ARCHITECT & ENGINEER SPECIFICATIONS
SECTION 28 23 29
VIDEO SURVEILLANCE REMOTE DEVICES AND SENSORS

SNC-VM641

Vandal-resistant Mini Dome Full High Definition (FHD)

(Software version 2.8.0 or later)

PART 2 – PRODUCTS

2.01 NETWORK CAMERA SPECIFICATIONS

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A. MAIN FEATURES:

1. Vandal-resistant Mini Dome Full High Definition (FHD) Network Camera

2. 1080p FHD picture quality (1920 x 1080 pixels maximum resolution), supporting H.264 at 60 fps (IP)

3. The camera shall capture crisp, low-noise Full HD images, even in challenging low-light conditions. The sensitive 1/2.8” type Exmor R CMOS image sensor shall be teamed with XDNR processing, improving low-light performance and achieving the minimum illumination of 0.006 lux(30 IRE) in colour mode.

4. High frame rate of 60 frames per second (fps) to provide smoother and less blurry moving pictures

5. The camera shall support Full HD dual stream.

6. Wide Dynamic range (Wide-D) equivalent to 90 dB

7. e-Varifocal:
   The camera shall electronically zoom an image and adjust the field of view for easy and flexible installation. This function shall provide panning, tilting and zooming by adjusting the position and zooming ratio from the maximum image size, without moving the camera and losing picture quality.

8. Simultaneously encoding up to 3 of the following streams in any combination, including multiple instances of the same compression format: JPEG and/or H.264 (High/Main/Baseline Profile)

9. AAC (16, 48 kHz)/G.726 (40, 32, 24, 16 kbps)/G.711 (64 kbps) audio compression formats

10. Minimum scene illumination of 0.006 lx in Color mode and 0.005 lx in Black and White (B/W) mode (30 IRE [IP], F 1.2, View-DR Off, VE Off, Auto Gain Control maximum rate MAX, 1/30s, 30fps).

11. Picture mode:
    Picture mode shall be selectable from a range of camera scenes in the setting menu to optimize picture quality in various applications. This mode has the following options;
    - “Standard”
    - “Situation Priority - Moving object” to stabilize images
    - “Situation Priority - Low noise” to reducing noise on images, especially dark scenes

- “Flickerless” to reduce the flicker on images according to power frequency (50 Hz or 60 Hz) of the lighting

12. Variable bit rate (VBR) capable of maximum bit rate setting:
    The camera shall have 2 bit rate compression modes, variable bit rate (VBR) or constant bit rate (CBR) compression, selectable to correspond with various network conditions.

    When VBR is selected, higher quality images shall be always maintained regardless of the bandwidth and storage capacity requirements, because the bit rate shall be variable by a scene. Besides, in VBR mode, the camera shall limit the "Maximum value of the bit rate", while maintaining the image quality and the frame rate, so as to reduce the storage capacity.
    Moreover in VBR mode with the "Maximum bit rate limit", the camera shall accept the frame skip for the bit rate control to minimize the storage capacity.

    On the other hand, when CBR is selected, the bandwidth and storage capacity requirements shall be calculated easily, because the bit rate shall be always constant.

13. IK10-rated vandal-resistant feature:
    The camera shall be IK10 rated in accordance with the IEC 62262 standard to vandal-resistant feature for protecting the camera from destructive behaviors.

14. Visibility enhanced wide Dynamic Range (View-DR):
    This technology shall be a combination of unique full-capture Wide Dynamic range (Wide-D) technology, the high-speed Exmor R CMOS sensor, and Visibility Enhancer (VE) technology.
    The full-capture wide dynamic range technology shall use an electronic shutter to capture multiple images and reproduce each frame.
    One image is taken using a standard exposure time and one image is taken using a very short exposure time.
    With the advanced View-DR algorithm, all of the electrons converted from the captured light are fully used by the imager, which is significantly different from some other Wide-D technologies in the industry which discard approximately half of these electrons.
    As a result, View-DR nearly doubles the sensitivity that is offered by conventional Wide-D technologies.
    The level of wide dynamic range (View-DR) setting changes automatically depending on lighting condition.
    When the light level drops, the wide dynamic range (View-DR) turns off automatically.

15. Exmor R (Back-illuminated) CMOS:
    This sensor shall realize high quality and low noise images even in challenging low-light conditions.

16. Visibility Enhancer (VE):
    This technology optimizes the brightness and color reproduction of an image dynamically on a pixel-by-pixel basis while continuously adapting to the scene. This method differs from the technique of using the preset gamma curves.
    Technically, this technology stretches the contrast in both the backlit portions and the shadows within the given dynamic range, which is different from unique wide dynamic range technologies. This technology also contributes to the high sensitivity of the camera.
    By combining this technology with a unique noise reduction feature named eXcellent Dynamic Noise Reduction (XDNR), the camera can reproduce clear and bright images in very low-light conditions, while keeping noise at a minimal level.

17. eXcellent Dynamic Noise Reduction (XDNR):
    This technology reduces Auto Gain Control (AGC) noise to provide clear images without motion blur. This also reduces image data size.

18. XDNR and VE can be used in conjunction with each other and shall provide approximately 4 times the sensitivity compared to the condition where both features are set to off.

19. Intelligent Motion Detection (IMD):
    This feature shall be able to minimize the number of false alarms by eliminating environmental noise such as trees moving, ripples in water, reflection from wet roads and gain noise to name but a few. This is very different to other manufacturers that typically compare just two frames together. This camera compares 15 frames together, which ensures that only ambiguous objects moving can trigger a real alarm.
    As a result, this enables end users to focus on real events, not suffer from loss of attention and quickly locate video that has been recorded upon alarm activations.

20. Distributed Enhanced Processing Architecture Advanced (DEPA Advanced):
    This technology shall extend the benefits of unique conventional intelligent video analytics and enables its functionality to be used with third-party software vendors. Alternatively the camera can be configured using the web interface to be a stand-alone intelligent surveillance solution.
    This means that end users get the same features as conventional

intelligent video analytics running at the edge without needing to have any recording solution. Alarms can be activated by the camera, video can be recorded to a built-in SD/SDHC card, and lights and alarms can be activated.

B. CAMERA:

1. The camera shall utilize a 1/2.8-type progressive scan Exmor R CMOS sensor.

2. The number of effective pixels shall be approx. 2.13 Megapixels.

3. The analog video output of the camera shall be selectable from either the NTSC or PAL standards.

4. Camera synchronization shall be internal.

5. The camera shall require a minimum scene illumination of:

   Color:
   0.01 lx (50 IRE [IP], F 1.2, View-DR Off, VE Off, Auto gain control maximum rate MAX, 1/30s, 30 fps)
   0.006 lx (30 IRE [IP], F 1.2, View-DR Off, VE Off, Auto gain control maximum rate MAX, 1/30s, 30 fps)

   B/W:
   0.007 lx (50 IRE [IP], F 1.2, View-DR Off, VE Off, Auto gain control maximum rate MAX, 1/30s, 30 fps)
   0.005 lx (30 IRE [IP], F 1.2, View-DR Off, VE Off, Auto gain control maximum rate MAX, 1/30s, 30 fps)

6. The camera shall have an equivalent 90 dB Wide Dynamic range (Wide-D) capability, realized by a technology that using electronic shutter to capture multiple images and reproduce each frame. (e.g. One image is taken using a standard exposure time and either 1 or 3 additional images are taken using very short exposure times.)

7. The camera shall use a technology to optimize the brightness and color reproduction of the image dynamically on a pixel-by-pixel basis.

8. The video signal-to-noise ratio shall be more than 50 dB (Auto gain control maximum rate 0 dB).

9. The camera shall limit the maximum amount of gain-controlled automatic exposure control.

10. The electronic shutter speed shall be set from 1/1 to 1/10,000 second.

11. The camera shall adjust the target brightness for the automatic exposure setting by selecting the exposure correction value from the list box on the menu.

12. White balance shall be selected among ATW (approx. 2000 K to 10000 K), ATW-PRO (approx. 2500 K to 6000 K), Indoor, Outdoor, Fluorescent lamp, Mercury lamp, Sodium Vapor lamp, Metal Halide lamp, White LED, One push WB, or Manual settings.
    The R/B gain offset can be set for the ATW or ATW-PRO settings.

13. The camera shall have an integrated 3X IR compensated DC auto-iris type Varifocal lens as a standard equipment.

14. The camera shall also have 4X digital zoom capability.

15. The camera shall have the total zoom ratio of 12X with 3X optical zoom and 4X digital zoom capabilities.

16. The camera shall have an Easy Focus function, which adjusts the camera focus via the Easy Focus button on the rear of the camera or remotely via the GUI. When the camera is switched between day and night modes, the Easy Focus function is activated to keep the camera focused.

17. The camera shall also have a zoom/focus adjustment capability via the ZOOM/FOCUS switch on the camera unit or remotely via the GUI.

18. The camera shall have Focus refresh function which returns to the last focus position manually or designated time in a day to prevent from shifting the focus position by unexpected impact.

19. The camera shall be adjusted all pan, tilt and rotation positions by turning the lens case to rotate the camera.

20. The viewing angle in 1920 x 1080 mode (16:9 aspect ratio) shall be:
    Horizontal: 105.3 ˚ to 35.6 ˚.
    Vertical: 56.9 ˚ to 20.1 ˚.
    Tilt: 127.6 ˚.

21. The ranges (typical) shall be:
    Pan: -192° to +192°
    Tilt: -7° to +75°
    Rotate: -99° to +180°

22. The focal length shall be 3.0 to 9.0 mm.

23. The aperture range for the lens (F number) shall be F 1.2 (Wide) to F 2.1 (Tele).

24. The minimum object distance shall be 11 7/8 inches (300 mm).

C. CAMERA FEATURES:

1. The camera shall have a True Day/Night (D/N) function to switch to Day mode (color mode) or Night mode (black and white mode) depending on the light level.

2. The camera shall be capable of an e-flip function, a feature when the camera passes the down position, electronically flips the image 180˚.

3. The camera shall have an Image Rotate function, which can be used to stream a H.264 video signal with rotating 90˚ or 270˚ so that operators can easily monitor a vertical area (such as corridors, hallways, aisles, and roads).

4. The camera shall have an Mirroring function, which can be used to stream a horizontally flipped video.
   A conductor of train or a bus driver use network camera as a rearview mirror in real time. If the camera shoots the opposite direction of movement, they can monitor horizontally flipped video like rearview mirror.

5. Image rotate and Mirroring functions can be used simultaneously.

6. The camera shall have a functionality to reduce Auto –Gain-Control (AGC) noise to provide clear images without motion blur in low light environment.

7. The camera shall have an Image Stabilizer function, which can display with less video sway when the camera is installed in a place with vibration.

8. The camera shall have a functionality to provide recommended parameter setting-combination as menu to optimize picture quality in various applications for general outdoor, moving object capturing, low noise, less flicker for 50Hz or 60Hz.

9. The camera shall have polygonal privacy zone masking which blocks out unwanted or prohibited area within the video image to protect privacy.
   Mask colors shall be Black, any of 6 shades of Gray, White, Green, Yellow, Red, Cyan, Magenta, and Blue.
   Mosaic patters shall be also selected as masking.
   The camera shall be capable of masking up to 20 areas.
   Such capability shall be via vendor supplied SNC toolbox utility software or the browser-based setup menu.

10. The camera shall have a built-in SD card slot for an on-board recording capability (Edge Storage).
    Network-disconnection on recording should be supported, and the recorded video search &replay function should be available in the camera GUI. The video streaming of replay from SD-card memory should be using the same protocols as live streaming such as RTP/RTCP, RTSP over TCP, RTSP over HTTP.

11. The pre-/post-alarm recording capabilities using an 'Edge Storage' function shall be as follows:

    - Capable of storing several seconds of pre-alarm and post-alarm images when an alarm is triggered by the motion detection, VMFs, camera tampering detection, or sensor input.

    - Capable of recording image and sound files on the approx. 8 MB of built-in memory or SD memory card (not supplied), or transferring the files to an FTP server.

    - Record in the compression format selected for monitoring.

    - Correspond to a still image as a snapshot in the event.

    - Have a maximum duration for pre- and post-alarm recording that shall be dependent on the bit rate setting for H.264 (High/Main/Baseline Profile or the picture quality and frame rate setting for JPEG as shown in the following tables:

    For H.264

Full HD	Bitrate (Kbps)	64	128	256	384	512	768	1000	1500	2000
	Capacity (sec)	60	60	60	60	60	60	60	60	60
	Bitrate (Kbps)	3000	4000	5000	6000	7000	8000	16000	24000	32000
	Capacity (sec)	60	60	60	60	60	53	26	17	13

    For JPEG

Image Size		320x184	640x480	1280x720	1920x1080
Framerate(fps)	1	1068	204	68	30
	2	534	102	34	15
	3	356	68	22	10
	4	267	51	17	7
	5	213	40	13	6
	6	178	34	11	5
	8	133	25	8	3
	10	106	20	6	3
	12	89	17	5	2
	15	71	13	4	2
	20	53	10	3	1
	30	35	6	2	1

12. The ‘Edge Storage’ function shall operate as follows:

    - Capable of storing up to 900 seconds of pre-alarm and up to 7200 seconds of post-alarm images and audio on a SD memory card.

    - Record in the compression format selected for monitoring.

    - Recording to this storage area can be done manually or when an alarm is triggered.

    - The trigger can be based on motion detection, VMFs, camera tampering detection, sensor input or network disconnection, or a combination of those alarms using Boolean operands such as a logical ‘AND’, ’OR’, or ‘THEN’.

    - Capable of streaming the recorded moving image data using the same protocols as live streaming such as RTP/RTCP, RTSP over TCP, RTSP over HTTP, so that the user can view recorded image while recording.

    - Capable of streaming the recorded still image data using the HTTP protocol.

    - Capable of simultaneously streaming live video with recorded video by using different sessions.

    - Capable of downloading the recorded video at a variety of speed rates such as 0.5x and 2x speed.

    - Capable of setting periodical recording, alarm record schedule, and overwriting record for the still image data.

13. The camera shall have an internal memory size of approx. 40 MB for buffering.

14. The camera shall be capable of pre- and post-alarm buffering.

15. The camera shall support the voice alert function, which can automatically play an audio file stored on the camera by an alarm trigger using motion detection, unique Video Motion Filters (DEPA Advanced VMFs), camera tampering detection, or via a sensor input.

16. The camera shall be IK10 rated in accordance with the IEC 62262 standard to vandal-resistant feature for protecting the camera from destructive behaviors.

17. The camera shall have the capability to display a wide variety of overlays in any of 7 positions on the video image (4 corners, top, bottom, or center of the image).
    The following overlays shall be possible:

    - Camera ID of up to 20 alphanumeric characters or a logo in gif format
    - Date/Time data with selectable formats such as yyyy mm dd hh:mm:ss, mm dd yyyy hh:mm:ss, and dd mm yyyy hh:mm:ss
    - User setting frame rate (fps) and bit rate (bps)
    - Event -- sensor IN, unique intelligent motion detection, unique video motion filters, camera tampering detection
    - Character string
    - Compression format information
    - Display styles: outline and transparent, white half-transparent, black half-transparent, white, and black backgrounds.
    - Font colors: Black, Blue, Red, Magenta, Green, Cyan, Yellow and White.
    - Font size: Large, Middle, Small, and Auto.

    Unique intelligent motion detection shall not be effective in the selected superimposed areas.
    All of overlays except the Date/Time data can be set to blink.

18. The camera shall be capable of displaying an alive monitoring indicator on the screen so that operators can quickly find if the current video is alive or not.

19. The camera web browser shall support the following languages: English, Japanese, French, Spanish, German, Italian, Simplified Chinese, Traditional Chinese, Korean, Portuguese, Russian, Hindi, Arabic, Vietnamese, and Thai. .

D. VIDEO:

1. The supported resolutions shall be 1920 x 1080, 1280 x 720, 1024 x 576, 720 x 576 (PAL), 720 x 480 (NTSC), 704 x 576, 640 x 480, 640 x 360, 352 x 288, and 320 x 184 resolution.

2. The supported resolutions are shown in the following:

Image 1 (30 fps)	Image 2 (30 fps)	Image 3 (30 fps)	Image 1 (60 fps)	Image 2 (60 fps)
1920 × 1080	1280 × 720 or lower	640 × 480 or lower	1920 × 1080	Not Selectable
1280 × 720	1280 × 720 or lower	640 × 480 or lower	1280 × 720	1280 × 720 or lower
1024 × 576	1280 × 720 or lower	640 × 480 or lower	1024 × 576	1280 × 720 or lower
720 × 576	1280 × 720 or lower	640 × 480 or lower	720 × 576	1280 × 720 or lower
704 × 576	1280 × 720 or lower	640 × 480 or lower	704 × 576	1280 × 720 or lower
720 × 480	1280 × 720 or lower	640 × 480 or lower	720 × 480	1280 × 720 or lower
640 × 480	1280 × 720 or lower	640 × 480 or lower	640 × 480	1280 × 720 or lower
640 × 360	1280 × 720 or lower	640 × 480 or lower	640 × 360	1280 × 720 or lower
352 × 288	1280 × 720 or lower	640 × 480 or lower	352 × 288	1280 × 720 or lower
320 × 184	1280 × 720 or lower	640 × 480 or lower	320 × 184	1280 × 720 or lower

3. The camera shall support Full HD dual stream as shown in the following table:

Full HD Dual Mode	High Framerate Mode	Image 1	Image 2	Image 3
On	Off	1920x1080, 30fps	1920x1080, 30fps	--
Off	On	1920x1080, 60fps	--	--
		1280x720, 60fps	1280x720, 60fps	--
	Off	1920x1080, 30fps	1280x720, 30fps	640x360, 30fps

4. The camera shall support the following compression formats: JPEG and H.264 (High/Main/Baseline Profile).

5. The maximum resolution for each compression format shall be 1920 x 1080.

6. The camera is compliant with the SMPTE 274M in terms of number of pixels (1920 x 1080) and 16:9 format.

7. The maximum frame rate shall be 60 frames per second in H.264 (High/Main/ Baseline Profile) at 1920 x 1080 resolution and 60 frames per second in JPEG at 1280 x 720 resolution.

8. The camera shall provide smoother and less blurry moving pictures with the High Frame Rate of 50 fps (PAL) or 60 fps (NTSC). When the High Frame Rate setting is set to off, the maximum frame rate shall be 25 fps (PAL) or 30 fps (NTSC).

9. Frame rate (fps) shall be selected among;
   For NTSC (60Hz) mode: 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 30, or 60*.
   For PAL (50Hz) mode: 1, 2, 3, 4, 5, 6, 8, 10, 12, 16, 20, 25, or 50*.

*Valid only when the High Frame rate mode is set to ‘ON’.

10. The camera shall have constant bit rate (CBR) or variable bit rate (VBR) capable of maximum bit rate setting compression mode selectable to correspond with various network conditions.

    When CBR is selected, the bandwidth and storage capacity requirements shall be calculated easily, because the bit rate shall be always constant. On the other hand, image quality shall degrade exhibiting signs of macro blocking depending on the scene situation.

    When VBR is selected, higher quality images shall be always maintained regardless of the bandwidth and storage capacity requirements, because the bit rate shall be variable by a scene. Besides, in VBR mode, the camera shall limit the "Maximum value of the bit rate", while maintaining the image quality and the frame rate, so as to reduce the storage capacity.
    Moreover in VBR mode with the "Maximum bit rate limit", the camera shall accept the frame skip for the bit rate control to minimize the storage capacity.

11. The camera shall support the setting of the I-picture interval in frame units (1-300 frames) and time (1-5 seconds) to achieve higher compression rate.

12. Bit rate (Kbps) shall be selected among 64, 128, 256, 384, 512, 768, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 16000, 24000, or 32000.

13. The camera shall be capable of electronic pan/tilt/zoom (e-PTZ) named Solid PTZ.

    The camera shall also be capable of saving the defined position as home position to reduce the bandwidth when shooting the specific area (e.g. license plates and human faces) at the entrance gate.
    The home position can be called after reboot.

14. The camera shall have e-Varifocal function which adjusts the angle of image in the range with less image quality degradation by limiting the cropped range of the image to the shooting range of equal magnification size.
    The e-Varifocal function can be used by selecting an output image size other than the maximum resolution size of the camera.
    Zoom ratio limitation shall be changed depending on the selected image size as shown in the following tables:

Output image size	Zoom ratio
1920 x 1080	1
1280 x 720	1.5
1024 x 576	1.88
720 x 576	
704 x 576	
720 x 480	2.25
640 x 480	
640 x 360	3
352 x 288	3.75
320 x 184	4

15. The camera shall have an Adaptive Rate Control (ARC) function when using H.264 (High/Main/Baseline Profile) compression. This function when enabled, shall allow the camera to maintain the frame rate at a reduced image quality when network congestion occurs. Should network bandwidth become further restricted, the frame rate shall then drop automatically to a suitable speed to maintain image integrity.

16. The camera shall be capable of limiting the bandwidth from 64 kbps to 32 Mbps in H.264 (High/Main/Baseline Profile), and from 0.5 Mbps to an unlimited bandwidth in JPEG.

17. JPEG compression levels shall be user selectable in 10 levels of compression ratios, based on an image of 24 bits per picture element (8 bits each for YUV).

18. Constant bit rate algorithm for JPEG data:
    The camera shall be capable of equalizing JPEG data sizes to have stable bandwidth utilization. Data size for each compression level is as follows:

Resolution	640 x 480	720 x 576	1280 x 576	1280 x 720	1920 x 1080
Image Quality Level	Data Size (KB)				
1	16	22	30	46	101
2	21	29	40	63	138
3	23	32	45	70	153
4	27	37	52	80	179
5	31	42	59	91	201
6	39	50	70	109	251
7	46	65	86	135	299
8	54	80	106	170	372
9	77	115	151	248	527
10	107	154	201	339	714

19. Actual frame rate in JPEG shall be shown in the following table:

Resolution	640 x 480	720 x 576	1280 x 576	1280 x 720	1920 x 1080
Image Quality Level	Actual Output Frame Rate (fps)				
1	30	30	30	30	30
2	30	30	30	30	30
3	30	30	30	30	30
4	30	30	30	30	20
5	30	30	30	30	20
6	30	30	30	30	20
7	30	30	30	30	15
8	30	30	30	20	12
9	30	30	20	15	8
10	30	20	15	10	4

20. The camera shall have the capability of simultaneously encoding up to 3 of the following compression formats in any combination, including multiple streams of the same format: JPEG and H.264 (High/Main/Baseline Profile).
    For example, the 1st streaming shall be used for the live monitoring, the 2nd streaming shall be used for recording to the storage, and the 3rd streaming shall be used for the mobile monitoring with the smartphone viewer.
    The maximum frame rates of each combination are shown in the following:

    For the standard frame rate:

	1st 1920 x 1080 8Mbps		2nd 1280x720 4Mbps		3rd 640x360 1Mbps	
	Codec	fps	Codec	fps	Codec	fps
Single Codec Stream	H.264	30				
Dual Codec Stream	H.264	30	H.264	30		
Triple Codec Stream	H.264	30	H.264	30	H.264	30

For the high frame rate:

	1st 1920 x 1080 8Mbps	
	Codec	fps
Single Codec Stream	H.264	60

	1st 1280 x 720 8Mbps		2nd 1280x720 4Mbps	
	Codec	fps	Codec	fps
Dual Codec Stream	H.264	60	H.264	60

21. The camera shall be capable of supporting up to 20 users simultaneously over the network.

22. The camera shall have up to 6 user level settings.
    The administrator shall have complete access/control of the cameras. The other 5 levels of access can be set to limit user privileges to functions such as viewing, changing image size, etc. Access to functions shall be determined as shown in the following table:

Function	Administrator	User				
		Full	Pan/Tilt	Preset position	Light	View
Monitor a live image	●	●	●	●	●	●
View the date and time	●	●	●	●	●	●
Control the frame rate (JPEG mode only)	●	●	–	–	–	–
Control the image view size	●	●	●	●	●	–
Save a still image and movie in the computer	●	●	●	●	●	–
Switch the TCP/UDP transmission mode (Available in H.264 mode only)	●	●	–	–	–	–
Receive audio	●	●	●	●	●	●
Select the codec mode	●	●	●	●	●	–
Control the setting menu	●	–	–	–	–	–

● Usable function
– Not usable function

E. INTELLIGENT VIDEO ANALYTICS:

1. The camera shall have a unique conventional intelligent video analytics named Distributed Enhanced Processing Architecture Advanced (DEPA Advanced) to trigger an alarm based on user-defined rules.

2. The camera shall incorporate a built-in unique Intelligent Motion Detection (IMD) capability.
   To minimize false triggers, this Intelligent Motion Detection shall compare the current image with prior 15 frames within the camera. This algorithm shall allow the camera to discriminate against some environmental noise such as shaking leaves or Auto Gain Control maximum rate noise.

3. The camera shall have a Face Detection function which detects the locations and sizes of human faces.
   It detects facial features and ignores other objects, such as buildings, trees, and bodies.

Maximum frame rate	3 fps
Maximum face size	960 x 960 pixels
Minimum face size	120 x 120 pixels
Maximum number of faces to be detected simultaneously	8 faces
Angles to be detected	Yaw: ±75° Pitch: ±40° Roll: ±30°

4. The camera shall have a camera tampering detection function that alerts the operator if the camera is tampered with. Tampering can include spraying of the camera lens, covering it with a cloth, or changing of the mounting direction.
   The camera tampering detection shall be able to be cleared manually or automatically (every period between 1-3600 seconds) via GUI after an camera tampering alarm is triggered.
   Also, its sensitivity level setting shall be selected among low, mid,

and high by sending CGI command to decrease the number of false alarms by setting proper level in the monitoring environment

5. The camera shall have the following scene analytics, all of which can be set from the camera setup menu:

   - Intrusion: When a moving object enters the designated area, an alarm is triggered.

   - Passing: A passage line is determined, and when a moving object passes the set line, an alarm is triggered.

   - Left Object Detection: When an object has been left unattended for too long in the designated area, an alarm is triggered.

   - Removed Object Detection: When an object has been removed from the designated area, an alarm is triggered.

F. AUDIO:

1. The camera shall support bi-directional audio, using G.711 (64 kbps), G.726 (40, 32, 24, 16 kbps) and AAC (48, 16 kHz) compression formats.

2. The camera shall be capable of storing and playing back up to 3 audio files.
   Audio files shall be generated and transferred to the camera using either the web browser or the manufacturer provided SNC toolbox software.

3. The camera shall provide time stamps on the streaming audio. Timestamps shall be inserted in the header area of the audio data.

4. The user shall have the ability to activate the microphone input via the web interface.

G. SYSTEM REQUIREMENTS & NETWORK:

1. The supported operating systems shall be Microsoft Windows 10 32 bit and 64 bit (Pro), Microsoft Windows 8.1 32 bit and 64 bit (Pro), and Microsoft Windows 7 32 bit and 64 bit (Ultimate/Professional) .

2. Minimum PC requirements shall be the Intel Core i7, 2.8 GHz or higher, with 2 GB RAM or more supporting 1600 x 1200 or higher resolution, 24-bit True Color display capability with Ethernet 100Base-TX.

3. The camera shall incorporate a built-in web server, such that the standard web browser Microsoft Windows Internet Explorer (version 11.0) can be used to access the camera without need for special viewer software.

4. The following web browsers can also be used to access the camera with the plug-in free viewer: Firefox version 50.1 and Google Chrome version 55.0.
   The plug-in free viewer enables the above browsers automatically when they are started.
   The plug-in free viewer display method will be selected automatically.
   ActiveX viewer can allow for H.264 (High/Main/Baseline Profile) video streams and JPEG format images on the Google Chrome version 55.0.

5. The camera shall support ActiveX viewer which allows the camera image to be viewed in Internet Explorer.
   The ActiveX viewer allows for recording of video and audio directly to the PC's hard drive, and supports direct audio from the PC Mic to the camera.

6. The camera shall be capable of generating HTML code for the video image, allowing for easy web page integration.

7. The camera shall support the following network protocols:
   IPv4, IPv6, TCP, UDP, ARP, ICMP, IGMP*, HTTP, HTTPS, FTP (client only), SSL, SMTP, DHCP, DNS, NTP, RTP/RTCP, RTSP over TCP, RTSP over HTTP, and SNMP (v1, v2c, v3).
   Network security shall be via password (basic authentication) and IP filtering.

   *Source-Specific Multicast (SSM) shall be supported.

8. The camera shall have the capability to stream H.264 (High/Main/Baseline Profile) video in TCP protocol or H.264

(High/Main/Baseline Profile) video in UDP (unicast/multicast) protocol.

9. The camera shall be capable of dynamic IP address change notification. It shall accomplish this via an email to a specified address or by HTTP when its IP address changes.

10. The camera shall support HTTPS client authentication.

11. The camera shall have an FTP client capability which allows the following:

    - Transferring a JPEG image to a pre-specified FTP server when an alarm is triggered by either motion detection, camera tampering detection or sensor input.

    - Periodically capturing a JPEG image and transferring it to the FTP server.

12. The camera shall have an email (SMTP) notification capability which allows the following:

    - Sending an email to pre-specified users when an alarm is triggered by either motion detection, VMFs, camera tampering detection, or sensor input. A JPEG image, which is linked with the alarm trigger, can be attached to the email.

    - Periodically capturing a JPEG image and sending it via email.

    - Encrypting mails if the SMTP server requires SMTP over TLS

    The range of the SMTP port number shall be from 1 to 65535.

13. The camera shall send Alarm notifications by HTTP to up to 3 designated URL, when the defined events such as Tampering alarm or network disconnection occurs in the camera.

14. The camera shall support POP3, APOP, and CRAM-MD5 authentication for SMTP transmission.

15. The camera shall support RTSP protocol based upon RFC 2326 and shall support the following options: DESCRIBE, SETUP, PLAY, TEARDOWN, and GET_PARAMETER.

16. The camera shall support QoS technology using Differentiated Services Code Point (DSCP).

17. The camera shall support Universal Plug and Play (UPnP) discovery protocol which is known as the Simple Service Discovery Protocol (SSDP). When cameras are added to the network, SSDP allows them to advertise their services to control points (e.g. VMS or server) on the network.
    The UPnP discovery protocol allows installers to register cameras to the VMS more easily.

18. The camera shall support IP Filtering, whereby access to the camera can be restricted to one or more groups of selected users. Up to 10 different groups can be established by defining an IP address range for each group.

19. ;The camera shall:
    - comply with the IEEE 802.1X standards,
    - be capable of being integrated into an IEEE 802.1X network to achieve high network security,
    - support EAP-TLS mode to use a key pair from a Certificate Authority (CA),
    - support EAP-MD5 mode,
    - support PEAP mode.

20. The camera shall have user configurable port settings.

21. Upon CGI command request, system log shall be recorded on a built-in memory (non volatile memory).

22. The camera shall be capable of arranging both information of system log and access log by designating log level (Critical, Warning, and Information) and log record size (200 to 1,024).
    Log files shall also be capable of downloading to the PC as text file.

23. The camera shall provide supplied applications via the designated website.

    The SNC easy IP setup Guide application shall provide the initial networking setting and Windows firewall configuration.

24. The camera shall be compliant with the Open Network Video Interface Forum Profile S (ONVIF Profile S) conformance.

    The camera shall also support ONVIF event commands such as Tampering alarm, Motion alarm and Fan error.
    The ONVIF multi-cast distribution function shall be supported.

H. INETERFACES:

1. The camera shall have a composite analog video output in addition to streaming video via Ethernet.
   The composite analog video output can be used for monitoring while installing the camera to adjust the field of view and focus.

2. The composite analog video output from the camera shall be 1.0 V peak-to-peak @ 75 ohms, unbalanced, sync negative via a BNC type connector.

3. Horizontal resolution shall be 700 TV lines (4:3 aspect ratio, analog video).

4. A secondary analog monitor output shall be provided, accessible from the camera control panel after the camera is installed. The interface shall be a phono jack type connector.

5. The camera shall have mini jack connectors to support external microphone and active speakers. Mic/Line input shall be switchable.
   Mic input shall be monaural, 2.2 kilo ohms, DC 2.5 V plug-in-power, Line input shall be monaural, and active speaker output shall have a maximum output level of 1 Vrms.

6. The camera shall have an RJ-45 socket on the rear of the camera.

7. The network interface shall be via an 8-pin RJ-45 connector, 10Base-T/100Base-TX Ethernet.
   Both IPv6 and IPv4 are supported.

8. The camera shall have a 7-pin I/O interface located on the rear of the camera.
   There shall be 2 alarm input ports, and 2 alarm/relay output ports.
   The alarm input ports shall be opto-isolated.
   For the alarm output ports, the timer execution shall be able to be selected.

9. The camera shall support 2 optically isolated sensor inputs, and 2 relay outputs.
   The interface shall be via a 6-pin push type spring lock connector.

10. The camera shall provide sensor-in/relay-out ports for interfacing with external equipment.
    The sensor input shall be configurable for either ‘make contact’ or ‘break contact’ configuration.

11. 2 relay outputs shall be rated at AC 24 V/DC 24 V, 1 A or less.

12. The camera shall have a built-in SD card slot for an on-board recording capability for movies and still pictures.
    The maximum number of recording shall be up to 4,000.
    The camera notify the specified SD card maintenance information.
    SD card up to 256 GB shall be available.
    (The maximum number of event recording in the SD card is 4000. It may not use the full capacity of the SD card, depending on the limitation set for the event recording.)

13. The camera shall notify the status of the memory card when memory card that corresponds to displaying maintenance information are used.

    The following 3 status are indicated as maintenance information:
    - Normal: Memory card is working without any problem.
    - Warning: Recommend that Memory card is replaced to brand-new one
    - Error: Memory card is broken.

    There are several notice methods as follows:
    - Checking on Administrator menu
    - Sending the alert by e-mail
    - Using the alarm output
    - Getting the alarm via CGI
    - Checking the log file

14. IO assignment: I/O Port

Color of wire	Name
Red	Sensor In 1+
White	Sensor In 2+
Black	Sensor In – (GND)
Yellow	Alarm Out 1+
Brown	Alarm Out 1–
Green	Alarm Out 2+
Blue	Alarm Out 2–

I. GENERAL SPECIFICATIONS:

1. The camera input power shall be a power voltage of either DC 12 V ± 10%, AC 24 V ± 20%, or shall be Power over Ethernet (PoE) (IEEE 802.3af compliant, Class 0).

2. The power connection shall be by means 2-pin Phoenix connector on a pigtail for AC 24 V and DC 12 V operation.
   UL cable (VW-1 style 10368) shall be needed for these connections.

Recommended cable

DC 12 V:

CABLE(AWG)	#24	#22	#20
Max. length(m)	9	15	23

AC 24 V:

CABLE(AWG)	#24	#22	#20
Max. length(m)	37	63	92

3. Power consumption for the camera shall be 6.0 W maximum.

4. The camera operating temperature shall be within the following range:
   +14 ˚F to +122 ˚F (-10 ˚C to +50 ˚C)

5. The camera starting temperature shall be within the following range:
   +32 ˚F to +122 ˚F (0 ˚C to +50 ˚C)

6. The camera storage temperature shall be within the following range:
   -4 ˚F to +140 ˚F (-20 ˚C to +60 ˚C)

7. The camera operating humidity shall be within the range of 20 % to 80 % (non-condensing).

8. The camera storage humidity shall be within the range of 20 % to 80 % (non-condensing).

9. The camera dimensions (Dia. x H) shall be approximately:
   5 7/8 inches x 4 3/8 inches (148 mm x 108 mm).

10. The camera shall weigh approximately 1 lb 13 oz (835 g) with lens.

11. The external material shall be:
    Top cover: PC (Polycarbonate)
    Dome cover: PC (Polycarbonate)

12. The external color shall be:
    Top cover: Munsell 4.4BG 8.4/0.2

13. The camera shall have a mounting screw hole (¼”, 20 UNC) on both the top and bottom of the camera body for standard mounting.

14. The camera shall be capable of being flush mounted to a ceiling using an optional in-ceiling bracket YT-ICB600, available from the camera manufacturer.

J. REGULATORY SPECIFICATIONS:

1. JATE Technical standard (LAN)
2. UL2044, IEC60950-1 (CB)
3. VCCI (Class A), FCC (Class A), IC (Class A)
4. Emission: EN55032 (Class A)
5. Immunity: EN55024+EN50130-4
6. Emission: AS/NZS CISPR32 (Class A)
7. EMC-TR
8. KC

K. SUPPLIED ACCESSORIES:

1. Operating Instructions - Download site Information
2. Bracket (1)
3. Template (1)
4. Power input cable (1)
5. Camera unit mounting screw M3 (1)
6. BNC cable (1)
7. Wire rope (1)
8. Wrench (1)
9. Audio cable (1)
10. I/O cable (1)
11. Safety regulations (1)

L. OPTIONAL ACCESSORIES:

1. YT-ICB600 In-ceiling bracket
2. YT-LD601S Smoke Dome Cover

M. DIMENSIONS:

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