Trusted Networks Initiative to Combat DDoS Attacks

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System & Network Engineering

Research Project 1

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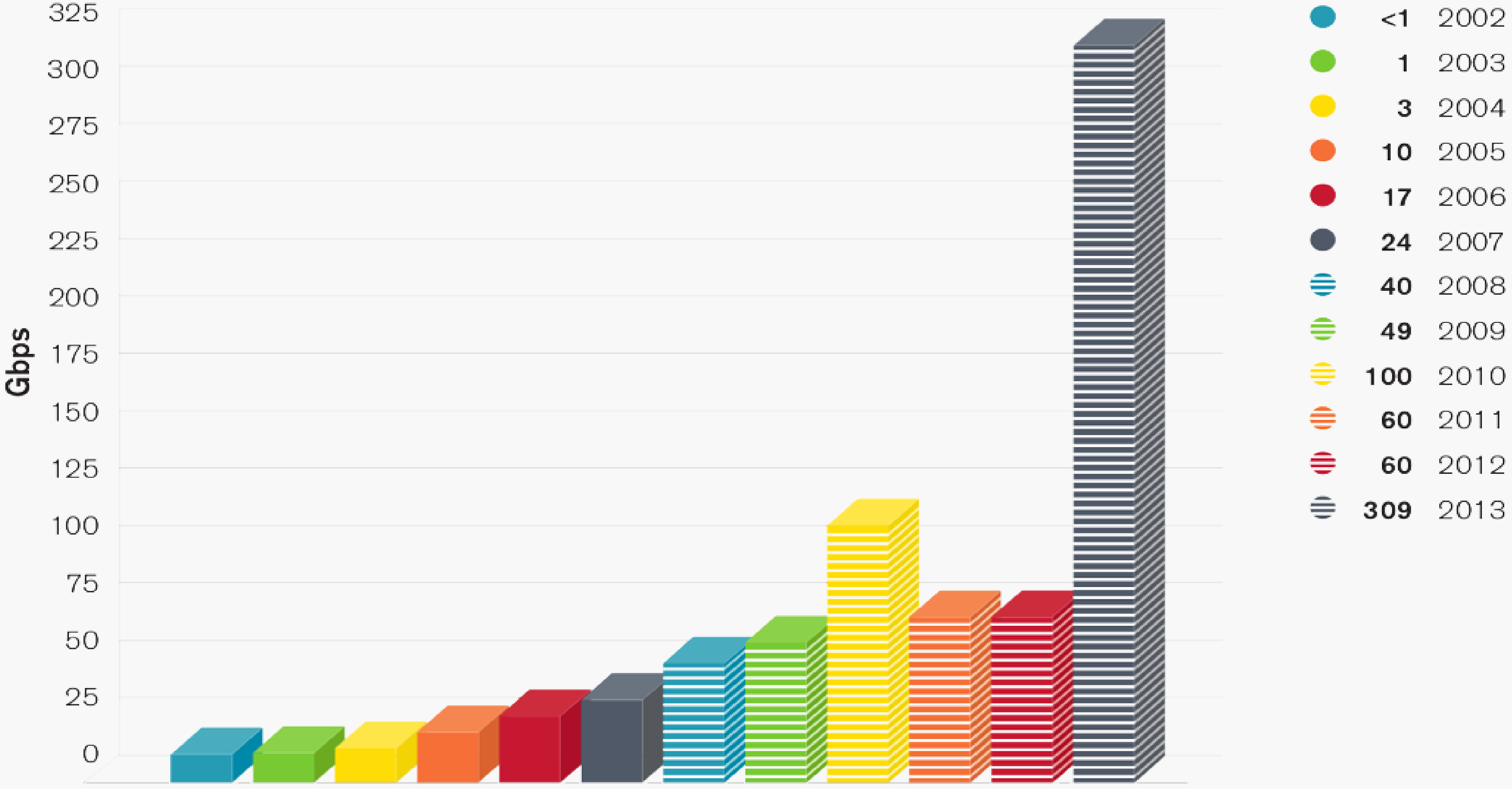
Research Question

Is the "**Trusted Networks Initiative**" a **feasible additional solution** in **protecting hosts and networks** from large and/or **long lasting DDoS attacks**?

Problem Description

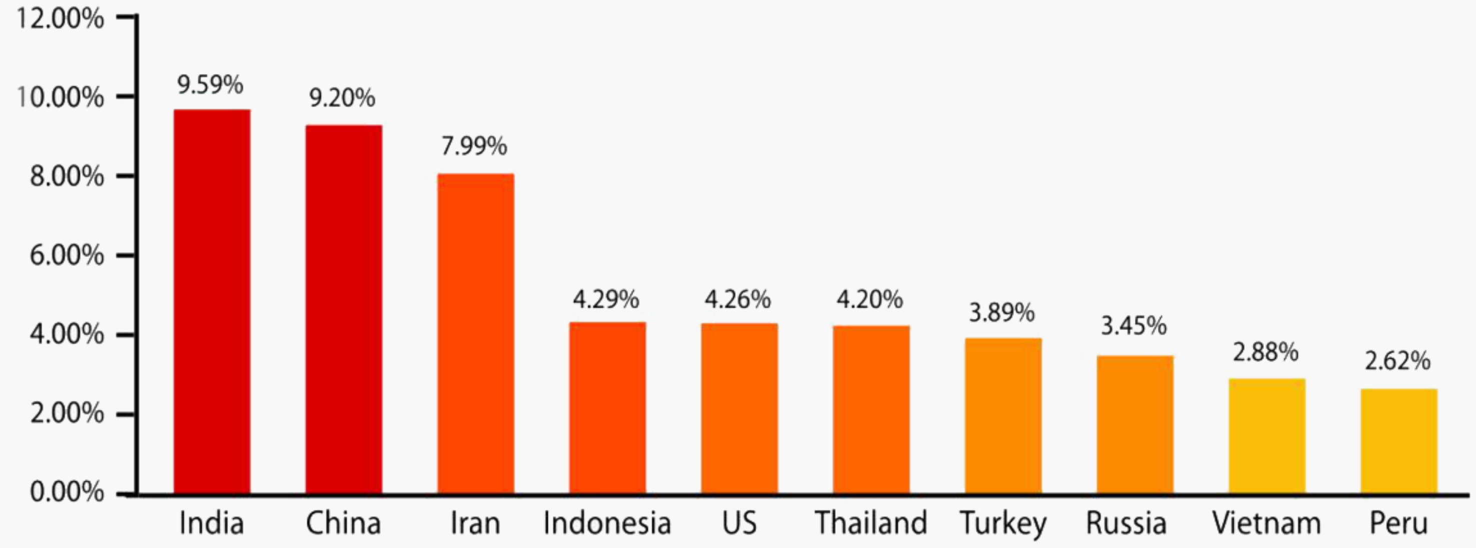
- The **size** of DDoS attacks keeps increasing
- Mitigation **costs** are also increasing
- **No short term answer** to this growing threat

Size of largest reported DDoS attacks



Source: Arbor Networks Worldwide Infrastructure Security Report, 2014

Top 10 countries of origin Q1 2014



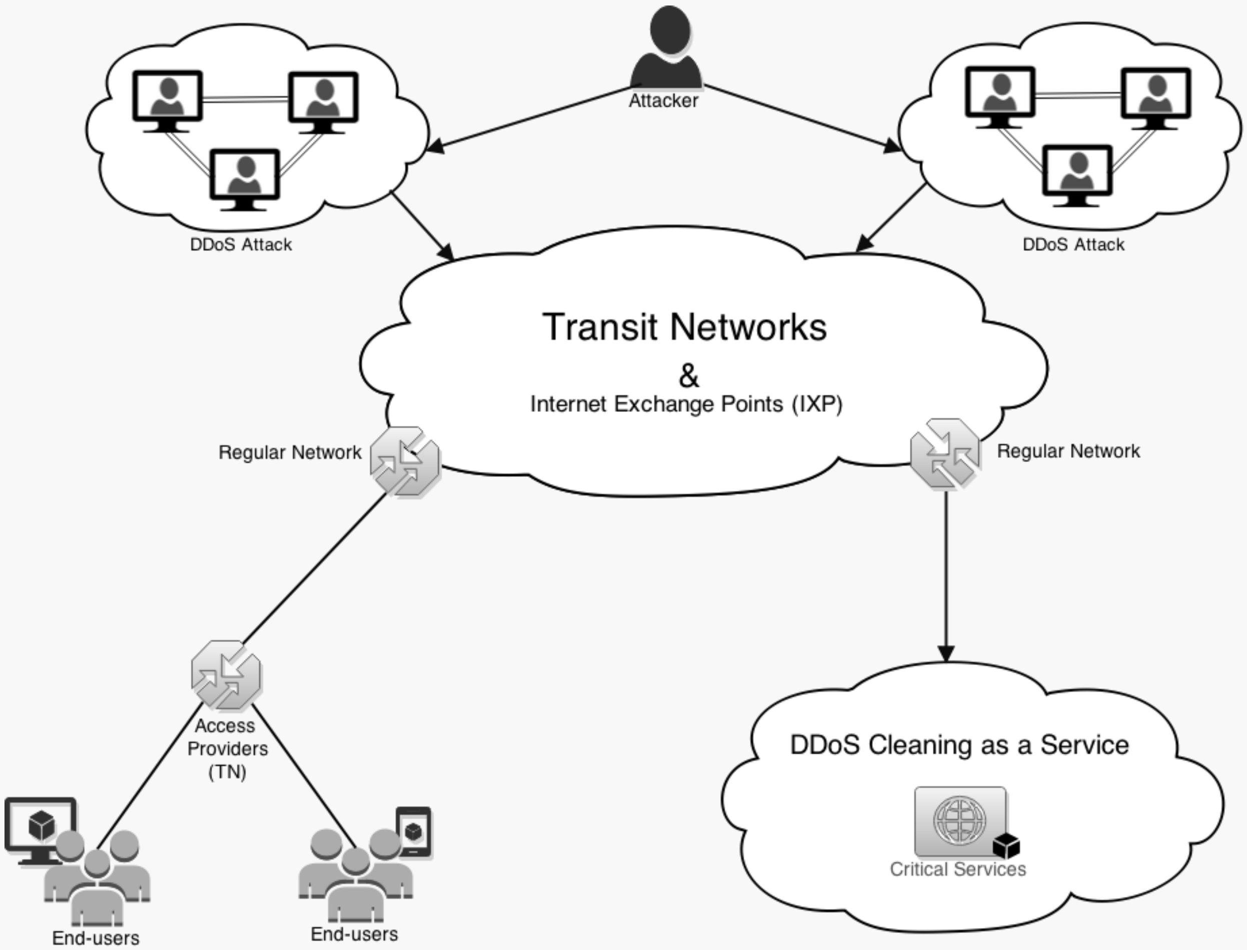
Source: Incapsula Top 10 DDoS Attack Trends of 2014

DDoS Types & Mitigation Solutions

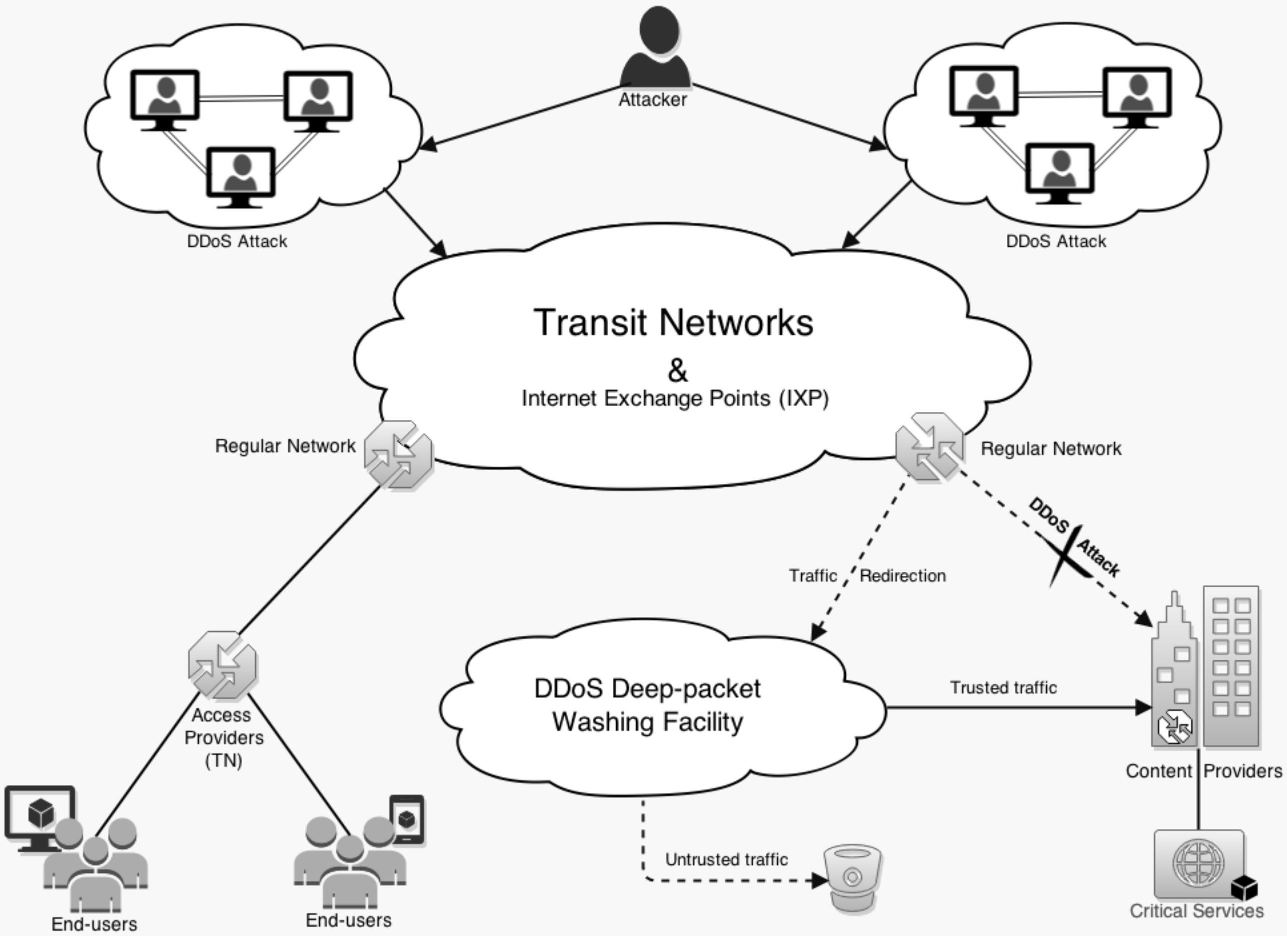
- **Attack types**
  - Volumetric Attacks
  - Application Layer Attacks

- **Mitigation Solutions**
  - Layer 3/4
  - Layer 7

DDoS Layer 7 Mitigation Solution



DDoS Layer 3/4 Mitigation Solution



Disadvantages

- **Legitimate traffic discarded** along with attack traffic
- Up to **30 minutes activation** time is too long
- **Privacy issues** when serving https:// websites
- High **cost**
- The industry is always **one step behind** the attackers

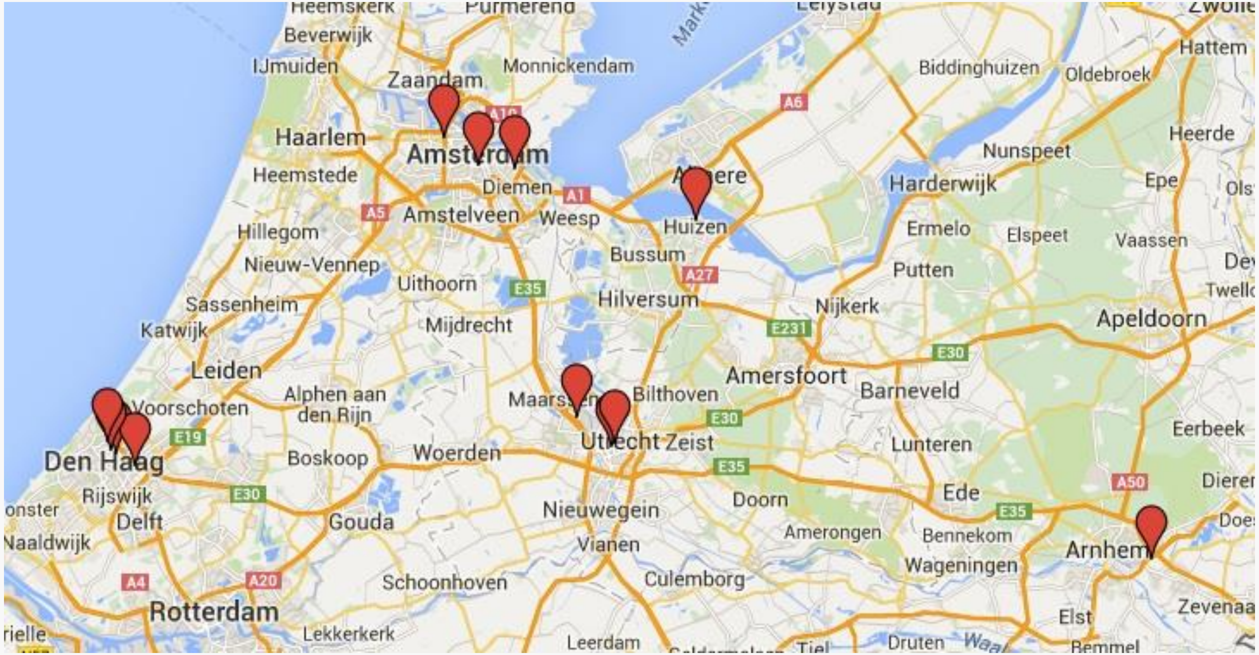
Trusted Networks Initiative Concept

- A **temporary last resort** solution for DDoS attacks
- Dutch, **internationally oriented** initiative
- In **combination** with other Mitigation Solutions
- **Trusted Routing** to provide a secure interconnection for **Trusted Networks**
- Temporarily separate traffic from **Trusted** and **Untrusted Networks**

Trusted Networks Initiative Concept

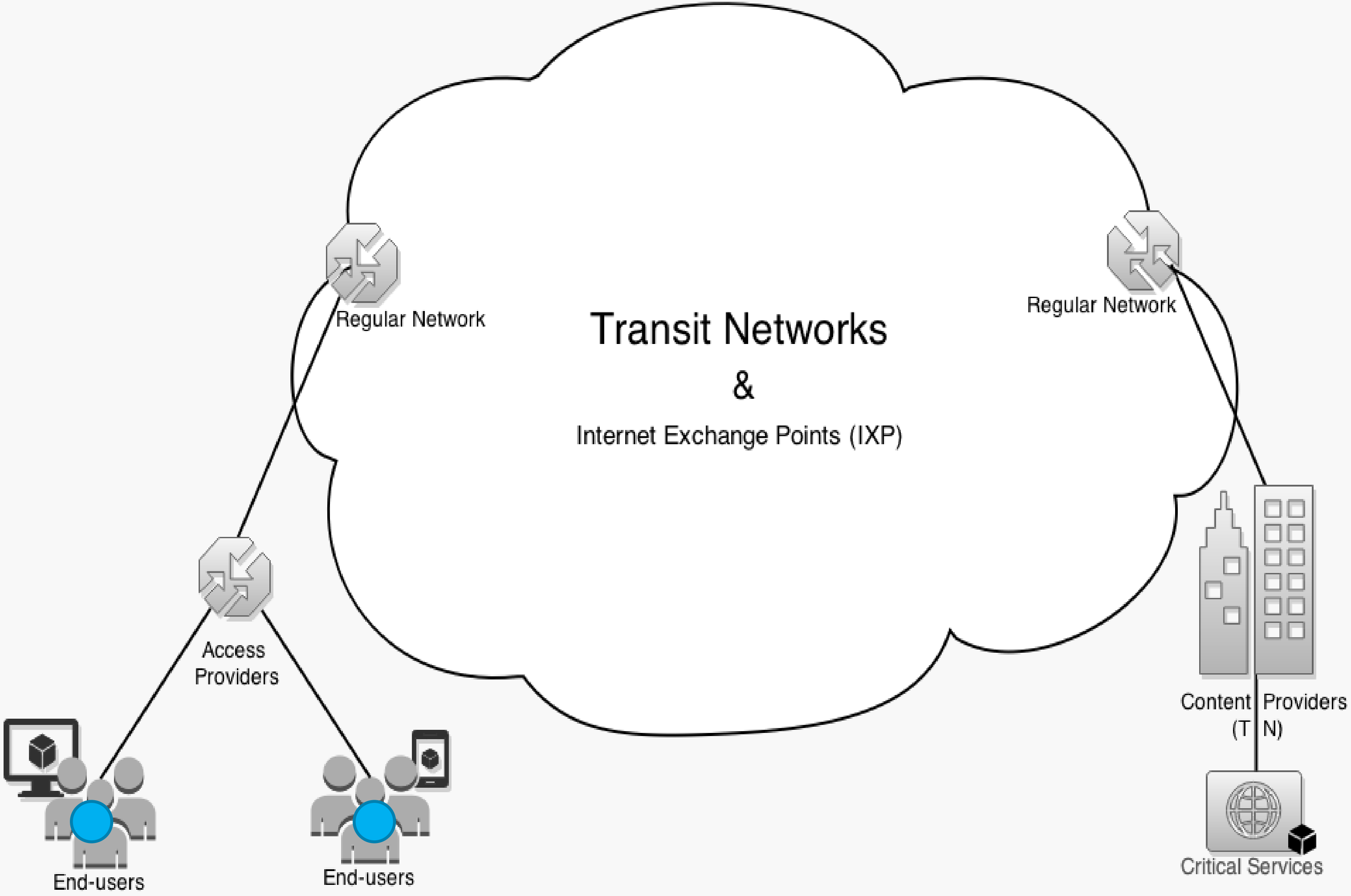
- Responsibility for **proper Networking**
  - Advertise only **valid prefixes**
  - **Ingress Filtering** (address spoofing)
- **24/7 Collaboration** between participants
- **Forensic Investigation** on DDoS Attacks

Participants



NLnet, The Hague Security Delta, AMS-IX, NL-ix, XS4ALL, ASP4ALL, KPN, Ziggo, UPC, SIDN Labs, SURFnet, Ministry of Justice and Rabobank.

Normal Routing, no DDoS Attack



Transit Networks

&

Internet Exchange Points (IXP)

Regular Network

Regular Network

Access Providers

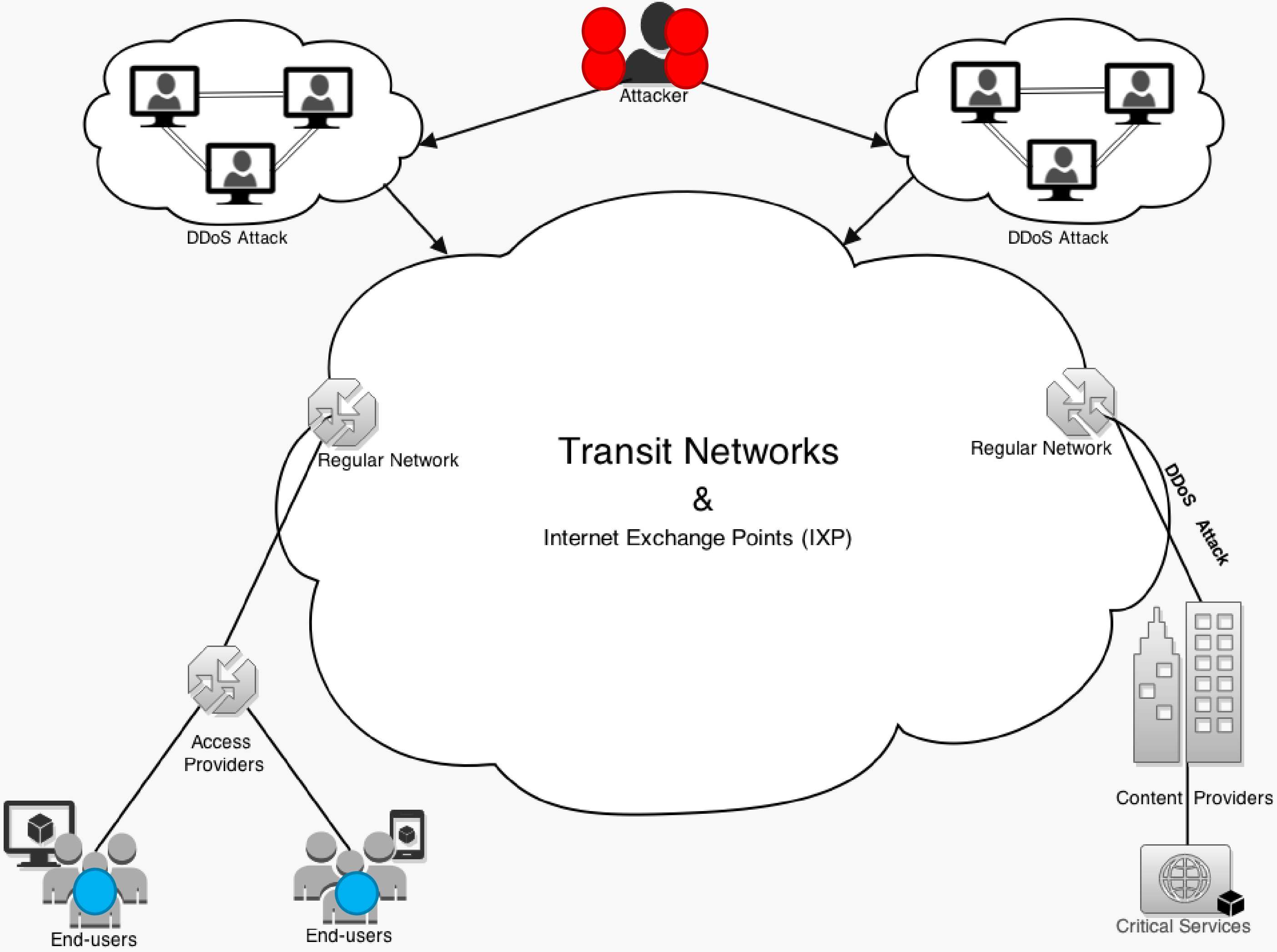
End-users

End-users

Content Providers (T N)

Critical Services

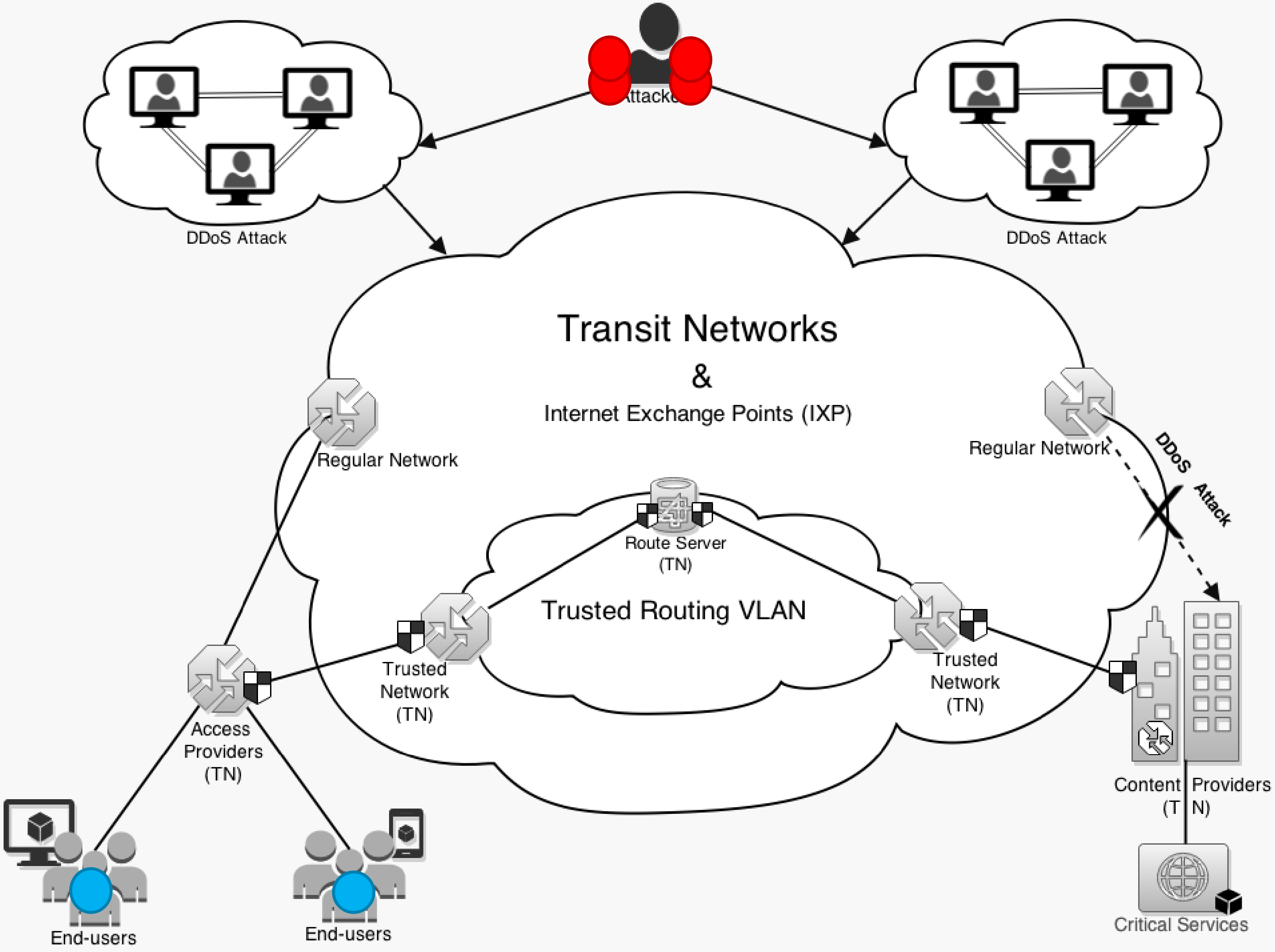
Under DDoS Attack


Attacker
DDoS Attack
DDoS Attack
Regular Network
Transit Networks
&
Internet Exchange Points (IXP)
Regular Network
DDoS Attack
Access Providers
End-users
End-users
Content Providers
Critical Services

How to mitigate a large DDoS Attack?

Trusted Routing

- **Scenarios**
  - On emergency Activation
  - Always On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DDoS Attack
DDoS Attack
Transit Networks
&
Internet Exchange Points (IXP)
Regular Network
Regular Network
DDoS Attack
Route Server
(TN)
Trusted Routing VLAN
Trusted
Network
(TN)
Trusted
Network
(TN)
Access
Providers
(TN)
Content Providers
(TN)
End-users
End-users
Critical Services

Technical Analysis

- Uses **already existent** infrastructure and technology
- Traffic segregation via **AS Numbers** and **IP ranges** through **BGP-4 routers**
- Implementation of Anti-Spoofing with **BCP 38**

Conclusions

- DDoS attacks’ **severity** increases
- Trusted Networks Initiative is a **feasible additional solution**
- Critical services **available** to end-users even under attack
- Strong future **marketing** point

However

- Participants need to reach a consensus on its **purpose**
- **Policies** need to be finalized and **timeframes** to be specified
- **Mobile Carriers** as Trusted Networks

Thanks for your attention!

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