Alarm Zones vs Virtual Fences: Which is Best?

Video analytics are powerful and versatile. They enhance live video surveillance and streamline security operations before, during, and after an incident. Because of their power and flexibility, different approaches can often be used to accomplish the same goal. For example, Senstar outdoor tracking analytics, the edge-based Outdoor Object Tracker (OOT) and the server-based Outdoor People and Vehicle Tracking (OPVT), can use either area-masking (alarm zones) or tripwire (virtual fence) rules to monitor protected areas and trigger intrusion alarms.

This article discusses the differences between alarm zones and virtual fences and provides best-practice guidelines on how and when to use them in different applications.

HOW AN ALARM ZONE WORKS

An alarm zone is a designated area drawn into a video surveillance scene using a mask rule. In Example 1, a mask area along the fence (in red) has been drawn on the video feed. If motion is detected within this masked area, an alarm will be generated.

Alarm masks are highly configurable. You configure them to trigger alarms based on the type of object within the scene – person, vehicle, or unknown. This is ideal when you know what should and should not be present, for example, when you are monitoring an area like a building entrance or walkway where only people should be present.

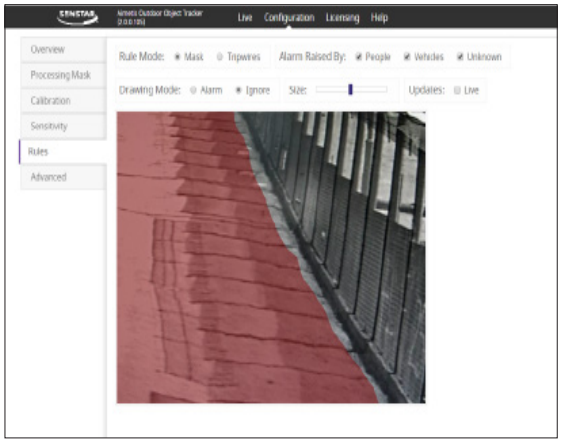
One significant benefit of alarm zones is their high accuracy when identifying objects moving within the designated field. An alarm will be triggered if a person is tracked inside the mask area (as opposed to tracking the person before and after they enter the area). You can also restrict alarms to trigger when only people or vehicles are detected in order to reduce nuisance alarms from animals or environmental motion like shadows or swaying tree limbs.

One constraint of area masks is that they do not allow for directional differentiation. For example, if you only want to trigger an alarm on people entering an area from east to west and not west to east, an area mask will not allow you to make this distinction (in this case, using a tripwire to create a virtual fence is the better choice).

HOW A VIRTUAL FENCE WORKS

A virtual fence can be used to enclose or wall-off a designated area. To configure a virtual fence, select the tripwire rule. Then, draw a line across the boundary you want to establish and determine which direction the object needs to travel in order to trigger an alarm.

Unlike an alarm zone, a virtual fence is excellent at determining the direction that an object is moving in. This is useful for monitoring people and vehicles when entering or exiting an area, such as a gate or designated exit door.



Example 1 – An Alarm Mask being placed along a perimeter wall

In addition, if the tripwire is drawn too close to the edge of a scene (see Examples 2 and 3), it is likely that an object crossing into the scene will not generate an alarm. For an alarm to be triggered, the object must be tracked before and after the virtual fence. In Example 2, the line is drawn too close to the edge and doesn't give the analytic enough time to register the object before it crosses. In Example 3, a series of tripwire rule lines are drawn, but a person could still walk through and not trigger an alarm because none of the four tripwire lines allow the algorithm enough time to track before and after.

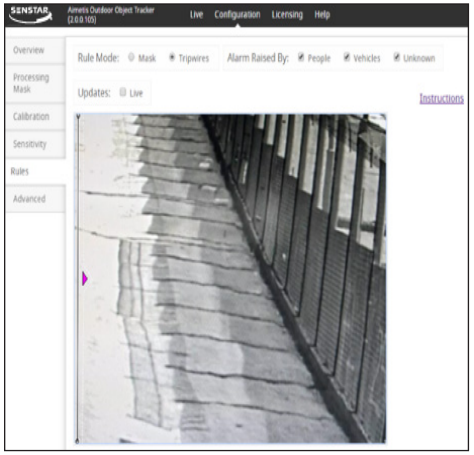
If you wish trigger an alarm only when people approach the fence (and ignore all other alarms), a setup like Example 4 is recommended. Notice that there is plenty of room on either side of the tripwire for tracking objects as they cross.

WHICH RULE IS BEST AND WHY?

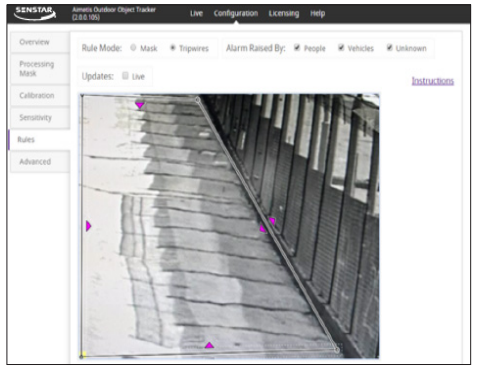
Alarm zones and virtual fences have their pros and cons. Each type can enhance nearly any video surveillance deployment. The question ultimately is, which one should I use?

- **Alarm zone** – Use mask rules when protecting restricted areas where no one should be present. For example, an alarm zone can be applied to monitoring outdoor storage areas, car dealerships, construction sites, or critical infrastructure locations that should have no activity during non-work hours.
- **Virtual fence** – Use tripwire rules when monitoring areas where the direction of an object's motion is important. These situations include monitoring areas with flow control – for example, an exit door or security check point where people should only be exiting. Keep in mind that when using tripwires, proper configuration is vital to detect and track objects before and after the drawn lines.

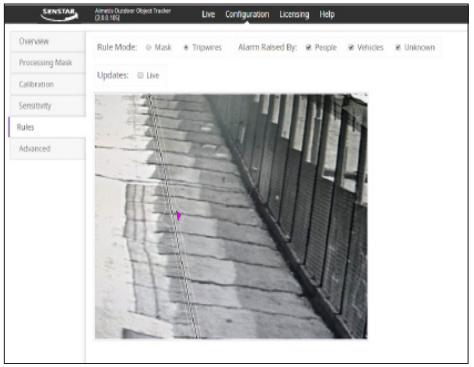
Analytics are powerful tools. When using technologies with overlapping capabilities, it is important to understand their operational nuances – these nuances can directly affect the performance of your security system.



Example 2 – Tripwire that has been drawn too close to the edge of a scene



Example 3 – Multiple tripwires that detect multiple directions but are drawn too close to the fence or the the edge of a scene



Example 4 – A correctly drawn tripwire that will detect people approaching the fence