How the Internet works

IPGO v3.0

APNIC

IPGO – 5 Islands

Banana

Coconut

Apple

Pineapple

Watermelon

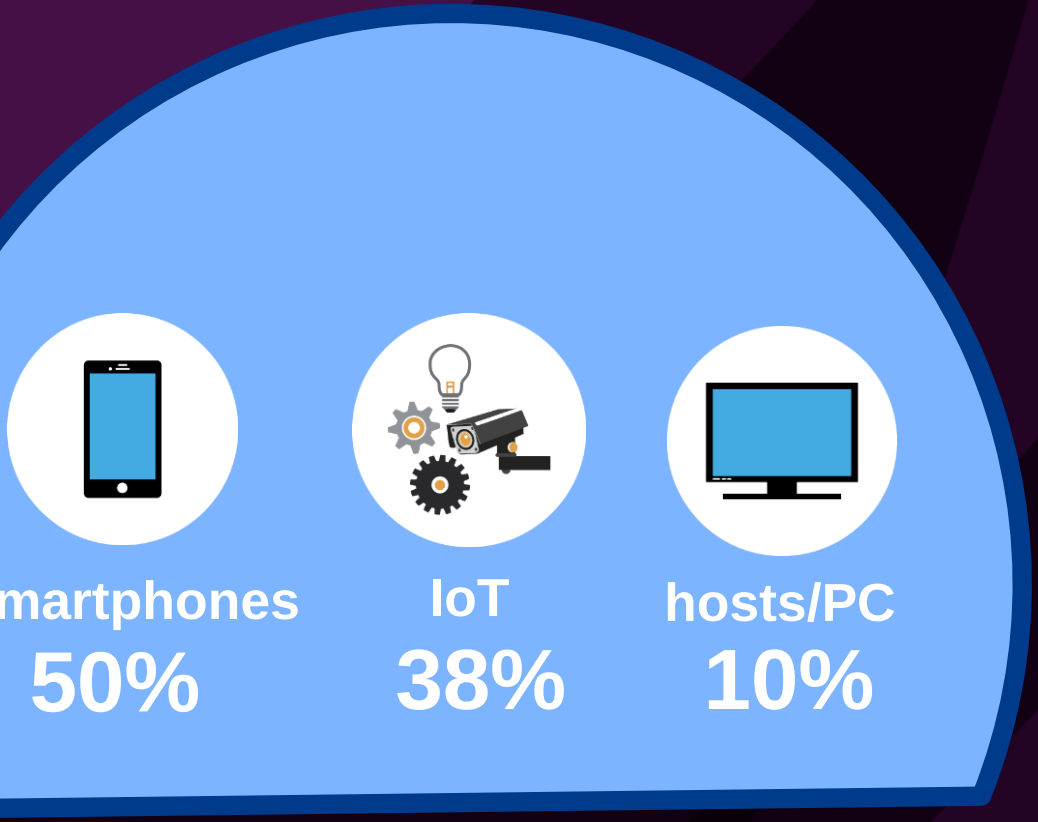
1. Devices
2. Network Operators
3. IP Addresses
4. Building a Network
5. Routing Packets
6. Sending Packets
7. IPv6
8. DNS

1. Devices

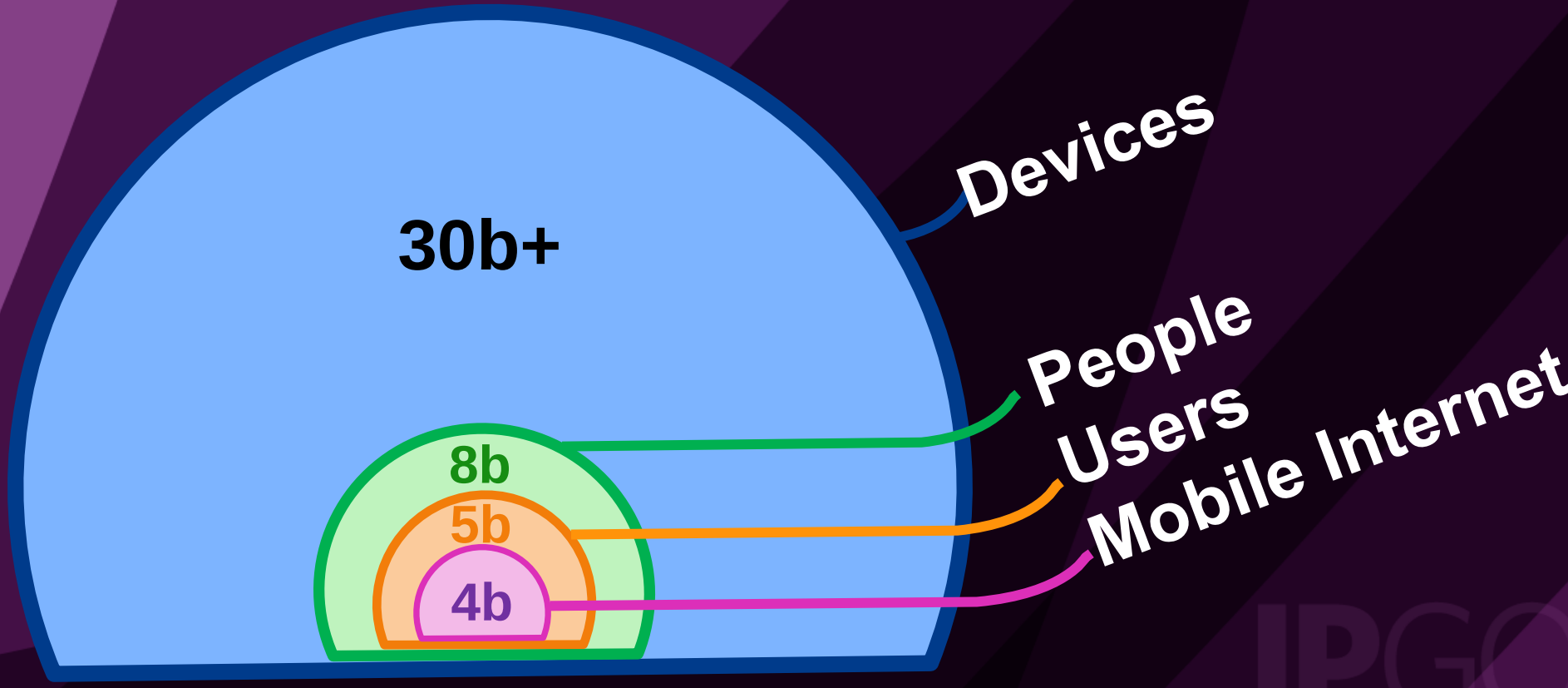
IPGO – 256 devices

IPGO

Total
256

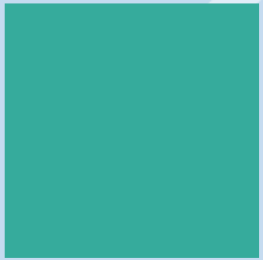


In the real world…

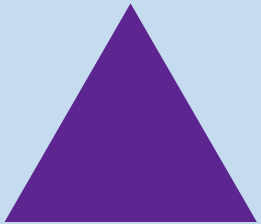


2. Network Operators

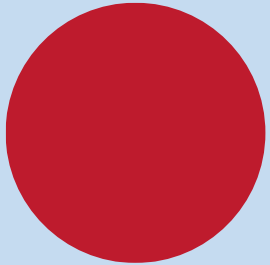
IPGO – 8 Network Operators



Square

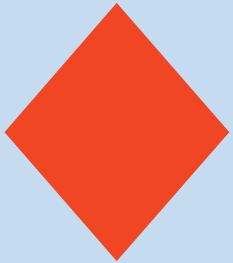


Triangle



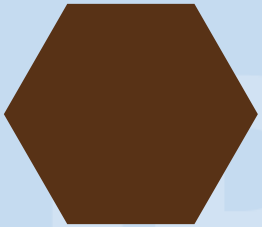
Circle

Heart



Diamond

Star



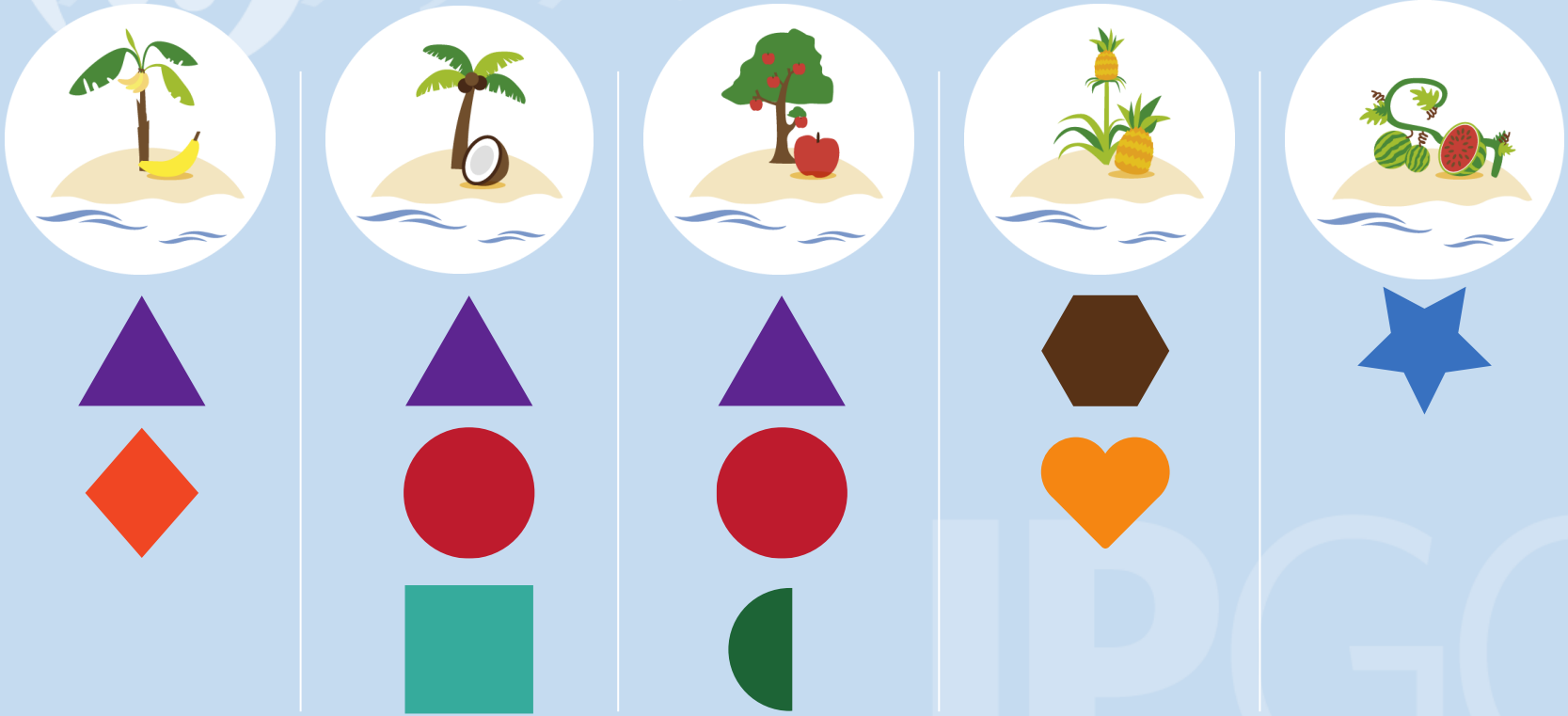
Hexagon

Semicircle

Operators

Devices

IPGO – Market Presence



1. Group your **devices** according to pre-assigned **operator**.

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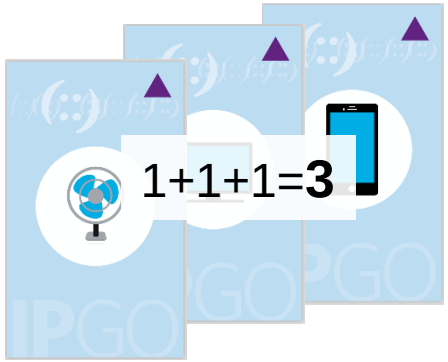
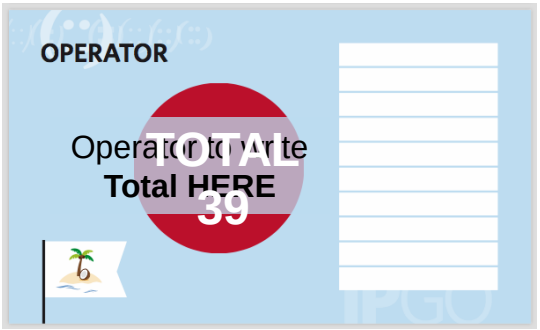
2. Count how many **devices** you have in each **operator**.



1. Group your **devices** according to pre-assigned **operator**.

2. Count how many **devices** you have in each **operator**.

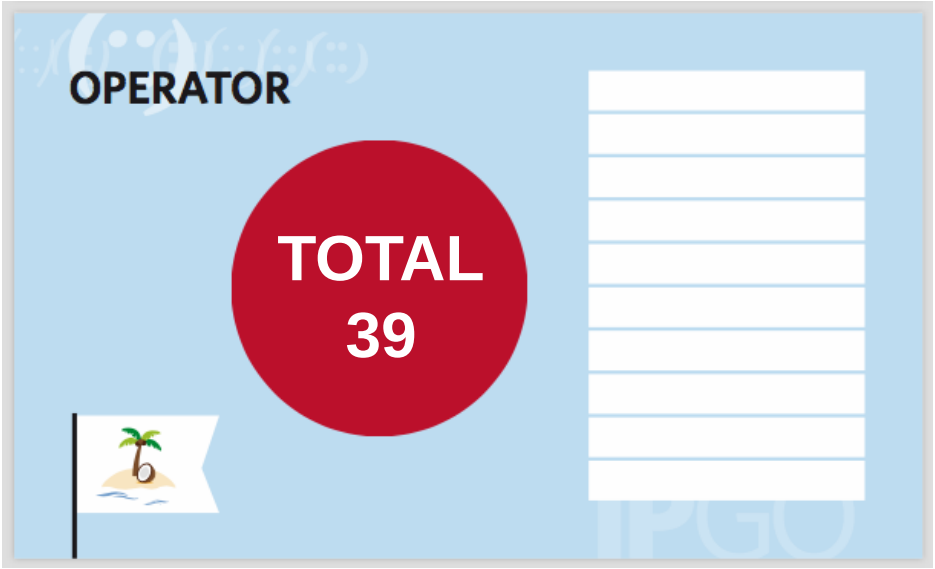
3. Tell each **operator** how many devices you **have**.



Users keep the devices!!

3. IP Addresses

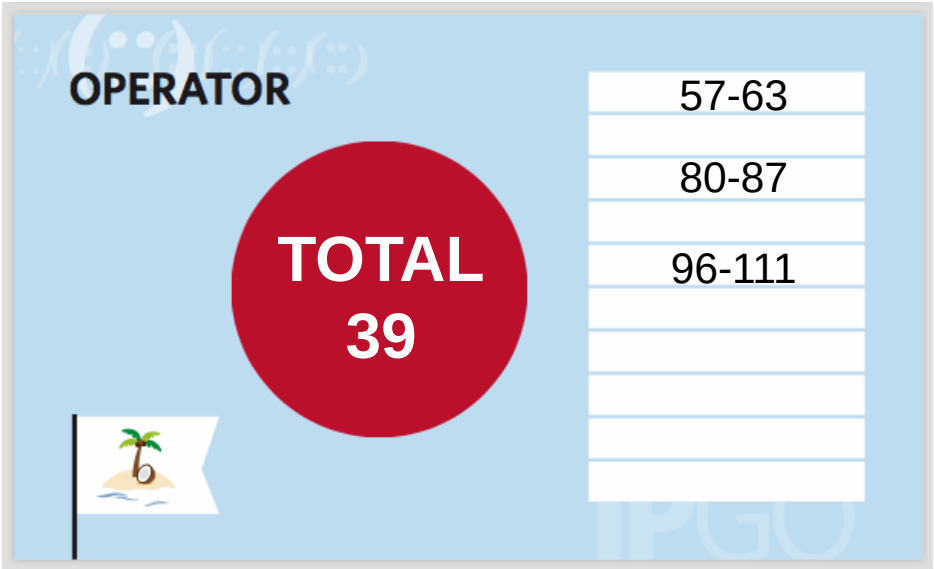
1. **Operators** request **IP addresses** according to their needs.



1. **Operators** request **IP addresses** according to their needs.

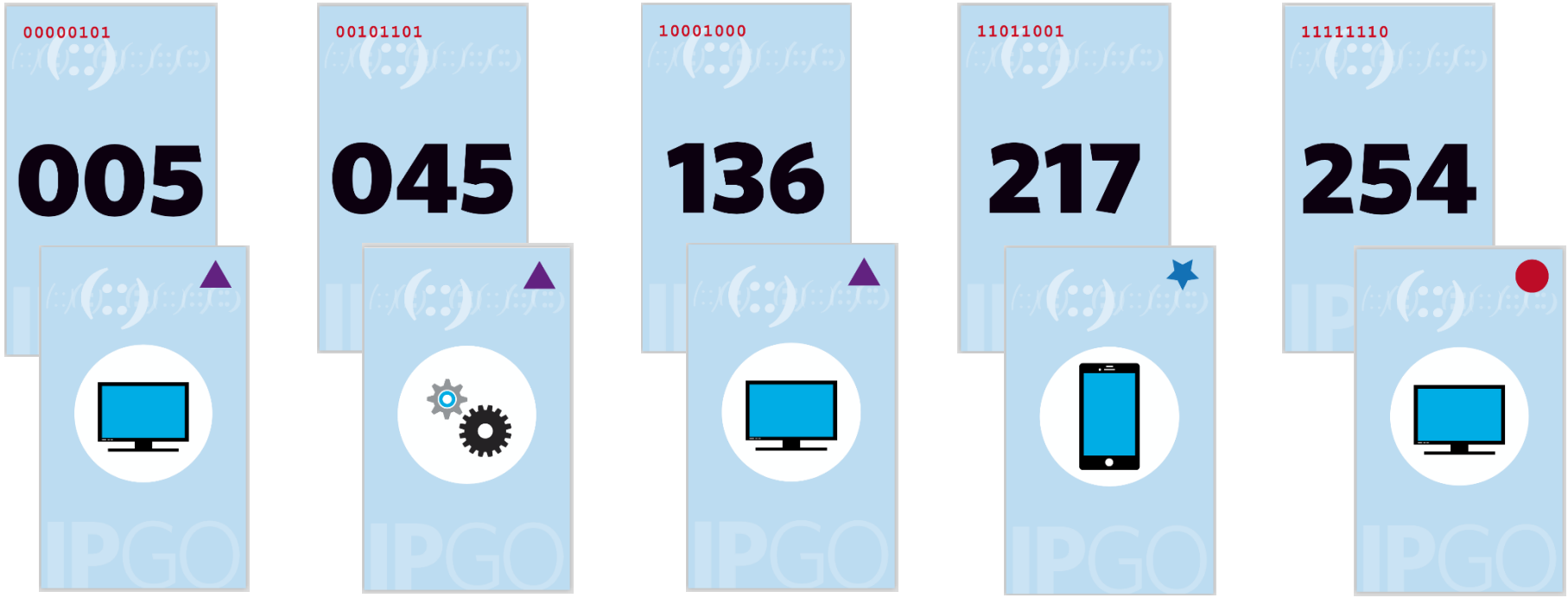
2. **Operators** receive an allocation of IP addresses according to the size of their networks and distribute them to the islands.

3. **Operators** build routing tables aggregating ranges of IP addresses. (Islanders help).




OPERATOR
128-135
OPERATOR
216-223
OPERATOR
144-159
224-231
OPERATOR
200-207
OPERATOR
184-191
OPERATOR
232-239

Each **operator** assigns IP addresses to their subscribed **devices**…



IPv4

An IPv4 address (dotted-decimal notation)

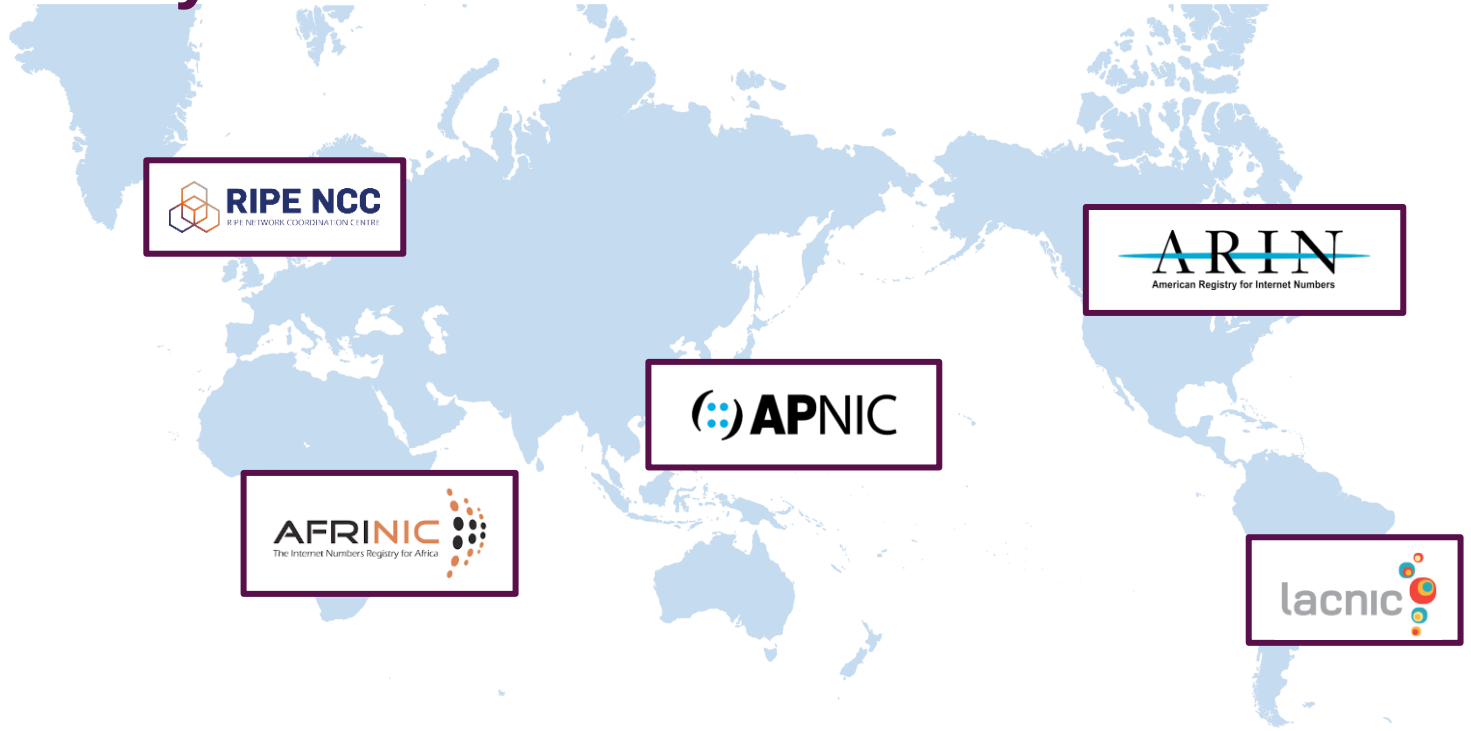
172 . 16 . 254 . 1

10101100 .00010000 .11111110 00000001

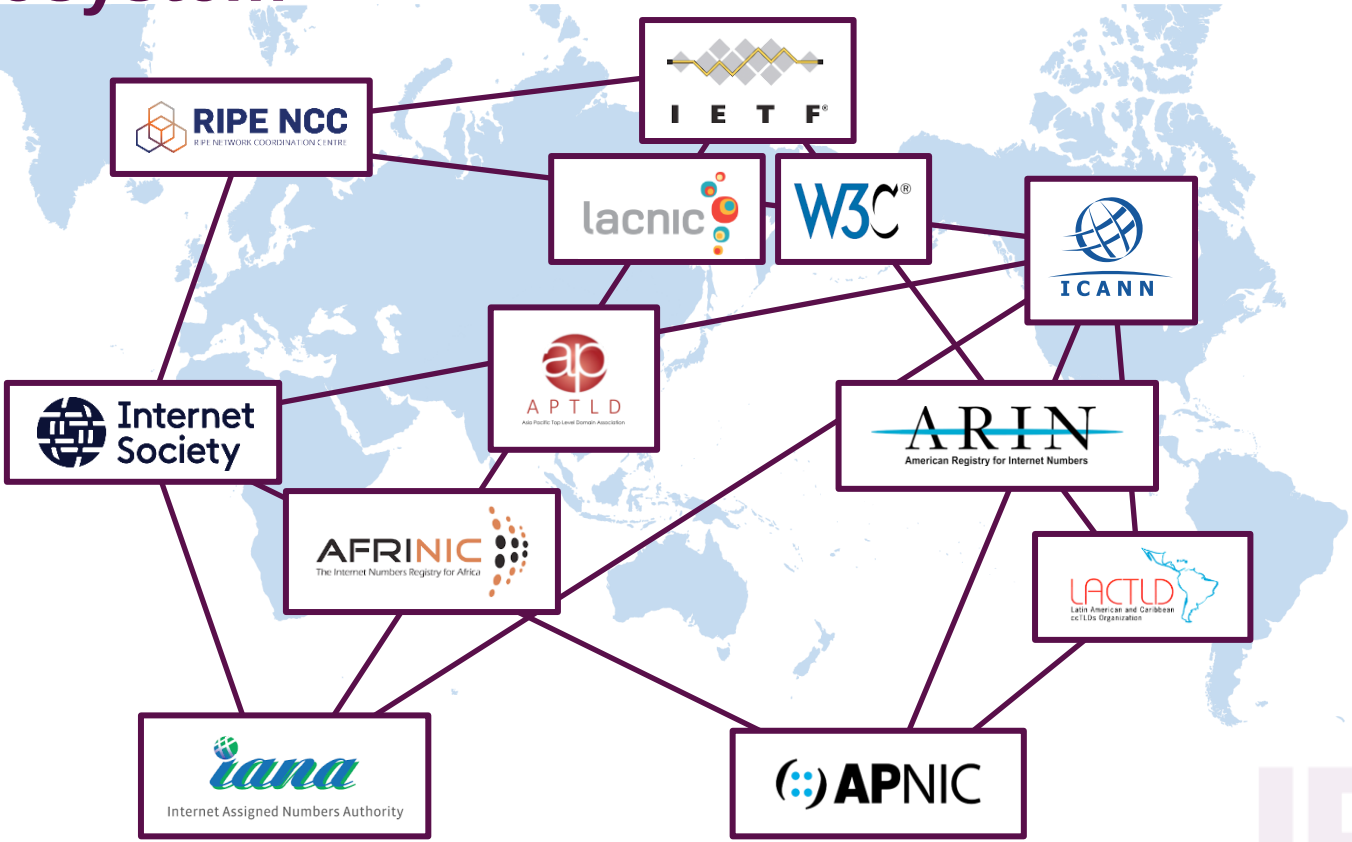
One byte =Eight bits

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

RIR system


RIPE NCC
RIPE NETWORK COORDINATION CENTRE
ARIN
American Registry for Internet Numbers
APNIC
AFRINIC
The Internet Numbers Registry for Africa
lacnic

I* Ecosystem


RIPE NCC
RIPE NETWORK COORDINATION CENTRE
I E T F
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

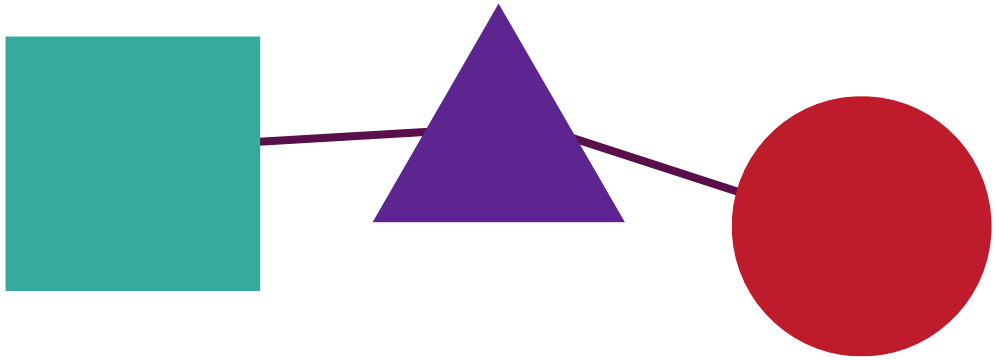
4. Building the Network

Test: connect 

with 

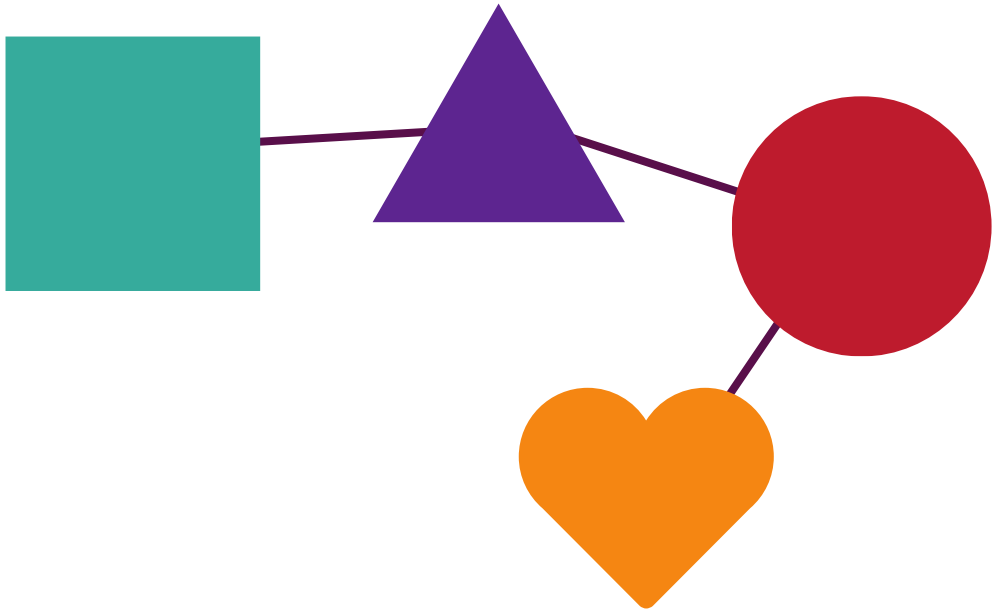
Test: connect

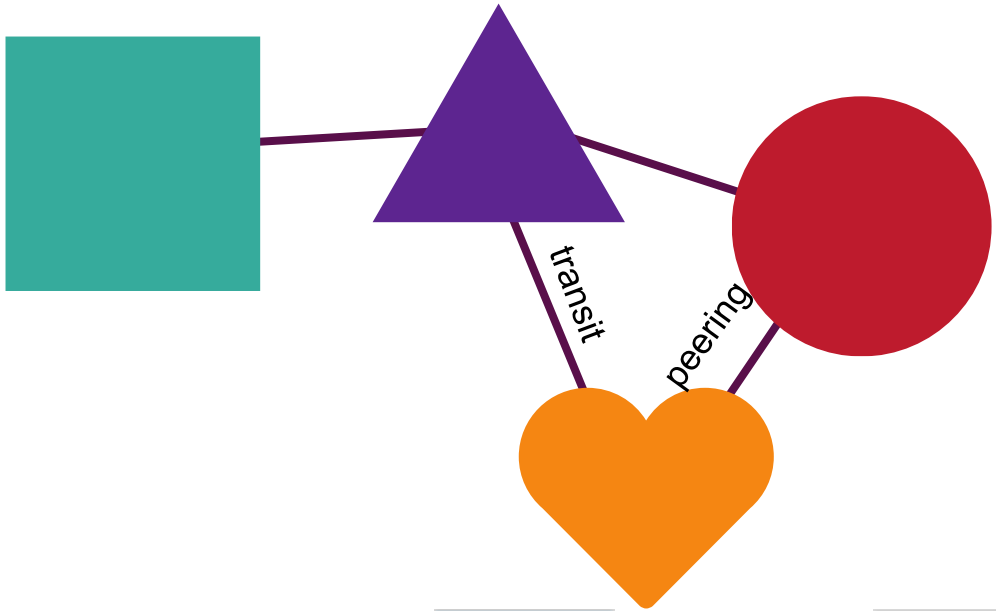
with



Test: connect 

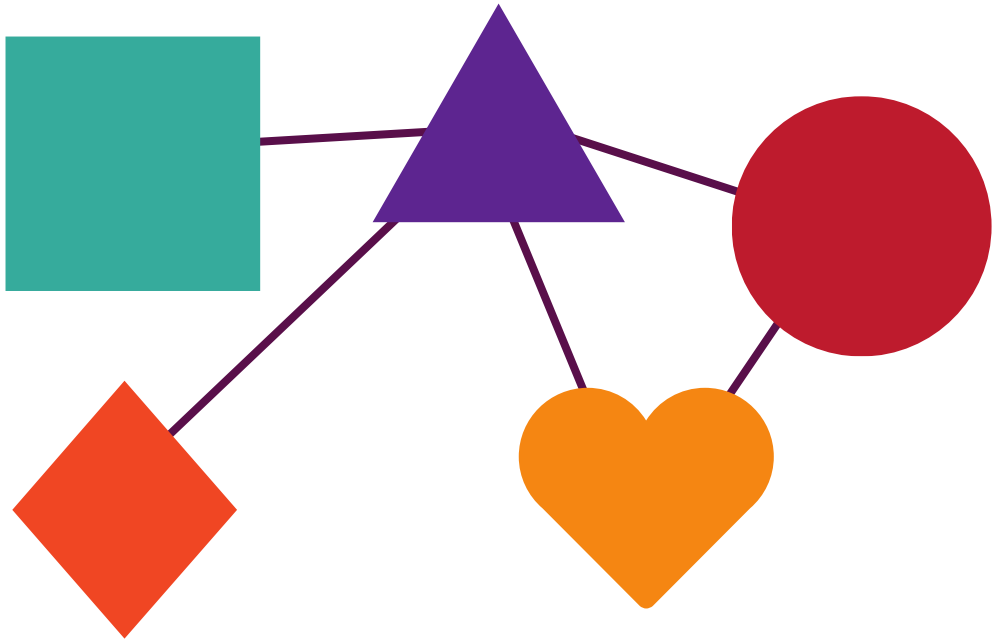
with 

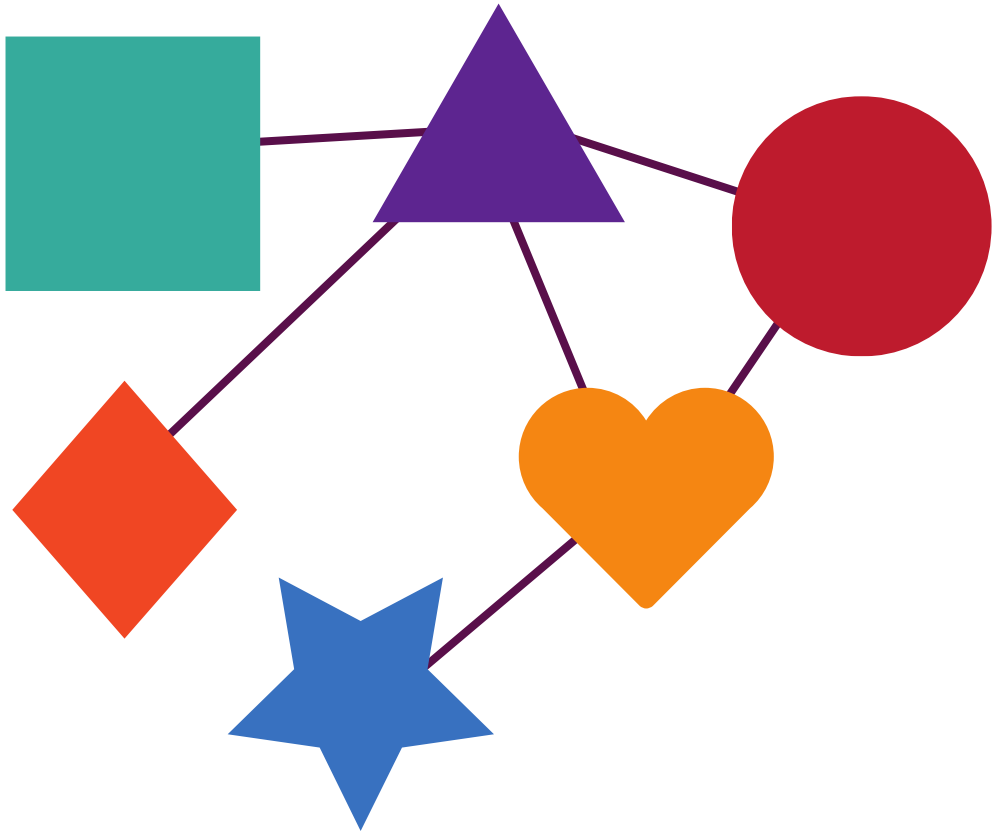


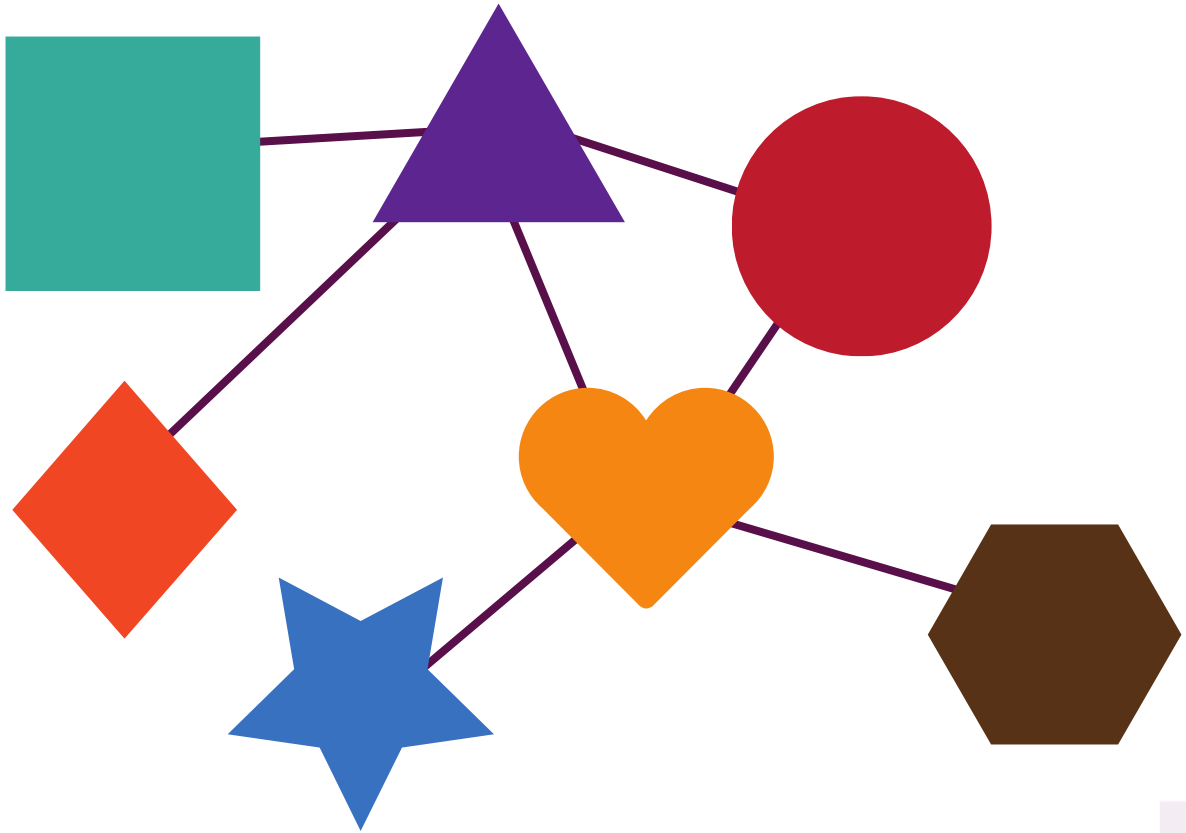


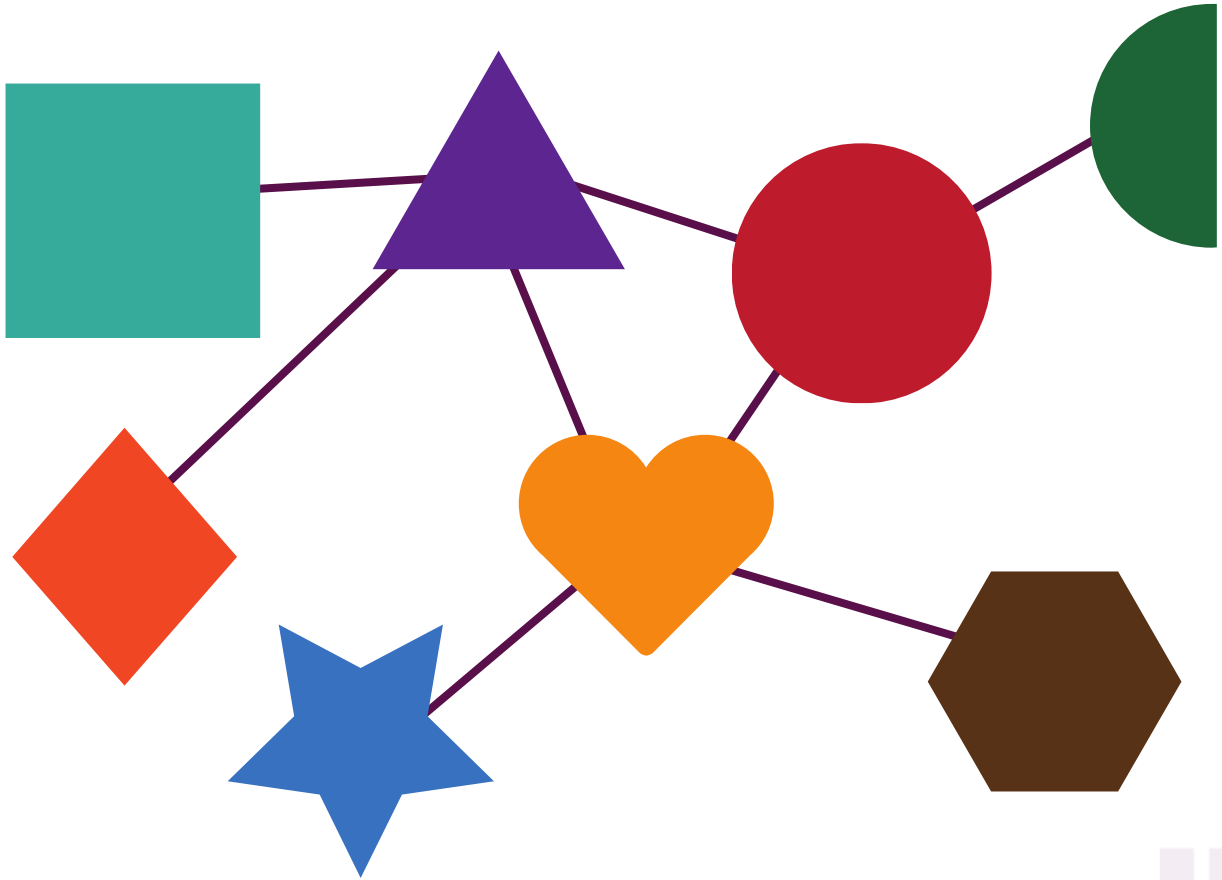
Test: connect 

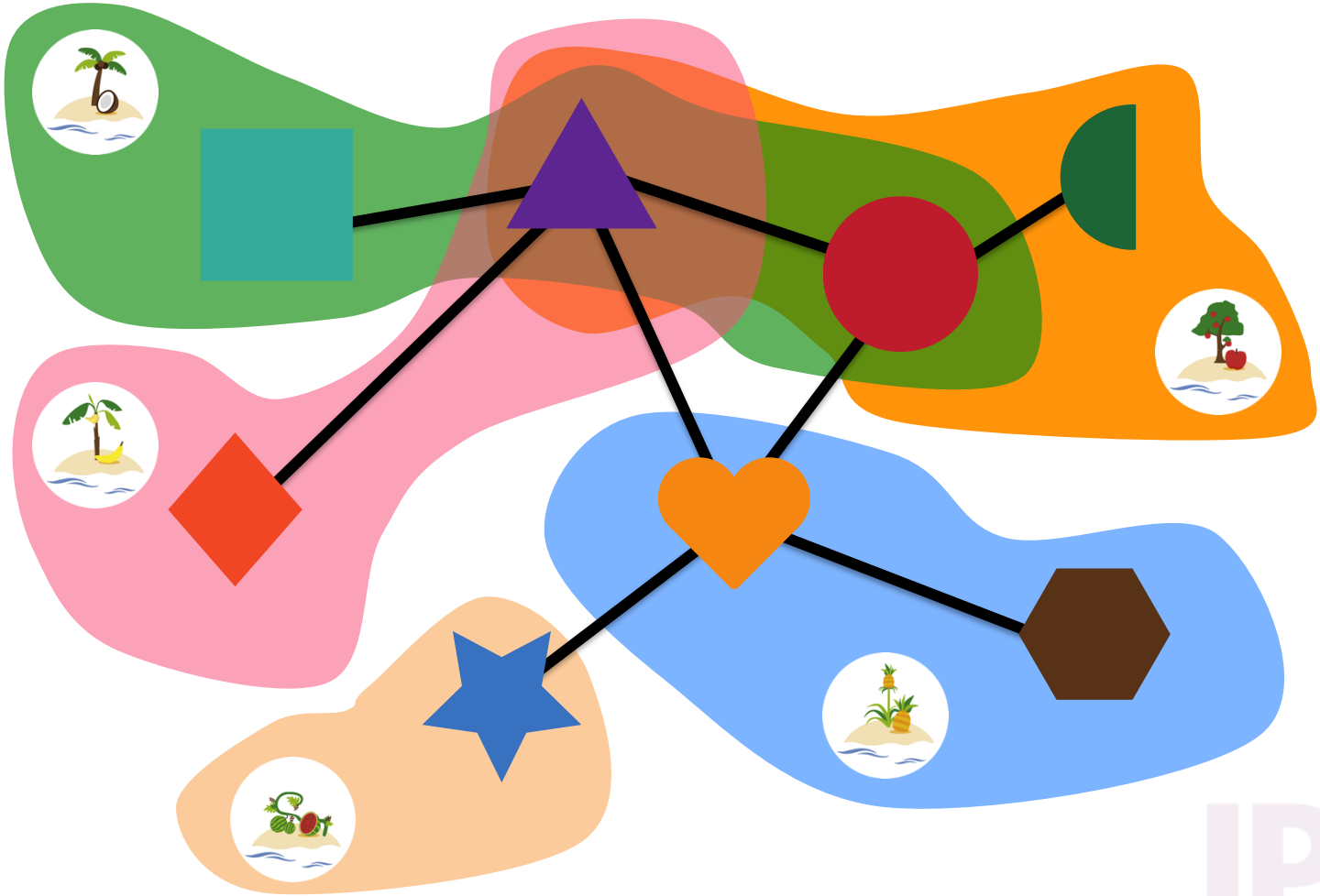
with 



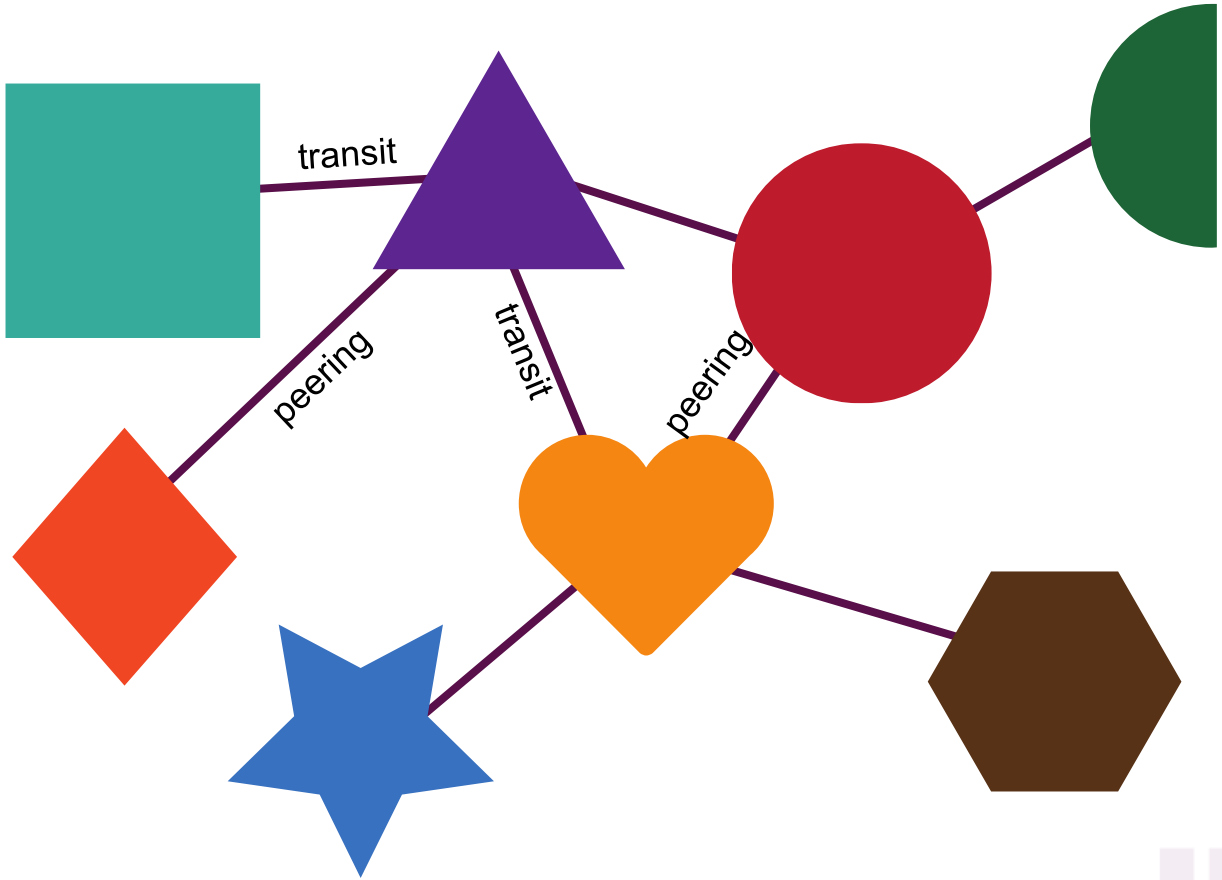






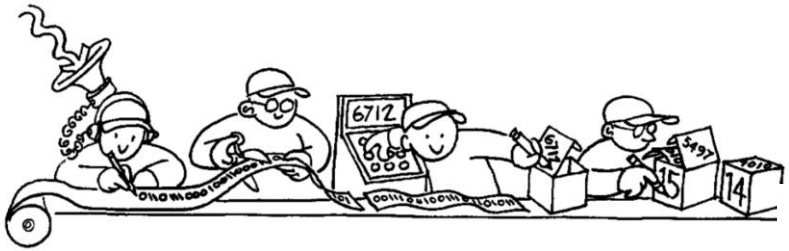


5. Routing Packets

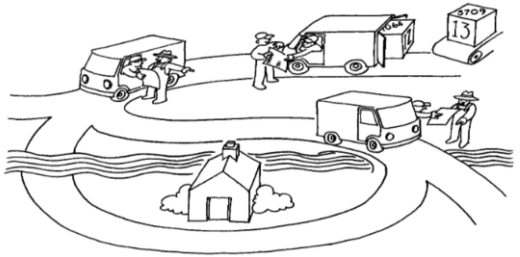

transit
peering
transit
peering

Sending data over the Internet

Data is sent over the Internet in discrete packets

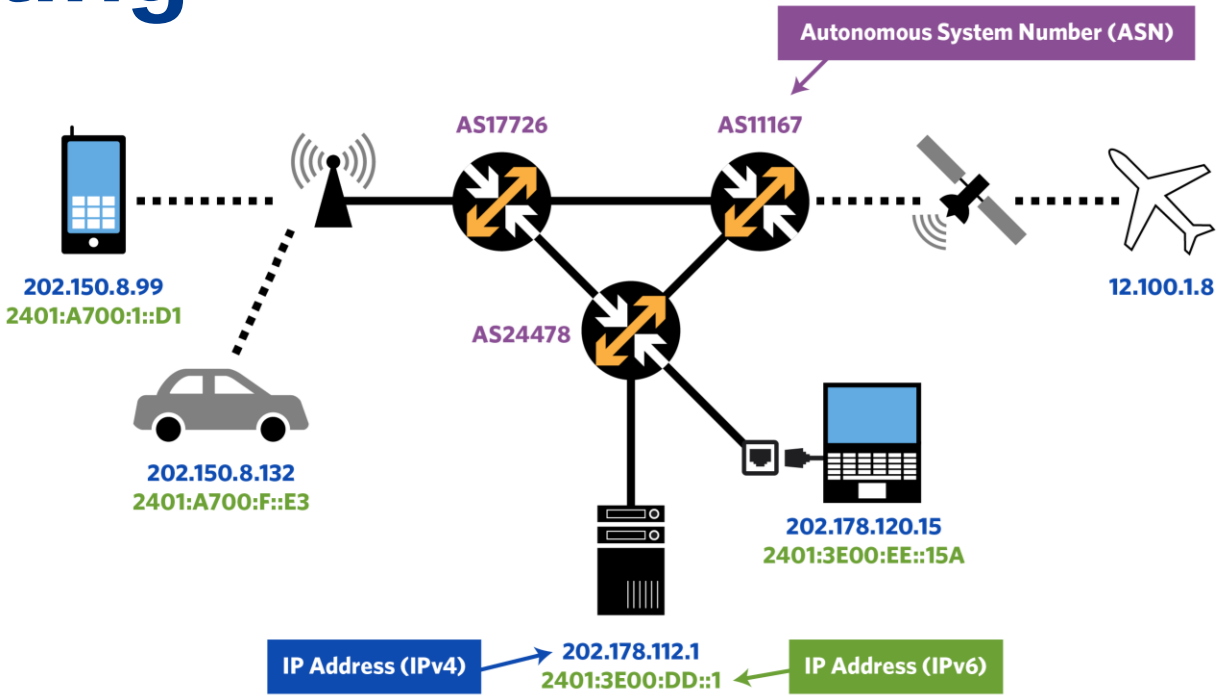


Packets are sent from ‘source’ to ‘destination’

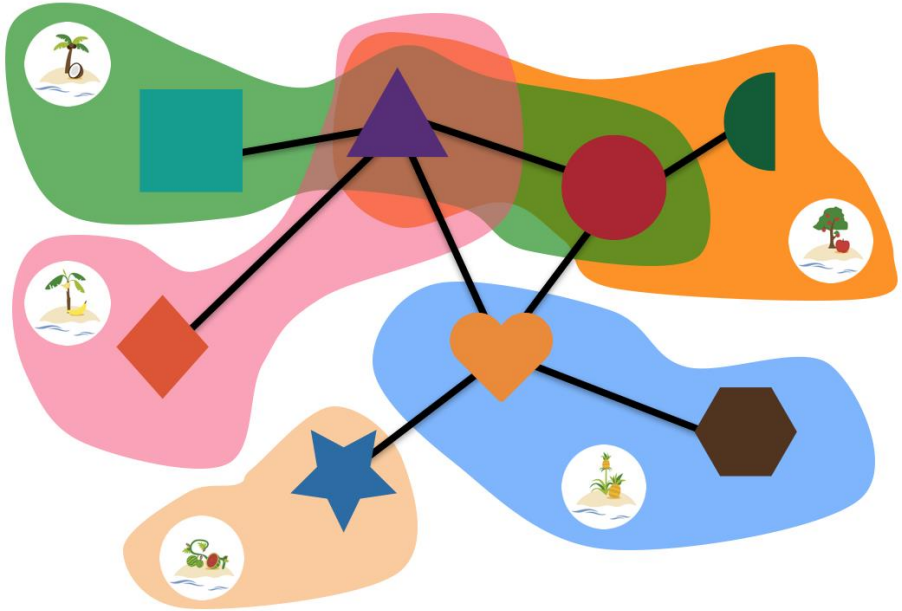


Every source and destination in the Internet must have an IP address

Routing

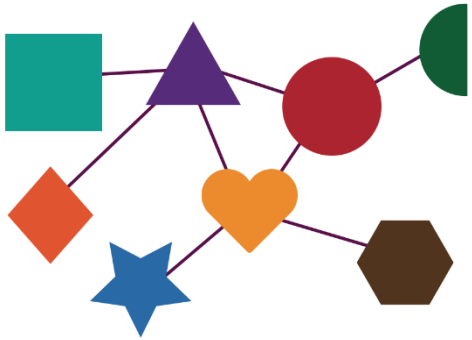

Autonomous System Number (ASN)
AS17726
AS11167
AS24478
202.150.8.99
2401:A700:1::D1
12.100.1.8
202.150.8.132
2401:A700:F::E3
202.178.120.15
2401:3E00:EE::15A
IP Address (IPv4)
202.178.112.1
2401:3E00:DD::1
IP Address (IPv6)

6. Sending Packets



Send: From 11101111 **239** to: 10000001 **129**

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

7. IPv6

Address Space

- **IPv4**
  - this pool is 32-bits (2^{32}) in size and contains 4,294,967,296 (4.2 billion) IPv4 addresses.
- **IPv6**
  - address space is 128-bits (2^{128}) in size, containing 340,282,366,920,938,463,463,374,607,431,768,211,456 IPv6 addresses.


012
076
140
237


012
076
140
237

The answer is

340,282,366,920,
938,463,463,374,607,
431,768,211,456

IPv6 addresses

8. Domain Name System

APNIC

addressing the Internet in the Asia Pacific