

ITU Regional Capacity Building Programme on Quadplay: Costing and Pricing of Infrastructure Access for Arab region

Session 2: Price Regulation and Costing Standards

9 July 2018, Rabat Morocco

Introduction

- ▶ Telecom Regulation around the globe has been facing an evolution towards techno-economic based regulation in the last couple of decades.
- ▶ Price regulation is typically based on costing information, requiring that NRAs need costing expertise.
- ▶ This session aims to provide a clear view on price regulation and costing standards commonly used by regulators, as well as the implications of main methodological choices.
- ▶ The presentation is split into two main topics:
 - ❖ Brief introduction to price regulations and modelling needs
 - ❖ Main cost standards and methodological choices

Contents

1. Price regulations and modelling needs

2. Main cost standards and methodological choices

NRAs typically identify operators with significant market power and impose a number of remedies related to costing exercises

Market Analysis typical findings

Fixed Markets

- ▶ Incumbent operators typically control relevant access infrastructure which is difficult to replicate by competitors.
- ▶ There are relevant barriers for new entrants to compete.
- ▶ Alternative operators are not typically found SMP, apart from voice termination services.

Mobile Markets

- ▶ Most countries have managed to get few competing MNOs and (sometimes) MVNOs.
- ▶ Operators are commonly found SMP in the voice termination market.
- ▶ Some countries have identified access related markets with SMPs (e.g. in certain areas).

Common costing related remedies

Wholesale serv., ROs and/or cost based rates

- ▶ Mandating wholesale services
- ▶ Requiring publication of Reference Offers
- ▶ Imposing cost based wholesale rates

Accounting separation / Regulatory Account.

- ▶ Requiring implementation of regulatory accounting or accounting separation system.
- ▶ Periodic (typically yearly) reporting of results.

Retail tariff approval and/or replicability

- ▶ Obligation to report retail tariffs and (sometimes) tariff approval procedures.
- ▶ Requiring of replicable tariffs when using wholesale services.

One of the most typical regulatory remedies is the creation of wholesale services with cost based rates and transparent terms

Common remedies

- ▶ Typically mandated wholesale services:
 - ❖ Fixed Networks:
 - Local Loop Unbundling
 - WLR, Bitstream & VULA
 - Leased Lines / Infrastructure
 - Voice Termination/Origination
 - ❖ Mobile Networks:
 - Voice Termination
 - MVNO & National Roaming
 - Infrastructure
- ▶ Publishing Reference offers may be requested
- ▶ Wholesale rates to be cost based

Cost modelling needs

- ▶ NRAs tend to develop their own bottom-up models to set/approve wholesale charges.
- ▶ Sometimes accounting separation/regulatory accounting is required (especially for fixed incumbents), which can be also used to review wholesale charges or as tether to ensure BU is not too theoretic.
- ▶ When no costing information is available, benchmarking may be used, but it is not the preferable option.

Incumbents and, in some cases, alternative operators may be required to present separated accounts or regulatory accounting

Common remedies

- ▶ Accounting Separation / Regulatory Accounting is typically mandated to ensure non-discrimination.
- ▶ Sometimes this remedy can be used to verify the absence of cross subsidies.
- ▶ Accounting Separation / Regulatory Accounting can be used as a source of information for wholesale tariff setting (previous slide) and/or retail tariff monitoring (next slide).

Cost modelling needs

- ▶ Accounting Separation / Regulatory Accounting is always developed by the operator due to the high complexity and data requirements.
- ▶ Regulators need to ensure results are accurate and aligned with their rules, for which they typically hire external consultants/technical auditors.
- ▶ It is a good practice that the regulator defines beforehand the rules, accounts, criteria, etc. and supervises the implementation (which can take a couple of years).

Retail tariffs are sometimes reviewed by regulators to ensure replicability by alternative operators using wholesale services

Common remedies

- ▶ Pre-launch reporting of retail tariffs and/or promotions.
- ▶ In some countries, tariffs should be approved by the regulators.
- ▶ Other countries review tariffs ex-post and/or only if there are complaints from other operators.
- ▶ Requirement of replicability when using wholesale charges (absence of price squeeze effect).

Cost modelling needs

- ▶ Costing information is required to ensure that there is no anticompetitive behaviour (e.g. price/margin squeeze, predatory pricing).
- ▶ Network costing information can be obtained either from bottom-up models or from accounting separation / regulatory accounting systems.
- ▶ Retail costs are not suitable to be obtained with bottom-up approach.
- ▶ Stand Alone Costs can be used to avoid excessive pricing, although it is not commonly assessed by NRAs.

Contents

1. Price regulations and modelling needs

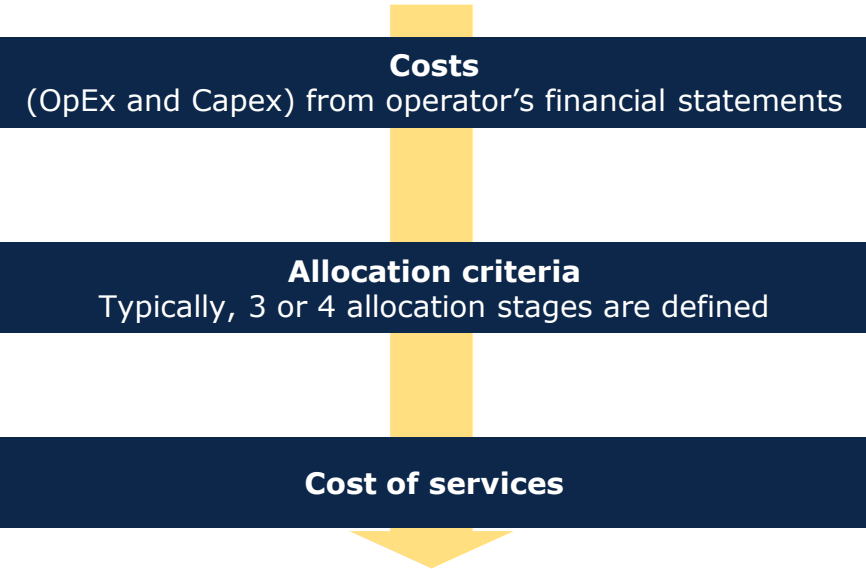
2. Main cost standards and methodological choices

There are two alternative approaches to calculate service provisioning costs: Top-Down and Bottom-Up

Top-down

The main input of these models is the financial statements of an operator. Based on a number of steps and allocation criteria, these costs are distributed to the retail and wholesale services.

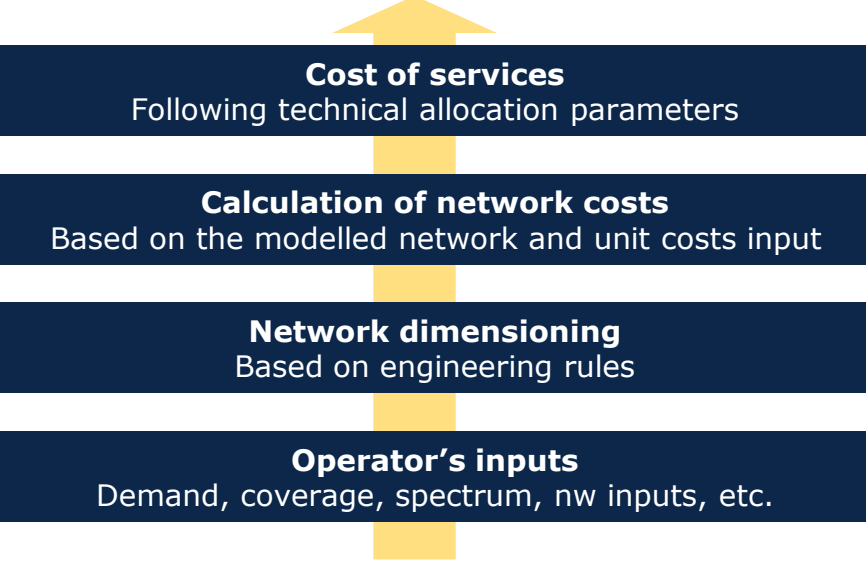
Illustrative Top-Down workflow



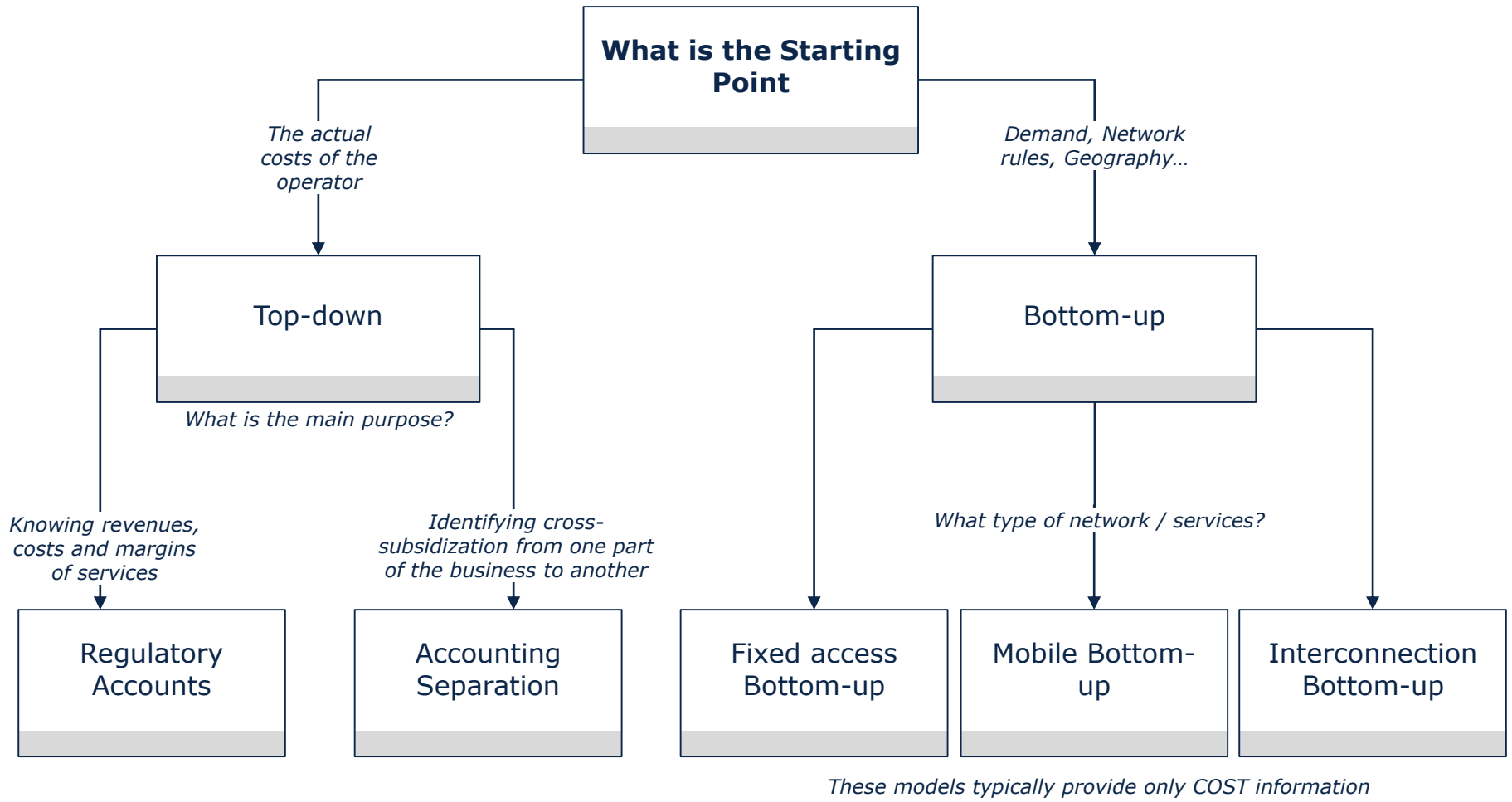
Bottom-Up

Based on a set of inputs (e.g. demand, coverage, etc.) and engineering rules, the network is modelled from scratch, calculating its costs which are then allocated to the services through technical criteria.

Illustrative Bottom-up workflow



A quick taxonomy of regulatory accounting and cost models



Engineers vs. Accountants

Bottom-up Models

"These are not realistic and can not reproduce the complexity of market processes"

- ▶ An engineer model that calculates costs according to techno-economics parameters, traffic/demand information and others hypothesis.
 - ❖ This methodology is being spread among the NRAs.
 - ❖ It is based in current costs and future traffic/demand.
 - ❖ It can include hypothesis of efficiency (e.g. of network)
 - ❖ It can underestimate costs

Top-Down Models

"The operators are historically inefficient"

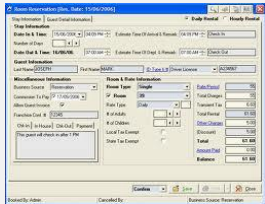
- ▶ Costs are derived directly from financial accounts of the operator, prepared under totally distributed standard costs or using the incremental approach
 - ❖ It can include hypothesis of efficiency in terms of current cost accounting (CCA)
 - ❖ It can overvalue costs

Sometimes, a mix of both approaches is used, in a model known as "hybrid"

The top-down models calculate the services costs (and revenues) based on the financial accounts and a set of allocation rules

The top-down approach provides a static representation of the actual costs and margins of the operator for a given historic period of time

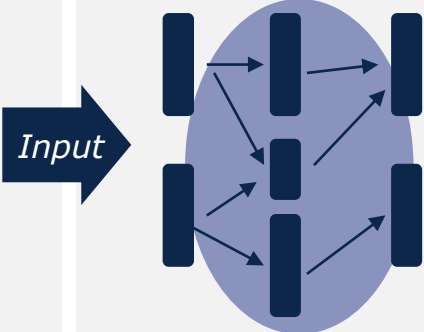
Financial Accounts



- ▶ Costs and Revenues of the Operator
 - ❖ P&L
 - ❖ Balance

Top-down system

Several Allocation Stages



Input

Output

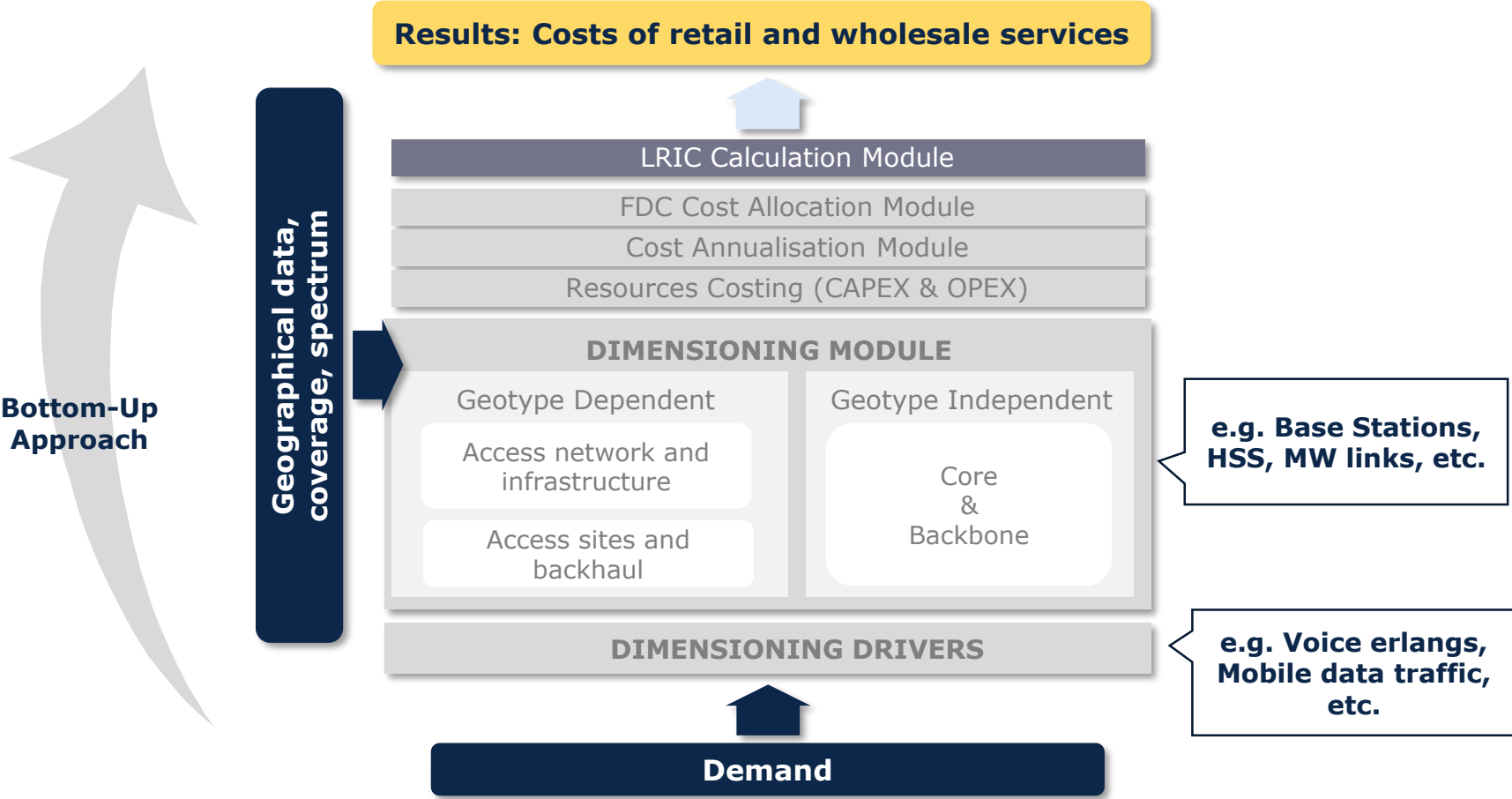
- ▶ Rules for allocation of costs & revenues
- ▶ Allocation to business units and services
- ▶ Activity Based Costing like

Results

TRANSFER CHARGE STATEMENTS									
	QUANTITY DATA				PRICE DATA				TRANSFER CHARGE
	Number of Service Units Sold/Provided by Receiving Market				Average Unit Price applied in the calculation of transfer charges (\$AR / Unit)				
	Market 1	Market 2	Market N	TOTAL	Market 1	Market 2	Market N	TOTAL	
ORIGINATING MARKET AND SERVICE									
Market 1									
Market 2									
Market N									
TOTAL									
MARKET 2									
Service 1									
Service 2									
Service N									
MARKET N									
Service 1									
Service 2									
Service N									
TOTAL									

- ▶ Reports include the revenues, costs and margins per service and in some cases "separated accounts"

A Bottom-Up model takes operators' data as an input, and performs the network dimensioning and cost allocation



Pros and cons of Top-Down vs Bottom-Up cost models

	Pros	Cons	Usages
Top-Down	<ul style="list-style-type: none"> ✓ Ensure reconciliation with operator's financial statements ✓ Includes both costs and revenues per service 	<ul style="list-style-type: none"> ✗ Based on past periods of time. Doesn't allow forecasting. ✗ Need to be implemented by operators. ✗ Doesn't allow the modelisation of a theoretically efficient operator 	<ul style="list-style-type: none"> ▶ Knowing revenues, costs and margins of services ▶ Identifying anticompetitive practices (price squeeze, cross-subsidies)
Bottom-Up	<ul style="list-style-type: none"> ✓ Provides results for future years ✓ Allows sensitivity analyses ✓ Can calculate costs for theoretical operators ✓ Can be developed with little information 	<ul style="list-style-type: none"> ✗ Do not include revenues data. 	<ul style="list-style-type: none"> ▶ Regulate wholesale charges

The development of a costing model raises several methodological questions

Methodological Questions

Inputs (Demand etc.)

- ▶ *What operator should be considered for the inputs?*
- ▶ *What types of costs should be included?*
- ▶ *How many years of data should be considered?*

Network Dimensioning (Bottom-up only)

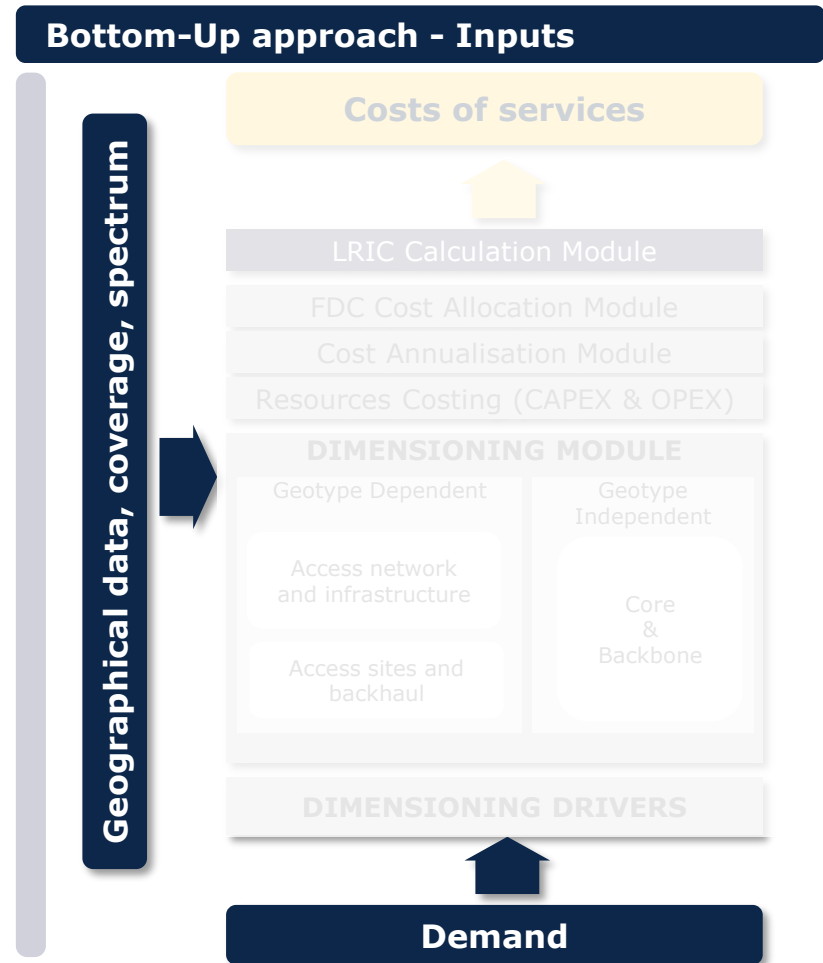
- ▶ *What technologies should be considered?*
- ▶ *How should the networks be dimensioned?*
- ▶ *Should we consider the network costs as of today or when they were installed?*

Cost Allocation

- ▶ *What cost standard should be used?*
- ▶ *How should investments be recovered over time?*
- ▶ *How should costs be allocated?*

Model Inputs. Cost models require a wide range of inputs

- ▶ Top-down models require financials and allocation drivers (which can be more or less complex).
- ▶ Bottom-Up models dimension the network of the operator based on a number of predefined inputs, such as:
 - ❖ Demand of the services to be provided
 - ❖ Coverage to be provided with each of the access networks
 - ❖ Geographical information, characterising the country in terms of population, orography...
 - ❖ Traffic statistics that characterise the network, such as the percentage of traffic in the busy hour or the average duration of a call.

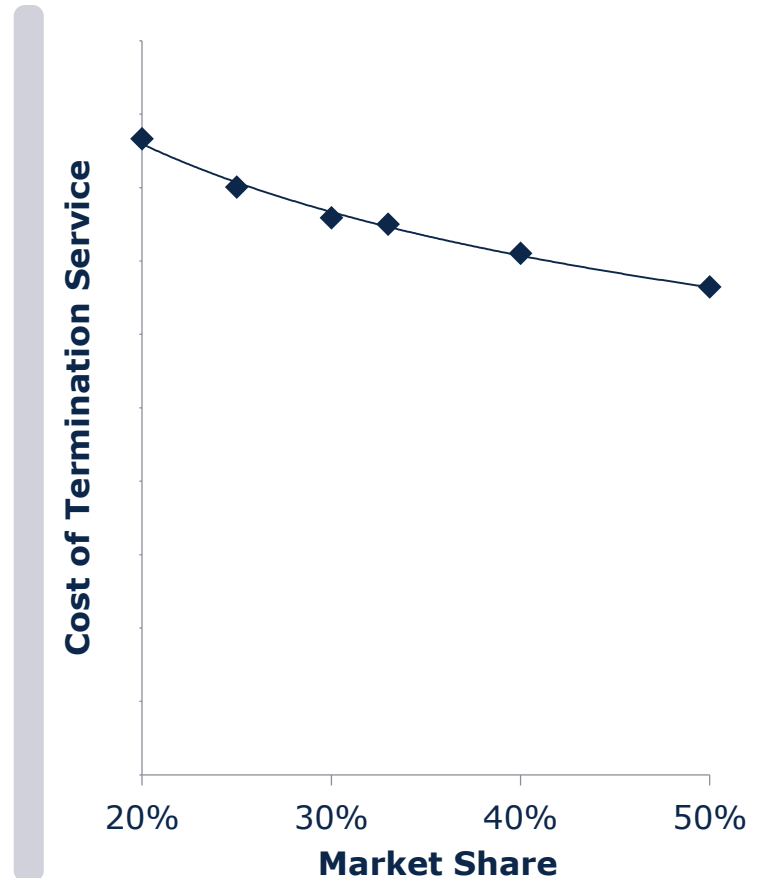


Reference Operator.

The selection of the reference operator has a direct impact on the unit costs to be obtained in the model

- ▶ Top-down models are hardly linked to the operator.
- ▶ Bottom-Up cost models calculate costs of providing telecom services incurred by a reference operator.
- ▶ The definition of such reference operator involves key model inputs, such as market share. The reference operator can be defined in different ways, however there are two main alternatives:
 - ❖ Existing op., modelling a real-world operator.
 - ❖ Hypothetical op., that does not exactly represent one given operator.
- ▶ The reference operator needs to be defined separately for fixed and mobile and fixed networks.

Illustrative example of effect of MS



Cost elements to be considered. The costs to be included in a cost model need to be carefully assessed

- ▶ The P&L accounts of an operator include different cost categories, such as:
 - ❖ Network related costs (including OpEx and CapEx)
 - ❖ General and Administrative (G&A) expenses
 - ❖ Retail costs
 - ❖ Finance charges
 - ❖ Taxes

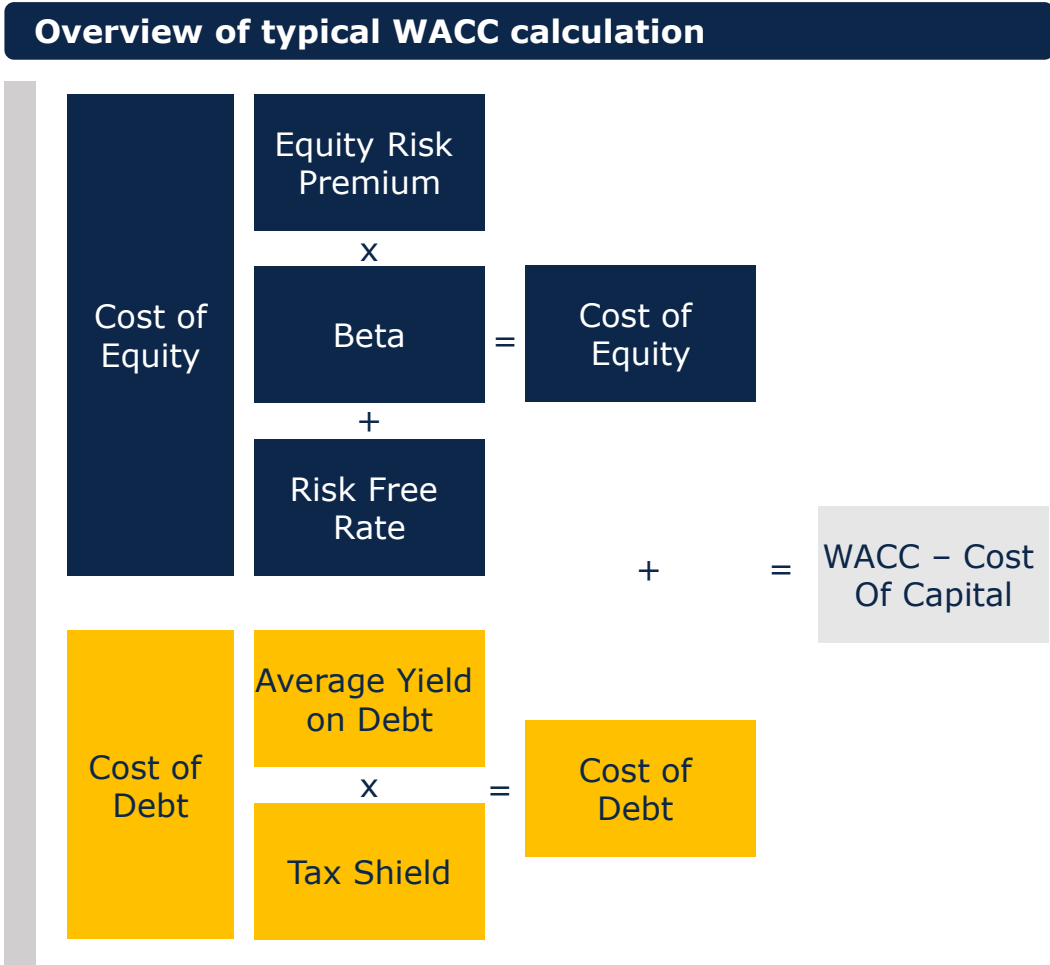
- ▶ While operators do incur in these costs, it is not obvious that all of them need to be included in cost models. For instance, in the case of Bottom-up models, only those that are relevant for the provision of wholesale services are typically represented.
 - ❖ Otherwise, operators would be compensated for a cost that is not relevant to provide their regulated wholesale services.

Cost elements to be considered. Network costs and G&A are always included in cost models. Other cost categories may be excluded.

- ▶ One of the main objectives of cost models is to analyse costs incurred by operators when providing telecom services. A large portion of these costs are network costs, in the form of Capital Expenditures (CapEx) and Operational Expenditures (OpEx). In addition, associated to the operation and provision of the services, structural costs (overheads) such as G&A are also relevant.
- ▶ Beyond that, while financial expenses should be excluded, a reasonable return on investment represented by the Weighted Average Cost of Capital (WACC) needs to be considered as well. This represents the operator's weighted cost of equity and debt.
- ▶ Other cost categories such as taxes or retail costs are typically be excluded from the bottom-up models, given that these costs are not directly attributable to the operation of the network and the provision of wholesale services.
- ▶ However, retail costs are typically included in top-down models since conciliation with financial statements is commonly pursued.

Cost elements to be considered. A reasonable return on investment is commonly considered on top of costs when setting wholesale charges

- ▶ A reasonable rate of return on the operators' investments is typically considered when setting wholesale regulated charges (and, therefore, when implementing cost models).
- ▶ This cost is typically considered through the Weighted Average Cost of Capital ('WACC'). WACC refers to the average rate of return a company expects to compensate all its different investors, weighting in each financing source in the company's capital structure (equity and debt).
- ▶ WACC is typically calculated within NRAs through a separate process, to be used in different internal projects.

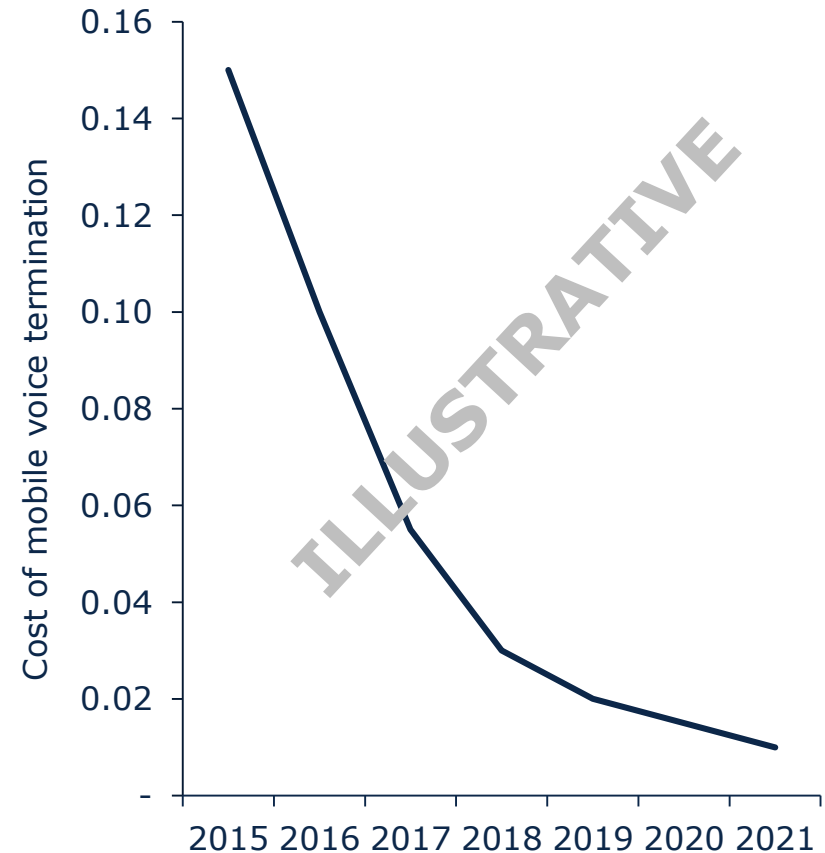


Time period to be modelled.

Bottom-up models typically follow a dynamic approach which allows the calculation of cost forecasts

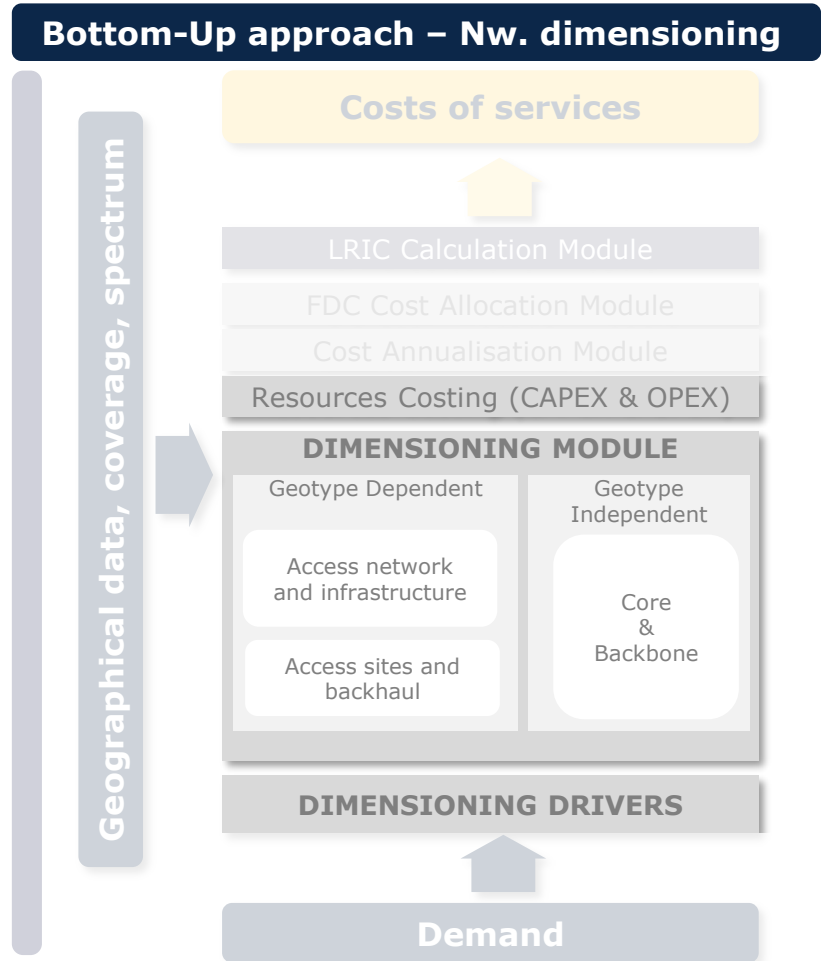
- ▶ Top-down models are static by definition.
- ▶ Bottom-Up models are capable of producing results for several years (historical and future).
- ▶ A timeframe needs to be predefined considering that:
 - ❖ It is necessary to have past years to assess the reasonability of the results produced.
 - ❖ A limited number of forecasted years can be included (otherwise, forecasts are likely not to make sense).
 - ❖ The more number of years included, the less manageable the model will become
- ▶ Typically, the timeframe selected for Bottom-Up models uses to lay around 10 years.

Illustrative representation of termination costs



Network dimensioning is an important step in bottom-up models to determine network elements required to satisfy demand

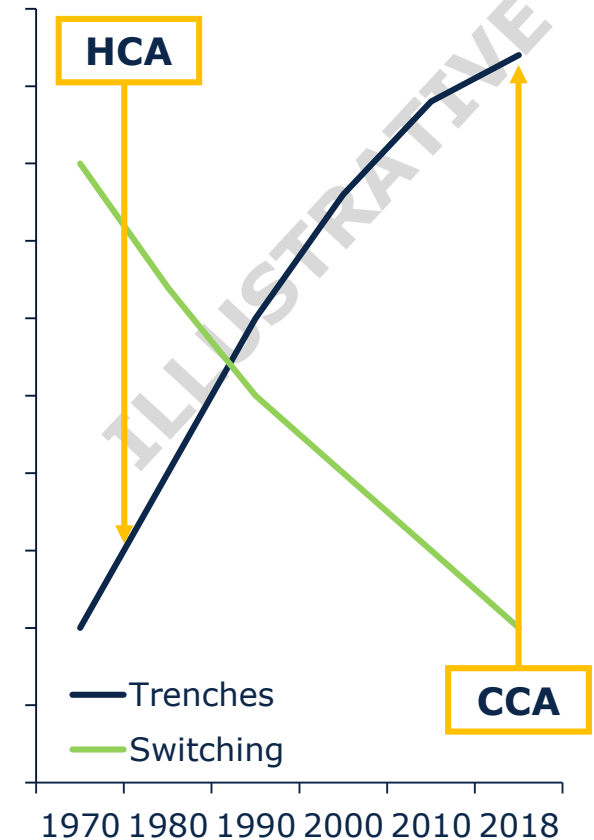
- ▶ Service providers have a catalogue of services that are provided through their networks (e.g. voice, broadband, etc.). For each of these services, there is a determined demand that the network has to serve with a given quality of service.
- ▶ In order to provide these services, the networks have to include a number of different network elements, such as mobile access sites, transmission links, core elements, etc.
- ▶ From the demand of the services and other defined inputs, Bottom-Up cost models are able to determine the network elements required to provide the services.
- ▶ These calculations rely on specific engineering rules, tailored for each network element included in the cost model.



Asset valuation. Two alternatives can be adopted to value assets: Historical Costs Accounting (HCA) and Current Costs Accounting (CCA)

- ▶ There are two ways in cost models to consider assets' prices:
 - Historical Costs Accounting (HCA)** - Assets are valued at their original purchasing price – and **Current Costs Accounting (CCA)** - Assets are valued at their current cost (current market price) -.
- ▶ The selection of one mechanism or the other is typically based on the regulatory signal the NRA wants to send to the market:
 - ❖ HCA is typically used when the regulator wants to foster competition based on the network of the incumbent operator at the expense of additional relevant investments.
 - ❖ CCA is typically used when the regulator wants to promote investment (and competition) in the country.
- ▶ CCA is commonly adopted in the development of cost models (especially bottom-up). Copper network assets are sometimes valued at HCA.

Evolution of assets' costs

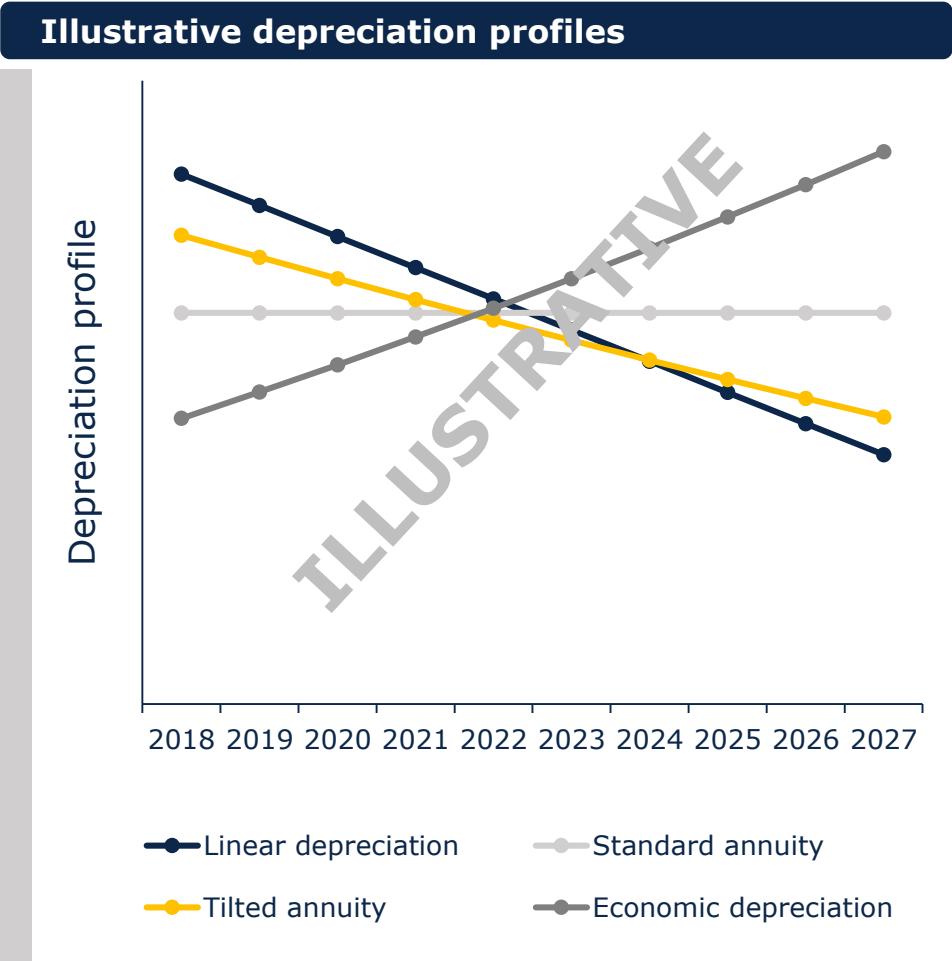


Depreciation of capital costs. Depreciation is used to annualise the costs associated to the investment

- ▶ Investments made by firms involve an up-front payment for assets that are going to produce outputs for more than one year. These investments also generate a cost of capital, defined as the expected return the company shall receive from the investment it is committing to.
- ▶ Therefore, it is necessary to compute these factors in the cost model. To do so, a selection needs to be made with regards to how these costs shall be recovered by the operator over the lifetime of the relevant assets.
- ▶ As the telecom sector is capital intensive, the methodology selected for depreciation plays a relevant role in determining the costs at service level.

Depreciation of capital costs. Each depreciation methodology has a different depreciation profile

- ▶ There are four main different annualization methods:
 - ❖ **Straight line depreciation:** It spreads the original cost of an asset evenly across its useful life. WACC has to be considered separately based on net book value.
 - ❖ **Standard annuity:** Which provides a constant depreciation charge considering the WACC.
 - ❖ **Tilted annuity:** Which is similar to the standard annuity but also considers the price evolution of the assets.
 - ❖ **Economic depreciation:** Which is defined as the period-by-period change in the market value of an asset.



Cost Allocation: Costing models can produce results under 4 main standards

FDC

Fully Distributed Costs (FDC): All the costs are allocated to the services based on certain allocation rules (drivers).

Typically used in Regulatory Accounting / Accounting Separation.

(Pure) LRIC

Long Run Incremental Costs (LRIC): Only the costs associated to variations of demand are allocated to the services. Under this standard, common costs are not allocated to services.

Used in EU for voice termination.

LRIC+

LRIC+: common costs (licenses, coverage, structure, etc.) are added on top of LRIC, based on certain criteria (e.g. mark-up).

Commonly used in Bottom Up models.

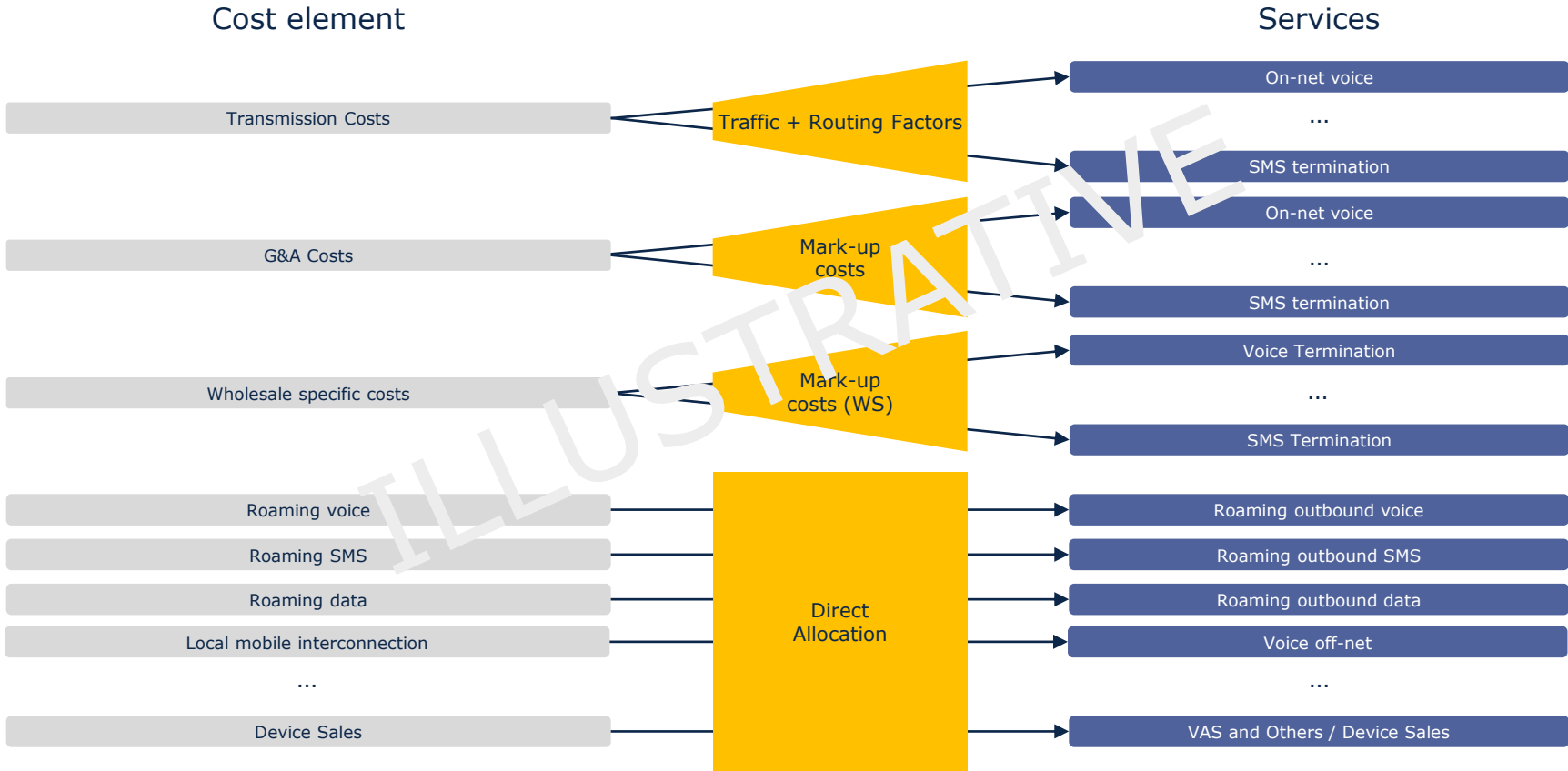
SAC

Stand Alone Costs (SAC): The services' costs are calculated as if the entire network were only built to provide one service or group of services.

Rarely used. Relevant to identify excessive pricing.

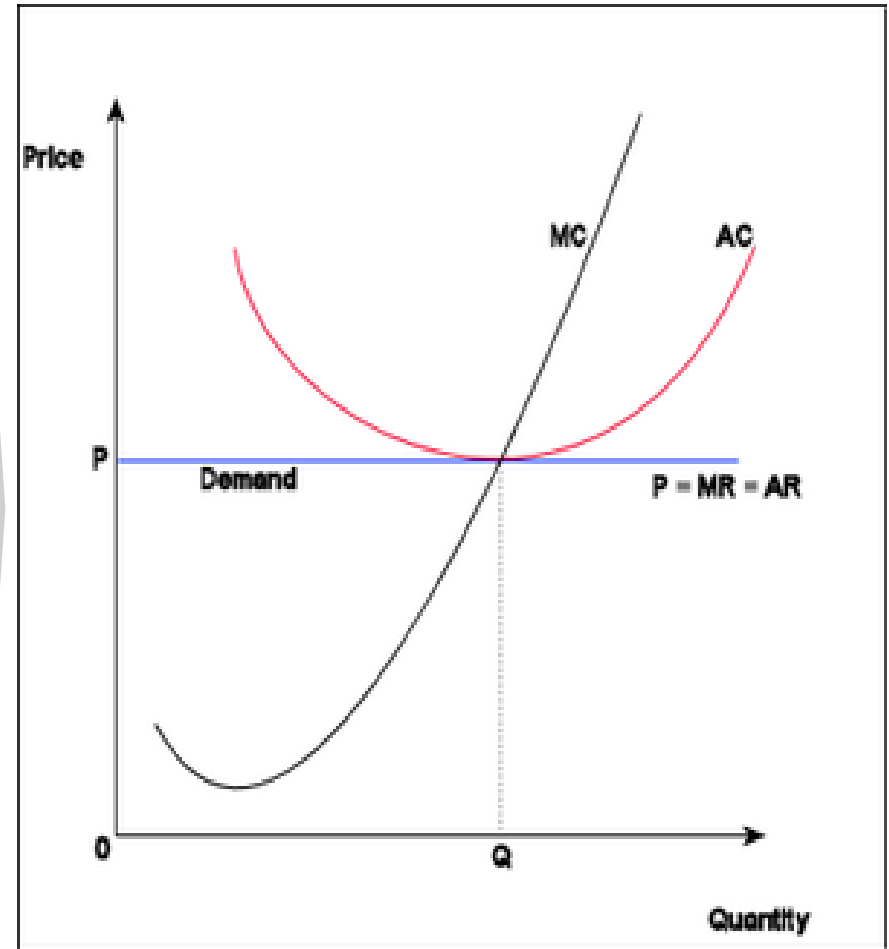
Cost Allocation: Under FDC standard, all costs are allocated to services based on causal drivers that represent the use of each resource

Illustrative example of cost allocation based on FDC standard



Cost Allocation: The standard economic theory predicts that prices adjust to marginal costs in perfect competition conditions

- ▶ The economic theory predicts that, in perfect competition conditions, prices are set to the level of production marginal cost of an additional unit.
- ▶ Theoretical economic studies about interconnection rates (two-way pricing) and access rates (one-way pricing) conclude the convenience of establishing this rates to marginal cost (or applying some adjustments to marginal costs).
- ▶ Standard economic theory predicts that, in perfect competition conditions, the marginal and average cost are equal, despite that this assumption is not applied in practice.



Cost Allocation: The definition of “Marginal Cost” has some inconveniences in Telecoms that are addressed with the use of LRIC

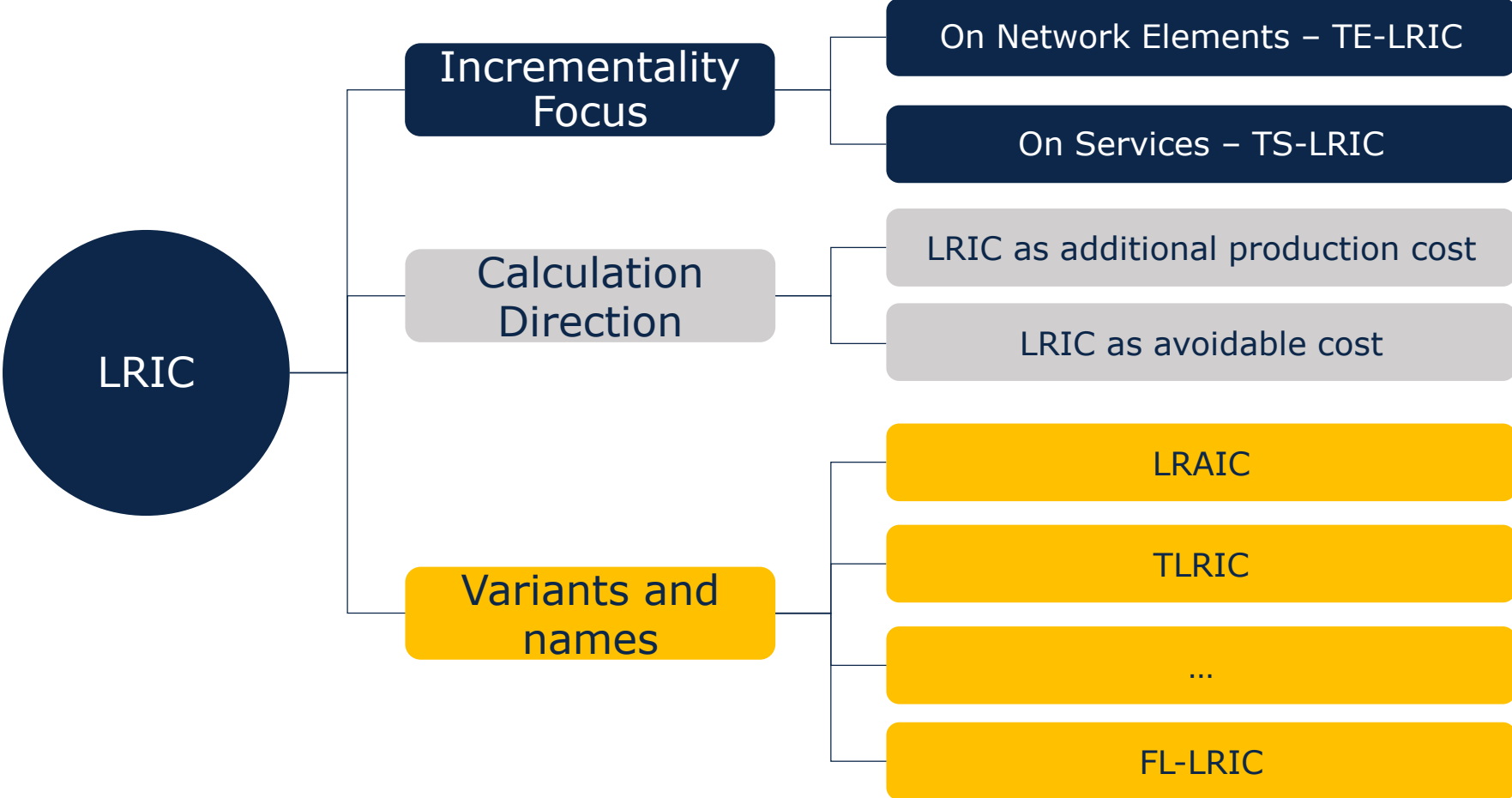
The definition of “Marginal Cost” is complicated in the Telecoms sector...

- ▶ The Telecommunications industry is characterized by economies of scope and sharing of resources.
- ▶ There is a big difference between marginal (short term) and average cost.
- ▶ Due to high production volumes and the modularity of equipment, it is difficult to estimate the marginal cost of 1 unit.
- ▶ Technology evolves quickly and operators keep an equilibrium between efficient use of the already available resources (sunk costs) and new developments.

... something which can be addressed using the LRIC standard

- ▶ The “common costs,” that can be imputed to different services or activities of the company, are recognized.
- ▶ When long-term cost is considered, all costs become variable.
- ▶ “Incremental” cost is meant as the production of an increment large enough to be measured with precision.
- ▶ It takes into account the market opening up to competition by considering potential future scenarios. Therefore, inefficiencies caused by past decisions are eliminated.

Cost Allocation: There are several different approaches for the calculation of LRIC



Cost Allocation: Network Elements vs. Services

TE-LRIC Approximation

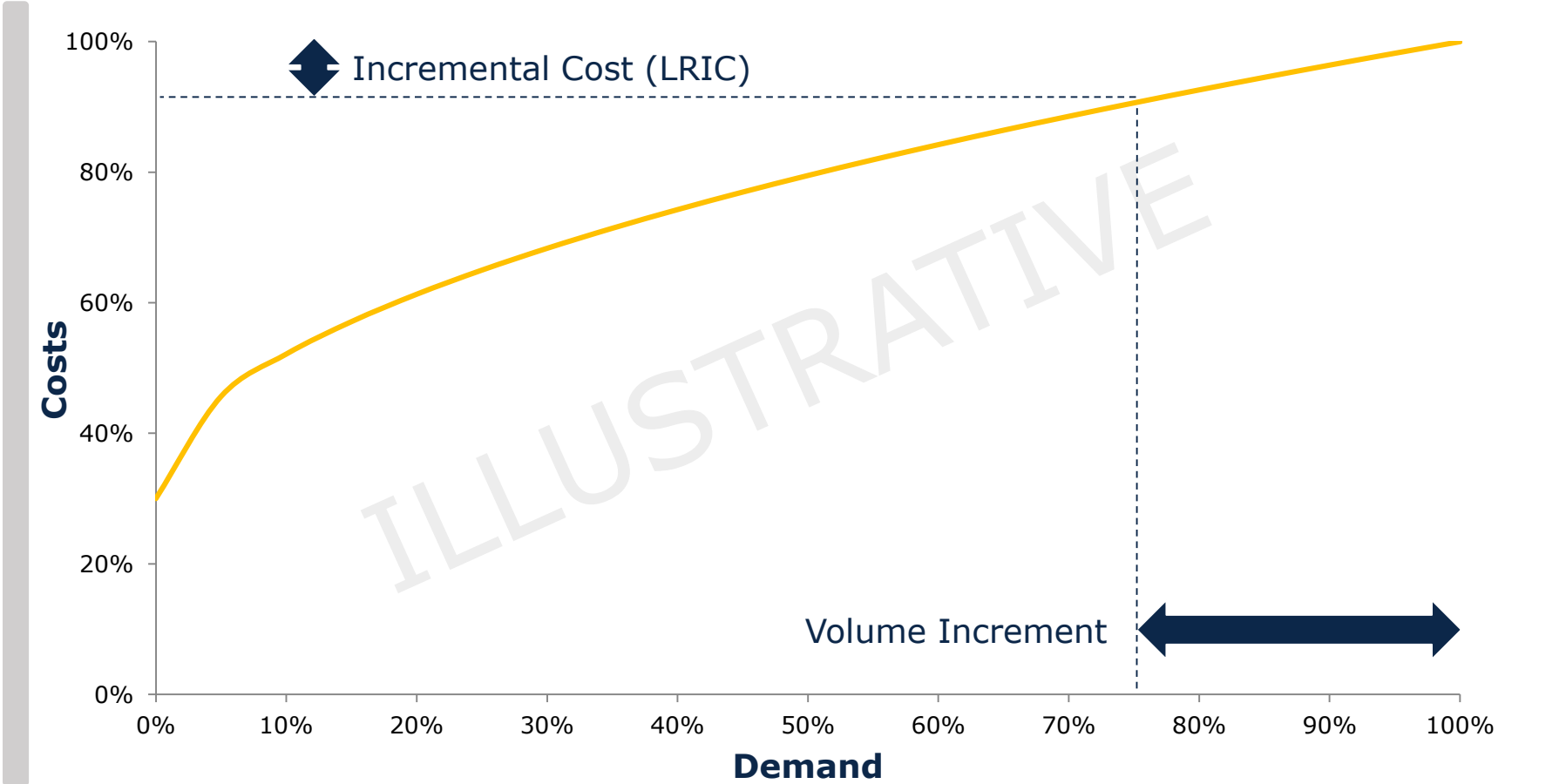
- ▶ “Total-Element LRIC”: incremental cost incurred for provision of a network element, supposing that the other productive activities remain constant.
- ▶ Takes the company as a set of network elements or functions that are mixed to create services.
- ▶ Appropriate to environments of network components disaggregation (e.g. loop disaggregation).
- ▶ Used in United States of America.

TS-LRIC Approximation

- ▶ “Total-Service LRIC”: incremental cost incurred for provision of a service, a set of services, or a certain quantity of traffic, supposing that provision of the other services remains constant.
- ▶ Takes the company as a provider of services.
- ▶ Specially appropriate to environments of interconnection (or end to end services).
- ▶ Preferred by the European Commission.

Cost Allocation: The incremental cost is usually calculated as the cost avoided when the increment's demand is removed (in the long term)

Illustrative example of the calculation of LRIC

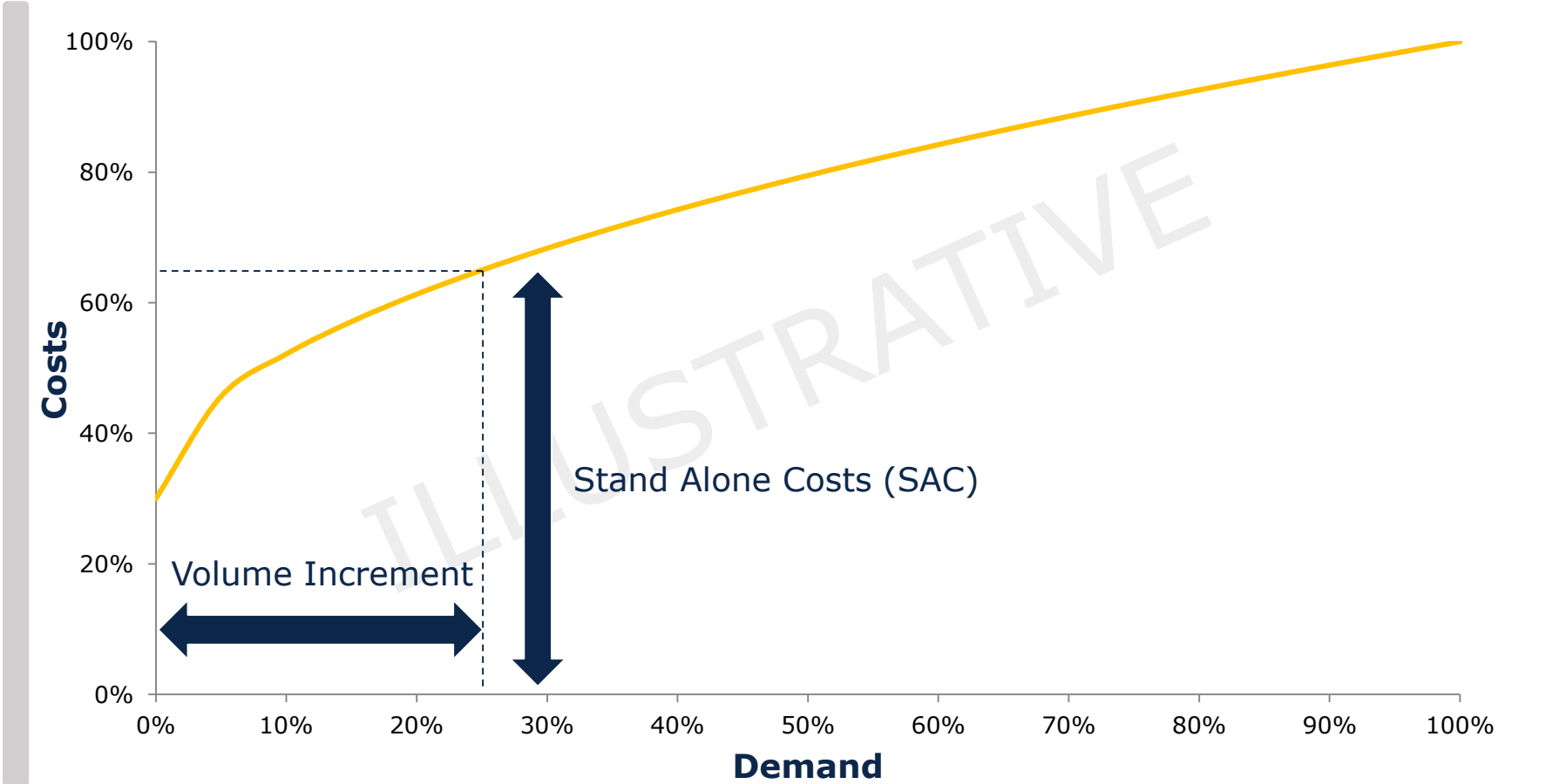


Cost Allocation: There are as many LRIC acronyms as regulators and consultants

LRIC	<ul style="list-style-type: none">▶ It can be considered as incremental cost of a “minor” increment compared to the LRAIC approach (e.g. just one additional minute)▶ However, the above is difficult to measure (cost virtually 0).
LRAIC (A= Average)	<ul style="list-style-type: none">▶ It is the average incremental costs of the units of each service included in the increment. A lot of references call it directly LRIC.▶ Some references consider LRIC as total incremental costs and LRAIC unit costs.
Forward Looking (FL-LRIC)	<ul style="list-style-type: none">▶ It includes a vision of the future (forward looking), in practice there is no difference with LRIC/LRAIC.
LRIC+ TLRIC (T=Total)	<ul style="list-style-type: none">▶ It includes common costs on top of Pure LRIC.▶ It is typically not very different than FDC.
Pure LRIC	<ul style="list-style-type: none">▶ Just to remark that no common costs are included.▶ Equivalent to what some sources call directly LRIC or LRAIC.

Cost Allocation: SAC standard assumes that the network is only build to provide the services included in one increment

Illustrative example of the calculation of SAC





Axon Partners Group

Calle Sagasta 18, 3rd
28004 Madrid (Spain)
Tel: +34 91 310 28 94

Any questions? Please, contact:



Jorge Martínez Morando

Principal

jorge.martinez@axonpartnersgroup.com