Newcomers' Session

Central Asia Peering and Interconnection Forum

November 2022

Why Peering Matters

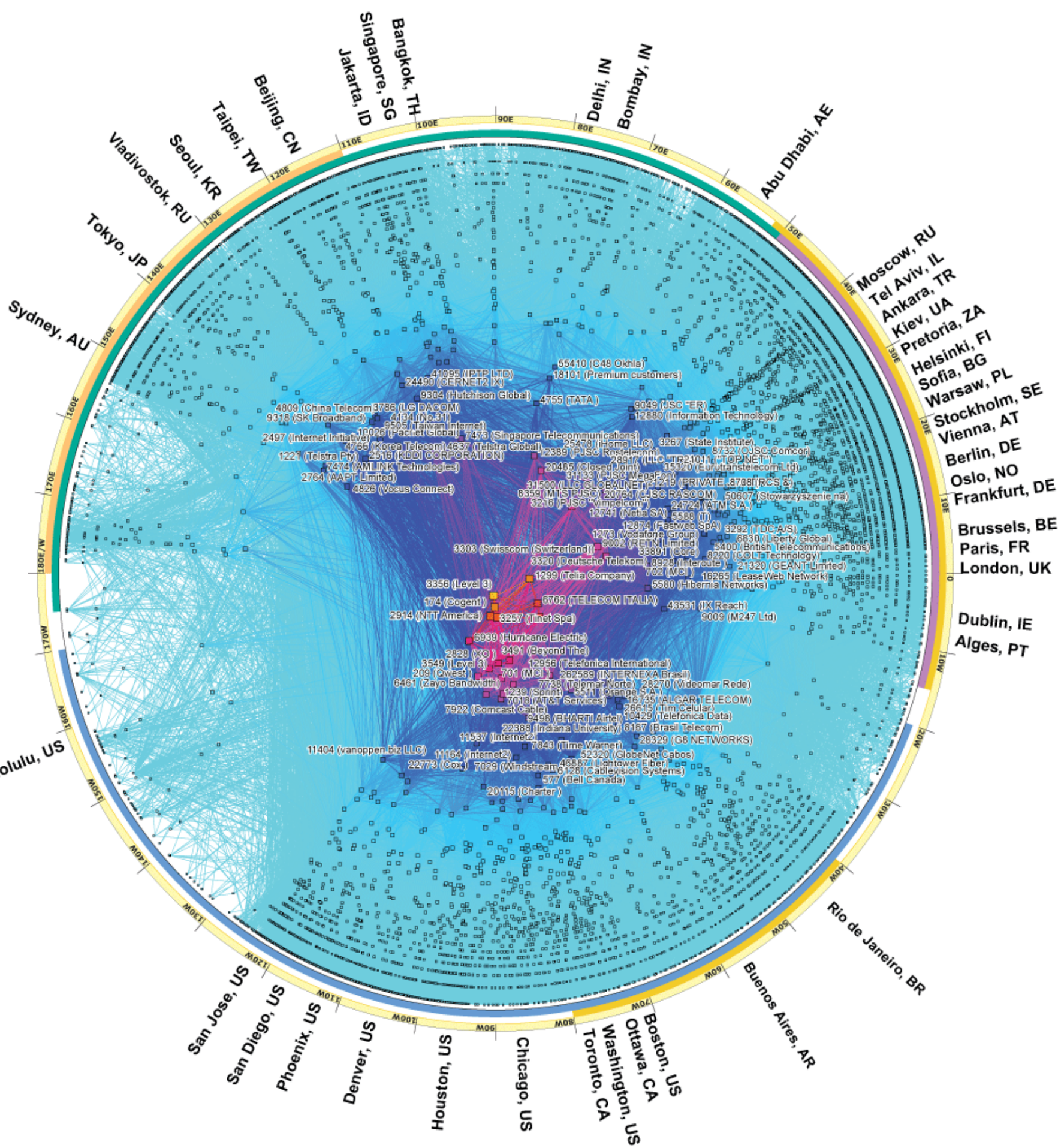
Nishal Goburdhan
Packet Clearing House
www.pch.net

Hello from PCH !

- Global non-profit providing operational support and security to critical Internet infrastructure, including IXPs and the core of the DNS

- Funded by grants, service provision fees from Internet operations industry, and specialised consultancies

- Global footprint with offices in SFO, PAR, KTM and JNB. De-centralised staff in other cities.



Source: caida.org

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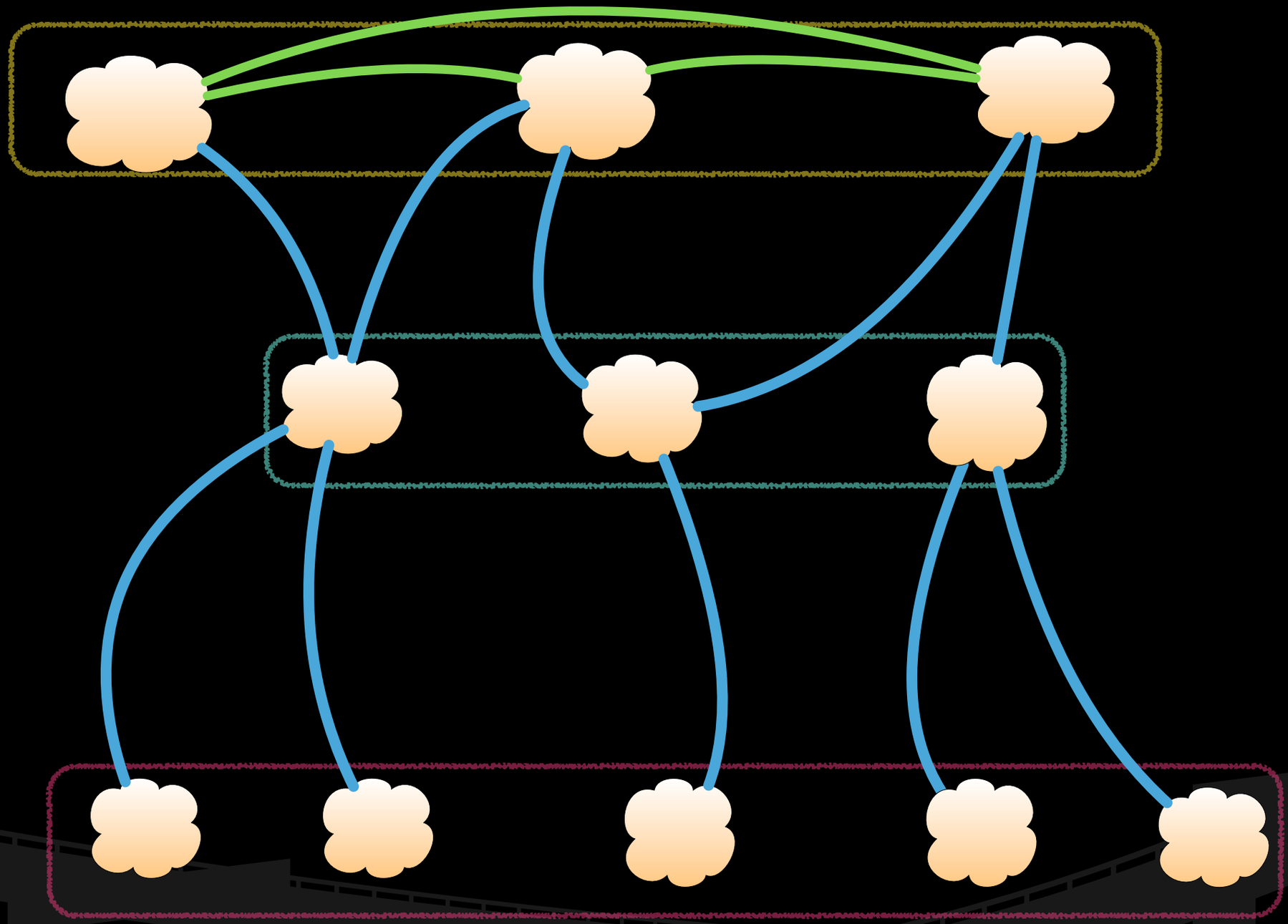
Packet Clearing House



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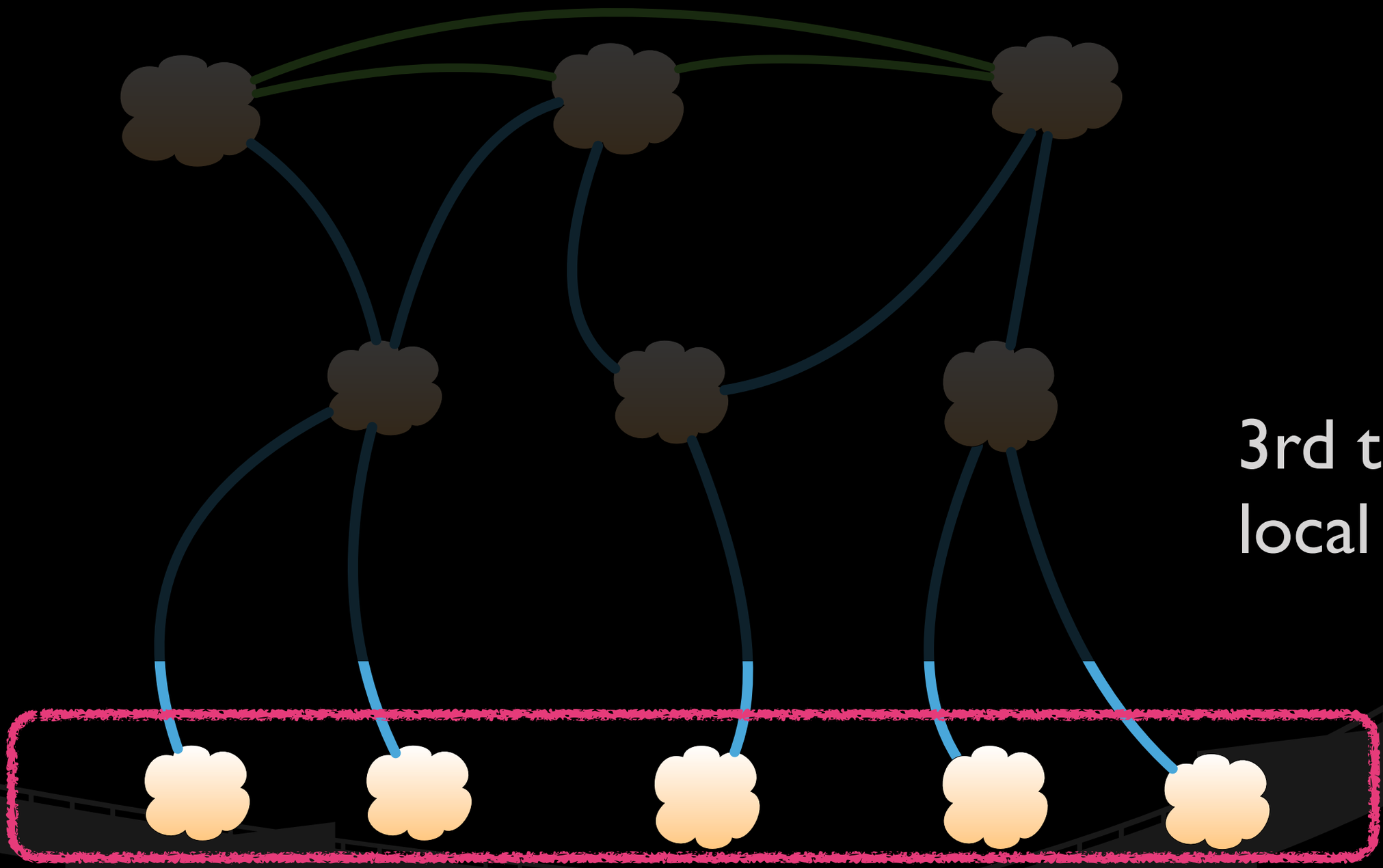
Packet Clearing House



3rd tier/
local ISP

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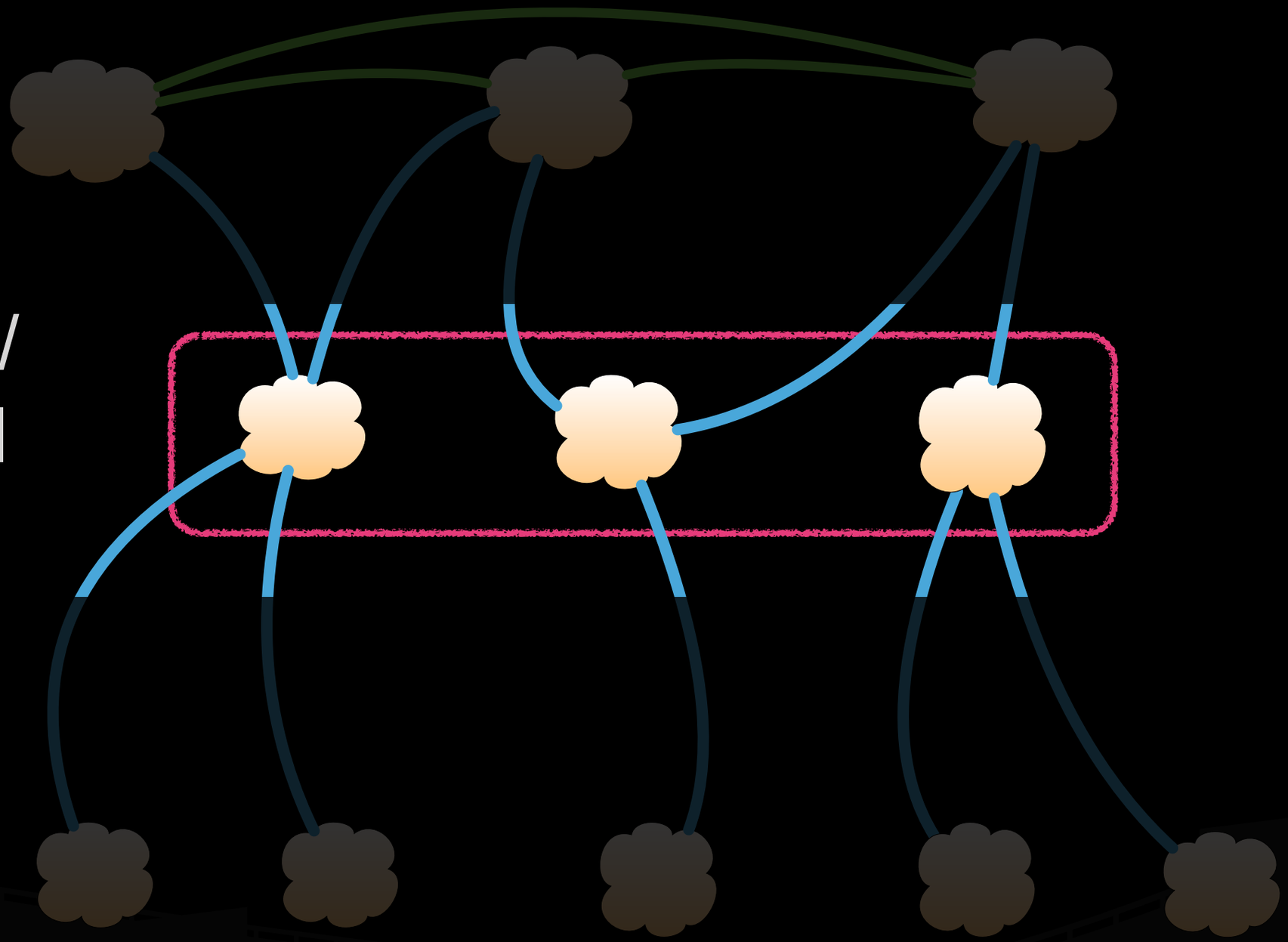
2nd tier/
regional
ISP



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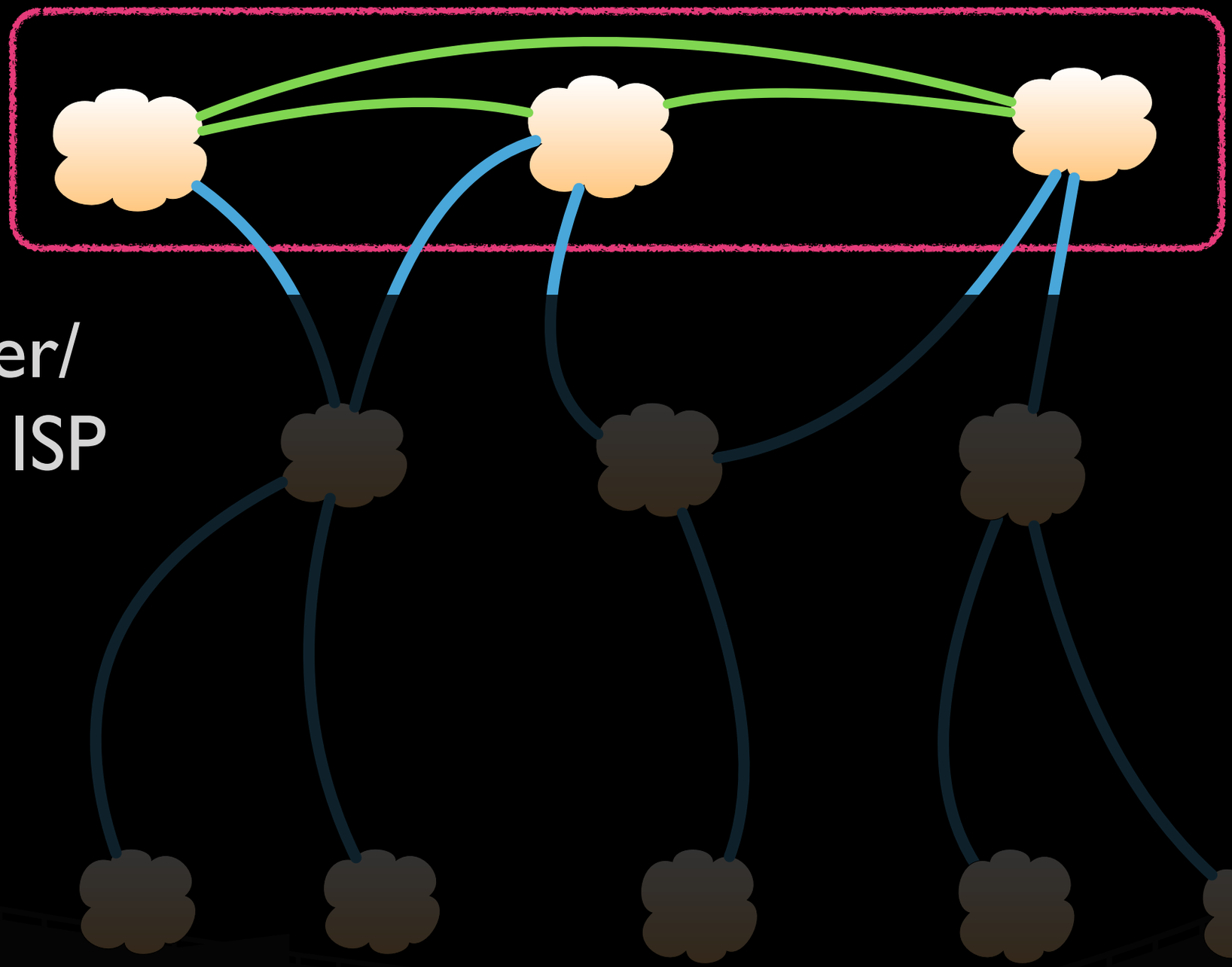

1st tier/
global ISP

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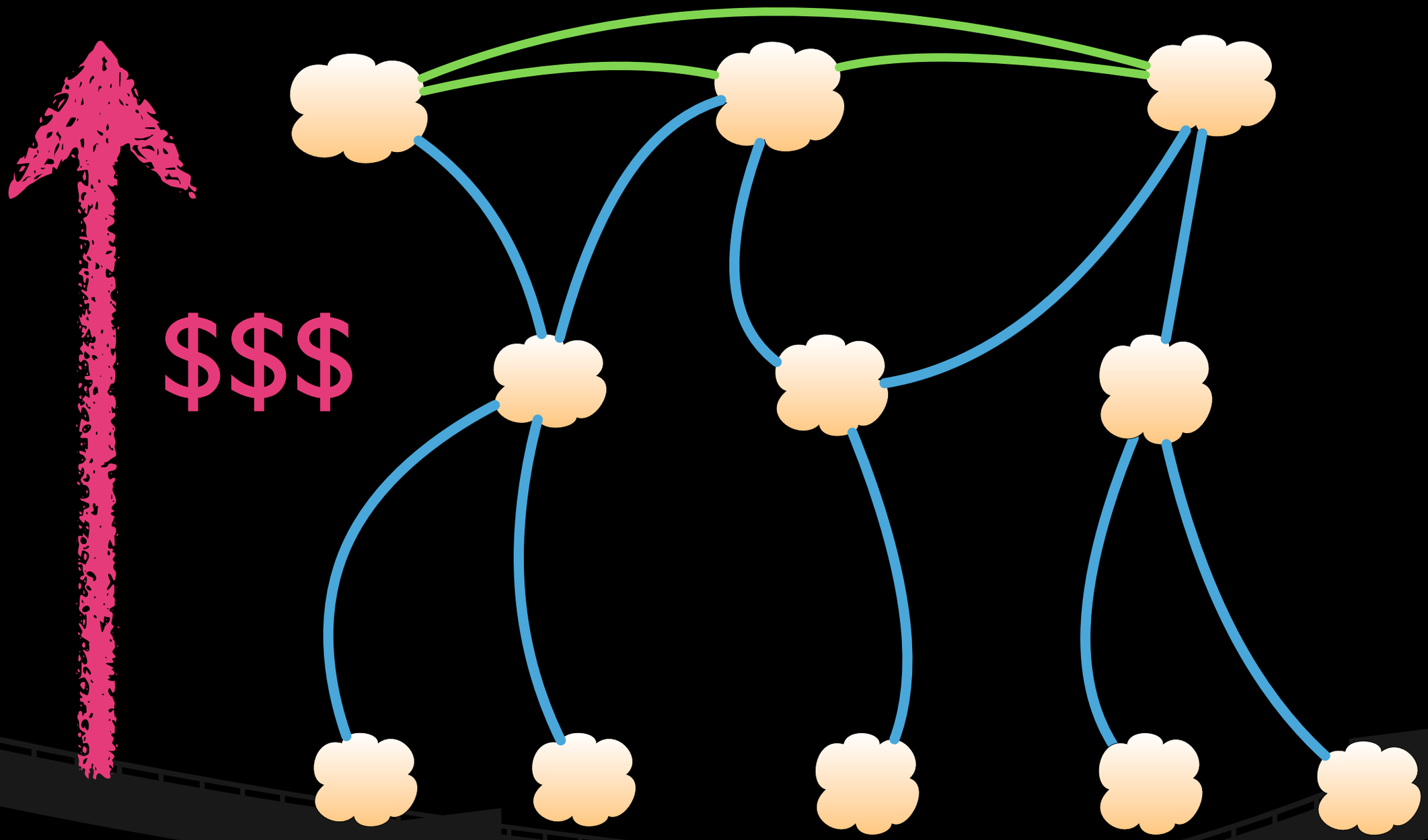

Transit

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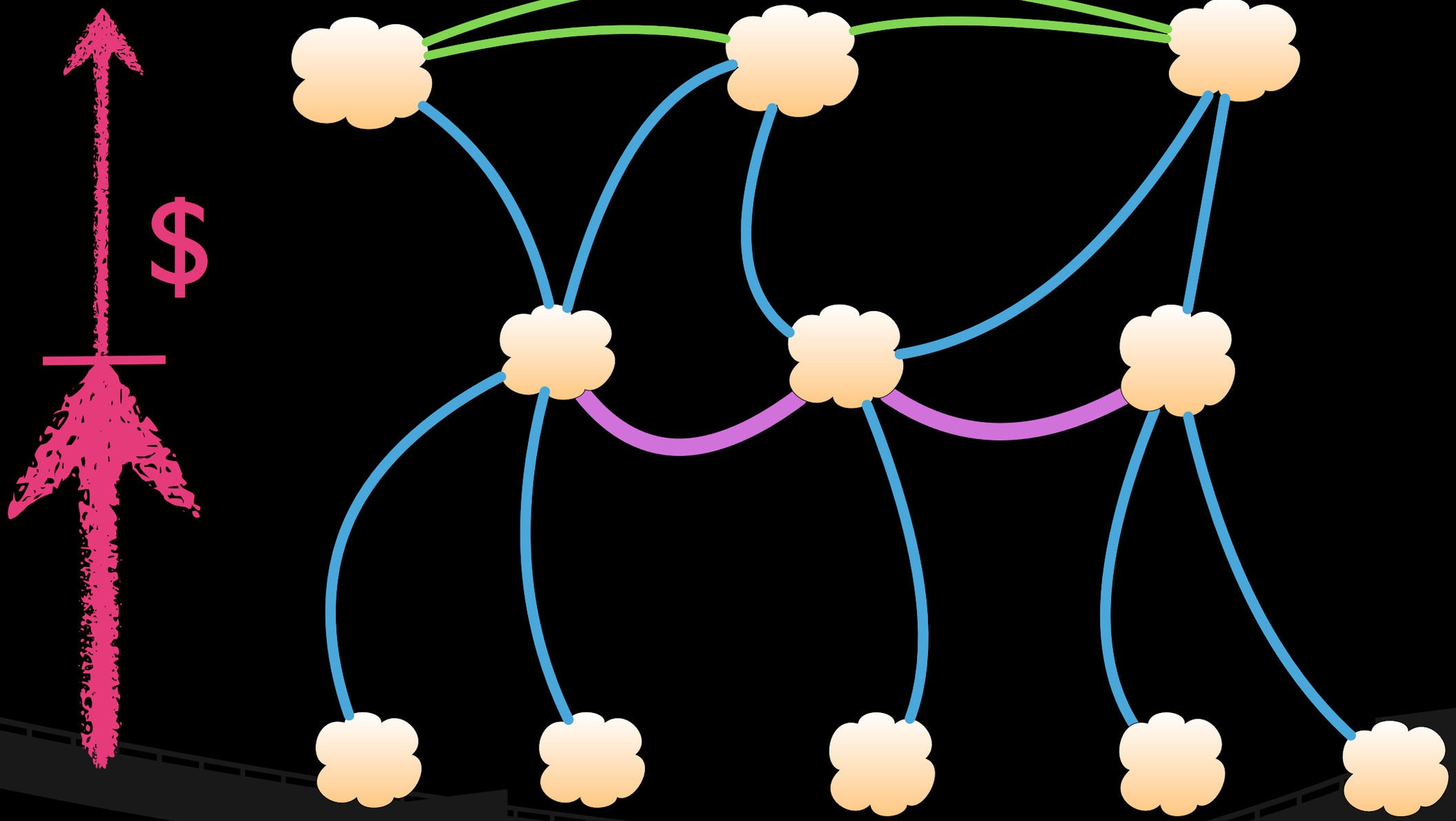

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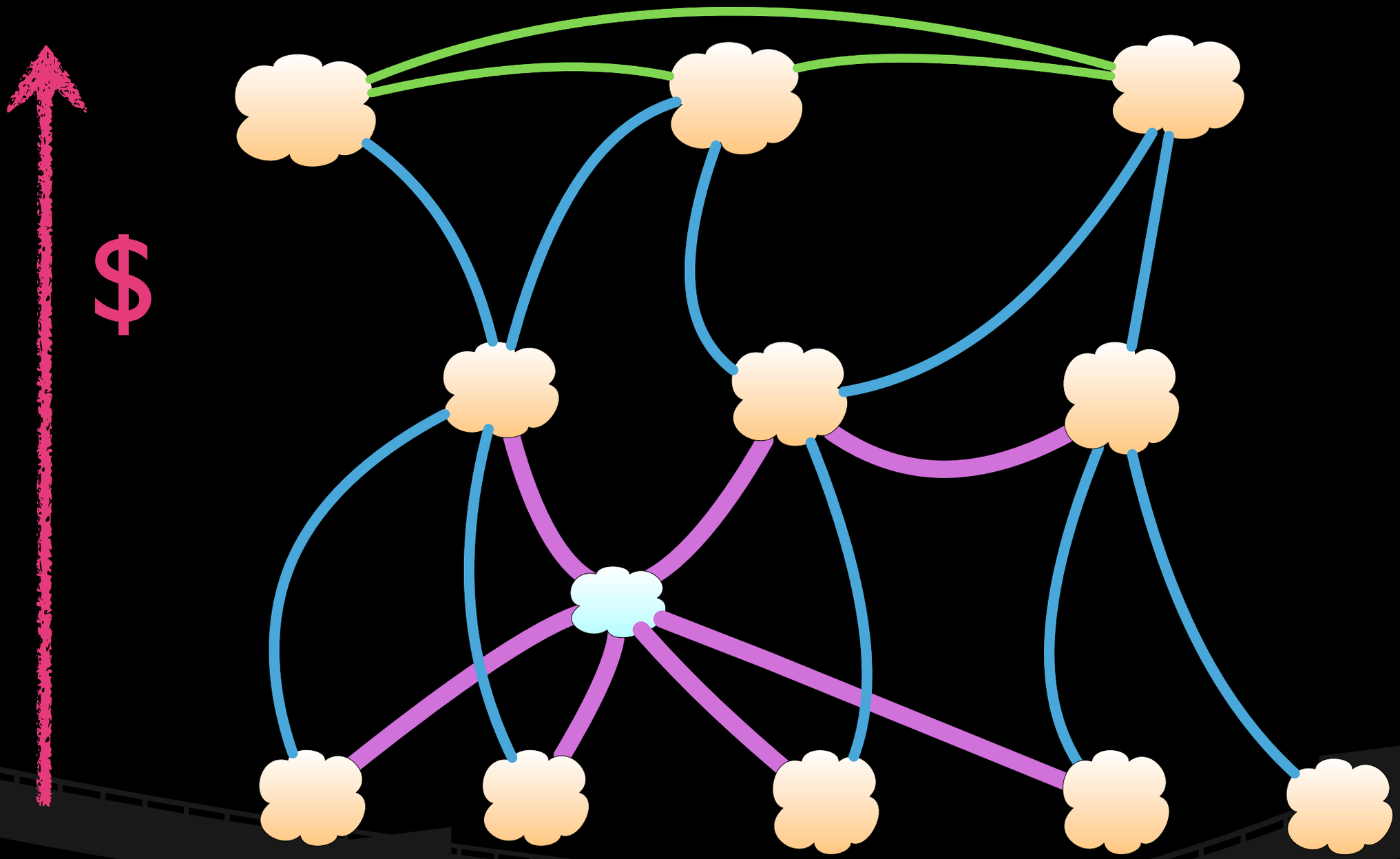

Transit and Peering

- **Transit agreements are commercial contracts** in which a customer pays a service provider for access to the entire Internet. Transit agreements are most common at the edges of the Internet.
  - Example: a corporate customer of a local ISP that provides Internet connectivity and managed ICT services.
- **Peering agreements** are the carrier interconnection agreements that allow carriers to exchange traffic bound for one another's customers; they are most common in the core of the Internet and are the true creators of value of the Internet.
  - Example: networks at an IXP with a free-settlement peering agreement

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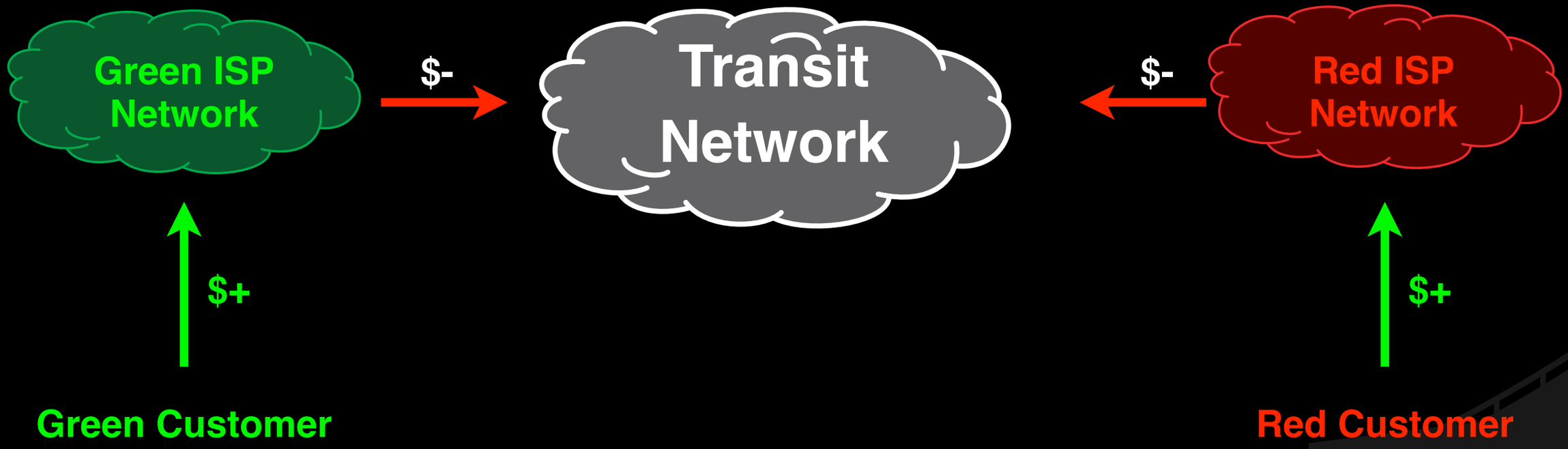
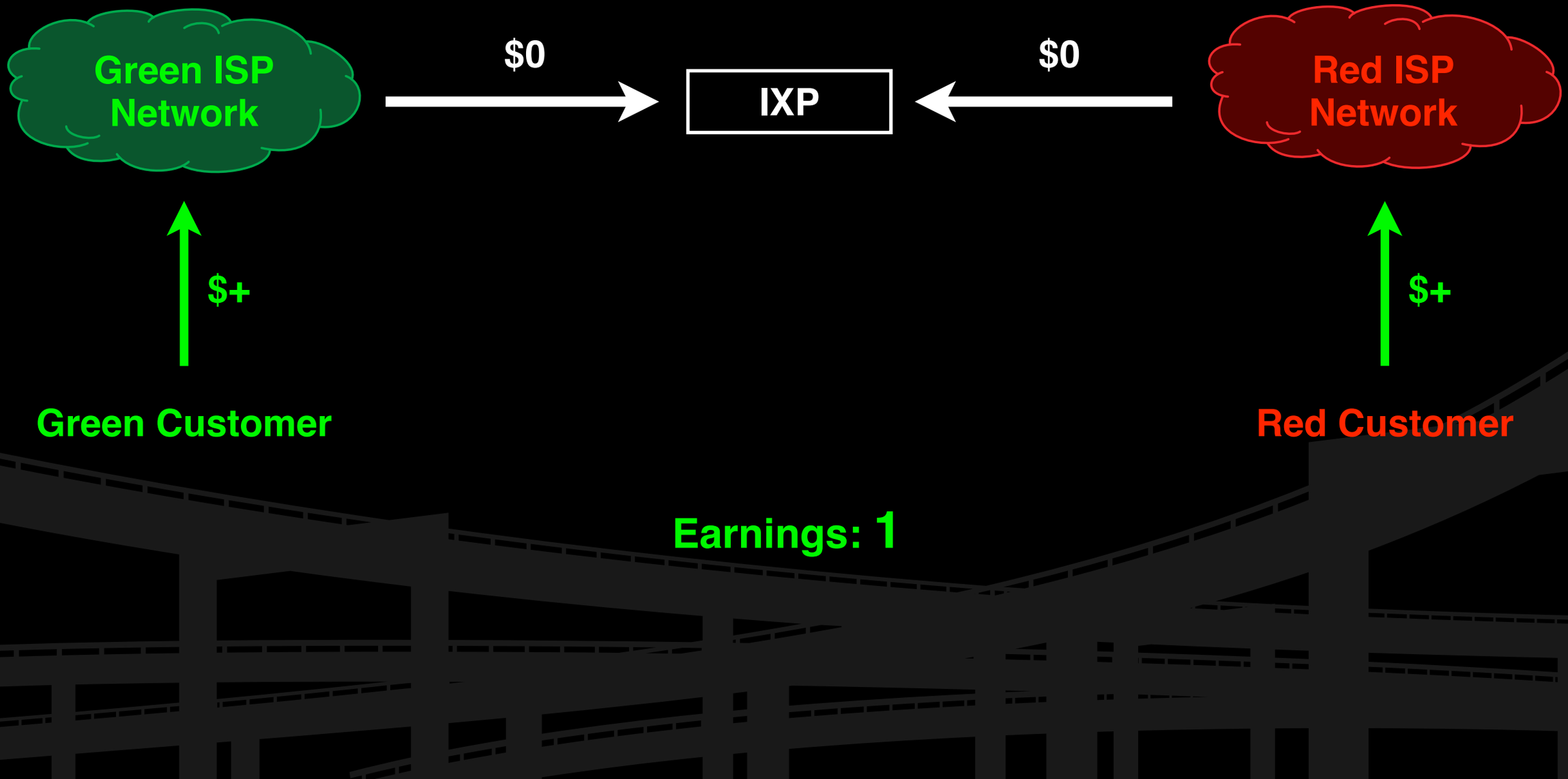
Earnings: 2


Green ISP Network
$-
Transit Network
$-
Red ISP Network
$+
$+
Green Customer
Red Customer

Earnings: 1-x


Green ISP Network
$0
IXP
$0
Red ISP Network
$+
Green Customer
$+
Red Customer
Earnings: 1

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Any rational network operator will always seek to maximise their peering …

How we interconnect

- Physical infrastructure (layer 2 switching) that facilitates network interconnection.
  - Cost and performance benefit (direct routes are the cheapest!)
  - Natural ecosystem for content driven systems to develop (traffic aggregation point).
  - Improved skills and knowledge (workforce and job creation)
  - Increases autonomy as a region.
  - Privacy and cyber security advantages

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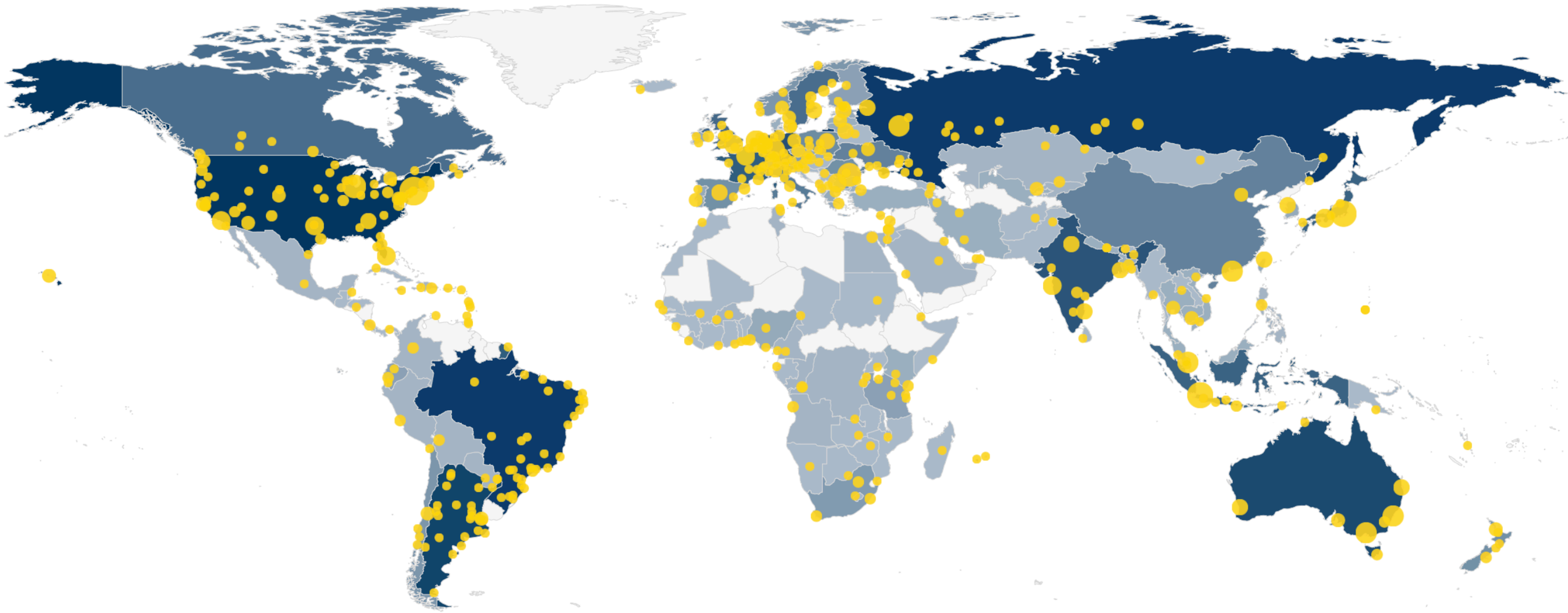
Internet Exchange Directory



Showing **712** IXPs from **1103** — Status is **Active** - Number of IXPs by Country

Source: **pch.net**

www.pch.net/ixp/dir

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Why do we peer?

Cost reduction

Economic tool

Performance

Sovereign Data

Knowledge Economy

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The Internet Lifecycle (from an ISP's perspective)

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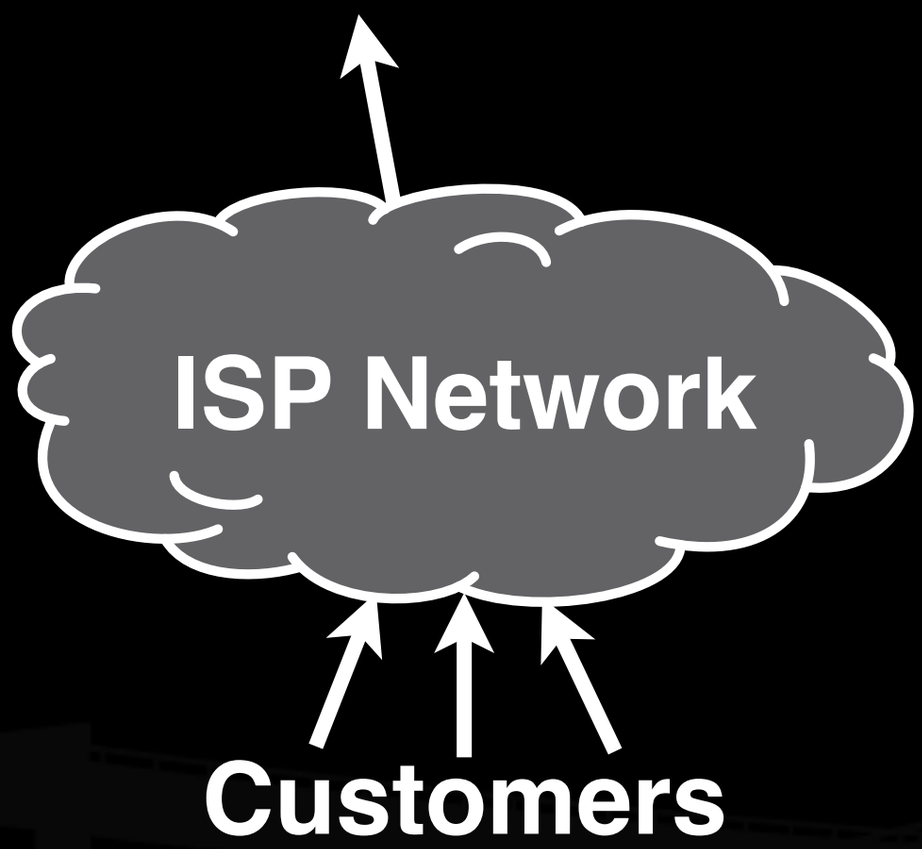
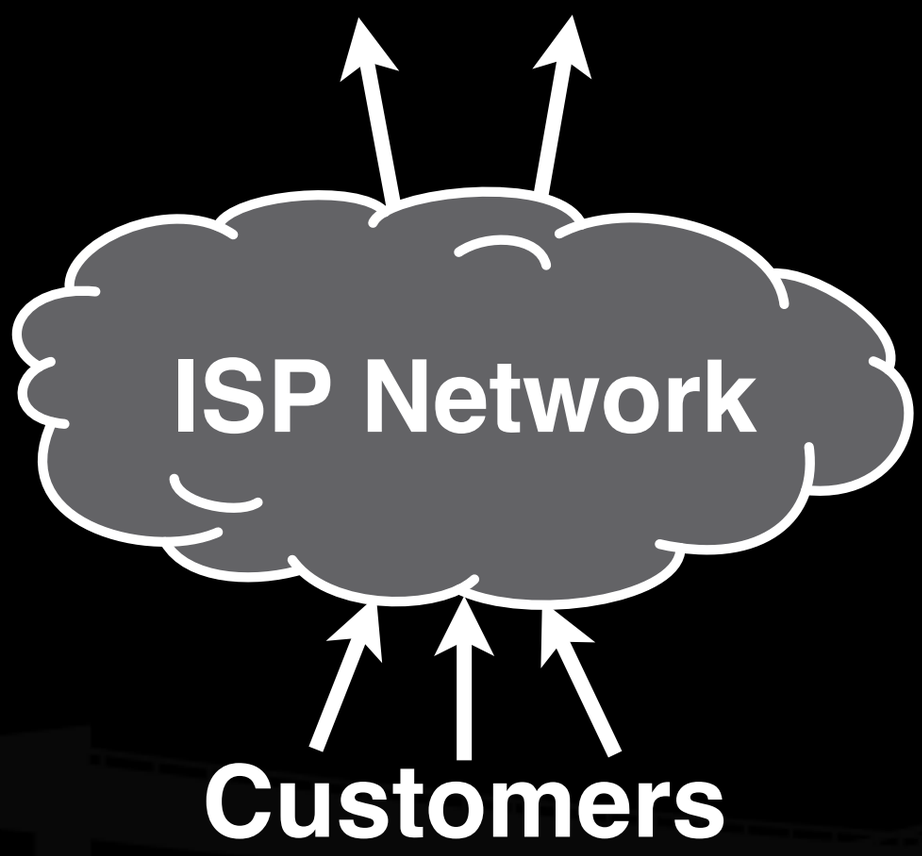
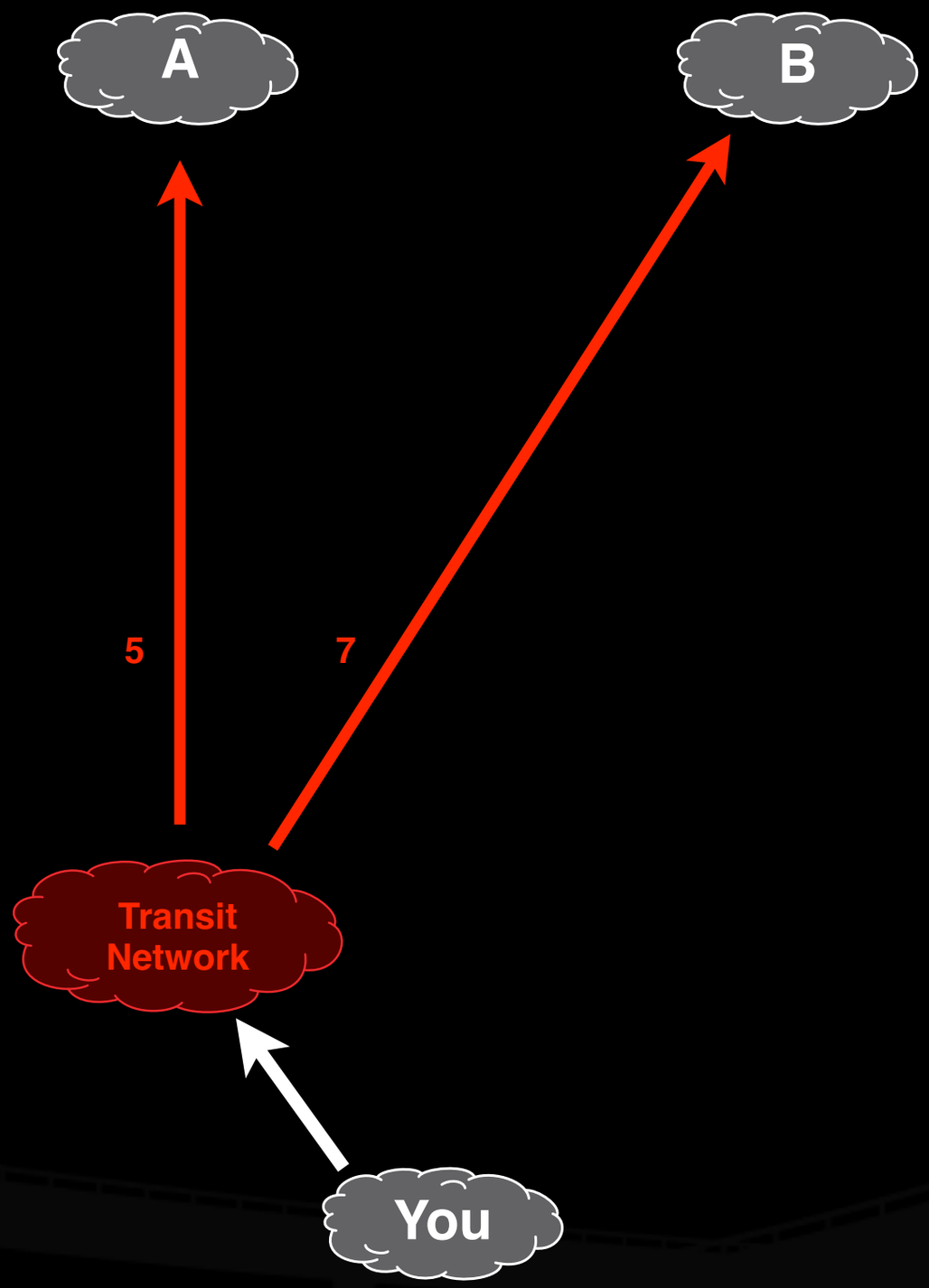
ISP Lifecycle: Simple Aggregator

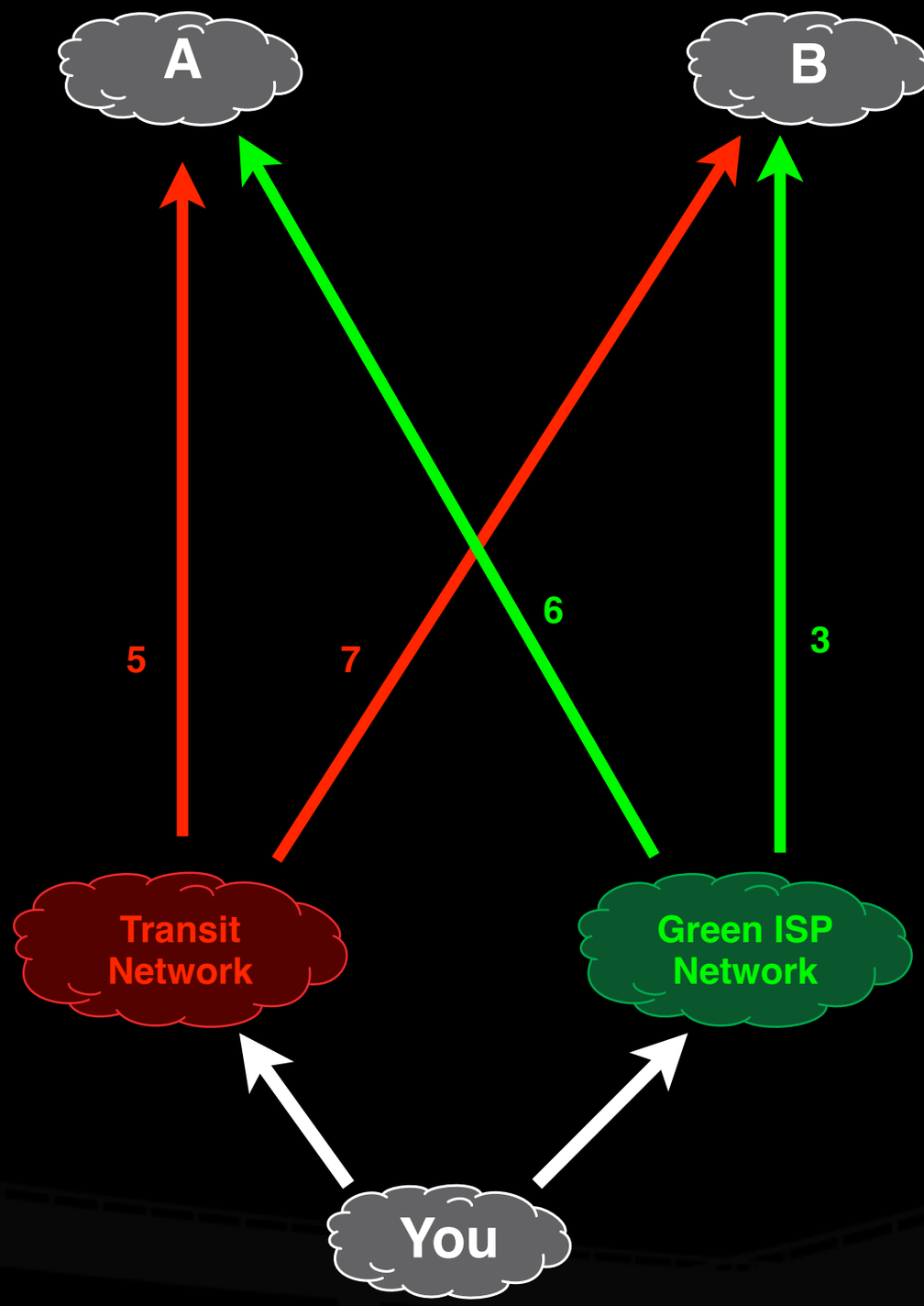


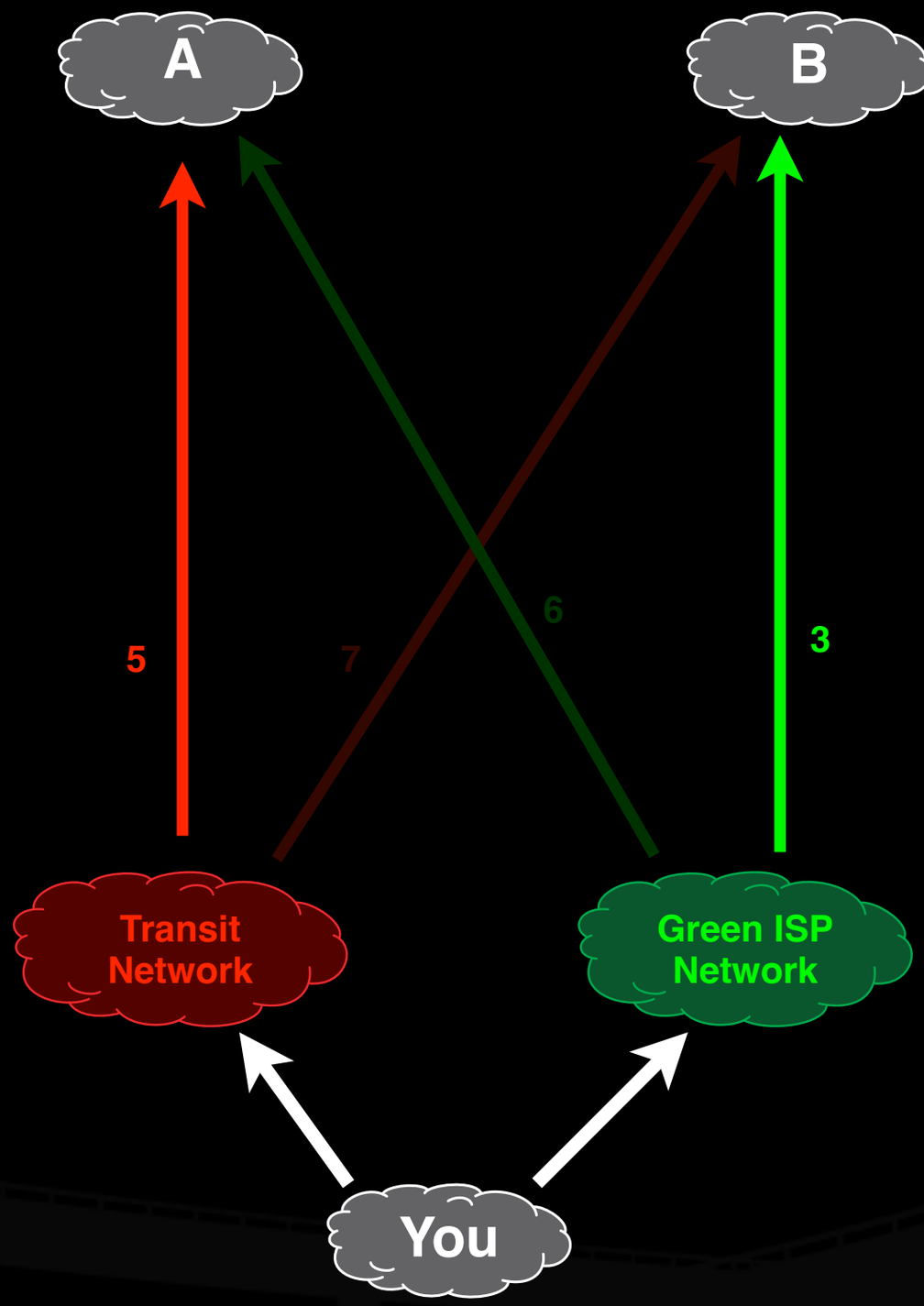
ISP Lifecycle: Redundancy and LCR





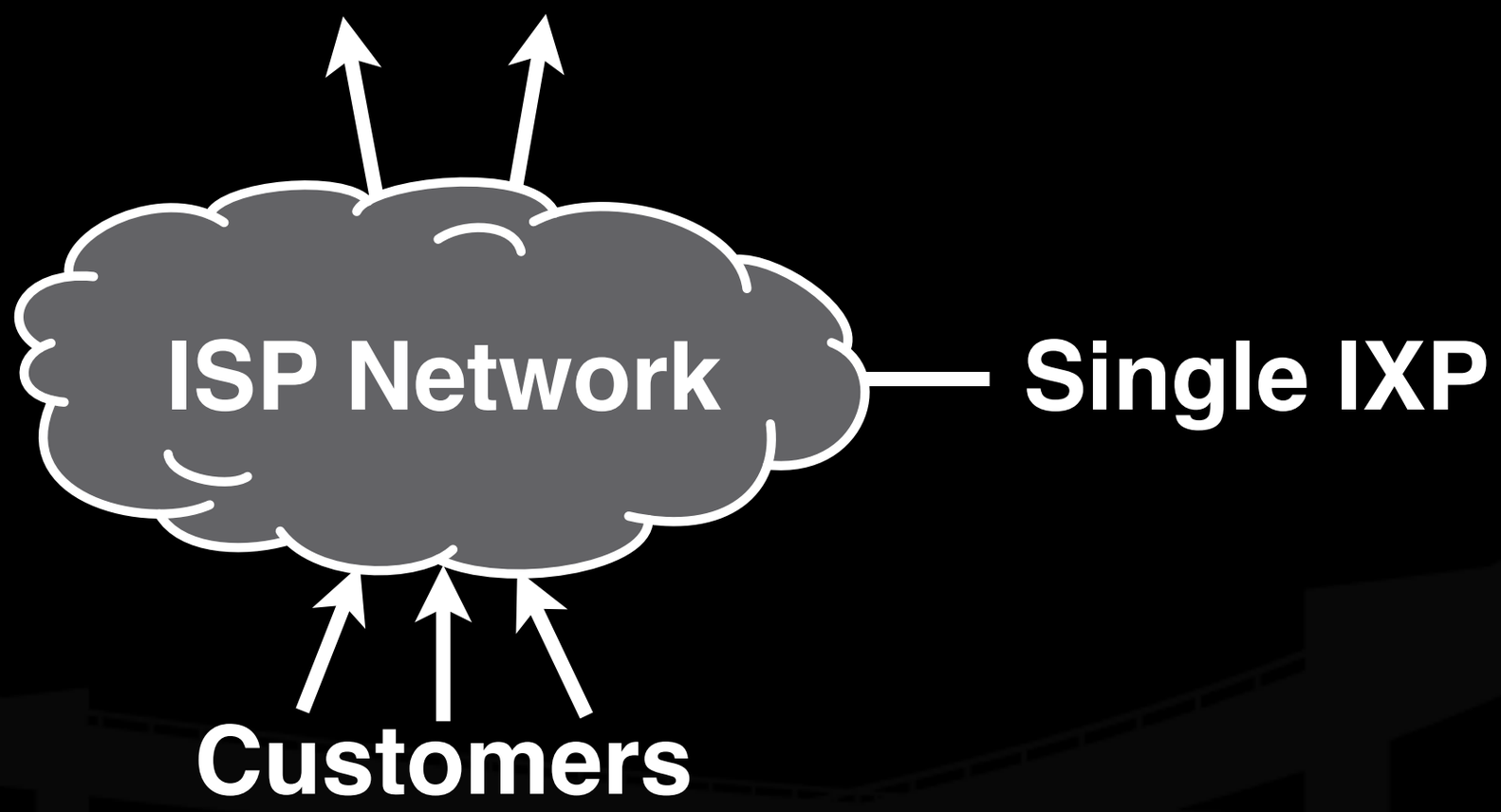
Ave Length = 6


A
B
5
7
6
3
Transit Network
Green ISP Network
You

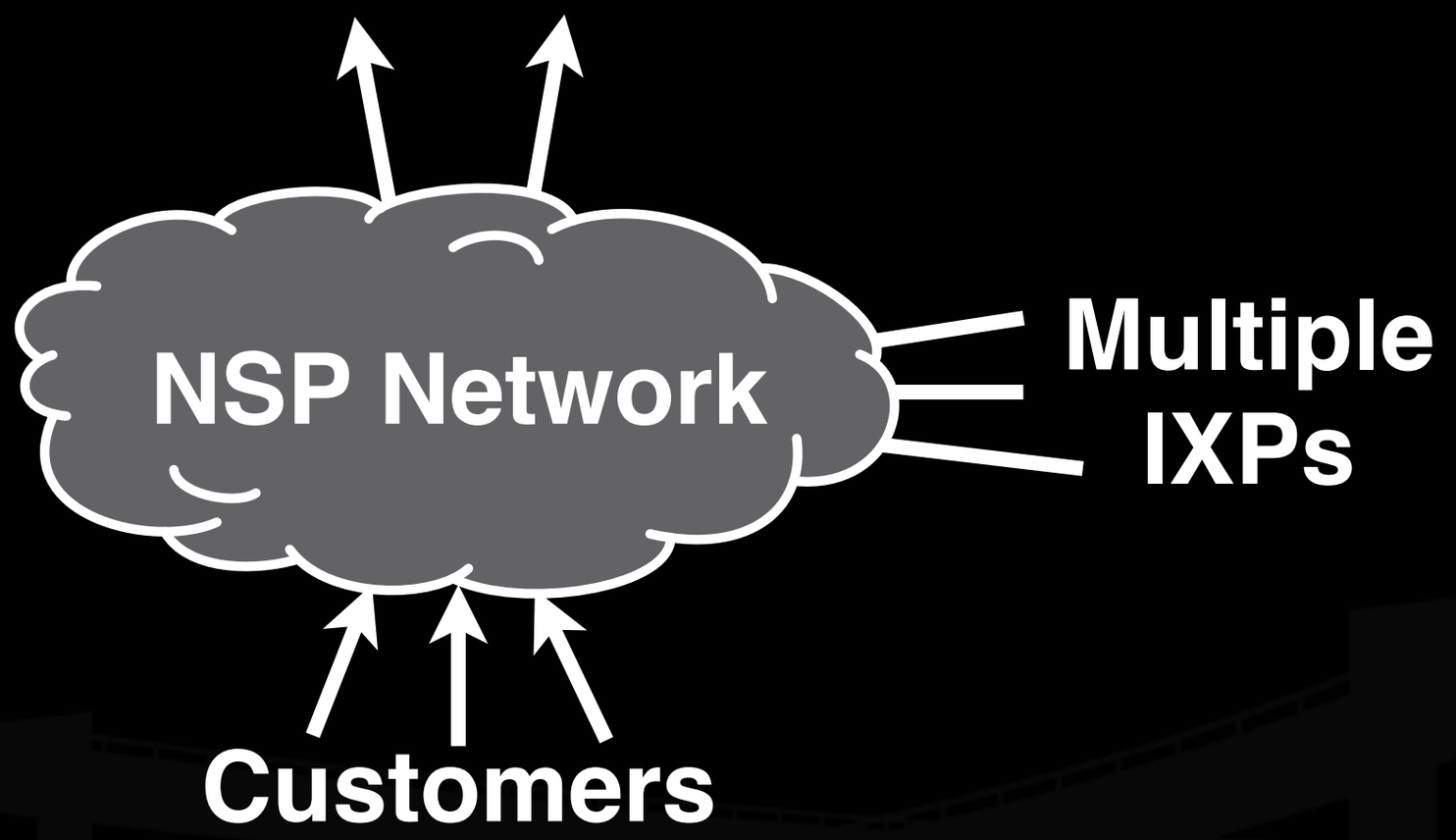


Ave Length = 4

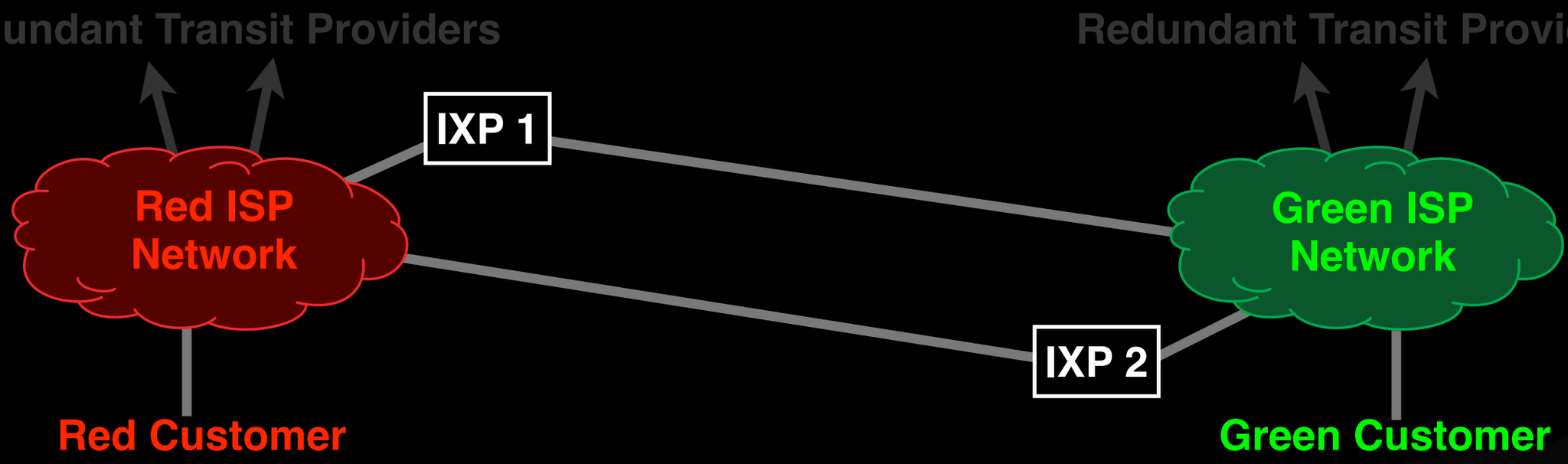
ISP Lifecycle: Local Peer



ISP Lifecycle: Backbone Network

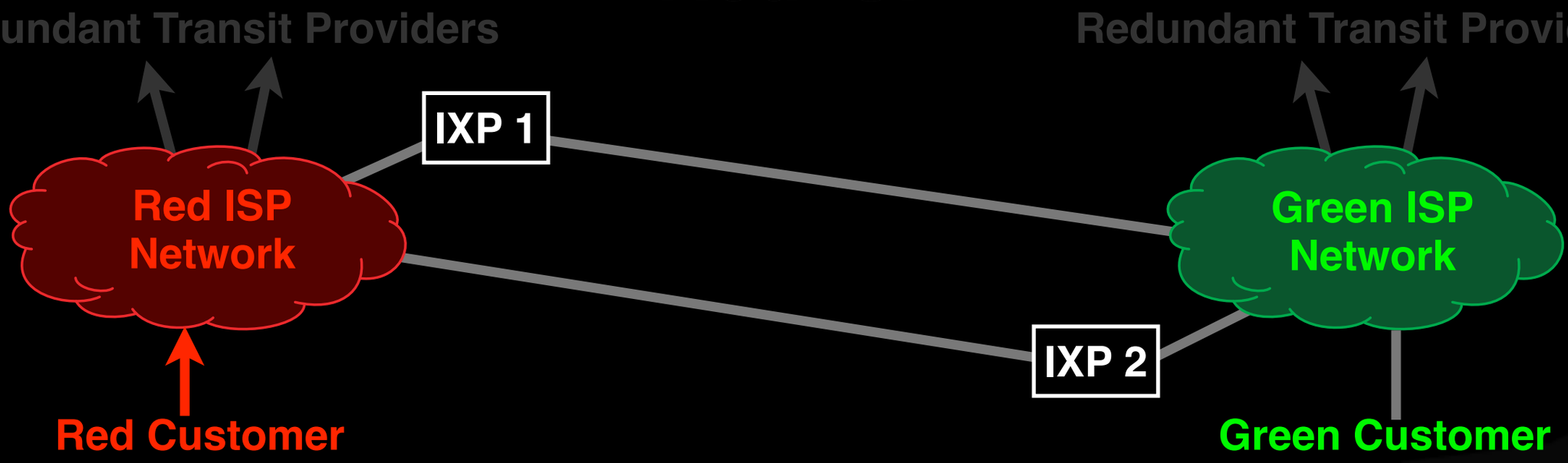


Hot Potato Routing



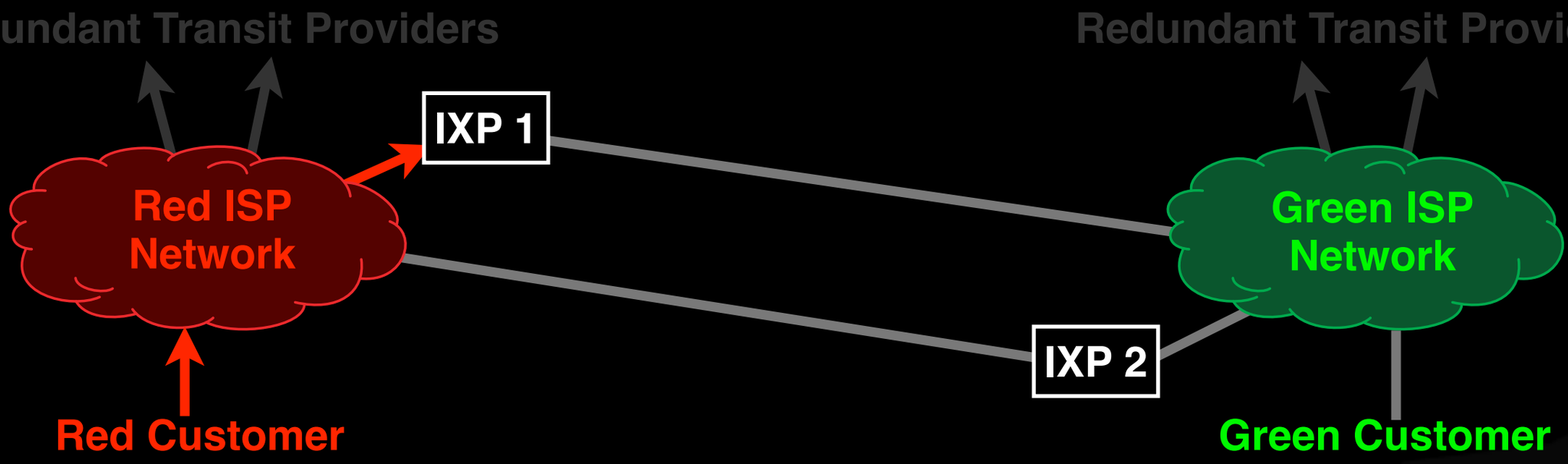
Hot Potato Routing

Red Customer sends to Green Customer via Red ISP



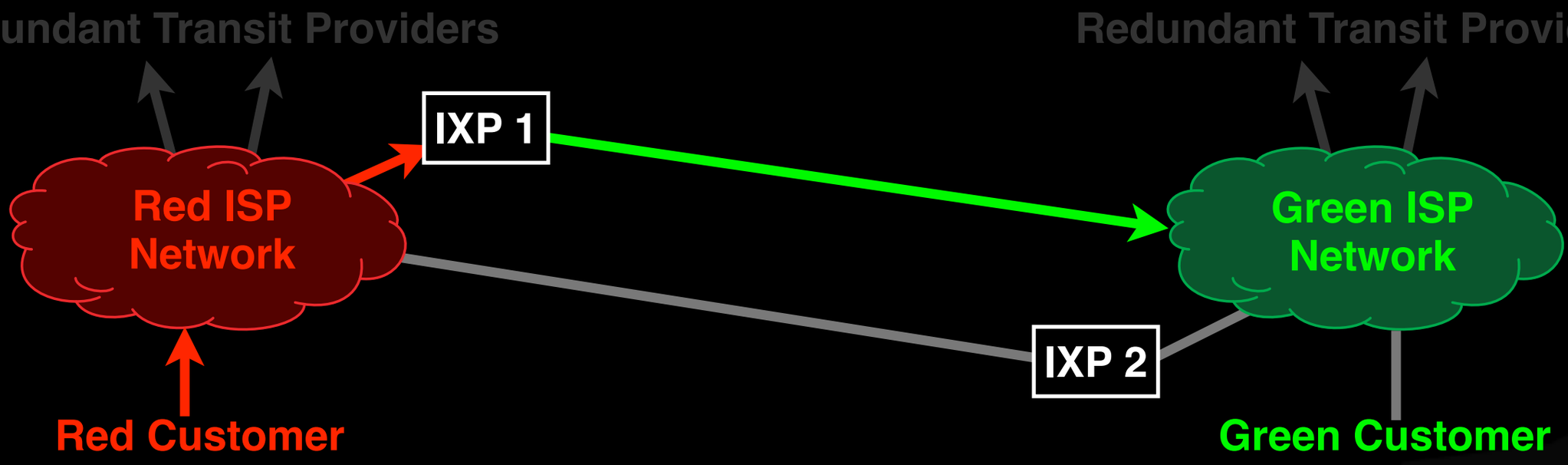
Hot Potato Routing

Red ISP delivers at *nearest* IXP



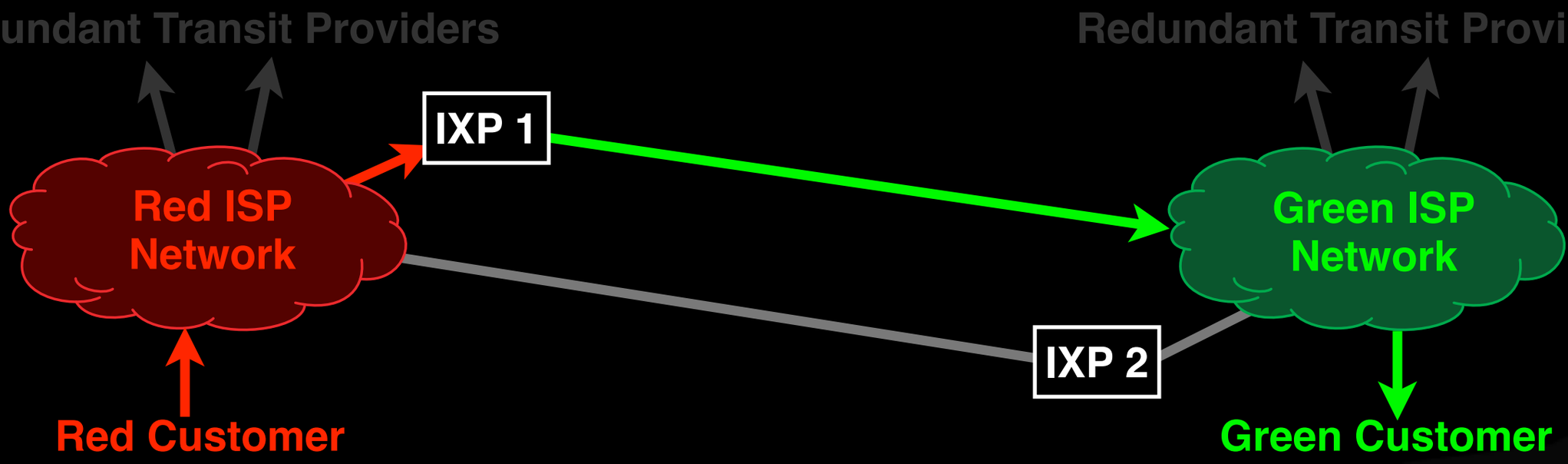
Hot Potato Routing

Green ISP backhauls from distant IXP



Hot Potato Routing

Green ISP delivers to Green Customer



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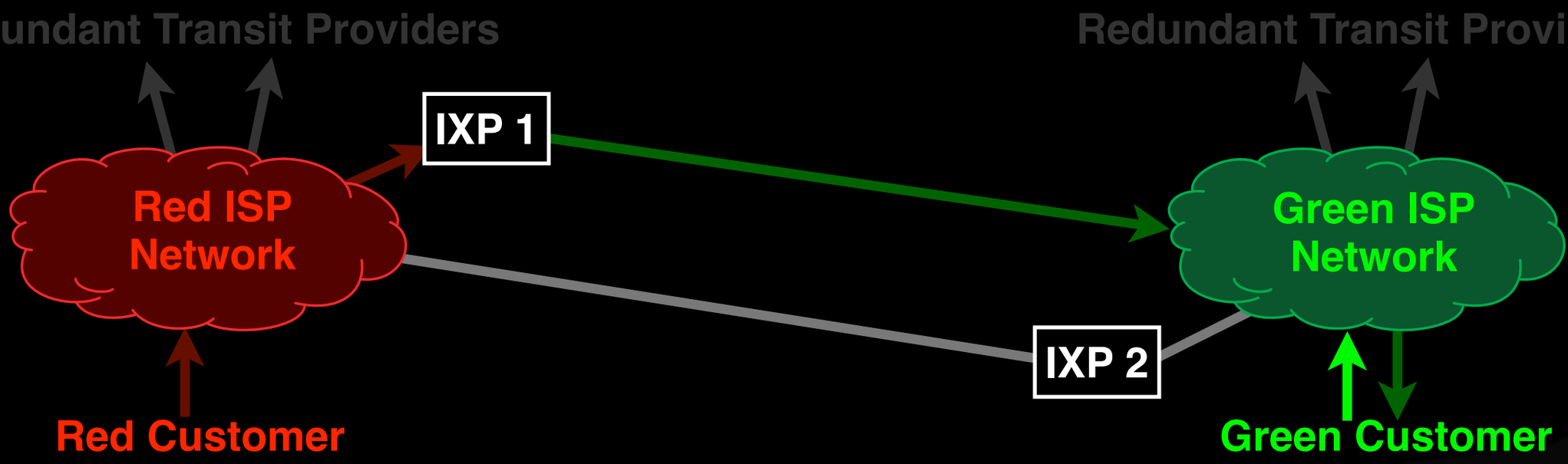
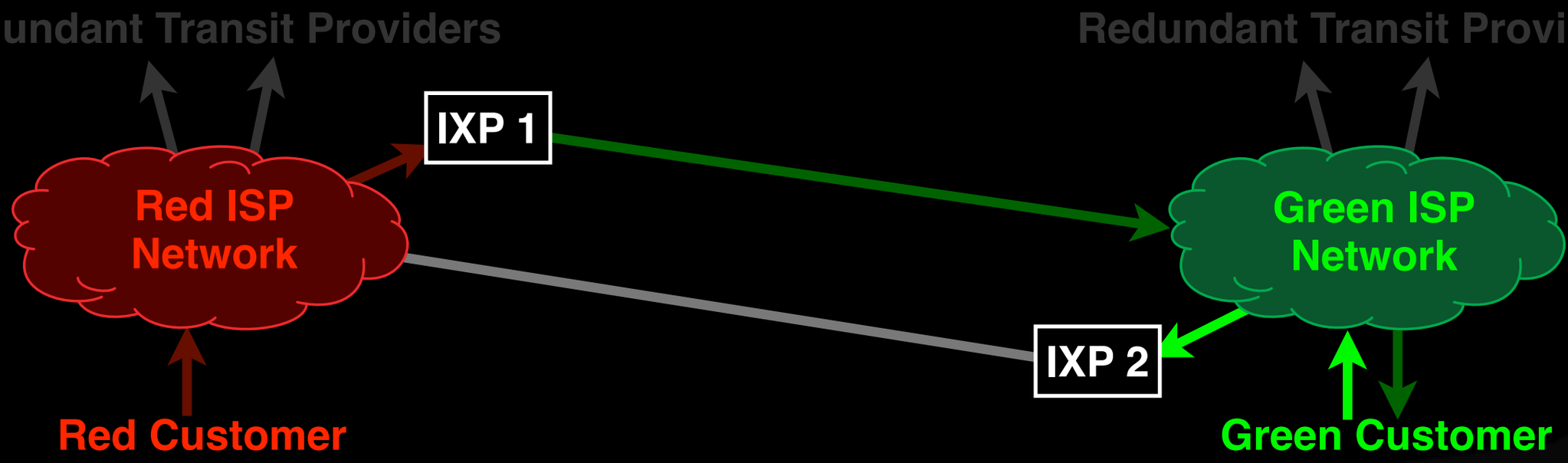
Hot Potato Routing

Green Customer replies via Green ISP



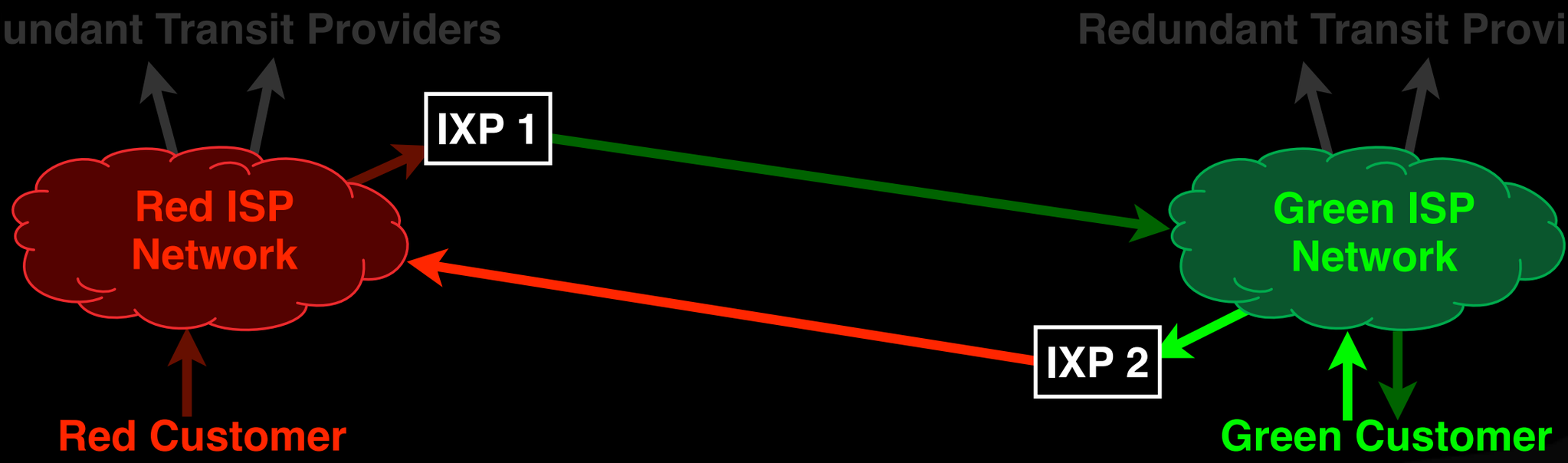
Hot Potato Routing

Green ISP delivers at nearest IXP



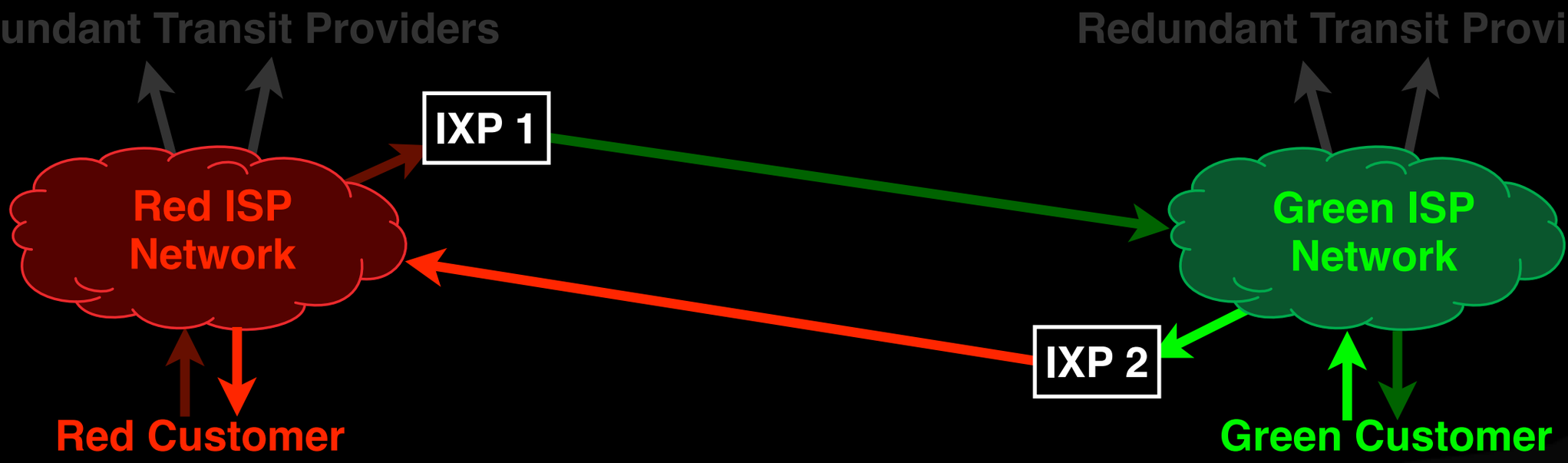
Hot Potato Routing

Red ISP backhauls from distant IXP



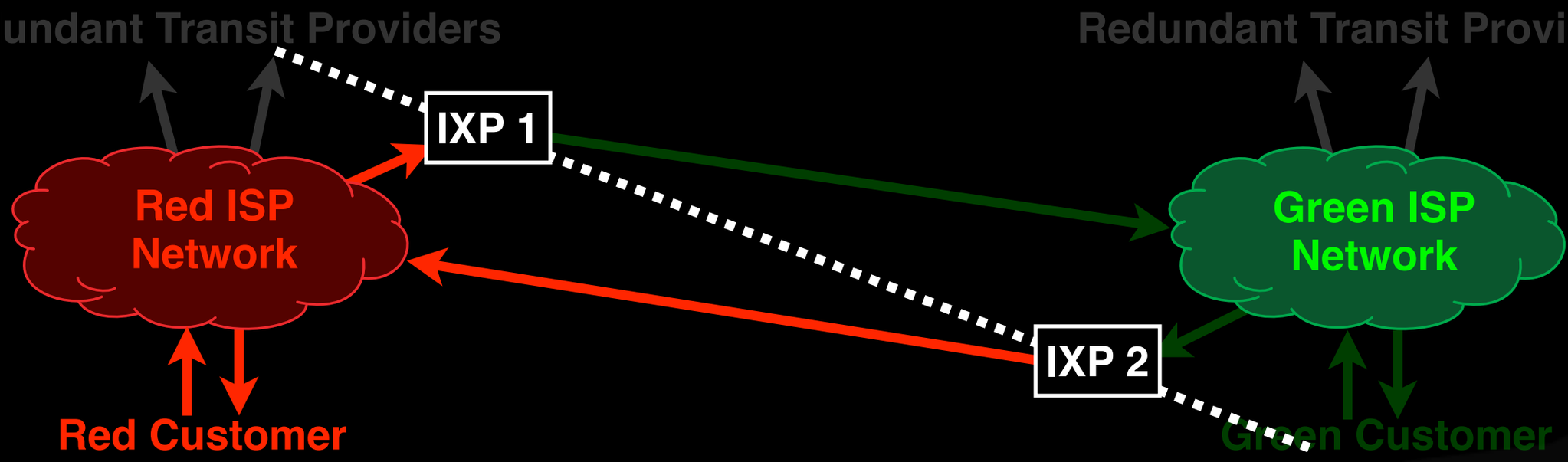
Hot Potato Routing

Red ISP delivers to Red Customer



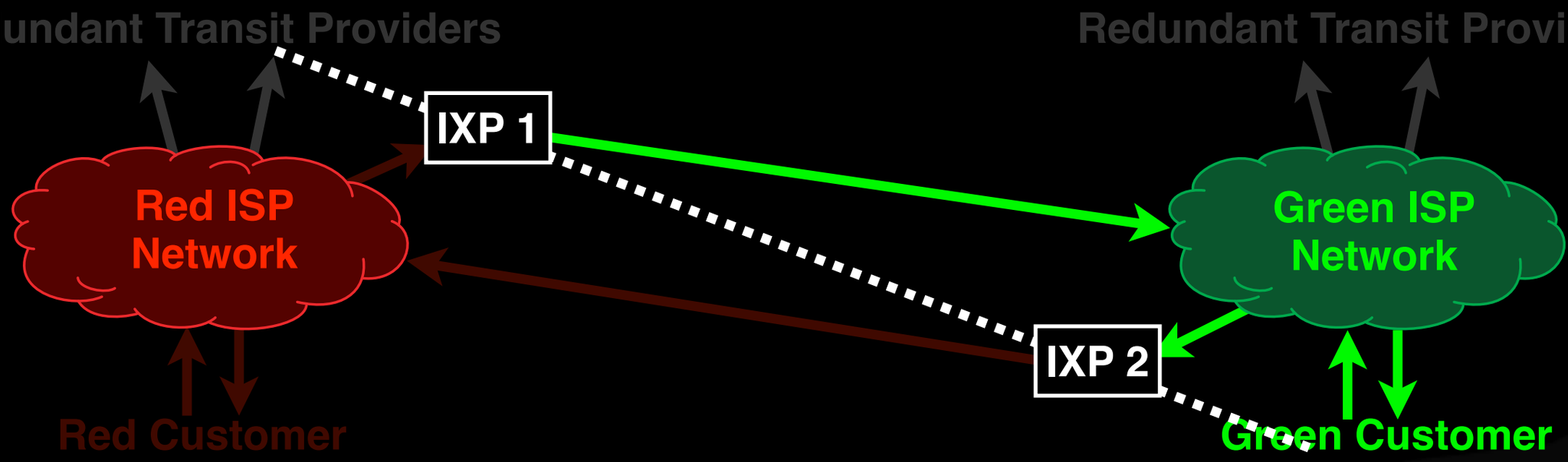
Hot Potato Routing

Red Network is responsible for its own costs



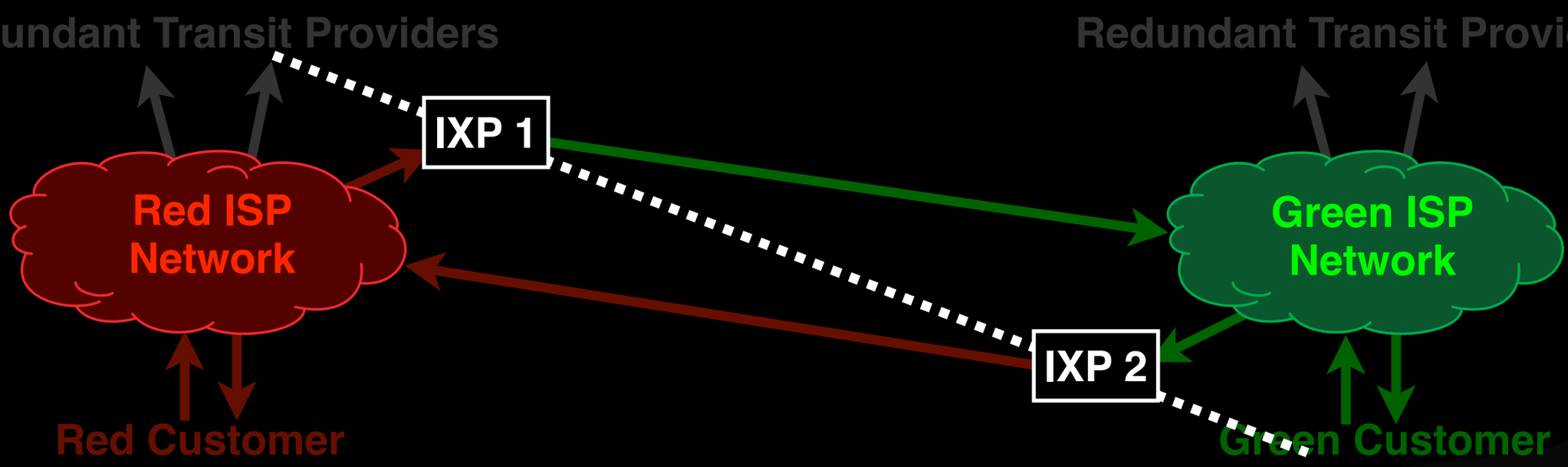
Hot Potato Routing

Green Network is responsible for its own costs



Hot Potato Routing

Symmetry: Fair sharing of costs



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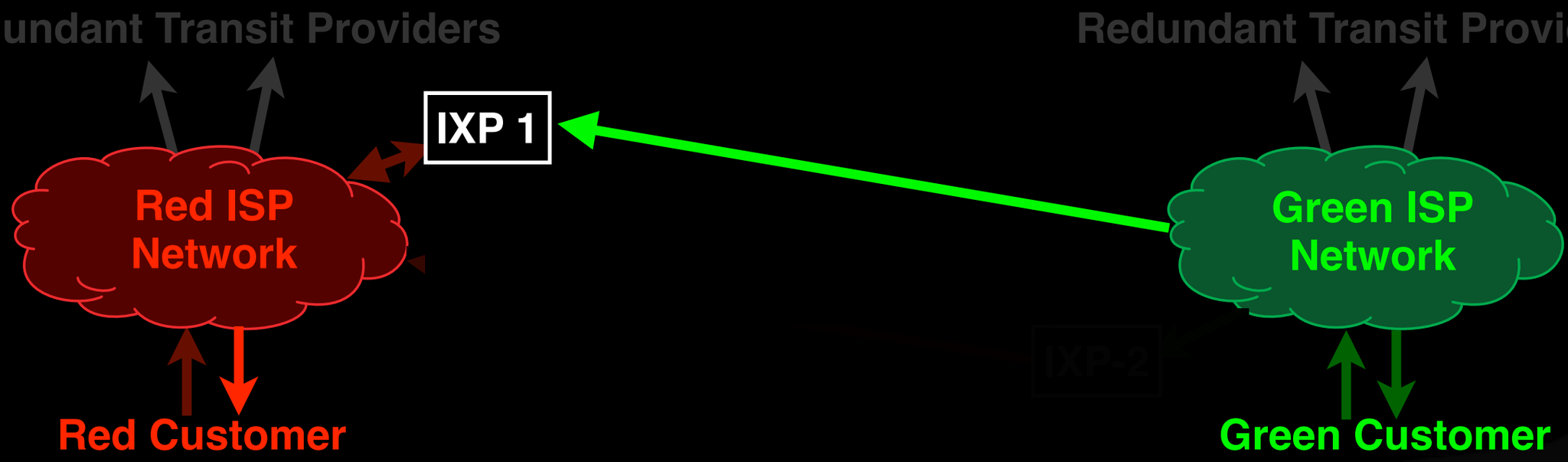
The efficiency of the Internet depends upon this principle:

For any two parties who wish to exchange traffic equitably, there must be a pair of exchanges, one near each party.

The Corollary:

Cities / countries / economies that have not yet built Internet Exchange Points disadvantage themselves, and export capital to cities / countries / economies that already have.

When there's no domestic IX…



…you are always on the "long" path!

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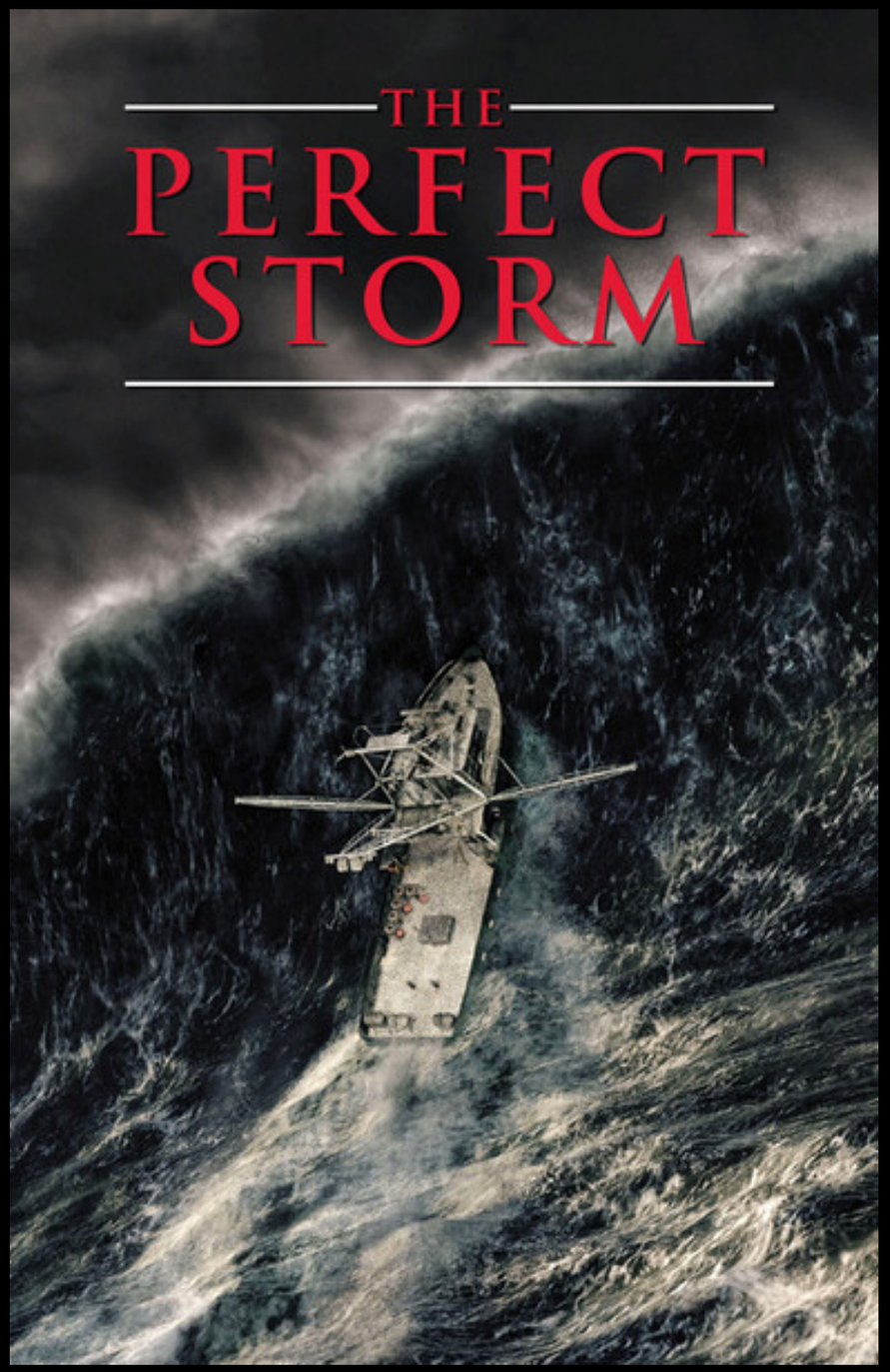
speed * distance = cost


92



Featuring:

Network operators

Cable providers

Data Centre operators

CDNs

IXP operators

Interested parties

99.998%*

*Source: https://www.pch.net/resources/Papers/peering-survey/PCH-Peering-Survey-2021/PCH-Peering-Survey-2021.pdf

peering personals

AS <x>

<org-name>

<policy>

<email>

<where>

AS 2018

TENET

Open peering
peering@tenet.ac.za
JINX, CINX, DINX, NAP

https://www.ripe.net/participate/meetings/regional-meetings/capif/capif-1/peering-personals

PeeringDB

- Free to use
- Canonical source of network peering information
- Requirement by some networks to get peering
- Rich ecosystem of tools to help you find/configure peers (search github for peeringdb!)

PCH AS42

Organization	Packet Clearing House
Also Known As	Woodynet, PCH
Long Name	
Company Website	http://www.pch.net/
ASN	42
IRR as-set/route-set	RADB::AS-PCH
Route Server URL	
Looking Glass URL	https://www.pch.net/tools/looking_glass
Network Type	Educational/Research
IPv4 Prefixes	600
IPv6 Prefixes	600
Traffic Levels	1-5Gbps
Traffic Ratios	Balanced
Geographic Scope	Global
Protocols Supported	✓ Unicast IPv4 ○ Multicast ✓ IPv6 ○ Never via route servers
Last Updated	2022-08-08T22:55:11Z
Public Peering Info Updated	2022-11-09T07:13:20
Peering Facility Info Updated	2022-03-20T07:47:59
Contact Info Updated	2021-04-29T10:31:02
Notes	AS 42 handles production DNS traffic for several root servers, about 400 TLDs including 130 ccTLDs, and the Quad9 recursive resolver. AS 3856 handles research traffic for a global network of BGP and DNS looking glasses, and a variety of networking research projects hosted on behalf of academic and industry research labs. Please also see http://as3856.peeringdb.com, as we peer using both ASes at every location. Translate »

Public Peering Exchange Points

Filter

Exchange IPv4	ASN IPv6	Speed	RS Peer
A.IX 185.1.108.42	42	1G	✓
AAIX 193.37.144.16	42 2001:7f8:4a::16	1G	○
AKL-IX (Auckland NZ) 43.243.21.78	42 2001:7fa:11:6:0:2a:0:1	10G	✓
AMS-IX 80.249.208.250	42 2001:7f8:1::a500:42:1	10G	✓
AMS-IX BA 206.41.106.52	42 2001:504:3d:1:0:a500:42:1	1G	✓
AMS-IX Chicago 206.108.115.21	42 2001:504:38:1:0:a500:42:1	1G	✓
Angola IXP 196.223.1.30	42	1G	✓
angonix 196.11.234.10	42 2001:43f8:9d0::2a:0:1	1G	✓
ANIX 185.1.100.21	42 2001:7f8:bb::9	1G	○
Any2East 206.51.40.16	42 2001:504:13:1::16	1G	○
Any2West 206.72.210.152	42 2001:504:13::210:152	10G	✓
APE	42	1G	✓

Private Peering Facilities

Filter

Facility ASN	Country City
151 Front Street West Toronto 42	Canada Toronto
Africa Data Centres, Cape Town CPT1 42	South Africa Cape Town

Use an IRR

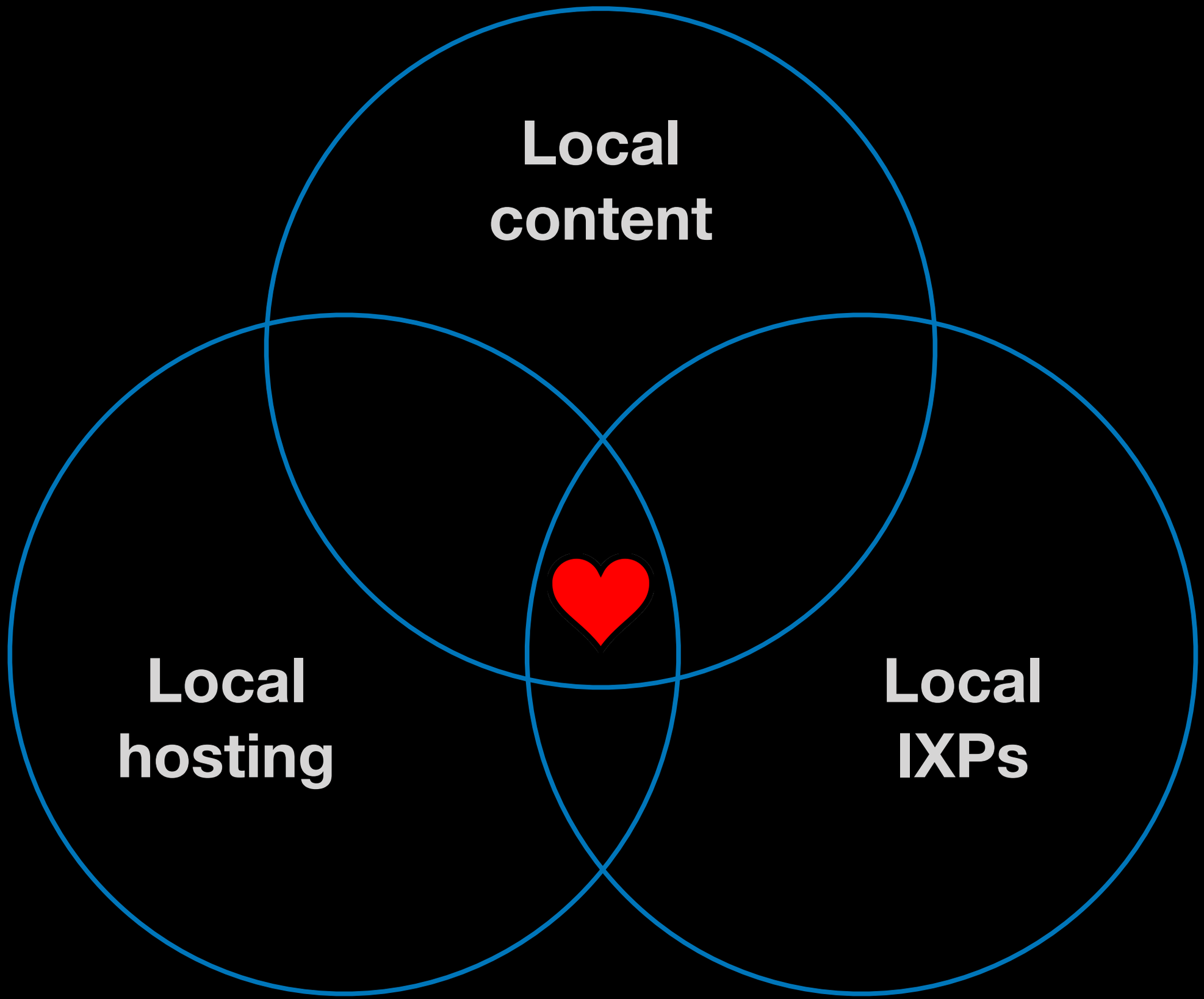
- Please create IRR (AS-SET and route(6)) objects
- Greatly simplifies peering and filtering for operators
- Helps automate network operations
- RIPE-NCC has training material
- IXPs often provide training (or contact me)

peering@

- Setup and maintain a peering@<domain> email address.
- Register this address as the point of contact for your ASN, with PeeringDB and with your IXP operator.

Peering Bilaterals

- 1:1 face time with peers that you want!
- high quality, high bandwidth sessions to arrange/setup new peering
- Usually planned through a “Meeting Tool”
- Space available at the Ablai Khan meeting room (“M” floor)


Local
content
Local
hosting
Local
IXPs

peeringdays@ripe.net

Thanks!

@ngoburdhan

nishal@pch.net

Copies of this presentation are available in PDF format.