DNS: The Internet’s Dirty Little Secret

Day-Con 2007

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NOTICE

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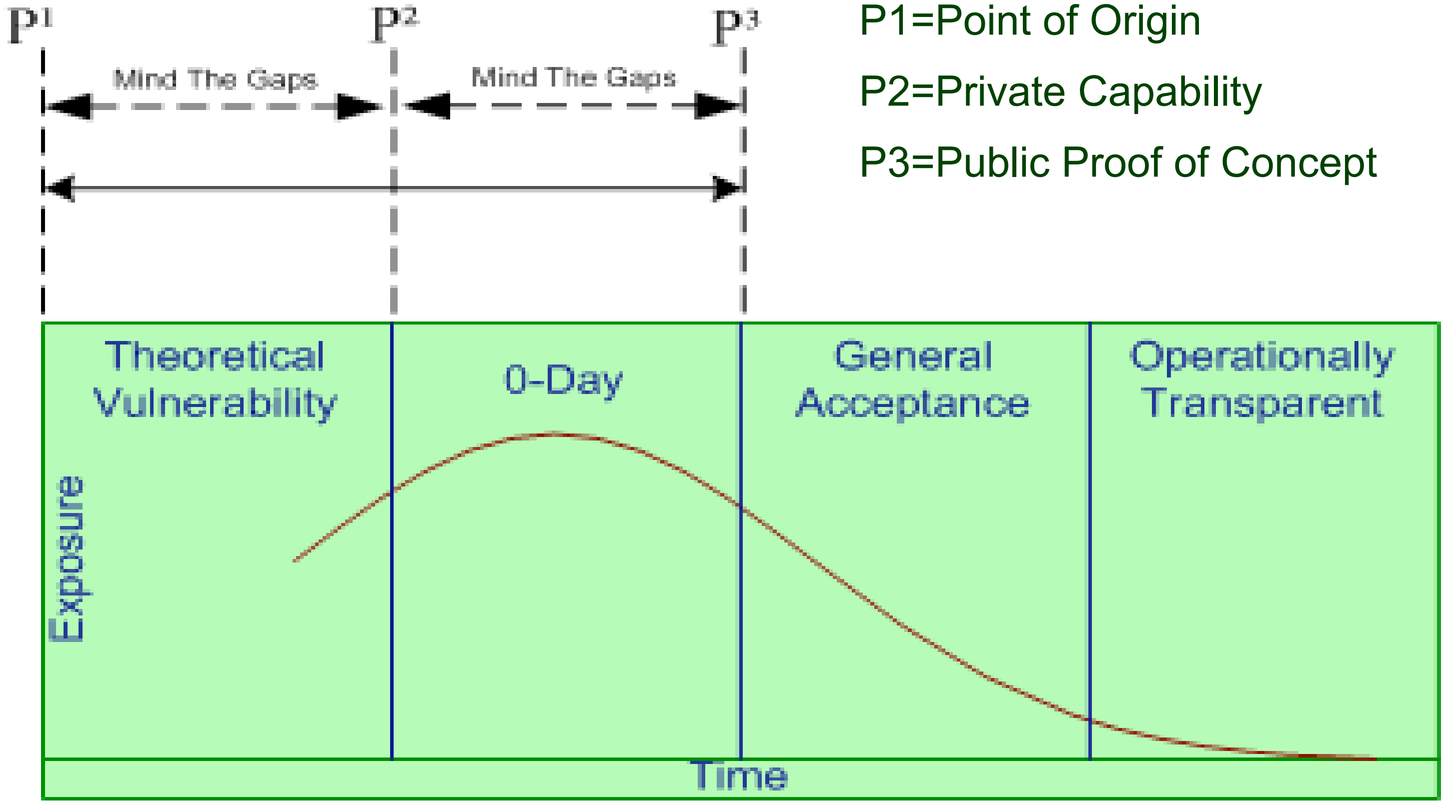
Who Am I?

- Angus Blitter
  - Global Security Architect
  - Veteran Information Security Practitioner, Researcher & Hacker
  - Founder of HACKSEC
  - Media Whore, Ego Maniac or Swell Guy;)

Agenda

- Mind The GAP
- DNS Defined
- Attack Surface
- Seen In The Wild
- Theoretical Vulnerabilities and The Future
- Open Discussion

“Mind The Gap” Series



P1=Point of Origin

P2=Private Capability

P3=Public Proof of Concept

Risk Management

- Risk = Threat * Vulnerability * Cost
- Practical Approach
  - Define Assets
  - Identify Asset Owners & Custodians
  - Assign Asset Value (high, medium & low)
  - Define <u>Relevant</u> Threats
  - Identify <u>Relevant</u> Vulnerabilities
  - Accept, Reject, Transfer or Mitigate

When To Worry?

If an adversary is motivated they will develop or obtain a capability to exploit a vulnerability.

Exposure Index = Motivation * Capability * Vulnerability

Dedication

- This presentation is dedicated to Dan Kaminsky

Yes Dan, DNS is VERY, VERY Interesting and VERY VERY Important!

DNS Defined

- An Acronym: Domain Name System
- Application
- Uses UDP (TCP for Zone Transfers)
  - Connectionless/Unreliable
  - Un-Authenticated (for the most part)
- Critical Infrastructure

DNS Defined

- Serves 4 Basic Functions
  - Lookup - Internet “Yellow Pages”
  - Reverse Lookup
  - Publish Preferred Servers (MX Records)
  - ENUM -mapping single ID to multiple Services (VOIP/SIP/Telephonic Convergence)

Defining The Attack Surface

- Read the RFC's (the theory)
- Identify the moving parts (OSI 1-7)
- Define dependencies
- Compare against reality (layers 8-10)
  - – people: ignorance, sloth and greed
  - – politics: strange bed fellows (agendas)
  - – religion: dogma (it is the way)

Application

- Bugs/Vulnerabilities
  - In the servers (open to the world)
  - In the client
- Stupid Human Tricks
  - Poor architecture (no segmentation)
  - Mis-configuration
  - No PTR records

Application

- Importance of Perspective:
  - on host
  - internal
  - external
- Covert Data Channels (Thanks Dan)
  - OzyManDNS
  - NSTX (IP-over-DNS)
  - DNStunnel.de

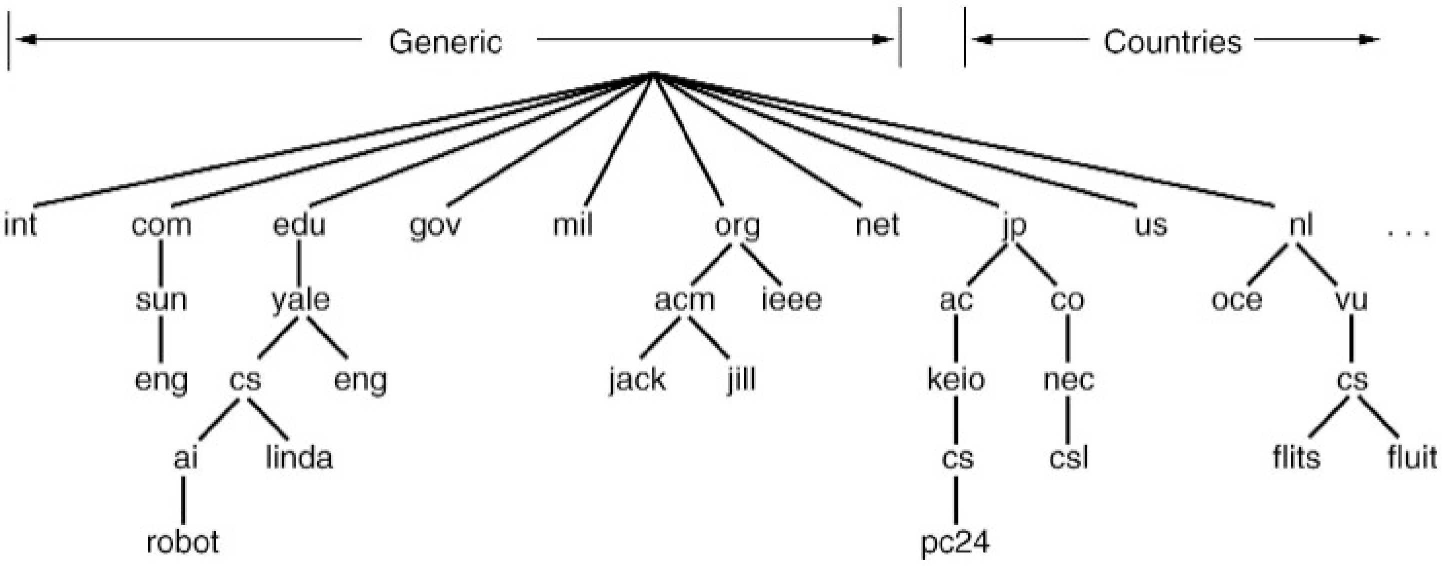
Application

- !!!Blatant Project Solicitation!!!
  - – Windows Executable
  - – Tunnels Any Protocol Through DNS Slack
  - – Transparent To Tunneled Application
  - – Other Features To Be Determined
  - – See me at the after party ;)

Availability & Dependencies

- According to root-servers.org:
  - 117 root servers exist worldwide
  - Operated by 12 different organizations
  - Geographically disproportionate
  - "Governed" by ICANN (Internet Corporation for Assigned Names and Numbers)
  - Top Level Domains (TLD's)

TLD's


Generic
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robot
pc24

Brand Abuse

- Identity Asset
- G-Commerce
  - Phishing
  - Pharming
  - Fast Flux
- Spoofing

Brand Abuse

- Highjacking
- DNS Pinning (Dan’s Newest Obsession)
  - I don’t understand the practical implications but if Dan is interested it probably is important!
  - Involved TTL & browser caching

DNS Scanning

- Sony Root Kit (Way to go Dan)
  - Caching & TTL
- Trust Relationships
- (Business) Intelligence???

Critical Infrastructure

- Availability Dependencies
- DDoS
  - What if everyone thought your web server was google.com?
- "We don't know what it does but the last time we touched it everything broke. So don't touch it!"

Future Opportunities

- DNSSEC
- IPV6
  - Anycast
  - Dual-Stack Stuff (must support legacy)
- Secure & “Aware” DNS Services

Putting It All Together

- DNS is taken for granted but critical
- Very simple functions but many moving parts (complexity kills)
- A changing world (chaos) breeds opportunity!!!

Open Discussion

(Angus at Hacksec dot org)