OSID-DE MULTI-EMITTER SYSTEM APPLICATION AND DESIGN APPLICATION NOTE

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Preface

This Application Note outlines techniques/methods for optimal positioning of emitters in spatial and multi-emitter sites.

This Application Note is intended as a guide to achieving the most out of an OSID-DE system using multiple emitters and demonstrating the superiority of an OSID-DE system compared to a one-on-one beam installation.

Related Products

Product	Description
OSI-10	Imager - 10º coverage
OSI-90	Imager - 80º coverage
OSE-SP-01	Emitter - Standard Power Alkaline battery
OSE-SPW	Emitter - Standard Power, Wired
OSE-HP-01	Emitter High Power Alkaline battery
OSE-HPW	Emitter - High Power, Wired
OSID-EHI	Imager environmental housing IP66
OSID-EHE	Emitter environmental housing IP66
OSE-ACF	Anti-condensation film for Emitters
OSEH-ACF	Anti-condensation film for OSID-EHE and OSID-EHI environmental housings
OSID-WG	Wire Guard
RTS151KEY	Imager Reset Station Flush Mount
RTS151 KIT	Imager Reset Station Surface Mount
OSP-001	FTDI Cable 1.5m
OSP-002	Laser Alignment tool
OSP-003	Acrylic test filter - 10 pack
OSP-003-200	Acrylic test filter - bulk pack 200 units
OSE-RBA	Emitter spare battery Alkaline
OSE-RBL	Emitter Lithium battery exchange unit
OSID-INST	Installation and maintenance kit

Contents

1 Introduction

The OSID-DE system offers many important extended features when compared to traditional or auto-aligning beam detectors. For example, the spatial capabilities of OSID-DE allow the Emitters to be placed in 3D planes that provide dense detection mesh. This detection mesh provides an absolute coverage for high-risk applications in a cost-effective way. The figure below shows an OSID-DE detection mesh in an auditorium.

The following summarizes the other important features of OSID-DE:

- Reduced installation wiring and complexity
- Reduced total cost of ownership
- High tolerance to building movement (raises a fault not an alarm)
- High resistance to dust and dirt (raises a fault not an alarm)
- Little affected by fog, steam, and vapor (raises a fault not an alarm)
- Unaffected by ambient light

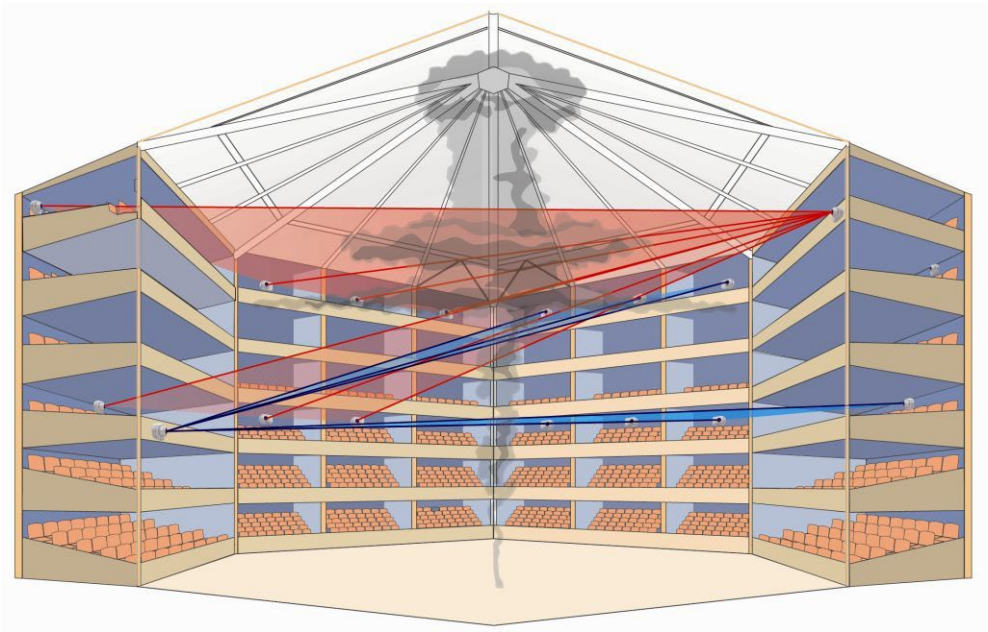


Figure 1: OSID-DE System

2 Minimum Fire Detection Requirements

Earlier detection of fire emergencies provided by OSID-DE allows earlier and safer evacuation of people, and increase the level of protection of properties. These earlier detection capabilities are beyond the minimum fire detection capability imposed by regulatory codes, fire brigade or insurance companies.

The figure below shows an auditorium protected by minimum fire detection requirements imposed by regulatory codes and standards for a multi-emitter solution. Depending on area height and local codes, this area could be protected with one or 2 layers of beam detection. For this example one layer of beam detection is required.

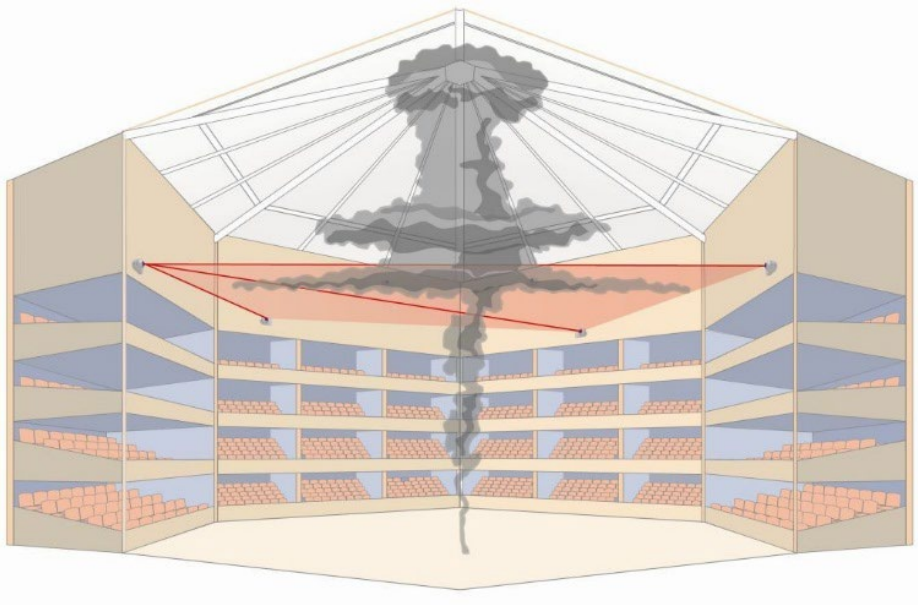


Figure 2: Minimum Fire Detection Requirements

3 Advantage of OSID-DE

Although the initial cost of the OSID-DE system is higher than traditional or auto-aligning beam detectors, this is justified by the extended features offered by OSID-DE.

Using OSID-DE in a multi-emitter deployment actually shows that the value proposition is as good and can be even better than one-on-one beam installations.

4 General Considerations

OSID-DE is designed to comply with and be approved to the product installation standards for “beam” detectors. This means the OSID-DE system design and installation must comply with local codes and regulations for projected beams (NFPA, GB 50116-98). The local codes and regulations prescribe:

- Beam spacing
- Distance below ceiling
- Distance to walls
- Maximum beam length
- Maximum supervised surface/area
- Deployment in apex ceilings

For multiple emitters (lines of protection) make sure that the covered areas at the emitters are compliant with local codes and regulation

5 Basic Rules

The following guides to good craftsmanship should be complied with.

- Include no obstructions between the Emitter and Imager
- Ensure the system is mounted well above the head height of a person
- Mount both imager and emitter on solid parts of the building such as the main support structure
- Avoid direct sunlight into the imager and emitter units. The imager and emitter may be installed in a location where direct sunlight occurs but the sun should never come into the field of view of the units. Avoid the units facing the rising and setting sun, install North-South
- Consider effects like stratification and other parameters that may affect the performance of the detector (e.g. room geometry, ceiling height, ceiling shape, …)

6 Where Not to Install OSID-DE

OSID-DE has a high resistance to dust and dirt. This does not mean that OSID-DE can be installed in all extremely challenging environments. Follow the rules below. If OSID-DE does not correspond to the criteria use ASD detectors that are especially developed and equipped for such extreme environments. Also see Doc. No. 25571".

- Verify upfront if the environment is suitable for OSID-DE (level of dust, dirt, steam, fog, ...)
- Check background level:
  - Use the OSID-DE Diagnostics software package to evaluate if the maximum ambient level (level of dust, dirt, etc) is within the OSID-DE limits and determine optimum sensitivity setting.

7 Square and Rectangular Shaped Areas

7.1 The Optimum Way

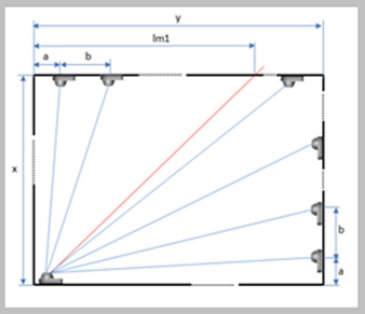
If the surface is rectangular or square, the OSA (OSID-DE Selection Assistant) program will indicate the exact position and number of emitters as well as the number of imagers required. Please refer to the OSA program for detail and use.

The result of this exercise is that you will use the minimum number of emitters/imagers and have a compliant system in minutes. OSA will equally provide you the comparison with both traditional and OSID-DE one-on-one beam solutions as well as a cost comparison of all the solutions.

The result of the OSA calculation is shown on several tables and graphs in an Excel spread sheet, illustrated below. The program prevents that you exceed the maximum allowed beam length, depending on type of emitters and imagers used, as well as the maximum allowed beam coverage and beam spread.

The program will also provide the spots where to point the laser alignment tool in order to be aligned to the horizontal ‘centre of its emitters.

OSI-90 Multi-Emitter Solution



Dimensions

Room Length	(y)	40	
Room Width	(x)	40	
Wall offset dist.	(a)	6	
Emitter Spacing	(b)	12	
Emitter Placement		3 along Y	4 along X
Alignment Tool Do (lm1)		40,0	Along Y
Alignment Tool Do (lm2)		N/A	Along Y

Units

	Number	Cost
OSI-90	1	EUR 507,00
OSE-SP	0	EUR 0,00
OSE-SPW	0	EUR 0,00
OSE-HPW	1	EUR 329,00
OSE-HP-01	6	EUR 1.974,00
Add. Module	1	EUR 1,00
Cable (m)	0	EUR 0,00
Total		EUR 2.811,00

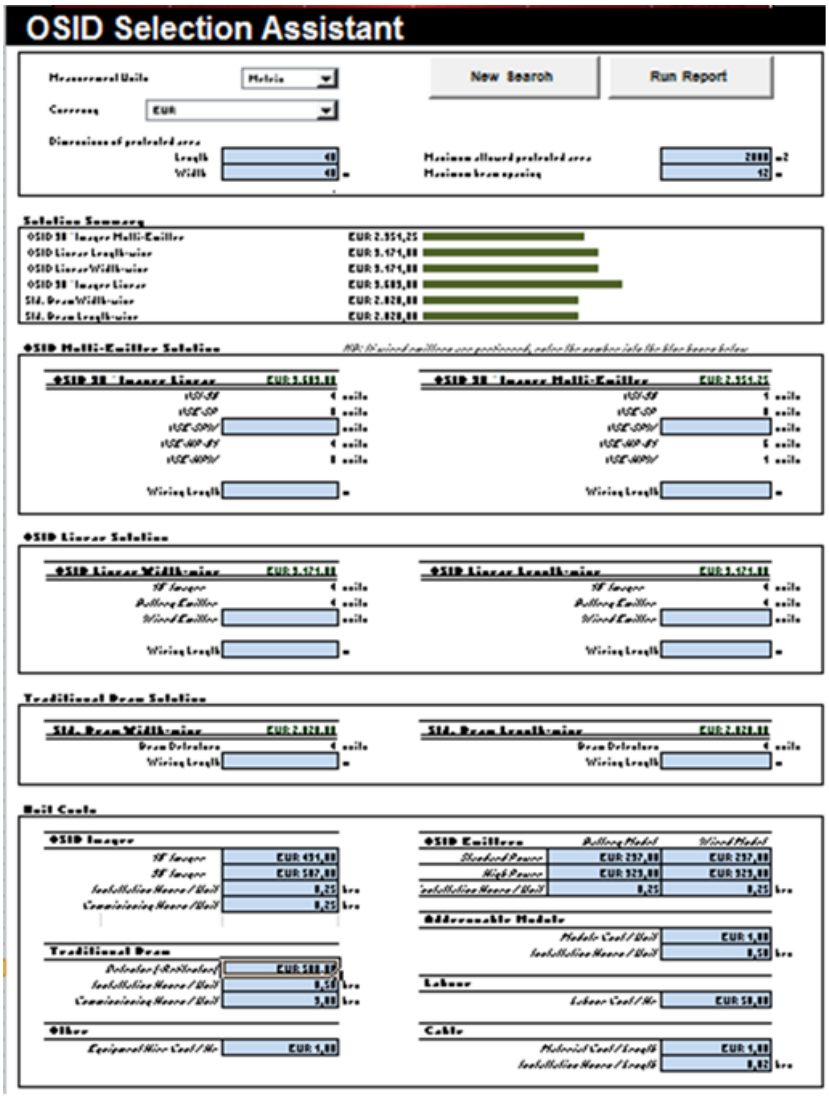
Installation

	Cost
Imager Mounting	0,25 hr
Emitter Mounting	1,75 hr
Add. Module	0,5 hr
Cabling	0 hr
Commissioning	0,25 hr
Equipment Hire	EUR 2,75
Labour	EUR 137,50
Total	EUR 140,25

Total Installation Cost

Total	**EUR 2.951,25**

OSID Selection Assistant



OSID Multi-Emitter Solution

Installation	Unit Cost	Unit Cost	Total 90 Linear Cost	Total 90 Multi Cost
Purchase Standard Power Battery	EUR/Emitt	237	0,00	0,00
Purchase Standard Power Wired Emitter	EUR/Emitt	237	0,00	0,00
Purchase High Power Wired Emitter	EUR/Emitt	329	0,00	329,00
Purchase High Power Battery Emitter	EUR/Emitt	329	1.316,00	1.974,00
Purchase 90°	EUR/Image	507	2.028,00	507,00
Purchase Addressable Module	EUR/Modul	1	4,00	1,00
Purchase Cable	EUR/Lengt	1	0,00	0,00
Total Material Cost			3.348,00	2.811,00
Battery Emitter mounting	hr/Emitter	0,25	0,00	0,00
Wired Emitter mounting	hr/Emitter	0,25	1,00	1,75
Imager mounting	hr/Imager	0,25	1,00	0,25
Addressable Module mounting	hr/Module	0,50	2,00	0,50
Cable mounting	hr/length	0,02	0,00	0,00
Commissioning	hr/Imager	0,25	1,00	0,25
Total hr	hr		5,00	2,75
Equipment hire cost	EUR/hr	1	5,00	2,75
Labor Cost	EUR/hr	50	250,00	137,50
Total Installation Cost	EUR/Site		3.603,00	2.951,25

OSID Linear Solution

Installation	Unit	Unit	Total Width	Total Length
Purchase Standard Power Battery	EUR/Emitt	237	948,00	948,00
Purchase Standard Power Wired Emitter	EUR/Emitt	237	0,00	0,00
Purchase 10 "Imager	EUR/Image	491	1.964,00	1.964,00
Purchase Addressable Module	EUR/Modul	1	4,00	4,00
Purchase Cable	EUR/Lengt	1	0,00	0,00
Total Material Cost			2.916,00	2.916,00
Battery Emitter mounting	hr/Emitter	0,25	1,00	1,00
Wired Emitter mounting	hr/Emitter	0,25	0,00	0,00
Imager mounting	hr/Imager	0,25	1,00	1,00
Addressable Module mounting	hr/Module	0,50	2,00	2,00
Cable mounting	hr/length	0,02	0,00	0,00
Commissioning	hr/Imager	0,25	1,00	1,00
Total hr	hr		5,00	5,00
Equipment hire cost	EUR/hr	1	5,00	5,00
Labor Cost	EUR/hr	50	250,00	250,00
Total Installation Cost	EUR/Site		3.171,00	3.171,00

Traditional Beam Solution

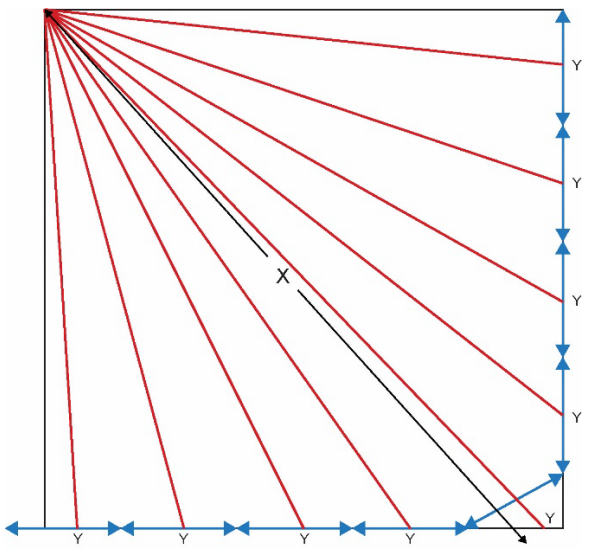
Installation	Unit	Unit	Total Short	Total Long
Purchase Beam Detector	EUR/Beam	500	2.000,00	2.000,00
Purchase Cable	EUR/Lengt	1	0,00	0,00
Purchase Addressable Module	EUR/Modul	1	4,00	4,00
Total Material Cost			2.004,00	2.004,00
Beam mounting	hr/beam	0,50	2,00	2,00
Addressable Module mounting	hr/Module	0,50	2,00	2,00
Cable mounting	hr/length	0,02	0,00	0,00
Commissioning	hr/beam	3,00	12,00	12,00
Total hr	hr		16,00	16,00
Equipment hire cost	EUR/hr	1	16,00	16,00
Labor Cost	EUR/hr	50	800,00	800,00
Total Installation Cost	EUR/Site		2.820,00	2.820,00

The Alternative Way

If you do not have the program at hand proceed as follows.

Make sure you have the right dimensions of your floor plan.

- Use the following convention:
- X = Beam length, both allowed by local codes and within the emitter range specs (see below).
- Y = Beam coverage, width allowed by local codes.
- Standard emitters and high-powered emitters can be mixed on any installation.
- Same goes for wired and battery powered emitters.



Proceed as follows:

Place the imager(s) in the most appropriate corner with regard to geometry and minimum wiring. Then set out Y values on the opposite walls.

You now put an emitter in the middle of each Y section.

The number of Y sections also determines how many imagers are required.

Available Combinations Imager and Emitter

Imagers	Emitters	
Field of View	Maximum Detection Range	
	Standard	High Power
7°	150 m (492 ft)	-
80°	34 m (111 ft)	68 m (223 ft)

8 Irregular Shaped Areas

Proceed as above with regard to the rules and regulations. Or use the alternative way described above or cut out of a piece of paper a rectangle of the size corresponding to beam width and length. Respect the scale and dimensions.

Place the imager(s) in the most appropriate corner with regard to geometry and minimum wiring and set out the coverage section as per drawing below.

X = Beam length, both allowed by local codes and within the emitter range specs (see below).

Y = Beam coverage, width allowed by local codes.

In this way you achieve the optimum spacing and coverage.

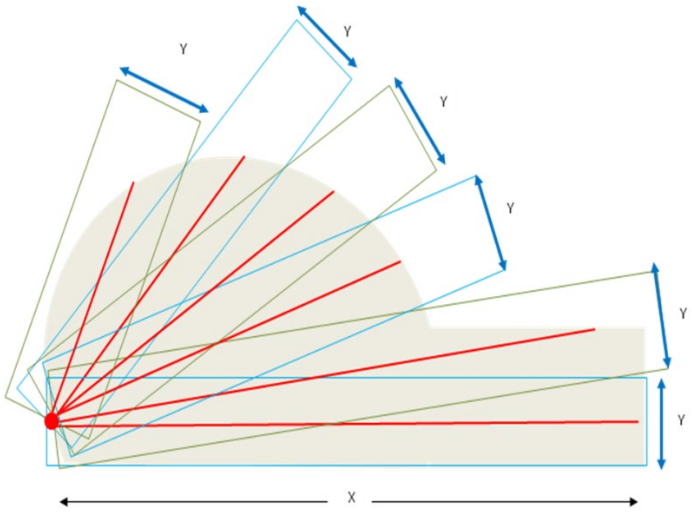


Figure 3: Irregular Shaped Areas

This method is a good approximation but not 100% correct.

The reason is that the 'rectangles' representing the beam stop at the walls and hence some of the surface will be located slightly outside the maximum allowed beam spacing.

9 OSID-DE Spatial Capabilities

The spatial capabilities of OSID-DE allow the Emitters to be placed in a 3D plane that provides a dense detection mesh. This detection mesh provides an absolute coverage for high-risk applications in a cost effective way. The figure below shows an OSID-DE detection mesh in an auditorium.

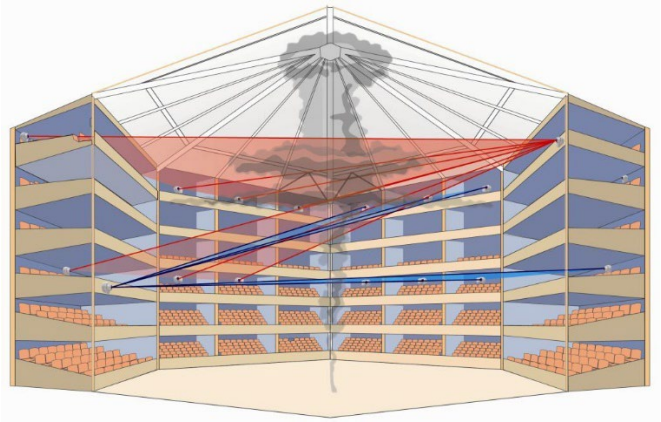


Figure 4: OSID-DE detection mesh in an auditorium

10 Verifying the Emitter Locations

When on site doing the installation, control the locations and direction of both the imager and the emitters by using the alignment tools, see also installation manual. Emitters do not need to be on the same height. The location of the emitters can be adapted depending on obstructions that were not visible on the floor plans while designing the system. The actual horizontal and vertical freedom, per type of imager, is available in the installation guide.

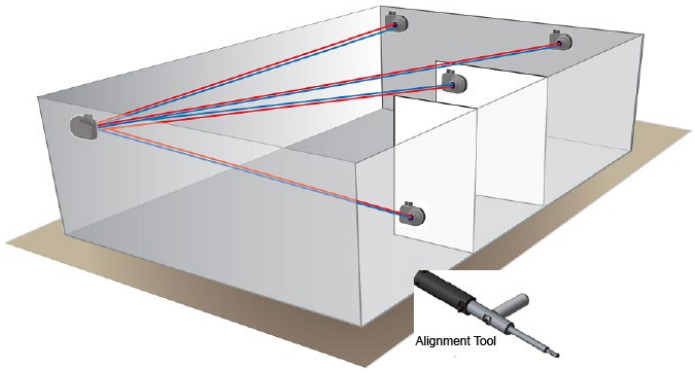


Figure 5: Different levels Emitter Locations

Using your laptop and the OSID-DE Diagnostics software, you can acquire an image and check exactly what the imager is ‘seeing’. Make sure all emitters are accounted for on the screen.

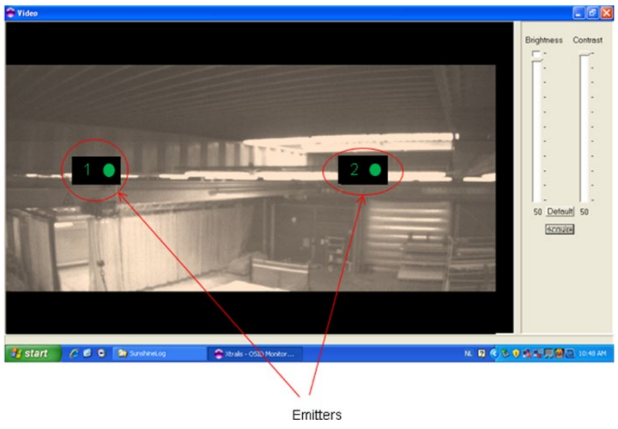


Figure 6: OSID-DE Diagnostics software

11 Typical Example of OSID-DE Versus Traditional Beam

The strength of OSID-DE multi-emitters applications is in the considerable savings of wiring and labor.

Below the drawings of the typical wiring for traditional beams versus OSID-DE wiring. Some beams may come without a control unit at ground level.

Non-auto aligning beams will alternate TX and RX to avoid cross talk of the signals.

These beam installations are taking close to double of the wiring for auto-aligning beams.

Even auto-aligning beams require a magnitude more wiring and labor that OSID-DE.

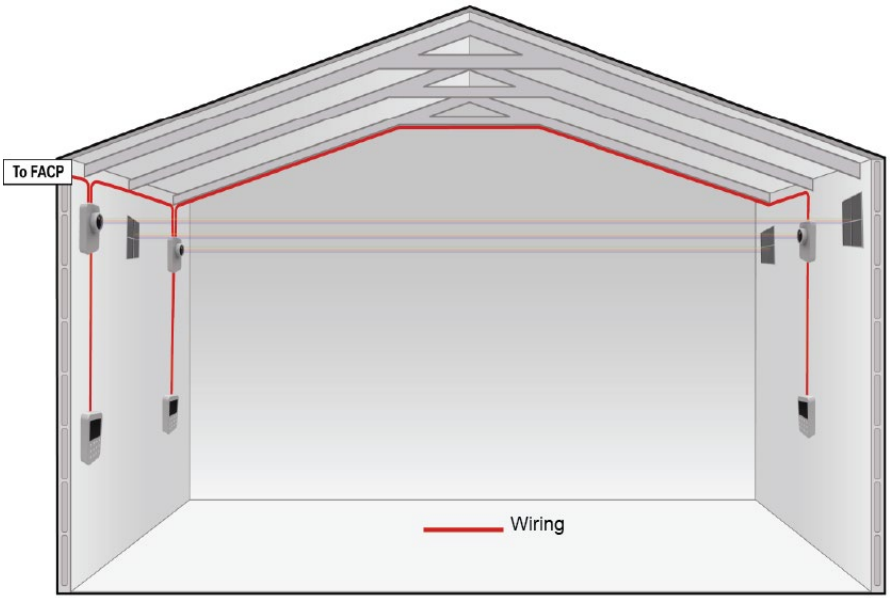


Figure 7: Traditional Beam

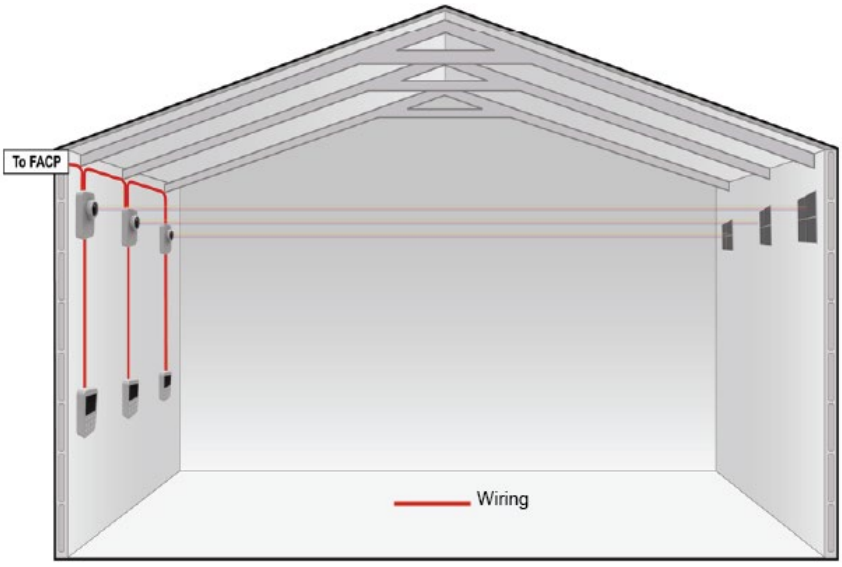


Figure 8: Auto-aligning Beam

Below is a typical application of multi-emitter OSID-DE implementation.

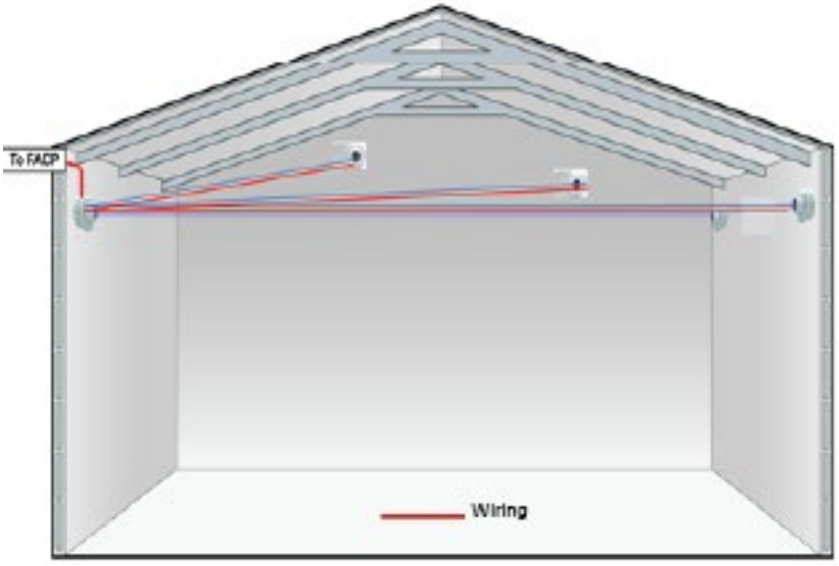


Figure 9: OSID-DE multi-emitter

Example considering local installation regulations stipulating 12 m inter-beam distance.

In this 40mx40m area, 1 imager and 7 emitters replace 4 traditional beams. The net result is that the OSID-DE installation is less expensive than traditional beams, whether auto-aligning or not. An important extra advantage is that is that multi-emitter solutions offer a 50% better detection coverage!

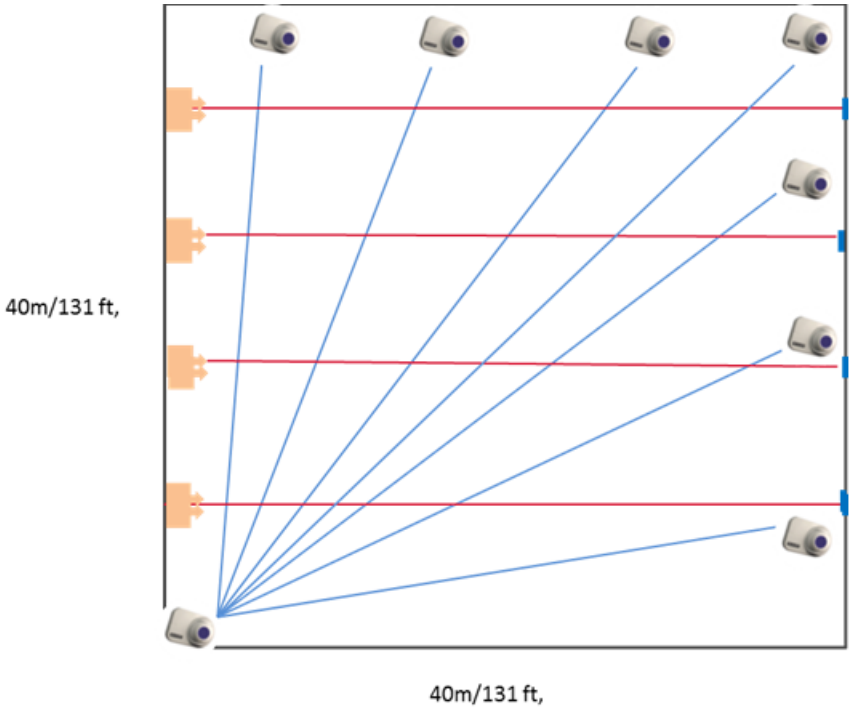


Figure 10: local Installation in 40mx40m area

12 Increasing the OSID-DE Detection Capabilities Using OSID-DE's Spatial Capabilities

Typically, in atria of shopping malls or theatres a customer may favor earlier detection over the imposed minimum detection by codes, fire brigade or insurance company.

This can be for earlier, hence safer, evacuation or for extra protection of valuables.

Note that extra emitters can be added at any time after the initial installation up to the maximum supported by that imager model.

Follow the guidelines set out in the installation manual.

13 Minimum Requirements

Let's examine a typical example of a shopping mall atrium.

Depending on the height and the local codes the area could be protected with one or 2 layers of beams.

For the sake of this example let's assume one layer.

The minimum coverage required by codes and standards for a multi-emitter solution will look as below.

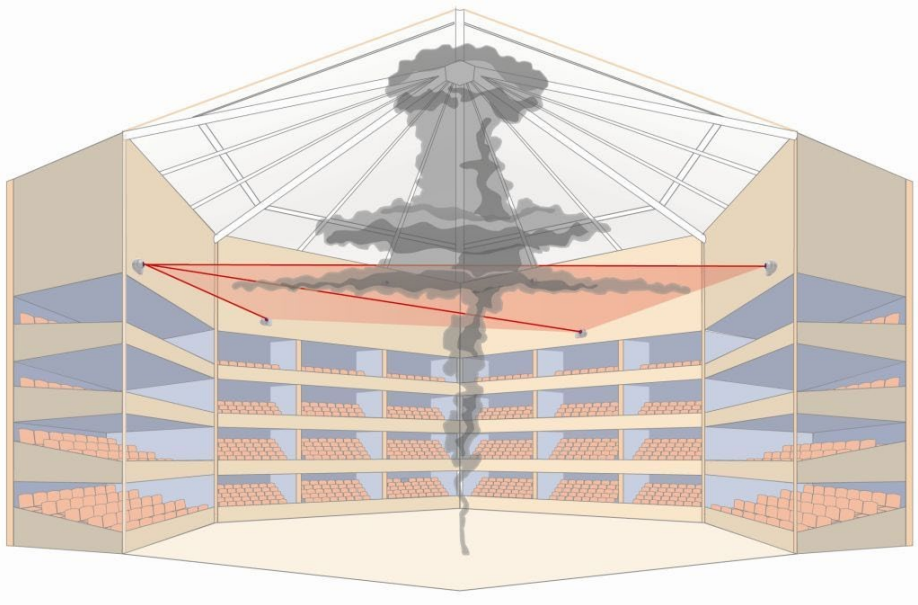


Figure 11: Minimum required coverage by codes

14 Increased Coverage and Earlier Detection

The unique ability of OSID-DE to position its emitters in a 3-dimensional space allows providing the customer with a dense detection mesh in a cost-effective way for an absolute coverage in high-risk applications.

Intermediate detection with multi-emitter needs careful installation planning. Depending on the height that the intermediate layer gets deployed, emitters will need to be placed very close to each other.

To allow the Imagers to commission multiple Emitters as separate sources, a spatial separation between Emitters of 5 degrees for the OSI-90, is required. To comply to this requirement consecutive Emitters along a wall will need to be paired with different Imagers!

One way of proceeding is as per below.

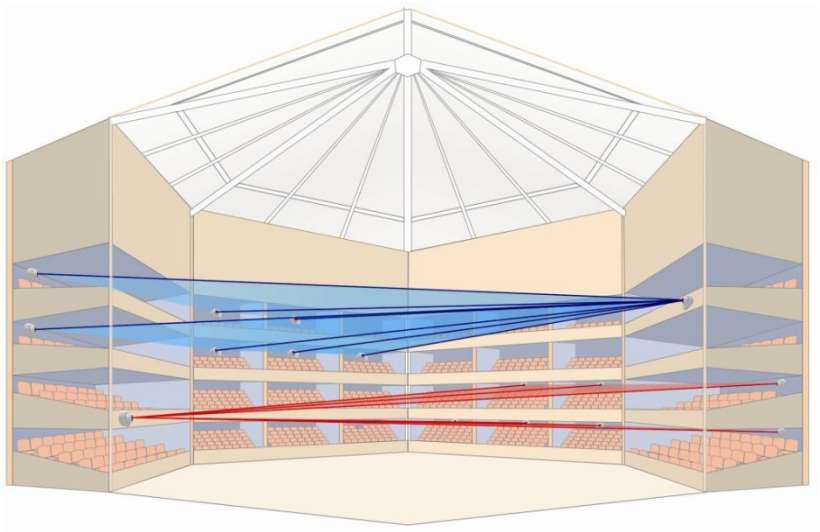


Figure 12: Imagers commissioning multiple Emitters

15 Further Support

Contact an Xtralis office or distributor for further information.

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