



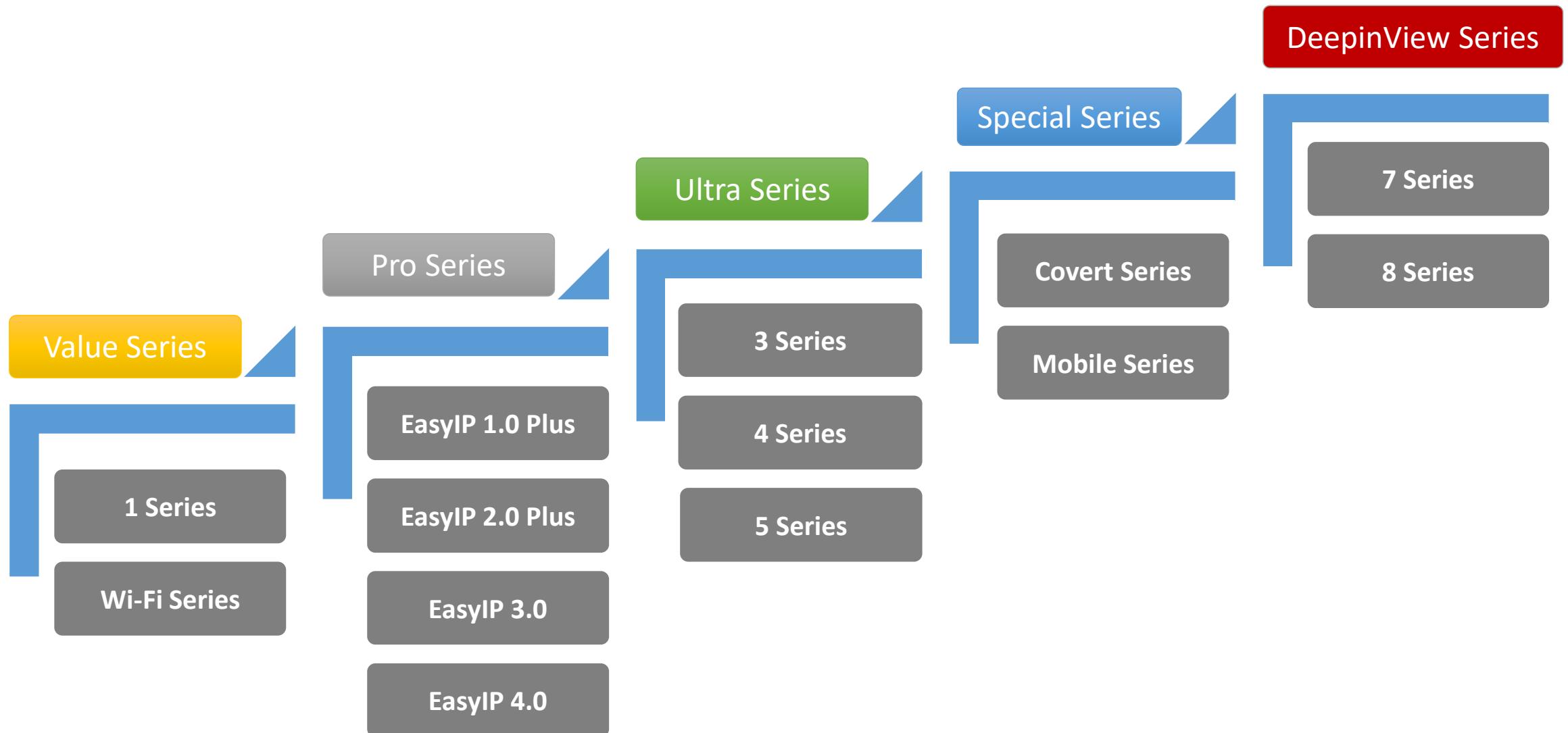
# **Hikvision IP Camera**

Hikvision Certified Security Associate

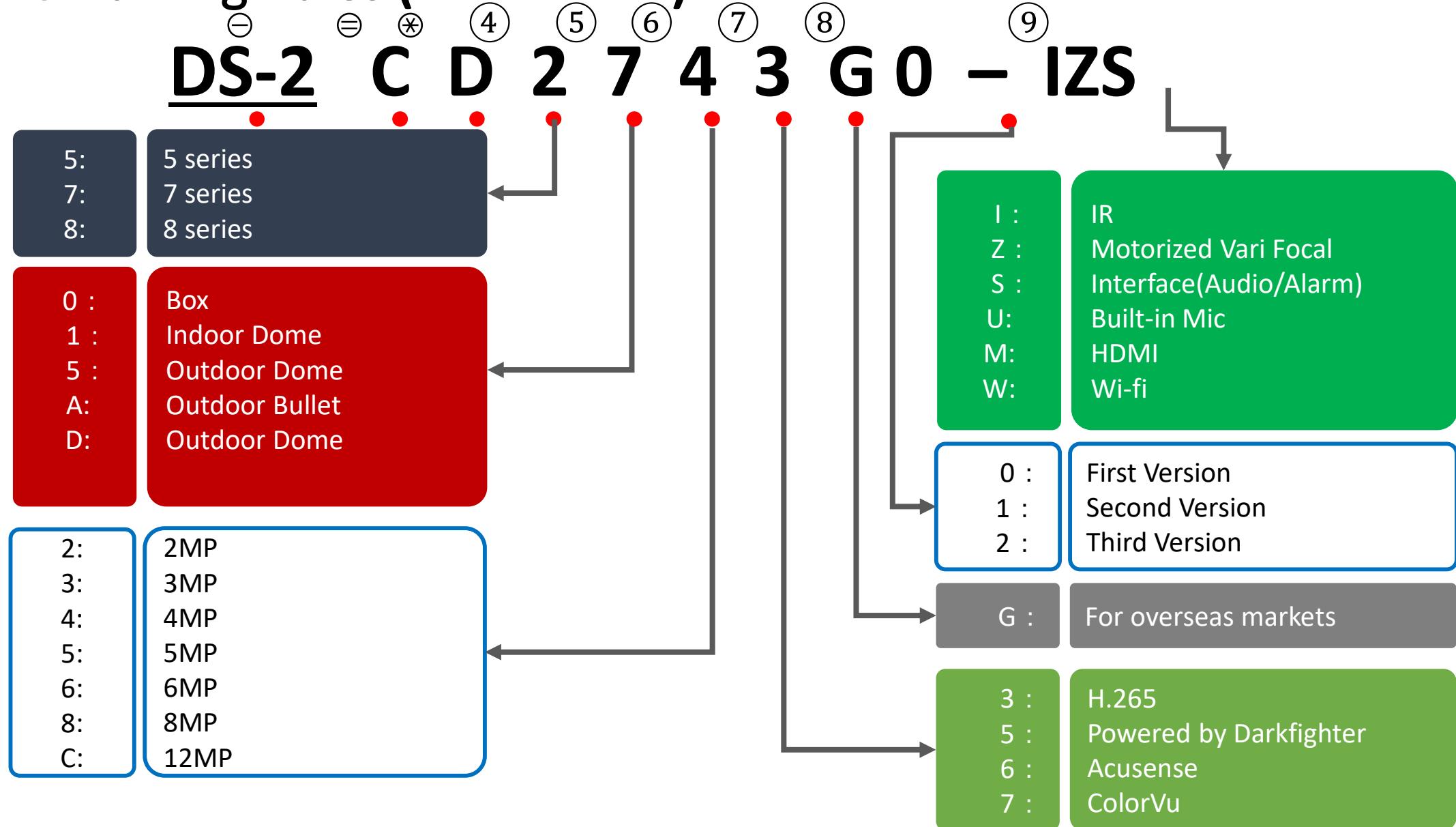
# Contents

- **Product Family**
  - Product Family
  - Naming Rules
  - Working Principle
- Functions & Applications
- Troubleshooting

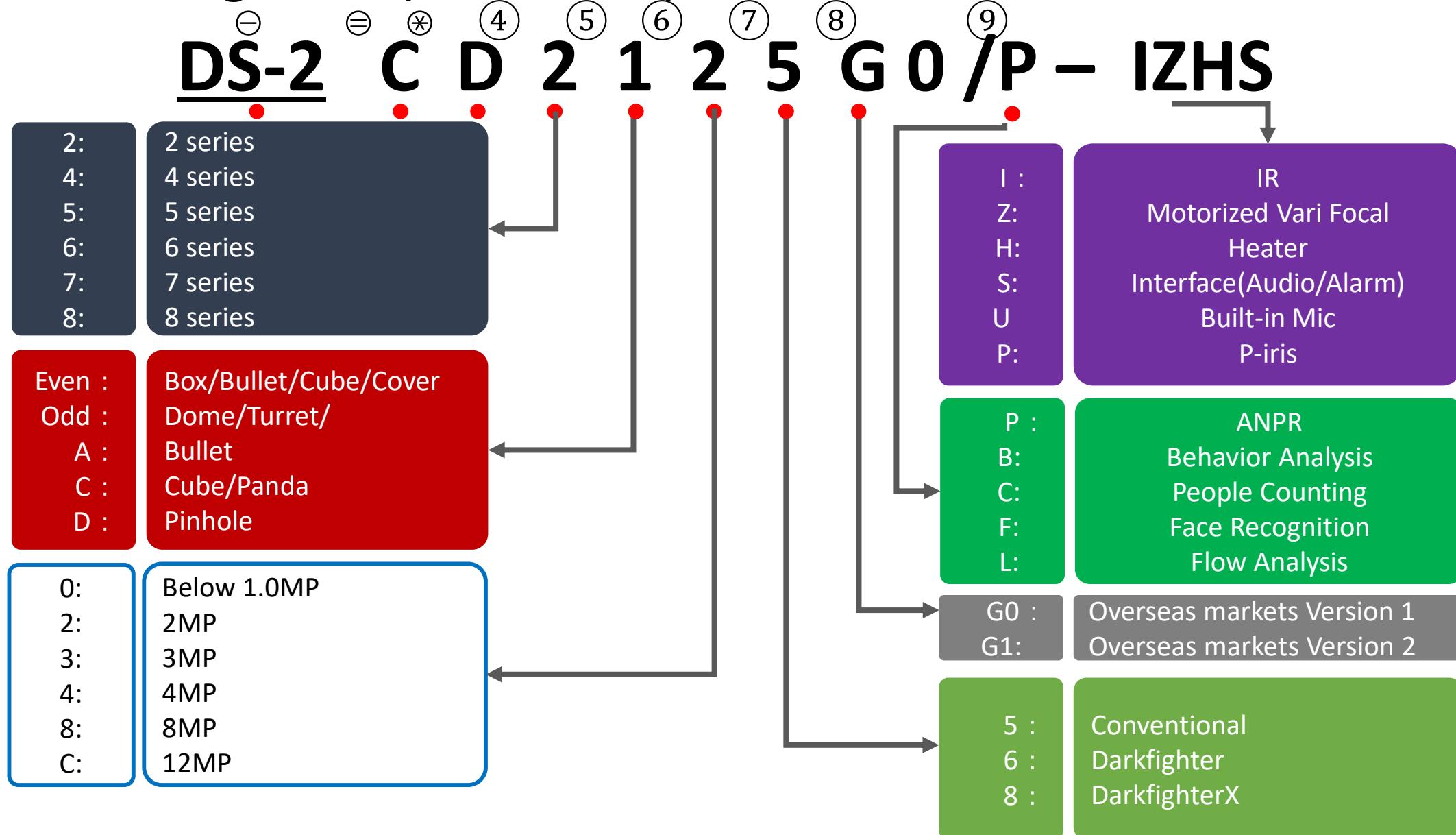
# IPC Products Family



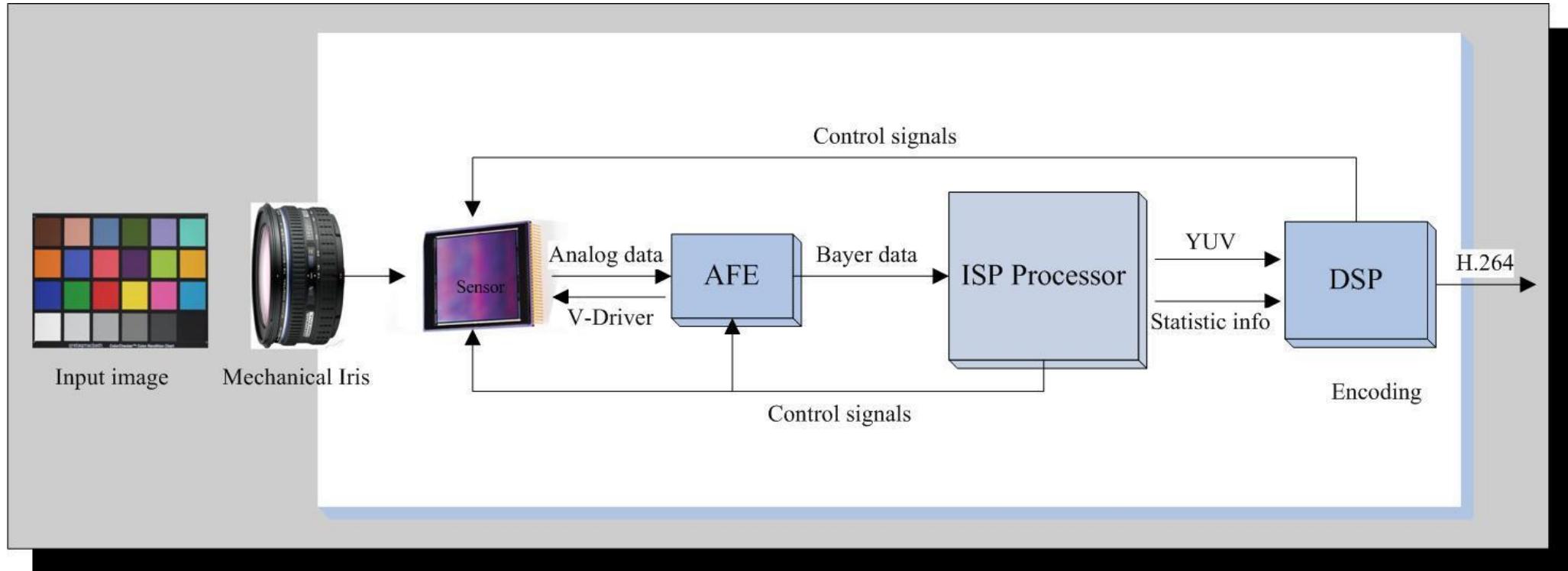
# IPC Naming Rules (1 - 3 series)



# IPC Naming Rules (4 - 8 series)



# Working Principle

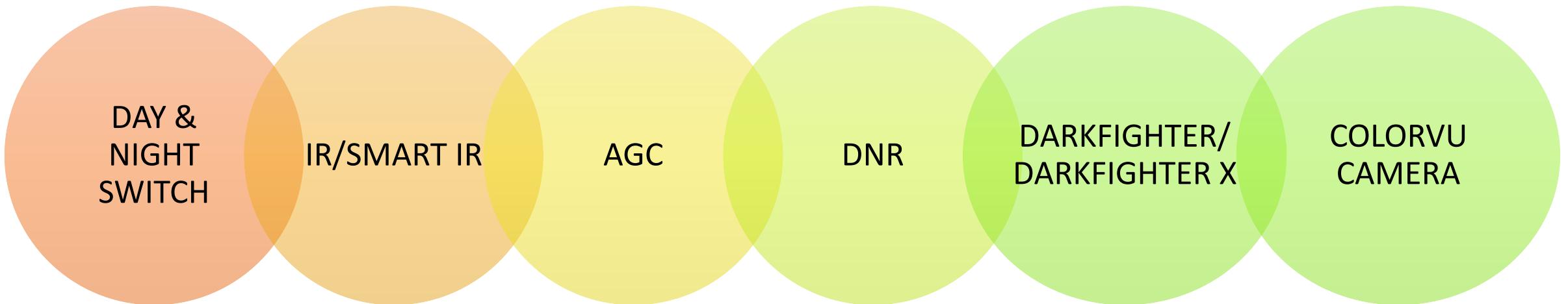


# Contents

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  - Advanced Features
  - Audio & Alarm
- **Troubleshooting**

# Low Light Features

How to achieve a good and clear image at night?



# Day & Night Switch

At night or under low illumination scenes, the camera switch from **color mode** to **B/W mode** automatically, which can improve low-light performance effectively.

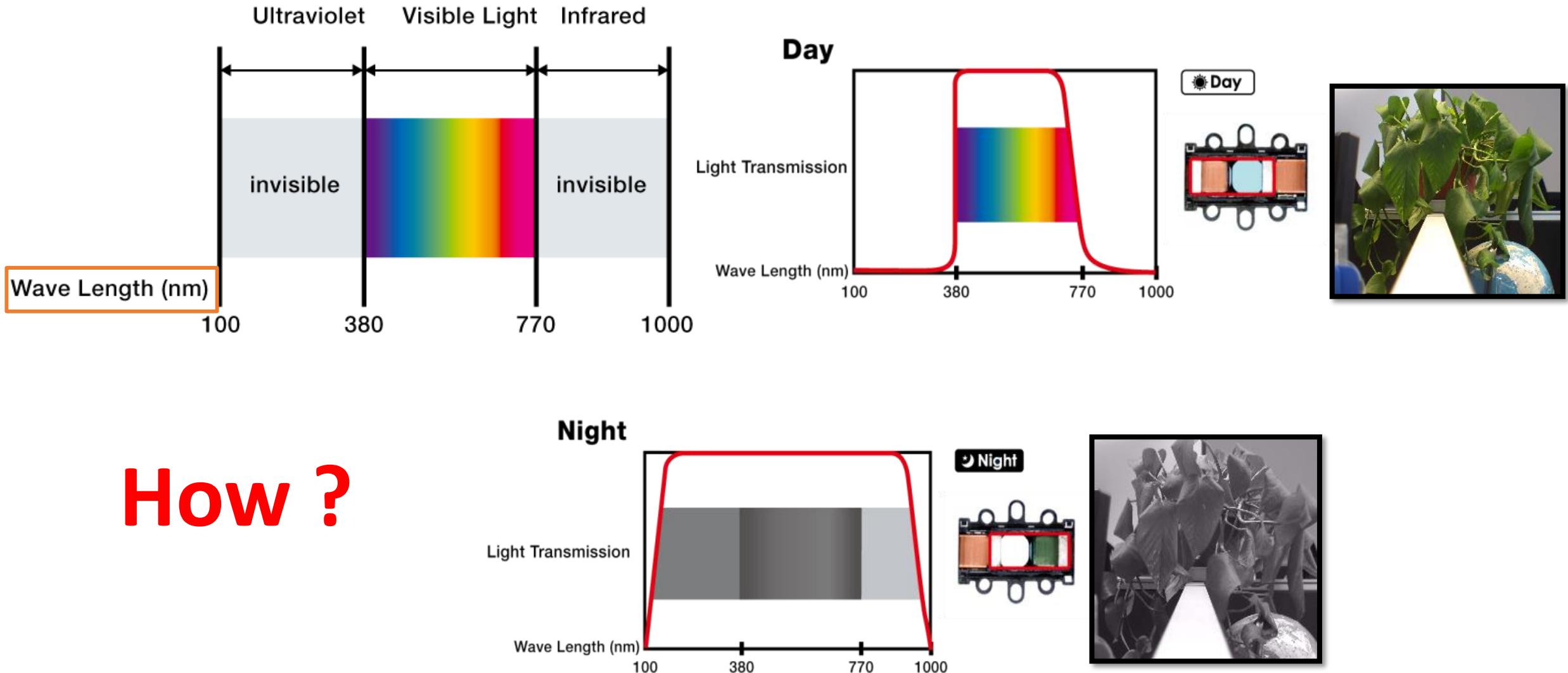


Day (color) mode

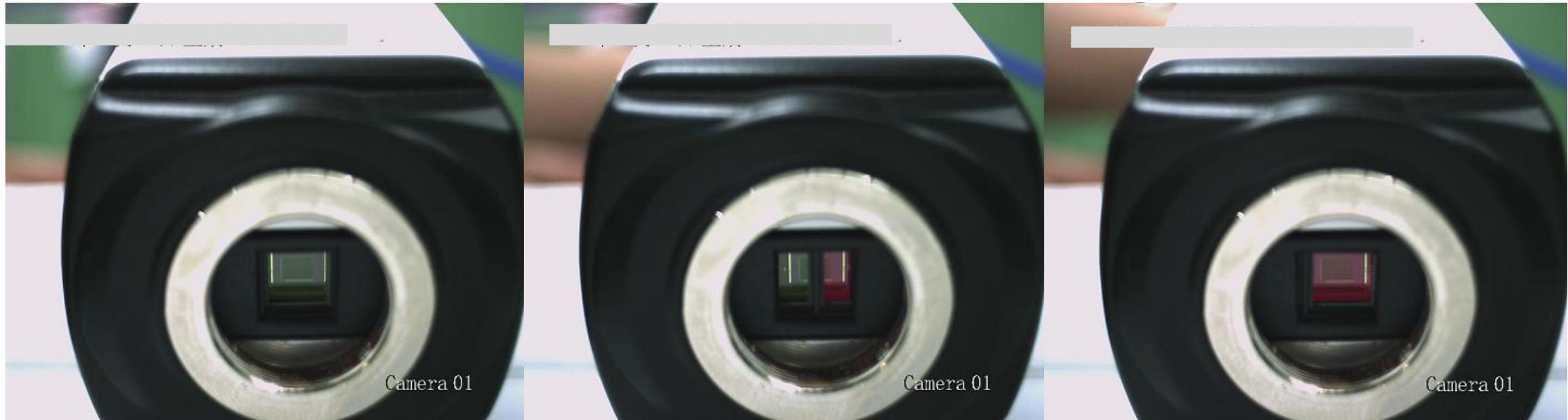


Night (black and white) mode

# ICR (IR-Cut Filter Removable)



# ICR (IR-Cut Filter Removable)



# Day & Night Switch Configuration

Configuration > Advanced Configuration > Image > Display Settings

Display Settings   OSD Settings   Privacy Mask   Picture Overlay



Switch Day and Night Set... Auto-Switch

Image Adjustment

Exposure Settings

Focus

Day/Night Switch

Day/Night Switch: Auto

Sensitivity: 4

Filtering Time: 5

Smart IR: OFF

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Day/Night Switch	Auto
Sensitivity	Day
Filtering Time	Night
	Auto
	Scheduled
	Triggered by Alarm Input



Day, night, auto, schedule, and triggered by alarm input are selectable for day/night switch.

# Day & Night Switch

Color & B/W Switch	Day, Night, Auto, Scheduled, Alarm Triggered	Multiple mode
Sensitivity	0~7	Judged by image brightness & gain
Filtering Time (s)	5~120	After this period of time, the color & B/W mode switch
Smart IR	ON/OFF	Prevent overexposure

**Day:** the camera stays at day mode.

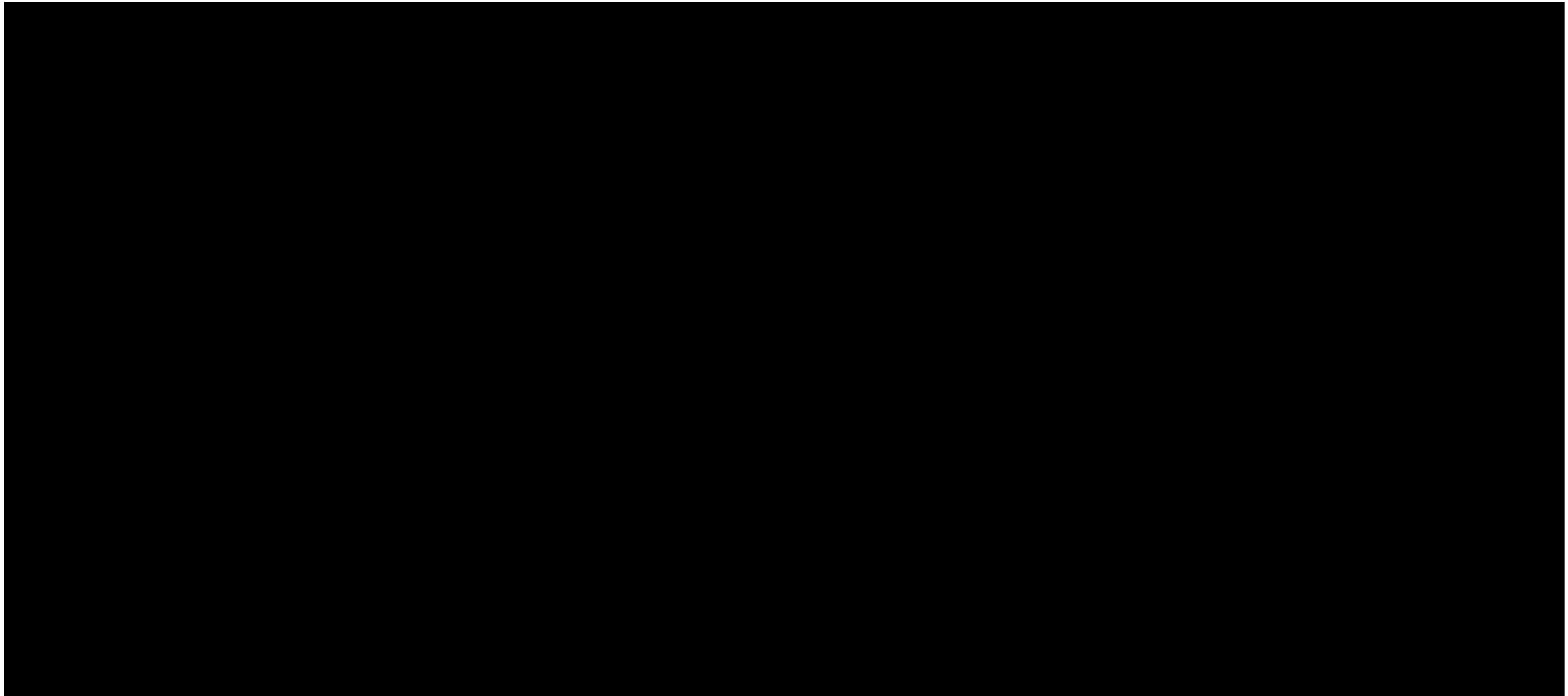
**Night:** the camera stays at night mode.

**Auto:** the camera switches between the day mode and the night mode according to the illumination automatically. The sensitivity ranges from 0~7, the higher the value is, the easier the mode switches. The filtering time refers to the interval time between the day/night switch. You can set it from 5s to 120s.

**Schedule:** Set the start time and the end time to define the duration for day/night mode.

**Triggered by alarm input:** The switch is triggered by alarm input, and you can set the triggered mode to day or night.

Low light or completely dark situation



Low light or completely dark situation

**What should we do ?**



# Smart IR

Smart IR function gives user an option to adjust the power of the IR LED, thus providing a clear image that is not overexposed or too dark.

## Anti Over Exposure



Smart IR off

Smart IR on

### Day/Night Switch

Day/Night Switch

Auto

Sensitivity

4

Filtering Time

5

Smart IR

ON

Mode

Manual

Distance

Auto

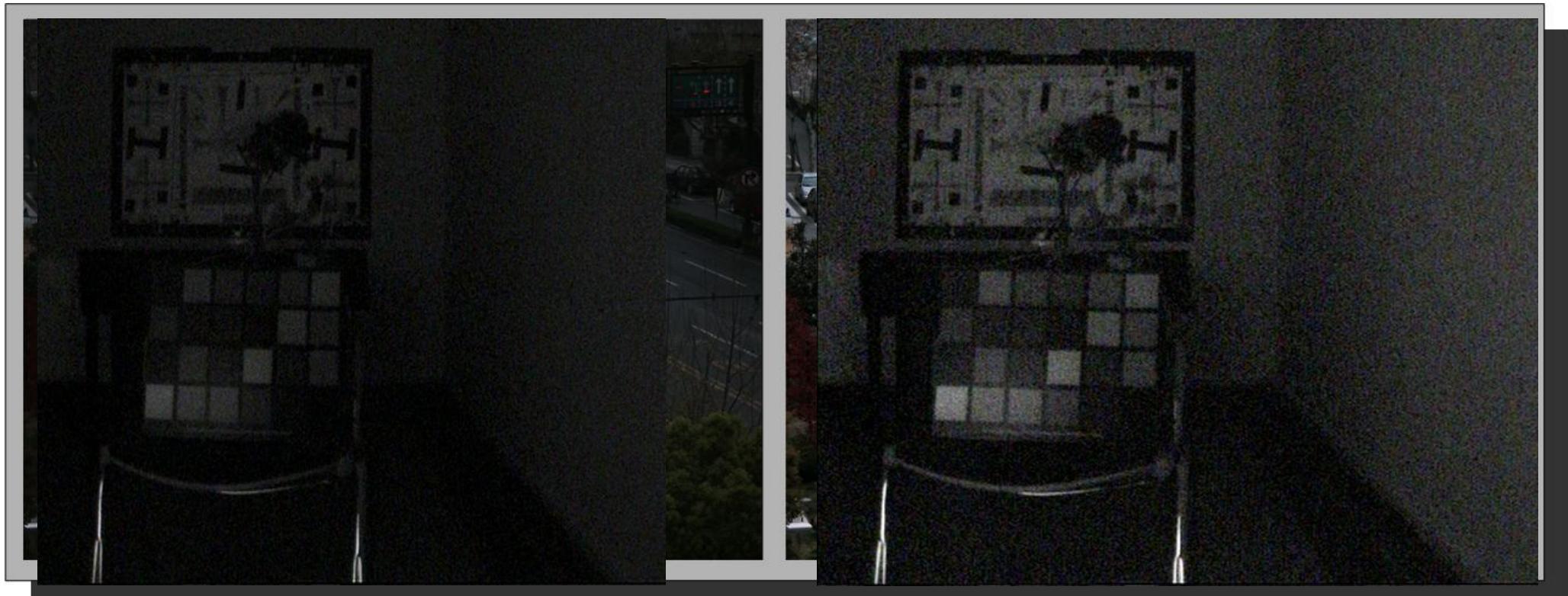
20

**Manual mode:** Configure the distance by control the current intensity of the led

**Auto mode:** Auto-adjust the current intensity of the IR led

# AGC

- AGC(**Auto Gain Control**) amplify the signal from CCD to make it brighter during night time. This amplification is called gain. The camera can auto adjust the gain control according to signal level.
- Advance: increase dynamic range;
- Disadvantage: amplify noise as well.



AGC Off

AGC On

# DNR

- Through DNR function we can reduce the noise to get a better quality image during **night**.
- Hikvision cameras adopt **3D digital noise reduction** to provide images with less noise in low-light surveillance scenes compared to conventional cameras. 3D DNR can be used to enhance image quality and save bandwidth.



**DNR Disabled**



**DNR Enabled**

# DNR

## Image Enhancement

Digital Noise Reduction

Normal

Noise Reduction Level



- **3D DNR (EXPERT MODE)**

- Space domain->static noise, vague
- Time domain → inter-frame noise reduction - dynamic noise, moving image trail

## Image Enhancement

Digital Noise Reduction

Expert

Space DNR Level



Time DNR Level



# ColorVu

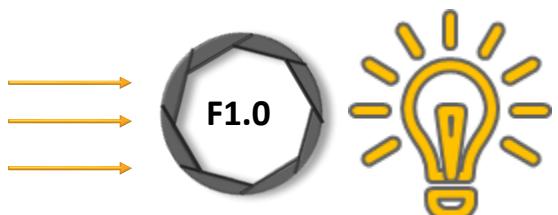
## 1. Large Aperture

F1.0 super aperture

More light and brighter images



Conventional Camera



ColorVu Camera

**4X amount of light of conventional camera**

## Bright and Colorful Image



## 2. Advanced Sensor

Higher utilization of light,  
more light enter sensor  
(4 MP 1/1.8" Sensor)

## 3. Warm-light, not dazzling



Traffic camera light

Warm-light  
ColorVu Camera2

# ColorVu

Recommended



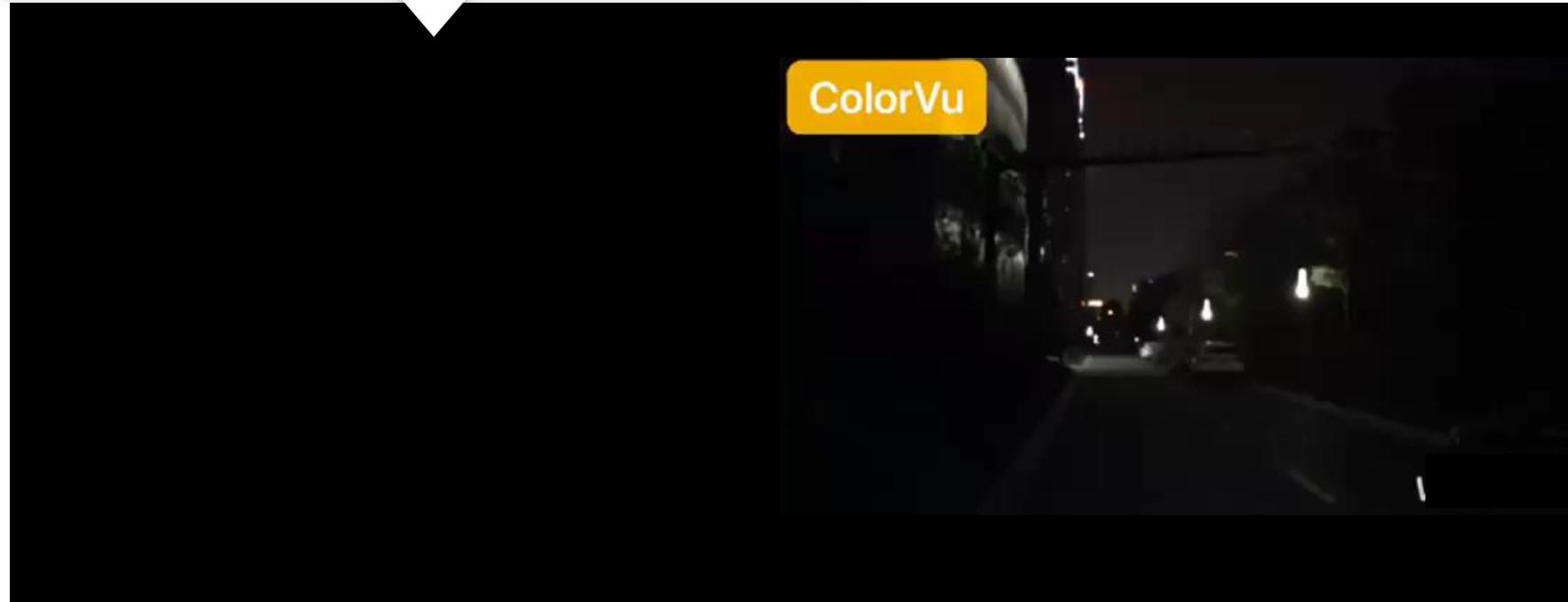
DS-2CD2347G1-L(U)  
DS-2CD2327G1-L(U)



DS-2CD2T47G1-L  
DS-2CD2T27G1-L



ColorVu



# Darkfighter

- Darkfighter adopts the **most advanced CMOS sensor**, with the optimized **3D DNR algorithm**.
- The minimum illumination in color mode is 0.002Lux.



Darkfighter



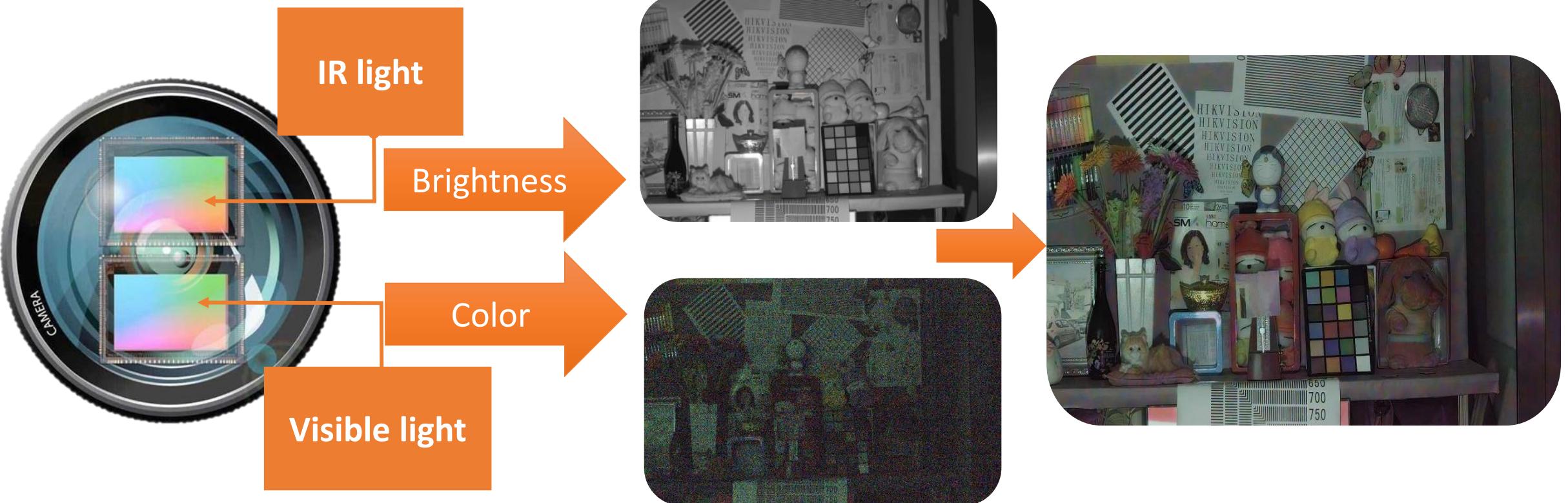
Conventional Camera



# DarkFighter X – Dual Sensors



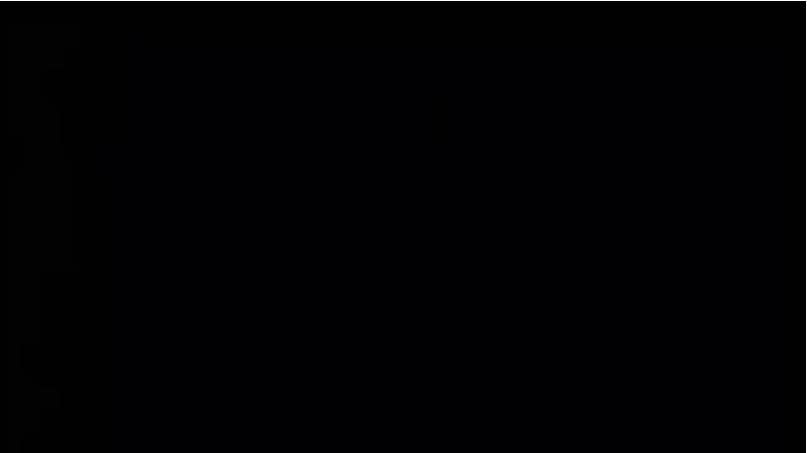
- DarkfighterX has innovative dual sensors design, one sensor for IR that guarantees the image brightness, the other one for visible light that guarantees chroma.
- Two images will be combined to form different spectra into **One Full Color** image.



# DarkFighter X – Image Comparison

DarkFighter X

iPhone 7



Traditional Camera



DarkFighter  
Camera



DarkFighter X  
Camera





# Successful Case

## Tower surveillance

**Background:** xx city wants to achieve panoramic surveillance by taking advantage of the communication tower.

Real performance at 10:25 pm midnight



**Installment:** 40 meters above ground on the tower



### Customer Value:

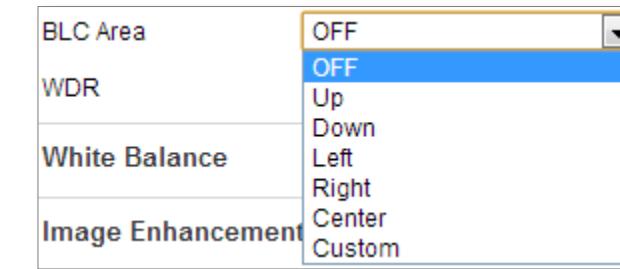
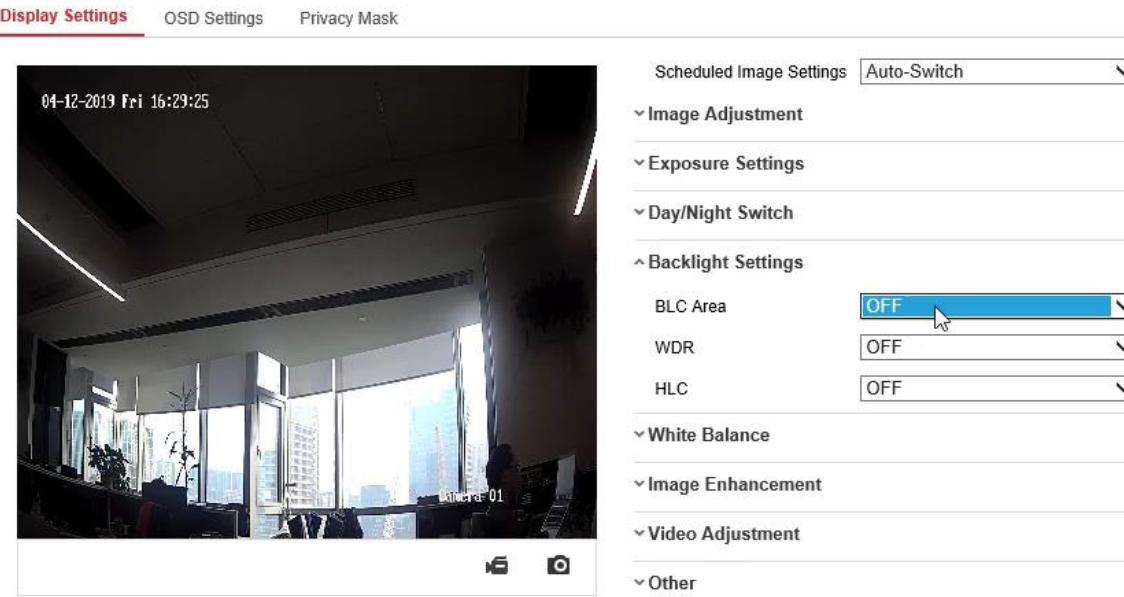
1. Cover 3-4 kilometers area with 35x optical zoom to check details
2. Provide clearly colorful image on dimly-lit condition
3. High altitude patrol for incidents, such as fire, flooding, etc.

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# BLC (Back Light Compensation)

- **BLC:** When you monitor objects against strong backlight, the objects are usually too dark. BLC compensates light to the object in the front to make it clear.
- It enables objects in the foreground to be seen clearly, although the background areas will be changed.



OFF, Up, Down, Left, Right, Center and customize are selectable.

# WDR (Wide Dynamic Range)

- **WDR:** WDR cameras often incorporate an image sensor that takes different exposures of a scene (e.g., a short exposure for very bright areas and long exposure for dark areas) and combine them into one image, **enabling objects in both bright and dark areas of a scene to be visible.**

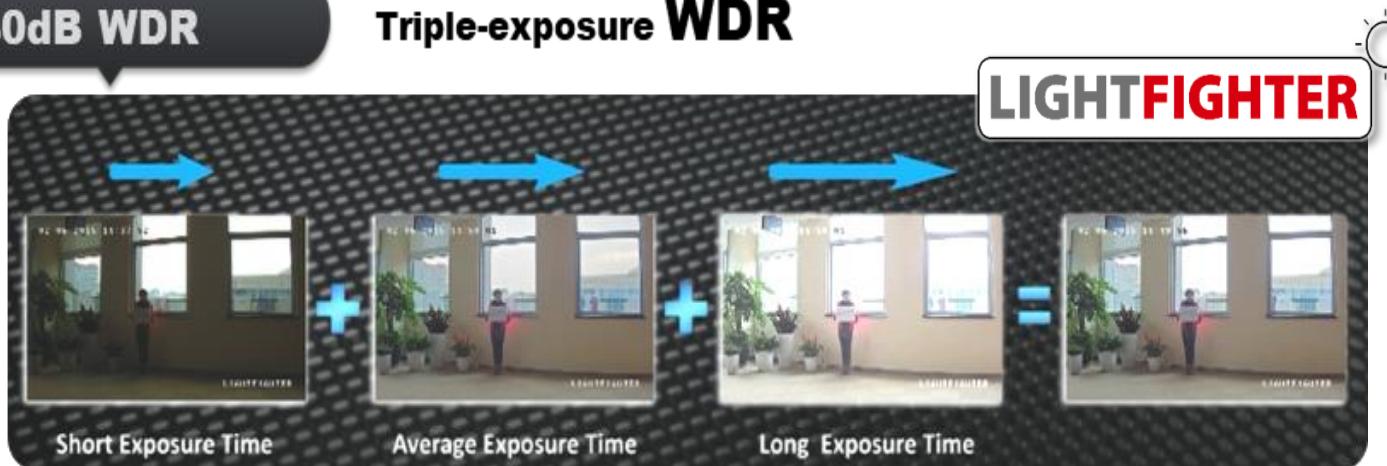
120dB WDR



Enable WDR may reduce the image quality (image looks grey) in normal situation.

140dB WDR

Triple-exposure WDR



Ultra IP Camera

— 5 Series

# LightFighter



LIGHTFIGHTER



▲ 4 MP Normal WDR Off



▲ 4 MP Normal WDR On



▲ 4 MP LightFighter WDR On

# HLC (High Light Compensation)

- Compensate the strong light in the picture, so that the surrounding area wouldn't be over-exposed and still could be seen.
- Widely used in traffic monitoring, where license plates must be recognized.

Display Settings   OSD Settings   Privacy Mask

The interface shows a live video feed from 'Camera 01' at 04-12-2019 Fri 16:41:10. The feed displays a modern interior with large windows overlooking a city skyline. The video player has a play/pause button and a camera icon.

Scheduled Image Settings: Auto-Switch

**Image Adjustment**

**Exposure Settings**

**Day/Night Switch**

**Backlight Settings**

BLC Area	OFF
WDR	OFF
HLC	OFF

**White Balance**

**Image Enhancement**

**Video Adjustment**

**Other**

# WDR vs. BLC vs. HLC

	WDR	BLC	HLC
Core technology	Circuit module & algorithm	Algorithm	Algorithm
Advantage	Twice or triple exposures	Areas are selectable	/
Disadvantage	Consume CPU	Background may be overexposed	/



Origin



BLC

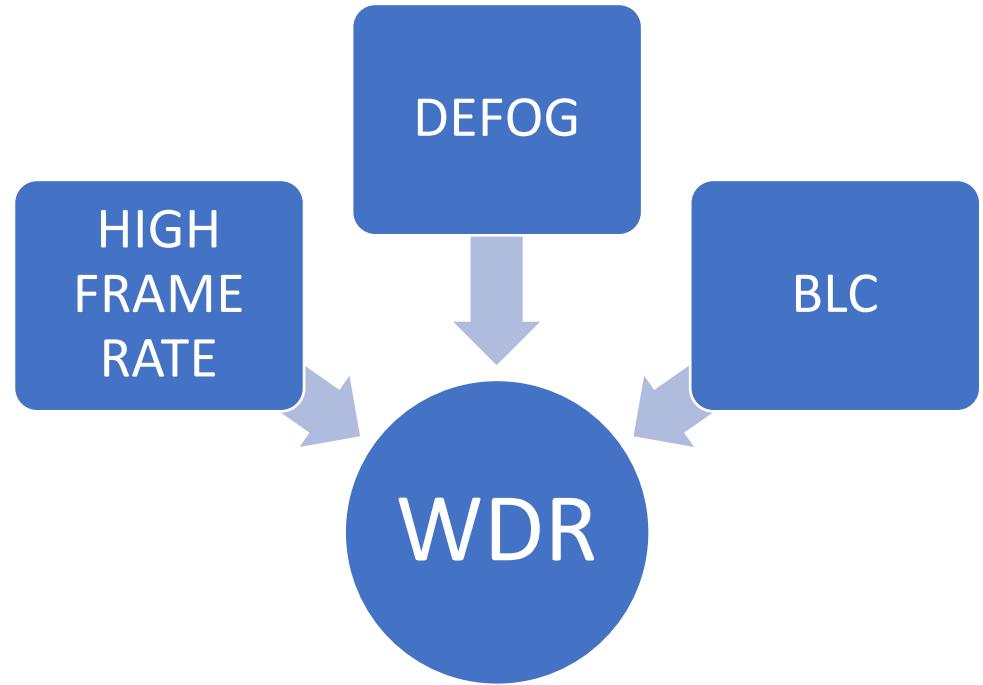


WDR

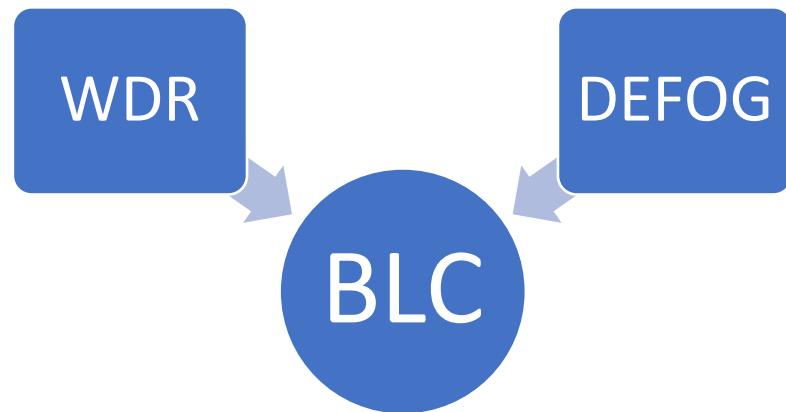


✓ Users should choose the mode appropriately according to the real scene to form the optimal image.

# WDR vs. BLC vs. HLC



For Hikvision cameras, WDR are conflicted with high frame rate, defog and BLC function. They cannot be enabled at the same time.



For Hikvision cameras, BLC is conflict with WDR and defog function. They cannot be enabled at the same time.

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# Fast Moving Objects

- Use **high frame rate** camera in the condition that the bitrate is enough, such as **4XXXFWD** camera.
- **Decrease the exposure time** to reduce the tailing.
  - For less than or equal to 70km/h vehicle speed, we recommend 1/200s or 1/250s exposure time.
- To see the vehicle clearly **at night**, **lower the contrast** and set the **3D DNR** to 20~30 or even lower.
- **Disable WDR** to reduce tailing.



# Frame Rate Comparison



15



10



5



2

# Exposure time

- Exposure time usually be set between 1/50 – 1/100,000 second.
- Long exposure time is suitable for dark scene, but moving objects may have trailing problem.
- Short exposure time is suitable for dynamic scene, while the image may be dark.



1/50s



1/500s

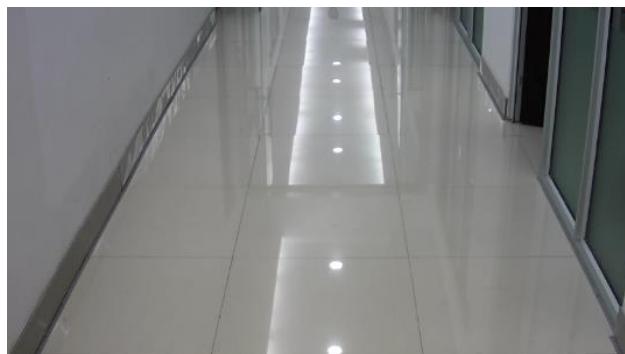
# Contents

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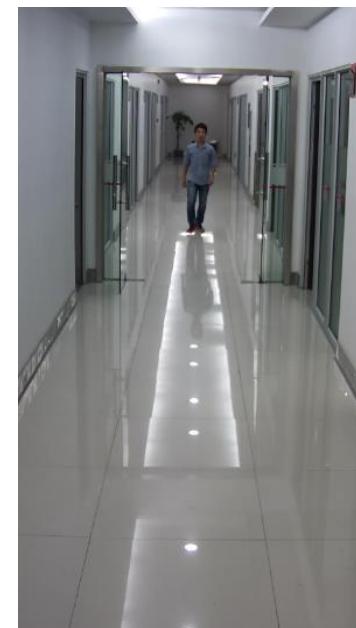
# Rotate mode

- **Rotate**

- To make a complete use of the 16:9 aspect ratio, you can enable the rotate function when you use the camera in a narrow view scene.
- When installing, turn the camera to the 90 degrees or rotate the 3-axis lens to 90 degrees, and set the rotate mode as on, you will get a normal view of the scene with 9:16 aspect ratio.



*Rotate  
mode on*

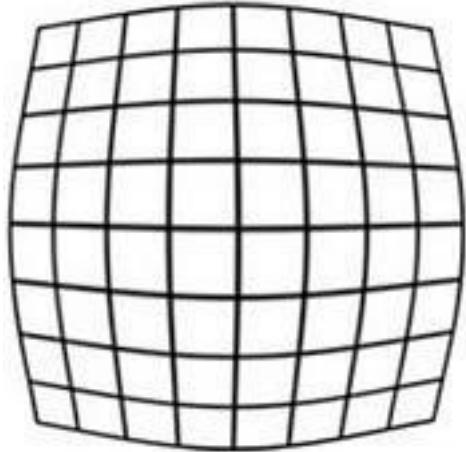
A large blue arrow points from the narrow hallway image to the wider hallway image below it, indicating the effect of enabling rotate mode.

## ^ Video Adjustment

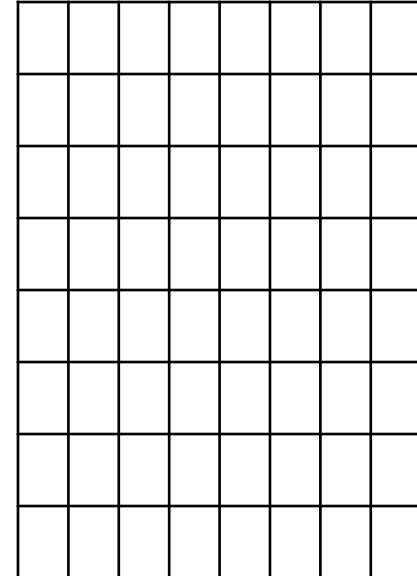
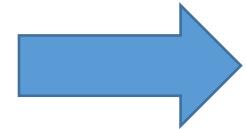
Mirror	OFF
Rotate	ON
Scene Mode	indoor
Video Standard	NTSC(60HZ)
Capture Mode	OFF
Lens Distortion Correction	OFF

# Lens Distortion Correction

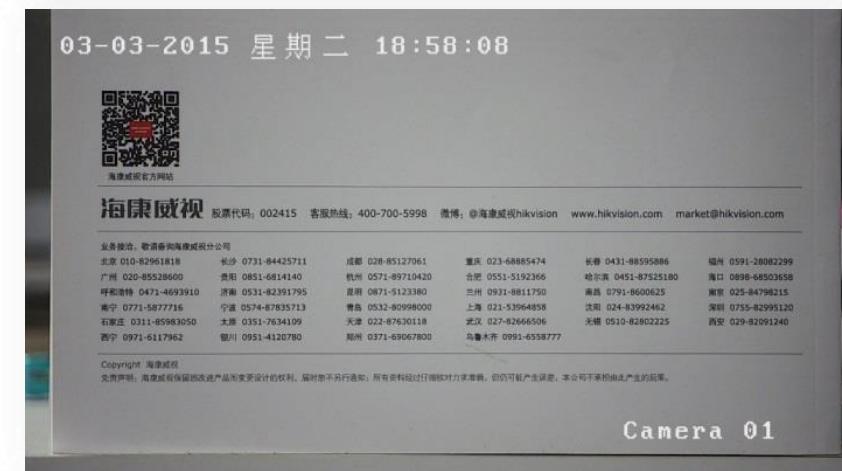
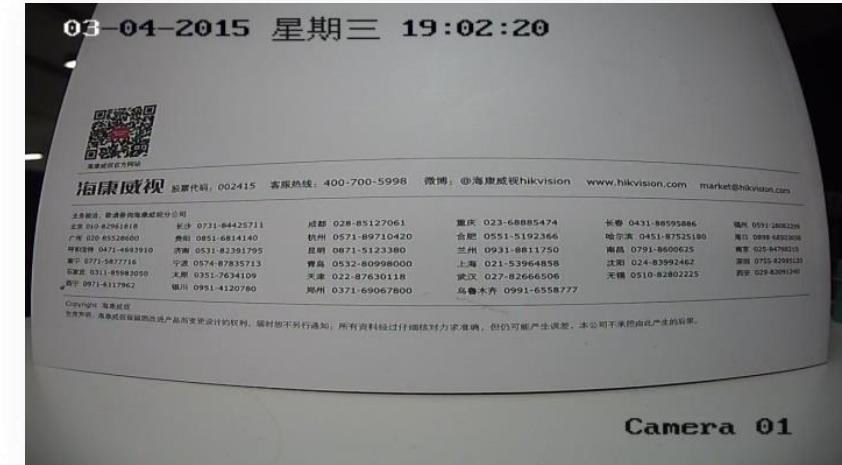
- Some of Hikvision cameras support lens distortion function.



Barrel Distortion

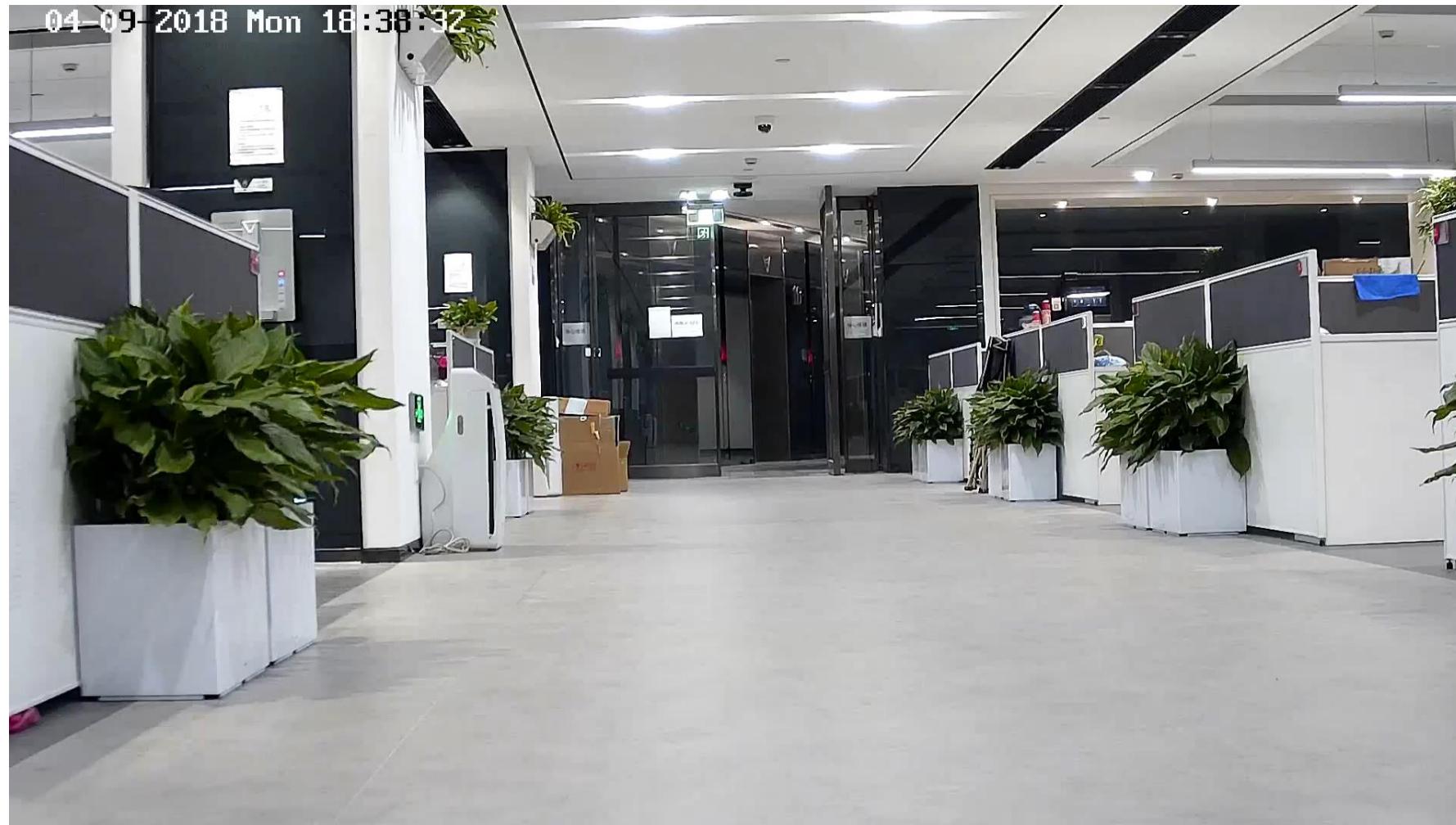


- ✓ All lenses have distortion
- ✓ If the original image is OK, do not enable distortion correction



# Hikvision 2<sup>nd</sup> Generation lens

Rapid auto focus



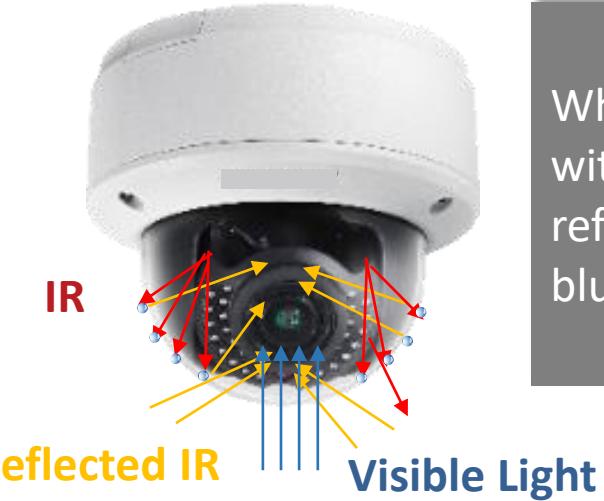
# Hikvision 2<sup>nd</sup> Generation lens

## Blue Glass



When camera is facing strong light source, halo would appear. Blue glass reduces the halo thus making image more clear.

# Hikvision 2<sup>nd</sup> Generation lens



When the bubble is adhered with dust and water, the reflected IR will make image blurred.



The new generation bubble guarantees the image quality while supporting IK10.



Traditional Dome



Anti-IR Reflection Dome

# Foggy Climate

- By modeling the imaging features of smoke, dust, fog, etc., defog technology effectively restores details and color to obtain accurate and natural video. Defog technology helps maintain clarity in images captured in poor weather conditions such as smog, or fog.

**Defog OFF**



**Defog ON**



# Contents

- **Product Family**
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    - **Key Factors**
    - Bandwidth control on Camera
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# Bandwidth and Storage Calculations

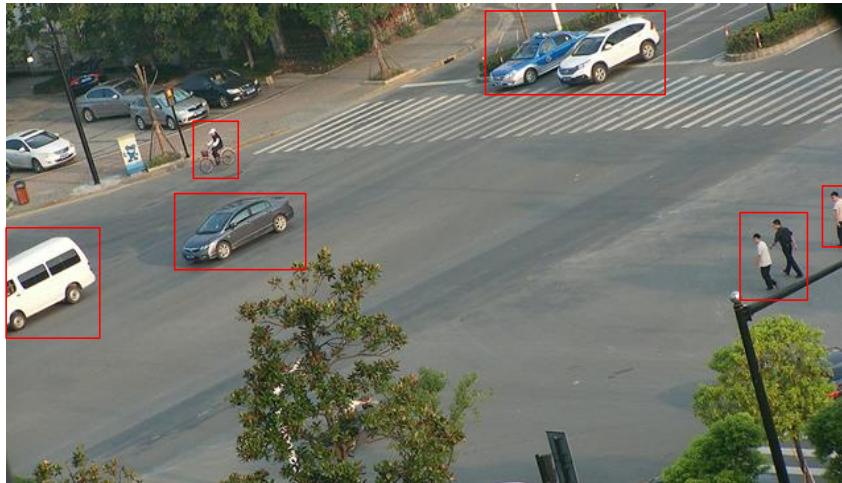
What factors will affect the bandwidth and storage space?

It depends on the following factors:

- **Video compression type:** H.264, MPEG-4, Motion JPEG, H.264+, H.265
- **Scene:** Image complexity (e.g., gray wall or a forest), lighting conditions and amount of motion (e.g., office environment or crowded train stations)
- **Image resolution**
- **Frame rate (Frames per second)**
- **I-frame interval**
- **Number of cameras will be recorded**
- .....

# H.265+

Based on the current H.265 standard, Hikvision analyzed and optimized the encoding, and developed H.265+ that reduces the bandwidth and storage requirements.



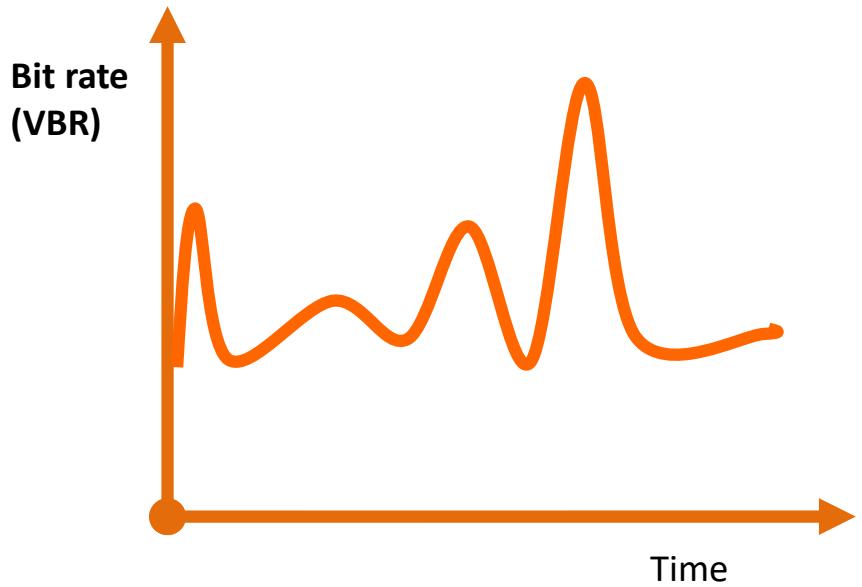
## General Surveillance Scenario Features

1. Fixed camera with few background changes
2. No frequent moving objects
3. Moving objects are the interesting monitor targets
4. 24/7 surveillance video, easily affected by image noise

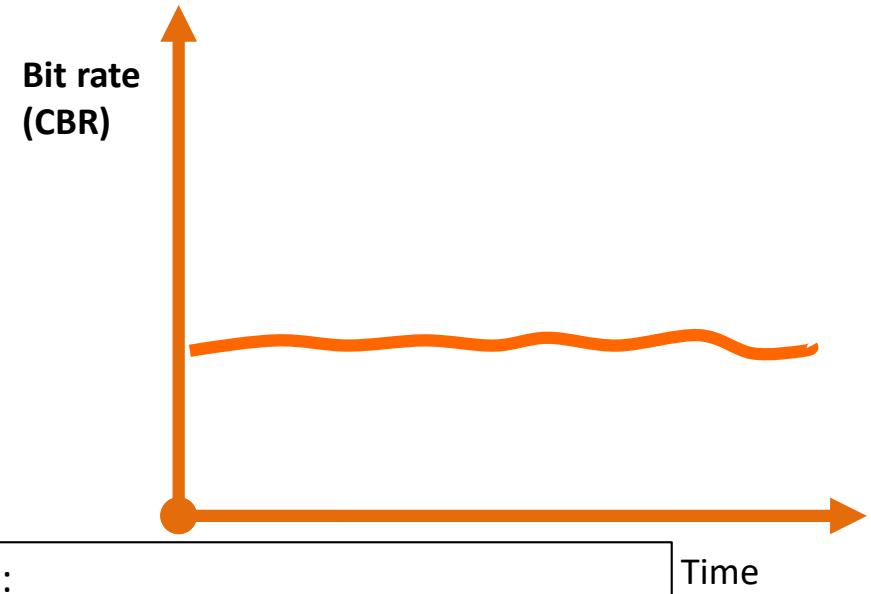
Different surveillance scenarios	Bandwidth/storage space comparison between H.265+ and H.265
Fixed Scene with few moving objects	H.265+ saves 75%
Fixed scene with many moving objects in a certain time period(not very frequently)	H.265+ saves 50%
Changing scenes with moving objects all the time	Nearly the same

# VBR vs. CBR

- In Variable bit rate (VBR), the **image quality is constant but as a result, the bit rate is variable.**
  - It is suitable for the scene with different movements in different time.
  - Can't estimate an accurate bandwidth/storage consumption.



- In Constant bit rate (CBR), the **bit rate is constant but as a result, the image quality is variable.**
  - It is suitable for the scene with constant movement.
  - Can estimate an “average” bandwidth/storage consumption.



Calculation method:  
storage space (MB/hour)= **bitrate (kbps)\*60\*60/8/1024**  
(8:bit->byte, 1024: k->M)

# Image Complexity

Complex images and more movements generate higher bit rates.



# Frame Type

- **I-frame:** independently compressed; larger amount of data.
- **P-Frame:** difference from previous I or P frame
- **Intra-Frame Period** specifies the time between I-frames

The screenshot shows a video configuration interface with the following settings:

Setting	Value
Stream Type	Main Stream(Normal)
Video Type	Video Stream
Resolution	2688*1520
Bitrate Type	Variable
Video Quality	Medium
Frame Rate	25 fps
Max. Bitrate	6144 Kbps
Video Encoding	H.264
H.264+	OFF
Profile	Main Profile
I Frame Interval	50
SVC	OFF
Smoothing	50 [ Clear<->Smooth ]

**Save**

# Contents

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    - **Bandwidth control on Camera**
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- **Troubleshooting**

# Bandwidth Control

- Network video products utilize network bandwidth and storage space based on their configuration. Under **insufficient bandwidth**, we need to lower the bitrate in order to see the video.
  - Choose the right stream type
    - Main stream
    - Sub stream
    - Third stream
  - Set the lower resolution and frame rate if there is no enough bandwidth.

# H.265+ Configuration

When H.265+ is enabled:

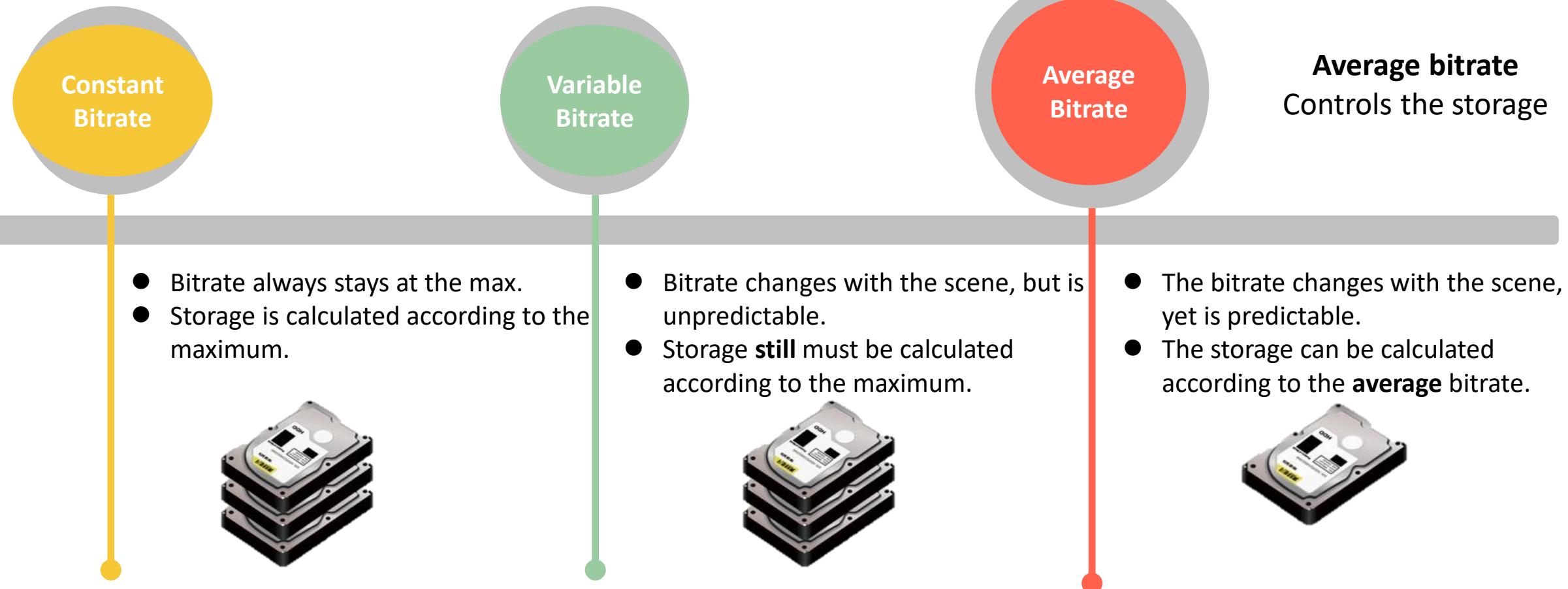
- Only variable bitrate type. The bitrate will be controlled by the algorithm to maintain the **long-term average bitrate**.
- I frame interval is auto-adjusted by algorithm.
- Third Stream, Stream Smoothing, ROI, Target Cropping, High Frame Rate are not available.



Max. Average Bitrate is used to calculate the HDD space.

Stream Type	Main Stream(Normal)
Video Type	Video Stream
Resolution	1920*1080P
Bitrate Type	Variable
Video Quality	Medium
Frame Rate	25 fps
Max. Bitrate	2048 Kbps <input checked="" type="checkbox"/>
Max. Average Bitrate	1024 Kbps <input checked="" type="checkbox"/>
Video Encoding	H.265
H.265+	ON
Profile	Main Profile
I Frame Interval	50
SVC	OFF

# The Bitrate Revolution



# ROI

- ROI (Region of Interest) encoding helps to differentiate the ROI and background information in video compression, which assigns more encoding resource to the region of interest, thus to increase the quality of the ROI whereas the background quality goes down.



(1080P, 2Mbps), ROI off



(1080P, 2Mbps), ROI on

# ROI Example

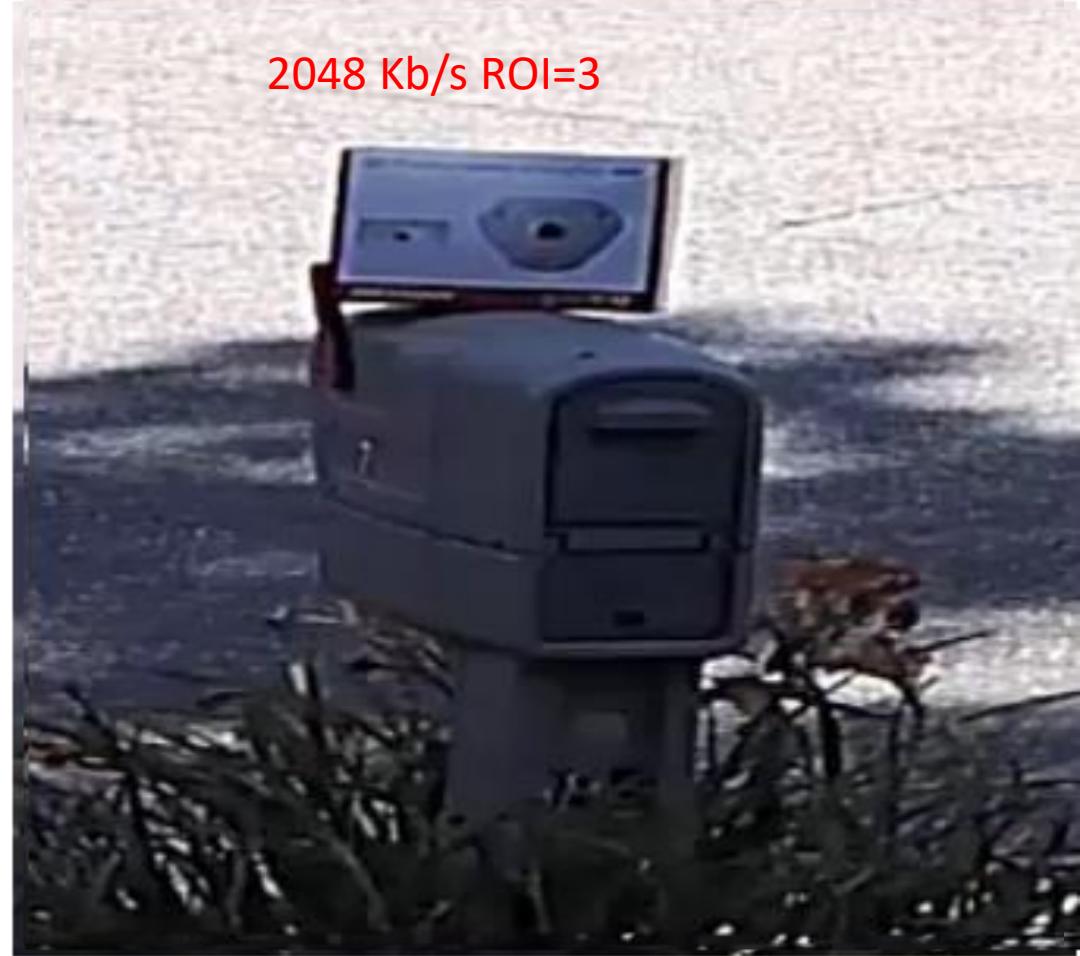


## ROI Levels at Reduced Bandwidth

8192 Kb/s Reference

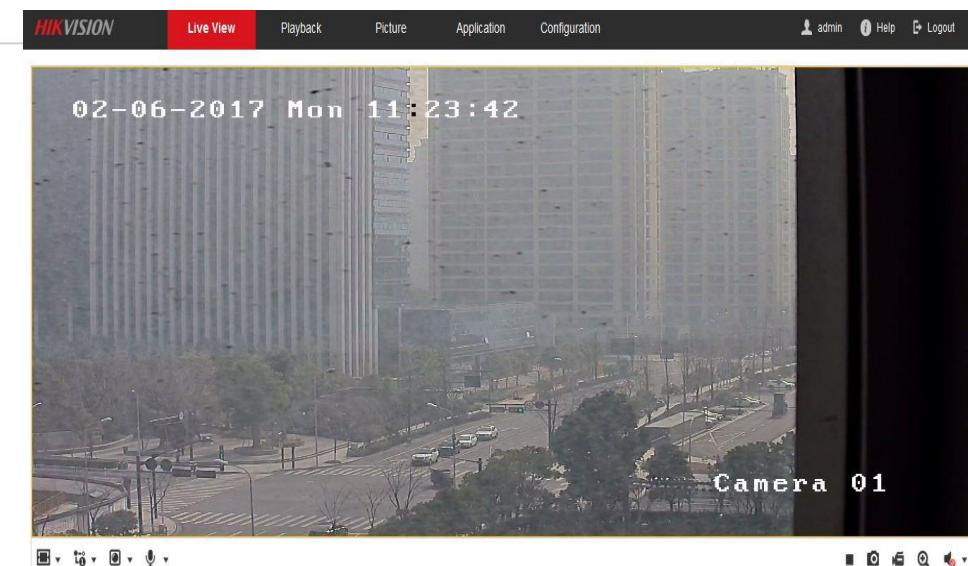
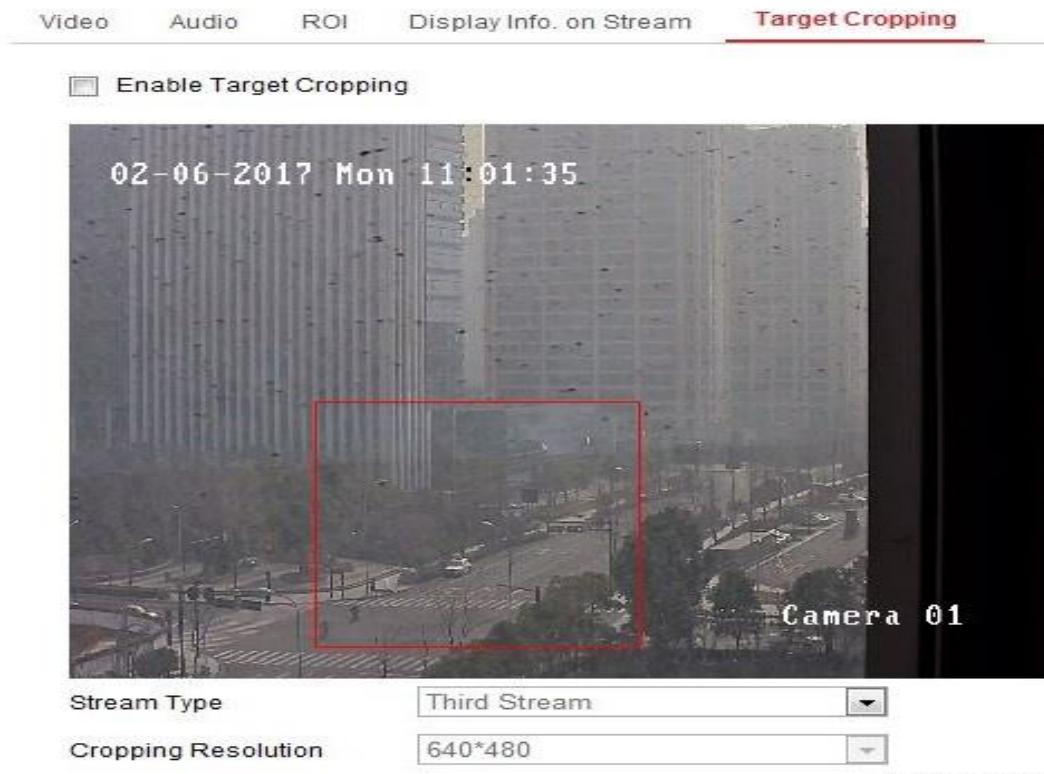


2048 Kb/s ROI=3



# Target Cropping

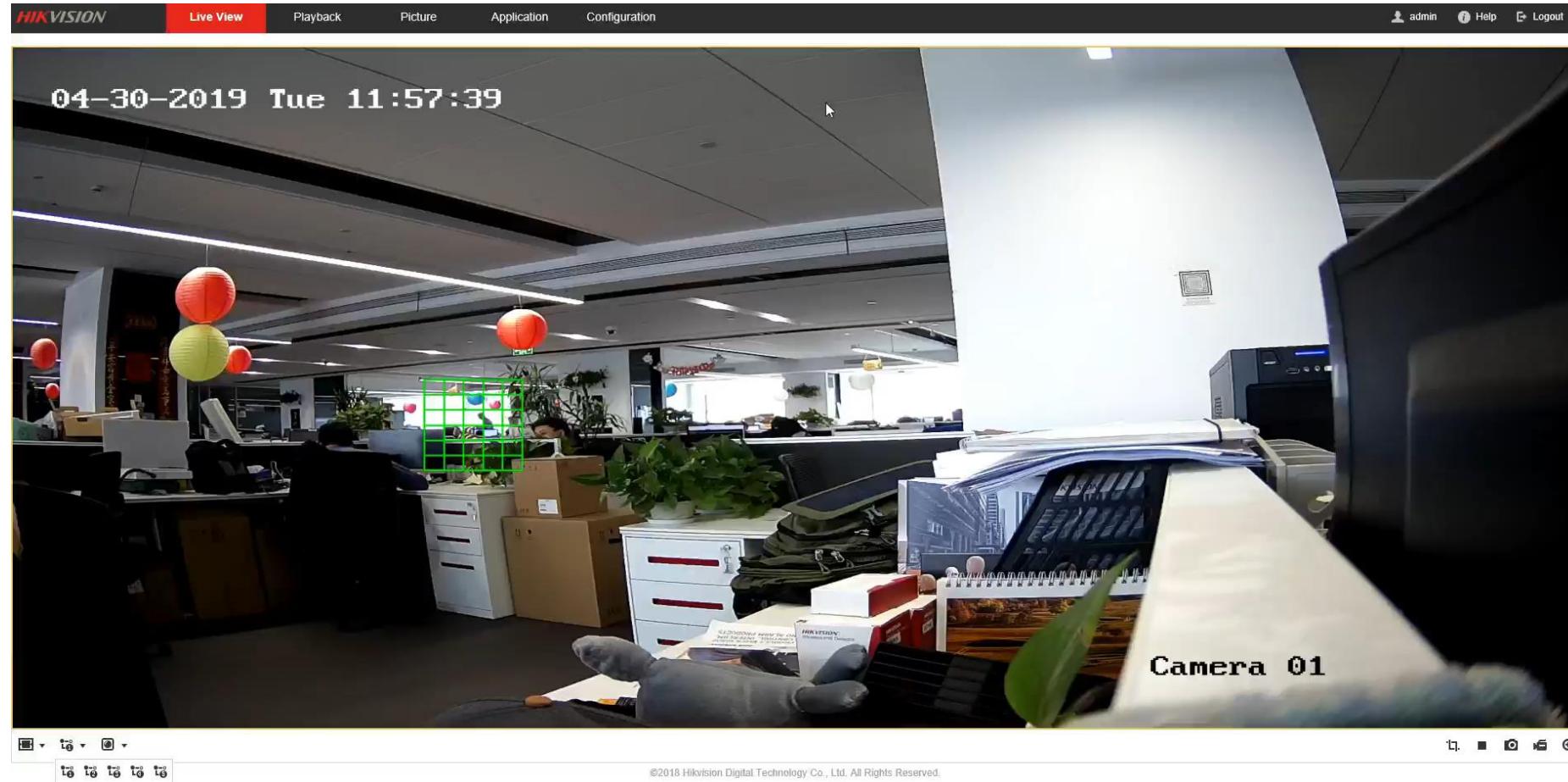
- You can specify a target area on the live video, and then it can be displayed via the **third stream** in some certain resolution, thus providing more details of the target area if needed.



Choose the third stream in live view



# Target Cropping Example



# Contents

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  - Stability Protections
  - Acusense Features
- Featured Cameras
- Audio & Alarm
- Troubleshooting

# Stream Type

- 5 defined streams + 5 custom streams

All streams support  
H.265



MJPEG up to  
2MP@30fps



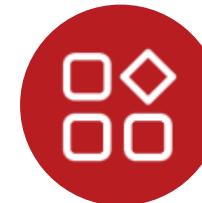
Recording



Cellphone surveillance



Preview



Third party integration

# Why do you need HEOP?

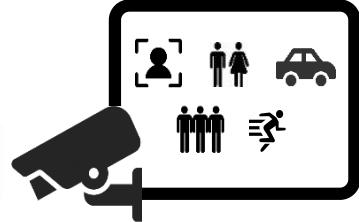


## Requirements

- To meet a variety of demands from different industry segmentations
  - To acquire more algorithm and software supplier resources
-

# What is Hikvision HEOP

**Hikvision Embedded Open Platform** is an open application platform that enables development of third party applications that can be downloaded and installed in Hikvision network cameras.



**Application partners**

It is possible for application partners to develop applications which are able to be installed in 5 Series cameras.



**VMS Partners**

It is possible for platform partners to access the cameras through their private protocols.



**Algorithm partners**

It is possible for algorithm partners to develop algorithms which can be applied in 5 Series cameras.

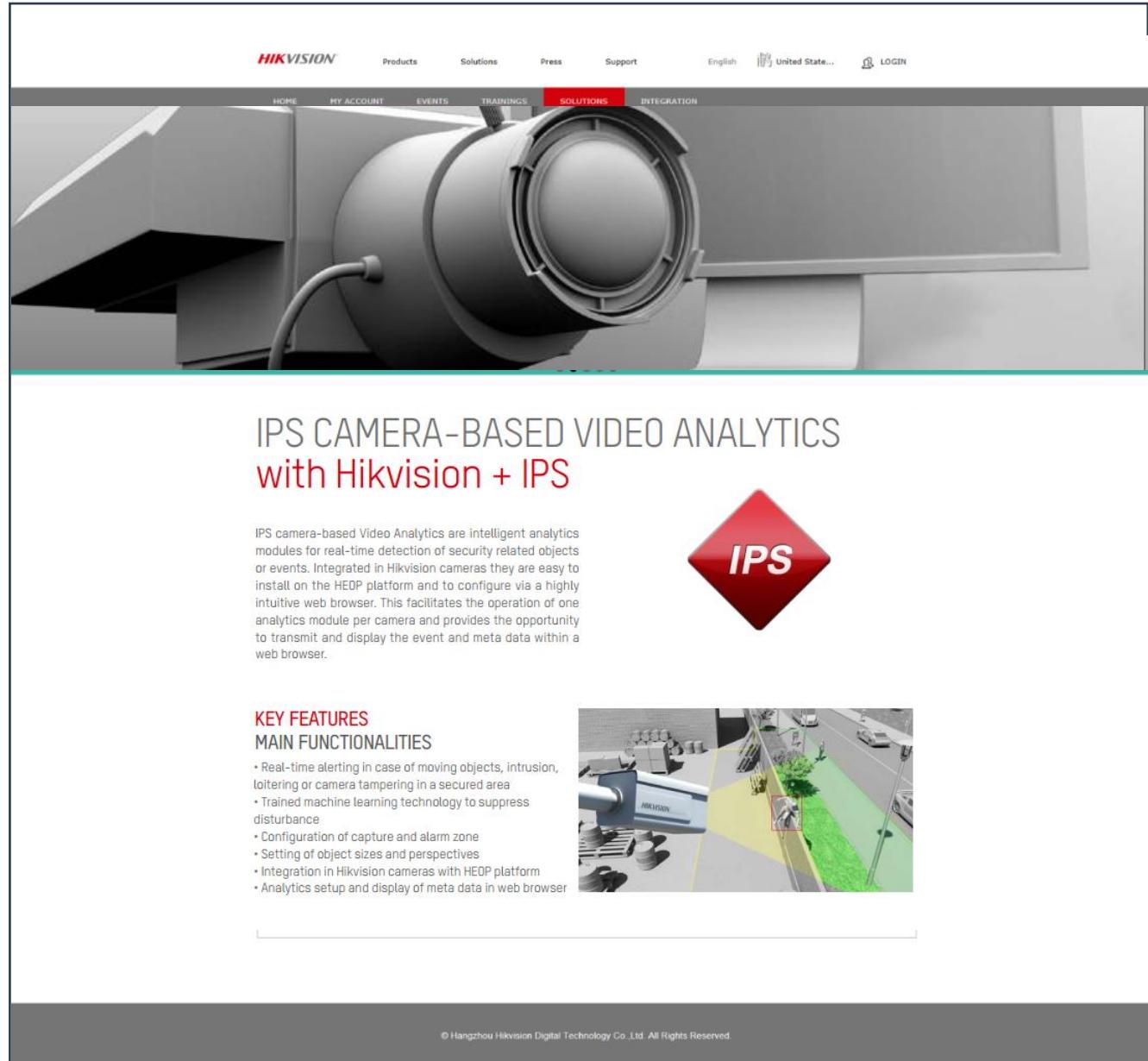
# Successful Cases

## IPS Intelligent Video Analytics

A German manufacturer of sophisticated video products. IPS has been developing its latest generation of IP-based software solutions for video analytics and management. IPS products are successfully installed in numerous applications. Selected solution partners, providers and distributors successfully sell the current IPS products across Europe.

## Applications

- IPS Motion Detection
- IPS Sabotage Detection
- IPS Intrusion Detection
- IPS Loitering Detection
- IPS Indoor Detection



The screenshot shows the Hikvision website's 'SOLUTIONS' section. The main image is a close-up of a grey surveillance camera mounted on a wall. Below the image, the text reads 'IPS CAMERA-BASED VIDEO ANALYTICS with Hikvision + IPS'. A red diamond-shaped logo with the letters 'IPS' in white is positioned to the right. To the left of the logo, there is a detailed description of the product's features and functionalities. To the right, there is a small thumbnail image showing a camera's field of view overlaid with a yellow polygonal area and a red rectangle indicating a detected object.

HIKVISION

Products Solutions Press Support English United States... LOGIN

HOME MY ACCOUNT EVENTS TRAININGS SOLUTIONS INTEGRATION

### IPS CAMERA-BASED VIDEO ANALYTICS with Hikvision + IPS

IPS camera-based Video Analytics are intelligent analytics modules for real-time detection of security related objects or events. Integrated in Hikvision cameras they are easy to install on the HEOP platform and to configure via a highly intuitive web browser. This facilitates the operation of one analytics module per camera and provides the opportunity to transmit and display the event and meta data within a web browser.

**KEY FEATURES**

**MAIN FUNCTIONALITIES**

- Real-time alerting in case of moving objects, intrusion, loitering or camera tampering in a secured area
- Trained machine learning technology to suppress disturbance
- Configuration of capture and alarm zone
- Setting of object sizes and perspectives
- Integration in Hikvision cameras with HEOP platform
- Analytics setup and display of meta data in web browser

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# How to Use HEOP

<https://partner.hikvision.com/tpp>

Obtain devices from  
any Hikvision channel

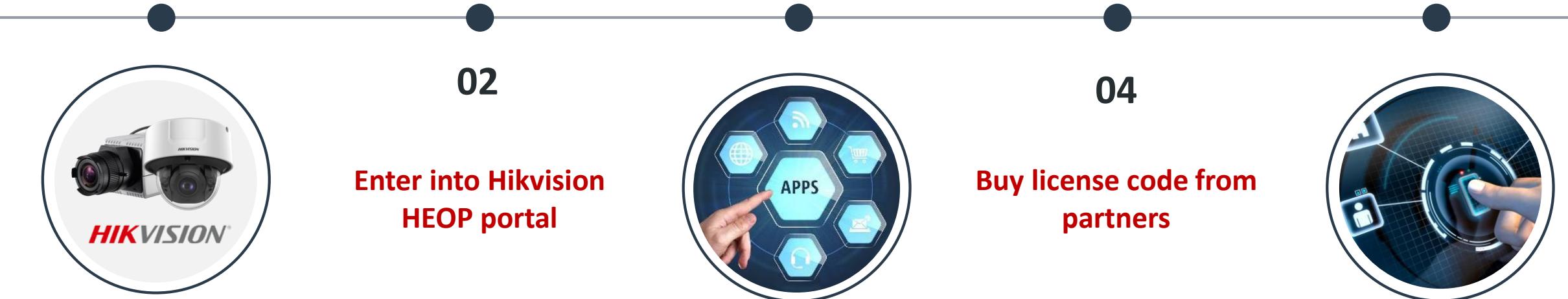
01



Select Apps



Enter into Hikvision  
HEOP portal



Generate license on  
portal by using  
serial number and  
license code

05



Buy license code from  
partners

# HEOP in 5 Series

Live View    Playback    Picture    Application    Configuration    adm

Application

**Resource**

memory : 35MB available (total 60MB).    flash : 2MB available (total 33MB).

**Import Application**

Application Packages

**Status**

**Application List**

No.	Software name	Operation	Version	Memory Used	Flash Used	Company	Status	License
1	HEOP BASIC DEMO APP		V5.5.60	5	10	Hikvision	Stop	Inactive
2	HEOP EXTERN DEMO APP		V5.5.90	5	1	Hikvision	Stop	Free
3	HEOP TEST DEMO APP		V1.1.1	10	10	Hikvision	Start	Free
4	HEOP WEB DEMO APP		V2.0.1_Web4.0	5	10	Hikvision	Stop	Free

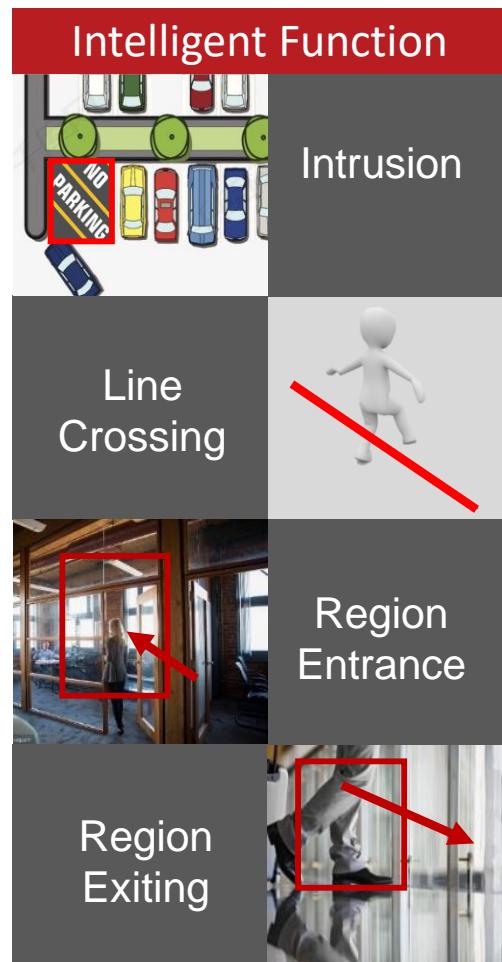
**Disclaimer**

Please note that some applications and/or solutions available below are supplied and/or developed by third parties, not HIKVISION.

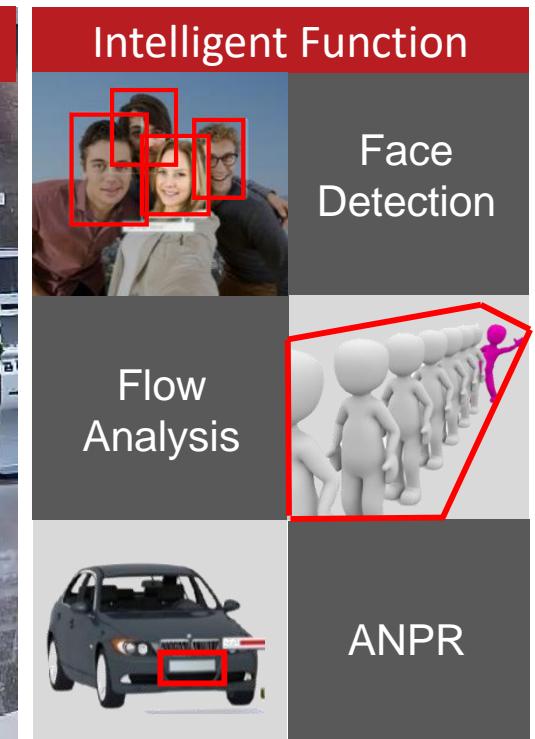
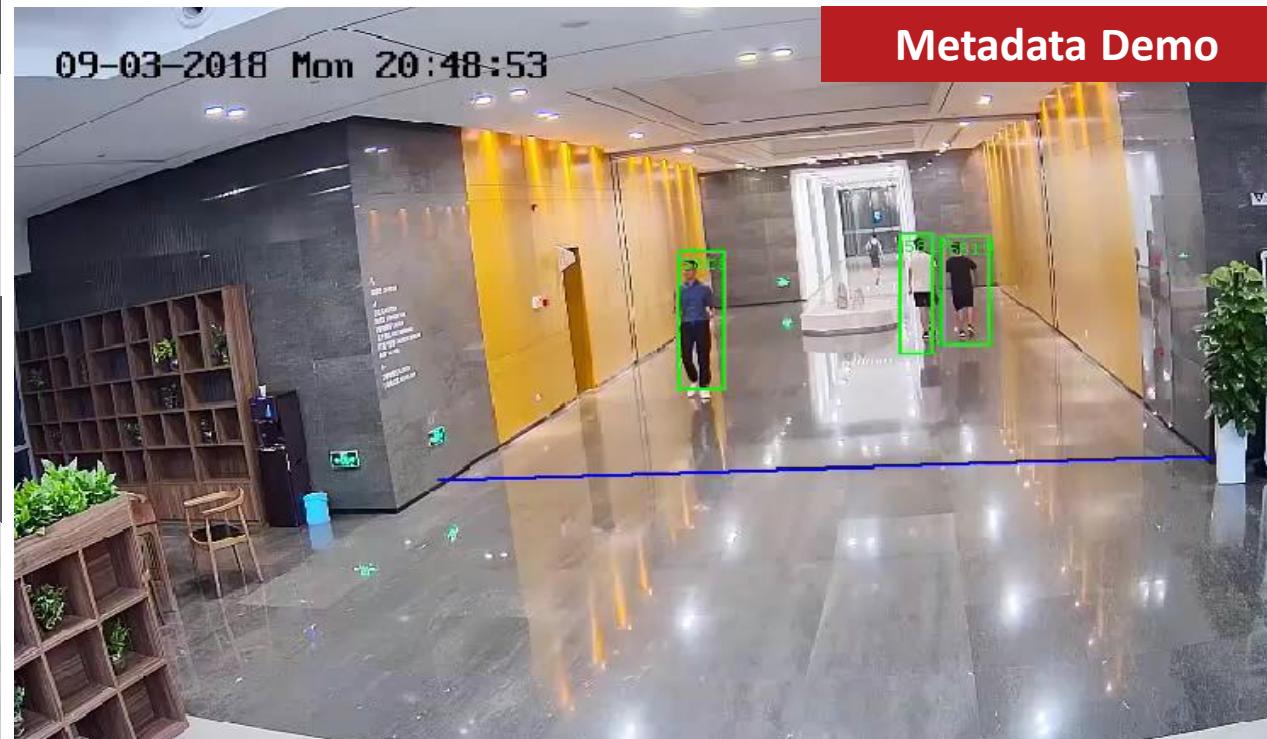
YOUR RELIANCE ON THIRD PARTY'S APPLICATION AND/OR SOLUTIONS IS AT YOUR OWN RISK. HIKVISION MAKES NO WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, ACCURACY, RELIABILITY, SECURITY, OR NONINFRINGEMENT OF

- Each 5 Series camera supports 4 Apps
- YUV is provided to support algorithm development
- RTSP is supplied for software application

# Metadata for 7 Series



7 Series cameras can provide **metadata** based on **ONVIF & ISAPI**, which provides the ability for third-party platform to support the function of **quick retrieving** relevant images from abundant video data in the **backend device**, or **tracing targets** to make more analyze.



# Contents

- **Product Family**
- **Functions & Applications**
  - Image Adjustment
  - Bandwidth Control
  - Advanced Features
    - Third Party Integration
    - **Stability Protections**
    - Acusense Features
  - Audio & Alarm
- **Troubleshooting**

# Dual-File System Backup

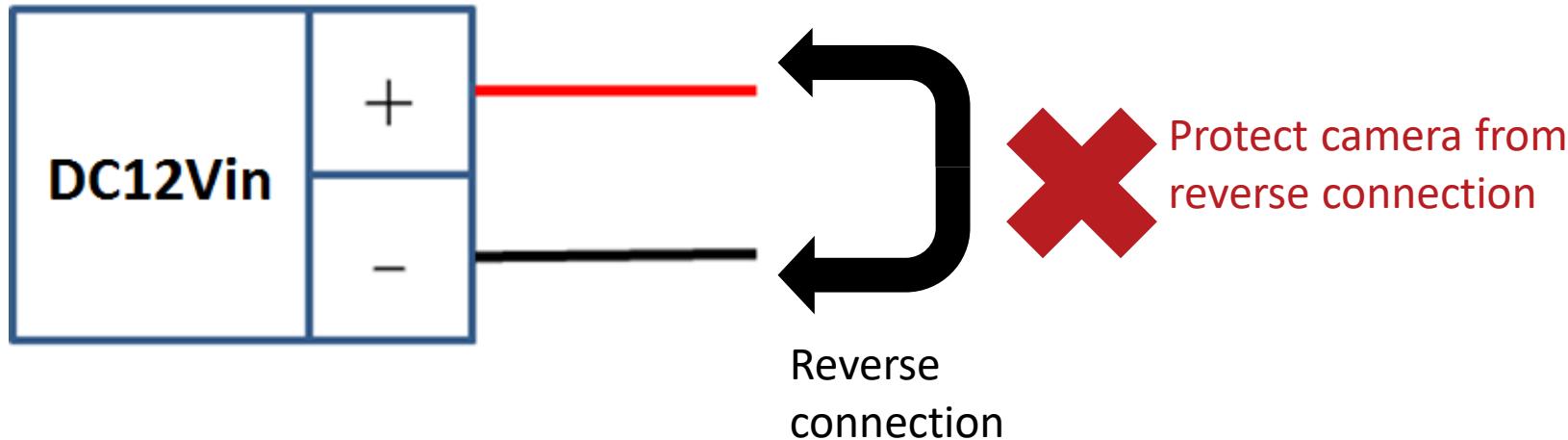
Backup File System helps camera working normally when main file system suffer from unexpected failure.



Main file system will copy from backup file system to recover from the failure.

# Reverse Power Protection

Reverse Power Protection prevents damage to camera when power cords are accidentally reversed.



DS-2CD50xxG0  
DS-2CD51xxG0  
DS-2CD55xxG0

# Anti-corrosion

Suitable for normal atmospheric environment where cameras without protection may be corroded like **temperate coastal** or **acid rain environment**.



DS-2CD5Ax6G0-IZS(H)Y  
DS-2CD55x6G0-IZS(H)Y

**Anti-corrosion painting**  
**NEMA 4X Standard**



# Inner Anti-fog Coating

- The **inner anti-fog coating** inside bubble or lens cover can prevent vapor condensing when vapor ingress into camera and saves maintenance cost.

- ✗ Improper installation procedure may lead to vapor coming into camera and desiccant losing efficiency.
- ✗ Improper storage may lead to vapor coming into camera and desiccant losing efficiency.



DS-2CD5AxxG0  
DS-2CD55xxG0

# Special Waterproof Design for Cable

The special waterproof design for cable can protect the camera from water ingress when improper installation occurs.

- ✖ Improper installation of network cable waterproof jacket may lead to leaking through cable.
- ✖ Improper installation of junction box may lead to leaking in junction box.



DS-2CD5AxxG0  
DS-2CD55xxG0

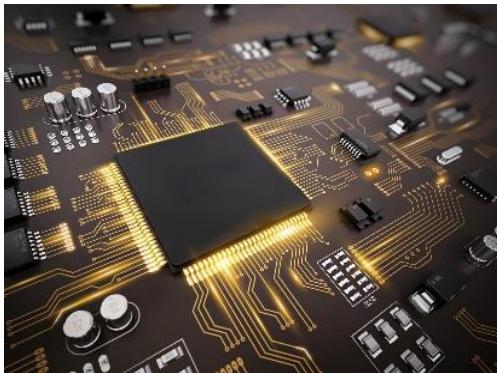
# Contents

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# AcuSense Features

Strobe light and audio alarm

## AcuSense Technology



One Stand-alone Chip

Hikvision  
Deep Learning Algorithm

False Alarm Filter

Strobe Light & Audio Alarm

Powered By Darkfighter



DS-2CD2346G1-I/SL

DS-2CD2326G1-I/SL

DS-2CD2T46G1-4I/SL

DS-2CD2T26G1-4I/SL

# AcuSense Demo

Strobe light and audio alarm

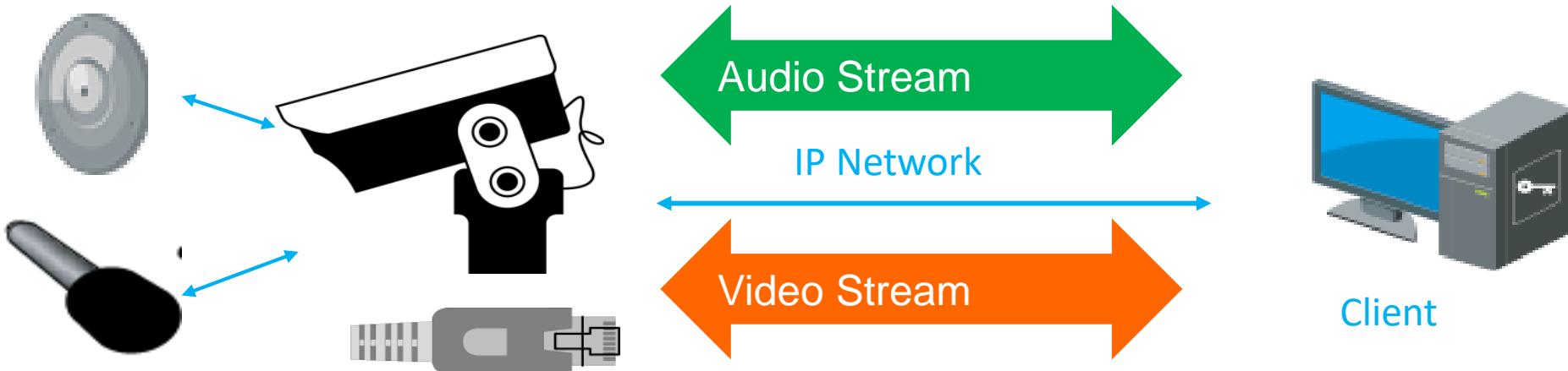


# Contents

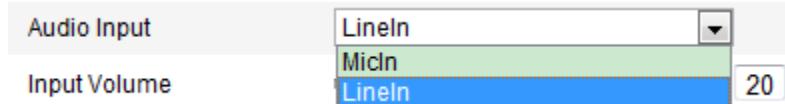
- Product Family
- Functions & Applications
- **Audio & Alarm**
- Troubleshooting

# Audio Support and Equipment

- A network video system with integrated audio support. Audio and video streams are sent over the same network cable.



- With mic-in/line-in support, users have the option of using another type or quality of microphone than the one that is built into the camera or video encoder.



*MicIn and Lineln are selectable for the connected microphone and pickup respectively.*

# Microphone vs Pickup

Comparison	Microphone	Pickup
Interface	Mic In	Audio In or Line In
Direction	Unidirectional	Omnidirectional
Quality	Not good	Good
Sensitivity	Low	High
Power	Passive	Active
Application	Shop, ATM, etc.	Law enforcement



- ✓ Multiple factors affect the audio quality.
- ✓ The user must choose all of them carefully.



# Contents

- Product Family
- Image Adjustment
- Bandwidth Control
- Ultra Series Features
- Featured Cameras
- Audio & Alarm
- **Troubleshooting**

# Image clear in the day but blurry at night

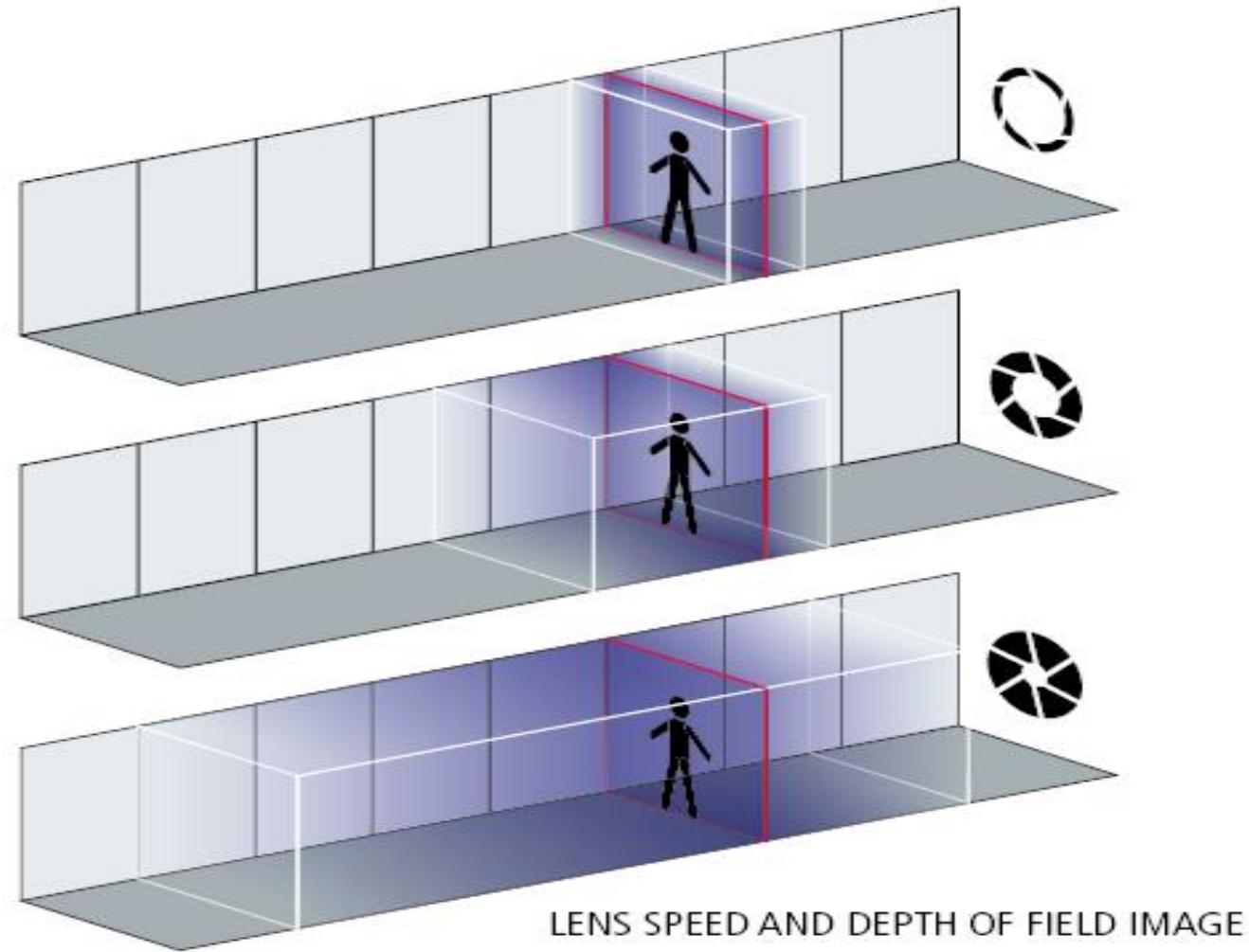


**Depth of field** is long during the day but short during the night, when you adjust the focusing point out of the DOF at night, image turns blurry.

# Image clear in the day but blurry at night

## Solution:

Adjust the focus during the night



# Blurry Image



NWC06 南大厅西南角高清

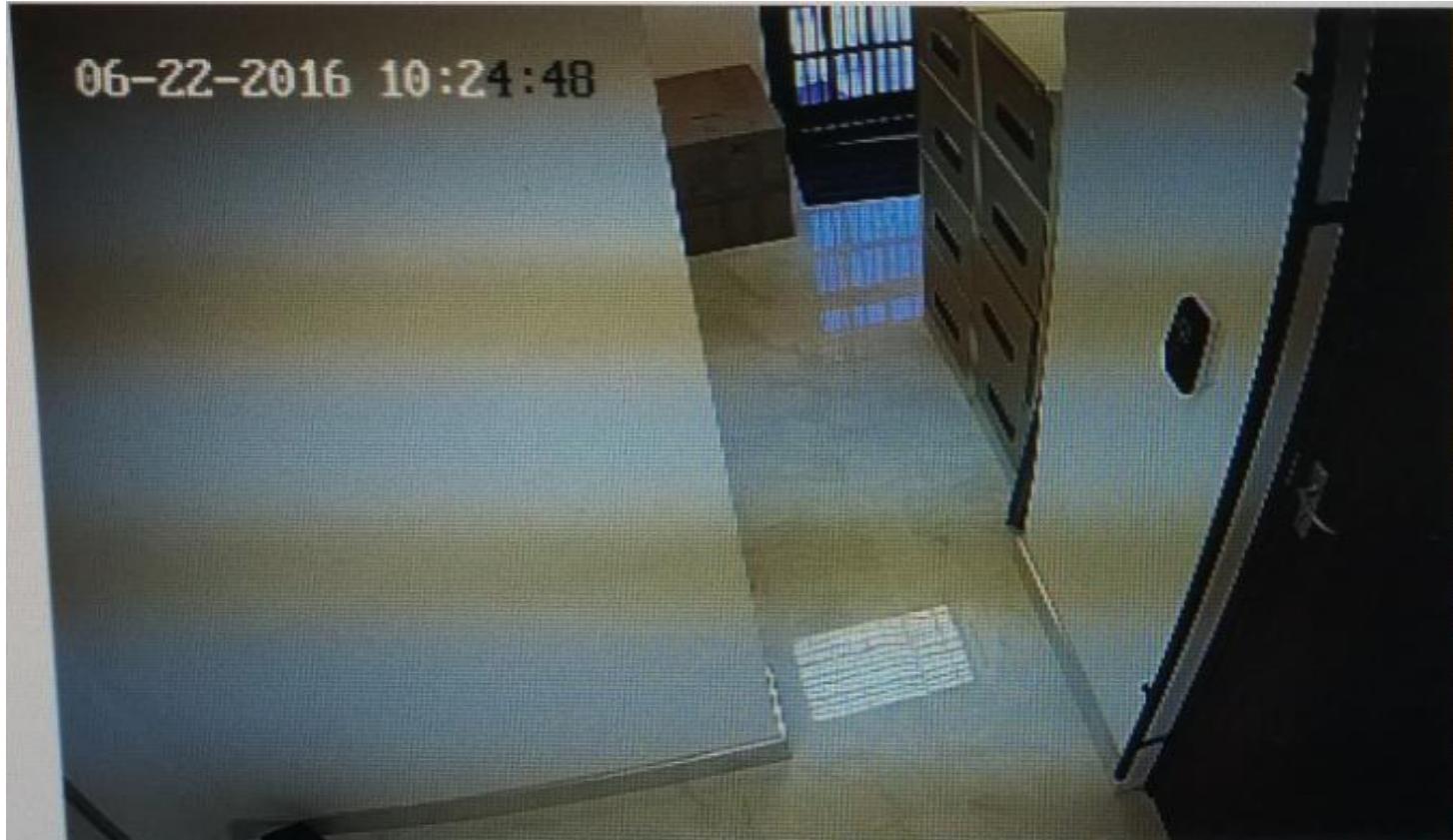
**When the video contains many moving objects, exposure time would be a key point to be considered.**

**Solution:**

Adjust the exposure time from the default 1/25 to 1/100 or faster

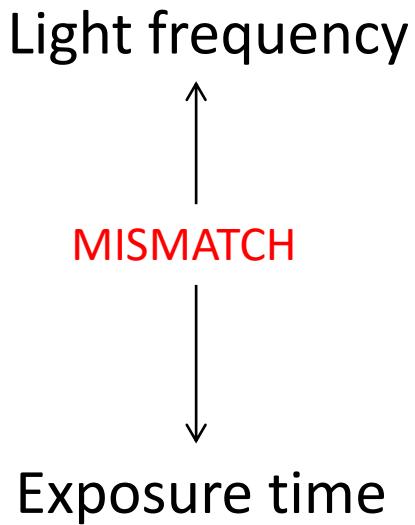
# Scrolling line issue

- **Issue:** In AC powered artificial lighting condition, the image will appear scrolling lines as shown below.



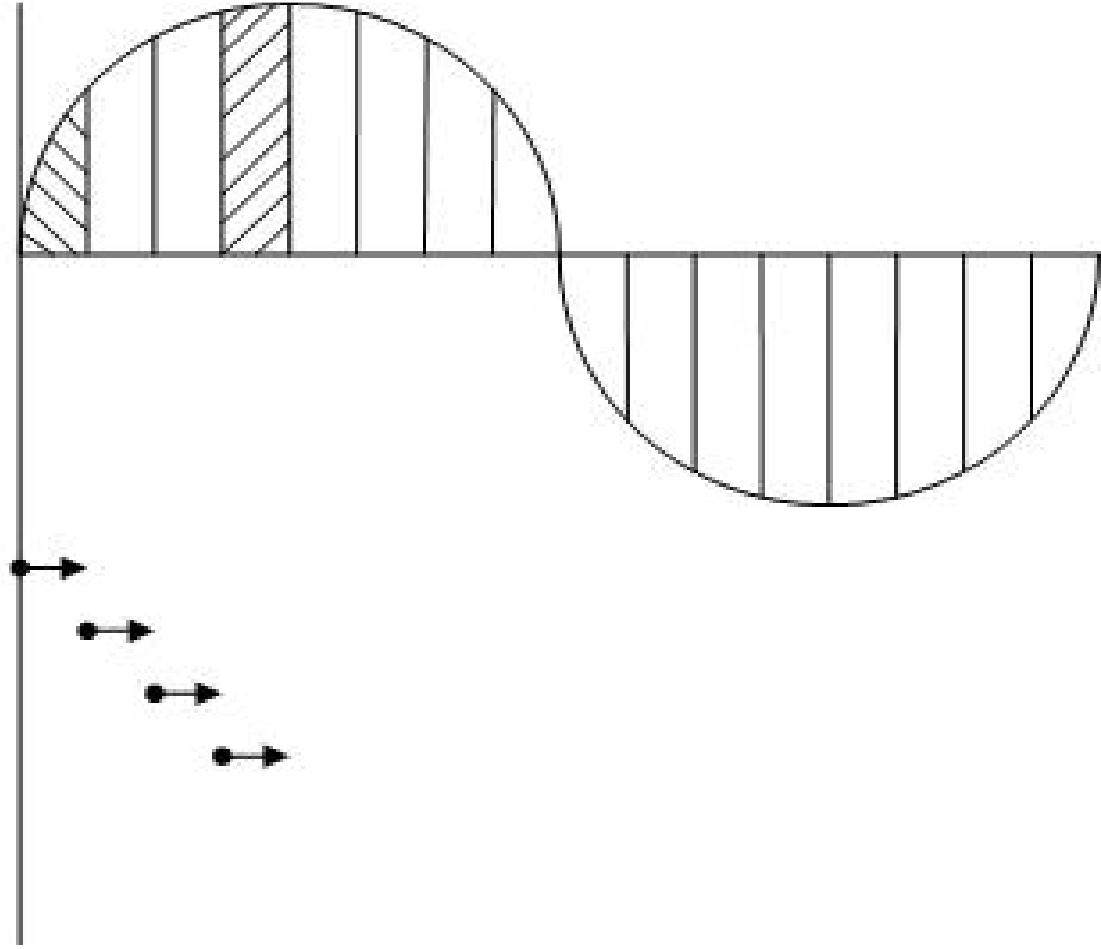
# Scrolling line issue

- Principle:



Artificial lighting AC voltage & brightness

Line 1 Exposure time →  
Line 2 Exposure time →  
Line 3 Exposure time →  
Line 4 Exposure time →  
.....



## Solution:

- 1. Switch off WDR function, the image get a little bit better, but still has yellow lines on image.
- 3. Change exposure time to 1/25, 1/50, 1/100, 1/250, until 1/2000. No more help, some even worse.
- 4. Check the installation and the environment.

# Comparison



Thanks!