Keeping the Internet Flowing: How IXPs Handle DDoS

José Alberto Nistal

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Agenda

- The need for DDoS mitigation in IXPs
- Basic concepts: The RTBH mechanism
- Approaches to DDoS mitigation in IXPs
- Recap

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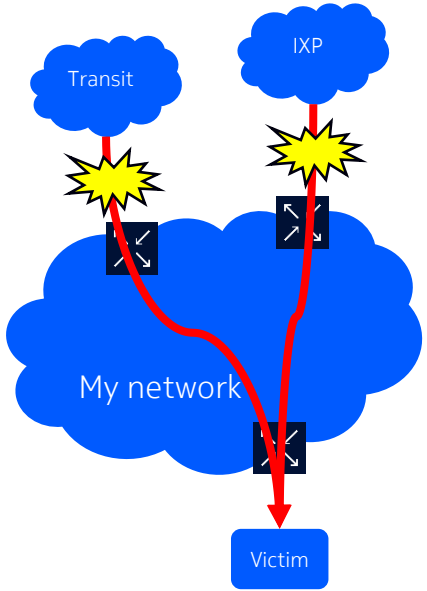
The need for DDoS mitigation in IXPs



- DDoS traffic comes from everywhere: transit, IXPs, etc.
- Blocking DDoS at edge works very well (if you have enough upstream bandwidth)
- In small and medium ISPs, upstream links may get congested
- Need for upstream mitigation
- Transit providers generally offer DDoS protection
- Up to now, IXPs didn’t

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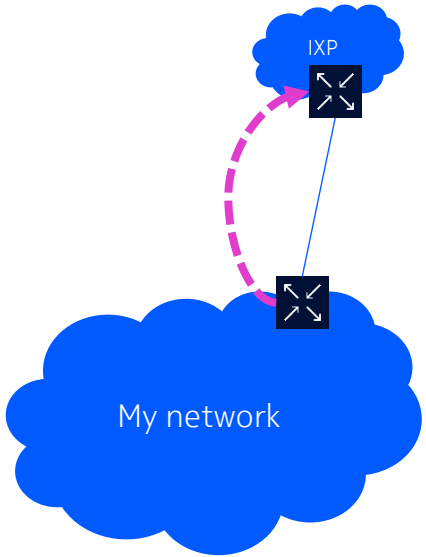
Basic concepts: The RTBH mechanism

Remotely Triggered Black Hole

- We advertise a BGP route that includes the victim's IP address
  - This can be an existing route or a new, temporary one
  - Ideally /32 although other lengths may be needed for carpet-bomb attacks
- This route is tagged with the BLACKHOLE community
  - Preferred 65535:666 as defined by RFC 7999
  - Other communities can be used instead
- The upstream network (IXP) discards all traffic destined for this prefix



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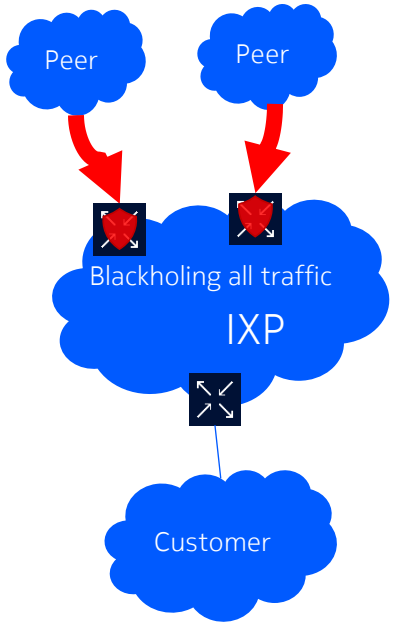
How do IXPs handle DDoS?

Approach 1: Blackholing

- Supported by most IXPs today, including CATNIX, DE-CIX and ESPANIX
- Customer needs to detect the attack and request the blackholing to the IXP using BGP
- All or nothing mitigation: the IXP discards all traffic destined for this prefix, including good and bad traffic



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Approach 2: Blackholing Advanced

- Introduced by DE-CIX
- Customer can drop, shape or whitelist specific protocols and ports using extended BGP communities
- Customer needs to detect the attack and request the required actions to the IXP using BGP
- Reasonably selective on what to drop, shape or whitelist
- Very hard to implement

Rule	Drop Community	Shape Community (5Mbps)
All traffic	RT:6695:4200000000	RT:6695:4200000001
UDP	RT:6695:4200000002	RT:6695:4200000003
UDP, source port = 0 (unassigned)	RT:6695:4200000004	RT:6695:4200000005
UDP, source port = 19 (CharGen)	RT:6695:4200000006	RT:6695:4200000007
UDP, source port = 53 (DNS)	RT:6695:4200000008	RT:6695:4200000009
UDP, source port = 123 (NTP)	RT:6695:4200000010	RT:6695:4200000011
UDP, source port = 389 (LDAP)	RT:6695:4200000012	RT:6695:4200000013
UDP, source port = 11211 (Memcached)	RT:6695:4200000014	RT:6695:4200000015

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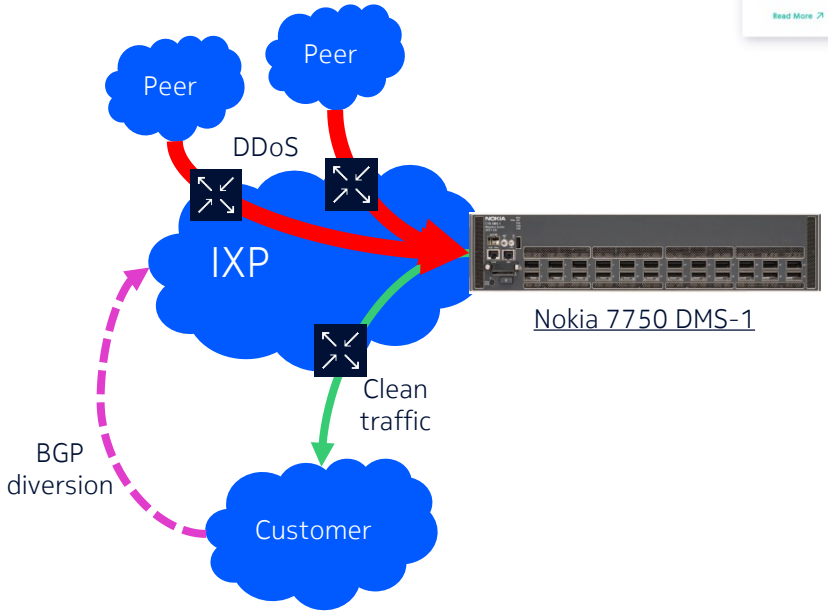
How do IXPs handle DDoS?

Approach 3: On demand scrubbing

Link to press release

- Introduced by LINX
- Customer detects the attack and requests cleaning using BGP communities
- Traffic is diverted to the scrubber, which analyzes the traffic and performs the required cleaning
- Clean traffic is routed back to customer



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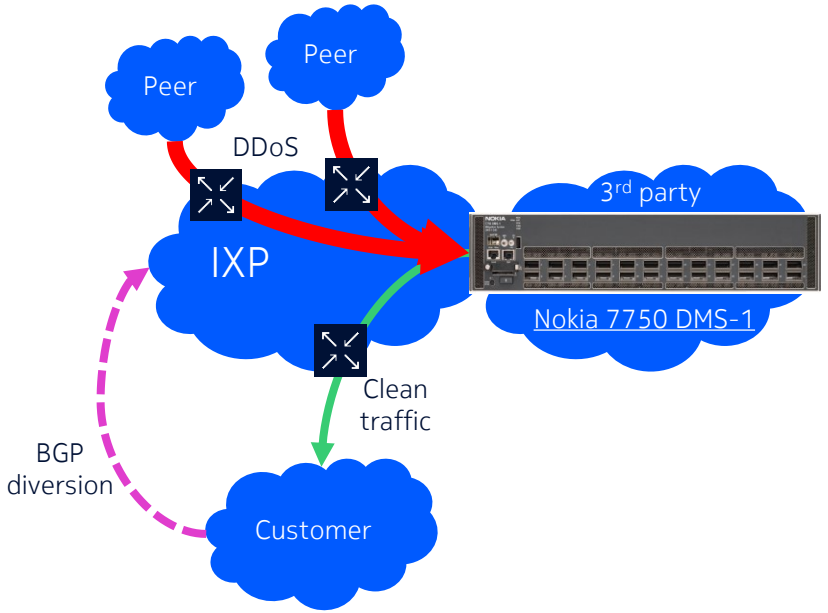
Approach 4: On demand scrubbing provided by 3rd party

- 3rd party takes care of scrubber/cleaning
- Customer detects the attack and requests cleaning using BGP communities
- Traffic is diverted to 3rd party for cleaning
- Clean traffic is routed back to customer



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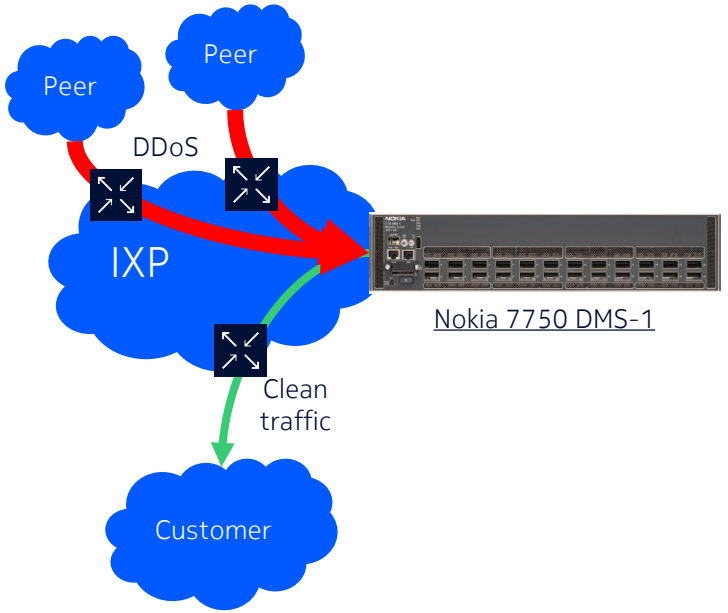
How do IXPs handle DDoS?

Approach 5: Automated scrubbing

- Customer does not need to detect the attack, it is detected automatically by the IX
- Traffic is diverted to the scrubber, which analyzes the traffic and performs the required cleaning
- Clean traffic is routed back to customer



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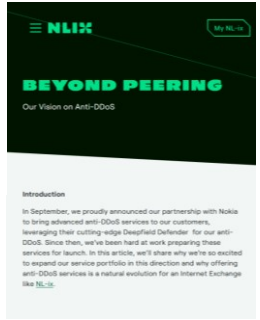
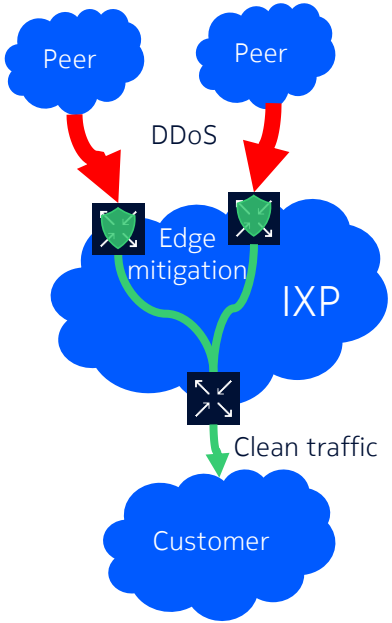
How do IXPs handle DDoS?

Approach 6: Automated edge mitigation

Link to blog post



- Introduced by NL-ix
- Customer does not need to detect the attack, it is detected automatically by the IX
- No scrubbing appliance needed, no diversion needed
- DDoS is mitigated by the existing network devices
- Clean traffic is routed normally



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DDoS protection model recap

Customer's perspective

	Blackholing	Blackholing Advanced	On-demand scrubbing	On-demand scrubbing (3rd)	Automated scrubbing	Automated edge mitigation
Who detects	Customer	Customer	Customer	Customer	IXP	IXP
Mitigation	All or nothing	Complex	Full	Full	Full	Full
Automation	Partial	Partial	Partial	Partial	Full	Full
Scalability	Peering capacity	Peering capacity	2.8 Tbps	2.8 Tbps	2.8 Tbps	Peering capacity

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DDoS protection model recap

IXP's perspective

	Blackholing	Blackholing Advanced	On-demand scrubbing	On-demand scrubbing (3rd)	Automated scrubbing	Automated edge mitigation
Network requirements	Basic equipment	Powerful filtering	Basic equipment	Basic equipment	Basic equipment	Powerful filtering
Integration requirements	Easy	Medium	Easy	Easy	Easy	Easy
Customer perception	Poor	Medium	Good	Good	Good	Good
Cost	Low	Low	Medium	Low (3rd party)	Medium	Medium
Revenue	None	None	Good	Medium	Good	Good

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