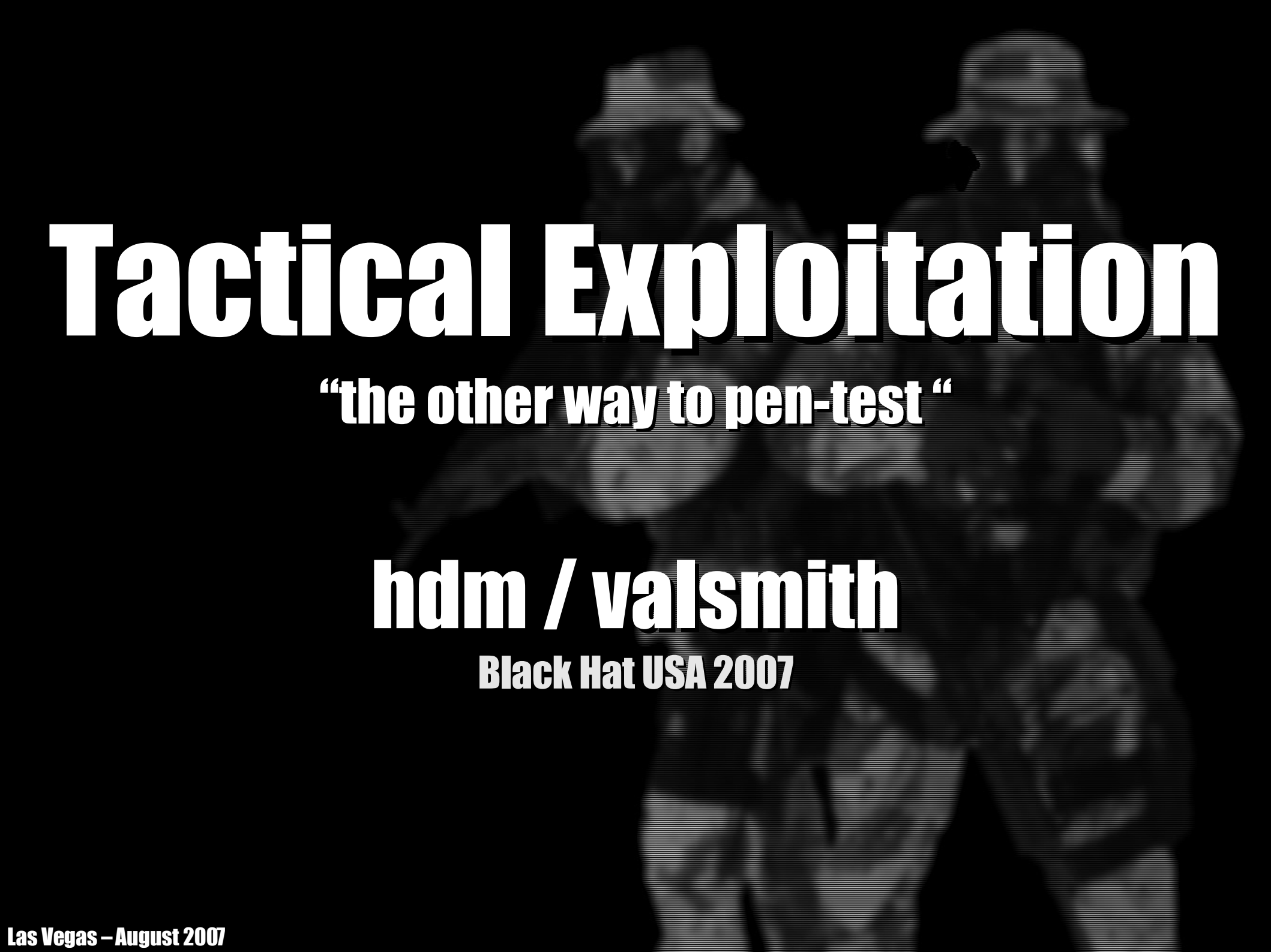




Tactical Exploitation

“the other way to pen-test”

hdm / valsmith

Black Hat USA 2007

who are we ?

H D Moore <hdm [at] metasploit.com>

BreakingPoint Systems || metasploit

Valsmith <valsmith [at] metasploit.com>

Offensive Computing || metasploit

why listen ?

- A different approach to pwnning
- Lots of fun techniques, new tools
- Real-world tested ;-)

what do we cover ?

- Target profiling
 - Discovery tools and techniques
- Exploitation
 - Getting you remote access

the tactical approach

- Vulnerabilities are transient
 - Target the applications
 - Target the processes
 - Target the people
 - Target the trusts
- You **WILL** gain access.

the tactical approach

- Crackers are opportunists
 - Expand the scope of your tests
 - Everything is fair game
- What you dont test...
 - Someone else will!

the tactical approach

- Hacking is not about exploits
 - The target is the **data**, not r00t
- Hacking is using what you have
 - Passwords, trust relationships
 - Service hijacking, auth tickets

personnel discovery

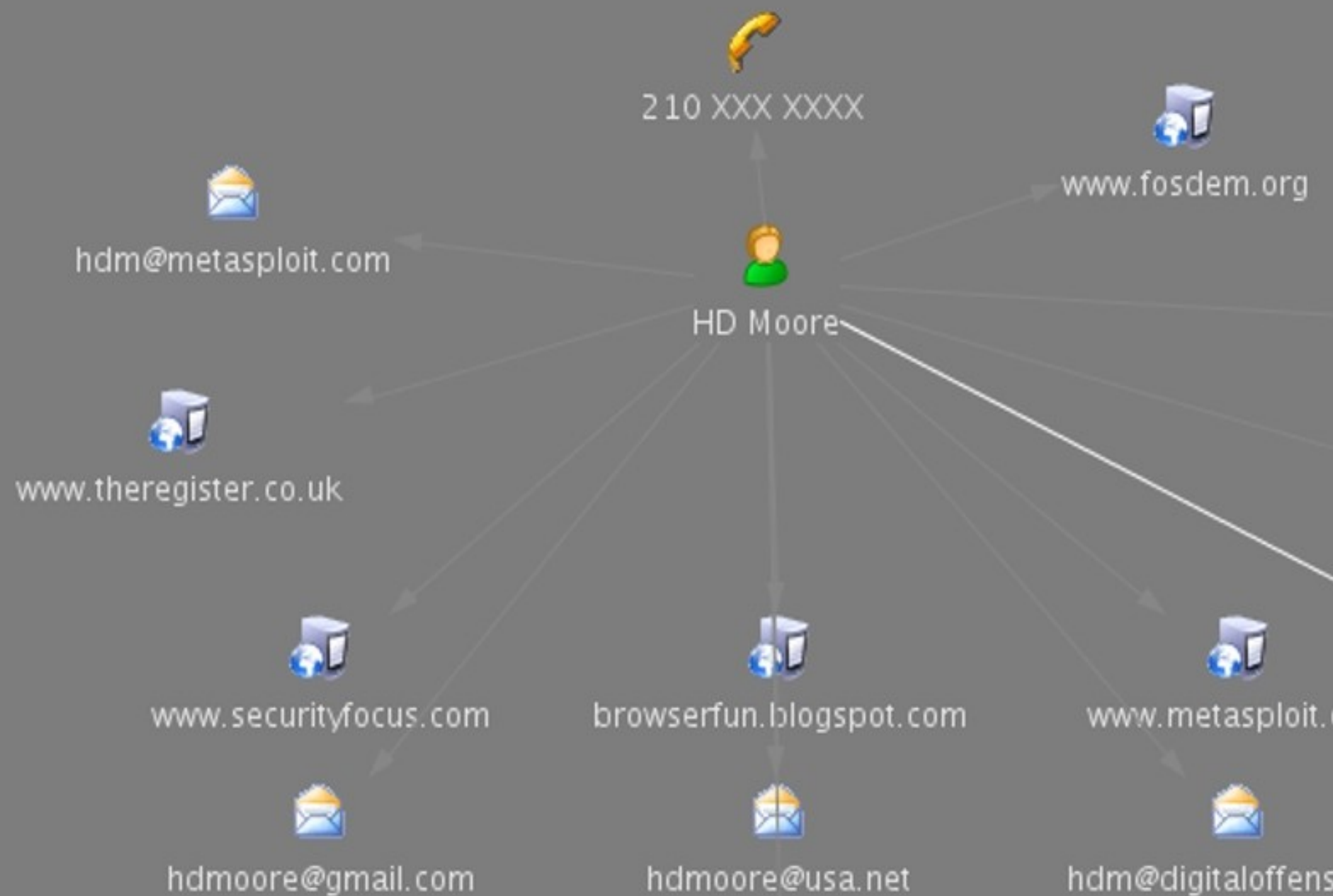
- Security is a people problem
 - People write your software
 - People secure your network
- Identify the **meatware** first

personnel discovery

- Identifying the **meatware**
 - Google
 - Newsgroups
 - SensePost tools
 - **Evolution from Paterva.com**

personnel discovery

- These tools give us
 - Full names, usernames, email
 - Employment history
 - Phone numbers
 - Personal sites



personnel discovery

- Started with company and jobs
- Found online personnel directory
- Found people with access to data
- Found resumes, email addresses
- Email name = username = target

personnel discovery

- Joe Targetstein
- Works as lead engineer in semiconductor department
- Email address joet@company.com
- Old newsgroup postings show
joet@joesbox.company.com
- Now we have username and a host to target to go
after semi conductor information

network discovery

- Identify your target assets
 - Find unknown networks
 - Find third-party hosts
- Dozens of great tools...
 - Lets stick to the less-known ones

network discovery

- The overused old busted
 - Whois, Google, zone transfers
 - Reverse DNS lookups

network discovery

- The *shiny new* hotness
- Other people's services
 - CentralOps.net, DigitalPoint.com
 - DomainTools.com
 - Paterva.com

network discovery

- DomainTools vs Defcon.org
 1. Darktangent.net 0 listings0 listings0 listings
 2. Defcon.net 0 listings0 listings0 listings
 3. Defcon.org 1 listings18 listings 1 listings
 4. Hackerjeopardy.com 0 listings0 listings0 listings
 5. Hackerpoetry.com0 listings0 listings0 listings
 6. Thedarktangent.com 0 listings0 listings0 listings
 7. Thedarktangent.net 0 listings0 listings0 listings
 8. Thedarktangent.org 0 listings0 listings0 listings

network discovery

- DomainTools vs Defcon.net
 - 1. 0day.com 0 listings0 listings0 listings
 - 2. 0day.net 0 listings0 listings0 listings
 - 3. Darktangent.org 0 listings0 listings0 listings

[snipped personal domains]

- 12. Securityzen.com 0 listings0 listings0 listings
- 13. Zeroday.com 0 listings0 listings0 listings

network discovery

- What does this get us?
 - Proxied DNS probes, transfers
 - List of virtual hosts for each IP
 - Port scans, traceroutes, etc
 - Gold mine of related info

network discovery

- Active discovery techniques
 - Trigger SMTP bounces
 - Brute force HTTP vhosts
 - Watch outbound DNS
 - Just email the users!

network discovery

Received: from unknown (HELO gateway1.rsasecurity.com)
(216.162.240.250)

by [censored] with SMTP; 28 Jun 2007 15:11:29 -0500

Received: from hyperion.rsasecurity.com by
gateway1.rsasecurity.com

via smtpd (for [censored]. [xxx.xxx.xxx.xxx]) with
SMTP; Thu, 28 Jun 2007 16:11:29 -0400

by hyperion.na.rsa.net (MOS 3.8.3-GA)

To: user@[censored]

Subject: Returned mail: User unknown (from [10.100.8.152])

application discovery

- If the network is the toast...
- Applications are the butter.
 - Each app is an entry point
 - Finding these apps is the trick

application discovery

- Tons of great tools
 - Nmap, Amap, Nikto, Nessus
 - Commercial tools

application discovery

- Slow and steady wins the deface
 - Scan for specific port, one port only
- IDS/IPS can't handle slow scans
 - *Ex. nmap -sS -P0 -T 0 -p 1433 ips*

application discovery

- Example target had custom IDS to detect large # of host connections
- Standard nmap lit up IDS like XMAS
- One port slow scan never detected
- Know OS based on 1 port (139/22)

application discovery

- Target had internal app for software licensing / distribution
- ~10,000 nodes had app installed
- A couple of hours with IDA/Ollydbg showed **static Admin password** in app's memory
- All accessible nodes owned, 0 exploits used

application discovery

- Web Application Attack and Audit Framework
 - W3AF: “Metasploit for the web”
- Metasploit 3 scanning modules
 - Scanning mixin

application discovery

DEMO

client app discovery

- Client applications are fun!
 - Almost always exploitable
 - Easy to fingerprint remotely
 - Your last-chance entrance

client app discovery

- Common probe methods
 - Mail links to the targets
 - Review exposed web logs
 - Send MDNs to specific victims
 - Abuse all, everyone, team aliases

process discovery

- Track what your target does
 - Activity via IP ID counters
 - Last-modified headers
 - FTP server statistics

process discovery

- Look for patterns of activity
 - Large IP ID increments at night
 - FTP stats at certain times
 - Microsoft FTP SITE STATS
 - Web pages being uploaded
 - Check timestamps on images

process discovery

- Existing tools?
 - None, really...
- Easy to script
 - Use “hping” for IP ID tracking
 - Use netcat for SITE STATS

process discovery

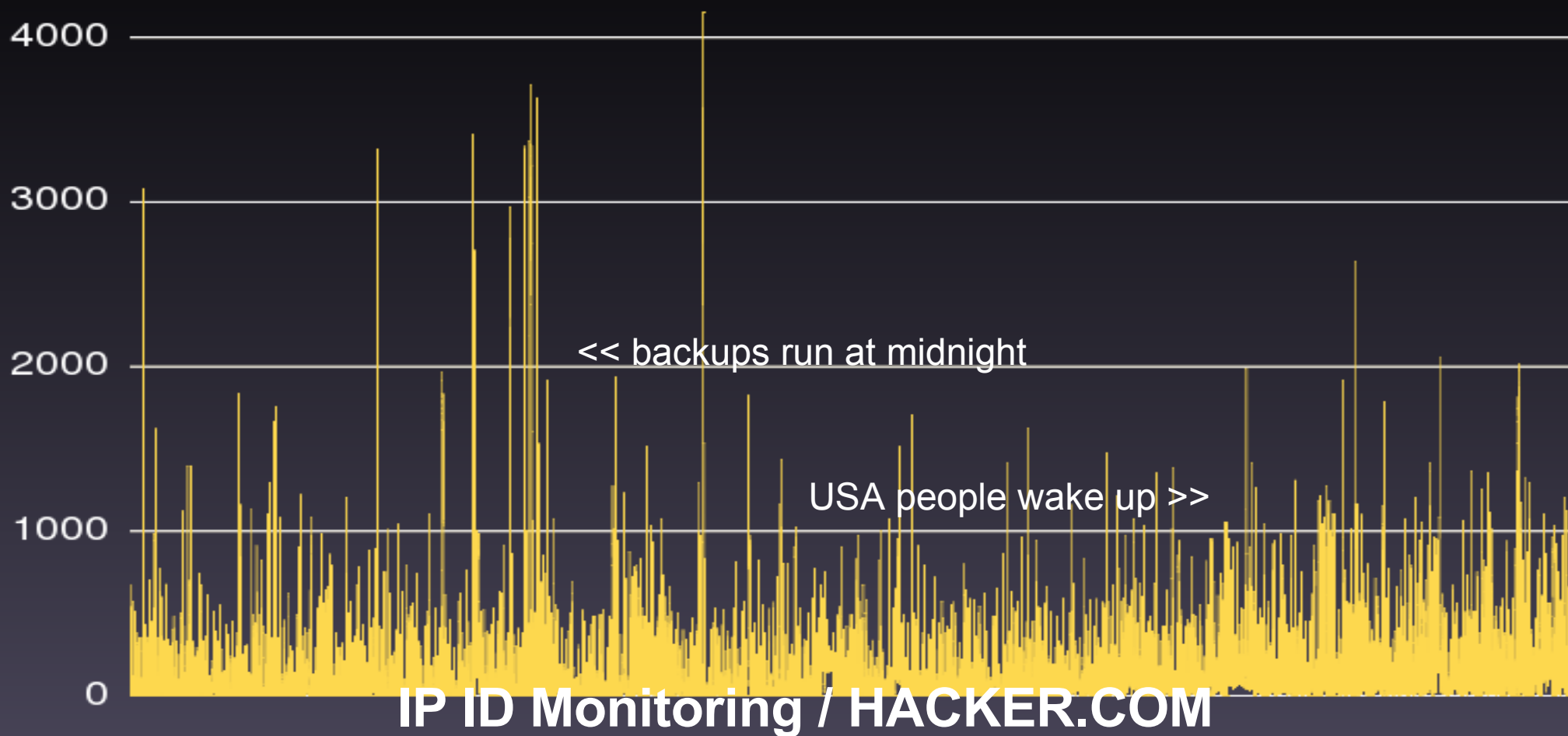
ABOR : 2138	NOOP : 147379	SIZE : 76980
ACCT : 2	OPTS : 21756	SMNT : 16
ALLO : 32	PASS : 2050555100	STAT : 30812
APPE : 74	PASV : 2674909	STOR : 3035
CDUP : 5664	PORT : 786581	STRU : 3299
CWD : 388634	PWD : 179852	SYST : 175579
DELE : 1910	QUIT : 143771	TYPE : 3038879
FEAT : 2970	REIN : 16	USER : 2050654280
HELP : 470	REST : 31684	XCWD : 67
LIST : 3228866	RETR : 153140	XMKD : 12
MDTM : 49070	RMD : 41	XPWD : 1401
MKD : 870	RNFR : 58	XRMD : 2
MODE : 3938	RNT0 : 2	
NLST : 1492	SITE : 2048	

ftp.microsoft.com [node]
SITE STATS / Uptime: 47 days

process discoverv

Traffic Monitor

■ Packets Per Second



15 Minute Break

- Come back for the exploits!

re-introduction

- In our last session...
 - Discovery techniques and tools
- In this session...
 - Compromising systems!

external network

- The crunchy candy shell
 - Exposed hosts and services
 - VPN and proxy services
 - Client-initiated sessions

attacking ftp transfers

- Active FTP transfers
 - Clients often expose data ports
 - NAT + Active FTP = Firewall Hole
- Passive FTP transfers
 - Data port hijacking: DoS at least
 - *pasvagg.pl* still works just fine :-)

attacking web servers

- Brute force vhosts, files, dirs
 - <http://www.cray.com/old/>
- Source control files left in root
 - <http://www.zachsong.com/CVS/Entries>

attacking web servers

- Apache Reverse Proxying

GET /%00 HTTP/1.1

Host: realhost.com

- Apache Dynamic Virtual Hosting

GET / HTTP/1.1

Host: %00/

load balancers

- Cause load balancer to “leak”
internal IP information
- Use TCP half-close HTTP request
- Alteon ACEdirector good example

load balancers

- ACEdirector mishandles TCP half-close requests
-
- Behavior can be used as signature for existence of Load Balancer
-
- Direct packets from real webserver forwarded back to client (with IP)

cgi case study

- Web Host with 1000's of sites
- Had demo CGI for customers
- CGI had directory traversal
- `www.host.com/cgi-bin/vuln.pl/../../cgi`
- CGI executable + writable on every directory
- Common on web hosts!

cgi case study

- Enumerated:
 - Usernames
 - Dirs
 - Backup files
 - Other CGI scripts
 - VHOSTS

cgi case study

- Target happened to run solaris
 - Solaris treats dirs as files
 - `cat /dirname = ls /dirname`
 - `http://www.host.com/cgi-bin/vuln.cgi/../../../../../dirname%00.html`

cgi case study

- Found CGI script names
- Googled for vulns
- Gained shell 100's of different ways
- Owned due to variety of layered configuration issues

attacking dns servers

- Brute force host names
- XID sequence analysis
 - BIND 9: PRNG / Birthday
 - VxWorks: $XID = XID + 1$
- Return extra answers in response

authentication relays

- SMB/CIFS clients are fun!
 - Steal hashes, redirect, MITM
- NTLM relay between protocols
 - SMB/HTTP/SMTP/POP3/IMAP
 - More on this later...

social engineering

- Give away free toys
 - CDRROMs, USB keys, N800s
- Replace UPS with OpenWRT
 - Cheap and easy to make

internal network

- The soft chewy center
 - This is the fun part :)
 - Easy to trick clients

netbios services

- NetBIOS names are magic
 - WPAD
 - CALICENSE

dns services

- Microsoft DNS + DHCP = fun
 - Inject host names into DNS
 - Hijack the entire network
 - **dhcpcd -h WPAD -i eth0**

Hijacking NTLM

- Quickly own all local workstations
- Gain access to mail and web sites
- A new twist on “smbrelay2.cpp”
 - Yes, it was released in 2001.
- Now implemented in Metasploit 3

Hijacking NTLM

1. MITM all outbound web traffic

- Cache poison the “WPAD” host
- Plain old ARP spoofing
- DHCP / NetBIOS + “WPAD”
- Run a rogue WiFi access point
- Manipulate TOR connections

Hijacking NTLM

2. Redirect HTTP requests to “intranet”

- WPAD + SOCKS server
- SQUID + transparent proxying
- 302 Redirect

Hijacking NTLM

3. Return HTML page with UNC link

- IE 5/6/7: ``
- Firefox: `mozicon-url:file:///ip/share/i.jpg`
- Third-party plugins:
 - Adobe PDF Viewer
 - Windows Media Player
 - Microsoft Office

Hijacking NTLM

4. Accept SMB connection and relay
 - Accept connection from the client
 - Connect to the target server (or client)
 - Ask target for Challenge Key
 - Provide this Key to the client
 - Allow the client to authenticate

Hijacking NTLM

5. Executing remote code

- Disconnect the client
- Use authenticated session
 - ADMIN\$ + Service Control Manager
 - Access data, call RPC routines, etc
 - Access the remote registry

Hijacking NTLM

DEMO

file servers

- *“NAS appliances are safe and secure”*
 - Don't worry, the vendor sure doesn't
 - Unpatched Samba daemons
 - Snap, TeraServer, OS X, etc.
- Inconsistent file permissions
 - AFP vs NFS vs SMB

samba is awesome

- 1999 called, want their bugs back
 - Remember those scary “NULL Sessions”
 - Samba ENUM / SID2USR user listing
 - Massive information leaks via DCERPC
 - Shares, Users, Policies
 - Brute force accounts (no lockout)

smb case study

- Old bugs back to haunt new boxes
- Found OS X Box running SMB
 - User sent mail touting OS X sec
- Previous scans had found vulns
- User: “false positive, its OS X”
- Us: “Owned”

smb case study

- Performed Null Session
 - `net use \loxsmb\ipc$ "" /user:""`
- Enumerated users and shares
- Brute forced several user accounts
- Got shell, escalated to root
- User: "but . .but . . its OS X!"

samba vs metasploit

- Metasploit modules for Samba
 - Linux (vSyscall + Targets)
 - Mac OS X (PPC/x86)
 - Solaris (SPARC,x86)
 - Auxiliary PoCs

nfs services

- NFS is your friend
 - Dont forget its easy cousin NIS
- Scan for port 111 / 2049
 - *showmount -e / showmount -a*
 - Whats exported, whose mounting?

nfs services

- Exported NFS home directories
 - Important target!
- If you get control
 - Own **every node** that mounts it

nfs services

- If you are root on home server
 - Become anyone (NIS/su)
 - Harvest *known_hosts* files
 - Harvest *allowed_keys*
 - Modify *.login*, etc. + insert trojans

nfs services

- Software distro servers are fun!
 - All nodes access over NFS
 - Write to software distro directories
 - Trojan every node at once
 - No exploits needed!

file services

- Example: all nodes were diskless / patched
- Clients got software from NFS server
- We hacked the software server
 - Using trust hijacking explained later
 - Inserted trojaned gnu binaries
- 1000's of nodes sent us shells

trust relationships

- The target is unavailable to *YOU*
 - Not to another host you can reach...
- Networks may not trust everyone
 - But they often trust each other :)

.

trusts

- Deal with firewalls/TCP wrappers/ACLs
- Find a node that is accepted and own it
- People wrapper Unix and leave Windows open
- Hack the Windows box and port forward past wrappers

trusts

- Example: Mixed network with Unix wrapperd
 - Target Solaris homedir server
 - Had auth credentials but couldn't reach port 22
- Found 1 vulnerable win box , owned / installed portforward to homedir port 22

Hijacking SSH

- Idea is to abuse legitimate users access over SSH
- If user can access other systems, why can't you? (even without users password)
- One time passwords? No problem!
- Intel gathering

Hijacking SSH

- Available tools
 - Metalstorm ssh hijacking
 - Trojaned ssh clients
 - SSH master modes
- Dont for get TTY hijacking
 - Appcap
 - TTYWatcher
- Who suspects a dead SSH session?

Hijacking SSH

DEMO

Hijacking Kerberos

- Kerberos is great for one time authentication . . . even for hackers
- Idea is to become a user and hijack kerberos tickets
- Gain access to other trusted nodes

Hijacking Kerberos

DEMO

Conclusion

- Compromise a “secure” network
- Determination + creativity wins
- Tools cannot replace talent.