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/

**2MP(PTZ) MULTI-DIRECTIONAL CAMERA WITH 4EA LENSES(2MP / 5MP)**

**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

**2MP(PTZ) MULTI-DIRECTIONAL CAMERA with 4ea lenses(2MP / 5MP)**

1. **GENERAL**
	1. **SUMMARY**
		1. Section includes an 2MP(PTZ) multi-directional camera with 4ea lenses(2MP / 5MP).
		2. Product - An 2MP(PTZ) IP video camera with 4ea lenses of multi-streaming (H.265, H.264 and MJPEG) capability and ability to produce videos in various view.

## 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. LLDP Link Layer Discovery Protocol
			30. LPR License Plate Recognition
			31. MJPEG Motion JPEG
			32. MP Megapixel
			33. MPEG Moving Pictures Experts Group
			34. NAS Network Attached Storage
			35. NTP Network Time Protocol
			36. NVR Network Video Recorder
			37. PIM-SM Protocol Independent Multicast-Sparse Mode
			38. PoE Power over Ethernet
			39. PPPoE Point to Point Protocol over Ethernet
			40. QoS Quality of Service
			41. RTP Real-Time Transport Protocol
			42. RTCP Real-Time Control Protocol
			43. RTSP Real-Time Streaming Protocol
			44. SDK Software Development Kit
			45. SFP Small Form factor Pluggable
			46. SMTP Simple Mail Transfer Protocol
			47. SNMP Simple Network Management Protocol
			48. SSDR Super Smart Dynamic Range
			49. SSNR Super Smart Noise Reduction
			50. SSL Secure Sockets Layer
			51. TCP Transmission Control Protocol
			52. UDP User Datagram Protocol
			53. UPnP Universal Plug and Play
			54. VBR Variable Bit Rate
			55. VMS Video Management System
			56. 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 / T
			3. EMC & Safety
				1. FCC 47 CFR Part 15 Subpart B

ANSI C63.4-2014 Class A

* + - * 1. IC Regulation ICES-003:2016

ANSI C63.4-2014 Class A

* + - * 1. CE EMC-Directive 2014/30/EU

EN 55032:2015 Class A

EN 50130-4:2011+A1:2014

* + - * 1. VCCI-CISPR 32: Class A
				2. AS/NZS CISPR32:2015 Class A
			1. Safety
				1. UL listed
				2. CE EN 50581:2012 (hazardous substances)
			2. Ingress Protection and Vandal Resistance
				1. ANSI / IEC60529 – Degrees of Protection Provided by Enclosures – IP66
				2. IEC EN 62262 - Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts : IK10
		1. 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 – Smart Codec that controls quantization parameter and dynamic fps in H.265 and H.264 to efficiently manage bitrate of the video stream and reduce the storage required.
			6. WiseStream – Technology 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.
			7. DORI (Detect, Object, Recognize, Identify) – A standard system (EN-62676-4) for defining the ability of a camera to distinguish persons or objects within a covered area.
				1. Detect: 25PPM / 8PPF
				2. Observe: 63PPM / 19PPF
				3. Recognize: 125PPM / 38PPF
				4. Identify: 250PPM / 76PPF
	1. **SUBMITTALS**
		1. Product Data
			1. Manufacturer’s printed or electronic data sheets
			2. Manufacturer’s installation and operation manuals
			3. Warranty documentation
	2. **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.
	3. **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.
	4. **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-9322VQP
		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 30/25fps(60Hz/50Hz) at 5M resolution

maximum of 60/50fps(60Hz/50Hz) at 2M resolution

* + - * 1. MJPEG – maximum of 30/25fps(60Hz/50Hz)
			1. The camera shall be able to configure up to 10 independent video stream profiles with differing encoding, quality, frame rate, resolution, and bit rate settings.
			2. The 5M lenses shall be able to configure various resolution selections.
				1. 16:9 aspect ratio : 2560x1440, 1920x1080, 1280x720, 800x448
				2. 4:3 aspect ratio : 2560x1920, 1600x1200, 1280x960, 1024x768, 800x600,

640x480, 320x240

* + - * 1. 5:4 aspect ratio : 1280x1024, 720x576
				2. 3:2 aspect ratio : 720x480
			1. The 2M lenses shall be able to configure various resolution selections.
				1. 16:9 aspect ratio : 1920x1080, 1280x720, 800x448, 640x360
				2. 4:3 aspect ratio : 1280x960, 1024x768, 800x600, 640x480, 320x240
				3. 5:4 aspect ratio : 1280x1024, 720x576
				4. 3:2 aspect ratio : 720x480
			2. The camera shall support unicast video streaming up to 20 users.
			3. The camera shall support multiple video streaming up to 10 profiles.
			4. The camera shall be able to configure Dynamic DNS (DDNS). DDNS shall be provided with no additional cost by the manufacturer.
			5. The camera shall provide WiseStream Ⅱ, Dynamic GOV and Dynamic FPS to efficiently manage bit rate of the video stream and reduce storage.
		1. Camera – The camera device shall have the following physical and performance properties:
			1. IK10 rated for protection against impacts for camera body.
			2. True day/night operation with scheduling and options for external devices.
				1. Low light level operation to 0.05 lux at F1.6 in color mode and 0.005 lux in black and white mode on 5ch(PTZ).
				2. The minimum illumination specification of a fixed lens is according to the specifications of each lens.
				3. The fixed lens type is Electrical day/night lens, so in this case minimum illumination is the same for day and night.
			3. The camera shall be able to produce clear images in highly contrast scenes with multi-exposure wide dynamic range.
			4. The camera shall support digital noise reduction using both 2D and 3D noise reduction technology.
			5. The camera shall be able to configure 32 privacy masking areas with polygonal zones at 1~4ch(changeable lenses) and 8 privacy masking areas with rectangle zones at 5ch(PTZ).
			6. The camera shall have the defog feature to remove fogginess of scene which can be triggered automatically from the fog detection event.
			7. The camera shall provide video display on smart phone (iPhone, Android) to adjust viewing angle, rotation and focus.
		2. Intelligence and Analytics – The camera shall have a suite of intelligent analytic functions.
			1. Motion detection with 8 definable detection areas with 8 point polygonal zones, and minimum/maximum object size.
			2. Detection of logical events of specified conditions from the camera’s video
				1. Directional detection
				2. Fog detection
				3. Face detection
				4. Motion detection
				5. Appear/Disappear
				6. Enter/Exit
				7. Loitering
				8. Tampering
				9. Virtual line
				10. Shock detection
				11. Audio detection with NW I/O Box (External Device)
				12. Sound classification with NW I/O Box (External Device)
			3. Detection and classification with NW I/O Box of the following sound.
				1. Scream
				2. Gunshot
				3. Explosion
				4. Crashing glass
		3. Interoperability – The camera shall be ONVIF Profile S and T compliant.
		4. 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. The camera shall provide streaming to multiple smart phones with DDNS provided freely from the manufacturer. In addition, the application shall be available for both iOS and Adroid, free of charge with search keyword, ‘Wisenet Mobile’.
			3. Micro SD/SDHC/SDXC memory card with configurable pre-alarm and post-alarm recording intervals
			4. NAS recording option with configurable pre-alarm and post-alarm recording intervals
			5. Alarms and notifications
				1. alarm notification triggers:

Analytics

Network disconnect

Alarm input with NW I/O Box

* + - * 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

Alarm output with NW I/O Box

PTZ preset

Handover

* + - 1. Pixel Counter available in the web viewer.
			2. HPoE capable
			3. IP66, IK10
			4. This device has been verified using STP cable. The use of appropriate GND grounding and STP cable is recommended to effectively protect your product and property from transient voltage, thunder stroke, communication interruption.
	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 with NW I/O Box (External Device)
			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 Playback speed
			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/TLS, 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. Privacy zone
			6. Audio setup to include source, audio codec type, gain and bit rate.
			7. 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.
			8. Event detection setup to configure notification parameters, recording rules, time schedule, tamper protection, motion detection and event triggers
			9. System function to control reboot, upgrade, check system and event logs and application (SDK) management
			10. View profile information
		5. Client requirements
			1. Recommend Browser : Chrome
			2. Acceptable Browser : Chrome, Safari, Firefox, MS Edge(chromium based)
			3. Acceptable Operating Systems: Windows, MAC, Android, iOS, Chrome
			4. Verified Environment:
				1. Windows 10 : Google chrome version 80 above, Firefox version 72 above,
				 MS Edge version 83 above
				2. Mac 10.13/14 : Safari version 11.0.1 above
* Decoding performance in web viewer depends on CPU/GPU performance of user
	1. **DETAILED SPECIFICATIONS**
		1. Video (PTZ)
			1. Imaging device 1/2.8" CMOS
			2. Scanning Progressive
			3. Minimum Illumination Color: 0.05Lux(1/30sec, F1.6)

B/W: 0.005Lux(1/30sec, F1.6)

* + 1. Lens (PTZ)
			1. Focal length 4.44~142.6mm(32x) zoom
			2. Max. Aperture Ratio F1.6(Wide) - F4.4(Tele)
			3. Field of View H: 61.8°(Wide)~2.19°(Tele)

V: 36.2°(Wide)~1.24°(Tele)

* + - 1. Min. Object Distance Wide:1.5m, Tele:2m
			2. Focus Control Auto / Manual / One shot AF
			3. Lens Type DC auto iris
		1. Lens Model
			1. SLA-2M1200P (12mm Zoom Ratio)
				1. Imaging Device 1/2.8” 2MP CMOS
				2. Effective Pixels 1945(H) x 1109(V)
				3. Min. illumination Color 0.055 lux (F2.0, 1/30sec)

B/W 0.055 lux (F2.0, 1/30sec)

* + - * 1. Focal Length 12.0mm fixed
				2. Max. Aperture Ratio F2.0
				3. Field of View H : 26.3°, V : 14.9°, D : 30.0°
			1. SLA-2M2400P (2.4mm Zoom Ratio)
				1. Imaging Device 1/2.8” 2MP CMOS
				2. Effective Pixels 1945(H) x 1109(V)
				3. Min. illumination Color 0.055 lux (F2.0, 1/30sec)

B/W 0.055 lux (F2.0, 1/30sec)

* + - * 1. Focal Length 2.4mm fixed
				2. Max. Aperture Ratio F2.0
				3. Field of View H : 135.4°, V : 71.2°, D : 161.6°
			1. SLA-2M2800P (2.8mm Zoom Ratio)
				1. Imaging Device 1/2.8” 2MP CMOS
				2. Effective Pixels 1945(H) x 1109(V)
				3. Min. illumination Color 0.055 lux (F2.0, 1/30sec)

B/W 0.055 lux (F2.0, 1/30sec)

* + - * 1. Focal Length 2.8mm fixed
				2. Max. Aperture Ratio F2.0
				3. Field of View H : 107.4°, V : 62.2°, D : 122.0°
			1. SLA-2M3600P (3.6mm Zoom Ratio)
				1. Imaging Device 1/2.8” 2MP CMOS
				2. Effective Pixels 1945(H) x 1109(V)
				3. Min. illumination Color 0.055 lux (F2.0, 1/30sec)

B/W 0.055 lux (F2.0, 1/30sec)

* + - * 1. Focal Length 3.6mm fixed
				2. Max. Aperture Ratio F2.0
				3. Field of View H : 94.8°, V : 49.3°, D : 114.3°
			1. SLA-2M6000P (6.0mm Zoom Ratio)
				1. Imaging Device 1/2.8” 2MP CMOS
				2. Effective Pixels 1945(H) x 1109(V)
				3. Min. illumination Color 0.055 lux (F2.0, 1/30sec)

B/W 0.055 lux (F2.0, 1/30sec)

* + - * 1. Focal Length 6.0mm fixed
				2. Max. Aperture Ratio F2.0
				3. Field of View H : 50.4°, V : 28.8°, D : 58.1°
			1. SLA-5M3700P (3.7mm Zoom Ratio)
				1. Imaging Device 1/1.8” 5MP CMOS
				2. Effective Pixels 2616(H) x 1976(V)
				3. Min. illumination Color 0.16 lux (F2.0, 1/30sec)

B/W 0.16 lux (F2.0, 1/30sec)

* + - * 1. Focal Length 3.7mm fixed
				2. Max. Aperture Ratio F1.6
				3. Field of View H : 97.5°, V : 71.9°, D : 126.2°
			1. SLA-5M4600P (4.6mm Zoom Ratio)
				1. Imaging Device 1/1.8” 5MP CMOS
				2. Effective Pixels 2616(H) x 1976(V)
				3. Min. illumination Color 0.16 lux (F2.0, 1/30sec)

B/W 0.16 lux (F2.0, 1/30sec)

* + - * 1. Focal Length 4.6mm fixed
				2. Max. Aperture Ratio F1.6
				3. Field of View H : 77.9°, V : 57.9°, D : 98.7°
			1. SLA-5M7000P (7.0mm Zoom Ratio)
				1. Imaging Device 1/1.8” 5MP CMOS
				2. Effective Pixels 2616(H) x 1976(V)
				3. Min. illumination Color 0.16 lux (F2.0, 1/30sec)

B/W 0.16 lux (F2.0, 1/30sec)

* + - * 1. Focal Length 7.0mm fixed
				2. Max. Aperture Ratio F1.6
				3. Field of View H : 50.7°, V : 37.8°, D : 63.8°
		1. PTZ (5 channel)
			1. PAN 360° Endless
			2. PAN Speed Max. 700°/sec, Manual: 0.024°/sec~250°/sec
			3. TILT 190 ̊ (-5 ̊~185 ̊)
			4. TILT Speed Max. 700°/sec, Manual: 0.024°/sec~250°/sec
			5. Sequence Preset(300ea), Swing, Group(128ea), Trace(4ea), Tour,

Auto Run, Schedule

* + - 1. Preset Accuracy ±0.2°
		1. PTR
			1. PAN -90° ~ 90°
			2. TILT 10° ~ 97°
			3. Rotate Range -180° ~ 180°
		2. Operational Functions
			1. Camera Title Off / On (Displayed up to 85 characters)
				1. W/W English / Numeric / Special characters
				2. China English / Chinese / Numeric / Special characters
				3. Common Multi-line (Max. 5), Color (Grey/Green/Red/Blue/Black/White),

Transparency, Auto scale by resolution

* + - 1. Direction Indicator Support
			2. Day/Night Setting 1~4ch : Auto(Electrical), 5ch(PTZ) : Auto(ICR)
			3. Backlight Compensation Off / BLC / HLC / WDR
			4. Contras Enhancement Off/On(SSDR)
			5. WDR 2MP 150dB, 5MP 120dB
			6. Digital Noise Reduction (DNR) Support (SSNR Ⅴ)
			7. Digital Image Stabilization (DIS) Support
			8. Defog Support
			9. Motion Detection Off / On (8ea, 8-point polygonal)
			10. Privacy Masking 1~4CH: 32ea, polygonal zones / 5CH: rectangle zones

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

- Mosaic

* + - 1. Gain Control Low / Middle / High
			2. White Balance ATW / AWC / Manual / Indoor / Outdoor
			3. Electronic Shutter Speed Min / Max / Anti-flicker (2 ~ 1/12,000sec)
			4. Image Rotation Flip, Mirror, Hallway view(90 ̊/270 ̊)
			5. Alarm I/O Input 1ea / Output 2ea
			6. Alarm Triggers Analytics, Network disconnect
			7. Alarm Events File upload via FTP and e-mail

Notification via e-mail

SD/SDHC/SDXC recording at event triggers\

Alarm output

* + - 1. Pixel Counter Support
			2. Webpage Language English, Korean, Chinese, French, Italian, Spanish, German,

Japanese, Russian, Swedish, Portuguese, Czech, Polish, Turkish, Dutch, Hungarian, Greek

* + - 1. Storage Micro SD/SDHC/SDXC 4slot 256GB(Each CH)
			2. Analytics Defocus detection, Directional detection, Face detection,

Fog detection, Motion detection, Appear/Disappear, Enter/Exit, Loitering, Tampering, Virtual line

* + - 1. Auto Tracking Support
			2. Memory 5GB RAM, 1280MB Flash
		1. Video Streams
			1. Video compression H.265, H.264, MJPEG
			2. Resolution [5MP]

2560x1920, 2560x1440, 1920x1080, 1600x1200, 1280x1024,

1280x960,1280x720, 1024x768, 800x600, 800x448, 720x576,

720x480, 640x480, 320x240

[2MP]

1920x1080, 1280x1024, 1280x960, 1280x720, 1024x768,

800x600, 800x448,720x576, 720x480, 640x480, 640x360,

320x240

* + - 1. Maximum Framerate
				1. H.265 / H.264 [5M]

H.265/H.264: Max. 30fps/25fps(60Hz/50Hz)

[2M]

H.265/H.264: Max. 60fps/50fps(60Hz/50Hz)

* + - * 1. MJPEG Max. 30/25fps(60Hz/50Hz)
			1. Video out CVBS : 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P)
			2. Smart Codec Manual Mode (area-based : 5EA)
			3. WiseStream Ⅱ Support
			4. Bitrate Control Method H.265 / H.264: CBR or VBR

MJPEG: VBR

* + - 1. Streaming Capability Multiple streaming (Up to 10 profiles)
			2. Streaming method Unicast / Multicast
			3. Simultaneous Users Unicast (20 users) / Multicast (128 user)
			4. Profile set Max. 10 ea
			5. Interoperability ONVIF Profile S / T, SUNAPI(HTTP API)
		1. Network
			1. Connectivity – Metal Shielded RJ-45(10/100BASE-T)
			2. Protocol
				1. IP v4 / v6, TCP, UDP
				2. Configuration: DHCP, LLDP
				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. Unicast: SRTP
				7. Multicast: IGMP, PIM-SM
				8. Notifications: FTP, SMTP
			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/TLS) login authentication
				8. HTTPS(SSL/TLS) secured communication
				9. Digest login authentication
				10. User access log
				11. 802.1X Authentication(EAP-TLS, EAP-LEAP)
				12. Device Certificate(Hanwha Techwin Root CA)
			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 HPoE(IEEE802.3bt, Class 8)
				2. Power Consumption HPoE: Max 65W, Typical 34W
		3. Mechanical And Environmental
			1. Color/Material White / Aluminum
			2. RAL Code RAL9003
			3. Dimensions (W x H) Ø367.8x335.7mm(Ø144.8"x132.2")
			4. Weight 7.05kg(15.54lb)
			5. Temperature
				1. Operating -40°C~+55°(-40°F ~ +131°F)
				2. Storage -50°C~+60°C (-58°F~+140°F)
			6. Humidity
				1. Operating Less than 95% RH (non-condensing)
				2. Storage Less than 95% RH (non-condensing)
			7. Ingression Protection IP66
			8. 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