

BGP and the Internet

Co-location practises overseas

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 1

Why Co-locate Overseas?

- Hard to re-terminate transoceanic circuit in case of “issues” with upstream ISP
- No Quality of Service
- No Control over infrastructure
- No Monitoring of link performance

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 2

Co-location Overseas

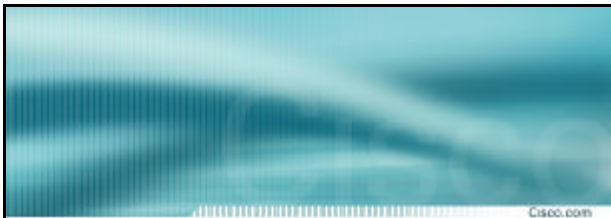
- Many ISPs outside the US and Western Europe co-locate equipment in the US and/or Western Europe
 - install their own router(s) and other hardware (servers, caches,...)
 - establish peering relationships with regional NSPs and domestic ISPs
 - buy facilities management services
 - usually hardware maintenance, installation management

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 3

Co-location Overseas

- Many ISPs outside the US and Western Europe co-locate equipment in the US and/or Western Europe
 - US/EU domestic circuits are “cheap”
 - Easy to change your upstream
 - Easy to have multiple upstreams
 - Easy to implement QoS related features, service differentiation, etc...

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 4



Co-location

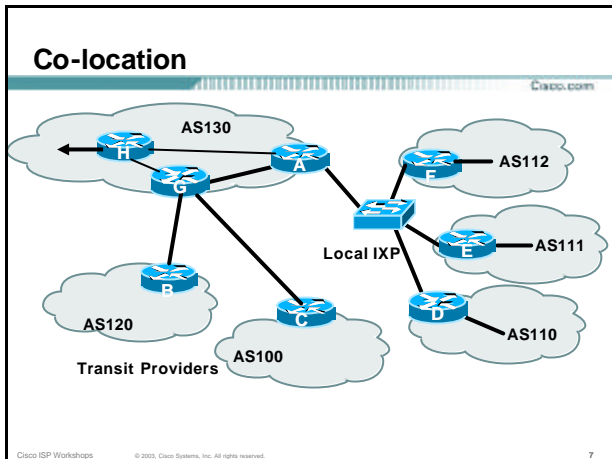
Simple Example

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 5

Co-location

- Common Scenario:
 - AS130 has co-locate space in the US
 - AS120 and AS100 are transit providers for AS130
 - AS130 is also present at the local exchange point for regional peers

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 6



Co-location

- AS130
 - Router A is dedicated to peering at local IXP
 - Router G is dedicated to links with the transit providers
 - Router H is dedicated to the transoceanic link

Cisco.com

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 8

Co-location Router A Configuration

```

interface loopback 0
  description Border Router Loopback
  ip address 221.0.0.1 255.255.255.255
!
interface fastethernet 0/0
  description Exchange Point LAN
  ip address 220.5.10.2 255.255.255.224
  ip verify unicast reverse-path
  no ip directed-broadcast
  no ip proxy-arp
  no ip redirects
!
..next slide
  
```

Cisco.com

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 9

Co-location Router A Configuration

```

interface fastethernet 1/0
  description Crossover 100Mbps Connection to Router G
  ip address 221.0.10.2 255.255.255.252
  no ip directed-broadcast
  no ip proxy-arp
  no ip redirects
!
interface fastethernet 2/0
  description Crossover 100Mbps Connection to Router H
  ip address 221.0.10.6 255.255.255.252
  no ip directed-broadcast
  no ip proxy-arp
  no ip redirects
!
..next slide
  
```

Cisco.com

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 10

Co-location Router A Configuration

```

router bgp 130
  neighbor ixp-peers peer-group
  neighbor ixp-peers soft-reconfiguration in
  neighbor ixp-peers prefix-list myprefixes out
  neighbor 221.0.0.2 remote-as 130
  neighbor 221.0.0.2 description Router G - Upstream Peers
  neighbor 221.0.0.2 update-source loopback 0
  neighbor 221.0.0.3 remote-as 130
  neighbor 221.0.0.3 description Router H - transpacific router
  neighbor 221.0.0.3 update-source loopback 0
  neighbor 221.0.0.4 remote-as 130
  neighbor 221.0.0.4 description Router at HQ
  neighbor 221.0.0.4 update-source loopback 0
  ..next slide
  
```

Cisco.com

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 11

Co-location Router A Configuration

```

neighbor 220.5.10.4 remote-as 110
neighbor 222.5.10.4 peer-group ixp-peers
neighbor 222.5.10.4 prefix-list peer110 in
neighbor 220.5.10.5 remote-as 111
neighbor 222.5.10.5 peer-group ixp-peers
neighbor 222.5.10.5 prefix-list peer111 in
neighbor 220.5.10.6 remote-as 112
neighbor 222.5.10.6 peer-group ixp-peers
neighbor 222.5.10.6 prefix-list peer112 in
!
ip prefix-list myprefixes permit 221.10.0.0/19
ip prefix-list peer110 permit 222.12.0.0/19
ip prefix-list peer111 permit 222.18.128.0/19
ip prefix-list peer112 permit 222.1.32.0/19
  
```

Cisco.com

Cisco ISP Workshops © 2003, Cisco Systems, Inc. All rights reserved. 12

Co-location Router A Configuration

Cisco.com

- Router A does NOT originate AS130's prefix block
 - if router is disconnected from AS130 either locally or across the ocean, announcement could cause blackhole
- Prefix-list filtering is the minimum required
 - usually include AS path filtering too

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

13

Co-location Router G Configuration

Cisco.com

```
interface loopback 0
  description Peering Router Loopback
  ip address 221.0.0.2 255.255.255.255
!
interface fastethernet 0/0
  description Crossover 100Mbps Connection to Router A
  ip address 221.0.10.1 255.255.255.252
  no ip directed-broadcast
  no ip proxy-arp
  no ip redirects
!
..next slide
```

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

14

Co-location Router G Configuration

Cisco.com

```
interface hssi 1/0
  description T3 link to BigISP
  ip address 222.0.0.2 255.255.255.252
  no ip directed-broadcast
  no ip proxy-arp
  no ip redirects
!
interface hssi 2/0
  description T3 link to MegaISP
  ip address 218.6.0.2 255.255.255.252
  no ip directed-broadcast
  no ip proxy-arp
  no ip redirects
..next slide
```

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

15

Co-location Router G Configuration

Cisco.com

```
router bgp 130
  neighbor 221.0.0.1 remote-as 130
  neighbor 221.0.0.1 description Router A - US Local IXP
  neighbor 221.0.0.1 update-source loopback 0
  neighbor 221.0.0.1 prefix-list myprefixes out
  neighbor 221.0.0.3 remote-as 130
  neighbor 221.0.0.3 description Router H - transpacific router
  neighbor 221.0.0.3 update-source loopback 0
  neighbor 221.0.0.4 remote-as 130
  neighbor 221.0.0.4 description Router at HQ
  neighbor 221.0.0.4 update-source loopback 0
..next slide
```

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

16

Co-location Router G Configuration

Cisco.com

```
neighbor 222.0.0.1 remote-as 120
neighbor 222.0.0.1 prefix-list myprefixes out
neighbor 222.0.0.1 prefix-list rfc1918-sua in
neighbor 218.6.0.1 remote-as 100
neighbor 218.6.0.1 prefix-list myprefixes out
neighbor 218.6.0.1 prefix-list rfc1918-sua in
!
ip prefix-list myprefixes permit 221.10.0.0/19
```

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

17

Co-location Router G Configuration

Cisco.com

- Router G accepts full BGP prefixes from both AS120 and AS100
- Router G announces AS130 prefix to upstreams
- Simple Example – policy may also be required for loadsharing etc

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

18

Co-location Router H Configuration

Cisco.com

```
interface loopback 0
  description Peering Router Loopback
  ip address 221.0.0.3 255.255.255.255
!
interface fastethernet 0/0
  description Crossover 100Mbps Connection to Router A
  ip address 221.0.10.5 255.255.255.252
  no ip directed-broadcast
  no ip proxy-arp
  no ip redirects
!
..next slide
```

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

19

Co-location Router H Configuration

Cisco.com

```
interface hssi 1/0
  description T3 link back to home
  ip address 221.1.0.1 255.255.255.252
  rate-limit output access-group 195 ..etc
  no ip directed-broadcast
  no ip proxy-arp
  no ip redirects
!
..next slide
```

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

20

Co-location Router H Configuration

Cisco.com

```
router bgp 130
  neighbor 221.0.0.1 remote-as 130
  neighbor 221.0.0.1 description Router A - US Local IXP
  neighbor 221.0.0.1 update-source loopback 0
  neighbor 221.0.0.2 remote-as 130
  neighbor 221.0.0.2 description Router G - peering router
  neighbor 221.0.0.2 update-source loopback 0
  neighbor 221.0.0.4 remote-as 130
  neighbor 221.0.0.4 description Router at HQ
  neighbor 221.0.0.4 update-source loopback 0
!
```

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

21

Co-location Router H Configuration

Cisco.com

- Router H is dedicated to transoceanic link part of ISP core iBGP mesh
- More complex configuration likely
CAR, RED, etc
- More complex links likely
e.g satellite uplink for low revenue latency insensitive traffic

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

22

Co-location

Cisco.com

- Richer interconnectivity possible
- Better redundancy possible
- Overall advantage – control!

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

23

BGP and the Internet

Co-location practises overseas

Cisco ISP Workshops

© 2003, Cisco Systems, Inc. All rights reserved.

24