



How to Secure Electronic Data and Communications

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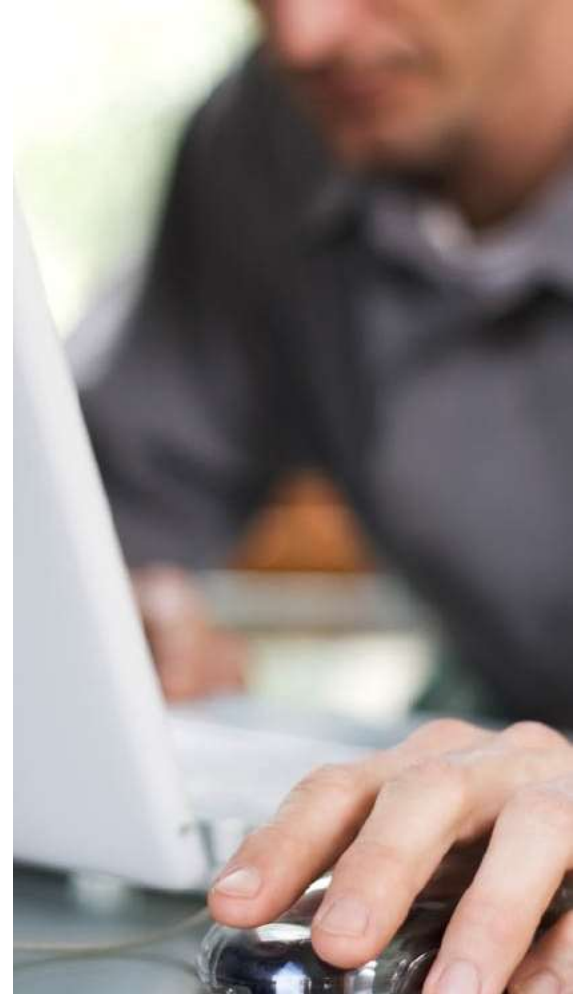
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How to Secure Electronic Data and Communications

- **Threat Models**
- **Defense Categories**
- **Defense Strategies**
- **Demonstration**

How to Secure Electronic Data and Communications

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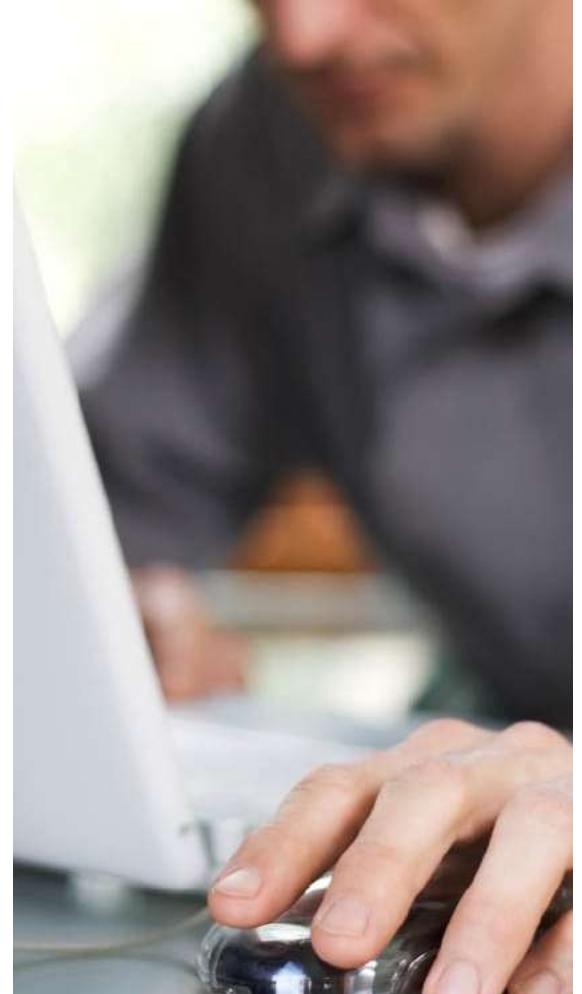
This talk is aimed at a nontechnical audience and contains numerous simplifications and generalizations meant to convey complex subject matter in an understandable manner within the time constraints available.

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How to Secure Electronic Data and Communications

Threat Models

Know Your Enemy



Poll - Targeting

Know Your Enemy

- No one size fits all solution
- Identify critical assets
- Identify adversaries
 - Targeted vs Collateral

Considerations:

- Scale
- Collaboration needs
- Resource Availability

Know Your Enemy

- No one size fits all solution
- **Identify critical assets**
- Identify adversaries
 - Targeted vs Collateral

What is required for you?

What is required for your clients?

Know Your Enemy

- No one size fits all solution
- Identify critical assets
- Identify adversaries
 - Targeted vs Collateral

Who would target you?

- Untargeted attacks
 - Internet Background Radiation
- Unskilled attackers
 - Script Kiddies
- Skilled attackers
 - Cybercriminals
 - Cyber-activists
 - Nation-states
- Insider threats
 - Not just YOUR insiders

Know Your Enemy

- No one size fits all solution
- Identify critical assets
- Identify adversaries
 - Targeted vs Collateral

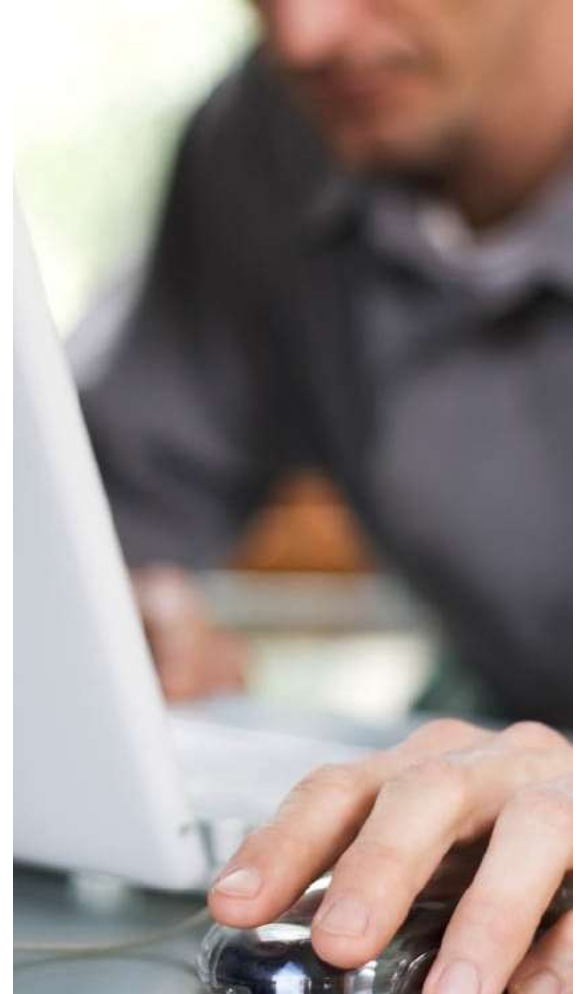
You are all targets:

- Insider trading
- Client Extortion
- Ransomware
- Crypto-mining

How to Secure Electronic Data and Communications

Defense Categories

Security is Fractal...



Security is Fractal...

..every part of it is as complicated as the whole.

- Weakest Link Problem
- Data at Rest
- Data in Transit
- Data in Use



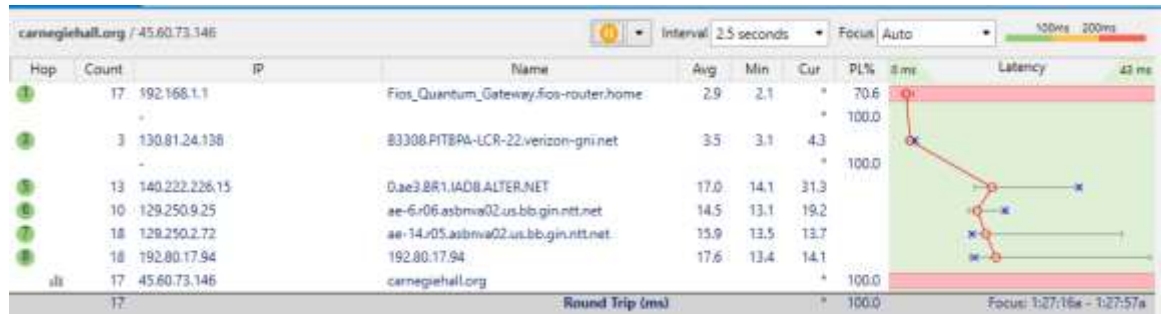
Data in Transit

“The internet”

- Translation:
The “not your net”
- Routing

Alphabet Soup

- SSL/TLS
 - Encrypted tunnel



Data in Transit

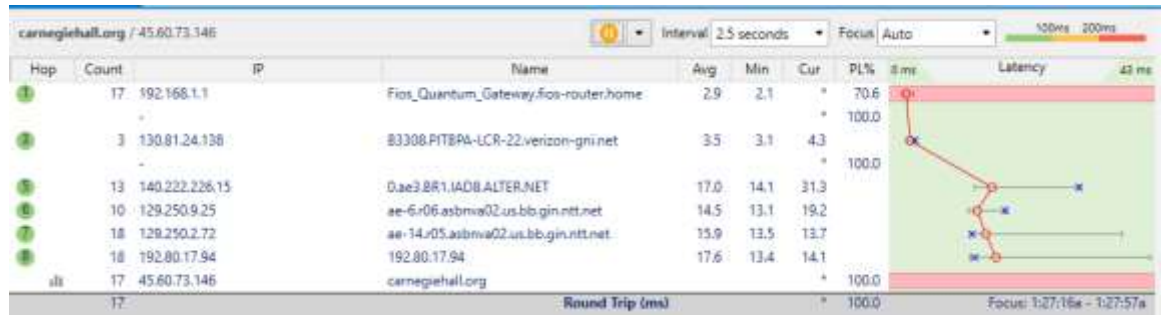
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How do you get to Carnegie Hall?



Data in Transit

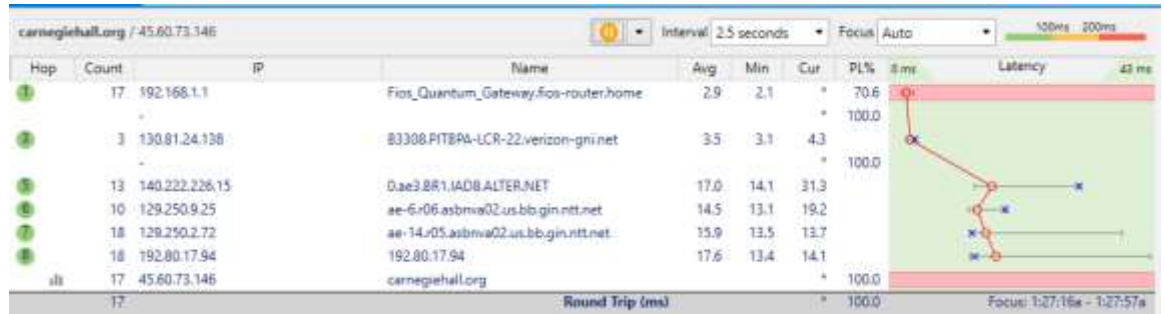
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How do you get to Carnegie Hall?



Practice, Practice, Practice

Data in Transit

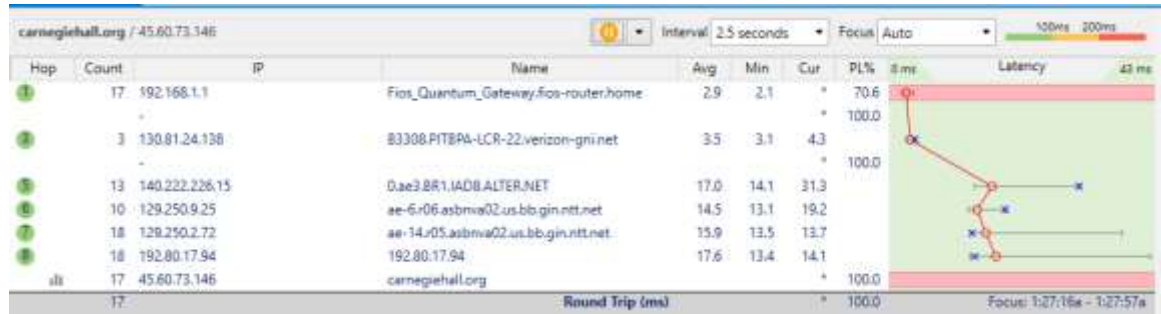
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Alphabet Soup

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How do you get to Carnegie Hall?



~~Practice, Practice, Practice~~
Correction: Via Japan.

Data at Rest

Encryption

- File
 - Partition
 - Drive
- Storage Devices
 - Mobility
 - Storage Locations
 - Jurisdiction(s)
 - sshfs example
 - Storage Services
 - “The Cloud”

Data in Use

Keys to the Kingdom

- Access to variety of data

Bypasses Encryption

- Data must be decrypted to be useful*

* Not including homomorphic encryption solutions, or working memory encryption solutions.

How to Secure Electronic Data and Communications
Defense Strategies

(Fire)walls are not enough



Poll - Devices

Defense Strategies

- Must match threat model
 - Defense in Depth
 - Principal of Least Privilege
 - Minimize Attack Surface
 - Situational Awareness
- Each client may require updating the adversary model
 - Asymmetric Capabilities
 - Due Diligence for traffic tickets looks different than for political dissidents

Defense Strategies

- Must match threat model
 - **Defense in Depth**
 - Principal of Least Privilege
 - Minimize Attack Surface
 - Situational Awareness
- The border is not sufficient
 - Minimizes damage when compromised
 - Multifactor

Defense Strategies

- Must match threat model
- Defense in Depth
- **Principal of Least Privilege**
- Minimize Attack Surface
- Situational Awareness

Need to know basis, and you don't need to know!

- Applications
 - Run as a limited user
- Users
 - Minimal permission
 - Timely Revocation
- Devices
 - BYOD?

Defense Strategies

- Must match threat model
- Defense in Depth
- Principle of Least Privilege
- Minimize Attack Surface
- Situational Awareness

Once again...

- Applications
 - What needs to run?
- Users
 - Who needs to do what?
- Devices
 - Where is it allowed to be done from?

Defense Strategies

- Must match threat model
- Defense in Depth
- Principal of Least Privilege
- Minimize Attack Surface
- Situational Awareness

If you were compromised, would you know?

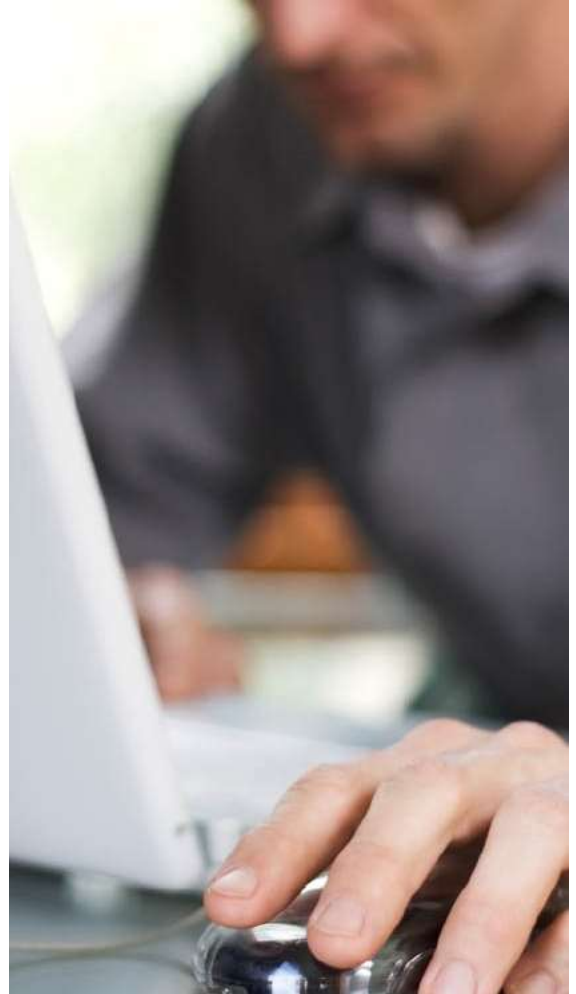
Average time from exploit to detection: **206 days**^{*}

* IBM - 2019 Cost of a Data Breach Report

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Demonstration

Tool Use



Data At Rest



Data in Transit



Questions

