**Problem:** What are the pain-points at the inter-domain level?

- **Static**
  - Long setup timeframes

- **Constrained**
  - Indirect control over packet forwarding
  - Only basic packet forwarding

- **Myopic**
  - Limited visibility
  - Influence immediate neighbors

**Solution:** Bringing SDN to the inter-domain settings

Internet eXchange Points

an opportunity ripe for impact

Map of Internet eXchange Points

iSDX/ENDEAVOUR idea:
SDN deployment even at single IXP can benefit tens to hundreds of providers…

…without IXPs’ customers deploying new equipment!

**Software-Defined IXP Advantages**

**for IXP Operators**
- Simplified Management
- Fine-Grained Monitoring
- New Services

**for IXP Customers**
- Improved Security
- Better Traffic Engineering
- Advanced Peering

**Use Case I: Block DDoS Attacks**

Legitimate user

Attacker

Victim can remotely block attack traffic at SDX

Drop UDP traffic destined to 128.40.88.4

**Use Case II: Advanced Traffic Engineering**

Member A

dst_port = 4321

Member B

Member C

Outbound policy at A

dPort = 80 → fwd(B)
dPort = 4321 → fwd(C)

Inbound policy at C

dPort = 4321 → fwd(C1)
dPort = 4322 → fwd(C2)

Member SDX platform

dPort = 4321

SDN-‐enabled Traffic Engineering and Advanced Blackholing at IXPs

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