

## Data Centers



## Data Centers

- What is a Data Center?
- A Data center or NOC (network operations center) is a place to consolidate application servers, Web servers, communications equipment, security systems, system administrators, support personnel, and anything or anybody else that provides data services. A data center benefits from centralized management, support, backup control, power management, security, and so on. It may be housed in a single room or fill an entire building. Special equipment is usually installed to protect against power outages, natural disasters, and security breaches.



## Data Centers

- Good design begins with facility concept plan
- Before you even think about the computers, there are many other “design decisions” to be made:
  - Physical security needs
  - Cooling issues / Environment Factors
  - Electrical requirements
  - Floor loading restrictions
  - Fire detection/suppression?
  - Growth/floor planning?



## Data Centers

- In a world where every IT director and security expert gets his wish, data centers would be constructed with dual electric power feeds, multiple generators, redundant heating, ventilation, air conditioning (HVAC), dual-interlock dry-pipe fire suppression systems, iris scans, laser grids, man traps, face-recognition devices, and a surfeit of other technologically advanced systems and procedures. In the real world, operating costs and business strategy intercede, and companies must develop the most practical and effective methods for building and securing their organizations' mission-critical data centers.



## Location, Location, Location

- Determine needs: Often, a location in a suburban settings is better than a city.
- Common sense factors:
  - Avoid co-location with neighbors involved in any kind of hazmat manufacturing or distribution
  - Avoid locations that may be prone to flooding – even if you seal the building, you have to be able to physically get there!



## Data Centers

- You can **not** have software security without first having physical security!
- Can be as simple as a card key, a proximity badge, or a cipher-lock, which is a key pad that requires the user to enter a multi-digit numeric code.
- At the top of the line are biometric security systems, which can include, but not limited to, handprint recognition, iris scans, and face recognition
- Cameras often a good idea



## Cooling

- Computers, packed together, produce a LOT of heat!
- Problem getting worse – as computers get faster, they're consuming more power. More Power = More heat, per SF.
- Extremely expensive HVAC systems that provide redundant cooling.



## Other Environmental Factors

- Relative Humidity – Keep around 45-50%? What if too low? Too high?
- Cabinets often need to protect against Vibration and Shock.



## Other things to note

- Studies show that electronic devices last much longer and experience fewer component failures when kept at constant temperature and humidity levels.



## Electrical requirements

Over the last 7 years (98-05), the average power consumption in data centers has increased 7-fold, from 20W/sqft to 140W/sqft due to huge increases in density of servers.



## Electrical Requirements

- Sole Source -- How valuable is it to have a single point of contact for the whole solution, including wiring, installation, maintenance and so on? Is it worth the effort and potential finger-pointing to go with separate vendors versus one group to hold accountable?
- Power Conditioning -- Line conditioners are designed to smooth out spikes, sags and remove EMI/RFI and harmonics from the line. Some UPSes (uninterruptible power supply) have line conditioning as an integral subsystem, while others require an external system to be effective.



## Electrical Requirements

- Uninterruptible Power Supply (UPS)'s – two main types
  - There are units that are online all the time -- thus, all power supplied to the data center flows through the UPS first. Due to this filtering, these systems provide conditioned power and there is no switching time associated with converting from "street" power to UPS power.
  - The second type of UPS is often termed a "standby" unit, as it is offline until the power fails and then there is time associated with switching from street to UPS power. This switching time may only take milliseconds, but there are some devices that are so sensitive that they can crash during that time.



## Electrical Requirements

- Electric Generators -- There are many types of electric generators. There are ones fueled by gasoline, natural gas, propane, and diesel. Your organization should select the fuel based on what will be most available during a crisis in their area. For example, inline natural gas sounds appealing, but can the gas company be depended on? The generator should be sized to meet the data center's need and expected growth.



## Fire Detection / Supression

- The best way to deal with a problem is to detect it QUICKLY.
- Very Early Smoke Detection Apparatus (VESDA)
- Chemical suppression systems – Halon alternatives
- Water as a backup/alternate (Hope you have raised floors!)



## Crisis Management

- Expect the worst, hope for the best
- Have a plan in the event something disastrous happens
- Several companies offer “emergency” services (Sungard)

