Definitely Not Secure (DNS)

October 18, 2025

DNS

BSIDES CLEVELAND

http://slides.dfirmatt.com

Matt Scheurer

About Me

I work for a big well-known organization...

As Vice President (VP) of Computer Security and Incident Response (IR). However, I have many years of hands-on technical experience, including Digital Forensics & Incident Response (DFIR).

I am also a Podcast Host for

ThreatReel

https://threatreel.com

Connect / Contact / Follow Matt:

https://www.linkedin.com/in/mattscheurer

https://x.com/c3rkah

Where I volunteer...

I am an Official

Advocate
https://www.hackingisnotacrime.org

Advisory Board: Information Technology and Cybersecurity
https://www.mywccc.org/

Women's Security Alliance (WomSA) Technical Mentor
https://www.womsa.org

Disclaimer!

Yes, I have a day job. However…

Opinions expressed are based solely on my own independent security research and do not express or reflect the views or opinions of my employer.

Agenda

- **DNS** Essentials (Primer)
- **DNS** Tools (w/ Demos)
- **DNS** Attacks (w/ Demos)

Definition

DNS

Definition

Domain

Name

System

Definition

Domain

Name

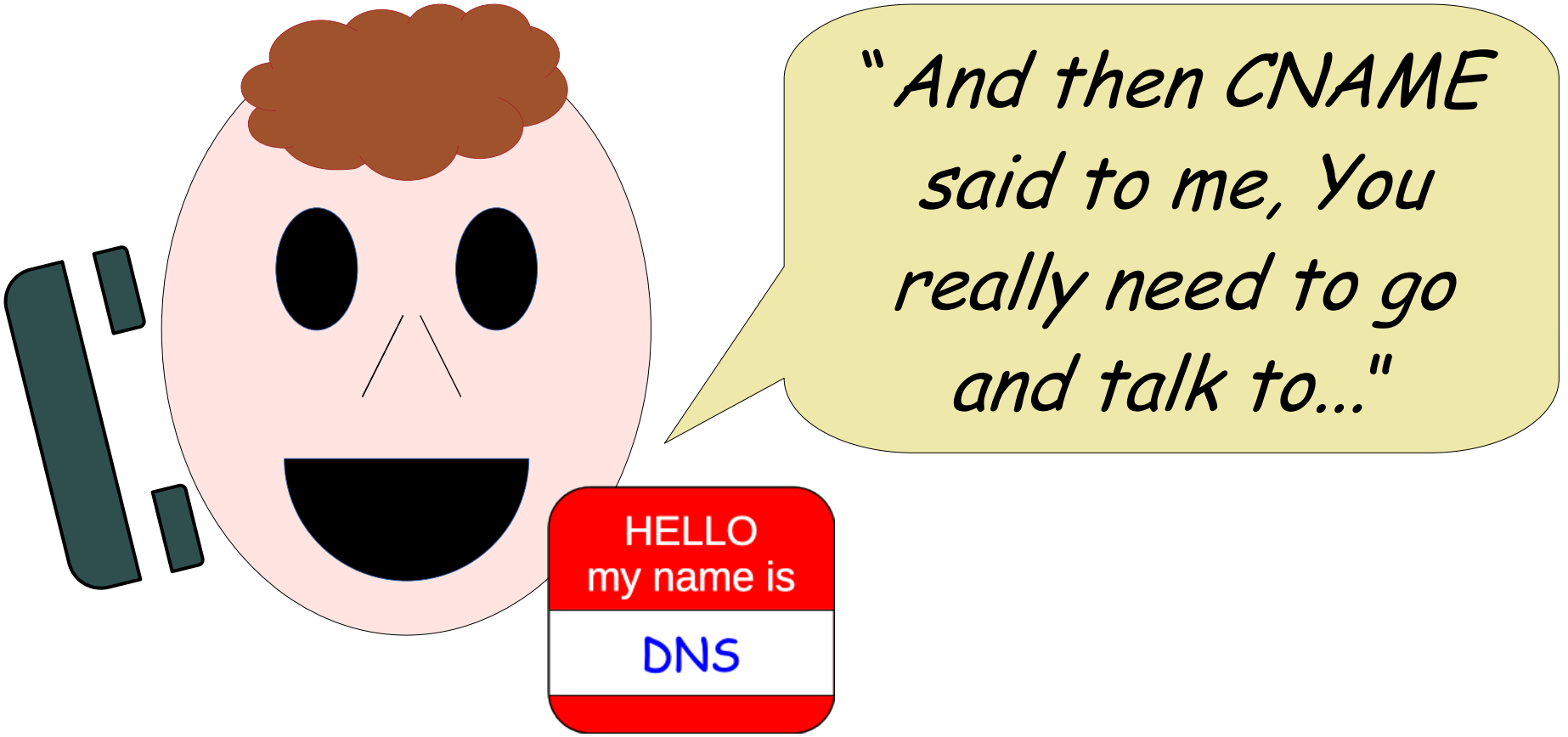
System

NOTE: The ‘**S**’ does not stand for “Security”!

Purpose

The “**Domain Name System**” (DNS) is a vanity protocol making internet and network addressing human-friendly.

DNS gossips a lot!



DNS in the OSI Model

Layer 7)	Application	DNS
Layer 6)	Presentation	
Layer 5)	Session	Port 53
Layer 4)	Transport	**UDP**, TCP
Layer 3)	Network	IP
Layer 2)	Data Link	
Layer 1)	Physical	

Networking

Mostly UDP Port 53

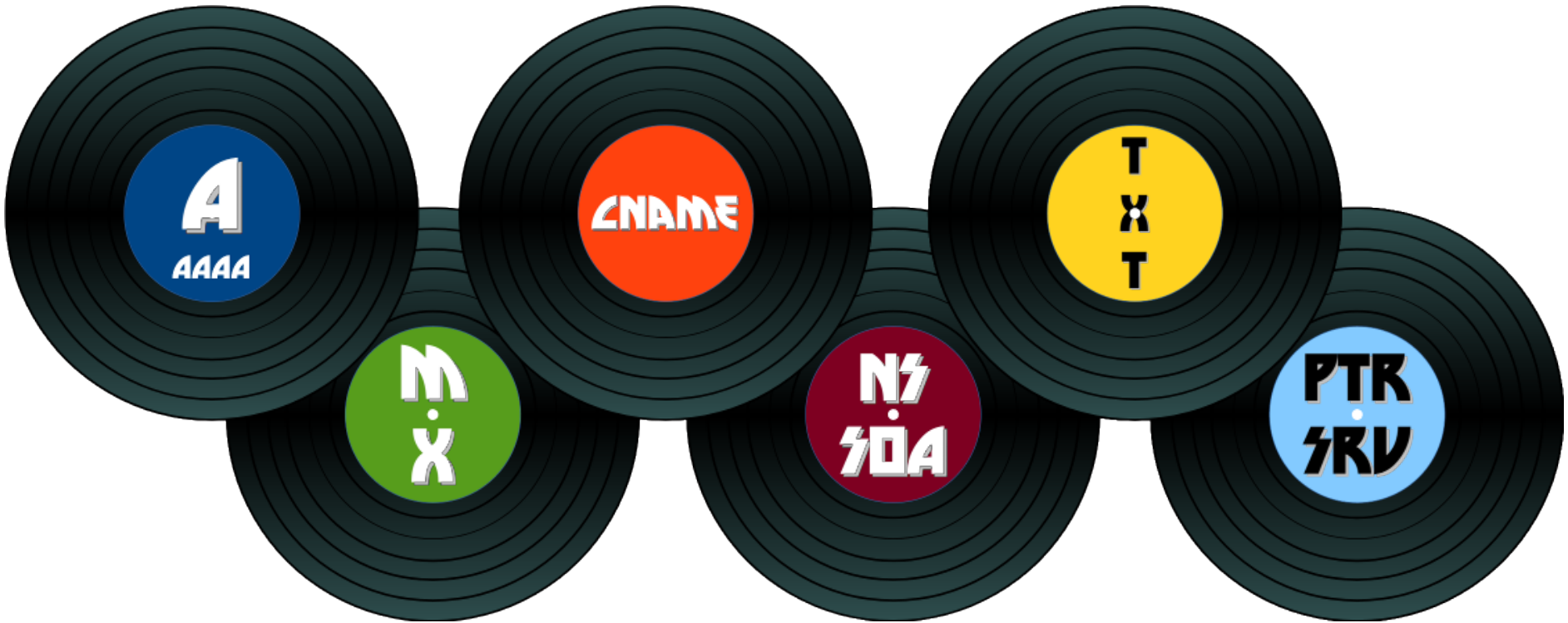
TCP Port 53

- > 512/4096 UDP byte limits
- DNSSEC
- Zone Transfers
  - Heavily restricted today

Other TCP Ports

- DNS over TLS (DoT)
  - TCP Port 853
- DNS over HTTPS (DoH)
  - TCP Port 443

Foundational DNS Records



More about “TXT”

RFC 1035

- 2.3.4 Size limits
  - 255 Characters

“Time to Live” (TTL) Values

Number of seconds DNS resolvers should cache records before refreshing

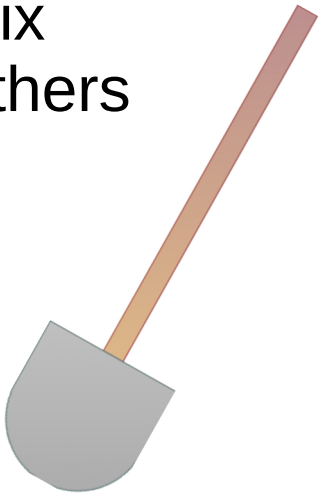
DNS Tools

`nslookup`

- Windows
- *nix
- Mainframe
- Others

`dig`

- *nix
- Others



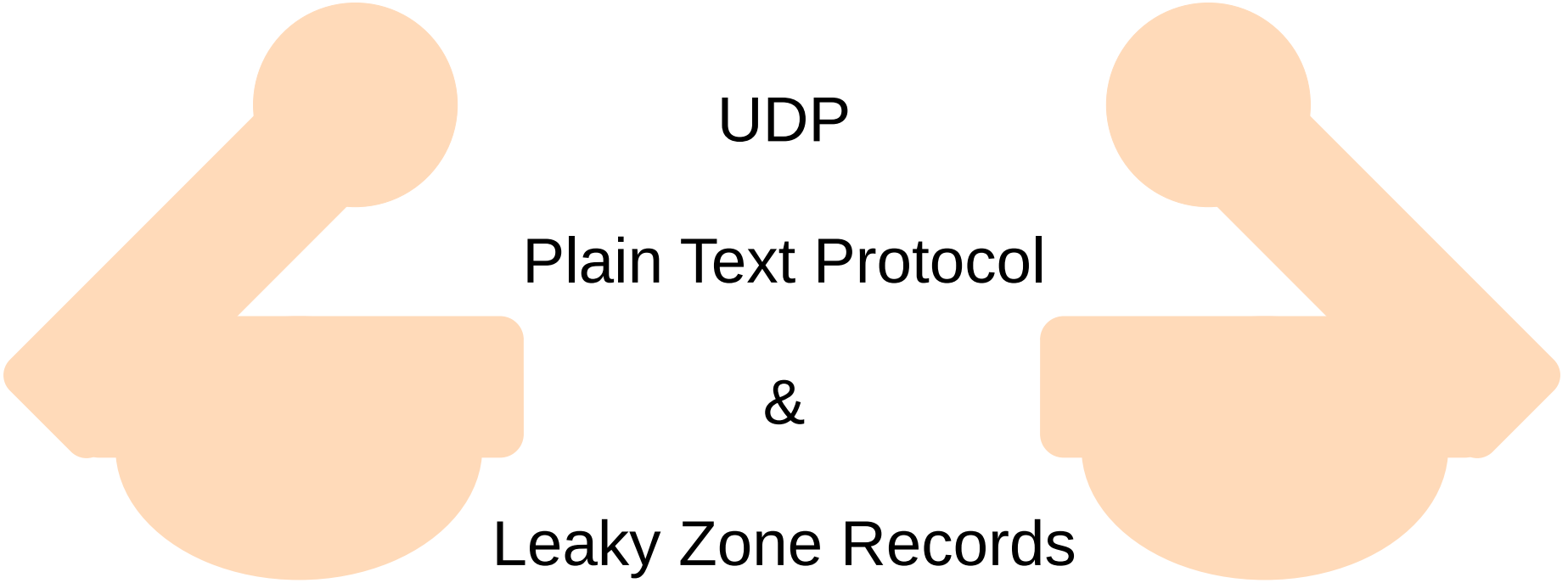
DNS tools demos

Live Demo

Early DNS Security Woes

- **RFC 1535**
  - A Security Problem and Proposed Correction With Widely Deployed DNS Software
    - https://www.rfc-editor.org/info/rfc1535
    - October, 1993

DNS Weaknesses



UDP

Plain Text Protocol

&

Leaky Zone Records

DNS packet capture

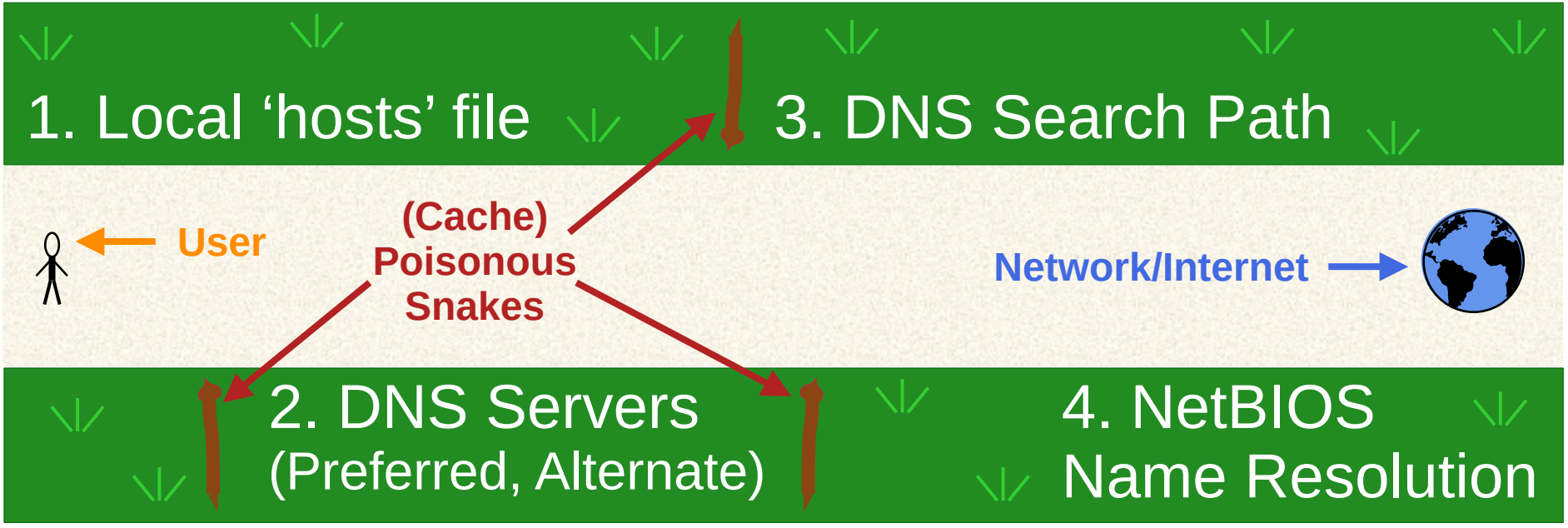
Live Demo

Leaky DNS Zones

Live Demo

DNS Hijacking

Abuse along the DNS Default Search Order trail



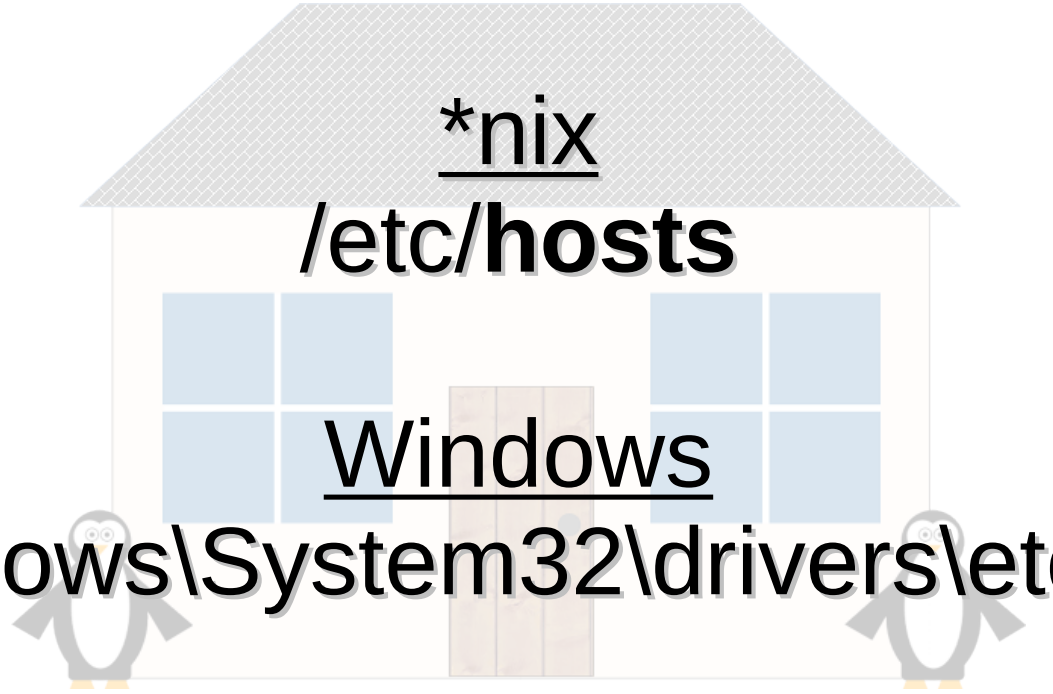
DNSSEC to the rescue?

DNSSEC provides a cryptographic “Chain of Trust” to prevent DNS spoofing and DNS Cache Poisoning

DNSSEC shortcomings

- Lack of adoption
- Configuration woes
- ‘hosts’ file bypass
- AitM / MitM
- Typosquatting

Where the “hosts” file lives



*nix

/etc/**hosts**

Windows

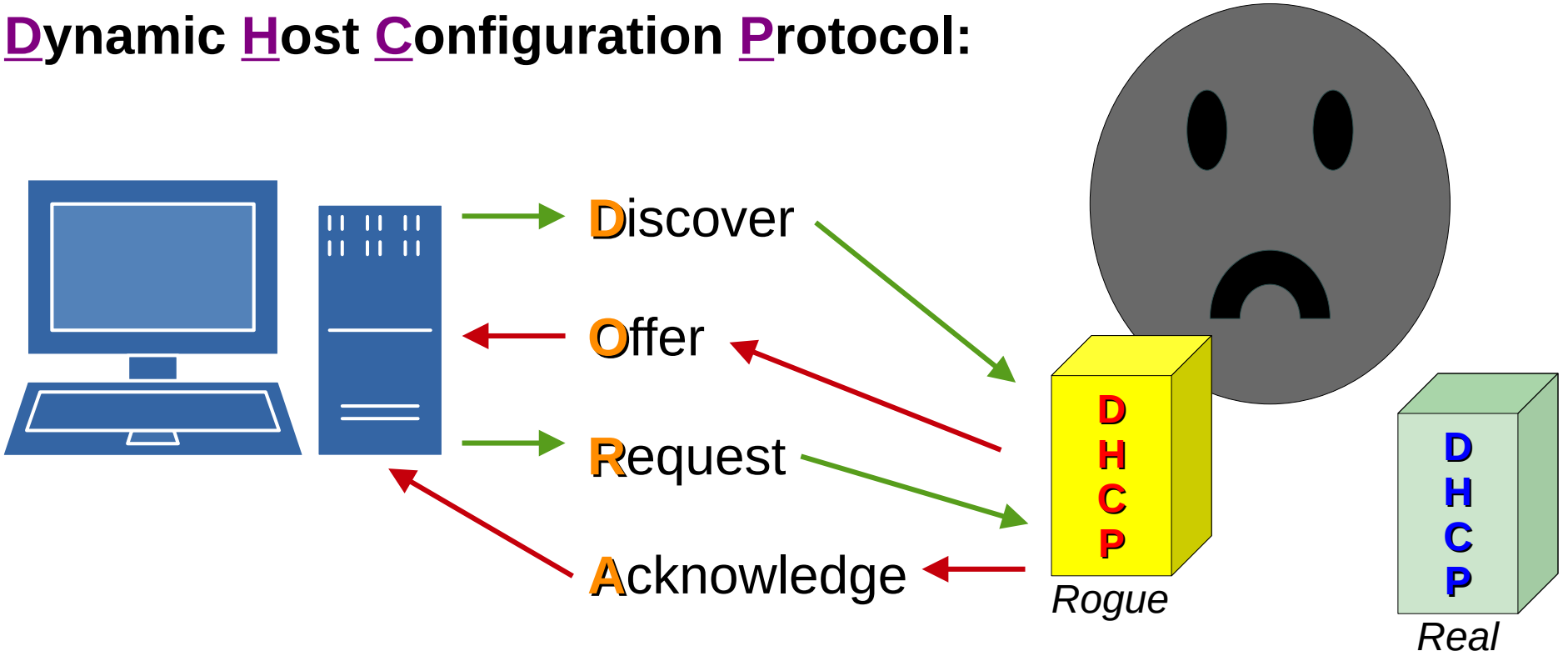
C:\Windows\System32\drivers\etc**hosts**

Injecting the “hosts” file

Live Demo

Rogue DHCP

Dynamic Host Configuration Protocol:



DHCP Network Settings

IP Address
Subnet Mask
Default Gateway
DNS Servers
Other (WINS for NetBIOS, etc.)

NOTES: NetBIOS = Network Basic Input/Output System, WINS = Windows Internet Name Service

DNS Tunneling

C2 & Data Exfiltration

Live Demo

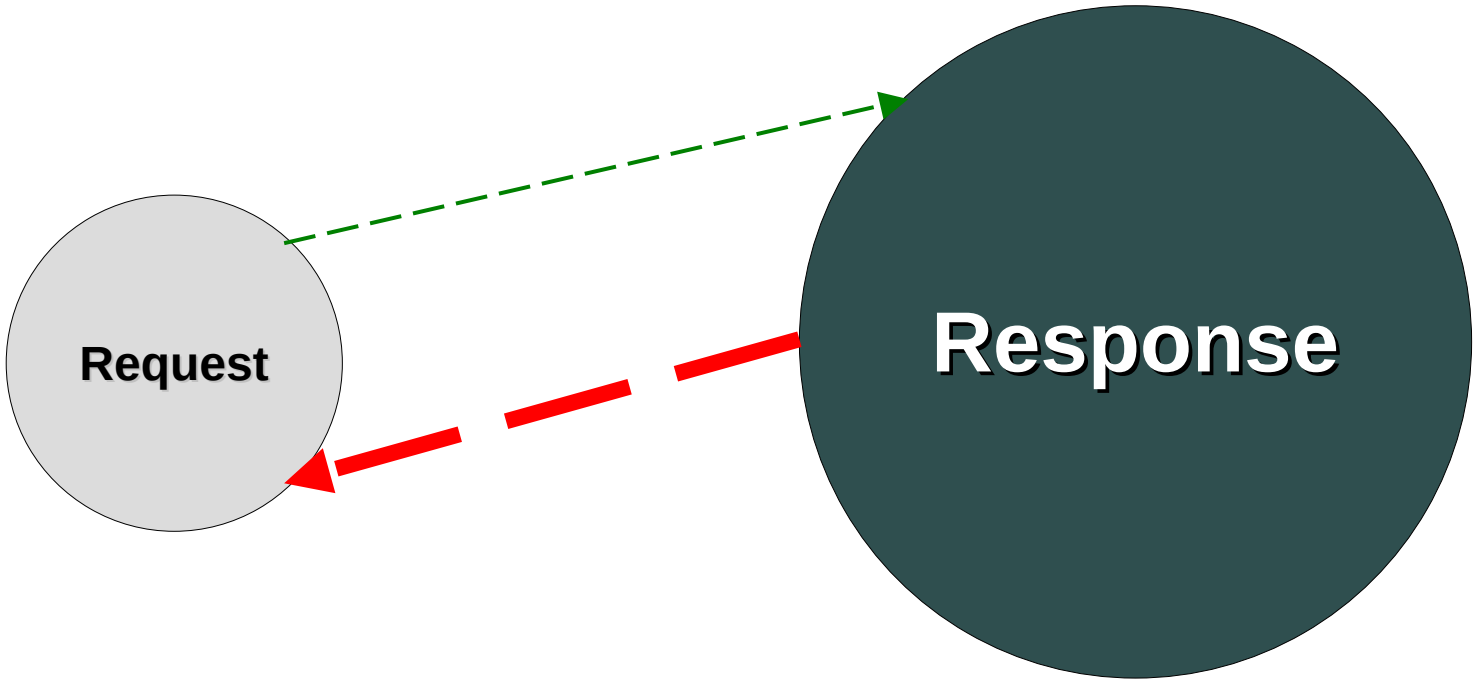
Other DNS Spoofing

ARP Poisoning

DNS Server Record Changes

Domain Registration Takeover

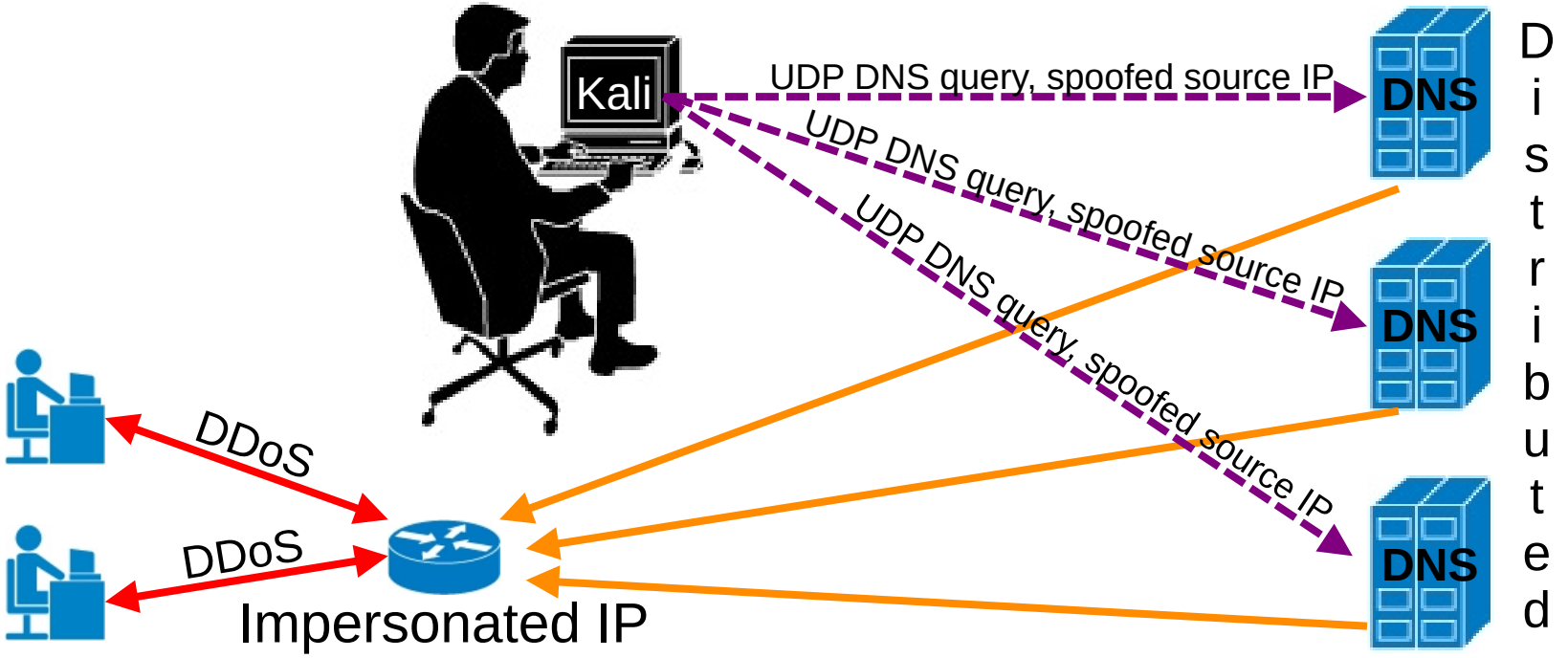
DNS Amplification Attacks



Too many large responses: Denial of Service (DoS)

DNS Reflection

How Reflection Attacks Work



Questions

Who?

What?

When?

Where?

Why?

How?

Definitely Not Secure (DNS)

October 18, 2025

DNS

BSIDES CLEVELAND

http://slides.dfirmatt.com

Matt Scheurer