BGP and the Internet

Co-location practises overseas

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

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**

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...**

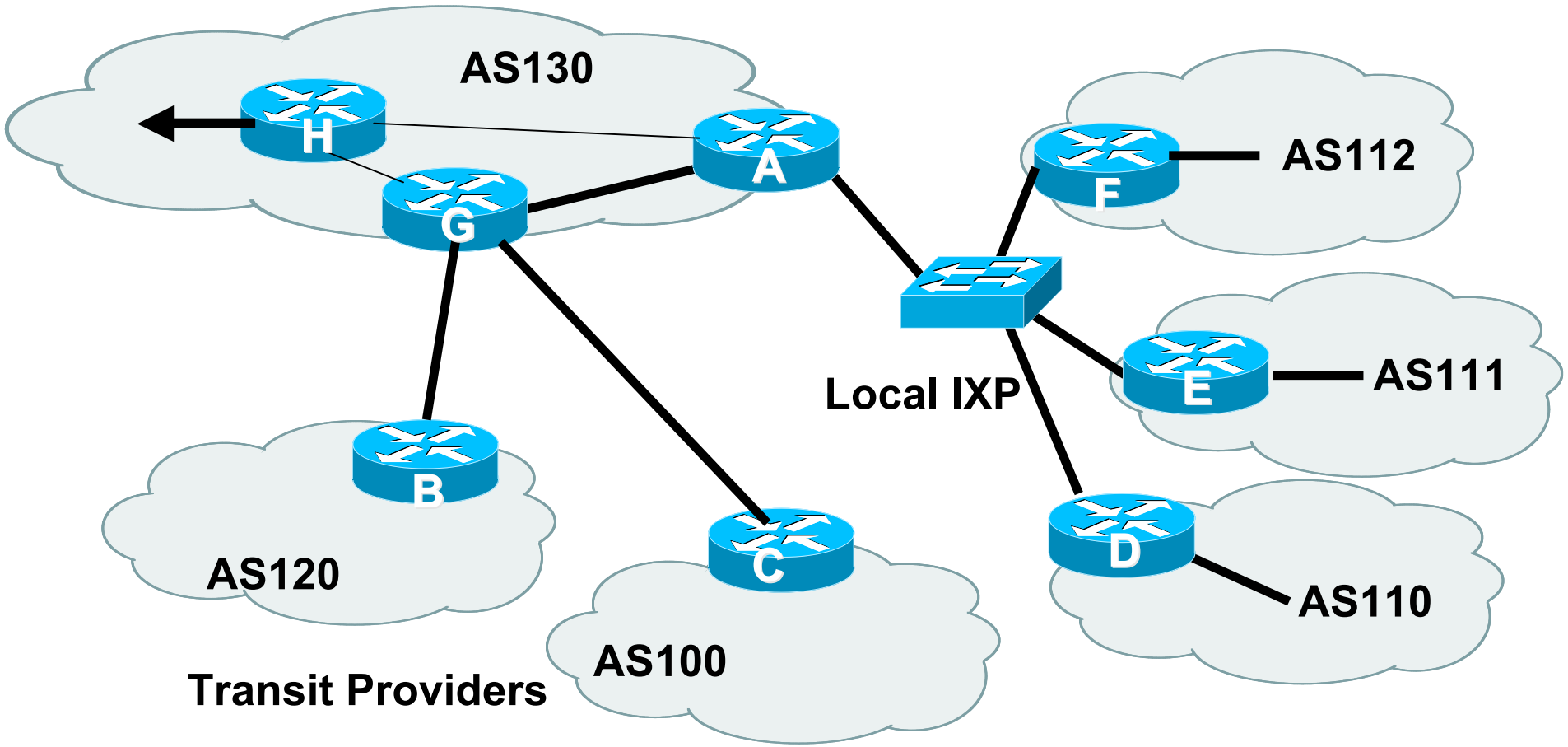
Co-location

Simple Example

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**

Co-location



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**

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

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

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
```

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
```

Co-location
Router A Configuration

- **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**

Co-location
Router G Configuration

```
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
```

Co-location
Router G Configuration

```
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
```

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Co-location
Router G Configuration

```
router bgp 130
 neighbor 221.0.0.1 remote-as 130
 neighbor 221.0.0.1 description Router A - US Local IXP
 neigbhor 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
```

Co-location
Router G Configuration

```
 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
```

Co-location
Router G Configuration

- 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

Co-location
Router H Configuration

```
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
```

Co-location
Router H Configuration

```
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
```

Co-location
Router H Configuration

```
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
!
```

Co-location
Router H Configuration

- **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**

Co-location

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

BGP and the Internet

Co-location practises overseas