

Security Cameras 2016 Review

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In 10 minutes, this note explains the current state of security / surveillance cameras in 2016, reflecting new technology changes and market shifts. This will help you to avoid mistakes based on out of date information.

We cover:

- Resolution - SD, SD+, 720p, 1080p, 4MP, 4K, Higher
- IP vs HD analog
- Image quality - WDR, Low Light, Integrated IR
- Video analytics
- Cost Falling

At the end of this article, you should have a solid appreciation of those options / issues.

Resolution

Whether or not resolution is the most 'important' criteria in selecting security cameras, it is certainly the most commonly cited. Also, there have been notable changes in resolutions offered recently that are important to understand.

SD and SD+ (700TVL, 960H, 1000TVL, 1280H, etc.) Dead

Over the past few years, a variety of SD 'Plus' offerings emerged, with 960H the most widely marketed, as low cost improvements on legacy NTSC / PAL.

As of 2016, all of these are essentially dead, being rapidly end of life'd by manufacturers. The reason is HD analog (offerings like AHD, CVI, TVI) are replacing them (which we examine later).

Just avoid SD and SD+ unless you are locked in to them by your existing system.

720P and 1080P Most Commonplace

Going into 2016, 720p and 1080P security cameras are the most common offerings on the market. 720p is now perceived as 'budget' but the visible quality difference between 720p and 1080p images are typically moderate (despite the doubling of pixels). On the other hand, the price premium for 1080p over 720p is generally minimal.

It is important to remember pixel count / resolution is only one element of video quality. In particular, low light and WDR can vary even for cameras with the same 'resolution'. We examine this more later in the quality section.

New - 4MP

Moving up from 1080p (2.1MP) are new 4MP cameras, which will be an emerging category in 2016. These cameras are still 'widescreen' 16:9 aspect ratio but have double the pixel count of 1080p. In our testing, the visible difference is modest over 1080p, however, many of these 4MP cameras are being sold for roughly the same price as 1080p. These cameras are worth considering for general coverage.

New - 4K (8.3MP)

4K cameras, quadruple (4x) the pixel count of 1080p ones, have been broadly released in 2015.

However, in our 4K testing, 4K camera performance varies widely with some models being fairly terrible and others delivering major improvements over 1080p. Be careful when selecting 4K cameras as the first generation offerings now available are not all mature. In particular, if you are using 4K without integrated IR for current models, the risk of very poor low light performance is high.

Many 4K cameras also support a 12MP mode, typically with taller 4:3 field of view (vs 4K's 16:9 aspect ratio). This extra coverage might be useful and is worth checking for. However, 12MP mode in current cameras almost always delivers significantly lower frame rate than 4K stream.

Though 4K is supposed to be at least 24fps, many manufacturers are marketing models as 4K with frame rates in the 6 - 12fps range. If frame rate is important to you, make sure to check this.

More Than 12MP

There are a handful of security cameras with greater than 12MP resolution. Be careful when selecting them as frame rate is often low, low light is often poor, bandwidth consumption and cost can be much higher. We recommend testing such cameras on site versus 4MP and 4K cameras to truly see if the difference is worth it.

IP vs HD Analog

In the past year, HD analog has emerged as a credible contender to IP for high definition video. This is perhaps the biggest and most important new decision.

HD analog's 3 biggest advantages are (1) low cost and (2) setup simplicity and (3) partial backwards compatibility.

- The cost of HD analog cameras, for similar feature sets is regularly ~30% less than IP.
- HD analog cameras do not require any IP configuration, firmware upgrades, network discovery, etc., working like SD analog cameras do.
- Finally, HD analog often allows reusing existing coaxial cabling (though cable age and length can limit that).

HD analog's biggest disadvantages include (1) limited high-end feature sets, (2) limited vendor selection, (3) limited resolution and (4) incompatibilities, though these will change (at least somewhat) in the next year or two.

- HD analog started with the very low end - low cost, fixed focal, basic cameras. Vendors are starting to add true WDR, super low light, smart IR, autofocus, etc., but it is important to check if those features are available in the vendors you are considering.
- Likewise, many of the biggest Western and Japanese brands are simply ignoring HD analog - e.g., you will not find any HD analog from Axis, Avigilon, Bosch, Panasonic, Pelco, Sony, etc. and most likely not start in 2016 as they are focused on IP.
- Resolution to date is limited to 1080p, though TVI anticipates shipping 3MP and 5MP in 2016 and CVI as well as AHD have been showing prototypes of future 4K offerings.
- Many HD analog offerings are not compatible with others, plus some use different names for the same technology (e.g., CVI is sometimes branded as MPX or HQA, etc.). This increases the risk that different cameras might not work recorders.

For more, see HD Analog vs IP Guide 2015.

Image Quality

More pixels does not guarantee better image quality. Indeed, as resolution increases, the risk that WDR and low light performance increases (how much varies by camera but it is an accurate general guide).

WDR

True WDR has become far more commonplace in the past year as lower cost sensors have added it 'standard', expanding true WDR availability from only premium priced products to broader availability. However, true WDR is still not available in most low cost cameras and manufacturers often try to trick buyers with confusing WDR marketing terms. What you want to verify is that the camera has multiple exposure WDR and this is tracked in our Camera Finder (see: WDR Camera Tracking Feature).

If you have concerns of capturing details (e.g., faces) that have sunlight behind them (e.g., sunrise or sunset), true WDR can be quite useful.

Low Light

Over the past few years, advances in image processing have significantly improve low light performance without adding any light (such as IR or street lights). Plus, in 2015, quite a number of new cameras with 1080p 1/2" imagers plus advanced image processing have come on the market. In our 1/2" testing, that combination has provided a significant increase in best in class low light performance.

The main downside is that these 'super' low light cameras, especially with 1/2" imagers tend to be some of the most expensive in the market.

Integrated IR

Integrated IR is the most common low cost way to deliver low light images without having to add in any external illumination. Over the past few years, integrated IR has moved from a fringe feature on 'cheap' cameras to be an offering for essentially every camera manufacturer, 'high' end or low.

Integrated IR quality can vary significantly. Range (distance IR will illuminate from camera) routinely varies from 5m to 50m or more (see our Camera IR Range Tool). Also, the beamwidth (how wide the IR covers can vary) and some cameras will cause hotspots if the IR beamwidth does not match up with the camera / lens' FoV. Finally, some integrated IR cameras have 'smart' capabilities that detect objects and automatically adjust IR power to not overexpose them.

For more, see our IR guide.

Video Analytics

Video analytics have been the next big thing for security cameras for more than a decade and continues to be so.

Unfortunately, most video analytics (especially outdoors where they are typically most desired) work insufficiently, suffering from significant false alerts. Even new offerings, like Axis video analytics, just released, are weak. It is possible to get video analytics that work well, but even in 2016, one needs to be careful about validating performance in one's own applications and for one's own needs (factoring in weather, lighting, ability to handle / respond to false alerts, etc.), as the technology is not broadly mature.

Cost Falling

Last but certainly not least is cost. Going into 2016, security camera pricing is essentially in a downward spiral, as rivals continue to cut costs, in a 'race to the bottom'. What is causing this is debatable, but it is certainly being lead by Chinese manufacturers, from the mega government run one (Hikvision) to the small assemblers in Shenzhen. When this stops is not clear but the trajectory is likely to lead quite a number of manufacturers out of business.

The good news is that decent security cameras can be bought incredibly inexpensively (\$100 or less is commonplace). Combine that with sensors having gotten much (e.g., true WDR and 4MP and 1/2" 1080p sensors, mentioned above) and it has never been better to buy security cameras. On the other hand, it has never been more dangerous to make or sell them.