



# Trends regarding Internet

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# 30 years ago...

- We had one telco
- They had some services
- They sold the end equipment
- Most fascinating service was call forwarding when there was no answer
- The telco was responsible for everything, and legislation was written to target only them
- And, they were owned by the government

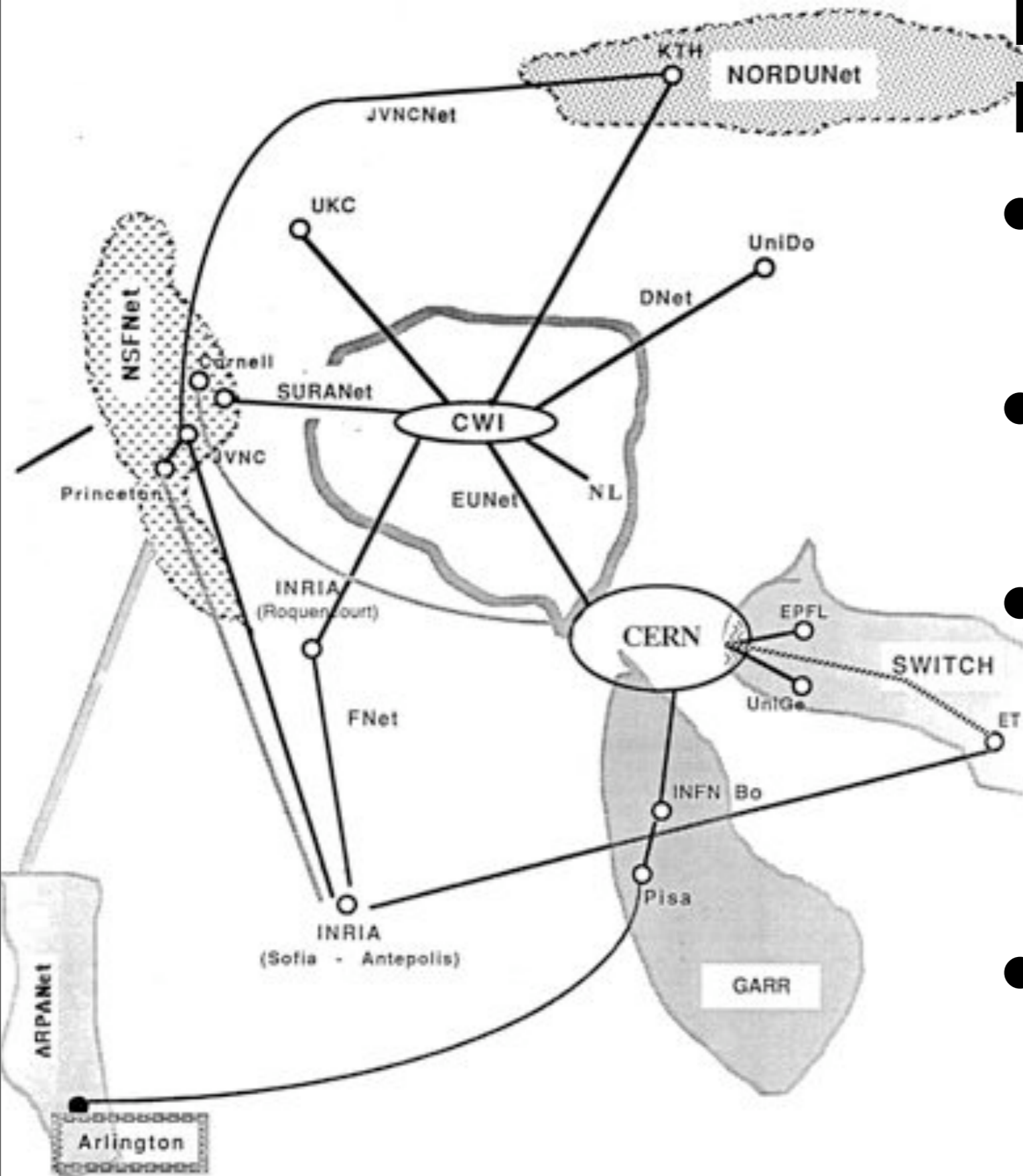


# 20 years ago

- We started to get competition
- First political decisions where made that said that competition was to be enabled
  - Number portability
  - More than one company selling phones
  - More than one cellphone provider



# Networks in Europe December 1989



- All connections to NSFNet
- “Default Network” was pointing at NSFNet
- 5 connections over the Atlantic: Stockholm, Amsterdam, Sofia-Antipolis and Pisa
- 4 large networks: NorduNet, EUNet, Switch and Garr

# Today a different world

- Many telcos
- Competition regarding new services
- Not only “telephony” uses telco equipment
- Internet has taken off
- With Internet, global reach at zero cost
- Globalization is here

# Computers and Internet

- Everything is in the future a computer, a networked computer of course!
- At its simplest your TV, your phone, your address book, your agenda, your micro-wave, you car, your.. and your laptop are all networked computers
- The Internet belongs to all of us - or at least we all own a bit of it
- Each of us has our own personal Internet and some of it we may choose to share
- Increasingly each of us runs part of the infrastructure

# Convergence?

- Information = Software
- Anyone can create Information
- Anyone can create Software
- Anyone can distribute Information
- Anyone can deploy Services

# Convergence?

- Historically we know who can create information
- Historically we know who can create software
- Historically we know who can deploy services
- Now anyone can deploy services

# My piece of the Internet?

- When a person or organisation connect to “the Internet”, the network and services provided end up being ***a piece of the Internet***
- Protection (and robustness) start at home
- You have a lock on your door, and do not ask road authorities to keep burglars out!

# Old and new world

- Telephony, Cable TV, Satellite, Mobile
  - ▶ Buy connection from one provider
  - ▶ Then buy additional services from provider
- Internet
  - ▶ Buy connection from one provider
  - ▶ Then buy additional services from anyone

# Old and new world

Old

- Telephony, Cable TV, Satellite, Mobile
  - ▶ Buy connection from one provider
  - ▶ Then buy additional services from provider
- Internet

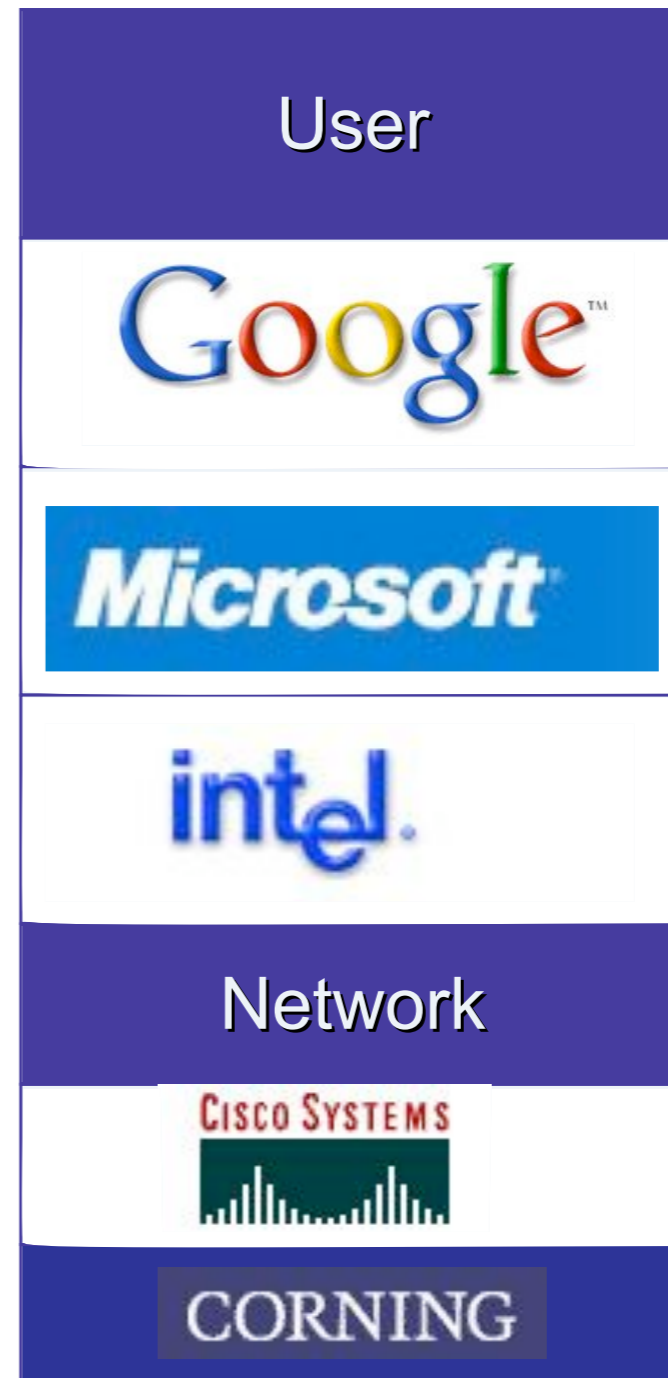
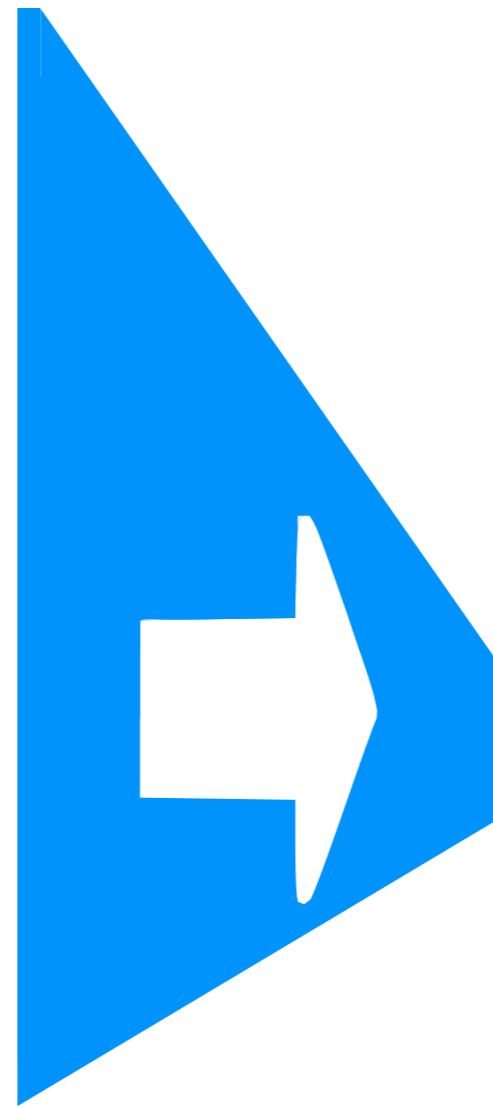
New

- ▶ Buy connection from one provider
- ▶ Then buy additional services from anyone

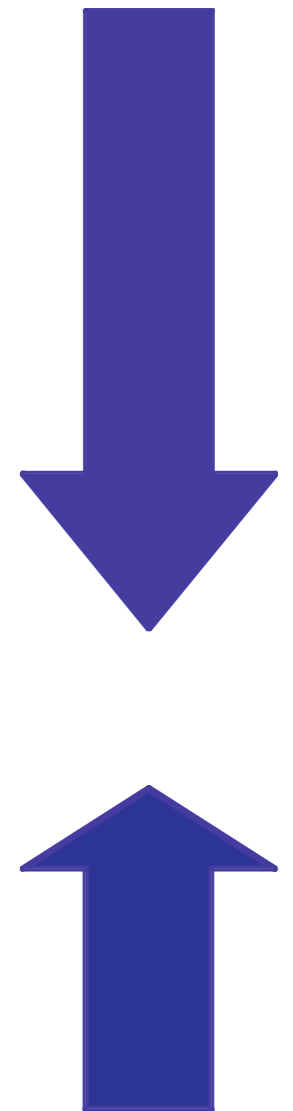
# Old and new world



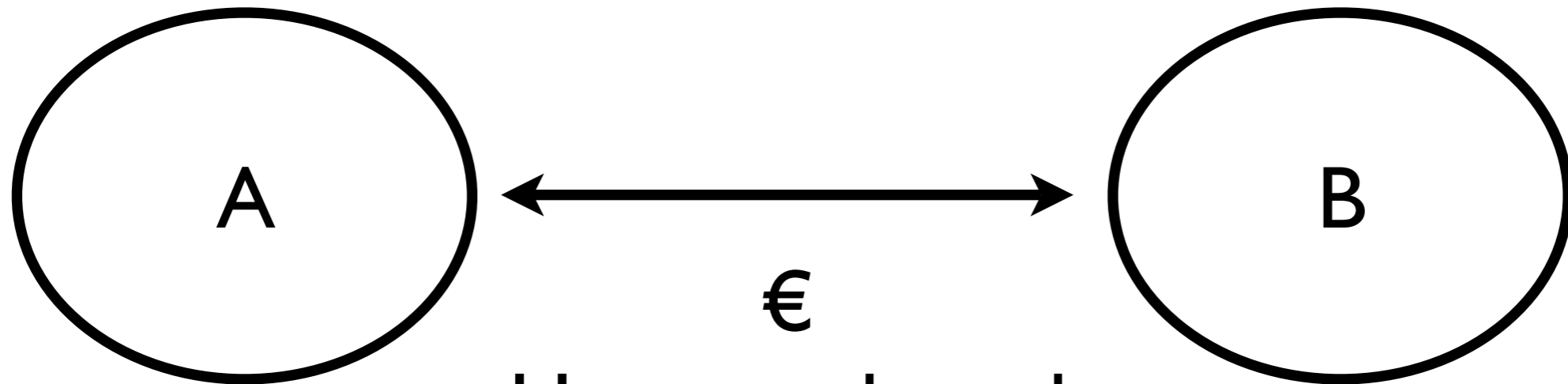
Nostalgia



Reality

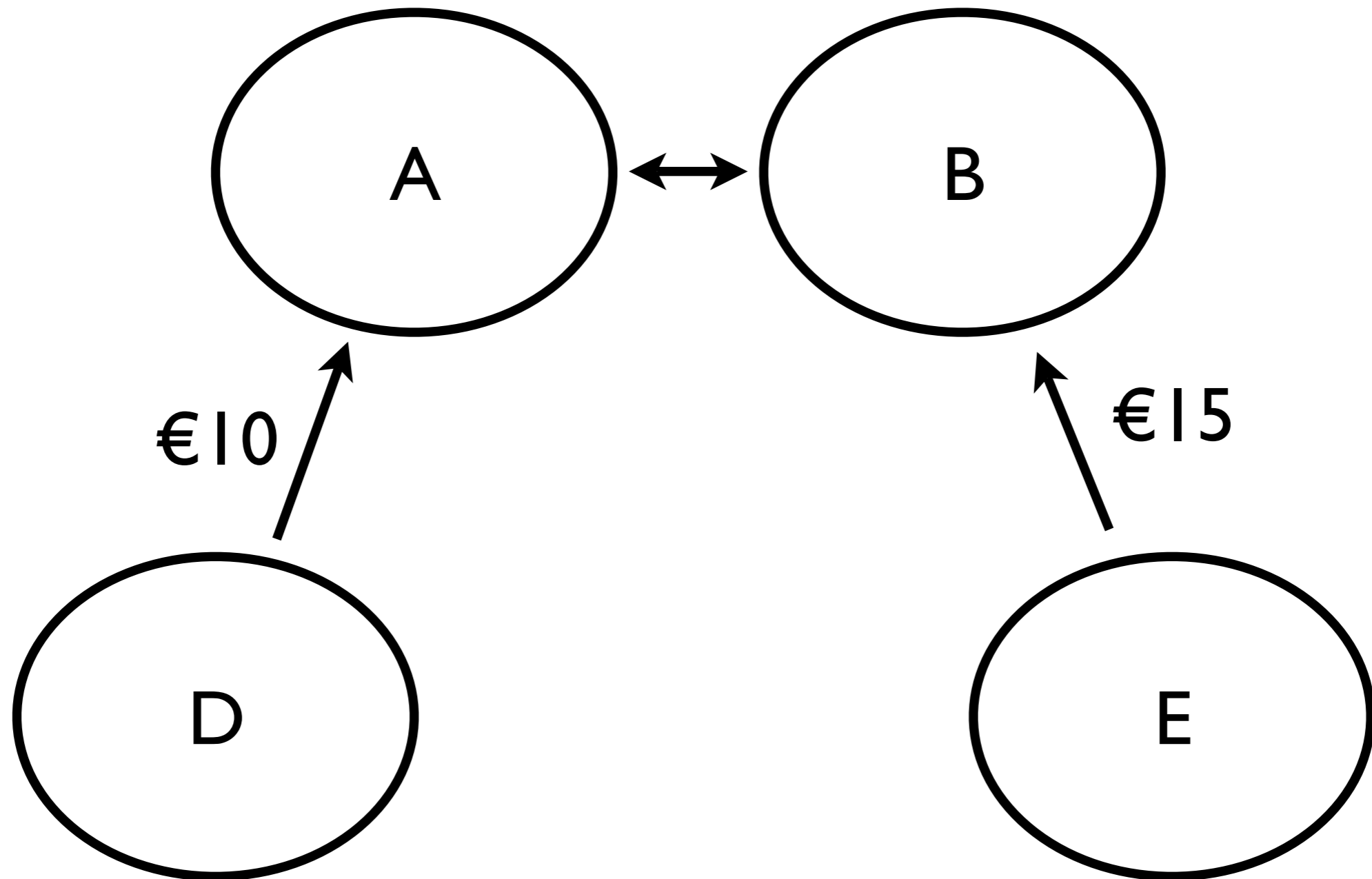


# Payment on Internet

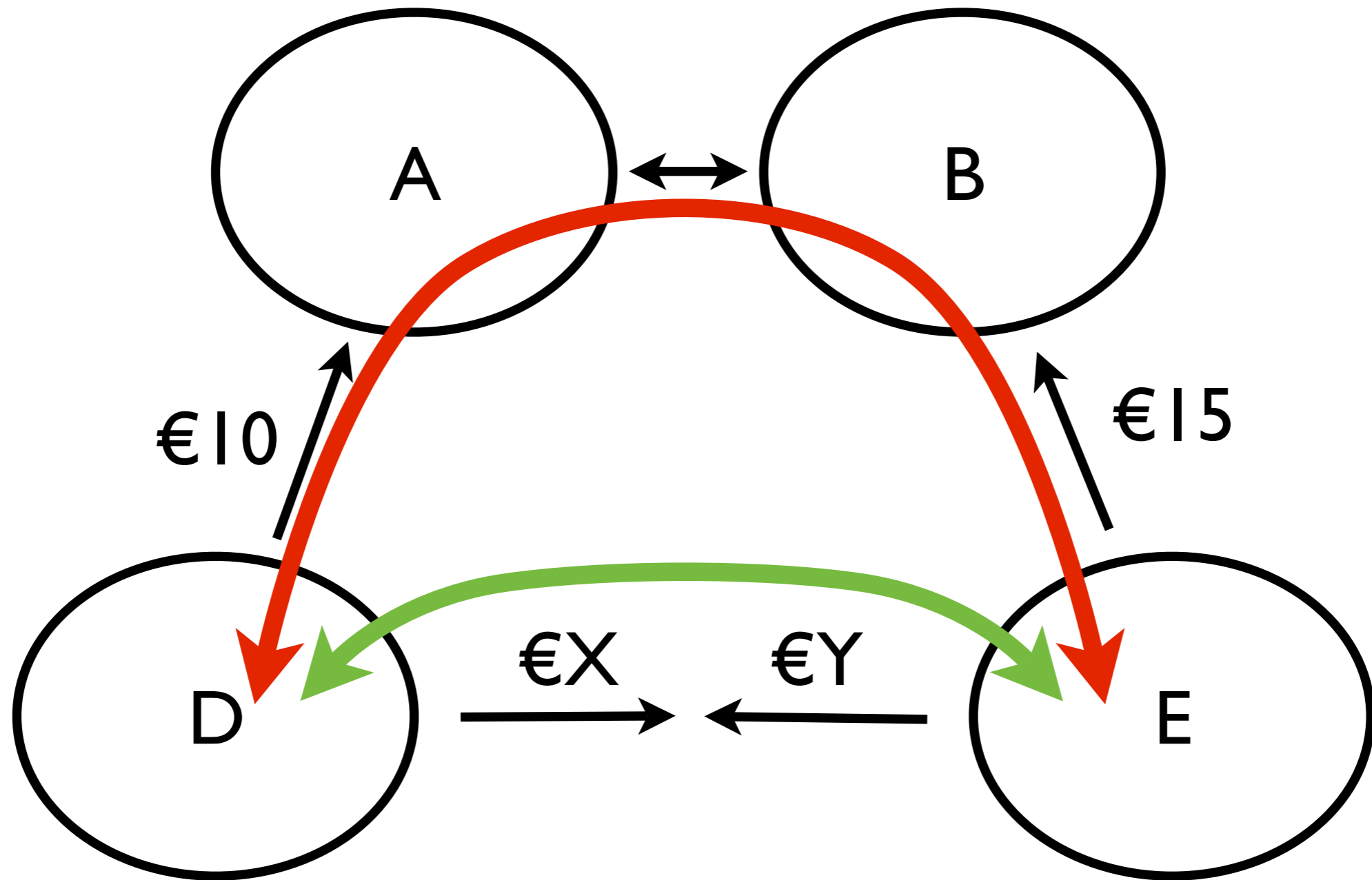


How much, and  
in what direction?

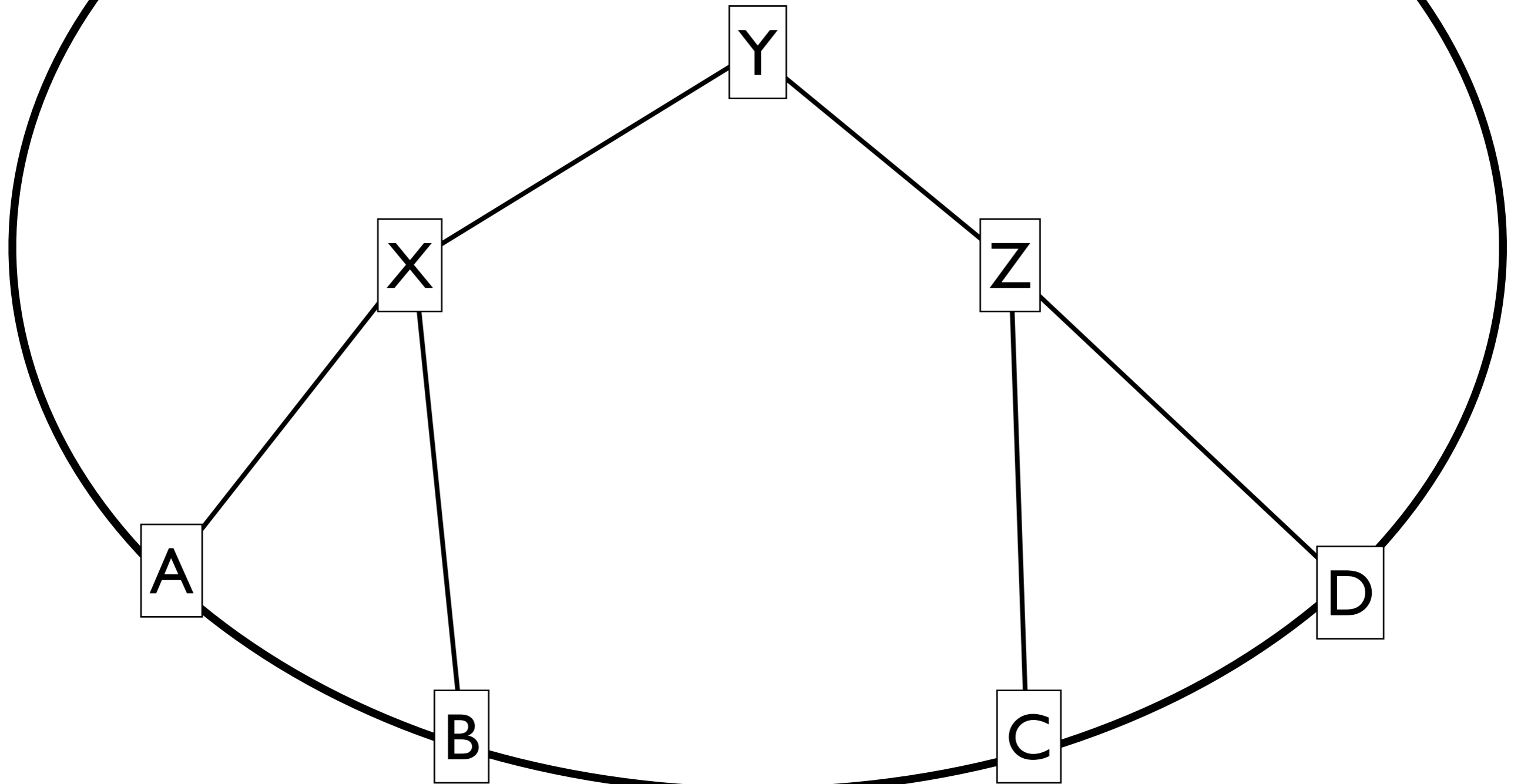
# Payment on Internet



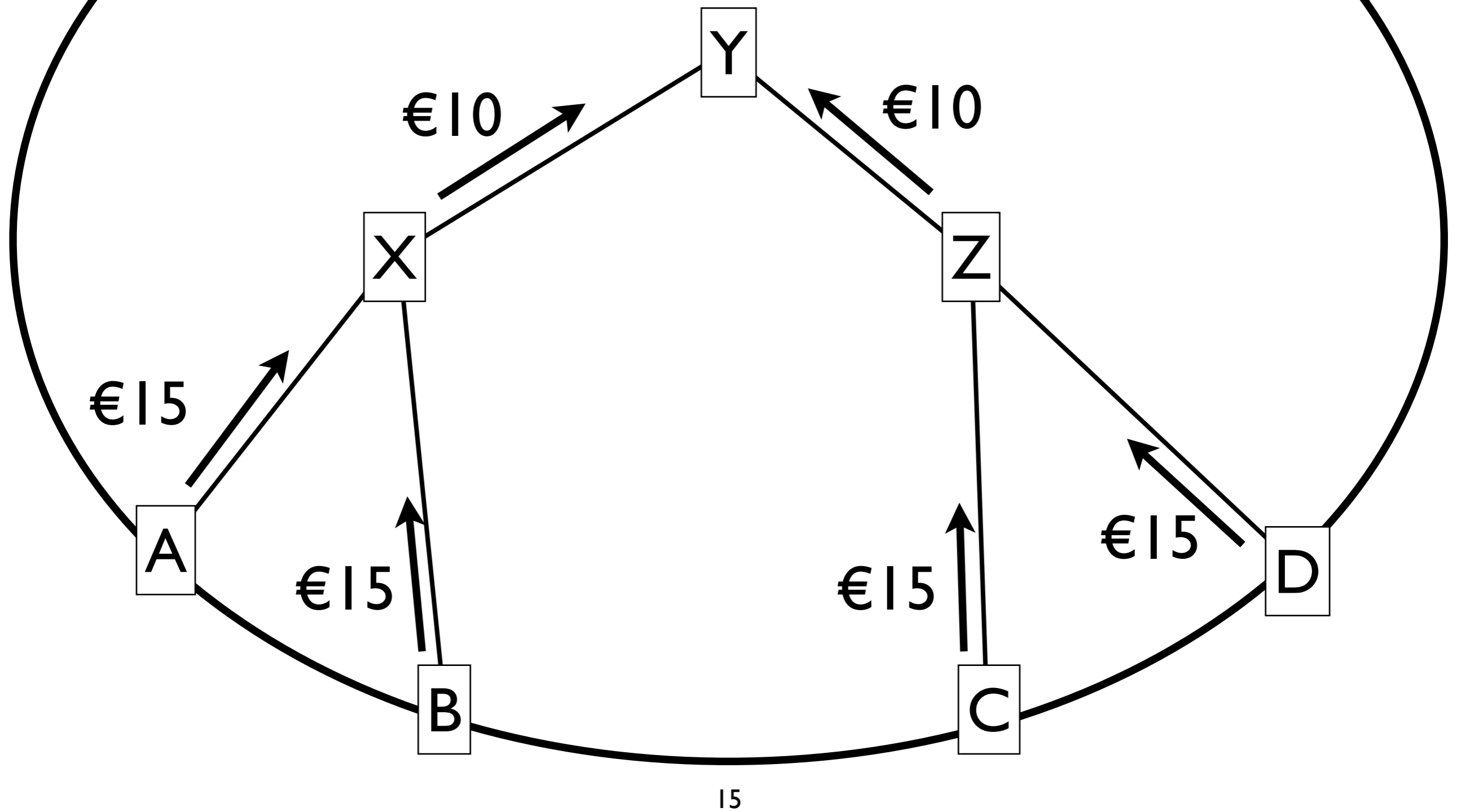
# Payment on Internet



# Traditional Internet



# Traditional Internet

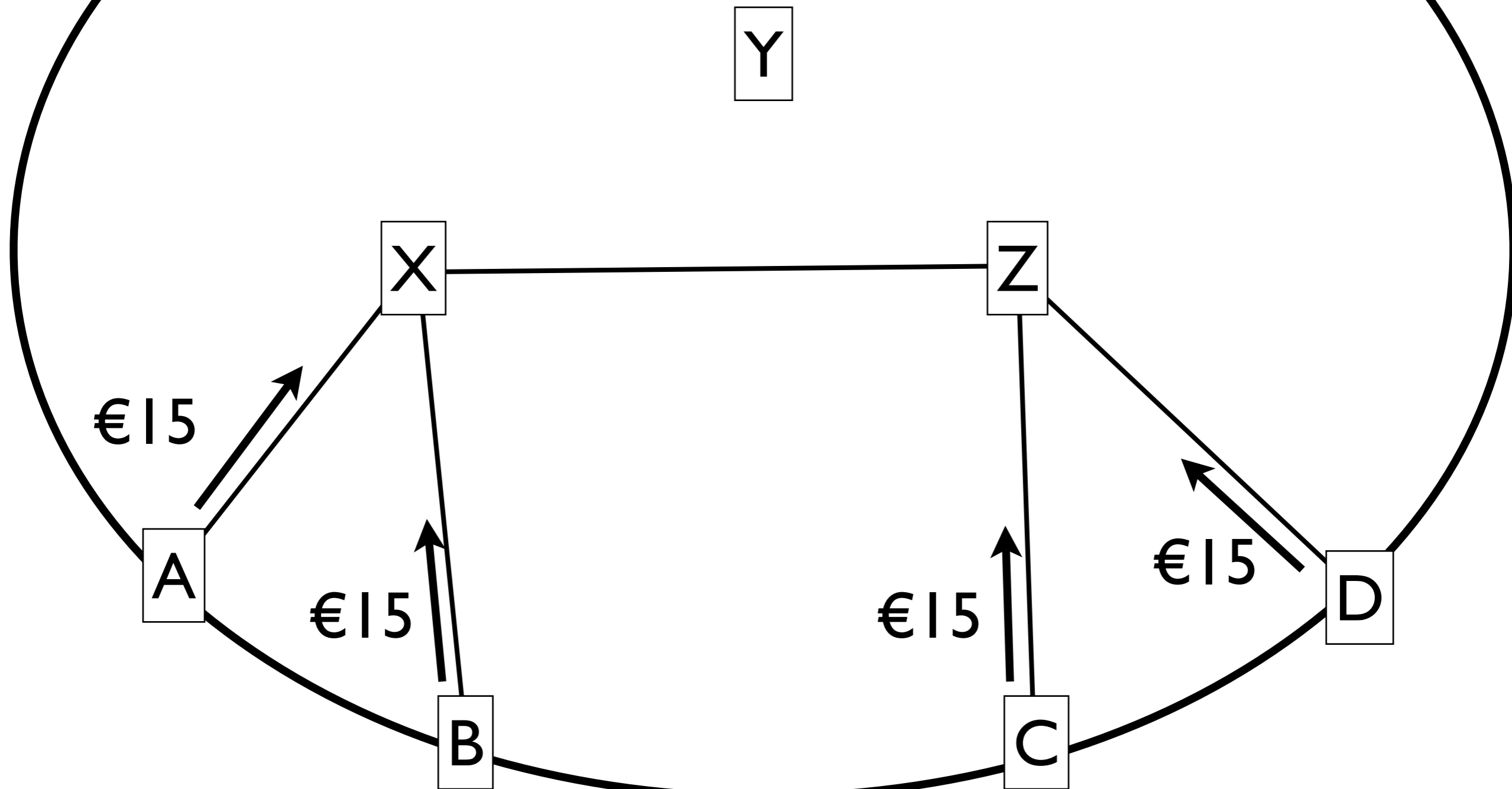


# Traditional Internet

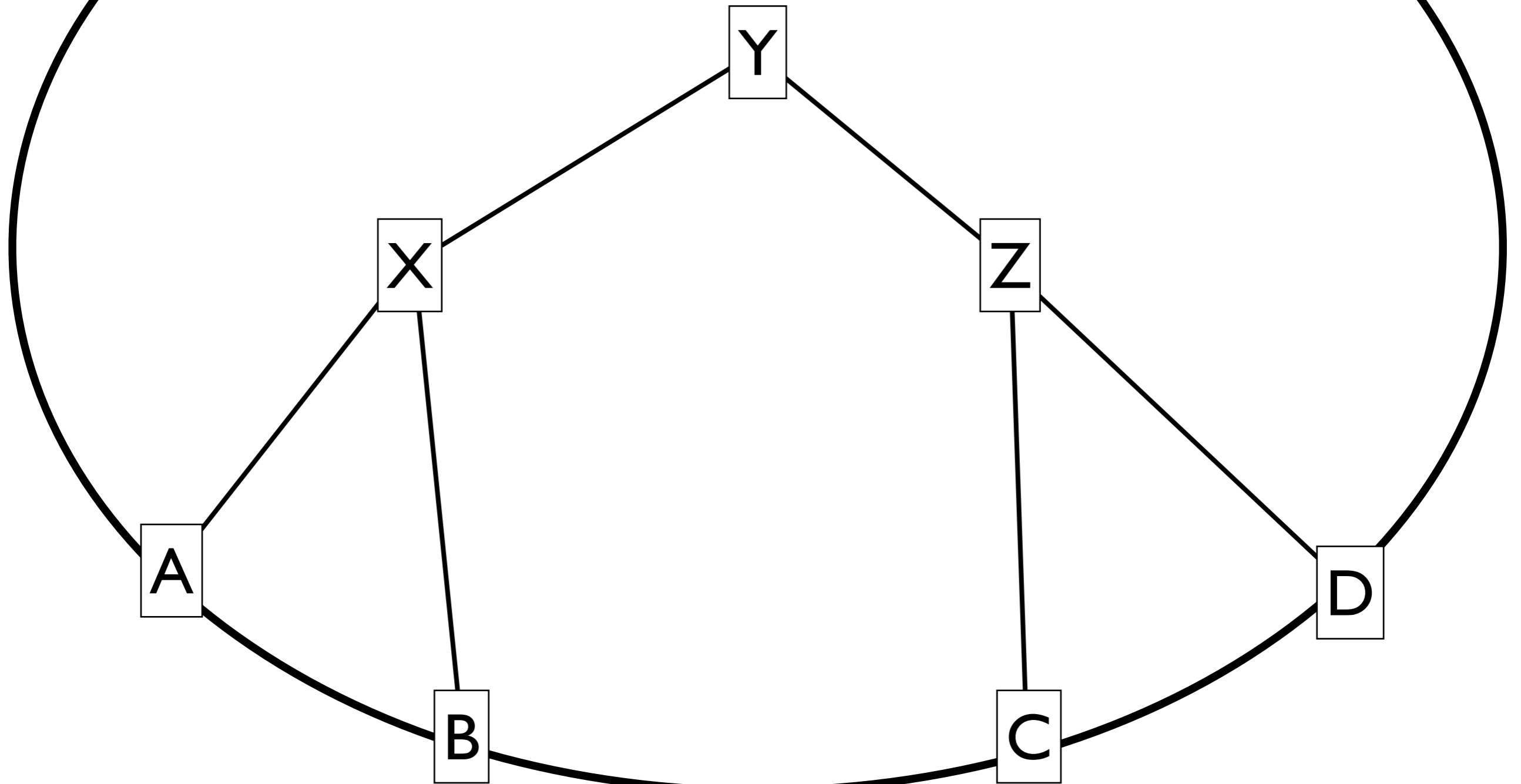
Y might loose traffic

If not Y is “good enough”

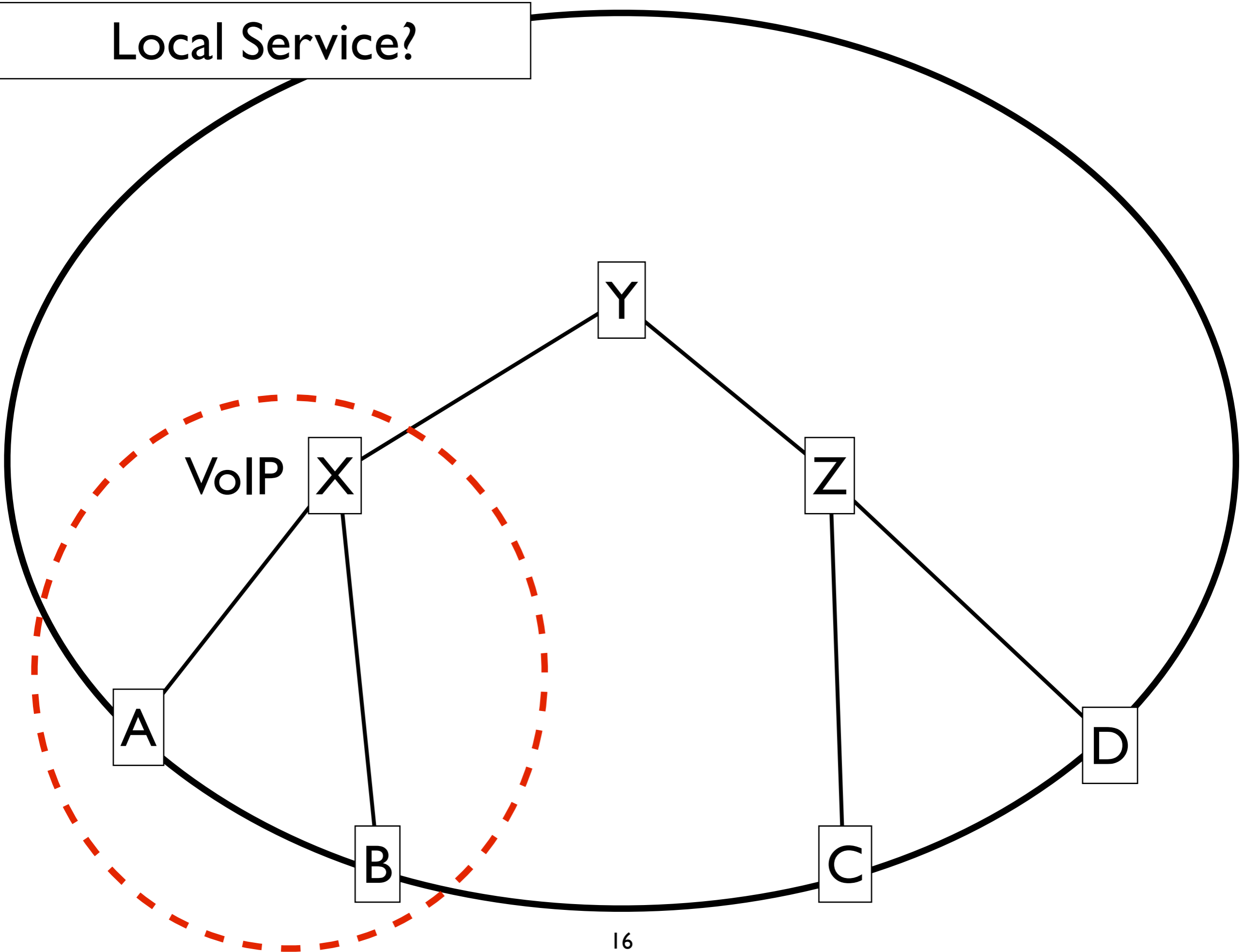
Y



Local Service?



Local Service?

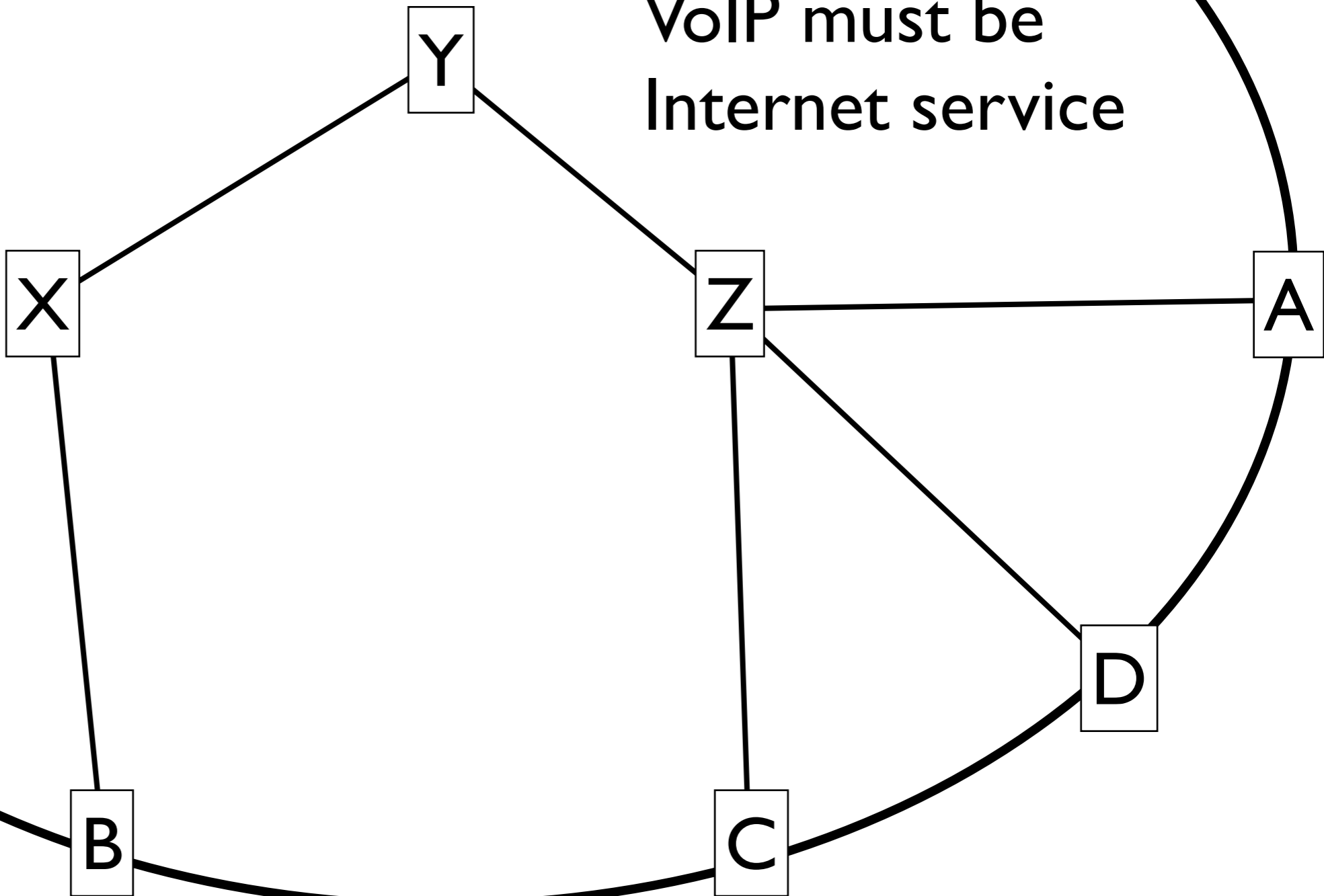


Local Service?

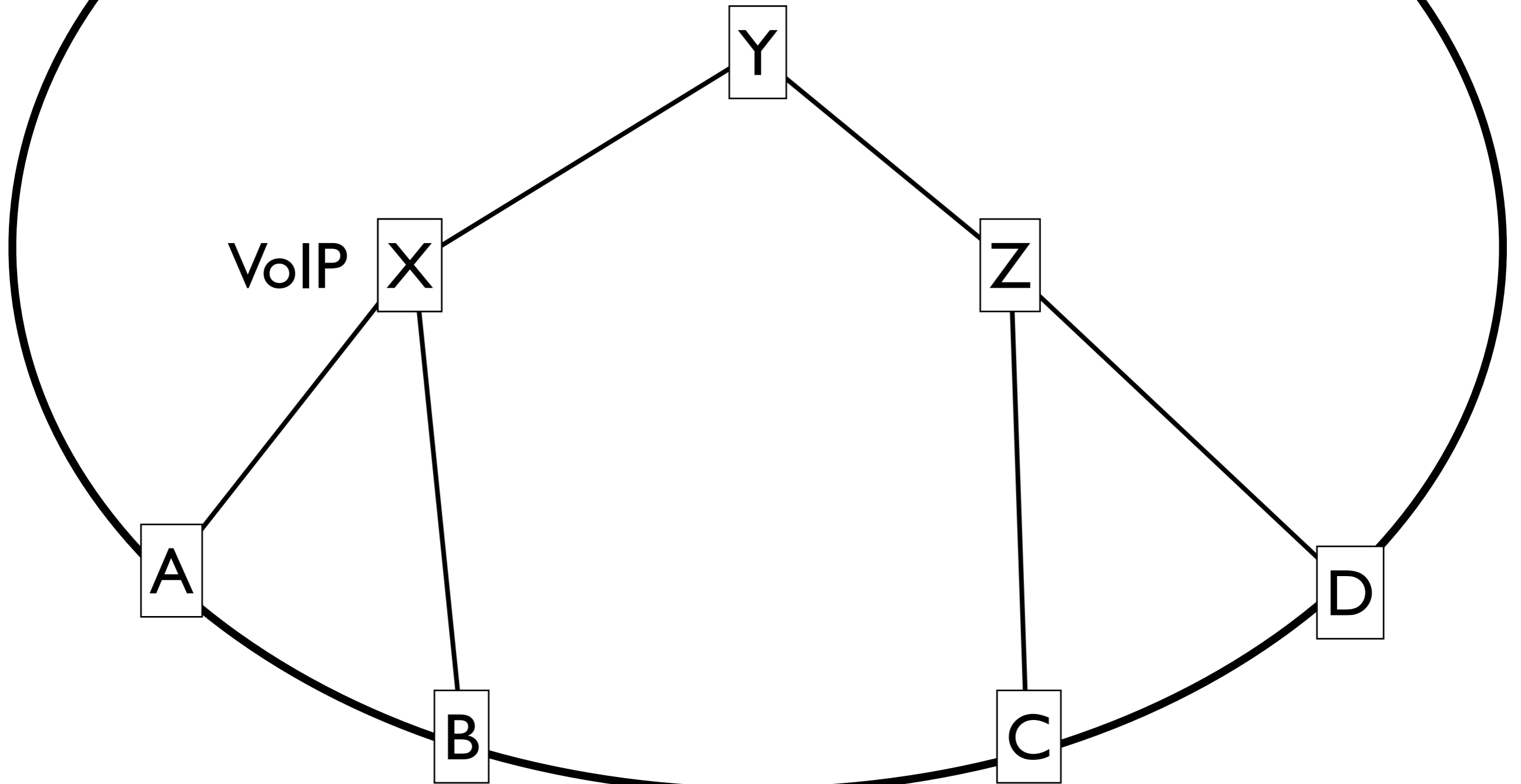
A can not access service  
when not being at home

VoIP must be  
Internet service

VoIP

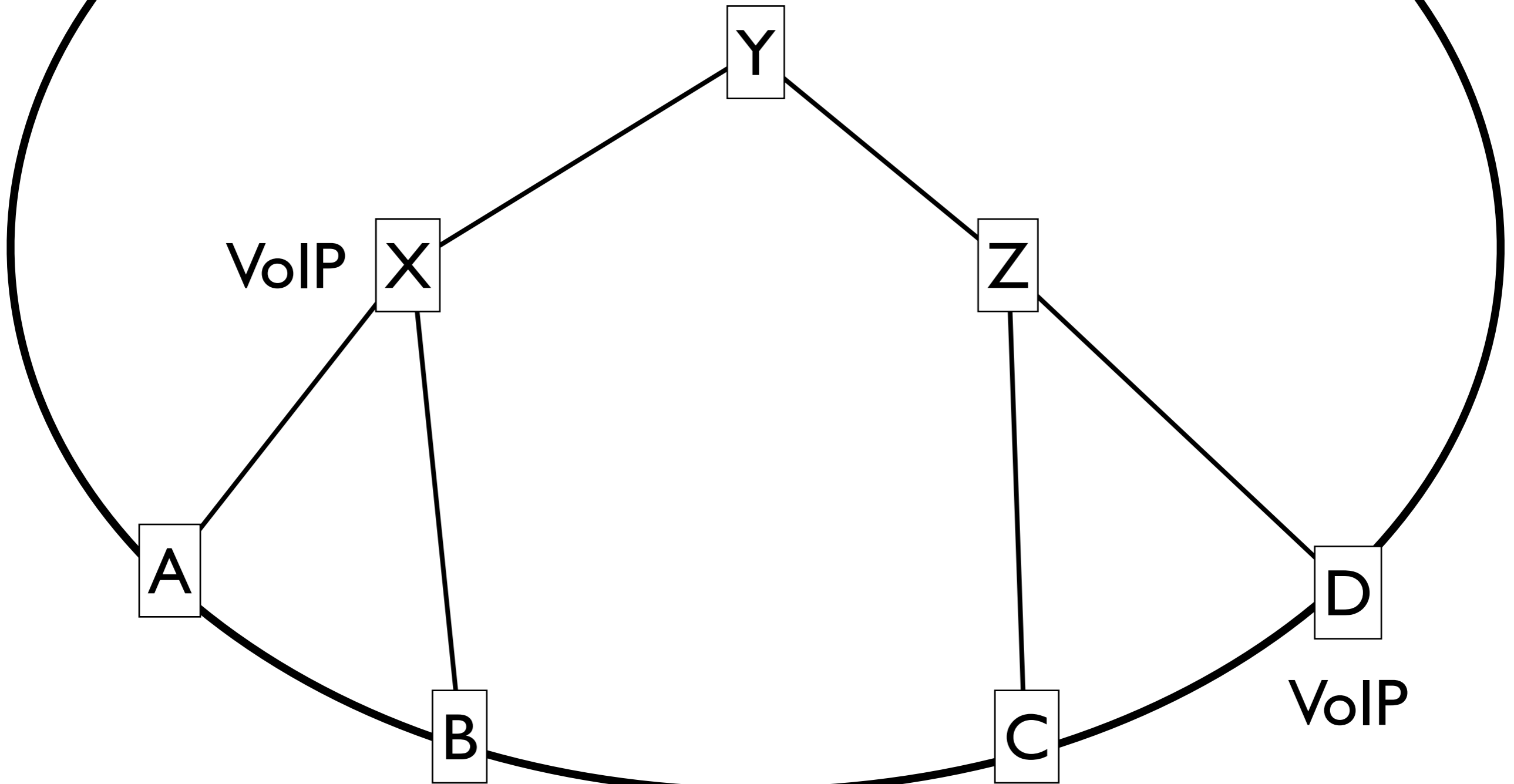


# Efficient Choice



# Efficient Choice

A can as well use VoIP  
provided by D as X



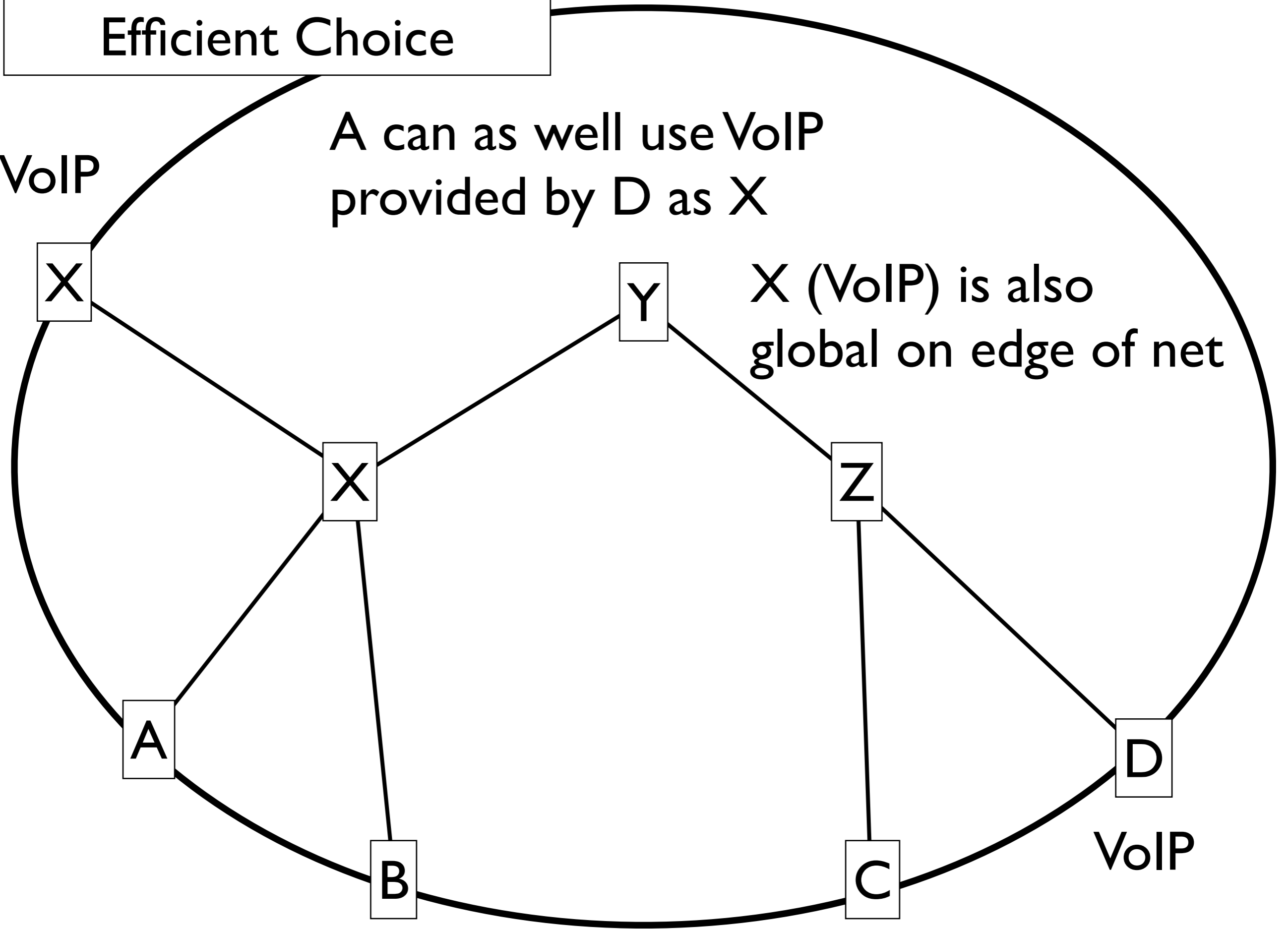
# Efficient Choice

A can as well use VoIP provided by D as X

X (VoIP) is also global on edge of net

VoIP

VoIP



# Efficient Choice

A can as well use VoIP provided by D as X

X (VoIP) is also global on edge of net

VoIP

€15

€10

€10

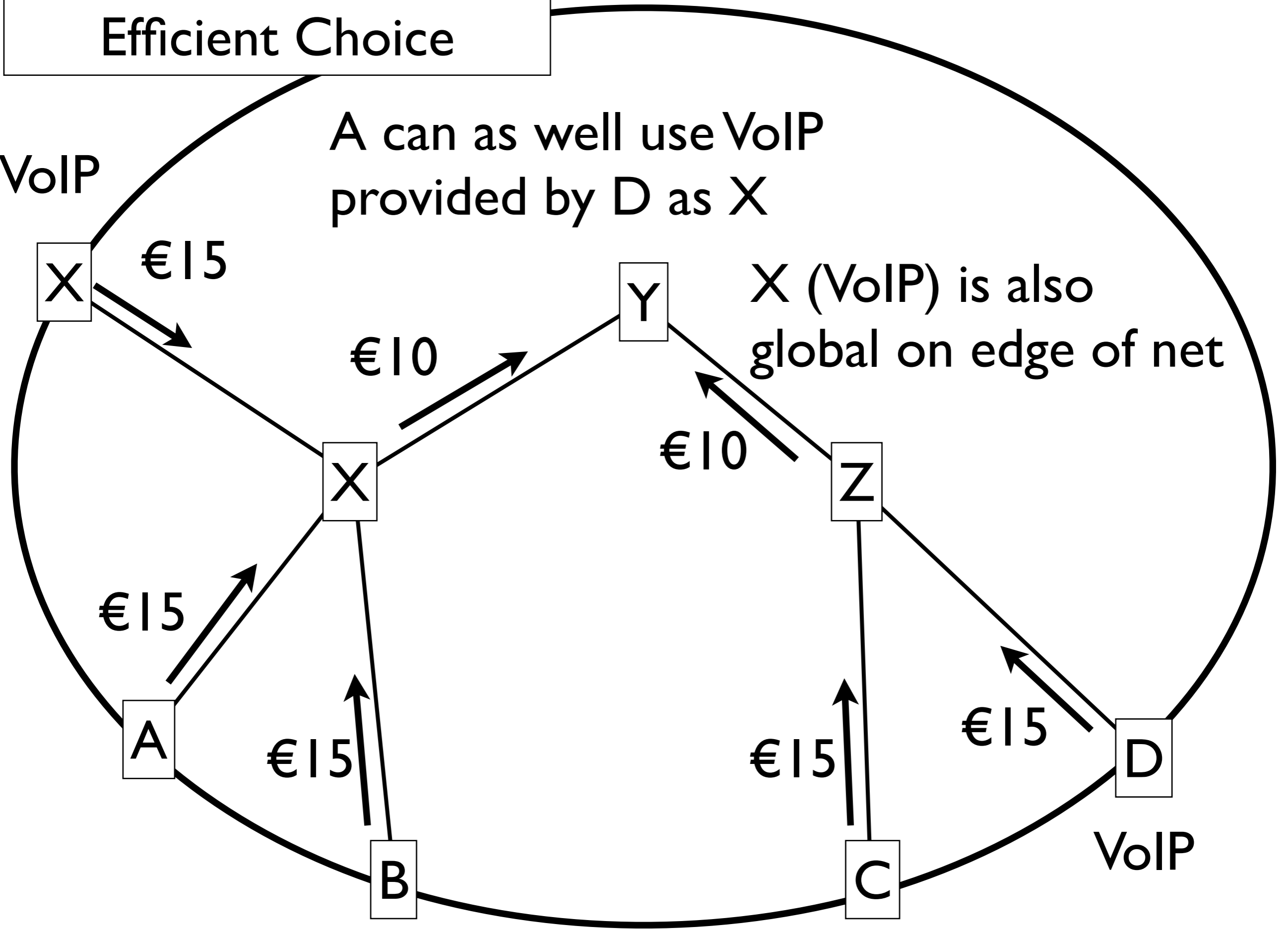
€15

€15

€15

€15

VoIP



# Efficient Choice

A can as well use VoIP provided by D as X

X (VoIP) is also global on edge of net

VoIP

€0

€10

€10

€15

€15

€15

€0

X

Y

X

Z

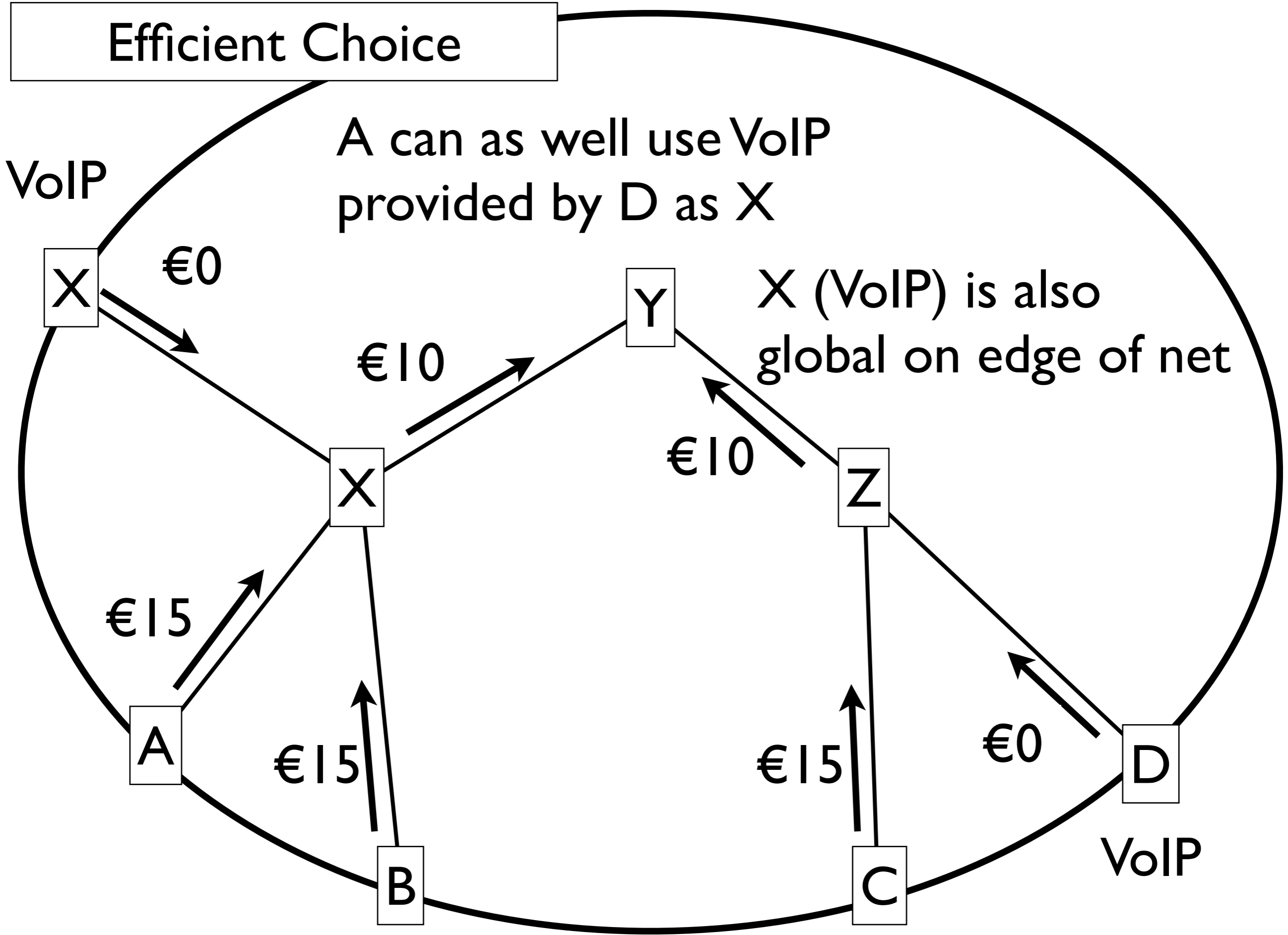
A

B

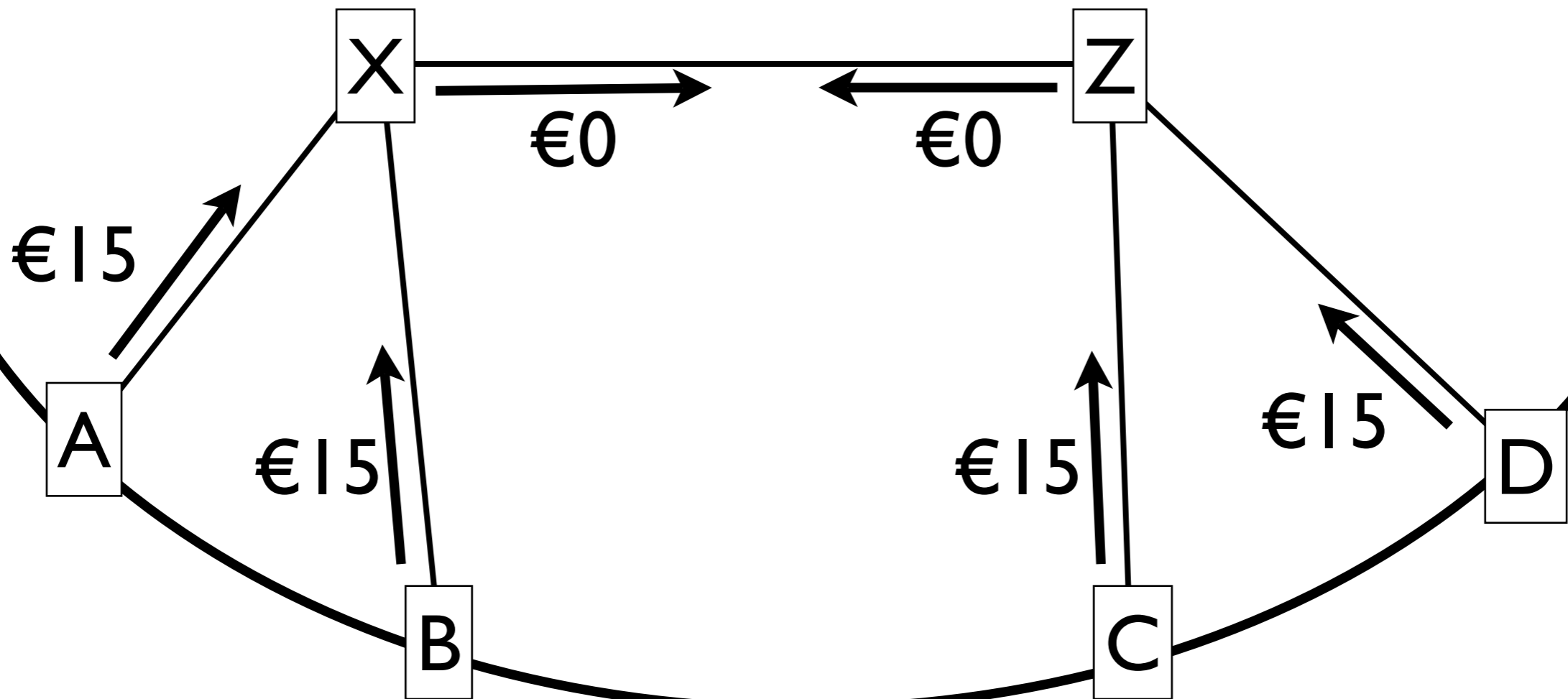
C

D

VoIP

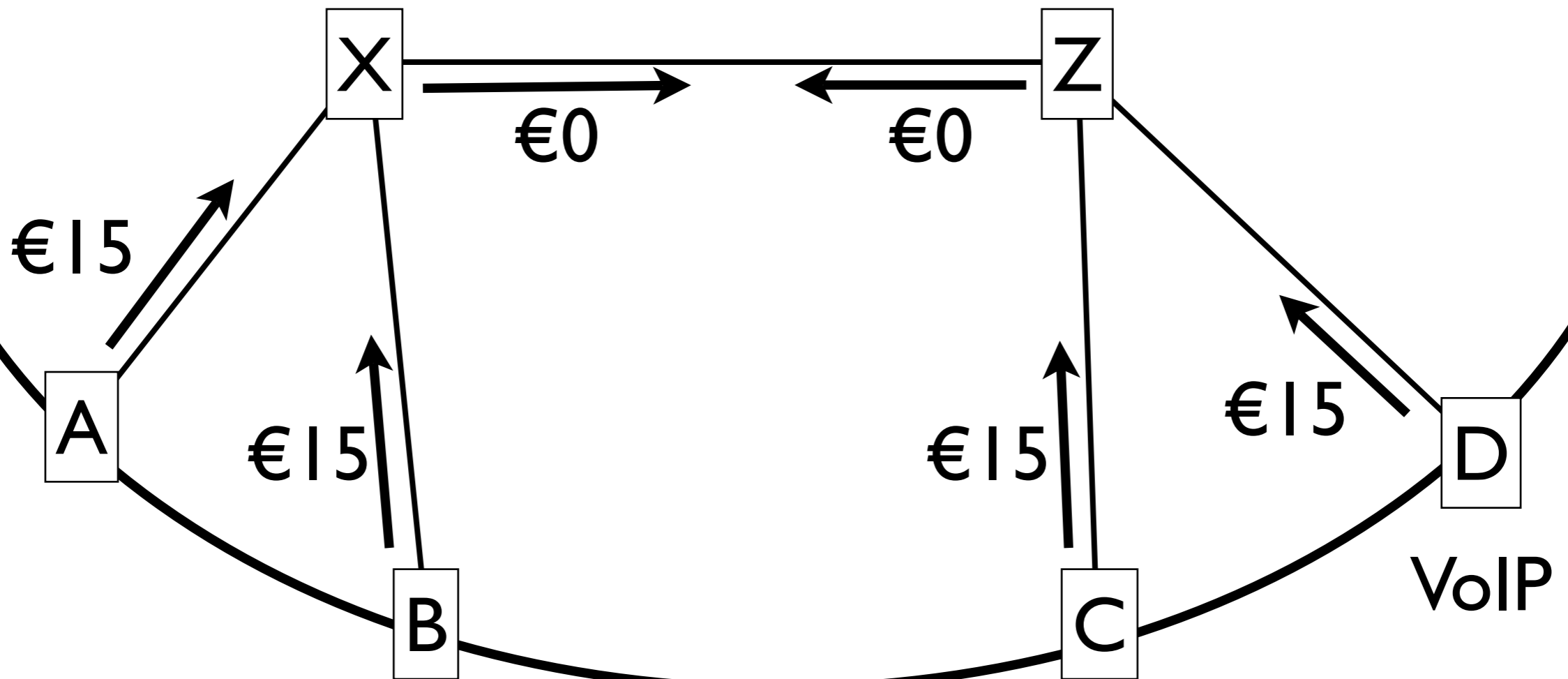


# Money negotiations



# Money negotiations

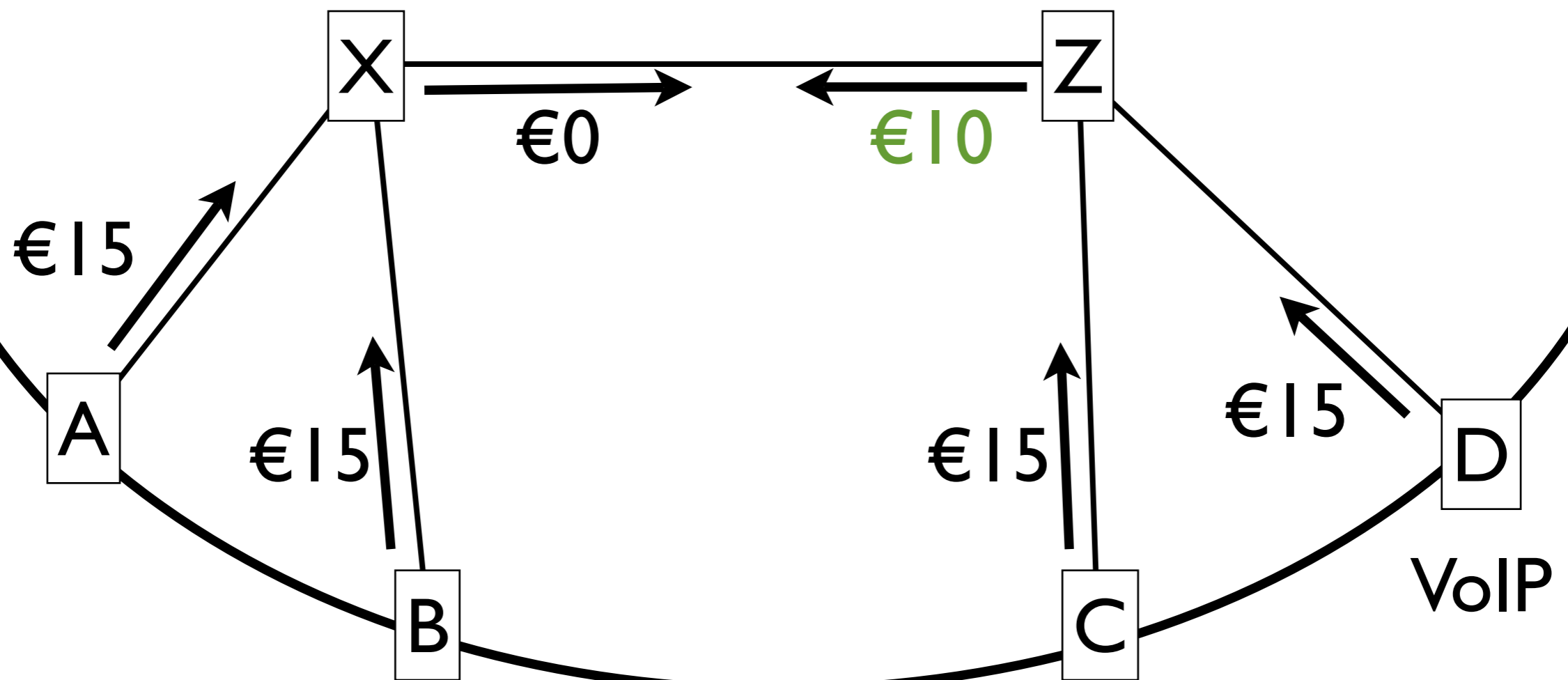
If D start popular service



# Money negotiations

If D start popular service

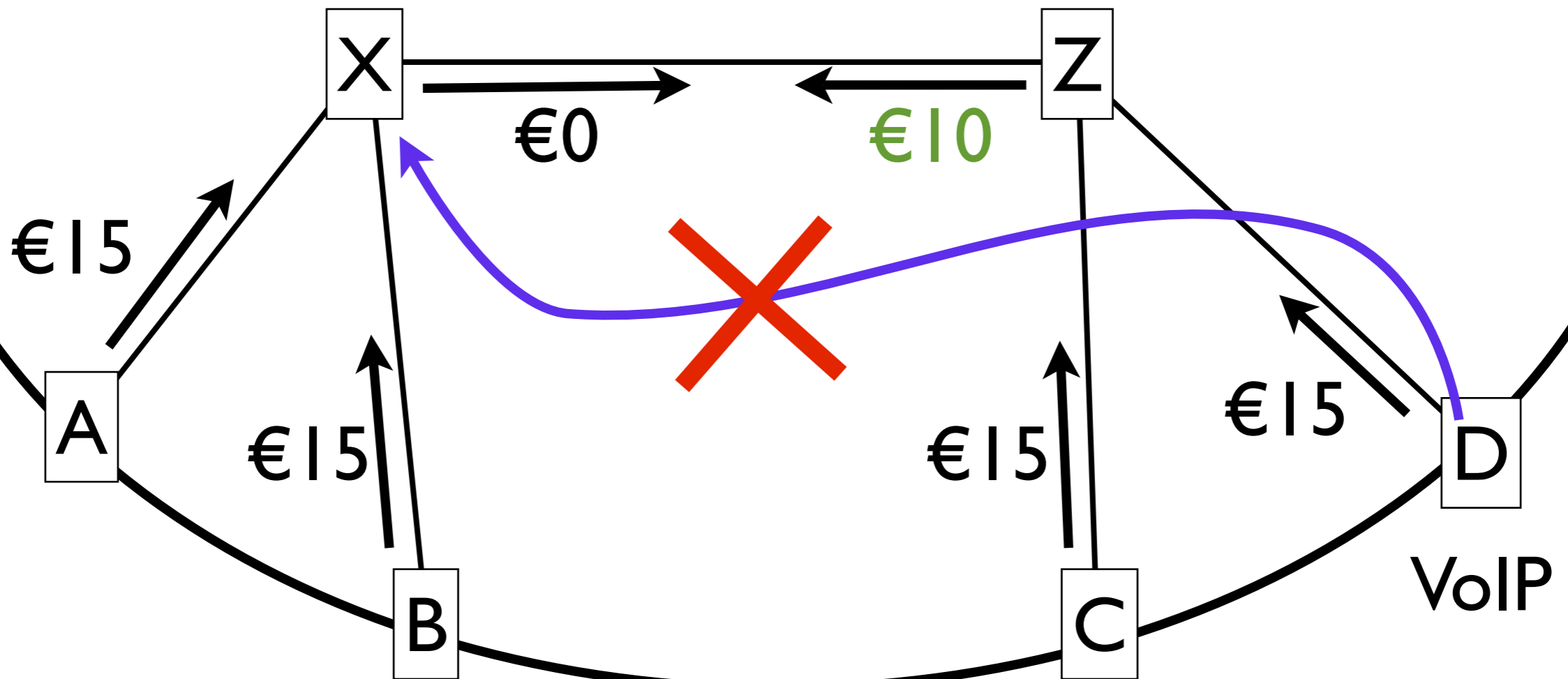
Then X can request more money from Z



# Money negotiations

If D start popular service

Then X can request more money from Z, not from D



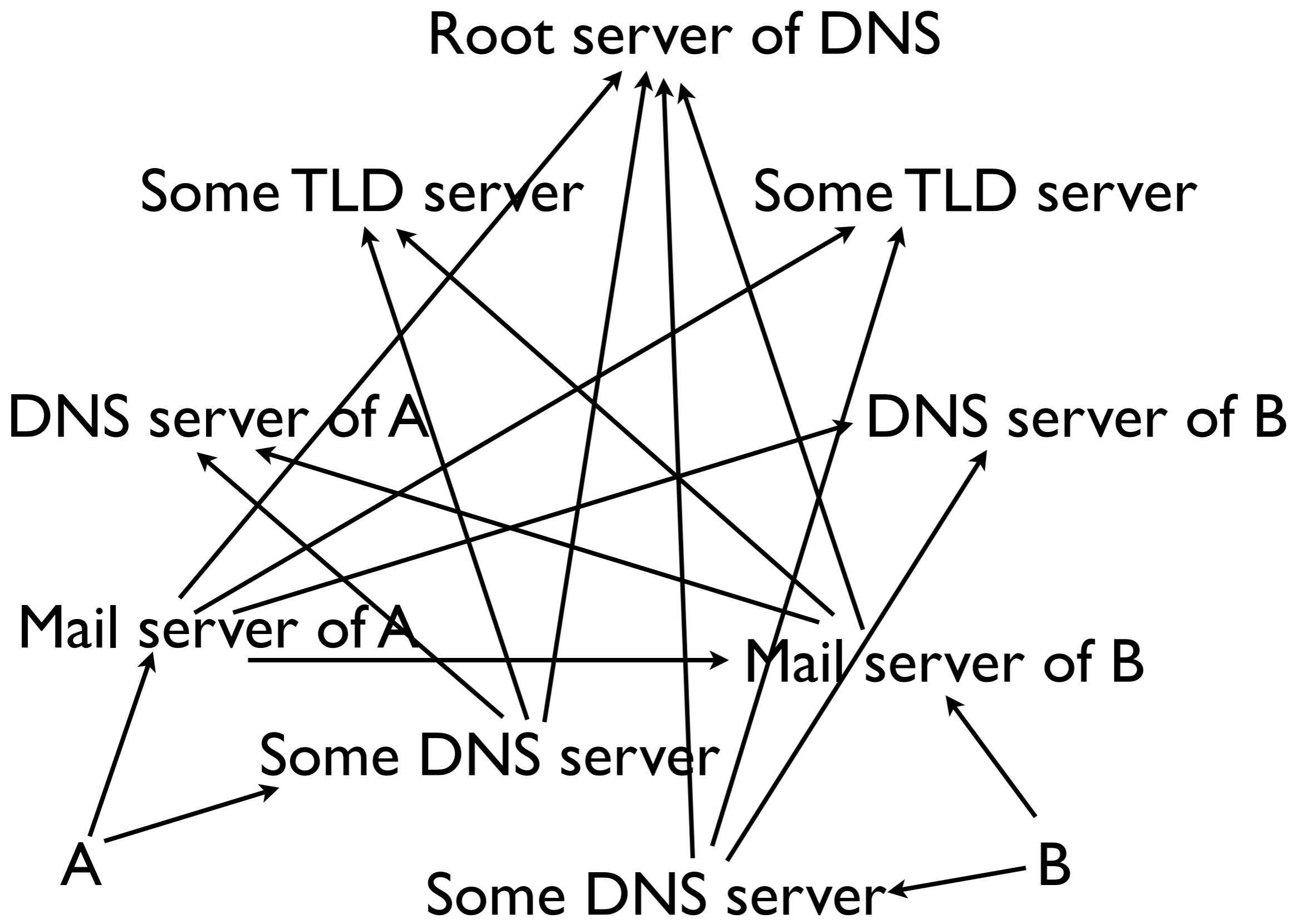
# Conclusions

- All services must be globally accessible
- Services are all on the edge of the Internet
- Competing service can come from anywhere
- Network and service run by same provider should be viewed as separate providers
- Customers to access providers are only interested in Internet Access
- Every node on the edge send money towards the center of the Internet

# Warning!

- You can never draw lines and explain how traffic is flowing on the Internet!





# What do people want?

- People want Flickr, Flirtomatic, Facebook, MySpace, Google, Jaiku, YouTube,...
- Service providers want to provide **A Service**
- Vodaphone 2007:

7% increase in voice revenue  
9% increase in SMS revenue  
49% growth in data revenue

Data is not from Vodaphone walled garden

<http://www.arcchart.com/blueprint/show.asp?id=428>

# The real change

Application

Wire

# The real change

Application

Transport

Wire

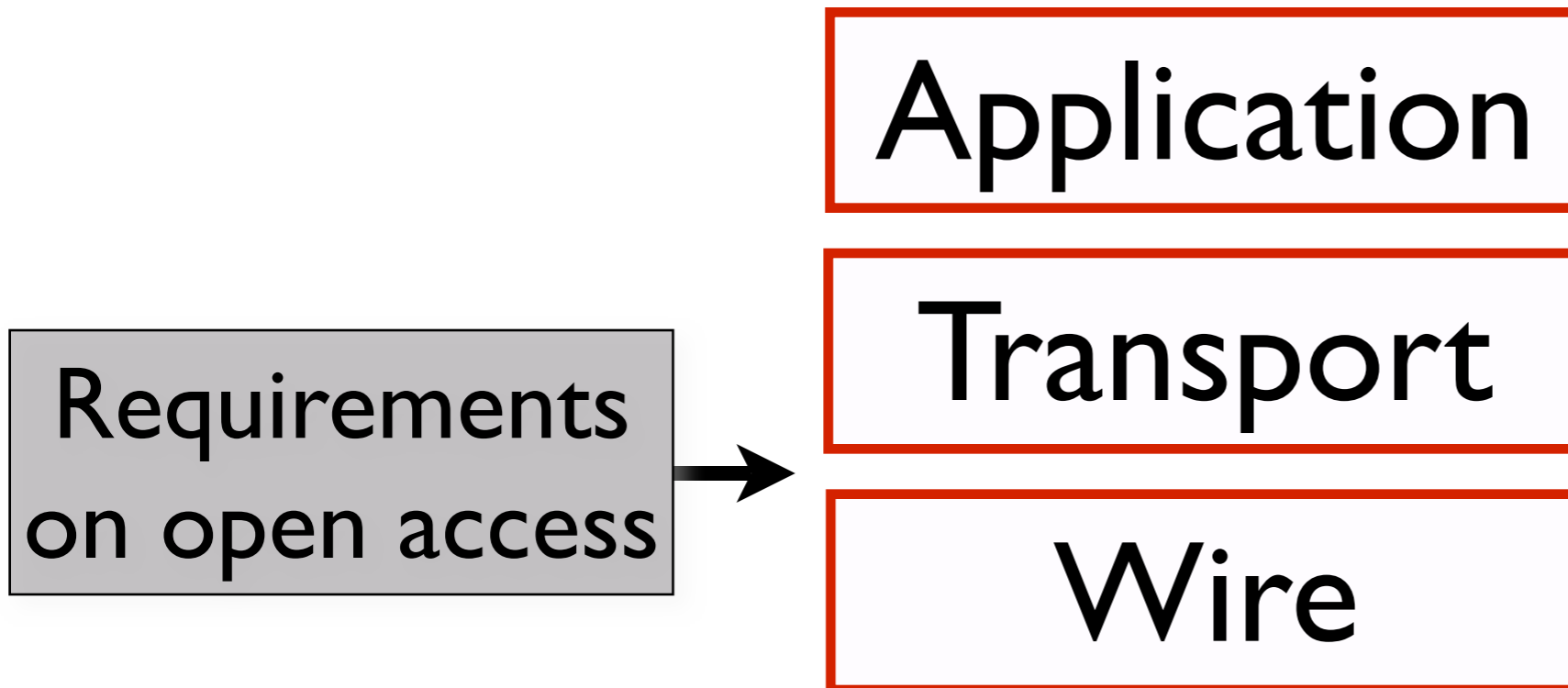
# What is the risk?

Application

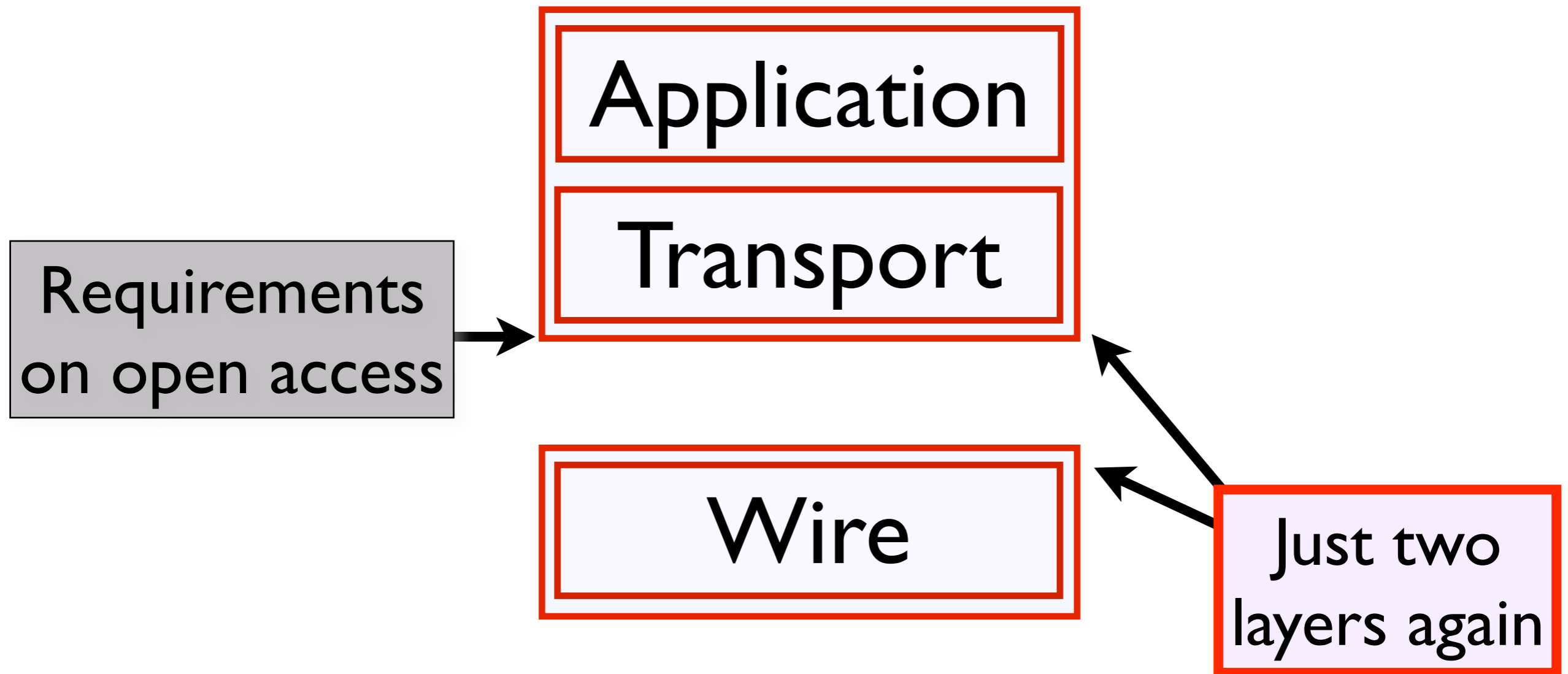
Transport

Wire

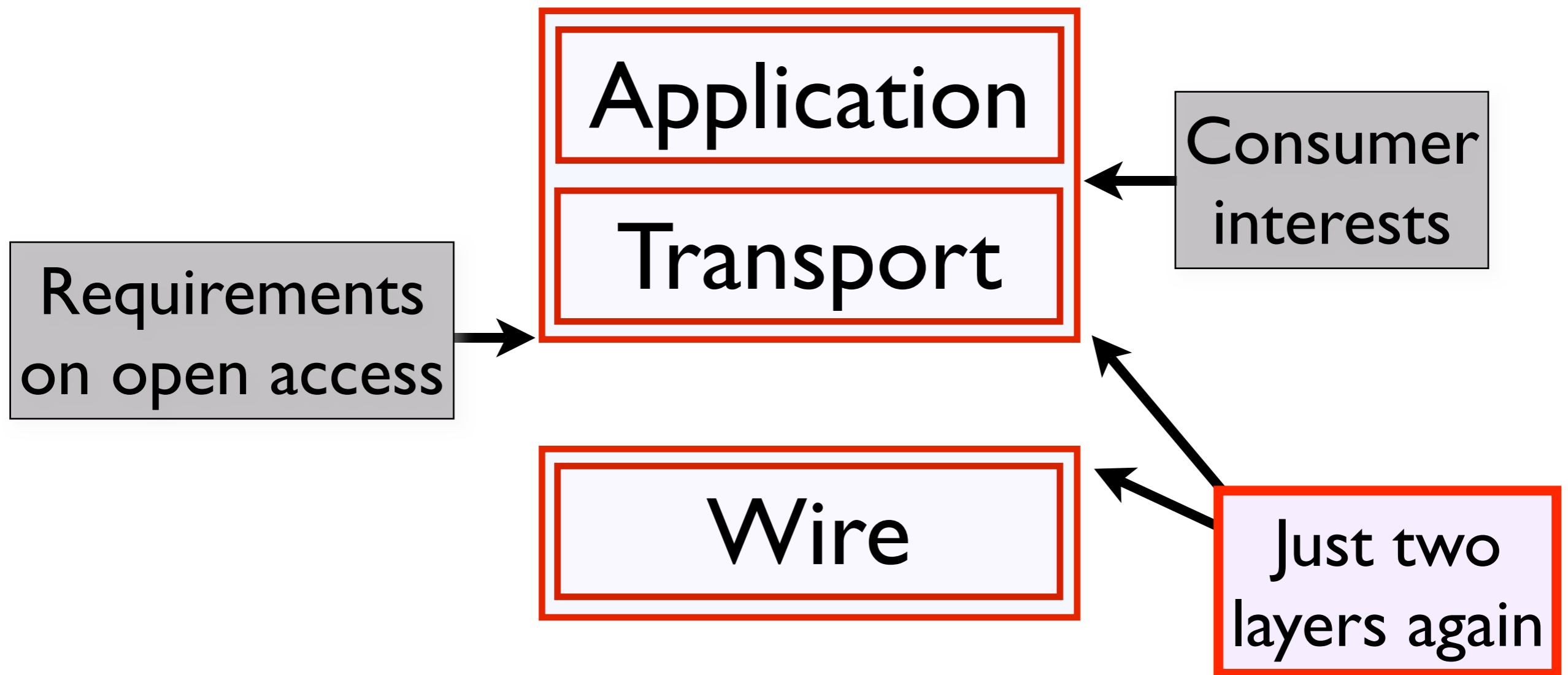
# What is the risk?



# What is the risk?



# What is the risk?



# Standards



## **Inter-Service Provider IP Backbone Guidelines**

**4.2**

**30 October 2007**

<http://www.gsmworld.com/documents/ireg/ir34.pdf>

# IPX

## **Interworking**

The ability for a service offered to subscribers of one network to communicate with a similar service offered to subscribers of a different network

## **IPX**

IP Packet eXchange. The entity providing the IPX functions. In the interconnection context, IPX is used to mean an interconnection at the service level. Also refers to the collection of all the interconnected IPX Provider's networks

## **IPX Provider**

A Provider that offers IPX services and may also offer GRX services

# IPX

## **Interworking**

The ability for a service offered to subscribers of one network to communicate with a similar service offered to subscribers of a different network

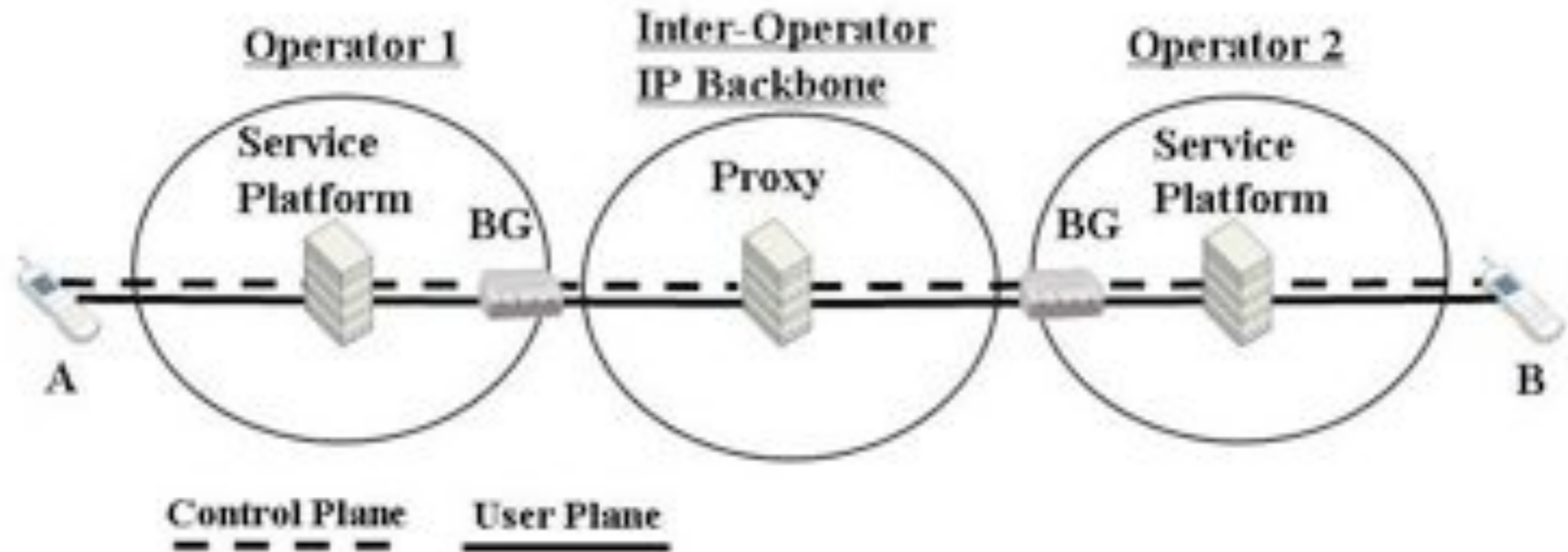
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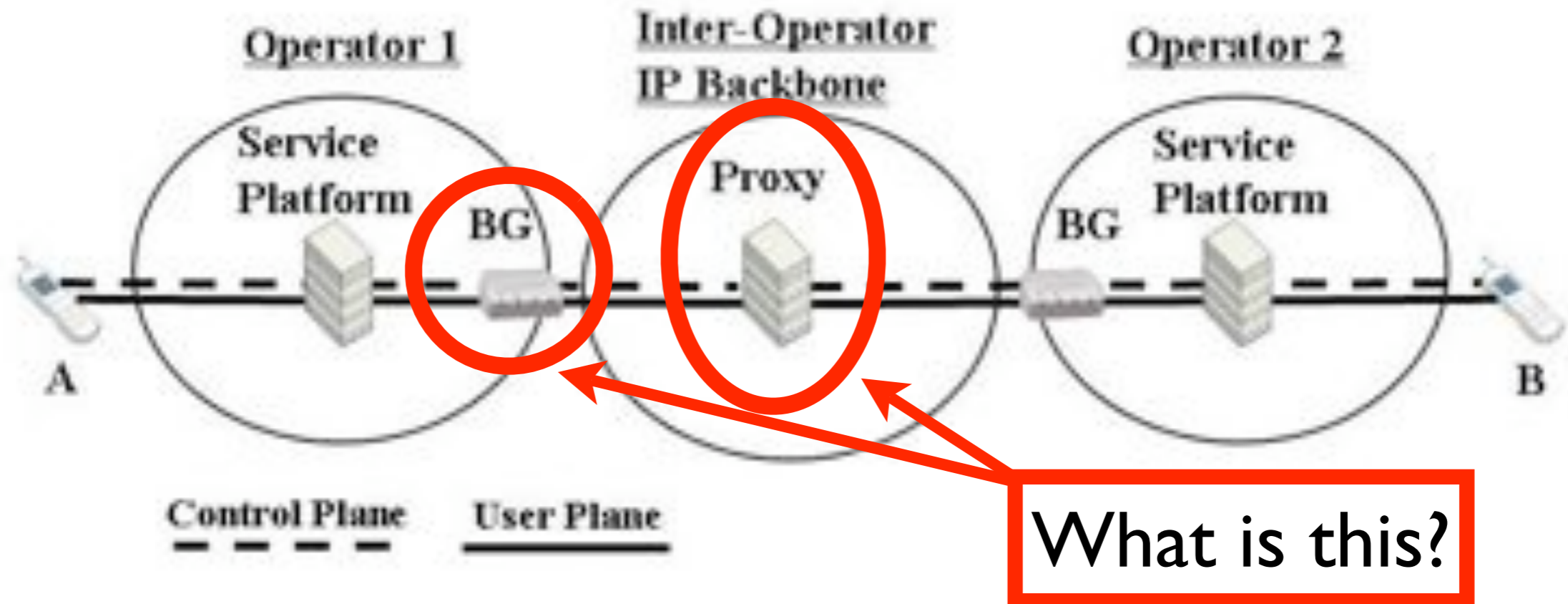
A Provider that offers IPX services and may also offer GRX services

# Internals...



**Figure 3 - Proxy in Inter-Service Provider IP Backbone**

# Internals...



*Figure 3 - Proxy in Inter-Service Provider IP Backbone*

# Internals...

## 6.5.4 IP Addressing

Internet routers should not be able to route to the IP addresses advertised to the Inter-Service Provider IP Backbone. The IP Backbone Providers and Service Provider networks shall be totally separated from public Internet, from an IP routing perspective.

Currently, Inter-Service Provider IP Backbone networks use IPv4 addressing and there is no plan to introduce native IPv6 addressing in the foreseeable future. It is intended that IPv6 is supported by tunnelling the IPv6 traffic over IPv4 between Service Providers where required.

# Internals...

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# Next 30 years?

- Consumers will choose themselves
- Services must be reachable from everywhere
- We will see fewer service providers, not more
- Internet will carry every information service
- Consumers will pay for Internet access
- New processes will help people “go green”
- All discussions around “NGN” and old business models will (finally) be dead, but it will be a blood bath

# Electronic Services - whenever and wherever

- Accessibility
- Robustness
- More secure Internet in Sweden
- IT-standardization
- Electronic identification / authentication
- Information security
- Electronic communication
- Development of digital services
- Openness in the networks
- A sustainable information society
- EU-chairmanship (fall of 2009)
- A renewed national IT agenda

# Thanks!



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