

Why Peer?

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Blink: 50 Exposures



50 Fishing trips







Interconnection Strategies for

DRAFT 2A

Internet 5

DRAFT 1A

DRAFT 1B

The Fol

The Internet Peering



Playbook

Connecting to the Core of the Internet

William B. Norton
2014 Edition

W. B. Norton

It pay for transi-
r interconnection
interconnection
a base and their

William B. Norton

system

ations of millions of network
ers, workstations, etc.) operated
of network operators, content
ers. We will call these operators
"Internet players". These
pendent (but interconnected)
we will call an "Ecosystem";
table role, an associated set of
responding behaviors. We will
ely on the core of the Internet
ork operators that make up the
ystem.

"Internet Peering Ecosystem"
ity of loosely affiliated network
and interconnect their network
relationships.

Internet Peering Ecosystems
h with their own set of network
providing Internet access to the

Internet between each region of
Ecosystem², so we model the
ring Ecosystem as a loosely
set "Regions" each with its own

net Regions

To provide access to the global
tached to the Global Internet, it
units³ or Peering⁴ relationships,
its within an Internet Region.

we refer to the big "I" Internet we
net.

e paper, we document some of the
ynamics, detailing some general
unique characteristics of the Japan,
nd Singapore Peering Ecosystems,
veral dynamics unique to the
ring environment.

is a business relationship whereby
nally sell) access to the Global

is a business relationship whereby
nphysical access to each others'
pically a free exchange of traffic.

11/18/2003

elcome to <wbn@qlogic.com>

groups to <wbn@qlogic.com>

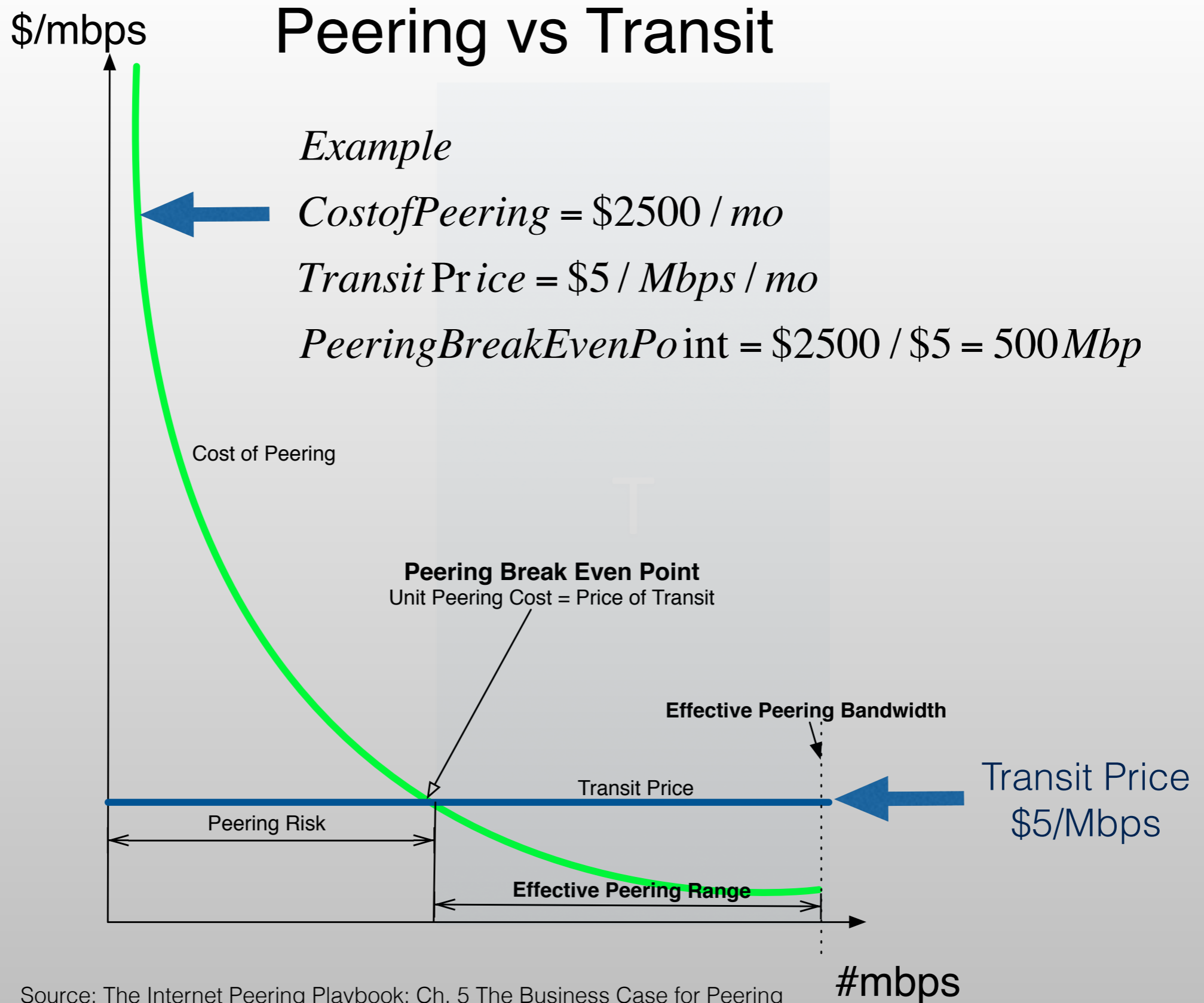
11/18/2003

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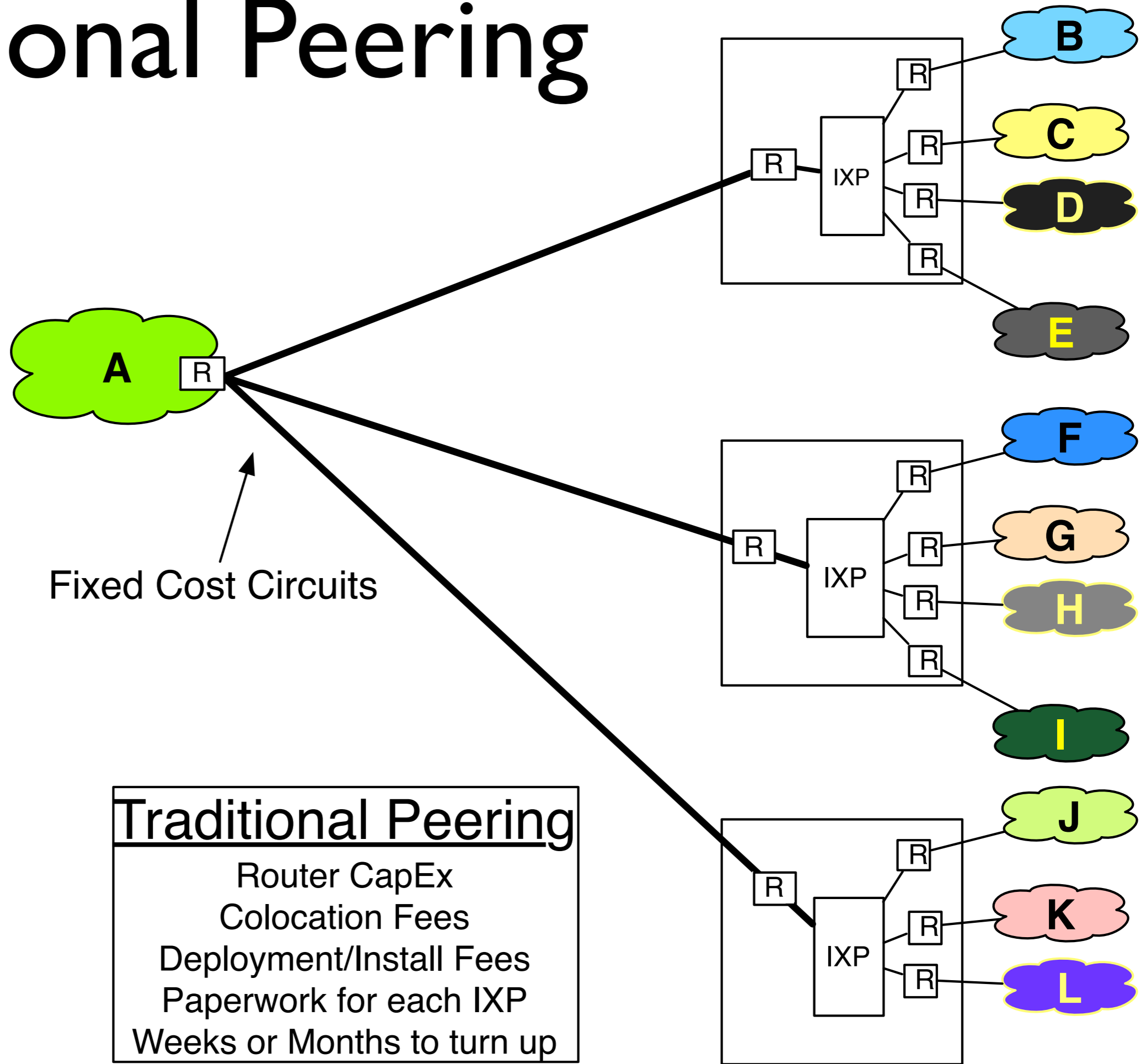
Why Peer?

Peering Saves Money



Source: [The Internet Peering Playbook](#): Ch. 5 The Business Case for Peering

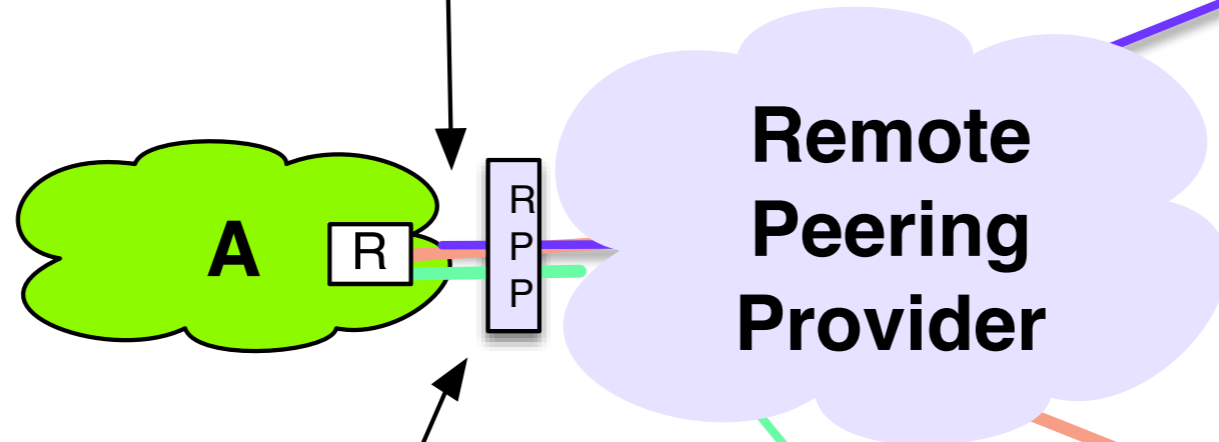
Traditional Peering



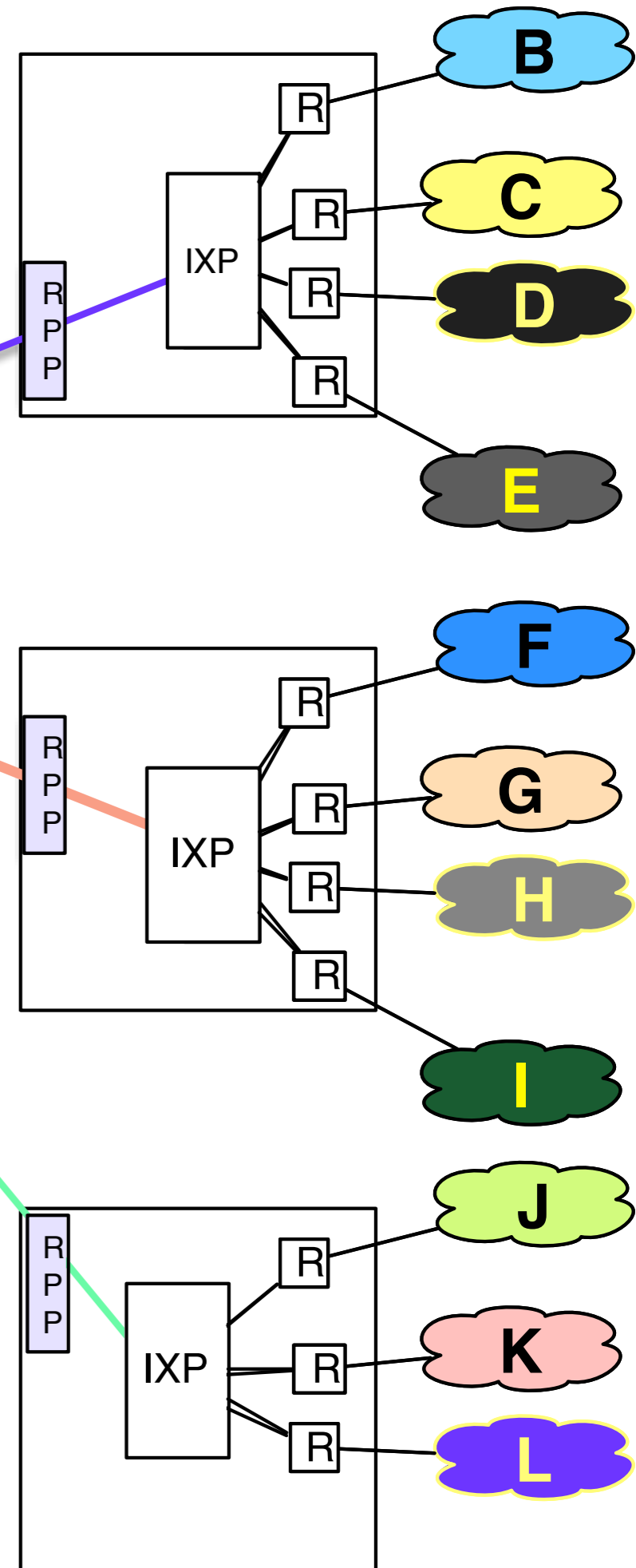
Traditional Peering
Router CapEx
Colocation Fees
Deployment/Install Fees
Paperwork for each IXP
Weeks or Months to turn up

Tethering (aka Remote Peering)

Remote Peering VLAN(s)
delivered to the router



Remote Peering Provider
Equipment

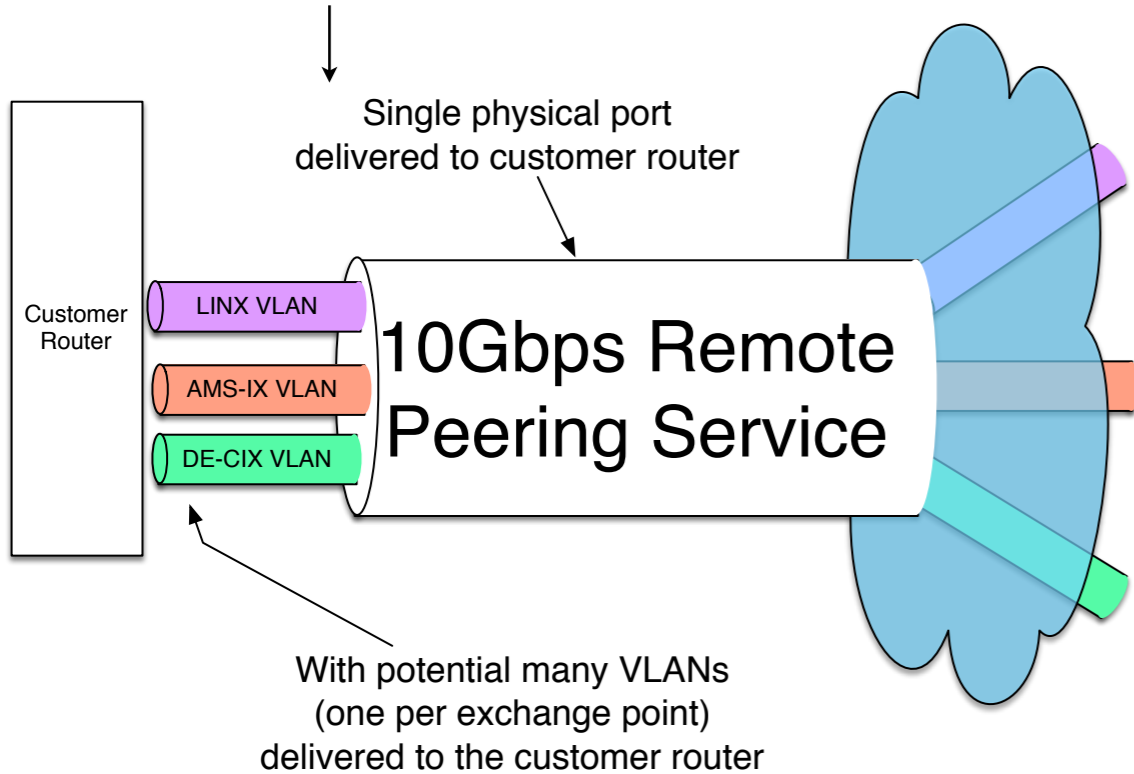


Remote Peering

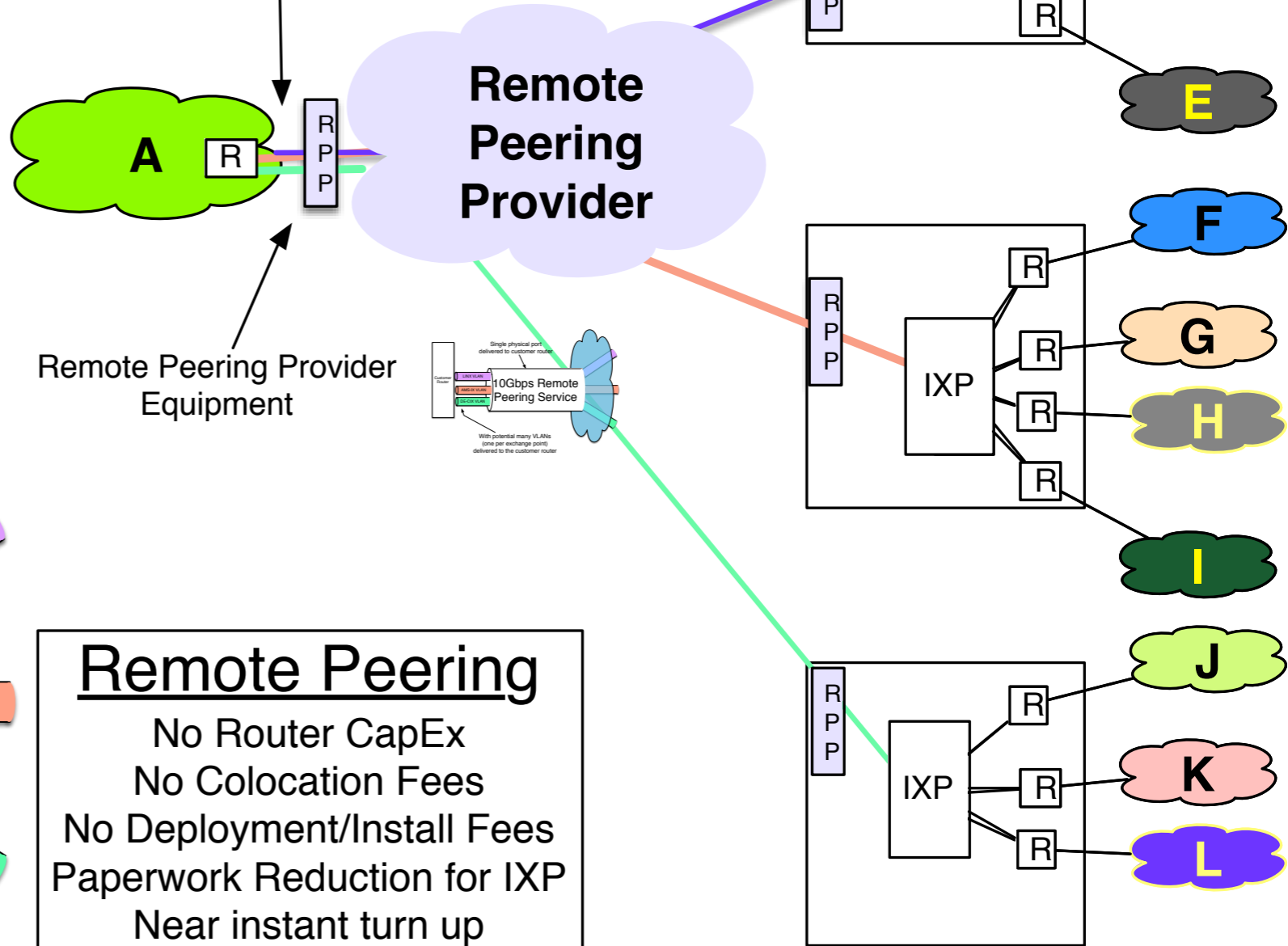
- No Router CapEx
- No Colocation Fees
- No Deployment/Install Fees
- Paperwork Reduction for IXP
- Near instant turn up

Tethering (aka Remote Peering)

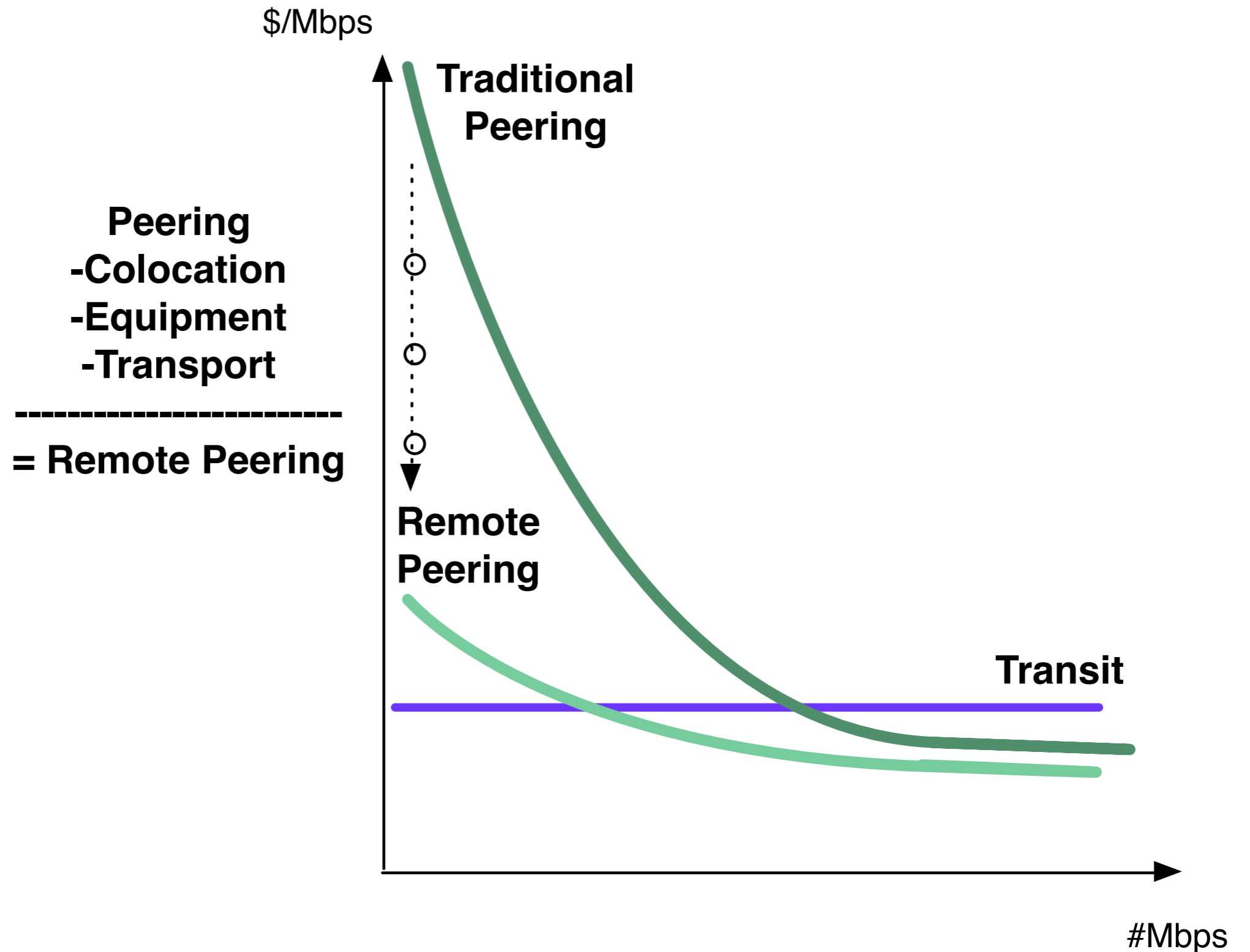
- Remote Peering Provider
- No physical presence required
- VLAN Service Model



Remote Peering VLAN(s) delivered to the router

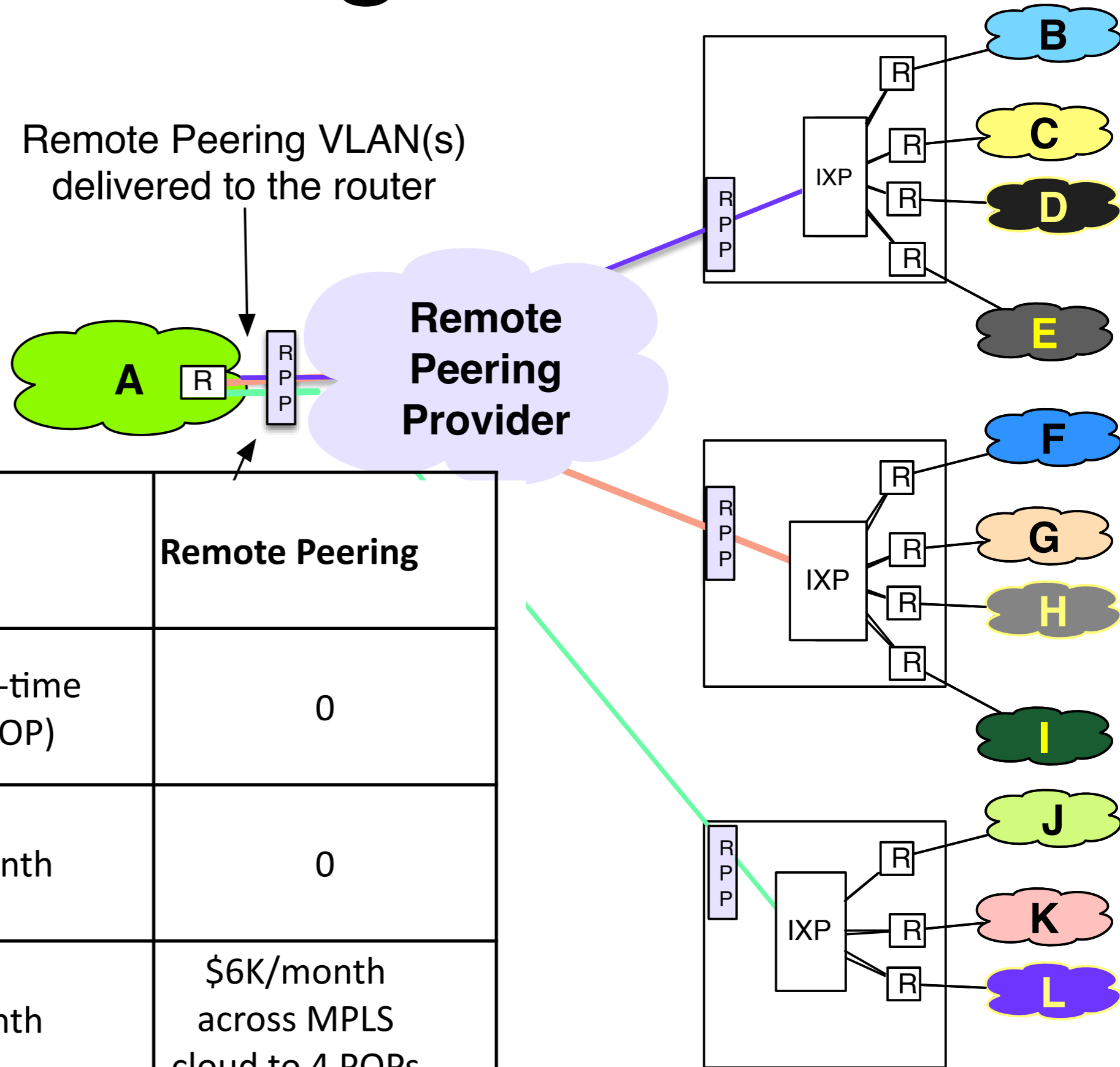


Traditional Peering vs. Remote Peering vs. Internet Transit



One Tethering Use Case

Remote Peering VLAN(s)
delivered to the router



	Traditional Peering	Remote Peering
CapEx for 4 European POPs	\$1.1M one-time (\$275K/POP)	0
OpEx for 4 European POPs	\$15K/month	0
Circuit Costs for network of 4 European POP	\$6K/month	\$6K/month across MPLS cloud to 4 POPs

Tethering opens up
Peering to a broader set
of networks.

When does it make sense to
have a physical router
presence at the IX?

When does *Tethering* make
sense?

Traffic Distribution: *Blend*

- Internet Transit
- Internet Peering
- Tethering (aka Remote Peering)
- CDN
- Paid Peering
- Caching



Optimal Traffic
Distribution Blend

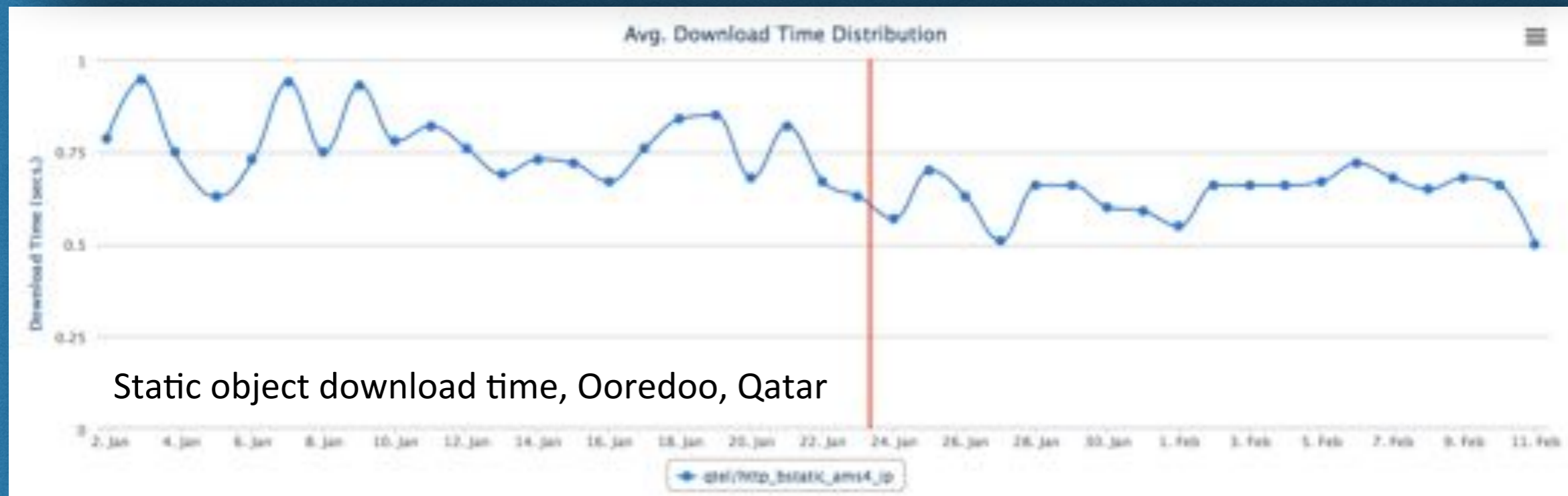
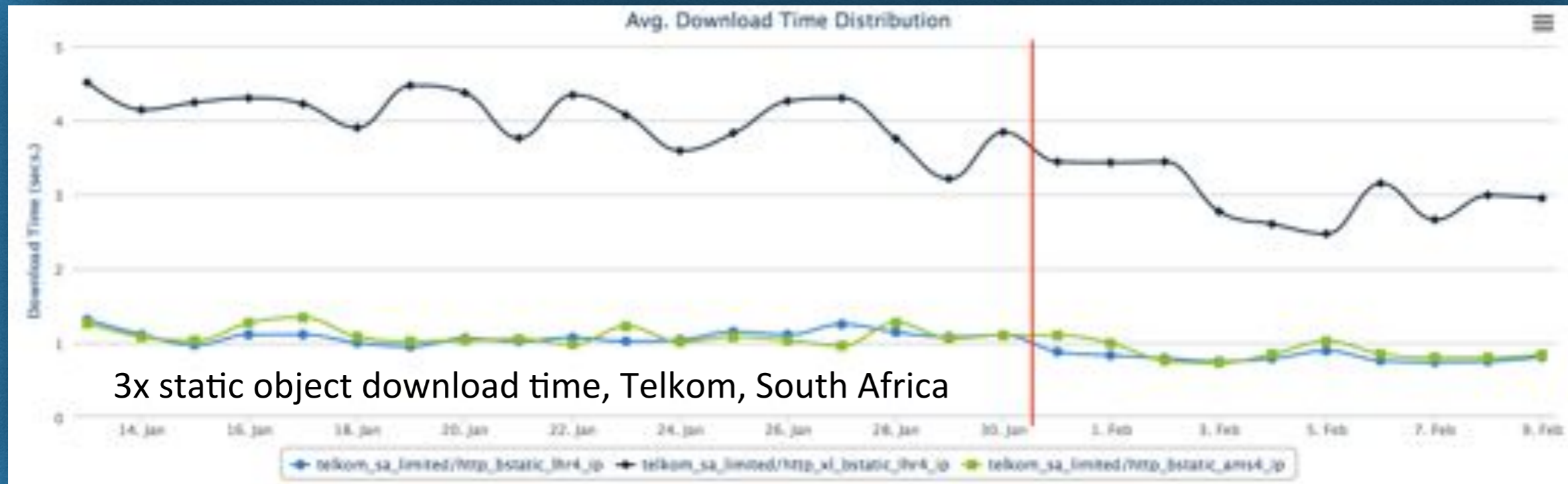
Why Peer?

1) Peering Saves Money

Why Peer?

2) Peering Improves Performance

Peering Improves Performance



Source: Grzegorz Janoszka, "Is peering really faster? Let the data speak for itself," EPF Split, Croatia

Why Peer?

3) Peering Makes Money

3) Peering Makes Money

ISPs charge on a metered basis



Peering tends to reduce latency and packet loss



Latency slows the TCP session establishment & data transfer



Packet Loss causes data transfer rate to divide by two



Packet Loss and Latency slows the transit billing meter



Peering enables the transit billing meter to spin faster



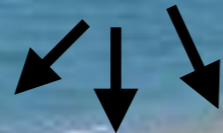
Therefore, Peering makes ISPs more money

4/ ~~Perino improves security~~

4) Peering Improves Mental Health

4) *Peering Improves Mental Health*

Face-to-face discussions
are better than email

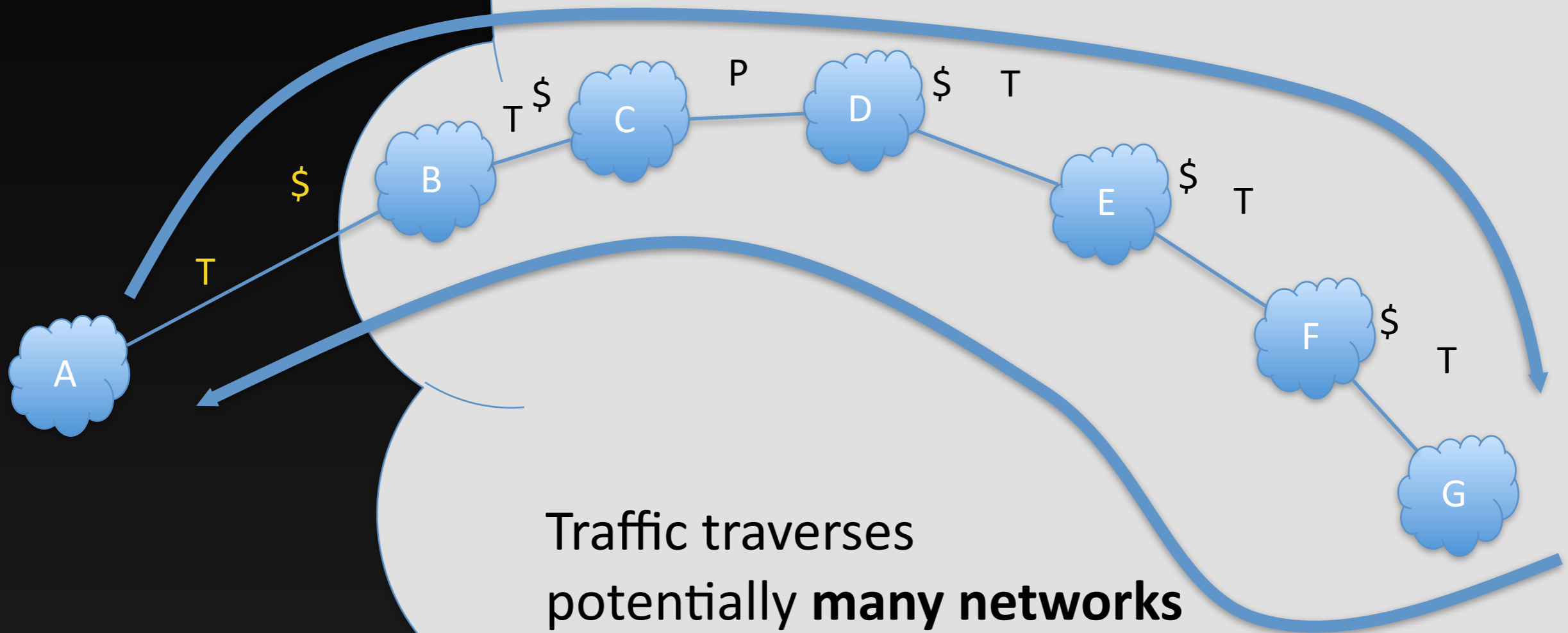


5) Peering Improves Security

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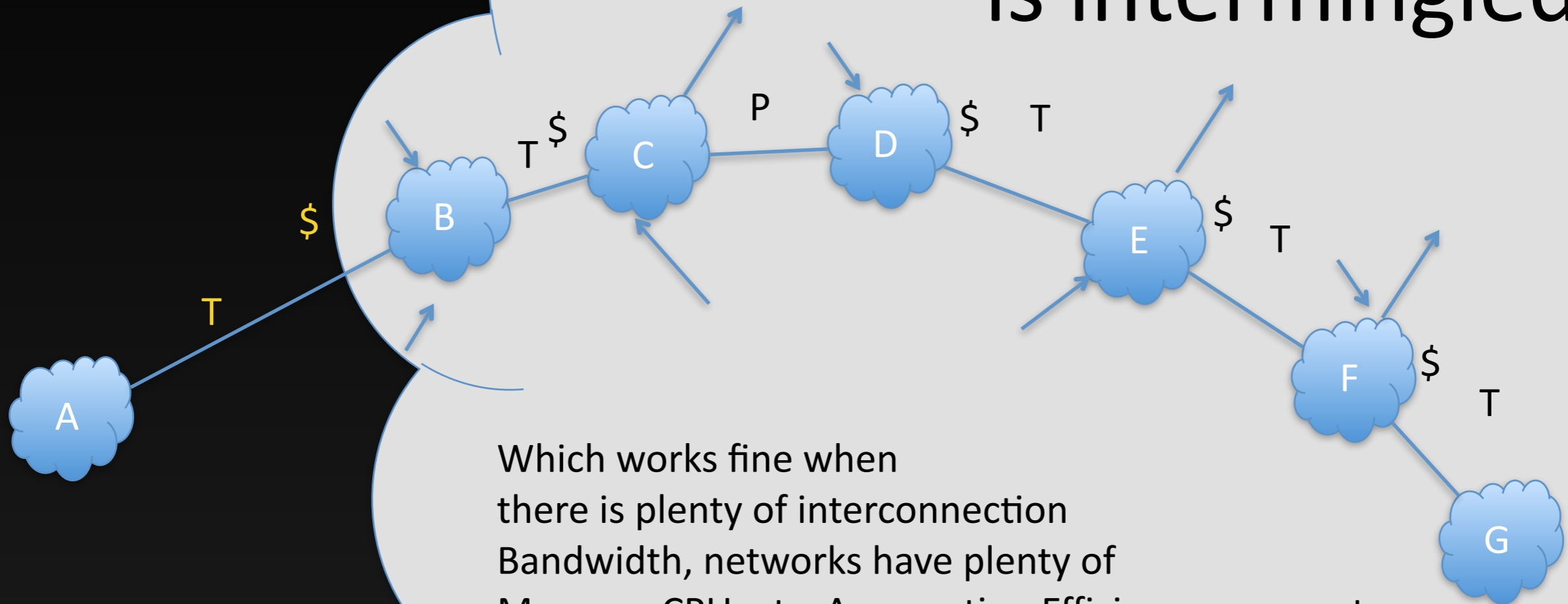
- 1) Peering Immune from side effects of DDoS
- 2) Peering Reduces “Attack Surface”
- 3) Peering *Speeds* Time to Recovery

On the Commodity Internet



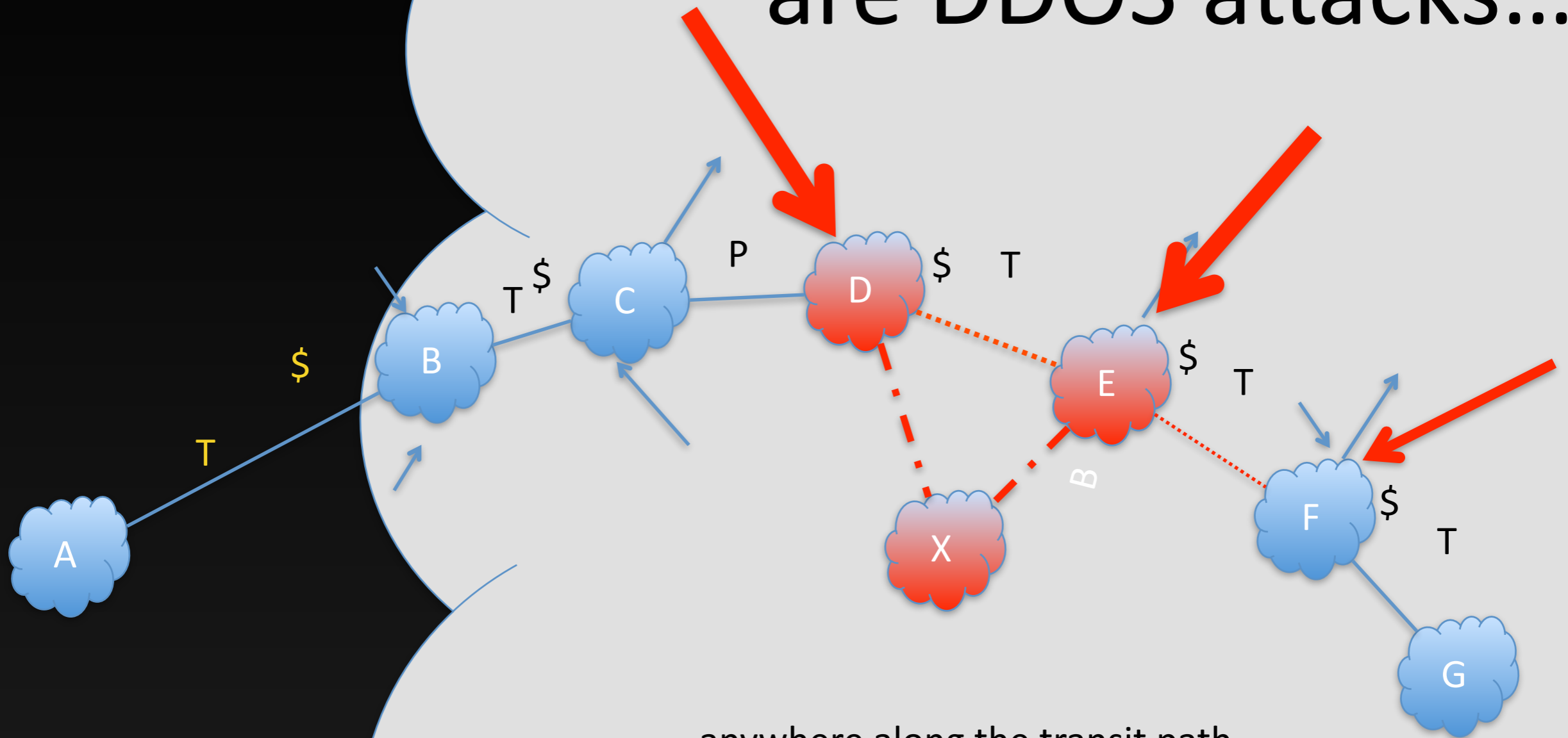
Traffic traverses
potentially **many networks**
before reaching its destination

All traffic in the Commodity Internet is intermingled



Which works fine when there is plenty of interconnection
Bandwidth, networks have plenty of
Memory, CPU, etc. Aggregation Efficiency are great.

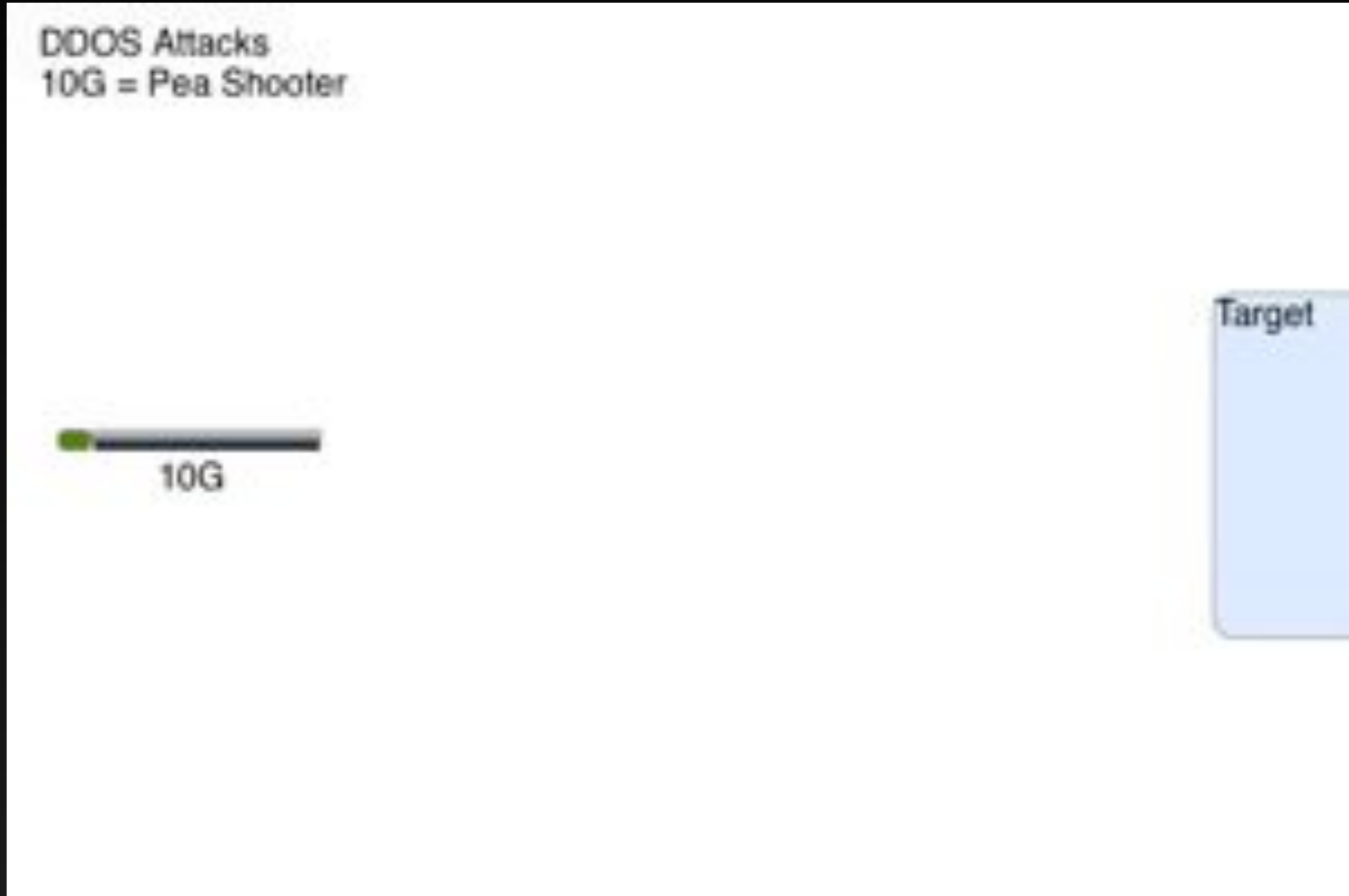
But when there are DDOS attacks...



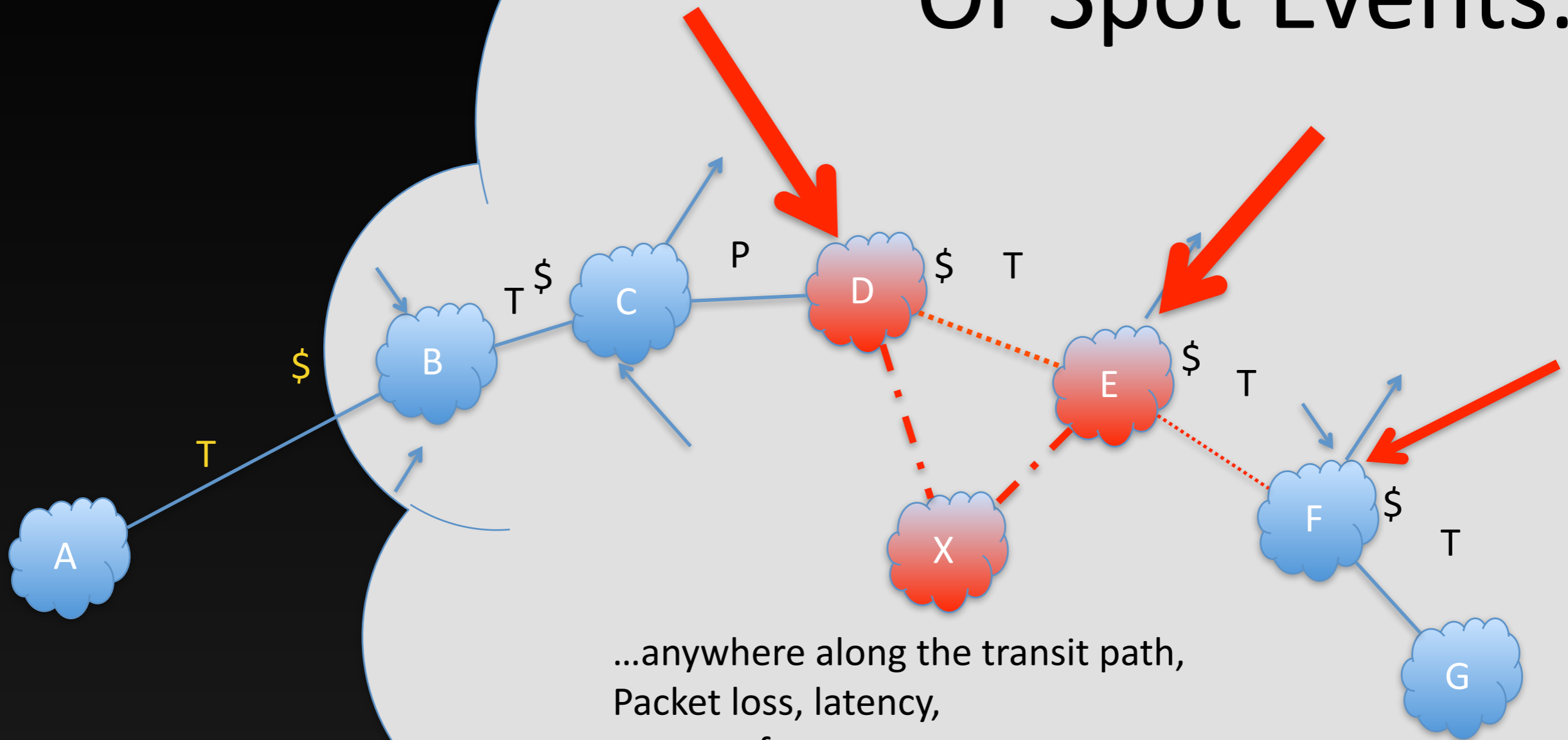
...anywhere along the transit path,
Packet loss, latency,
poor performance.

Result: DOS: A→G Unable to establish a secure channel.

DDoS Scale



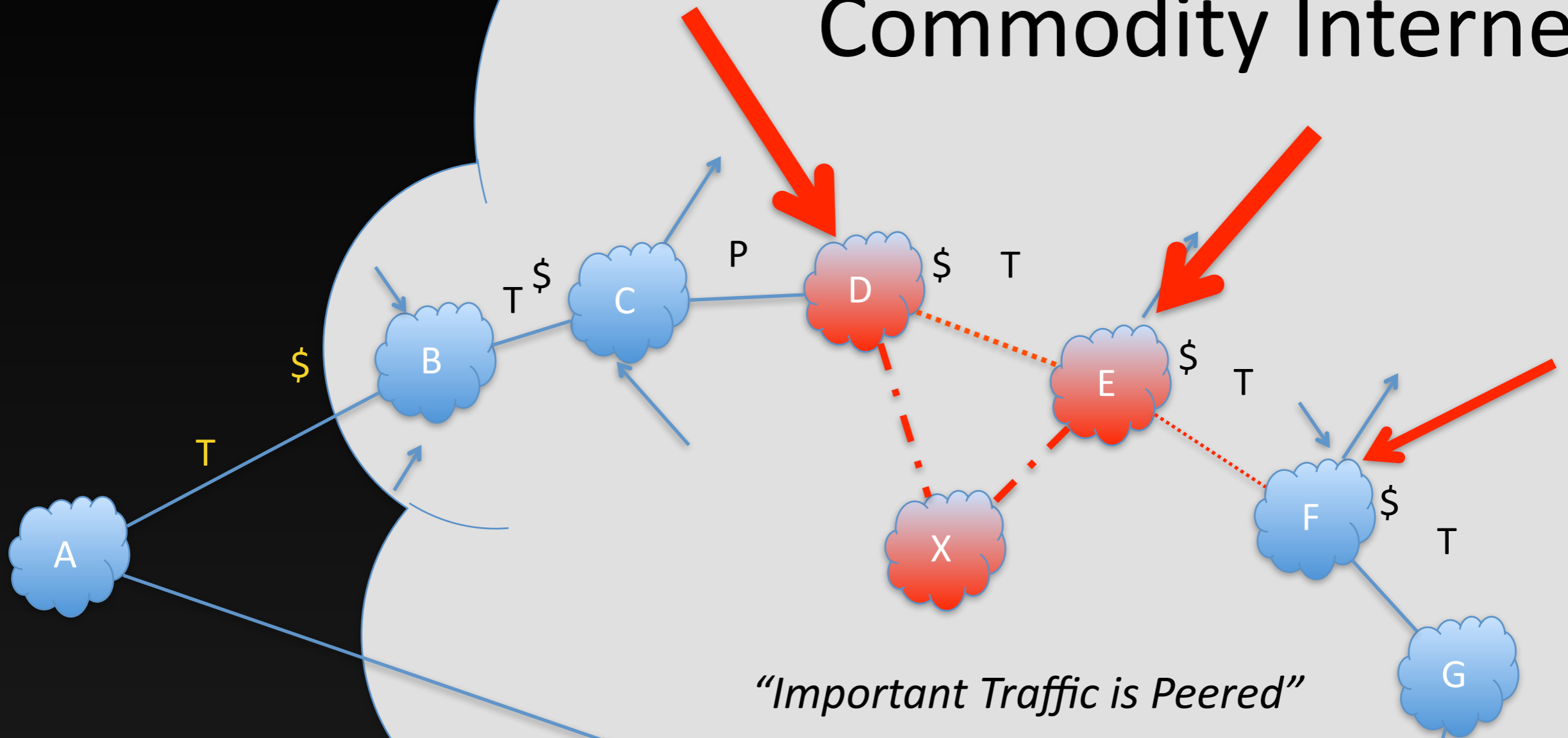
Or Spot Events...



...anywhere along the transit path,
Packet loss, latency,
poor performance.
Result: DOS: A → G Unable to establish a secure channel.

Note:
Not just DDOS
Spot Events (MS Update, Oprah interview, etc.)

1) Peering Bypasses the Commodity Internet

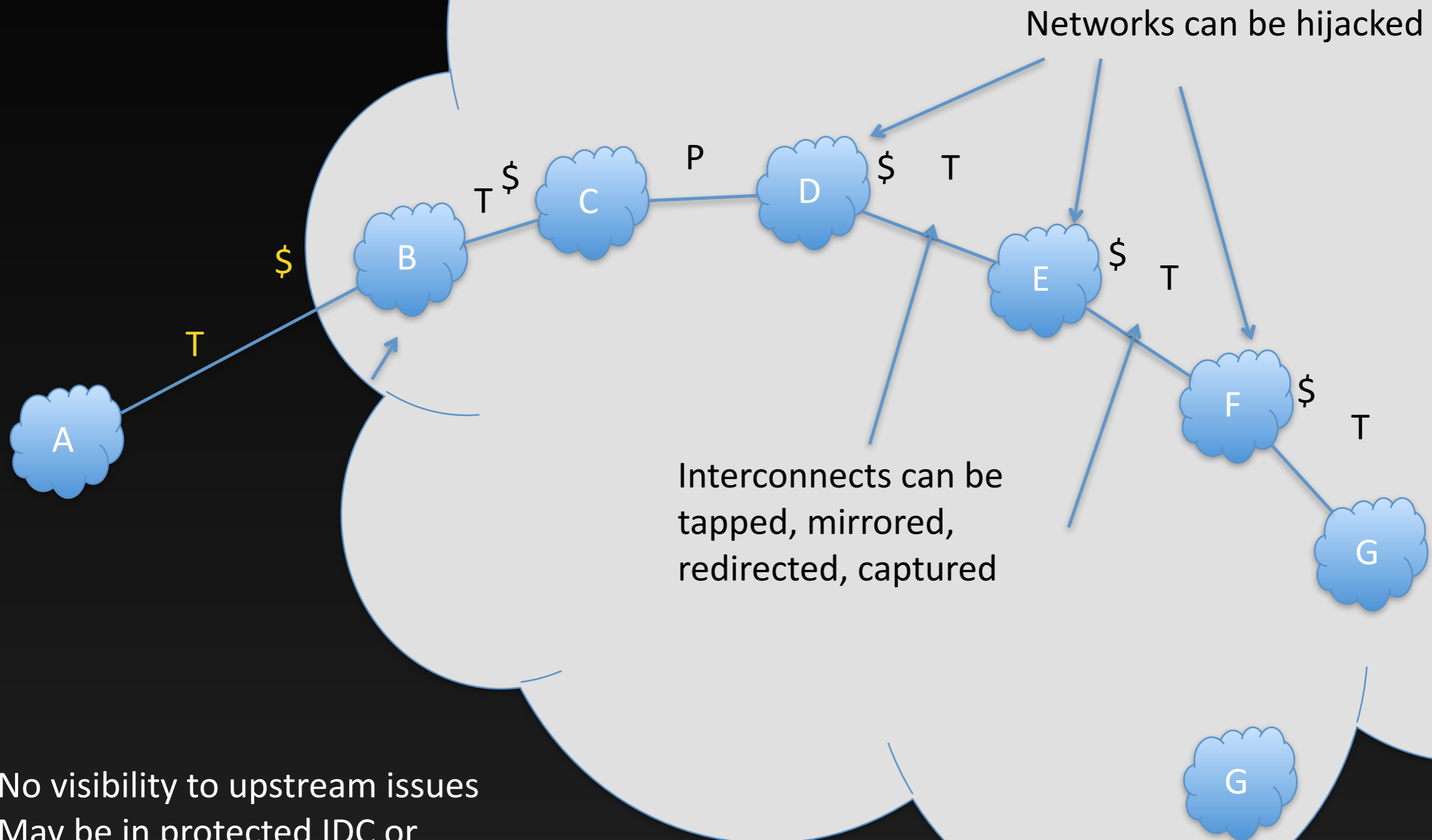


"Important Traffic is Peered"

IXP

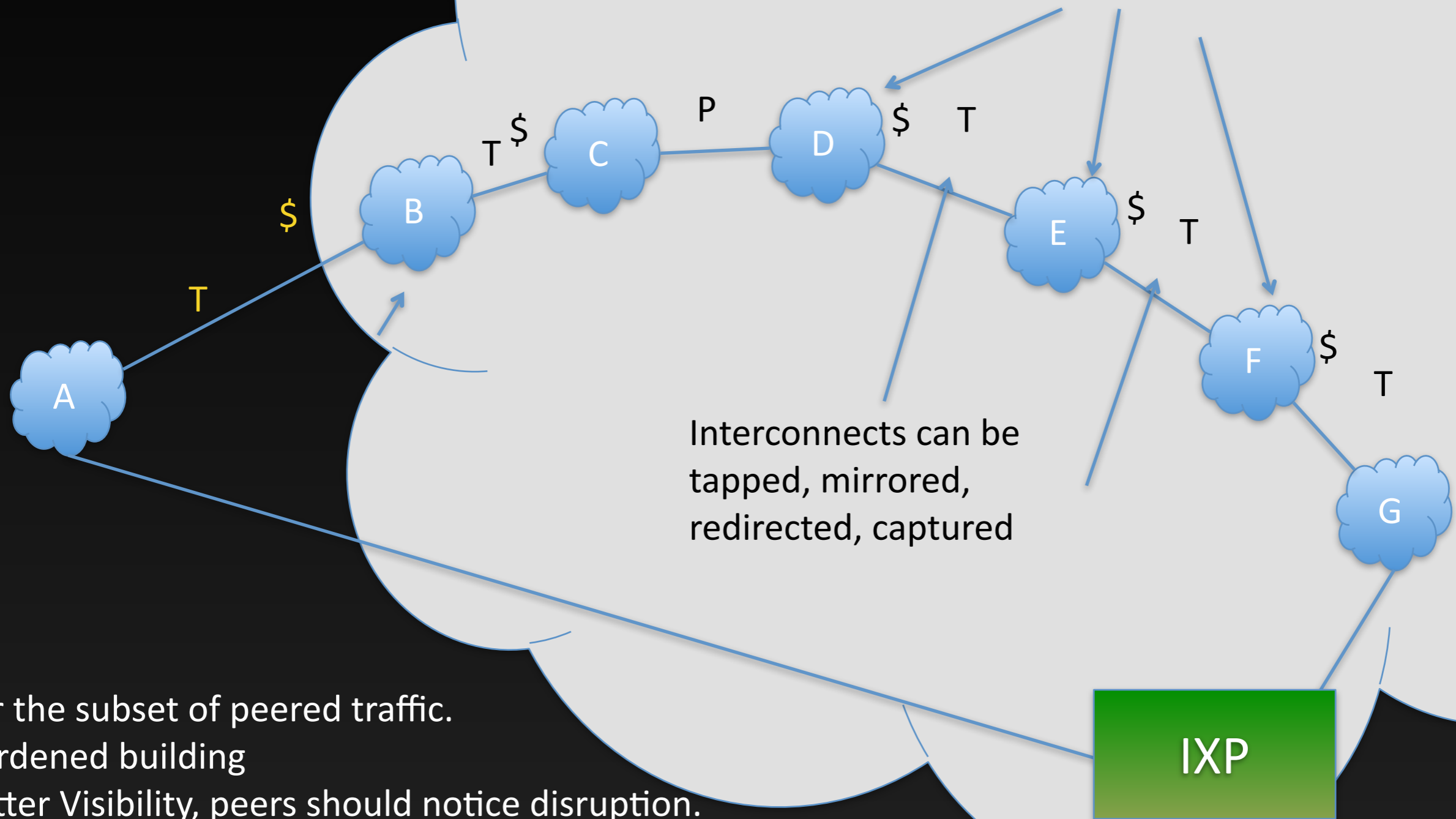
1) By peering, peered traffic is immune from the side affects of DDOS, Peering Improves Security

Commodity Internet has many points of vulnerability



2) Peering Reduces the network vulnerability

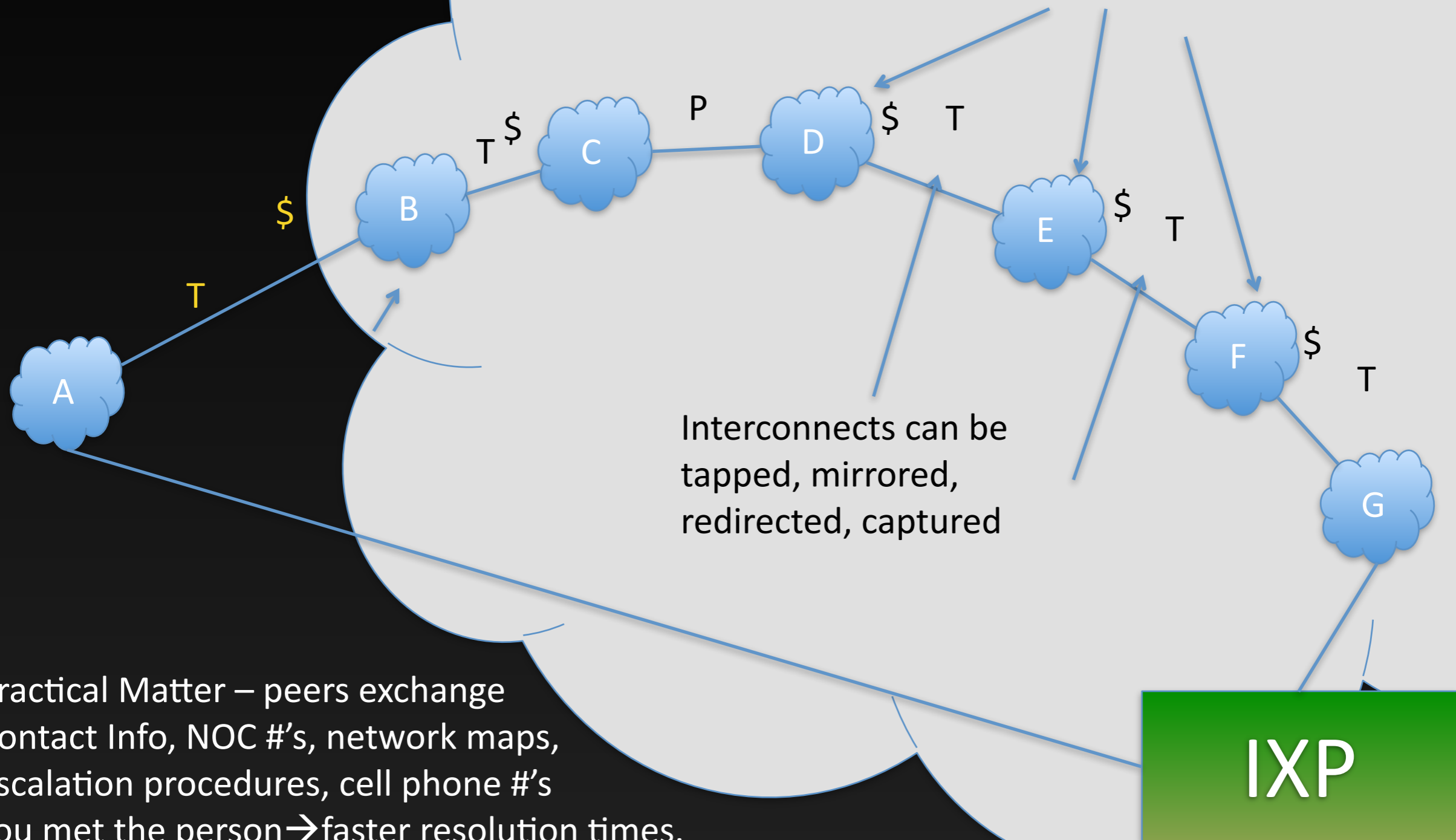
Networks can be hijacked



For the subset of peered traffic.
Hardened building
Better Visibility, peers should notice disruption.
Peering Improves Security

3) Peering Improves Recovery Time

Networks can be hijacked



Practical Matter – peers exchange Contact Info, NOC #'s, network maps, Escalation procedures, cell phone #'s You met the person → faster resolution times.

Peering Improves Security

1. Internet Transit intermingles traffic

Vulnerable to DDOS side effect

Peering bypasses the “wild wild west commodity Internet”

2. Internet Transit more points of vulnerability

Interconnects and networks along the path

Peering involves fewer network elements between content and eyeballs

3. Security response is faster with peers

Upstream NOCs won't take your call

What are some counter arguments?

Q&A

Thank you for your time!

Comments Welcome!

wbn@iix.net



Why Peer?

1. Peering Saves Money
2. Peering Improves Performance
3. Peering Increases Revenue
4. Peering Improves Mental Health
5. Peering Improves Security