

## Dedicated Lighting for Dome Systems

**“The challenge for all CCTV professionals is to maximise the performance from a CCTV system. The challenge is at its greatest when the system is under most threat and working under the most difficult conditions – namely at night. Dome cameras are most vulnerable for a number of technical reasons and due to a lack of dedicated, purpose designed lighting” says Simon Bowman, Technical Director of Raytec.**



Fully functional dome cameras have become increasingly popular in many major projects. They are popular due to their flexibility, ease of installation and aesthetic appeal. However, the increasing use of dome cameras has brought its own challenges to CCTV designers – particularly when considering the night-time performance of the system.

There are several reasons why dome cameras are more vulnerable during the hours of darkness:

- Chip Size
- Integrated Lensing with Auto-Focus
- Light Losses through the zoom lens
- The challenge of providing the right lighting in the right place at the right time

This article will explain address those issues and provide practical tips to improve the night-time performance of any dome camera.

### **Chip Size**

Most dome cameras in the market utilise integrated camera and lens modules from a small number of manufacturers. The CCDs used in these module are typically ¼” chips and smaller. This means that the sensitivity of these cameras is typically much lower than full format cameras with a 1/3” or ½” chips.

**Practical Tip: When designing lighting schemes for dome cameras – ensure sufficient lighting is provided. You may require more lighting with a dome camera than would otherwise be required.**

### **Integrated Lensing with Auto-Focus**

The modules used in most dome cameras integrate both the camera and lens together which means that there is a limited choice of lens options available. It also means that the optimal set up of the lens may not be possible for night-time performance.

Also, the integrated lensing and auto-focussing system can sometimes have issues achieving a good focus with Infra-Red lighting. Some dome manufacturers

have addressed this with special settings within the camera's menu system to achieve improved focus with Infra-Red lighting.

**Practical Tip: Increasing the amount of Infra-Red lighting for the camera can help reduce soft focussing issues and stop the auto-focus system hunting for best focus.**

**Practical Tip: Having the ability to control camera focus at night can help to achieve improved focussing.**

### **Light Losses through the zoom lens**

When reviewing the typical specification for a dome camera, the aperture of the lens is quoted as having two numbers. The first number denotes the aperture of the lens when it is viewing wide angle – and the second number denotes the aperture of the lens when it is viewing tele-photo or zoom. A typical spec will show an aperture rating of between f1.6 to f4.5.

It is the aperture rating of a lens that indicates how much light the lens can capture. At first glance, the difference between the apertures above might indicate there is a performance difference of about 3 between wide and tele-photo.

However, the amount of light captured by a lens is:  $1/f^2$



This means that in reality, when zoomed into a distant object a lens will capture only 1/8<sup>th</sup> of the light compared to when it is viewing wide. Or put another way, the installer will need to put 8 times as much light on scene

**Practical Tip: The more “powerful” the zoom lens (ie the greater the zoom ratio)– the more likely the lens will suffer from higher losses when used in tele-photo mode. For best night time images – use a zoom lens that is appropriate for your application – and where possible don’t always zoom to the max tele-photo setting.**

**Practical Tip: If zooming long distances to view specific targets – it may be appropriate to use “Target Illumination” (see section below) where a higher power illumination can be targeted at specific long distance objects.**

***Fitting Lighting to a dome system; the right lighting in the right place at the right time.***

The biggest challenge of providing the right illumination for dome camera systems is the fact that it is very difficult to attach lighting to the dome itself. However, for full coverage of where the dome can look, in many cases 360° lighting is important.

**High Quality Even Illumination from Raytec**





A small number of manufacturers are now starting to incorporate IR lighting into the dome. Where the lighting is fitted internally in the dome – there are serious risks of internal reflections (significantly reducing image quality) and the thermal integrity of such systems is very poor (significantly reducing reliability).

Some manufacturers have addressed these problems by installing the lighting away from the camera module outside the dome fitting. However, these systems are relatively low power and designed mainly for short range.

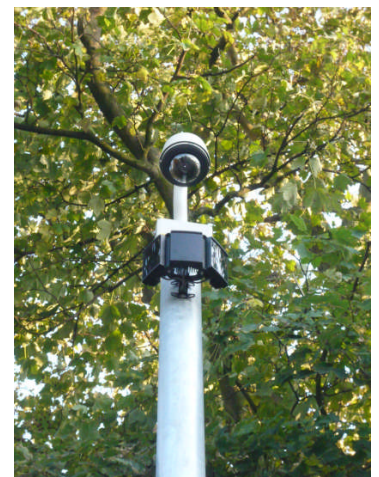
### **New Technology**

New advances in LED lighting technology allows installers to fit dedicated purpose designed lighting for dome systems. Achieving 360° lighting for domes has traditionally been costly, requiring multiple units which are difficult to install.

Raytec, who specialise in CCTV lighting, have designed a series of ultra-wide angle Infra-Red (RAYMAX) and White-Light (RAYLUX) LED illuminators with Ultimate Adaptive Illumination™, specifically for fully functional domes. They allow installers to adjust beam patterns on site up to 180°, achieving full 360° lighting using only two units. Raytec's Ultimate Adaptive Illumination™ achieves an even spread of illumination, and delivers excellent image quality up to 100m.

### **On Site**

Raytec's Ultimate Adaptive Illumination™ is improving the performance of Dome Installation all around the world. One particular scheme covers a number of public spaces in Stockton-





on-Tees, Middleborough, thanks to the flexibility of the 360° lighting solution. “The units are reliable, easy to install and align, and don’t cause over-exposed areas at the centre of the image which was a typical problem with the older bulb units” explains installer Visual Security Systems’ MD Ashwin Lal. “Mounting two sets of RAYMAX Infra-Red illuminators suitably located on a pole provides a 360° array of illumination – ideal for speed domes”.

Raytec RAYMAX and RAYLUX illuminators provide 3 alternative solutions for the challenge of installing lighting for dome systems.

### **1.Ultra-Wide Angle Illumination**

Raytec’s surface mount LED technology helps deliver world class CCTV images for domes at night, providing ultra-wide illumination up to 180° and distances up to 100m. If even more distance is needed the new **PLATINUM** series of illuminators deliver enhanced performance up to 125m at 180°.

All Raytec LED illuminators are easy to install, deliver low running costs and zero maintenance. Raytec’s Ultimate Adaptive Illumination™ provides the best practical solution for dome systems.

### **2.Target Area Illumination**

Where domes are only concerned with illuminating specific security ‘hot-spots’, illumination can be targeted at key vulnerable areas such as an entrance point or a low lit area. Raytec’s Adaptive Illumination™ allows specific lighting angles to be selected onsite, providing targeted lighting for these key areas. Greater distances can be



covered by selecting narrow angle illumination. Target area illumination for domes reduces light pollution and enables key target areas to be properly lit which the dome will track on a pre-set tour.

### **3. Local Area Illumination**

In some cases, where longer distance performance is required, or where lighting cannot be fitted immediately on or next to the dome, it can be installed closer to the target scene to flood the area of interest. This is termed local area illumination and ensures that the area is well lit when the dome is zoomed into the scene. Raytec illuminators can flood the area with high quality even-output illumination, delivering optimum image performance for domes at night.

### **New Thinking**

Good lighting is critical to the performance of domes. Dedicated CCTV lighting solutions from Raytec are the best way to provide effective lighting for dome systems. Recent developments in ultra-wide angle illumination now makes achieving 360° illumination easier. In addition, Raytec's Adaptive Illumination™ gives installers the option of target area illumination or local area illumination for domes. Every dome camera is now able to maximise its performance with dedicated, purpose designed CCTV lighting.

For more information on cost-effective, practical lighting solutions for domes, please request your free copy of Raytec's complete guide to CCTV lighting at

[sales@rayteccctv.com](mailto:sales@rayteccctv.com)

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**rayTEC**<sup>®</sup>



**Wide Angle Lighting**

**2x 180° illuminators**

**to provide full 360°  
coverage**

**Picture courtesy of 'Blue  
Mountain Systems'**

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