Addressing Networks

Sunny Chendi

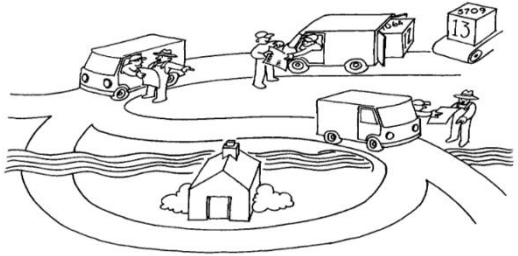
NPSIG 2018, 19-20 January, Kathmandu

APNIC

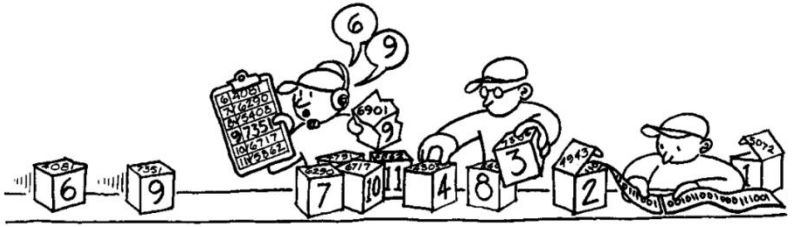
Sending data over the Internet

Data is sent over the Internet in discrete packets

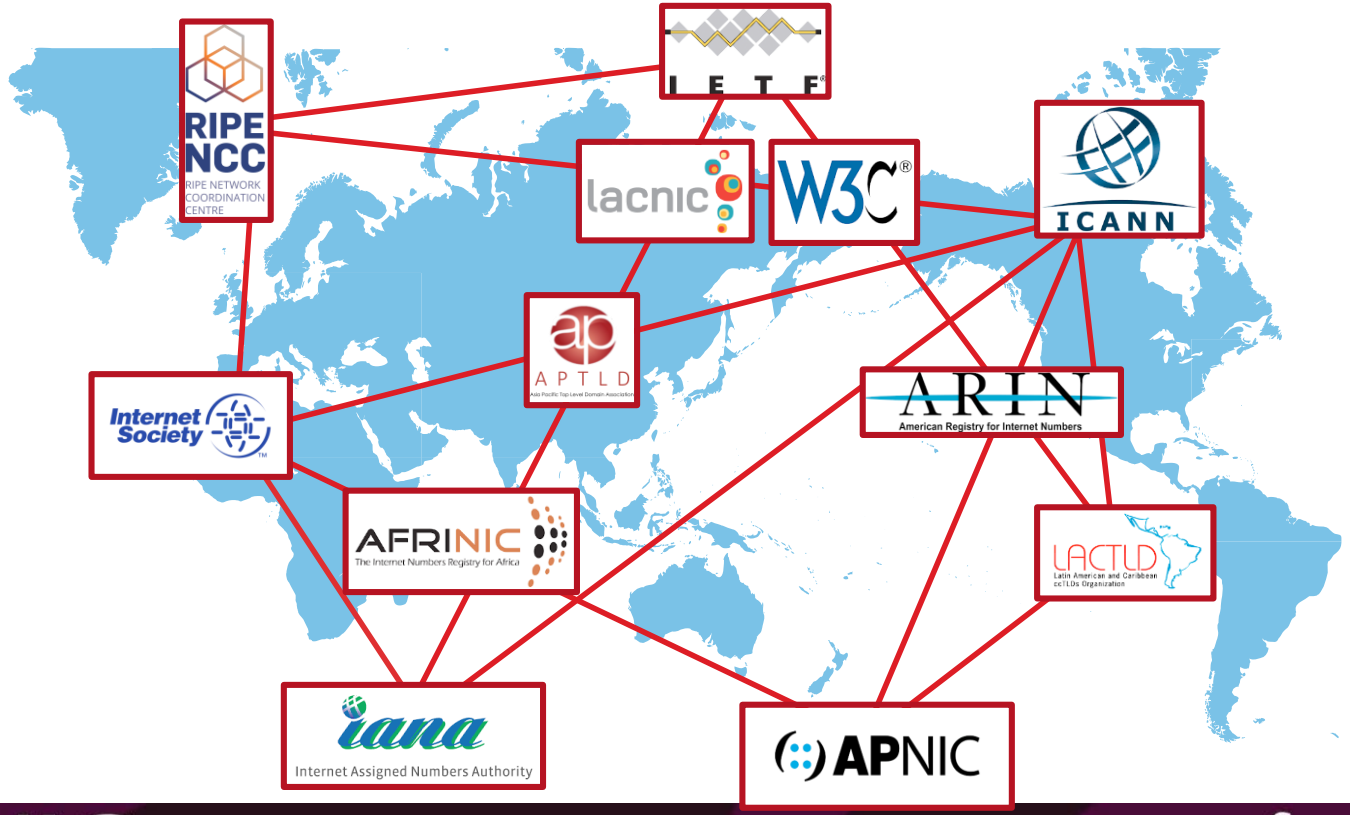
Packets are sent from ‘source’ to ‘destination’



Every source and destination in the Internet must have an IP address



I* Ecosystem


RIPE NCC
RIPE NETWORK COORDINATION CENTRE
IETF
lacnic
W3C
ICANN
APTLD
Asia Pacific Top-Level Domain Association
Internet Society
ARIN
American Registry for Internet Numbers
AFRINIC
The Internet Numbers Registry for Africa
LACTLD
Latin American and Caribbean ccTLDs Organization
iana
Internet Assigned Numbers Authority
APNIC

IPGO

1. Magic Box: critical Internet resources

BINARY
DECIMAL
AS
00000001
001
VENUS
DEVICE
ECONOMY

00010000
016
VENUS
ROUTER

00000000	00000000
00000001	00000001
00000010	00000010
00000011	00000011
00000100	00000100
00000101	00000101
00000110	00000110
00000111	00000111

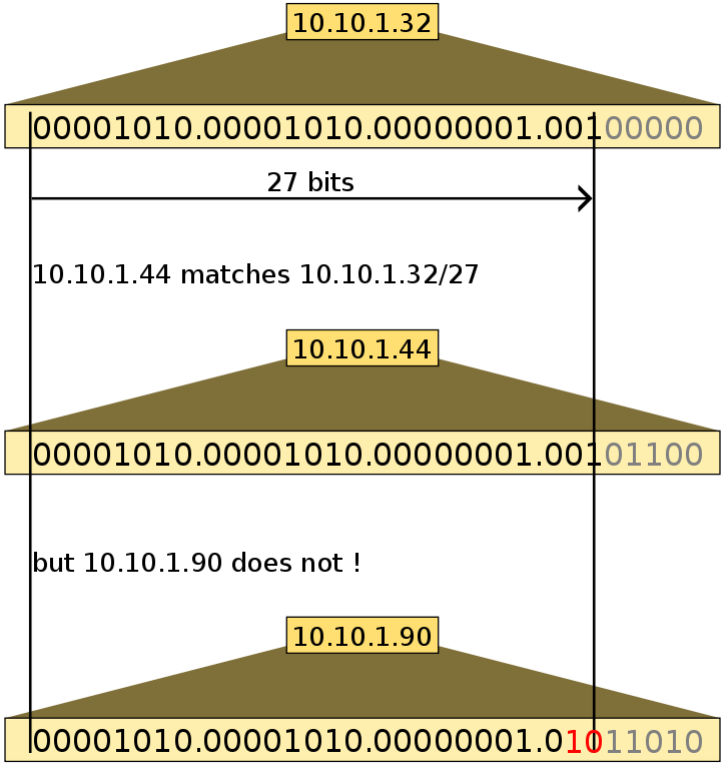
An IPv4 address (dotted-decimal notation)

172 . 16 . 254 . 1

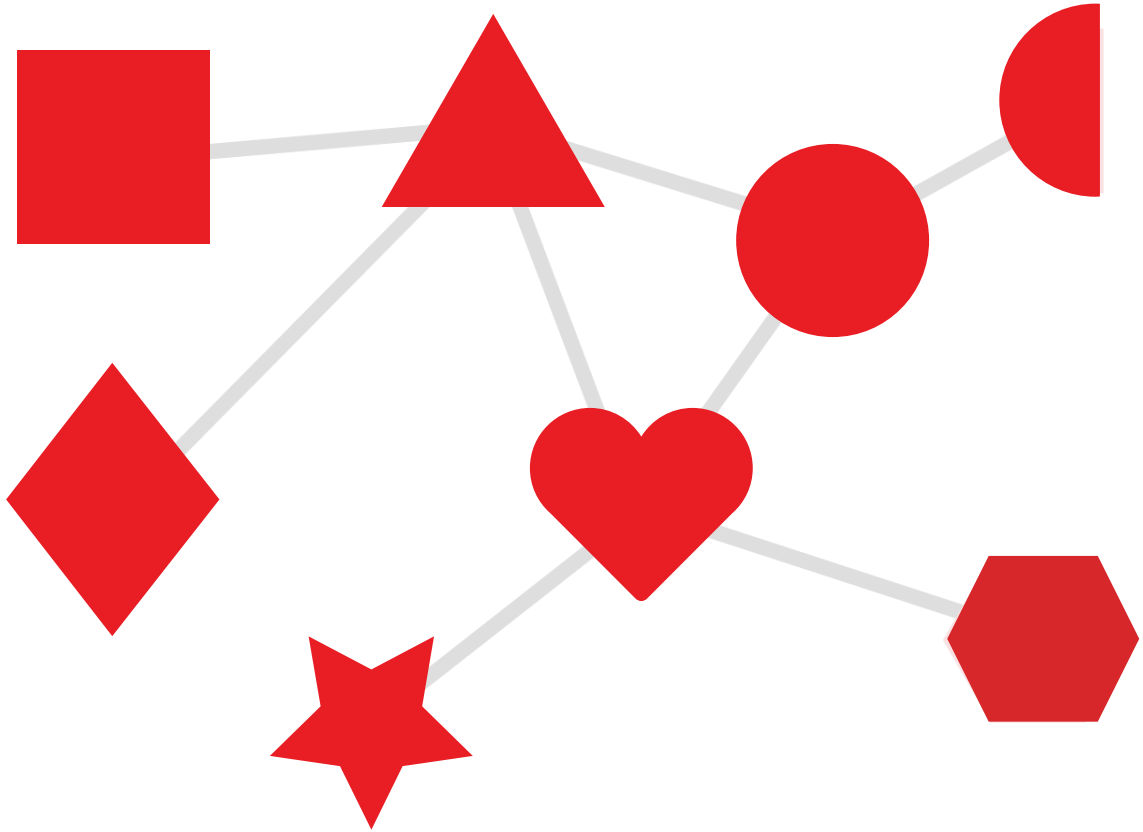
10101100 .00010000 .11111110 .00000001

One byte = Eight bits

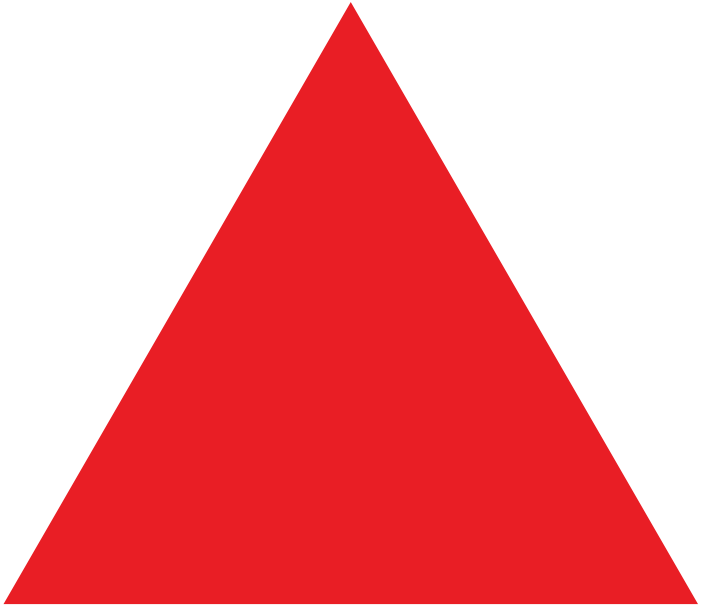
Thirty-two bits (4 x 8), or 4 bytes


10.10.1.32
00001010.00001010.00000001.00100000
27 bits
10.10.1.44 matches 10.10.1.32/27
10.10.1.44
00001010.00001010.00000001.00101100
but 10.10.1.90 does not !
10.10.1.90
00001010.00001010.00000001.01011010

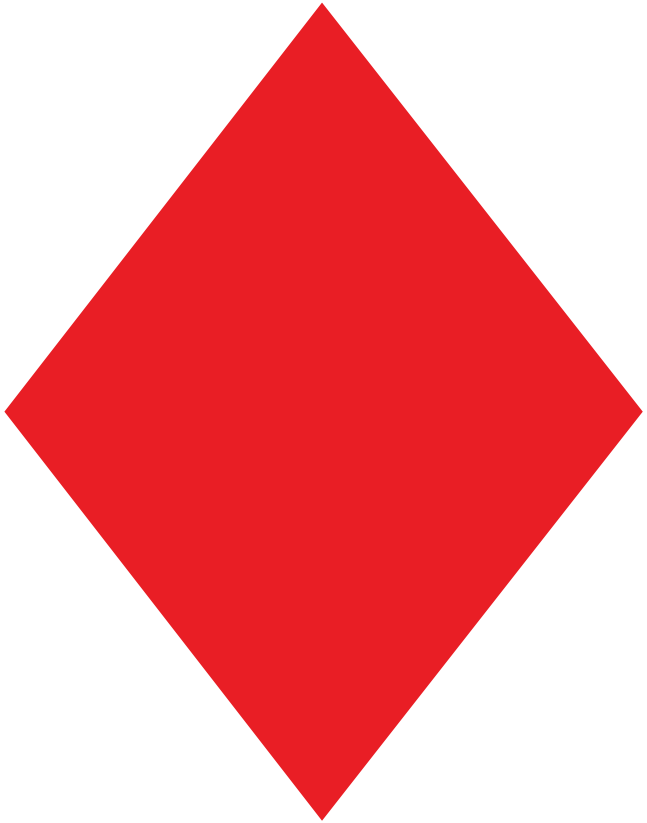
2. Autonomous Systems



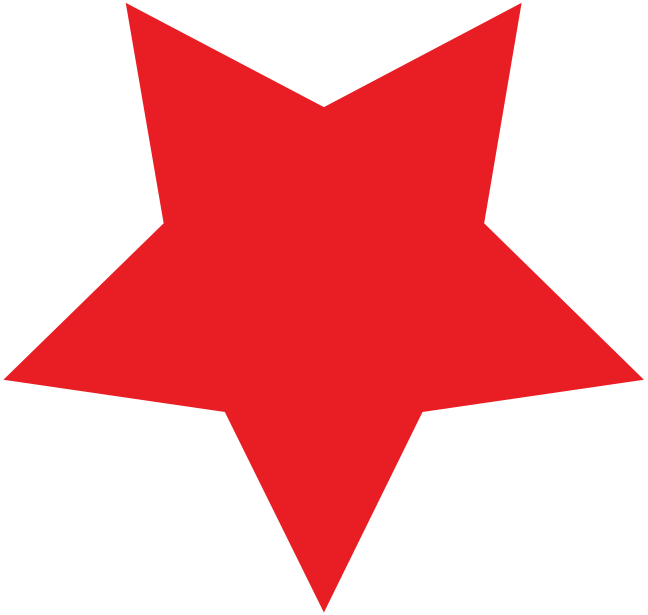
128



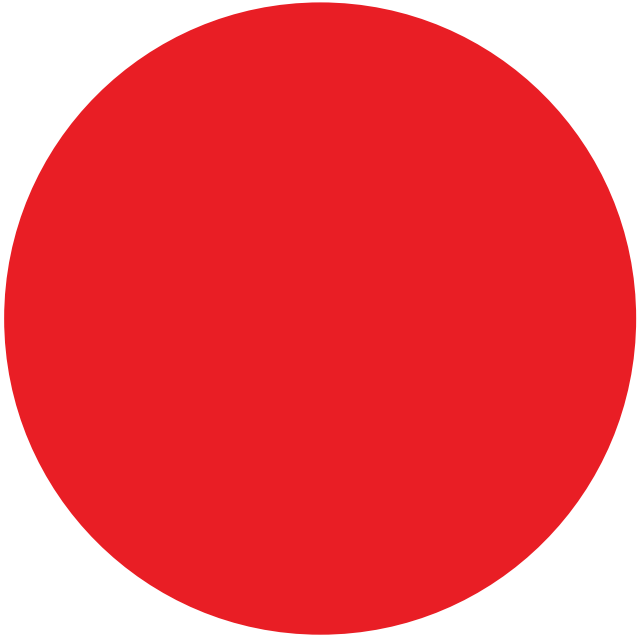
0
8
16
136
144
152
168,192
208, 248



120
184

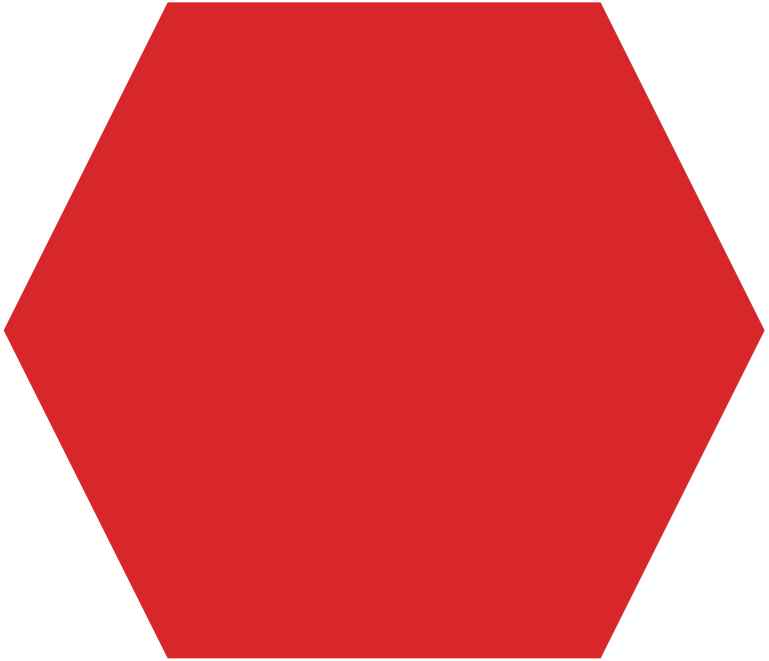


216



40
48
56
80
96
104, 112
160, 176
224

200
240

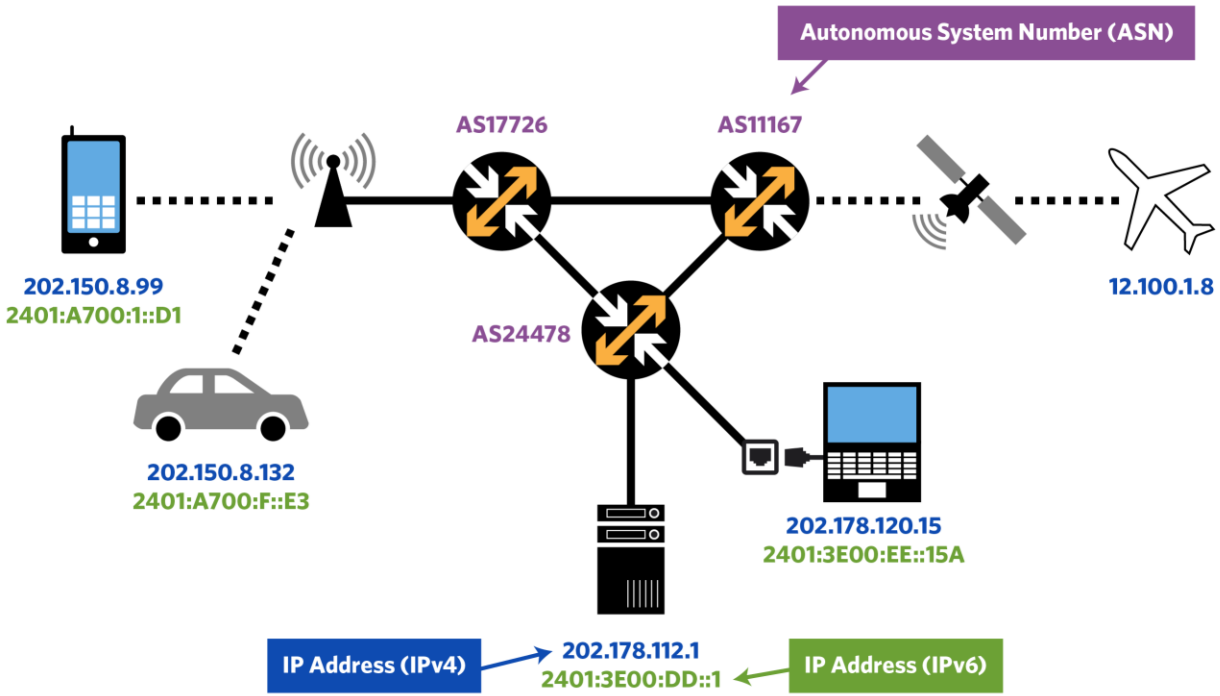


24
32
88
232

3. Routers

BINARY
DECIMAL
AS
00010000
016
VENUS
IPGO
ROUTER
ECONOMY

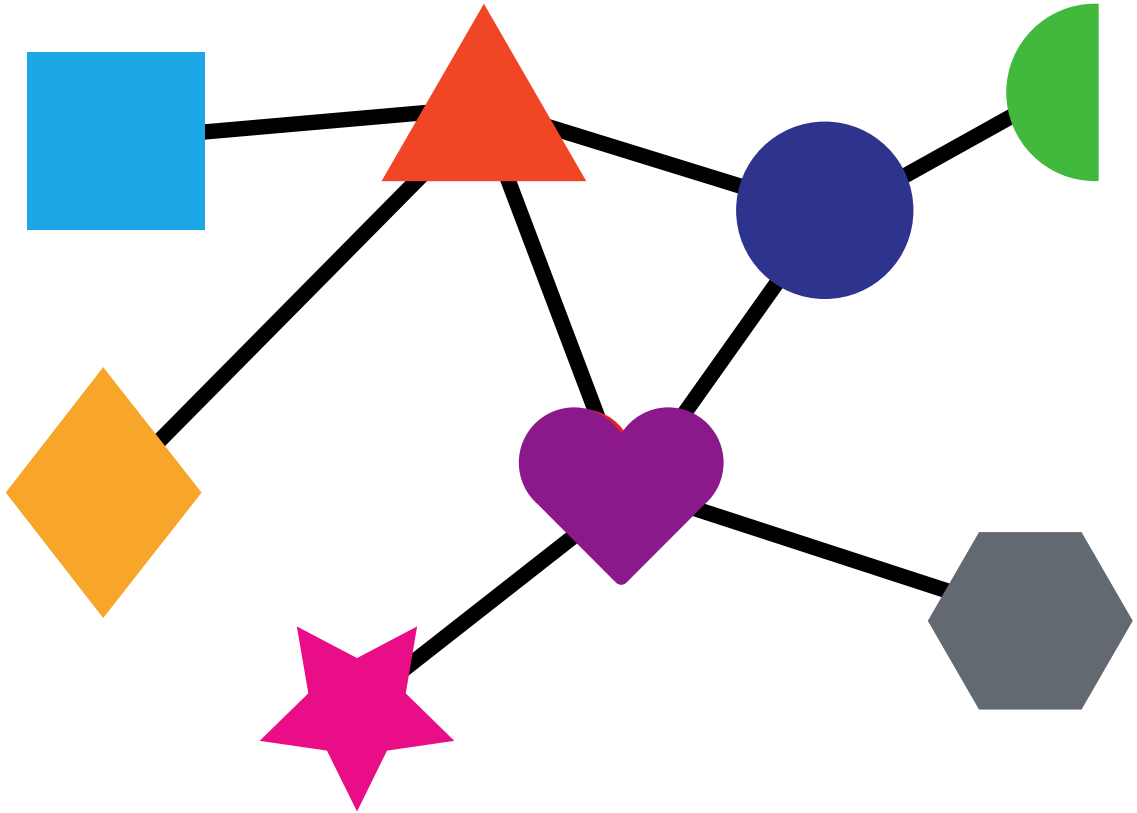
Routing


Autonomous System Number (ASN)
AS17726
AS11167
AS24478
202.150.8.99
2401:A700:1::D1
12.100.1.8
202.150.8.132
2401:A700:F::E3
202.178.120.15
2401:3E00:EE::15A
IP Address (IPv4)
202.178.112.1
2401:3E00:DD::1
IP Address (IPv6)

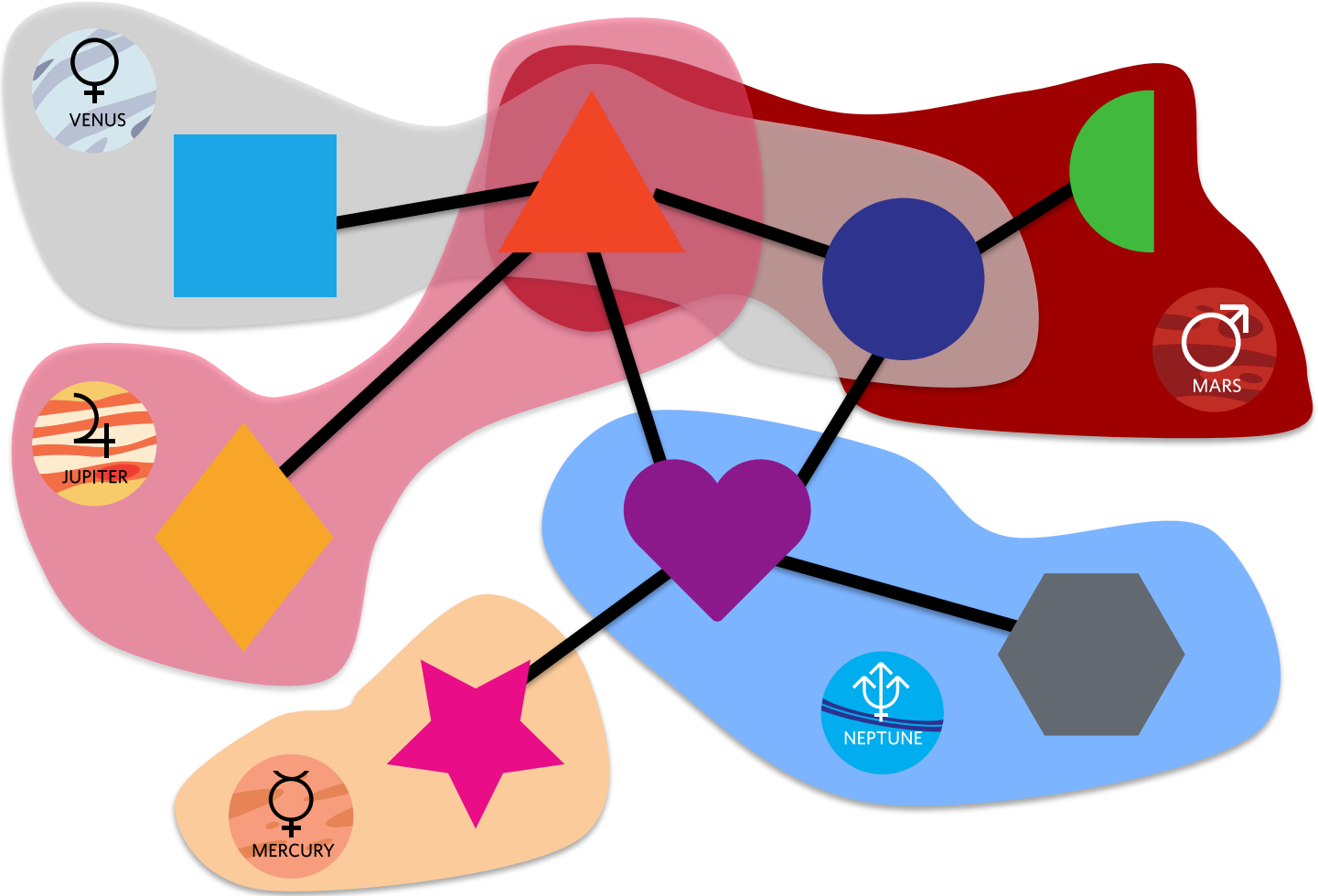
4. Establishing Communication

Computers: Turn ON

5. Building a Network

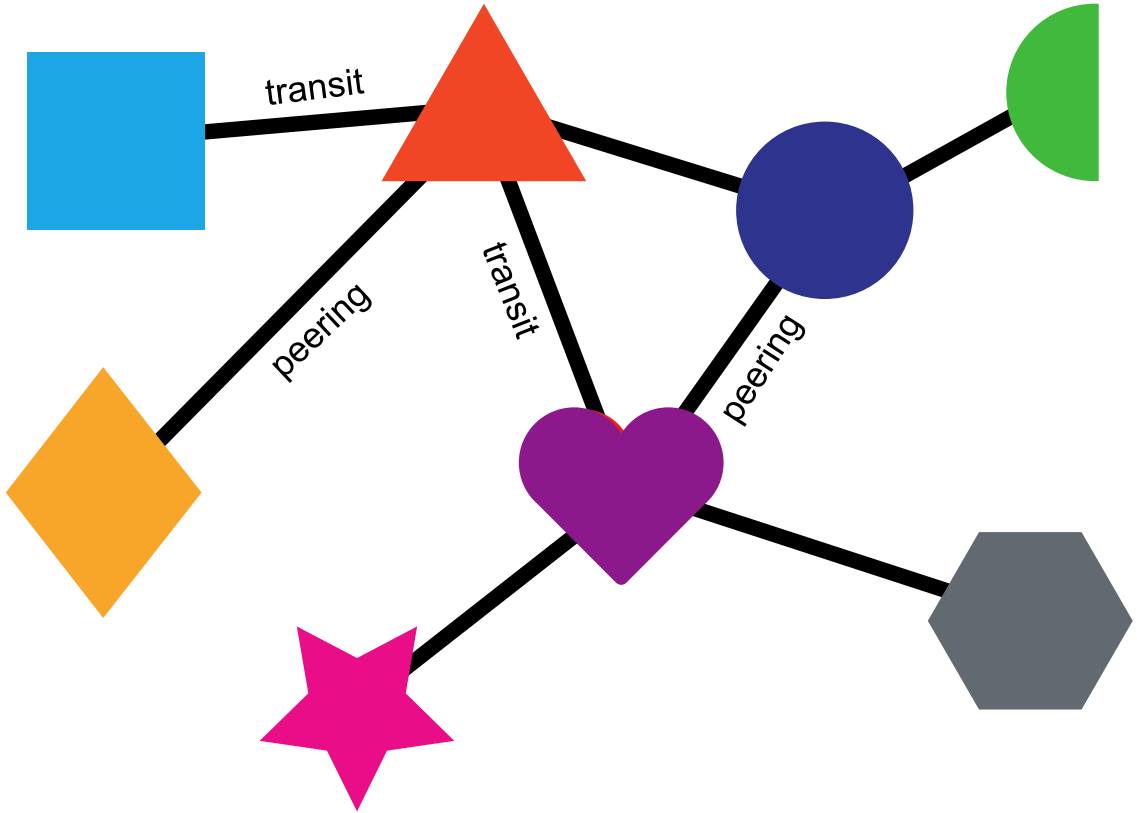


6. Economics and Jurisdiction

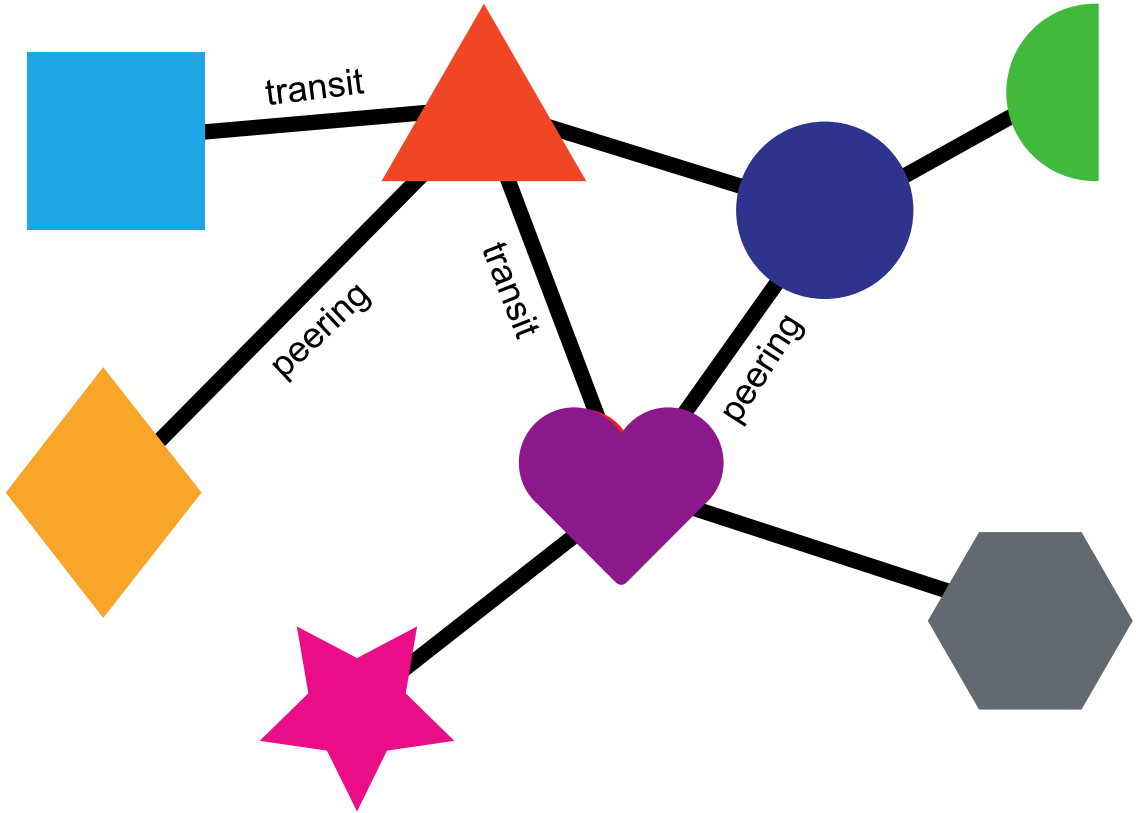

VENUS
MARS
JUPITER
NEPTUNE
MERCURY

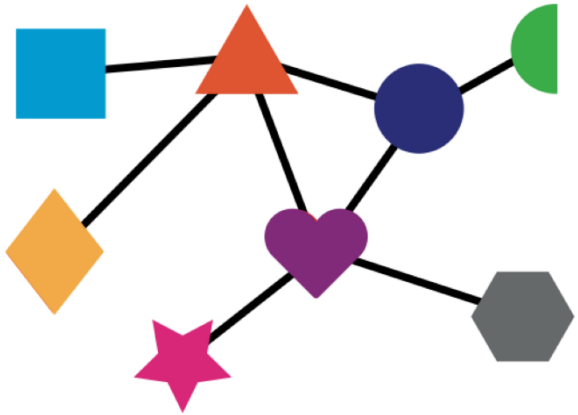
Market Presence

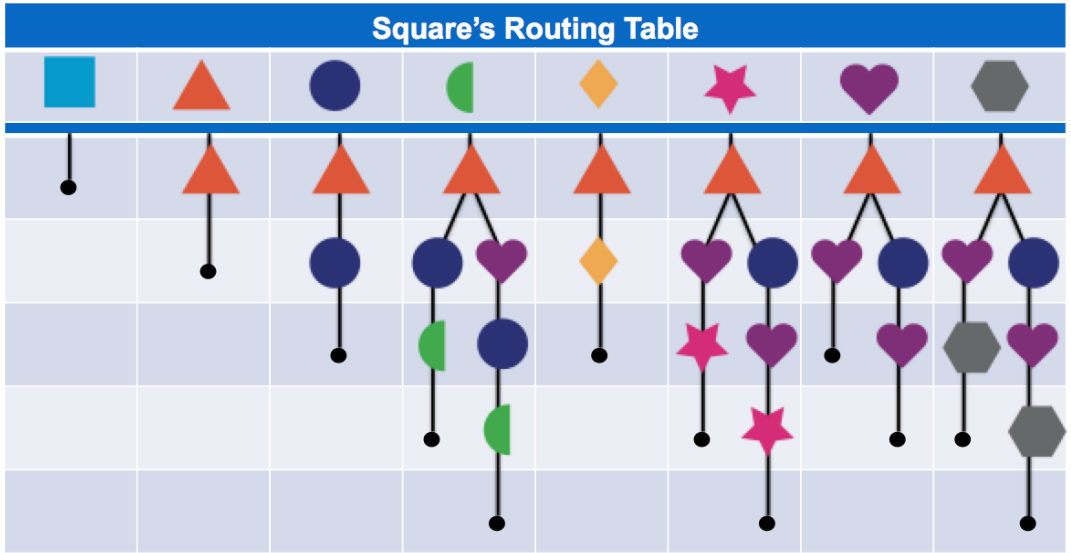
JUPITER	VENUS	MARS	NEPTUNE	MERCURY
▲	▲	▲	⬢	★
◆	●	●	♥	
	■	◗		

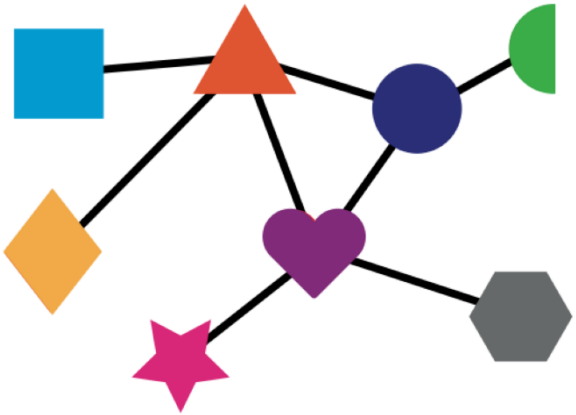

transit
peering
transit
peering

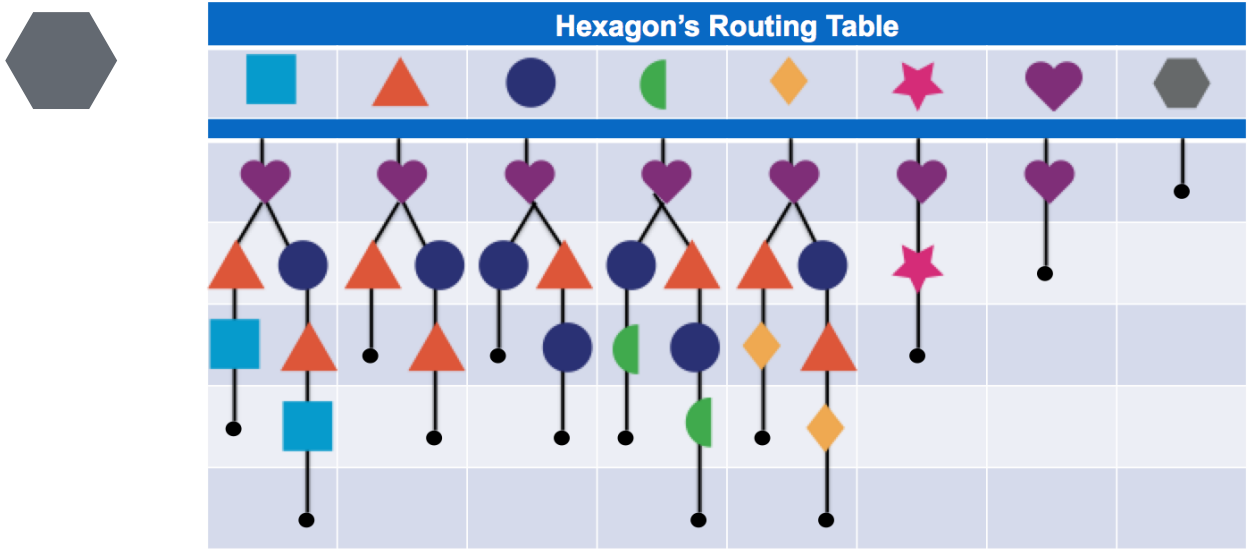
7. Sending Packets


transit
peering
transit
peering

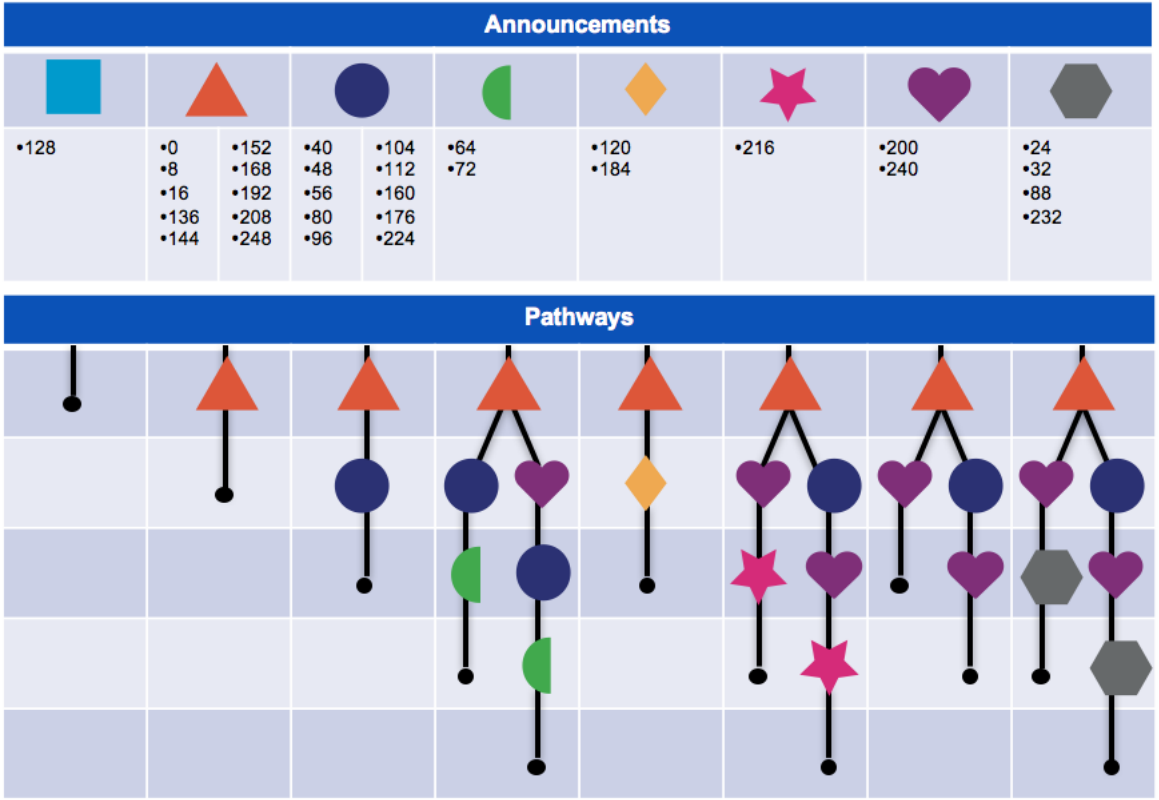



Square's Routing Table




Hexagon's Routing Table

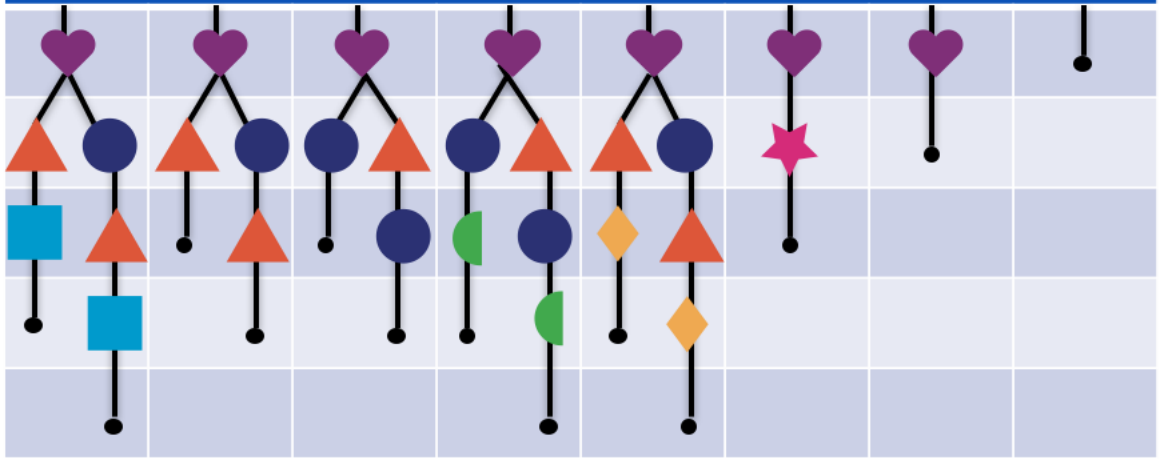
Square’s Routing Table



Hexagon's Routing Table

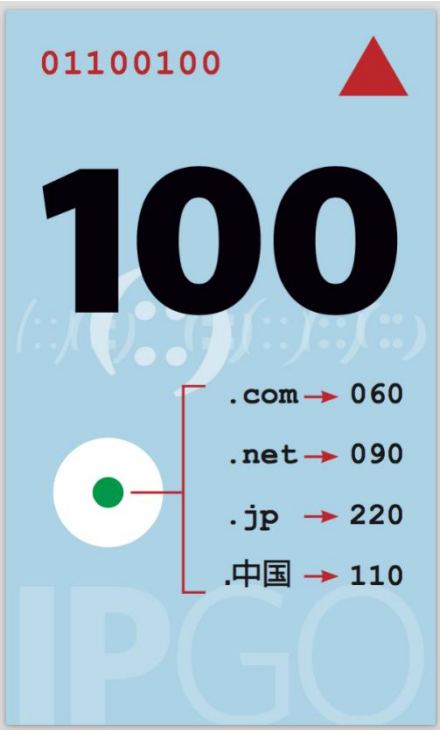
Announcements								
•128	•0 •8 •16 •136 •144	•152 •168 •192 •208 •248	•40 •48 •56 •80 •96	•104 •112 •160 •176 •224	•64 •72	•120 •184	•216	•200 •240	•24 •32 •88 •232

Pathways

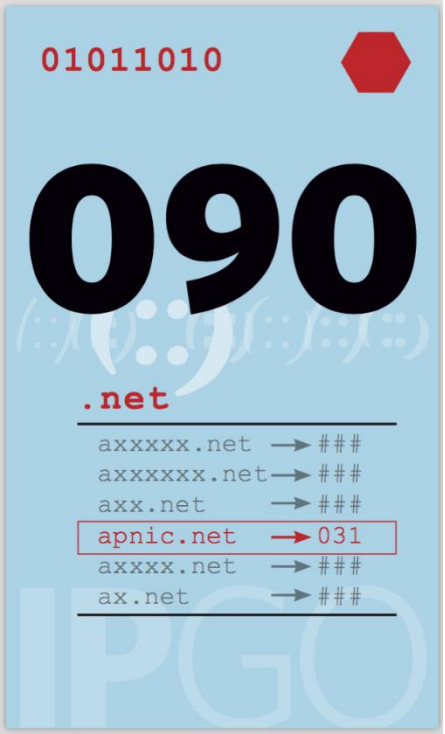


8. Domain Name System

Root Server



.net Registry



apnic.net Website

9. IPv4 exhaustion

00001100
012
VENUS
IPGO

Thank you!

… Oh… And visit:
blog.apnic.net

APNIC

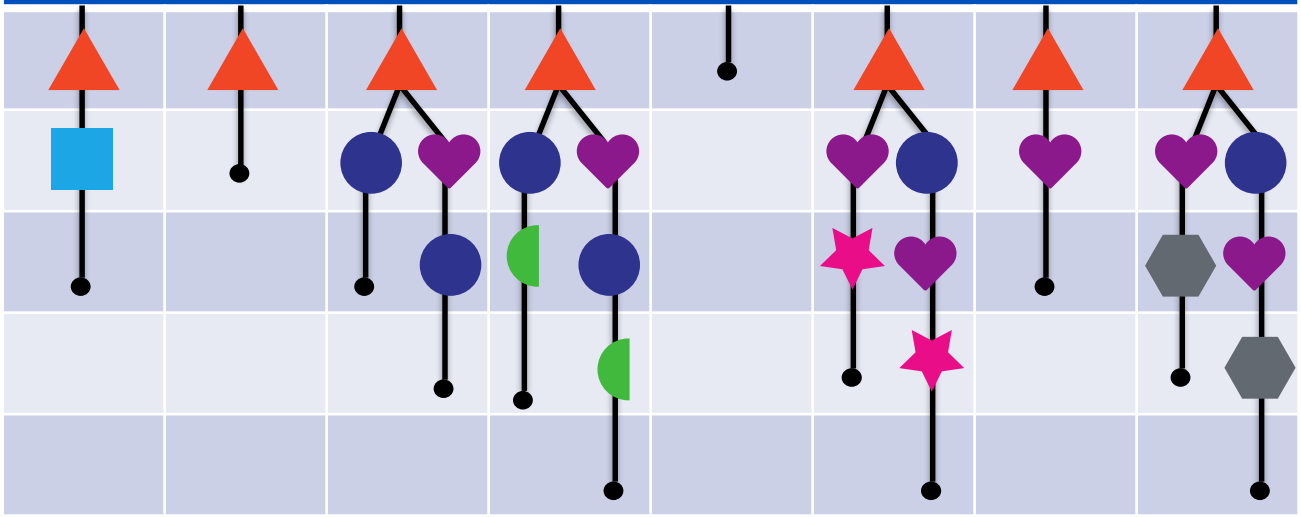
APNIC

Diamond’s Routing Table

Announcements

•128	•0 •8 •16 •136 •144	•152 •168 •192 •208 •248	•40 •48 •56 •80 •96	•104 •112 •160 •176 •224	•64 •72	•120 •184	•216	•200 •240	•24 •32 •88 •232

Pathways

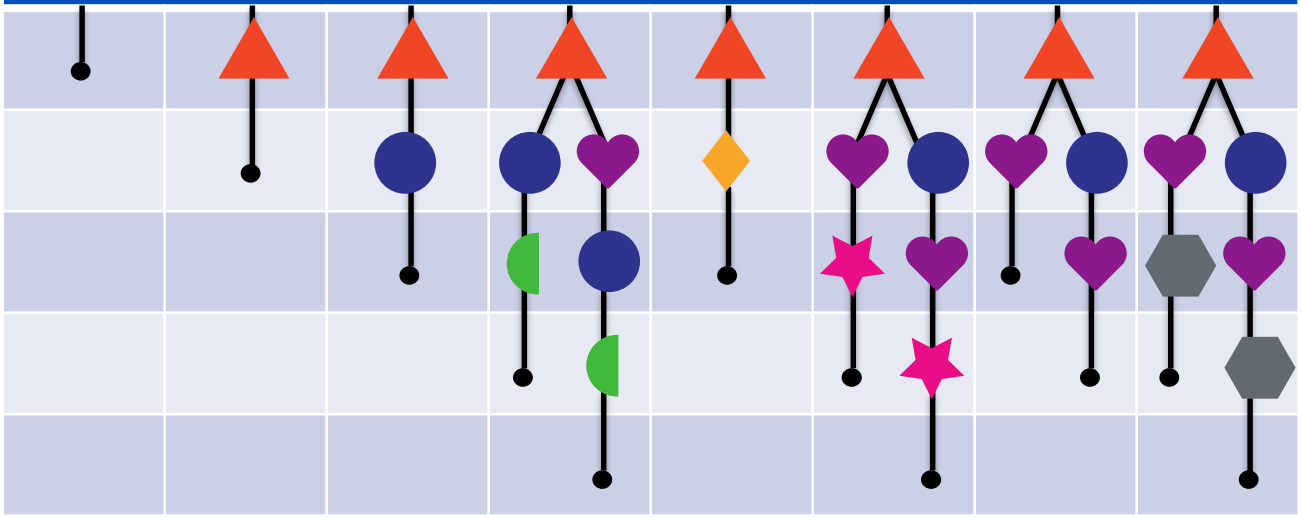


Square’s Routing Table

Announcements

•128	•0 •8 •16 •136 •144	•152 •168 •192 •208 •248	•40 •48 •56 •80 •96	•104 •112 •160 •176 •224	•64 •72	•120 •184	•216	•200 •240	•24 •32 •88 •232

Pathways

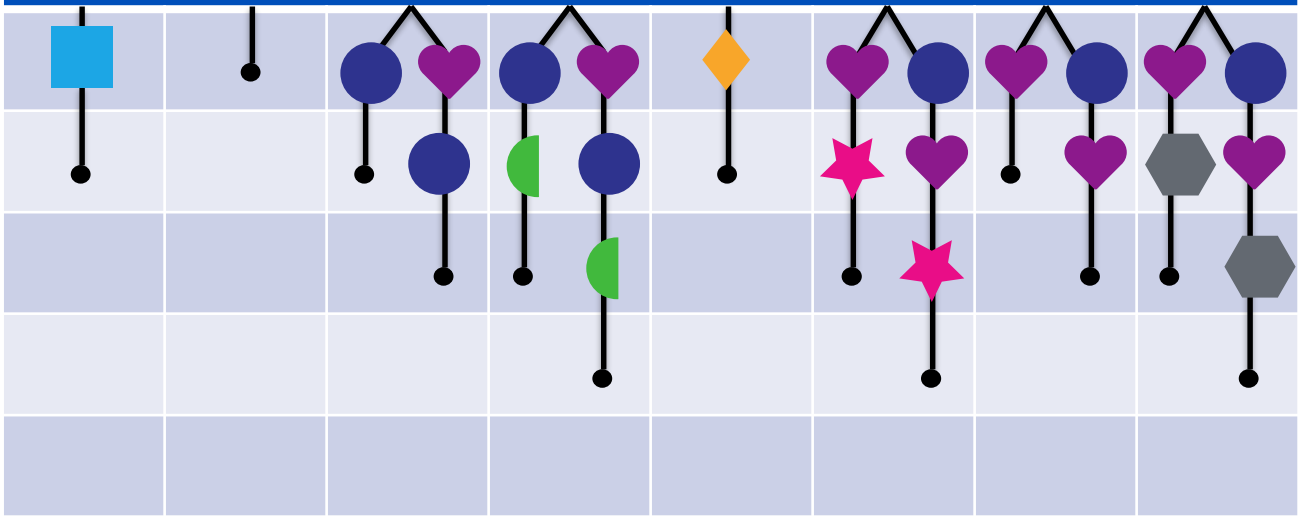


Triangle’s Routing Table

Announcements

•128	•0 •8 •16 •136 •144	•152 •168 •192 •208 •248	•40 •48 •56 •80 •96	•104 •112 •160 •176 •224	•64 •72	•120 •184	•216	•200 •240	•24 •32 •88 •232

Pathways

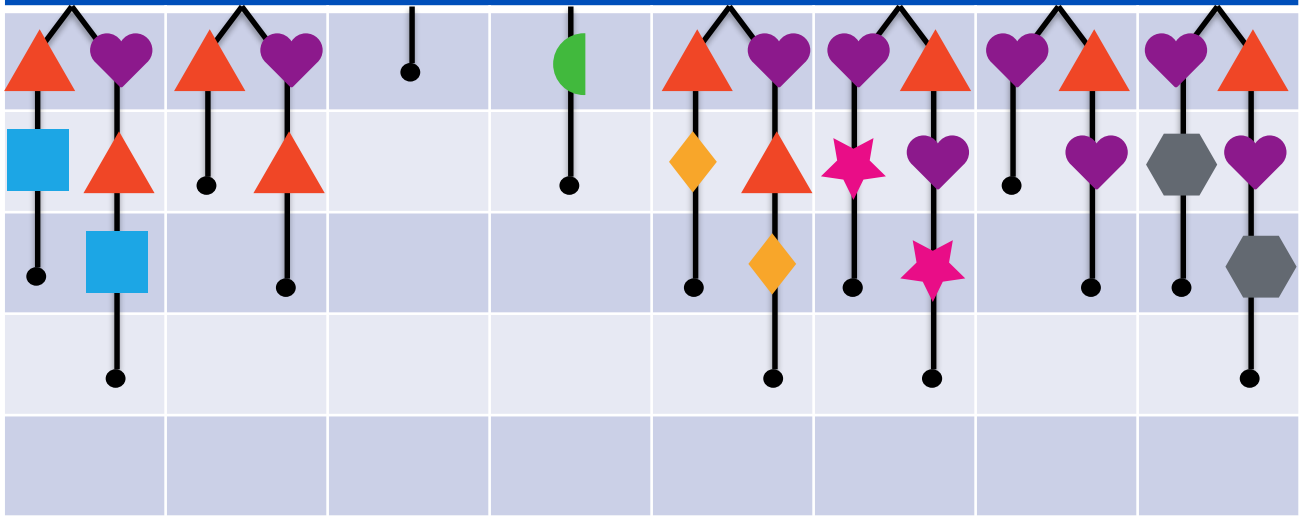


Circle’s Routing Table

Announcements

•128	•0 •8 •16 •136 •144	•152 •168 •192 •208 •248	•40 •48 •56 •80 •96	•104 •112 •160 •176 •224	•64 •72	•120 •184	•216	•200 •240	•24 •32 •88 •232

Pathways

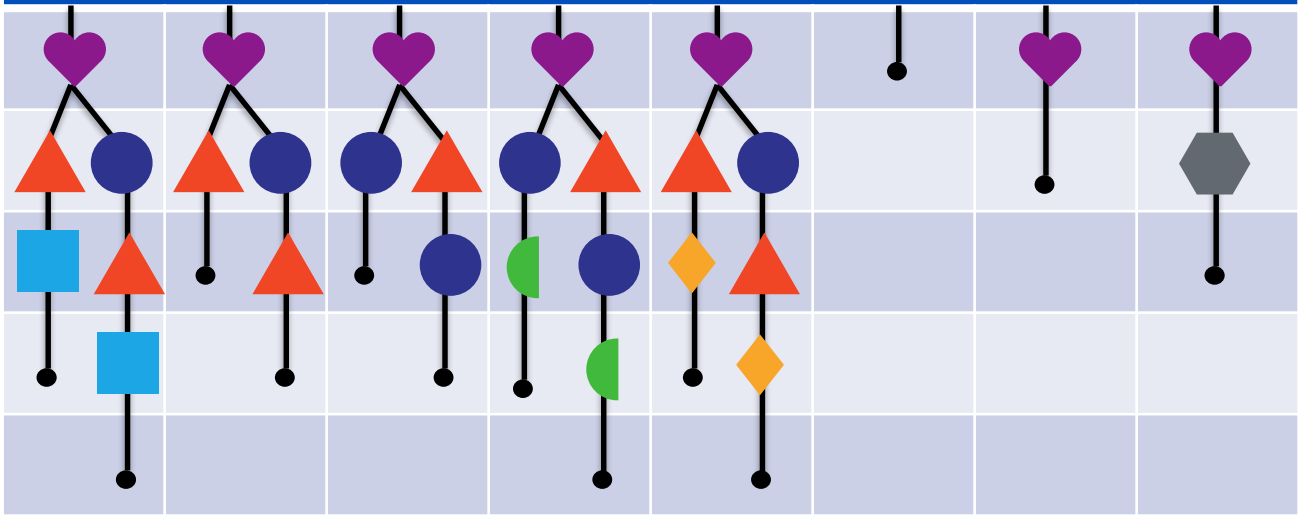


Star’s Routing Table

Announcements

•128	•0 •8 •16 •136 •144	•152 •168 •192 •208 •248	•40 •48 •56 •80 •96	•104 •112 •160 •176 •224	•64 •72	•120 •184	•216	•200 •240	•24 •32 •88 •232

Pathways

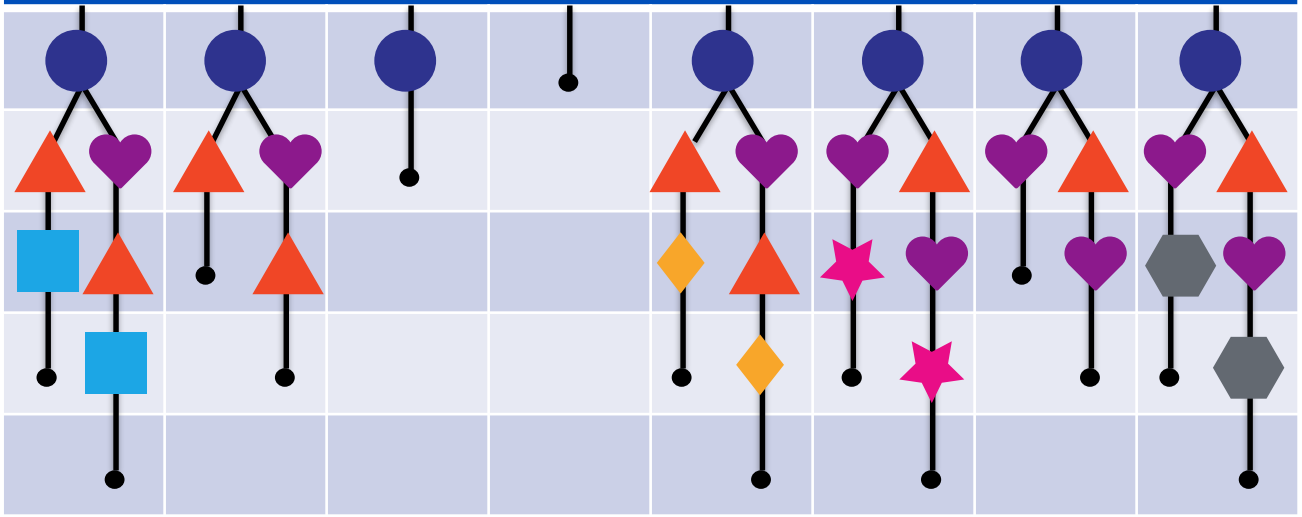


Semicircle's Routing Table

Announcements

•128	•0 •8 •16 •136 •144	•152 •168 •192 •208 •248	•40 •48 •56 •80 •96	•104 •112 •160 •176 •224	•64 •72	•120 •184	•216	•200 •240	•24 •32 •88 •232

Pathways

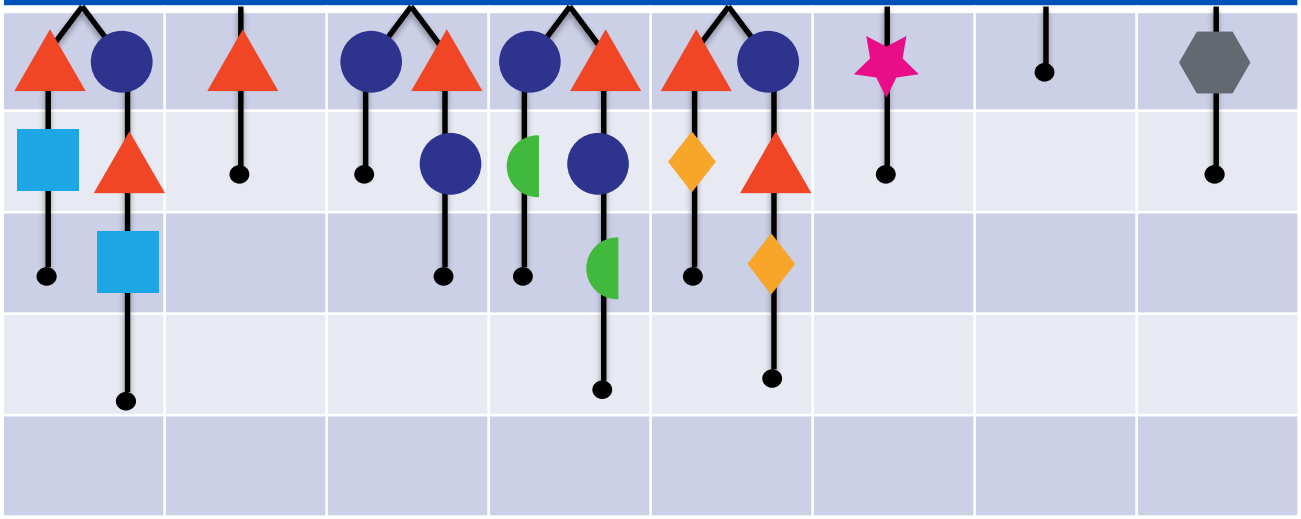


Heart’s Routing Table

Announcements

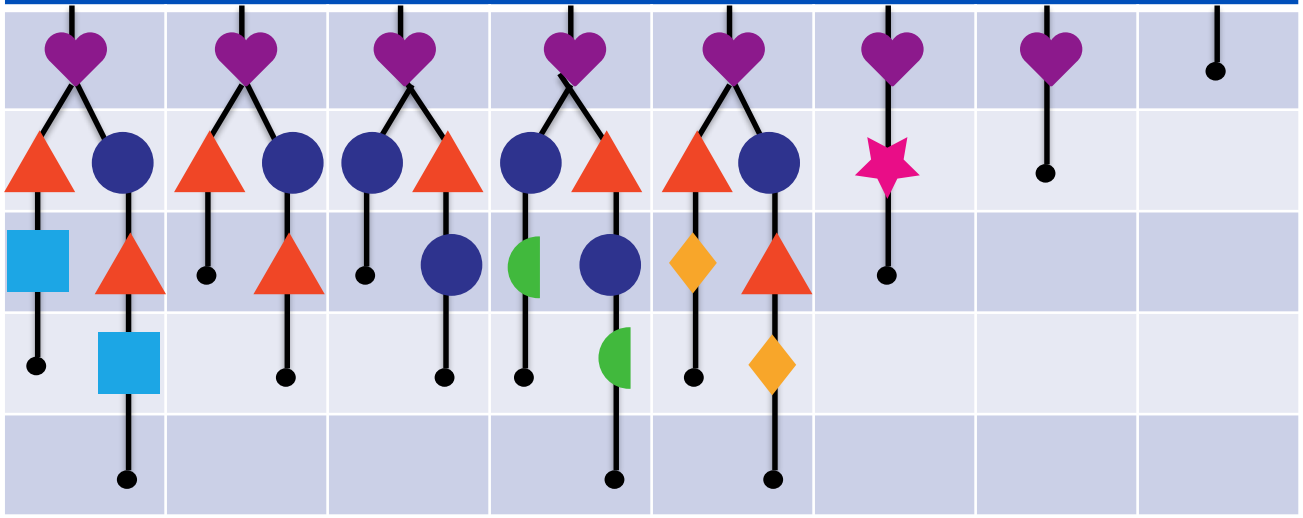
•128	•0 •8 •16 •136 •144	•152 •168 •192 •208 •248	•40 •48 •56 •80 •96	•104 •112 •160 •176 •224	•64 •72	•120 •184	•216	•200 •240	•24 •32 •88 •232

Pathways



Hexagon’s Routing Table

Announcements

•128	•0 •8 •16 •136 •144	•152 •168 •192 •208 •248	•40 •48 •56 •80 •96	•104 •112 •160 •176 •224	•64 •72	•120 •184	•216	•200 •240	•24 •32 •88 •232

Pathways