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ROUTING PROTOCOL AND ROUTING DOMAIN

Some basic definitions
In the Protocol Architecture

Internet routing architecture - 4
Routing Protocol

Protocol for routers to exchange information on the network to determine the best route to each destination

Based on routing algorithm
Define metric(s)
Their encoding in packets
Specific timing
Configurable parameters
Routing Domain

- A set of routers deploying the same routing protocol
- It is a connected portion of the network
Redistribution

→ A router may belong to multiple routing domains

→ It uses multiple routing protocols

→ It can redistribute information learned with a protocol through another one
Redistribution Policies

- Defined by administrator
- Advertisement filters
- Metric conversion
- Information source priority
AUTONOMOUS SYSTEM
What

→ A set of subnets grouped based on
  → Topology
  → Organizational criteria
→ E.g. the subnets of a large internet service provider
Why

- Addressing and routing tightly coordinated
- Possibly multiple internal routing domains
- Controlled AS interfacing
- Data
- Routing information
→ Administration
→ Autonomous internal routing choices
→ Negotiated external routing choices
→ Scalability
→ Not all information propagated everywhere
How

Exterior gateway
Border gateway
Boundary router

Interior gateway

AS 367

AS 82

AS 1534

IGP

EGP

Internet routing architecture
Identification

- Two byte number
- Assigned by IANA (Internet Assigned Numbers Authority)
- Private number range
  - 64512–65534
- Controlled routing information exchange
Administration Aspects

Announcements determine data flows
Exterior Routing

- Not necessarily shorter path
- Choice based on policies
- Reflect agreements among ASs
Scalability

- Destinations can be aggregated

- 195.1.2.0/24 and 195.1.3.0/24 can be announced as 195.1.2.0/23

- Hierarchical routing
Internet Routing Architecture

Client-provider

Private peering

Tier 1 ISP

Tier 2 ISP

Tier 3 ISP

Tier 1 ISP

Tier 2 ISP

Tier 3 ISP

Tier 1 ISP

Tier 2 ISP

Tier 3 ISP

Tier 2 ISP

Tier 3 ISP
Internet Routing Architecture

- Tier 1 ISP
- Tier 2 ISP
- Tier 3 ISP

Client-provider

NAP/IXP

Private peering
Internet Routing Architecture

- Tier 1 ISP
- Tier 2 ISP
- Tier 3 ISP

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Private peering
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Neutral Access Point (NAP) Internet eXchange Point (IXP)

- A LAN to which routers of different AS’s (ISPs) connect
- Pairs of routers exchange routing information
- Possibly using BGP
Physical Topology

- Ethernet switch
- Router
- High speed link