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iDEFENSE
A VeriSign Company

Evolution and Current State of DDoS Attacks

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Threat Intelligence Team

iDefense, a VeriSign Company

Where it all comes together.

Agenda

- iDefense Overview
- Availability of Information
- Timeline of DoS/DDoS Evolution
- Attack Motivations
- Attack Tools and Methods
- Command and Control
- Defenses
- Case Study: US Financial Services Firm
- Q&A

About iDefense: Overview

- iDefense, a VeriSign Company, is a leader in cyber threat intelligence.
- Industry-Leading Service Offerings
  - Intelligence is all that iDefense does
- Marquee Customer and Partner Base
  - Government, financial services, retail, telecom and others
- Experienced Intelligence Teams
  - iDefense Labs
  - Vulnerability Aggregation Team (VAT)
  - Malicious Code Team (Malcode)
  - Threat Intelligence Team
  - Rapid Response Team
- In business since 1998, iDefense became a VeriSign Company in July 2005

iDefense Intelligence Services

Daily / Hourly Research Deliverables

- Comprehensive Vulnerability Feed
  - Most comprehensive, timely, technical feed in the industry
- iDefense Exclusive Vulnerabilities
  - More than 250 contributors around the globe
  - Released to vendor and iDefense customers only
  - More than 180 iDefense Exclusive vulnerabilities in 2005
- Malicious Code Research and Reporting

iDefense Intelligence Services

Weekly / Semi-Monthly Research deliverables

- Weekly Threat Report
  - Weekly compilation of worldwide threats
  - Critical Infrastructure, State of the Hack, Cyber Crime, Terrorism and Homeland Security, Global Threat
- Bi-Weekly Malicious Code Review
  - Summary of previous two weeks malcode activity
  - In-depth analysis of specific malcode from the Malcode Lab
- iDefense Topical Research Papers
  - Examples
    - Security of Enterprise Web-based E-Mail Interfaces
    - Security Comparisons: Internet Explorer vs. Firefox
    - Phishing and Pharming: A Comparison
    - Mitigating the Threat from Keyloggers
- Focused Threat Intelligence Reporting
  - Topics specific to individual customers

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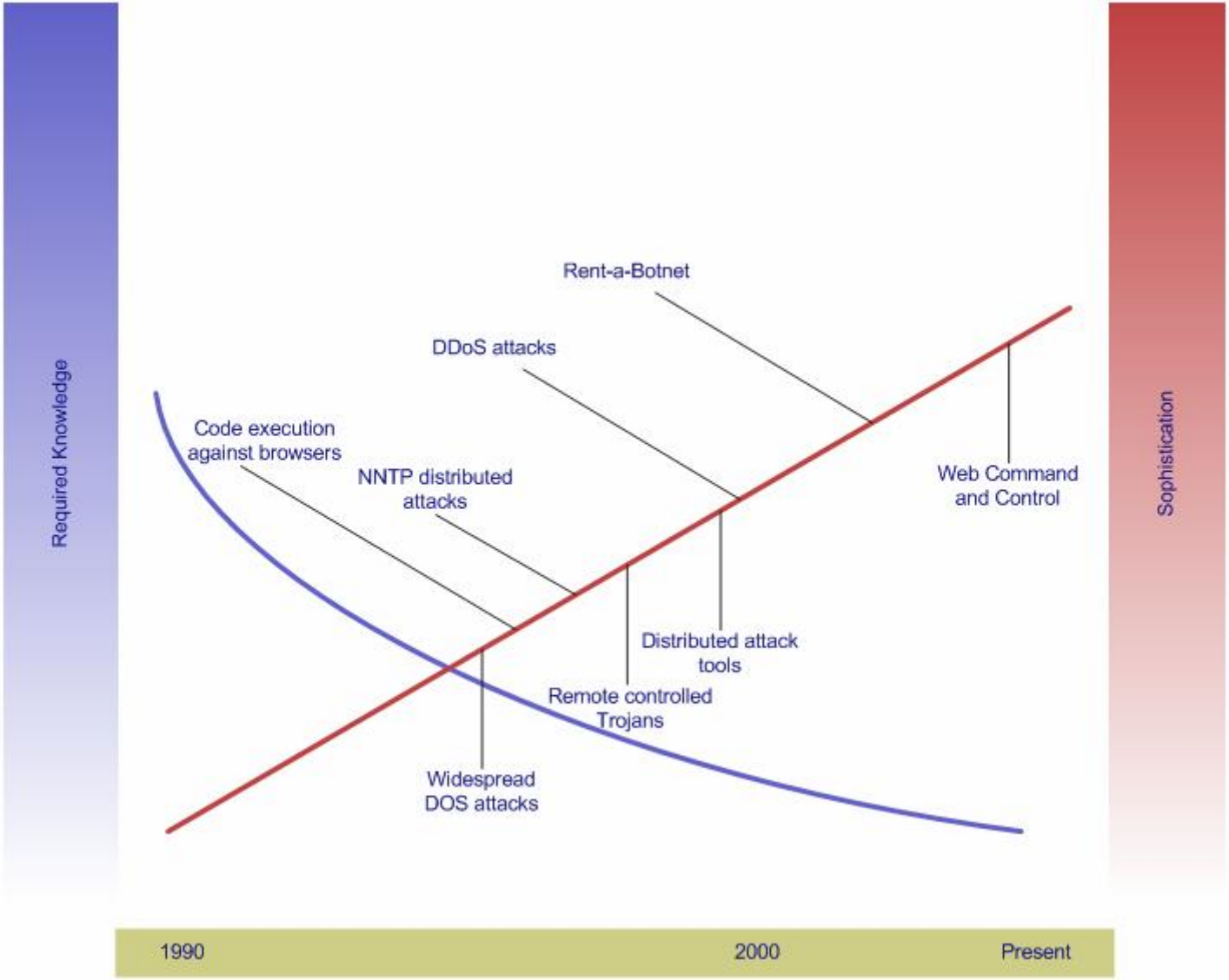
Availability of Information

- Little incentive for victims to report the event
  - Negative publicity
  - Potential legal compliance ramifications
- Lack of accepted research strategies
  - Inferential models only at embryonic stages
  - Data collection methods are limited
- Varied attack characteristics
  - International origins
  - Evolving anonymization tactics
  - Numerous command and control structures

Presently Known Characteristics

- Measurements vary widely
  - 1,000-8,000 attacks per day
- Vast majority of attacks last less than 25 minutes
- Nearly all attacks utilize massive botnets
- Largest attacks exceed 10 Gbps

Timeline of DoS/DDoS Evolution



Attack Motivations

- Experiments or challenges
  - Script-Kiddies and rival hacking groups
  - Profuse, but are often low-intensity and of short duration
  - In the aggregate, a significant concern
- Principle-Driven attacks
  - Political, religious or ideological motivation
  - Special interest groups
  - Revenge
- Sabotage and extortion
  - Pure economic motivation
  - Longer, stronger and often conducted by the best
  - Paying up does not guarantee cessation

Attack Tools and Methods

- Methods
  - Bandwidth Depletion
    - ICMP flood attacks (Ping of Death)
    - Reflection attacks (Smurf and Fraggle)
    - UDP flooding
    - Amplification attacks
  - Resource Depletion
    - TCP SYN attacks (Synflood)
    - PUSH and ACK attacks
    - Recursive HTTP flood (Spidering)
    - Teardrop, Land, and Naptha
- Major tools
  - TCP SYN Attacks (Synflood)
  - Trinoo
  - Tribe Flood Network (TFN)
  - Stacheldraht (German for 'Barbed Wire')
  - Trinity
  - Shaft

DDoS via DNS Recursion

- Process
  - Attacker queries for a large, typically altered, DNS record
  - Large response is sent to the target
- 75-80 percent of DNS servers allow recursive requests
- Amplification of more than 70x
- Mitigation requires collective action
  - Packet filtering by ISPs
  - Disable recursive DNS

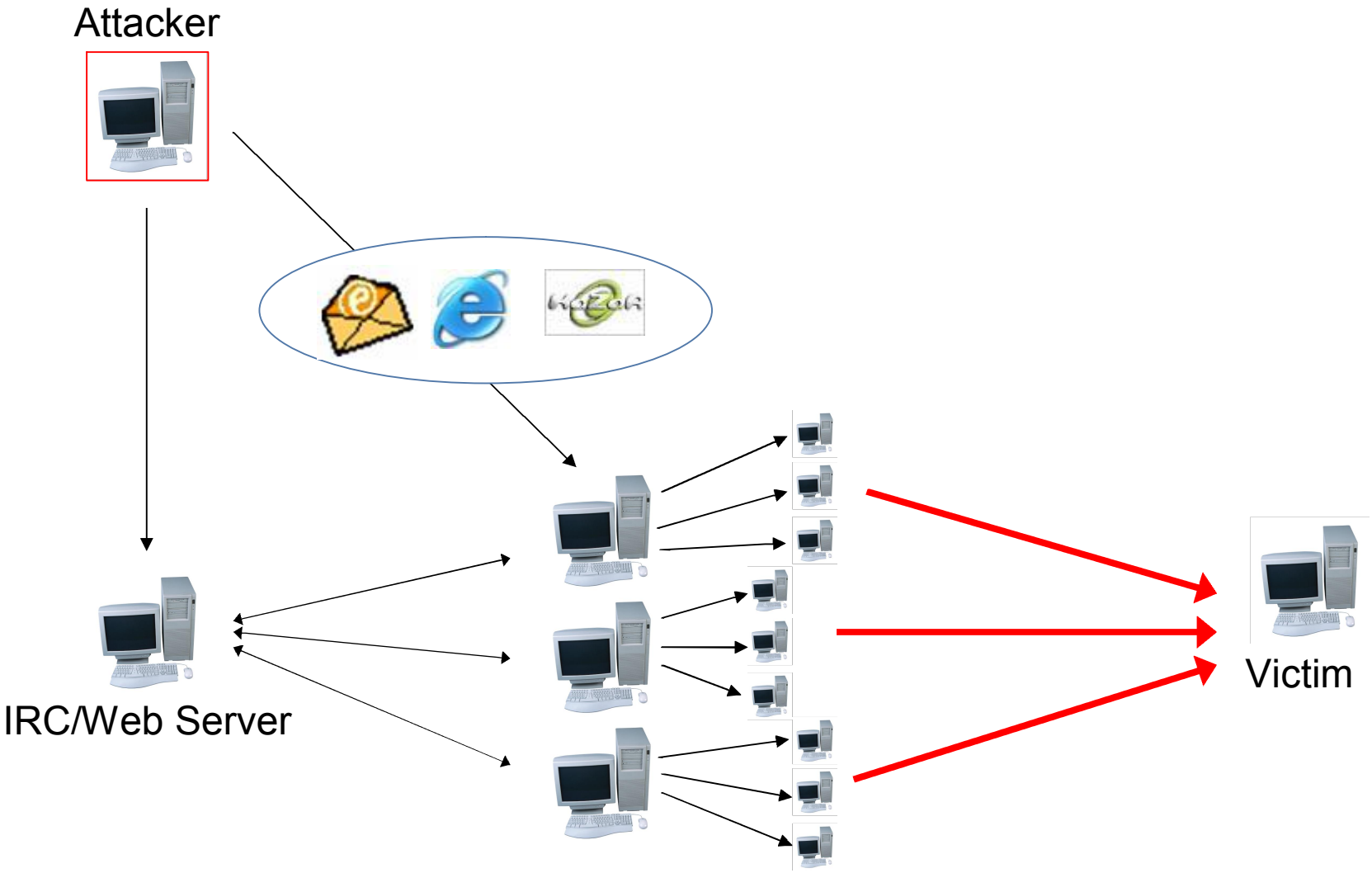
Botnet Command and Control

- Agent-Handler attacks
  - No longer widely used
  - Not scaleable
- IRC
  - Massive increase in IRC bots began in 2004, continues today
  - Limited to tens of thousands of nodes
  - Customized IRC servers and commands
  - Driven by diverse, elegant source code development and modularity
  - Major families
    - AgoBot
    - PhatBot
    - Rbot
    - SDbot
    - Spybot

Botnet Command and Control (cont.)

- Web-based
  - Easy to deploy
  - More scaleable, allowing larger botnets
  - Communication over port 80
  - Easier to use - Easier to sell
- VoIP
  - Use is speculative
  - Highly anonymous

Structure of a Botnet



Defenses

- Deck is stacked in favor of the attacker
- Prevention and mitigation
- Internal approaches
  - Overprovisioning
    - Bandwidth
    - Hardware
  - Key resources:
    - Trained Staff
    - DDoS-specific appliances
  - Can grow enormously expensive
- External approaches
  - Independent network analysis
  - Traffic filtering services
  - Emergency response services

Case Study: US Financial Services Firm

- Began in March 2004, and lasted nearly one year
- 2,000-4,000 request intensity: 5-6 MB bandwidth consumption
- Worm spread from Middle East— source never identified
  - Code analysis points to venerable attacker sympathetic to Al Qaeda
  - Coder is not highly skilled, but is well connected to underground
- Mitigation
  - Syslog appliance
  - Trip wire set at 50,000 requests per eight hour period
  - Suspicious request origins were blacklisted
  - Redirect implementation
  - Law enforcement contacted— hardware seized in the US and Canada
- The attack continues today, but is insignificant

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Q&A

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Thank You

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