Anycast in Internet Service Provider Environment

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Introduction

- **What is Anycast?**
  - *Basis for large-scale content-distribution networks since early 90’s*
  - *Configuration methodology that provides redundancy and load sharing to specific types of network services on the Internet*
  - *Assigns a common IP address to multiple instances of the same service*
Introduction

- Anycast implementation
  - Local server cluster, global network or global network of clusters
  - Does not interfere with the existing network, it leverages it
  - Clients, server and routers require no special software or firmware
Introduction

- How does Anycast work from a routing point of view?
  - Using multiple sites across the network
  - Single announcement over internet
  - Chosen site is determined by routing and network topology
  - Internal routing decision based on IGP/BGP
Introduction

- How does Anycast work from a system point of view?
  - Multiple nodes are configured to accept traffic on single IP address
  - One node receives each packet
  - The node that receives the packet is determined by unicast routing & load balancing algorithm
**Introduction**

- **Why Anycast?**
  - Services Load balancing
  - System reliability
  - Low latency
  - Best path selection
  - Transparency for end users
Normal Behaviour?

Best Path? Using MED for the choice..

ISP/PEER

Subscriber A

Subscriber B

Traffic goes back to subscriber..

Site A

Site B

Border A

Border B

Load balancing based on server Load..

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But then?

Subscriber A

Subscriber B
Using different Provider..

Packets forwarded
To the shortest path

Best Path?
Using MED for the choice..

ISP/PEER

Border A

Border B

Site A

Site B

Internal path lookup..

AS30781

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And then failure ..

Packet must be Forwarded to backup site
Traffic for Subscriber B Still goes to the same site

Primary site for Subscriber A fail.
Traffic now goes To the backup site ..

All customers are now Happy :D
Server redundancy..

- The request is sent back to the subscriber with the right IP address (DR).
- Packets are travelling over the network to reach the VIP IP address..
- The request comes to the Load Balancer.
- The Load Balancer will choose the least used server for the connection.

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Server Failure ...

The request comes to the Load Balancer.
The Load Balancer will detect the failure on the server and will remove it from the pool.

Packets are travelling over the network to reach the VIP IP address.

The request is then sent back to the subscriber by the new server with the right IP address.

The request is then sent to the new server in the pool.
What about management?

- Services Synchronisation & Systems backups
- Protocol Filtering
- Site A
- AS30781
- Production Only
- Network Operation Centre
- IPv4 MGMT
At the end anycast is ...

- ... Quick, reliable, dependable

- ... Necessity for any web based company that depends on web-site accessibility and uptime

- ... Very efficient DDOS attack method, enables constant server availability and flawless performance of the servers while being attacked

- ... Improves “cloud computing” based services (Software as a Service, GRID-utility modeling etc.)
Questions ?

Thanks for listening !
Any Questions / Comments ?
- Concept discussed in RFC1546
- Evolution of unicast documented in RFC2101
- Anycast DNS documented in RFC2181
- Anycast authoritative name service documented in RFC3258
- Anycast multicast RP documented in RFC3346
Related documents (IPv6)

- Anycast Architecture RFC3513 was RFC1884
- Reserved IPv6 Anycast addresses RFC2526
- Anycast IPv4 prefix for 6to4 gateway RFC3068
- Source address selection RFC3484
- IPv6 Anycast DHCP services RFC3315