NCCIC | NATIONAL CYBERSECURITY & COMMUNICATIONS INTEGRATION CENTER

LITTLE ARC-FLASH:
HOW DIGITAL ATTACKS CAN CAUSE PHYSICAL RAMIFICATIONS

7/18/2019

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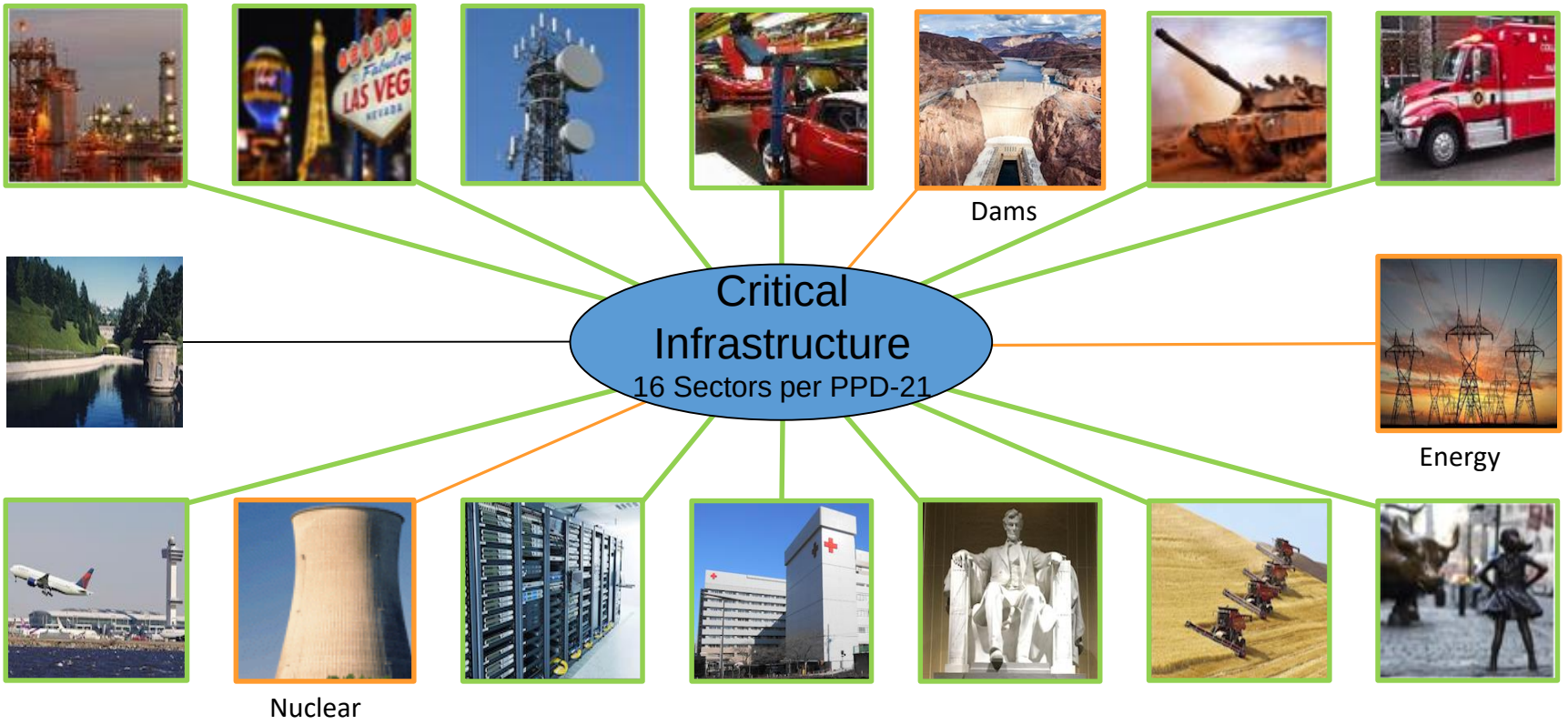
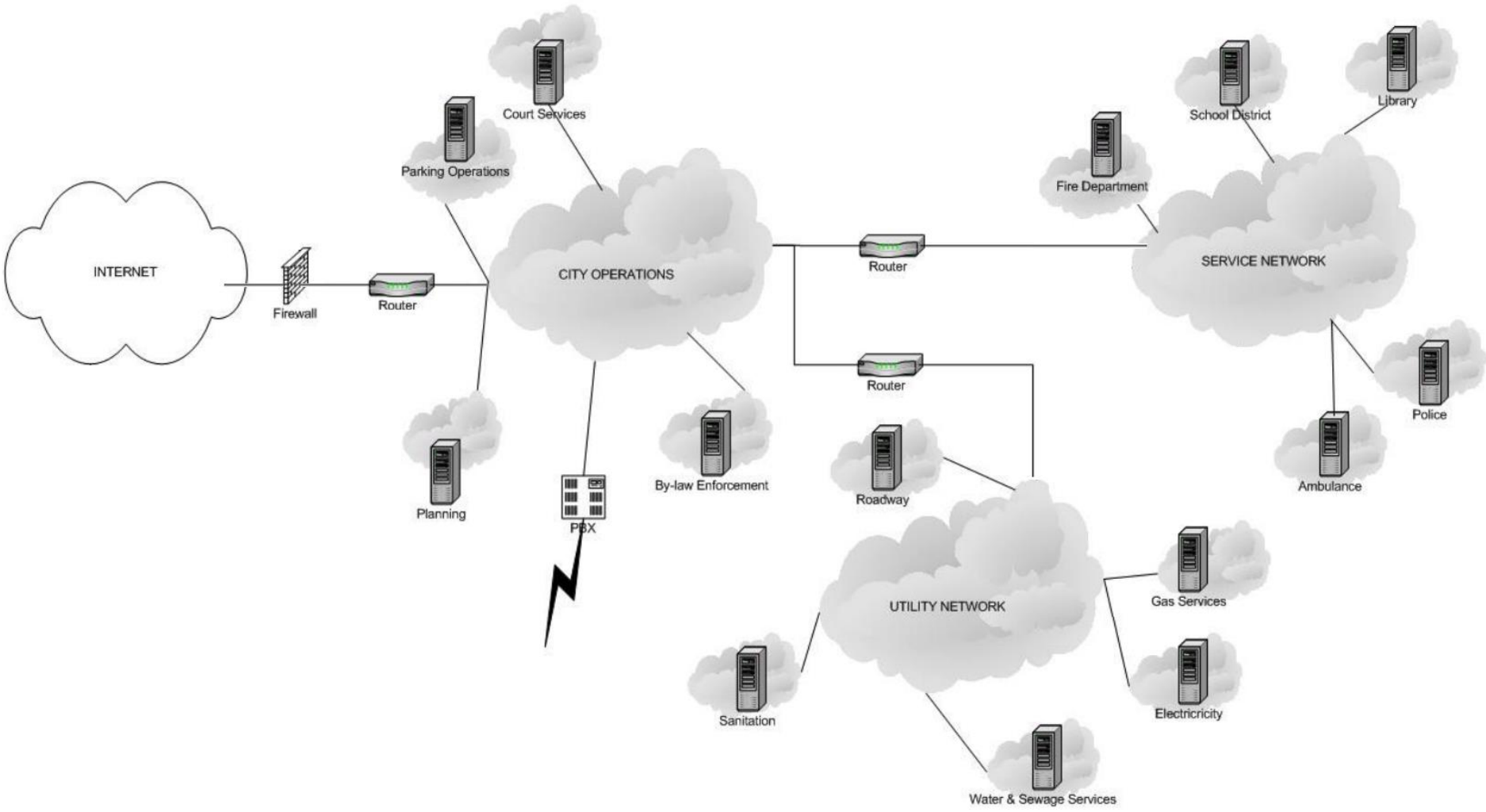
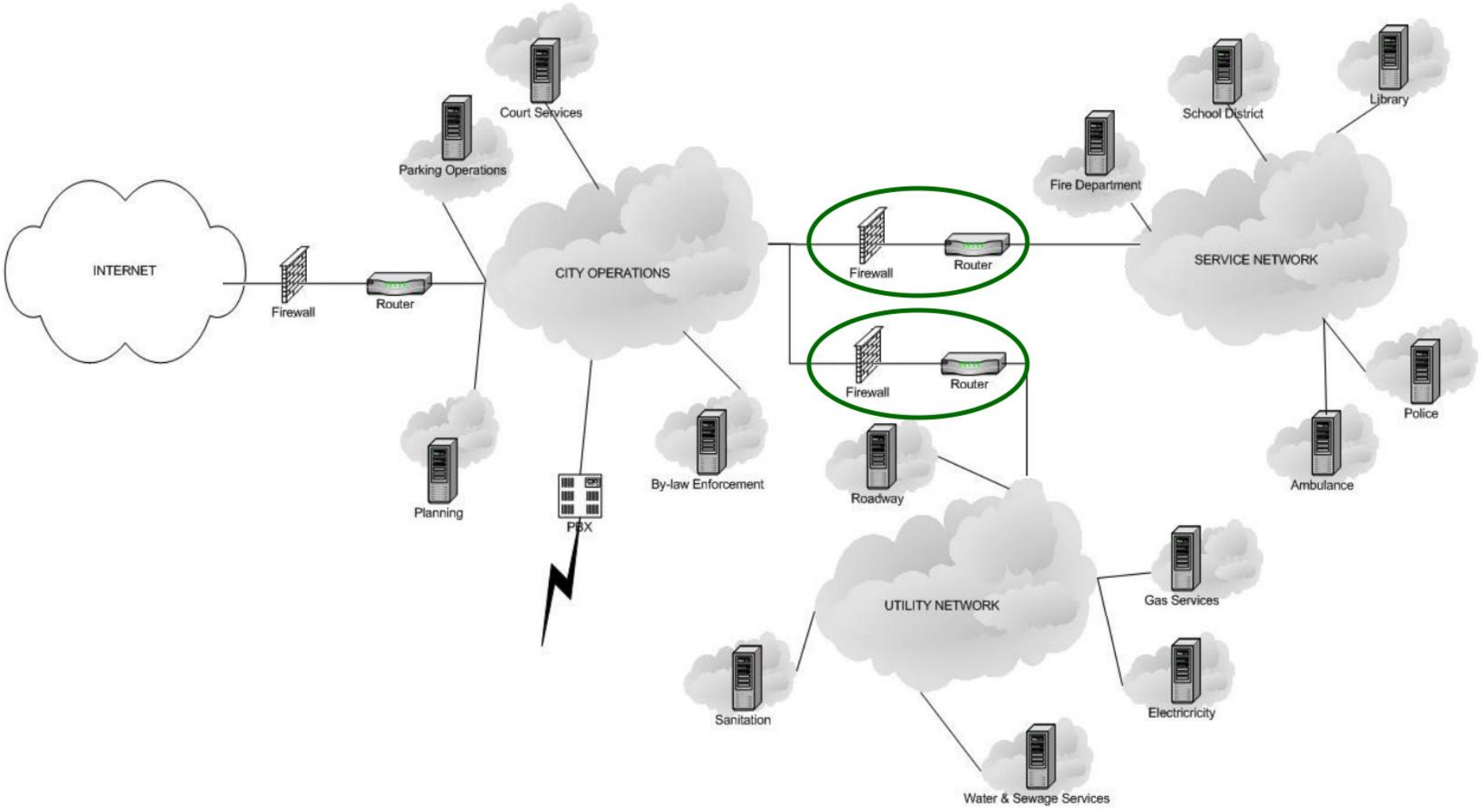
Critical Infrastructure Sectors



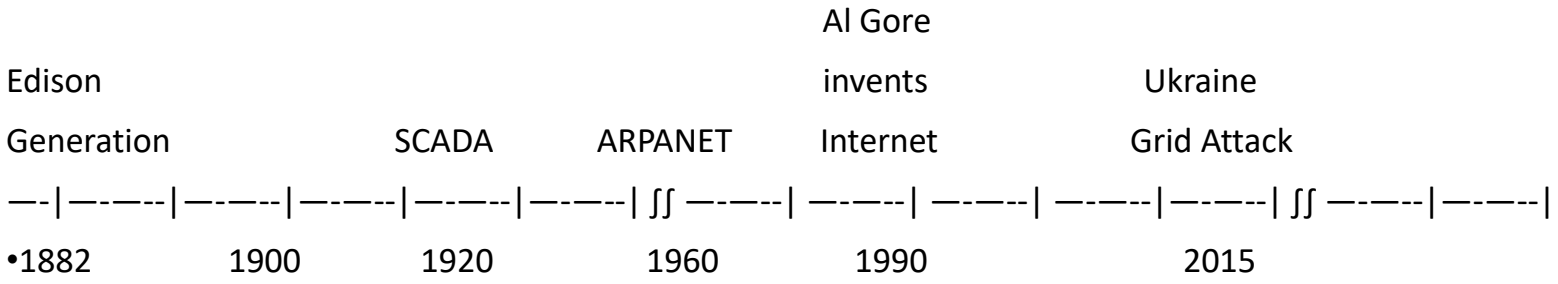
Flat Networks Pose Significant Risk



Isolated Networks are the First Mitigation



Moving into the Present



From the Perspective of an Attacker

How to Approach the Target?

- Reconnaissance
  - Opensource research

- Gain access to the network through any workstation
  - Each employee has access to some level of sensitive information
    - Email, applications and logistics all provide new insights to the inner workings of the organization

- Elevate access through either an exploit or credential harvesting
  - Zero day exploits are rarely used or needed

How to Approach the Target?

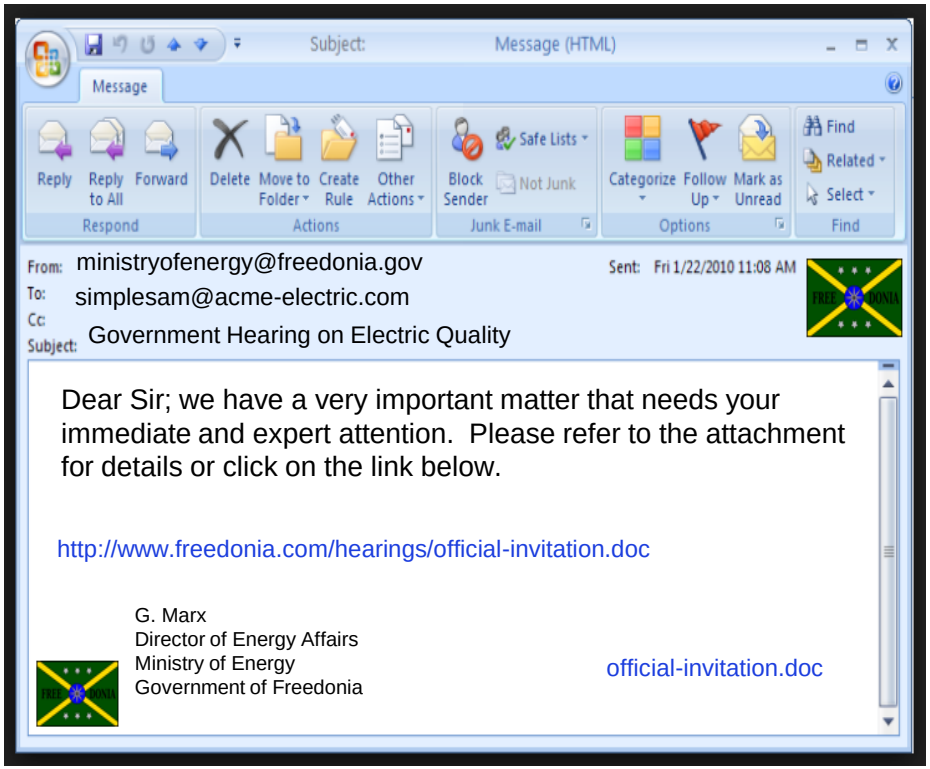
- Determine how and when to cause a certain outcome
    - This process may take considerable time
        - Gathering intel can be a lengthy process, and time between initial intrusion and taking action will make post-mortem analysis more difficult
        - Understanding the system and how to disrupt it or cause a cyber-physical consequence
- Timing depends on desired effect
    - Holiday? Weekend? Weekday?

- Strike when there is a lack of visibility or when a larger impact can occur

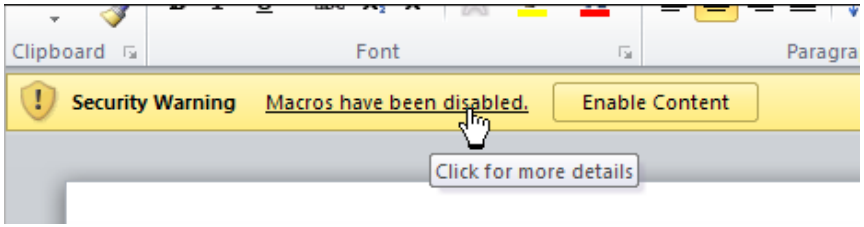
Approach A: Spear Phishing

- Pros:
- Very little time investment for the attacker
- Exceedingly high likelihood to be effective
    - People get used to repetition
- Cons:
- Could expose the attack effort if someone investigates

BlackEnergy



- An official invite from the government!
- The ministry of energy asked for my help!

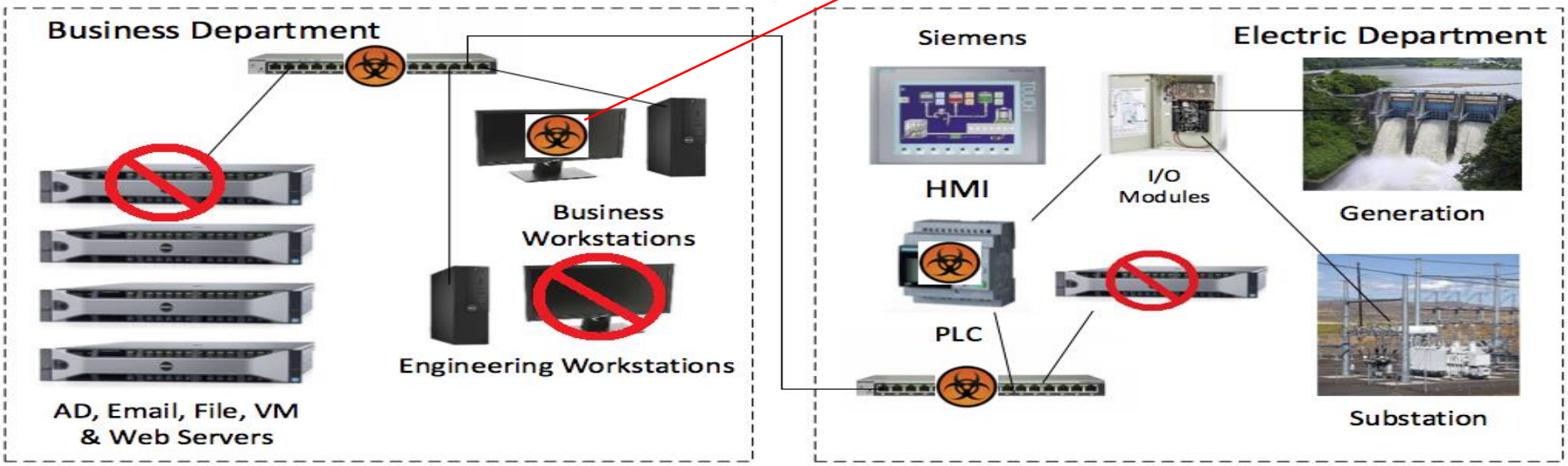


It is definitely official alright, its got the seal in the email and everything.

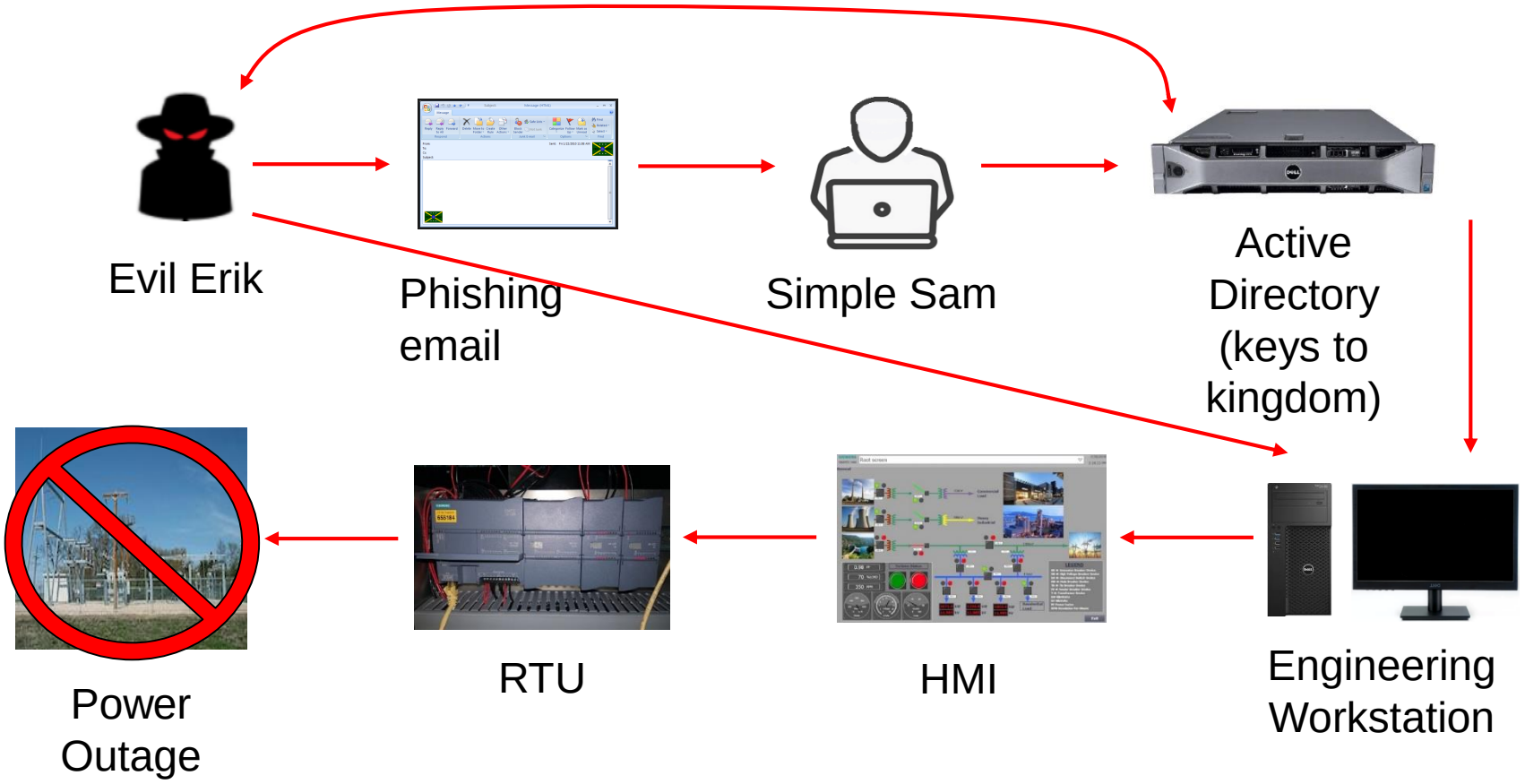
I better enable macros to view, it must be incredibly important.

BlackEnergy

- Multiple infection vectors
- Macros enabled in a Word document
- HMI software vulnerabilities
- Variants targeted routers
- Destructive: Overwrite files and hard drives



BlackEnergy Timeline



Approach B: Watering Hole

- Pros:
- Much more difficult to discover
- May provide elevated access immediately
  - Much more reliable for segmented networks
- Cons:
- Requires upfront effort to compromise third party
  - Operation could be derailed if discovered early
- Difficult to control timeframe

Havex

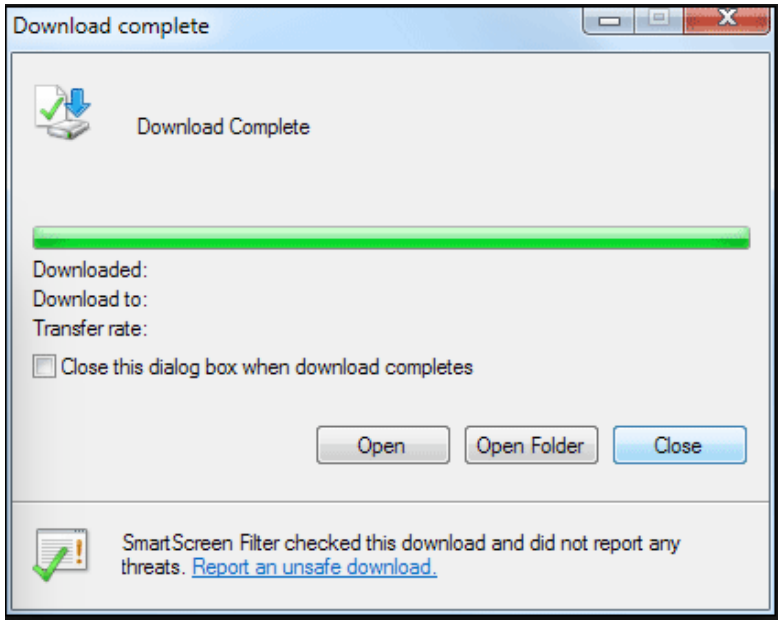
- Its time to patch! Let's get the latest updates from our trusted vendor.

Checkums

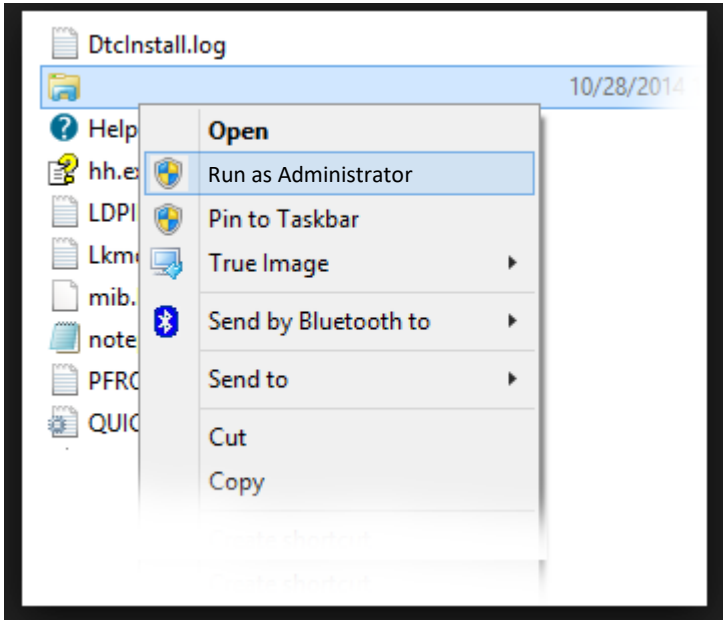
md5	42fc5859322ca48798651db3a77e2748
LM	fb19972931b97724e3ffaf3a65f0dbd1
NTLM	31d6cfe0d16ae931b73c59d7e0c089c0
sha1	b02e34bdbab0ef4da9e034c9c2c8d6412abac8bf
sha256	fe8fa4daa404ebb3bd6df4c20650a1c94ee686d0fe624aa4cda3fe7d1282ce32

I wonder what this gobbledygook is for?

Havex

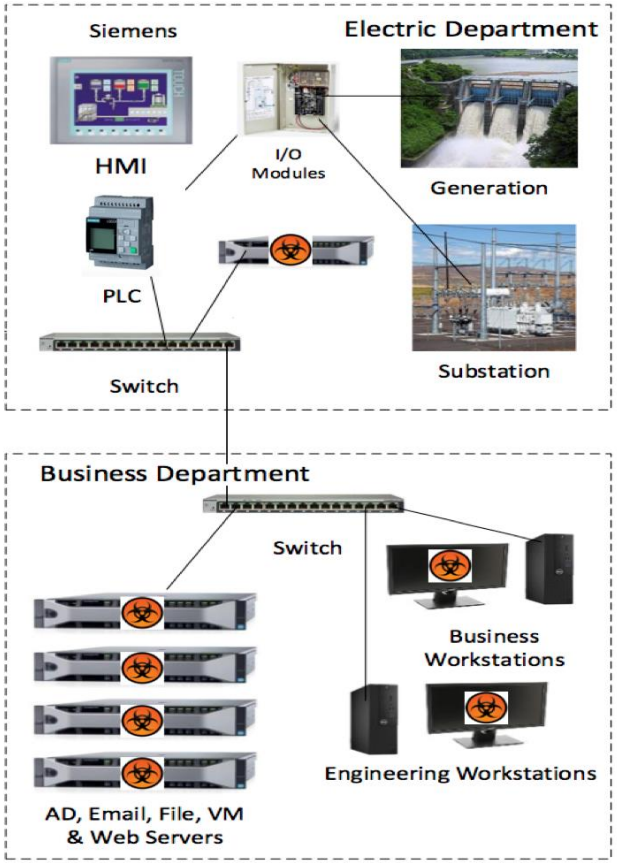


I don't remember the last update taking that long to download. Hmmm… and this patch seems to be a weird size?



However, I'm really busy today, I need to get this installed ASAP.

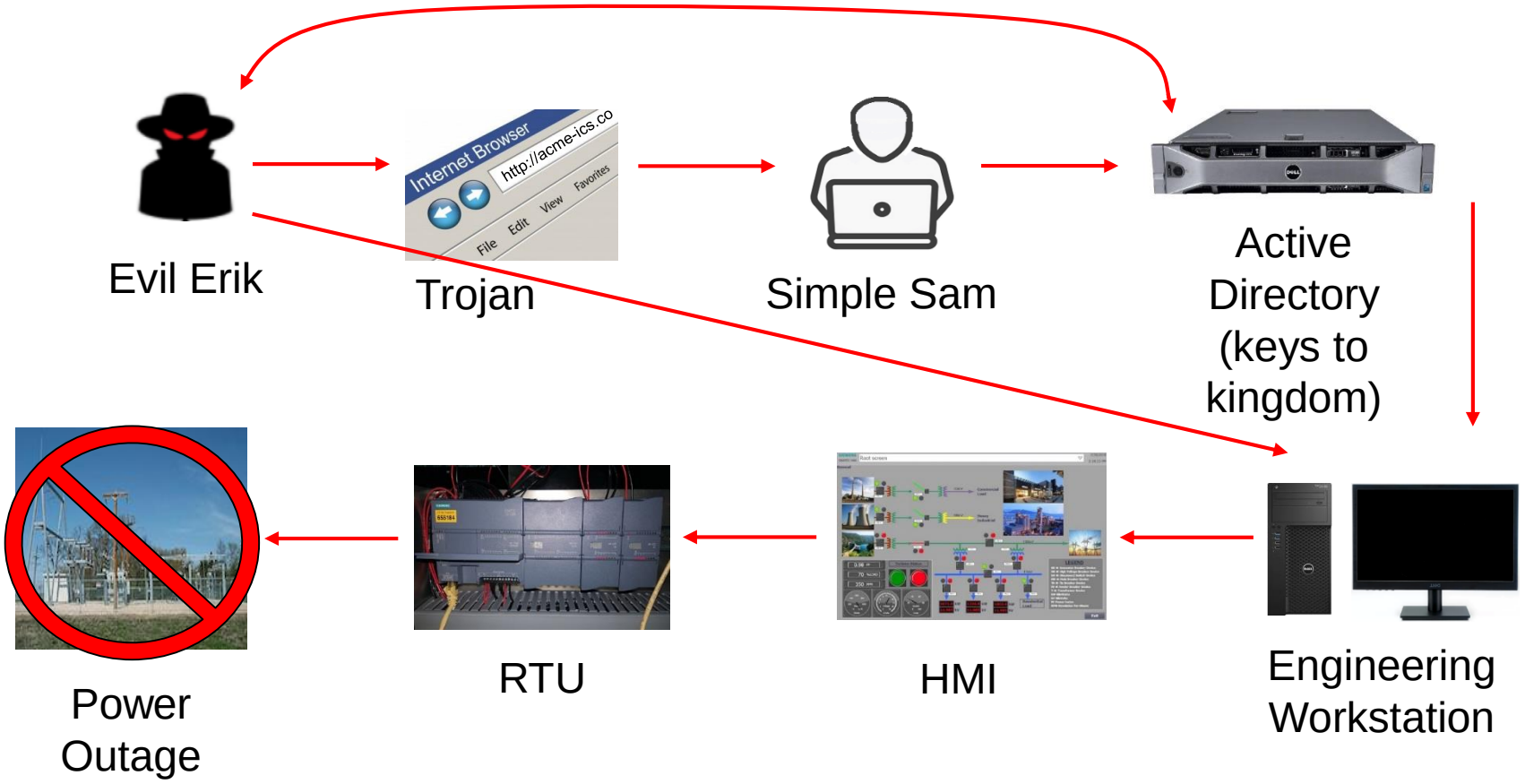
Havex



As a result of running Trojan-ized software, systems have been infected with a Remote Access Trojan (RAT).

Your ICS details are now being gathered by a Black Hat from anywhere in the world and operation continuity is at risk.

Havex Timeline



So what?

- Many different techniques to gain initial access to a victim network
- Often insufficient security in place at utilities due to need for remote access
- Similar threat landscape is seen across all sectors

Little Arc-Flash (LAF)

- All components of LAF are functional industrial control system equipment commonly seen in the field

- Attacker utilizes a common phishing strategy to gain initial access to the corporate environment

- Active Directory manipulated by the attacker to gain execution on engineer workstation

DEMO

Aftermath

- Recovery
  - Returning to a known good state can be exceedingly difficult after the fact
- Avoid becoming a victim
  - Auditing and proactive monitoring of infrastructure changes is vital to the ongoing process
- Plan for the day things go wrong
  - Proactive approaches are key, but all the planning in the world will not protect against a sufficiently motivated attacker
  - Know your ‘worst case’ scenario, and how you would respond to a compromise

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