



HD Network Camera
WV-SP305/WV-SP306



HD Fixed Dome Network Camera
WV-SF335/WV-SF336

Network Camera
WV-SP302

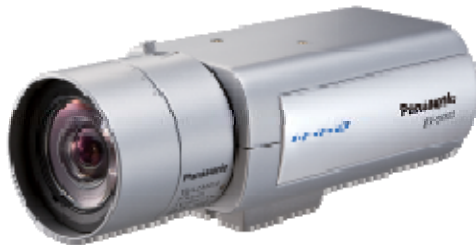
Fixed Dome Network Camera
WV-SF332

Security & AV Systems Business Unit
Panasonic System Networks Company

WV-SP302/305/306 Overview

i-PRG
SmartHD

WV-SP302



<Lens : Option>

800x600, 30fps

Simple D/N

Focus Assist

Face Detection

WV-SP305



<Lens : Option>

HD/720P, 30fps

Simple D/N

Focus Assist

Face Detection

WV-SP306



<Lens : Option>

HD/720P, 30fps

True D/N

ABF

Face Detection

■ Key Features

- ❑ Real time HD/720P video with H.264 High Profile format
- ❑ High sensitivity: 0.3 lux @ color mode
- ❑ On-device analytics

WV-SF332/335/336 Overview

i-PRD
SmartHD

WV-SF332



800x600, 30fps

Simple D/N

Focus Assist

Face Detection

WV-SF335



HD/ 720P, 30fps

Simple D/N

Focus Assist

Face Detection

WV-SF336



HD/ 720P, 30fps

Simple D/N

Lens ABF

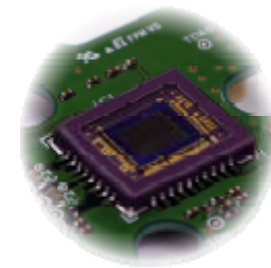
Face Detection

■ Key Features

- ❑ Real time HD/720P video with H.264 High Profile format
- ❑ High sensitivity: 0.3 lux @ color mode
- ❑ On-device analytics

1.3 Megapixel RGB MOS Sensor

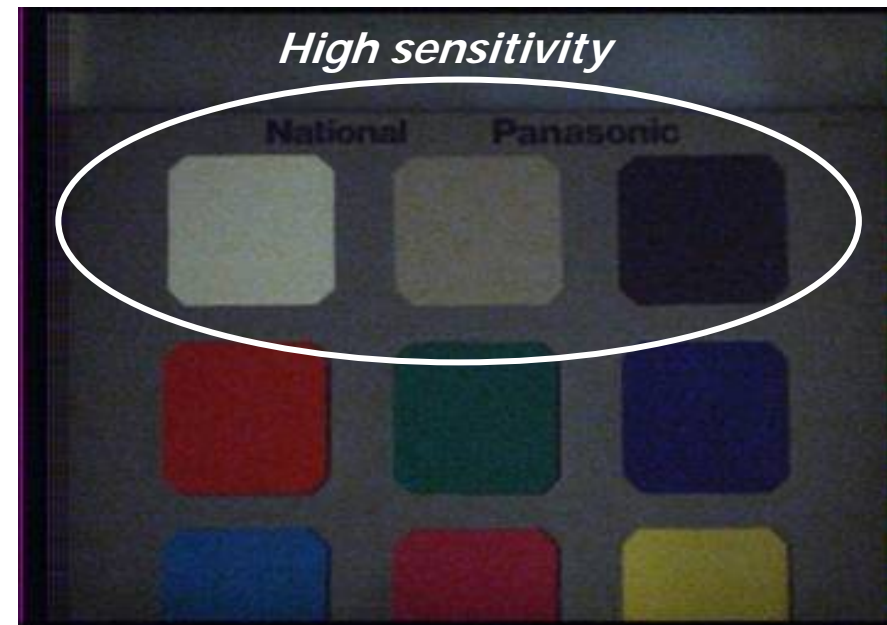
- High sensitivity (Min. illumination: 0.3lux)
- Low Power Consumption (Reduce 50% Power Consumption)
- Superior Color Reproduction by Primary (RGB) Color Filter



Low Light Condition Image (Same illumination)



Conventional MOS image



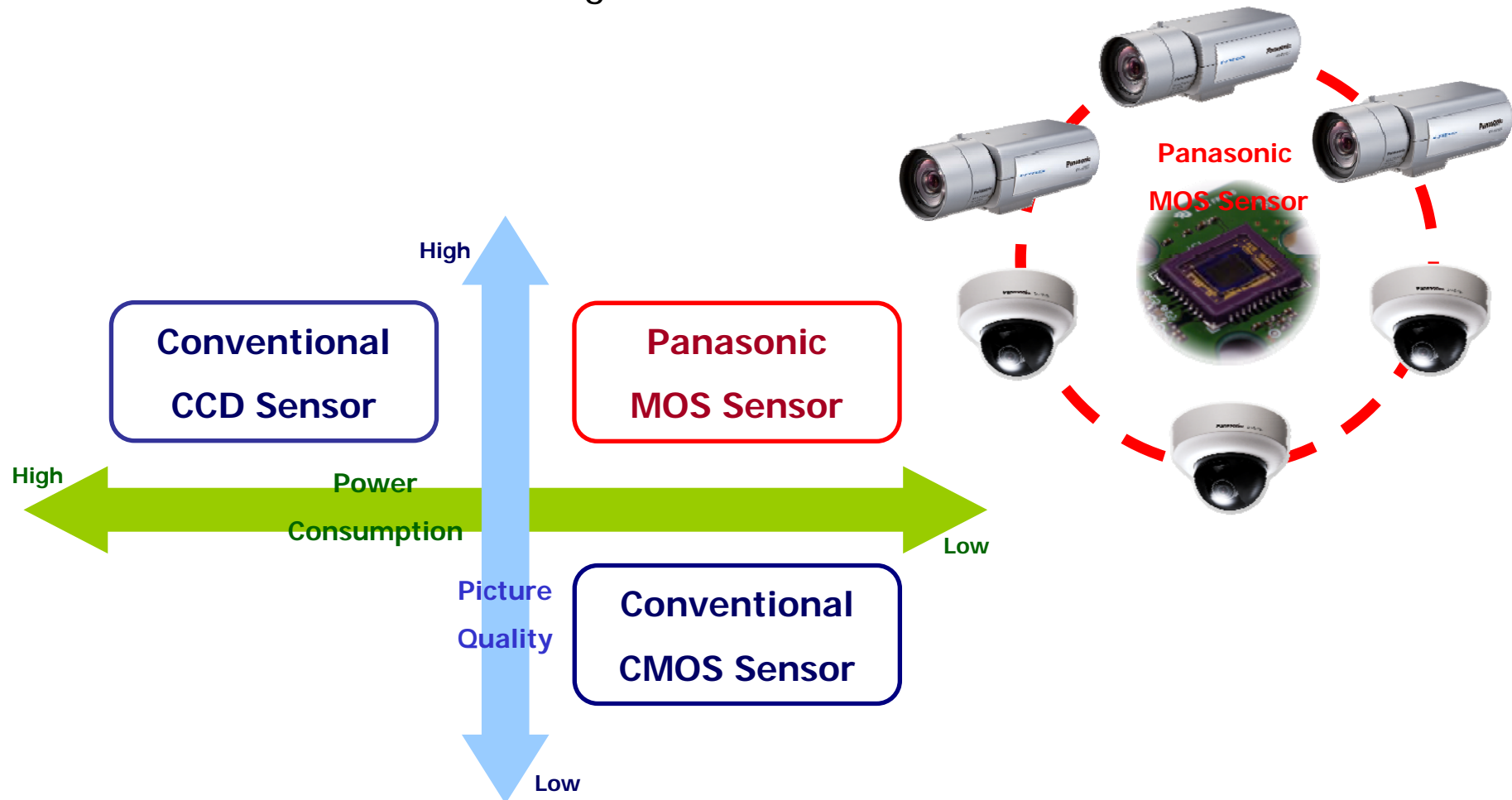
New MOS image (reference)

Panasonic ideas for life

Panasonic MOS Sensor - 1

i-PRD
SmartHD

Panasonic develops **new original MOS sensor**, and implement it in SP/SF series camera, and the sensor achieves both high sensitivity & low power consumption of CCD & CMOS sensor advantages.



Panasonic ideas for life

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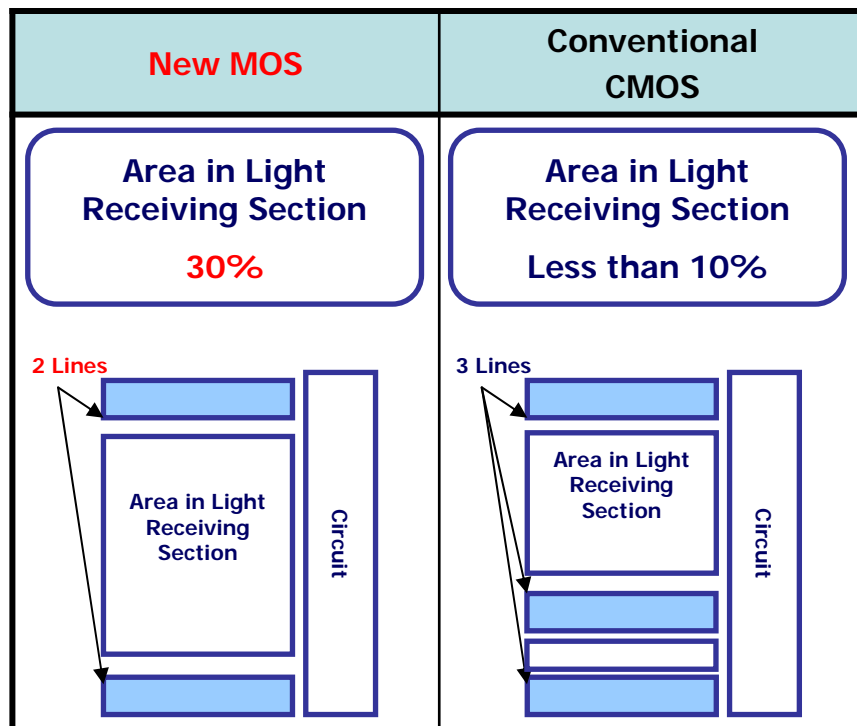
Panasonic MOS Sensor - 2

i-PRG
SmartHD

Panasonic MOS sensor has original pixel architecture technology for high sensitivity & lower noise in darker condition as the followings:

- To take wide area in light receiving section by reducing 3 lines of CMOS to 2 lines architecture.
- To reduce dark current by improving photodiode device architecture.

Light Receiving Architecture



Photodiode Device Architecture

New MOS	Conventional CMOS
Dark Current 60 electrons/s	Dark Current 1500 electrons/s

Panasonic ideas for life

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CMOS vs CCD Sensor

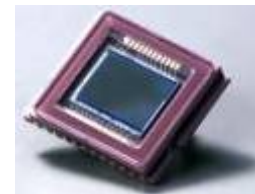
i-PRG
SmartHD

i-Pro 2nd Generation

Sensor	CCD	Conventional CMOS
Sensitivity	Better	Less
Fix Pattern Noise	Lower	Visible
Moving Object Distortion	No	Visible
Smear	Less (in case FIT)	No
Power Consumption	Higher	Lower
Cost	Higher	Lower

- CMOS can be higher density with lower cost and may be suitable for low cost market with low quality.
- However for general surveillance purpose, CCD will be the **best choice** in total performance.

Adapt & Implement CCD Sensor
in Panasonic Camera



CCD Sensor

Panasonic ideas for life

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MOS vs CCD Sensor

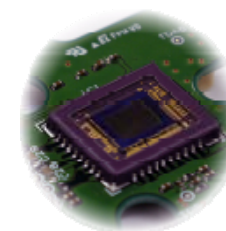
i-PRO
SmartHD

i-PRO 3rd Generation

Sensor	New MOS	CCD	Conventional CMOS
Sensitivity	Much Better	Better	Less
Fix Pattern Noise	Much Lower	Lower	Visible
Moving Object Distortion	Lower	No	Visible
Smear	No	Less (in case FIT)	No
Power Consumption	Lower	Higher	Lower
Cost	Lower	Higher	Lower

- Panasonic develops **new MOS sensor** for high sensitivity & lower noise by latest SC processing lower noise & by original amplifier technology.
- Currently for general surveillance purpose, **new MOS sensor** will be the **best choice** in total performance.

Adapt & Implement **New MOS Sensor**
in Panasonic Camera



New
MOS Sensor

Panasonic ideas for life

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UniPhier (Original System LSI)

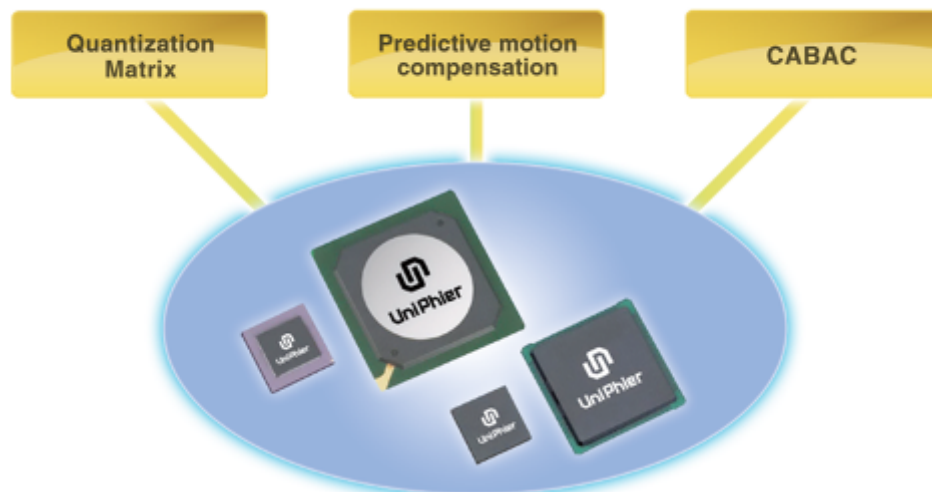
- Multiple H.264 High Profile Streams
- Real Time HD Video Processing
- On-device Intelligence Support



H.264 profiles

H.264 High Profile encoding with Panasonic Uniphier LSI enables
1280 x 960 high quality real time video with smaller data size.

UniPhier H.264 High Profile



1280x960 comparison		VGA comparison	
JPEG 11.5Mbps	1280 x 960 11 ips JPEG	MPEG-4 2 Mbps	VGA 30 ips
JPEG quality mode = 5			
H.264 4 Mbps	1280 x 960 30 ips H.264	H.264 1 Mbps	VGA 30 ips

* Superior image and high frame rate with smaller data size.

Panasonic ideas for life

High Definition

i-PRO
SmartHD

It improves picture resolution from standard definition to high definition.



Analog Camera

i-Pro SmartHD Camera



* SP305/306 & SF335/336 support high definition.

Panasonic ideas for life

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Progressive Scan

i-PRG
SmartHD

Progressive video output ensures clear images with less motion blur and no tearing even when the subject is moving.

Interlace scan



Image appears with tearing when the subject is moving due to temporal difference between odd/even field.

Progressive scan



There is no tearing even when the subject is moving.

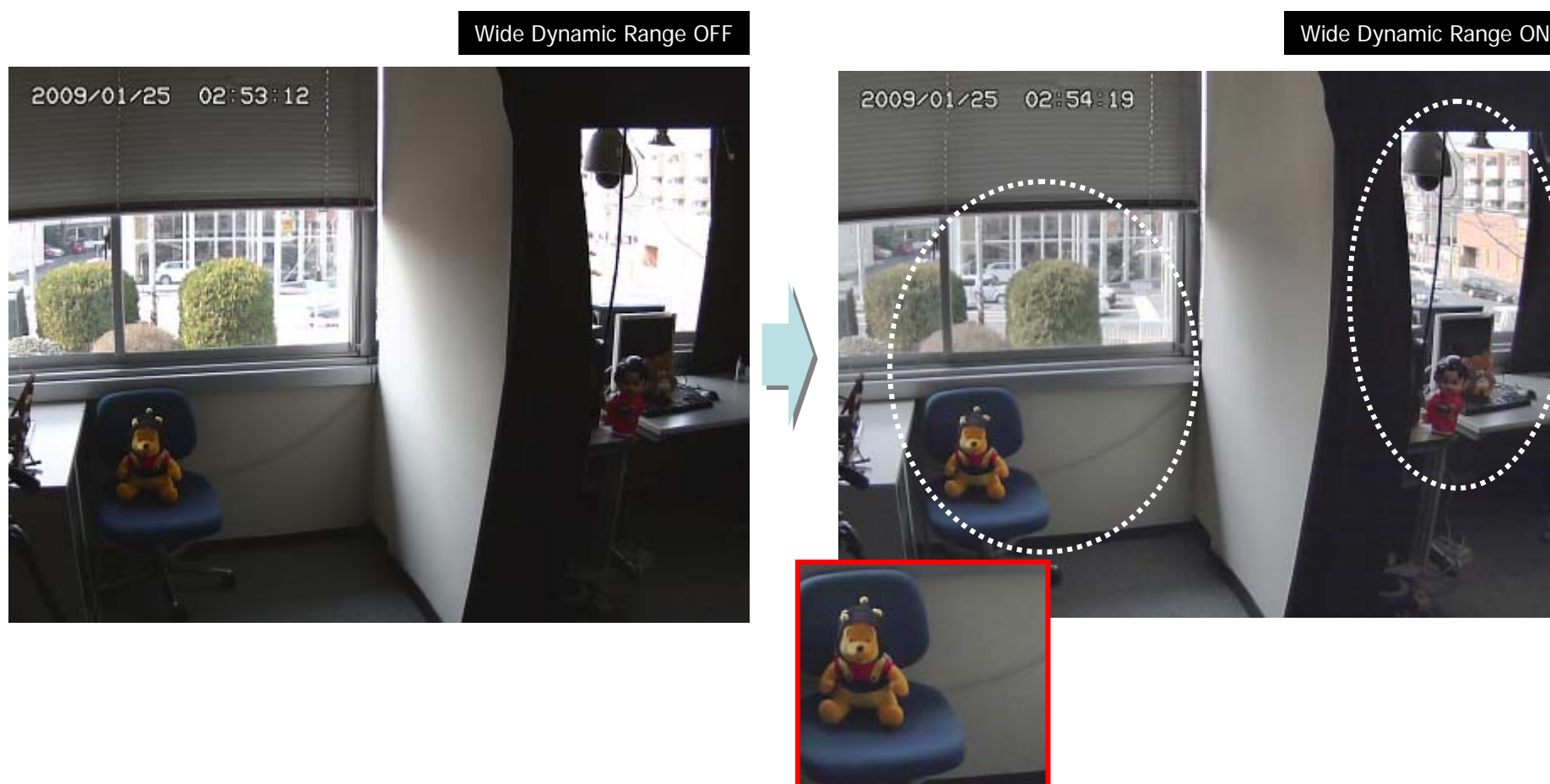
Panasonic ideas for life

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Wide Dynamic Range - 1

i-PRG
SmartHD

It expands dynamic range by tuning gain control, gamma control and dark area calibration.



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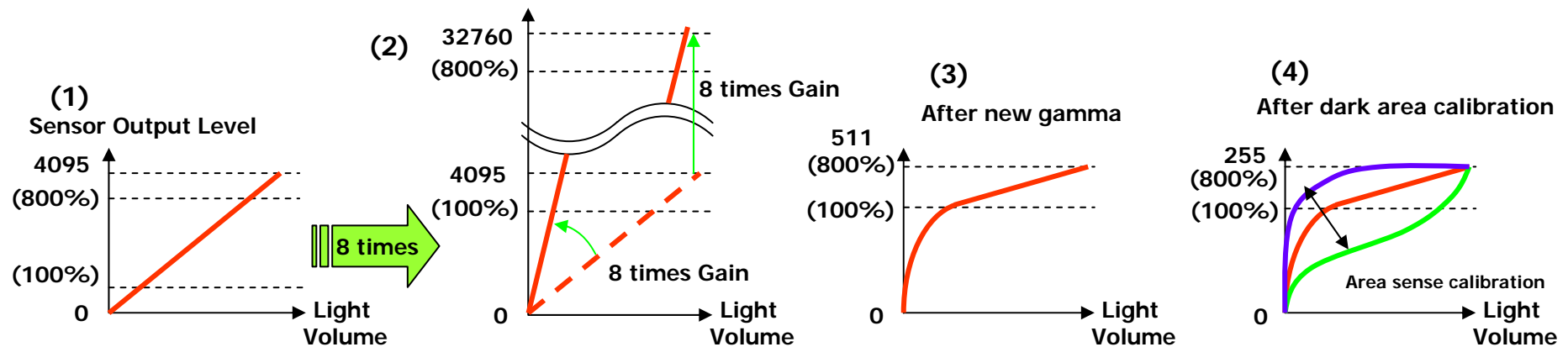
Wide Dynamic Range - 2

i-PRG
SmartHD

Wide Dynamic Range Mechanism

1. Adjust lens iris until bright area is saturated.
 - > The areas that have less than normal brightness become darker.
2. Amplify signals digitally until normal level in the areas that became darker.
 - > Amplify signals even in bright areas up to 8 times.

Note: Signal noise is increasing in dark areas, since it is without shutter control and it just amplifies signal in the dark areas.
3. Calibrate gamma included knee characteristic by amount of signal amplifying.
 - > It is possible to control bright areas and bright conditions.
4. Make image clear by accentuating contrast as well as dark area calibration.



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Face Detection

i-PRG
SmartHD

It automatically detects up to 8 faces, and transfers face data as XML.
It enables to develop custom applications such as NV200 recorder.

Automatic Face Detection



* Face detection is not handled as an alarm source.

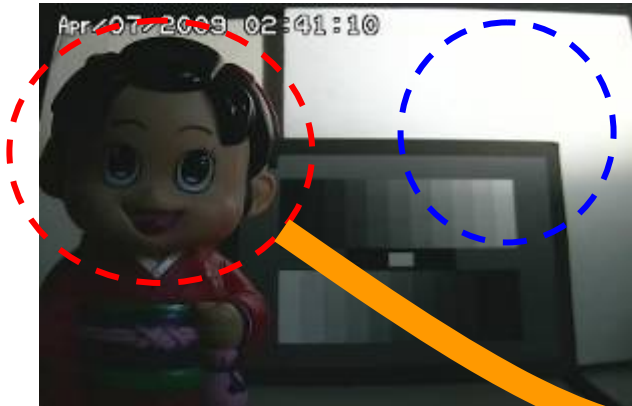
Panasonic ideas for life

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Face Detection with WDR

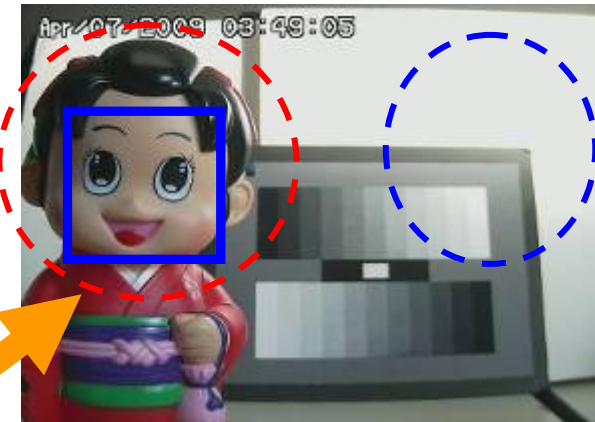
i-PRG
SmartHD

It automatically detects human faces and makes brightness adjustment to provide better identification for the faces by brightness calibration of human faces in backlight condition.



Before Calibration

To recognize a face is difficult because of backlight.
Camera is adjusted from bright section circled in blue.



After Calibration

Overall brightness level is increased without causing the saturation in the originally bright section (blue circle).

Wide Dynamic Range OFF



Wide Dynamic Range ON



Face Detection with
Wide Dynamic Range ON



* When face detection with WDR works, it just adjusts dynamic range, and bright area may be saturated by light condition around a face.






Panasonic ideas for life

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Face Wide Dynamic Range

i-PRD
SmartHD

Camera automatically turn ON or OFF face WDR function by detecting whether human faces are there or not

WDR Setting	WDR : OFF Face WDR : OFF	WDR : ON Face WDR : OFF	WDR : ON Face WDR : ON
With Human Face			
Without Human Face		 Without human face, face wide dynamic range is not operated.	

Panasonic ideas for life

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Face Matching

i-PRG
SmarHD

The information of position detection of human faces and information is sent by XML form with video stream. And, it enables the matching of human face data in real time.



Automatic Face Detection

1.
Face registration



2.
Detect the face



3.
Recognize the face and send alarm



* Necessary to integrate with SmarHD Recorder (NV200 Series).

* NV200 requires SXVGA resolution for face matching, so SP302 and SF332 are excluded as cameras for face matching.

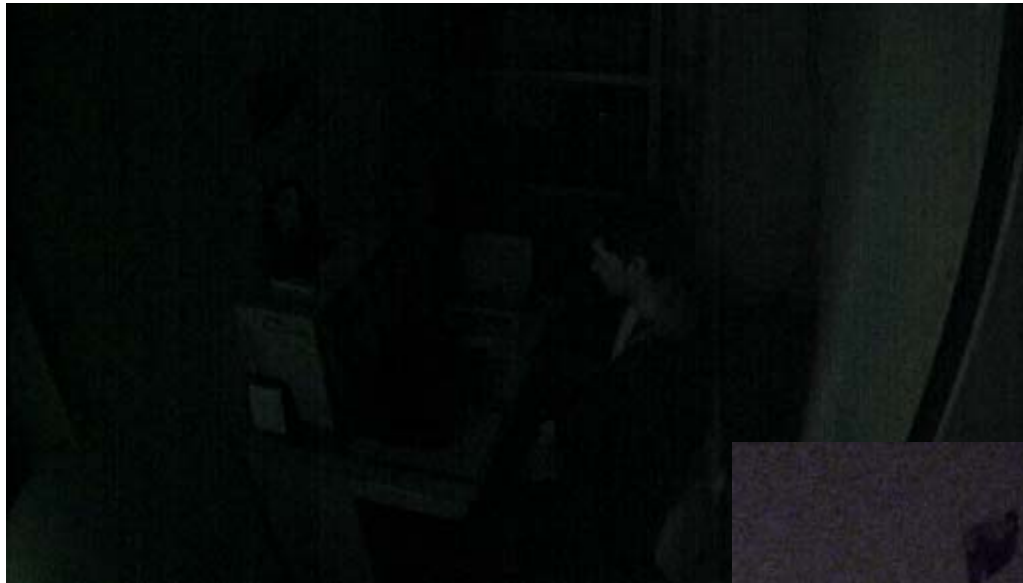
SP302 SP305 SP306 SF332 SF335 SF336

Panasonic ideas for life

High Sensitivity

i-PRO
SmartHD

It improves low illumination performance even in darker condition.



Conventional HD Camera



i-Pro SmartHD Camera

* SP305/306 & SF335/336 support HD high sensitivity.

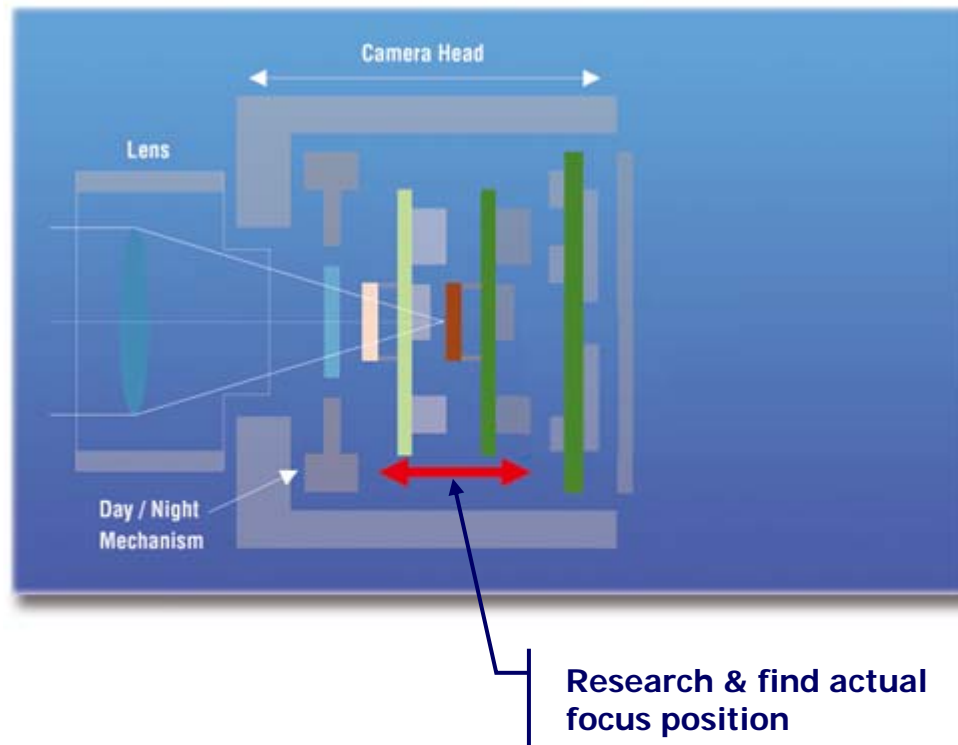
Panasonic ideas for life

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Auto Back Focus (ABF)

i-PRD
SmartHD

ABF is very useful for easy installation and accurate focus in both color and B/W modes.



* SP306 supports ABF function.

Panasonic ideas for life

SP302 SP305 **SP306** SF332 SF335 SF336

Lens ABF

i-PRG
SmartHD

SP336 has lens ABF function which is very useful for easy installation.
Lens ABF means just "Auto Focus."

After pushing "Execute" button, focus adjustment will run automatically.



* SF336 supports lens ABF function.

Panasonic ideas for life

SP302 SP305 SP306 SF332 SF335 **SF336**

Focus Assist

i-PRG
SmartHD

Focus Assist is used for easy, accurate and illumination independent focus adjustment.

After pushing button, focus indicator will appear.



* SP302/305 & SF332/335 support focus assist function.

Panasonic ideas for life

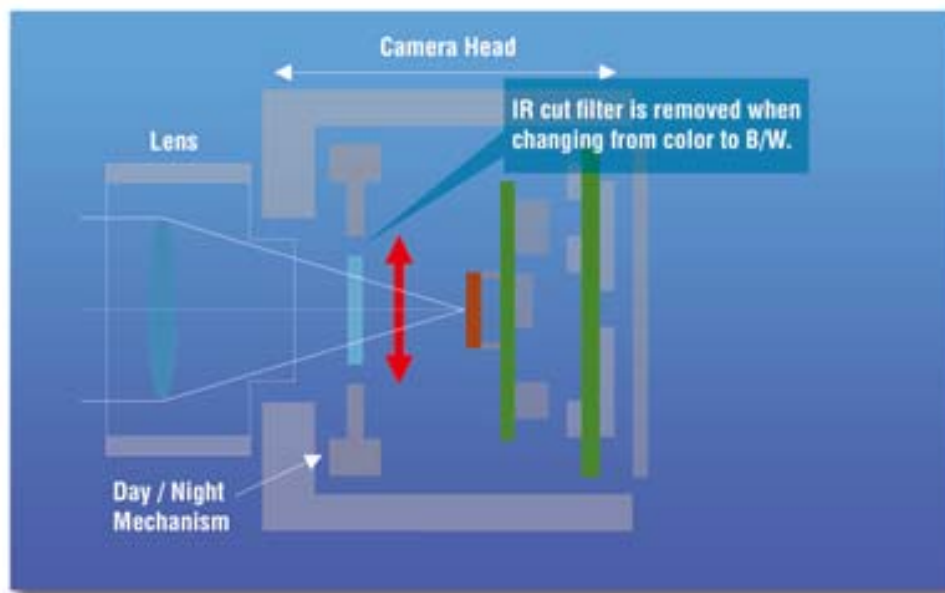
SP302 SP305 SP306 SF332 SF335 SF336

Day-Night

i-PRG
SmartHD

Day-Night function automatically switches camera from color to B/W and vice versa depending on the illumination, an ideal solution for 24-hour surveillance.

With moving IR cut filter and ABF, both high sensitivity and accurate focus are ensured.



* SP306 supports real day-night function.

Panasonic ideas for life

SP302 SP305 **SP306** SF332 SF335 SF336

Adaptive DNR (Digital Noise Reduction)

i-PRG
SmartHD

2D-DNR for motion area and 3D-DNR for static area are effectively combined, realizing a clear low noise image with less motion blur and resolution deterioration.



AGC OFF: Image is too dark

AGC ON: Image is too noisy.

Conventional DNR:
Motion blur on moving subject.

Motion adaptive DNR:
Clear image without motion blur.

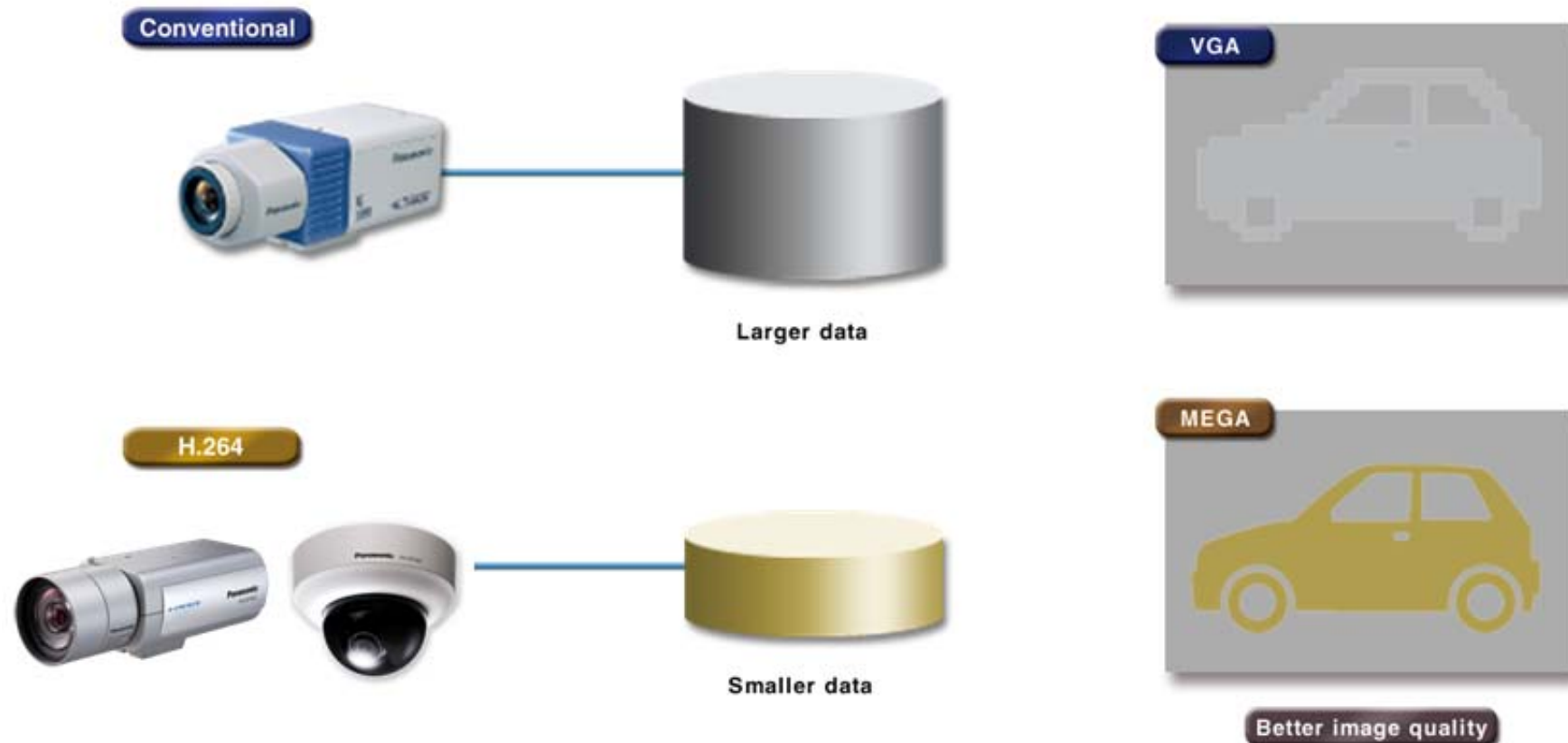
Panasonic ideas for life

SP302 SP305 SP306 SF332 SF335 SF336

H.264 Latest Encoding - 1

i-PRP
SmartHD

H.264 latest encoding technology with Panasonic Uniphier platform enables superior image of 1280 x 960 with smaller data size.



* This allows better image quality within the limited network/disk capacity.
SP305/306 & SF335/336 support H.264 encoding at a megapixel resolution.

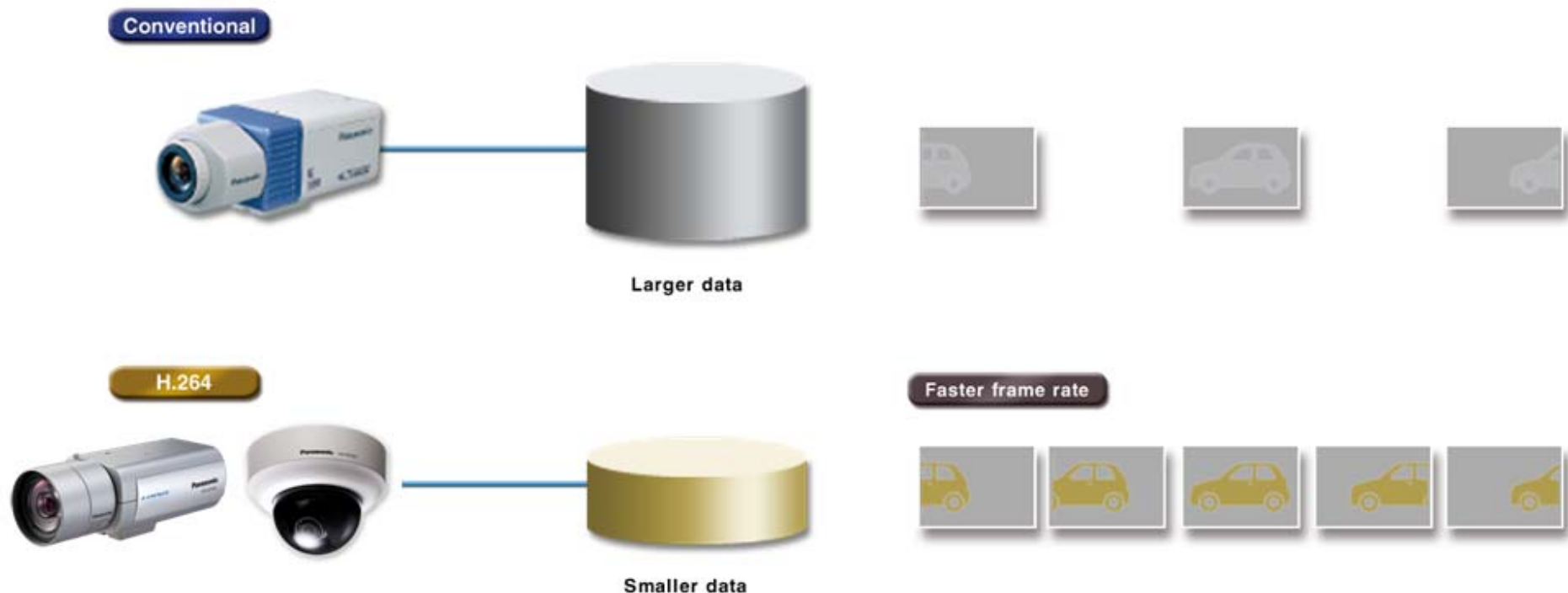
Panasonic ideas for life

SP302 SP305 SP306 SF332 SF335 SF336

H.264 Latest Encoding - 2

i-PRG
SmartHD

H.264 latest encoding technology with Panasonic Uniphier platform enables superior image of 1280 x 960 with smaller data size.



* This allows better image quality within the limited network/disk capacity.
SP305/306 & SF335/336 support H.264 encoding at a megapixel resolution.

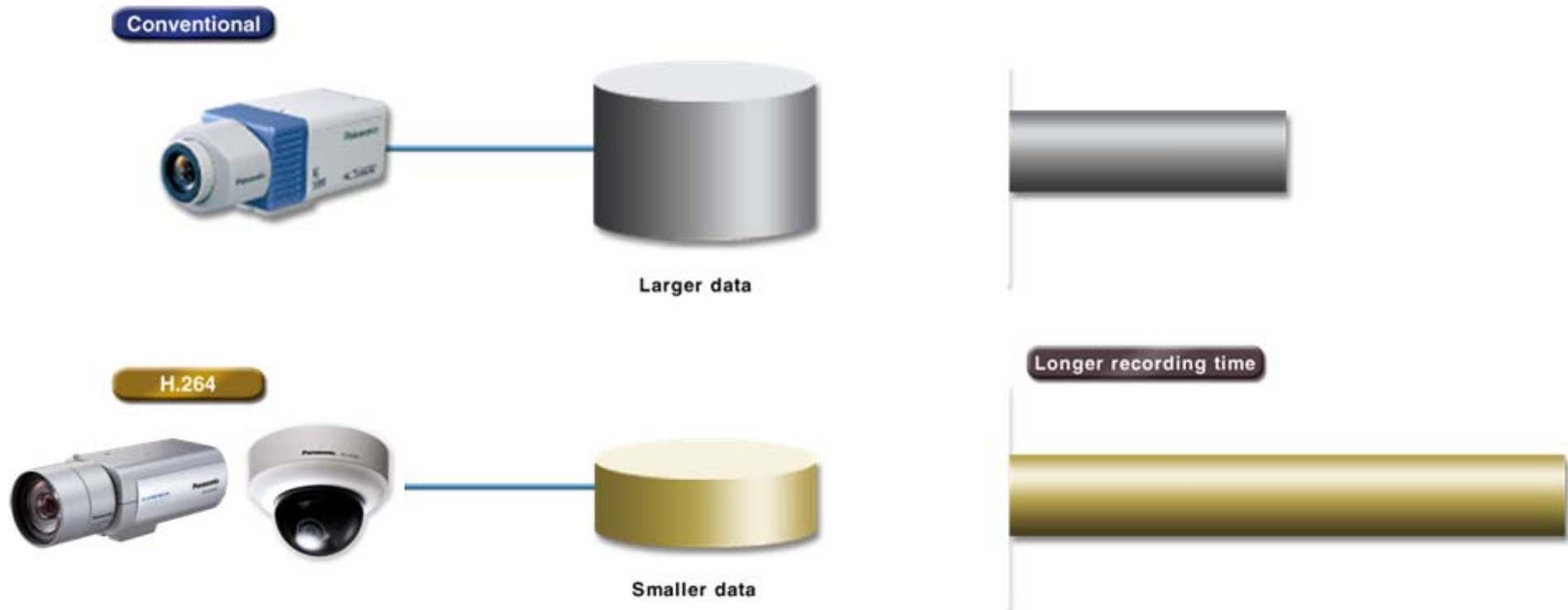
Panasonic ideas for life

SP302 SP305 SP306 SF332 SF335 SF336

H.264 Latest Encoding - 3

i-PRG
SmartHD

H.264 latest encoding technology with Panasonic Uniphier platform enables superior image of 1280 x 960 with smaller data size.



* This allows better image quality within the limited network/disk capacity.
SP305/306 & SF335/336 support H.264 encoding at a megapixel resolution.

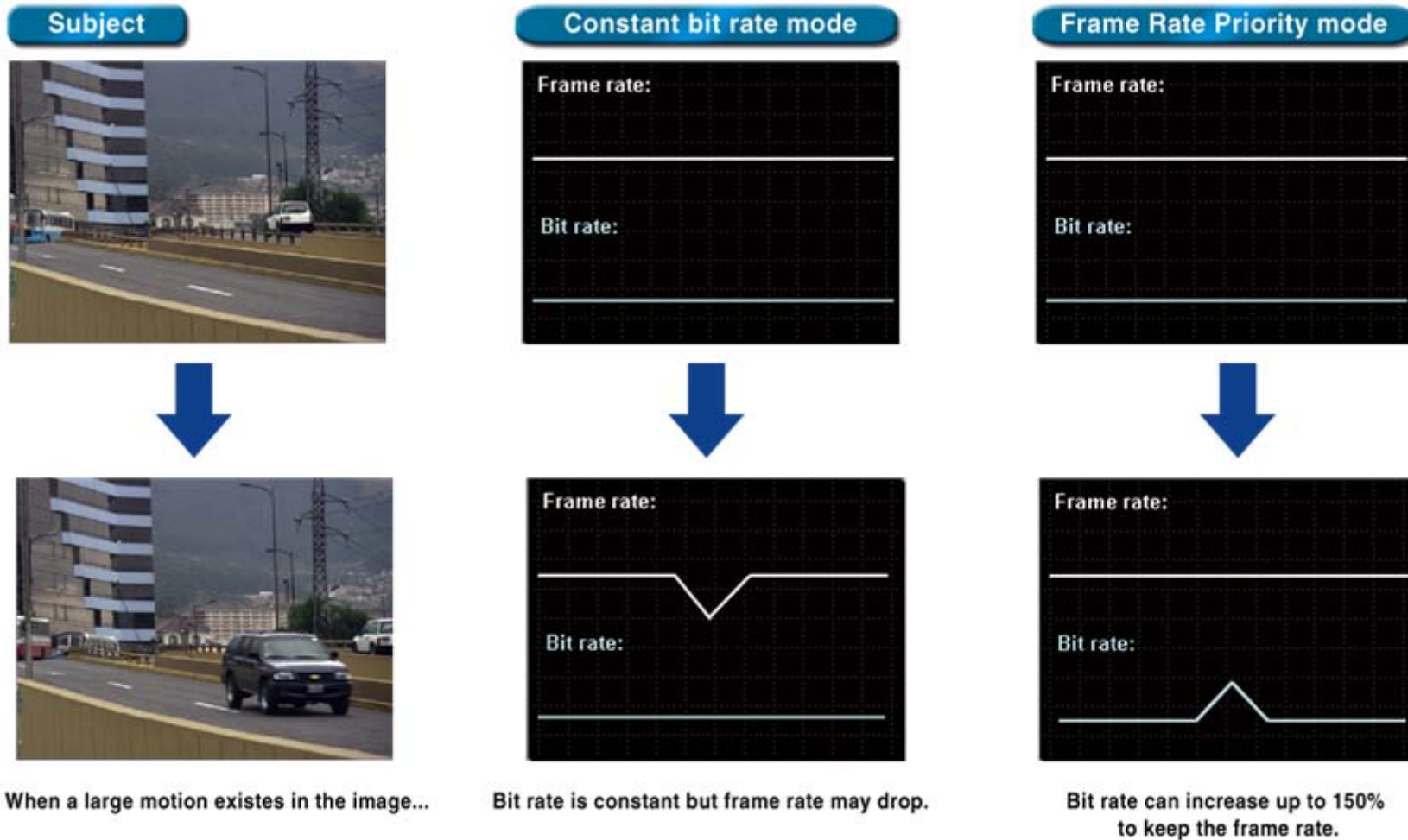
Panasonic ideas for life

SP302 SP305 SP306 SF332 SF335 SF336

Frame Rate Priority Mode

i-PRG
SmartHD

Frame rate priority mode dynamically controls bit rate depending on the subject to maintain the frame rate.



* This mode does not always guarantee the frame rate.

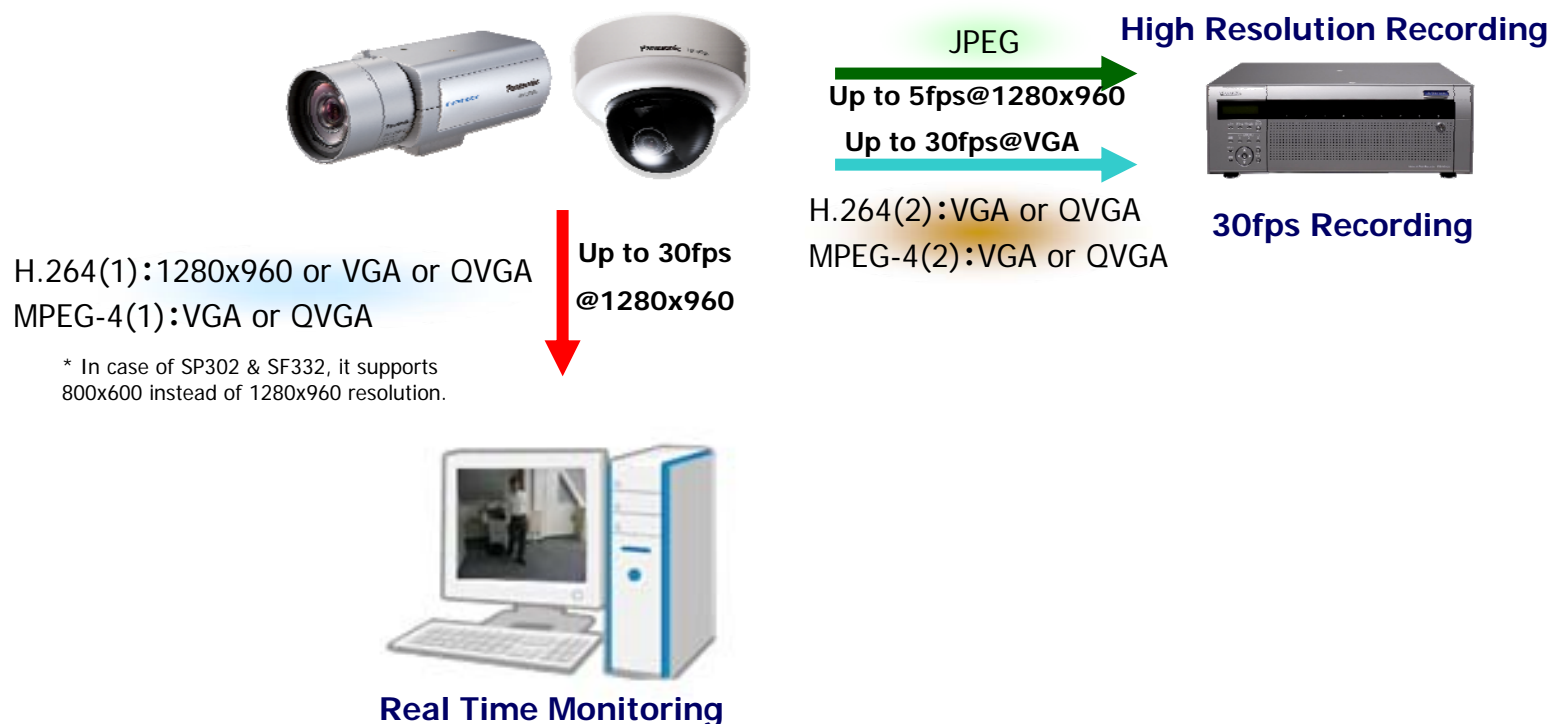
Panasonic ideas for life

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Multiple Streaming – 4:3 ratio

i-PRG
SmartHD

Triple streams(4:3 aspect ratio) including JPEG and H.264(2ch) or MPEG4(2ch) can be transmitted simultaneously, enabling both real time monitoring and high quality recording.



* When motion stream 1 is H.264 or MPEG-4, motion stream 2 must be H.264 or MPEG-4 (same compression type).
Total bit rate must be less than camera's max performance. Detail of the streaming combination is under study.

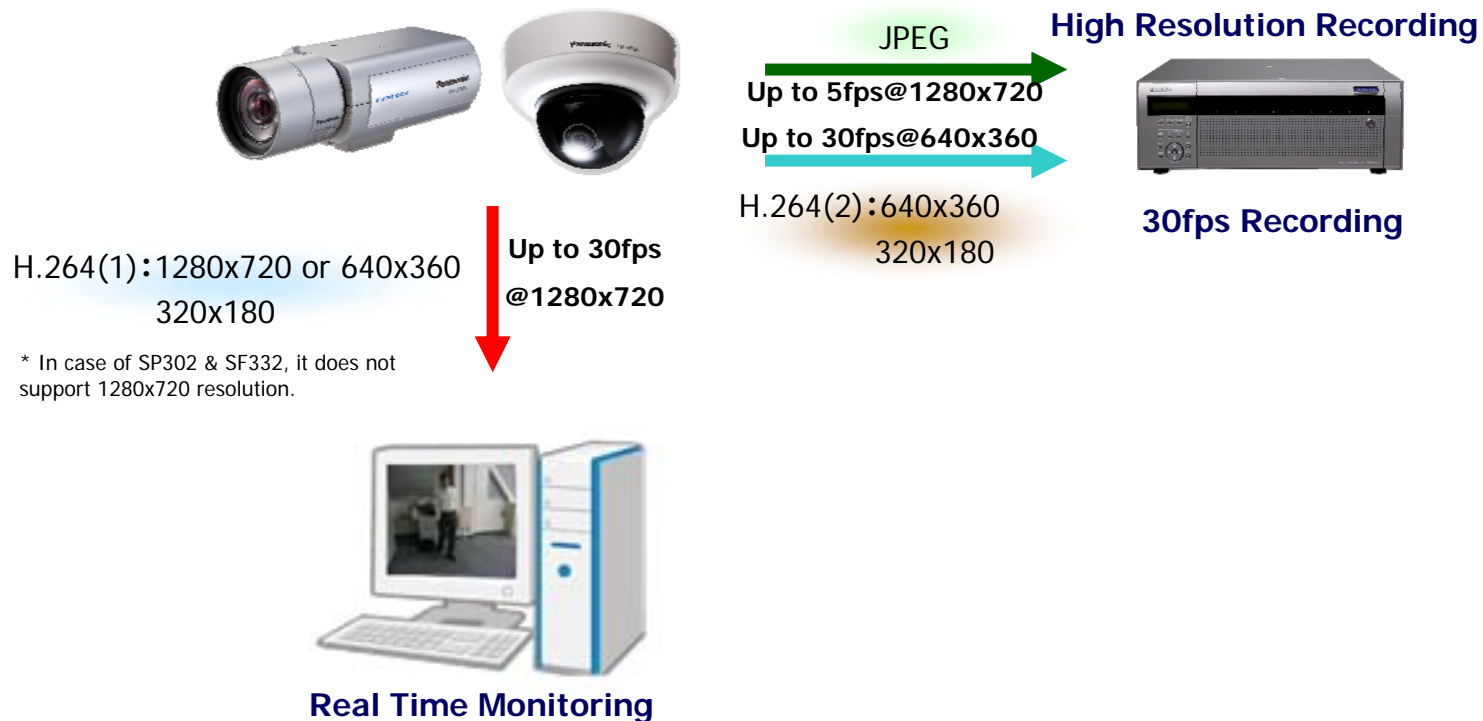
Panasonic ideas for life

SP302 SP305 SP306 SF332 SF335 SF336

Multiple Streaming – 16:9 ratio

i-PRG
SmartHD

Triple streams(16:9 aspect ratio) including JPEG and H.264(2ch) can be transmitted simultaneously, enabling both real time monitoring and high quality recording.



* Total bit rate must be less than camera's max performance. Detail of the streaming combination is under study.

Panasonic ideas for life

SP302 SP305 SP306 SF332 SF335 SF336

SD Memory Recording

i-PRG
SmartHD

SD/SDHC Memory card slot for manual recording (H.264/JPEG), alarm recording (H.264/JPEG) and backup upon network failure (JPEG).

SD Memory Setting



1. Select image format

- JPEG
- H.264

*** In case selecting H.264, H.264 (2) streaming is used only for SD memory recording. In case using recorder backup upon network failure, select JPEG.**

2. Select recording mode

- JPEG : Manual REC/Alarm REC (Post)
/Backup upon network failure (FTP error)
- H.264 : Manual REC/Alarm REC (Pre/Post)

3. Select recording setting

- Resolution :
 - 4:3 mode : 1280x960/VGA/QVGA
 - 16:9 mode : 1280x720/640x360/320x180

- Frame Rate/Bit Rate

*** In case of H.264, the setting for H.264(2) will be changed to the SD memory recording setting.**

4. Select data size setting in pre/post alarm for H.264

- Pre-Alarm : ON (data size: up to 2Mbps)/OFF
- Post-Alarm: 10s – 300s



*** In case of H.264, video data is recorded in the MP4 encoding format.**

Panasonic ideas for life

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Video Motion Detection

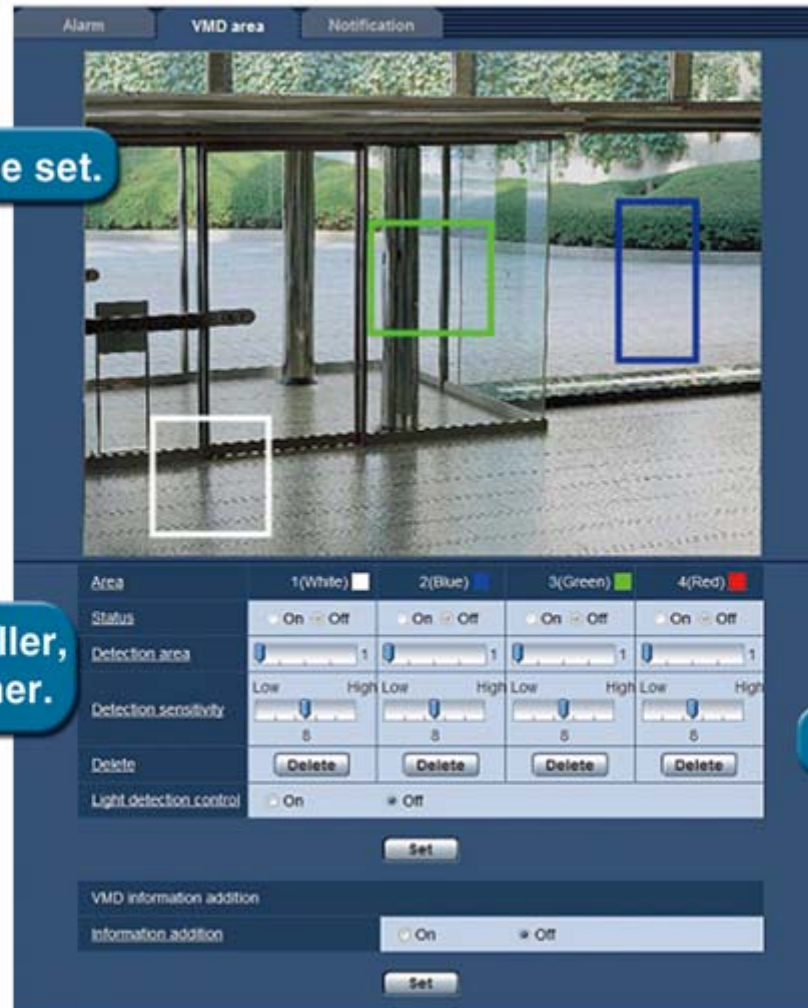
i-PRG
SmartHD

The motions in the specified areas can be detected, triggering an alarm.

Up to 4 areas can be registered. Finer tuning is possible with area and sensitivity adjustment.

Up to 4 areas can be set.

Detection size; When smaller,
sensitivity becomes higher.



Sensitivity: Low to High

Panasonic ideas for life

SP302 SP305 SP306 SF332 SF335 SF336

Flexible alarm handling

i-PRG
SmartHD

Alarm sources including Terminal input, VMD and Panasonic alarm command can trigger actions such as SD memory recording, FTP image transfer, E-mail notification, Indication on browser, Alarm terminal output, and Panasonic protocol output.



Panasonic ideas for life

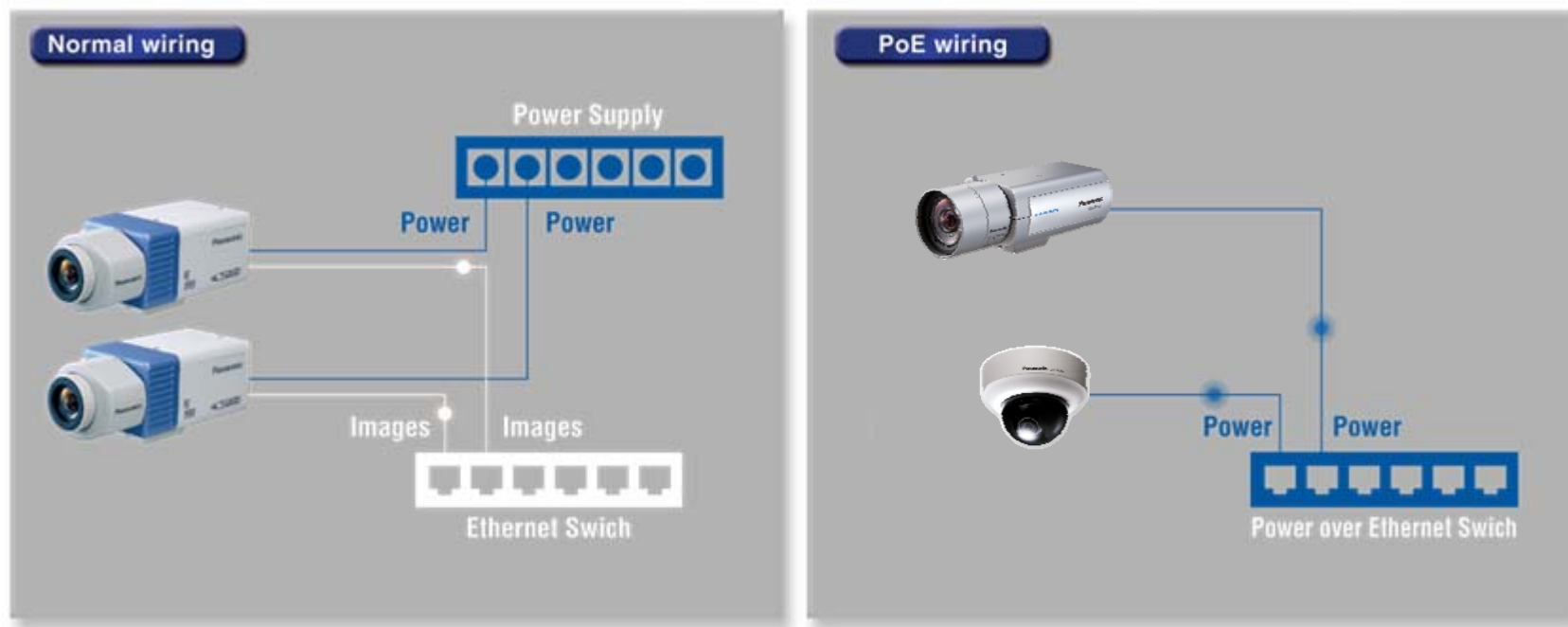
SP302 SP305 SP306 SF332 SF335 SF336

PoE (Power over Ethernet)

i-PRD
SmartHD

Both power and image data can be transmitted through a signal Ethernet cable.

By eliminating the need for power cables and supplies when installing cameras or changing layouts, installation and maintenance costs are reduced.



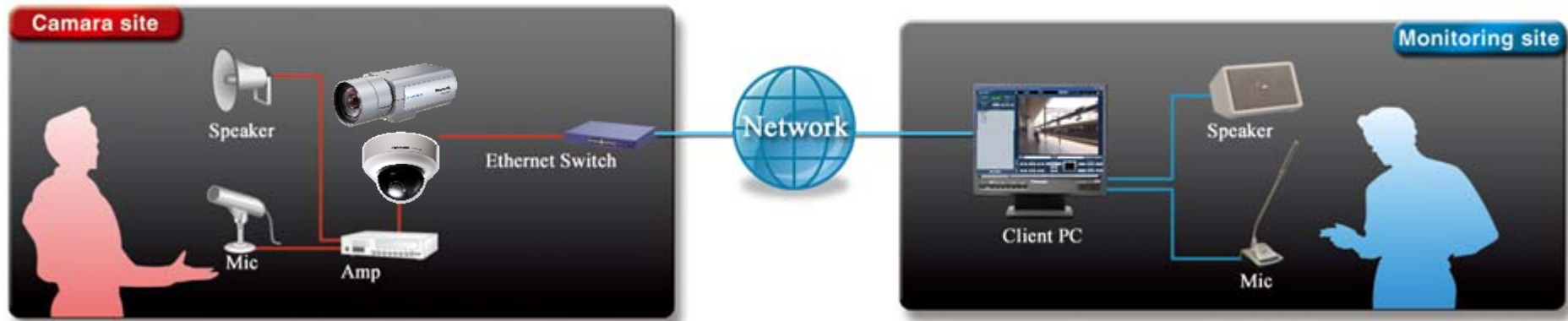
Panasonic ideas for life

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Bi-directional Audio

i-PRG
SmartHD

Full duplex bi-directional audio allows interactive communication between camera site and monitoring site.



* G.726 (ADPCM) 32 kbps mode only.

Panasonic ideas for life

SP302 SP305 SP306 SF332 SF335 SF336

Bit Rate, Frame Rate Setting



Transmission Priority is “Frame rate” (Frame Rate priority mode).

Recommended bit rate for H.264

* Refresh interval for H.264 (I frame interval) should be set 1 second.

	SXVGA(1280x960)	VGA(640x480)	QVGA(320x240)
H.264 30 fps	2,048kbps	768kbps	512kbps
H.264 5 fps	1,024kbps	384kbps	256kbps
H.264 3 fps	1,024kbps	384kbps	256kbps
H.264 1 fps	768kbps	256kbps	128kbps

Bit rate for JPEG and MPEG-4

H.264 requires less bit rate than JPEG for the same frame rate

H.264 is 5 time more frame rate than JPEG with the same bit rate in this case.

H.264 requires less bit rate than JPEG for the same frame rate

	SXVGA(1280x960)	VGA(640x480)	QVGA(320x240)
JPEG 1 fps	28KB(=1,024kbps)	48KB(=384kbps)	24KB(=192kbps)
M-JPEG 30 fps	Normal image quality: Maximum 13 fps (Low image quality : 30 fps , 13,248kbps)	11,868kbps	6,624kbps
MPEG-4 30 fps	N/A	2,048kbps	1,024kbps

* The above recommended values change up to the object conditions and required image quality.

H.264 : Transmission priority is “Frame rate”, possible frame rate values are shown in the table. Refresh interval is 1 second. The image quality is equivalent to normal image quality of JPEG.

M-JPEG: Normal image quality (5 of 9 levels)

MPEG-4 : Normal image quality (Constant bit rate mode), Refresh interval is 1 second.

Panasonic ideas for life

H.264 Bit rate Comparison



WV-SP305 / WV-NP502 H.264 Bit rate

Comparison is done by equivalent image quality: Normal
Camera target is moving object.

	SXVGA (1280x960)		VGA (640x480)		QVGA (320x240)	
	NP502	SP305	NP502	SP305	NP502	SP305
H.264 30 fps	2,048 kbps		1,024 kbps	768 kbps		512 kbps
H.264 15 fps	1,536 kbps		768 kbps	512 kbps		384 kbps
H.264 10 fps	1,536 kbps		768 kbps	512 kbps		384 kbps
H.264 5 fps	1,024 kbps		512 kbps	384 kbps		256 kbps

Company A H.264 Bit rate

The values in red color are much better than Company A

	1280x720*	VGA (640x480)	QVGA (320x240)
H.264 30 fps	8,196 kbps (30~26 fps)	1,536 kbps	384 kbps
H.264 15 fps	6,144 kbps	768 kbps	384 kbps
H.264 10 fps	6,144 kbps	512 kbps	256 kbps
H.264 5 fps	3,072 kbps	384 kbps	256 kbps

*As Company A doesn't have SXVGA resolution, 1280x720 resolution is measured.

The above is one of examples. The values might be different up to object conditions or required image quality.