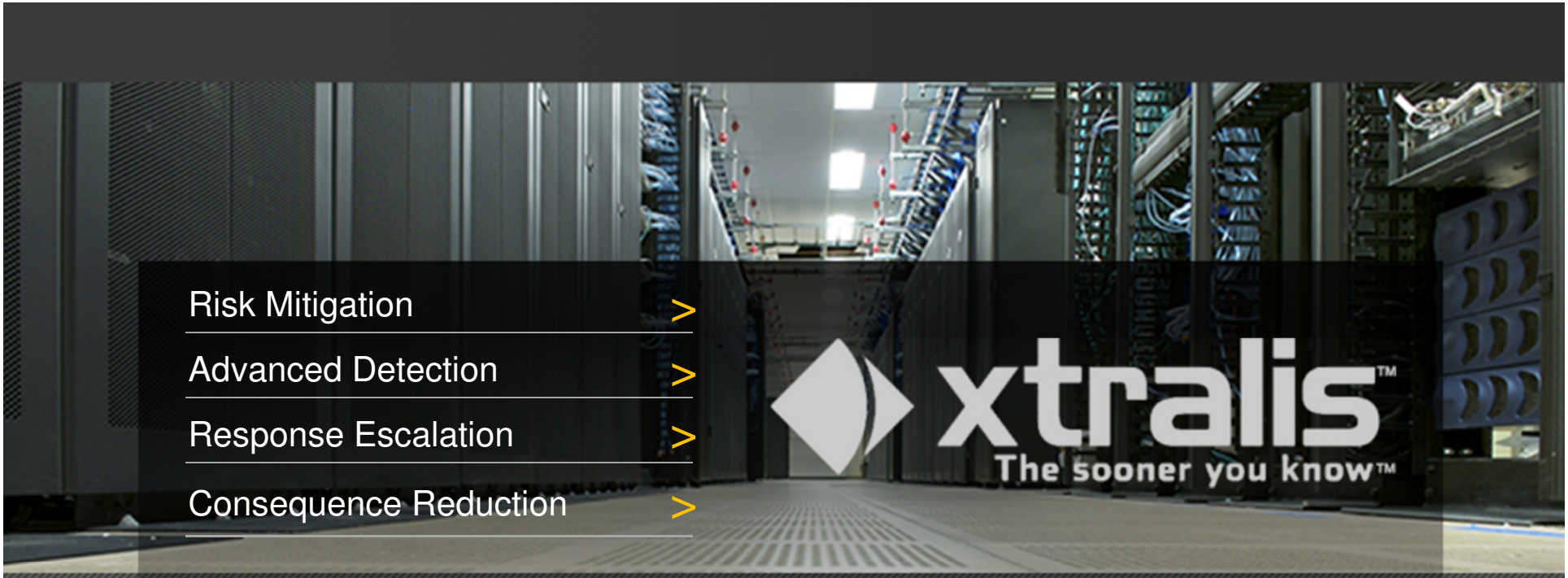


Application of Aspirating Smoke Detection Technologies in IT/Communication Infrastructure

Rory Manley
Regional Sales Manager, Xtralis

Xtralis

- Core competency
- Industry leader
- Proven track record
- Technology innovator

THE WORLD'S
NUMBER 1 BRAND
OF ASPIRATING
SMOKE DETECTOR

VESDA® by xtralis™

SAMSUNG
BMW
AMERICAN EXPRESS
verizon
BOEING
AT&T
NASA
T-Mobile
McDonald's
Sprint
Microsoft
citi
facebook
YAHOO!
HSBC
JACK DANIEL'S
TOYOTA
intel
LG
amazon

Fire Risks

Common instigators…

- Electrical
- Mechanical
- Administrative

Fire Protection Strategy

What's driving requirements…

- Codes and standards
- Economic loss
- Regulatory impact (e.g. maintain network reliability)
- Brand Image
- Life and welfare of public relying on function of network
- Building occupants or exposed property
- Military and government installations relying on function of network

Fire Detection Goals

Ensure uptime…

- Detect
- Control
- Mitigate

Challenging Environment

With many variables…

- Obstructions
- Configuration
- Temperature
- Airflow patterns
- Air velocity
- Air circulation
- Dilution

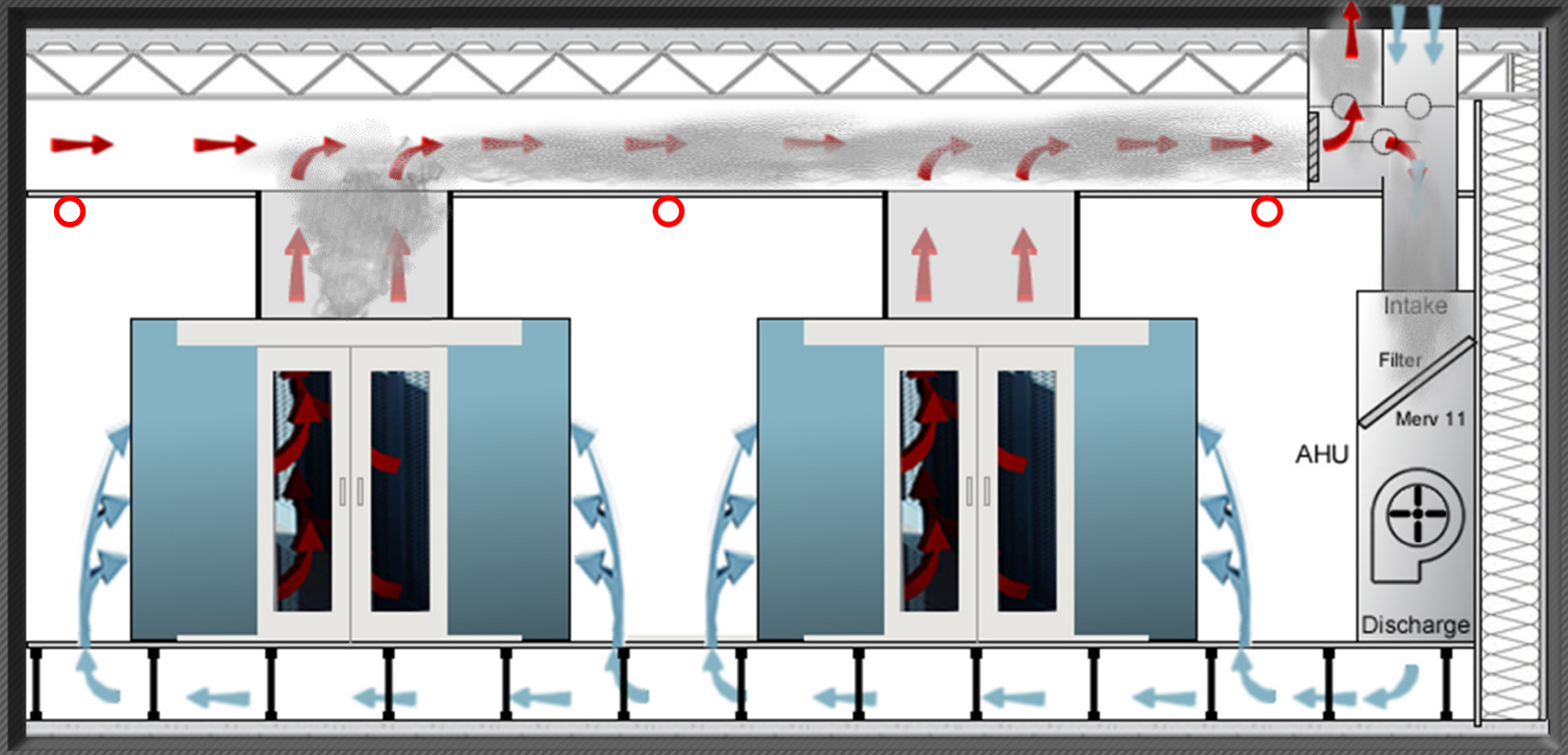
Challenging Environment

Leaving to question detection…

- Suitability
- Placement
- Spacing

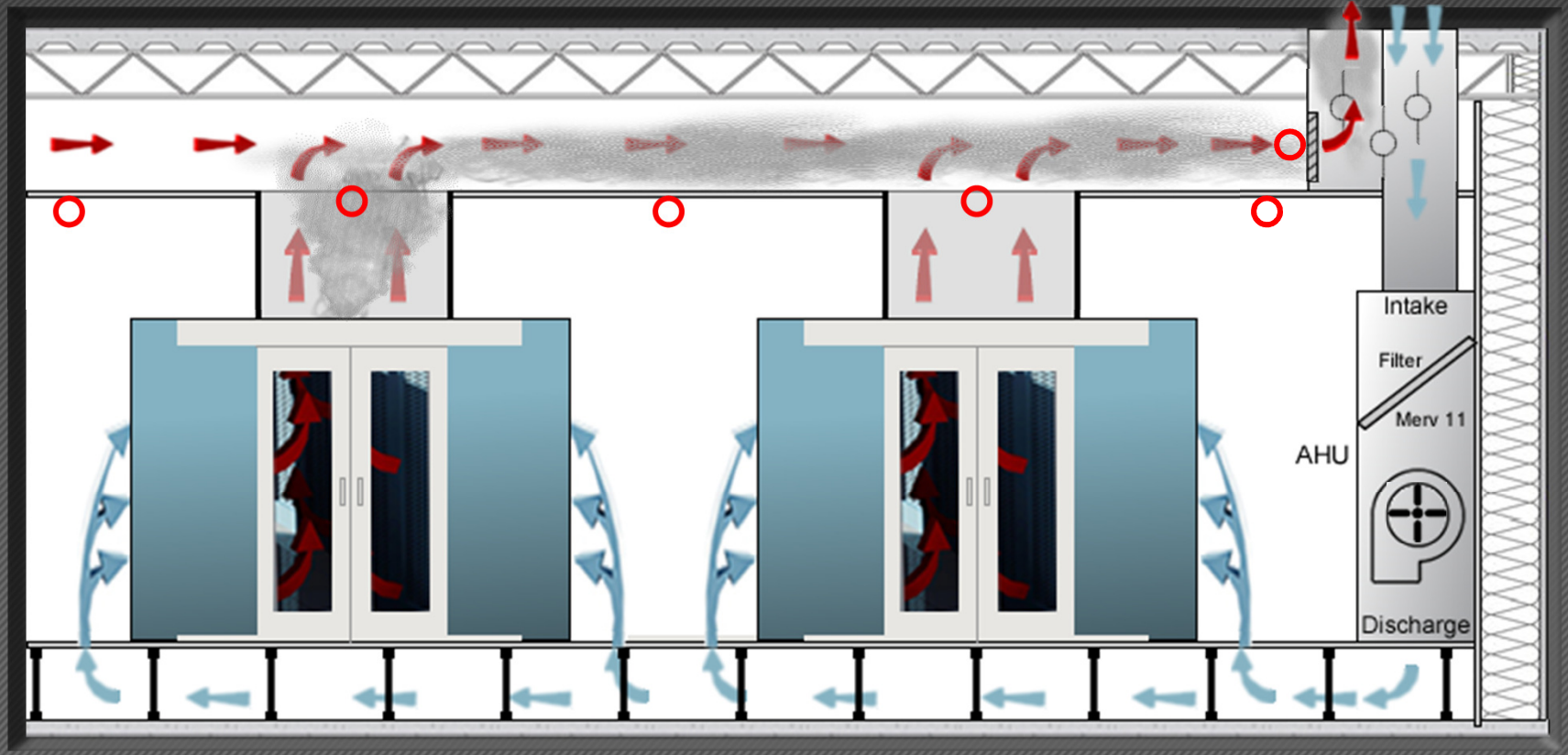
Conditions

For smoke detections systems to detect products of combustion, the products must travel from the source to a sensor or port and arrive there in sufficient density to be detectable.



Performance Based Approach

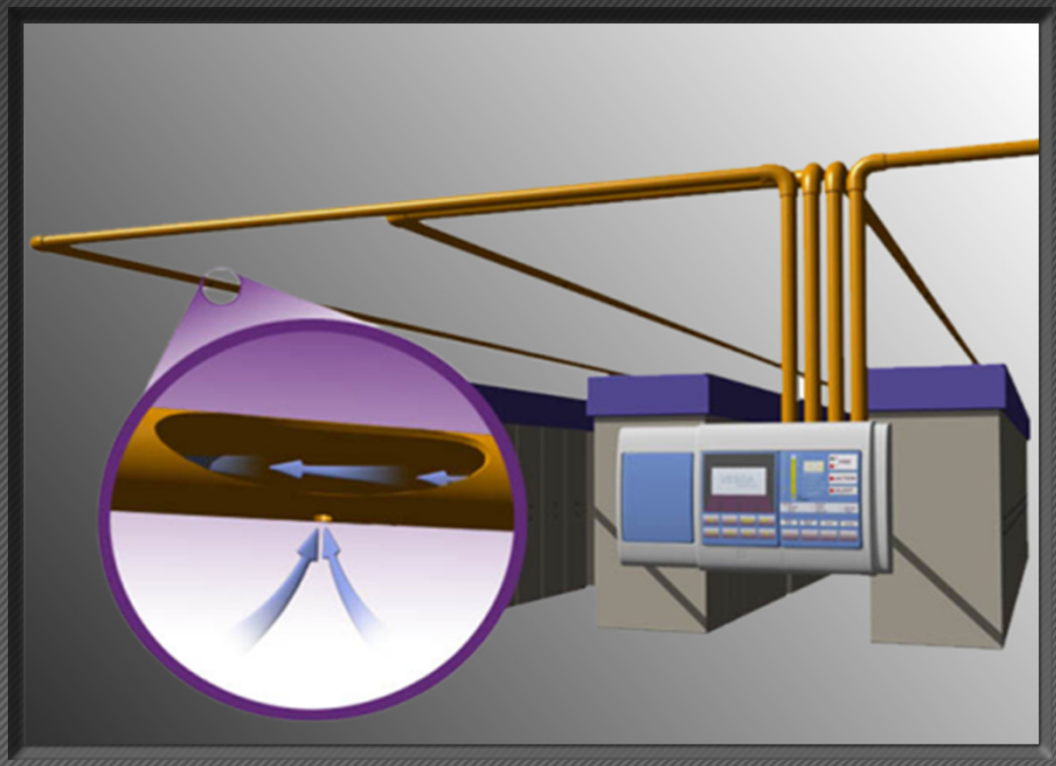
Detection within exhaust/return air distribution path, at a point prior to dilution provides best opportunity to detect incipient stage of fire development.



Air Sampling Smoke Detectors

Suitable performer…

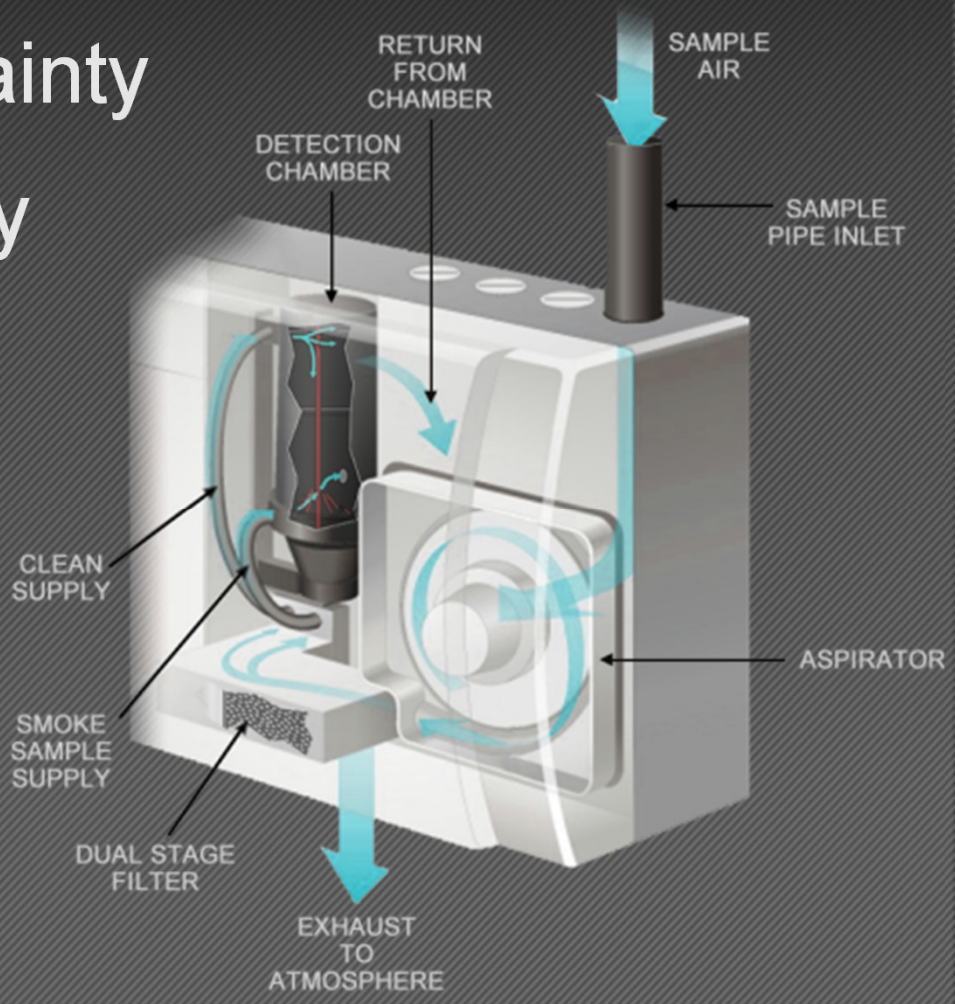
- ✓ Sensitive
- ✓ Capable
- ✓ Flexible
- ✓ Intelligent
- ✓ Simple
- ✓ Secure



Air Sampling Smoke Detectors

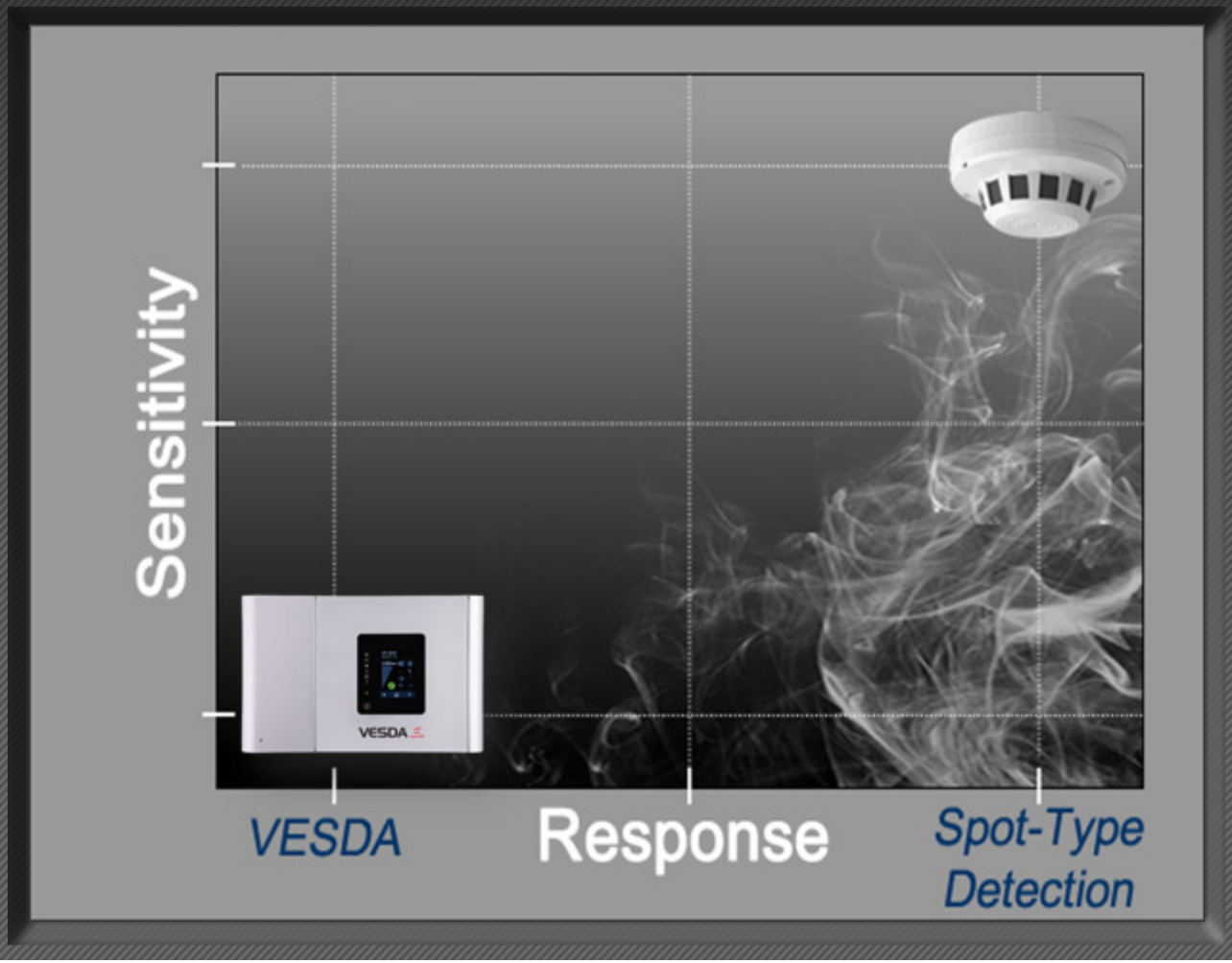
Detector performance…

- Measurement certainty
- Operational stability
- System integrity



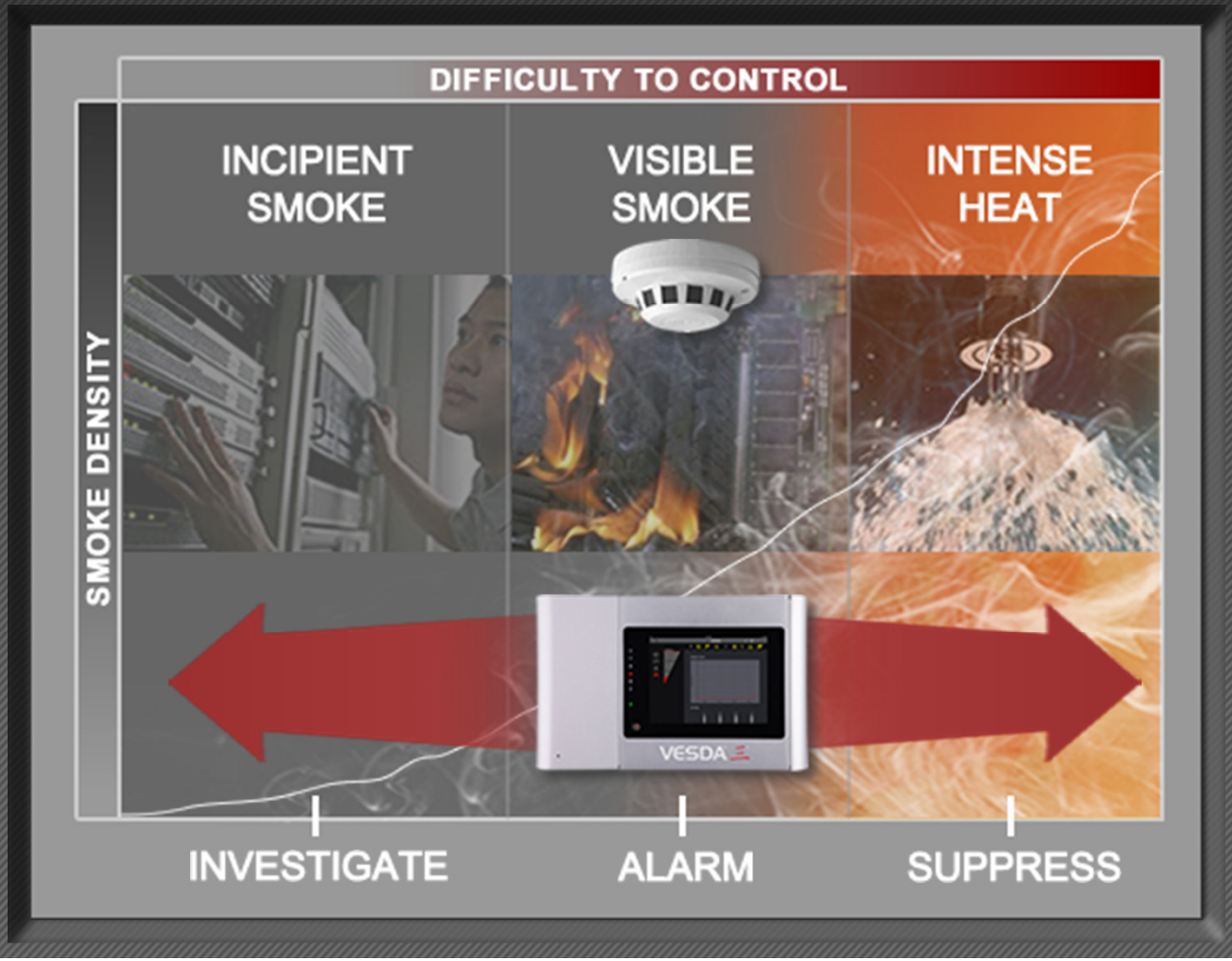
Air Sampling Smoke Detectors

Sensitive by design…



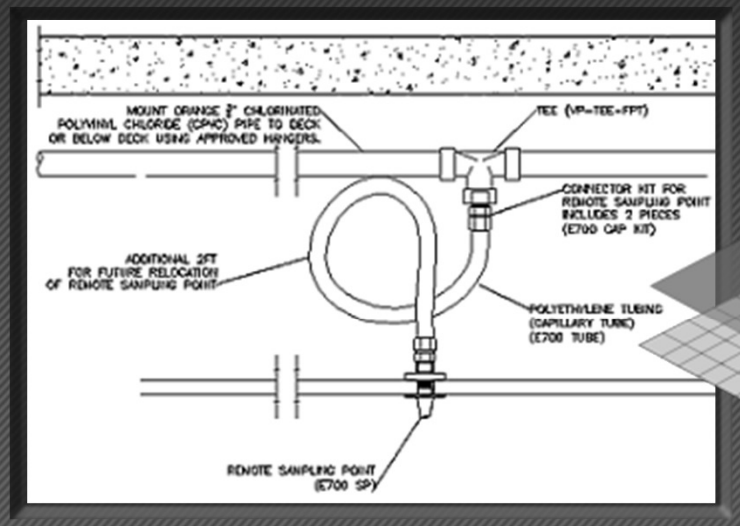
Air Sampling Smoke Detectors

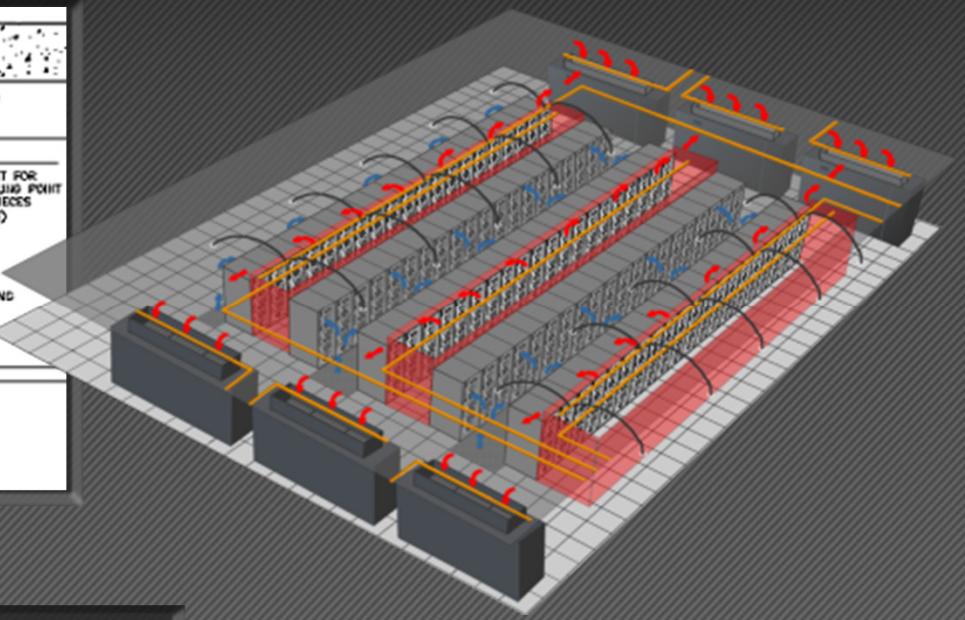
Staged response…

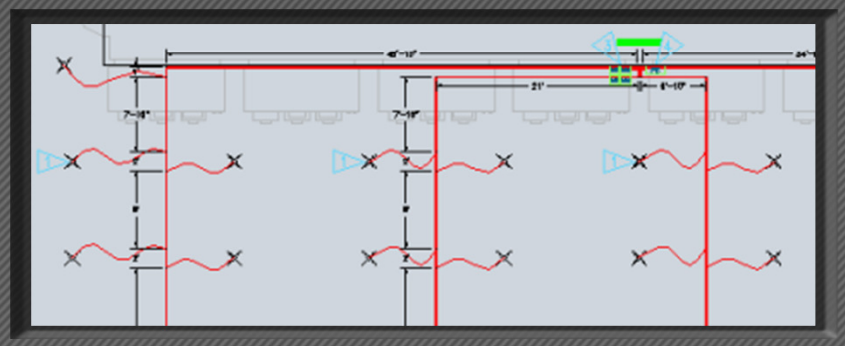


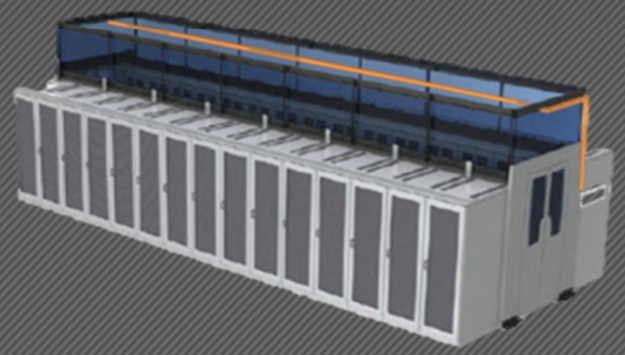
Air Sampling Smoke Detectors

Flexible by design…



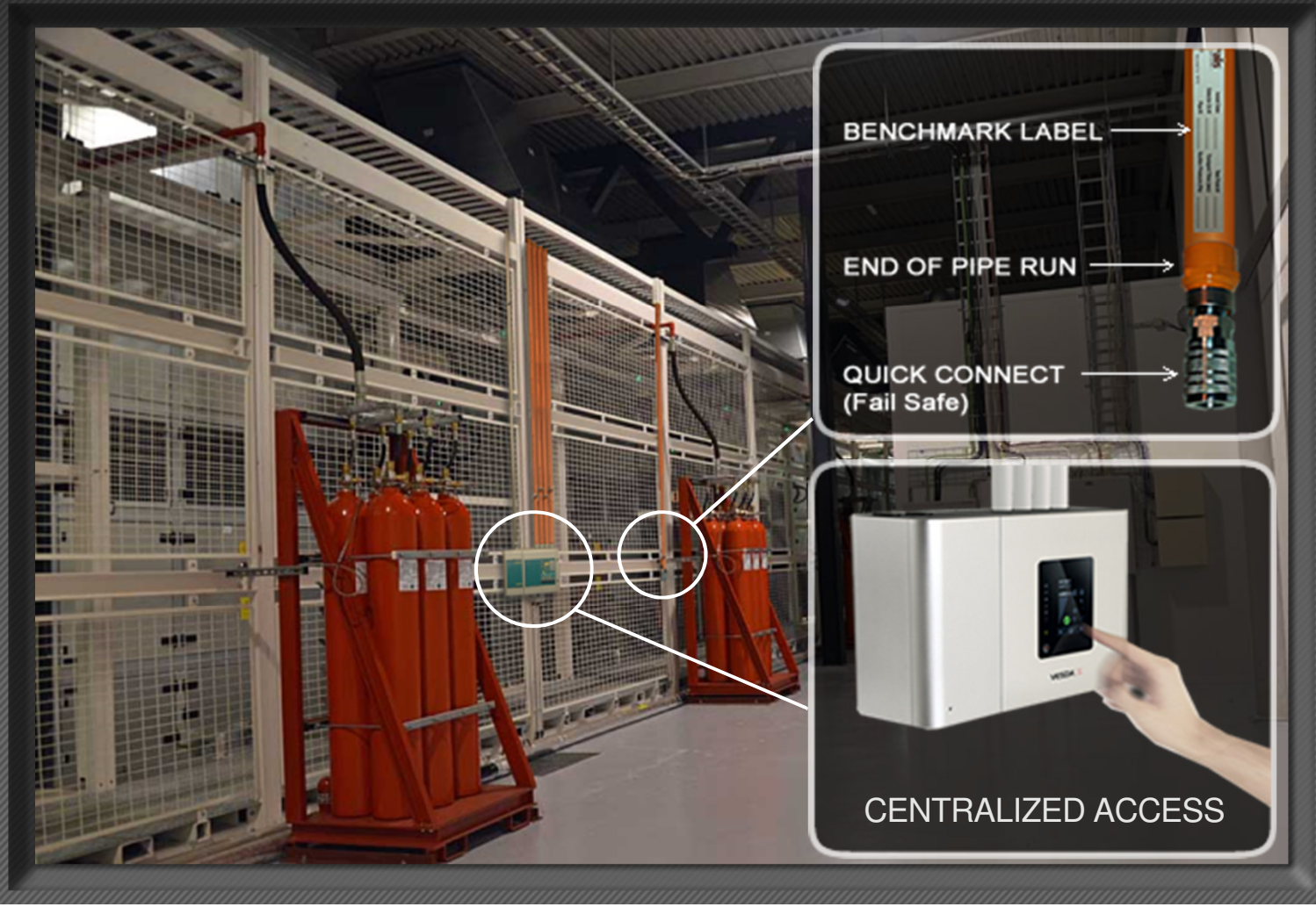






Air Sampling Smoke Detectors

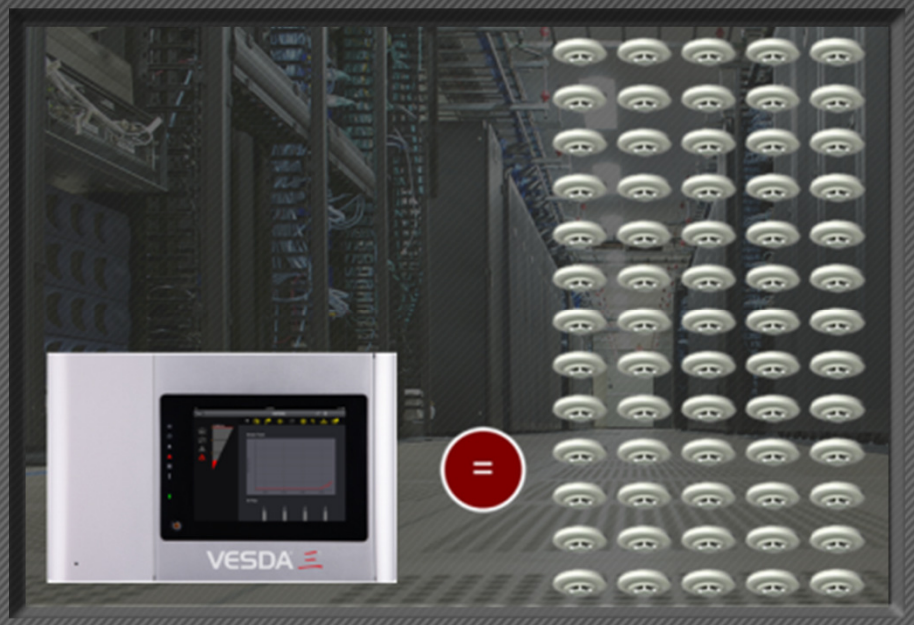
Accessible by design…



Air Sampling Smoke Detectors

Affordable by design…

- Less hardware to install
- Reduces equipment cost
- Reduces labor cost
  - Improves TCO
  - Green solution



Air Sampling Smoke Detectors

Affordable by design…

- Less hardware to maintain
- Accessible
- Significantly reduces cost
- Mitigates risk

=

Implementation

Design Conditions & Factors…

- Requirements
- Environment
- Coverage area
- Performance category
- Coverage techniques
- Zoning requirements
- Product selection
- Integration

Design Conditions & Factors

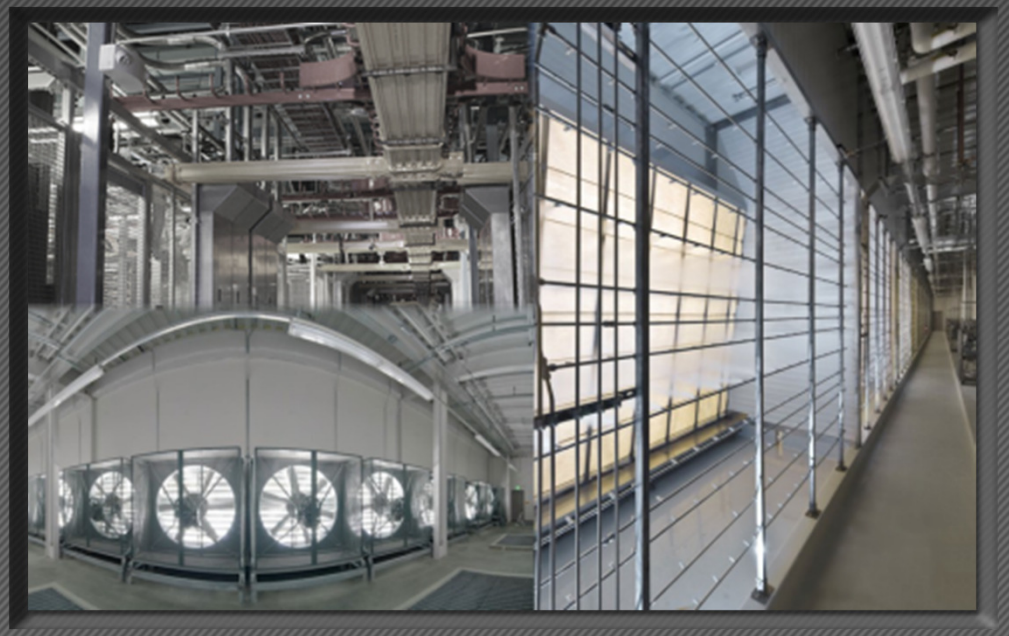
Requirements…

- Local codes & standards
- End user practices
- Facility requirements

Design Conditions & Factors

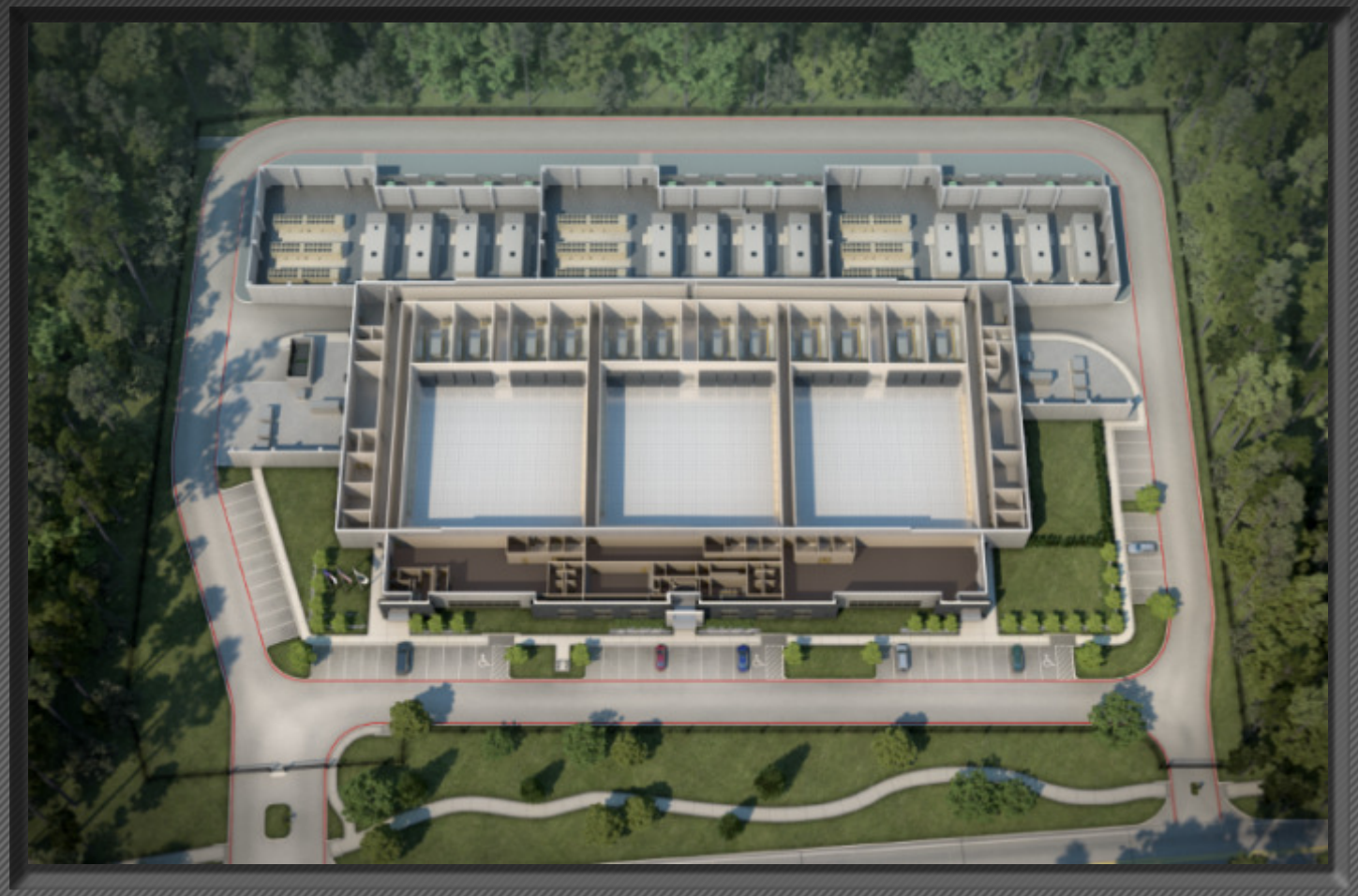
Environment…

- Environmental Conditions
- Structural Characteristics
- External Influences
- Accessibility



Design Conditions & Factors

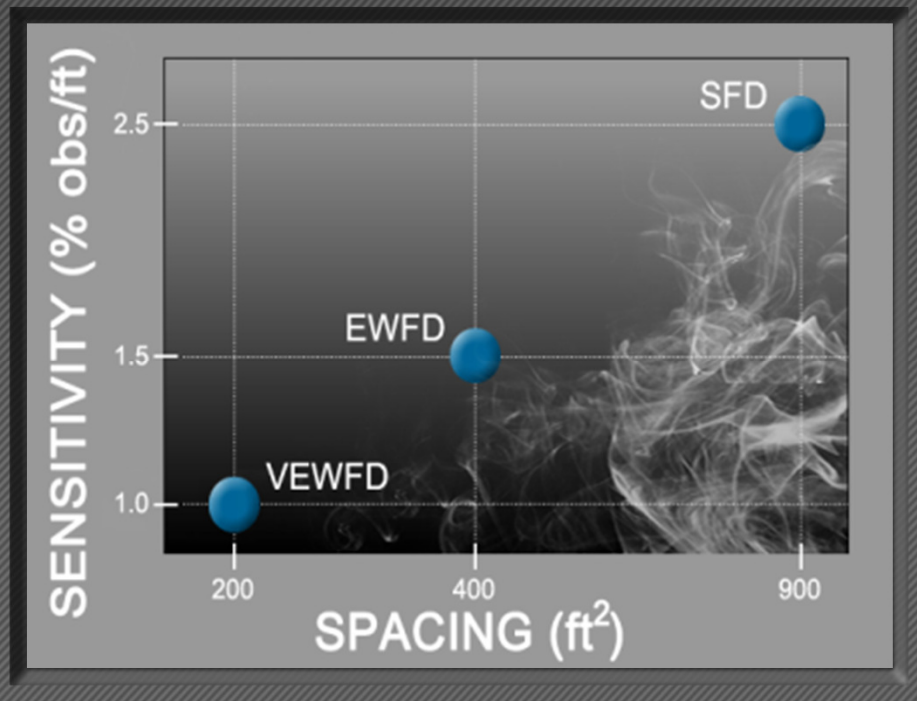
Coverage area…



Design Conditions & Factors

Smoke detection performance categories…

1. Standard Fire Detection (SFD)
2. Early Warning Fire Detection (EWFD)
3. Very Early Warning Fire Detection (VEWFD)



Smoke Detection Performance Categories

PARAMETER	SFD	EWFD	VEWFD
Sensitivity[1]			
Pre-Alarm[2]	Optional	Optional	0.2% obs/ft.
Alarm	2.5% obs/ft.	1.5% obs/ft.	1.0% obs/ft.
Coverage			
Open Area	900 sq. ft.	400 sq. ft.	200 sq. ft.
Air Distribution Paths	Duct Detection	Duct Detection	Every 4 sq. ft. grille area
Transport Time (ASSD)	120 sec.	90 sec.	60 sec.

[1] Sensitivity at each port/sensor [2] ASSD provides pre-alarm capabilities across all sensitivity categories

Design Conditions & Factors

Coverage techniques…

Air sampling pipe distribution networks are designed and installed to monitor the total room for smoke concentration, not simply an area within a larger space.

Area coverage

- Ceiling
- High/Low
- Beam pockets
- Drop ceiling
- Ceiling / Floor voids

Air distribution paths

- Return Air grilles
- Transfer grilles
- Ducts
- Economizers
- Ceiling & floor voids (plenum spaces)
- Containment structures

Coverage Technique Details

Area Coverage (Ceiling)

- **Equipment:** ASSD appropriately sized to adequately and efficiently protect area
- **Construction:** Rigid pipe & fittings with sample points drilled directly into pipe
- **Placement:** Sample points 1-4” below ceiling oriented downward towards floor
- **Spacing / Sensitivity / Transport:** In accordance with performance classification
- **Benchmark Test point:** 5ft AFF

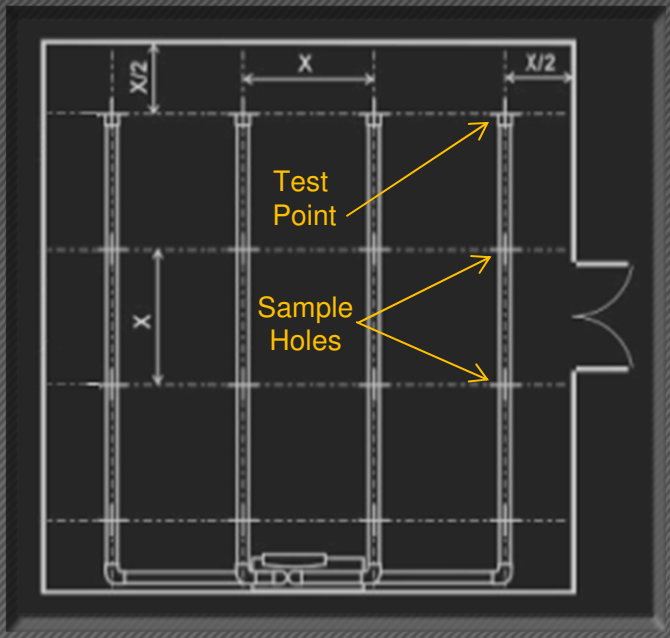


Fig. 1: Grid Layout Example

Coverage Technique Details

Area Coverage (High / Low)

- **Equipment:** ASSD appropriately sized to adequately and efficiently protect area
- **Construction:** Rigid pipe & fittings with sample points drilled directly into pipe. Use of stanchions.
- **Placement:** Alternate sample points above/below cable trays or other horizontal obstructions orientating points downward towards floor
- **Spacing:** In accordance with performance classification alternating between high/low sampling holes
- **Sensitivity / Transport:** In accordance with performance classification
- **Benchmark Test point:** 5ft AFF

Coverage Technique Details

Area Coverage (Beam Pocket)

- **Equipment:** ASSD appropriately sized to adequately and efficiently protect area
- **Construction:** Rigid pipe & fittings with sample points drilled directly into pipe. Use of stanchions.
- **Placement:** Sample points in accordance with NFPA 72 oriented downward
- **Spacing / Sensitivity / Transport:** In accordance with performance classification
- **Benchmark Test point:** 5ft AFF

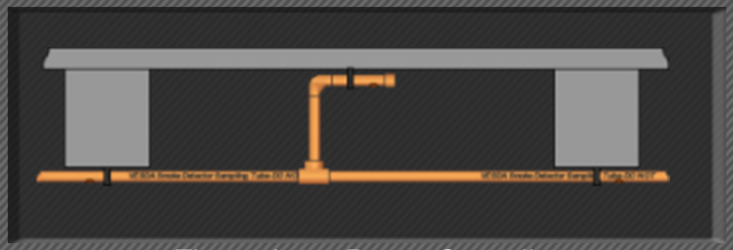


Fig. 1: Inter-Beam Sampling

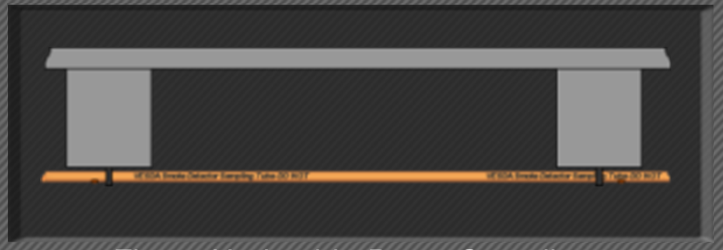
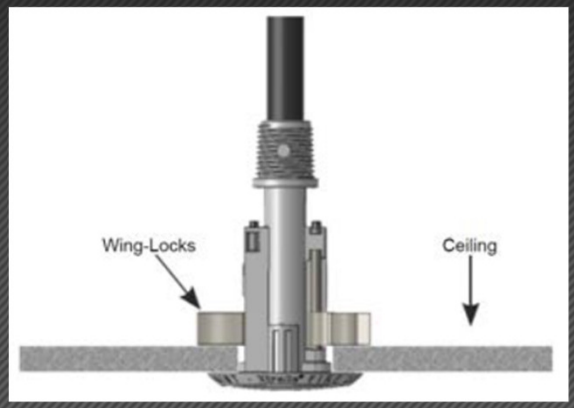


Fig. 2: Underside-Beam Sampling

Coverage Technique Details

Area Coverage (Drop Ceiling)

- **Equipment:** ASSD appropriately sized to adequately and efficiently protect area
- **Construction:** Rigid pipe & fittings installed above drop ceiling with remote sample points mounted to the underside of the drop ceiling. Use of flexible “capillary” tubing to interconnect port to pipe
- **Placement:** Sample points 1-4” below drop ceiling oriented downward towards floor
- **Spacing / Sensitivity / Transport:** In accordance with performance classification
- **Benchmark Test point:** 5ft AFF

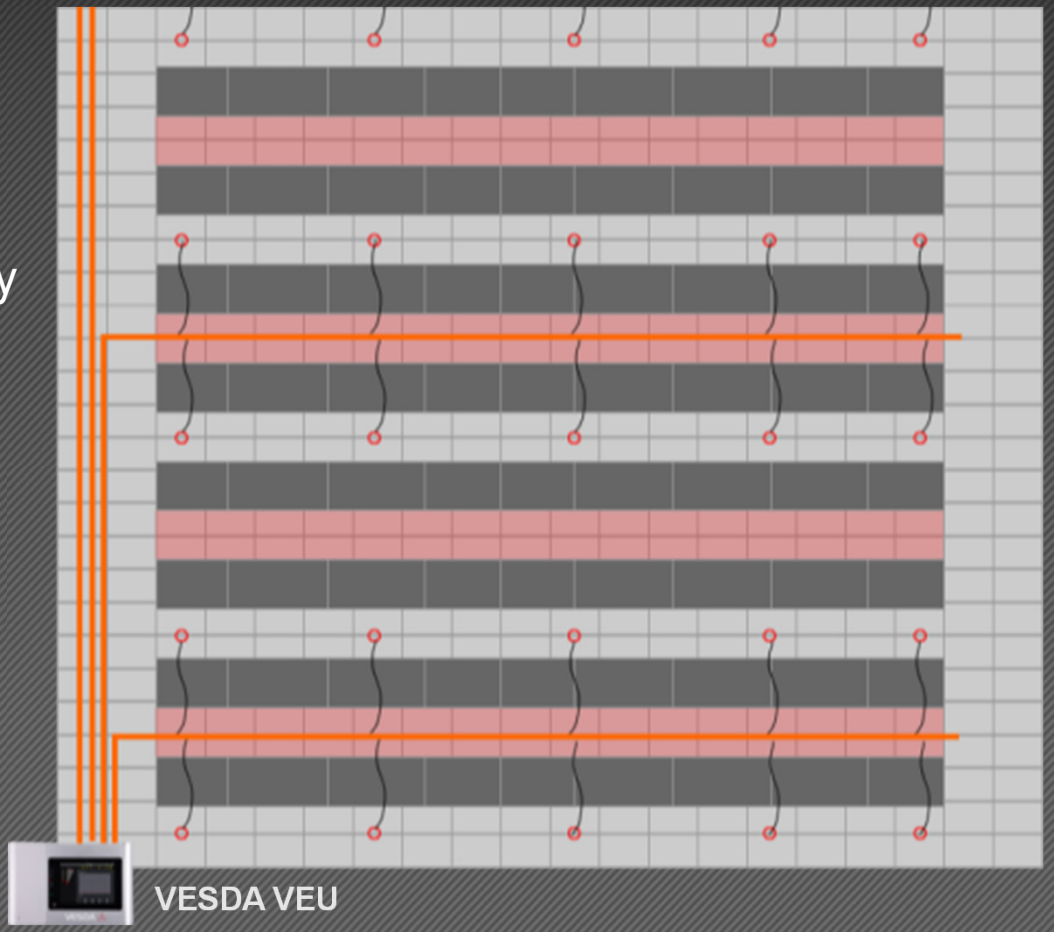


Coverage Technique Details

Area Coverage (Drop Ceiling)

Design Efficiencies

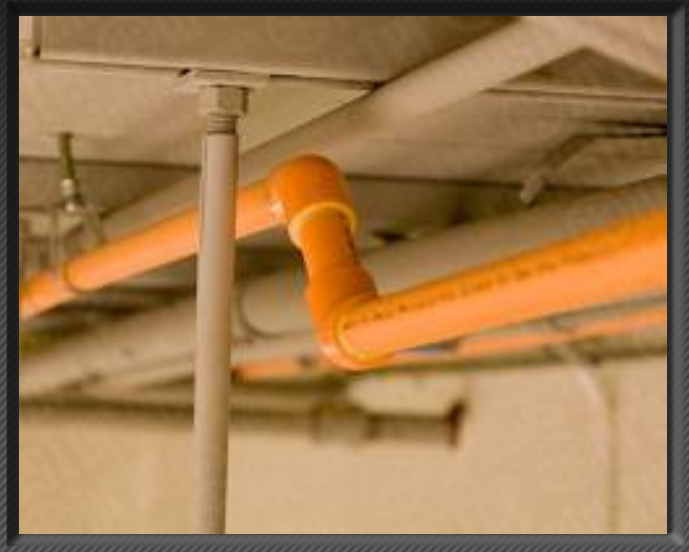
- Reduces rigid pipe installation
- Improves transport times
- Maximizes detector capacity
- Reduces hardware
- Reduces cost



Coverage Technique Details

Area Coverage (Ceiling/Floor Void)

- **Equipment:** ASSD appropriately sized to adequately and efficiently protect area
- **Construction:** Rigid pipe & fittings with sample points drilled directly into pipe
- **Placement:** Sample points 1-4” below ceiling oriented downward towards floor
- **Spacing / Sensitivity / Transport:** In accordance with performance classification
- **Benchmark Test point:** 5ft AFF



Coverage Technique Details

AHU (Return/Supply/Exhaust Grille)

- **Equipment:** ASSD appropriately sized to adequately and efficiently protect area
- **Construction:** Rigid pipe & fittings with sample points drilled directly into pipe
- **Placement:** Sample points positioned at face of grilles oriented 30-45º towards incoming flow, no ports outside of grille area
- **Spacing / Sensitivity / Transport:** *Every* 4 sq. ft. of grille area, 1% obs/ft, 60 seconds

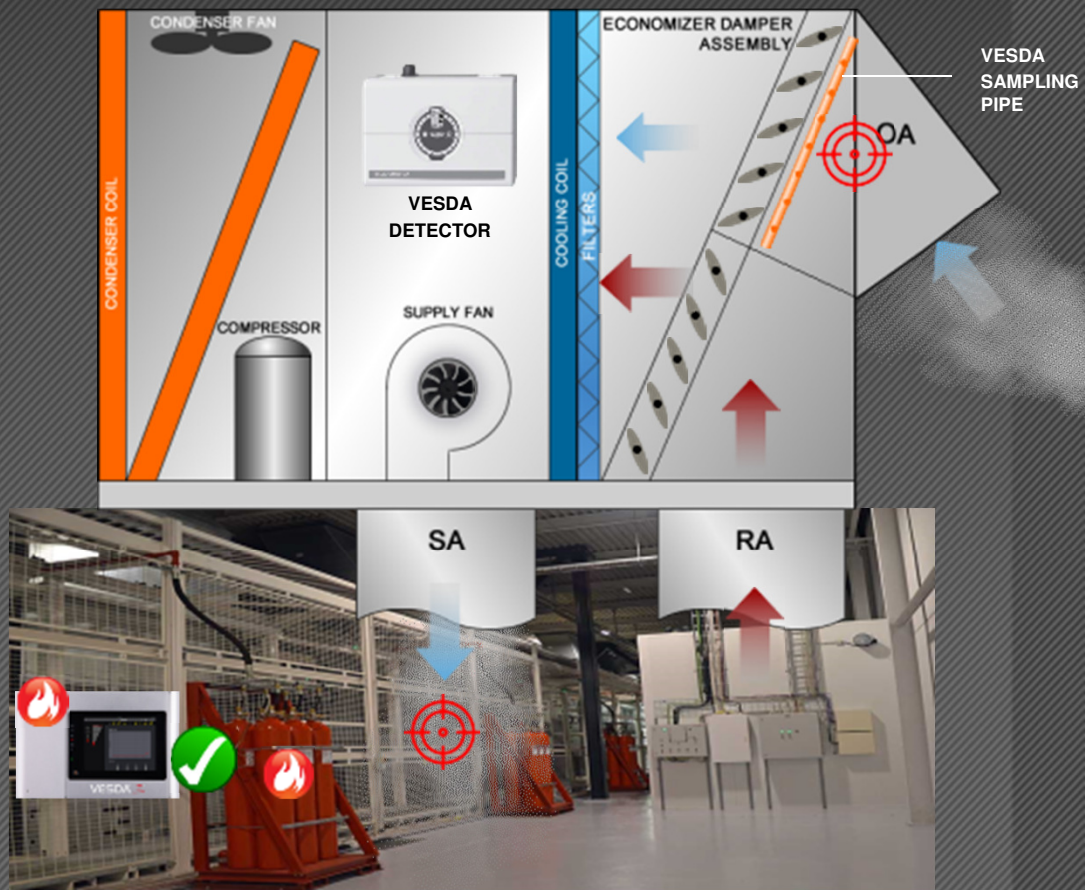
Coverage Technique Details

AHU (Outside Air Intake)

- **Equipment:** ASSD appropriately sized to adequately and efficiently protect area
- **Construction:** Rigid pipe & fittings with sample points drilled directly into pipe
- **Placement:** Sample points positioned at face of grilles oriented 30-45º towards incoming flow, no ports outside of grille area
- **Spacing / Sensitivity / Transport:** *Every* 4 sq. ft. of grille area, 1% obs/ft, 60 seconds

Coverage Technique Details

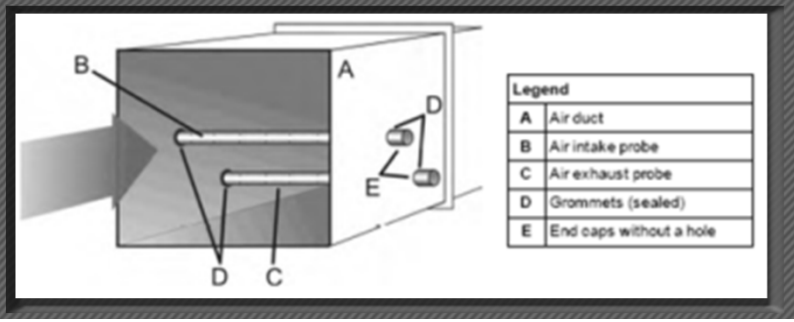
AHU (Outside Air Intake) application example



Coverage Technique Details

AHU (In-Duct)

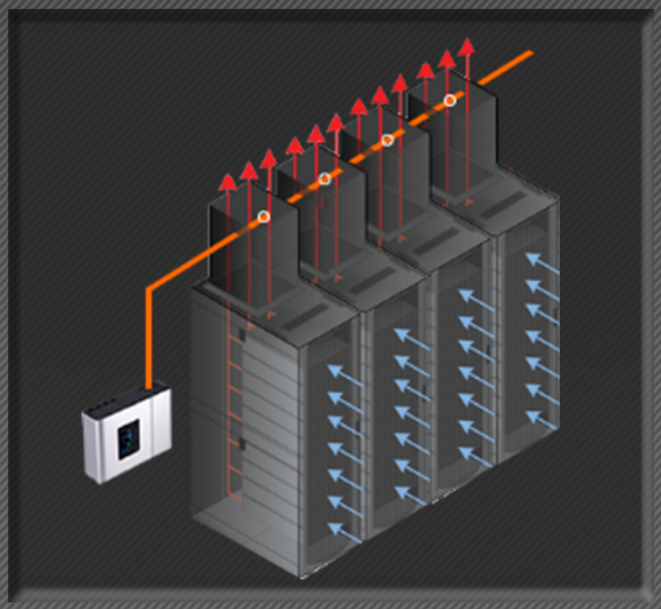
- **Equipment:** ASSD appropriately sized to adequately and efficiently protect duct. Must be dedicated to duct being monitored
- **Construction:** Rigid pipe, sample points drilled directly into pipe. Exhaust returned directly to duct being sampled
- **Placement:** Sample points positioned across width of duct oriented 30-45º towards incoming flow, no ports outside of duct
- **Spacing / Sensitivity / Transport:** Spacing based on duct size (w x h) following MFG's guidelines, 1% obs/ft, 60 seconds transport
- **Benchmark Test point:** 5ft AFF



Coverage Technique Details

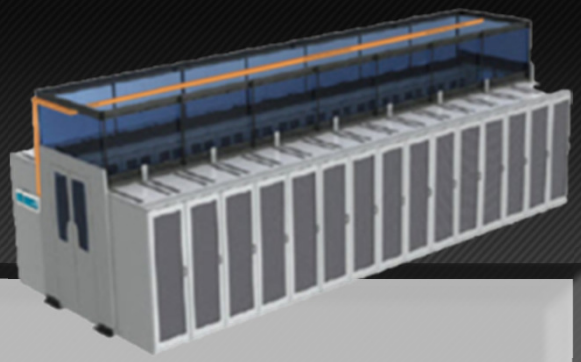
Containment structures

- **Equipment:** ASSD appropriately sized to adequately and efficiently protect area
- **Construction:** Rigid pipe & fittings with sample points drilled directly into pipe
- **Placement:** Sample points positioned within air exhaust path oriented 30-45º towards incoming flow
- **Spacing:** Depends on configuration
  - Open collar: min. 6’ on center
  - Chimney: one port per chimney
- **Sensitivity / Transport:** 1% obs/ft, 60 seconds transport
- **Addressability:** Individual aisle
- **Benchmark Test point:** 5ft AFF

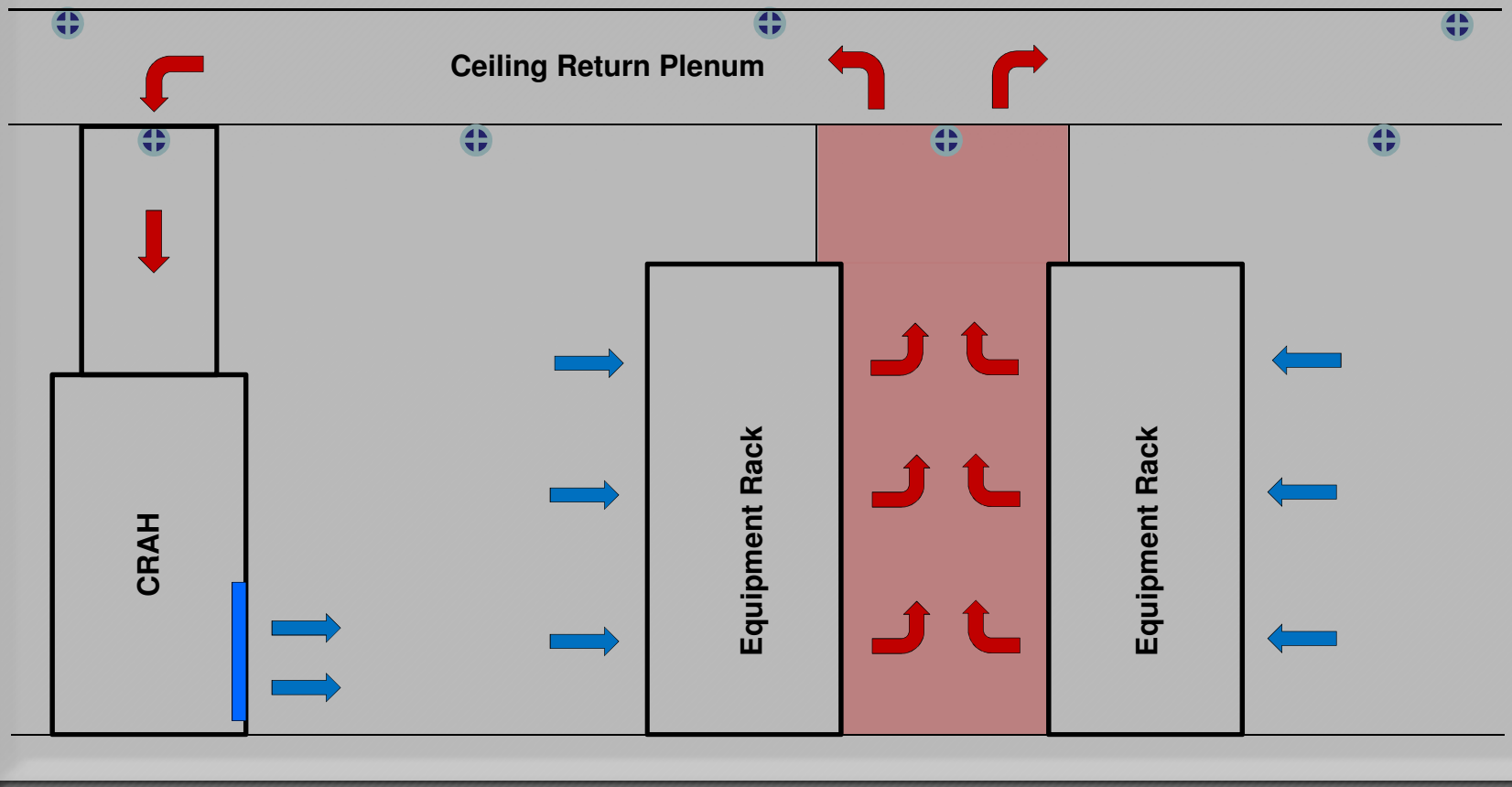


Coverage Technique Details

Containment structures



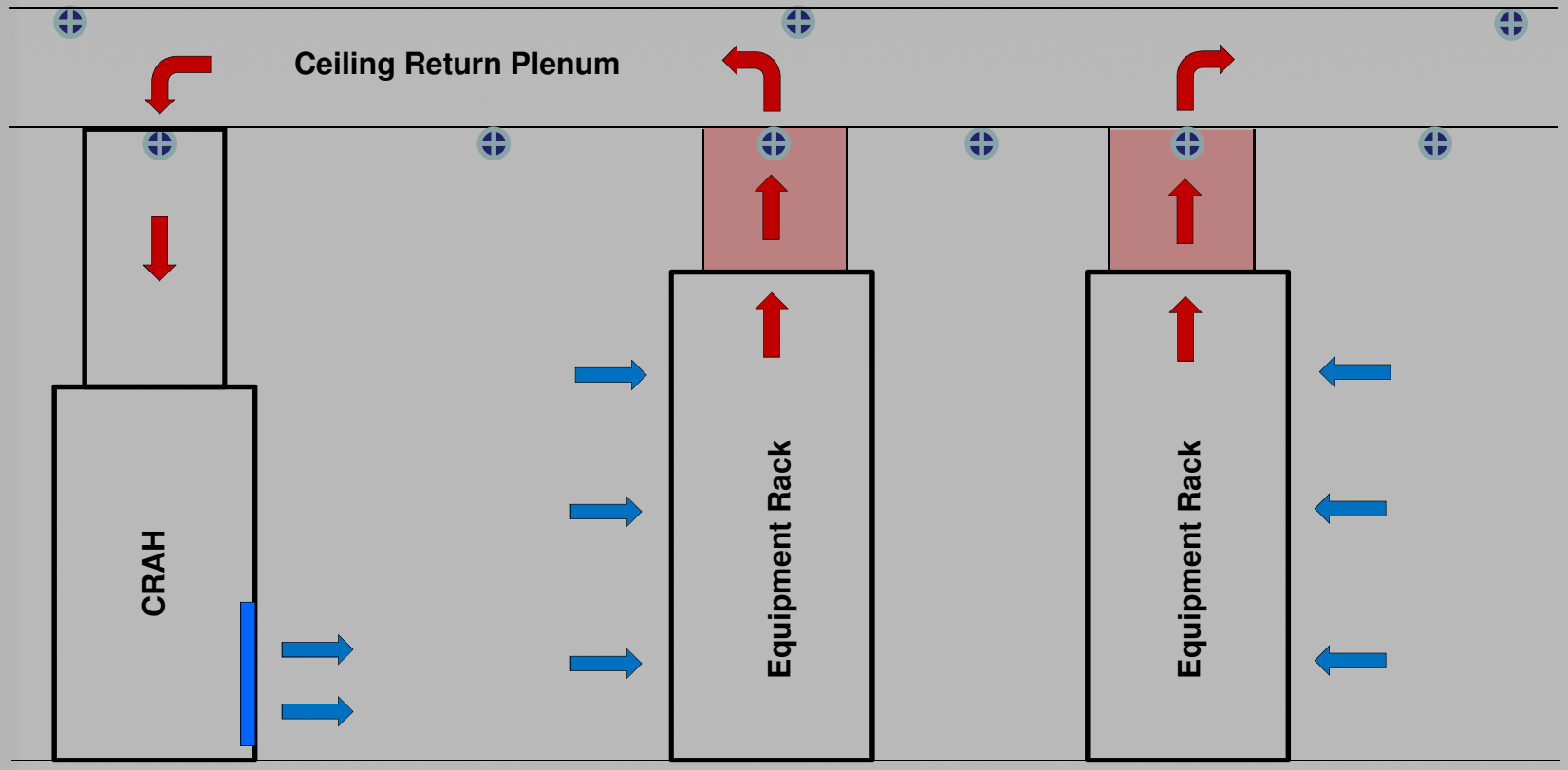
Contained Hot Aisle (Open Collar)…



Coverage Technique Details

Containment structures

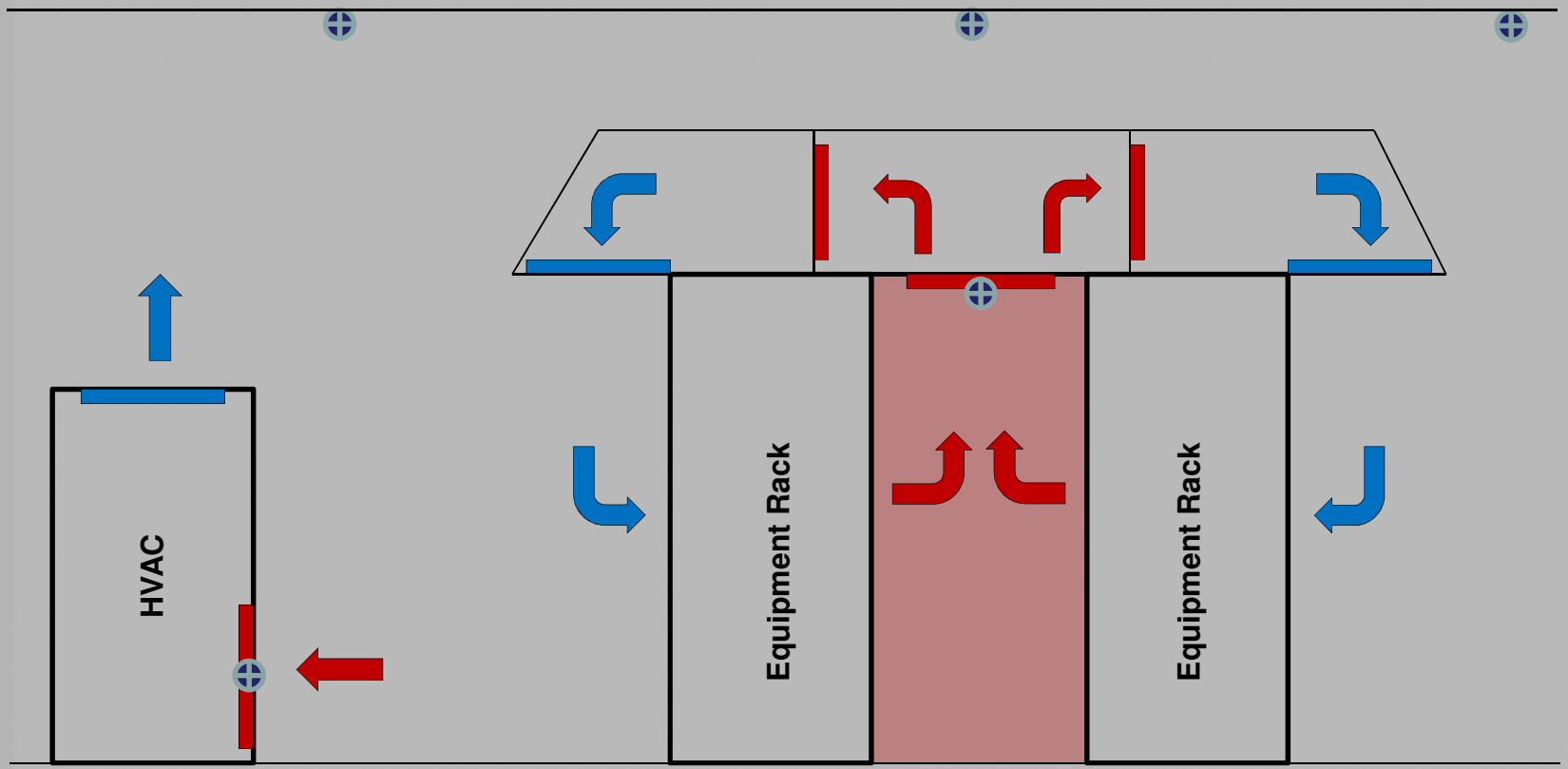
Contained Hot Aisle (Server Rack Chimneys)…



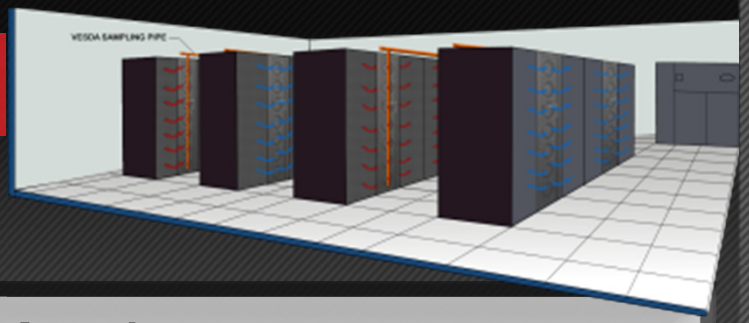
Coverage Technique Details

Containment structures

Contained Hot Aisle (Overhead Coolers)…

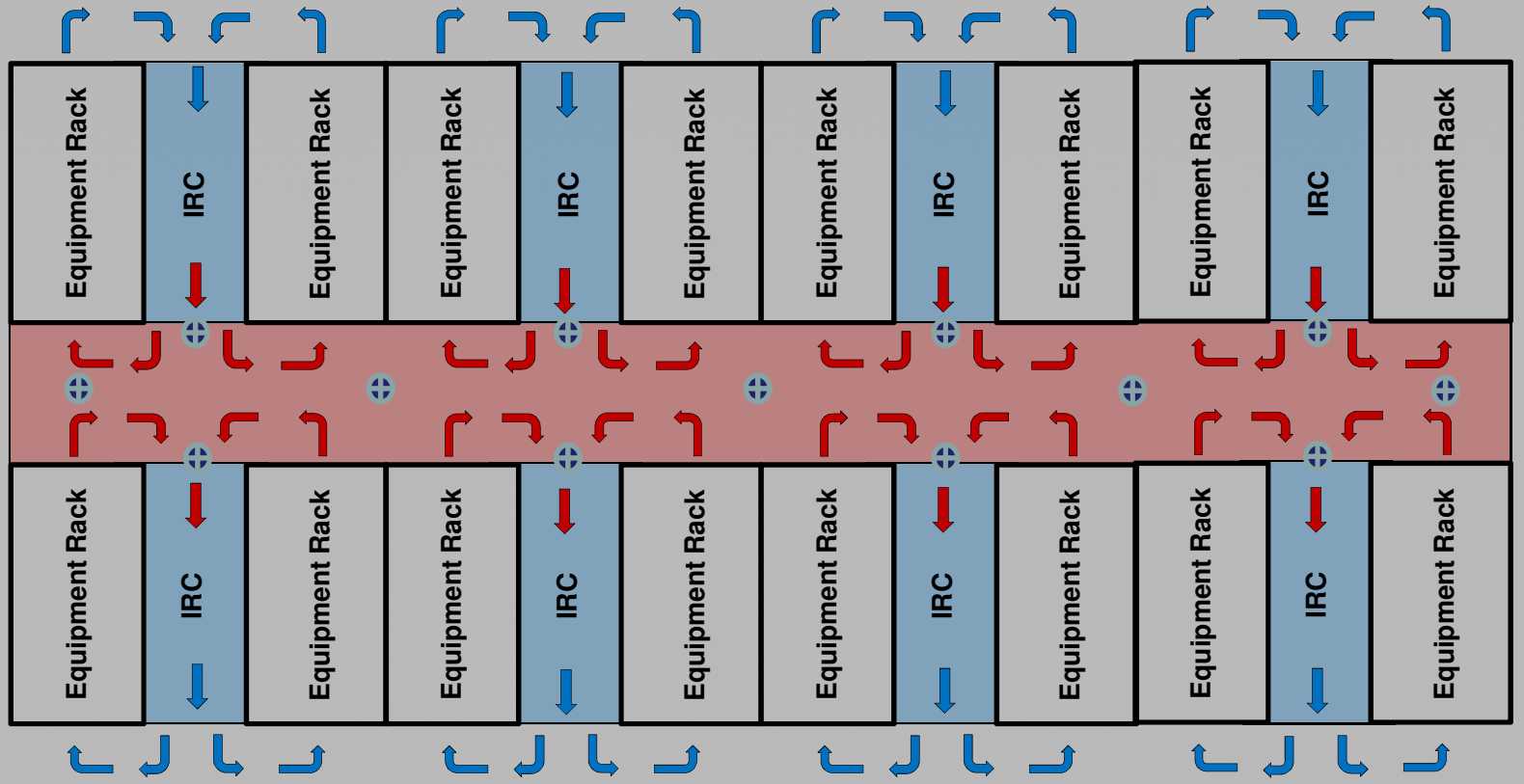


Coverage Technique Details



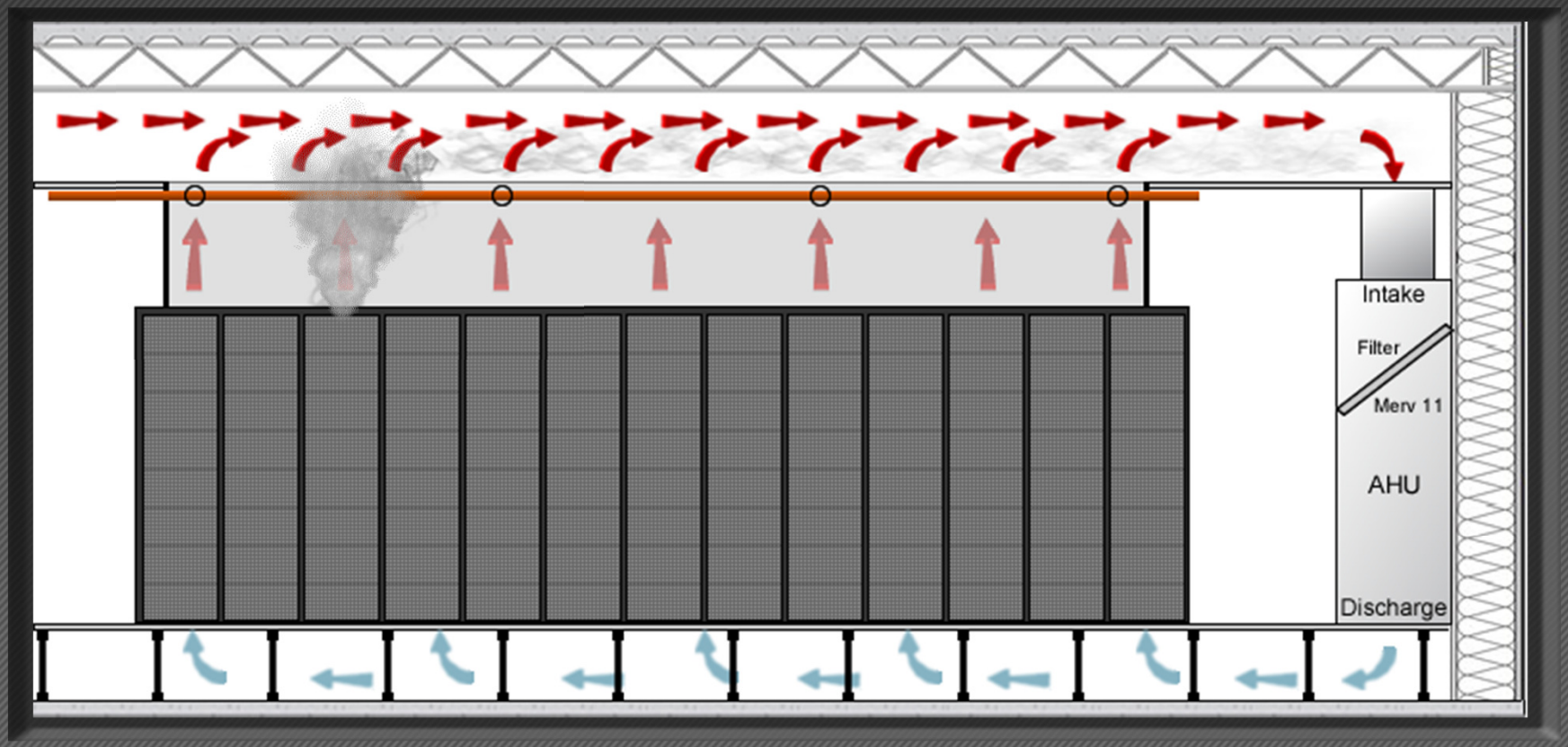
Containment structures

Contained Hot Aisle (In-Row Coolers)…



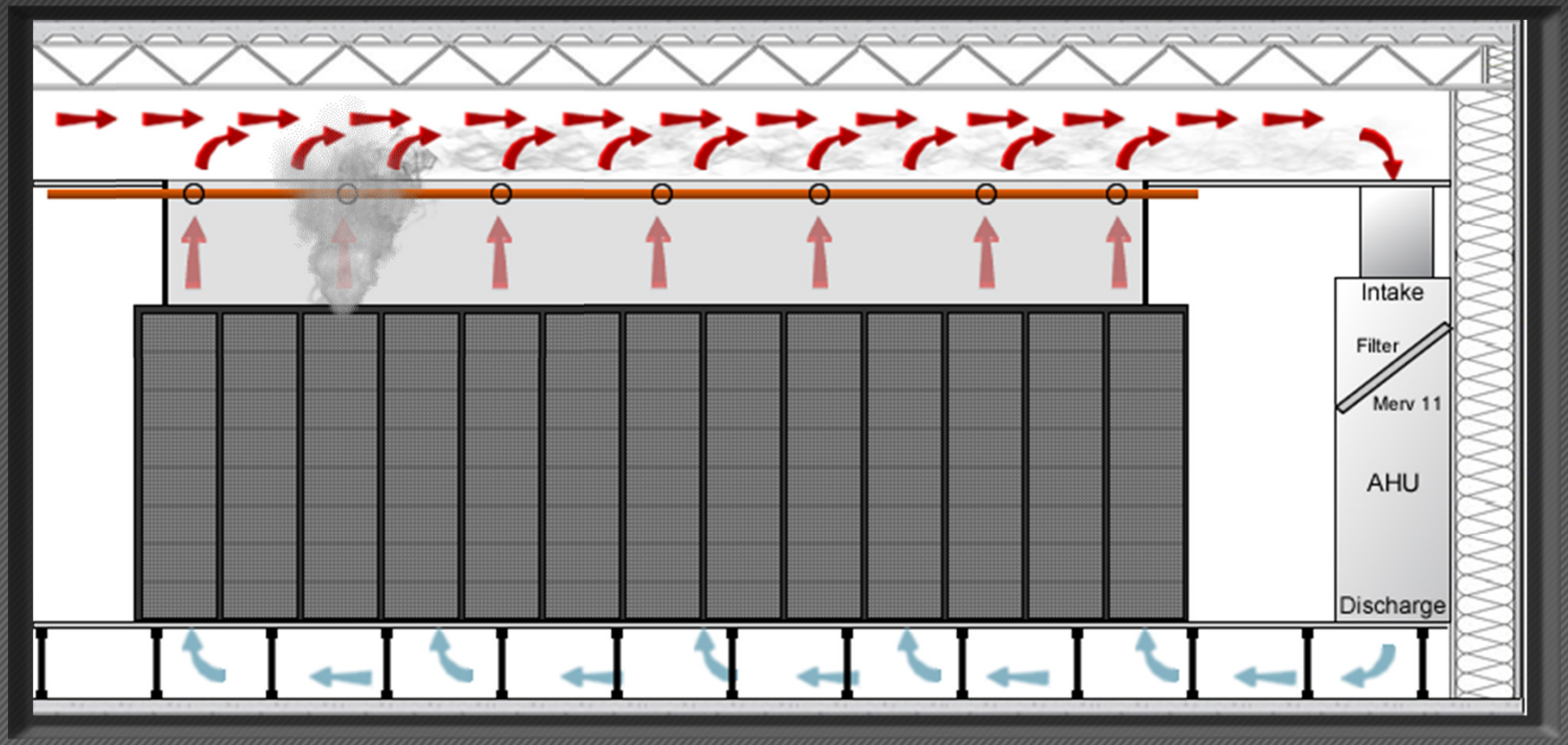
Coverage Technique Details

Spacing is too far apart may miss smoke!



Coverage Technique Details

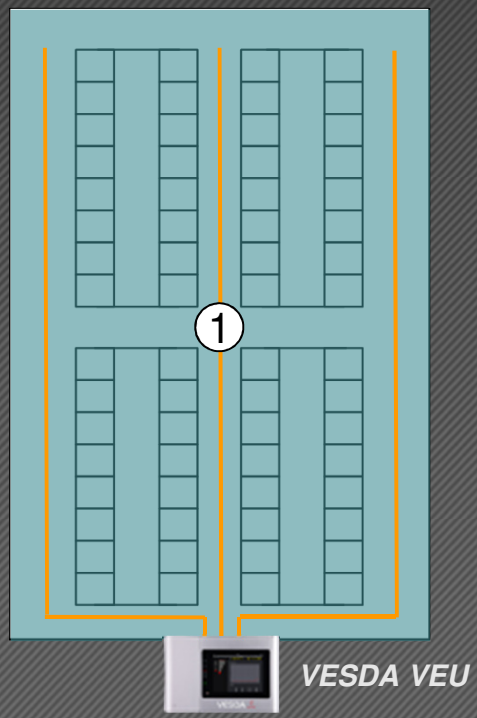
For very early warning within containment structures, consider port spacing at a minimum every 1.2m (6 ft) on center.



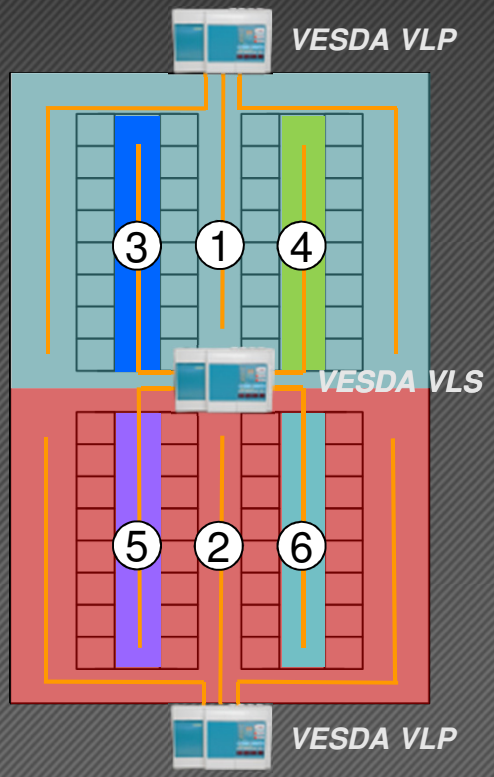
Zoning Requirements

Consider…

- Suppression zones
- Locating source
- Product selection
- Cross zoning



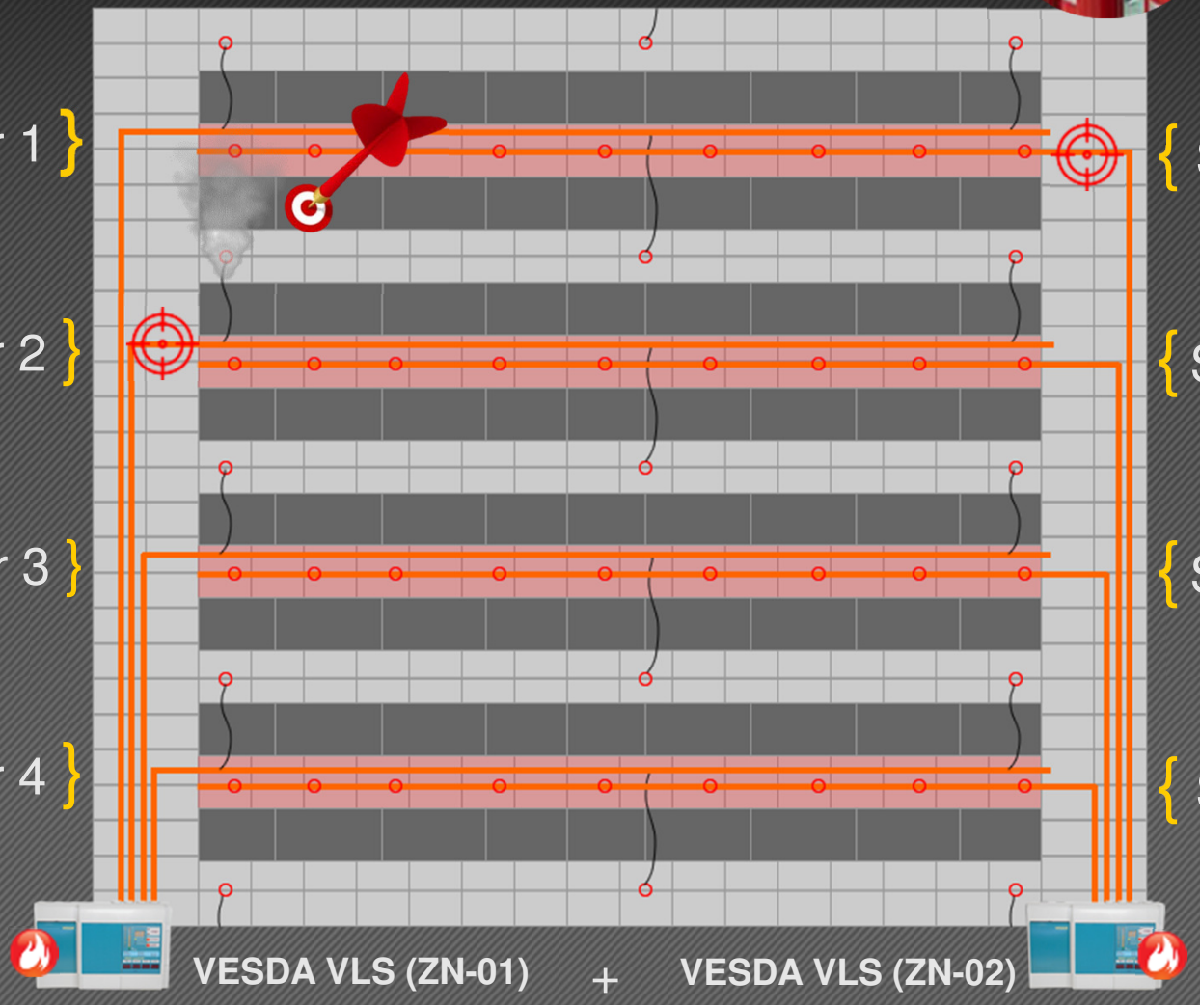
Room



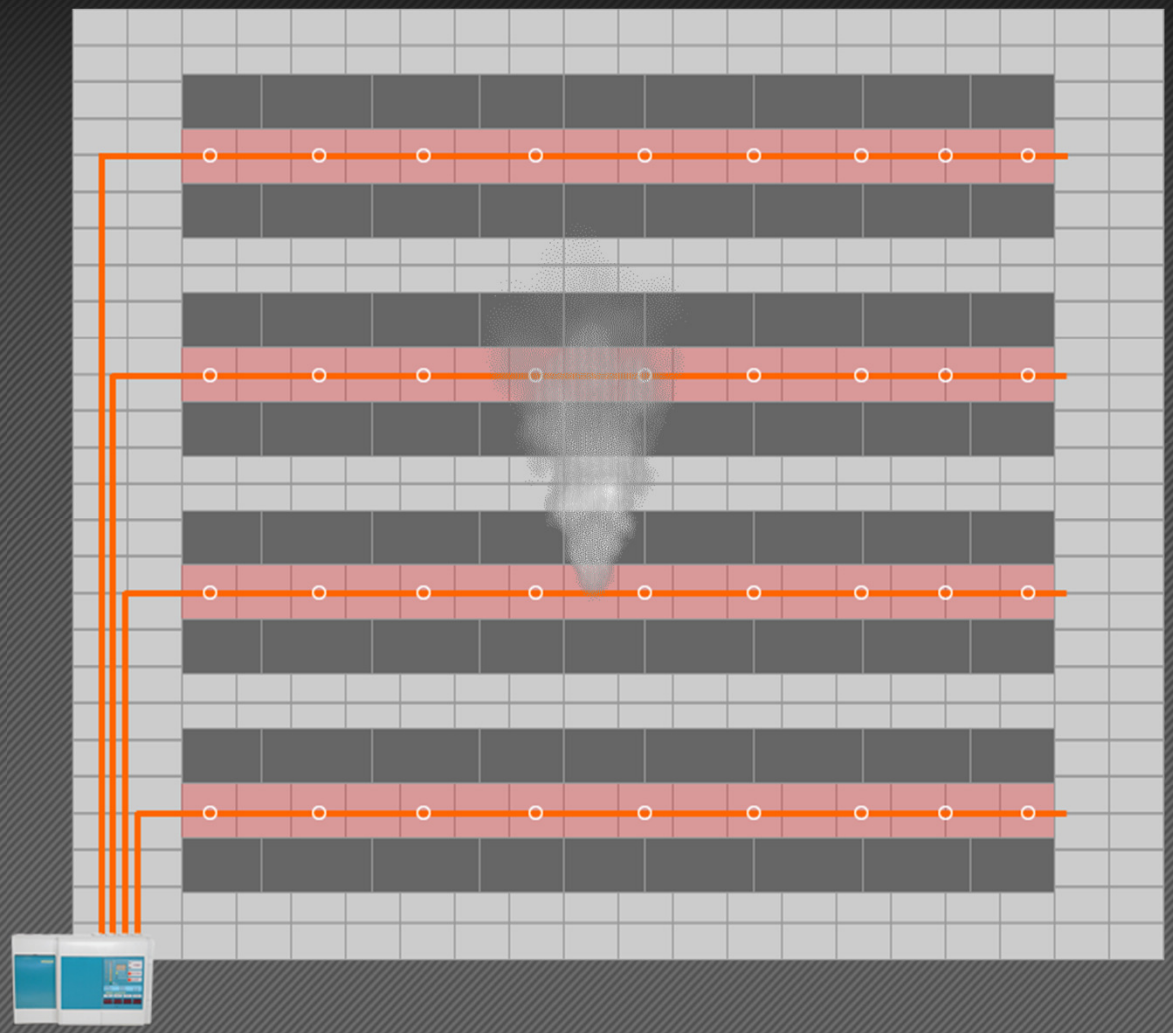
Zones within a room

Suppression Cross Zoning

Strategic use of sectors…



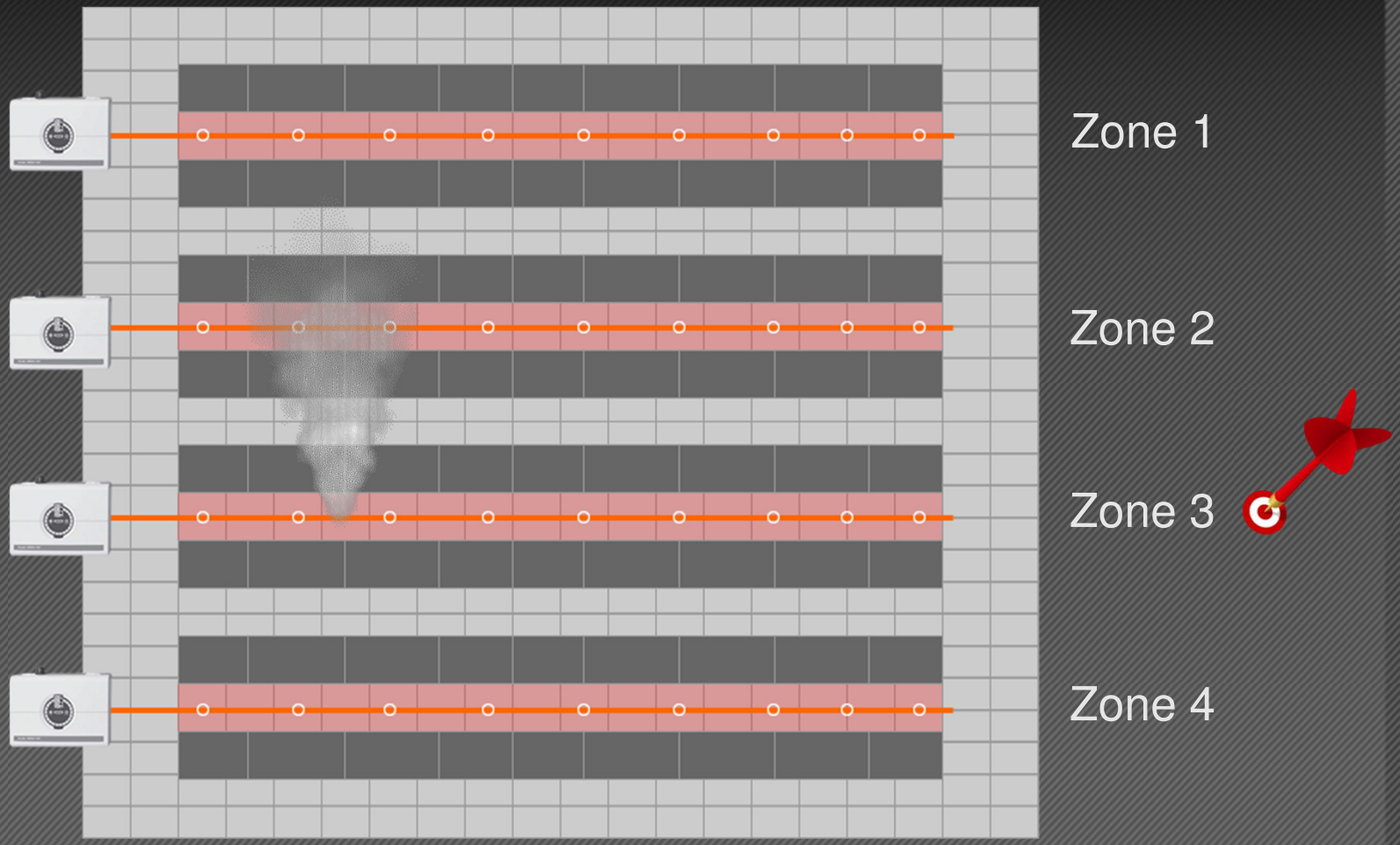
Single-Zone ASD



Zone 1

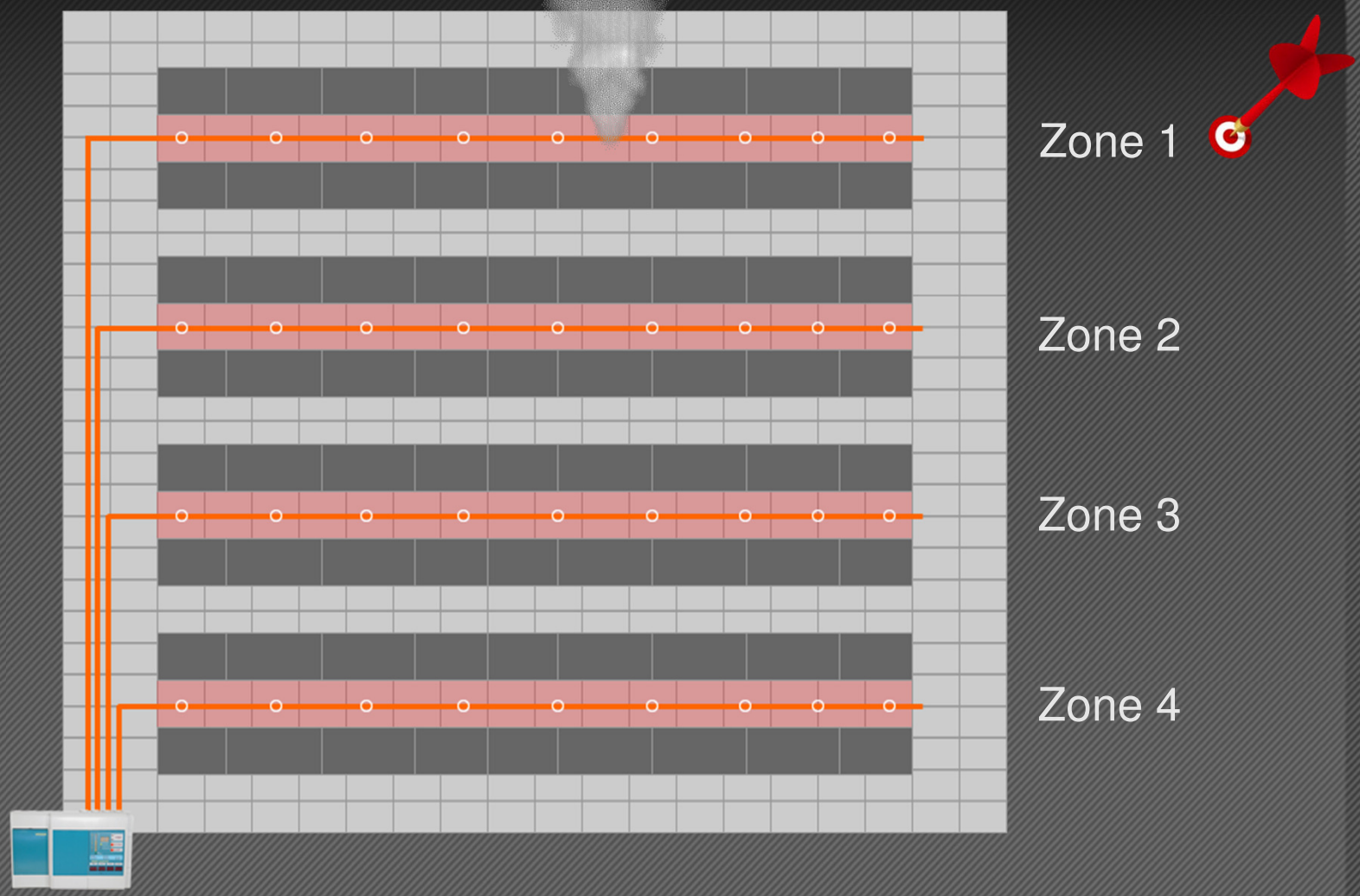
VESDA VLP (one per every four hot aisles)

Single-Zone ASD



4 x VESDA VLF or VLC (one per hot aisle)

Multi-Zone ASD



VESDA LaserSCANNER (one per every four hot aisles)

Product Selection

Detector Selection/Value Engineering Strategies

- Coverage capacity
- Addressability
- Integration

Designing & Specifying ASD Systems

Elements of success…

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In Closing

- ✓ First line of defense
- ✓ Dynamic detection challenges
- ✓ Aspirating Smoke Detection advantage
- ✓ Holistic design approach
- ✓ Integration for effectiveness & efficiency
- ✓ Specifications improve field experience
- ✓ Experience matters

Tools & Resources

- Visit www.Xtralis.com (login as partner)
  - Application Guides
  - Design Guides
  - Datasheets
  - Presentations
  - Whitepapers
  - and much more....
- Xtralis ASD Specification Template
  - Streamline your next project
  - Avoid common errors
  - Achieve efficient and effective results

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Xtralis Unsurpassed Dedicated Support

- ☑ 30+ Years of innovation and application know how
- ☑ Dedicated Client Account Manager
- ☑ Specification consultation
- ☑ Dedicated 24/7 tech support
- ☑ Field Application Engineers at your fingertip
- ☑ Customized training in conjunction with distributor
- ☑ Design, application & commissioning assistance

Thank You

Q & A