

Introduction to Telecom Regulation

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Topics Covered

1. Recent advances in telecommunications technologies
 2. Regulation tools and procedures, and ...
 3. their present and future application to telecommunications
- Competition issues and regulation
 - Economic models related to regulation
 - Regulation tools and procedures
 - Pricing based on cost
 - Technologies and means of estimating the value of scarce resources
 - Current telecom technologies and services that require regulation
 - Regulation's impact on telecommunications present and future, industry firms and customer services

Today's situation in Telecom Markets (I)

- **Deregulation** in markets with traditional telecom monopolies
 - Alternative providers are already in the market for 10+ years
- New technologies deployed continuously at all levels
 - Digitization and convergence of telecoms with computers
 - Standardization and Open interfaces, leading to:
 - New business opportunities
 - Ease of interconnection
- Costs keep dropping

Today's situation in Telecom Market (II)

- New access technologies (broadband, wireless) and the proliferation of the Internet suggest:
 - Network convergence, unbundling of bottlenecks
 - Complicated usage of infrastructure:
 - Same links/elements → multiple services
 - Same service → infrastructure of multiple owners
- Relation between services and their demand is **unclear**
 - Wireless vs. fixed telephony, internet vs. telephony
 - Internet and **VoIP** complicate matters

Today's situation in Telecom Markets (III)

- Breakup of value chain and increased **competition**
 - Provision of value-added services over infrastructures
 - Their demand needs for customization are increasing
- Over-The-Top providers (content providers etc.) earn high revenues
 - They are served by telecom operators, who have to make **investments**, which may not be recovered due to flat-rate pricing.
- Market situation is **VERY** complicated
- Regulator should promote **competition** while ensuring **viability** of players

History of Competition and Regulation

AT&T's (Bell Co.) Monopoly Era (I)

- Telephony **patents**: A.G. Bell 1876-77
 - Formed a company that gave local operating companies exclusive licenses to use the technology in U.S. towns and cities
 - Bell charged an annual license fee for each telephone instrument leased to customers (mainly businesses)
 - Demanded equity stake (often grew to 100%)
 - Controversy with Elisha Gray on who was the first inventor

AT&T's Monopoly Era (II)

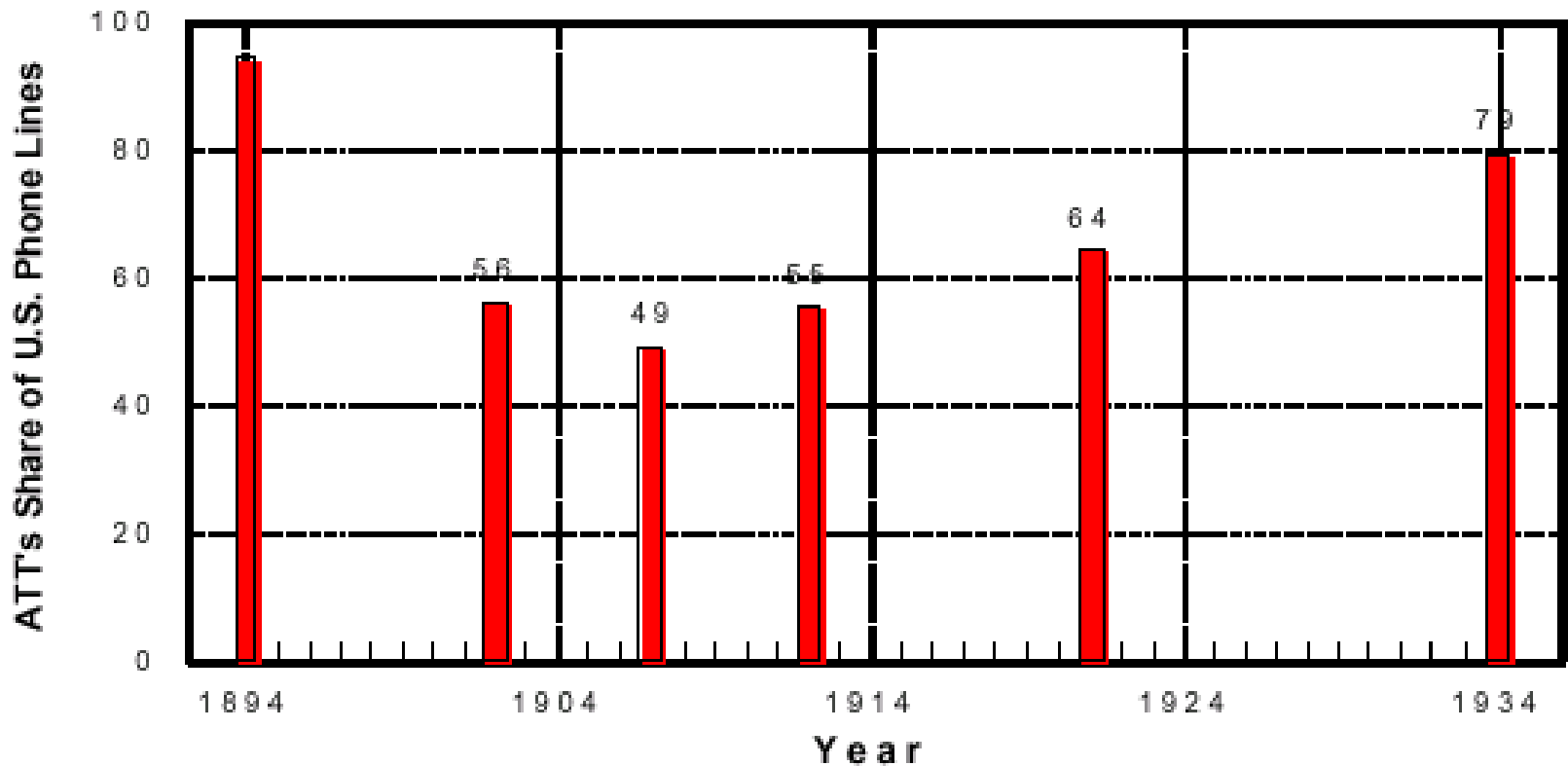
- Competition appeared immediately
 - Western Union controlled long-distance telegraph cables
 - Tried to acquire AT&T
 - AT&T vs. Western Union 1877 -79!! → WU conveyed patents to AT&T but retained telegraph monopoly
- Independent companies' **early** appearance:
 - 1894 : Patent (and monopoly) expiration date
 - 87 companies → 1894, 4000 companies → 1902

AT&T's Response to Competition

- AT&T's response to competition was swift and devastating:
 - Strategy aiming to dominate both local and long-distance telephone markets
 - **Cut** rental rates in areas threatened by independent
 - ◆ Between 1893 and 1898 average rental rates fell by 75%
 - ◆ **Demand increase** due to competition
 - Patent infringement **suits** against independents
 - **Takeover** of successful independent companies
 - **Refused** interconnection and equipment provision

AT&T vs. Independents

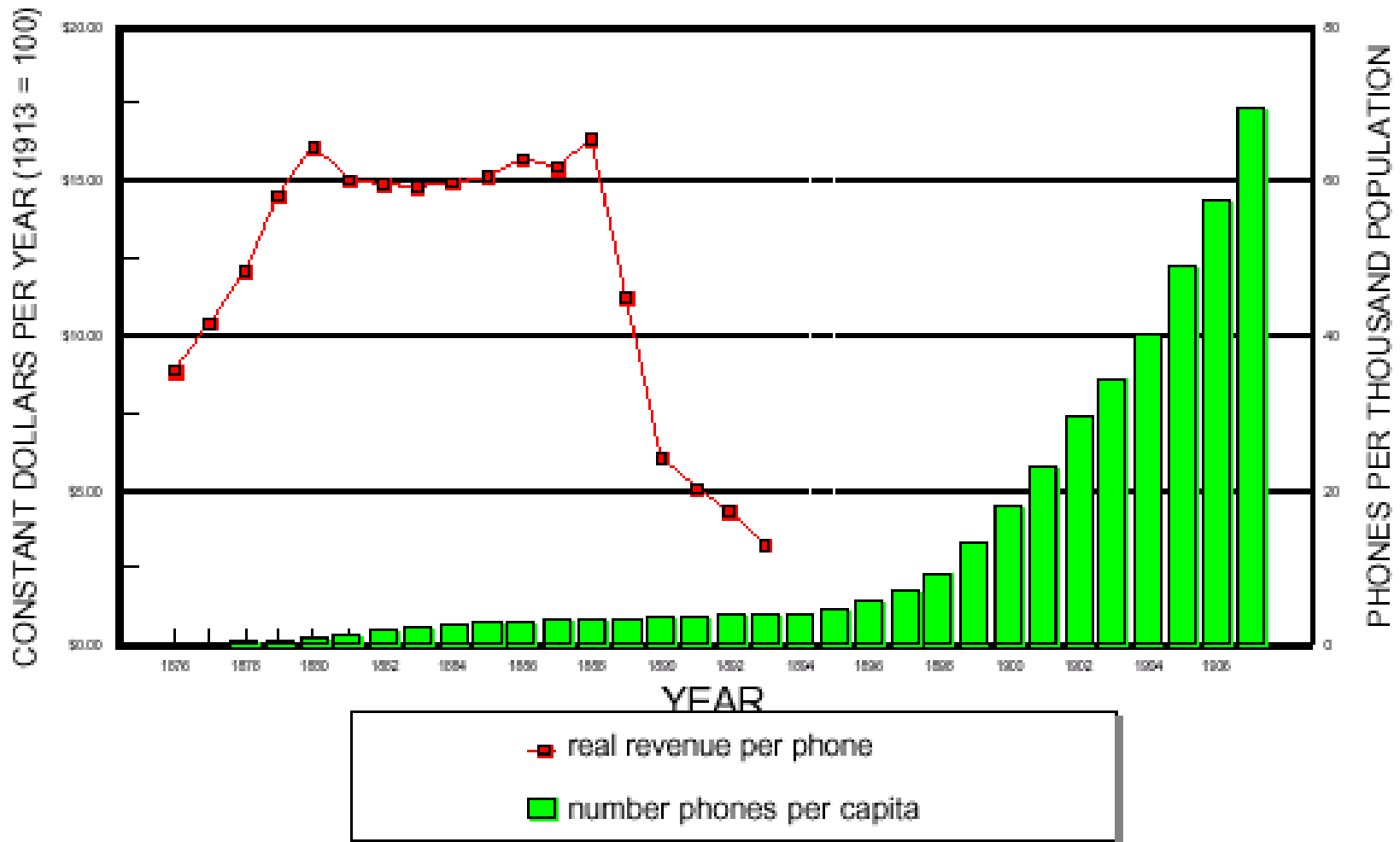
Figure 1: HISTORICAL TELEPHONE MARKET SHARE
AT&T vs. The Independents



Source: Bornholz and Evans (1983)

Competition's Effects

Figure 2: EARLY LOCAL PHONE PRICING AND PENETRATION



Early Legal Action

- Concern about growing market power of AT&T (~1900+)
- State laws mandated interconnection of independents with AT&T
- 1913: AT&T offered to stop acquisition of competitors
- 1934 USA's Regulatory Authority (FCC) was founded
 - Initially dealt with spectrum allocation and interstate communications
 - AT&T operates as a **regulated monopoly**

Monopoly in Question (I)

- 1949: U.S. versus Western Electric: 0 – 1
- 1956: AT&T versus “Hush-a-Phone”: 0 – 1
- 1959: Limited permission of “above 890MHz” by FCC
 - Significant step to **competition** despite AT&T petition for exclusive franchise over the use of this band
- 1974: U.S. versus AT&T →

Monopoly in Question (II)

- 1974: U.S. versus AT&T: 1 – 0 against **monopoly** in **long-distance** and relation with Western Electric → U.S. alleged that:
 - AT&T's exclusive relationship with Western Electric was illegal;
 - AT&T monopolized the long distance service market;
 - AT&T refused interconnection to competitors
 - AT&T used various discriminatory practices that raised the costs of competitors;
 - AT&T abused the regulatory process and did not provide complete information to regulators;
 - AT&T set prices to exclude competitors

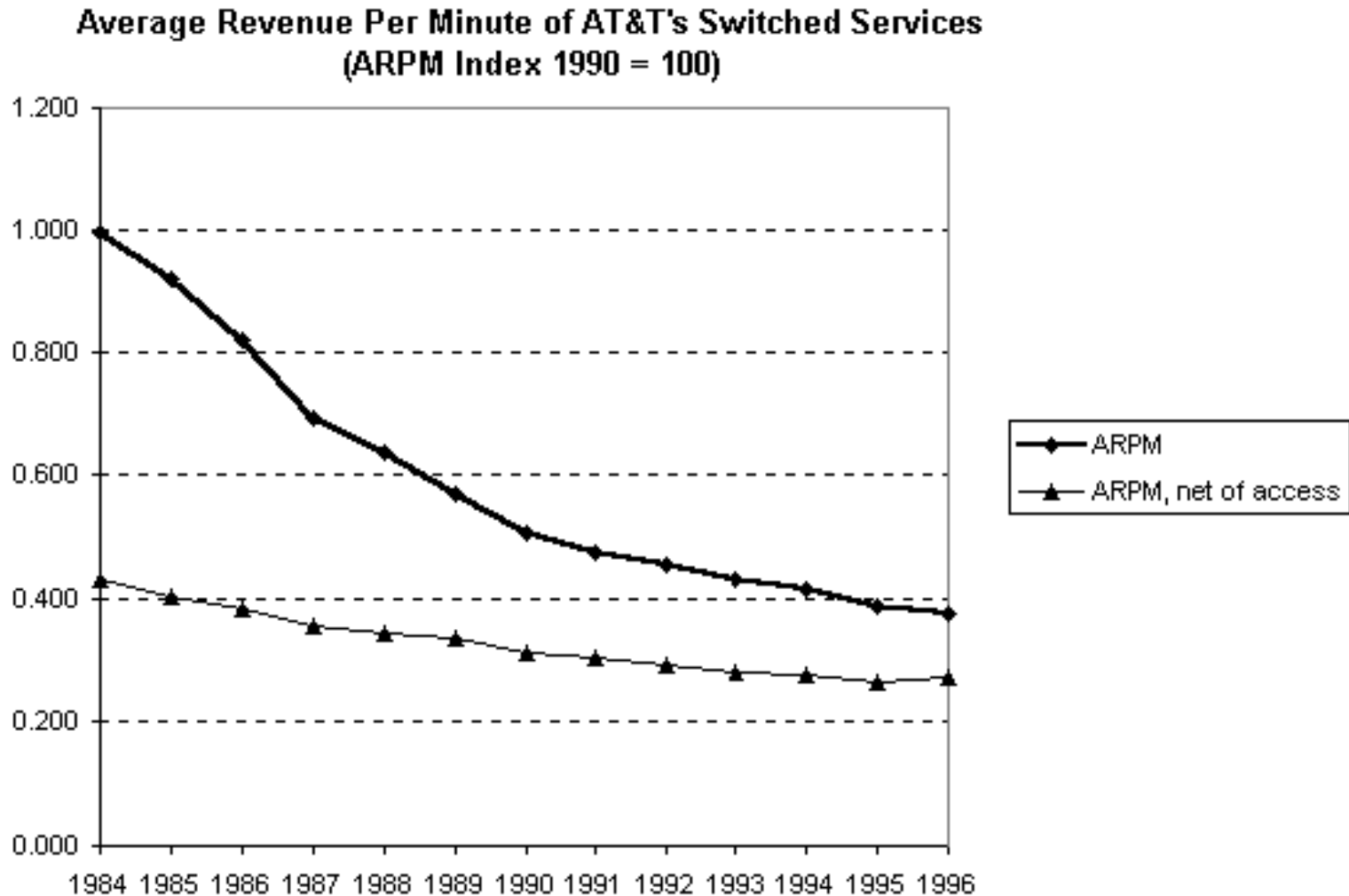
Monopoly in Question (III)

- 1982: Modified Final Judgment (MFJ)
 - Competition in long-distance : MCI, US Sprint
 - Breakup of AT&T to 7 Regional Bell Operating Companies (RBOCs)
 - AT&T allowed to enter computer market

Competition in Long Distance ('82-'96)

- Was **great success**
 - New long distance companies
 - **Resellers** proliferated (~500 in CA)
 - AT&T share of call time: 85% in 1984, 53% in 1996
 - Its average revenue per minute dropped by 60%
 - Was declared **non-dominant** in 1995
- 1996 Telecom Act: **unbundling**, **Local Loop competition**

AT&T Average Revenue per Minute



Telecom Act 1996 (I)

- Main goals:
 - Enable **competition** in **local exchange** by means of reduction of entry barriers.
 - Allow **Incumbent Local Exchange Carriers** (ILECs) to enter long distance **after** opening **local**.
 - Make provision of **Universal Service** (i.e., of a minimal set of services for all users) more efficient.
- Thus, Telecom Act 1996 mandates:
 - ILECs should offer:
 - Interconnection and unbundling, physical collaboration of equipment, **number portability**, sell at **wholesale prices** to retailers

Telecom Act 1996 (II)

- The Act:
 - envisions competition in all telecom markets
 - recognizes the telecommunications network as a network of interconnected networks
 - mandates telecommunications providers to interconnect with entrants at any feasible point the entrant wishes
- But these goals were **not** met, mainly because of:
 - Miscalculation of ILECs incentives and priorities: open local market in order to enter long distance)
 - Legal and Procedural issues

Years 2000 – today in USA

- Serious crisis in market due to wrong prediction on the expansion of Internet.
- Success of unbundling was not as high as foreseen
 - Several other alternatives.
- High expectations from Internet resulted in over-investment → Internet overcapacity has led ISPs to offer VoIP, offering considerably lower prices.
- Mergers of telecom companies
 - Often with ISPs, content providers, cable TV providers
 - Companies offer bundles of services
 - ILECs do have share in long-distance market
- AT&T pulling out from both local and long-distance
- Reconstitution of AT&T monopoly **without** AT&T!

What happened in European Union

- Competition was boosted by regulation, starting in mid 90s
- Dual regulation: Centralized regulatory policies and National Regulatory Authorities
- Common tools over EU countries: relevant markets
 - Local amendments also allowed and effected
- Main emphasis on competition in **broadband** markets rather than in telephony

Why Regulation ?

Why Regulation ? (I)

- Objective: Market efficiency
- Means to attain this: Competition
- Regulation should be employed only when we have:
 - Competitive situation and outcome may not be achievable by market forces only
 - Social reasons:
 - Deviation from economic efficiency may be socially desirable → universal service
 - Minimum safety standards required to guard social vs. private interests
 - Need to enforce coordination in technical and other issues, e.g. compatibility etc.

Why Regulation ? (II)

- **Key Question: Natural Monopoly ?**
 - i.e. can competitors survive?
Or are **network effects** strong enough?
 - If yes, then the regulation should deter high monopolist prices
 - Answer depends on: technology and cost structure, service, geographical area etc.
- Desirable effect: **all** networks interconnected
 - Incumbent has an incentive to **refuse** to interconnect with small competitors
 - Regulator enforces interconnection

Number Portability

As a Case Study for Regulatory Action

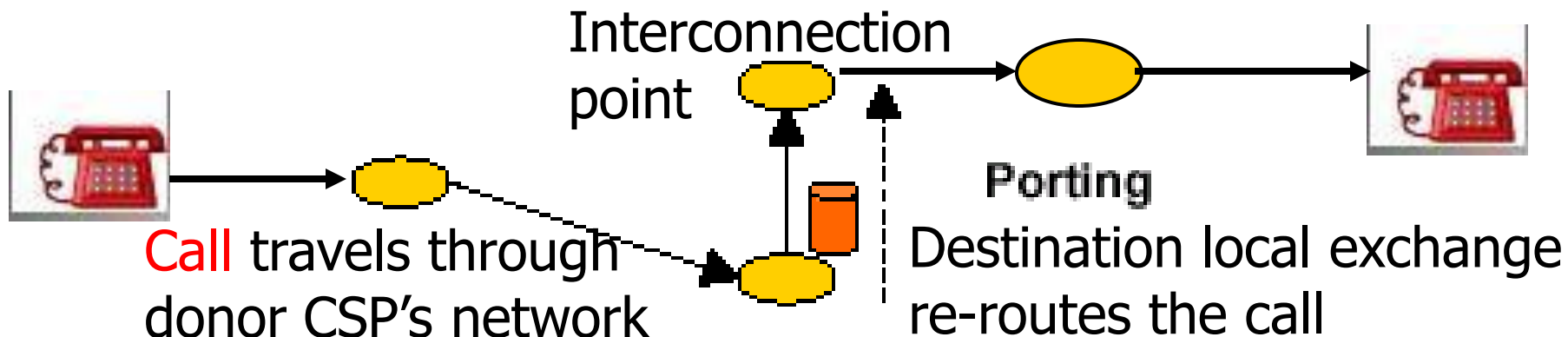
Local Number Portability

- The 1996 Telecom Act required **number portability** for local services and 0-800 services
 - Requirement now spread worldwide
- Local Number Portability (LNP) allows a household to **switch** from one Carriage Service Provider (CSP) to another and **retain** the same phone number
- Splitting the **cost** for offering LNP is a very complicated matter

LNP Issues for the Regulator

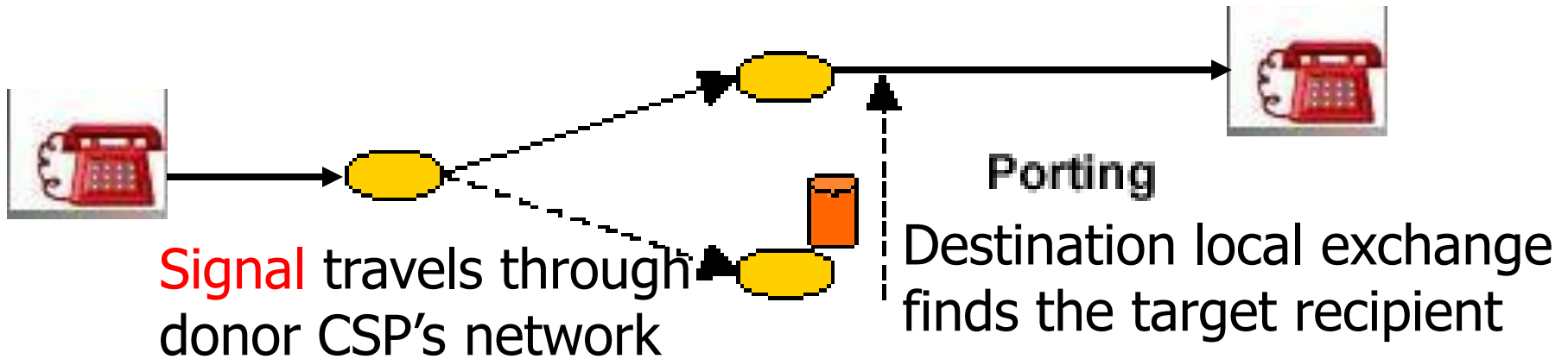
- **Issues** taken under consideration by the regulator:
 - **Business** interests and **investments**.
 - **Customers** interests both short and long term.
 - **Direct costs** of providing access to service.
 - The **operational** and **technical** requirements for the **safe** and **reliable** operation of a telecommunications network, or facilities used to supply carriage services.
 - The **economically efficient** operation of a carriage service, a telecommunications network or a facility.
- Different **technical solutions** evaluated with respect to both their technical merits and **cost** →

Call Forwarding (Facility Re-direct)



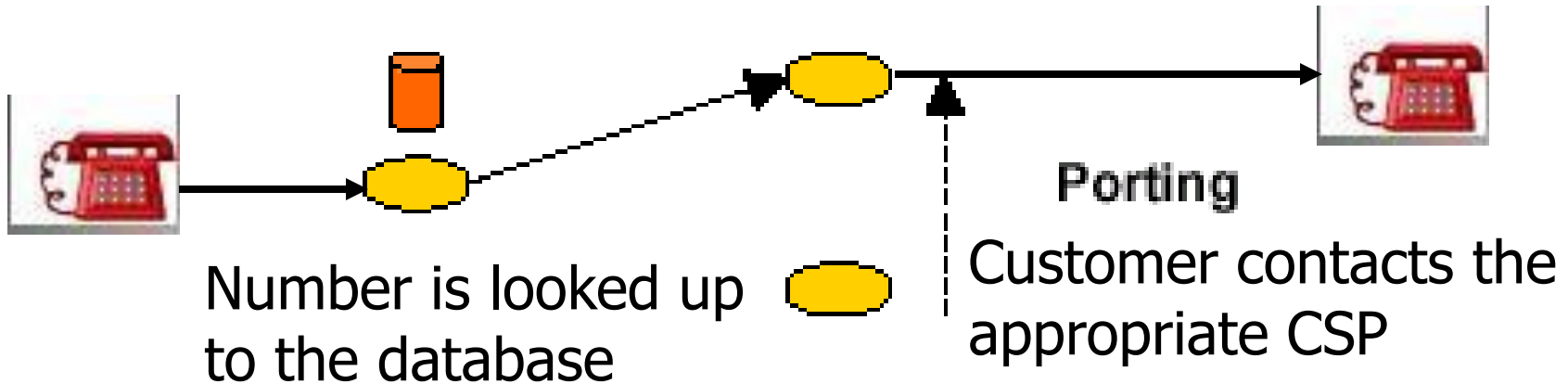
- Relatively **low** system **set-up** costs as it uses the existing network infrastructure.
- Calls to ported numbers create **additional** loop for the duration of the call
- ➔ Requires additional switch processing, switching capacity and transmission capacity for each call to a ported number

Call Drop-Back



- The donor CSP's destination local exchange takes **no** further **part** in the **call**

Intelligent Network (IN) Solutions



- IN solutions involve **high** system **set-up** costs: Costs of software, network alterations and establishing DBs and query points in the network are usually quite high.
- IN solution routes calls to ported numbers using **less** network elements → **lower** call **conveyance** costs

Best LNP Provision Method?

- Identifying the most **cost efficient** method of providing LNP is difficult and **depends** on a number of factors:
 - Number of calls to ported numbers, the number of competing CSPs, technology of the donor CSP's network
 - If the percentage of ported calls is **high** enough, then it becomes more cost efficient to use an **IN** solution.
 - If this percentage is **low**, then **call forwarding** is more cost efficient

Role of the Regulator

- To set **principles** and let the **market decide**:
 - To create **incentives** for CSPs to select efficient solutions to provide LNP.
For example:
 - Each CSP is initially responsible for his own costs:
 - ◆ system set-up, call conveyance and customer transfer costs
 - Define **methods** of recovering costs but let the CSPs decide which approach to follow:
 - ◆ Donor CSP recovers costs from their recipient CSP who recover them from their customers
 - If disagreement among CSPs, the regulator **arbitrates** the dispute

Mobile Number Portability

- **Definition:** Mobile number portability allows customers to **switch** from one carriage service provider (CSP) to another CSP while **retaining** their mobile number(s) and receiving **equivalent** service
- The **lack** of MNP would represent an **impediment** to competition by:
 - Locking in customers to particular service providers
 - Making it difficult for new entrants to attract these customers
- Now made possible

Spectrum Allocation

Spectrum Allocation (I)

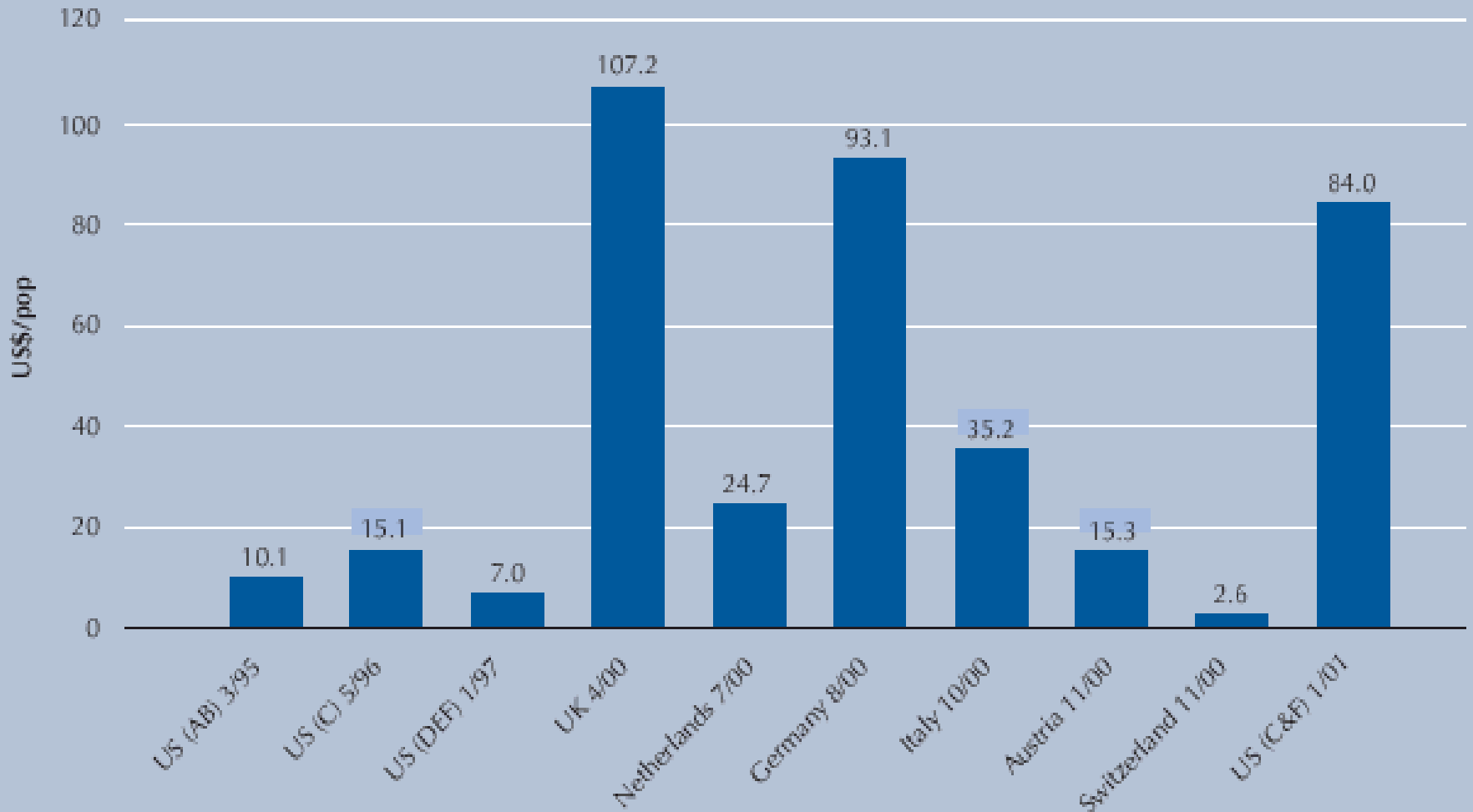
- **Regulator's problem:** Spectrum is a scarce public resource, suitable for **wireless services**.
- Whom should it be **allocated** to and how should it be **priced**?
- Main alternative **objectives**: efficiency for better exploitation and high revenue for the state
 - Beauty contest (Congress committees decide)
 - Not transparent, possibly **inefficient**, **unfair**, **low revenue**
 - Possibly time consuming (lasted 10 years once!)
 - Auctions.
 - **Fast** (few days-months) transparent, **fair**
 - **Market** decides on spectrum allocation and price
 - **Efficiency** and possibly high **revenue** for the state

Spectrum Allocation (II)

- The US introduced an **innovative** auction design
- Applied repeatedly and successfully
- Case study: European **UMTS** auctions.
 - UK auction was run first: Produced higher revenue than other auction and had **impact** on 3G deployment in Europe
 - The right auction design is not at all obvious
 - Germany: successful after long disputes
 - Turkey, France: unsuccessful design
 - Finland: opted for a beauty contest

UMTS Auctions Results

1 Mobile Wireless Price Comparison (2x10 MHz + 5 MHz)



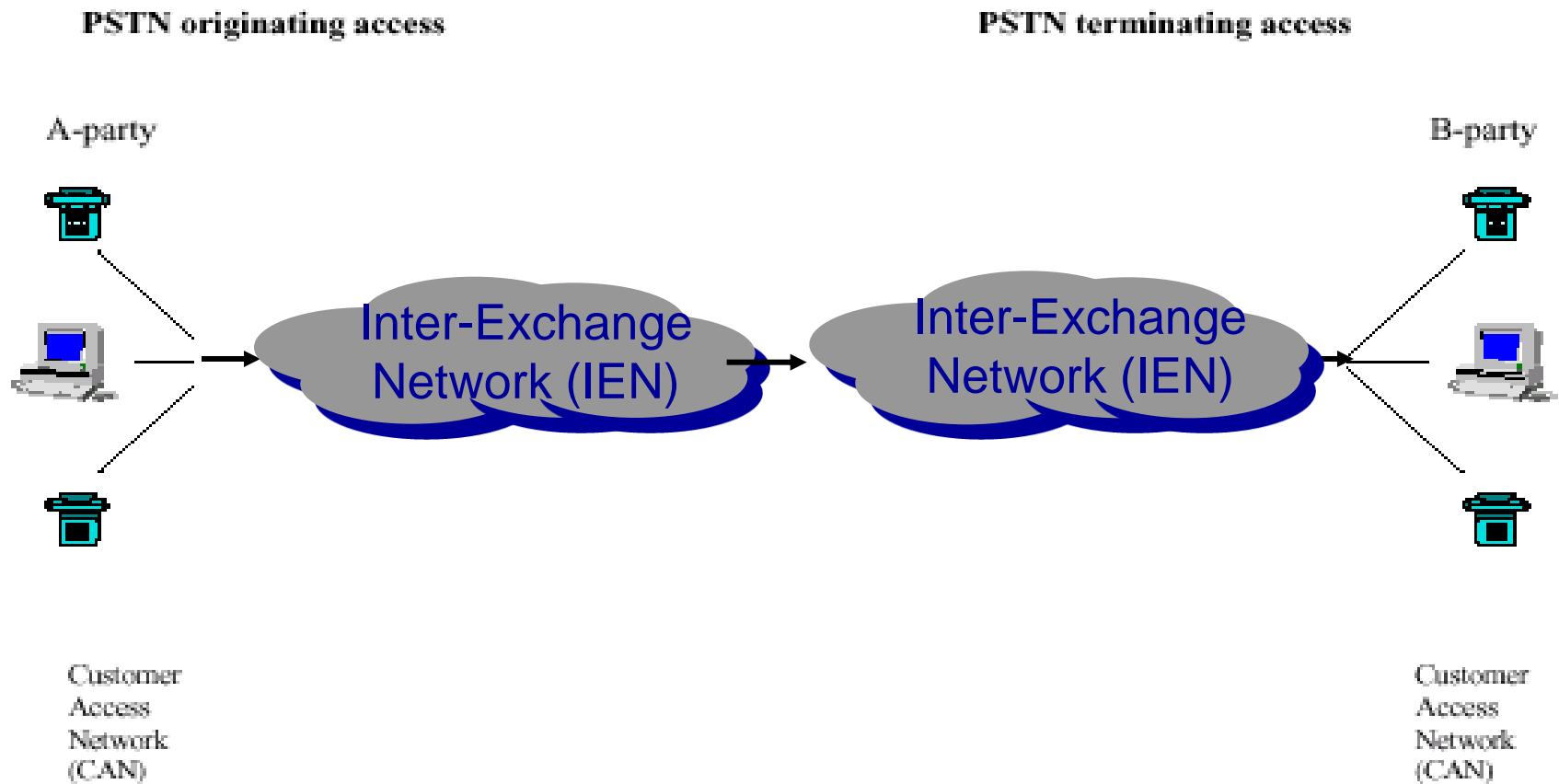
Access Pricing

Access Pricing

- **Access pricing** is an interesting issue for regulation, involving a variety of types of networks and customer “access” such as:
 - Unconditioned Local Loop Services
 - GSM Termination Service
 - Cable TV
 - Wireless access

PSTN Termination Service

- Regulation for termination charges that arise for calls made from one fixed line network to another.



Economic Characteristics of Termination

- **Key economic characteristics** of termination:
 - **Market power over access** to a consumer
 - If a subscriber in network A contacts another in network B, there he has **no** other choice than buying termination service from B
 - **Customer ignorance** regarding the network called
 - Networks have the ability to raise termination charges without facing adverse consumer reaction
- Termination should be regulated

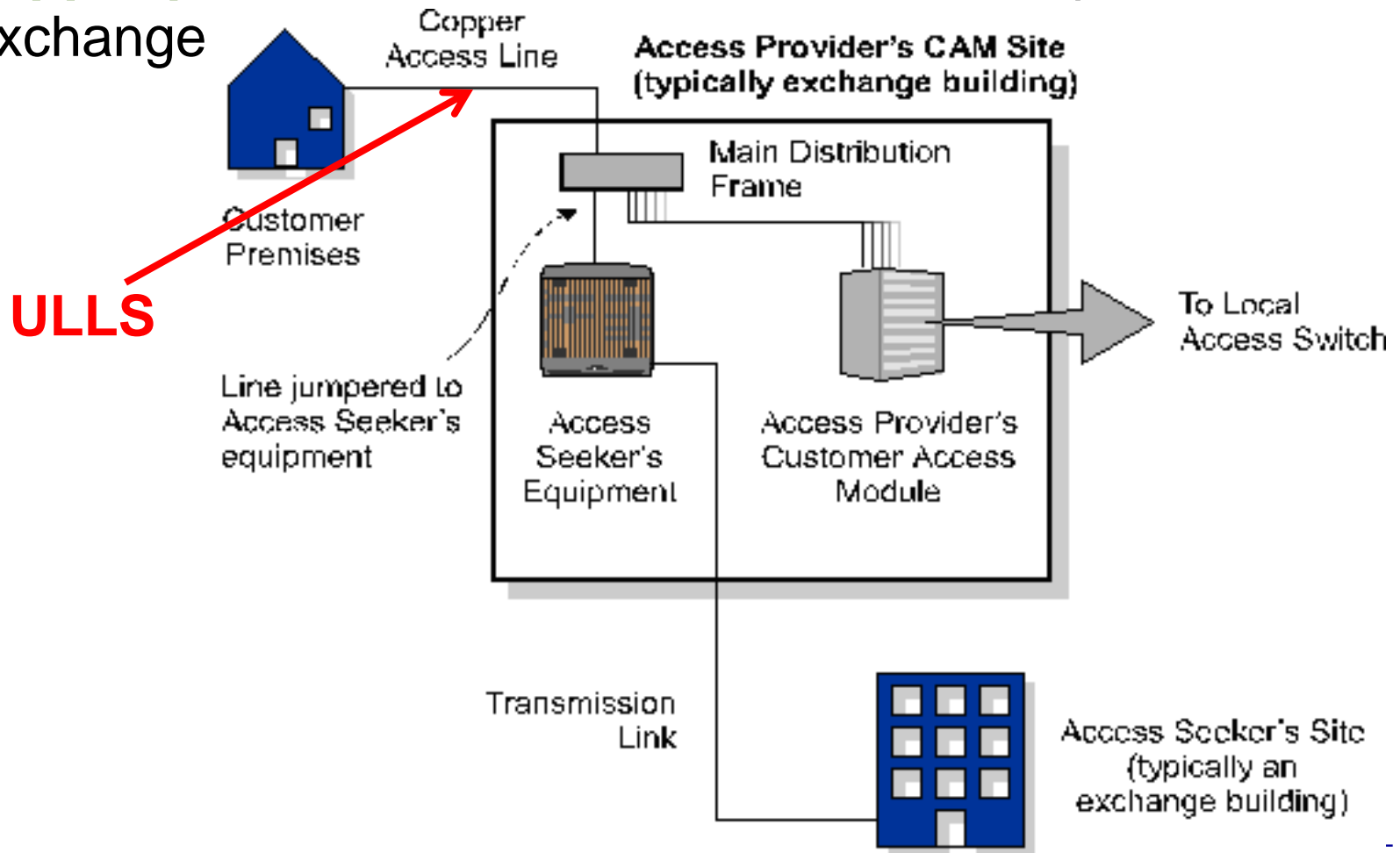
The Case for ULLS Regulation

The following would arise in unregulated markets:

- **Horizontal separation:**
 - One network can raise its termination price and this only affects the **average** call price → wrong incentive for a provider to **inflate** its termination charges as it shares any customer response with its competitors
- **Vertical separation**
 - In a multi-provider environment, the price of a call may extend the price of the regulated monopoly
- **Tariff-mediated network externalities**
 - Dominant carrier may subsidize services and prevent entry of competitors

Unconditioned Local Loop Services (I)

- **ULLS** involves the use of unconditioned cable, primarily **copper pairs**, between end-users and a telephone exchange



Unconditioned Local Loop Services (II)

- Copper pairs infrastructure is a **huge** investment and should be exploited as much as possible
- Enable service providers to connect their own networks to **existing** infrastructure in order to deliver **new** innovative services to end-users more efficiently
- Reduces the need for duplication of communications networks
- Encourages service providers to roll out their own infrastructure where this is efficient
- Regulation should ensure a framework for **high** and **wide** exploitation of copper infrastructure

The Mobile Services Market

- The interaction of four “joint factors”: Provision of mobile calls involves
 - GSM origination services
 - Allow a mobile phone user to generate a call and charge it accordingly.
 - GSM **termination** services
 - Mobile carrier charges other mobile carrier/PSTN.
 - Mobile access (subscription) services
 - Mobile carrier charges subscriber
 - Outgoing call services
 - Include combinations of the above services
- Similar issues for regulator

Conclusions

- Regulation sets the rules and shapes the future
- Impact of telecommunications regulation in the US:
 - “increased productivity and lower costs....
 - More vigorous competition stimulated industry restructuring and innovation and benefited consumers through better service and lower prices.... ”

(URL: *<http://www.regulation.org/keyfacts.html>*)
- Recently, the situation changed.