

## Scalable Infrastructure Protection and Performance Evaluation in Power-law Networks

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**Objective** Scalable DDoS Prevention: Scalable global performance in large-scale networks  
 Infrastructure Protection: Global network infrastructure vs. protection infrastructure  
 Internet-scale Simulation-based Performance Evaluation

### Scalable DDoS Prevention

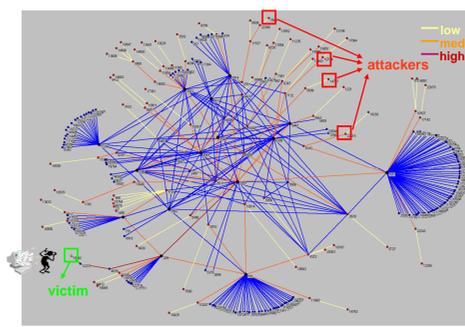
#### Route-based Distributed Packet Filtering

- Proactive Protection (Containment)
- Reactive Protection (Traceback)

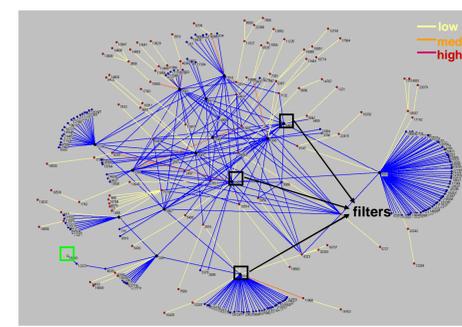
#### Internet Power-law Topology

- Strategic & economic filter placement (VC)

→ NLANR (1997-2002), CAIDA, RIPE, USC/ISI, UMich Internet AS measurement data



Without DPF



With DPF

### Infrastructure Protection

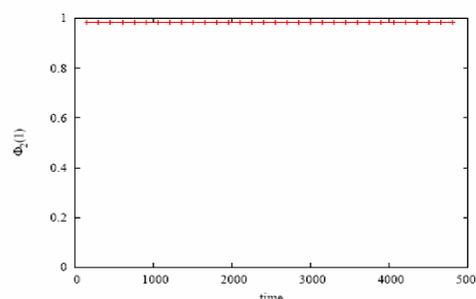
#### Global Network Infrastructure Protection

- From scalable DDoS prevention

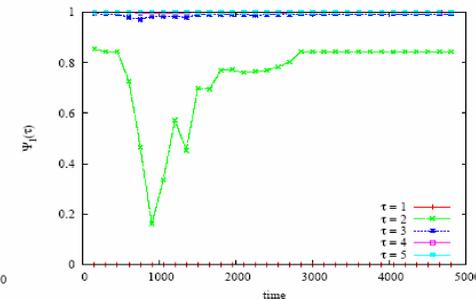
#### Protection Infrastructure Protection

- Failure & recovery models of ASes
- Failure & recovery models of BGP routes
- Effective containment and traceback
- Resilience of protection performance

#### Access AS Failure Case 01/01/1998 NLANR Internet AS Graph



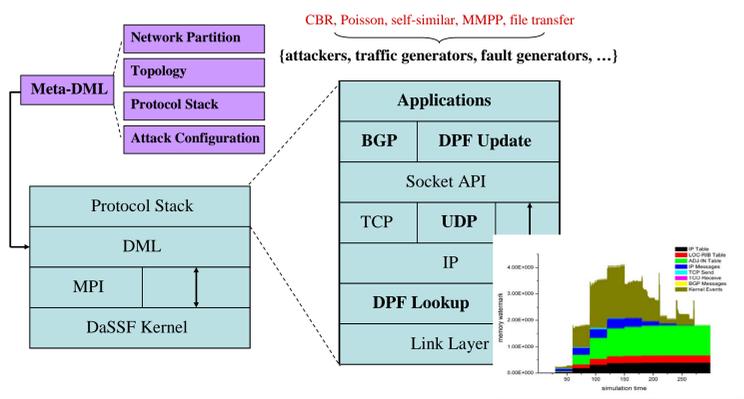
Containment



Traceback

### Internet-scale Simulation Tool

#### Dynamic DPF Simulator: Distributed Network Simulation



- 16,900+ node networks
- Failure/recovery models
- Power-law partitioning
- Resource usage monitoring
- Meta-DML configuration
- Trace-driven visualization



→ workstation cluster

