ExptsSecurityAnalysis:

GENI Experiments for Traffic Capture Capabilities and Security Requirement Analysis

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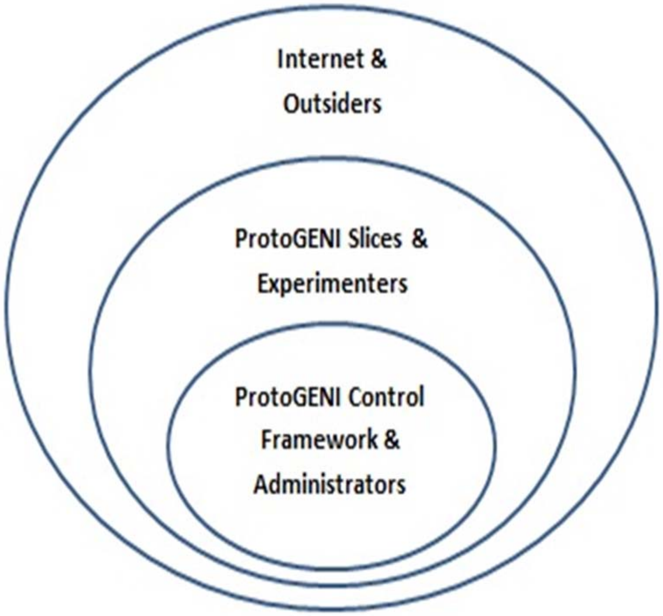
Project Introduction

- Project Goal:
  - To find vulnerabilities through ProtoGENI experiments
    - As an insider!
  - To suggest prevention approach
- GENI Security Goals:
  - To avoid being abused to conduct illegal activities or as a launchpad for attacks, and to ensure the availability of services not being compromised by attacks
- Year 2 findings and suggestions

THREAT MODEL



- Experimenter as an insider
  - Data Plane to Control Plane
    - Compromise the availability of ProtoGENI resources to other users
  - Data Plane to Data Plane
    - Compromise the correctness and confidentiality of other running experiments
  - Data plane to Internet
- Experimenter as a victim from an outsider

Network DoS experiments

Findings	Suggestions

An SSH connection from local PC to a sliver node can be disconnected.	(Performed using ARP Cache Poisoning)
	Tune ARP frequency;
	Software: ARPOn, ARPWatch;
	Hardware ARP Defender, VLANs;
	OS: Static ARP entry;
	Free node sleep;

A free node (as resource) can be prevented from being allocated to a requesting slice.	
A tunnel connection between Utah and Kentucky can be disrupted to loss 95% ping packets.	
Distributed flooding attack to Internet hosts from different sites, only warned by Utah site	Automated anomaly traffic detection; Install warning system at all CMs; emergency stop;
Flooding Control Framework	
A follow-up issue: the free node status was not correct for a few days after the ARP attack.	

Network DoS experiments (cont’d)

Findings	Suggestions
Classic ICMP flood, UDP flood, possible	Automated anomaly traffic detection; Install warning system at all CMs; Emergency stop
Advanced source spoof and SYN spoof possible, victim’s SSH connection not open anymore	
DDoS attack to a ProtoGENI node is possible, SSH connection close. Other nodes are not accessible too. The user can not create new slice.	
A follow-up issue: the user lost credential (can not delete or create new slice) until the victim slice expires .	

System issues

Findings	Suggestions

Dated Operating System.
E.g., Fedora 8 known issues:
Gain elevated privilege;
Unauthorized remote access;
Initial DoS attack;
	Update OS image as soon as possible;
	Using automated system updates;

Exposed Open Ports --though filtered by firewall, still has port open to Internet:
with known vulnerabilities like port 32769;
ports of well known services (5001 of Iperf);
GENI software;
	Refined filter;
	Leverage the scope of open ports;
	Service specific monitoring;
	VPN connection;

Spread malware using current file transfer method	Transfer encrypted data

- Thank you!
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- Welcome to our demo!

- Questions and suggestions highly welcomed!