ADPRO®
LoiterTrace™

Technical Manual

For FastTrace 2 Series and iFT Series

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The following icons are used in this document.

Icon	Description
	Note. This icon indicates information of special interest that will help the reader make full use of the product, optimise performance, etc. Failure to read the note will not result in physical harm to the reader, or damage to equipment or data.
	Caution! This icon indicates danger to equipment. The danger can be loss of data, physical damage to the equipment, or permanent corruption of configuration details.
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Contents

1 Introduction 7
1.1 About LoiterTrace 7
1.2 Purpose 7
1.3 Scope 7
1.4 Intended Audience 8

2 Quick Guide 9

3 The Role of Security 10

4 LoiterTrace System Concept 11

5 System Design 12
5.1 Summary 12
5.2 Preliminary Information 12
5.3 Site Survey 12
5.4 System Hardware 15

6 System Installation 21
6.1 Camera Installation 21
6.2 Instrument Racks and Cablings 22

7 LoiterTrace Configuration 23
7.1 Prerequisites 23
7.2 Information in the LoiterTrace Configuration Window 24
7.3 Information in the About Window 26
7.4 Rendering Analytic Bounding Boxes 26
7.5 CMS Priority 28
7.6 Summary 28
7.7 Enabling and Disabling LoiterTrace on a Camera 29
7.8 Detection Zones 32
7.9 Mask Zones 34
7.10 Scene Configuration 36
7.11 Calibration 47
7.12 Testing the LoiterTrace Configuration 58
7.13 LoiterTrace Alarms 59
7.14 Configuration and Calibration Pictures Backup 59
7.15 Troubleshooting 62

8 Performance Assessment 63
8.1 Detection Tests 63
8.2 Soak Tests 63
8.3 System Tests 64
8.4 Recording System Configuration 64

9 Site Maintenance 65
9.1 Routine Maintenance 65
9.2 Routine Site Maintenance 65
9.3 Routine Equipment Maintenance 66
9.4 Routine Detection Tests 66
9.5 Maintenance to Regulatory Requirements 66

Appendix A: False and Nuisance Alarms **67**

Appendix B: Site Survey Checklist **68**

Appendix C: Example Site Plan **69**

Appendix D: System Design and Equipment Checklist **70**

Appendix E: Camera/Lens Selection **71**

Horizontal FOV – 20 Metres (66 Feet) 71
Horizontal FOV – 22 Metres (75 Feet) 71
Horizontal FOV – 25 Metres (83 Feet) 71
Horizontal FOV – 30 Metres (98 Feet) 71

Appendix F: Commissioning Checklist **73**

Appendix G: Site Detection Tests **74**

Appendix H: Site Maintenance Tables **75**

Appendix I: Installation Quick Reference **76**

Appendix J: LoiterTrace Dos and Don'ts **77**

1 Introduction

1.1 About LoiterTrace

The ADPRO® LoiterTrace™ application is designed to provide full outdoor and indoor loitering detection analytics. LoiterTrace is available as an add-on application to the ADPRO XO software that runs on the ADPRO Remotely Managed Multiservice Gateways (RMGs)[1].

It provides reliable and predictable detection of loitering in secure areas. The system analyses images from strategically placed cameras to detect 'human-like'[2] loitering, and if the movement fulfils a number of criteria, alarms are generated. These alarms are handled by the RMG and can be transmitted to a remote central monitoring station (CMS), assessed and managed by experienced security personnel. A well designed, installed, and maintained LoiterTrace application can remove the need for onsite guards or patrols, or provide an adjunct to local monitoring, improving the effectiveness of the overall site security.

1.2 Purpose

The purpose of this Technical Manual is to describe the specification, design, installation, commissioning, and maintenance of the LoiterTrace application. The recommendations presented are designed to achieve optimal system performance and high reliability. Although there are many variations to the recommended scenarios, any departure from these recommendations may result in less than ideal system performance.

1.3 Scope

The following items are addressed in this Technical Manual:

- operational background information on the LoiterTrace application
- site survey and system design
- equipment installation
- configuration of the LoiterTrace analytics in the XO client software for the ADPRO FastTrace 2 Series and iFT Series devices. Wherever **XO device** or **RMG** is mentioned in this document, it applies to both ADPRO FastTrace 2 Series and ADPRO iFT Series devices, unless specifically mentioned otherwise.
- system commissioning
- site and equipment maintenance.

The following items are not discussed in detail in this guide:

- Installation or configuration of ADPRO FastTrace 2 Series or iFT Series devices. For details, see the *Hardware Installation Manual* of your ADPRO device (FastTrace 2 Series: 21790; iFT Series: 27817).
- Installation of the XO client software. For details, see the *XO Client Software User Manual* (21796).
- LoiterTrace license management (installing, revoking) in the Xtralis Xchange tool. For details, see the *Xchange Tool User Manual* (27816).
- Installation or configuration of central monitoring software. For details, see the documentation of these software products.

You can find the latest versions of this document and any referenced document on the Xtralis Security Solutions Support site www.xtralissecurity.com (logon may be required). If a document number is indicated (between parentheses), you can enter it in the Keywords box on the site, and search for the document.

[1] The ADPRO RMGs include the ADPRO devices of the FastTrace 2 and iFT Series.
[2] Human-like: a feature that is able to differentiate between human and non-human movement for intrusion detection.

1.4 Intended Audience

The intended audience for this Technical Manual includes the following key stakeholders:

- Security consultants
- System integrators
- System installers
- Facilities/building/site managers.

2 Quick Guide

This guide divides the implementation of the LoiterTrace application into four main areas:

- system design
- system installation
- site commissioning
- site maintenance.

The Quick Guide shown in the table below provides an overview of key design considerations allocated in each step and may be used as a quick reference. Use it together with the ADPRO/XO technical manuals to produce a robust system design.

Area	Key Design Considerations	Reference
Site survey & checklist	Conducting a site survey and what information shall be gathered	*Site Survey* on page 12
Illumination	Illumination selection and location for use with LoiterTrace	*Illumination Requirements* on page 18
Cameras	Camera selection and location for use with LoiterTrace	*Camera Selection and Location* on page 15
LoiterTrace configuration	Configuring the LoiterTrace application for operation	*LoiterTrace Configuration* on page 23
Commissioning and system test	Testing the system and checking the detection performance	*Performance Assessment* on page 63
System maintenance	Ensuring the system continually operates to the required criteria	*Site Maintenance* on page 65

3 The Role of Security

Security is becoming an increasingly accepted part of everyday living. It is imperative for organisations to consider physical and information security as a fundamentally important element of their overall management strategy. Suitable security must include detailed **Risk Analysis and Management** as well as an awareness of **Business Continuity Management**, ensuring that the system instituted provides the organisation with the best approach to achieve on-going success.

The key elements to instituting a security solution are:

- Identify and evaluate risks
- Develop strategy to remove or reduce risks
- Test and monitor strategy.

Xtralis provides a range of video security solutions that focus on remote monitoring of facilities, but also provide excellent onsite monitoring capabilities. The product range features video transmission, video recording, and video detection systems that link to an industry-leading software package, such as Video Central or M3000, for remote management and control. A typical approach to security is to provide an indication when an intrusion has occurred. Xtralis, however, recognises the value in being able to immediately identify the cause, evaluate the situation, and respond accordingly.

The combination of Xtralis onsite detectors, audio/video recording and transmission to monitoring stations, provides security in a wide variety of markets and application areas. The LoiterTrace application forms an important element of security solutions where automatic detection and verification of loitering is paramount.

4 LoiterTrace System Concept

The ADPRO LoiterTrace analytic is an image analysis tool able to detect human(s) remaining for too long in an indoor or outdoor scene. It is suitable for scenes that are empty most of the time, such as building entrances, lobbies, indoor ATMs, etc. The detection zone should be free of obstacles such as cars, trees, etc. LoiterTrace is not suitable for scenes that are usually populated, such as crowded airport halls.

LoiterTrace analyses video from CCTV cameras to detect loitering that may be suspicious. The LoiterTrace application uses advanced algorithms to maximise target detection and tracking under a wide range of environmental conditions.

LoiterTrace monitors contrast changes and rate of contrast change within the defined detection areas. This information is analysed to extract valid targets from the images, whilst rejecting changes from background movement. If the user-defined criteria are met, an alarm is generated.

5 System Design

5.1 Summary

The system design phase consists of the following elements:

- **Preliminary information**: Gather general site information and discuss the security requirements with the customer to ensure that the LoiterTrace application meets the customer's requirements.
- **Site survey**: Conduct a site survey to determine site requirements such as the positioning of cameras and other detectors, lighting, and existing and required communications infrastructure.
- **Equipment selection**: Conduct a comprehensive analysis to determine equipment requirements, such as camera types and lenses, level and type of illumination, and communications and control room equipment.

The system design is critical to ensure that the LoiterTrace application performs as expected. A well-designed system can deliver exceptional performance, whereas a system that has not had a rigorous design process will not perform to expectations. LoiterTrace provides flexibility in its configuration, but is dependent on the quality of video signals and scene content to deliver a high performance solution.

5.2 Preliminary Information

Gather site information to determine LoiterTrace's suitability for the site. If possible, obtain a copy of the site plans to check the layout and suitability of LoiterTrace.

5.2.1 Assess Site Plans

Assessing the site plans before visiting the site allows a quick overview, because this knowledge is important for a good LoiterTrace system design. If you are unable to obtain site plans before you visit the site, then once on site prepare a sketch of the site. Remember to include the immediate external environment, such as roads and location of neighbouring buildings.

5.2.2 Discuss Requirements

During the preliminary stages, discuss the security requirements and expectations with the customer's representative. Different areas of the site may have varying security requirements, and knowledge of the external environment is critical in understanding the customer's requirements and the expected system performance. Collect information about the customer's response requirements, such as use of local guards and/or remote monitoring.

5.2.3 Recommendations

If, after the preliminary investigation phase, the site is deemed suitable for LoiterTrace and the customer's performance expectations can be met, you conduct a detailed site survey. The following criteria determine the site's suitability for the LoiterTrace application:

1. Specificity of the protected area:
   - Is the area free from general or expected activity?
   - Is the area indoor or outdoor (near buildings)?
   - Are there clear areas in which detection can occur?
2. What are the customer requirements for response (onsite or remote)?
3. What are the customer expectations of system performance, such as false alarms or integration into third-party systems?

5.3 Site Survey

Once you have collected preliminary information and the site is considered suitable for protection with LoiterTrace, you can conduct a site survey. Take into account any customer tender or requirements document to ensure that the survey and subsequent design implementation meet the customer's specifications and requirements. The site survey draws on the preliminary information to design a complete

system. Determine all necessary criteria for the system and ensure that all relevant information is collected. Where clarification is required, endure that you receive this from the customer (or their representative). *Appendix B* contains a checklist for a site survey.

The items you need to perform a detailed site survey include:

- digital camera
- tape measure
- workbook
- site plans (accurate engineering drawings of the site).

The different stages of a site survey are described below.

5.3.1 Detailed Site Plan

The production of a detailed site plan annotated with key information (see *Appendix C* for an example) is the key element in completing a successful site survey. As a minimum, you must include the following information:

1. Location and type of existing illumination, including coverage, to determine its suitability. If necessary specify additional illumination.
2. The location of the equipment room for the installation of the RMG with the LoiterTrace application, to confirm cable-run lengths for cameras.
3. If remote monitoring is to be used, confirm the location and type of any existing communications infrastructure.
4. Location of trees and other vegetation that may affect detection performance, camera positioning, and field of view.
5. Any other permanent or semi-permanent structures not already marked on the site plan, e.g. semi-permanent location of large cable drums, which may obscure camera views.
6. Location of any nearby roads, to determine whether street lighting or car lights from any roads nearby may present a lighting problem.
7. Location and description of nearby buildings or structures to understand whether lighting may spill from adjacent properties, or shadows from industrial equipment may affect performance, e.g. a shadow from a moving crane cast across the FOV of a camera may cause nuisance alarms.
8. Location of any existing CCTV cameras or other detectors and their suitability with the LoiterTrace application, or incorporation as a third-party detector.
9. Special requirements within protected areas, i.e. high security critical areas within the site, or special requirements due to dangerous chemicals and/or service reliability.
10. If audio is considered for offsite response, identify the location of any noisy equipment, such as generators, to ensure that the noise does not affect any microphones to be installed. This also relates to onsite audio broadcast equipment: speakers and horns shall be appropriately located and specified with appropriate power.

5.3.2 Site Images

Collect a detailed set of site images covering all protected areas. The site images provide a visual reminder when assessing the site plan offsite. These also provide a reference point during installation and commissioning.

Ideally, you collect the digital images under a variety of lighting conditions, i.e. dawn, daylight, dusk, and night. The most challenging lighting conditions for CCTV systems can occur at dawn and/or dusk. It is vitally important to be aware of the variable lighting conditions under different circumstances and in different seasons. The detailed site survey must consider the likely occurrence of seasonal variations. Shedding or sprouting of new leaves on nearby trees may affect lighting conditions and camera views. Ideally there shall be no trees in any camera views, however this is not always possible. Lighting and views change as foliage grows or drops, affecting nuisance alarm rates or detection probability.

The following images illustrate some suitable and unsuitable loitering and area protection scenarios for the LoiterTrace application.

5.3.2.1 Suitable Loitering Conditions and Area Detection Scenes






5.3.2.2 Unsuitable Loitering Conditions and Area Detection Scenes






LoiterTrace is used in loitering area protection scenarios. The key to providing a successful solution is installing LoiterTrace into a scenario that is suited to its requirements. Essentially, the sterility of the area/perimeter to be protected is paramount. It is essential to have clear areas for target observation with minimum continuous or sporadic movement from non-target sources.

5.3.3 Clarify Requirements

You must clarify the exact requirements for site security through tender documents or engineering specifications. This is vital to ensure that the system design and installation meet the customer's expectations. It is good practice to draft a commissioning schedule to further clarify the system acceptance criteria. Details of system commissioning are described in *Performance Assessment* on page 63.

5.4 System Hardware

Appendix D contains a checklist for system design and equipment selection.

5.4.1 Camera Selection and Location

The selection and location of cameras is vitally important for the successful operation of the LoiterTrace application. The cameras are intrinsically linked with any other detectors in use and the availability of suitable lighting.

5.4.1.1 Camera and Video Signal Requirements

Using Analogue Cameras

Analogue cameras must adhere to the CCIR/PAL or RS170/NTSC standard for suitable operation with LoiterTrace. LoiterTrace only processes the monochrome section of the video signal. Any colour signal present neither adds nor detracts from the performance.

The RMG must meet the following conditions to synchronise to an incoming video signal from the camera and to provide good video motion detection:

- The sync amplitude at the video input of the RMG must be within the range of 0.2 V to 0.4 V.
- The video amplitude (excluding sync) at the video input of the RMG must be within the range of 0.75 V to 1.0 V.

If the video level at the video input of the RMG is low, you shall install cable compensators or line drivers at the camera end, and adjust these to boost the video signal to within the correct voltage levels. Typically, the best solution is to use the correct grade of coaxial cable for transmitting the images over the required distance. Take into consideration impedance and capacitance qualities of the selected cable type to ensure that image degradation is minimised from the outset. The cable length and quality influence the quality of the video. Generally, the shorter the cable runs between the RMG and the camera, the better the quality of the picture. For long cable runs, you may require cable compensators.

Using IP Cameras

Check the Supported IP Cameras list for your RMG (for FastTrace 2X/2E and iFT Series: document 26742; for FastTrace 2: document 29579). Only supported IP cameras will guarantee that the LoiterTrace application will function as described.

Furthermore, make sure that the cameras support the analytics stream. For details, check the chapter on managing the IP video streams in the list of supported IP cameras.

5.4.1.2 Camera Field of View (FOV)

Setting the correct horizontal FOV of the camera is critical for reliable detection. The horizontal FOV determines the lens required on the camera. Keep the following guidelines in mind:

- Ensure there is adequate detection area. Ensure that the **horizontal FOV at the maximum detection range** does not exceed the recommended maximum of **30 m** (98 ft) (if calibrated; 20 m/66 ft if not calibrated; for details, see *Calibration* on page 47). If the field of view is wider than this, LoiterTrace cannot detect or continuously track a person at that detection range.
  Corridor mode affects the maximum horizontal FOV because fewer pixels are available horizontally. For a 3:4 corridor image, the maximum horizontal FOV is 18 m (59 ft); for a 9:16 corridor image, it is 14 m (46 ft).
  For optimal results with **fisheye** cameras, keep the detection area within a 5 m radius around the camera.



FOV must include adequate detection area: if too much of a person is hidden from the camera, or masked, LoiterTrace cannot detect the person.

- The tilt of the camera shall be such that the FOV does not include large areas of the sky, thereby reducing the detection area of the LoiterTrace system.
- Ensure the FOV is clear, with minimum views of foliage and obstructions that provide cover for loiterers.
- LoiterTrace uses perspective compensation for its motion detection algorithms, hence it is important that the FOV is not obtuse, i.e. a target in the background on the left edge of the FOV must be the same size as a target on the right edge of the FOV.
- When designing cameras to look along a fence line, the majority of the horizontal FOV of the camera shall be on the monitored side of the fence.

5.4.1.3 Camera Position and Lens Selection

The maximum horizontal field of view and the likely target size to be detected, determines the required camera and lens configuration. The absolute maximum horizontal field of view where detection occurs shall not be more than 30 m (98 ft). It is also advised to avoid that large parts of the FOV are not used for detection. Large areas of the sky, or large unmonitored areas render the loitering detection unreliable.

The LoiterTrace application functions most effectively when the camera is not mounted too high. The perspective characteristics used in the detection algorithms will not function as expected when the camera is mounted too high. When looking directly down on a cat or a person, their relative sizes are quite similar. Their true sizes can be judged only when viewing at an angle. Place the camera at a height that it is out of reach of intruders. The ideal height is 4.2 m (14 ft), as this allows the detection algorithms to function and is high enough to prevent tampering with the camera.

Analysis of the site plans and information from the site survey determine the FOV of the camera to ensure coverage of all areas requiring protection. Always ensure that the maximum horizontal FOV is no greater than 30 m (98 ft), to prevent compromising detection of small targets.

The tables in *Appendix E* show the approximate maximum distance between the camera and the target for reliable detection, at a maximum horizontal field of view of 20 m (66 ft), 22 m (75 ft), 25 m (83 ft), and 30 m (98 ft) respectively. The approximate dead zone beneath the camera is also shown, for a camera mounted at 4.2 m (14 ft), although this will vary depending upon the final angle at which the camera is set. These figures shall be used for guidance only. Other considerations, such as lighting and external environmental aspects, may dictate the use of different camera/lens combinations.

The formula for determining the distance from camera to target based upon the maximum horizontal FOV is as follows:

$$\text{Distance between camera and target} = \frac{(\text{lens focal length}) \times (\text{maximum horizontal FOV})}{(\text{camera format width})}$$

Where:

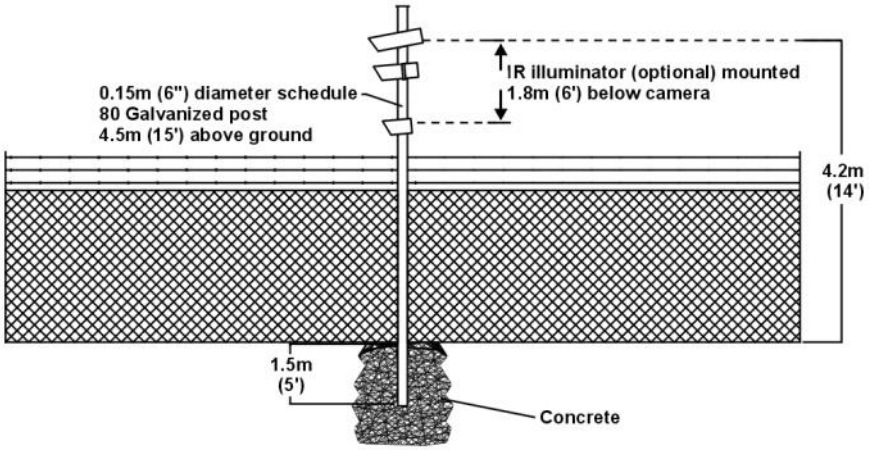
- Distance between the camera and target is in metres
- Maximum horizontal field of view is in metres
- Lens focal length is in millimetres
- Camera format is in millimetres
  = 8.8 mm for a 2/3" camera; 6.4 mm for a 1/2" camera; 4.8 mm for a 1/3" camera; 3.2 mm for a 1/4" camera.

> ***Note***
>
> Consider using cameras with varifocal lenses to meet the lens criteria.

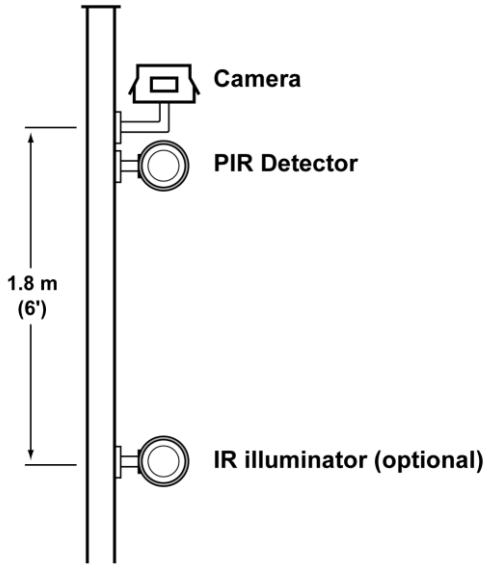
5.4.1.4 Camera Positioning and Mounting

The position and mounting of cameras is vital to ensure reliable performance from the LoiterTrace application. The essentials when choosing a position and mount for cameras are:

- Ensure that the camera mount and pole are stable, even in windy conditions. As the lens size increases, smaller movements appear magnified and the stability of the camera mounting becomes increasingly important. Ensure that there are at least three mounting points on the selected camera housing mounting. A camera mounting used for a standard CCTV site implementation may not be suitable, as some camera movement generally does not cause distress to an operator, however LoiterTrace relies on steady camera images. Though the algorithms within LoiterTrace allow for some camera shake, it is advisable to use a heavy-duty mounting location or pole.



- The position of the cameras relative to lighting is extremely important. Do not install cameras close to lights (particularly infrared illuminators) which could attract insects, and do not face cameras into lights, windows, the sun, or in areas that have a large number of reflections or shadows. When the lighting is below or to the side of the camera, the recommended safe distance is 2 m (6 ft). If the lighting is directly above the camera, then insects flying up towards the light in front of the camera may cause nuisance alarms or obscure the view. If this is the case, ensure that the lighting is well above the camera, in excess of 4 m (13 ft).



- Do not install cameras facing at trees or plants, which may move in the wind or drop leaves (tree shadows may also move in the wind). In many circumstances this is unavoidable, but it shall be limited as far as possible. Use the LoiterTrace mask zone functionality to mask out areas with foliage.

- Do not install cameras facing into areas where there is likelihood of vehicle headlights at night. The presence of roads near sites is unavoidable, and the positioning of cameras must account for this. The placement of opaque material on fences near roads can alleviate most nuisance alarms from lighting.
- Take into consideration the position of sunrise and sunset, as well as reflections from objects in the FOV to limit any 'blinding' of the camera due to bright light.
- Do not install cameras facing into bright lights or IR illuminators.

5.4.1.5 Cable Selection

Using Analogue Cameras

Typically, you shall use RG59 standard cable as a minimum requirement:

- In a monochrome system, restrict the cable length to 250 m (800 ft). Install cable compensators for longer lengths.
- Signal degradation due to cable length has a far greater effect on colour video. Therefore, restrict coaxial cable length to 150 m (500 ft). Install cable compensators for longer lengths.

Using IP Cameras

Use the standard IP camera cabling via network cables (e.g. CAT5E or CAT6).

5.4.1.6 Automatic Camera Adaptation

Xtralis recommends to disable automatic camera adaptation (iris, shutter, gain…), or to use slow adaptation settings.

5.4.2 Illumination Requirements

Ideally, the illumination around the site shall be even, with no major contrast changes caused by shadows at all times of the day and night. Typically, to provide a more even illumination, it is better to use high levels of ambient lighting throughout the field of view of the camera rather than subjective lighting systems. To ensure continuous monitoring by LoiterTrace, the lighting (or illuminators) shall be on at all times during hours of darkness (typically photocell controlled).

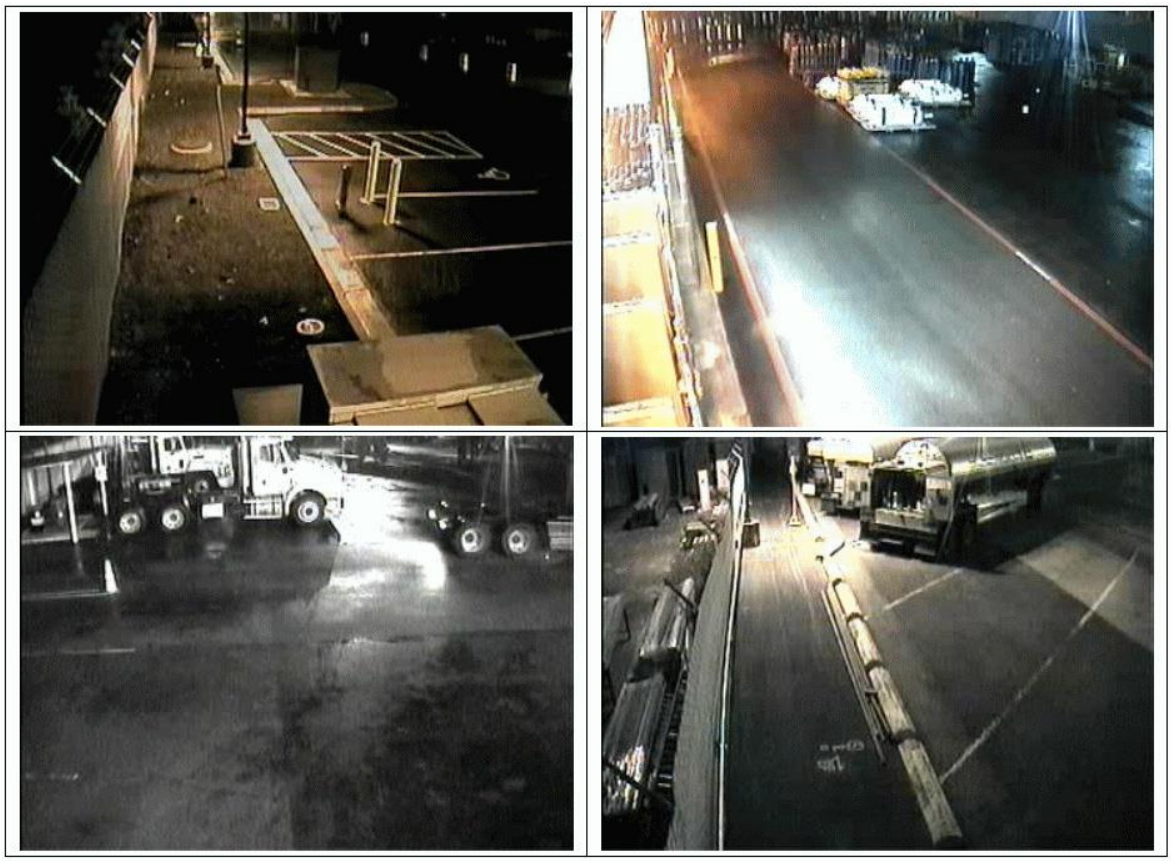
Switching illuminators on at the point of alarm in order to deter loitering humans is not effective because if illumination levels are too low, LoiterTrace may not detect the loitering. If the scene contrast is poor, and no additional lighting can be installed, then the contrast can be increased by adding stripes to walls and pathways, by painting the background surfaces a light colour, or by laying strips of different colours of gravel. Determining the required lux level from a mathematical calculation can be difficult. There are references available that describe this process in detail. Check these references, or other sources for a mathematical approach in determining the lux level required at a site to provide adequate illumination for the cameras selected. Lux meters are available for checking the illumination level at a site and to relate the measurements to camera specifications. A good rule of thumb is, if the target is clearly visible to the human eye at the maximum range under the worst lighting conditions, then a camera can detect it.



Tracking of persons in the well-lit foreground may stop when they move into the back of the scene, which is poorly lit. Ensure even illumination throughout the scene to prevent this.

Below are some key lighting considerations:

- The requirements will dictate if IR illuminators or visible lighting is used. The cameras used with IR illuminators must be either B&W or day/night cameras capable of automatically switching between colour/B&W depending on the conditions. Visible lighting must be used for colour cameras. The level of lighting required is higher for colour cameras as these have less sensitivity compared to B&W cameras.
- The sensitivity of the cameras determines the required level of illumination. When visible illumination is used, the lighting shall be sufficient for the human eye to see targets at the maximum detection range. When using IR illumination, verify the intensity by viewing the camera output on a monitor.
- It is important to ensure that areas where lighting casts shadows do not provide dark areas for loiterers to utilise.
- Illuminators (visible or IR) shall not be positioned to face directly into a camera.
- Typically, the best type of visible lighting is closest to normal daylight, i.e. a white light source rather than a coloured light source such as sodium vapour.



5.4.3 Equipment Room

The equipment room for installing the RMG equipment shall meet the requirements described in the following sections.

5.4.3.1 Environmental Requirements

The equipment room shall meet the following environmental specifications:

- Temperature: 5–40 °C (41–104 °F)
- Humidity: 20–93% non-condensing.

5.4.3.2 Power Supply

Depending upon security requirements, consider using a backup power supply (such as a UPS). To ensure total system reliability in the event of power failure, a backup supply needs to provide power for all the cameras and other detectors, as well as any communications equipment. For details on power consumption, see the manuals of the respective equipment.

5.4.3.3 Access Requirements

Access to the equipment room shall be limited to authorised personnel. An access control system may be used to limit access to the equipment room.

5.4.3.4 Equipment Mounting

If the RMG is mounted in a 19" racking system, allow spacing equivalent to 1U between different equipment in the racking to ensure proper cooling. Consider providing cooling within the rack if the rack has a large amount of equipment.

5.4.4 Monitoring Equipment

A LoiterTrace application may be remotely monitored via an Xtralis or a third-party Central Monitoring Station (CMS).

For remote monitoring, you must provide a suitable communications infrastructure. There is a range of communications media choices available for use, such as PSTN, ISDN, ADSL, GPRS, 3G, 4G, and Ethernet. The most suitable type of communications link depends on a number of criteria:

1. **Existing infrastructure**: To provide a cost-effective solution, consider using any existing communications infrastructure at the site, but ensure that it meets the bandwidth and other operational requirements.
2. **Backup communications**: Under some circumstances, you may require a a secondary communication link if the primary method is negated (redundancy).
3. **Availability**: Consider the availability of different telecommunications options, as not all telecommunication solutions will be provided by a single provider, or site requirements may exclude certain types of communications.
4. **Installation and operational cost**: The installation and operational cost are a major factor in selecting the type of communications infrastructure. The cost is generally linked to the bandwidth provided on the link.
5. **Bandwidth requirements**: The expectation of bandwidth, which ultimately drives how quickly video information can be transmitted, is extremely important to ascertain. Links with throughput of 33.6 kbps or higher are available (a minimum of 256 kbps is recommended). Xtralis video transmitters are optimised for operation over low-bandwidth links, however they also provide outstanding operation over higher bandwidth links.

6 System Installation

Install the LoiterTrace application and associated hardware in accordance with appropriate CCTV installation practices. Ensure adherence to any local, legal, or mandatory requirements for electrical or telecommunications infrastructure.

Appendix I contains a flowchart providing an overall view of the installation and commissioning process. It can be used as a guide for the installation and commissioning sequence of events.

6.1 Camera Installation

6.1.1 Alignment

Confirming the FOV of the camera is very important. The initial design must ensure that the area is completely protected and no dead zones are present. Adherence to the design during installation ensures there will be no dead zones or blind spots in the protected area.

Placing traffic cones or markers at the edges of the expected detection areas (foreground and background) provides a mechanism to initially align the camera and ensure that the FOV is as required. Alternatively, have one person watch a monitor and direct another to walk the site (use a walkie-talkie).

6.1.2 Installation Tips

When installing cameras in camera housings, the following tips will prevent some nuisance alarms.

- Apply insect-repellent material, such as pest control strips or surface spray, to reduce any nuisance alarms caused by insects or spiders in or near camera housings.
- Place a bead of silicone across the top of the shield or housing near the front. This prevents that water droplets fall in front of the camera off the front of the sun or rain shield of the housing. When water hits the bead, it diverts to the side and does not collect along the front of the housing.
- Rain or sun shields can catch the wind, causing significant camera shake. To restrict camera movement, appropriately increase the strength of the fixing hardware as the size of the shield increases.

6.1.3 Interference Caused by High Voltage or Ground Loops

Take care to preserve the signal integrity. There is significant potential for interference in some installations, particularly on sites with high-voltage infrastructure, such as electricity substations. High 'ground loop' currents are produced between equipment earthed at different points around the site. Depending on the level and type of interference, ground loop currents may cause nuisance alarms or a reduced detection rate, if they cause interference on the video signal (i.e. the picture displayed on the monitor) or data corruption on IP connections.
Furthermore, high voltages and currents that may be present due to incorrect earthing, can damage equipment.

During the design stage, carefully consider the likelihood of interference or damage from high voltage or ground loops. Factor counter measures into the design, such as floating earths, and isolation transformers on video signals.

6.1.4 Installation Adjacent to Roads

Headlights sweeping across the area under surveillance have the potential to cause nuisance alarms. If the area is near a road and has the likelihood of headlights sweeping over it, consider some sort of light barrier to ensure the headlights do not cause nuisance alarms. The options for light barriers include solid panels such as plastic or metal facades placed on fences next to the road, high opacity shades or greenhouse/landscaping cloth, or privacy mesh interwoven on chain link fences.

6.2 Instrument Racks and Cablings

Follow standard procedures while installing any electrical equipment:

- Follow all local safety regulations regarding installation of electrical equipment.
- Route all cables neatly and hold them in place using routing trays, channels, or ties.
- Label all cables for future reference, and mark the identifiers on cabling diagrams or plans.
- Allocate adequate space between equipment in racks to provide ventilation.

Once all equipment has been installed and is operating in the rack, monitor the temperature in the rack to check that the equipment is operating within specified limits (operating range 5–40 °C). Even though equipment may be operating within the specified limits, keeping the temperature low will increase the operable life of all equipment in the system.

7 LoiterTrace Configuration

The first element of Site Commissioning is to configure the LoiterTrace application in the XO software that runs on your RMG.

7.1 Prerequisites

7.1.1 Camera Resolution and Frame Rate

Whatever the resolution of the camera, the system is providing the analytics with CIF (352 x 288) images (or the next available higher resolution with a maximum of 640 x 480), 5 fps, and quality 'normal'. This is the **default** analytics stream.

As of ADPRO firmware version XO 4, you have more control over the aspect ratio and quality of the analytic stream:

- By specifying the stream to use for analytics, you can match the aspect ratio to that of the live and recorded views. In some cameras, your choice can be better than the default chosen by the system.
- By selecting a higher compression quality, the system may, in extreme circumstances, give fewer false alarms and more reliable detections because fewer compression artefacts are present. However, extensive testing shows that the default is typically sufficient, and consumes less bandwidth.
- The resolution of the selected stream does not affect analytics performance.

The resolution and frame rate used for monitoring or continuous/event recording have no influence at all on the loitering detection analytic.



Note

If you will be using IP cameras with LoiterTrace, make sure that they support the analytics stream. For details, check the chapter on managing the IP video streams in the *XO Supported IP Cameras* list (26742).

7.1.2 Corridor Mode

With ADPRO software version XO 4.0 and above, analytics work with corridor mode[3], where the image is taller than wide. In hallways and corridors, a larger part of the camera image is useful for analytics when using corridor mode. In addition, it reduces the dead zone beneath the camera.



Camera image in normal mode



Camera image in corridor mode, showing more of the foreground

If you have used a camera with analytics in normal mode before, you have to make new calibration pictures and recalibrate the scene when you switch to corridor mode.

Corridor mode affects the maximum horizontal FOV because fewer pixels are available horizontally. For a 3:4 corridor image, the maximum horizontal FOV is 18 m (59 ft); for a 9:16 corridor image, it is 14 m (46 ft).

[3] On supported IP cameras of the following brands: Honeywell, Axis, Dahua, Hikvision, Samsung, and Sony.

7.1.3 Fisheye Cameras

With ADPRO software version XOa 3.2.33 and above, analytics work with fisheye cameras. For optimal results with fisheye cameras, keep the detection area within a 5 m radius around the camera.

7.1.4 PTZ Cameras

Although it is possible to use LoiterTrace on a PTZ camera, Xtralis does not recommend it.
If you want to run LoiterTrace on a PTZ camera, consider the following restrictions:

- LoiterTrace **only works when the camera is in the home position**. LoiterTrace is suspended while the camera moves until it is back in the home position. You define the detection zones and calibrate the camera in the home position.
- You must set up the PTZ camera in the XO client so that it automatically returns to the home position after moving (using the **Auto-Home Expire Time** in the camera configuration window).
- Use LoiterTrace on a PTZ camera only if the **PTZ function is used in exceptional cases**; for example only when the CMS wants to investigate an alarm. The more a PTZ camera moves, the more it may drift from its originally set home position over time. This in turn may affect the position of detection zones in the scene and the camera calibration, reducing LoiterTrace's optimal performance.
- Even on PTZ cameras that rarely move, you must regularly check and adjust the detection zones and camera calibration.

7.1.5 Licensing

For each camera that you want to use with LoiterTrace, you need a LoiterTrace application license.

The LoiterTrace menu in the XO client will not be available until you install at least one LoiterTrace license on the XO device. For details on installing application licenses on your XO device, see the *Xchange Tool User Manual* (27816).

The number of analytics application licenses that can run simultaneously on your XO device, depends on the number of available analytic channels on your device. One analytics application (IntrusionTrace, LoiterTrace…) requires one analytic channel. The maximum number of analytic channels is:

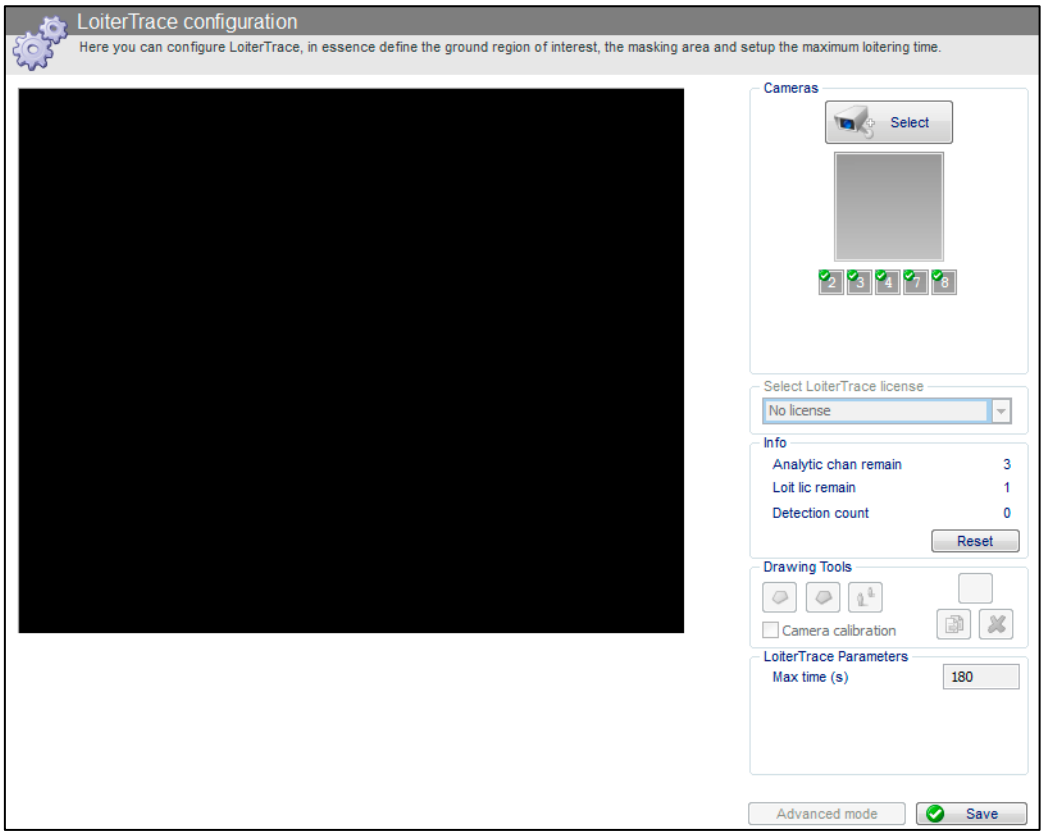
- FastTrace 2: up to 4 analytic channels
- FastTrace 2X: up to 16 analytic channels
- FastTrace 2E: up to 32 analytic channels
- iFT: up to 16 analytic channels (via trade-off with video channels)
- iFT-E: up to 32 analytic channels.

7.2 Information in the LoiterTrace Configuration Window

The LoiterTrace configuration window displays the cameras that have LoiterTrace enabled, and the available analytic channels and licenses on the XO device.

To open the LoiterTrace configuration window, proceed as follows:

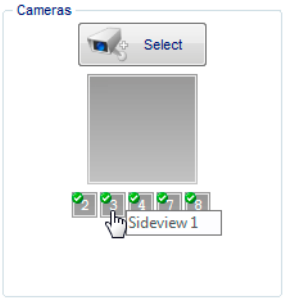
- Open the XO client software, connect to the desired XO device, and then choose **System > Behaviour > Analytics > LoiterTrace**.



The **Info** section displays the following information:

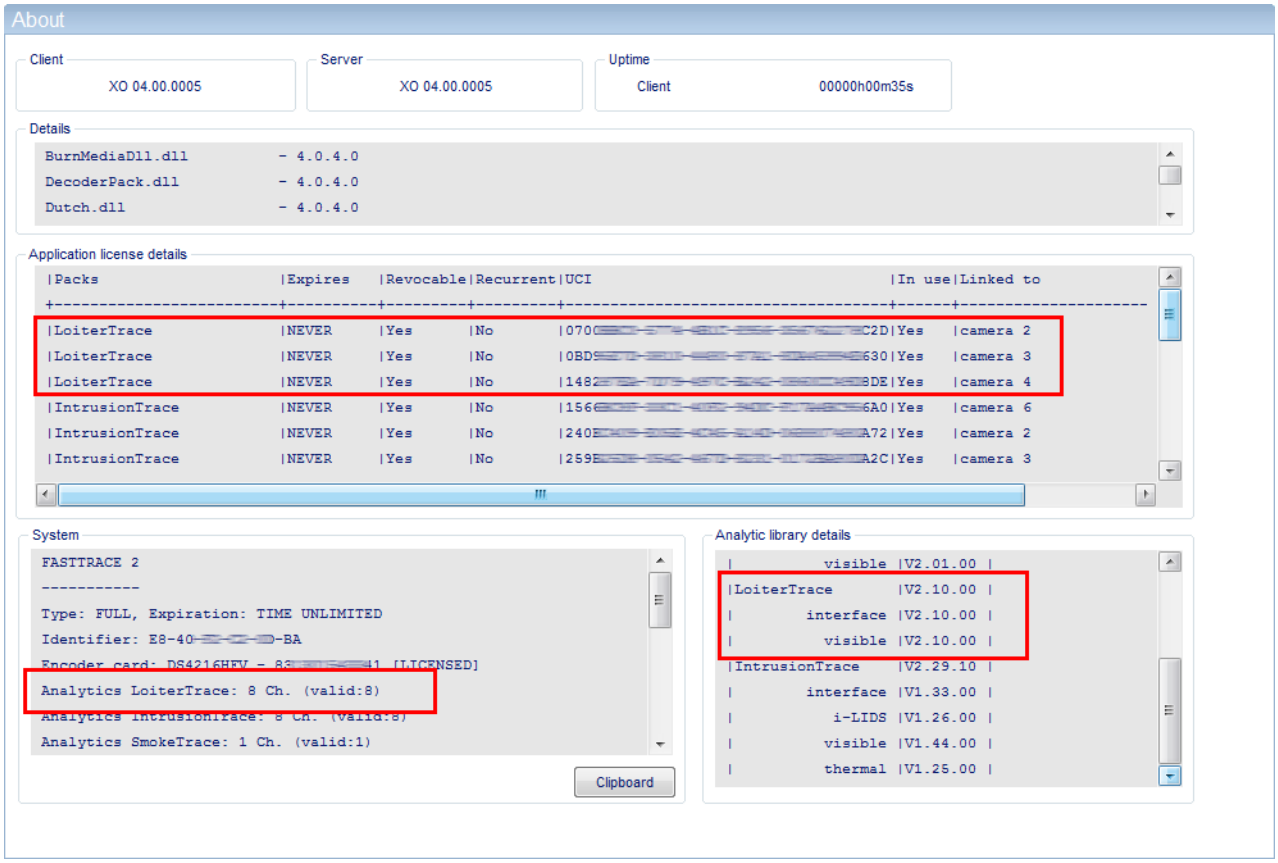
Item	Description
Analytic chan remain	The number of remaining analytic channels on the XO device = the maximum number of analytic channels available minus the channels that are already in use by analytic applications (3 in the example screen above). This includes all analytics: IntrusionTrace, LoiterTrace, and SmokeTrace. If there are no remaining analytic channels on the XO device (**Analytic chan remain** = 0), you cannot enable more analytic applications on the XO device.
Loit lic remain	The number of unused LoiterTrace licenses on this XO device = the total number of LoiterTrace licenses minus the LoiterTrace licenses that are already assigned to a camera (1 in the example screen above). If there are no remaining licenses (**Loit lic remain** = 0), you can install additional LoiterTrace licenses on the device using Xchange, or you can move an unused license from another XO device (revoke–install via Xchange).
Detection count	The detection counter is used for testing the configuration. For details, see *Testing the LoiterTrace Configuration* on page 58.

The **Cameras** section displays the numbers of all the LoiterTrace-enabled cameras on the XO device. Position the mouse cursor over the number to see the corresponding camera name.



7.3 Information in the About Window

The **About** window displays detailed information about LoiterTrace. To open the **About** window, click **About** in the top menu in the XO client.



The window displays the following information:

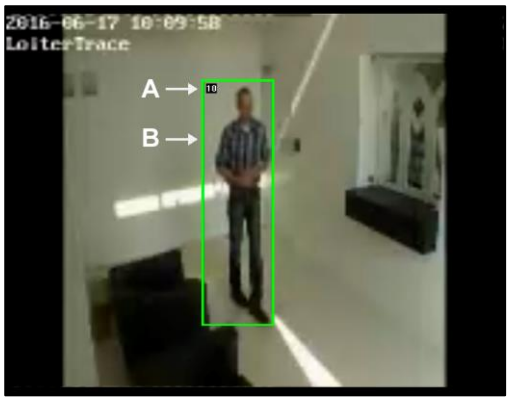
- Under **Application license details**, you find detailed information on the LoiterTrace licenses that are installed on the XO device: expiry date, unique identifier, if they are in use or not, and on which camera.
- Under **System**, you find a summary with the number of LoiterTrace licenses (**8 Ch.** in the example) that are installed on the XO device, and the number of valid licenses (**valid: 8** in the example).
- Under **Analytic library details**, you find technical information on the libraries that the LoiterTrace analytic application uses.

7.4 Rendering Analytic Bounding Boxes

Analytic bounding boxes indicate the presence of detected objects in the scene, detected by the Xtralis analytic applications. The bounding boxes are:

- Green: when the alarm is not triggered
- Red: when the alarm is triggered.

As long as the alarm is not triggered, LoiterTrace also displays the time (in seconds) that the object is being tracked in the detection zone.



Analytic bounding box (**B**) and timer (**A**)

For live and recorded images in the **Live Video** and **Recorded video** windows, you can choose whether you want to render analytic bounding boxes or not. The following options exist:

- **Off**: the system does not display bounding boxes.
- **Alarm only**: the system displays only the red bounding boxes when an alarm occurs.
- **Alarm and tracking**: the system displays the green bounding boxes for tracking (pre- and post-alarm), and the red bounding boxes when the alarm occurs.

> ***Note***
>
> The **IntrusionTrace zone outline upon event** option does not apply to LoiterTrace.

Below, you can see several examples:



Off:
no bounding boxes or timer visible.



Alarm only:
red bounding box upon alarm.



Alarm and tracking:
green bounding box and timer for tracking;
bounding box will turn red upon alarm.

If you have multiple analytic applications running on the same camera (for example, IntrusionTrace and LoiterTrace), the system will display bounding boxes for all analytics. The example below displays a red bounding box for IntrusionTrace (alarm) and a green bounding box for LoiterTrace (tracking), around the same object.

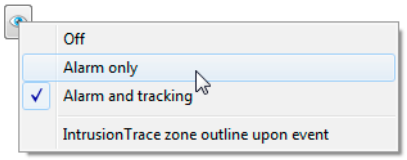


The following limitations apply to bounding box rendering:

- When playing back recorded images, bounding boxes and timers only appear in **normal playback mode**, not during fast forward/backward.
- The player software that allows you to play downloaded recordings (.hbox files) from your local PC or from a USB drive, offers the same options for rendering analytic bounding boxes and timers.

To select the desired options for rendering bounding boxes, proceed as follows:

- From the live or recorded images view, click the button, and then click the desired rendering option.



7.5 CMS Priority

When you open the analytics configuration pages in the XO client software, the client takes CMS priority on the XO device. The analytics configuration then becomes unavailable to all other users. This prevents conflicts with the monitoring and alarm management software.

7.6 Summary

To configure a camera with LoiterTrace, perform the following steps:

1. Install the LoiterTrace license on the XO device. For details, see the *Xchange Tool User Manual* (27816).
2. Enable LoiterTrace on the desired camera.
3. Draw the detection zones.
4. Optional: draw mask zones.
5. Advanced: set up a custom detection profile for the scene.
6. Optional: calibrate the scene.
7. Test the configuration.
8. Configure the alarms for LoiterTrace.
9. Back up the client configuration and calibration pictures.

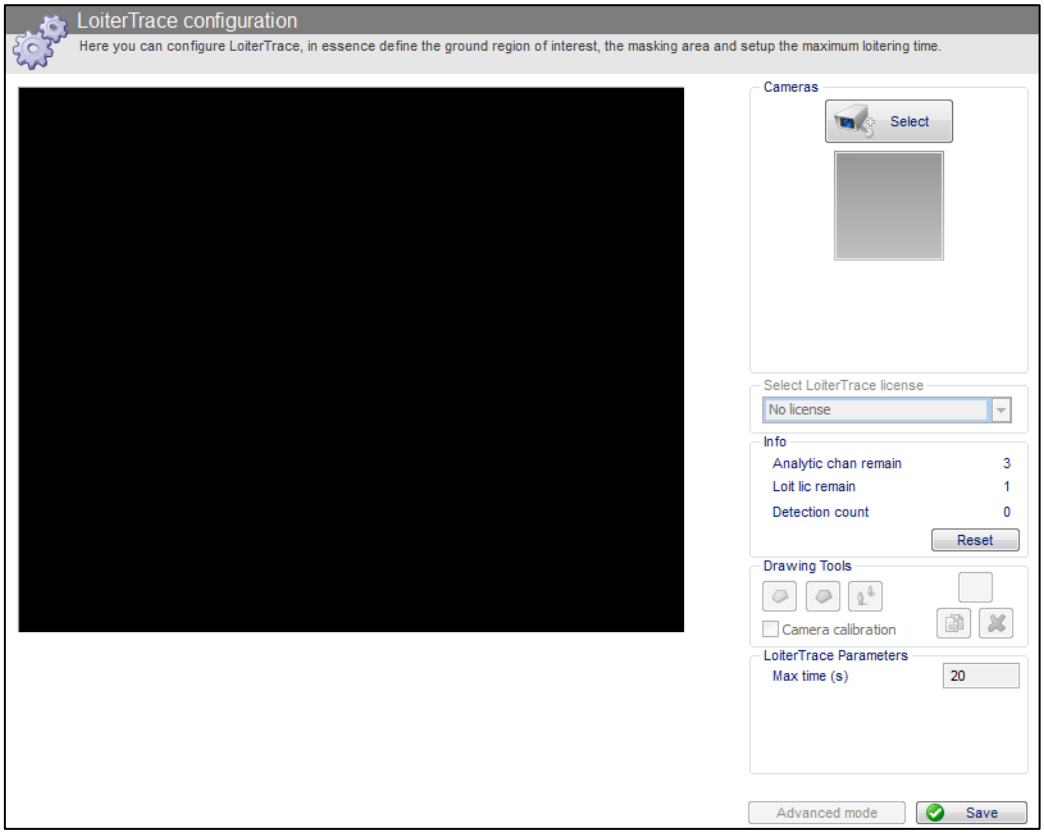
Each step is described in detail in the following sections.

7.7 Enabling and Disabling LoiterTrace on a Camera

7.7.1 Enabling LoiterTrace on a Camera

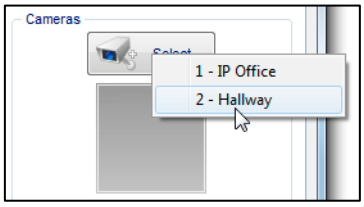
To enable LoiterTrace on a camera, proceed as follows:

1. Open the XO client software, connect to the desired XO device, and then choose **System > Behaviour > Analytics > LoiterTrace**.



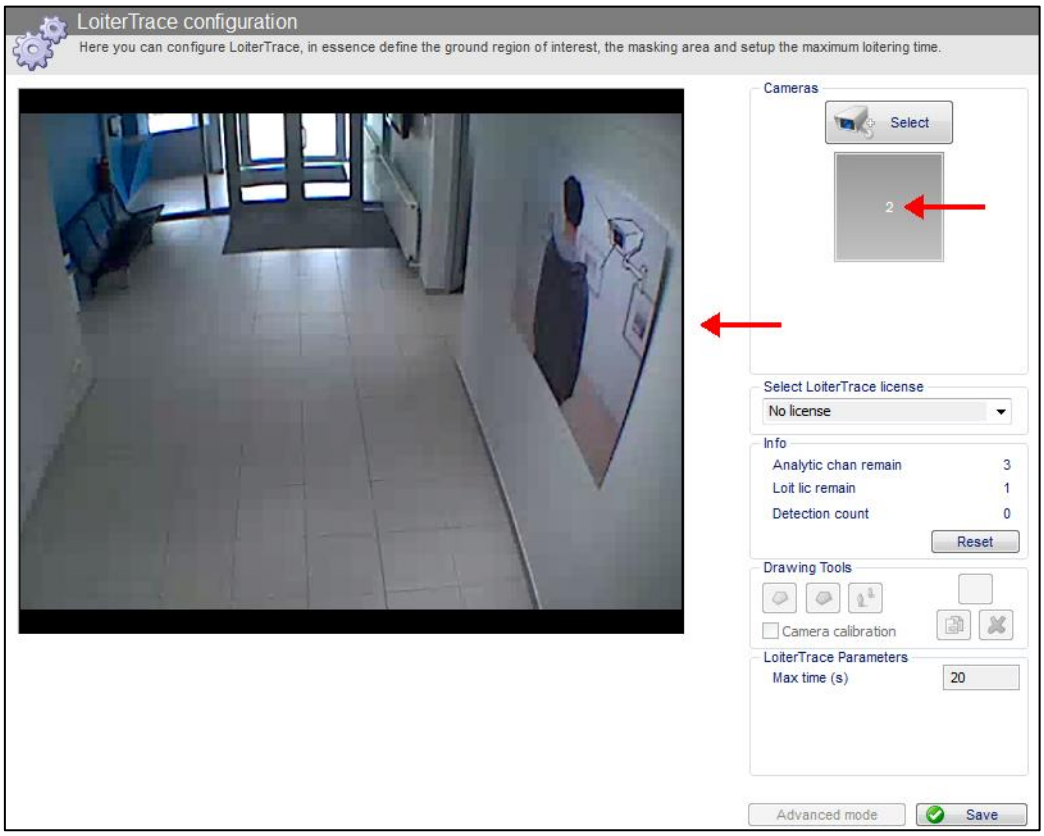
The example screen above shows that there are 3 analytic channels remaining, and 1 LoiterTrace license.

2. Under **Cameras**, click **Select**, and then click the desired camera.

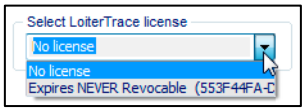


> ***Note***
>
> Before selecting a camera, check any restrictions and guidelines for camera usage as described in *Prerequisites* on page 23.

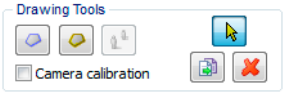
The system displays the camera's live image, and the selected camera number appears in the grey box under the **Select** button.



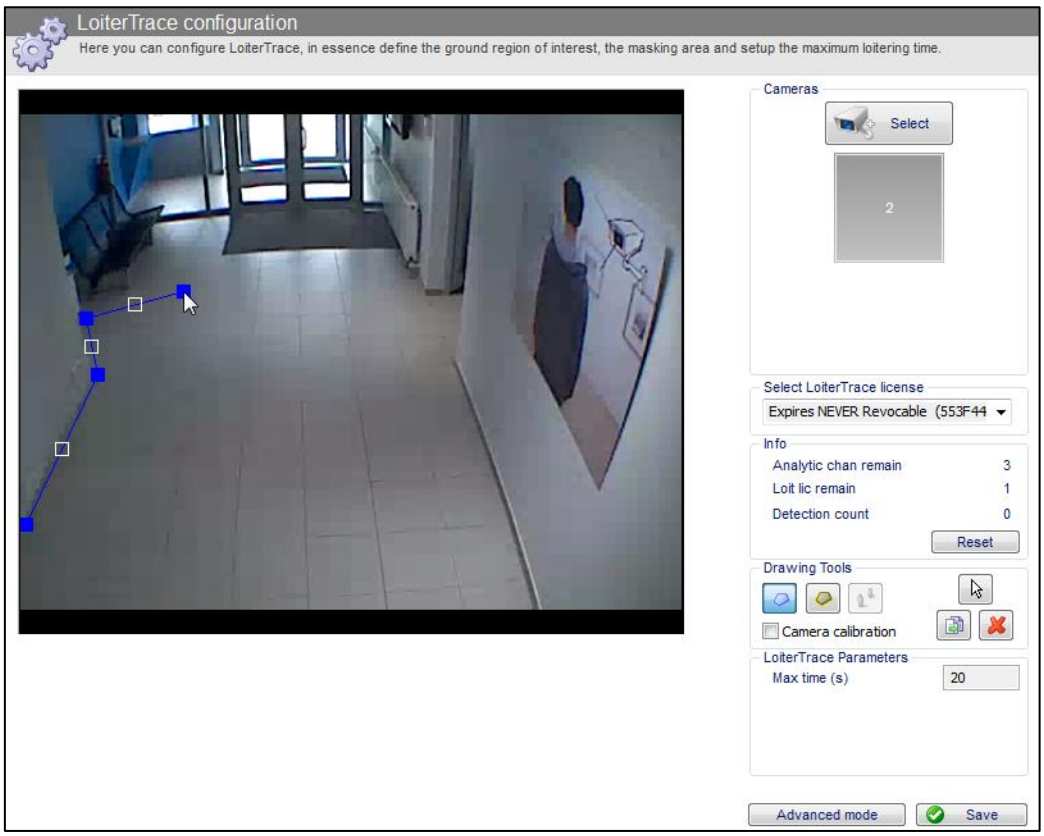
3. In the **Select LoiterTrace license** box, select one of the available licenses.



The drawing tools become available when you have selected a license.



4. Click the  button and draw one detection zone: click on the live image in each corner of the detection zone. You can draw the first zone very roughly, and adjust later. For instructions, see *Drawing Detection Zones* on page 33.



5. Click **Save**.

> ***Caution!***
>
> Do not click **Save** until you have drawn at least one detection zone for the camera. If there are no detection zones, the system **unlinks the license** from the camera when you click **Save**.

LoiterTrace is now active on the camera, and will start its analysis using the drawn detection zone and the default detection parameters. The number of the camera appears in the **Cameras** section under the grey box. The number of available analytics channels and the number of remaining LoiterTrace licenses is reduced by 1:



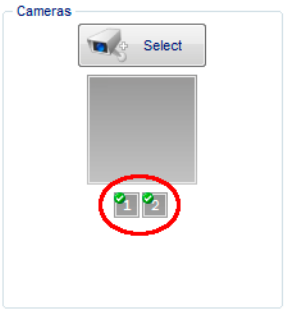
7.7.2 Disabling LoiterTrace on a Camera

To disable LoiterTrace on a camera, you unlink the license. You can then assign the license to a different camera, or move it to a different XO device using Xchange.

> ***Note***
>
> The system remembers the last saved LoiterTrace configuration for the camera, and when you assign a license again to the camera, that configuration will be restored.

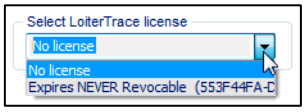
To disable LoiterTrace on a camera, proceed as follows:

1. Choose **System > Behaviour > Analytics > LoiterTrace**, and then click the desired camera in the **Cameras** section.



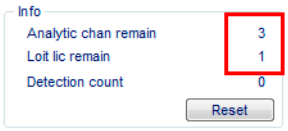
The configuration screen for the selected camera appears.

2. In the **Select LoiterTrace license** box, select **No license**.



3. Click **Save**.

The LoiterTrace license is now available to assign to other cameras, or to move to a different XO device via Xchange. The number of available analytics channels and the number of remaining LoiterTrace licenses is increased by 1:

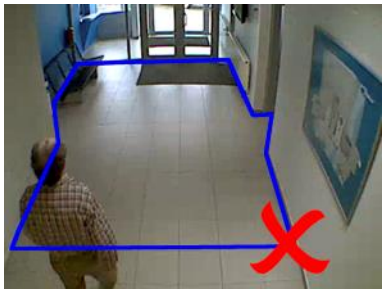


7.8 Detection Zones

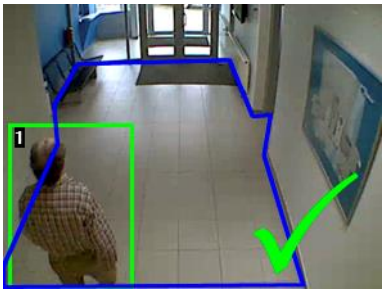
7.8.1 About Detection Zones

A detection zone is a zone **on the ground** where loiterers shall trigger an alarm. You can draw up to 5 polygonal detection zones for one camera. The detection zones can overlap. It is advised to use a slightly larger zone than the real ground zone, especially if you expect people to hover around the edges.

The lower edge of the detection zone must cover the lowest part of the loiterer. An object whose lowest point (= ground position) is outside the detection zone, will not trigger a loitering detection, and the system will not generate an alarm. Therefore, there must not be any gap between the lower edge of the detection area and the lower edge of the image if you wish to detect loiterers in the immediate foreground.



Detection zone does not reach edge of image. **Warning!** LoiterTrace may not detect loiterers in the foreground.

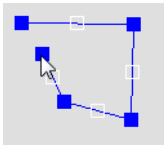


Detection zone reaches edge of image; loiterers in the foreground can be detected.

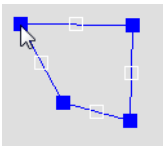
7.8.2 Drawing Detection Zones

To draw a detection zone, proceed as follows:

1. Click the  button (blue polygon).
2. In the camera image, draw the detection zone by clicking on the image everywhere you want to make a corner.

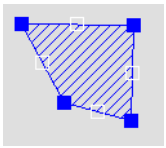


3. To close the detection zone:
   - Click on the first corner.



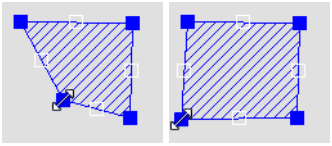
   - Alternatively, right-click anywhere.

   The detection zone appears hatched in blue lines:

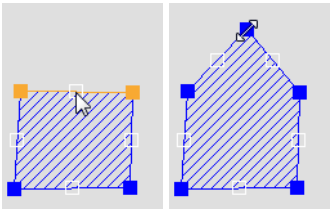


> ***Note***
>
> It may be difficult to draw on the edges of the camera image. If the detection has to run to the edge of the camera image, then first draw roughly near the edges. Finish the polygon, and then adjust it by dragging the corners to the edge of the image.

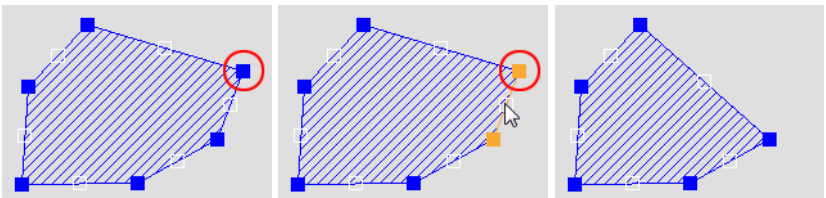
4. To adjust the zone, proceed as follows:
   - To move a corner, drag it to the desired position.



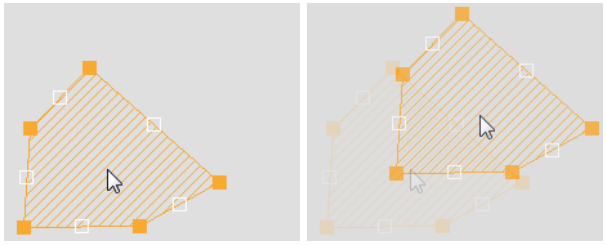
   - To add a corner to the polygon, click the white handle in the middle of the edge where you want to add a corner, and then drag the handle to the desired corner position.



   - To remove corner from the polygon, click the white handle in the middle of the edge that extends clockwise from the corner that you want to remove, and then click the  button (or press Delete on the keyboard).



- To move the whole zone, click anywhere in the zone and drag it to the desired position.



5. Click **Save**.

7.8.3 Copying Detection Zones

To copy a detection zone, proceed as follows:

1. Click the detection zone that you want to copy.
2. Click the  button; or press Ctrl+C. The copy appears in the top left corner.

> ***Note***
>
> If you copy a detection zone that is located in the top left corner, the copy appears immediately on top of the original detection zone. It may look as if the copy is not there.

3. Drag the copy to the desired position.
4. Adjust the shape of the copied zone as required.
5. Click **Save**.

7.8.4 Deleting Detection Zones

To delete a detection zone, proceed as follows:

- Click the detection zone, and then click the  button, or press Delete.

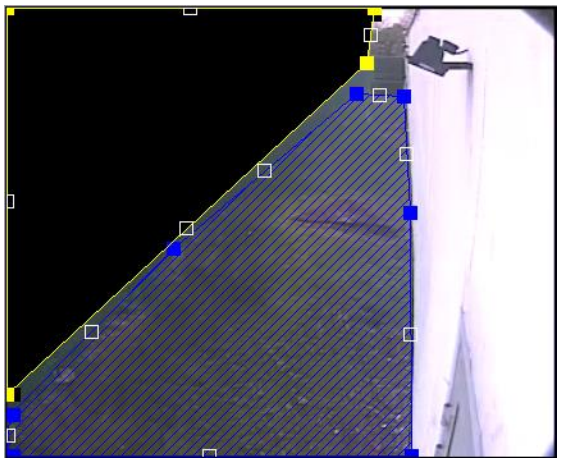
7.9 Mask Zones

7.9.1 About Mask Zones

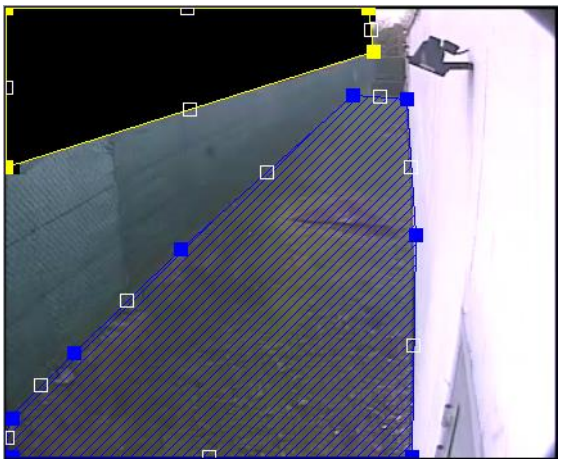
Mask zones define the areas in the camera image that LoiterTrace will not analyse. Use mask zones sparingly, because they distort the shapes and sizes of bounding boxes. You can achieve much of what is intended by moving the detection area instead.
Mask zones are most useful for preventing false alarms due to flashing lights, on-screen display text, and other outside influences.

You can draw up to 5 mask zones. The mask zones can overlap.

However, the mask zones must not overlap with the detection zones. You draw detection zones on the ground area, and mask zones in other areas. Mask zones must not cover the upper part of the loiterer's body when they are in a detection zone: keep the distance between the top of the detection zone and the bottom of the mask large enough to detect a loiterer.

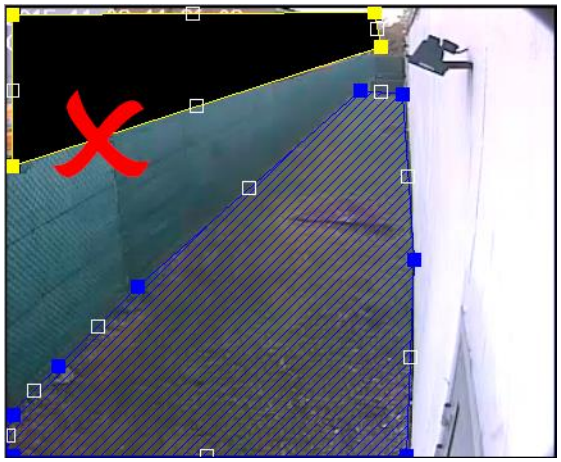


Mask zone too close to detection zone

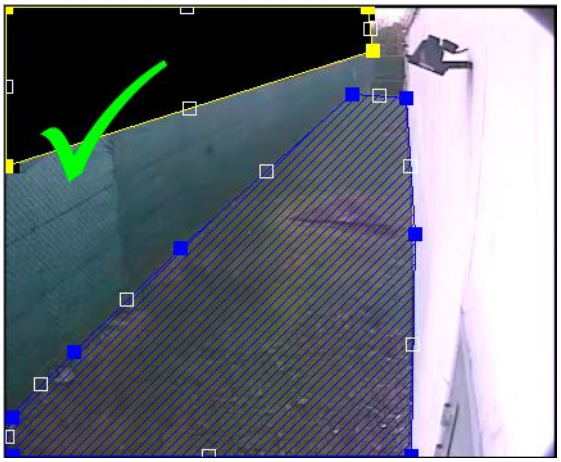


Mask zone at sufficient distance from detection zone

Just like detection zones, mask zones near the edge of the camera image must reach the edges. If not, LoiterTrace may detect any activity at the edge. It occasionally happens that bounding boxes span the corner of a mask and cause problems.



Mask zone does not reach edge of image.
Warning! LoiterTrace may detect activity at the edge.

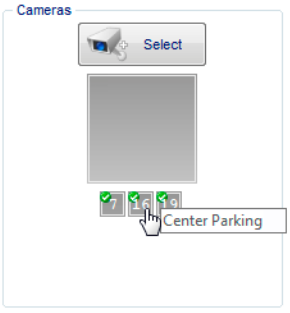


Mask zone reaches edge of image.

7.9.2 Drawing Mask Zones

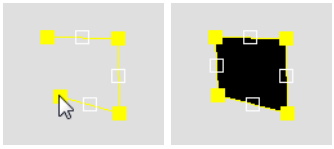
To draw a mask zone, proceed as follows:

1. From the LoiterTrace configuration window, click the desired camera.



2. Click the  button (yellow polygon).

3. Draw and adjust the mask zone in the same way as a detection zone. For details, see *Drawing Detection Zones* on page 33. The finished mask zone appears in black on the camera image.



4. To draw another mask zone, click the  button again and start drawing.

   You can also copy an existing mask zone: click the mask zone, and then click the  button (or press Ctrl+C).
5. Click **Save**.
6. Test detection with the mask zones, and adjust the mask zones if necessary.

7.10 Scene Configuration

7.10.1 Simple Mode

7.10.1.1 About Simple Mode

Working in the normal, simple mode is suitable for most applications. As of ADPRO firmware version XOa 3.02.0017, you have to specify only one parameter, the loiter time:

- **Max time (s)**: the maximum time that a person can remain in a detection zone before the loiter alarm is triggered. When an object/person enters a detection zone and LoiterTrace detects the object/person, LoiterTrace starts tracking the detected object/person and starts counting the time the object/person remains in the detection zone. The tracking time (in seconds) appears in the bounding box around the object/person (see *Rendering Analytic Bounding Boxes* on page 26).
  If LoiterTrace tracks the object/person for longer than the maximum time, it generates a loiter alarm.

In simple mode, if people are crossing in the detection zone, LoiterTrace will assign the highest loiter time to both persons after they cross.







Note

The sensitivity setting from previous versions is now available in **Advanced** mode. In addition, you can now choose what happens when people are crossing in **Advanced** mode. For details, see *Advanced Mode* on page 37.

In simple mode, LoiterTrace keeps tracking the object/person even if it stops moving and becomes static, up until half the loiter time. If the object/person remains static for longer than half the loiter time, LoiterTrace stops tracking the object/person, and will not generate an alarm. Only when the object/person moves again, LoiterTrace will restart detection and tracking.
For example, if the loiter time is set to 180 s, and an object/person stays static for more than 90 s (= 180/2), then LoiterTrace stops tracking the object/person.

LoiterTrace stops tracking static objects to prevent false alarms. LoiterTrace may detect static objects being removed or added to the scene, or scene changes such as a door that remains open. If LoiterTrace would not stop tracking such objects, they would cause false alarms.

7.10.1.2 Setting the Maximum Loiter Time

To set the maximum loiter time, proceed as follows:

1. In the LoiterTrace configuration window, type the maximum allowed loiter time (in seconds) in the **Max time (s)** box.
   The minimum setting is 20 seconds.
2. Click **Save**.
3. Test the setting, and adjust if necessary. For more information on testing, see *Testing the LoiterTrace Configuration* on page 58.

7.10.2 Advanced Mode

7.10.2.1 About Detection Profiles

A detection profile is a set of criteria for triggering the loiter alarm. In simple mode, LoiterTrace uses a default detection profile, which is suitable for typical scenes. However, in advanced mode (available from ADPRO firmware version XOa 3.02.0017), you can define custom detection profiles to better meet specific needs. The settings in a profile are valid for all the detection zones in the scene.

The following parameters are available in the detection profiles:

- Contrast sensitivity
- Object sensitivity
- Maximum static time
- Timer strategy (available from firmware version XO 4.00).

Each parameter is described in detail in the following sections.

> ***Caution!***
>
> The default profile is designed to detect a range of loiter types over a range of conditions while ignoring a range of false alarm sources. Any deviation from the default profile risks affecting performance. You must verify performance with comprehensive walk tests of the site.
>
> If you do need custom detection profiles, then keep the default values as much as possible, and adjust only the one parameter that makes the difference for the issue you are facing.

7.10.2.2 Contrast and Object Sensitivity

The sensitivity setting for LoiterTrace consists of the following parts:

- **Contrast sensitivity**: determines the minimum contrast needed between an image point and the background to belong to an ‘object’.
  The higher the contrast sensitivity, the less contrast is needed to be an object.
  - You can **increase** the contrast sensitivity to improve detection in poorly contrasted scenes, for example if illumination is less than optimal.
  - You can **decrease** the contrast sensitivity to prevent detection of small disturbances and video glitches.



Poor contrast: person is not fully detected, LoiterTrace may drop detection.



Increased contrast sensitivity allows LoiterTrace to fully detect the person.

- **Object sensitivity**: determines if the object is a 'real' object (human, vehicle…) or a disturbance (cloud shadow, blurred spider, lighting change…). To determine this, the system uses criteria such as object edges, object blur, etc.
  The higher the object sensitivity, the more objects are considered real.
  - You can **increase** the object sensitivity to detect people more reliably when their behaviour is less 'human-like' and therefore more challenging to the analytic.
  - You can **decrease** the object sensitivity to prevent the detection of objects that present 'human-like' behaviour or characteristics (for example, a 'Wet Floor' sign that is moved occasionally).



Wet Floor sign is tracked.



Decreased object sensitivity: Wet Floor sign is no longer tracked.

Each sensitivity setting has 5 levels (1–5). Combining both sensitivity settings gives you 25 sensitivity levels, providing more control to suppress false alarms.

In simple mode (using the **Default** detection profile), both sensitivity parameters are set to 3 (normal).

7.10.2.3 Maximum Static Time

The maximum static time defines how long LoiterTrace keeps tracking a detected object that stops moving. If an object remains motionless for longer than the maximum static time, LoiterTrace will stop tracking it, and will not generate an alarm (if the loiter time has not been reached).

You can **increase** the maximum static time if you want LoiterTrace to keep track of very static persons (sitting, sleeping…).

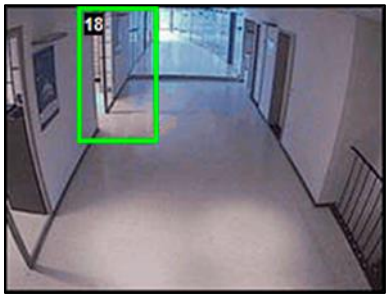




A higher maximum static time allows LoiterTrace to keep track of sleeping persons, and generate an alarm.

You can **decrease** the maximum static time to prevent false alarms caused by static objects such as doors or furniture.
If static objects in the scene are added or removed (for example a 'Wet Floor' sign), or if the scene changes (for example illumination changes, a door remains open…), then LoiterTrace may detect these objects and start tracking them. After the maximum static time, LoiterTrace will drop these objects and consider them as background.





Local illumination changes, such as from an adjacent room with an open door, may cause an ‘object’ detection. LoiterTrace will drop the ‘object’ after the maximum static time.





Global illumination changes, such as lights that are switched on or off, may cause a large ‘object’ detection. LoiterTrace will drop the ‘object’ after the maximum static time. If the change occurs while a person is loitering, the person’s loiter time will restart at 0 as soon as the person starts moving again.

In simple mode (using the **Default** detection profile), LoiterTrace stops tracking static objects/persons after half the loiter time.

> ***Note***
>
> The system does not display the maximum static time setting for the predefined detection profiles. The setting will appear only for custom detection profiles.

7.10.2.4 Timer Strategy

The timer strategy (available with software version XO 4.00 and above) allows you to define what happens when people are crossing in the detection zone. You can choose to assign either the highest (option **1=MAX**) or the lowest (option **2=MIN**) loiter time to both persons after they have crossed.

- Use MAX to detect loitering in case of crossing people, or people forming a group. This setting tends to generate more alarms.
- Use MIN to prevent false alarms when people ‘replace’ each other, like in a queue. This settings tends to generate less alarms.

In the example below, the system assigns the highest loiter time to both persons.







In software versions below XO 4.00, LoiterTrace will always assign the highest loiter time to both persons after they have crossed.

7.10.2.5 Predefined Detection Profiles

When you switch to advanced mode, LoiterTrace offers the following predefined detection profiles:

Profile name	Setting				Application
	Contrast sensitivity	Object sensitivity	Maximum static time	Timer strategy	
Default	3	3	= Loiter time / 2	1 (max)	Suitable for most applications
Low Sensitivity	2	2	10 s	1 (max)	To prevent false alarms from external influences, static changes…
High Sensitivity	4	4	= Loiter time	1 (max)	To prevent missed detections

You can assign any of the profiles to your camera, or create your own profile if necessary.
You cannot modify the values in the predefined profiles, they are fixed. When you assign the **Default** profile to a camera, the system switches back to simple mode for that camera.

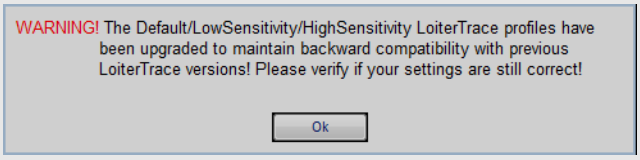
Note

With firmware versions below XOa 3.02.0017, there is only one general sensitivity setting with three levels (low, normal, and high). When upgrading from below XOa 3.02.0017, the system converts the old sensitivity level to the new profiles as follows:

- From sensitivity = **low** to profile **LowSensitivity**.
- From sensitivity = **normal** to the **Default** profile.
- From sensitivity = **high** to profile **HighSensitivity**.

The system does not display the maximum static time setting for the predefined detection profiles. The setting will appear only for custom detection profiles.

From software version XO 4.00, the predefined profiles provide identical settings to the old general sensitivity settings. The timer strategy setting is new in software version XO 4.00: when upgrading, the system automatically sets it to **1=MAX** in the existing profiles. If you upgrade from software version XOa 3.02.0017 or above, the system will display the following warning:



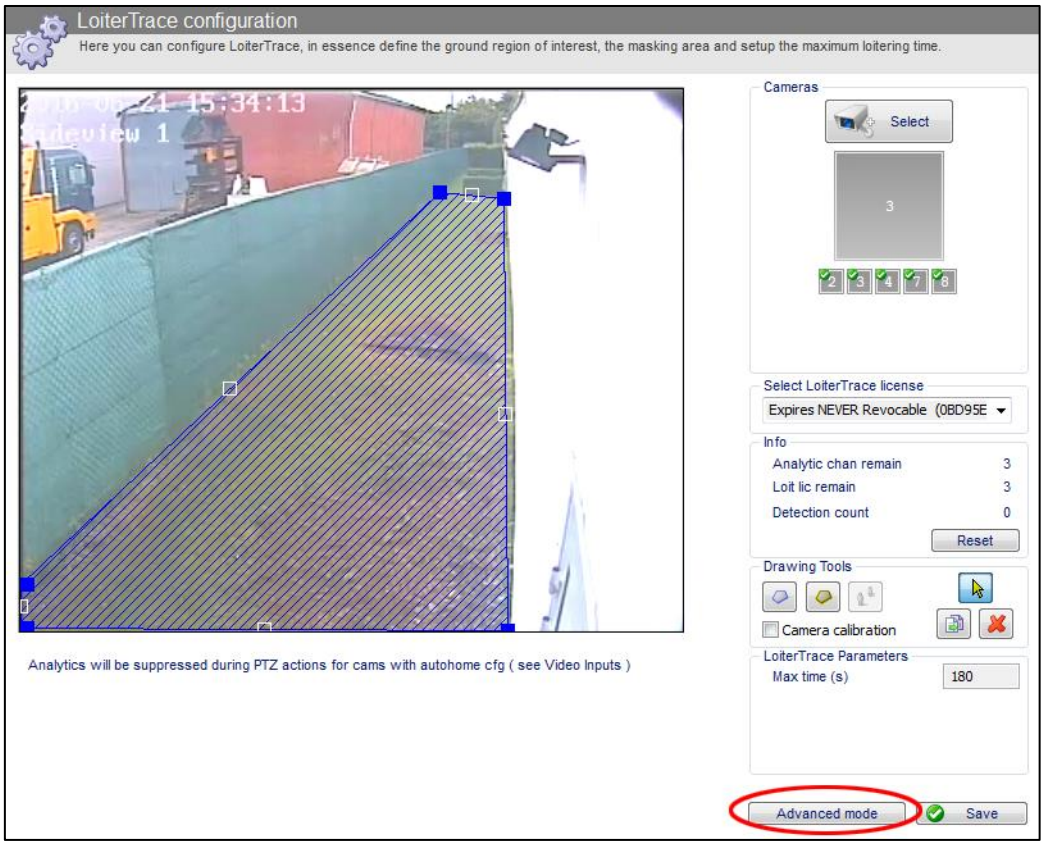
Check your settings to see if they are still valid.

7.10.2.6 Switching to Advanced Mode

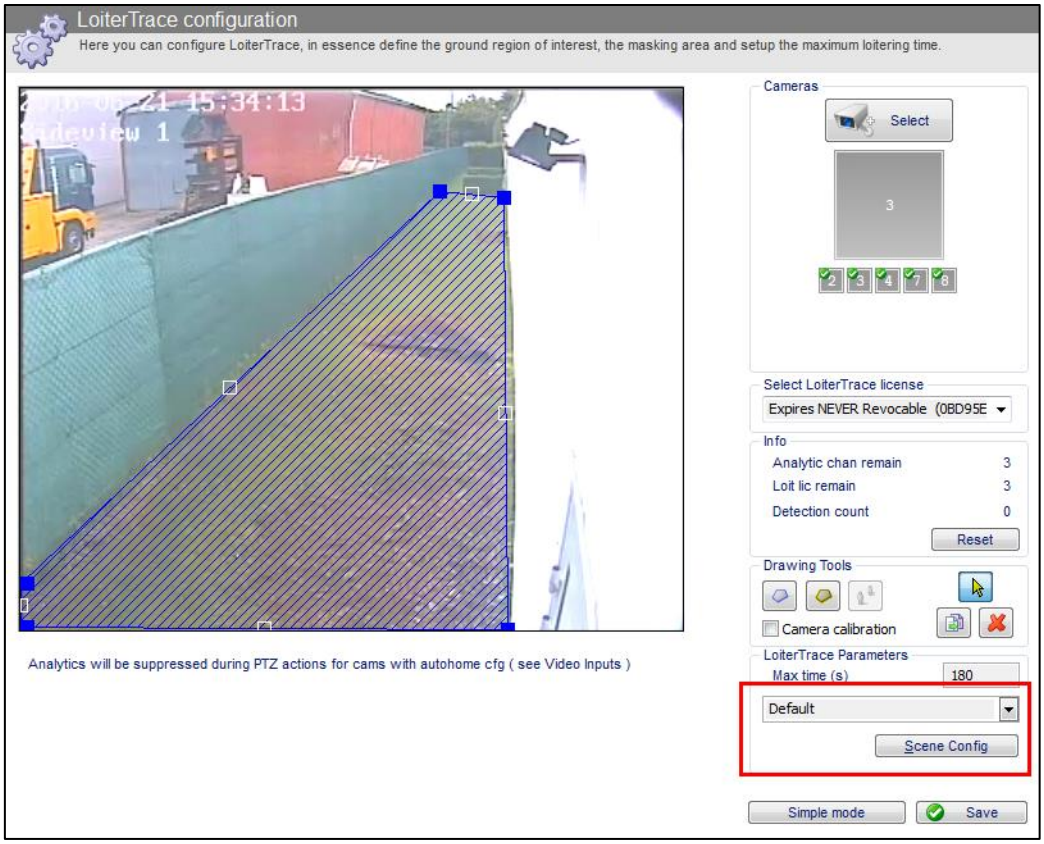
For each LoiterTrace-enabled camera, you can choose simple or advanced mode.

To switch to advanced mode, proceed as follows:

1. Click **Advanced mode**:



In advanced mode, the detection profiles are available.



7.10.2.7 Creating a Custom Detection Profile

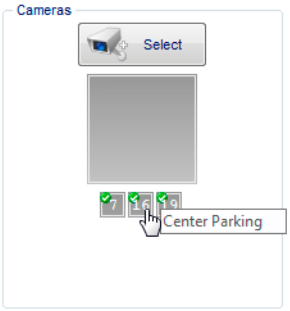
If the predefined detection profiles are not suitable, you can create your own custom detection profile. If need be, you can create different detection profiles for different cameras. Any detection profile that you create is available to all LoiterTrace-enabled cameras on the XO device.

> ***Caution!***
>
> If you assign the same detection profile to different cameras, make sure to test the settings on all these cameras.

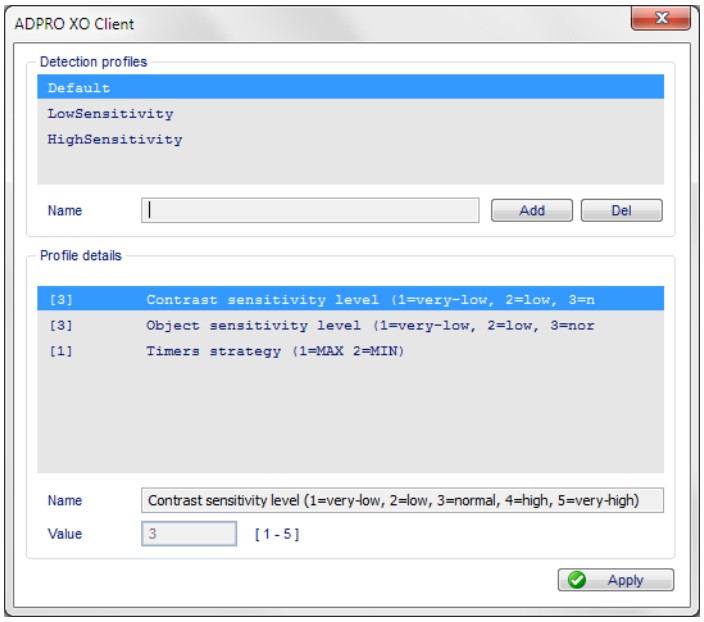
To get a feel for how the different settings influence detection, adjust only one setting at a time, and then test detection.

To create a custom detection profile, proceed as follows:

1. From the LoiterTrace configuration window, click the desired camera.

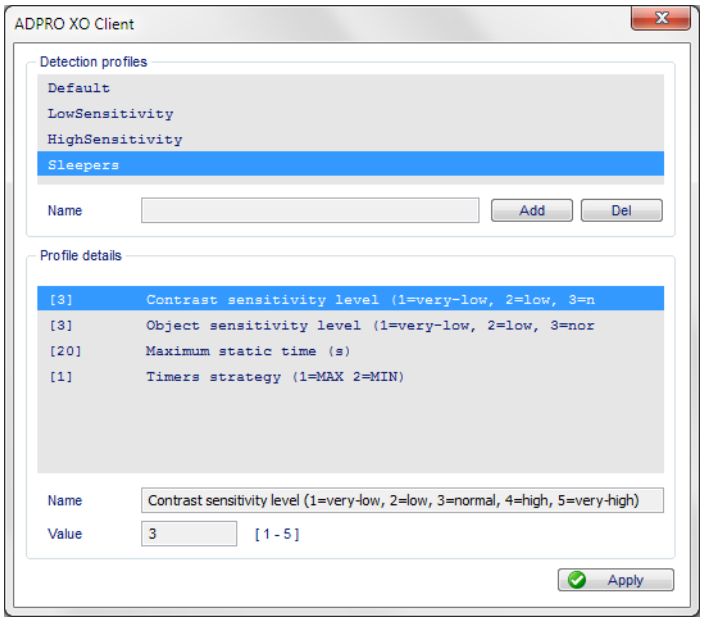


2. If advanced mode is not yet active, click **Advanced mode**.
3. Under **LoiterTrace Params**, click **Scene Config**.



4. In the **Name** box, type a meaningful name for your custom profile.

5. Click **Add**. The system adds a profile with the chosen name and the default settings.



The **Profile details** list shows all the settings, and their current value on the left between brackets.

6. To adjust a setting: under **Profile details**, click the desired setting. The setting's name appears in the **Name** box below the **Profile details** list. (You cannot change the setting's name).
The current value appears in the **Value** box. The possible range of values appears to the right of the **Value** box.
7. In the **Value** box, type the desired value for the setting.
8. Repeat for all the settings. The options are as follows:

Setting	Description
Contrast sensitivity level	Set to any round number from 1 to 5.
Object sensitivity level	Set to any round number from 1 to 5.
Maximum static time	Set to any value (in seconds) from 10 to 999.
Timers strategy	• Set to **1** to assign the highest loiter time of two crossing persons to each person after they cross. • Set to **2** to assign the lowest loiter time of two crossing persons to each person after they cross.

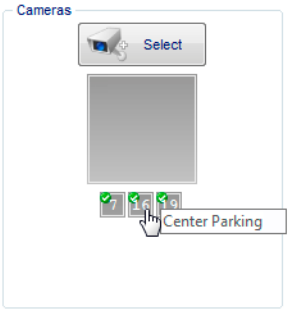
9. Click **Apply** to save the changes, and then close the profile window. The system automatically assigns the new profile to the scene.
10. Click **Save**.
11. Test the settings, and adjust if necessary. For more information on testing, see *Testing the LoiterTrace Configuration* on page 58.

7.10.2.8 Assigning Existing Profiles to Cameras

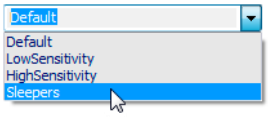
Once you have created a detection profile, you can assign it to any LoiterTrace-enabled camera on the XO device.

To assign an existing profile to a camera, proceed as follows:

1. From the LoiterTrace configuration window, click the desired camera.



2. If advanced mode is not yet active, click **Advanced mode**.
3. Under **LoiterTrace Params**, select the desired profile from the list.



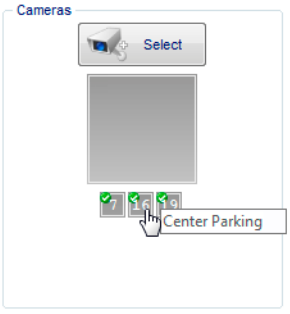
4. Click **Save**.

7.10.2.9 Changing an Existing Detection Profile

> ***Note***
>
> You cannot change the **Default** detection profile; it is fixed.

To change an existing detection profile, proceed as follows:

1. From the LoiterTrace configuration window, click a camera that uses the desired detection profile.



2. Under **LoiterTrace Params**, click **Scene Config**.
3. Under **Profile details**, click the desired setting, and adjust its value in the **Value** box.
4. Click **Apply** to save the changes, and then close the profile window.
5. Click **Save**.
6. Test the new settings, and adjust again if necessary.

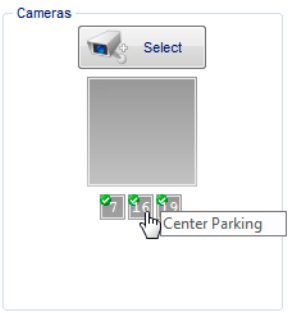
> ***Caution!***
>
> If you have assigned the same detection profile to different cameras, make sure to test the settings on all these cameras.

7.10.2.10 Deleting a Detection Profile

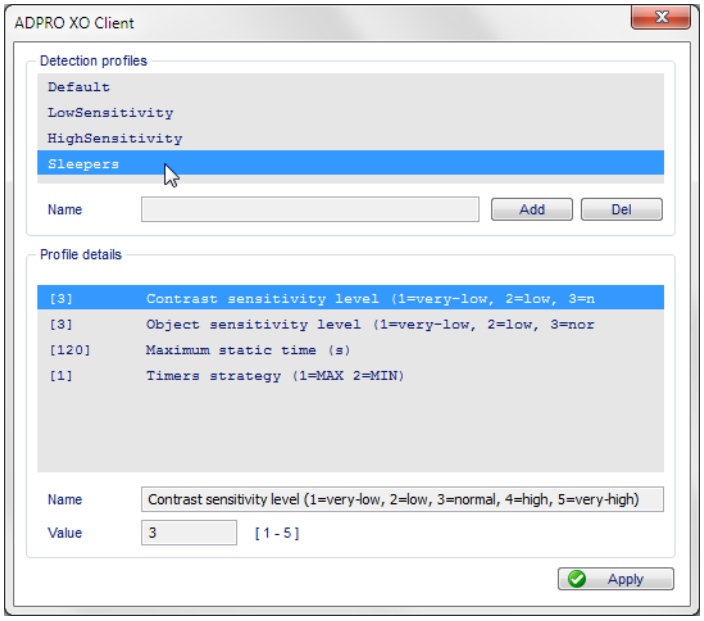
> ***Note***
>
> You cannot delete the **Default** detection profile, or a custom detection profile that is still assigned to a camera. Make sure that all LoiterTrace-enabled cameras on the XO device use a different profile (or the **Default** profile).

To delete a detection profile, proceed as follows:

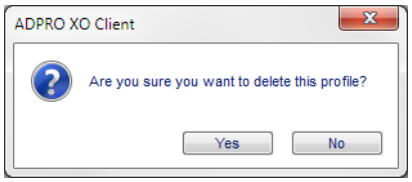
1. From the LoiterTrace configuration window, click any camera.



2. If advanced mode is not yet active, click **Advanced mode**.
3. Under **LoiterTrace Params**, click **Scene Config**.
4. Under **Detection profiles**, click the desired profile.



5. Click **Del**. The following message appears:



6. Click **Yes** to confirm.
7. Click **Apply** to save the changes, and then close the profile window.
8. Click **Save**.

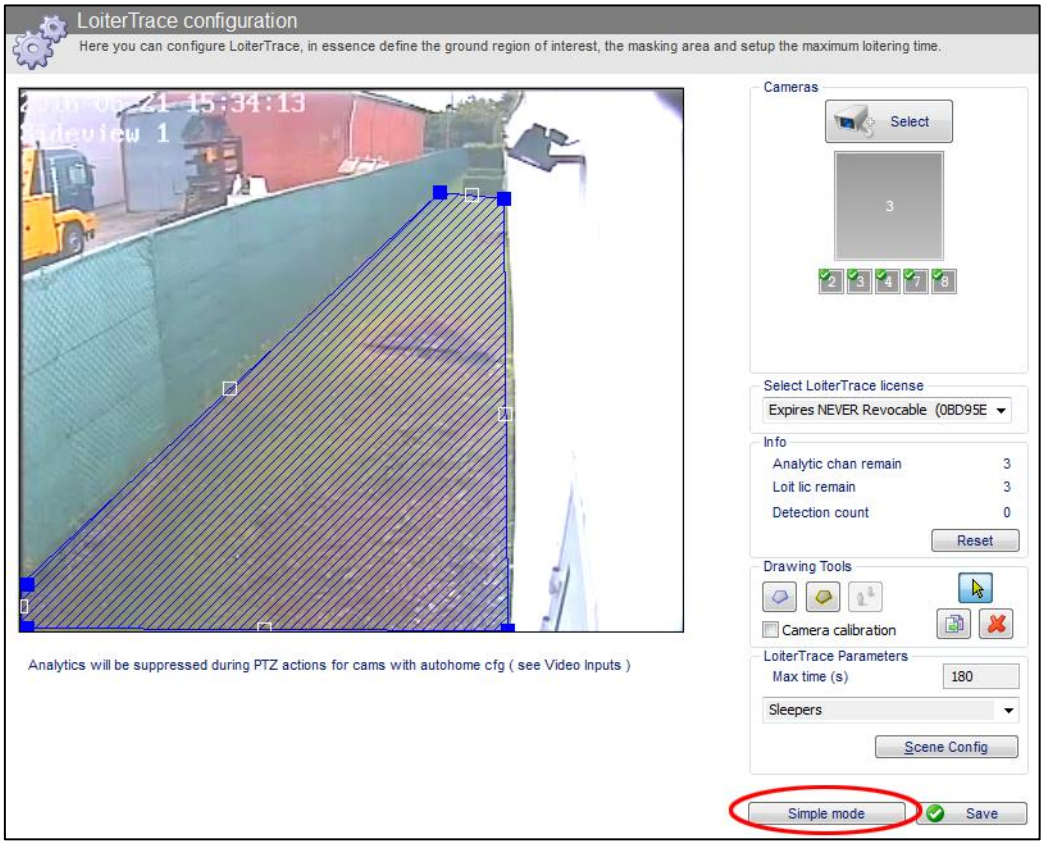
7.10.2.11 Switching Back to Simple Mode

When you switch back to simple mode, the system will apply the default parameters to the scene:

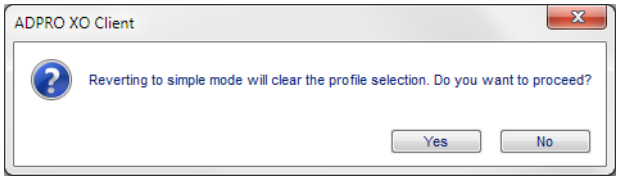
- Contrast and object sensitivity = 3 (normal)
- Maximum static time = half the loiter time
- Timer strategy = 1 = MAX.

To switch back to simple mode, proceed as follows:

1. To switch back to simple mode, click **Simple mode**.

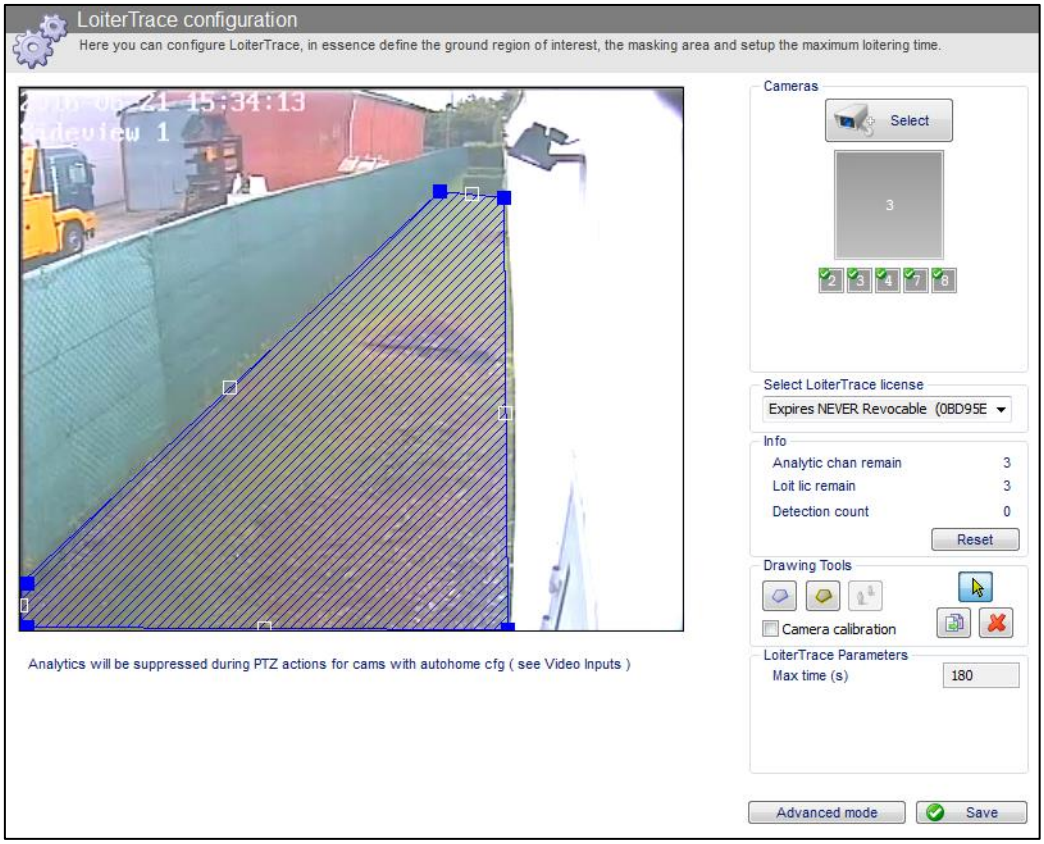


The following message appears:



> ***Caution!***
>
> The system will reset the detection parameters to the default values.

2. Click **Yes** to confirm.



Note

If you select the **Default** profile in the advanced settings, the system automatically reverts to simple mode.

7.11 Calibration

7.11.1 About Calibration

If you are using analytics, you may need to perform the following camera calibrations:

- **3D calibration**: this is **optional** for LoiterTrace. The 3D calibration of a scene makes sure that LoiterTrace can calculate the size of an object, the distance it travels through the scene, the speed… If calibrated, LoiterTrace can work reliably up to a 30 m (98 ft) wide field of view at the maximum detection distance. If not calibrated, it can only support a 20 m (66 ft) wide field of view.
- **Bounding box calibration**: only for IP cameras that use different aspect ratios for the analytics stream and the live/recording stream. Bounding box calibration makes sure that the analytic bounding boxes appear correctly on all streams, regardless of their aspect ratio.

You can find detailed instructions for both calibrations in the following sections.

Caution!

If you change the aspect ratio of the analytics stream for a camera, **you have to make new calibration images and recalibrate that camera**.

7.11.2 3D Calibration

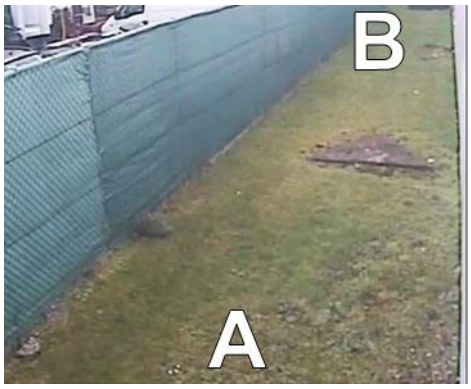
7.11.2.1 Overview

3D calibration allows analytics applications to identify the size, speed… of detected objects in the camera image. Setup requires two easy steps to mark:

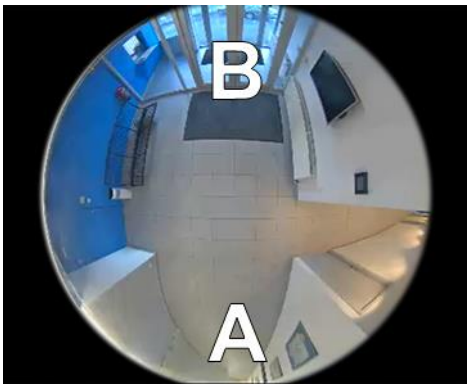
- the height of a known object at the front of the scene
- the height of that same object at the back of the scene.

Typically, you make a snapshot of the scene with a person/object standing at the front of the scene (**A**), at the bottom of the camera image, and another snapshot with the same person/object standing at the back of the scene (**B**), at the top of the camera image.
On a **fisheye** camera, you do the same: you make a snapshot with a person/object at the bottom of the scene (**A**), and another with the same person/object at the top of the scene (**B**). Although the objects will be similar in size at these two extremes, the measurements provide reliable detection across the scene.

Always perform walk tests to confirm detection.



Position of objects for 3D calibration in normal scene



Position of objects for 3D calibration in fisheye scene

You can either use live images, or you can first record images and take snapshots when you play back the footage, so that only one person can calibrate the scene.

You can calibrate a scene in the XO client:

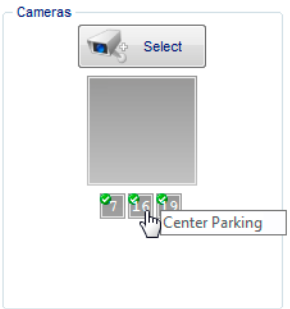
- from the IntrusionTrace configuration window
- from the LoiterTrace configuration window
- or from the video input configuration window.

You need to calibrate a scene only once. The calibration is valid for all analytics applications (IntrusionTrace, LoiterTrace). As of XOa 3.02.0017, the system displays thumbnails of the calibration pictures (if available) in the analytics configuration window. As of XO 4.00, the system also displays the resolution of the calibration pictures (= the analytics stream resolution) in the calibration window.

7.11.2.2 3D Calibration from Live Images

To calibrate a scene from live images, proceed as follows:

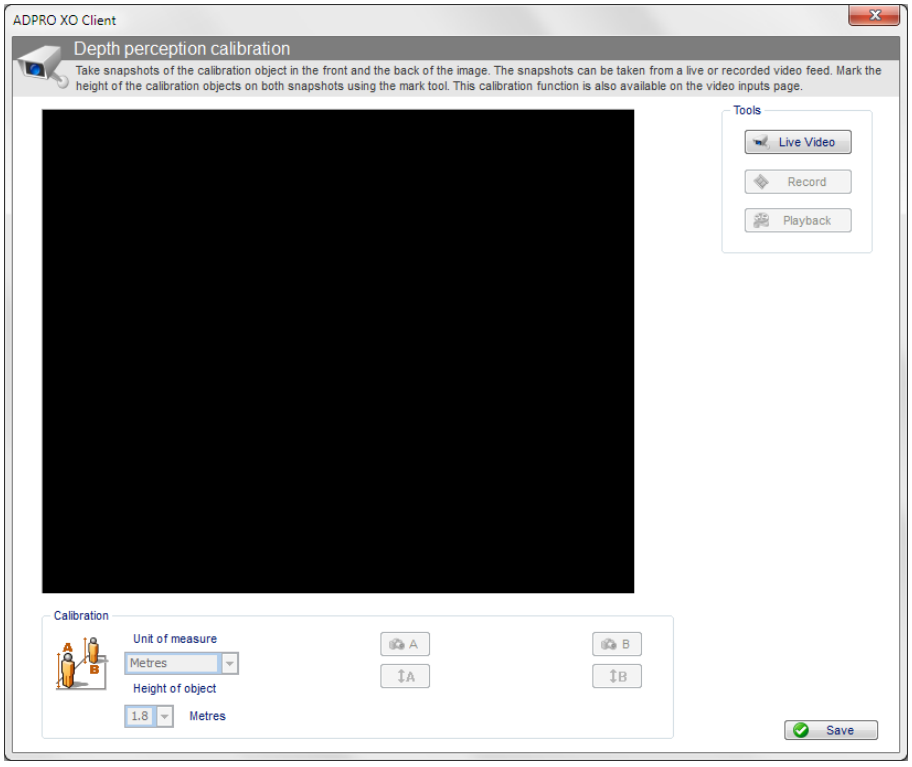
1. From the LoiterTrace configuration window, click the desired camera.



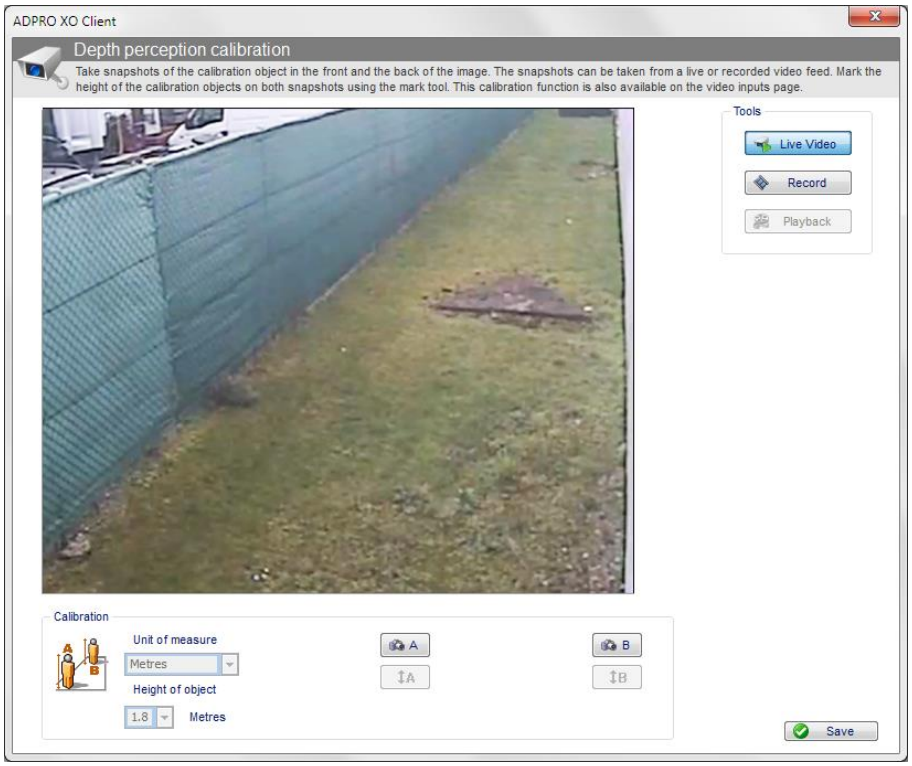
2. Under **Drawing Tools**, select the **Camera calibration** check box.



3. Click the  button.



4. Under **Tools**, click **Live Video**. The live camera image appears.



5. When the person/object is standing **at the front** of the scene, click A to make a snapshot. Make sure that the person/object is completely visible (from head to toe). A miniature version of the snapshot appears at the bottom of the screen; the system indicates the image resolution.



6. When the person/object is standing **at the back** of the scene, click B to make a snapshot. Make sure that the person/object is completely visible (from head to toe). A miniature version of the snapshot appears at the bottom of the screen; the system indicates the image resolution.



7. To calibrate the front of the scene, you need to draw a marker line with the same height as the object/person in the front: click A. The front snapshot now appears as the camera image.

8. Click the camera image near the top of the person/object, and drag downward to the bottom of the person/object. A vertical, red marker line appears.



> ***Note***
>
> If you have calibrated the scene before, the vertical red marker is already visible. You only need to adjust it.

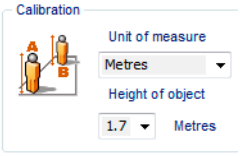
9. Adjust the marker line until it has exactly the same height as the person/object at the front, as follows:
   - To move the position of the marker line in the scene, drag it by its white handle in the middle.
   - To change the height of the marker line, drag the red handles at the top and bottom.
10. Click **Save**. You will now calibrate the back of the scene.
11. To calibrate the back of the scene, click ↕B. The back snapshot now appears as the camera image.

12. Click the camera image near the top of the person/object, and drag downward to the bottom of the person/object. A vertical, red marker line appears.



> ***Note***
>
> If you have calibrated the scene before, the vertical red marker is already visible. You only need to adjust it.

13. Adjust the marker line until it has the same height as the person/object at the back.
Next, you will indicate the height of the person/object.
14. Under **Calibration**, in the **Unit of Measure** list, choose the desired unit of measure (metres, yards, or feet). The unit of measure is valid for the back and front of the scene.
15. In the **Height of object** box, select the height of the person/object. Choose the value that is the closest to the person/object's exact height. The height is valid for the back and front of the scene.

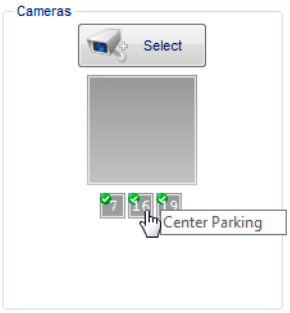


16. Click **Save**, and then close the calibration window.

7.11.2.3 3D Calibration from Recorded Images

To calibrate a scene from recorded images, proceed as follows:

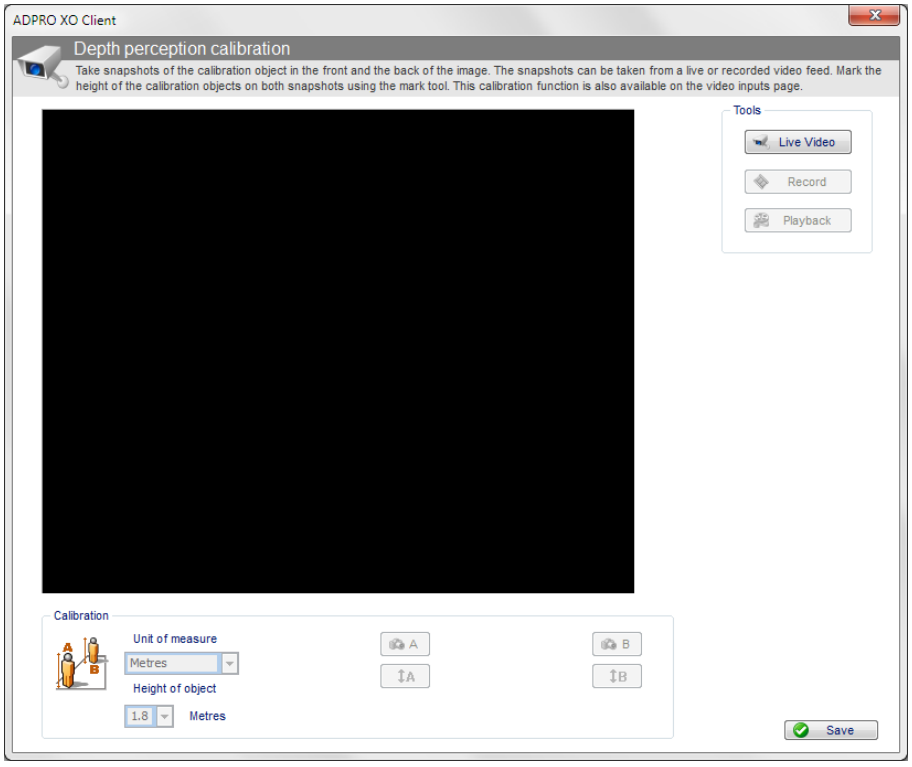
1. From the LoiterTrace configuration window, click the desired camera.



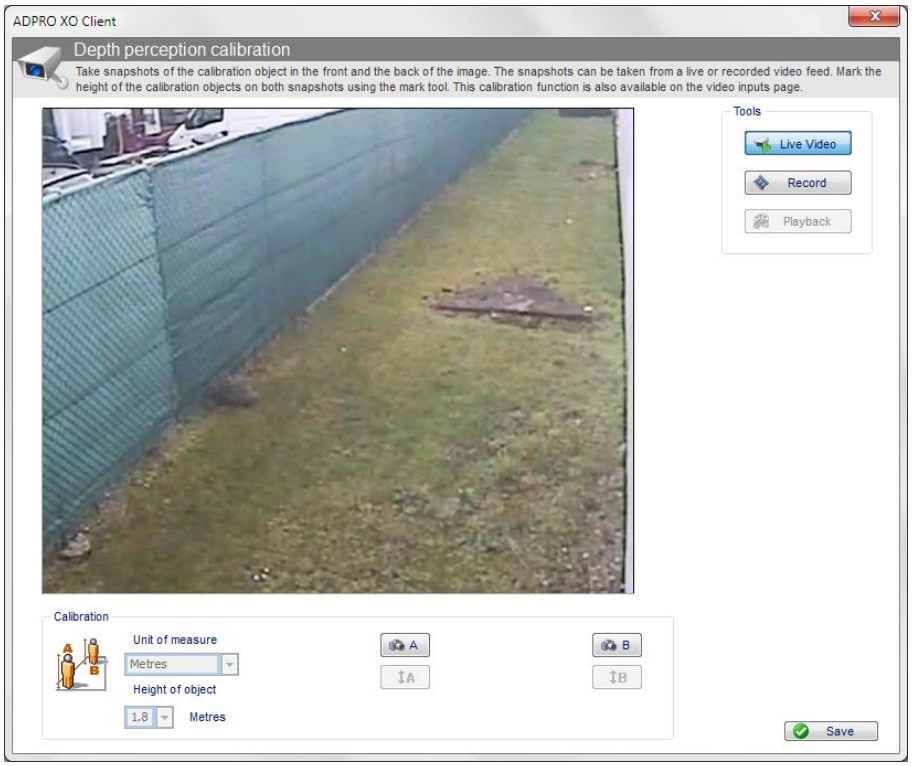
2. Under **Drawing Tools**, select the **Camera calibration** check box.



3. Click the  button.

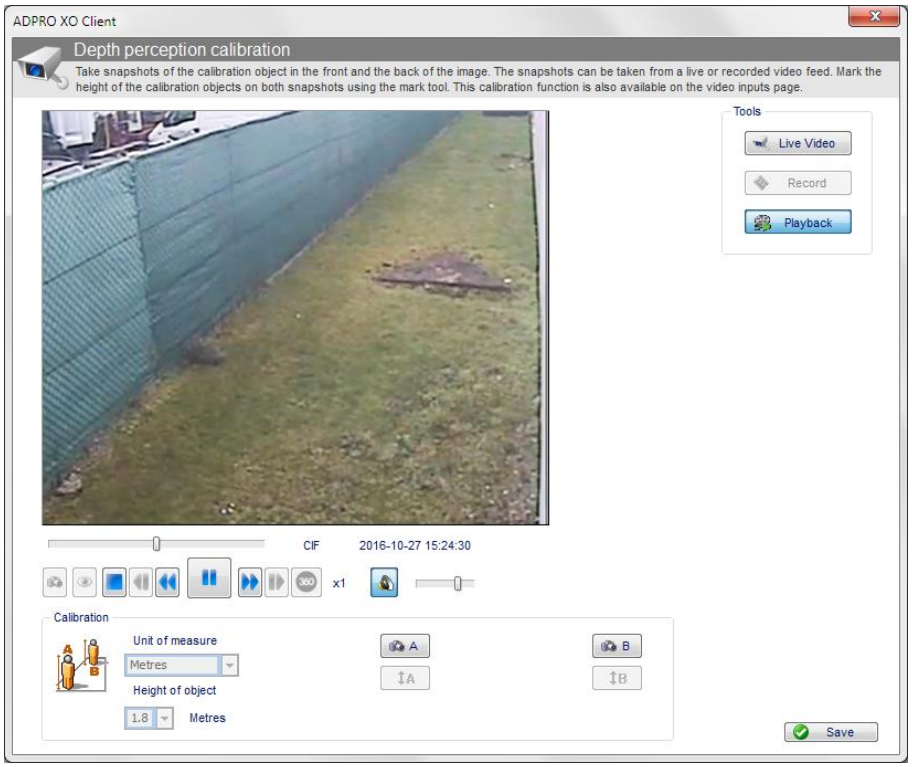


4. Under **Tools**, click **Live Video**. The live camera image appears.



5. Click **Record**. The system starts recording the live images.
6. While recording, make the person/object stand still at the front and at the back of the scene.
7. When you have the required footage, click **Record** again to stop recording.

8. Click **Playback**. The system starts playing the recorded footage.



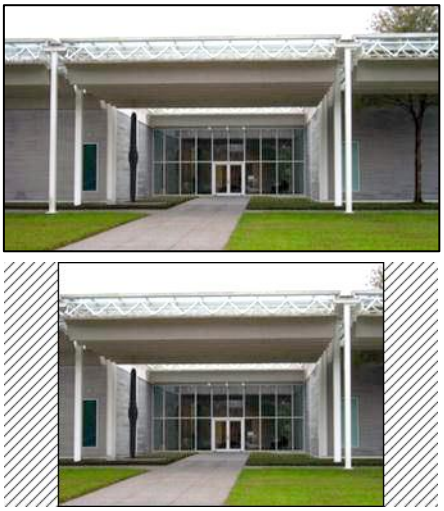
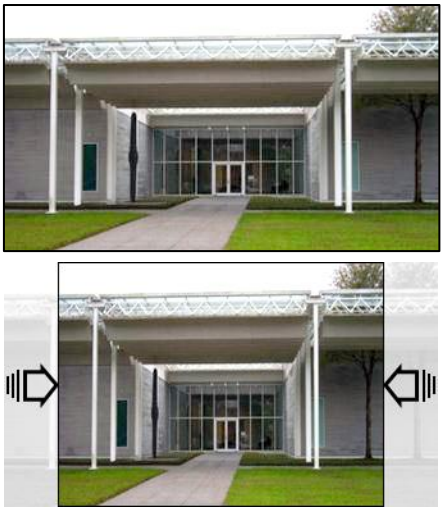
9. Making snapshots and calibrating the scene is identical as for live video. For details, see the procedure in *3D Calibration from Live Images*. Start at step 5 on page 50, and continue to the end.

7.11.3 Bounding Box Calibration for Different Aspect Ratios

Bounding box calibration is only required for IP cameras that use different aspect ratios for the analytics stream and the live/recording stream. It makes sure that the analytic bounding boxes appear correctly on all streams, regardless of the aspect ratio.

Ideally, the aspect ratio of the low-resolution analytics stream is identical to the aspect ratio of the high-resolution live/recording streams. However, wide-screen cameras may not offer low-resolution streams with the same aspect ratio.

For example, a camera may offer low-resolution images (for the analytics stream) with aspect ratio 4:3, and high-resolution images with aspect ratio 16:9. Typically, a 4:3 camera image has a narrower field of view than the 16:9 image: the edges are cut off. However, some cameras take the wide image and squeeze it into a narrow image. This results in a full field of view in the 4:3 image, but the image is distorted.

16:9 image	16:9 image
	
4:3 image, cropped: edges are cut off, narrower field of view, image is not distorted	4:3 image, squeezed: full field of view (no cut-off edges), but distorted image

Correct bounding box calibration depends on the way the camera provides the low-resolution stream:

- To calibrate the bounding boxes for cameras that provide **cropped images**: see *Normal Bounding Box Calibration* on page 55.
- To calibrate the bounding boxes for cameras that provide **squeezed images**: see *Bounding Box Calibration for Squeezed Images* on page 57.

> ***Caution!***
>
> Set up the recording stream resolution **before** you calibrate the bounding boxes.

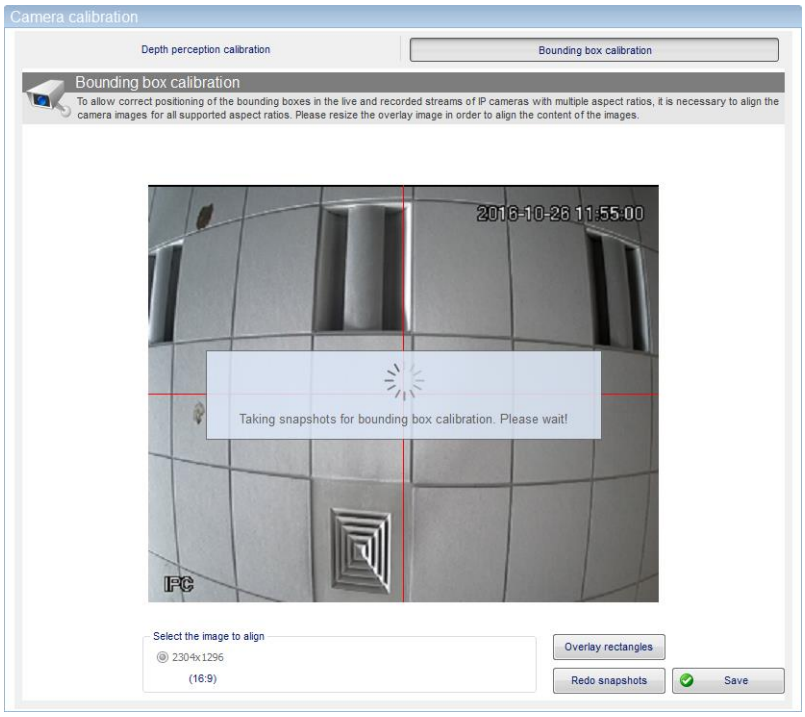
Bounding box calibration is available in firmware version V2.10 and above. If the analytics and recording streams have the same aspect ratio, then bounding box calibration is not required and the option is unavailable.

7.11.3.1 Normal Bounding Box Calibration

To calibrate the bounding boxes, proceed as follows:

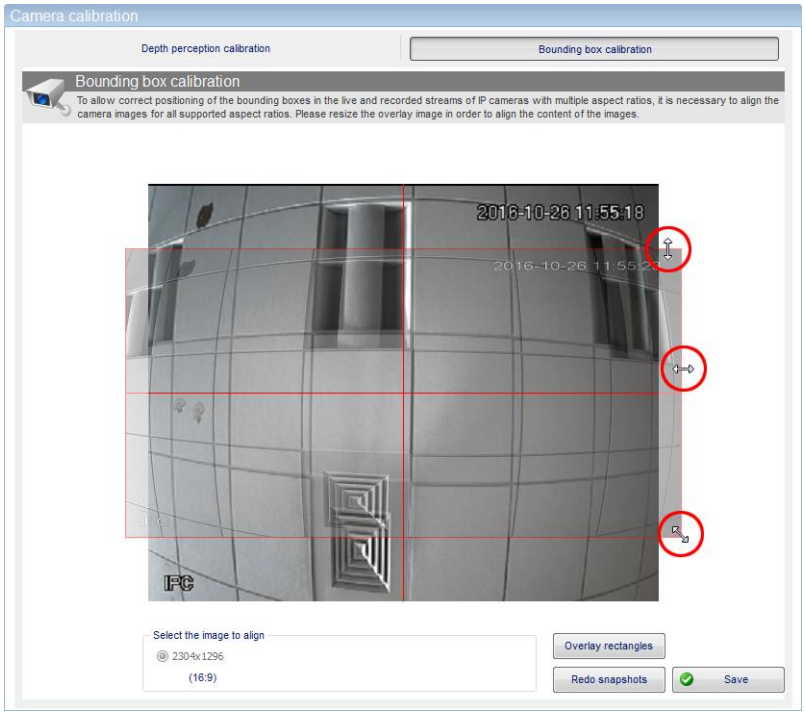
1. Choose **System > Connections > Video Inputs**, and select the desired camera.
2. Under **Video Settings**, click **Camera calibration**.

3. Click the **Bounding box calibration** tab.

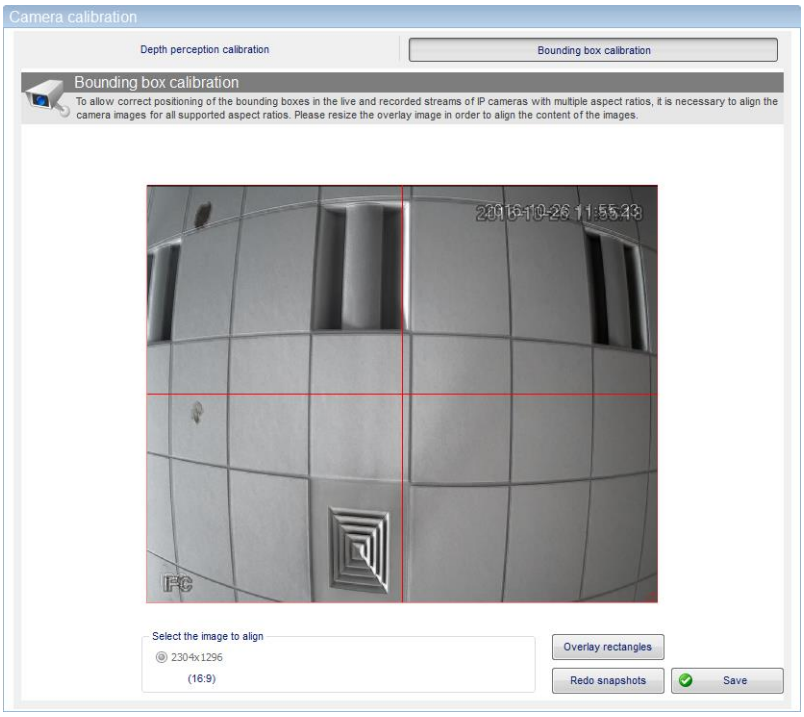


The system takes two screenshots, one at each resolution, and displays them on top of each other.

4. Drag the sides or the corner of the image until both images overlap perfectly.



The result should look like this:



5. Click **Save**, and then close the calibration window.

7.11.3.2 Bounding Box Calibration for Squeezed Images

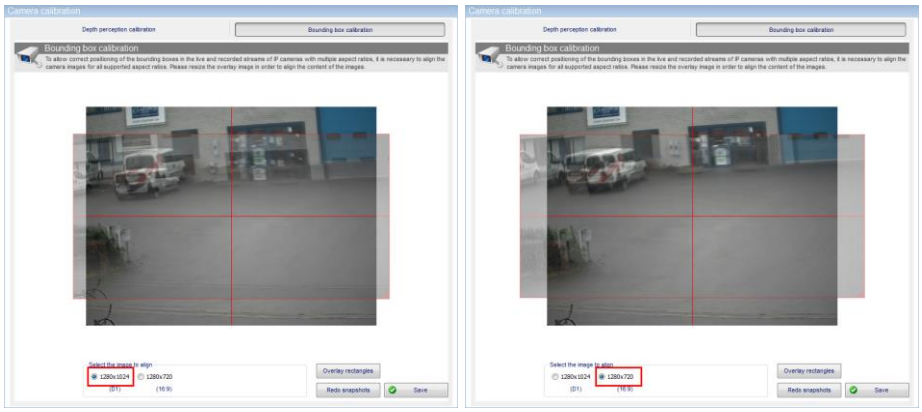
Bounding box calibration for squeezed images is available in firmware version XO 4.0 and above.

To calibrate the bounding boxes for squeezed images, proceed as follows:

1. Choose **System > Connections > Video Inputs**, and select the desired camera.
2. Under **Video Settings**, click **Camera calibration**.
3. Click the **Bounding box calibration** tab. The system takes two snapshots, one at each resolution, and displays them on top of each other.
4. Click **Overlay rectangles**. The system aligns the images automatically.
5. Click **Save**, and then close the calibration window.

7.11.3.3 Bounding Box Calibration for Three-stream Cameras

If your camera provides 3 streams, and you have selected 3 different aspect ratios (for analytics, continuous, and event recording), then you have to perform calibration twice. The **Select the image to align** box will display two resolutions. Select each resolution in turn and perform calibration as required.



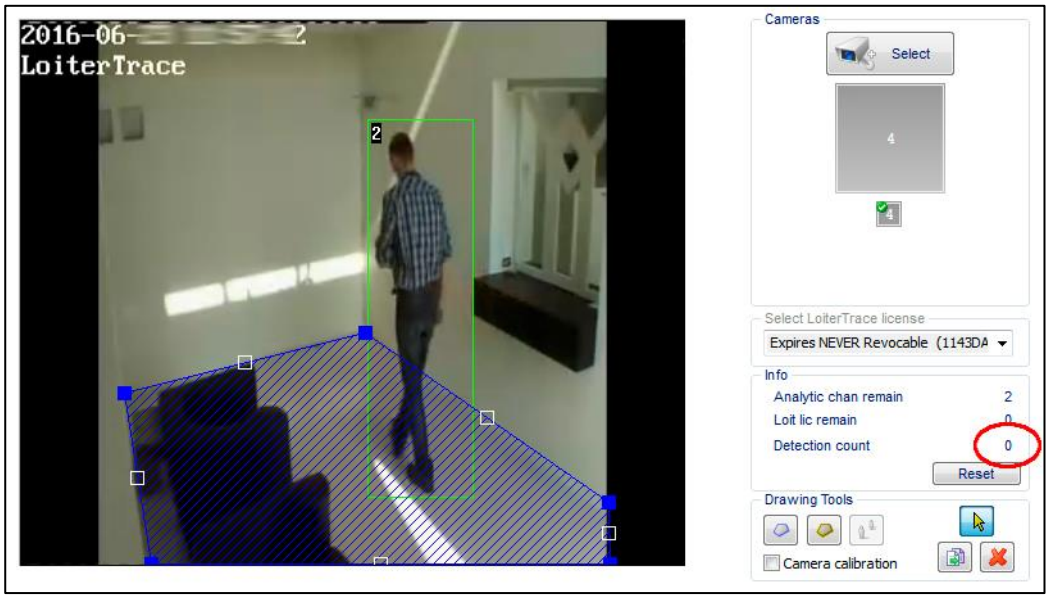
7.12 Testing the LoiterTrace Configuration

You need to test the configuration carefully before going live. You can do this from the LoiterTrace configuration screen, which always displays the analytic bounding boxes.

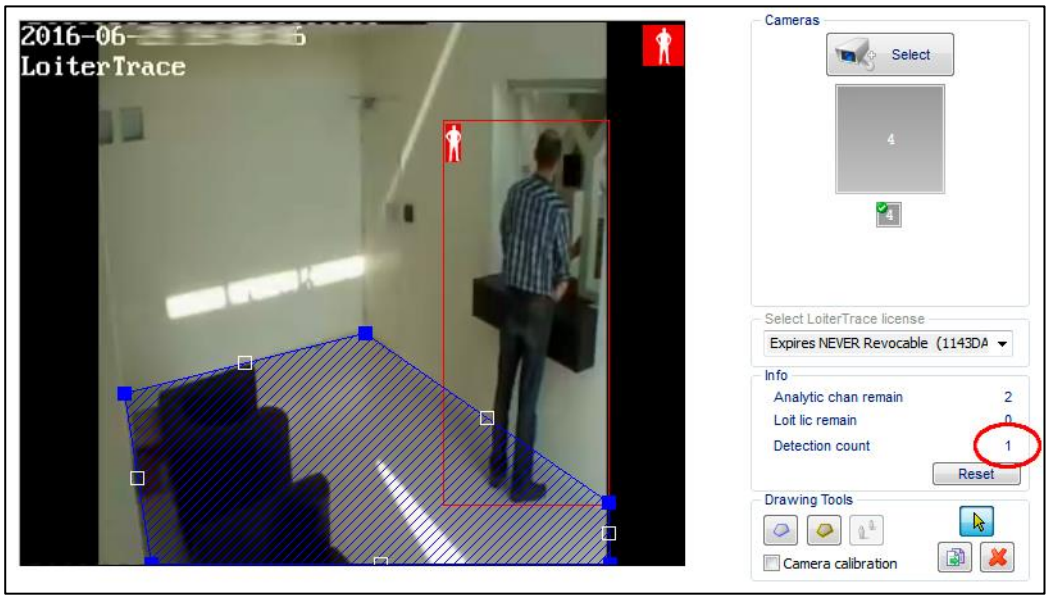
However, unlike the live or recorded video windows, it displays only the LoiterTrace bounding boxes; it does not display bounding boxes of other analytic applications. Because there cannot be any confusion with other analytics, the configuration screen is the most suitable environment for testing your settings.

Furthermore, a **detection counter** in the configuration screen indicates the number of detections made on the selected camera during configuration. The system automatically resets the counter to 0 when you select a different camera or when you leave the LoiterTrace configuration screen.
To manually reset the counter, click **Reset**.

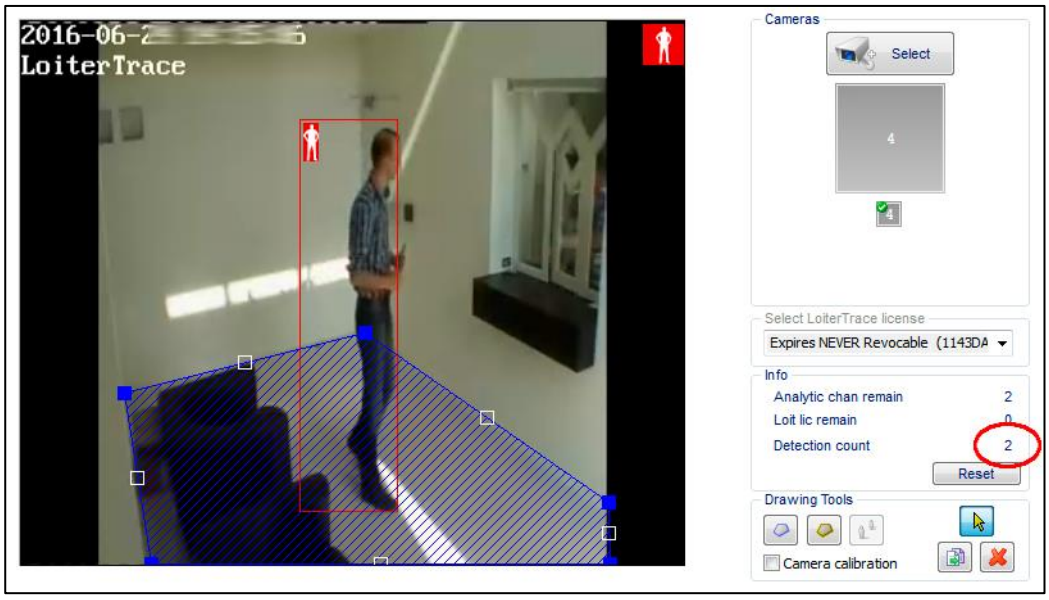
The screen below shows the green bounding box and the timer in the upper left corner of the bounding box, indicating that LoiterTrace has detected the person, but has not yet triggered the alarm (detection count = 0):



The screen below shows the red bounding box, indicating that LoiterTrace has detected the person loitering and triggered the alarm. The system has increased the detection counter by 1:



The detection counter increases upon each alarm:



7.13 LoiterTrace Alarms

For each camera that runs LoiterTrace, there is a general LoiterTrace input available in the XO client.
For camera 1, this is:
I1046 – [REAL] – CAM01 LOITER. EVENT
For camera 2:
I1078 – [REAL] – CAM02 LOITER. EVENT
...

LoiterTrace activates the input if it detects loitering in any of the detection zones of that camera.

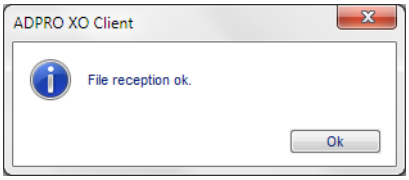
7.14 Configuration and Calibration Pictures Backup

7.14.1 Backup

Xtralis recommends to back up the configuration and the calibration pictures when the LoiterTrace configuration is complete and fully tested. You can then reload the configuration or pictures in case of a system malfunction, or use the data to quickly configure another system.

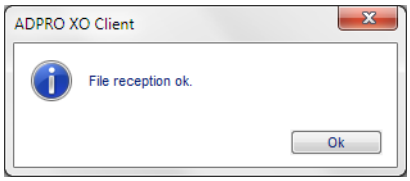
To back up the configuration and calibration pictures, proceed as follows:

1. Choose **System > Maintenance > Transfer**.
2. In the **Receive from server** section, click **Configuration**.
3. Select the correct configuration from the list, and then click **Get**.
4. Select the destination folder where you want to store the configuration, and then click **Save**. The following message appears if saving is successful:



5. Click **OK** to close the message box.
6. Click **Calibration pictures**, and then click **Get**.

7. Select the destination folder where you want to store the calibration pictures, and click **OK**. The following message appears if saving is successful:



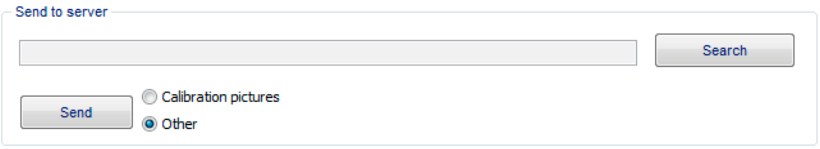
8. Click **OK** to close the message box.

7.14.2 Restore

> ***Caution!***
>
> When you restore the configuration file, you restore not only the LoiterTrace configuration, but also the other settings in the **System** menu (except settings for MIO/EIO cards and Net I/O modules, users, and licences).
>
> Restoring the configuration file requires a system restart.

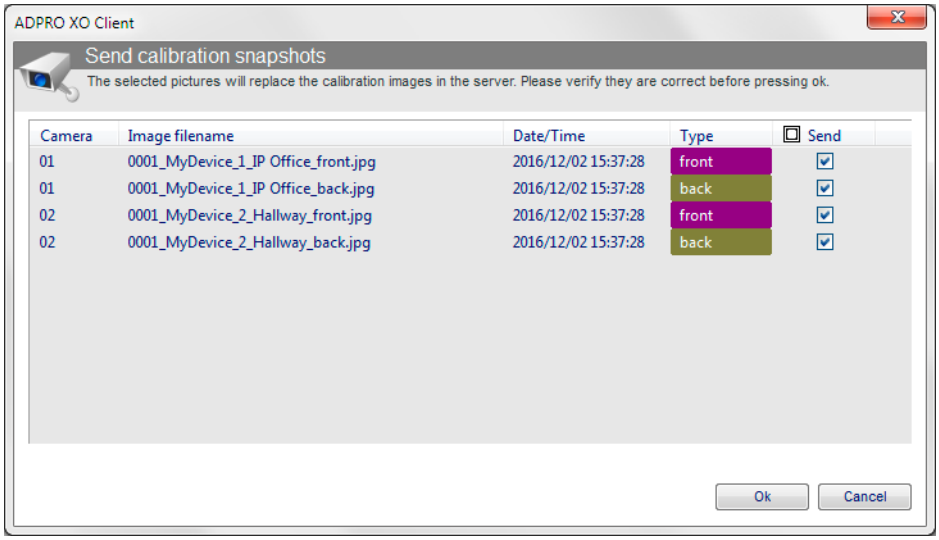
To restore the calibration pictures and configuration file, proceed as follows:

1. Choose **System > Maintenance > Transfer**. For uploading, you will work in the **Send to server** section.



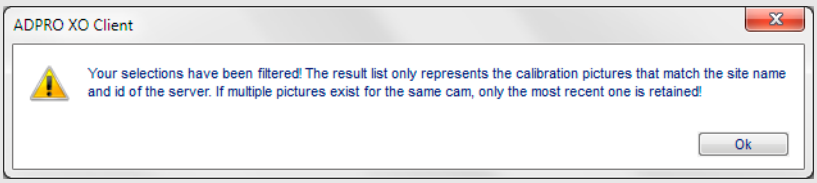
First you will upload the calibration pictures.

2. Click **Calibration pictures**.
3. Under **Send to server**, click **Search**.
4. Select the file(s) that you want to upload, and then click **Open**.
5. Click **Send**. The system will now check the files you selected, and then present an overview of the calibration pictures that it will upload:



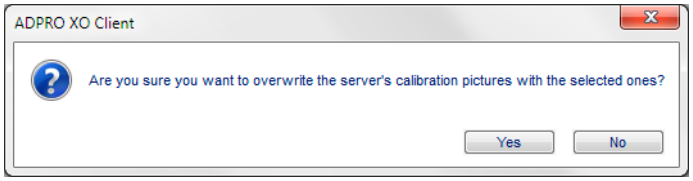
Note

If the system detects one or more files that are not suitable calibration pictures (their site name and ID do not match that of the XO device, or they are snapshots), of if you have selected more than one front or back picture for the same camera, the following message appears:

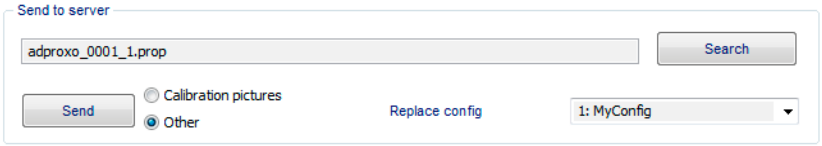


Click **OK** to close the message box. The system filters out the unsuitable pictures, and takes only the most recent version of the suitable pictures.

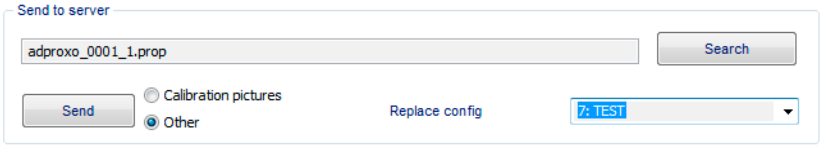
6. Carefully check the overview, and clear the checkboxes of the listed pictures that you do not want to upload.
7. Click **OK** to confirm. The following screen appears:



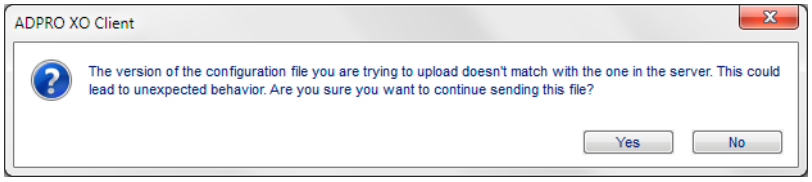
8. Click **Yes** to confirm.
   The system uploads the selected calibration pictures.
   Next, you will upload the configuration file.
9. In the **Send to server** section, click **Other**.
10. Click **Search**.
11. Select the configuration file that you want to upload, and then click **Open**.



12. In the **Replace config** box, select the configuration that you want to overwrite.



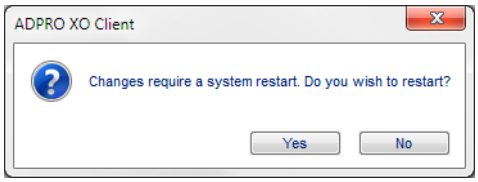
13. Click **Send** to upload the file to the XO device. If the configuration file has a different version than the active configuration, the following screen appears:



Caution!

Settings from different versions may cause conflicts and unexpected behaviour in the system. Proceed at your own risk.

14. If you are sure that you want to upload the configuration, click **Yes**. The following screen appears:



15. Click **Yes** to restart the XO device.

7.15 Troubleshooting

LoiterTrace is not available in the System menu

You must install at least one LoiterTrace license on the XO device. Purchase your licenses via your regular channel, and install the license using Xchange.

LoiterTrace license is no longer assigned to a camera

In the LoiterTrace configuration window, you have to draw at least one detection zone before saving the settings. If you click **Save** when there is no detection zone available, the system automatically unlinks the LoiterTrace license from the camera.

The assigned detection profile is incorrect

When you are working in the profile window to create or change detection profiles, the system assigns the profile that is currently selected in the profile window to the camera when you close the window.

Detection profiles are not available

Advanced mode is not active for the selected camera. To the left of the **Save** button, click **Advanced mode**.

Cannot add a mask zone

You can draw maximum 5 mask zones.

8 Performance Assessment

The second part of commissioning is the performance assessment. It consists of the following steps:

- Detection tests
- Soak tests
- Monitoring tests.

Appendix F contains a checklist for each LoiterTrace channel.

8.1 Detection Tests

LoiterTrace, as a detection system, shall initially be configured to ensure detection occurs effectively, and then corrective action can occur to limit any nuisance alarms. Whilst performing the detection tests, it is important to ensure that the tests are adequately documented and described for proper on-going maintenance. A subset of the tests shall be performed on a regular basis to confirm correct operation. The detection tests shall also be annotated on a site plan to highlight the areas where the tests are performed. See *Site Maintenance* on page 65 for a description of the necessary maintenance procedures.

Appendix G contains a table for documenting the detection tests performed and their outcome.

For each detection area, the following shall be performed:

- Check that the detection area covered by each camera connected to LoiterTrace matches the design, and that the detection areas programmed for LoiterTrace are correctly aligned within the field of view of the camera.
- Determine the level of loitering to be detected. Design and document the tests based around the security level and scene content. Factors that may vary include the speed of target, the size of the target and the location in the scene. The following describes how to perform the tests, and is suitable for the LoiterTrace detection testing:
  - Tests shall be performed at three separate locations: the foreground FOV, the middle of the scene, and the maximum FOV.
  - The target shall move to the point where loitering would expect to start. If this is within the detection area, then once the target has moved to the start point, the target shall stay motionless for one minute to allow LoiterTrace to settle.
  - For size discrimination testing, you can use a small target, such as a basketball rolled across the scene, to check that small targets are or are not being detected by LoiterTrace as required.
- Execute tests in each detection area based on the type of loitering, and where possible in differing environmental conditions, e.g. day/night/dusk/dawn. Ensure that the alarm activation is reported as expected at the LoiterTrace system, and that any third-party system triggered from the LoiterTrace system receives an alarm notification.
- If the system is installed in a high-security installation, then also perform tests with different types of camouflaged clothing.

8.2 Soak Tests

Once the system has been installed and the detection tests performed, then the system must be monitored for its performance in relation to the ambient environment. Changes in environmental conditions or just routine actions can produce nuisance alarms. The system shall be monitored on a daily basis prior to going 'live' to highlight issues of concern, and then adjust the LoiterTrace and RMG parameters as required. Every time detection parameters are modified, detection tests shall be performed again to ensure the detection performance has not been compromised. Once the performance of the soak tests has reached an acceptable level, and the detection performance is as required, the system can go 'live'.

8.3 System Tests

The integration and performance of LoiterTrace as a component of a larger system must be verified to ensure the complete system behaves as required and expected. There are a number of areas to check:

- For remote monitoring, ensure that generated alarms are successfully transmitted to the Central Monitoring Station (CMS).
- If any functions are being used within LoiterTrace, test that the behaviour meets expectation and the system generates alarms when it is armed.
- If the LoiterTrace application is integrated into a larger matrix or CCTV system, ensure that any inputs/outputs to/from the larger CCTV system function as expected.

8.4 Recording System Configuration

Once all the LoiterTrace channels have been configured, you shall back up the configuration of your RMG. You can then reload the configuration in case of a system malfunction, or use the data to quickly configure another system.
For details, see *Configuration and Calibration Pictures Backup* on page 59.

9 Site Maintenance

This section covers the following areas of system maintenance and management:

- routine maintenance
- routine site maintenance
- routine equipment maintenance
- routine detection tests
- maintenance to regulatory requirements.

9.1 Routine Maintenance

On many sites, LoiterTrace will be used in conjunction with other detection technologies. The respective maintenance and testing procedures for the other products shall be used in conjunction with this information to ensure overall site security is maintained at the required level.

To perform maintenance in a repeatable and consistent manner, Xtralis suggests to draw up a table of tests and checks to be carried out in each inspection/maintenance cycle. This shall be done as part of the commissioning phase. This will ensure that the system is tested in a similar fashion each time, particularly if sufficient detail is provided for each test.

These tables shall include the following information for each camera and detection area:

- date/time/person conducting tests
- description of test or maintenance to be performed
- results of test or maintenance performed
- any maintenance or site issue that needs to be addressed
- date/time for next maintenance/test.

In addition, copies of site plans annotated showing camera locations as well as location of any other detector technologies shall be used to document detection areas and the path of detection tests.

Appendix H contains examples of tables for tracking maintenance procedures and outcomes.

9.2 Routine Site Maintenance

Regular site inspections, preferably on a monthly basis, that check the listed site conditions shall occur as a minimum. These conditions can impact on the performance of LoiterTrace or on the level of security provided, but they are by no means an exhaustive list. If a very significant change occurs, then a site re-evaluation may be required to ensure optimum performance.

Foliage can impact LoiterTrace in a number of ways, and must be kept controlled so that the following scenarios do not occur:

- masking areas where detection should occur
- nuisance alarms where foliage has grown and has become visible in the field of view
- blocking lighting of areas during the night
- removal of foliage causing changed lighting conditions, such as removal of shrubs along a fence line allowing multiple vehicle headlights to sweep across a camera's field of view
- moving shadows from wind-blown foliage in the field of view of the camera causing nuisance alarms.

Lighting is an essential element of the performance of LoiterTrace. Lighting shall be checked to ensure that all areas are adequately lit at all times, and in particular structures or foliage are not blocking lights.

Other environmental factors can have an impact on the performance of LoiterTrace or the level of security provided. These include:

- Changes to adjacent premises, such as the erection of temporary or permanent structures, can alter lighting, or change activity levels expected around the site.
- Changes within the premises, such as the erection of temporary or permanent structures, facilities maintenance activities, or new operating procedures.

9.3 Routine Equipment Maintenance

You shall perform a number of regular maintenance tasks monthly to ensure that the LoiterTrace application continues to perform as expected.

- General inspection of all cabling, conduit, connectors, glands, and housings to ensure that they are all in good working order and not suffering deterioration.
- General inspection of the RMG chassis, ensuring that it is dust free and the fan mounted on the power supply is not obstructed in any way.
- If the RMG is equipped with fan filters, check whether they require cleaning or replacing.
- Regular cleaning of camera housing windows with lens cleaner and a lint-free cloth to ensure that the performance of the system is not prejudiced by poor image quality.
- Check that any heaters, blowers, washers, or wipers installed on camera housings are operating as expected.
- Where insects or spiders can be a problem in or near camera housings, apply insect-repellent material, such as pest control strips or surface spray, to reduce any nuisance alarms.

9.4 Routine Detection Tests

Regular site detection tests shall be performed at least once per month, but preferably weekly, to check whether the LoiterTrace application detects unauthorised loitering. The detection tests used as part of the maintenance program shall follow the tests performed as part of the initial installation and commissioning. The descriptions of these tests shall be documented in tables.

For each detection area, the following shall be performed:

- Check that the detection area covered by each camera connected to LoiterTrace matches the initial design and commissioning, and that the detection areas programmed for LoiterTrace are still aligned within the field of view of the camera.
- Execute a test in each detection area based on the type of loitering, such as a walking target for opportunistic loiterer. Ensure that the alarm activation is reported as expected at the LoiterTrace application, and that any third-party system triggered from the LoiterTrace application receives an alarm notification.
- Repeat the tests under the different lighting conditions, e.g. day or night. Conducting tests at dawn/dusk shall also be considered as the lighting conditions at these times can provide the most challenging environment for detection.

It is also important to check that detection is not occurring in areas where detection should not occur. In each detection area, check that detection does not occur in areas that should be masked out.

9.5 Maintenance to Regulatory Requirements

Regular maintenance and testing of security systems may be mandated by internal organisational requirements, but in some industries, specifically high-risk industries such as nuclear power generation, there may be statutory requirements for maintenance and testing. Please check with the appropriate government agencies to determine whether any such criteria apply in your industry area.

Appendix A: False and Nuisance Alarms

Ultimately no security system is perfect, generally through generating false or nuisance alarms. As a security system is made more sensitive to detecting loitering, the false and nuisance alarm rate can increase. False or nuisance activations limit the effectiveness of a security system, as operators become used to receiving alarms that are not valid, and may miss valid alarms assuming that the alarm is just another false or nuisance alarm.

- A **false alarm** can be defined as an alarm activation that is reported, but the cause of which cannot be identified.
- A **nuisance alarm** can be defined as an alarm activation that is reported, but the cause of the alarm can be verified and no further response is required.

The goal in designing a security system is to provide the highest rate of successful detection, traded off against the lowest rate of false and nuisance alarms. Using an application such as LoiterTrace allows for removing nuisance alarms, as the alarm must be verified remotely at a monitoring centre before dispatching personnel.

In addition, a well-designed and correctly installed system can limit the generation of false alarms significantly. The capability to reduce the impact of false/nuisance alarms greatly enhances the utility and suitability of the LoiterTrace application to a number of scenarios.

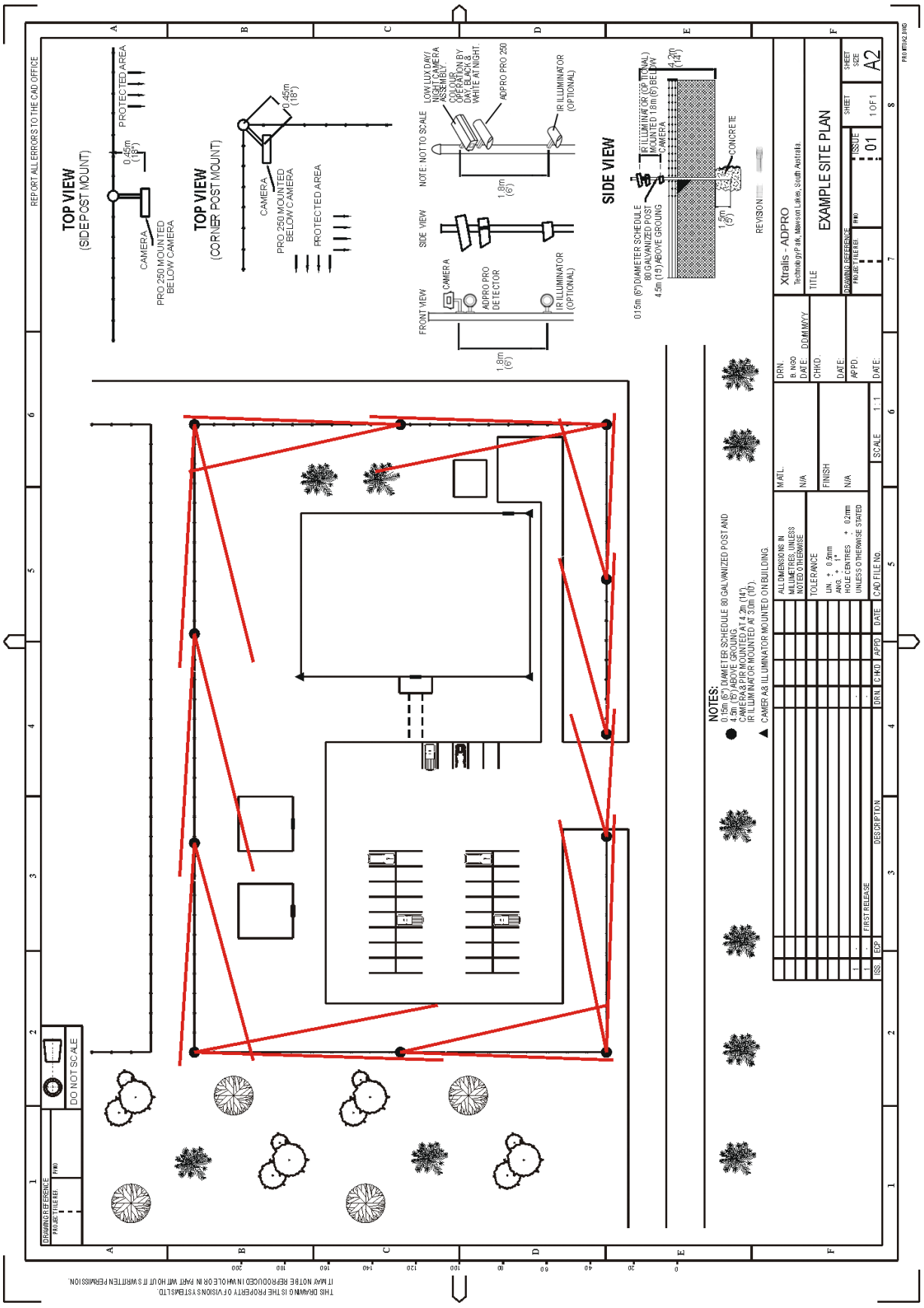
Appendix B: Site Survey Checklist

Company : ..... Date : .....

Location : ..... Surveyed by : .....

Site Plan Annotation	Checked
Location of lighting	
Location of equipment room	
Communications infrastructure identified	
Trees identified and marked	
Location of fences and barriers	
Location of nearby roads	
Location of adjacent structures	
Location of existing CCTV systems or other detectors	
Location of all structures	
Other Requirements	
Site images acquired	
Clarification of customer and security expectation	
Clarification of any special security requirements	
Location of noisy equipment (only if using audio)	

Appendix C: Example Site Plan



Appendix D: System Design and Equipment Checklist

Company : ..... Date : .....

Location : ..... Designed by : .....

Channel No.	Camera selected	Lens selected	Field of view OK	Lighting OK	Other detectors	Camera mounting	Cabling distance
1.							
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3.							
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Any special requirements:

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Appendix E: Camera/Lens Selection

Horizontal FOV – 20 Metres (66 Feet)

Lens focal length (mm)	1/4" camera format				1/3" camera format				1/2" camera format			
	Max. distance (metres/feet)		Dead zone (metres/feet)		Max. distance (metres/feet)		Dead zone (metres/feet)		Max. distance (metres/feet)		Dead zone (metres/feet)	
4.8	30	98	6	19	20	65	3	10	14	48	2	5
6.0	37	123	8	25	25	81	4	15	18	60	3	9
8.0	50	164	10	35	33	109	7	22	25	81	4	15
12.0	75	247	16	53	50	164	10	35	37	123	8	25
16.0	NR	NR	NR	NR	67	220	14	47	50	164	10	35
25.0	NR	NR	NR	NR	NR	NR	NR	NR	78	257	17	55

Horizontal FOV – 22 Metres (75 Feet)

Lens focal length (mm)	1/4" camera format				1/3" camera format				1/2" camera format			
	Max. distance (metres/feet)		Dead zone (metres/feet)		Max. distance (metres/feet)		Dead zone (metres/feet)		Max. distance (metres/feet)		Dead zone (metres/feet)	
4.8	33	108	6	20	22	71	3	11	16	53	2	6
6.0	41	135	8	26	27	90	5	15	20	67	3	10
8.0	55	181	11	35	36	120	7	22	27	90	5	15
12.0	NR	NR	NR	NR	55	181	11	35	41	135	8	26
16.0	NR	NR	NR	NR	73	242	15	48	55	181	11	35
25.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Horizontal FOV – 25 Metres (83 Feet)

Lens focal length (mm)	1/4" camera format				1/3" camera format				1/2" camera format			
	Max. distance (metres/feet)		Dead zone (metres/feet)		Max. distance (metres/feet)		Dead zone (metres/feet)		Max. distance (metres/feet)		Dead zone (metres/feet)	
4.8	37	123	6	20	25	81	3	11	18	60	2	6
6.0	47	154	8	26	31	102	5	16	23	76	3	10
8.0	62	206	11	36	41	137	7	23	31	102	5	16
12.0	NR	NR	NR	NR	62	206	11	36	47	154	8	26
16.0	NR	NR	NR	NR	NR	NR	NR	NR	62	206	11	36
25.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Horizontal FOV – 30 Metres (98 Feet)

Lens focal length (mm)	1/4" camera format				1/3" camera format				1/2" camera format			
	Max. distance (metres/feet)		Dead zone (metres/feet)		Max. distance (metres/feet)		Dead zone (metres/feet)		Max. distance (metres/feet)		Dead zone (metres/feet)	
4.8	45	148	6	21	30	98	4	12	22	73	2	7
6.0	56	185	8	27	37	123	5	17	28	92	3	11
8.0	75	247	11	38	50	164	7	24	37	123	5	17
12.0	NR	NR	NR	NR	75	247	11	38	56	185	8	27
16.0	NR	NR	NR	NR	NR	NR	NR	NR	75	247	11	38
25.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Note

Detection ranges with NR in the table are Not Recommended, as the longer focal length lenses tend to amplify the effects of camera movement in the image, which may lead to false alarms.

Camera mounting height = 4.2 m (14 ft).

Appendix F: Commissioning Checklist

Company : ..... Date : .....

Location : ..... Commissioned by : .....

Channel No.	Detection Test	Detection Test Documented	Soak Test	Parameters Recorded
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Appendix G: Site Detection Tests

Caution!

Perform the detection tests **at least** twice: once during the day, and once at night.

Company : ..... Date : .....

Location : ..... Tested by : .....

1. Detection Test Description

Detection Area (Camera Name and No.)	Test Number	Test Conditions (day/night/dawn/dusk)	Test Description

2. Detection Test Performance

Detection Area (Camera Name and No.)	Test Number	Test Due	Test Performed	Signed	Detection Pass/Fail

Appendix H: Site Maintenance Tables

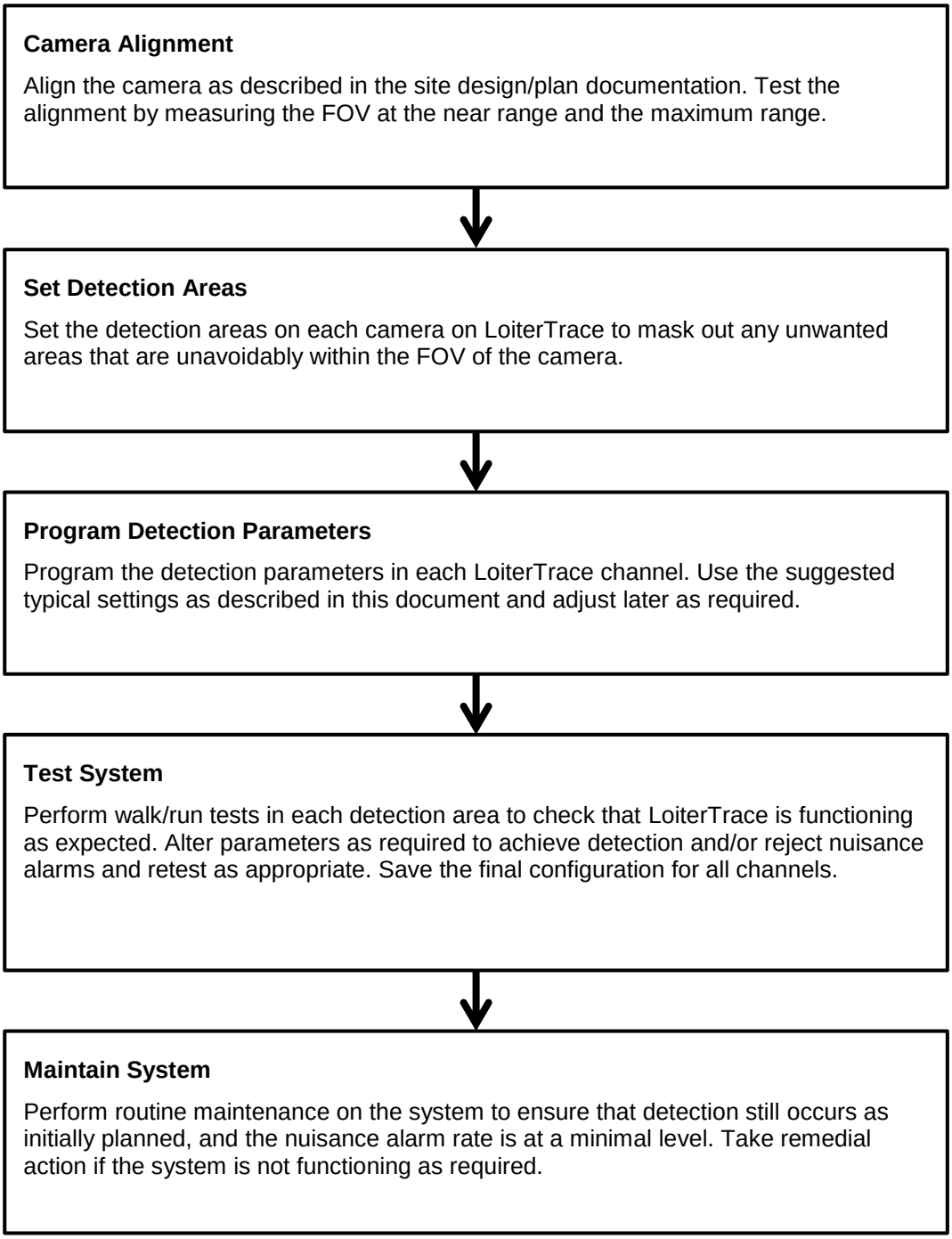
Company : ..... Date : .....

Location : ..... Tested by : .....

Camera Name and Number					
Maintenance Due					
Maintenance Performed					
Signed					
Cleaned Window					
Housing Condition					
Cable Condition					
Heater or Blower functioning					
Correct Alignment					

Appendix I: Installation Quick Reference

This appendix provides a quick reference for installing a LoiterTrace application:



Appendix J: LoiterTrace Dos and Don’ts

Dos	Don’t
Walk test at day/dusk/night	Install cameras looking into lights/IR illuminators
Trim foliage regularly	Change parameters without testing the system
Check alignment of cameras	Use a FOV of greater than 30 m/98 ft (20 m/66 ft if not calibrated).
Regularly clean camera windows/lens	
Route cables neatly	
Spend time performing a thorough survey	
Use barriers to prevent light spillage from roads	
Account for dead zones in site layout and camera/lens selection	
Check target sizes at the foreground and background	

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