IR reflections in dome cameras

Preventing and reducing reflections in cameras with built-in IR illumination

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1 Summary

A dome camera with three IR LED lights inside the dome.

Cameras with integrated infrared (IR) illumination enable video surveillance in the dark. Occasionally, however, some of the light is reflected back into the camera. This might decrease the image quality by introducing foggy effects in the image or mirror effects in the dome. Issues are typically caused by:

- nearby objects, such as walls or poles

- water droplets, dirt, or dust on the dome

- external light sources directed towards the camera.

Reduce reflections by:

- making sure the IR beam stays clear of nearby walls, poles, ceilings, windows, or other surfaces with high reflectivity

- placing the camera where it is not much exposed to the weather

- cleaning the dome regularly

- ensuring that no external lights shine into the camera

- tilting the camera lens as little as possible.

Axis OptimizedIR technology helps reduce reflections by enabling adaptable IR intensity and optimizing the IR beam width.

The impact of reflections can also be reduced using a semi-smoked dome which is lightly tinted.

2   Introduction

Using cameras with built-in infrared illumination is a way to enable video surveillance at night or in dark environments. IR lights provide discreet and covert illumination for night-mode video while minimizing light pollution.

In some cases, however, a part of the light is reflected back into the camera which might introduce foggy or blurry effects in the image or mirroring effects in the dome. The result may be a severely reduced video image quality.

This white paper outlines the main causes for this type of reflection and how potential problems can be avoided.

3   Types of reflections and how to prevent them

Unwanted reflections appear when the camera's IR light hits objects located close to the camera or on the dome. External light sources directed towards the camera can have the same impact.

3.1   IR light reflected against nearby objects

Walls, eaves, ceilings, and other objects may reflect the camera's IR light back into the camera. The severity of this effect depends on the proximity and the surface of the object. As a rule of thumb, light and glossy surfaces, such as metal and glass, will reflect more light than dark or matte surfaces.
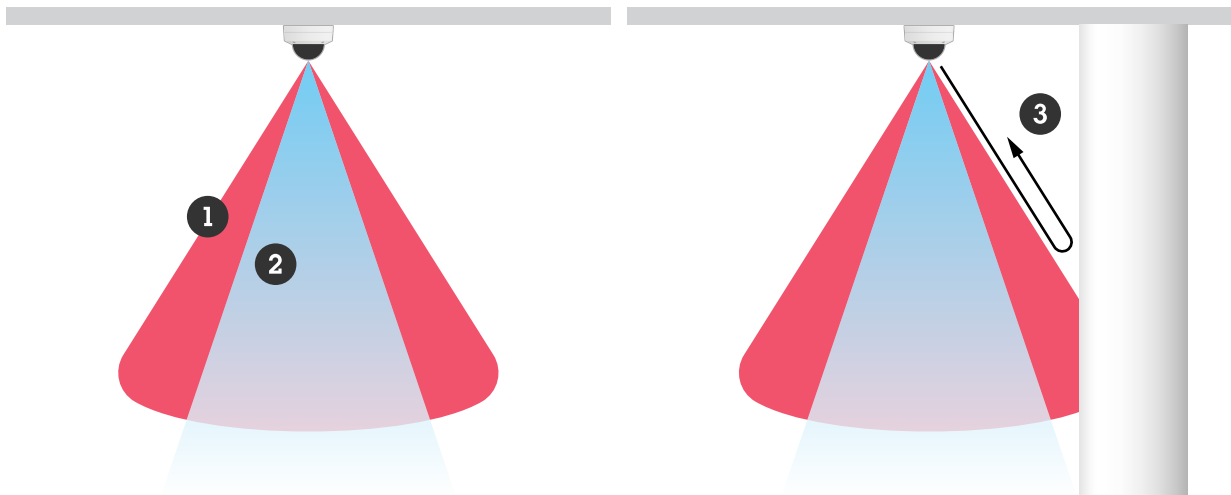
1   *Field of view for IR light*
2   *Field of view for camera*
3   *Reflected IR light*

Place and aim the camera so that the cone-shaped IR beam stays clear of nearby walls, poles, ceilings, windows, or other objects with high reflectivity. In some cases, the camera's angle of illumination might be larger than its angle of view, so it is not always possible to depend on the video image to determine whether an object is in the IR beam path or not.

If the camera must be installed close to a highly reflective surface, consider painting or covering the surface to reduce reflections.

3.2 IR light reflected against objects on the dome surface

Dirt, dust, or spider webs on the dome can significantly deteriorate the image quality by reflecting the camera's own IR light into the lens. Water drops, snow, or ice can cause similar problems.

Mount the camera at a location where it is as little exposed to the weather as possible. If water droplets are often an issue it may help to regularly apply a water repellent spray, such as used for the visors of motorcycle helmets.

Clean the dome regularly so that dirt or dust is removed. Use a mild soap detergent, water, and a soft microfiber cloth to avoid scratches on the camera. Dust on the dome could also be removed using compressed air.

3.3 External light sources reflected in the dome

IR light from another camera or white light from a lamp might cause reflections in the dome. If this is the case, consider moving or redirecting either the camera or the external light source so that the light is not aimed directly at the camera.

3.4 IR light leaking into the lens

Depending on the installation height, the camera lens may need to be tilted to achieve the desired field of view. But the more it is tilted, the higher the risk of IR light from the integrated LEDs leaking across the rubber seal that shields the lens. Normally this seal prevents light interference.

When installing the camera on a wall or a ceiling, tilt the lens as little as possible. Do not remove or damage the rubber ring around the lens. It is important that the rubber touches the dome.

4 General solutions for reducing reflections

Axis offers some additional ways to reduce the general risk of reflections.

4.1 OptimizedIR

Axis OptimizedIR technology automatically adapts the IR illumination angle to the zoom level set at installation. This ensures an evenly illuminated image while minimizing the amount of light outside the camera view, decreasing the risk of the IR beam reaching and reflecting off nearby surfaces. With OptimizedIR it is also possible to adjust the intensity of the IR LEDs in order to reduce reflections.

4.2 Semi-smoked domes

Some cameras are delivered with a semi-smoked dome, which is lightly tinted and helps reduce the impact of reflections. Smoked domes are also available as an accessory for most cameras. It should be noted, however, that smoked domes reduce the camera's light sensitivity.

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Axis has around 4,000 dedicated employees in over 50 countries and collaborates with technology and system integration partners worldwide to deliver customer solutions. Axis was founded in 1984, and the headquarters are in Lund, Sweden

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