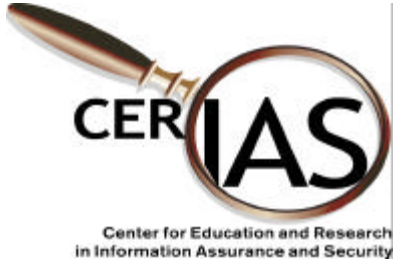


Spoofstat : How Easily can Network Attackers Hide their Location?

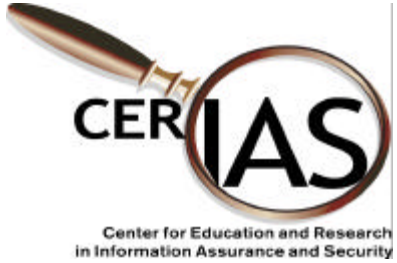
Clay Shields

Thomas E. Daniels

Greg Ellis

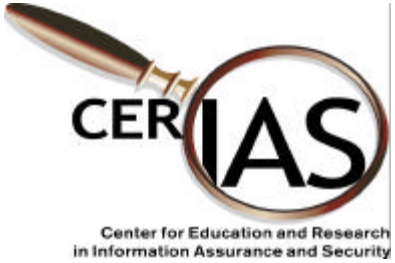
Benjamin Kuperman

Manu Pathak



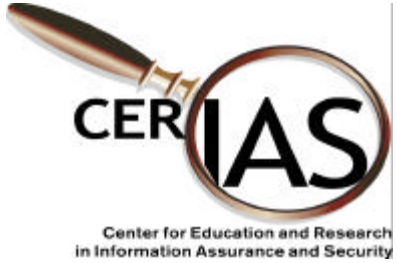
Motivation

- Network security is going to be critical for future applications like e-commerce
- Recent Denial of Service (DoS) attacks show the difficulty in tracing source of the attacks
- Attackers hide their location by IP spoofing, and by loose source routing
- Edge filtering makes this more difficult, and is recommended. But how commonly is it done?



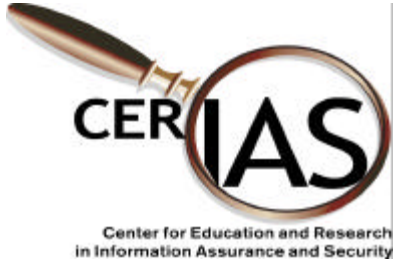
Goals of Spoofstat

- Evaluate the number of domains useable by attackers by testing a large number of networks
- Spoofstat goals include:
  - *Estimating percentage of hosts which can send spoofed packets*
  - *Determining percentage of these networks which disallow source routing*



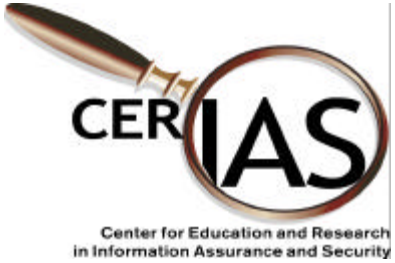
Design of Spoofstat

- Simple client-server system with client publicly distributed
- When run, client connects to the server running outside our firewall
- Client then sends several types of spoofed packets
- Server measures which packets arrive



Spoofstat – Key Features

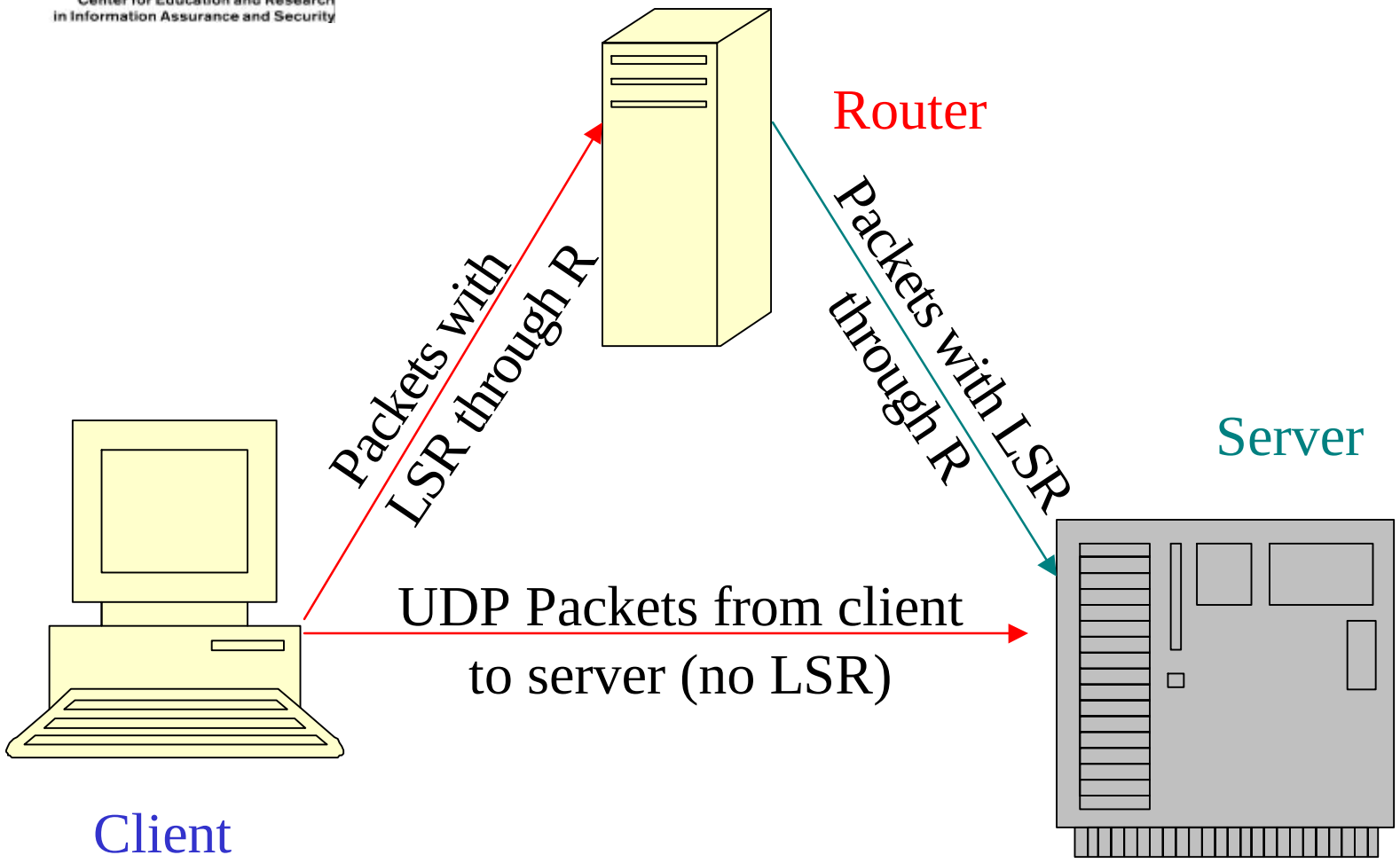
- TCP used for establishing connection
- UDP used for encapsulating nonce
- Cryptographically random nonce uniquely identifies each client
- Different types of UDP packets used to test common vulnerabilities

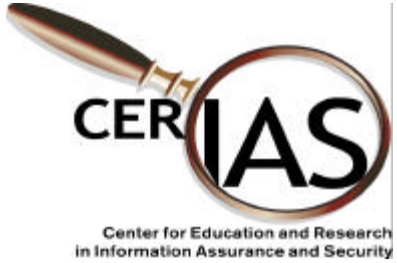


Spoofed Packets

- Different kinds of packets to be used:
  - Real source address of the client (normal case)
  - An unused IP address from the CERIAS domain
  - An address from unassigned address space (10.X.X.X subnet)
  - A loose source routed packet

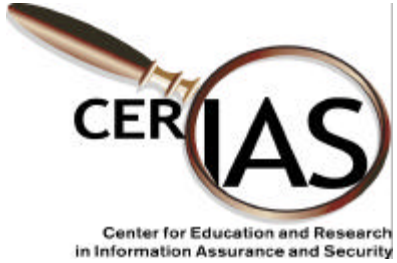
Basic Spoofstat Configuration





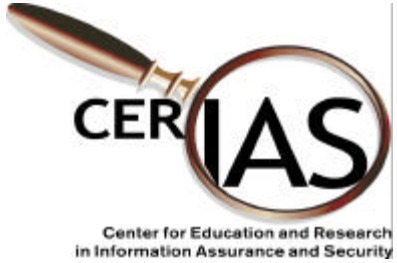
The Spoofstat Protocol

- Client opens a TCP connection to port 80 of Server
- Server replies on the connection with cryptographically random 128 bit nonce and UDP port to be used
- Client replies on the TCP connection with an acknowledgement of receiving N and P



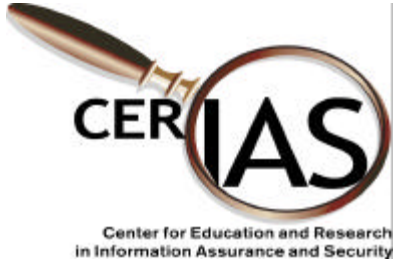
Details of Spoofstat

- Client sends a number of UDP packets with a spoofed source address. Each UDP packet has N as payload
- If the Server receives a UDP packet and the nonce matches, it sends a control message and Client moves to next phase



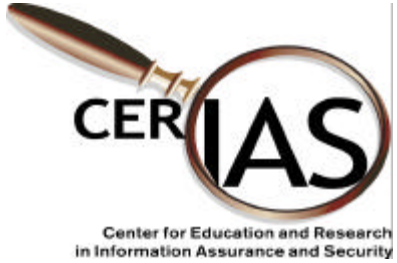
Details of Spoofstat

- If Server does not receive UDP packets within timeout, filtering is assumed to be in place.
- Repeat steps above for each different packet type
- Client reports to user what kind of filtering is being done
- Server logs connections results for each client



Implementation Notes

- Open Source software
- Implementation in C
- Tested on Linux, Open BSD, FreeBSD, Solaris
- Windows port planned
- Logging to a cryptographic file system for security



Execution

- Goal is to get client to be run from many domains
- Distribute to Corporate Partners for their own information
- Distribute to “geek” community via popular web forums