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***Regulatory accounting, costing methodologies  
and tariff regulation for broadband services:***

***Best practices in the region and  
implications on NGN and NGA***

***ITU/BDT Regional Economic and Financial Forum of  
Telecommunications/ICTs for Latin America and the Caribbean***

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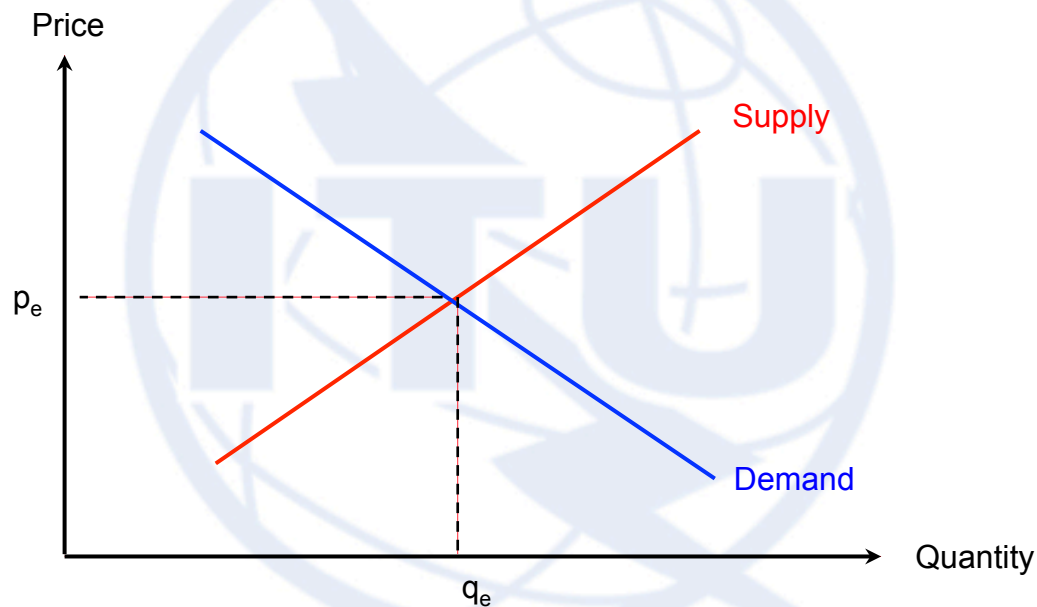
## Scope

- ◆ *The purpose of price regulation*
- ◆ *Main methodologies for price regulation*
  - *Long run incremental cost (LRIC)*
  - *Benchmarking*
  - *Fully distributed costs*
  - *"Retail minus" criterion*
- ◆ *Costs are estimated, prices are set*
- ◆ *Technological convergence*
- ◆ *Next generation networks (NGN) and their accesses (NGA)*
- ◆ *The new inevitable problem: most NGN costs are common*
- ◆ *Regulatory accounting*
- ◆ *Best regional practices*

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## *The purpose of price regulation*

- ◆ In a competitive market, prices are determined by the free interaction of supply and demand:



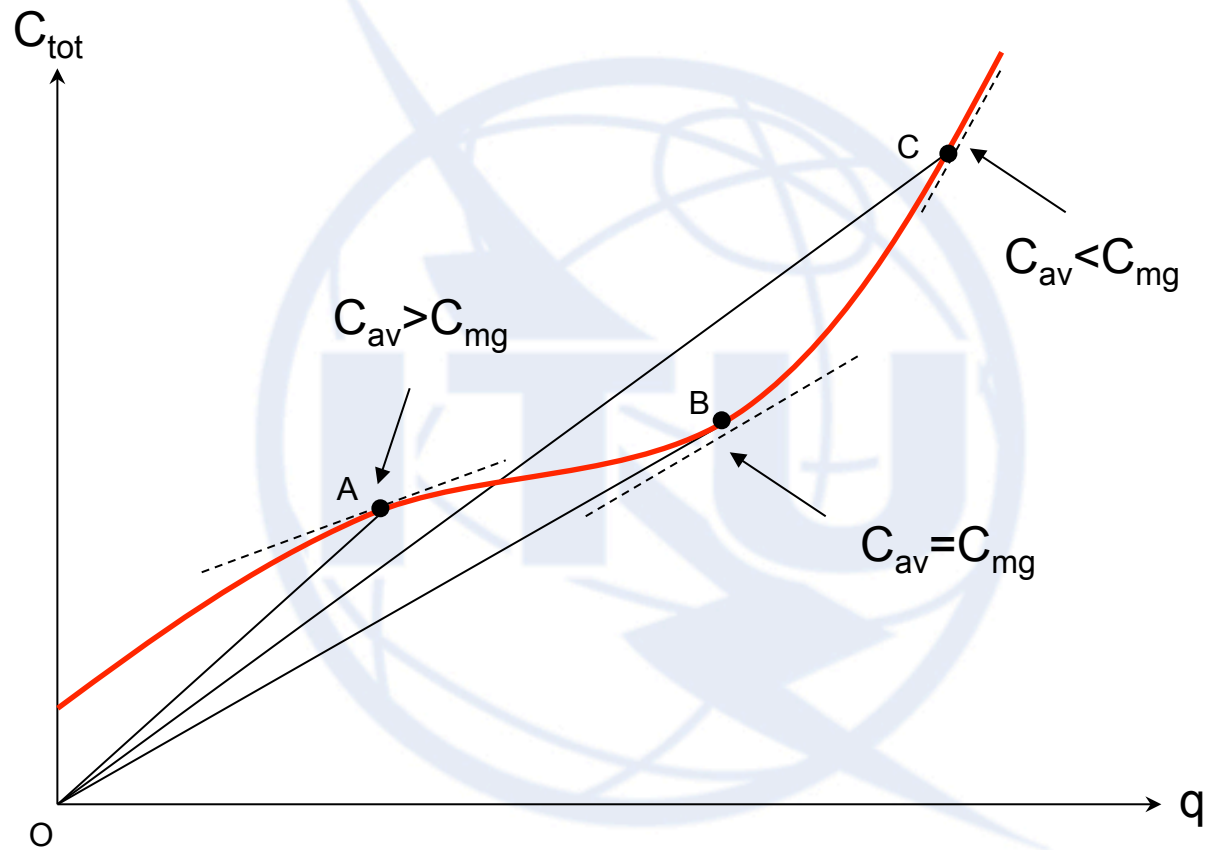
- ◆ In such a case, the offer corresponds to the marginal cost of production.

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## *The purpose of price regulation*

- ◆ Marginal cost is total cost rise when an additional unit is produced.
- ◆ In equilibrium, that cost equals the value consumers assign to the last unit consumed, and an optimum is reached.
- ◆ When there is enough competition, there is nothing to decide in terms of prices, since those are set by the market (they are a fact) and suppliers may not influence them.
- ◆ In such a case, the company decision is limited to enter or not into the market. Nothing else.

## The purpose of price regulation



Total cost, average cost and marginal cost

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## *The purpose of price regulation*

- ◆ However, when there is not enough competition, companies with significant market power (SPM) can affect prices (prices rise and the amount produced falls), vendor companies earn above-normal profits and the economy moves away from the former optimal situation.
- ◆ In addition, if a supplier can influence prices, it will also seek to reduce competition through pricing.
- ◆ A supplier able to influence prices, will also seek to increase its market power and maximise profits.

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## *The purpose of price regulation*

- ◆ In key services provided under conditions of low competition (such as water, electricity or formerly telecommunications), the State attempts to regulate prices, in order to protect the public interest.
- ◆ Not all markets function competitively (pure competitive markets really don't exist; because of that competition authorities are needed).
- ◆ When there is no price regulation in a certain market, the monopoly provider (or SMP provider) will seek to operate where its marginal revenue equals its marginal cost, but the global optimum is not located here.

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## *The purpose of price regulation*

- ◆ Let's remember that the optimum is located where price (average revenue) equals to marginal cost.
- ◆ Therefore, economic theory holds that the global optimum can also be reached if a regulator fixes a price equal to the marginal cost of producing the service.
- ◆ This forced and artificial procedure simulates price levels that would freely prevail in the market, if it was competitive.
- ◆ However, in telecommunications services it is virtually impossible to determine the marginal cost of production.



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## *The purpose of price regulation*

- ◆ Indeed, when a certain telecommunications facility has clearance or slack - which usually happens - the cost rise consequence of producing one additional unit (e.g. one more minute or one extra MB) is virtually null, and impossible to be applied as a price.
- ◆ But in certain conditions there will be no slack; if so, the marginal cost will result excessively high, and also impossible to be applied.
- ◆ A solution is to use an approximation to the marginal cost, which is the long run incremental cost (LRIC).

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## *Long run incremental cost*

- ◆ LRIC methodology determines the unit cost (tariff) as the ratio between the service expansion cost of an efficient company, in an extended future period, and the service increase during that period.
- ◆ LRIC methodology is based on modelling an efficient (theoretical) company, to avoid cost distortions of real companies, and to simulate competitive conditions.
- ◆ An efficient company uses market price supplies.
- ◆ LRIC includes capital costs (profits above investment).
- ◆ LRIC methodology is widely used in electricity, water supply, telecommunications and many other industries.

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## *Long run incremental cost*

- ◆ However, in telecommunications facilities there are economies of scale, and efficient tariffs determined with LRIC methodology will not allow the regulated company to self-finance.
- ◆ The solution is to move a little away from the global optimum identified by LRIC and set definitive tariffs enabling the company to cover its long run total costs.
- ◆ Some authors call it “corrected long run incremental cost” (LRIC+).
- ◆ Other talk about a price mark-up, necessary to cover the company’s long run total cost.

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## *Long run incremental cost*

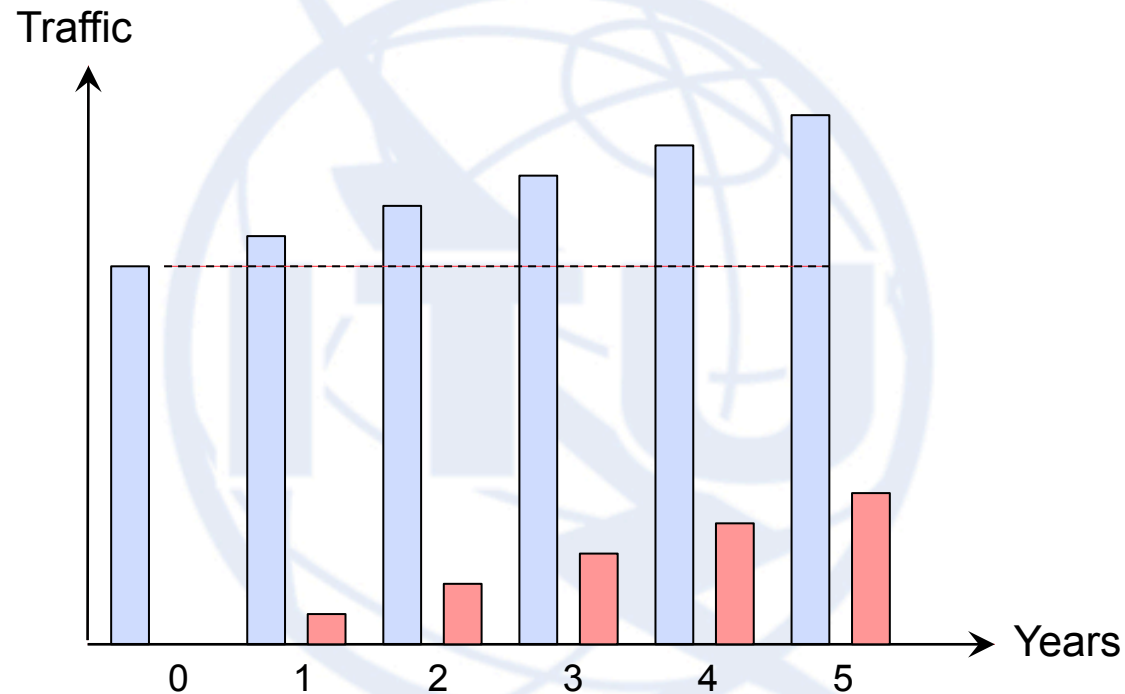
- ◆ LRIC is estimated defining an expansion project.
- ◆ LRIC+ is estimated defining a replace project.

$$\text{unit cost (tariff)}_{\text{LRIC}} = \frac{\text{expansion cost}}{\text{traffic increment}}$$

$$\text{unit cost (tariff)}_{\text{LRIC+}} = \frac{\text{total cost}}{\text{total traffic}}$$

## Long run incremental cost

- ◆ This graph will clear the above:



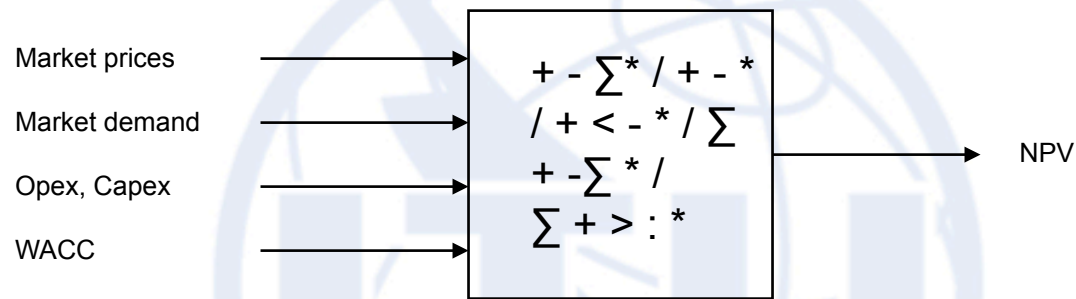
LRIC expansion project satisfies only traffic increment ■

LRIC+ replace project satisfies total traffic ■

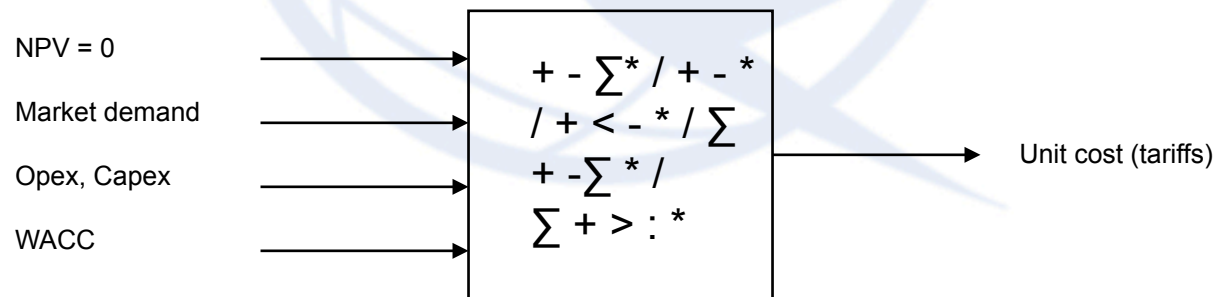
## Long run incremental cost

- ◆ A LRIC calculation is similar to a project evaluation:

### A typical project evaluation:



### A LRIC calculation:



## Long run incremental cost

- ◆ A simple example of both LRIC and LRIC+:

Year	0	1	2	3	4	5	5 year
Total traffic (TB)	4.000	4.400	4.800	5.200	5.600	6.000	30.000
Total cost (MUSD)	80	84	88	92	96	100	540
Incremental traffic (TB)		400	800	1.200	1.600	2.000	6.000
Incremental cost (MUSD)		4	8	12	16	20	60

Unit cost according to LRIC	0,010 USD/MB	<i>(60/6.000)</i>
Unit cost according to LRIC+	0,018 USD/MB	<i>(540/30.000)</i>
5 year revenue with LRIC	300 MUSD	<i>Self-financing is not achieved</i>
5 year revenue with LRIC+	540 MUSD	<i>Self-financing is achieved</i>

*Total cost is estimated with the replace project of an efficient company*

*Incremental cost is estimated with the expansion project of an efficient company*

*1 TB = 1.000.000 MB*

*WACC is assumed as 0*

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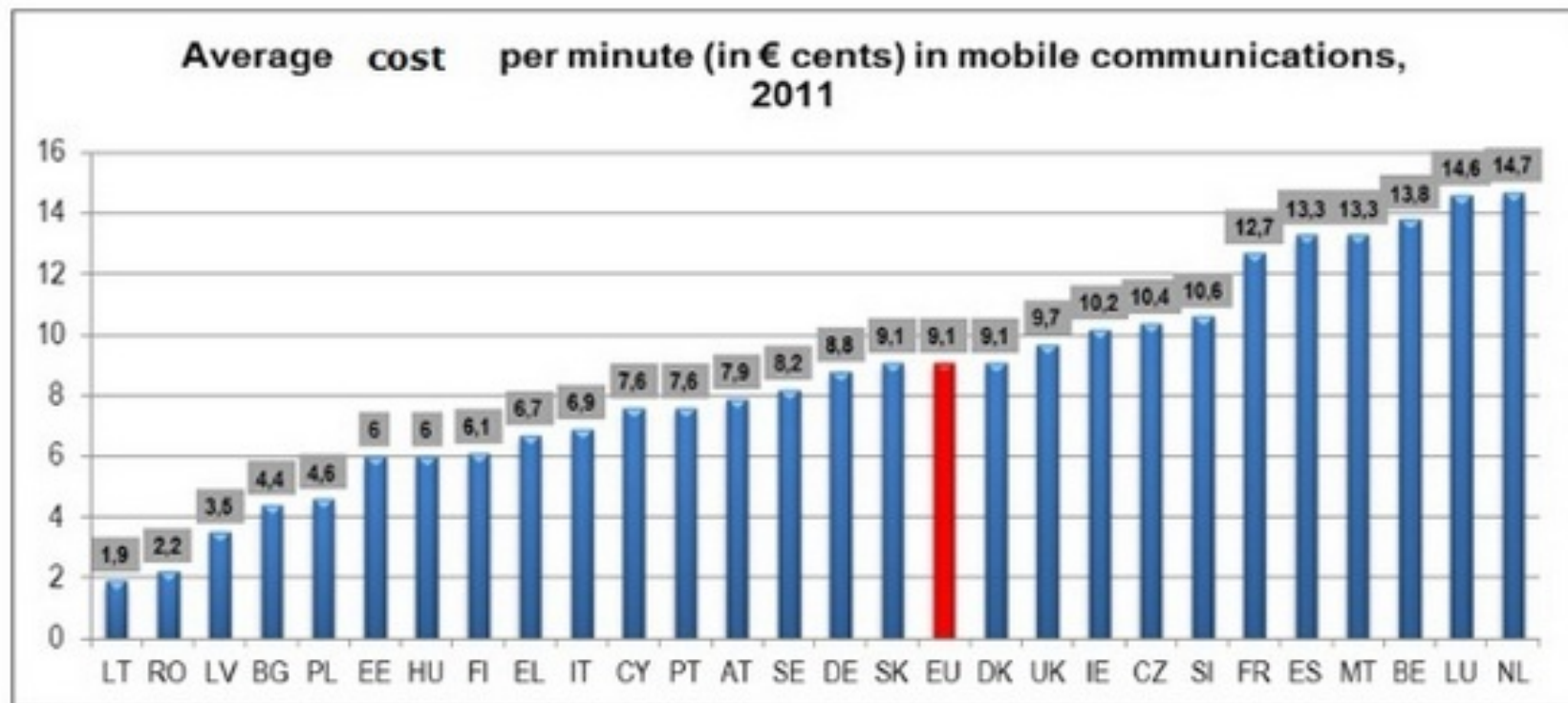
## *Long run incremental cost*

- ◆ Apart from LRIC methodology, there are other internationally accepted methods to estimate costs and regulate prices.
- ◆ Among those methods, the following ones must be mentioned:
  - *Benchmarking*
  - *Fully distributed costs, and*
  - *“Retail minus” criterion*



## Benchmarking

- ◆ Benchmarking essentially consists in observing prices in other countries.

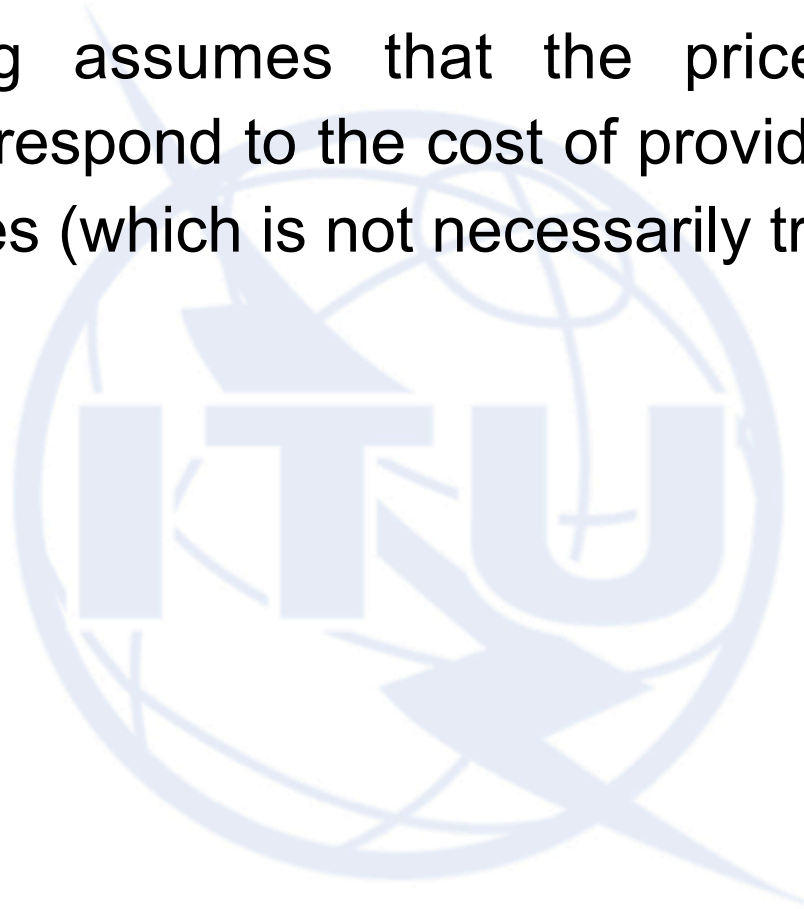


Source: Digital Agenda Scoreboard 2012

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## *Benchmarking*

- ◆ Benchmarking assumes that the prices that we're observing correspond to the cost of providing services in those countries (which is not necessarily true).

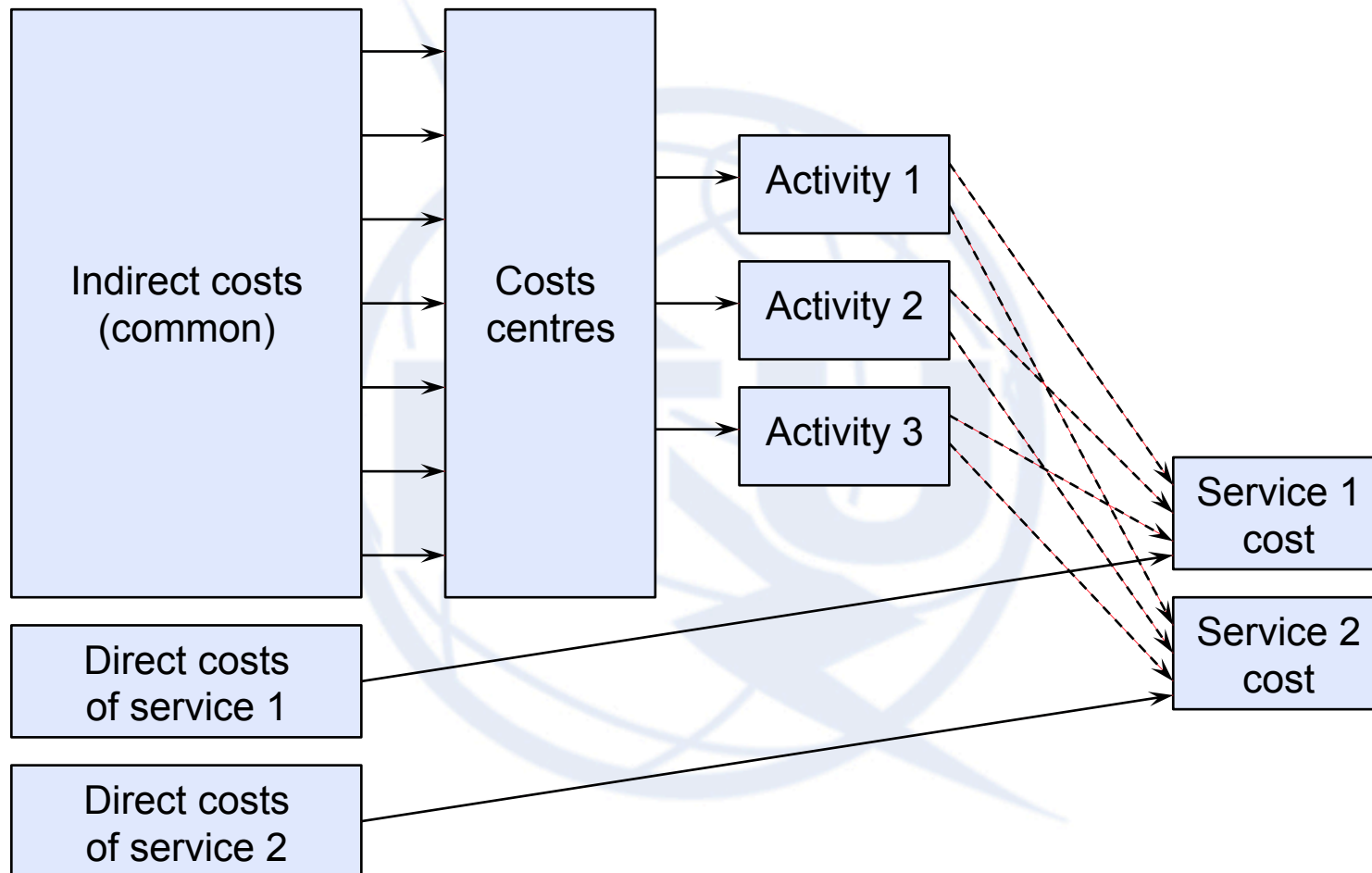


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## *Fully distributed costs*

- ◆ Most investment and operating costs are common in modern telecommunications networks.
- ◆ The fully distributed costs methodology determines the unit cost (tariff) as the sum of direct costs of a service, plus an adequate proportion of the company's indirect costs (common costs).
- ◆ Data for fully distributed costs methodology is usually obtained from a cost accounting system, such as activity based costing (ABC).

## Fully distributed costs



Activity based costing

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## *"Retail minus" criterion*

- ◆ The "retail minus" method determines wholesale prices considering retail prices less a discount - calculated with a technical criteria - to reflect economies achieved by high-volume purchases, and by marketing and distributions costs avoided by the wholesaler.



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## *"Retail minus" criterion*

- ◆ Anyway, discount margins in this criterion are highly variable and depend on each industry.
- ◆ In telecommunications, margins are about 50%, although they also vary according to the type of service.

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## *Purpose of price regulation*

- ◆ Cost methodologies are not only used by regulators. They are also used by operators who want to know their costs to compete effectively, and not lose money in specific services.



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## *Purpose of price regulation*

- ◆ Each cost methodology has pros and cons.
- ◆ LRIC, for example, looks at the future and permits to know the cost impact of forthcoming technologies, but it requires to develop a cost model. LRIC also considers competitive efficiency.
- ◆ Fully distributed costs uses documented (accounting) information but can't foresee the future; it also requires to develop a cost model. Fully distributed costs don't consider efficiency.
- ◆ Benchmarking and “retail minus” are very simple.



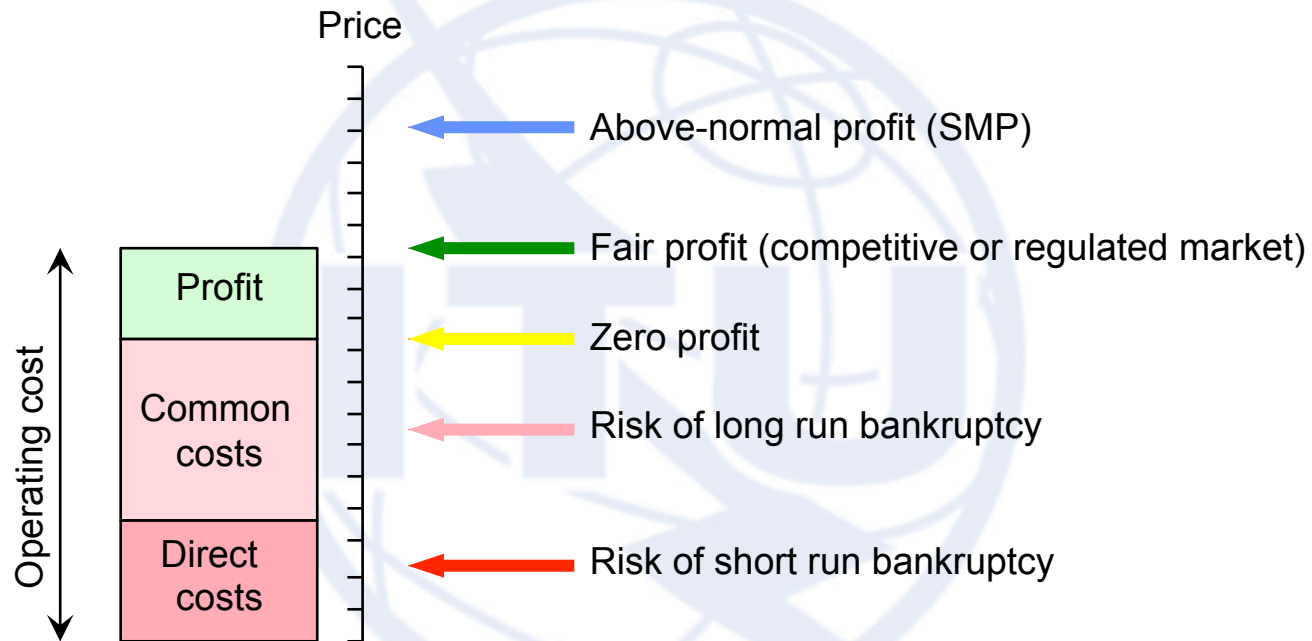
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## *Costs are estimated, prices are set*

- ◆ It is important to keep in mind that costs are estimated (with any of the former methodologies) but prices are set.
- ◆ Prices are set by the market, if we are in a competitive environment.
- ◆ Prices are set by an operator, if it has SMP.
- ◆ Prices are set by the regulator, if law or a competition decision forces to regulate them.

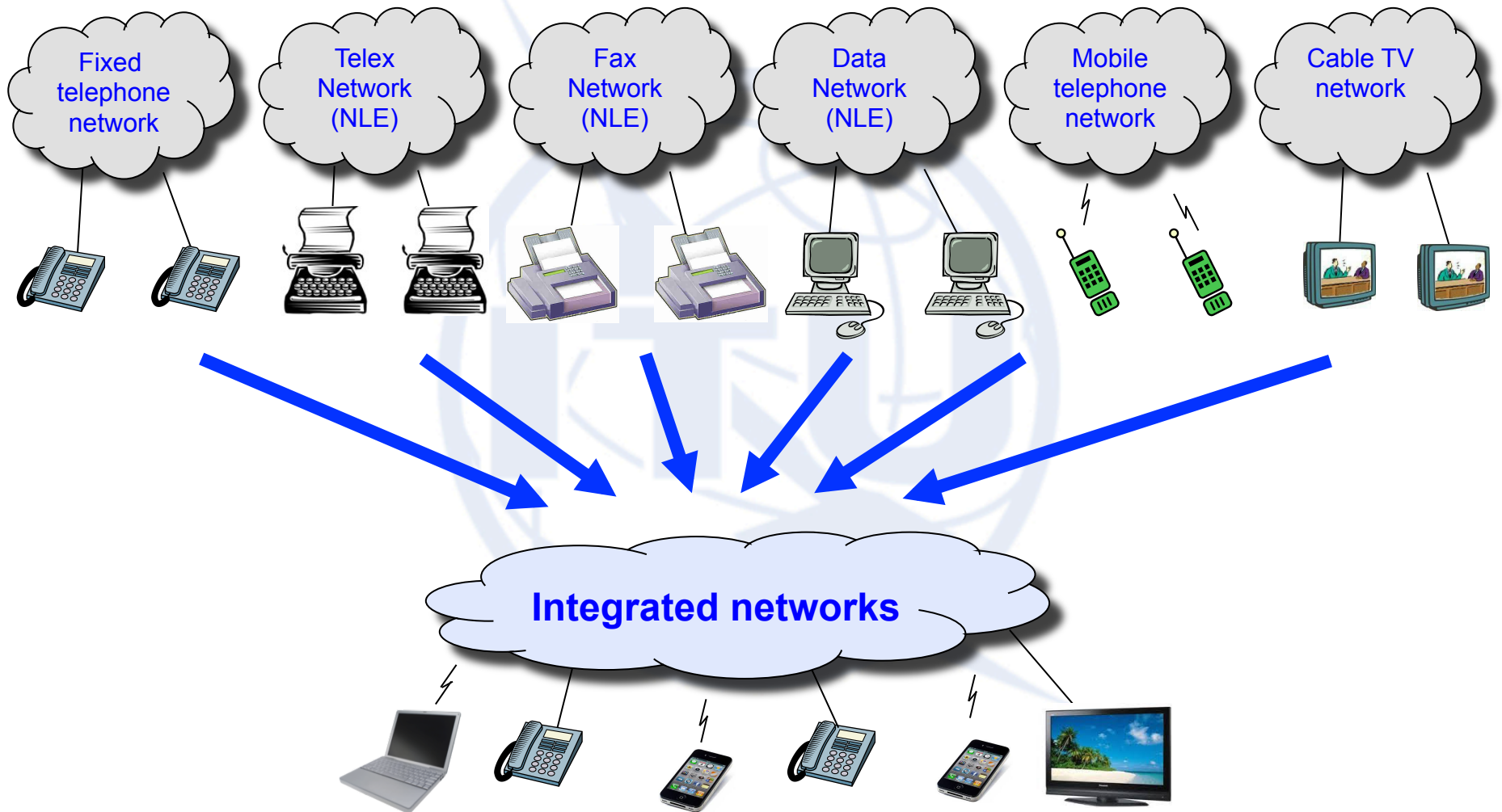
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## Costs are estimated, prices are set



Prices can be above costs, cost oriented or below costs

## Technological convergence



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## *Next Generation Networks and their accesses (NGA)*

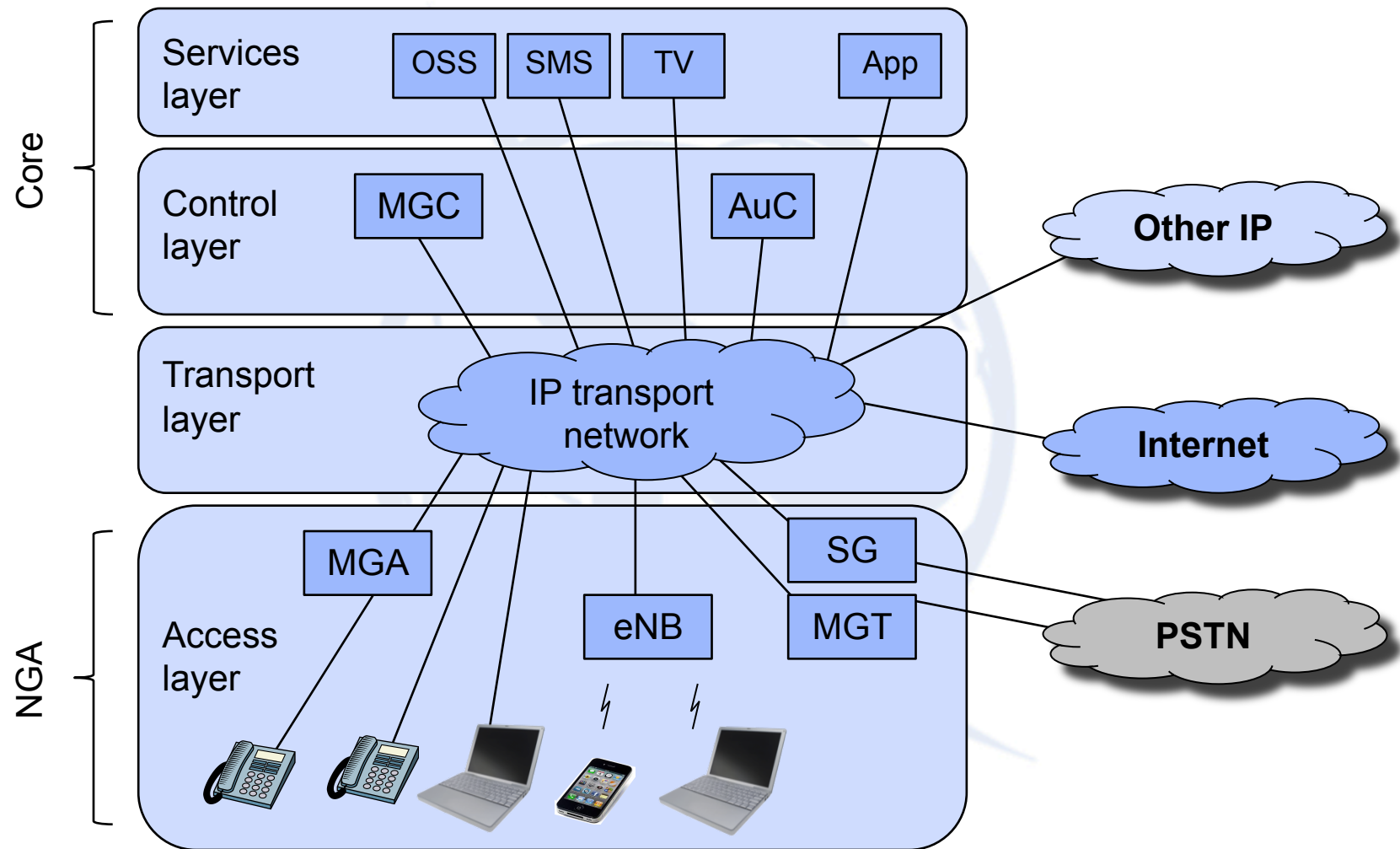
- ◆ Let's remember that in the 1970s, telecommunications technology and computer technology began to converge, allowing advancement towards the digitisation of telecommunications networks.
- ◆ Nowadays, technological convergence and IP switching are giving way to next generation networks (NGN).
- ◆ NGN is a network based on packet transmission, capable of providing integrated services, including traditional phone service: it makes use of quality of service (QoS) mechanisms.

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## *Next Generation Networks and their accesses (NGA)*

- ◆ Today's fixed and mobile networks are gradually evolving into NGN.
- ◆ NGN provides access for users of different operators, at different levels, whose networks are properly interconnected, and that include - according to the case - mobility required by those users.

## Next Generation Networks and their accesses (NGA)



Next generation network (NGN) basic architecture

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## *Next Generation Networks and their accesses (NGA)*

- ◆ The access layer: connects to traditional users (POTS) and IP users - through physical or wireless accesses - and when it corresponds, converts information formats (from circuit to packet, and vice versa).
- ◆ It was formerly known as "the last mile". Now - with broadband capability - it's called Next Generation Access (NGA).
- ◆ The NGA increases the bandwidth of access networks to match NGN's core and transport layers capabilities, using fibre optics, high speed DSL or wireless (4G) technologies.

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## *Next Generation Networks and their accesses (NGA)*

- ◆ Transport layer: allows connectivity for network components - many of which are scattered on streets, or in rural areas - and supports information transfer among them.
- ◆ Control layer: houses MGC software switching (softswitch), processes protocols and routes communications.
- ◆ Control layer also performs users authentication and tracking (HLR).
- ◆ Service layer: provides value added services such as SMS, TV, video and other applications and contents.



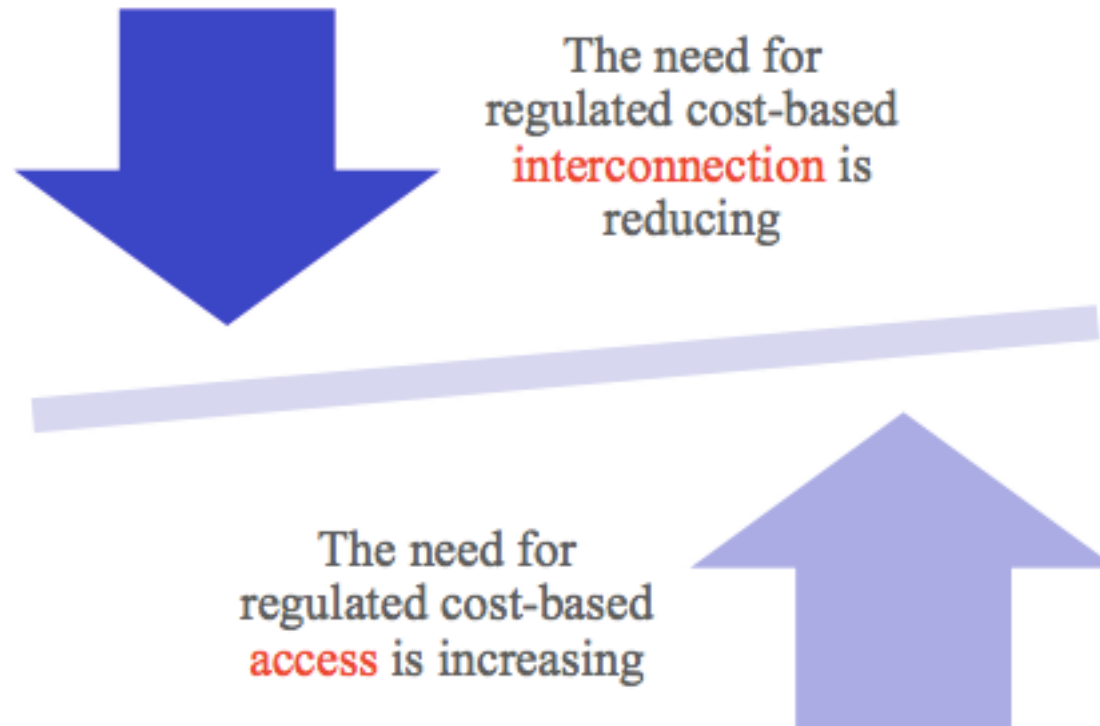
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## *Next Generation Networks and their accesses (NGA)*

- ◆ Some operators may not control (have) all layers.
- ◆ For instance, MVNOs don't have access layers and get them - and pay for them, of course - from other operators (from MNOs).
- ◆ The same may happen with some ISPs, which get the access layer from NGA operators.
- ◆ Some content and application providers may only be in the services layer, and get access to their customers through ISPs.

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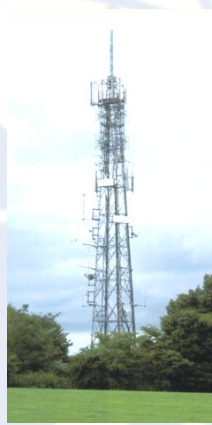
## Next Generation Networks and their accesses (NGA)



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## *Next Generation Networks and their accesses (NGA)*

- ◆ “Access” means entry to a specific active or passive network element:



- ◆ “Access” means too entry to NGA (i.e. access to facilities that provide access to users), or to higher NGN layers.

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*The new inevitable problem: most NGN costs are common*

- ◆ It's no longer desirable to force new artificial network divestitures or separations, to facilitate regulation (as it happened in the 80s with local and long distance separation, in the US and latter somewhat in Chile).
- ◆ Separate accounting - understanding it as separated accounting registers, obtained from divested or separated companies - is no longer a good solution.
- ◆ Accounting separation - understanding it as separating the multiservice company accounting, using ABC costing, for example - is still a good solution.

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*The new inevitable problem: most NGN costs are common*

- ◆ If we divest companies, we would lose many benefits arisen from NGNs.
- ◆ But it generates a new regulatory problem: most NGN's investment and operating costs are common.
- ◆ However, common costs is not the only problem.
- ◆ Common revenue from bundled services is another issue related with NGNs.
- ◆ In triple play (voice, Internet access and TV) with a single or common price, it is very difficult to separate the corresponding revenue.

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## *Regulatory accounting*

- ◆ Regulatory accounting is a specific tool to provide cost information, to assist a regulator in dealing with monopoly or SMP operators.
- ◆ Regulatory accounting is based essentially on the regulated operator's accounting system (financial statements).
- ◆ Regulatory accounting should be made by the operator itself - following regulator's guidelines - and audited by the regulator (regulatory accounting should match with financial statements).

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## *Regulatory accounting*

- ◆ The purpose of regulatory accounting includes:
  - *Price regulation (albeit LRIC could be better for that purpose, because this last one considers efficiency).*
  - *Monitoring real performance against the assumptions underlying LRIC price regulation.*
  - *Detection of certain anti-competitive behaviour.*
  - *Improving transparency in the regulatory process.*

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## *Best regional practices*

- ◆ Many regional countries use LRIC to regulate interconnections tariffs.
- ◆ LRIC is also a good tool to regulate other wholesale services (Internet access, SMS, etc.), especially in a NGN environment.
- ◆ I know for a fact that LRIC has been used in US, Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Dominican Republic, Colombia, Peru, Paraguay, Argentina and Chile. Probably other regional countries use LRIC too.

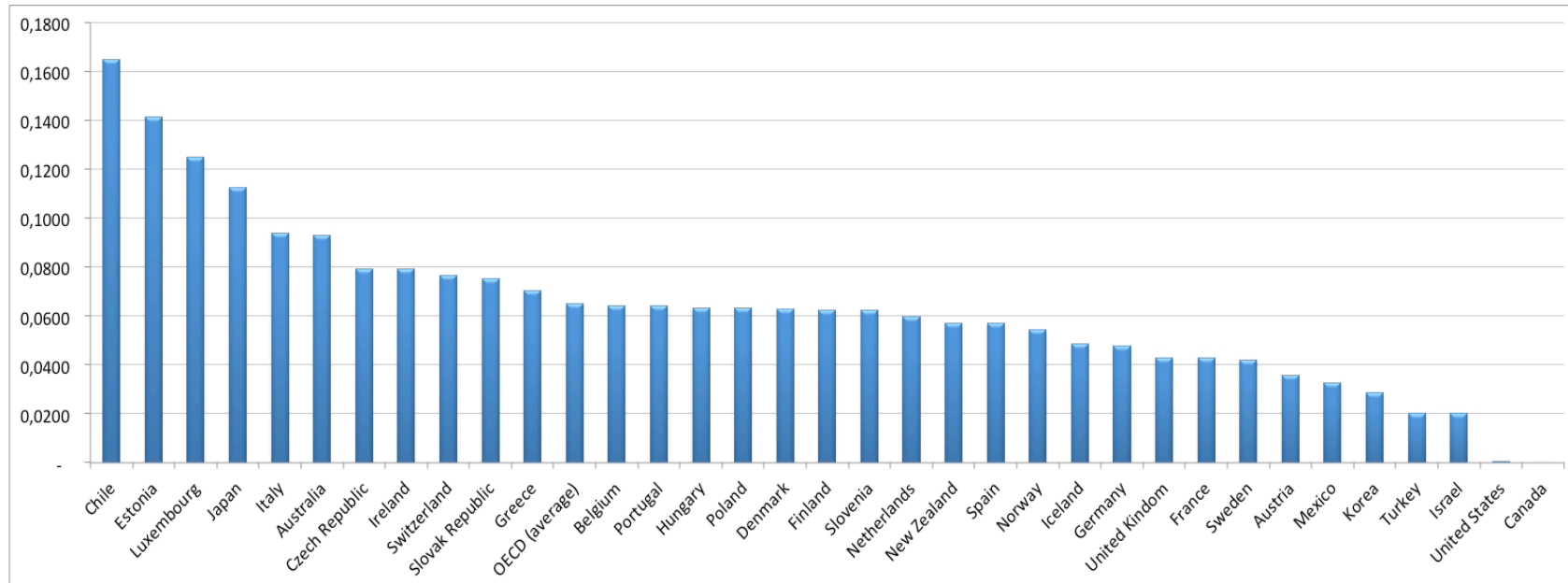


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## *Best regional practices*

- ◆ However, the use of LRIC doesn't ensure that proper results - economic rationale - will be achieved.
- ◆ For instance, in the case of Chile, LRIC has been used to set mobile interconnection rates, but proper results were not achieved in 2003 nor in 2008 (Chile sets interconnection rates each five years).
- ◆ Because of that, Chilean mobile interconnection rate became OECD's highest by 2013:

## Best regional practices



Interconnection rates in OECD countries by 2013 (USD/minute)

- ◆ Chilean mobile interconnection rate was also about 5 times non-regulated tariffs for comparable retail services.

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## *Best regional practices*

- ◆ It didn't happen because of a LRIC methodology failure, but because of an application failure. This is a key lesson from the Chilean experience!
- ◆ Nevertheless, this problem was partially solved in 2013, when Chilean mobile interconnection rate dropped from about .12 USD/minute to about .03 USD/minute.
- ◆ It will continue to drop to reach about .02 USD/minute by 2017.
- ◆ Let's see what is happening about regulatory accounting.
- ◆ Less regional regulators seem to be involved in regulatory accounting.

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## *Best regional practices*

- ◆ I know for a fact that that regulatory accounting has been used in Mexico, El Salvador, Nicaragua, Costa Rica and Dominican Republic. Probably there are other regional countries using it too.
- ◆ Regulatory accounting is not an alternative to LRIC: regulatory accounting is a good complement to LRIC, and any regulator should use both.
- ◆ Most of telecommunications companies provide multiple services, a tendency that is fostered everyday by NGN.
- ◆ The provision of multiple services causes common costs, which day by day are more relevant.

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## *Best regional practices*

- ◆ Consequently, LRIC, fully distributed costs and regulatory accounting require separation methods.
- ◆ Most used separation methods are:
  - *common costs distribution in proportion of assets use (gauged with technical criteria such as minutes, MB, Mbps, MHz, etc., depending on the kind of asset)*
  - *common costs distribution in proportion to direct costs*
  - *common costs distribution in proportion to each service revenue*
  - *allocation of accounting common costs with ABC costing methodology.*

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## *Best regional practices*

- ◆ Simplicity is highly recommended in common costs separation methods.
- ◆ Simplicity is achieved by considering only main types of assets or activities involved in the provision of each service.
- ◆ Simplicity is achieved too by considering only main services provided by the company, and not all services.
- ◆ Excessive details on the above often conduce to extremely complex cost models, which may become inoperative or impossible to understand.

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## *Best regional practices*

- ◆ An additional recommendation is to test cost models results against non-regulated wholesale or retail prices for similar services observed in the market.
- ◆ It is feasible when services whose prices need to be regulated are comparable with services rendered to final users in markets with some degree of competition.
- ◆ For example, a cost model indicates that wholesale price for mobile Internet access should be .015 USD/MB, but in the market you find Internet access retail services for USD 50 per month, permitting 10 GB (if so, the retail implicit price corresponds to .005 USD/MB).

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## *Best regional practices*

- ◆ The above is a clear market signal showing that the cost model is wrong, or that mobile operators are subsidising that specific service, which could be a predatory price.
- ◆ If wholesale prices are to be set, resultant retail prices must pass the economic replicability test.
- ◆ For example, the replicability test asks: can a MVNO compete with the MNO providing wholesale access?
- ◆ As we said previously, common revenue from bundled services is another issue related with NGNs.



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## *Best regional practices*

- ◆ A final recommendation about bundled services.
- ◆ It is not recommendable try to separate that revenue in its components (voice revenue, data revenue or whatever).
- ◆ Its is easier treat the bundled service as a new service.



*Thank you very much*