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2017 Joint Engineer Training Conference & Expo

Mission Operations & Resilience through Cyber/Infrastructure Security

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2017 Joint Engineer Training Conference & Expo

Mission Operations and Resilience through Cyber/Infrastructure Security

worst case scenario: “destructive attacks focused on some aspect of critical infrastructure” and data manipulation “on a massive scale”

Admiral Michael Rogers,
Commander US Cyber Command
and Director NSA
May 9, 2017 testimony to Senate Armed Services Committee

Vital Infrastructure

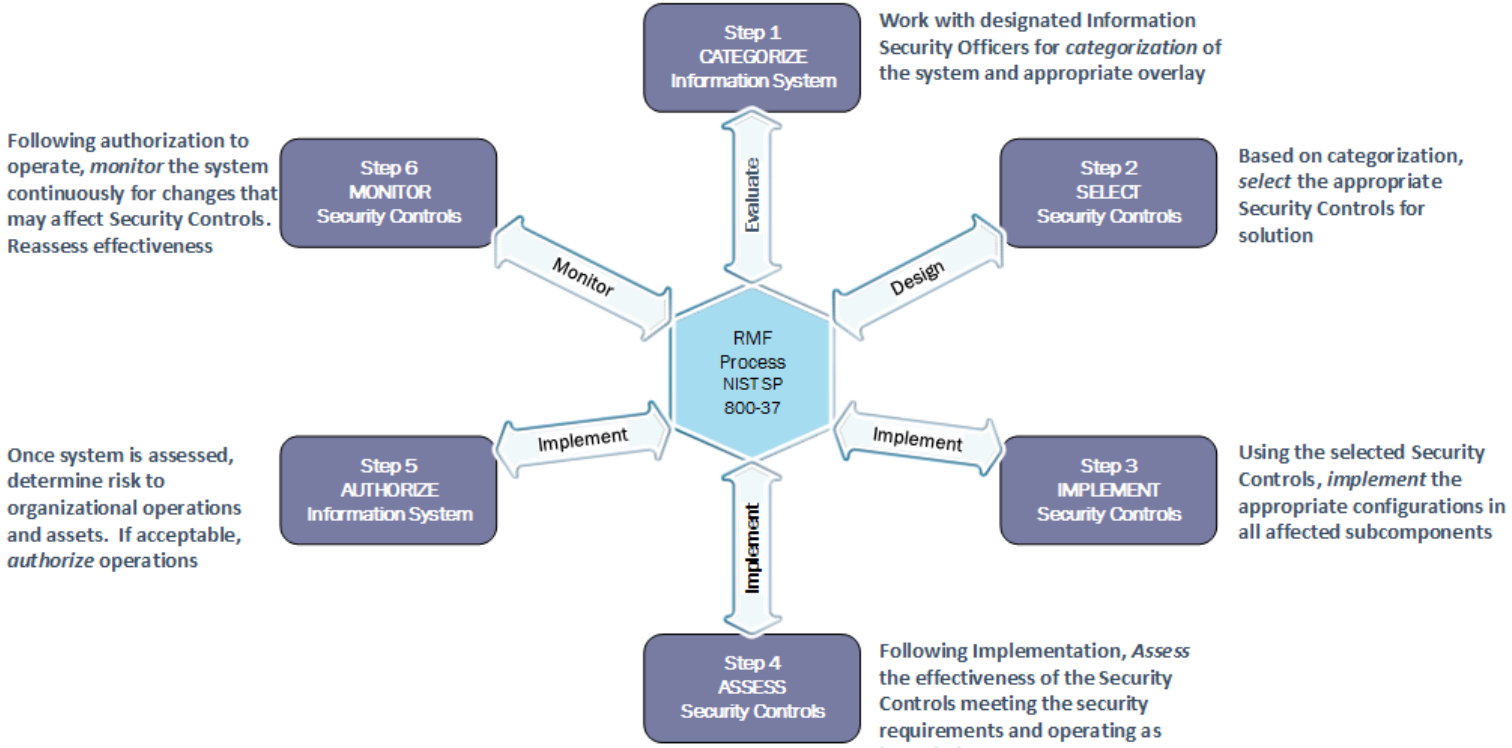
Threats

- Physical intrusion
- Technical incursion/attack
- Utility interruption
- Environmental disturbances
- Electro-Magnetic Pulse (EMP) threats

Vulnerabilities

- Out-dated systems
- Interconnected systems with weak links
- Co-located systems
- Re-purposed spaces inadequate for the new mission

Vulnerability & RMF Assessments



Potential Infrastructure Solutions

Physical Security
Technical Security
Utility Security
Environmental Security
HEMP Security

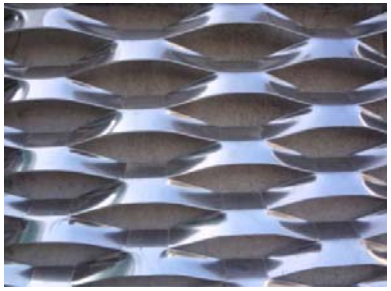
Physical Security

Physical Security Solutions

- Barriers
  - Gates & Fencing
  - Border Wall
  - Pop-up Barriers

Physical Security Solutions

- Hardening
  - Expanded Metal Walls
  - Rated Doors
  - Locks
- FEBR
  - Doors
  - Windows



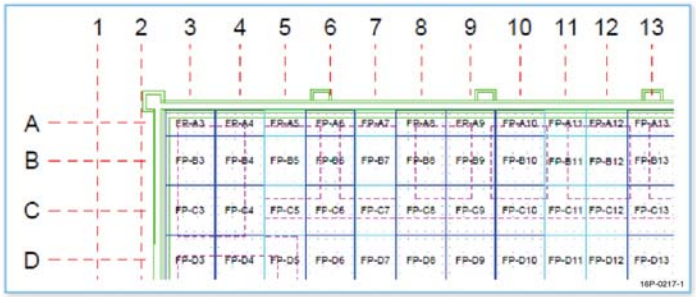
Physical Security Solutions

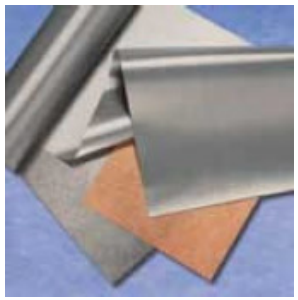
Objective	Responsibility	Solution	Challenges – Implementing & Maintaining
Physical			
Prevent or delay unauthorized personnel from gaining physical access to a location	Building/Physical Security Manager	**Barriers** • Walls • Gates • Pop-up Barriers	• Maintaining aesthetic of facility while increasing security posture • Providing security while maintaining operational capabilities and OPTempo • Modifying entrance/egress routings to accommodate changing traffic patterns and volumes
		Hardening • Locks • Expanded metal walls • Rated door assemblies	• Providing efficient access for those who need to enter space while providing a sufficient level of security • Re-evaluation of threats and vulnerabilities for new and repurposed buildings
		Forced Entry Ballistic Resistant (FEBR) • Doors • Windows	• Upgrading and strengthening older facilities to incorporate FEBR elements • Re-evaluating threats and vulnerabilities as mission evolves to identify needed upgrades and modifications

Technical Security

Technical Security Solutions

- Radio Frequency (RF) / Emanation Protection
  - Film / Foil
  - Dielectric breaks
  - Steel enclosures





Technical Security Solutions

- Intrusion Detection Systems
  - –CCTV
  - –PIRs & Microwave-based Motion Detectors
  - –Iris Scanners
  - –X-ray machines

Technical Security Solutions

- Information Assurance
  - Secure Technical Implementation Guidelines (STIG) Hardening

Technical Security Solutions

Objective	Respon-sibility	Solution	Challenges – Implementing & Maintaining
Technical Security			
Prevent electronic signals from leaving a space and being intercepted Prevent electronic signals from penetrating a space and influencing activities	Facility Security Officer (FSO)	**Emanation Protection** • TEMPEST • RF Shielding	• Inadequate maintenance of shielding and barriers; resulting in ineffective protection • Retrofitting existing spaces with effective shielding • Test, inspect and repair enclosures on a periodic basis • Monitoring/restricting future penetrations into the enclosure
Prevent unauthorized persons from gaining access to a location or capability		**Intrusion Detection Systems (IDS)** • Entry protection • Cameras • Alarms	• Old technology that is susceptible to intrusion or tampering • Old technology that is incompatible with updated technology
Prevent unauthorized persons from gaining electronic access to a network		**Information Assurance** • STIG Hardening	• Managing classified and non-classified data • Managing hybrid network communication system • Hardening a vast network with thousands of access points • Considering expansion capability of the system as needs evolve

Utility Security

Utility Security Solutions

- Continuous Power
  - Conditioned power
  - Uninterruptible power supplies (UPS)
  - Generators

Utility Security Solutions

- HVAC
  - Redundant Systems
  - Entry-resistant
  - Inspectable

Utility Security Solutions

- Industrial Control Systems

Utility Security Solutions

Industrial Control Systems

Graphic courtesy of MG T. Harrison

Utility Security Solutions

Objective	Respon-sibility	Solution	Challenges – Implementing & Maintaining
Utility Security			
Provide uninterruptible utilities to personnel and key infrastructure	Building Facilities Manager & Energy Manager	**Power** • Conditioned power • Uninterruptible power supply (UPS) & Generators	• Interconnected Power grids introduce vulnerabilities • Coordinating Energy security and Energy independence measures • Performing periodic system-wide vulnerability analyses
		HVAC • Filtration systems • Physical Barriers	• Interconnected HVAC systems introduce vulnerabilities • System serving secure & non-secure areas • Need for redundancy • Performing periodic system-wide vulnerability analyses
Provide remote control of critical SCADA systems and prevent tampering of critical systems by hostile elements		**Industrial Control Systems**	• Interconnected utility and control system introduce vulnerabilities • Portions of a utility system may be damaged or destroyed so control system need flexibility

Environmental Security

Environmental Security

- Chemical/Biological/Radiological/Nuclear Detection, Protection, Remediation
  - Real-time Monitoring
  - Bio and Rad Filters
  - Decontamination
- Potable Water
  - Real-time Monitoring
  - Redundant Systems

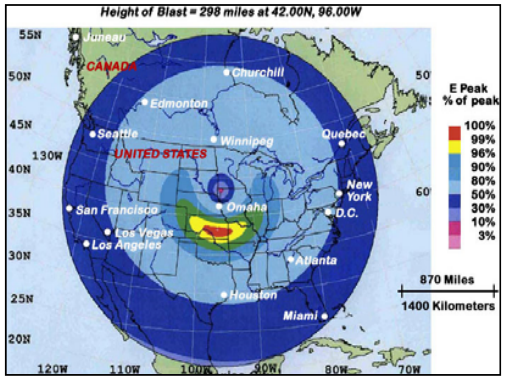
Environmental Security

Objective	Responsibility	Solution	Challenges – Implementing & Maintaining
Environmental Security			
Prevent disruption due to chemical, biological, radiological or E agents	Facility Environmental Manager	**CBRE** • Protection • Detection • Remediation	• Quickly realize if contamination is present and protect personnel • Provide safe shelter capability in critical locations
Provide sufficient quantity and quality of drinking water		**Potable Water** • Protected supplies • Constituent monitoring	• Supplies may be interrupted by emergency situation • Bad actor may seek to contaminate supply • Public water supplies are interconnected. • Local water supplies may have seasonal/permanent yield limitations

HEMP Security

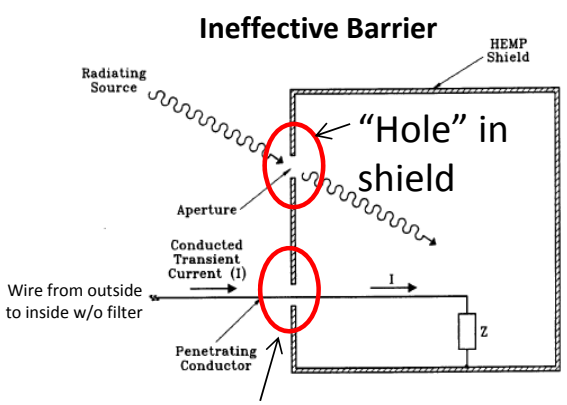
Electro-Magnetic Pulse (EMP)

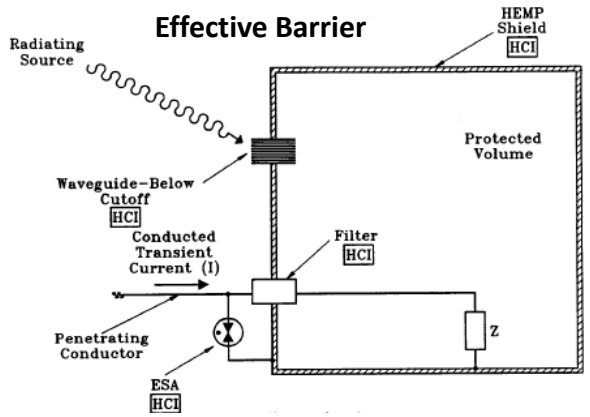
- High Altitude ElectroMagnetic Pulse -Exoatmospheric nuclear detonation produces intense electromagnetic field
  - An EM field from a high altitude burst creates three types of pulses which couple to wires and produce different waveforms
  - These threats can couple to ANY lines exposed to the threat field (outside the HEMP barrier)
    - Overhead power and telephone lines
    - Distribution power lines inside building
    - Control lines inside building



Electro-Magnetic Pulse (EMP) Security

- HEMP evaluation, design & repair
- Hardness Maintenance/Hardness Surveillance (HM/HS) implementation





Electro-Magnetic Pulse (EMP) Security

Objective	Responsibility	Solution	Challenges – Implementing & Maintaining
Electro-Magnetic Pulse Security			
Prevent high-altitude electromagnetic pulses (HEMP) from disrupting key systems	Operations Director	**HEMP** • Evaluation of HEMP Volumes • Design • Repair	• Determining those systems that are vital during an emergency • Retrofitting HEMP volumes into active spaces • Inspecting and maintaining effectiveness of the volumes as technology and missions evolve
		Hardness Maintenance/Hardness Surveillance (HM/HS) Programs	• Maintaining the effectiveness of HEMP volumes over time • Educating users and maintainers about the impacts of their actions on volume effectiveness • Assuring no new penetrations have been made

Conclusions

- Cyber Security ⟷ Infrastructure Security
- Holistic evaluation of threats and vulnerabilities
- Distributed responsibility for security