

Examining Video Analytics for Perimeter Violation

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This report provides metrics and analysis of key technical and logistical steps required to deploy video analytics for perimeter violation - Editor's note

For the past 3 years, my organization, C3 Shared Services, has been deploying video analytics for many facilities with the highest level of risk in South Africa. This report shares 3 key lessons we have learned:

- Our customers demand very low levels of false alerts
- Significant differences in performance exist between different video analytic manufacturers
- Optimizing the on-site setup is crucial to performance

Low Levels of False Alerts

For our customers, it is common that a fee is charged every time a responder is dispatched to follow up on an alarm. The money for these fees can add up very quickly. In fact, one of customers used to joke how false alarms from previous systems doubled the responder's salaries. Unfortunately, high level of false alarms are not acceptable by customers - both from a cost and organization basis.

Significant Differences Between Vendors

We have been participated in numerous tests with many vendors offering video analytics for perimeter violation. The poor results can be alarming. For instance, one test had harsh environment shadows from smoke stacks and pedestrian shadows cast through concrete palisade into detection zones. We had 3 analytic vendors tested with 2 cameras each for 1 week. The results:

- 6,000 alarms
- 16,000 alarms
- 175 alarms

As you can imagine, the first two (generated by two of the most respected European manufacturers) were totally unacceptable.

We went with [ioimage](#) and have been using them for many projects over the last 2 years. We have deployed ioimage systems along extensive perimeters in adverse environments.

Across all of our deployments, the probability of detecting a true intruder is essentially 100%. This is actually tested by most of our customers every day and night.

False alarms have been low with the amount of false alerts depending on the environment. In our best performing environments, we rarely have more than 1 false alert per camera per month. In our most demanding environments, with rain and reflecting light, we do not average more than 1 false alarm per night. In all cases, the operators find this manageable.

Optimizing On-Site Setup Crucial

On-site system optimization is crucial and consists of two major components: camera optimization and analytic configuration.

Camera optimization is the most important and significant part of our installations. The cameras must provide clear images and a wide depth of field both day and night to allow for optimal alerting.

For perimeter violation, we place cameras on posts looking down the fence line. The distances between cameras depends whether it is a colour/IR or thermal camera.

- For colour/IR infrared cameras, we place cameras every 60 meters. Our tests demonstrate that the cameras can reliably alert up to 70 meters. We provide 10 meters overlap of camera coverage to ensure that there are no dead spots and to detect anyone attempting to tamper a camera.
- For thermal cameras, we place 75 mm thermal cameras every 400 meters. Our tests demonstrate that thermal camera can reliably alert up to 450 meters. We provide 50 meters overlap between each camera (because thermal cameras have a dead spot for the first 50 meters in front of the camera).

For all cameras, we position them 5 meters to 7.5 meters high. This height ensures depth perception. Short heights make it more difficult to detect movement.

The positioning and the projection of light are important. We always seek to have lighting in front of the camera rather than behind. Specifically, we want to avoid aiming the camera directly into the rising or setting sun. If we use artificial light (such as an IR illuminator), we want to ensure that the light is projected in parallel. If the light is projected too far downwards, the auto iris may reduce light entering the camera and therefore shrink the depth of the FOV.

We budget 3 or 4 hours for optimization of each camera, with tuning done during the day and a final tuning at night.

As part of this, we setup the analytics in the appliance's web-based setup. The key element in the setup is to ensure that the depth perception is accurate because cameras provide 2 dimensional images of a 3 dimensional world. A demonstration of this can be seen in the video below:

Finally, we make sure of monthly maintenance so that the lenses are clean and that the cameras are not moved. Dirty lenses or shifted cameras can both undermine performance so this is crucial.

All of our deployments have been done using analogue cameras connected to intelligent encoders. Learn more about the details of a few of our projects by visiting our web site at www.c3ss.com

Conclusion

While video analytics requires field expertise and care in selecting of manufacturers, we have had great success deploying video analytics.

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