Macs in the Age of APT

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iSEC Partners

Black Hat USA 2011

review notes by macmark.de v1.2

Agenda

1. Motivation
   - Preface and Background
2. Anatomy of an APT
   - Social Engineering
   - Initial Exploitation
   - Local Privilege Escalation
   - Network Privilege Escalation
   - Persistence
   - Exploration
   - Exfiltration
3. Conclusion
   - Summary

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What is APT?

Apple Purchases Tacos?

- **Advanced**: not your average Joe, may be government funded, may have zero-day vulnerabilities.
- **Persistent**: initial access leads to the creation of many access methods and long-term exploration `persistent means not giving up soon`
- **Threat**: defines the group of attackers with these capabilities, not an actual attack scenario

Case Study: Aurora

What the what?

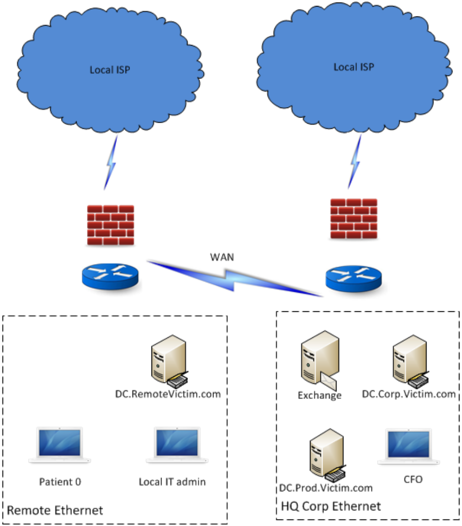
- Originally disclosed by Google on January 12th 2010
- Google discovered evidence of >30 other victims
- Attack was focused on Windows exploitation and escalation in AD
- Estimates range from dozens to hundreds of companies attacked[1]
  - Google
  - DuPont
  - Adobe
  - Juniper Networks
  - Northrop Grumman
  - Sony
  - And many more

In summary you forgot this.

[1] http://threatpost.com.mx/en_us/blogs/hbgary-e-mails-dupont-other-firms-hit-aurora-attack-031011

Case Study: Aurora

Socially engineer a victim to click on a malicious link



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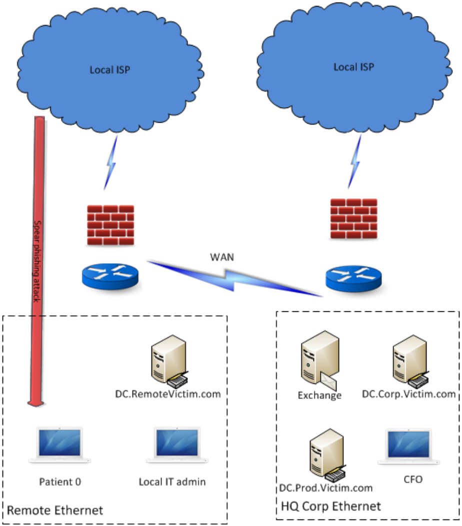
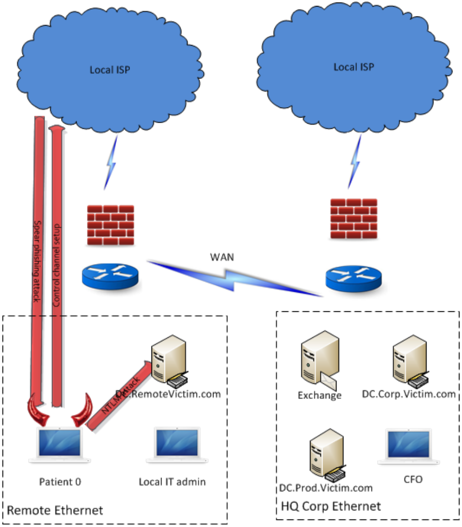


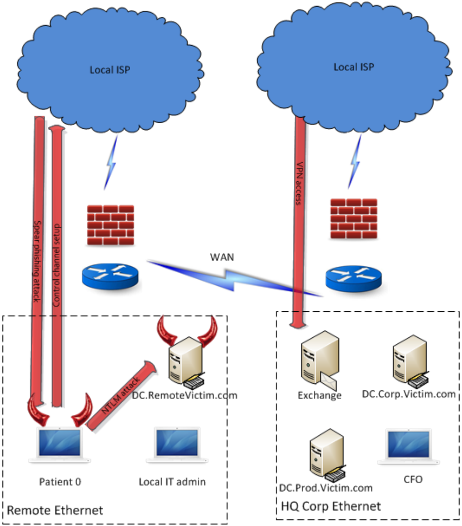
Case Study: Aurora

Escalate network privileges



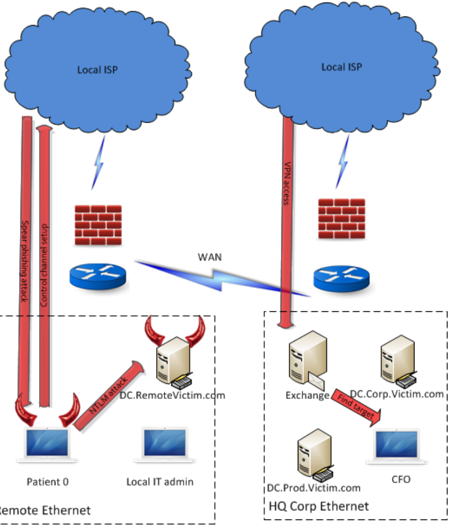
Case Study: Aurora

Make your attack more persistent



Case Study: Aurora

Explore



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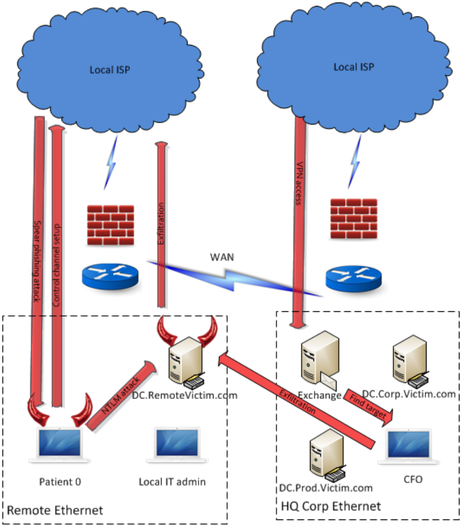
Case Study: Aurora

Exfiltrate the data



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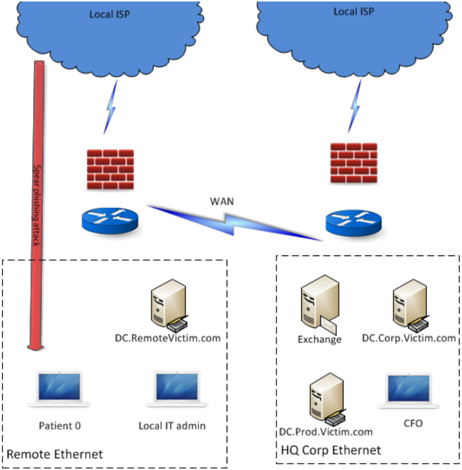


Your Mac is Safer

Sep 2011: 10,6 (Aug: 9,6)

- Apple has a small computer market share (6-8%)[2]
- Building a bot-net? Go for Windows users Trend is smaller bot-nets!
- There are fewer viruses and malware applications for Mac
  - ~~No~~ exploits included in common crimeware toolkits targeting Macs[3]
  - Attacks focus on social engineering (such as Mac Defender)

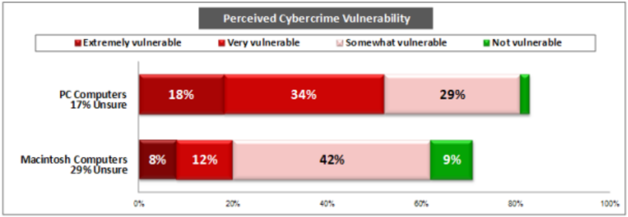
Virus hard!

[2] http://www.networkworld.com/news/2011/060611-mac-os-security.html

[3] See iSEC consultant Dan Guido's research

Training Mac Users to Feel Safe

- A history of ~~non~~-exploitation
- Go ahead, run this unsigned binary AppStore mandatory code signing
- Who needs anti-virus?[4] better not!



More than half of Americans believe that PCs are "very" or "extremely" vulnerable to cybercrime attacks, while only 20 percent say the same about Macs, according to this ESET survey.

(Credit: ESET)

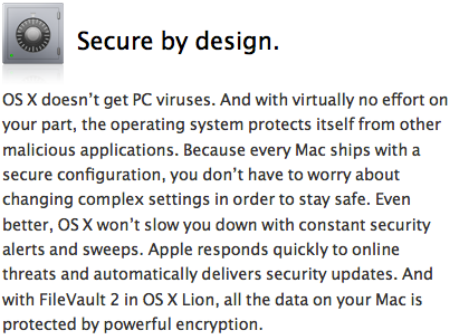
[4] http://news.cnet.com/8301-27080_3-10444561-245.html

Apple Marketing is Misleading

Sort of like all marketing (unrelated: hire iSEC because we are the best at everything)

- "OS X doesn't get *PC* viruses"[a]
- Other things OS X can't catch:
    - A Nintendo Wii virus
    - Mad cow disease, malaria, or chickenpox
    - Footballs (we tried)
- OS X is still vulnerable to malware (like almost any computer system)

`diff in rights`



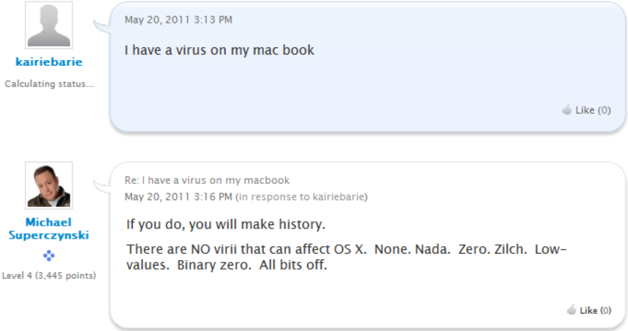
Secure by design.

OS X doesn't get PC viruses. And with virtually no effort on your part, the operating system protects itself from other malicious applications. Because every Mac ships with a secure configuration, you don't have to worry about changing complex settings in order to stay safe. Even better, OS X won't slow you down with constant security alerts and sweeps. Apple responds quickly to online threats and automatically delivers security updates. And with FileVault 2 in OS X Lion, all the data on your Mac is protected by powerful encryption.

[a] `http://www.apple.com/macosx/security/`

Mac Users are Susceptible to Social Engineering

- Mac users aren't as paranoid as Windows users[5]



kairiebarie

Calculating status...

May 20, 2011 3:13 PM

I have a virus on my mac book

Like (0)

Michael Superczynski

Level 4 (3,445 points)

Re: I have a virus on my macbook

May 20, 2011 3:16 PM (in response to kairiebarie)

If you do, you will make history.

There are NO virii that can affect OS X. None. Nada. Zero. Zilch. Low-values. Binary zero. All bits off.

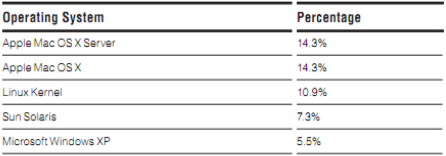
Like (0)

- Mac Defender
- Mac users may be easy to socially engineer

[5] https://discussions.apple.com/message/15242642#15242642

OS X isn't More Secure

- 14.3% of publicly disclosed OS vulnerabilities affected OS X in 2008[6]



Operating System	Percentage
Apple Mac OS X Server	14.3%
Apple Mac OS X	14.3%
Linux Kernel	10.9%
Sun Solaris	7.3%
Microsoft Windows XP	5.5%

- Latest OS X security patch addressed 39 CVEs
- 1,151 CVEs reported in the last 3 years affect Apple (including third-party software)
- Similar number of Windows CVEs (1,325)
- Safety in numbers

Single big bug impact more important than number of more harmless bugs.

[6] Subsequent annual reports focused on mobile operating systems. Source: http://www-935.ibm.com/services/us/iss/xforce/trendreports/xforce-2008-annual-report.pdf

Back to APT

- Targeted attackers don’t care what OS a corporation is running
- Mac users may be more vulnerable Social Engineering
- Plenty of vulnerabilities lead to “Initial Exploitation”

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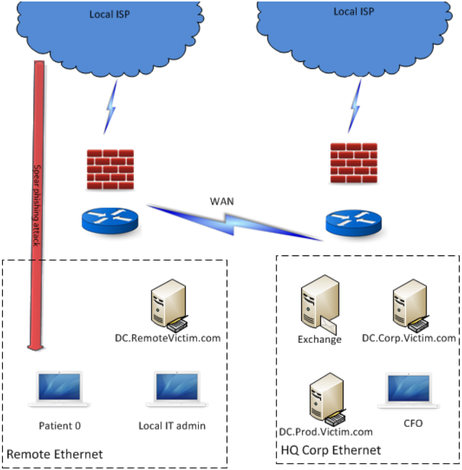


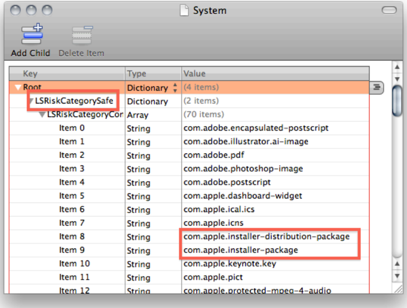
Exploitation in APT

- Get user to click a link
- And then exploit...
  - Railroad user into an installer with Safari's safe files
  - Browser or plugin exploit `Sandboxed`

Safari's open "safe" files includes installers

- .pkg and .mpkg files
- A .zip containing a .pkg runs Installer.app (Fixed in Safari 5.1)
- User must click through
- MACDefender[7] and variants triggered a "4-5x higher than normal" call volume with AppleCare when it hit[8]

not using Lion but talking about it

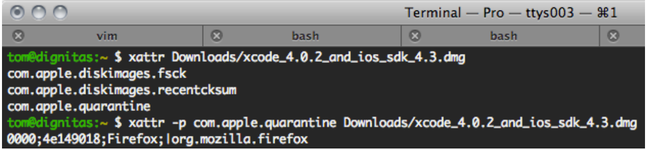


Key	Type	Value
Root	Dictionary	(4 items)
LSRiskCategorySafe	Dictionary	(2 items)
LSRiskCategoryCor	Array	(70 items)
Item 0	String	com.adobe.encapsulated-postscript
Item 1	String	com.adobe.illustrator.ai-image
Item 2	String	com.adobe.pdf
Item 3	String	com.adobe.photoshop-image
Item 4	String	com.adobe.postscript
Item 5	String	com.apple.dashboard-widget
Item 6	String	com.apple.ical.ics
Item 7	String	com.apple.icns
Item 8	String	com.apple.installer-distribution-package
Item 9	String	com.apple.installer-package
Item 10	String	com.apple.keynote.key
Item 11	String	com.apple.pict
Item 12	String	com.apple.protected-mpeg-4-audio

[7] http://blog.intego.com/2011/05/02/macdefender-rogue-anti-malware-program-attacks-macs-via-seo-poisoning/

[8] http://www.zdnet.com/blog/bott/an-applecare-support-rep-talks-mac-malware-is-getting-worse/3342?pg=1

File Quarantine and XProtect



```
tom@dignitas:~ $ xattr Downloads/xcode_4.0.2_and_ios_sdk_4.3.dmg
com.apple.diskimages.fsck
com.apple.diskimages.recentcksum
com.apple.quarantine
tom@dignitas:~ $ xattr -p com.apple.quarantine Downloads/xcode_4.0.2_and_ios_sdk_4.3.dmg
0000;4e149018;Firefox;|org.mozilla.firefox
```

- File Quarantine
  - Part of the LaunchServices API
  - Quarantine properties dictionary
  - `const CFStringRef kLSItemQuarantineProperties`
- XProtect
  - Signature-based scanner
  - Piggy-backs on File Quarantine
    - Downloaded files marked with extended attribute
    - LaunchServices triggers scan
  - In its ~~infancy~~ on Mac OS X (introduced in 10.6) works great
  - Security Update 2011-003: Malware database now updates daily[9]

[9] `http://support.apple.com/kb/HT4657`

Anti-exploit Mitigations

available does not mean used

Mitigation availability: not always on by default when introduced

on by default

Mitigation	Windows	Mac OS X
Stack Protections	2003 (Visual Studio's /GS)	2007 (10.5/~~XCode~~ Xcode 3.1)
Heap Protections	2003 (XP SP2)[10]	~~2009 (10.6)~~ 2007 (10.5)
DEP	2004 (XP SP 2)	2006 (10.4.4 Intel)
ASLR	2007 (Vista)	2007 (10.5)

ASLR Windows Server: 2008 OS X Server: 2007

Sucked before 2008 (SEH protection)

ASAP with Intel, since PPC had no NX support

[10] http://blogs.technet.com/b/srd/archive/2009/08/04/preventing-the-exploitation-of-user-mode-heap-corruption-vulnerabilities.aspx

Smash the Stack

- GCC ProPolice can be used at compile-time (GCC $\geq$ 4.1)
- GCC's -D_FORTIFY_SOURCE in 10.6
- 10.5/XCode 3.1: GCC 4.2 first included, but not the default (GCC 4.0)
- 10.6/XCode 3.2: GCC 4.2 the default, -fstack-protector enabled by default
- Binaries built using older toolchain may not have it enabled

Break the Heap

- Mac OS X
  - 10.5: checksum — not a security protection
  - 10.6: Include a security cookie — better[11]
- Windows
  - XP SP2 and Server 2003[12]: Safe unlinking and heap entry header cookie
  - Vista and later: Numerous additional heap protections

[11] http://securityevaluators.com/files/papers/SnowLeopard.pdf

[12] http://blogs.technet.com/b/srd/archive/2009/08/04/preventing-the-exploitation-of-user-mode-heap-corruption-vulnerabilities.aspx

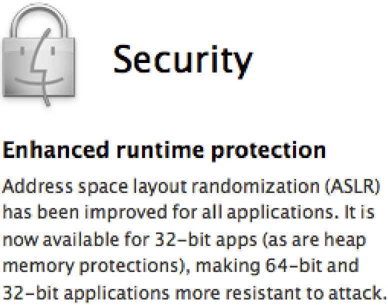
NX/DEP/ED

- Supported on Intel architectures
- Sets the default mprotect() exec flag for heap and stack
- 10.6: heap always executable for 32-bit binaries
  - not even mprotect() can disable
- 10.7: 32-bit binaries compiled on 10.6 still have always-executable heaps
- Not configurable `not disable-able`

	10.4	10.5		10.6		10.7	
	i386	i386	x86_64	i386	x86_64	i386	x86_64
Stack	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Heap	No	No	No	No	Yes	Yes	Yes

ASLR

- 10.5: First introduced
- 10.6: No major changes
  - Not all libs use it
  - Not application code
  - Not the stack or heap
  - ROP exploits possible using dyld[13]
- 10.7: Greatly improved[14]
- Not configurable `not disable-able`



Security

Enhanced runtime protection

Address space layout randomization (ASLR) has been improved for all applications. It is now available for 32-bit apps (as are heap memory protections), making 64-bit and 32-bit applications more resistant to attack.

[13] http://securityevaluators.com/files/papers/SnowLeopard.pdf

[14] http://www.apple.com/macosx/whats-new/features.html#security

Back to APT

- Been behind Microsoft, but finally catching up
- DEP and ASLR are not configurable
- Backwards compatibility threats

switching them off for windows apps is security?

yea for windows

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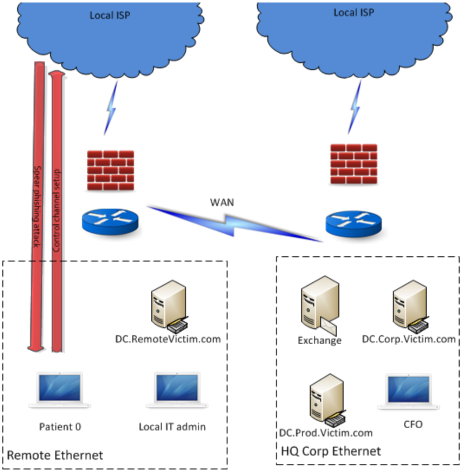


Accessing Patient Zero's Data

Information stored on disc

- Locally stored E-mail
- Safari History, Bookmarks
- iChat logs
- Spotlight DBs

Escalating Privilege

Attacking the login keychain

- Code execution doesn't mean full account access
- The "Login Keychain" can be used to brute-force the user's password

`can have distinct password`

Escalating Privilege

Sudo make me a sandwich[15]

windows doesn't even need that

- If a user is a sudoer, password can directly escalate privilege
- User password can be used to decrypt the "Login Keychain"
- Privileged credentials in the keychain can be used to spread and explore

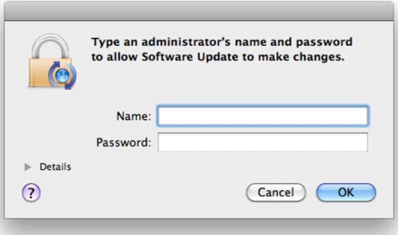
can have distinct password

[15] http://xkcd.com/149/

Escalating Privilege

Phishing for admin

- OS X requires authorization for privileged action:



Type an administrator's name and password to allow Software Update to make changes.

Name:

Password:

- Windows UAC screen slightly harder to spoof

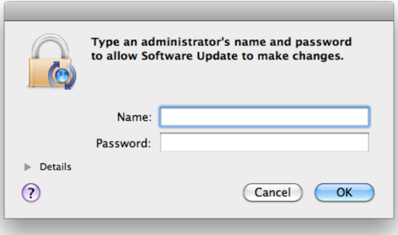
Escalating Privilege

Phishing for admin

- This application sends admin credentials offsite in an HTTP “GET”

You talk about Lion but show outdated system.

There should be a process Software Update and other info messages beforehand.



Type an administrator's name and password to allow Software Update to make changes.

Name:

Password:

Lion shows reason without disclosure triangle immediately.

```
"GET /paul/Usernameis/isecadmin/Password/p@ssw0rd HTTP/1.1"
```

- UAC can be spoofed on Windows as well

Why bother? Don't need that at all on Windows.

Lion Improvements

AppSandbox: a safer place to play

- Subscription-based via plist

```
<key>com.apple.security.app-sandbox</key>
<true/>
```

- Per application container

```
export $HOME=~/Library/Containers/app.bundle.id/Data
```

- Per session entitlements
- Powerbox (`pboxd`)
  - sandbox-free broker process
  - transparent to developers (NSOpenPanel/NSSavePanel)

Lion Improvements

AppSandbox: cool kids use least privileges

- Entitlements
  - `com.apple.security.documents.user-selected`
  - `com.apple.security.assets`
  - `com.apple.security.network`
  - `com.apple.security.personal-information`
  - `com.apple.security.device`
- Temporary Exceptions
  - $HOME/absolute file access
  - Send Apple Events
  - Look up mach services
  - Inherit

Lion Improvements

XPC: Intra-application privilege separation

- libSystem IPC API
- XPC binaries stored in `Bundle.app/Contents/XPC`
  - Address space isolation
  - Fully restricted sandbox by default
  - Elevating XPC service to `root` is unsupported
- On-demand launching
  - integration with GCD and launchd
- Quicktime Player uses a low-privileged process called VTDecoderXPCService[16]

[16] `http://arstechnica.com/apple/reviews/2011/07/mac-os-x-10-7.ars/9`

Back to APT

What can the local user do

- Access valuable local data
- Brute-force a valuable credential store
- Phish for admin credentials
- Help is on the way?

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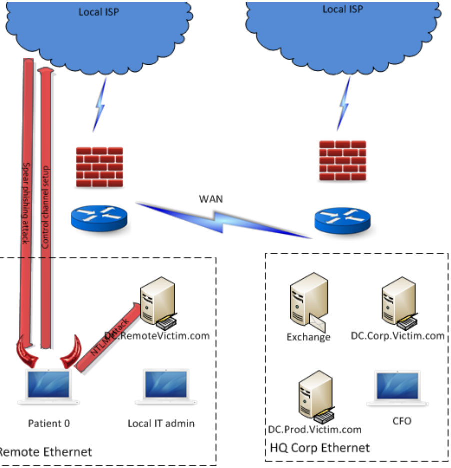

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Lots of Services Makes Us Enterprise, Right?

Right? All services added for Lion server are off by default.

- Presented at SOURCE Seattle and ToorCon
- Examined security of network administration protocols in Snow Leopard Server (10.6) Which services? Again offtopic: Not talking Lion.
  - 28 network ports open after default install!!!
- Found pervasive authentication issues
- Exploited two of the most widely used protocols for managing Macs

AFP Authentication

You are the Weakest Link, goodbye!

- AFP provides multiple user authentication modules (UAM)
- Clients supporting weaker UAMs -> degredation attack

Authentication Mechanisms	**Attacks**
Kerberos	Offline brute force attacks, relay attacks
DHX2 Cast 128 Version 2 (DHX2)	Active network attacker
DH Cast 128	Active network attacker
Two way random	Crack DES
Random number exchange	Crack DES, No server auth
Clear text password	Passive network attacker
No user authentication	None needed

Bonjoof

Completeley unrealistic pipe dream scenario.

- Apple Remote Desktop

Apple Remote Desktop is a seperate product not includede with Lion or Lion server. Talk is about Lion not additional software.

  - Uses 512-bit prime for (anonymous) Diffie Hellman key agreement
  - Creates a shared AES-128 key for UDP transmission
  - Authenticates over the established encrypted channel
- Bonjour

No DNS. There is no domain name server. Bonjour has no centralized server but is peer to peer.

  - ad-hoc DNS service
  - No authentication
  - Requires peers to back off if a desired name is taken

Bonjour works only on subnet. Company servers need to be seen across subnets thus company cannot use Bonjour for server lookup at all.

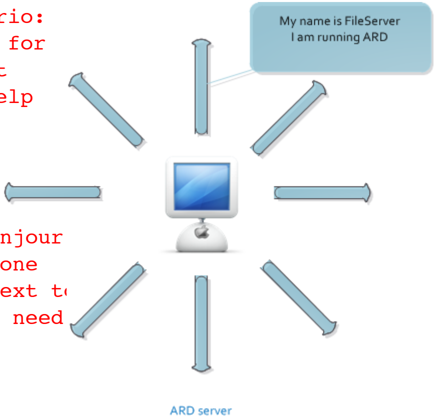
- Combine the two...
  - Weak server auth + Untrusted identification -> Bonjoof

No Public-Key-Infrastructure (PKI) used. This is a company IT admin department task. Not using PKI means IT sucks.

Bonjoof Beta

File server offering ARD services

Combining ARD and Bonjour is an unrealistic scenario: If you're in need for ARD then you don't have Bonjour to help you.

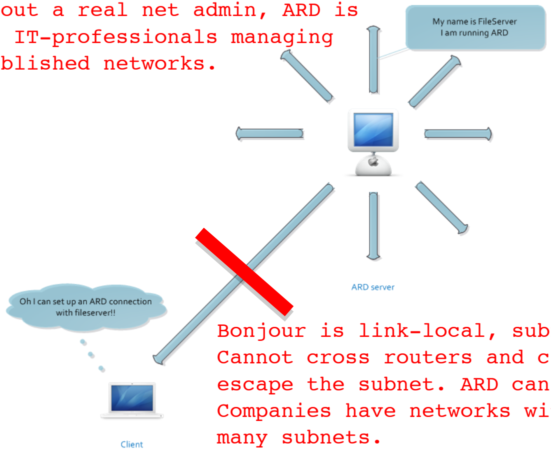


If you can use Bonjour to see the other one then he's right next to you and you don't need ARD.

Bonjoof Beta

Administrator enjoys his coffee

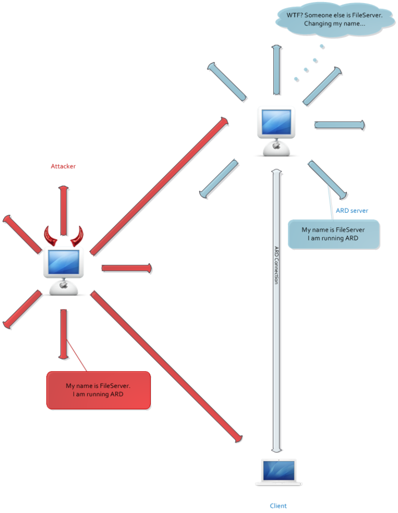
Bonjour is for family home and ad-hoc networks without a real net admin, ARD is not. It's for IT-professionals managing stuff in established networks.



Bonjour is link-local, subnet. Cannot cross routers and cannot escape the subnet. ARD can. Companies have networks with many subnets.

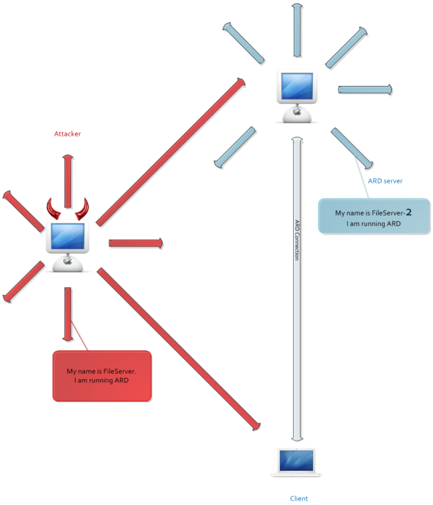
Bonjoof Beta

Spoofing mDNS



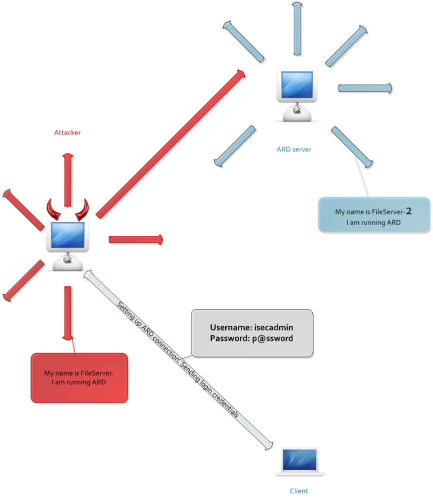
Bonjoof Beta

Claiming the hostname



Bonjoof Beta

ARD client silently updates its stats (auto-login)



Attacker

ARD server

My name is FileServer-2
I am running ARD

My name is FileServer.
I am running ARD

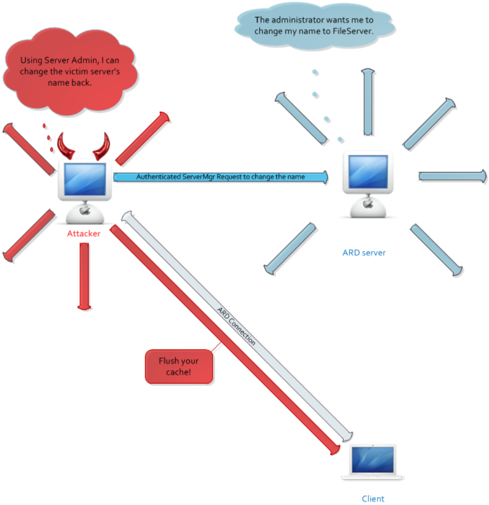
Setting up ARD connection. Sending login credentials

Username: isecadmin
Password: p@ssword

Client

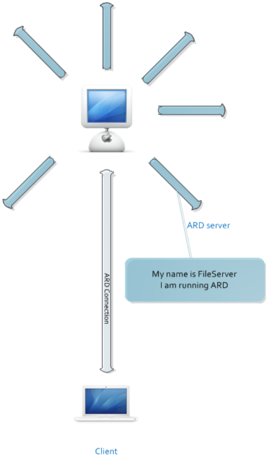
Bonjoof Beta

Reset the file server's hostname


The administrator wants me to change my name to FileServer.
Using Server Admin, I can change the victim server's name back.
Authenticated ServerMgr Request to change the name
Attacker
ARD server
ARD Connection
Flush your cache!
Client

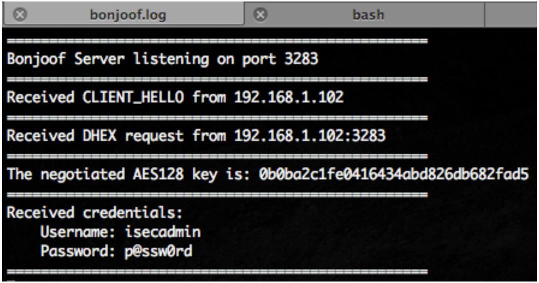
Bonjoof Beta

Where'd who go?



Bonjoof Beta

Some sample tool output



```
================================================================
Bonjoof Server listening on port 3283
================================================================
Received CLIENT_HELLO from 192.168.1.102
================================================================
Received DHEX request from 192.168.1.102:3283
================================================================
The negotiated AES128 key is: 0b0ba2c1fe0416434abd826db682fad5
================================================================
Received credentials:
    Username: isecadmin
    Password: p@ssw0rd
================================================================
```

Back to APT

- No standardized authentication mechanism/configuration
- AFP, OpenDirectory, ServerAdmin all suffer from authentication issues
- Bonjour makes local DNS poisoning easy...no race condition required

Outline

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   - Preface and Background
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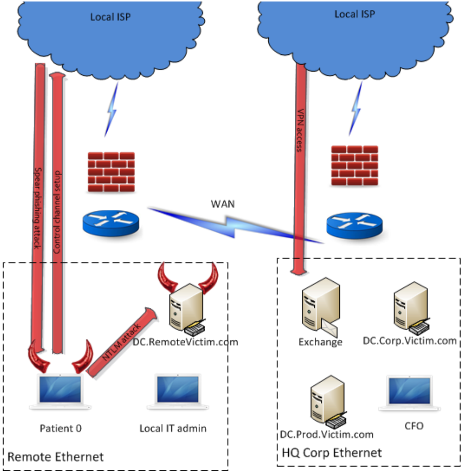
   - Network Privilege Escalation
   - Persistence
   - Exploration
   - Exfiltration
3. Conclusion
   - Summary



Maintaining Access

how to survive the reboot

- Create a hidden startup item
- ~~Com.apple.SystemLoginItems.plist Exploit[17]~~ No SLI since 10.6.
- Append to existing user startup scripts
- Hidden cronjob or automator script
- Modify existing binaries and services, which breaks signing but is ~~generally not noticed~~ Signature is checked for Keychain, Parental Control, Firewall and Task For PID for example.
- Modify kernel extensions or cached extensions
- Persist in firmware

No examples for the rest.

[17] http://www.macshadows.com/kb/index.php?title=Com.apple.SystemLoginItems.plist_Exploit

Maintaining Access

Attacking and hiding

- Execute arbitrary shell commands
- Run JavaScript in Safari to manipulate/create webpages in Safari
- Attach folder actions to hide data
- Send file transfer messages to your iChat contacts (may be Adium only)

Maybe? You did not check your claims?

Maintaining Access

At the network layer

- Issue VPN credentials to maintain foothold
- Issue soft tokens from access server
- Issue certificates
- Create new AD users

The Persistent Attack

Userland rootkits: a history...

In userland not possible because of usage of task for pid().

Dino dreams about injected stealth threads in Safari. Only with officially signed trojan app and that throws auth boxes.

- Nemo recreates PTRACE functionality and does great Mach ports research [18]
- Dino publicly releases remotely controllable PoC Mach proxy rootkit[19]
- Jonathan Rentzsch creates tools and uses them for “hooking” and “swizzling”: methods of modifying existing binaries in memory or on disc

You got history wrong.

- Dino and Miller write “Mac Hacker’s Handbook” with excellent illustrative examples of persistent attacks using these techniques[20]
- More followed

[18] nemo, Abusing Mach on Mac OS X. May 2006. http://www.uninformed.org/?v=4&a=3&t=pdf

[19] http://trailofbits.files.wordpress.com/2009/08/advancedmacosxrootkits.pdf

[20] C. Miller, D. A. Dai Zovi. Mac Hacker’s Handbook. 2009. pp300–318.

Fighting Persistence

Mac IR

- How do we handle IR on Macs?
- Commercial Products
  - EnCase, BlackLight, FTK
  - All handle standard HFS+ forensics
  - Some claim file hash checking (and fail)
- What's missing?
  - Easy checking of OS integrity
  - Binary and driver signing
  - Memory forensics[21]
- Is all of the system state captured on the HDD?

There's no cryptic registry or the likes. Just easy plain text.

Living under a rock?

So again you're unsure about the topic.

[21] Volatility `https://www.volatilesystems.com/default/volatility` is working on it

Dealing with APT

Mac Hardware Forensics

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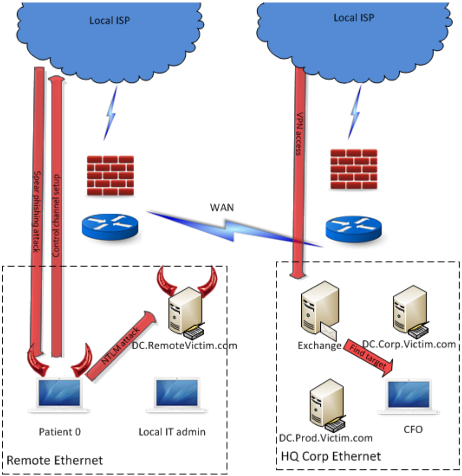

Who do you Love?

Are you for sure?

- Pick accounts to attack by examining the Open Directory users, groups, and privileges using unauthenticated ldapsearch
  - Engineers: source code
  - Product Management: release information
  - CFO's office, Controller: Financial data
  - In house counsel: Lawful intercept access
- Account home directories ~~network mounted by default~~

Sharing is off by default.

Accessing Interesting Accounts

- Root users on Open Directory server can get the password directory (mkpassdb)
- Domain administrators can change user passwords to access accounts
- Administrators in Windows can do bad things too

Making Exploration Harder

- Don’t allow server admin accounts to have root access
- Use strong password hash formats
- Regularly review audit logs and set up alerts to track password changes and VPN enrollment

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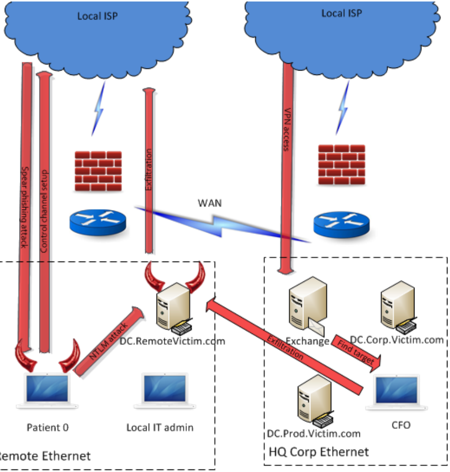

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The Getaway

- Shawshank-style
  - Identify overseas internal drop server
  - Move data over corporate WAN to internal drop
  - Test for allowed outbound protocols
  - Bulk exfiltration though local office NAT to external drop server
- Covert Channels
  - ICMP
  - HTTPS
- Hide in plain sight[22]
- PKI via embedded public keys

earlier and in summary forgotten.

of course public keys inside, that is
what it is for you joke

[22] http://invisiblethings.org/papers/passive-covert-channels-linux.pdf

How can we mitigate the exfiltration threat?

Short term

- Coordinated egress restrictions in *all* offices
- DLP & proxy log monitoring
- 24x7 SOC ninjas

How can we mitigate the exfiltration threat?

Long term

- Time to rethink global architecture
  - Leased lines
  - Unified Forest
  - L3 routing directly between offices
- Alternatives
  - ADFS Federated domains
  - WAN accelerators
  - Limited, audited file sync

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Dealing with APT

Comparison with Windows

- In each phase of an APT, how does OS X stack up?
- Assumptions:
  - Windows 7 and 2008R2
  - OS 10.7 Client and Server
  - No mixed environments

And on previous pages you used here 10.6
tztztz

Windows vs Mac Comparison

Default: on

Initial Exploitation:

Microsoft: new sec features usally introduced with default off

Windows 7	OS 10.7 Lion	Advantage
Stack Canary	Stack Canary	~~Tie~~
Heap Hardening	Heap Hardening	~~?~~
Heap and Stack DEP	Heap and Stack NX	~~Tie~~
ASLR (32 and 64 bit)	ASLR (32 and 64 bit)	~~Tie~~
Configurable with EMET	Not configurable	~~Windows~~

can turn off

cannot turn off

Conclusion: OS X has now equalized anti-exploit technologies with Windows.

Windows vs Mac Comparison

not even necessary with Win users running
with max rights (and other at same time)

Local Privilege Escalation: bypass with ease and official API

Windows 7	OS 10.7 Lion	Advantage
NT Priv Dropping	Broker service and XPC	OS X
Default all privs	New default sandbox	OS X
UIPI and Secure Desk	Pop-up cred box	~~Windows~~
No default cred store	Login Keychain rocks	~~Windows~~

Conclusion: Local privilege escalation on both platforms is still quite possible. Everybody loses.

means no secure storage by default

Windows vs Mac Comparison

ARD not part of Lion (and server)

Network Privilege Escalation:

PKI is a must so or so, you mentioned it and forgot.

Windows 2008R2	OS 10.7 Server	Advantage
NTLMv2	Unsigned DH	Windows
Kerberos Only Option	Lots of fallback to DH	Windows
RPC Privacy and Integrity	No central protocol crypto	Windows
RDP with session security	~~Apple Remote Desktop~~	~~Windows~~
AD DNS with Secure Updates	mDNS is no DNS	~~Windows~~

forgot your intro?

Conclusion: OS X networks are significantly more vulnerable to network privilege escalation. Almost every OS X Server service offers weak or broken authentication methods.

Windows vs Mac Comparison

not needed, because no registry

Persistence:

Windows 7	OS 10.7 Lion	Advantage
User-Mode Services	User-Mode Services	Tie
Kernel Rootkits	Kernel Rootkits	Tie
Many disk forensics options Better hiding in Windows.	Fewer disk forensics	Windows
Several RAM forensics tools	Almost no RAM forensics shell can do all i need	Windows

Conclusion: Persisting malicious code on both platforms is not a problem for APT. Defenders have more options to detect modification of Windows and analyze code, but this need should be slowly met by open-source and commercial tools.

Windows vs Mac Comparison

You value "stealth mode" for TCP/IP too?

Exploration and Exfiltration:

Windows 2008R2	OS 10.7 Server	Advantage
AD LDAP locked to unauthed users	Anonymous LDAP browsing	Windows
Configurable outbound FW	~~No outbound rules~~	~~Windows~~
Central logging requires product	Supports syslog UDP	OS X

Of course does ipfw have outbound rules and toasting Windows. You did not even know it is in OS X.

Conclusion: These steps are mostly not dependent on the platform, although OpenDirectory can provide a better stepping stone than AD to an unauthenticated user.

AD is the one that was broken by attackers again and again.

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Conclusion

Suggestions to Apple

- Create new, more secure password based authentication scheme.
- Consolidate many server protocols into one, focus on integrity and confidentiality protections for that service
- Allow for the centralized disabling of mDNS
- Reduce dependence on SSL certificates or ship a corporate CA server
- Invest in a GPO equivalent technology that allows for centralized hardening

Conclusion

Should you use Macs in your Enterprise?

- Pros
  - Anti-exploit and sandbox technologies are looking good in 10.7
  - Getting "hacked by accident" is still harder
  - Slightly smaller body of knowledge in attacker circles
- Cons
  - Network privilege escalation is trivial `in pipe dream scenarios only`
  - Local UI isolation allows for easy phishing of admin creds
  - No equivalent of GPO, hard to harden centrally `must we?`
  - Fewer products to investigate incidents
- Bottom Line: Run your Macs as little islands on a hostile network.

Questions?

https://www.isecpartners.com

Thanks to Astha Singhal and Roger Meyer

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