

Designing Border and Perimeter ESS Systems

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Welcome and Introduction

Discussion Topics for Today's Presentation:

- Perimeter Security as a Priority Layer
- Classifying the Boundary Threat
- The Five Ds of Security
- Layering Methodologies
- Topographical Limitations
- Physical Barriers
- Critical System Protection
- SMAAS and Wireless Infrastructure
- Components for Perimeter Design
- Security Policies for a Rapid Response
- BICSI Challenge



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Perimeter is a Vital Layer

- First Contact with an Intruder
Assessing the Threat
The Response Deterrent
- Knowledge of the Site
Perimeter Layer May Be Large
Inherent Vulnerabilities



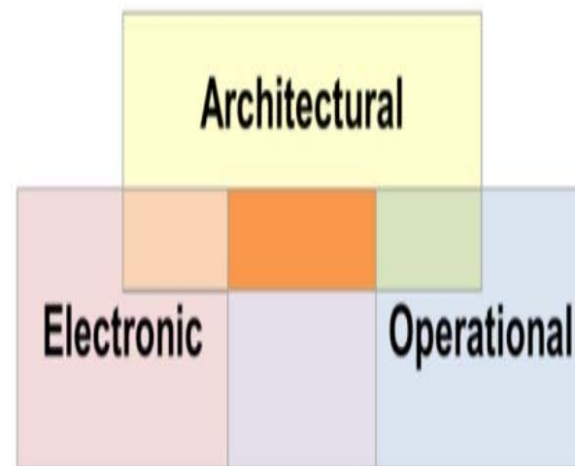
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Principles of Security

1. Deter
2. Delay
3. Detect
4. Decide
5. Defend



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Factors for Deterrence

- Deterrence is Always Preferable
- How Do We Establish Deterrence?
- Methods Include:
 - Barriers
 - Signage
 - Motion Detection Audio



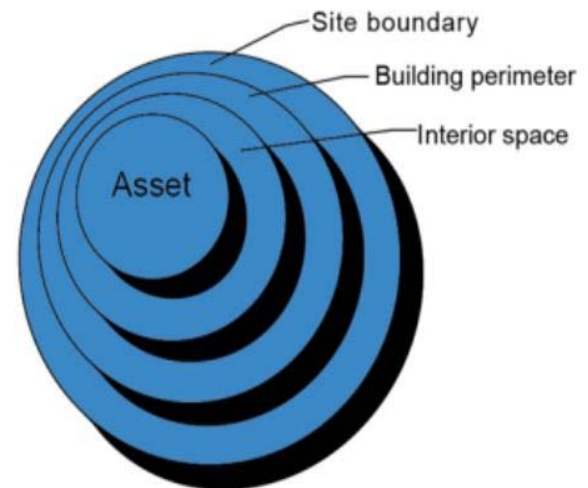
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Achieving the Delay

- Delay is Critical in Intercepting the Threat
- Delay Tactics:
 - Fences
 - Barriers
 - Multiple Layers



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Accurate Detection

- Dependent Upon Countermeasures
 - Intrusion Detection Sensors
 - Video Analytic Based Surveillance
 - Fence Detection
 - Radar/Wireless Detection



- Without Detection Response Will Not Occur



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Decision Time

- Once Threat is Established and Detected,
We Must Determine the Response Needed
 - Policy Development and Training are Essential
 - Threat Matrix will Determine Response
 - Utilizes a Pre-Planned Course of Action
 - Which Countermeasures, Human or Electronic?



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Defend the Perimeter

- Enforce Predetermined Response Policies
- Response is Calculated for Each Threat Type
- Response Drills
- All Perimeter Systems Will be Tested



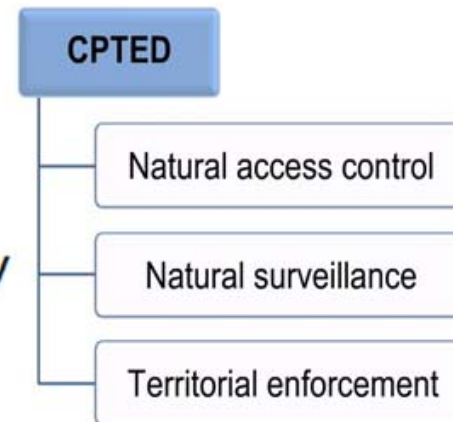
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Security is Designed in Layers

- Site Boundary Layer
 - Open Visible Ground is a Best Practice
 - CPTED
- Building Perimeter
 - Doors, Air Vents
 - Loading Docks are a Vulnerability
- Secure all Critical Spaces



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What Risk Elements Exist ?

- Man Made Risks
 - Planned group of Attackers
 - Individual Intruder
- Natural Risk
 - Flood, Seismic Event
 - Storm or Weather Incursion

Risk = Threat x Vulnerability x Impact

Control Measures

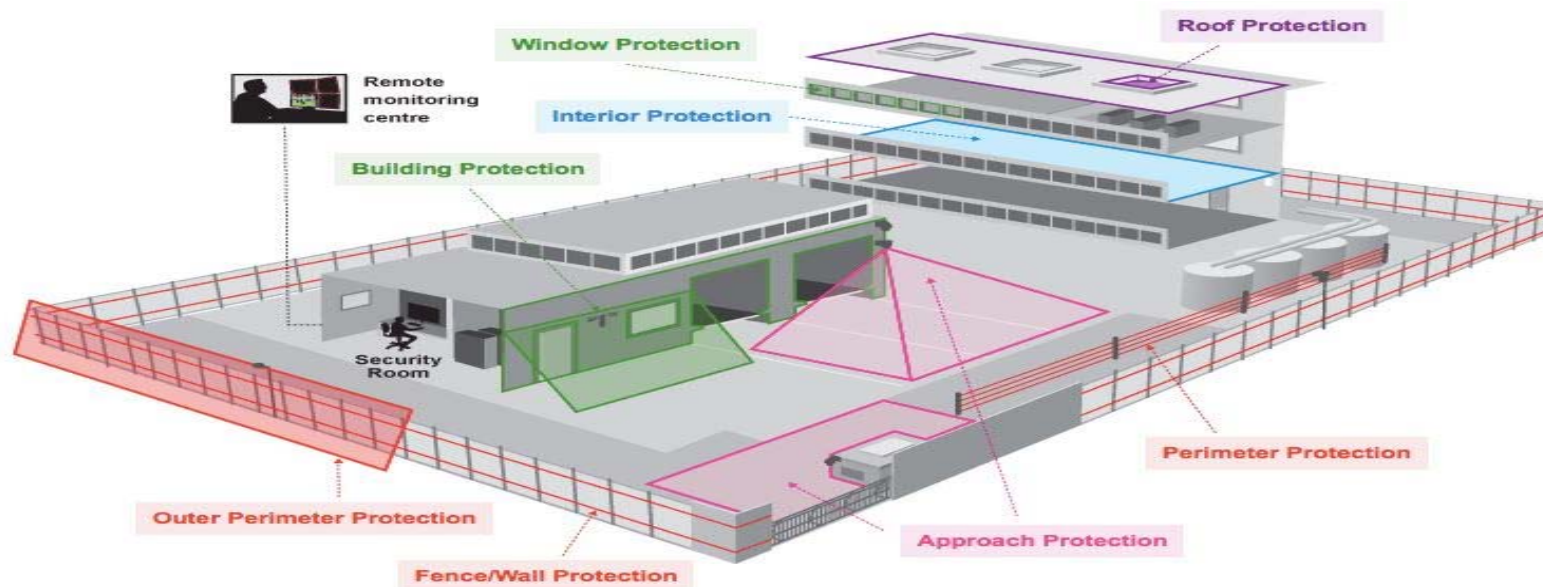


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Perimeter Management – Types of Facilities that Pose Exceptional Design Challenges



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Airport Facilities



- **Perimeters are Highly Complex**
- **Threats are Difficult to Identify Due to Density**



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Shipping Ports



- Risks and Threats are Easily Concealed
- Radiological and Other Sensors Needed



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Critical Infrastructure



**Homeland
Security
Designates
Critical
Infrastructure for
Federal Funding
To Improve
Perimeter Security
Systems**



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Special Purpose Commercial Facilities

- **Chemical Plants**
- **Grain Storage**
- **Oil Refineries**
- **Tank Farms**



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Countermeasures: Human vs. Technology



A Combination of Both are Typically Required



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Response Policies for Perimeter Breach

- **Primary Response**
 - Probes and Reconnaissance
 - Threat Identification
- **Force Assignment**
 - Quantity, Skills Required
 - Predetermined Mobilization
- **Response Plan Execution**
 - Assets in the Air
 - Assets on the Ground



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Which Assets are Deemed Critical ?

- Critical Infrastructure
 - Power Grid
 - Communications Backbone
- Communications, ITE Hardware
 - Transmitters
 - Satellite, Wireless Links
- Site Personnel
 - Monitoring and Operational Response



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Fence Barriers



Israel, Russia, Saudi Arabia, Turkey, Mexico, India, China, Pakistan, and the EU all have currently active Border Fence Building Programs. Statistics prove the effectiveness of the fence barrier.

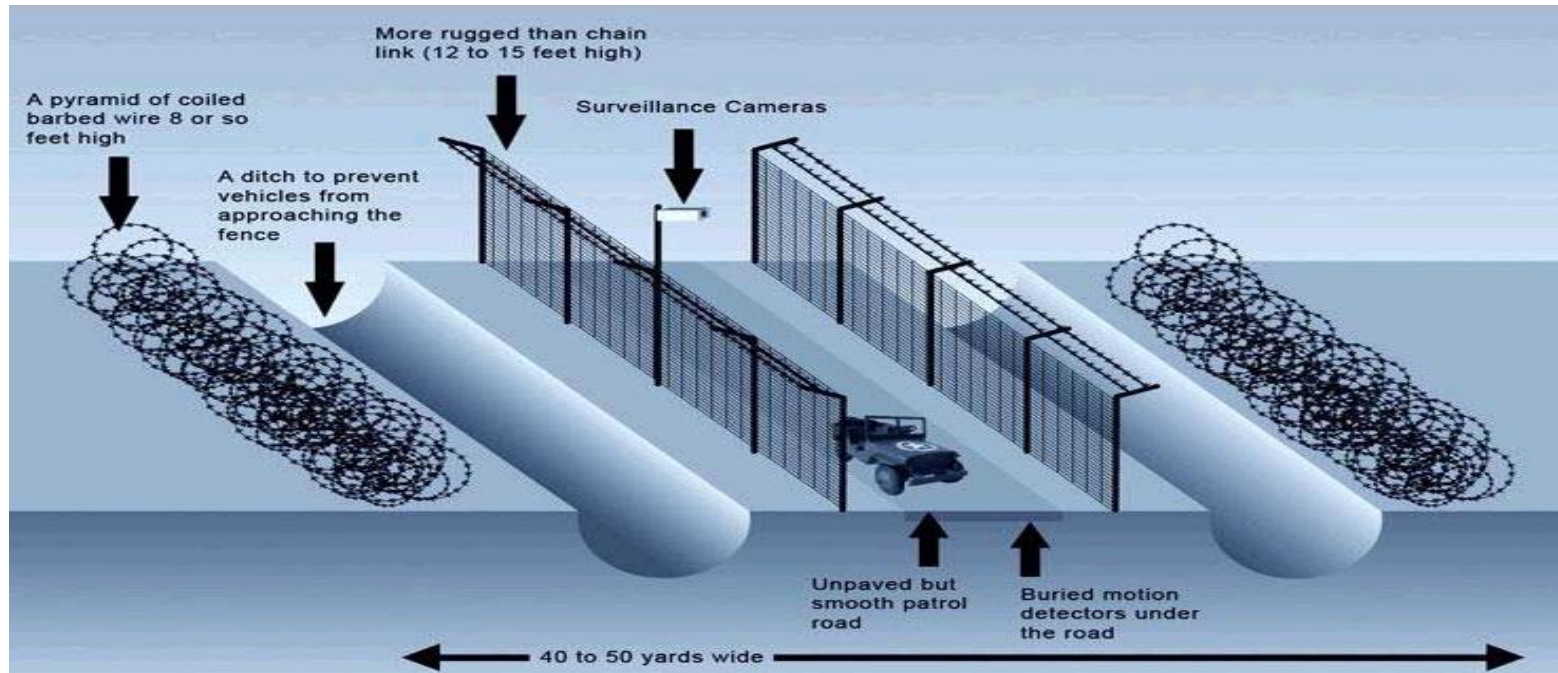


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Layout Methodologies

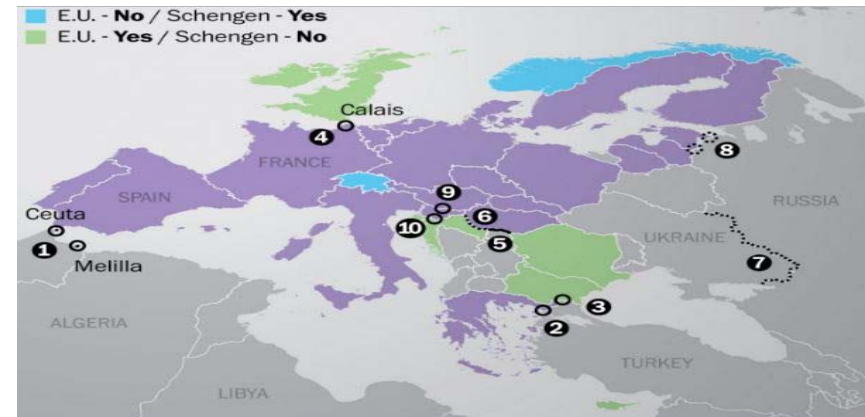
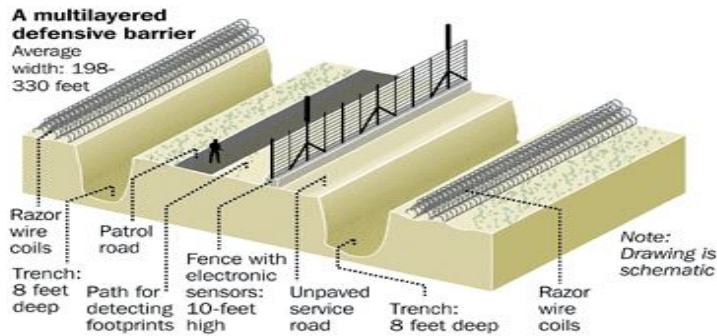
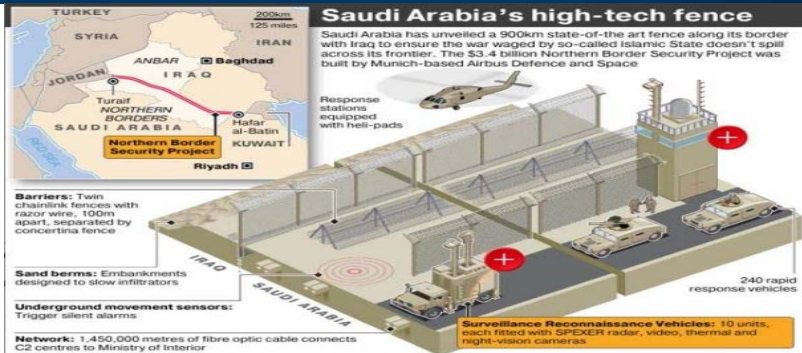


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Additional Case Studies

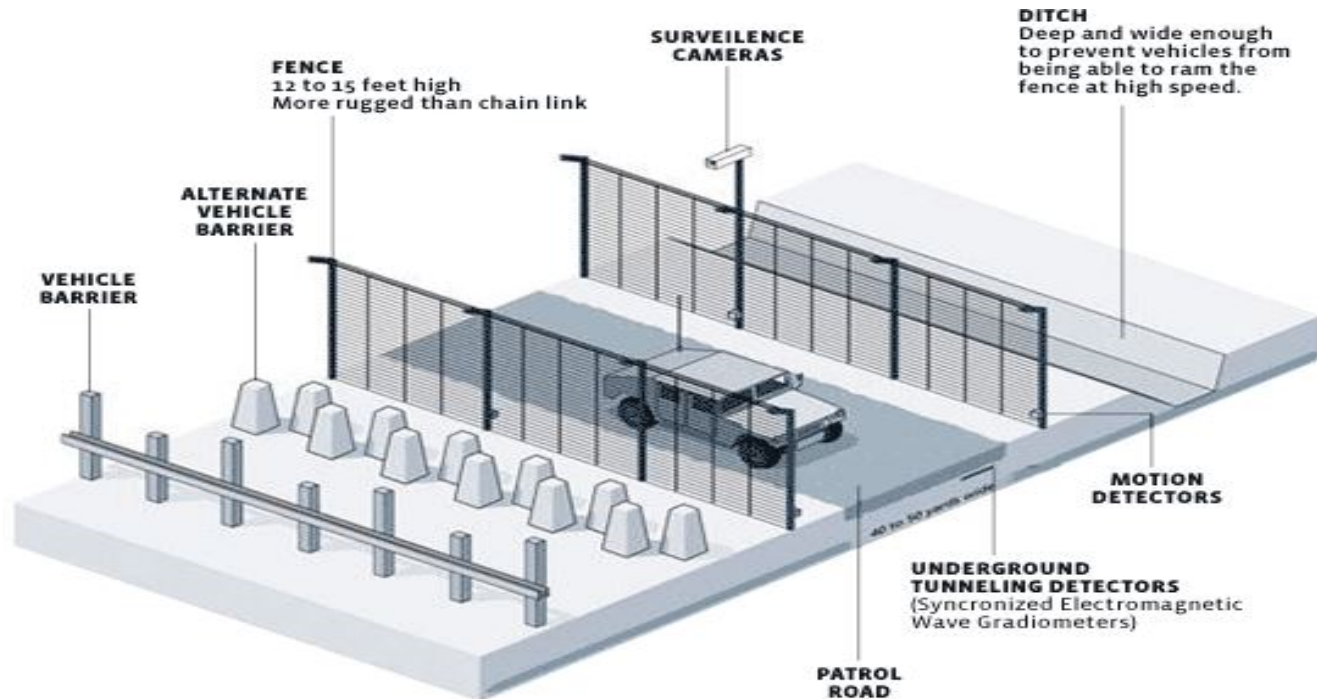


- 1 Ceuta and Melilla (Spanish possessions in North Africa) – Both extended fences in **2005**
- 2 Greece – Completed **2012**
- 3 Bulgaria – Completed **2015**
- 4 Calais, France – Extended **2015**
- 5 Hungary – Completed **2015**
- 6 Hungary – Scheduled for completion **2015**
- 7 Ukraine – Scheduled for completion **2018**
- 8 Estonia – Construction scheduled to begin **2018**
- 9 Austria – Considering fence on border with Slovenia
- 10 Slovenia - Considering fence on border with Croatia



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Variations on Design



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Fence Design is Important, However it But May Not Stop a Determined Intruder



The Goal is to Delay, in order
that the Intruder Be Detected...



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Fence Detection Systems Allow for Intrusion Detection



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Fence and Gate Vulnerabilities



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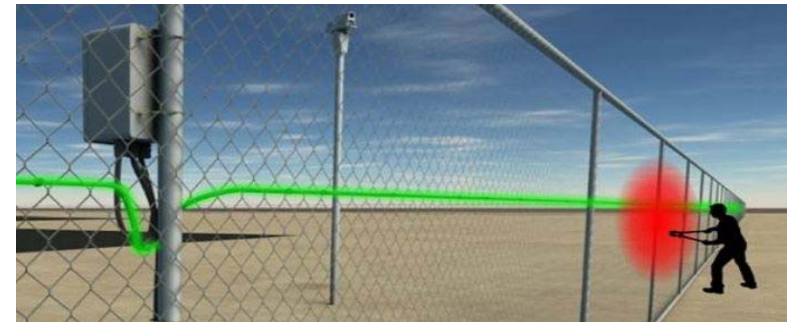
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Best Practices for Fence Construction

- **Foundation and Footer**
 - **Discourages Tunneling**
 - **Sufficient Depth**
- **Minimum Height 12-15'**
- **Security Cap on Top**
 - **Concertina Wire**
 - **Barbed Wire**

(More than one level)
- **Fiber or Copper Fence Detection System Present**



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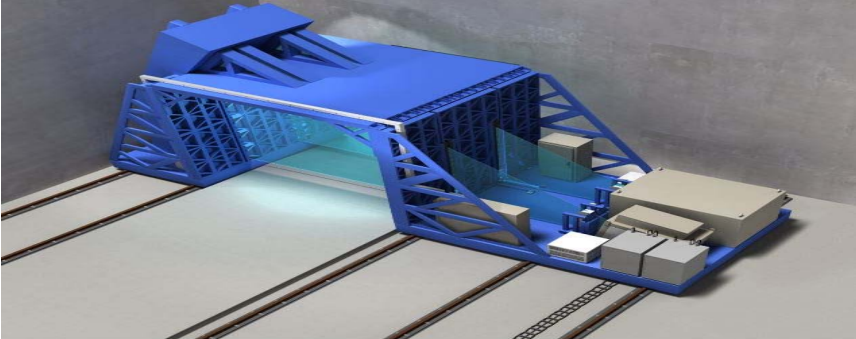
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Portals and Barrier Types for Access



Automation is a Trend in Portals



Chemical, Narcotics, Biohazard and Radiological Sensors will be part of the Active Scan Process



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Specialized Systems for Critical Facility Access



**Traditional
Entry System
as Compared to
Special
Purpose
Vehicle
Detainment
Barrier
Systems**



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Designing a Transport System

- **Communications Duct Bank Footer**
 - **Underground Concrete Encasement**
 - **Integrated Tamper/Seismic Sensor**
 - **Secure Access Ports**
- **SMAAS – Single Mode as a Strategy**
- **Wireless Backbone**
 - **Bandwidth/Distance Limitations**
 - **Mobility Networks**
 - **Aerial Support Infrastructure**

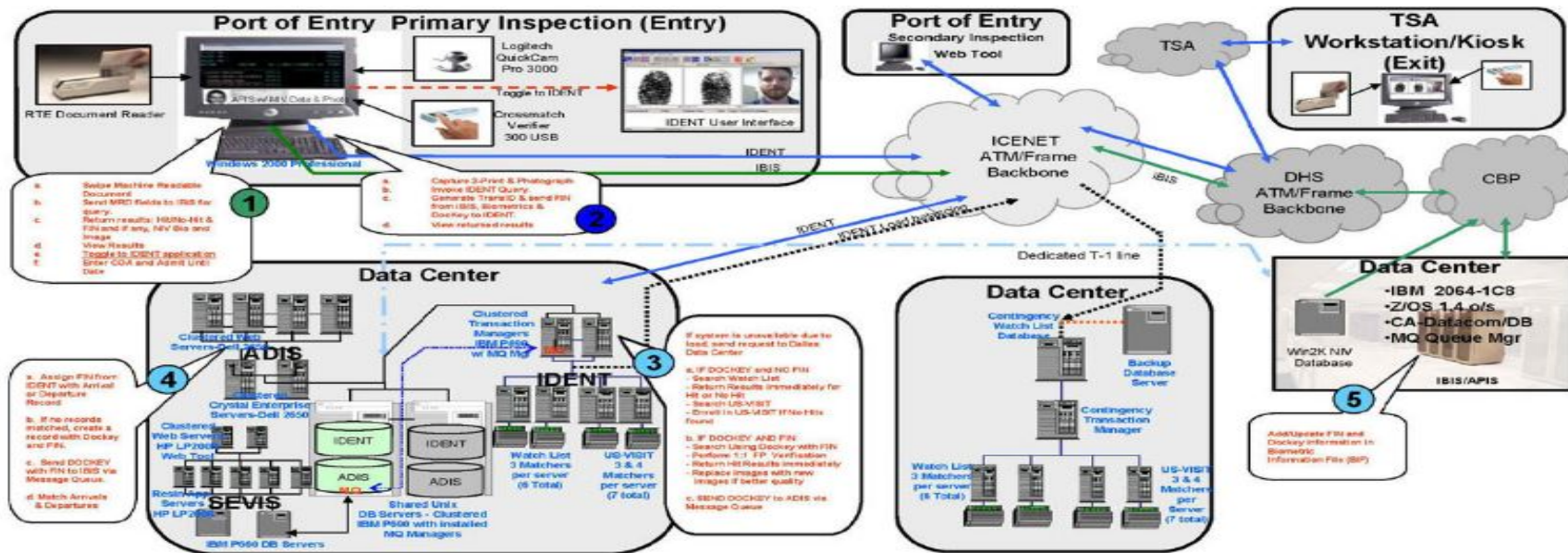


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Cloud or Enterprise Infrastructure



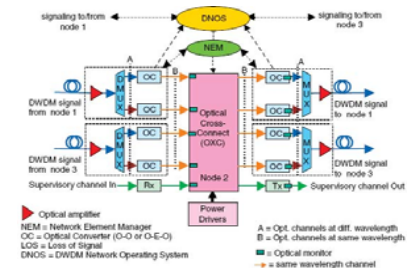
Source: US-VISIT procurement notice, DHS



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Bandwidth and Performance Requirements

- **Bandwidth Calculation**
 - Based upon Sum of all Systems
 - Based on Geographical Aggregation
 - Design based upon Segmentation Methods For Each Defined Region
- **Network Latency for Video Performance**
- **Central or Remote Stream Monitoring**
- **Mobility Network Mesh vs. Wired**



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Available Technology

- **Classified versus Commercial Grade Components**
- **Use of Ruggedized Technology**
- **Proven Use in the Environment**
- **Mission Critical Level of IP Network Availability**



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Wireless Support Infrastructure



- **Monopole or Tower Requirements**
- **Other Subsystems**



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The Three “M”s of Wireless Technology

- Mesh
- Microwave
- MM Wave



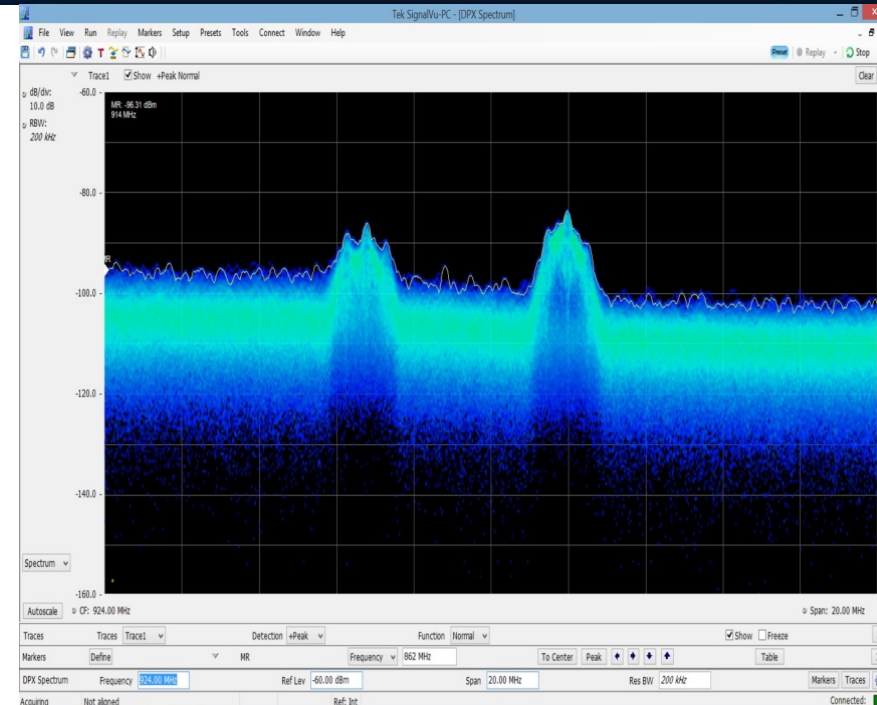
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Wireless Intrusion Monitoring

- In Band Interference
- Out of Band Interference
- Broadcast Signals
- Unauthorized Devices
- Covert Interception



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The Need for ODAS



Outside DAS will be utilized for communications between RF mobile devices along a remote perimeter where normal carrier signals are not present.



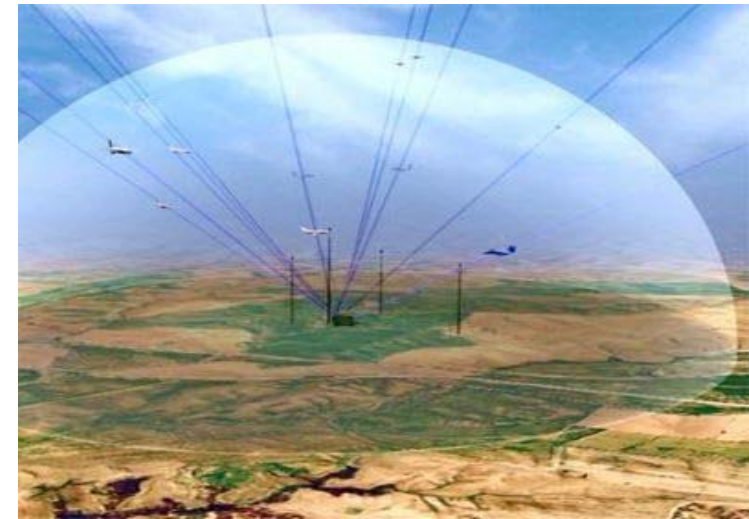
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Wireless Network Vulnerability

- Intruder Location Utilizing RF Receiver Triangulation
- Jamming RF Transmission Location Methods

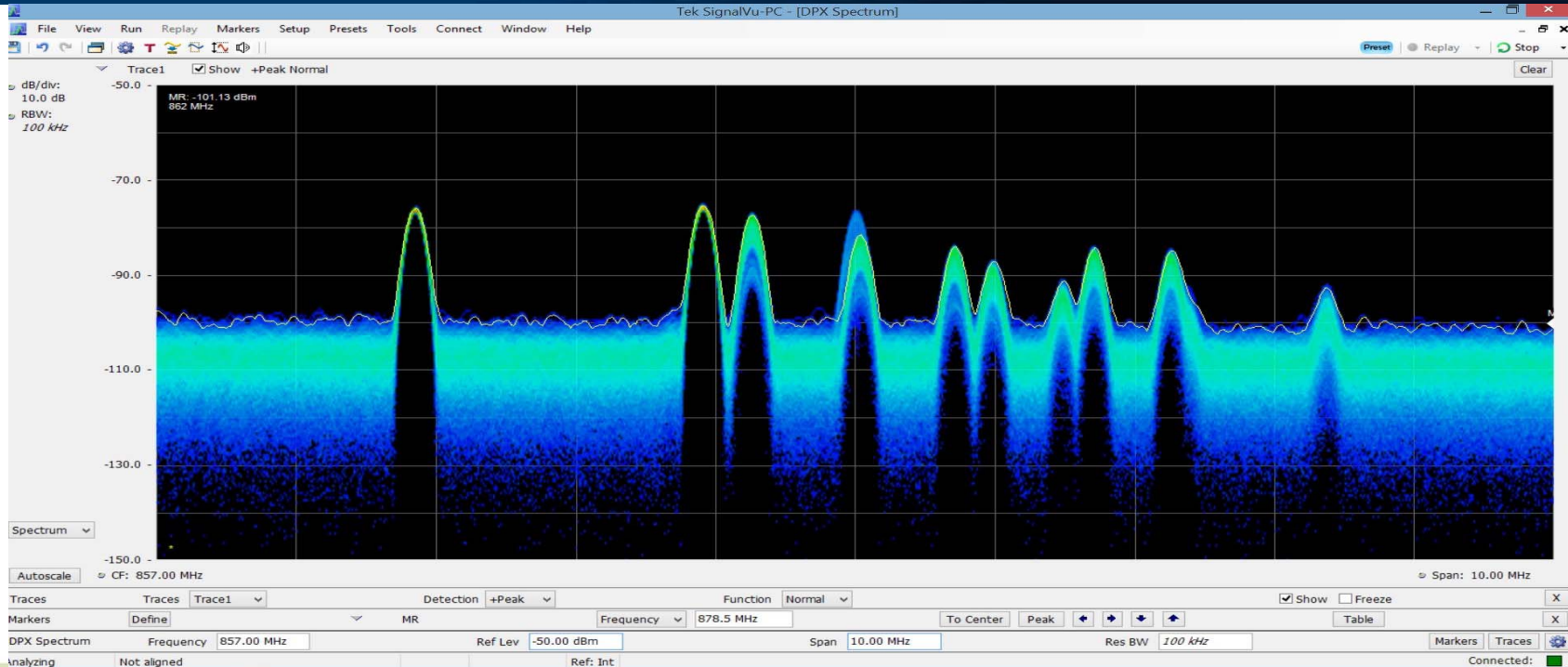


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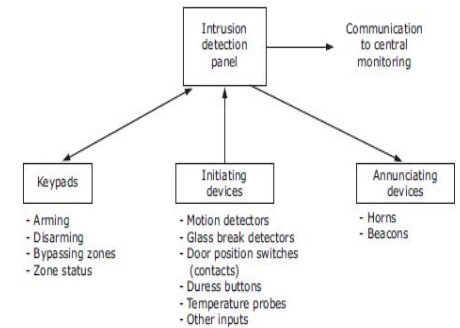
Wireless Spectrum Monitoring



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Electronic Countermeasures

- The Intrusion Detection Layer
- The Access Control Layer
- Video Surveillance
- Analytics Processing
- IP Based Systems



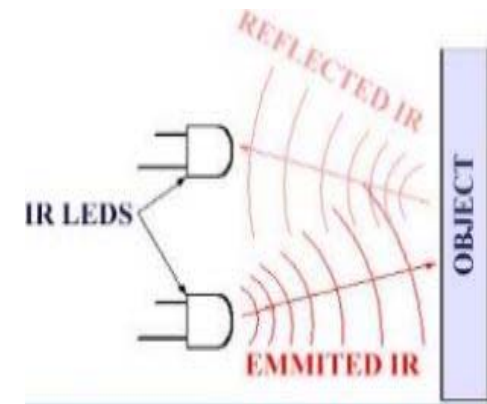
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Intrusion Detection Systems

- Seismic Detection
- Motion Detection
 - Infrared
 - Video Analytics (Motion or Thermal)
- Radar and Wireless Systems, GPR Based

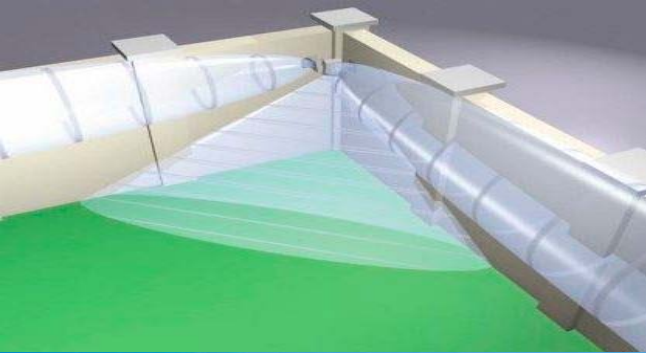


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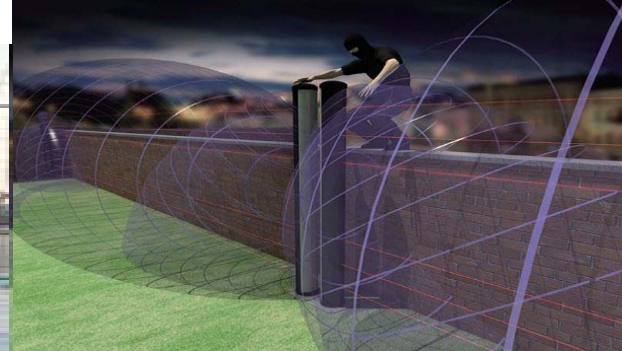
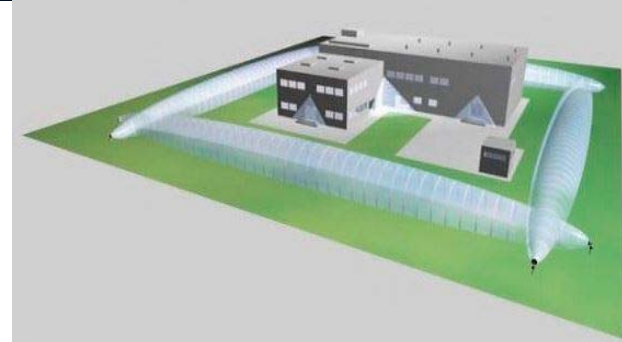
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Perimeter Wireless Detection System



**Detection Based Upon
X and K Band Radar
Intruder Signature**



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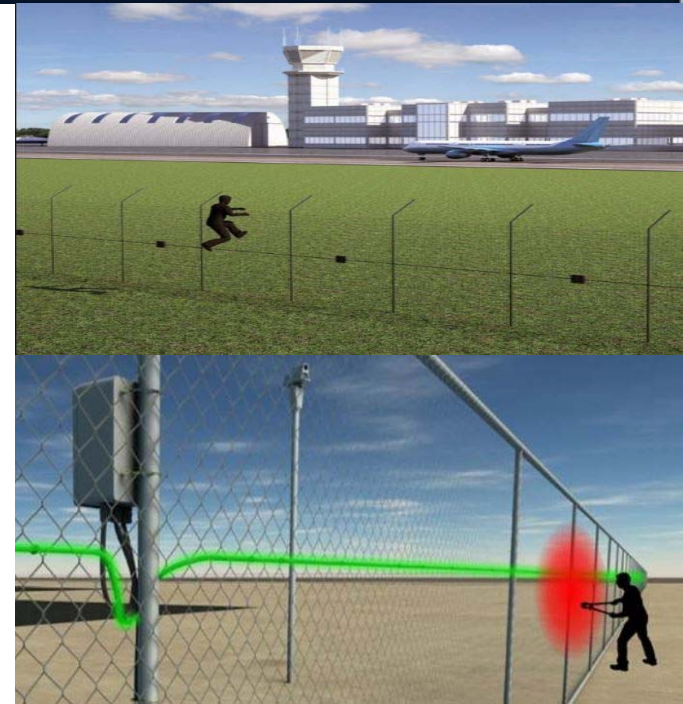
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Sensor Technology



**Seismic Sensors
May be Wired or
Wireless**

**Fence Sensors are
Single Mode Fiber
or Copper Based**



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The Access Control Layer

- Portals and Entrance Points
- Intelligent Transportation System Elements
 - LPR
 - Biohazard Detection Systems
 - Radiological Sensors
- Vehicle RFID Systems



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Limiting Flow with Entry Portal Systems

- Object Processing Speed is Improved Through Automation
- Various Sensors Types Utilized in this Process
- Video Analytics Including LPR Databases

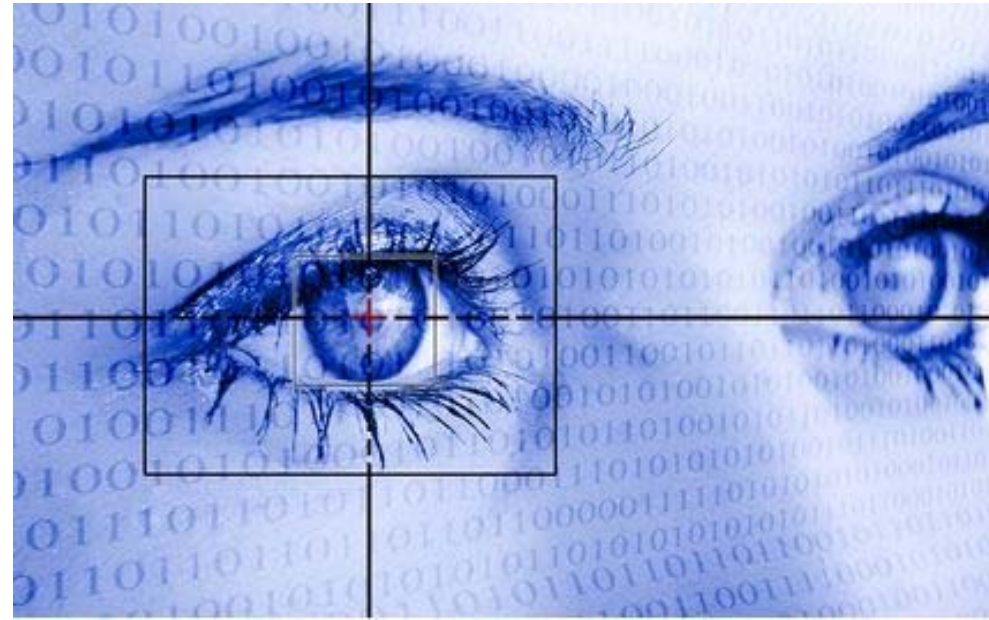


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Biometrics and Facial Recognition Systems



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Surveillance Platforms

What Is The Application?

- Long Distance Platforms - How Much Height AGL is Needed?
- PTZ versus Fixed Field of View
 - Dependent on Distance, Environment, Topography
- 180 and 360 Degree Applications
- Specialized High Resolution Systems
- Aerial Surveillance Platforms
- Infrared and Thermal Imaging Systems

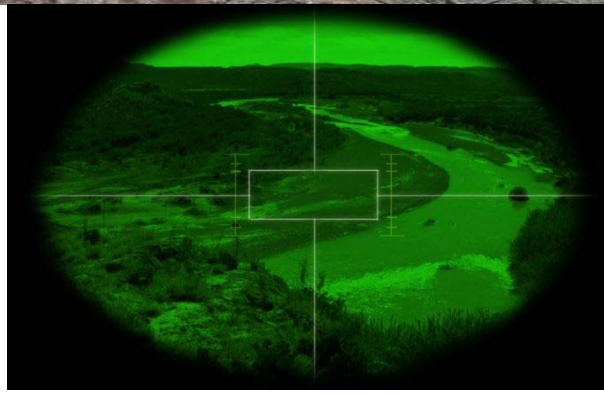
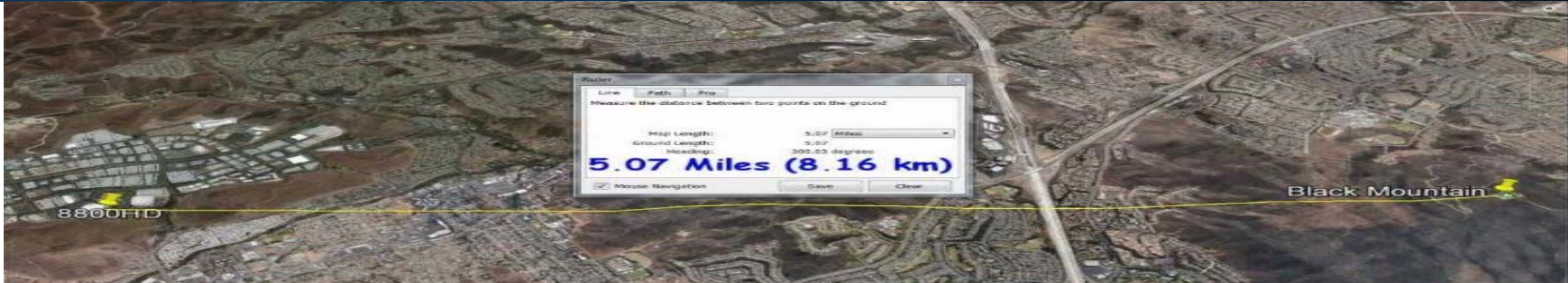


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Selection of the Camera for the Application



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The Video Analytics Tool Set

- Rules Based Detection
- Augments Site Personnel
- Remote Notification
- Requires Significant Expertise to Deploy
- 100% Reliability Not Assured
 - Performance Subject to External Factors
 - Weather Impact
 - Terrain Issues



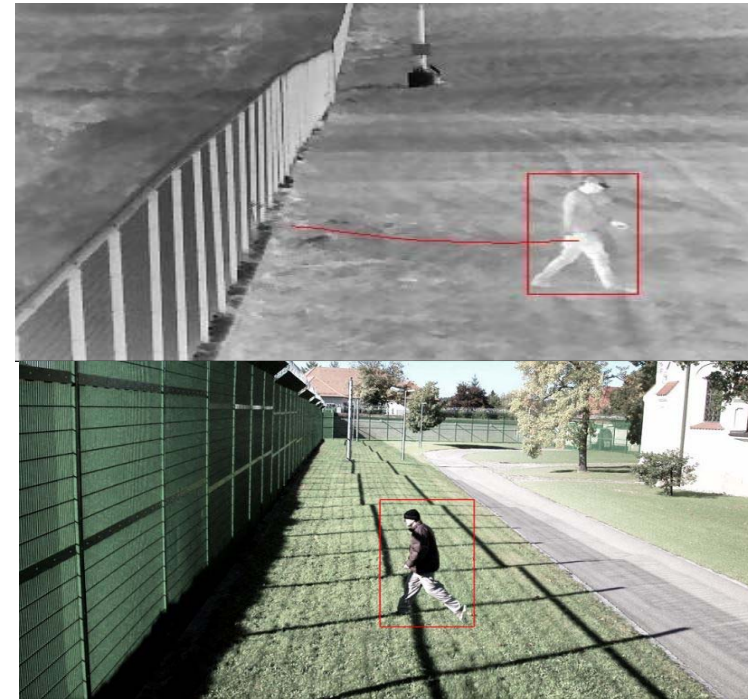
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Types of Analytic Models

- **Vehicle Detection**
- **Individual Detection**
- **False Alarm/Animal Discrimination**



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Surveillance Quality Challenges



**Visibility Challenges
Due to Terrain, Fog,
Weather, and Lighting**



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Monitoring, Command and Control Systems



- PSIM
- VMS Platforms
- Monitoring Centers



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Systems Designed for Mobility



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Autonomous Vehicles



**ISRAEL
G-NUS
PLATFORM**



**Autonomous Monitoring and Mobility Platforms are
In Use Today with Proven Success**



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Geospatial Systems

- Satellite Based
- High Priority for National Security
- Cost is Extreme for 24/7 usage
- Earliest Warning System Available



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Force Responsiveness

A Swift and Powerful Response to Intrusion is Necessary



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Aerial Platforms



- **COST**
- **STATISTICS**
- **LOITER TIME**



**WEAPONIZED
PLATFORMS**



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Aerostats



**RADAR
PLATFORMS**



**SURVEILLANCE
PLATFORMS**



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Combat Drones



PREDATOR And REAPER PLATFORMS



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Industrial Drones



TETHERED



WIRELESS



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Power Systems Design

- **Electrical System Source**
- **Power Distribution System**
- **Power System Redundancy**
- **Remote Device Power**
 - **Fence and Gate Systems**
 - **Intrusion, ACS, and Surveillance**
 - **Communication Infrastructure**



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Alternate Power Sources

- **Utility Entrances (Fiber and Power)**
- **Transformer Components**
- **Generator Components**
- **Solar and Fuel Cell**
- **Monitoring and Management**
 - **Mobile versus Fixed Control Assets**



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Alternate Power Sources



FUEL CELL



GAS TURBINE



SOLAR



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Redundant Systems

- **Utility Entrances (Fiber and Power)**
- **Transformer Components**
- **Generator Components**
- **Solar and Fuel Cell**
- **Monitoring and Management**
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Physical Protection of Key Components

- **Transformers and Switchgear**
 - **Solar Panels**
 - **Fuel Cells**
- **Fuel Storage**
- **Natural Gas Supply Lines**
- **Generator Farms**
- **Duct Banks**



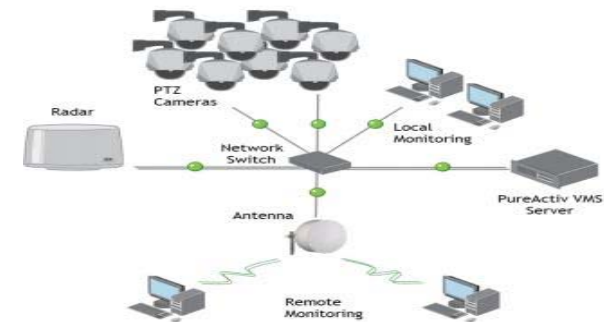
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Perimeter Security Systems

- More Advanced Integrations
- Use of 180 and 360 Degree Megapixel Imaging
- Advanced Biometrics
- Local and Remote Site Monitoring
- Sensor Accuracy



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Budgetary Cost Analysis

- **Cost per Mile Analysis**
- **Operational Costs**
- **TCO for ten year analysis**
 - **Fixed Capital versus Ongoing Costs**



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Designer's Challenge



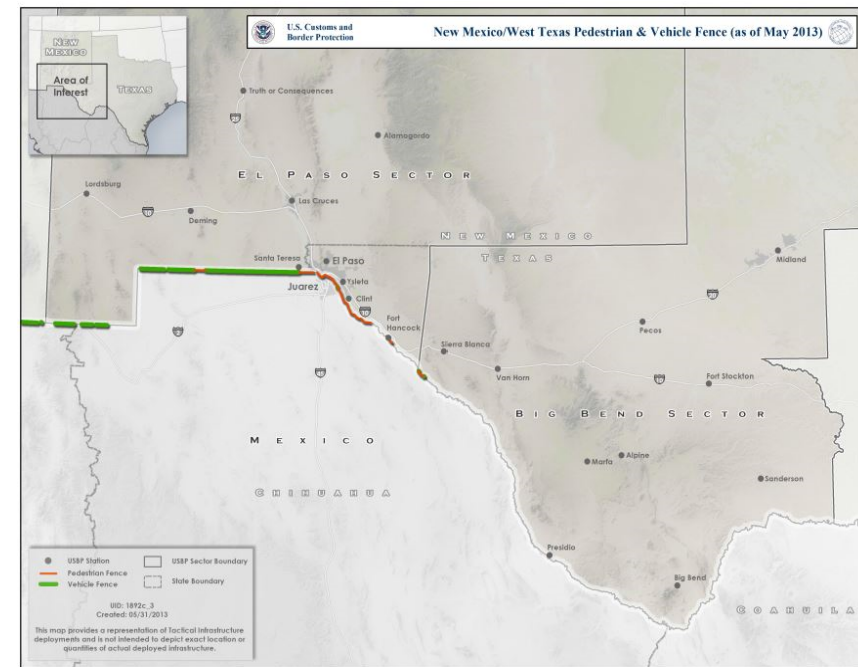
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Sample Border Perimeter Design

- **National 1 Mile Section Border System Design**
 - Security Layers
 - Perimeter Sensors
 - Communications Transport
 - Barriers
 - Seismic, Radiological, Biohazard Sensors
 - Surveillance and Access Control



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Q&A

Thank you for attending the presentation!

Enjoy the Conference and Maintain Your Perimeter at all Costs!

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