Relying on RARE for DDoS Attack Protection - Demonstrating RARE Integration with GÉANT DDoS Attack Protection Services (FoD and NeMo Use Cases)

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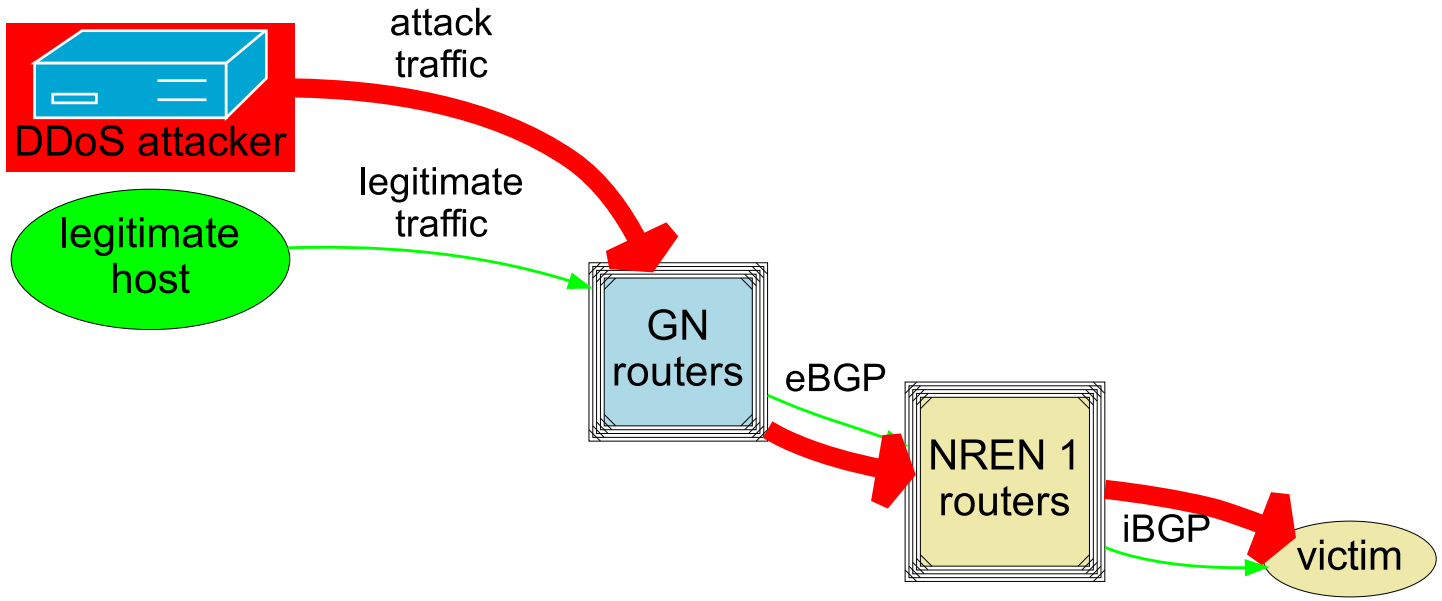
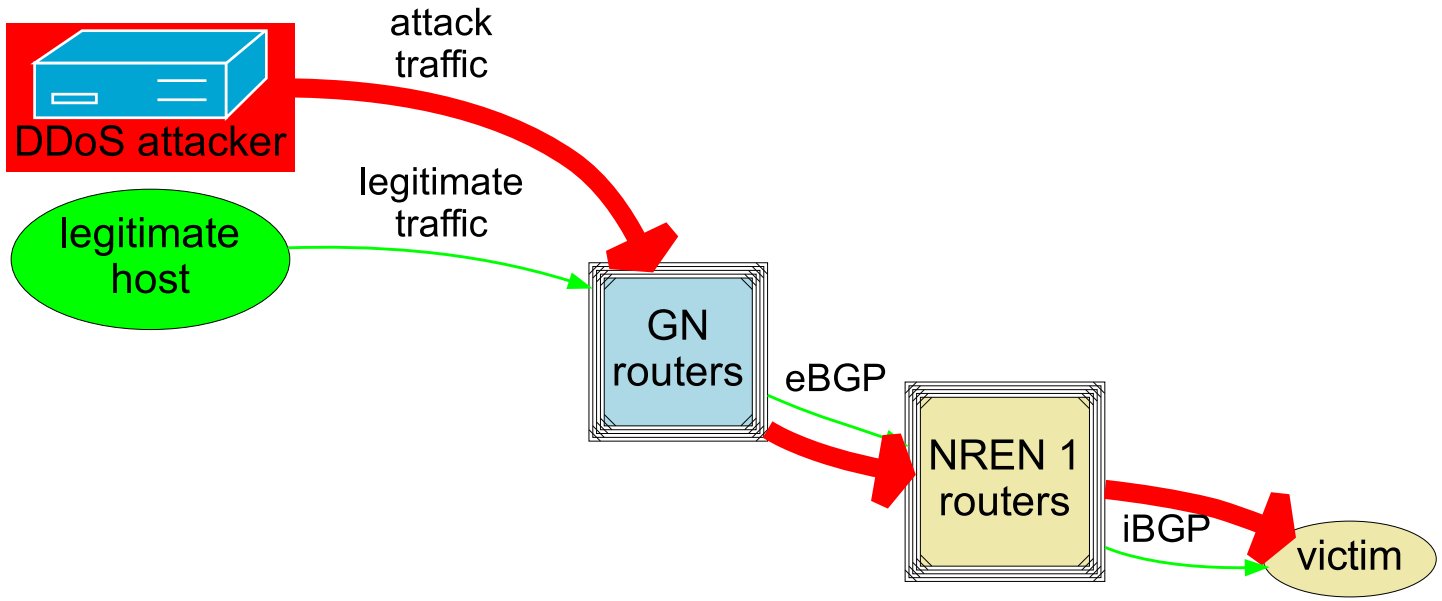
DDoS-Attack (1)



DDoS-Attack (2)



- Victim host attacked by DDoS
- Victim's local network may also be impacted ?

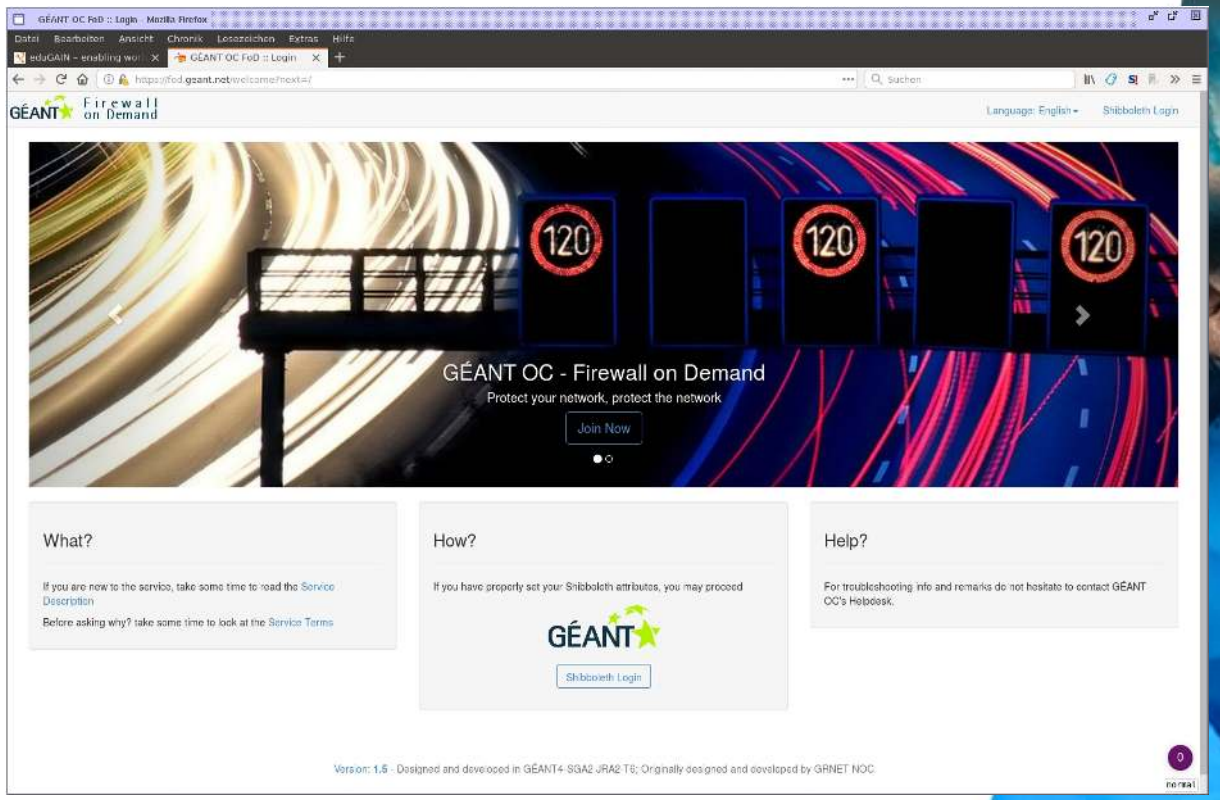
FoD and NeMo with freeRTR: DDoS detection and mitigation demo

- Firewall-On-Demand (FoD): own DDoS mitigation by the user via BGP FlowSpec
- NeMo: DDoS detection and mitigation
- freeRTR
  - emulation and demo-ing of CISCO-like router(s)
  - also used in real hardware

Firewall-On-Demand (FoD)

Firewall-On-Demand (FoD): Introduction

- not 'Firewall' in the usual sense!
- service for DDoS mitigation control by user himself
  - dynamically, on the routers
  - BGP FlowSpec-based
  - multi-tenant, eduGAIN-based
  - developed by GÉANT project
- z.B. GÉANT FoD service instance
  - mitigation within GÉANT core
  - for NREN NoC Admins
  - productive since > 8 years
- GÉANT WP8-T3-DDoS
  - Continued development and support
  - Collaboration with the GÉANT security team

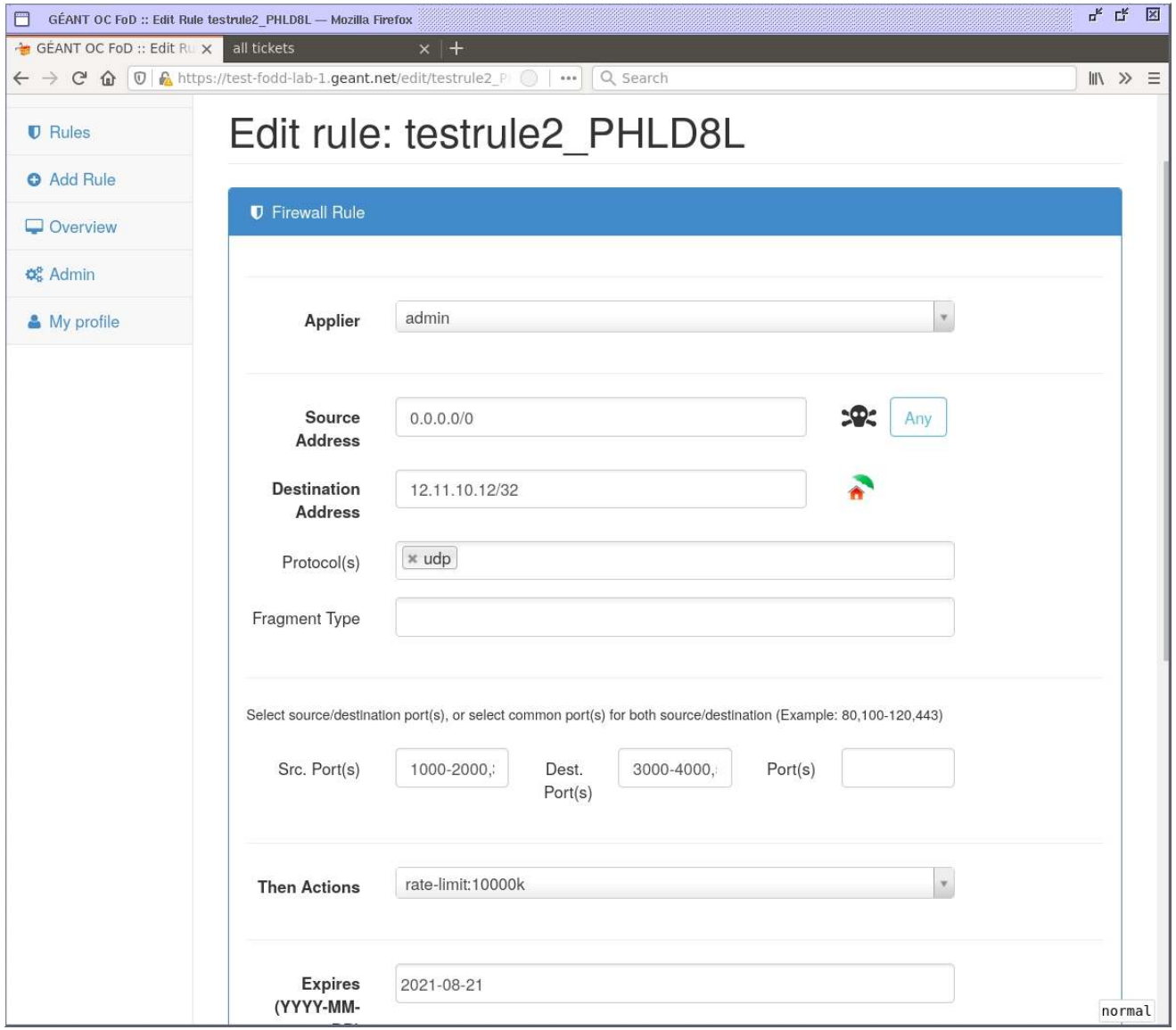


Firewall-On-Demand (FoD): Benefit for Users

- user (NREN NoC) is able to perform DDoS mitigation
  - for own IP traffic: start/edit/stop
  - manually (WebUI) oder automated (REST API)
  - without contacting GÉANT NoC

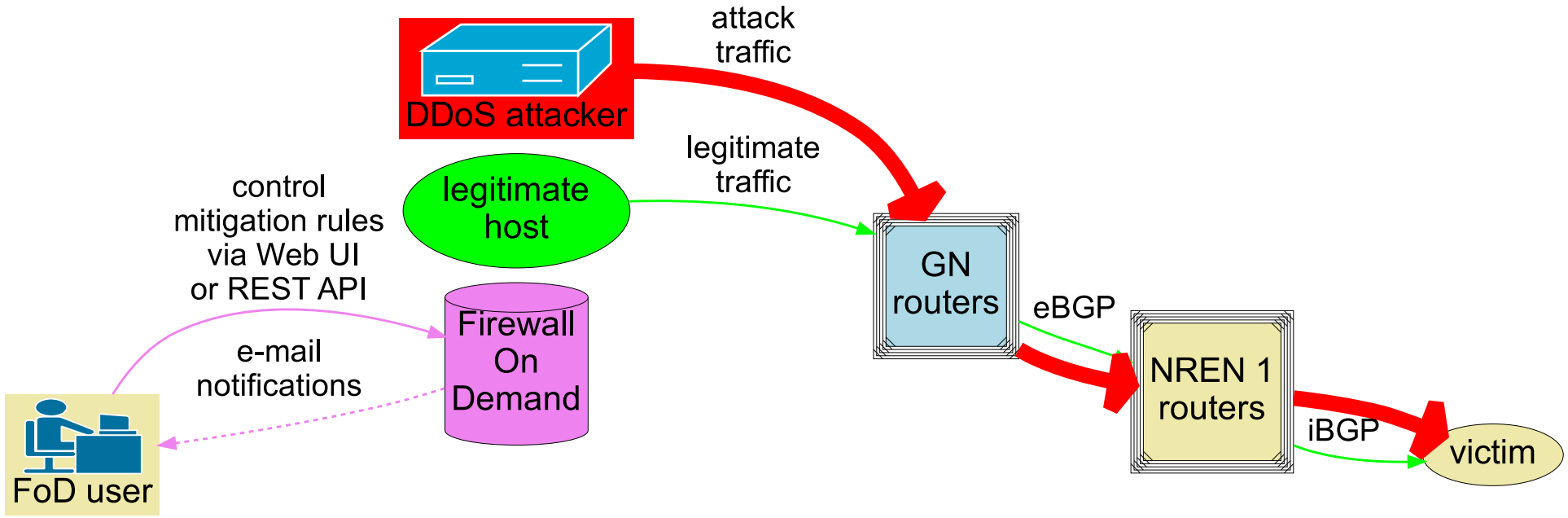
- ⇒ flexible, independent, fast mitigation
  (most DDoS attacks: < 1 h)

Firewall-On-Demand (FoD): Input of a mitigation rule



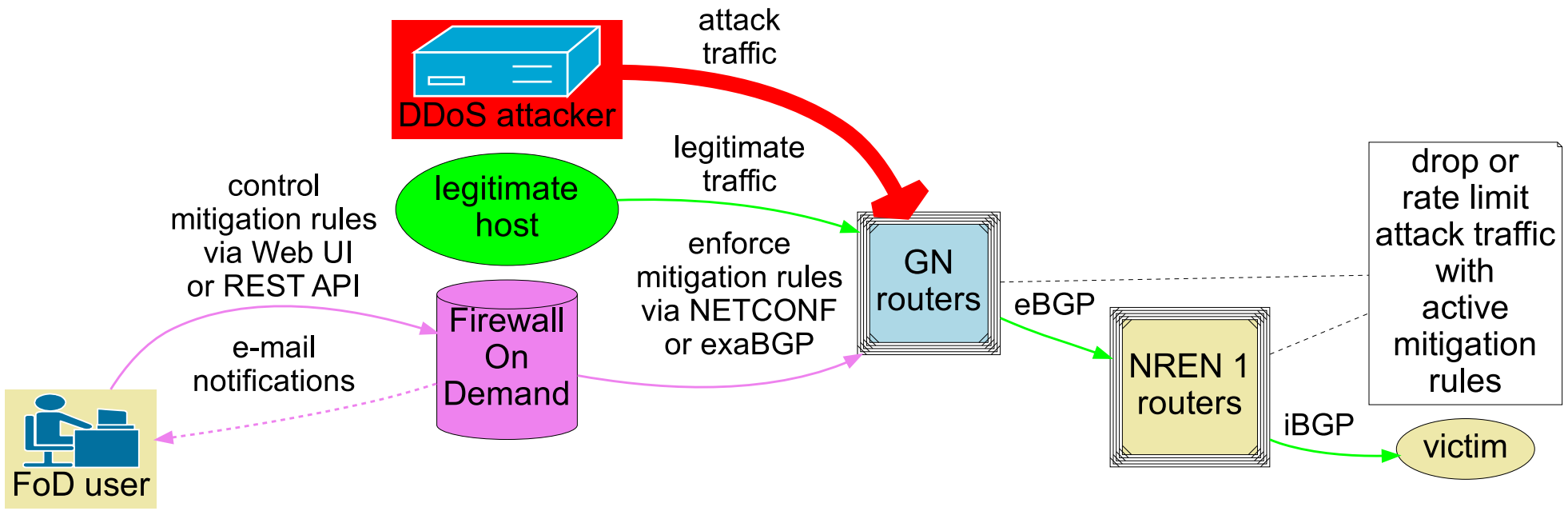
- Match
  - source IP prefix (attacker)
  - destination IP prefix (multi-tenant)
  - IP protocol: ICMP, UDP, TCP
  - ggf. UDP/TCP port (lists)
  - IP fragment options
- Mitigation
  - drop all
  - rate limit
- Expire time

Firewall-On-Demand: Mitigation



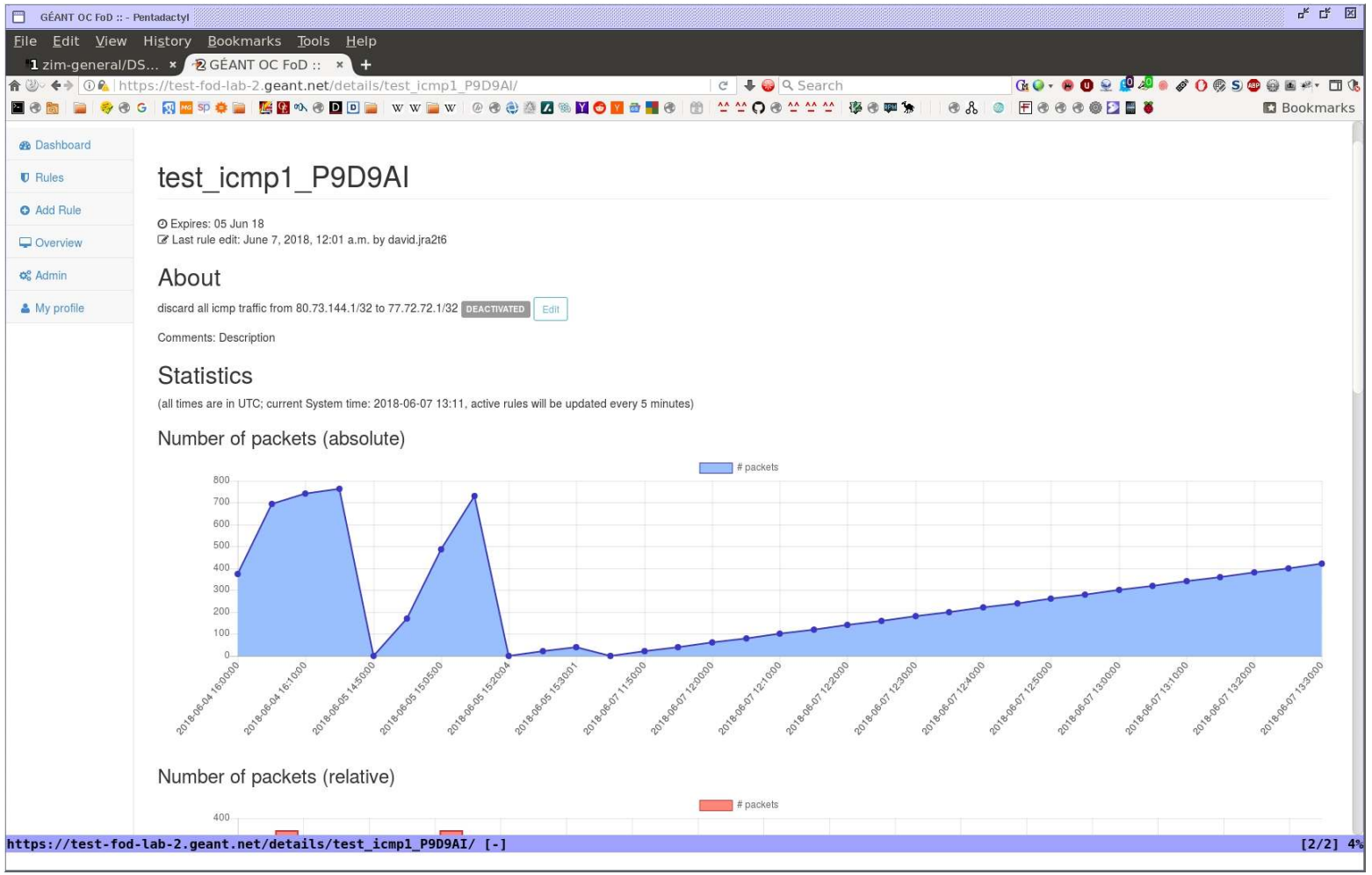
- Victim host attacked by DDoS
- Victim's local network may also be impacted

Firewall-On-Demand: Mitigation



- DDoS traffic blocked as early as possible
- Based on BGP FlowSpec supported in routers

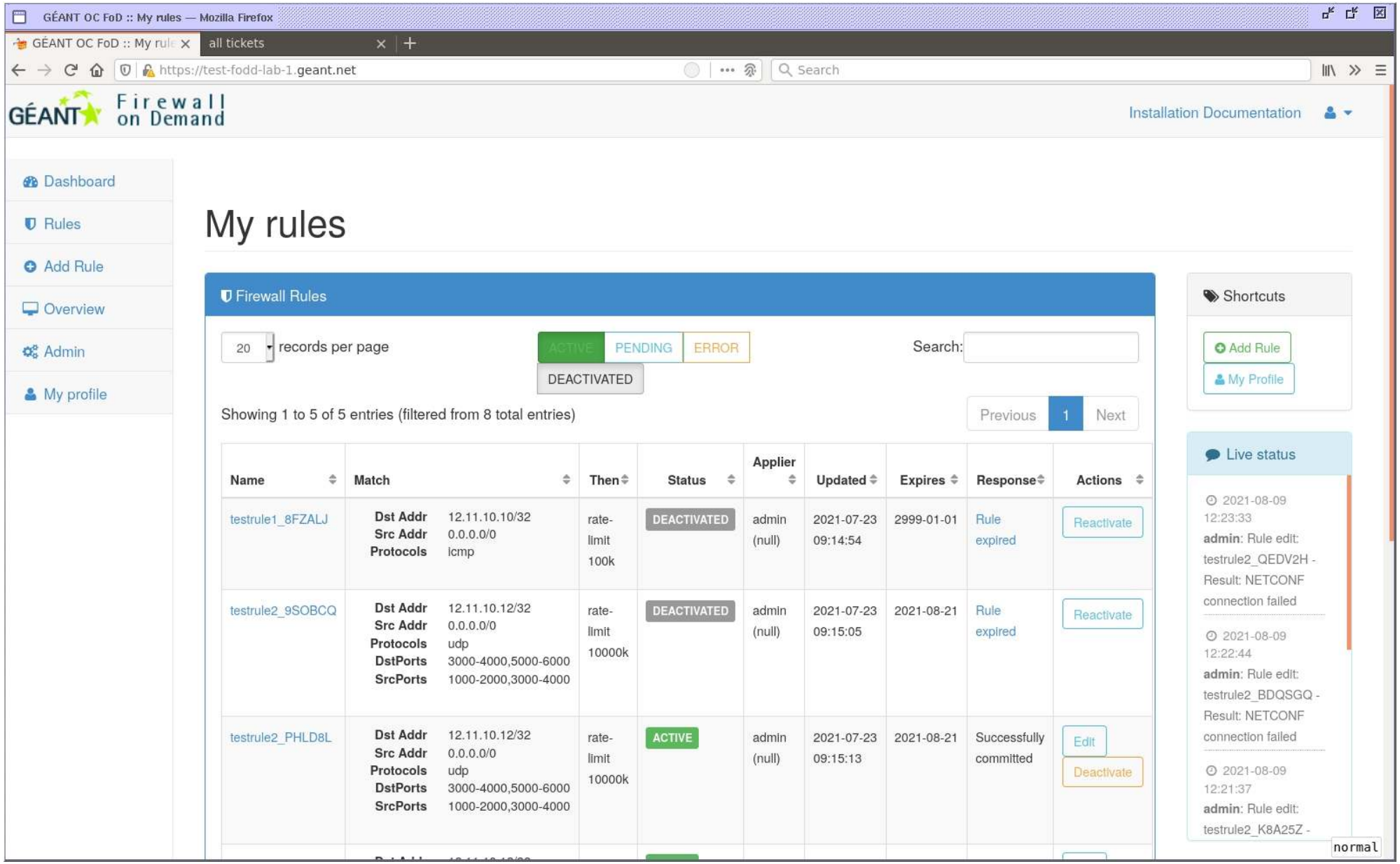
Firewall-On-Demand (FoD): Statistics of a mitigation rule



actually dropped
bytes / packets

via SNMP
(JUNOS-specific filter stats via Firewall MIB)
from routers, aggregated

Firewall-On-Demand (FoD): Overview of the mitigation rules



"FoD in a box" using Docker Compose

- Docker based-container running FoD inside
  - as reference installation
  - for testing
- Docker Compose specification for FoD container, Freertr router, attacker and victim host containers
  - https://github.com/GEANT/FOD/blob/feature/exabgp_support2/docker-compose-singlefodctr-novol.yml
- instructions how to build and use Docker Compose specification manually
  - https://github.com/GEANT/FOD/blob/feature/exabgp_support2/docker-compose/README.txt
- automated FoD Mitigation Demo (based on Docker Compose)
  - demo script: https://github.com/GEANT/FOD/blob/feature/exabgp_support2/docker-compose/demo1.sh

"FoD in a box" using Docker Compose: Automated Mitigation Demo

- runs only in terminal, not via Web UI
- rules emitted into FoD via Python code

Demo

"FoD in a box" based on Containerlab

- Containerlab (https://containerlab.dev/)
  - similar as Docker Compose, but more network-centric
  - typically prebuild containers for testing specific network components (e.g., routers, freeRTR, FoD, etc.) are used
- Containerlab specification for FoD with freeRTR:
  - https://github.com/rare-freertr/freeRtr-containerlab/blob/main/lab/005-rare-hello-fod/rtr005.clab.yml
- Automated FoD Mitigation Demo (based on Containerlab)
  - instructions for manual demo: https://github.com/rare-freertr/freeRtr-containerlab/blob/main/lab/005-rare-hello-fod/containerlab-fod-freertr.txt
  - demo script: https://github.com/rare-freertr/freeRtr-containerlab/blob/main/lab/005-rare-hello-fod/containerlab-fod-freertr.sh (requires containerlab to be installed)

"FoD in a box" based on Containerlab: Automated Mitigation Demo

- runs only in terminal, not via Web UI
- rules emitted into FoD via Python code

Demo

NeMo with freertr: installation and use

End