

ITU ADVANCED LEVEL TRAINING

Strategic Costing and Business Planning for Quadplay

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Session 10: Assessing how quad-play demand affects international 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 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

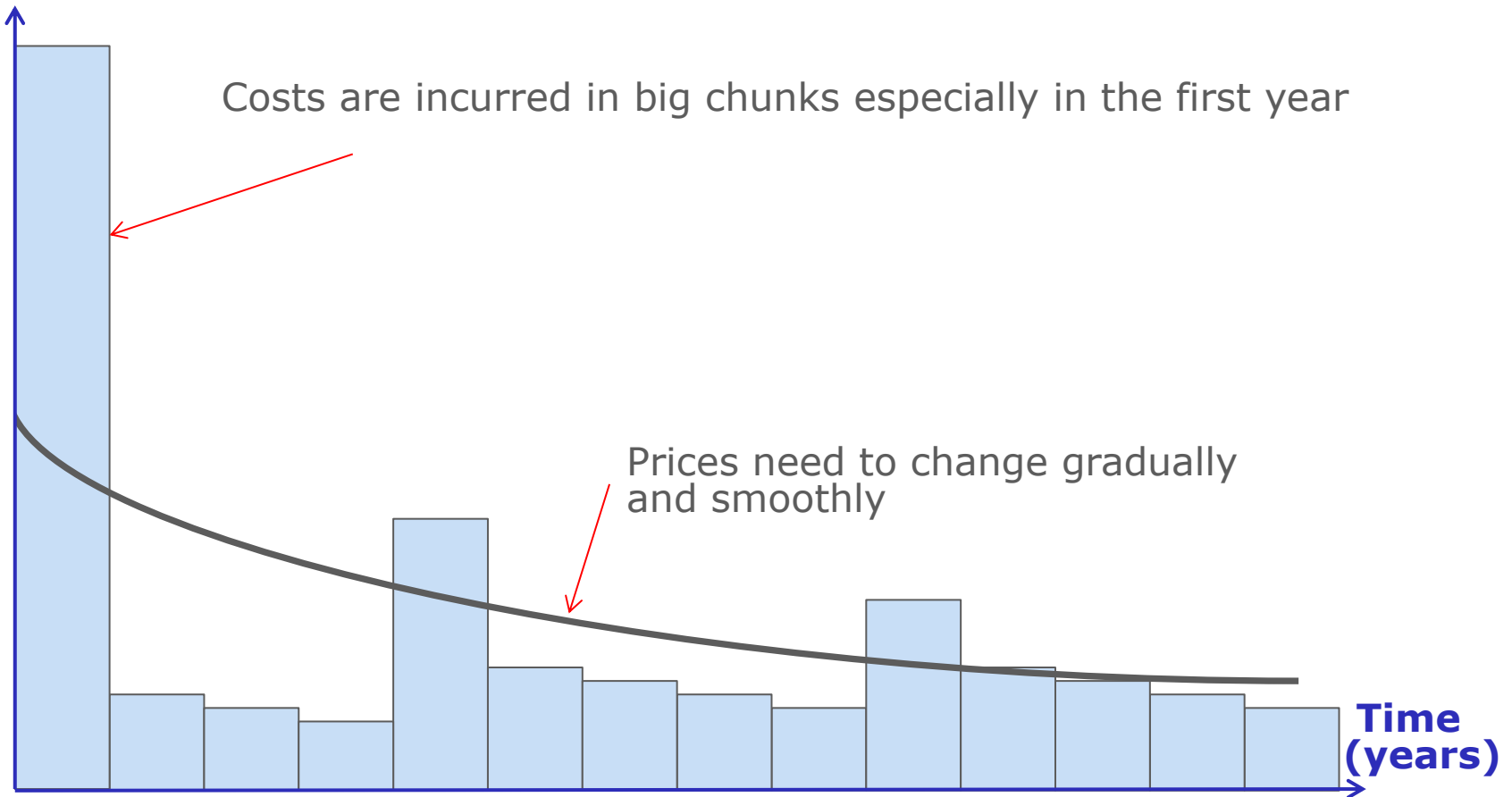
- Forms of price regulation:
 - Price approval ... the CLS operator takes the lead
 - Specification of the price ... the regulator determines
 - Price cap ... the regulator guides.
- Methods of determining cost-based prices:
 - Cost modelling ... depends on input data and assumptions
 - Retail minus ... but in this case what is the retail service?
 - Benchmarking ... but are the relevant prices published?
- A price cap based on a cost model is a good solution given the error-margins involved in cost calculation.

Principles of cost-based pricing

- The CLS operator must recover the costs of:
 - its investment in the international submarine cable
 - 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

Scale (\$)



Simple mechanics of a CLS cost model

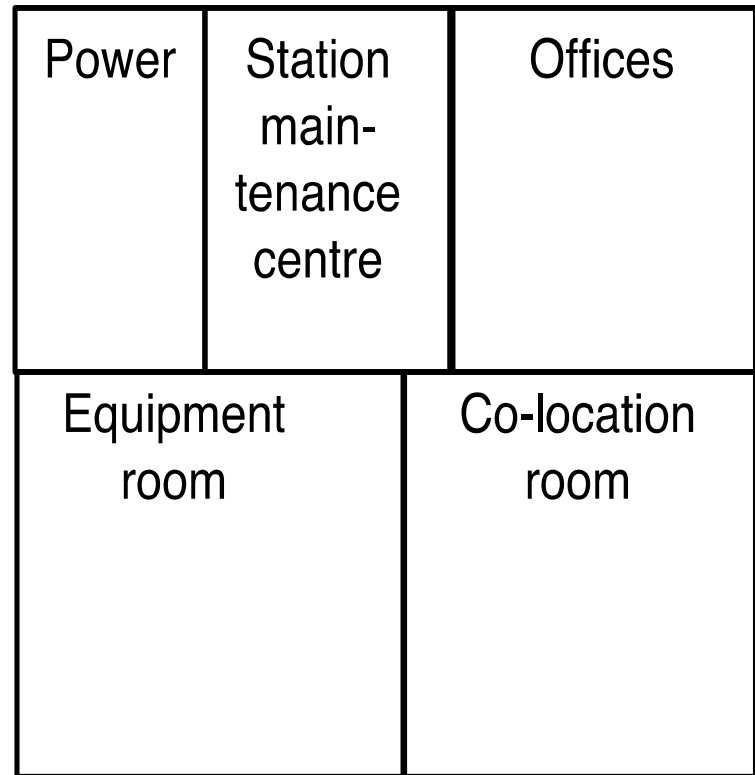
- Take all the relevant costs:
 - Cable costs
 - Site and building costs
 - Equipment costs
 - Indirect operating expenses
 - Cost of capital
- Estimate annual cost-based wholesale prices for:
 - Capacity services
 - Colocation services
- Given an assumed level of demand

Submarine cable 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

Site and building costs

- The capital costs associated with the CLS
 - Costs need to be allocated between the various functions of the CLS, typically on the basis of floor space
- An annual capital charge (i.e. depreciation expense)
 - Tilted annuity approach

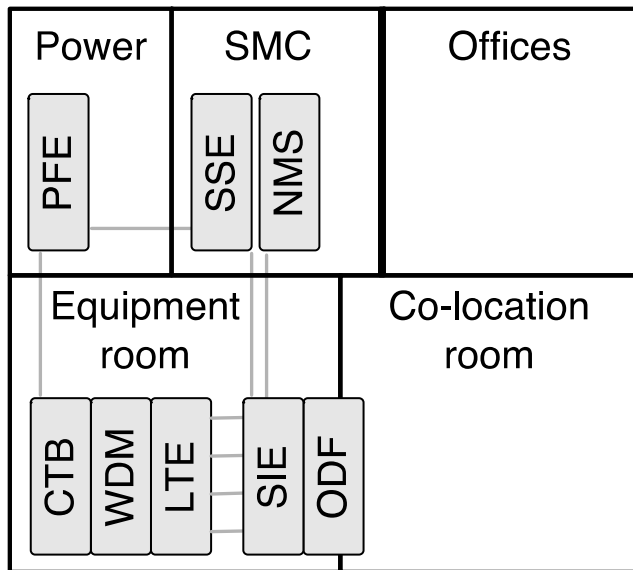


Cable landing station

Equipment costs

- The capital costs of equipment purchases and associated annual operating costs
 - Some of the capital costs may be included as part of the cable investment cost
 - De-multiplexing equipment costs will depend on the particular capacity services that are to be offered
- An annual capital charge (i.e. depreciation expense)
 - Tilted annuity approach – this allows for the same capital charge each year except tilted to allow for trends in equipment costs.

Key equipment to be costed



Cable landing station

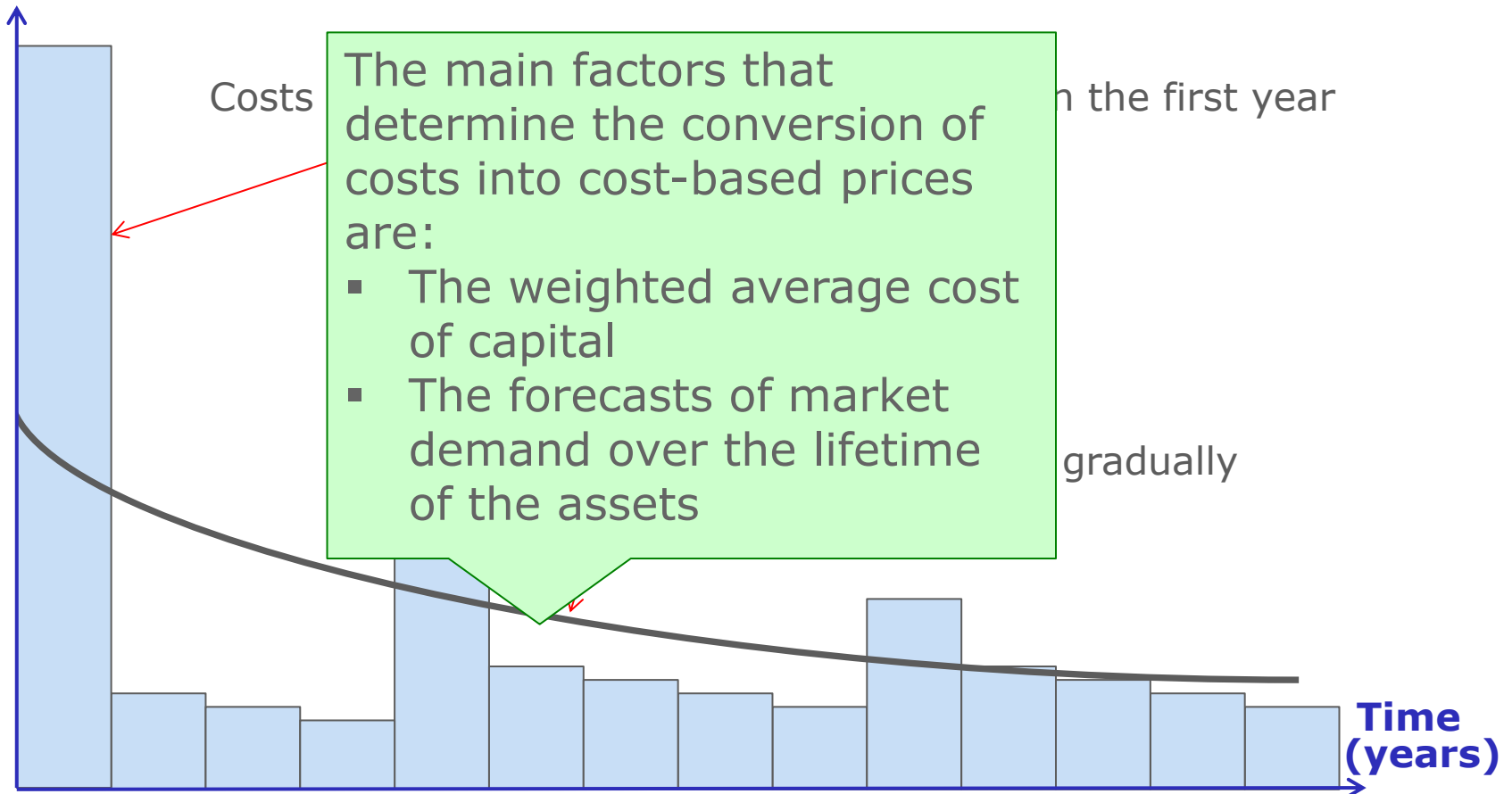
CTB: cable termination box
LTE: line terminal equipment
NMS: network management system
ODF: optical distribution framework
PFE: power feeding equipment
SDH: synchronous digital hierarchy
SIE: SDH interface equipment
SMC: station maintenance centre
SSE: system supervisory equipment
WDM: wavelength division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

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

Scale (\$)



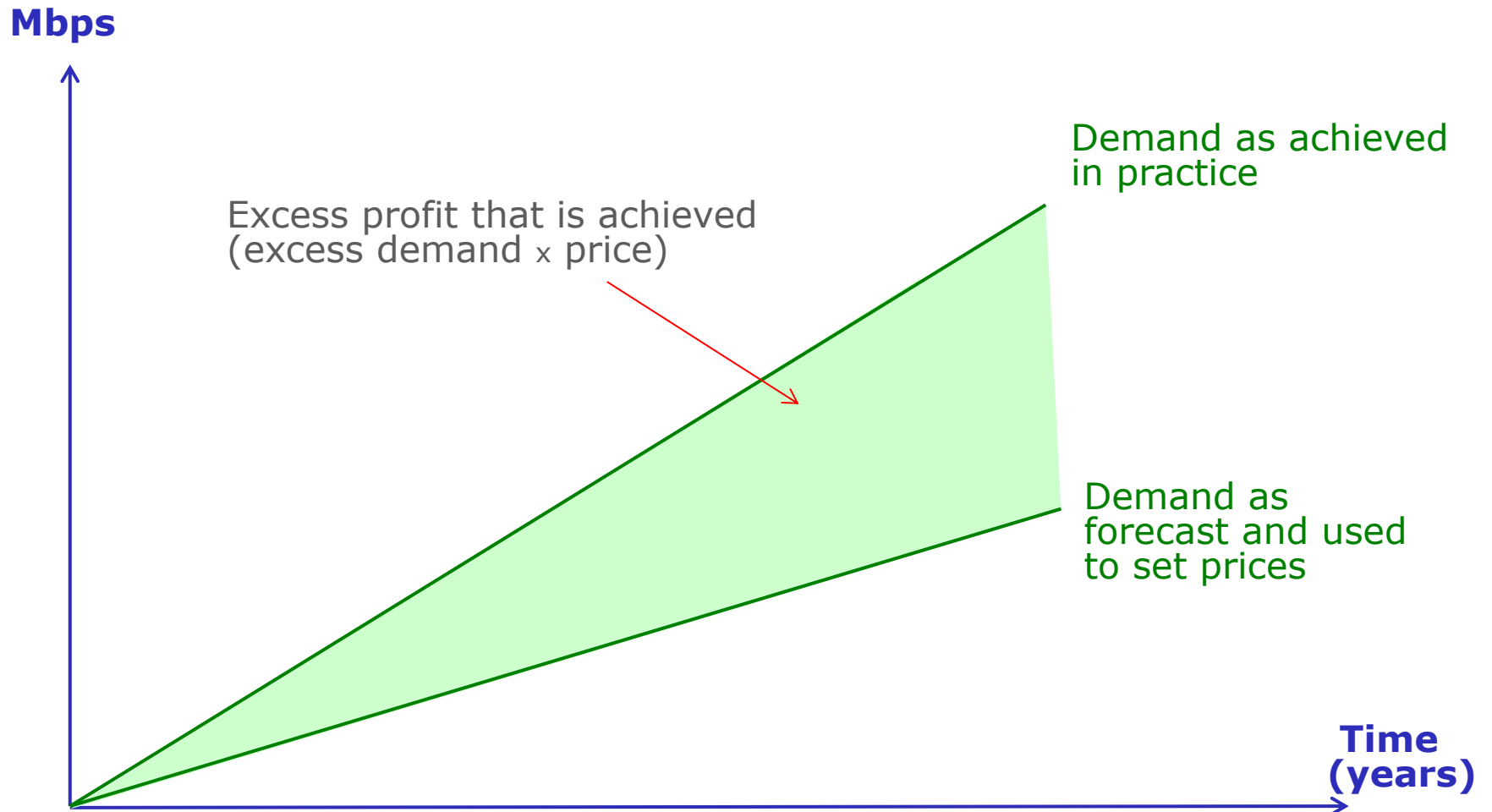
Cost of capital

- 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.

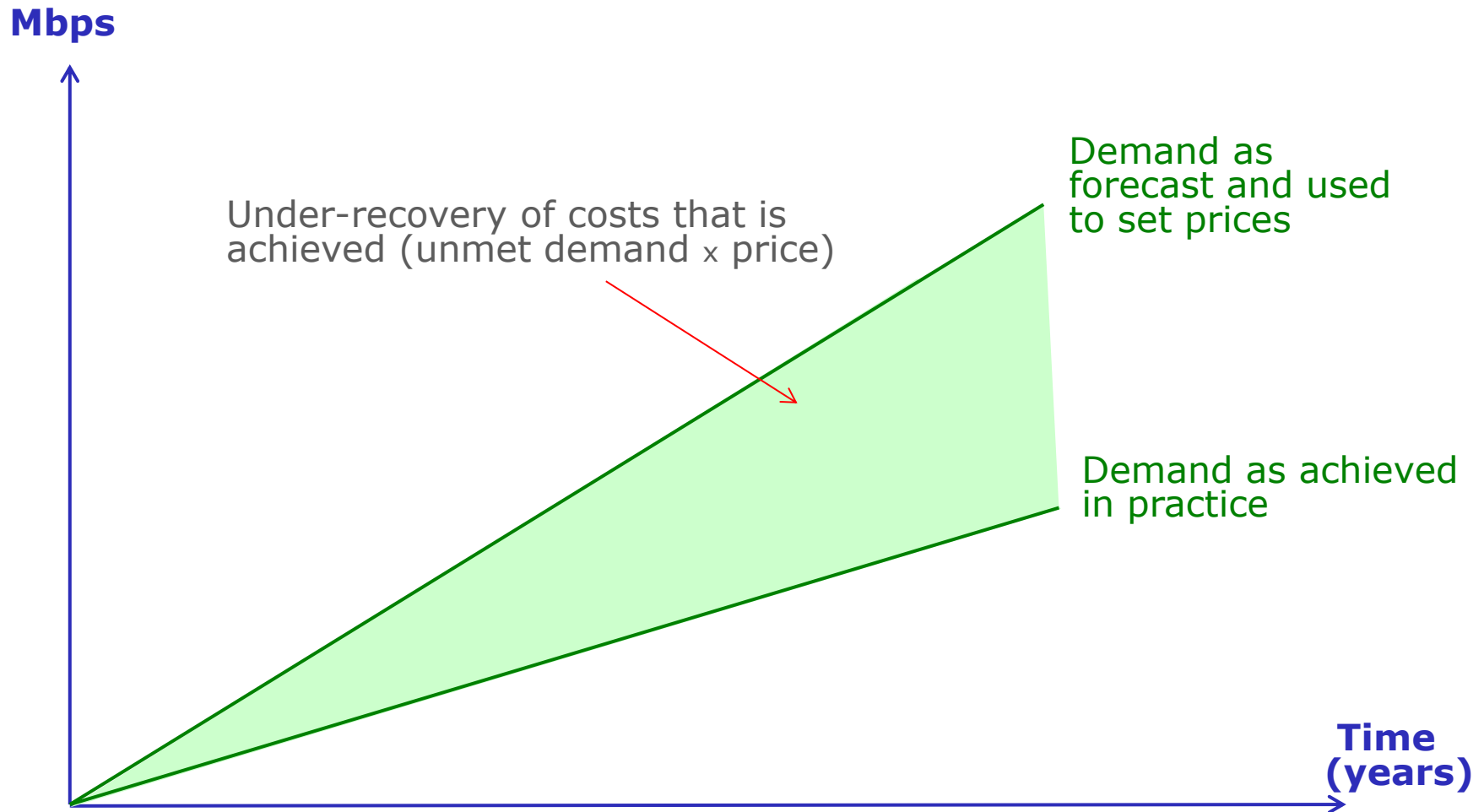
Demand forecasts

- 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	$\$25\text{m}/10 = \2.5m	$\$2.5\text{m}$
Opex	$\$0.5\text{m}$	$\$0.5\text{m}$
Cost of capital	$6\% * \$25\text{m} = \1.5m	$4\% * \$25\text{m} = \1.0m
Total annual costs	$\$4.5\text{m}$	$\$4.0\text{m}$

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	$(5000-500)/10 = 450\text{Mbps}$	$(8000-500)/10 = 750\text{Mbps}$
Demand in Year 3	$500+3*450 = 1850\text{Mbps}$	$500+3*750 = 2750\text{Mbps}$
Cost per Mbps in year 3	$\$4.5\text{m}/1850 = \2432	$\$4.0\text{m}/2750 = \1455

The incumbent's option is 67% more expensive

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

Remembering Normalia

- This case study concerns the fictitious country of Normalia.
- Normalia is a typical (“normal”) country with regulatory challenges similar to those in your country.
- The material is presented as a worked example as we don’t have time to conduct another practical exercise.



Telecoms in Normalia

Regulator - TRAN

(Telecom Regulatory Authority of Normalia)

Fixed Telecoms

- 4m subscribers
- Telecom (75%)
- Newtel (25%)

Mobile Telecoms

- 10m subscribers
- Telecom (60%)
- Normcell (40%)

Content and service providers

(various including **Cloud** an ambitious entrant providing digital TV services)

The story so far ...

- After intense negotiations and regulatory hearings a quad-pay deal is close to being reached between Cloud, Newtel and Normcell.
- The last piece of the jigsaw puzzle of costs and prices concerns access to the international submarine cable.
- Submarine cables are expensive and prices in Normalia have remained high because of:
 - a Telecom monopoly on the cable landing station (CLS)
 - demand has been insufficient to trigger a virtuous cycle of price reductions thus triggering further demand.
- The new quad-play partnership now has a 2-year window to achieve scale and profitability to rival that of the incumbent, Telecom.

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 2014

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 2016 (half the current average tariff).



TRAN's market research

% of traffic that uses submarine cable	2014 estimate	2018 forecast	Comments
Internet	80%	60%	Increase in local hosting and content
IPTV	90%	50%	Increase in local programming
Mobile data	15%	25%	Increasingly affordable c.f. fixed networks
Mobile video	40%	40%	Combined trends of IPTV and mobile data

	2014 estimate	2018 forecast
% of broadband traffic generated by other SPs	15%	35%
% of this traffic using JKL	0%	40%



Advice from TRAN's consultants

- TRAN's consultants have derived the following cost information for submarine cable systems

Assumptions

Based on survey of submarine cable systems

Cost (\$m) for first 10Gbps	
Discount each per additional 10Gbps	
Lifetime of the submarine cable (depreciation period) years	
WACC (lower figure assumes 50% bid funded)	
Operations and maintenance costs (% of initial capex)	
Annual change in O&M costs	
Effective cable utilisation rate	

Minimum	Maximum
3.0	12.0
25%	40%
15	30
6%	12%
3.5%	6.0%
-1%	5%
70%	80%

Possible outcome

Submarine cable demand assumptions

Assumptions

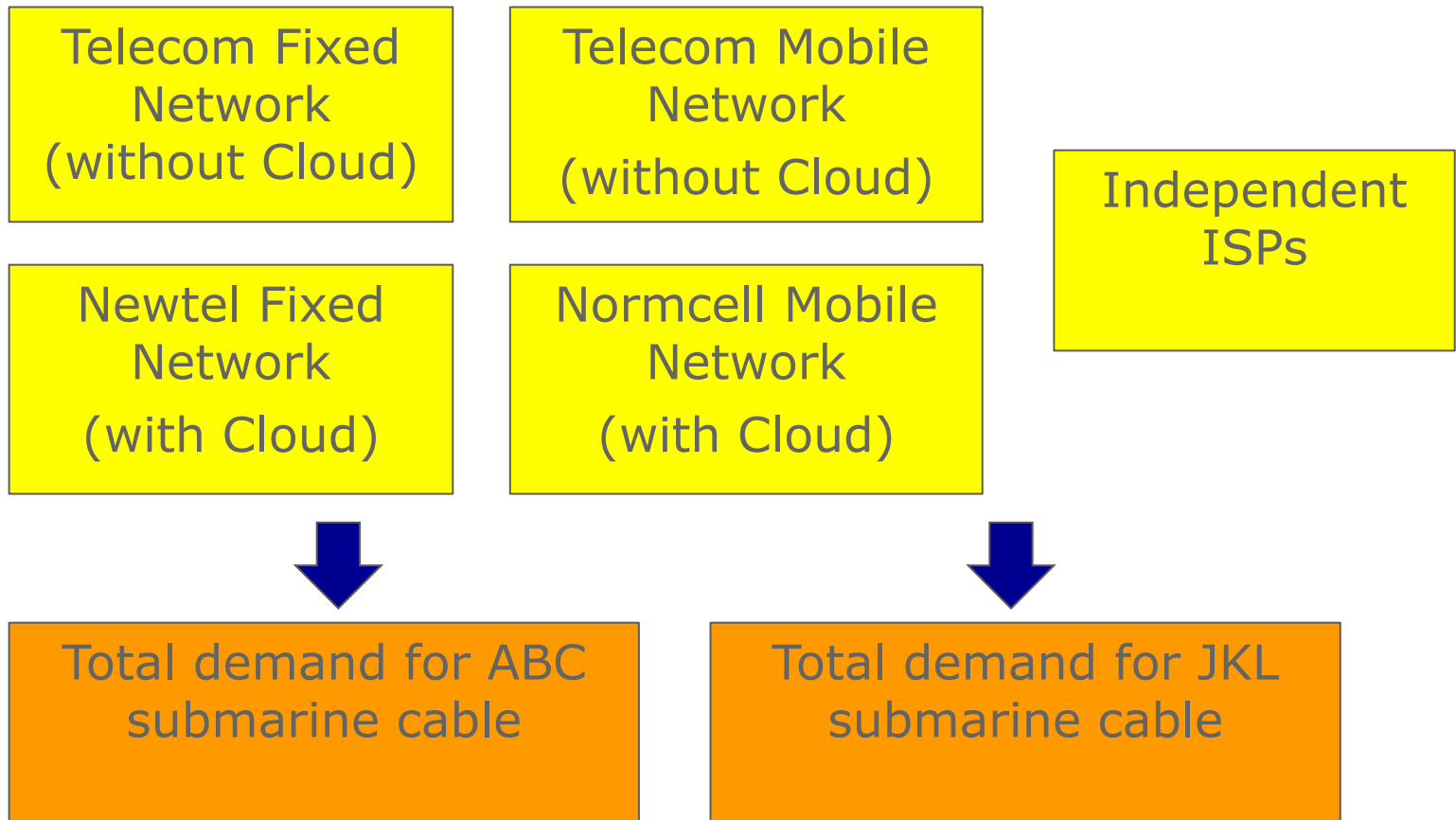
	2014	2018
Proportion of Internet traffic that uses submarine cable (i.e. is not hosted locally)	80%	60%
Proportion of IPTV traffic that uses submarine cable (i.e. is not hosted locally)	90%	50%
Proportion of fixed broadband traffic carried by other ISPs	15%	35%
Proportion of mobile videostream that uses submarine cable (i.e. is not hosted locally)	40%	40%
Proportion of mobile data traffic that uses submarine cable	15%	25%
Proportion of mobile broadband traffic carried by other service providers (e.g. DTT)	15%	35%
Proportion of ISP traffic on ABC submarine cable (rather than KL)	100%	50%

Conversion factor MB to Mbps 0.08

Assumptions drawn from TRAN's market research and inserted in the CLS demand model



Demand data drawn from cost models



Service demand for submarine cables

Total Service Demand ABC

BH Mbps	2014	2015	2016	2017	2018
Telecom (fixed subscribers)	17,199	20,547	24,051	27,864	31,873
Telecom (mobile subscribers)	28,407	33,437	38,984	45,236	52,180
Other service providers	13,542	23,521	37,019	53,734	71,336
TOTAL	59,148	77,505	100,053	126,833	155,389

Total Service Demand KKL

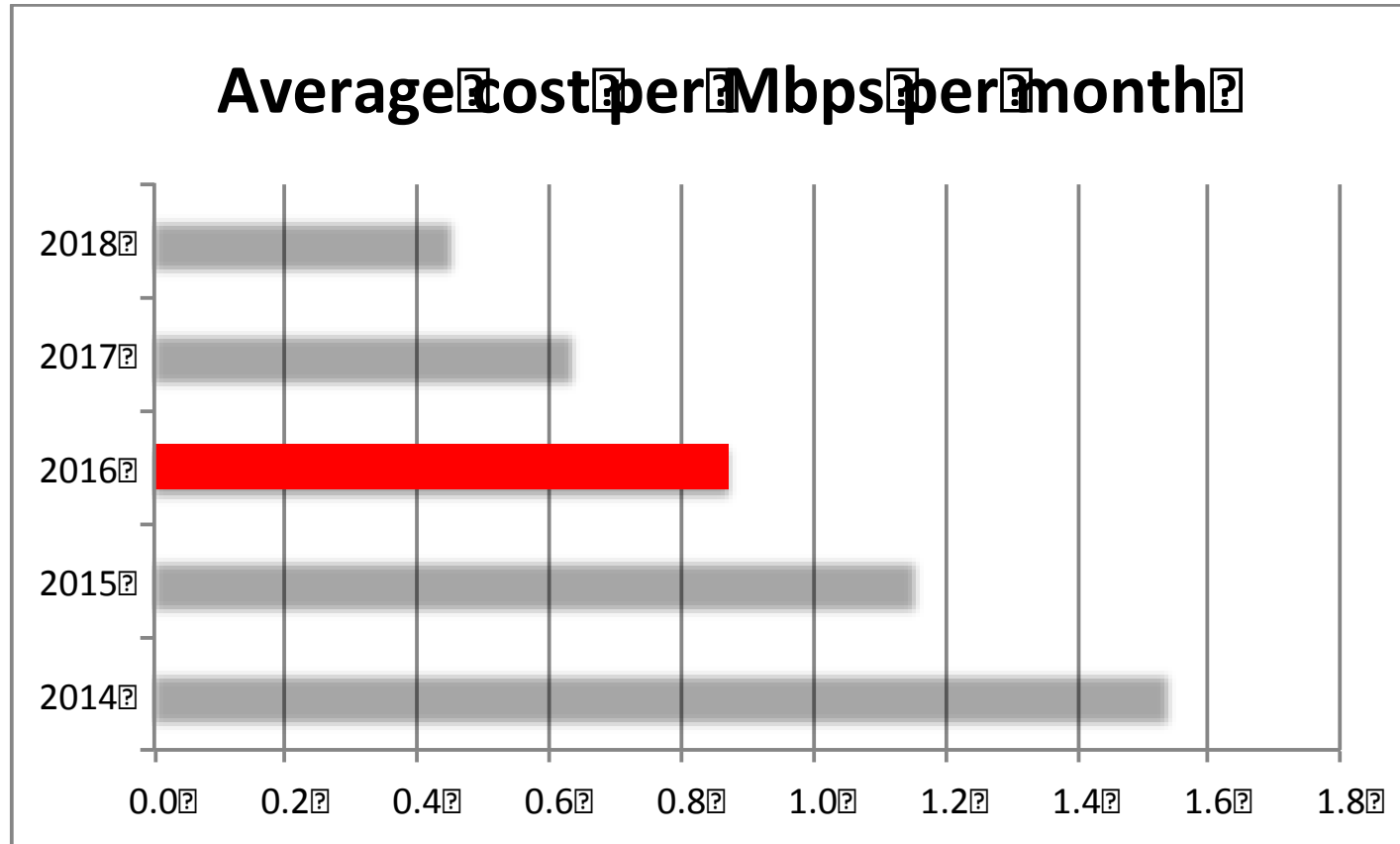
BH Mbps	2014	2015	2016	2017	2018
Newtel (fixed subscribers)	7,481	11,040	14,693	18,376	21,797
Newtel (mobile subscribers)	18,008	32,737	54,222	83,624	120,223
Other service providers	0	3,360	12,340	32,240	71,336
TOTAL	25,489	47,137	81,255	134,240	213,357

Cost input assumptions

Cost (\$m) for first 10Gbps	3.2
Discount each per additional 10Gbps	33%
Lifetime of the submarine cable (depreciation period) years	20
WACC	6%
Operations and maintenance costs (% of initial capex)	4.5%
Annual change in O&M costs	4%
Effective cable utilisation rate	75%

Assumptions drawn from TRAN's consultants' analysis and inserted in the CLS cost model

Results that meet TRAN's expectations



TRAN's perspective

- Initial effect of introducing the second submarine cable is to split the market and increase costs.
 - JKL cost is \$2.1 per Mbps per month in 2014 compared with \$1.3 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 2016.