Costing and Pricing Infrastructure Access

Rabat, MOROCCO

9–12 July, 2018

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Session 12:
Assessing how demand affects international capacity and submarine cable costs

How to determine cost-based prices for submarine cable access

- What are we pricing?
- What are we costing?
- What are the key factors in the transition between costs and prices?
- A worked example of quad-play impacts on submarine cable costs and prices

What are we pricing?

- Price of backhaul from national border to international submarine cables
  - For Mongolia this means leased capacity from Russia / China
- Price of wholesale access to capacity on international submarine cable
  - Expressed as a price per Mbps per month
  - Potentially differentiated by capacity (e.g. E3, STM1)
- Charge for co-location in the cable landing station (CLS)
  - Physical or virtual
  - One-off establishment charges plus recurring rental charges.

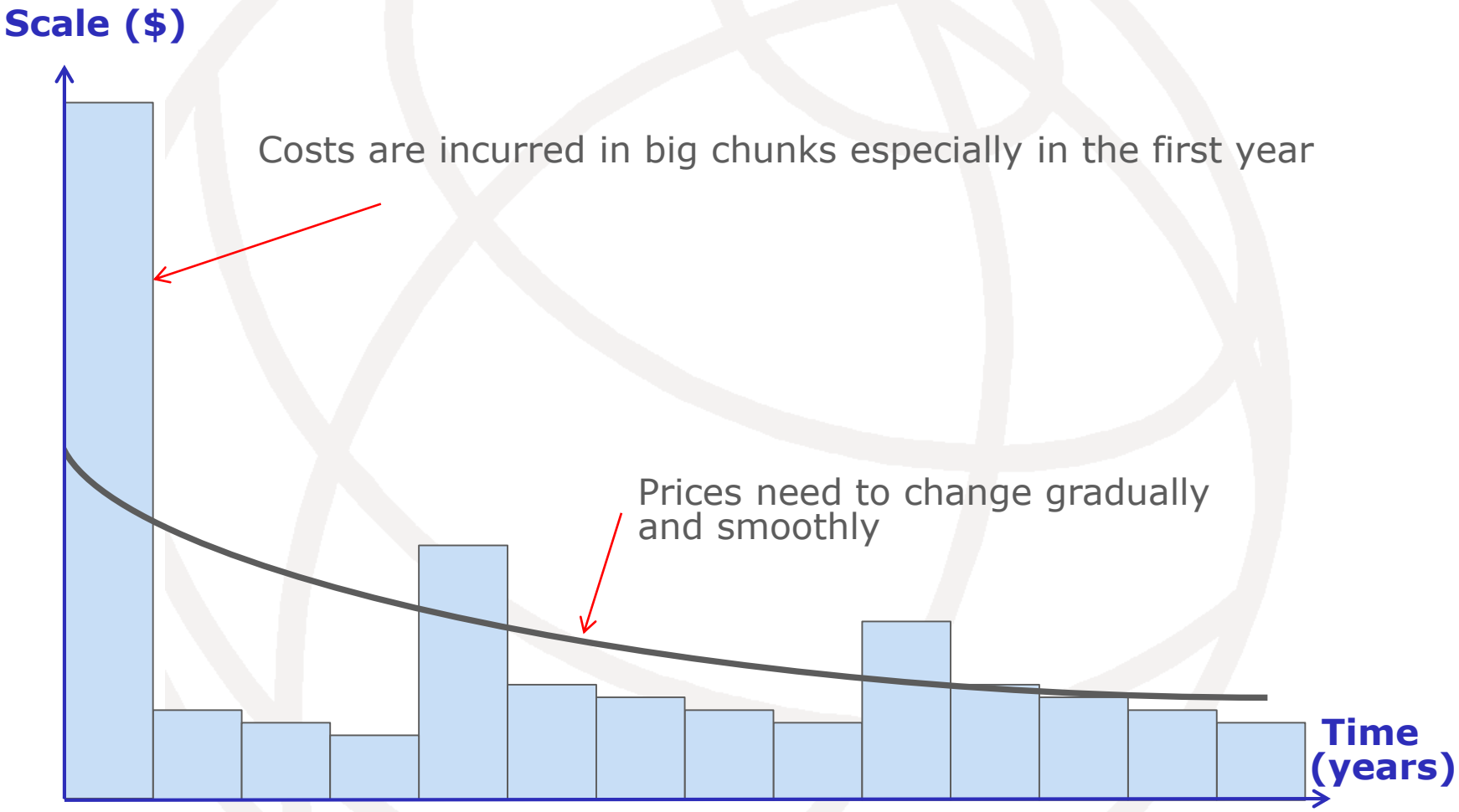
Price regulation options

- Forms of price regulation:
  - Price approval … the operator takes the lead
  - Specification of the price … the regulator determines
  - Price cap … the regulator guides.
- Methods of determining cost-based prices:
  - Cost modelling … depends on input data and assumptions
  - Retail minus … but in this case what is the retail service?
  - Benchmarking … but are the relevant prices published?
- Note that the regulator may be in a foreign jurisdiction and hence have little incentive to bring prices down.

Principles of cost-based pricing

- The international capacity provider must recover costs of:
  - its investment in the international submarine cable and any backhaul facilities
  - the CLS site and building
  - all of the constituent equipment.
- The costs that are included must be efficiently-incurred (based on best practice techniques and technologies).
- Prices will recover costs over the lifetime of the assets.

Converting costs into prices



Simple mechanics of a CLS cost model

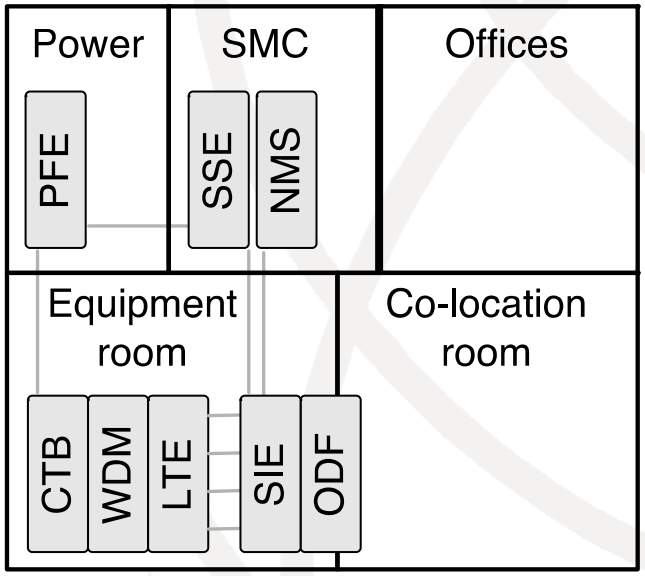
- Take all the relevant costs:
  - Cable costs
  - Site and building costs
  - Equipment costs
  - Indirect operating expenses
  - Cost of capital
- Estimate annual cost-based wholesale prices for:
  - Capacity services
  - Colocation services
- Given an assumed level of demand

International capacity costs

- The capital and operating costs relating to the investment in the cable system and the associated CLS.
- Biggest item is the investment in the submarine cable – usually $ millions over 20-25 years in return for IRUs.
- Cost of international cable per 10Gbps (STM64) per annum
  - 10Gbps is the standard capacity unit for international cables – typically corresponding to a single wavelength
  - Lower capacities may be derived through de-multiplexing.
- Costs of fibre backhaul are less than submarine cable, but fewer customers and less regulatory pressure may result in higher prices.

Key CLS equipment to be costed

- The main cost items at a Cable landing Station (CLS):



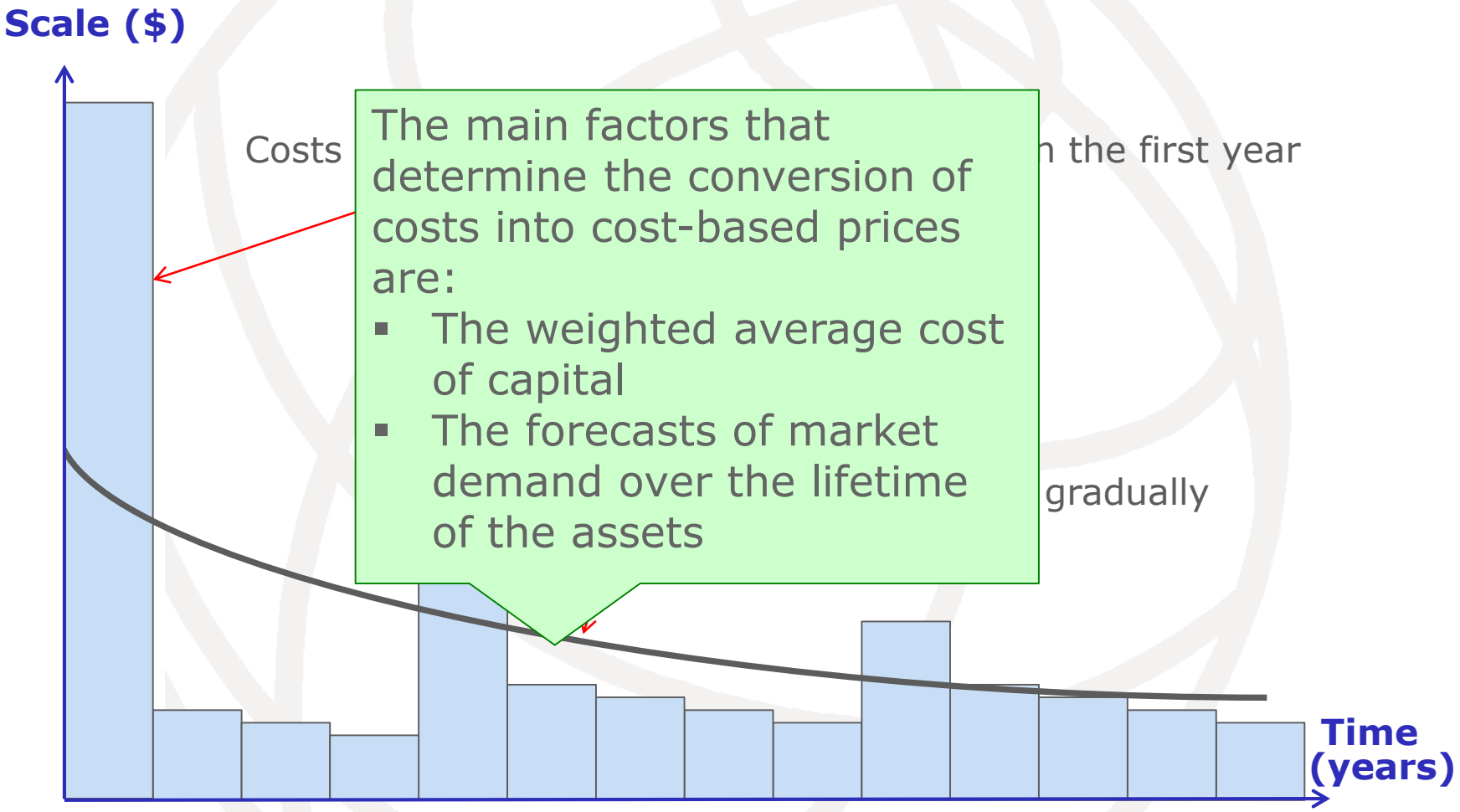
Cable landing station

CTB: cable termination box
LTE: line terminal equipment
NMS: network management system
ODF: optical distribution framework
PFE: power feeding equipment
SDH: synchronous digital hierarchy
SIE: SDH interface equipment
SMC: station maintenance centre
SSE: system supervisory equipment
WDM: wavelength division muliplexer

Operating expenses

- Each asset has an annual maintenance cost and some other costs (e.g. power) may be directly attributed.
- Other operating costs are not directly related to the cable equipment but still form part of the delivery of wholesale capacity services
  - Air-conditioning, security, cleaning.
- Typical approach is to establish a ratio between capital costs and operational expenditure, typically 3-5%.

Converting costs into prices



The main factors that determine the conversion of costs into cost-based prices are:

- The weighted average cost of capital
- The forecasts of market demand over the lifetime of the assets

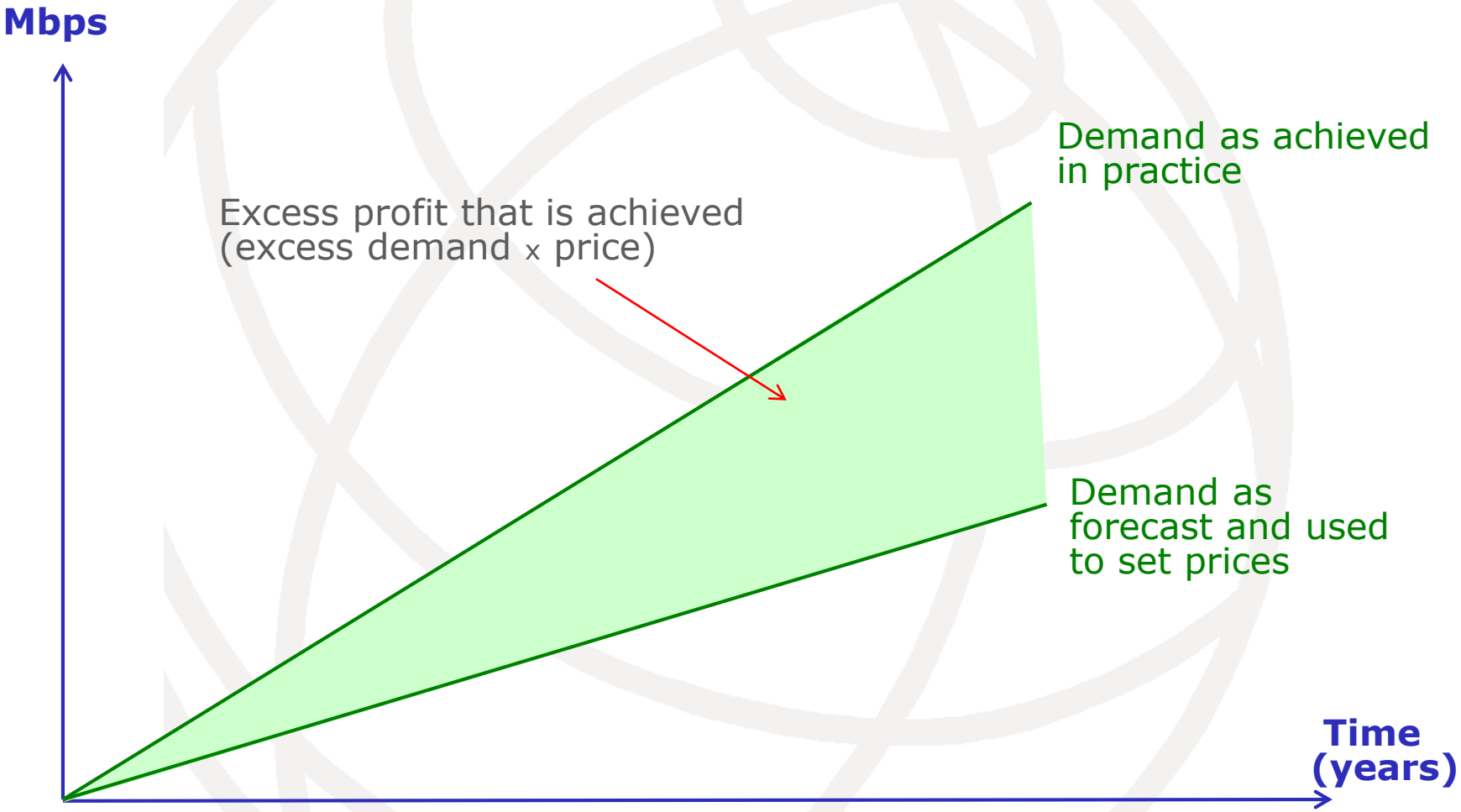
Cost of capital

- Can contribute to a very significant portion of annual expenses
- Investments in submarine cables are risky, so investors want higher rates of return
  - E.g. 25–33%
- Government or donor-funding can result in much lower WACC
  - E.g. 0–5% compared with 10% or more for commercial funding
- So the source of funding can substantially affect investment risks, costs and prices.

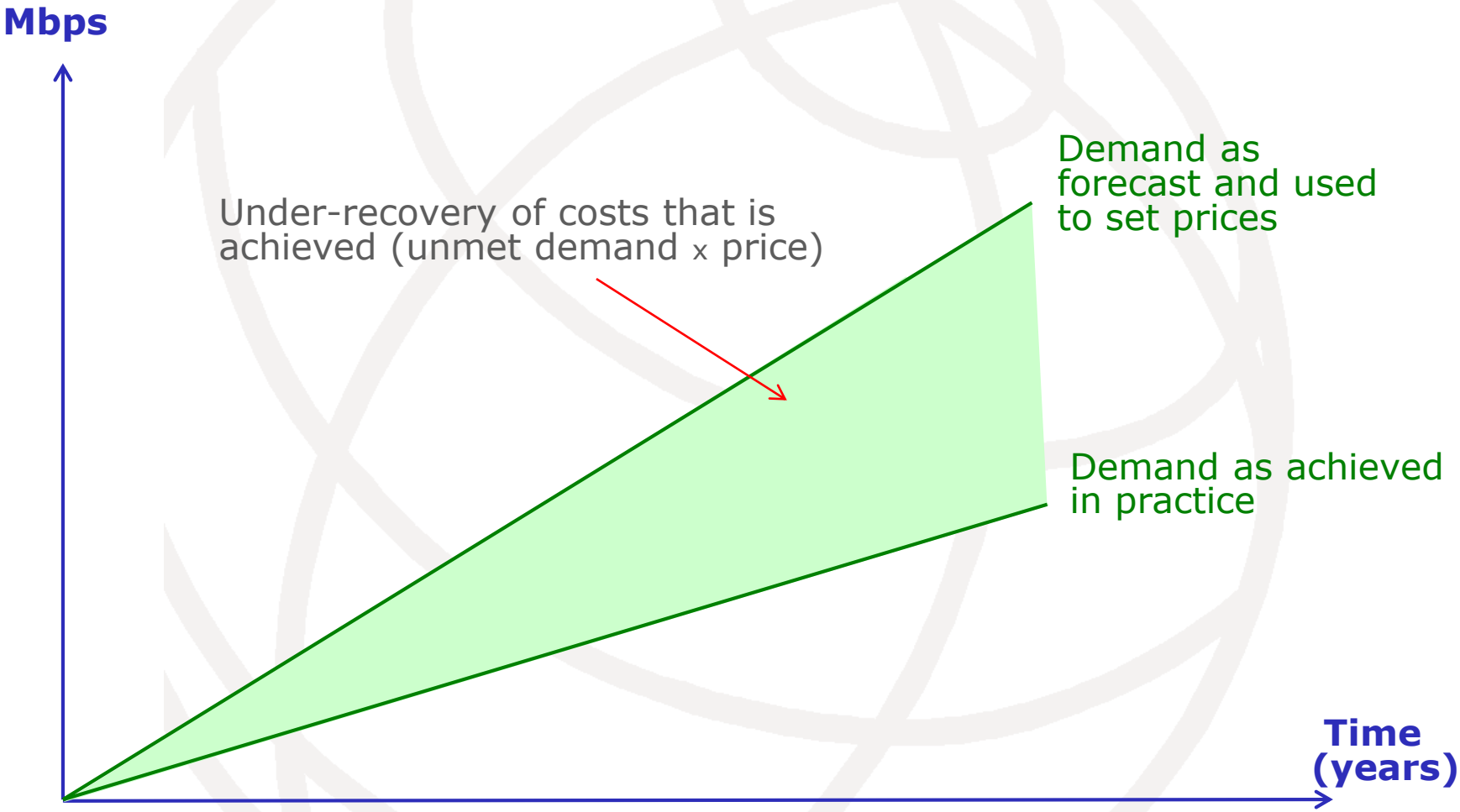
Demand forecasts

- Substantial growth in bandwidth demand may be expected as submarine cable capacity is installed.
- If costs are established based on annuity functions they are constant for each year of an asset's life.
- This means that unit costs drop every year as demand grows.
- To set prices that recover costs over the full lifetime of the assets, it is imperative to know (or estimate) demand levels over that same time period.
- Year 1 costs may be high, but year 1 prices should be low so as to stimulate demand in later years and recover costs over the long term.

How demand forecasts affect costs and prices - 1



How demand forecasts affect costs and prices - 2



Conclusions

- Costs and prices are crucially dependent on demand.
- It is impossible to forecast demand with any accuracy over the lifetime of a cable landing station.
- Errors will be magnified year-on-year.
- Cost models should be revised every few years to take account of any under- or over-recovery of costs that happens in practice.
- Prices (or price caps) should then be adjusted as well.

Mini working group exercise - 1

- New submarine cable investment of $25m needed for 10 year access to 10Gbps cable capacity.
- Incumbent offers to invest and run CLS:
  - WACC based on 50% equity and 50% commercial loan
- Government considers alternative of taking 50% loan from World Bank and rest in equity participation of various operators.
- Annual operating expenditure of CLS estimated at $500k.
- What is the % difference in total annual CLS costs under these two scenarios:
  - Assume WACC for WB loan is 0%; for commercial loan is 4%; for equity is 8%.
  - Assume straight-line depreciation.

Answers to mini working group exercise - 1

Item	Case 1 - Incumbent	Case 2 - Government
Depreciation	$25m/10 = $2.5m	$2.5m
Opex	$0.5m	$0.5m
Cost of capital	6% * $25m = $1.5m	4% * $25m = $1.0m
Total annual costs	$4.5m	$4.0m

The incumbent option is 12.5% more expensive

Mini working group exercise - 2

- New submarine cable investment of $25m needed for 10 year access to 10Gbps cable capacity.
- Incumbent suggests that total demand in year 1 is 500Mbps and will rise to 5Gbps in year 10.
- Government consultants agree that year 1 demand will be 500Mbps but rising to 8Gbps in year 10.
- Assuming straight line growth (and taking the cost estimates from mini exercise 1) what % difference is there now in year 3 prices?

Answers to mini working group exercise - 2

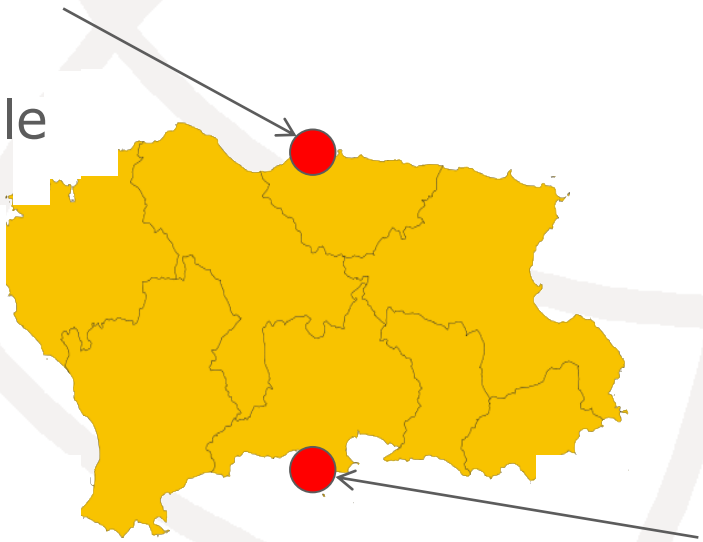
Item	Case 1 - Incumbent	Case 2 - Government
Total annual cost	$4.5m	$4.0m
Annual growth in demand	(5000-500)/10 = 450Mbps	(8000-500)/10 = 750Mbps
Demand in Year 3	500+3*450 = 1850Mbps	500+3*750 = 2750Mbps
Cost per Mbps in year 3	$4.5m/1850 = $2432	$4.0m/2750 = $1455

The incumbent's option is 67% more expensive

Example of how quad-play demand affects international submarine cable costs in Normalia

Submarine cables in Normalia

Telecom has been the monopoly provider through the ABC cable. It is a consortium member and operates the cable landing station (CLS)



Normcell has just secured the rights for operating the CLS of a new rival cable, JKL, that will commence operations before the end of 2016

TRAN's main concern – Normalia is lagging

- Normalia's neighbours have recently taken major strides forward in offering low-cost broadband internet access
- They have achieved higher broadband penetration and as a result prices for broadband services are now 25% lower than in Normalia.
- They have access to the same submarine cables (ABC and JKL) and have only slightly larger national markets.
- Immediate action is needed to stop Normalia falling further behind and suffering economic consequences.
- TRAN has set a target of $1 per Mbps per month in 2018 (half the current average tariff).

TRAN's market research

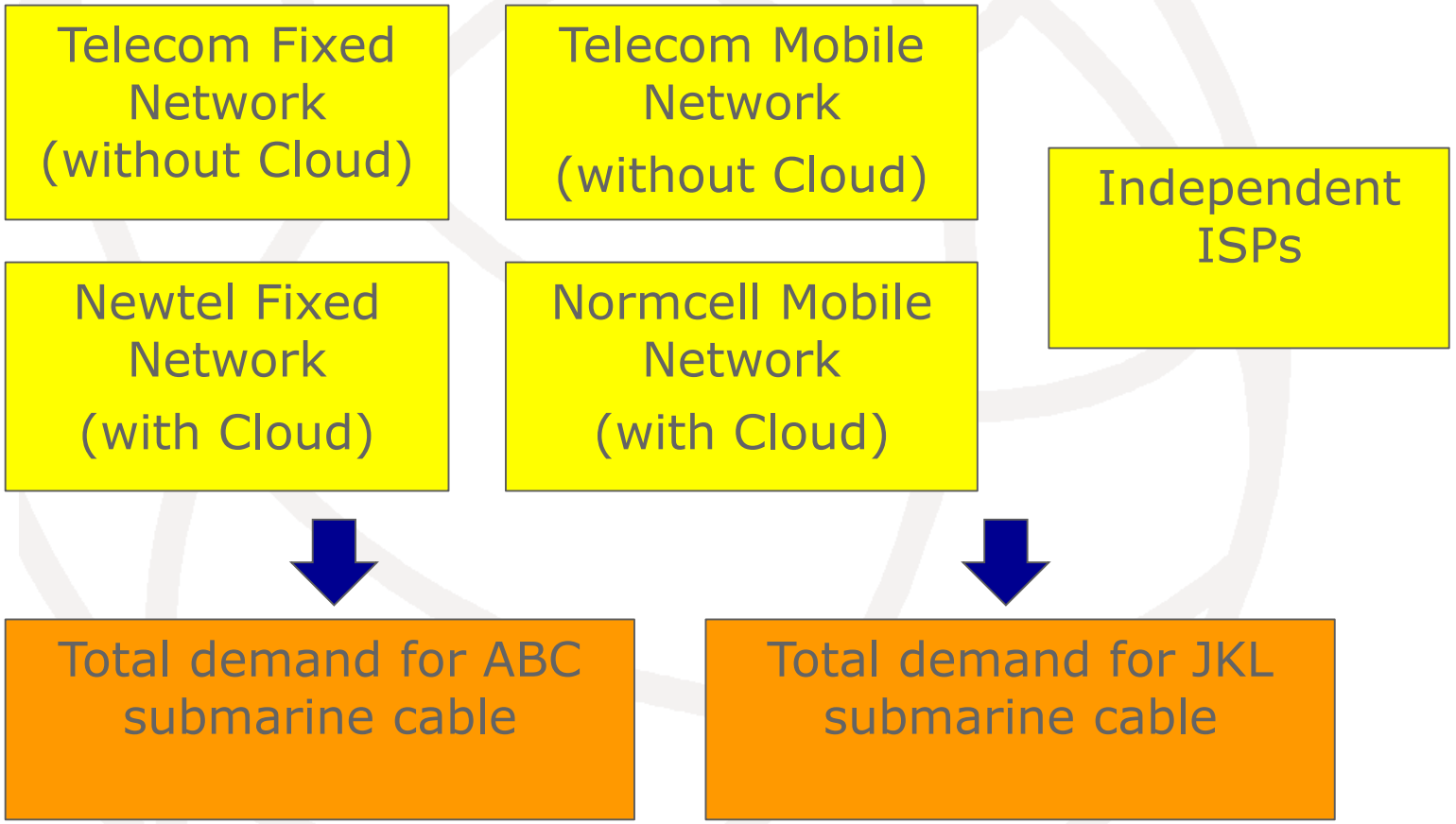
	2016 estimate	2020 forecast	Comments
% of broadband traffic that uses submarine cable	80%	60%	Increase in local hosting and content
% of broadband traffic generated by other SPs	15%	35%	Increase in OTT applications
% of this international traffic using SMC	0%	40%	Second submarine cable gains market share

Assumptions

Based on survey of 38 submarine cable systems

Cost ($m) for first 10Gbps	3.2
Discount each per additional 10Gbps	40%
Lifetime of the submarine cable (depereciation period) - years	25
WACC	6%
Operations and maintenance costs (% of initial capex)	4.5%
Annual change in O&M costs	4%
Effective cable utilisation rate	75%

Demand data drawn from cost models



Service demand for submarine cables

Total service demand ABC

BH Mbps	2016	2017	2018	2019	2020
Telecom (fixed subscribers)	17,199	20,547	24,051	27,864	31,873
Telecom (mobile subscribers)	8,337	18,537	27,354	40,550	60,267
Other service providers	7,585	15,909	26,656	42,436	64,880
TOTAL	**33,121**	**54,994**	**78,061**	**110,850**	**157,019**

Total service demand KL

BH Mbps	2016	2017	2018	2019	2020
Newtel (fixed subscribers)	7,280	10,772	14,693	19,151	24,085
Normcell (mobile subscribers)	4,323	10,818	17,739	29,158	47,990
Other service providers	0	1,768	6,664	18,187	43,253
TOTAL	**11,603**	**23,358**	**39,095**	**66,495**	**115,327**

TRAN's perspective

- Initial effect of introducing the second submarine cable is to split the market and increase costs.
  - JKL cost is $2.6 per Mbps per month in 2016 compared with $1.5 on ABC
- Costs may be lower with one submarine cable provider but:
  - The market lacks the dynamism to stimulate demand
  - The one service provider takes excessive profit (>50% profit margin)
- Over time the second player will grow the market, reduce costs and ultimately help consumers through lower prices.
  - Prices should fall below the target level of $1 per Mbps per month in 2018.

Results that meet TRAN's expectations