Defense in Depth
Securing Your Systems and Data

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Sample Agenda

1. Security Myths
2. System and Data Risk
3. Changing Your Risk Profile
4. Protection Measures
Common Myths

• “We’re protected – we have a firewall.”
  • Mmmm; crunchy outside, chewy inside.
• “We don’t have anything anyone wants to steal.”
  • Then you won’t mind giving me an administrative account?
• “We’re too small for hackers to want to get in.”
  • You have users? You have data? They want in.
• “If someone tries to [...] , we would see it in the logs.”
  • Page down is not an effective data mining technique.
• “Our users aren’t allowed to [...] .”
  • And they always do what they’re told.
• “Microsoft SCEP (Forefront) is good enough.”
  • Sure, if you’re never attacked.
Common Myths

• “Why should I care, I have nothing to hide.”
  • Except passwords, credit cards, bank accounts, ...
• “Why would anyone bother attacking my computer?”
  • Sometimes you’re a house, sometimes you’re just a step.
• “It’s too difficult for them to get access to my computer”
  • You use a browser, right? For that internet thing?
• “I made a really difficult password so I can use it on multiple sites.”
  • The good news is they only have to breach one of those sites to use it.
• “If someone tries to […], I would notice!”
  • And the last time you looked at the security logs on your system was ...
• “I don’t need antivirus since I don’t go to bad sites.”
  • You might not, but your browser will happily redirect you at any time.
• “I have antivirus so I’m good.”
  • Antivirus is dead, long live endpoint protection.
Setting the Record Straight

- End goals
  - $$$
  - State sponsored
  - Hactivism

- Who/what is the target?
  - It might not be you or your company
    - What other systems/companies do you or your company have access to?
    - Where else might your credentials be valid?
  - You may be only the foot in the door
    - Recon
    - Zombie (Spam, DDoS)
    - Conduit (repository, exfiltrator)
    - Credential/system hopping
Setting the Record Straight

• All data is valuable to some degree
  – Technical use
    • User name, password, department
    • System naming and/or IP addressing conventions
    • Operating systems, service packs, hotfixes, applications
    • Security tools in use
  – Social engineering use
    • Who you are (name, nickname, family, pets, birthdate, SSN)
    • Where you work (company, department, floor, cubicle, remote)
    • Where you live (homeowner/renter, apt/single family, address, phone)
    • Interests (hobbies, organizations, friends (and their data))
    • What you have (CC#, bank accounts, identity (financial, online))
Points of Entry and Exfiltration

• Network
  – Internet, LAN, WAP, Rouge switches/WAP
  – Servers, Desktops, Laptops, NAS, Vendor/Guest system, BYOD

• Services
  – File access - HTTP(S), FTP(S/ES/SSL), SMB/CIFS
  – Email - SMTP, POP3, MAPI, IMAP, Webmail

• Endpoints
  – USB’s
  – Applications

• Humans
  – Intentional vs. uninformed or oblivious
Tools of Entry

• Network
  – Redirection/Pharming
  – Infected hosts

• Email
  – Malicious attachments
  – Phishing, Spear Fishing, Whaling

• Endpoint
  – Malware on USB’s
  – Application/OS vulnerabilities
  – Drive-by’s and watering holes
  – User downloads (LAN, Web)
  – Program/Driver “updates”
  – Shared systems
Change Your Thinking

Start with new assumptions

• You are already compromised – you just haven’t found it yet
• You are a viable target
• Security is not a “Set it and forget it” capability
• Depending on any single security feature/product is too risky
• 100% protection is an ostrich with its head in the sand
  – You don’t know what you don’t know
  – Attackers are continuously evolving
  – You don’t have endless resources
  – You may be dependent upon other’s diligence
Change Your Thinking

Start with new assumptions

• Balance security against acceptable business/personal risk
  – Definition of acceptable
    • Unique to every organization and person
    • Unique to the asset being protected
    • Unique to the threat level of the target
  – Avoid, transfer, reduce/mitigate/control, accept
  – Value of the asset vs. cost of protection

• You will need to expend resources to get and stay secure
  – Time, equipment, and/or money
  – Training (you, your family, your employees, your peers)
Protection Paradigms

Bank Scenario: Teller

- Outside perimeter
  - Doors with deadbolts
- Inside perimeter
  - Guards
  - Surveillance cameras
- Asset access
  - Bulletproof glass
  - Teller conduit
  - Proof of identity

Bank Scenario: Vault

- Outside perimeter
  - Doors with deadbolts
- Inside perimeter
  - Alarm system
  - Surveillance cameras
- Asset access
  - Inner access door
  - Vault door
  - Access controls (time, people, combination/keys)
Protection Methodology

• Identify all assets requiring protection
  – Physical – computers, mobile devices, supporting systems (A/C, UPS)
  – System – OS, Applications, credentials
  – Data – PII, PHI, credit card data, identity data, personal data

• Assign risk level
  – Confidentiality – protect against disclosure
  – Integrity – protect against change
  – Availability – protect against loss of use

• Protect every point of entry

• Protect with an appropriate level of security
  – Attack resistance – how well does it protect asset and itself
  – Initial cost – acquisition, installation, implementation
  – Ongoing cost – maintenance, upkeep, monitoring
Physical Protection

• Prevent against theft
  – Although “noisy”, it gives attackers plenty of time to work on it
  – May provide access to other systems directly or through data on the system
  – May be the only copy of data or latest data

• Prevent against “hands-on”
  – Risk of discovery higher, but allows for unanticipated direct attacks
    • Brute force at keyboard
    • Autorun
    • Hardware sniffers and loggers
# Physical Protection

**Protect against theft**

| ✓  | Dedicated server room |
| ✓ ✓ | Lock doors/windows |
| ✓  | Building/room access controls |
| ✓  | Surveillance system |
| ✓ ✓ | Alarm system (if not 24x7) |
| ✓ ✓ | Cable lock downs |
| ✓ ✓ | Don’t walk away from unsecured systems |
### Physical Protection

Protect against “hands-on”

| ✓ | Dedicated server room |
| ✓ ✓ | Building/room access controls |
| ✓ | Surveillance system |
| ✓ ✓ | Don’t share the system (alternatively, set up a limited guest user) |
| ✓ ✓ | Use strong passwords |
| ✓ ✓ | Use screensaver with timeouts and passwords |
| ✓ ✓ | Periodically inspect for unauthorized devices |
| ✓ ✓ | Don’t walk away from unsecured systems |
System Protection

• Prevent or limit system access
  – Every other system does not need access to yours
  – Your system may be the end target or just a conduit or attack platform

• Limit access from compromise
  – Limit damage that can be done to your system
  – Stop attacker from gaining access to other systems
  – Don’t be a zombie or conduit
## System Protection - Products

**Prevent or limit system access**

| ✓ ✓ | Hardware firewall/UTM/NextGen device |
| ✓ | Network Access Control, IDS/IPS |
| ✓ | Server and client management system |
| ✓ ✓ | Desktop antivirus |
| ✓ ✓ | Desktop firewall |
| ✓ ✓ | Desktop IDS/IPS |
| ✓ | Application, process, and device controls |
| ✓ | SIEM and/or MSS |
**System Protection - Products**

**Set up your firewall/router properly**

| ✓ ✓ | Change default logins *(every default login *everywhere*) |
| ✓ ✓ | Use WPA2 – only downgrade to WPA if absolutely necessary |
| ✓ ✓ | Use a strong passphrase/key |
| ✓ ✓ | Set up a separate network for WEP-only devices *(Corp: buy new ones)* |
| ✓ | Use certificate/VPN access control |
| ✓ ✓ | Set up wireless MAC filtering – use a separate network for guests |
| ✓ ✓ | Disable UPnP – use a separate network for consumer devices *(see WEP)* |
| ✓ | Only give out the guest network key – never yours |
## System Protection – Local System Behavior

Prevent or limit system access

| ✓  | ✓  | Patch early, patch often (OS and applications) |
| ✓  | ✓  | Install only the applications you need       |
| ✓  | ✓  | Remove any unneeded applications             |
| ✓  | ✓  | Use a current and supported OS               |
| ✓  | ✓  | Use a current and supported browser          |
| ✓  | ✓  | Put only truly trusted systems in the trusted sites and only if necessary |
| ✓  | ✓  | Do not reuse your username/password           |
| ✓  | ✓  | Do not give your username/password to anyone  |
## System Protection – Online Behavior

Prevent or limit system access

| ✓  | ✓  | Every site should get its own password (use a password manager) |
| ✓  | ✓  | Use two-factor authentication where offered |
| ✓  | ✓  | Provide/collect the minimum personal details necessary |
| ✓  | ✓  | Download files directly from the author’s or manufacturer’s site |
| ✓  | ✓  | Verify the file you are downloading is the same type you asked for |
| ✓  | ✓  | Don’t click links in email – go to the site directly |
| ✓  | ✓  | Disable Java |
| ✓  | Disable Java Script as a default (enable only if and as needed) |
| ✔ | ✔ | Being on the first page of the search results doesn’t mean it is a safe site |
| ✔ | ✔ | Remember even good sites get compromised – don’t update flash, reader, or codecs just because the site said you had to |
| ✔ | ✔ | If a site tries to download a file to you when you visit, just leave |
| ✔ | ✔ | The big download button is probably an ad – look for the real one |
| ✔ | ✔ | Look for third-party software in your downloads |
| ✔ | ✔ | That popup window may not really be a popup window |
| ✔ | ✔ | Neither Symantec nor Microsoft are going to call and tell you you’re infected and offer to clean it up |
| ✔ | ✔ | The FBI, IRS, DMV, and Interpol is not going to let you pay a fine for viewing that pornography, paying your overdue taxes, or driving on the toll road |
## System Protection – Behavior for the Paranoid

### Prevent or limit social engineering

| ✔️ ✔️ | “Unsubscribing” may add you to the list of valid emails |
| ✔️ | Do not respond to questionnaires and surveys* |
| ✔️ | Do not list what you own(ed) in your forum signature block |
| ✔️ | Limit who can see what on your social site posts |
| ✔️ | If IT calls and asks for your password, tell them to just reset it |
| ✔️ ✔️ | Don’t offer company, personal, coworker, or friends details |
| ✔️ | If the bank or credit card company is calling you and asking you to verify your account or access details first, call them back at their 800 number |
| ✔️ ✔️ | Just because you’re paranoid doesn’t mean they’re not out to get you |

*Some exceptions may include web site performance, professional inputs, customer service metrics if they don’t violate other rules.
Data Protection

• You have to know what data you’re trying to protect
• You have to know where that data resides
• You have to decide what “protect” means
  – At rest, in motion, in use
  – Actions you’ll take
    • Notification only
    • Automatic/manual remediation
    • Blocking
• You have to decide what it’s worth
Data Protection

• DLP is significantly impacted by access control
  – Least privilege
    • Systems
    • Users
  – Privilege de-escalation
• DLP and backups
  – Ransomware
Data Protection

PII, PHI, credit cards, research, employee/student identities

• Actors
  – Insiders
  – Malicious Insiders
  – Malicious Outsiders

• Options
  – Data at rest – storage
    • Full drive encryption
    • File and Folder encryption
  – Data in motion – email, web
    • Email encryption
  – Data in use – file copy, print, cut/paste
    • DLP agent
Data Protection

PII, PHI, credit cards, research, employee/student identities

• Data Loss Prevention program
  – Policy
  – Discovery
  – Monitoring
  – Notification
  – Remediation
Data Protection

PII, PHI, credit cards, personally private data

• Actors
  – Family/Friends with access
  – Malicious Family/Friends with access
  – Malicious Outsiders

• Options
  – Data at rest – storage
    • Full drive encryption
    • File and Folder encryption
    • Software or hardware based USB encryption
  – Data in motion – email, web
    • Email encryption
    • Secure web storage/sharing
Data Protection – DLP

| ✓ | ✓ | Data Loss Prevention doesn’t stop at discovery; it starts there |
| ✓ | ✓ | Implement least privilege |
| ✓ | ✓ | Encrypt data at rest |
| ✓ | ✓ | Don’t send sensitive data through email unencrypted |
| ✓ | ✓ | Don’t make an unencrypted copy of sensitive data to “work on at home” |
| ✓ | ✓ | Treat credit card information like cash (your cash) |
| ✓ | ✓ | Beware phishing email |
| ✓ | ✓ | Start dealing with this today; you may already be compromised |
## Data Protection – Backups

- **RAID is not a backup solution**
- **Snapshots are only a short-term option**
- **Backups can contain private information; consider encryption**
- **A backup stored onsite is probably useless after a fire, flood, or burglary**
- **A single backup device is a single point of failure**
Data Protection – Be Aware

Things to ponder

| ✓  | ✓  | SMTP is seldom encrypted |
| ✓  | ✓  | Full disk encryption only helps data at rest |
| ✓  | ✓  | Pieces of data can be spread over multiple locations and combined |
| ✓  | ✓  | Your cloud provider may be able to read your data – where is the encryption taking place? |
| ✓  | ✓  | Encryption is only as good as the protection of the key |
| ✓  | ✓  | Deleted data can often be recovered – even from a USB |
Final Thoughts

• Trust no one
  – You’re about 50 milliseconds from every creep on the planet
  – Yes, some people really are that [mean|greedy|corrupt|depraved|…]
  – Friends today, but ...
  – If it’s not the NSA, then it’s China, or hackers, or ...
  – Would you leave your door unlocked? Your wallet on the street?

• Security is
  – Hard
    • You have to be right 100% of the time
    • The bad guys only have to be right once
  – Constantly changing
  – Successful when nothing happens
Thank you!

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