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Penetration Testing with Live Malware

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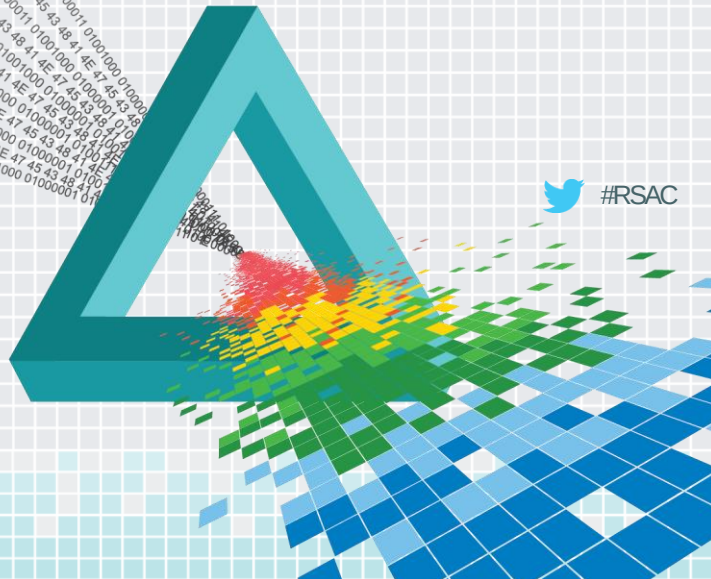
The Pentest Conundrum



Pentesting Debate

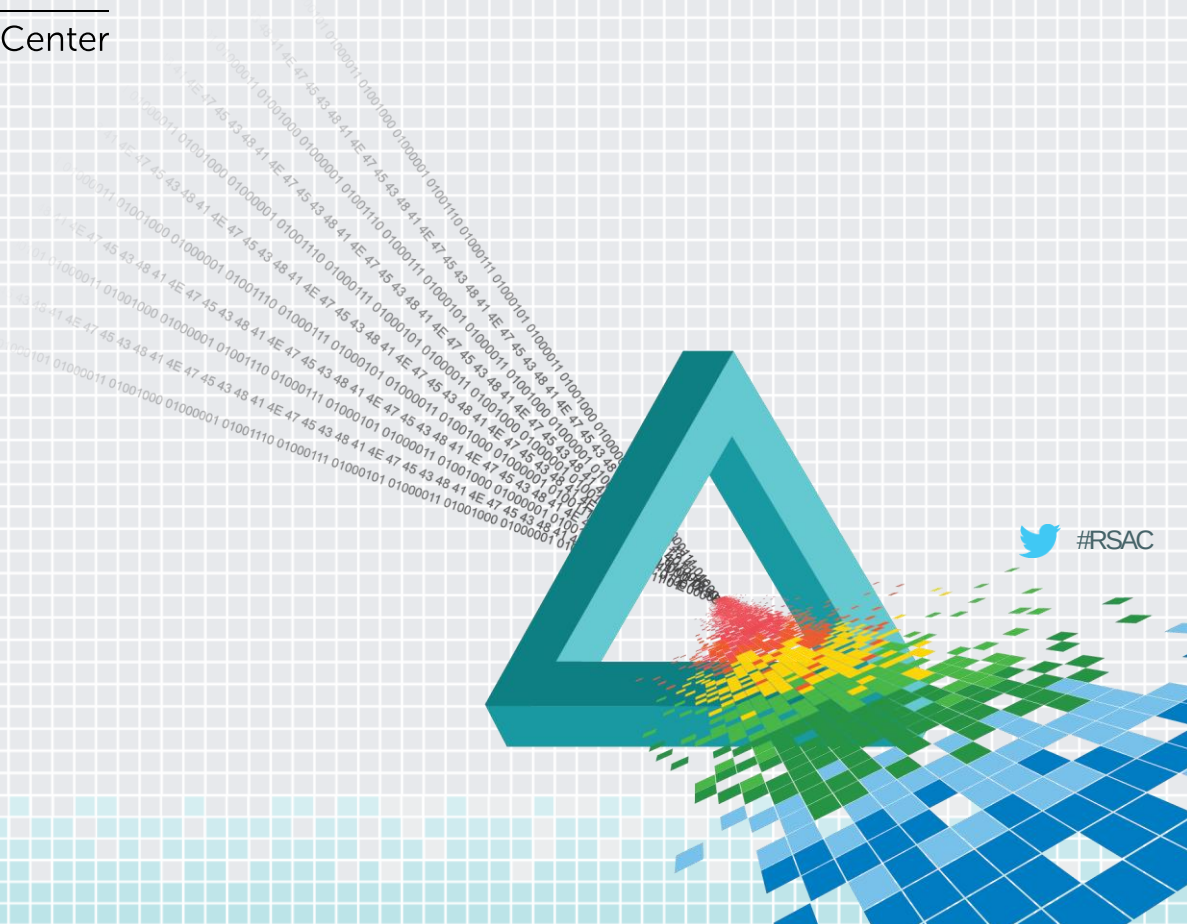
Pentesting Debate

- Morphing to vulnerability scanning and onto tick-box compliance
- “Penetration testing” being pulled to extremes:
  - Hardcore bug-hunting and reversing
  - Semiconductor reversing
  - Red Team testing
- *“Testing as a pentester, rather than an attacker”*

Where is the threat?

- “Hackers” continue to probe defenses, scan ports, and enumerate services.
- External attacks against unpatched OS-vulnerabilities (in)frequent.
- Attacks that exploit unpatched vulnerabilities and manage to breach corporate defenses through the front door are an increasingly rare breed.

The Real Threat



Ignoring the Real Threat

Breached

- Malware accounts for vast majority of breaches
  - Vehicle for getting inside the target
  - Platform for horizontal movement
  - Tool for data extraction and remote access
- Successful attacks delivered through:
  - Barrage of social engineering & trickery
  - Browser & user-level application subversion

Enterprise Penetration

- Penetration of an enterprise network requires the defeat and subversion of multiple layers of defense
  - Including anti-virus and intrusion prevention technologies.

Enterprise Penetration

Cloud
Email/attachment scanning, URL checking, etc.

Gateway
Proxy filtering, URL filtering, etc.

DMZ
Scanning appliances, Dynamic analysis, VM, etc.

Server
Mail server/archive scanning, host scanning, etc.

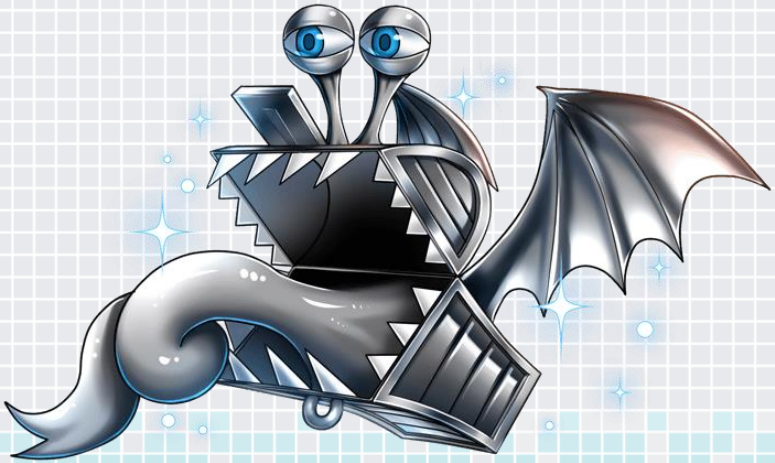
Endpoint
Desktop suites, etc.

Biggest Failure

- Unwarranted “faith” in (dynamic) malware analysis tools
  - Appeals like diet pills
  - Promise of weight loss without altering lifestyle
- No changes to business practices
  - Malware gets smarter
  - Vectors gets smarter
  - Network just as dirty as ever

Pentesting Requirements

- In order to test these defenses…
  - It is necessary to construct the same kind of advanced and stealthy malware as employed by the (best) cybercriminals
  - We need to deploy the malware in a similar fashion to the cybercriminals



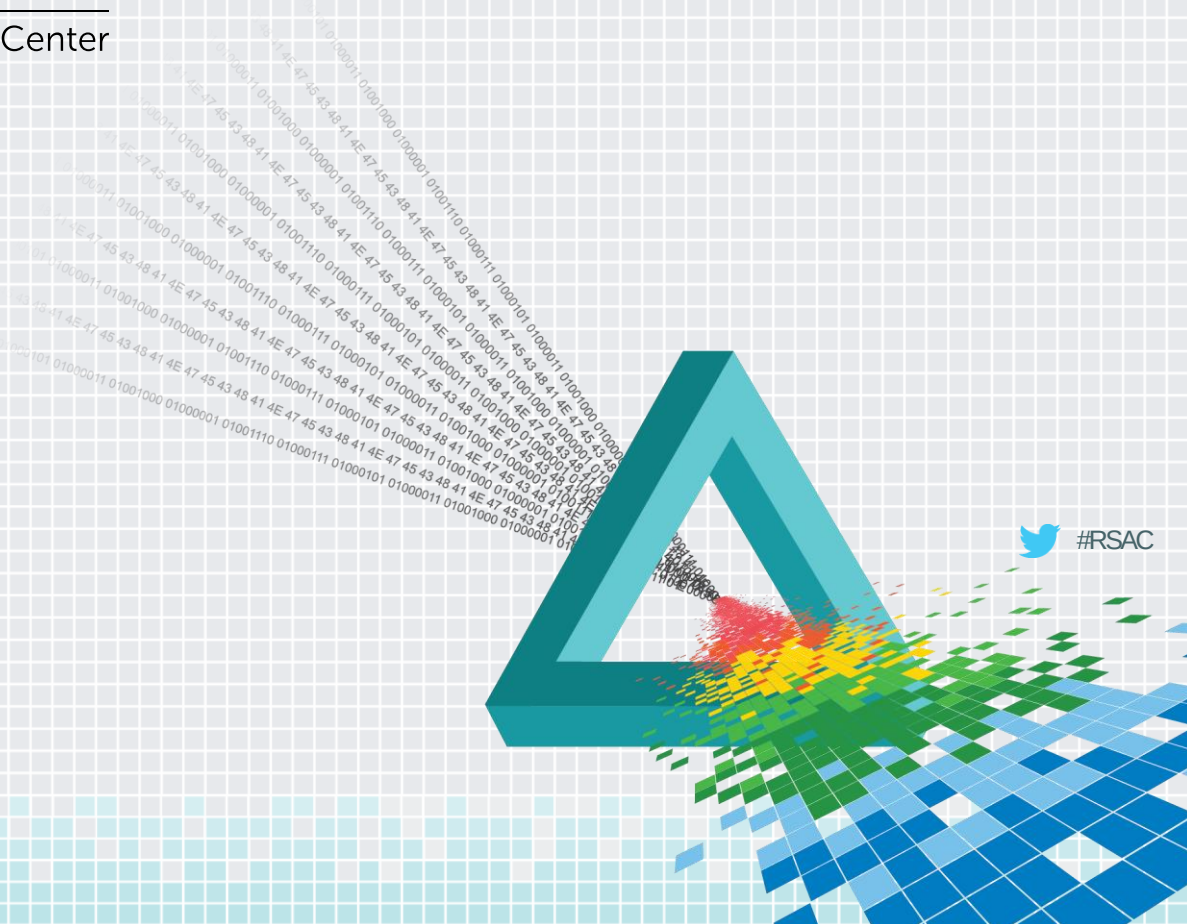
The “Ethics” Question

- Beg, borrow, or steal tools from the bad-guys?
- Engage the underground ecosystem and pay their fees?
- Access or construct better tools than what the “average” bad-guys have?
- Pollution of commercial AV with non-criminal malware?
- Blah, blah, blah…

Pentesting Twenty-teenies

- Need new penetration testing methodologies designed to replicate current generation attack profiles and stress the layered defense model.
- Practical considerations
  - Which layer(s) detected it?
  - Did it compromise the target host?
  - Is the malware serviceable to an attacker?

Building Malware



Malware Construction

- Plenty of samples, but need something new…
  - Modification of existing source code
  - Tweaking of existing malware
  - “Lawful intercept” malware
  - Underground cybercrime kits
  - Commercial malware kits
    - Growing business need *(start a business!)*

- ***Not*** worth throwing yesterday’s malware at a target…

Malware Armoring

- "Off-the-shelf" malware trivial to detect
- Armoring tools & methodologies advancing at a rapid pace
  - Anti-debugging
  - Anti-virtualization
  - Anti-decompilation
  - Polymorphic manipulators, etc.

- Most tools are "commercial", efficient, and *not* backdoored (surprisingly)

Malware Vetting

- Create one or many samples?
  - **Many**!!!
  - Create a “tree” of malware derivatives
    - Naked, armored, hardened, to “the works”
- Should I pre-test the malware?
  - **Yes**, but only if you can keep the samples to yourself
  - Turn off “cloud” submissions and analytics
- Can I reuse my old samples?
  - **No**.

For Corporate Use Only

- Include a marker within your malware specific to the job
  - Files identified through binary inspection
  - Don’t make it obvious though
- Choose carefully the method of C&C
  - Protocols are important, so too is being proxy-aware
  - Static and dynamic routes to C&C
- Report/record which host affected
  - Beaconing after XXX hours is good

Vectors Are Important

- But don’t get hung up on them
  - Remember the scope of the pentest
  - Red Team offers more opportunities
- Assessing the security of layered-defenses
  - Multiple samples, multiple vectors
  - Preparation is key
    - Expect to expend 4 days effort building , tuning, and watermarking samples
    - Takes 3+ days to research/build spear-phishing lists and messages

Attack Vectors

- Social engineering vectors tend to be more successful
  - Email with URL's to download malware
  - Dropping Trojanized files on file servers
  - Career/recruitment portals accepting attachments
- Deploying malware through exploited vulnerabilities
  - Horizontal propagation done via malware

Client Considerations

1. Make sure T&C's cover malware behaviors
2. Be specific on engagement scope and what vectors are allowable
3. Document and tag each sample that is to be deployed
4. Post-engagement C&C locations, beaconing, and tag information must be disclosed
5. Submit all samples to AV vendors afterwards

Conclusions

- Penetration testing methods need to include “malware”
- Difference between testing the layers of detection versus layers of prevention
- There are many good/safe tools
- Preparation effort and duration for testing are not insignificant
- CYA on T&C’s and post-op cleanup

Apply… actions…

- Immediate actions
  - Document your anti-malware defensive layers
  - Assume you will always be breached by malware – focus upon immediate detection & automated remediation
- Next 3 months
  - Plan on assessing malware defenses on a quarterly basis
  - Ensure that network anomaly detection tools are capable of detecting malware communication artifacts
  - Identify layers of implicit trust and double-down on defenses

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Thank you

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