What is CloudFlare?

- CloudFlare makes websites faster and safer using our globally distributed network to deliver essential services to any website

- Performance
- Content Optimization
- Security
- Analytics
- Third party services
How does CloudFlare Work?

• CloudFlare works at the network level.
  • Once a website is part of the CloudFlare community, its web traffic is routed through CloudFlare’s global network of 24 (and growing) data centers.
  • At each edge node, CloudFlare manages DNS, caching, bot filtering, web content optimization and third party app installations.
IPv4/IPv6 – automatically enabled

- With the Internet's explosive growth and the number of on-net devices closing in on IPv4’s maximum capacity, CloudFlare now offers an automatic IPv6 gateway seamlessly bridging the IPv4 and IPv6 networks
  - For most businesses, upgrading to the IPv6 protocol is costly and time consuming
  - CloudFlare’s solution requires NO hardware, software, or other infrastructure changes by the site owner or hosting provider
  - Enabled via the flip of a switch on the site owner’s CloudFlare dashboard
  - Users can choose two options: (FULL) which will enable IPv6 on all subdomains that are CloudFlare Enabled, or (SAFE) which will automatically create specific IPv6-only subdomains (e.g. www.ipv6.yoursite.com)
Anycast CDN

• Anycast prefixes
  • Same IP prefixes (IPv4 & IPv6) advertised in each of the 24 sites around the world (and growing)
  • Unicast used to pull traffic from “origin” web source

• Traffic Control
  • How the eyeball ISP routes
  • If ISP A routes to CloudFlare in Germany then traffic will be served for ISP A from Frankfurt
  • If ISP B routes to CloudFlare in Central USA then traffic will be served for ISP B from Dallas or Chicago
Anycast CDN

• Traceroute from Hong Kong
  traceroute to 173.245.61.248 (173.245.61.248), 30 hops max, 40 byte packets
  1  202-150-221-169.rev.ne.com.sg (202.150.221.169) 0.351 ms 0.406 ms 0.456 ms
  2  s4-6-r10.cyberway.com.sg (203.117.6.209) 0.610 ms 0.652 ms 0.692 ms
  3  anuts10.starhub.net.sg (203.118.3.162) 2.579 ms 2.575 ms 2.562 ms
  4  six2uts11.starhub.net.sg (203.118.3.189) 1.452 ms 1.633 ms 1.768 ms
  5  SH.gw5.sin1.asianetcom.net (203.192.169.41) 1.561 ms 1.620 ms 1.610 ms
  6  te0-0-2-0.wr1.sin0.asianetcom.net (61.14.157.109) 2.135 ms 1.921 ms 1.950 ms
  7  gi4-0-0.gw2.sin3.asianetcom.net (61.14.157.134) 1.909 ms 1.907 ms 1.882 ms
  8  CDP-0003.gw2.sin3.asianetcom.net (203.192.154.26) 1.417 ms 1.504 ms 1.493 ms
  9  cf-173-245-61-248.cloudflare.com (173.245.61.248) 1.470 ms 1.461 ms 1.520 ms
  Traceroute Completed.

• Traceroute from Singapore
  traceroute to 173.245.61.248 (173.245.61.248), 64 hops max, 44 byte packets
  1  bbs-1-250-0-210.on-nets.com (210.0.250.1) 0.423 ms 0.329 ms 0.320 ms
  2  10.2.193.17 (10.2.193.17) 0.719 ms 0.661 ms 0.682 ms
  3  peer (218.189.96.62) 0.569 ms 0.550 ms 0.545 ms
  4  cloudflare-RGE.hkix.net (202.40.160.246) 1.893 ms 2.419 ms 1.910 ms
  5  cf-173-245-61-248.cloudflare.com (173.245.61.248) 2.101 ms 1.973 ms 1.780 ms
  Traceroute Completed.

• Traceroute from Dubai
  traceroute to 173.245.61.248 (173.245.61.248), 64 hops max, 52 byte packets
  1  10.50.0.1 (10.50.0.1) 7.423 ms 56.679 ms 23.776 ms
  2  94.200.91.194 (94.200.91.194) 22.342 ms 35.165 ms 9.889 ms
  3  10.171.0.49 (10.171.0.49) 20.604 ms 28.953 ms 24.390 ms
  4  10.128.144.29 (10.128.144.29) 24.678 ms 6.069 ms 5.836 ms
  5  10.44.19.177 (10.44.19.177) 9.389 ms 7.570 ms 8.151 ms
  6  10.44.247.89 (10.44.247.89) 6.074 ms 6.196 ms 8.031 ms
  7  94.201.0.65 (94.201.0.65) 6.074 ms 14.462 ms 11.681 ms
  8  10.44.24.58 (10.44.24.58) 194.345 ms 162.052 ms 199.916 ms
  9  * * *
  10  cf-173-245-61-248.cloudflare.com (173.245.61.248) 152.790 ms 167.038 ms 143.949 ms
  11  Traceroute Completed.
Anycast CDN

- DNS Query

- DNS result returned with “Anycast” IP

- Client makes connection to closest server

- CloudFlare replies

- Outage Re-routes to next closest cluster
Transit
Transit

• Who?

  • Choice of Transit Provider is VERY important
  • We’ve chosen one provider per region – One in US/EU and one in Asia (or the same provider for both regions)
  • Single Provider makes routing easier
  • Transit provider should offer good routing controls
    • You need to be able to keep routes within a region
    • Prepend to specific peers
  • Transit Provider should make use of “Hot Potato” routing to their peers
    • i.e. Peer and exchange traffic in every mutual location
Transit

• Routing Controls?
  • Transit must be able to keep advertisements within region.
    • A customer of your European transit provider is likely to be a peer of your Asian transit provider
    • You don’t want to serve traffic from Asia for Europe
  • A lot of work should be done in the presales stage to understand the providers network and how they peer.

• Example location to look for controls
  • Looking at AS1299’s (Telia-Sonera) whois entry gives a good idea how they peer
  • Some routing controls listed at http://www.onesc.net/communities/
Transit

• Choices?

• Many providers give you good coverage for common US/EU locations (LA, New York, London, Amsterdam, etc ... )

• One provider can’t do it all in Asia

• Asian networks are usually somewhat ‘disconnected’
  • Few peer with NTT in Asia & NTT, Pacnet and TATA are all disconnected from each other

• Transit in the US/EU could be far cheaper for the provider than within Asia or Africa or Middle East

• Supplement this with peering in all regions
Peering
Peering

• North America Peering
  • Is it economic to peer?
  • Transit is < $1
  • Eyeball networks probably *won't* peer with you
    • Comcast (not at any exchange)
    • ATT
  • South America?
    • Peering in Miami
    • Most networks open to peering

• EU Peering
  • Same argument as US, might be more costly to peer
  • Many networks open to peering however
  • Major providers / incumbents more difficult, probably won't peer:
    • DTAG, TeliaSonera
    • Telecom Italia Sparkle
    • Telefonica, France Telecom
  • IX’s have good reach to surrounding regions.
    • AMS-IX, DE-CIX, NETNOD, LINX

• Asia Peering
  • Very economical; however large providers may not peer
  • HKIX and Hong Kong Equinix
    • No IX charges and HKIX will get you 100% of domestic Hong Kong.
  • Very good Vietnam and some Taiwan, Korea, Japan and China routes too
  • Singapore Equinix
    • Priced competitively and great coverage for South East Asia (Indonesia, Thailand, Malaysia, India)
  • Tokyo Japan
    • JPIX and JPNAP much more costly
Challenges
Challenges

• Challenges
  
  • Routing
    
    • Inefficient routing, optimizing.
    
    • Turning up peering, causing unexpected routing changes
    
    • Russian Network preferred our routes via HKIX instead of in Europe.
    
    • Keeping optimal routing to Eyeball Networks
  
• Deployments into new markets
  
  • China, South America, Africa, Middle East
Questions?