OSY.SSI[2015][11]

Attack planning

Question

Attack planning

a.k.a. the Starcraft God Mode lecture.

If you understand how attacks work...

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If you understand how attacks work...
...you may be less clueless about defences.

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If you understand how attacks work...
...you may be less clueless about defences.
...you may leverage the same techniques elsewhere.

Also more and more certifications *require* you to attack yourself.

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Strategic layer cake

Strategic levels

"Means to an end".

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Organised by distance:

- How do we destroy/compromise X?

Strategic layer cake

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- How do we get to/subvert X? "Tactical".

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- What kind of X do we want?

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- What do we want?

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- What do we want? "Political"/Philosophical/Ideological.

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- What do we want? "Political"/Philosophical/Ideological.

No clear distinctions, but helpful model.

Strategic layer cake

Soldiers

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Last time: operational knowledge..

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Example of operation :

- send a crafted packet to a server,

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- get control of the server

Strategic layer cake

Soldiers

Last time: operational knowledge..

Example of operation :

- send a crafted packet to a server,
- cause a buffer overflow,
- use ROP to escalate priviledges
- get control of the server
- send packet from the server to another server

Strategic layer cake

Captains and lieutenants

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Example of tactical operation:

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Example of tactical operation:

- Use disguise to seduce the nerdy IT guy,

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- Evade by claiming you have to go to the WC and get out of the building

Strategic layer cake

Captains and lieutenants

Example of tactical operation:

- Use disguise to seduce the nerdy IT guy,
- Plug an USB key to exploit his Mac AirBook
- Evade by claiming you have to go to the WC and get out of the building
- Exfiltrate data from company to HQ.

Strategic layer cake

Generals and commanders

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Example of strategic operation

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Example of strategic operation

- Ruin the reputation of Gesu Yarō Corp.

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Example of strategic operation

- Ruin the reputation of Gesu Yarō Corp.
- Reveal the affair of Mr Húndàn with Mrs Jìnǚ.

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- Block production of Feind GmbH.

Strategic layer cake

Generals and commanders

Example of strategic operation

- Ruin the reputation of Gesu Yarō Corp.
- Reveal the affair of Mr Húndàn with Mrs Jìnǚ.
- Block production of Feind GmbH.
- False flag Porochny Inc.

Strategic layer cake

Chiefs

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Example of political goals:

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Example of political goals:

- Become world leader in consulting

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Example of political goals:

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- But be subtle! And no killing. (“doctrine”)

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The strategic question

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Examples: chess, Go, robotic motion, etc.

Example: the Botnet Master Equation

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- w_i: work necessary to compromise host i

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Data:

- w_i: work necessary to compromise host i
- r_i: risk of getting caught while attacking i
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Goal: find the optimal sequence $i_1, i_2, \ldots$ of targets, to infect a maximum of host in a given time.

Textbook case: knapsack

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A thief gets in a jewelry with a knapsack. Each jewel has

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The knapsack can only carry a weight W.

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The knapsack can only carry a weight W.

What items do you choose?

Computer-assisted attacks

Fact: we won't refrain from using computers to help planning attacks.

Your attackers won't either.

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How are attacks planned?

A few standard steps:

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1. Target identification and reconnaissance

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5. Evasion

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A few standard steps:

1. Target identification and reconnaissance
2. Vulnerability discovery
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Again, no sharp frontiers, but a useful roadmap.

0. War

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"Maximise freedom of movement"

1. Target identification and reconnaissance

Know thy enemy

- Goal:

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- Risk: Low risk
- Time: unconstrained/weakly constrained

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Find an example!

2. Vulnerability discovery

Know thy enemy's weakness

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- Means: analysts, replication, reverse-engineering, scanning, fuzzing...
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Good news: targets can't change too fast too often! (Why?)

3. Exploit weaponisation

Minimise operational risk

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- Cost: Low to medium

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- Means: testing/rehearsal/drills
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- Risk: Low (off-line) to medium (on-line)
- Time: Constrained by target's change cycle

4. Payload delivery

Fire in the hole!

- Goal:

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- Means: Operatives, (spear)phishing, dragnet, ...

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  - Usually direct effect or a payload (RAT, ...)
  - Use knowledge gathered in Step 1 to devise the best strategy
- Means: Operatives, (spear)phishing, dragnet, ...
- Cost: Low (untargeted) to high (very targeted)

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  - Usually direct effect or a payload (RAT, ...)
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5. Evasion

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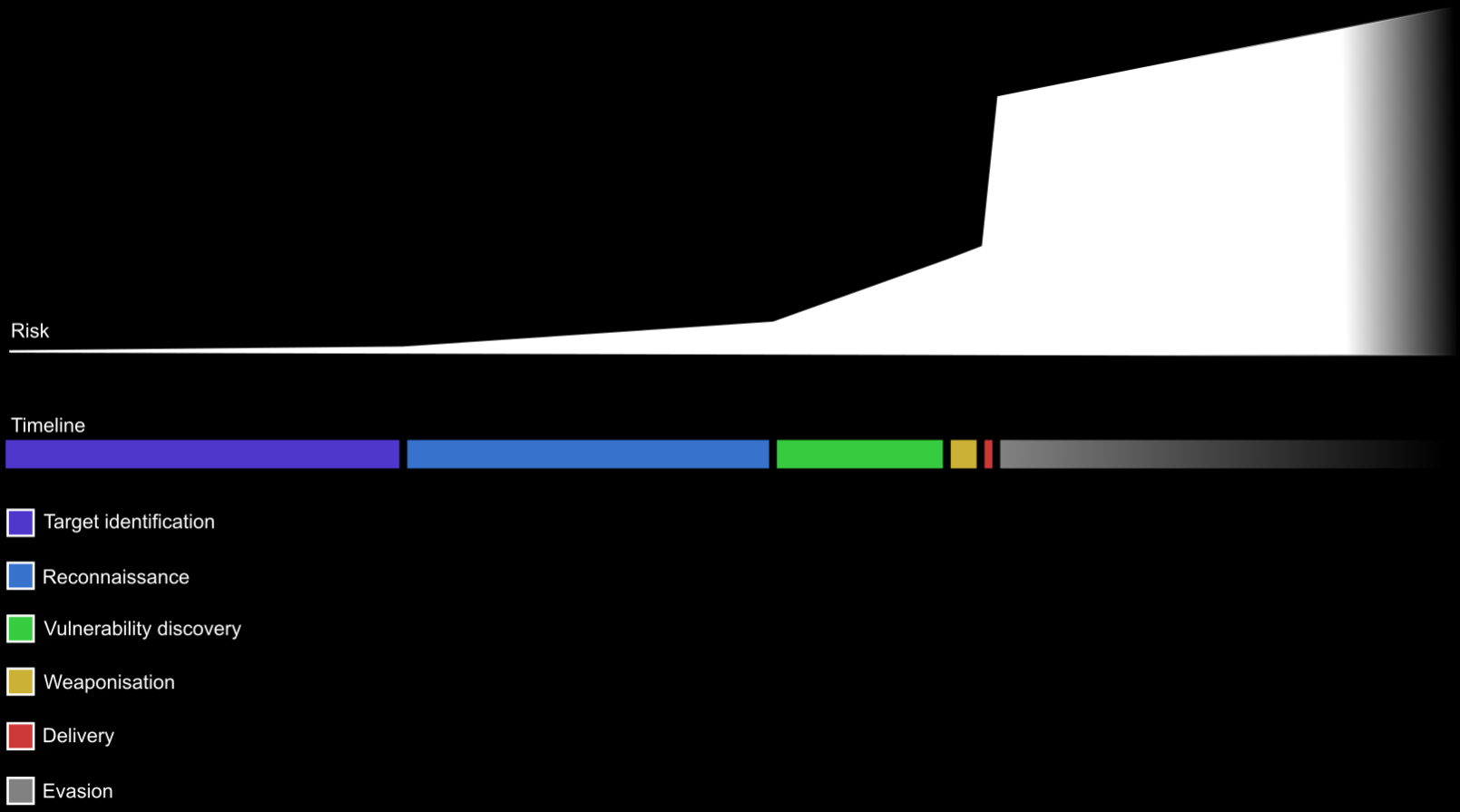
- Time: constrained to critically constrained (if detected)

Attack timeline



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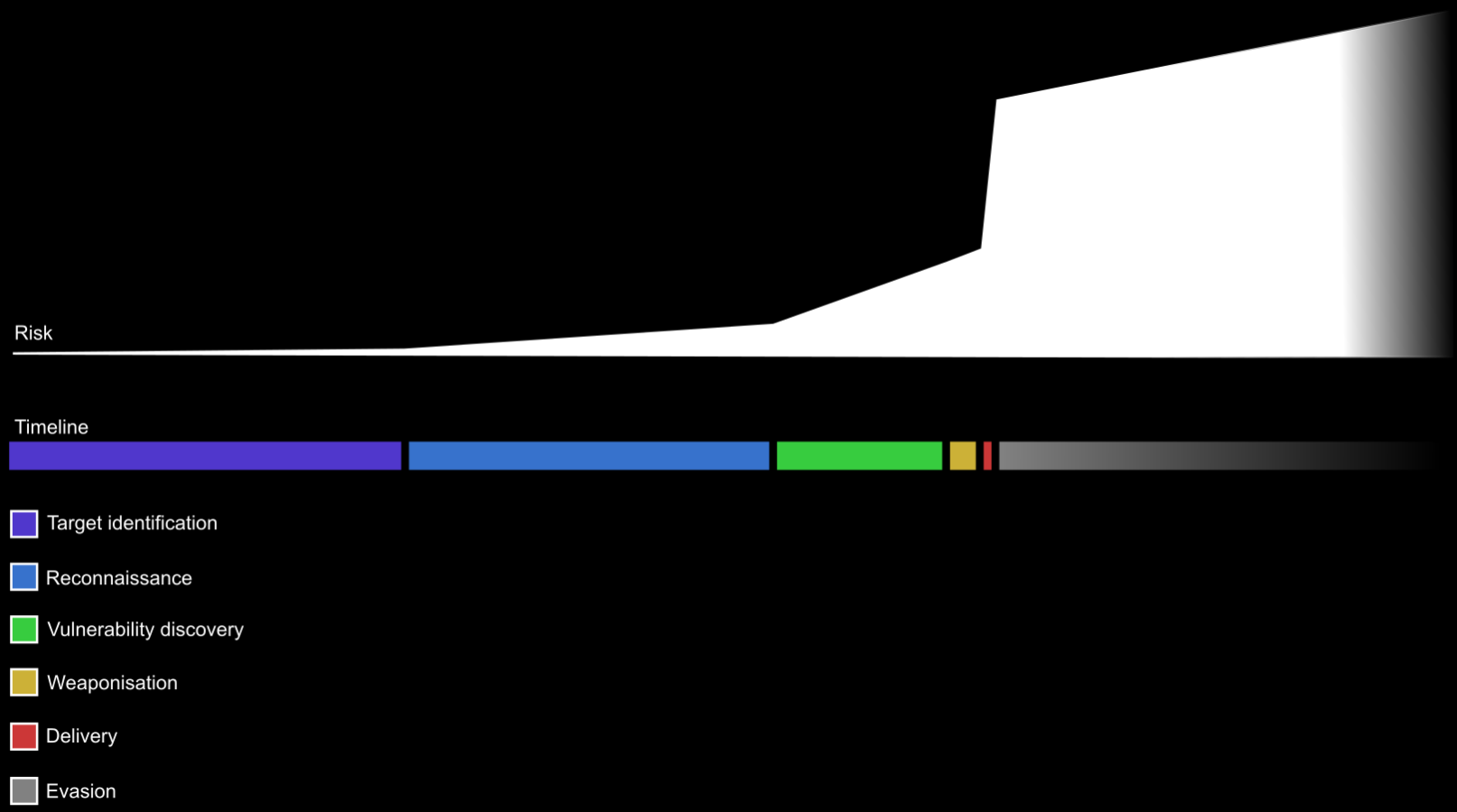

Note: A failed operation puts further operations at risk.

Attack timeline

RSA SecurID attack (2011)

28/02

CVE-2011-0609
(@yuange1975)

CVE-2011-0609
Poison Ivy RAT

2011 Recrutement Plan.xls

01/03

Mail to employee 1

02/03

Mail to employee 2

Employee 2 opens it

03/03 to 10/03

Analyses user list and priviledges, bypasses defence in depth mechanisms

Gains access to staging servers

Gains access to server of interest, moves data to staging servers

Compresses and encrypts data, FTP transfer to an external compromised server

Deletes data from there

10/03

EMC/RSA discover the attack, conduct forensics analysis and report to EMC executives

11/03 to 17/03

RSA contacts SecurID customers individually under NDA (~25 000 customers)

17/03

Official SEC 8-K breach declaration

Attack timeline

RSA SecurID attack (2011) – cont'd

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- 06/06: RSA admits SecurID compromise ($66 million loss)
- 01/12: 0 detections on VirusTotal

Attack timeline

Direction of movement

- Vertical movement: gaining access to more critical areas
- Horizontal movement: gaining access to neighbouring areas

Attack graph

Real attacks coordinate *multiple vulnerabilities*.

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Advanced Persistent Threats (APT).

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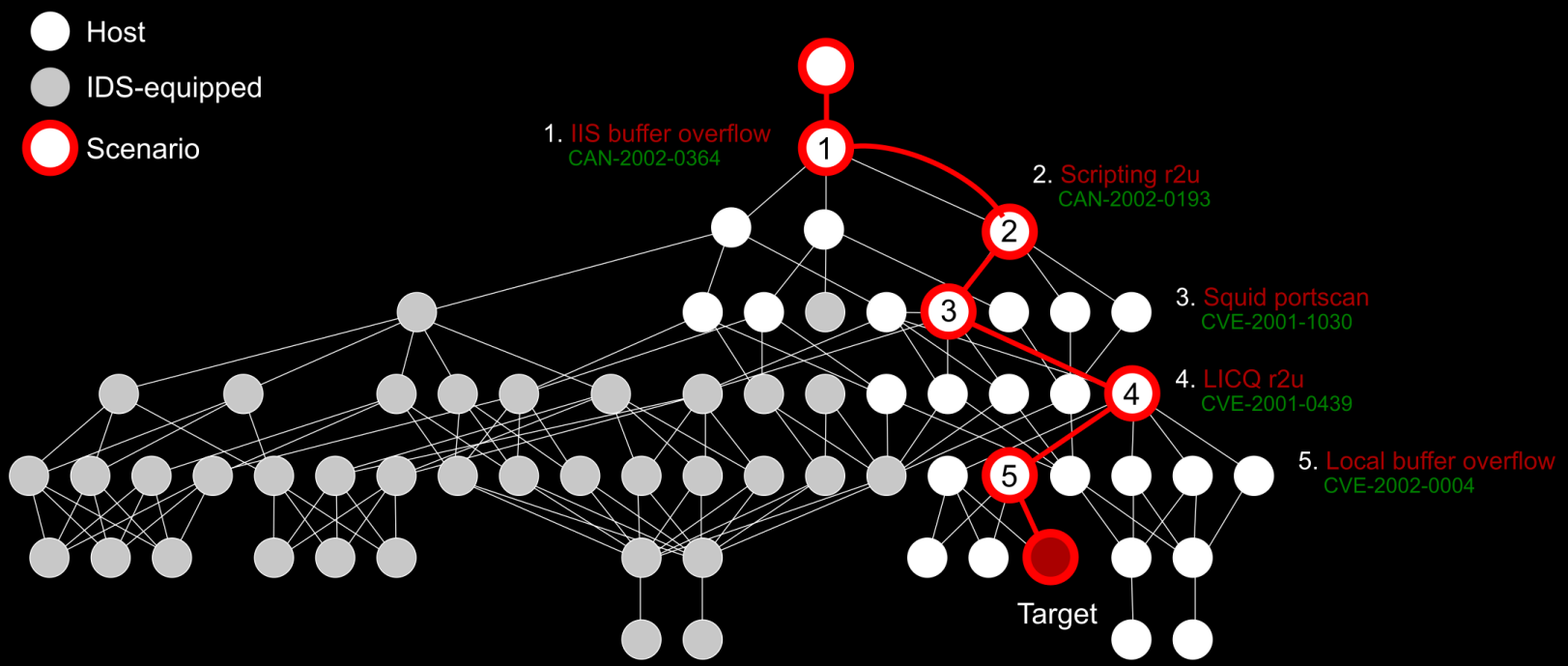
A more elaborate attack



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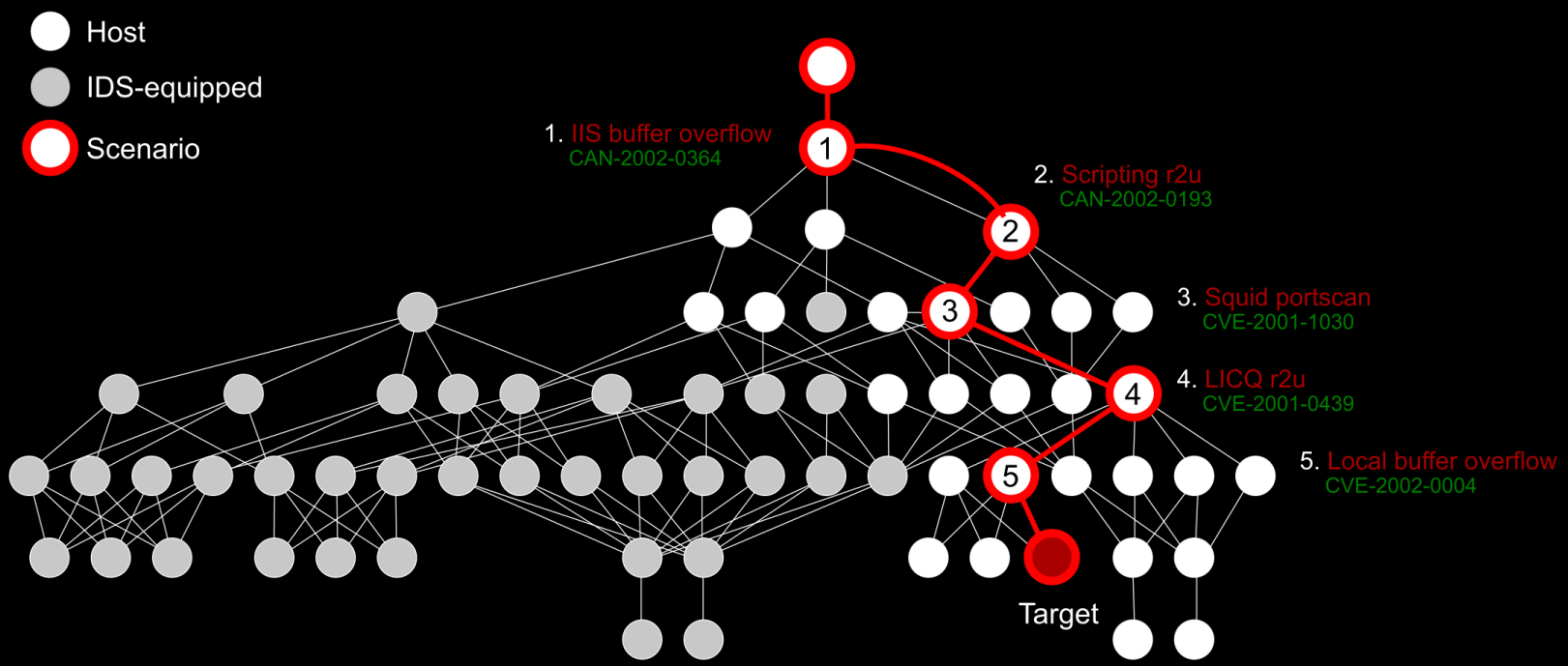

How hard is it? How long is it? Why aren't all hosts IDS-equipped? Can this strategy be automatically discovered?

Table of Contents

Counter-measures

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We know how we are going to be attacked.

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Can we sabotage the attacker's plan?

Honeypots

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Idea:

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Remember the cyber-attack maps?

What's the defence plan?

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Note: This is complementary to the (topological) defence-in-depth paradigm.

To each step, a counter-step

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Tip: reduce attack surface.

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Problem 3: by design, these procedures make troubleshooting hard for you as well.

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Problem 4: when that happens, it's probably too late...

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Note: if you're still under attack, this information might help to stop the attack.

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- Recover: replace destroyed hardware, sanitize software, ...
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Note: if you're still under attack, this information might help to stop the attack.
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5. Recover and pursue

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Problem 7: your chances of success in pursuit are not brilliant.

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Problem 1: (again) change is hard.
Problem 8: change takes time.

Better unsafe than sorry

All this line of defence requires **careful preparation**.

More importantly, it requires that you **update quickly**.

Pipo mode: ISO 27000s Denning wheel (Plan, Do, **Check**, Act)

Ah, also, listen to your experts.

Shamir's Ten Commandments

Crypto'95, also Turing lecture 2004

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9. Don't trust systems
10. Don't trust people.

Incident response

All hell loose

Situation:

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- You didn't prepare correctly, and something went wrong

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Question: how do you know?

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Question 2:

Incident response

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Question: how do you know? Detection (after the break).
Question 2: ok, so what do you do now?

Incident response plan

Three rules

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1. **You should have an IRP ready**.

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Incident response plan

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Hint: prepare *before* incidents happen.

Incident response plan

Three actors

1. **Management**:

Incident response plan

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Incident response plan

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Hint: put them together in a room.

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Hint: put them together in a room.
Hint 2: management takes the blame for things agreed upon, you take the blame if you deviate from the plan.

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1. Decide who to contact and gather in case of incident (response team), their role and **responsibilities**

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Hint: In the workplace, your responsibility is often to act as determined by the hierarchy. Just make sure they write it down.

Stuxnet?