEG
			31. MP Megapixel
			32. MPEG Moving Pictures Experts Group
			33. NAS Network Attached Storage
			34. NTP Network Time Protocol
			35. NVR Network Video Recorder
			36. PIM-SM Protocol Independent Multicast-Sparse Mode
			37. PoE Power over Ethernet
			38. PPPoE Point to Point Protocol over Ethernet
			39. QoS Quality of Service
			40. RTP Real-Time Transport Protocol
			41. RTCP Real-Time Control Protocol
			42. RTSP Real-Time Streaming Protocol
			43. SDK Software Development Kit
			44. SFP Small Form factor Pluggable
			45. SMTP Simple Mail Transfer Protocol
			46. SNMP Simple Network Management Protocol
			47. SSDR Super Smart Dynamic Range
			48. SSNR Super Smart Noise Reduction
			49. SSL Secure Sockets Layer
			50. TCP Transmission Control Protocol
			51. UDP User Datagram Protocol
			52. UPnP Universal Plug and Play
			53. VBR Variable Bit Rate
			54. VMS Video Management System
			55. WDR Wide Dynamic Range
		2. Reference Standards
			1. Network - IEEE
				1. 802.3 Ethernet Standards
				2. 802.1x Port-based Network Access Control
				3. IPv4 IP addressing version 4
				4. IPv6 IP addressing version 6
				5. QoS Quality of Service
			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 – Profile S / G
			3. Emission
				1. FCC Part 15 Subpart B Class A
				2. ICES-003:2016 Class A
				3. CE EN 55032:2015 Class A
			4. Immunity - CE
				1. EN 50130-4:2011+A1:2014
				2. EN 61000-4-2:2009
				3. EN 61000-4-3:2006/A2:2010
				4. EN 61000-4-4:2012
				5. EN 61000-4-5:2014
				6. EN 61000-4-6:2014
				7. EN 61000-4-11:2004
			5. Safety
				1. UL listed
				2. CE EN 50581:2012 (hazardous substances)
		3. Definitions
			1. 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 two kinds of frames in video surveillance setup: I-Frame and P-Frame.
			2. 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.
			3. Multi-exposure wide dynamic range – Operation which automatically adjusts shutter speed to provide a wide range between dark and light areas visible at the same time, preventing backlighting issues. Long exposure is used for dark areas and a short exposure is used in bright areas.
			4. Dynamic fps – Dynamic assignment of fps (frames per seconds) based on the movement of object(s) in the scene to efficiently manage bitrate of the video stream and reduce the storage required.
			5. Smart Codec – Codec that controls quantization parameter, fps, and GOV length in H.265 and H.264 to efficiently manage bitrate of the video stream and reduce the storage required. Smart Codec may be referred to as WiseStream in this document.
			6. Multi-Sensor Panoramic Camera – A camera which can produce a panoramic video stream stitched from several sensors inside one body.
	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.
	4. **DELIVERY, STORAGE AND HANDLING**
		1. Deliver the camera in the manufacturer’s original, unopened, undamaged container with identification labels intact.
		2. Store the camera 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 at least a limited 3 year warranty for the product to be free of defects in material and workmanship.
		2. Manufacturer shall provide embedded camera video analytics free of license charges.

END OF SECTION

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

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

* + 1. Model PNM-9030V
		2. Alternates: None
	1. **GENERAL DESCRIPTION**
		1. Video Compression and Transmission – The camera shall have the following properties relating to the video signals it produces.
			1. H.265, H.264 and MJPEG compression, each derived from a dedicated encoder and capable of being streamed independently and simultaneously.
				1. H.265 and H.264 – maximum of 30fps at all resolution
				2. MJPEG – maximum of 15fps at under 2MP
			2. The camera shall be able to select the panoramic mode between 180˚ and 220˚.
			3. The camera shall support panoramic stitching, original and crop view channels at the same time.
			4. The camera shall be able to configure up to 5(@180˚) or 3(@220˚) independent video stream profiles per channel with differing encoding, quality, frame rate, resolution, and bit rate settings.
			5. The camera shall be able to configure various resolution selections.
				1. 180˚ mode: 6096x2540, 5760x2400, 5472x2280, 5184x2160, 4800x2000, 4560x1900, 4096x1704, 3840x1600, 2688x1120, 2560x1064, 2048x852, 1920x800, 1280x532, 640x264
				2. 220˚ mode: 7744x1936, 6096x1524, 5760x1440, 5472x1368, 5184x1296, 4800x1200, 4560x1140, 4096x1024, 3840x960, 2688x672x 2560x640, 2048x512, 1920x480, 1280x320, 640x160
			6. The camera shall support unicast video streaming up to 15 users.
			7. The camera shall be able to configure Dynamic DNS (DDNS). DDNS shall be provided with no additional cost by the manufacturer.
			8. The camera shall provide smart codec (WiseStream Ⅱ, Dynamic GOV, and Dynamic fps) to efficiently manage bit rate of the video stream and reduce storage while producing video quality that is visually equal to the one without smart codec.
		2. Camera – The camera device shall have the following physical and performance properties:
			1. The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range up to 120dB.
			2. The camera shall support digital noise reduction using both 2D and 3D noise reduction technology.
			3. The camera shall be able to configure 16 privacy masking areas with rectangles.
			4. The camera shall have the defog feature to remove fogginess of scene which can be triggered automatically from the fog detection event.
		3. Intelligence and Analytics – The camera shall have a suite of intelligent analytic functions.
			1. Motion detection with eight definable detection areas with eight point polygonal zones, and minimum/maximum object size.
			2. Motion detection handover to call a preset of PTZ camera when motion event is triggered.
			3. Detection of logical events of specified conditions from the camera’s video
				1. Tampering
				2. Loitering
				3. Directional detection
				4. Virtual line
				5. Enter/Exit
				6. (Dis)Appear,
				7. Audio detection
				8. Motion detection
				9. Sound Classification
				10. Heatmap
			4. Detection and classification of the following sound.
				1. Scream
				2. Gunshot
				3. Explosion
				4. Crashing glass
		4. Interoperability – The camera shall be ONVIF Profile S and G compliant.
		5. The camera shall possess the following further characteristics:
			1. Built-in web server, accessed via non-plugin browsers including Google Chrome, MS Edge, Mozilla Firefox and Apple Safari.
			2. Micro SD/SDHC/SDXC memory card with configurable pre-alarm and post-alarm recording intervals
			3. NAS recording option with configurable pre-alarm and post-alarm recording intervals
			4. Alarms and notifications
				1. alarm notification triggers:

Alarm input

Motion detection

Video & Audio analytics

Network disconnect

* + - * 1. available notification means upon trigger:

File Upload via FTP and E-mail

Notification via E-mail

Local storage (SD / SDHC / SDXC) or NAS recording at event triggers

External output

* + - 1. Pixel Counter available in the web viewer.
			2. PoE+ capable
			3. IP66, IK10 capable
	1. **CAMERA SOFTWARE**
		1. The camera shall have a built in web server which supports non-plugin browsers including Google Chrome, MS Edge, Mozilla Firefox and Apple Safari from a PC or Mac.
		2. The web viewer shall provide a monitoring screen which displays live camera video and simultaneously provides same-screen access to the following functions:
			1. Live view window size
			2. Resolution setting
			3. Image (snapshot) capture
			4. Manual recording to SD or NAS
			5. Audio/microphone control
			6. Access recorded data playback and camera configuration menus
		3. The web viewer shall provide a playback screen which provides access to the following functions:
			1. Recorded data search using date and time range
			2. Recorded data search using event type
			3. Play a recorded video by event triggering
			4. Set resolution
			5. Play audio if present
			6. Generate a backup copy of saved video data
		4. The web viewer shall provide a setup screen which provides access to the following configuration settings and functions in the camera:
			1. Digital video profile to include compression type, maximum or target bit rate, frame rate, multicast parameters, and crop encoding area
			2. User profile to include password, access level, authentication
			3. Date and time
			4. Network settings and IP version
				1. DDNS
				2. IP filtering
				3. SSL, including certificate management
				4. 802.1x authentication
				5. Quality of Service settings
				6. SNMP to include version selection and settings
				7. Auto IP configuration
			5. Video setup
				1. Flip / mirror mode
				2. Video output type
				3. Privacy zone.
			6. Audio setup to include source, audio codec type, gain and bit rate.
			7. Image alignment to configure 180 / 220˚ mode and optimized target distance.
			8. Camera settings to configure image preset, sensor frame capture, dynamic range, white balance, back light, exposure, day/night operation, on-screen display, sharpness, contrast, color level and lens distortion correction.
			9. Event detection setup to configure notification parameters, recording rules, time schedule, tamper protection, motion detection and event triggers
			10. System function to control reboot, upgrade, check system and event logs and application (SDK) management
			11. View profile information
		5. Client requirements
			1. Acceptable Operating Systems: Windows 7 / 8.1 / 10, MAC OS X 10.10, 10.11, 10.12
			2. Acceptable browsers:
				1. Non-plugin WebViewer Google Chrome, MS Edge, Mozilla Firefox,

Safari (Mac OS X only)

* 1. **DETAILED SPECIFICATIONS**
		1. Video
			1. Imager
				1. Sensor 1/2.8" 5MP CMOS x 4CH

Image Pixels Total: 2,704(H) x 2,104(V) 5.69M x 4CH

Effective: 2,616(H) x 1,964(V) 5M x 4CH

Scanning Progressive

* + - * 1. Minimum Illumination

Color Mode 0.15Lux (F2.0, 1/30sec, 30IRE)

Black & White Mode0.01Lux (F2.0, 1/30sec, 30IRE)

Pan / Tilt Range 355° / 60°

* + - * 1. Video Out (Installation) USB: Micro USB type B
				2. The following features with control settings shall be available:

Camera Title Off / On (Displayed up to 75 characters)

W/W English / Numeric / Special characters

China English / Chinese / Numeric / Special characters

Common Multi-line (Max. 5), Color (Grey/Green/Red/Blue/Black/White),

Transparency, Auto scale by resolution

Day/Night Setting Auto (ICR) / Color / B/W / Schedule

Backlight Compensation (BLC) Off / BLC / HLC (Masking / Dimming) / WDR

WDR 120dB

Contrast Enhancement Off / On (SSDR)

Digital Noise Reduction (DNR) Off / On (SSNR3 : 2D+3D Noise Filter)

Digital Image Stabilization Off / On

Defog Off / Manual / Auto

Motion Detection Off / On (8ea, 8-point polygonal)

Privacy Masking Off / On (16 zones, rectangle)

- Color: Gray / Green / Red / Blue / Black / White

- Mosaic

Gain Control Off / Low / Middle / High

White Balance ATW / AWC / Manual / Indoor / Outdoor

(Including Mercury and Sodium)

Electronic Shutter Speed Min / Max / Anti-flicker (1 ~ 1/12,000sec)

Digital Zoom 24x

Digital PTZ Support

Image Rotation Flip: Off / On

Mirror: Off / On

Alarm I/O Input 1ea / Output 1ea

Alarm Triggers Alarm Input, Motion Detection,

Video & Audio Analytics,

Network Disconnection

Alarm Events File Upload via FTP and E-mail,

Notification via E-mail,

Local storage (SD / SDHC / SDXC) or

NAS recording at event triggers,

External output, Preset

Pixel Counter Support

* + - * 1. Lens: 4mm

Max. Aperture Ratio F2.0

Field of View [180˚ mode] H: 180˚ V: 70°

[220˚ mode] H: 220˚ V: 52°

Min. Object Distance 3m (9.84ft)

Focus Control Fixed

Mount Type Board-in Type (M12)

* + - 1. Video Streams
				1. The camera shall be able to produce 5 or 3 video profiles per channel, each of which may have the following properties:

Encoding Type

H.265

H.264

MJPEG

Resolution 180˚ mode: 6096x2540, 5760x2400, 5472x2280, 5184x2160,

 4800x2000, 4560x1900, 4096x1704, 3840x1600,

 2688x1120, 2560x1064, 2048x852, 1920x800,

 1280x532, 640x264

220˚ mode: 7744x1936, 6096x1524, 5760x1440, 5472x1368,

 5184x1296, 4800x1200, 4560x1140, 4096x1024,

 3840x960, 2688x672x 2560x640, 2048x512,

 1920x480, 1280x320, 640x160

Maximum Framerate

H.265 / H.264 Max. 30fps at all resolutions

MJPEG Max. 15fps at under 2MP

Smart Codec WiseStreamⅡ, Dynamic GOV, Dynamic fps

Bitrate Control Method H.265 / H.264: CBR or VBR

MJPEG: VBR

* + - 1. Streaming Capability Up to 5 or 3 profiles for each channel
			2. Simultaneous Users (Total) 15 maximum (Unicast)
			3. Audio
				1. Audio In Line-in

(Supply voltage: 2.5VDC (4mA),

Input impedance: approx. 2K Ohm)

* + - * 1. Audio Out Line out (3.5mm stereo mini jack)
				2. Compression Format G.711 u-law / G.726 Selectable, G.726 (ADPCM) 8KHz,

G.711 8KHz, G.726: 16Kbps, 24Kbps, 32Kbps, 40Kbps,

AAC-LC: 48Kbps at 16KHz

* + - * 1. Communication Bi-directional (2-Way)
			1. Storage and Recording
				1. The camera shall have an onboard SD card storage

Card Type Micro SD/SDHC/SDXC

Capacity 512GB (256GB x 2 slots)

Video or images content on the card shall have the ability to be downloaded to a selected destination

* + - * 1. NAS
				2. The capacity of the SD card storage capacity shall not be compromised by other factors such as 3rd party applications
			1. Interoperability – Video streams shall be capable of supporting ONVIF Profile S / G
			2. Still Image – The camera shall support image screenshot and export
		1. Network
			1. Connectivity – 10/100 Base-T Ethernet via RJ-45 connector
			2. Protocol
				1. IP v4 / v6, TCP, UDP
				2. Configuration: DHCP
				3. Web service: HTTP, HTTPS
				4. Network Service: ARP, Bonjour, DNS, ICMP, NTP, PIM-SM, SNMP v1/2c/3 – MIB-2, UPnP
				5. Media: RTP, RTCP, RTSP
				6. Multicast: IGMP
				7. Notifications: FTP, SMTP
				8. Remote Access: PPPoE
			3. DDNS – The camera shall support DDNS services offered by the manufacturer and others publicly available service offerings
			4. QoS – Layer 3 DSCP
			5. Security Feature
				1. User password protection
				2. The device shall not provide a manufacture default password. Default password change shall be required to access the camera.
				3. A minimal level of password complexity shall be required by the camera.
				4. The camera shall not have a manufacture back-door password.
				5. The manufacturer shall provide a tool that provides the ability to make password changes to multiple cameras at the same time.
				6. IP address filtering – List of allowed or blocked IP addresses
				7. HTTPS(SSL) login authentication
				8. HTTPS(SSL) secured communication
				9. Digest login authentication
				10. User access log
				11. 802.1x authentication
			6. Discovery – The manufacturer shall offer a discovery program to identify all devices of them on the network.
			7. Configuration – The manufacturer shall offer a configuration program that remotely allows users to change settings on multiple cameras simultaneously.
			8. Firmware upgrade – The manufacturer shall offer a program capable of upgrading multiple cameras at the same time (not requiring access to individual cameras).
			9. Camera backup setting – The manufacturer shall provide a program that provides the ability to save multiple camera settings to a file and restore these camera settings if needed.
			10. Reporting – The manufacturer shall provide a tool that can generate a report including thumbnail view, MAC address, IP address, serial number and other camera settings.
		2. Electrical
			1. Power
				1. Input Voltage / Current PoE+ (IEEE 802.3at), DC 12V
				2. Power Consumption Max 25.5W (PoE+), Max 21W (DC 12V)
		3. Mechanical And Environmental
			1. Material Aluminum
			2. Dimensions (W x H x D) Ø253 x H165mm (9.96" x 6.5")
			3. Weight 3.2Kg (7.1lb)
			4. Temperature
				1. Operating -40°C ~ +55°C(-40°F ~ +131°F)
				2. Storage -40°C ~ +60°C (-40°F ~ +140°F)
			5. Humidity Less than 90% RH
			6. Ingression Protection IP66
			7. Vandal Resistance IK10

END OF SECTION

1. **EXECUTION**
	1. **INSTALLERS**

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

* 1. **PREPARATION**

The network design and configuration shall be verified for compatibility and performance with the camera(s).

Network configuration shall be tested and qualified by the Contractor prior to camera installation.

All firmware found in products shall be the latest and the most up-to-date provided by the manufacturer, or of a version as specified by the provider of the VMS or NVR.

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.

* 1. **INSTALLATION**

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.

All equipment shall be tested and configured in accordance with instructions provided by the manufacturer prior to installation.

Before permanent installation of the system, the contractor shall test the system in conditions simulating the final installed environment.

* 1. **STORAGE**

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

END OF SECTION