



## INTEGRATING SAFETY & SECURITY SYSTEMS IN ASSEMBLY OCCUPANCIES

Nusrulha Wani  
Product Marketing Manager  
**Region MENA**

Email: [nusrulha.wani@dorma.com](mailto:nusrulha.wani@dorma.com)





## COURSE DESCRIPTION

---

### Integrating Safety & Security Systems in Assembly Occupancies – Case study of Stadiums

In the middle of our busy life style, we take time off to watch a football match, go to a movie or take a vacation to visit some Holy places or tourist destinations.

If we look around, it seems that all the above entertainment and peaceful venues are becoming places of grief and sorrow due to loss of valuable lives because of overcrowding, stampede or security lapses.

We will take the case study of Stadiums which are coming into prominence with regional events like Expo 2020 in Dubai and FIFA 2022 in Qatar.

It will give us details of Safety & Security issues from the Parking Area to the Playing Arena.

For example; the Inner perimeter from the Safety point of view where we can save lives by using Systems (locks, Turnstiles) which are suitable for escape routes that can provide a smooth egress in case of an Emergency & Panic situations.

Or the outer perimeter from the Security point of view by using body and equipment scanners, bomb proof, bullet proof and Vandal resistant readers etc.

Also, how a Single Card can give you Access to:

Parking, Ticketing, Hospitality, Fan Shop, Viewing the stands.

And how One system should give you Control over:

Access (Parking, Perimeter, Stadium); CCTV, Burglar Alarm, Fire, Escape routes, Building Management, Ticketing, Payment Solutions.

How can we, as professionals, contribute in making the Stadiums an entertaining and a Safe place?

## THE PRESENTER

---

Nusrulha is having a Diploma & Bachelors in Instrumentation Engineering. He started his career in Factory/Industrial Automation where he got the knowledge of MESSUNG & MITSUBISHI ELECTRIC PLCs (Programmable Logical Controllers), Control Panels and HMI (Human Machine Interface) Panels. His experience in Factory Automation Systems was augmented with Building Automation Systems when he joined Johnson Controls International.

Nusrulha is competent in BMS, CCTV, Access Control System, Smart Cards & Mobile Key Technologies using low energy Bluetooth (BLE), Fire Alarm System, Perimeter Protection, ELV, Wireless Telecommunication (P2P & P2MP), PLC, SCADA and RTU.

Nusrulha is well versed with Building Management System and Access Control Systems.

He also has a Certification of Honeywell - Notifier **Fire Alarm System**, Certification of Lenel's **Access Control System & Digital Video-CCTV Certification**. Allen Bradley's - **PLC & SCADA Programming**. For **Wireless Communication** – Point to Point & Point to Multipoint, he is Netronics **Certified System Specialist**.

He has worked for different verticals & industries like Infrastructure, Hospitality, Airport, Oil & Gas.

Currently Nusrulha is working with DORMA as a Product Marketing Manager - PMM to provide the customers a Premium Access Solutions.





## LEARNING OBJECTIVES

---

### 1. Case Studies: What went wrong ?

- a. National Stadium Disaster – Peru
- b. The Kathmandu Disaster - National Stadium, Nepal
- c. Hillsborough Disaster (Sheffield)
- d. Ohene Djan Stadium, Accra, Ghana
- e. Air Defense Stadium – Egypt

### 2. Analysis based on the History of 100 years.

### 3. Contingency Plan - the related Security & Safety Risks, and solutions.

### 4. Access Control - How can System Integration help Safety & Security issues ?

The purpose of this presentation is to convey technical knowledge to the conference participants.

The presentation also contains slides with text that summarises the content of the presentation and the main learning objectives.

These may be used to update CPD records for relevant organisations including the Chartered Institute of Building (CIOB).





## National Stadium Disaster – Peru

(24 May, 1964 - Peru vs Argentina. At least **328 killed** & above **500 Injured**)

- Pitch Invasion
- Panic and an attempt at a **mass exit** to avoid the gas.
- Cause of death was mostly from internal **haemorrhage** or **asphyxia**.
- **No standard gates** available. (The stadium had solid **corrugated steel shutters**)
- In the street, the crowd caused destruction on private property around the stadium.



## The Kathmandu Disaster - National Stadium, Nepal

(12 March, 1988 - Janakpur Cigarette Factory Ltd Vs Liberation Army of Bangladesh.

At least **93 killed** & more than **100 Injured**)

- Structure : **No proper Roofing**
- Fans attempted to flee from a hailstorm inside the stadium.
- **Exit doors were closed.**
- Spectators rushed to the stadium's **eight exits** but found **only one open.**





## Hillsborough Disaster (Sheffield)

(15 April, 1989 - [Liverpool](#) Vs [Nottingham Forest](#) . At least **96 killed** & **766 Injured**)

- Structure : **Standing Terraces**
- **Overcrowding** outside the ground before kick-off.
- **Entry** was possible only via **one of seven turnstiles**
- **Barriers** installed **did not meet** official safety **standards**.
- Firefighters with cutting gear had difficulty getting into the ground
- Cause of death was mostly from compressive **asphyxia**.



## Ohene Djan Stadium, Accra, Ghana

(9 May, 2001 - [Accra Hearts of Oak Sporting Club](#) Vs [Asante Kotoko](#))

At least **127 killed** & **Hundreds Injured**)

- **Disappointed** fans throwing plastic seats and bottles onto the pitch
- **Panic** and a resulting stampede.
- Cause of death was mostly from compressive **asphyxia**.
- Some **gates were locked**, preventing escape.





## Air Defense Stadium – Egypt

(8 Feb, 2015 - Zamalek Vs Enppi, **22 killed** & **Dozens Injured**)

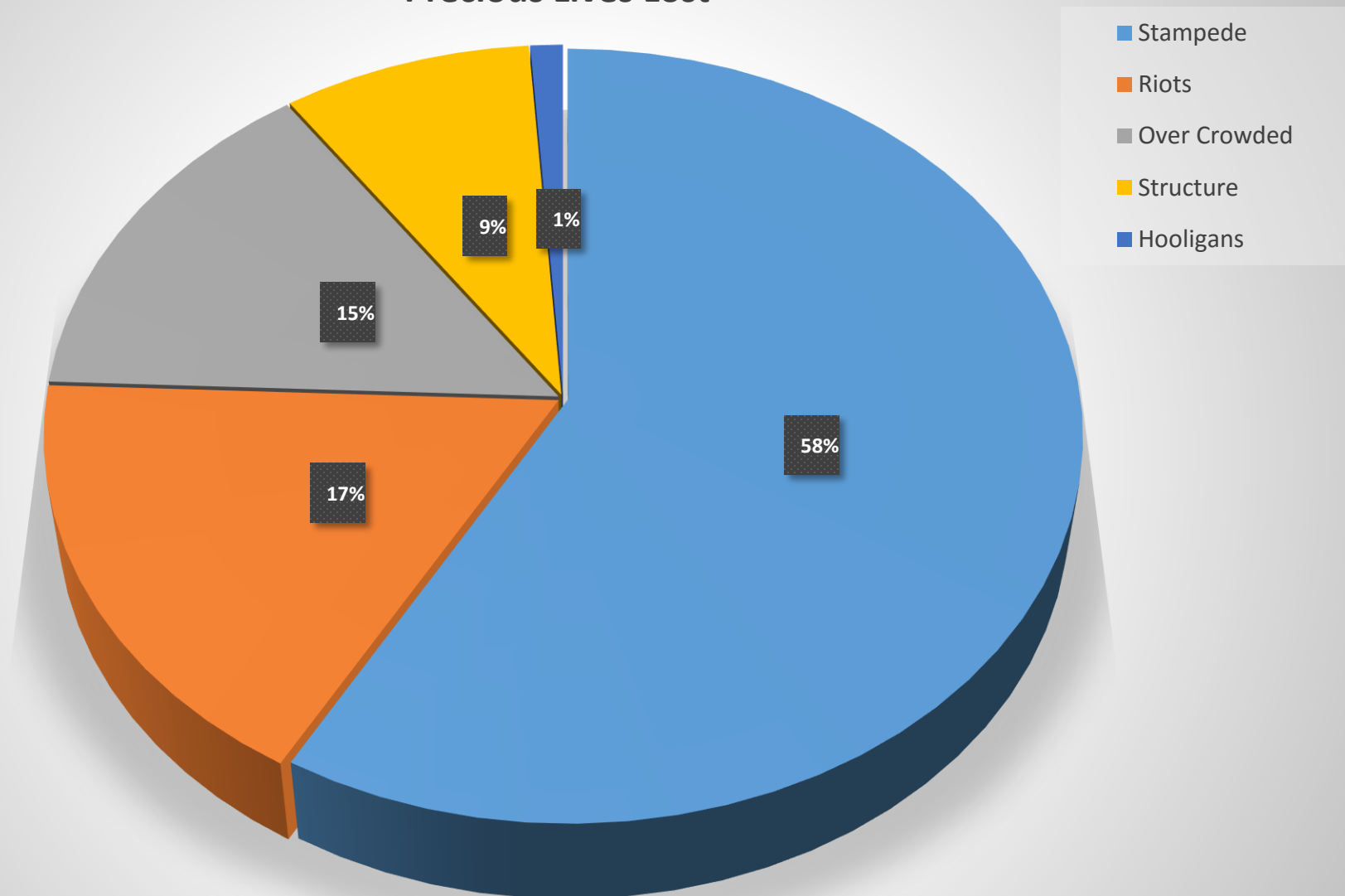
- No proper check on the no. of tickets issued and no. of fans gathered
- No proper Access Control System – fenced-in passageway
- Instead of a Turnstiles a customized Iron cage was put for Access Control
- No Crowd Management
- No proper Fencing - Forced Entry
- People were crushed in a stampede.





### Cause of the Incidents - Analysis based on the 100 years of History

#### Precious Lives Lost





## The main Risks for an Event:

### A. Before the Event

1. Ticketing
2. Ingress
3. Fan Separation
4. Structure Design (The View from the Crowd)
5. Extremism

### B. During the Event

1. Excited Moments (a Goal, a Foul, a Penalty, a Wrong decision etc)
2. Weather / Natural Calamity (Hailstorm, HVAC, Rain, Earthquake etc)
3. Riots
4. Egress due to Emergencies

### C. End of the Event

1. Egress ( Access Control and Escape Route Systems needs to be balanced)
2. Alternative means of Egress.
3. Crowd Management – Based on Behavior of the winning team fans and losing team fans





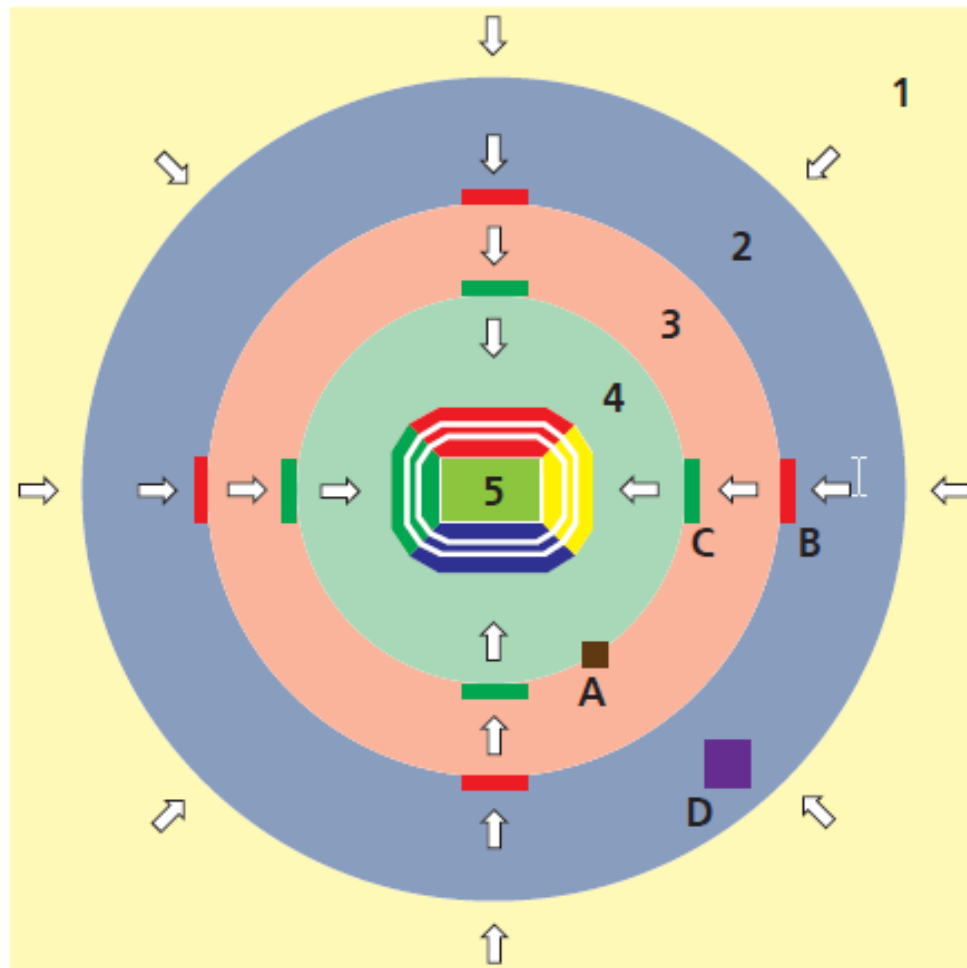


# Contingency Plan



# Stadium Areas & Zones

Stadiums used during FIFA events are divided into five distinct perimeters, as follows:



- 1. The public zone
- 2. The exclusive zone
- 3. Outer perimeter (visual ticket check)
- 4. Inner perimeter (electronic access control)
- 5. The stands
- A. TCP
- B. Mags & bags
- C. Turnstiles
- D. STC

**Notes:**

TCP: Ticketing clearing point  
 STC: Stadium ticketing centre

## Example: Air Defense Stadium – Egypt

(8 Feb, 2015 - Zamalek Vs Enppi, **22 killed** & **Dozens Injured**)

- No proper check on the no. of tickets issued and no. of fans gathered
- No proper Access Control System – fenced-in passageway
- Instead of a Turnstiles a customized Iron cage was put for Access Control
- No Crowd Management
- No proper Fencing - Forced Entry
- People were crushed in a stampede.







# Air Defense Stadium – Egypt

## ■ The Public Zones

Check points- Few Kms away from the Stadium

## ■ The Outer Perimeter

Check points- Few 100 meter away from the Stadium

## ■ Inner Perimeter

(Access Control System)

Check points- Stadium wall or inside the Stadium





# Case Study : Air Defense Stadium: Egypt

## Public Zone

- Check points- away from the Stadium
- Checking of Cars, No. plate recognition
- Checking people and bags etc







# Case Study : Air Defense Stadium: Egypt

## ■ Outer Perimeter

Check points- Few meters away from the Stadium or Stadium Material







# Case Study : Air Defense Stadium – Egypt

## Outer Perimeter

- Checking of tickets, Manually & Mobile or Handheld devices
- Check points – Few meters away from the Stadium
- CCTV with Video Analytics
- Body & Bag Scanners
- Tickets issued and no. of fans gathered





# Case Study : Air Defense Stadium – Egypt

## ■ Inner Perimeter

Check points-  
Stadium wall or Few  
meter away from the  
Stadium



# Inner Perimeter

## 1. Main Entrances

- Turnstiles, barriers and revolving doors - **control throughput**
- An Intelligent Ticketing System

## 2. Internal Doors, Stands & Virtual Fences

- Hardware for the protection of the Doors and walls against heavy impact
- Delayed action as standard for ease of access
- Electro-mechanical hold-open function for single-leaf fire / smoke control doors

## 3. Exit or External Doors

- Door locking system and door terminal for electronic escape route control system

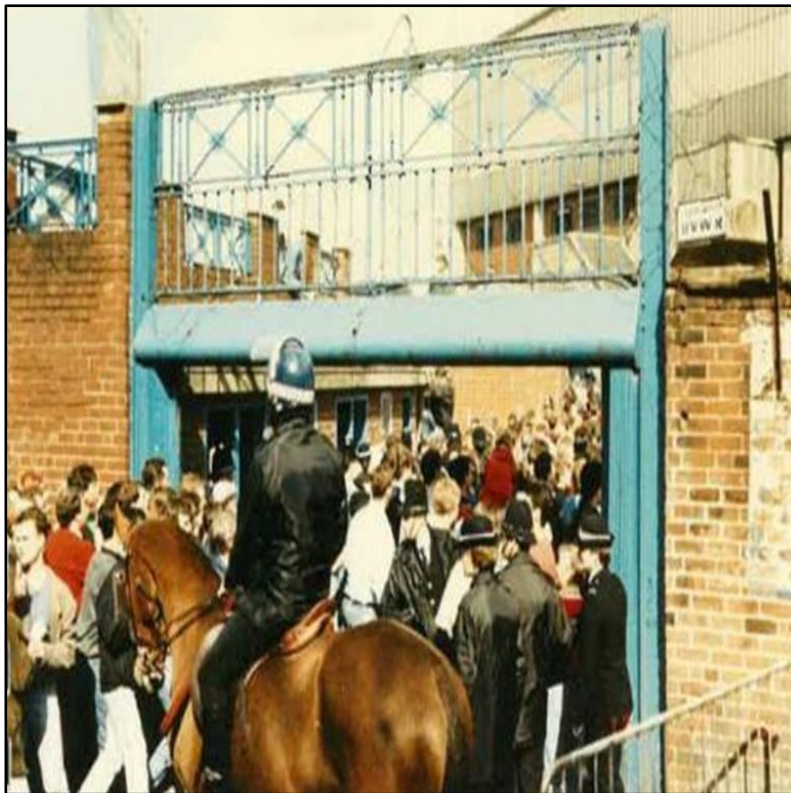






# Access Control System

## 1. Main Entrances





# Access Control System

## 1. Main Entrances





## Access Control System

How to Calculate the no. of Turnstiles depending on the capacity of the Stadium or any Venue ?

Approximate Stadium Capacity: 40,000 persons

Considering the Turnstile throughput: 10 persons per min.

Assumed time to fill the stadium: 60mins

No. of turnstiles required = = **66.66 or 67 turnstiles**  
(40,000 persons/ 10 persons per minute/ 60 minutes)

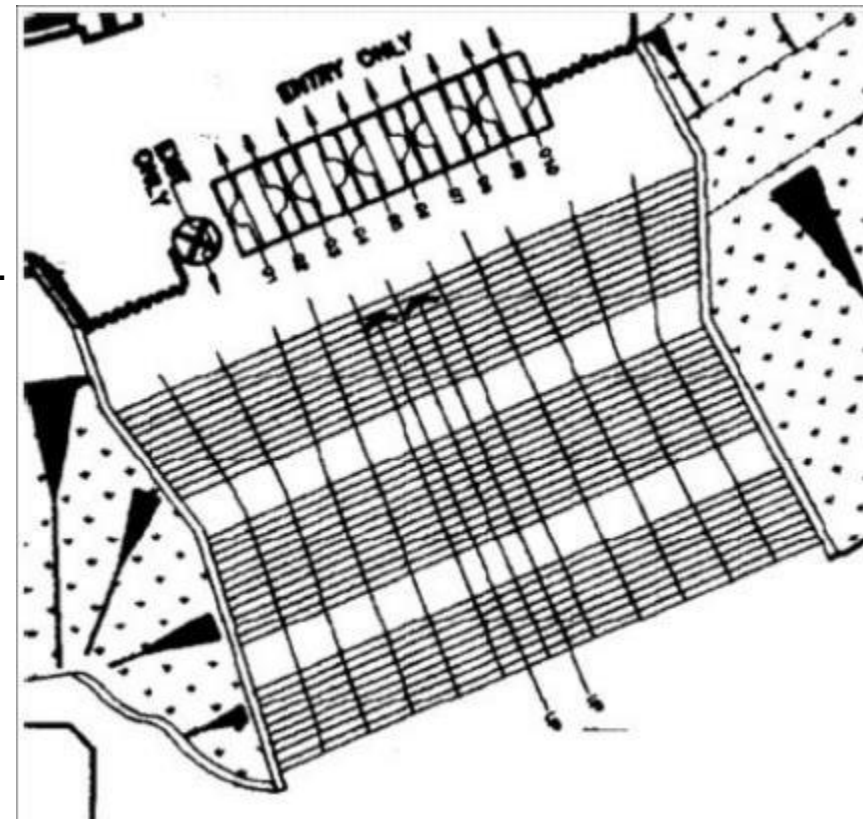


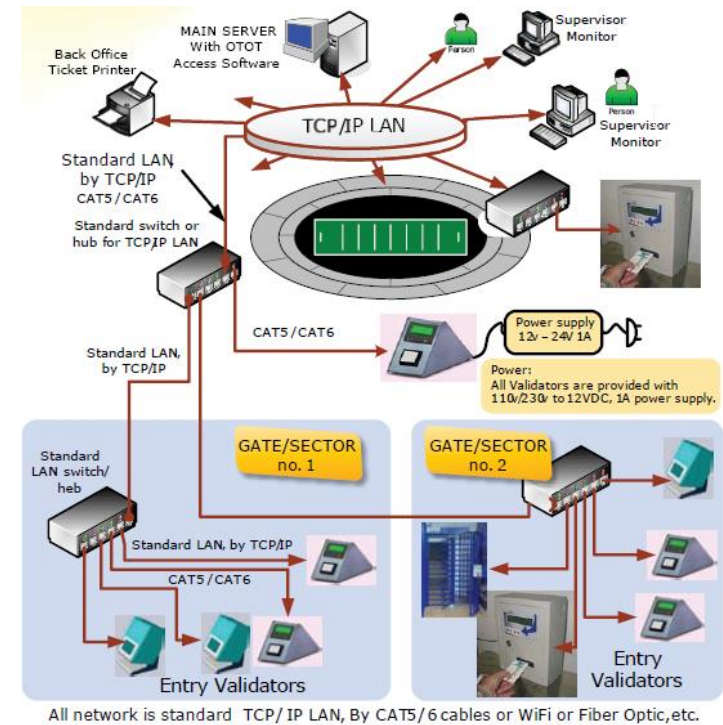
Figure 42 - Plan of gate G and turnstiles (Left = 1, Right = 10)





# Integration of ACS with the Ticketing System

- System has to **count the people** per block .
- Ticketing System should give **an alarm**, if the maximum number is reached.
- Fan **Separation**.





# Access Control System

## Main Entrances – Access Points or Readers

1. Vandal Proof & Bullet Proof readers



Bullet & Vandal Proof  
Access Card Readers



# Access Control System - Inner Perimeter

## Main Entrances – Full Height Turnstiles

- For High Security
- Control and regulate throughput







## Access Control System - Inner Perimeter

### Main Entrances –

- Half Height & Full Height Turnstiles for people with Special Needs
- Way to Carry Trolleys



## Access Control System - Inner Perimeter

### Main Entrances – Carpark Control

- Physical protection of cars/lorries,





## Access Control System - Inner Perimeter

### Main Entrances – VIP

- Elegant design as per the entrance areas
- Adaptable design
- Matches the Aesthetics of architectural design
- Silent







## Access Control System - Inner Perimeter

### Main Entrances – Other Areas

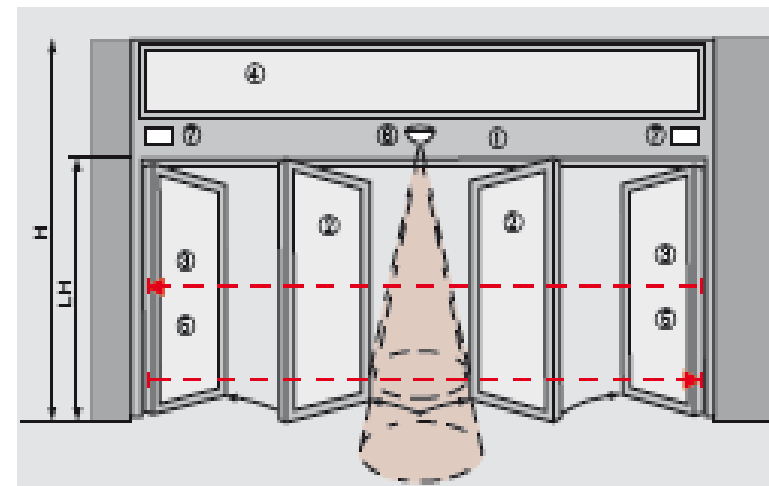
- Fan shop
- Press Center
- Office Areas





# Access Control System - Inner Perimeter

Automatic Sliding Breakout Function

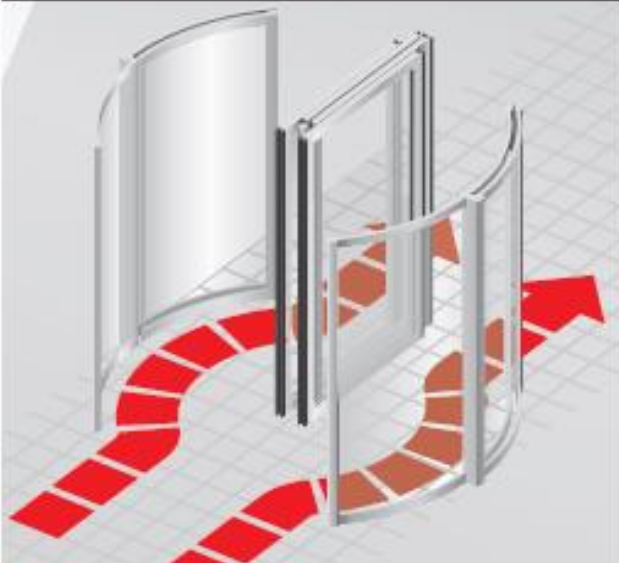




# Access Control System - Inner Perimeter

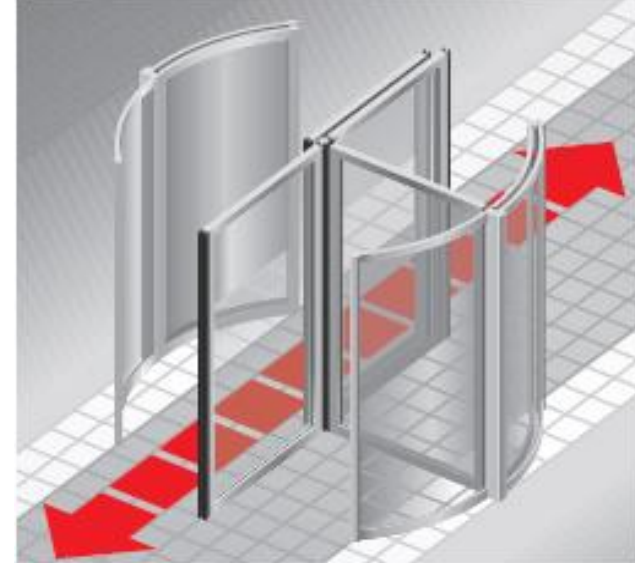
## Automatic Revolving door Breakout

**Escape route**

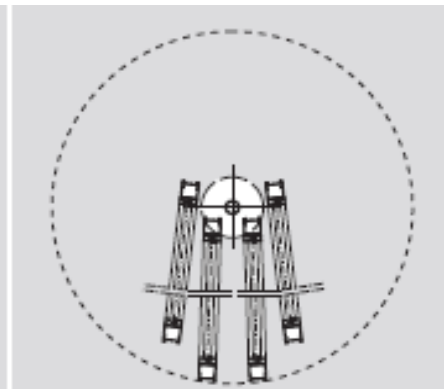
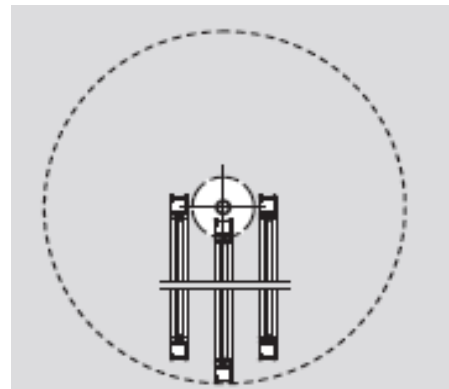


The bookfold mechanism for the door wings offers a special folding function. The folding mechanism enables the wings to be folded together almost in parallel, thereby giving the largest possible passage width. This folding capability of the wings makes these doors suitable for installation in emergency exits and escape routes.

**Transport opening**



The leaf hinge for the transport opening provides a special folding-function for one wing (not available for KTV/Atrium). By folding a single wing, one can create an opening, enabling long objects to be carried through the KTV.





## Access Control System - Inner Perimeter

### Internal Doors, Stands & Fences

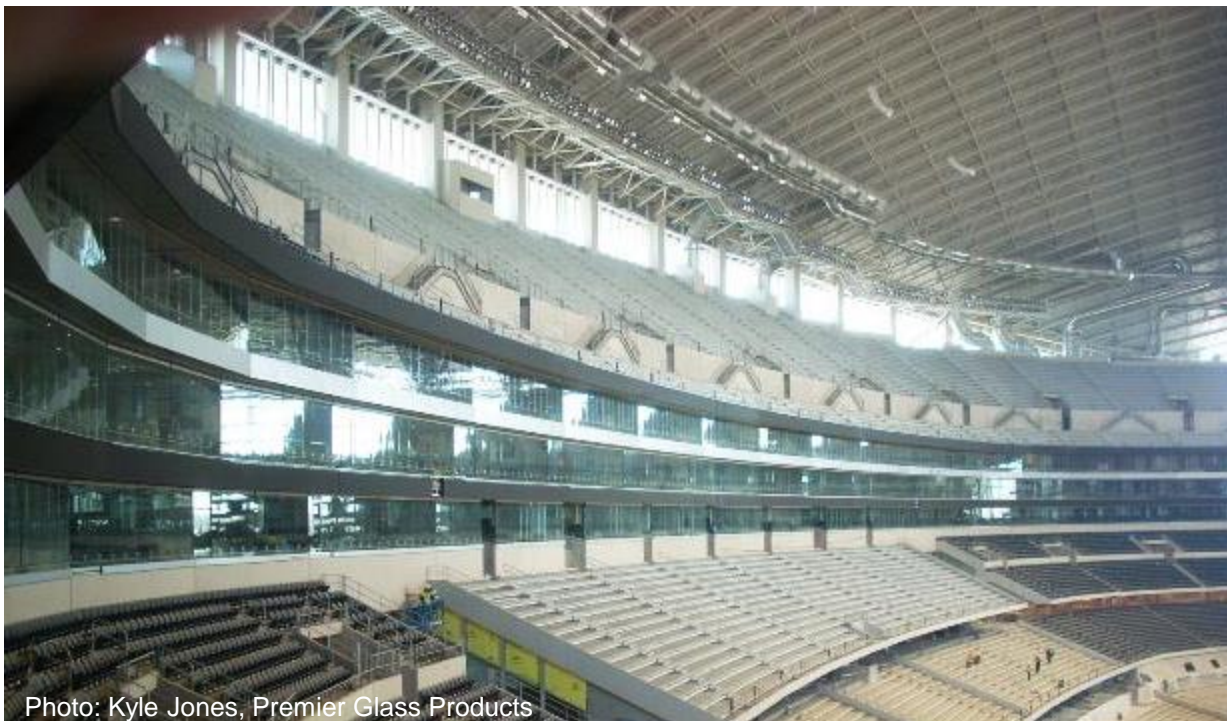
- No solid fence between fan block and playing field
- Fan Separation, through security people & ACS.
- One seat per fan, no standing fan groups.
- Restriction of numbers of fans per entrance block
- Entrance via card for a certain block.





## Access Control System - Inner Perimeter

Transparency and flexibility for VIP boxes







## Access Control System - Inner Perimeter

Narrow profiles for a fluid appearance

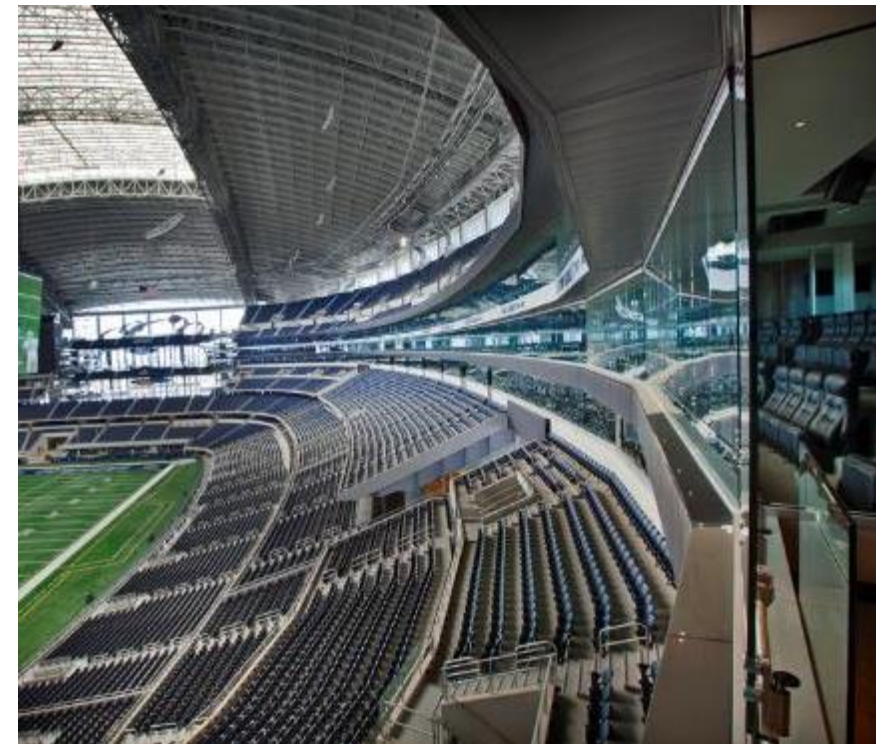






# Access Control System - Inner Perimeter

## Dallas Cowboys Stadium





# Access Control System - Inner Perimeter

## 2. Internal Doors

- Equipped with adjustable **back-check** as standard
- Protects the wall and door against heavy impact
- Optionally with delayed action for ease of access – also for fire and smoke control doors
- Electro-mechanical hold-open function for single-leaf fire / smoke control doors

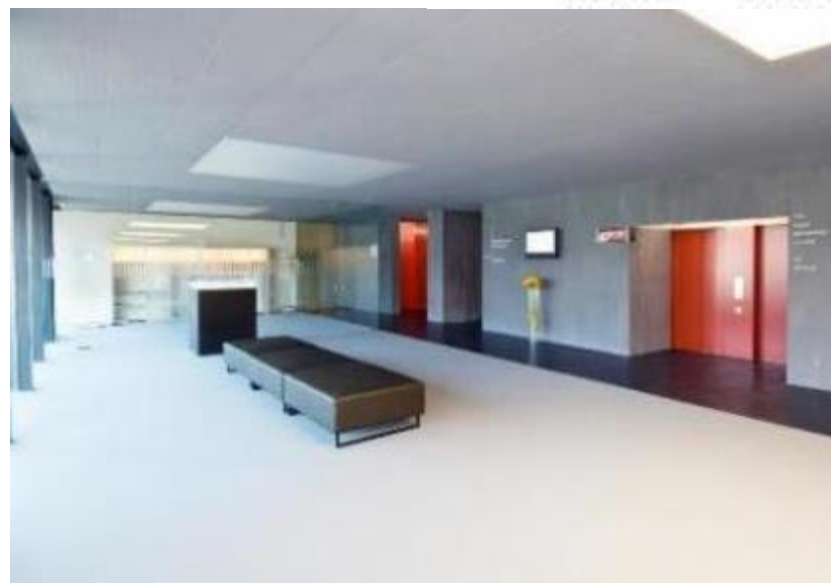




# Access Control System - Inner Perimeter

## 2. Internal Doors

- In the VIP Areas Convenience and flexibility for visitors
- Locker Rooms & Changing Facilities
- Electronic Cylinders, Fittings & Readers







# Access Control System - Inner Perimeter

## 3. Exit or External Doors



## Access Control System - Inner Perimeter

### 3. External Doors – Emergency Exit Doors

- Panic Bars with Motorized Latch Retraction (MLR) function for immediate Egress
- Should be Remotely operable for Magnetic Dogging
- Delayed Egress Panic bars (also EMDE) for delayed Egress



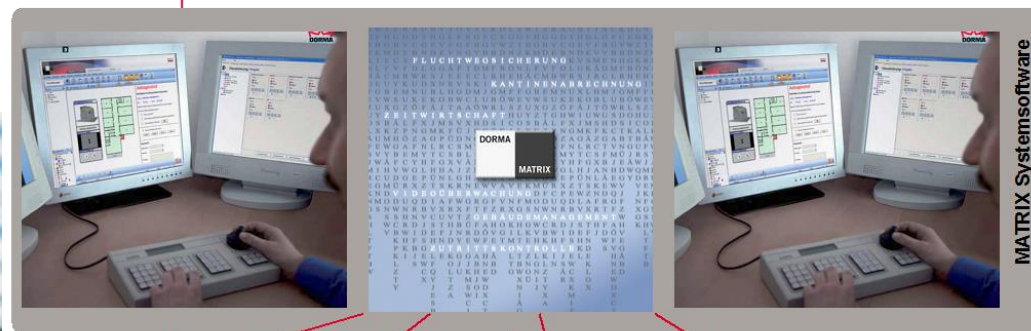




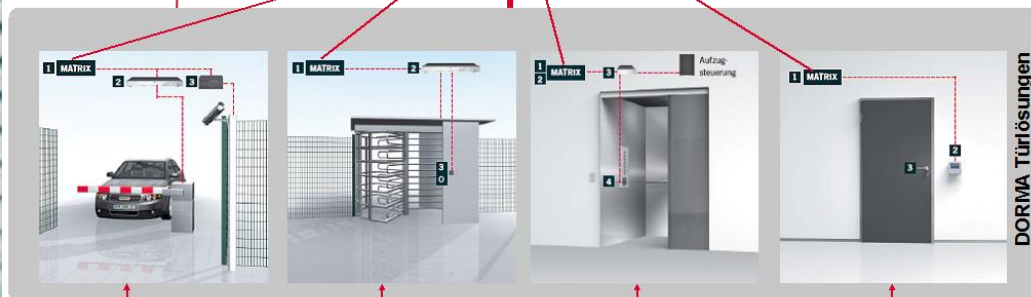
# Access Control System - Inner Perimeter

## 3. External Doors – Emergency Exit Doors

- Door Management System for electronic escape route control.
- Door locking system
- Door terminal for electronic escape route control system



MATRIX Systemsoftware  
DORMA security application



DORMA Türlösungen



Magnet, Mifare, Legic, Legic Advant, Mifare DESFire, Trovan, Indala, EM





# Access Control System - Inner Perimeter

## One card can give access to:

1. Parking
2. Hospitality
3. Fan Shop
4. Viewing the game



# Access Control System - Inner Perimeter

## ACS should be Integrated to:

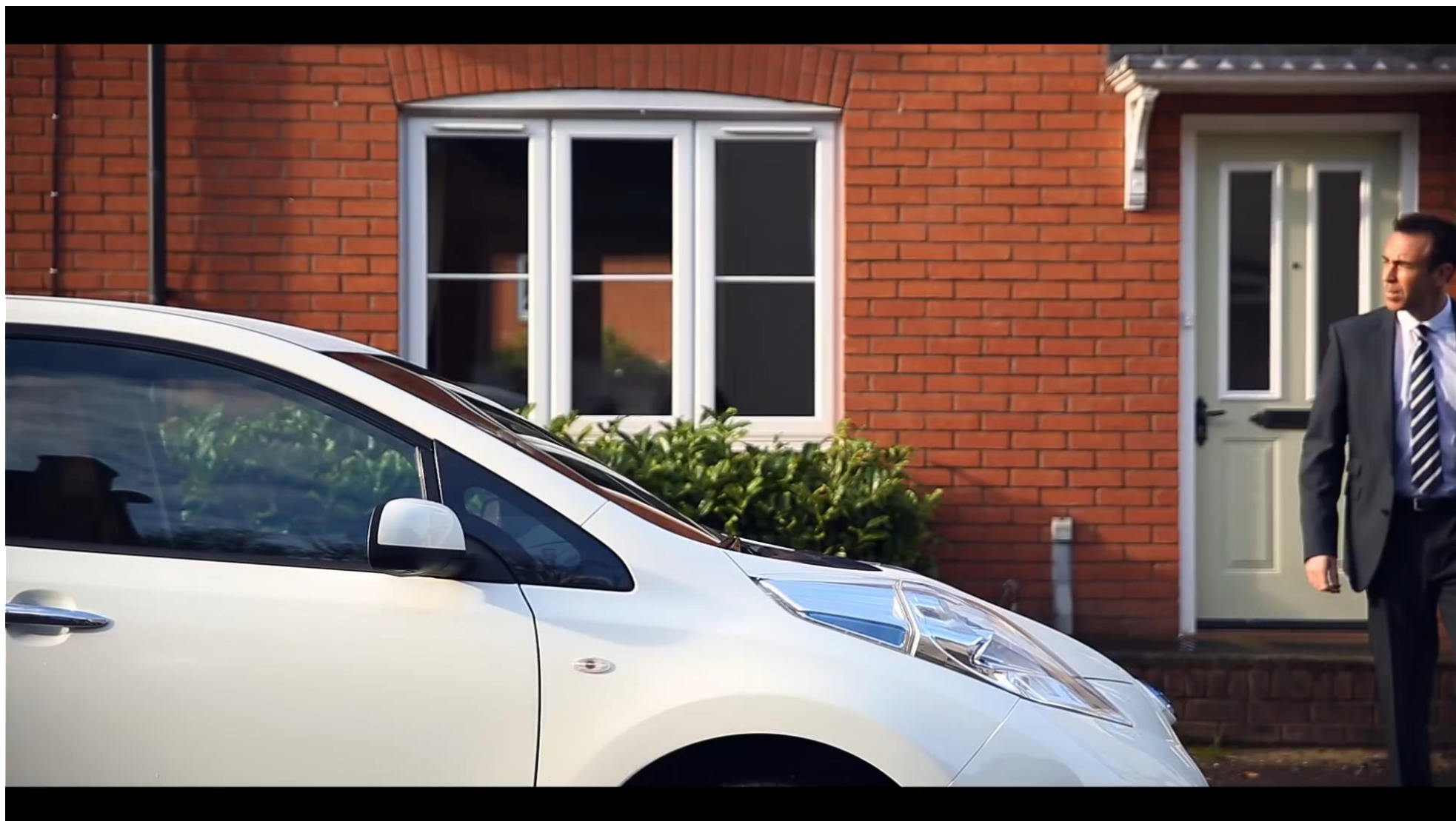
- Fire Alarm System
- Escape Route System
- Building Management System
- CCTV
- Intrusion / Burglar Alarm System
- Ticketing System
- Payment Solutions
- INTERCOM System
- Public Address System .....





## Access Control System - Inner Perimeter

**One Device can give you access to:**







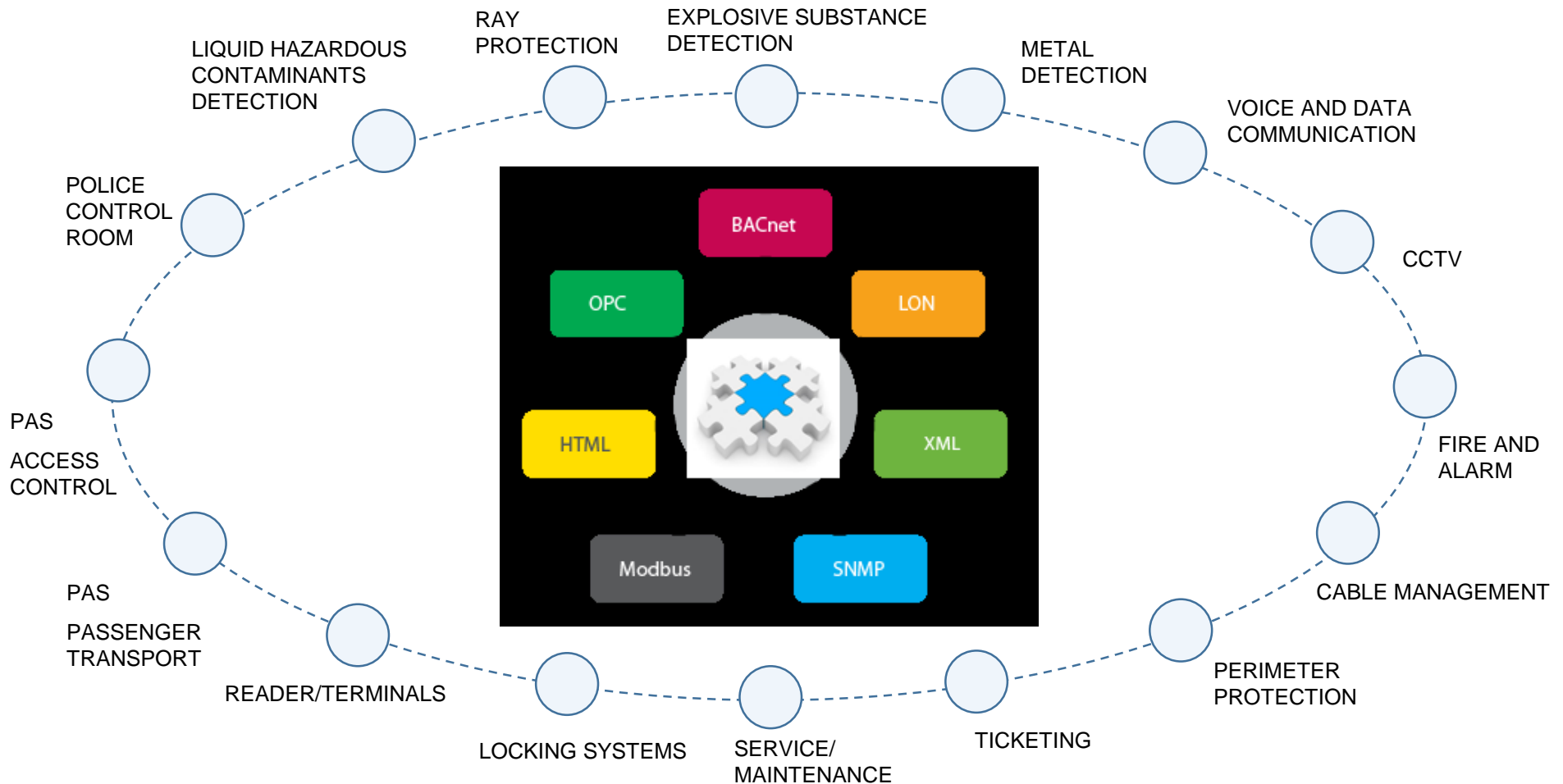
# Total Solution:

## Safety & Security Systems as one Integrated System



# Total Solution:

## Communication between Safety & Security Systems

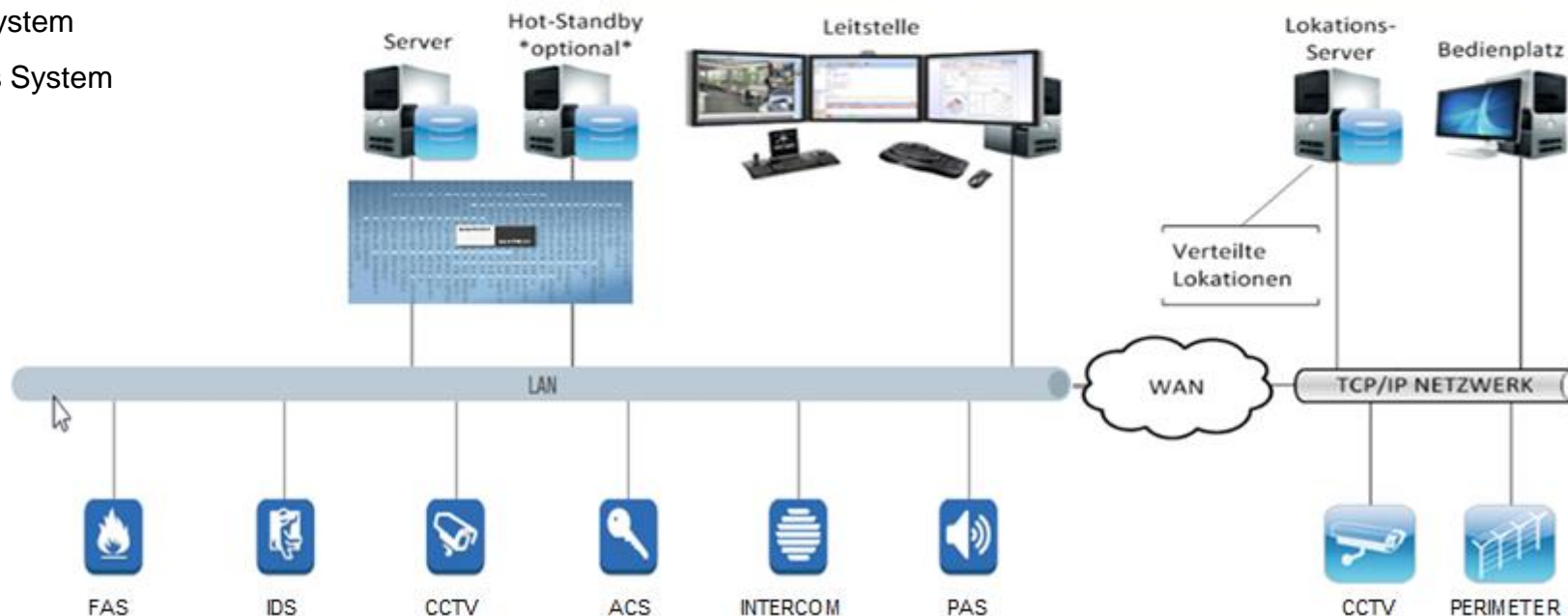




# Common Control/ Command Center

One system can give you control over:

1. Access (Parking, Perimeter, Stadium)
2. Fire Alarm System
3. Escape Route System
4. Building Management System
5. CCTV
6. Intrusion / Burglar Alarm System
7. Ticketing System
8. Payment Solutions
9. INTERCOM System
10. Public Address System



Thank you !

