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# The LOBSTER project



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## Large Scale Attacks on the Internet Lessons learned from the LOBSTER project

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Learning from Large Scale Attacks on the Internet  
Policy Implications

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# Agenda



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- Motivation
- The LOBSTER Infrastructure
  - Number of sensors - deployment
  - Attacks captured
- Lessons Learned
- Policy Implications



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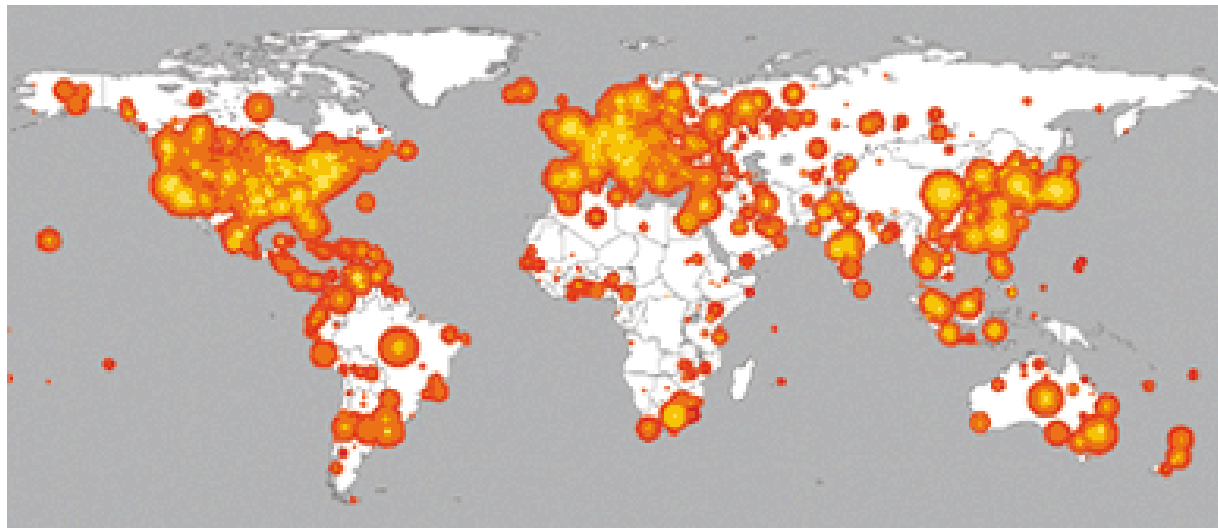
## Computer Security is getting increasingly important



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- 1988
  - The Morris worm compromised 6,000 UNIX computers
- 2001
  - The Code Red worm compromised 300,000 computers



Source: CAIDA/UCSD



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# Computer Security is Critical



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- 2007: Vint Cerf (the father of the Internet and VP of Google) says:
  - 25% of all computers online are compromised
    - 100-150 million computers are compromised...



BBC NEWS | Business | Criminals 'may overwhelm the web' - Mozilla Firefox

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http://news.bbc.co.uk/2/hi/business/6298641.stm

BBC NEWS | Business | Criminals... Vint Cerf says BotNets infect 1/4 of a...

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Last Updated: Thursday, 25 January 2007, 14:18 GMT

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### Criminals 'may overwhelm the web'

By Tim Weber  
Business editor, BBC News website, Davos

**Criminals controlling millions of personal computers are threatening the internet's future, experts have warned.**

Up to a quarter of computers on the net may be used by cyber criminals in so-called botnets, said Vint Cerf, one of the fathers of the internet.

Do you know if your PC has been taken over by cyber-criminals?

Technology writer John Markoff said: "It's as bad as you can imagine, it puts the whole internet at risk."

The panel of leading experts was discussing the future of the internet at the World Economic Forum in Davos.

**Internet pandemic**

Mr Cerf, who is one of the co-developers of the TCP/IP standard that underlies all internet traffic and now works for Google, warned that the spread of botnets has become a serious threat to the internet.

**WORLD ECONOMIC FORUM 2007 LATEST NEWS**

- Davos misses out on the big bang
- World trade talks set to restart
- YouTube users to get ad money
- Blair sees hope of climate deal
- Skype roadmap: Trial and error
- Has Big Business gone green?
- Criminals 'may overwhelm web'
- What's the appeal of Davos?
- Germany wants globalisation push
- 'Good 2007' for world economy
- Bosses 'confident on economy'

**DAVOS BLOG - LATEST POSTS**

- Good-bye from Davos
- The Little Britain show
- The Google ticket

**BACKGROUND**

- Q&A: Davos 2007
- Green agenda for global leaders

**WORLD SOCIAL FORUM**

- Street kids raid poverty summit
- Vibrant 'anti-Davos' has impact

## Internet guru warns of botnet pandemic

Tags: Botnet, Vint Cerf

Will Sturgeon silicon.com

Published: 29 Jan 2007 09:39 GMT

Email Trackback Clip Link Print

**Father of the internet Vint Cerf has warned high-powered attendees at the World Economic Forum in Davos that the internet is at serious risk from botnets.**

Vast networks of compromised PCs, used by criminals for sending spam and spyware and for launching denial of service attacks are reported to be growing at an alarming rate in terms of their

n the Internet

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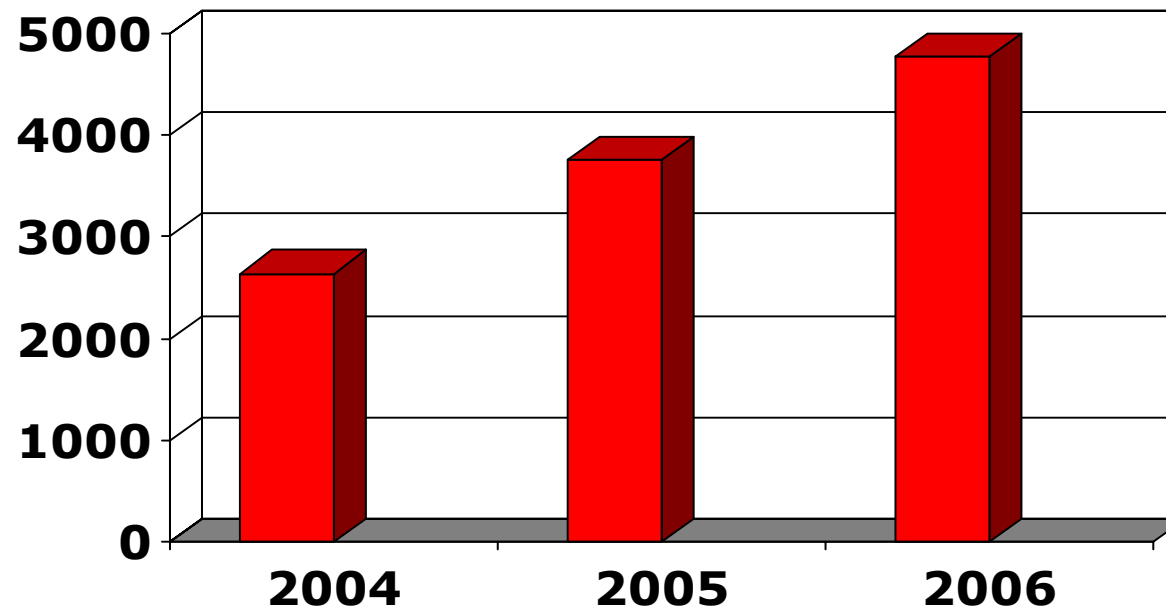
# Vulnerabilities



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## Vulnerabilities found



- Total Vulnerabilities documented by Symantec Corporation  
(source: Internet Security Threat Report)

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# Black Market Trading



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PC Pro: News: Black market thrives on vulnerability trading - Mozilla Firefox

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http://www.pcpro.co.uk/news/84523/black-market-thrives-on-vulnerability-trading.html

**pc PRO** COMPUTING IN THE REAL WORLD

Worry Free Security Solutions for Small Business **Free trial >**

CERTIFIED FOR Windows Vista™ TREND MICRO

SEARCH FOR:  IN: All IT Sites Search Advanced Search

Guest Level 00  Register | Log in

Home > News  
**News** [Security]  
 Tuesday 7th March 2006  
**Black market thrives on vulnerability trading**  
 6:09PM, Tuesday 7th March 2006

Security giant Symantec claims that anonymous collusion between hackers and criminals is creating a thriving black market for vulnerability trading.

As criminals have woken up to the massive reach afforded to their activities thanks to the Internet, hackers too are now able to avoid risking prison sentences by simply selling on their findings.

Graeme Pinkney, a manager at Symantec for trend analysis, told us: 'People have suddenly realised that there's now a profit margin and a revenue stream in vulnerabilities... There's an element of anonymous co-operation between the hacker and criminal.'

The evidence comes from Symantec's latest biannual security report: vulnerabilities are up. Nearly 2,000 new holes were identified, the largest rise in seven years. And it's not Microsoft's fault. Two-thirds affected web applications rather than the operating system. Four in five were found to be trivial to exploit, and 97 per cent were moderately or highly severe.

Symantec Offers  
 Find Symantec at Ask.com

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 Windows Home Server: ready to install?  
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http://www.pcpro.co.uk/news/115852/windows-home-server-ready-to-install.html

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# So?



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- One out of four computers is compromised
- Hackers penetrate all different kinds of computers
- Vulnerabilities are increasing every year
- They are being sold in the black market
  
- We need to react:
  - Monitor large scale attacks
  - Understand mechanisms and motives of attackers





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# The LOBSTER project



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- **Research Networking Test-Bed** project

- 2005-2007      Funded by IST



- Installed a monitoring infrastructure

- To study performance and security issues in European Research and Educational networks

- Deployed

- more than 40 sensors
- in 10 countries

- Monitors incoming traffic to see if it contains network attacks from hackers

Funded by the European Commission

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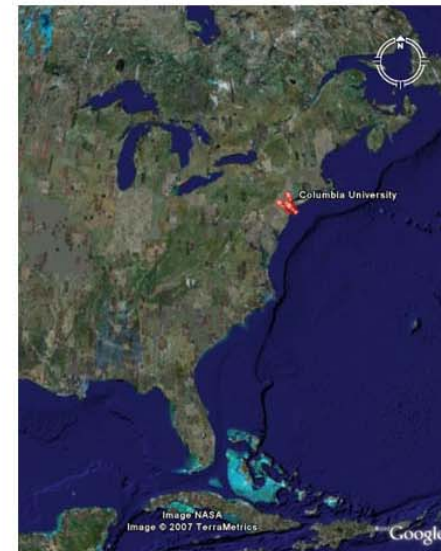
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# LOBSTER Deployment



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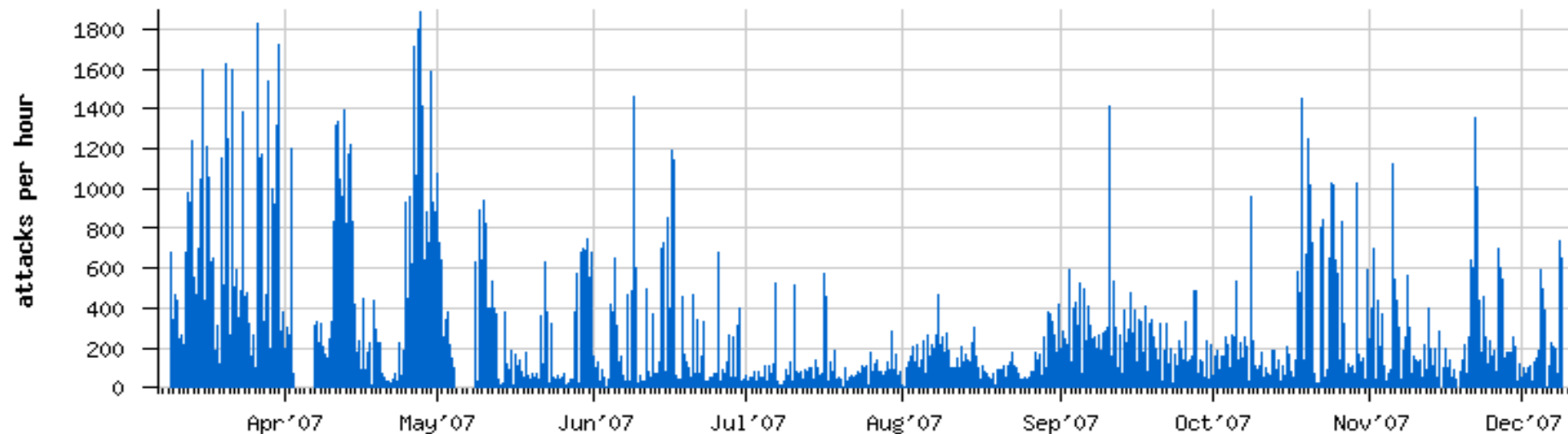
## Attacks Captured: focus on polymorphic attacks



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- Close to one million attacks captured
- One attack every 30 seconds!
- One attack every two seconds (peak rate)!



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# Where do attackers come from?



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## All over the world



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# Where do attackers come from?

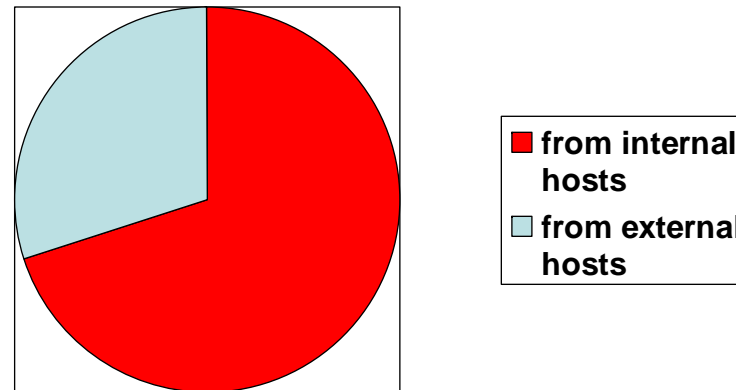


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- 70% of the attacks to an organization originate from “inside” hosts
  - Maybe compromised computers which attack the local network

Attacks Launched





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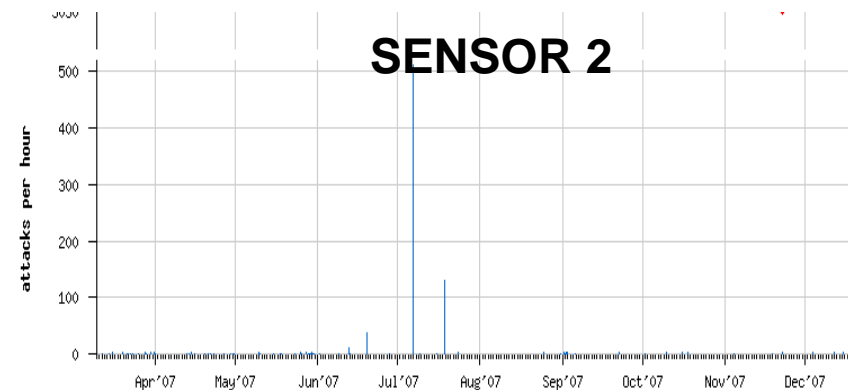
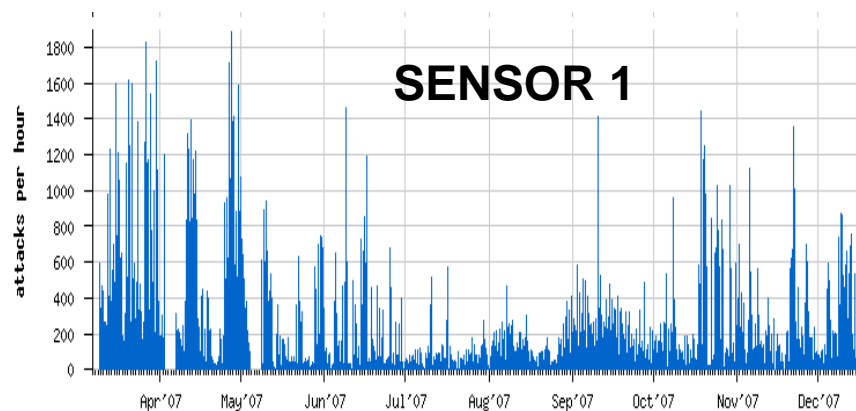
# Lessons Learned



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- Attackers launch attacks **from all over the world**
- Several attacks originate **from “internal” hosts**
  - Probably compromised computers of the organization
- Isolated viewpoints provided a “narrow point of view” of the attack plane, i.e.
  - One sensor reported heavy attack while
  - Another sensor reported very little attacks



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## What needs to be done?



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- The knowledge of large scale attacks may be fragmented today
  - Individual organizations know their status but do not know the status of other organizations/networks
- Very few people/organizations have a global view of the attack landscape
- Even fewer publish this information on the public domain
- We need to work towards a “broad viewpoint” by sharing of data
- Large-scale attack monitoring needs “**broadened points of view**”



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## What has been done



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- ENISA has started work in this area:
  - Examining the feasibility of a data collection framework
- Unit A3 of ICT promotes the “Learning from Large-Scale Attacks on the Internet”
- Individual projects/organizations in Europe provide some form of data/information (NoAH, WOMBAT, Arakis, Leurre.com, etc.)
- BUT
- We need to **share more information/data**



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## What needs to be done?



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- Facilitate sharing of knowledge – facilitate sharing of data
  - Encourage Organizations to **share attack-related data**
    - Universities are usually willing to provide information but
      - they may need technical and legal advice before doing so
  - Help organizations **exchange attack-related data**
    - Create repositories for all data provided by individual organizations
- Provide a **legal framework** for data sharing
  - **Who** can access the data, **when** and for **which** purposes



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# Summary



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- Lots of attacks out there
- Vulnerabilities are increasing
  - They are being traded in the black market
- One out of four computers is compromised
- Existing projects/initiatives/organizations provide attack-related information-data but
  - Most of them provide narrow viewpoints
- We need to find a formula to broaden our point of view
  - And to share data and information
- Large-scale attacks need large-scale viewpoints



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