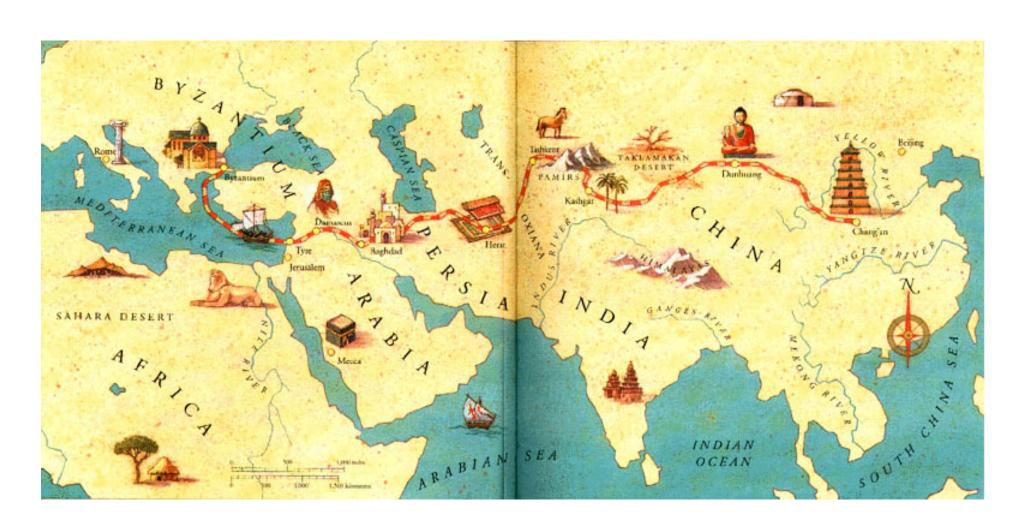
## Attacks Against the Cloud: Combating Denial-of-Service



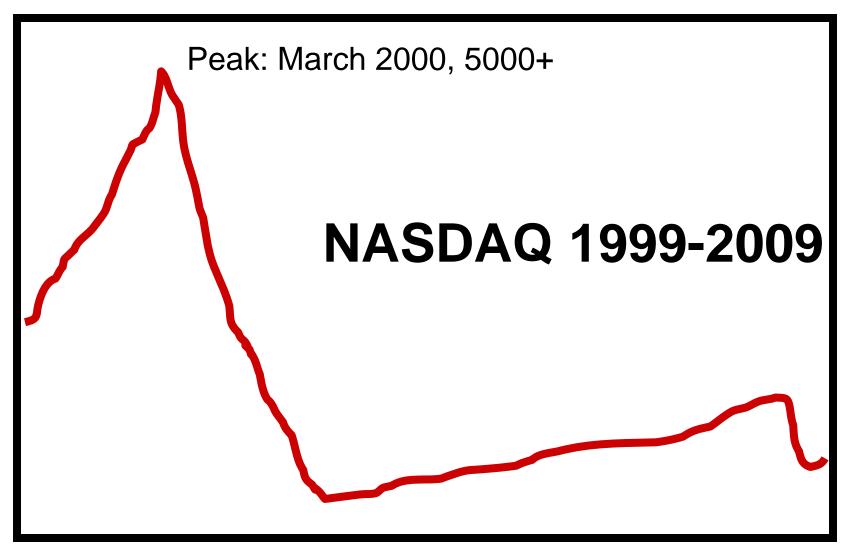
R. Malan, Ph.D.

Presented by: Jose Nazario, Ph.D.

FIRST 2009 Kyoto Japan

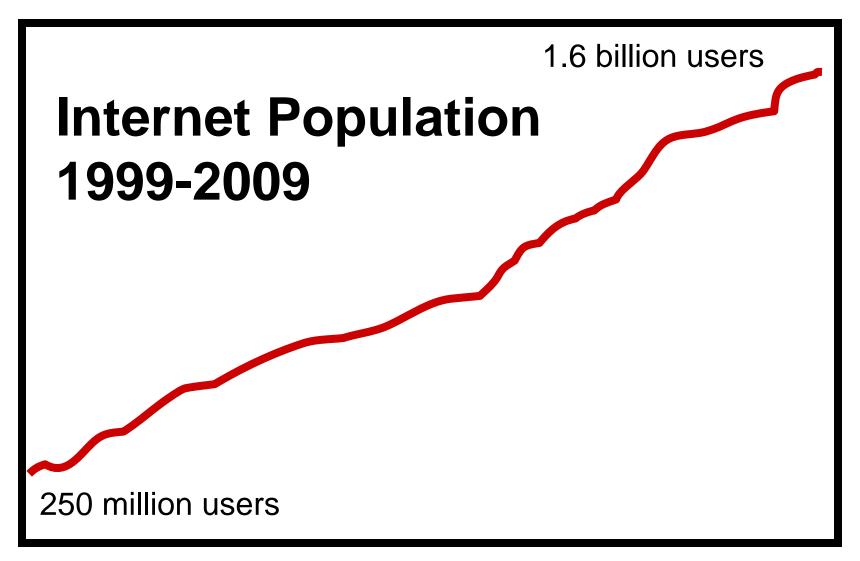






1999





1999









Video

Voice





Cloud

Mobile











## **Internet Attack Sizes** 1999-2009

50 Gbps

200 Mbps

1999



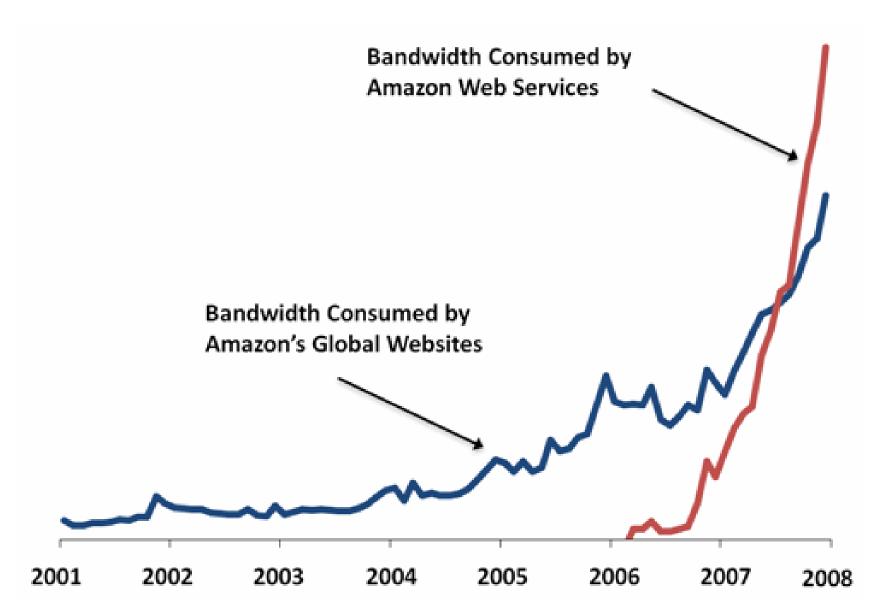
1999	2002	2005	2008
Routers die under forwarding load	Servers die under load	Renewed targets in infrastructure (DNS, peering points)	Web services



1999	2001	2004	2007	2009
IRC wars lead to widespread adoption of primative DDoS tools	Worms: Code Red, Nimda, SQL Slammer	Rise of the IRC botnets  Online attacks go criminal	Estonia attacks cause gov'ts around world to worry about cyberwar	Iran election results lead to DDoS, Twitter, etc



2001	2003	2007
Providers start to protect their own infrastructure	Providers start to offer DoS protection as a	Protecting key converged services (VoIP, IPTV)
Blackhole routing	service  BGP injections	Multi-GBbps inline filtering deployed





## Thank you

どうもありがとう

