
Broadband costing and pricing - Approaches and best practices

AGER, São Tomé 3 February 2015

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Agenda

Overview situation in Africa

Cable landing stations cost modeling

Backbone networks

The last mile

Conclusions

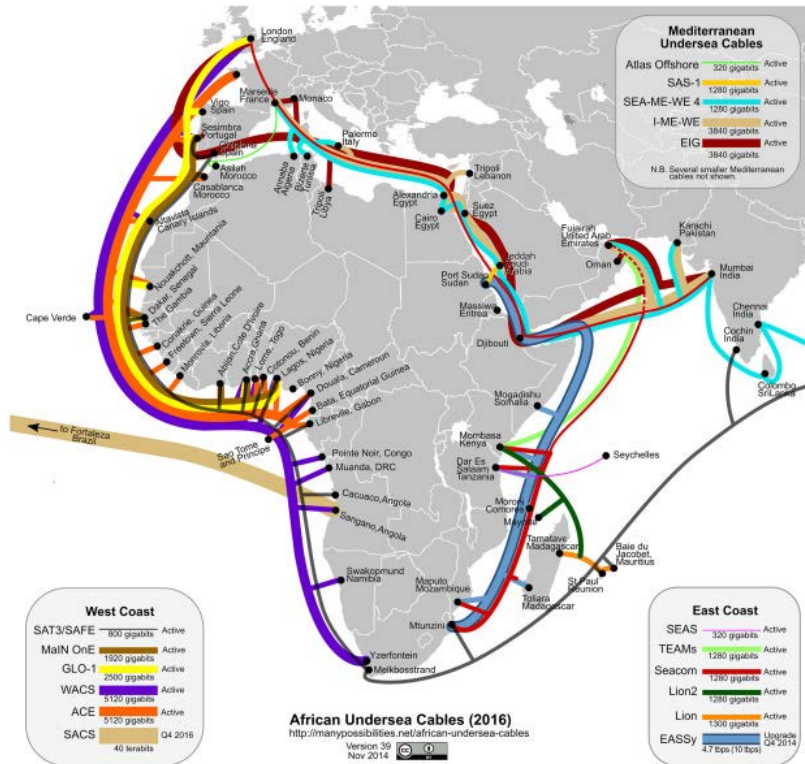


There have been significant improvements to Africa's Broadband services in recent years

- Enormous investments have taken place across the value chain, notably in submarine cables and terrestrial backbone
- These investments have had a dual impact on Internet access services, through lower prices and increased adoption
- However a number of countries is still underperforming due to policy and regulatory shortfalls
- This presentation will address the policy issues and regulatory approaches that may enhance improvements in Broadband access services in African countries



Once a bottleneck, undersea cable contributed to a significant decrease in Internet retail prices



- Seven major new submarine cable systems have been completed in Sub-Saharan Africa since 2009
- Increased availability of bandwidth in coastal regions, and competition between cable operators is leading to a substantial reduction in consumer's internet price: cable connectivity accounts up to 50% of a fixed broadband cost
- The median monthly charge for an STM-1 circuit (Johannesburg to London) has fallen by more than 40% per year since 2009

Source: <https://manypossibilities.net/african-undersea-cables/> accessed in January 2015, Telegeography



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Fixed retail prices have decreased significantly but still vary widely across African countries

Fixed broadband cost as % of GNI p.c.			
	2013	2008	% change
Maritius	0,84	11,1	-92%
Seichelles	1,6	6,8	-76%
South Africa	2,85	5,5	-48%
Gabon	3,42	n.a	n.a
Cape Verde	3,54	19,6	-82%
Botswana	6,05	6,1	-1%
Namibia	10,62	16,5	-36%

Less affordable countries are landlocked

Fixed broadband cost as % of GNI p.c.			
	2013	2008	% change
Central African R.	2193,6	4407	-50%
Rwanda	642,5	344	87%
Malawi	241,2	4320	-94%
Burundi	220,5	n.a	n.a.
Niger	176,2	249	-29%
Madagascar	159,4	450,2	-65%
Togo	102,2	352	-71%



International
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Investment in capacity has been huge, but a number of obstacles remain in place

■ Submarine Cables

- USD 3.8 billion invested in recent years
- Total lit capacity in Sub-Saharan African submarine cable systems increasing by 57% annually between 2007 and 2013
- Seven countries have had their first landing station
- Eleven other countries have an additional landing station

■ Terrestrial Capacity

- USD 8 billion invested

- Two coastal countries have no submarine cables, a few others have only one or two
- 16 landlocked countries in Africa that require cross-border terrestrial capacity to access international connectivity at cable landing stations either than by satellite
- Evidence that cross-border connections are still limited, resulting in indirect traffic exchange

Source: <https://manypossibilities.net/african-undersea-cables/>
Terabit Consulting <http://www.terabitconsulting.com/downloads/2014-submarine-cable-market-industry-report.pdf>, accessed January 2015



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In countries where there will be only one or two cables there may be need for some form of price regulation

- Forms of price regulation:
 - Price approval ... the Cable Landing Station (CSL) 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



What are we pricing?

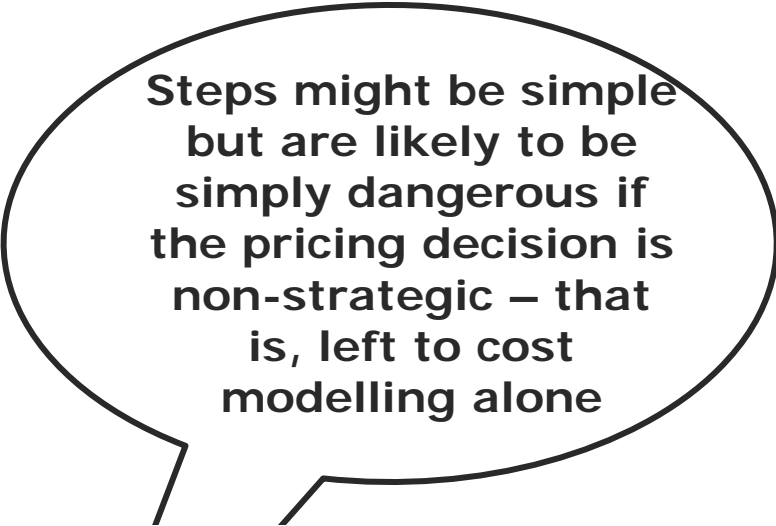
- Price of wholesale access to capacity on international submarine cable
 - Expressed as a price per Mbps per month
 - Potentially differentiated by capacity (e.g. E3, STM1)
- Charge for co-location in the CLS
 - Physical or virtual
 - One-off establishment charges plus recurring rental charges.

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.

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



Steps might be simple but are likely to be simply dangerous if the pricing decision is non-strategic – that is, left to cost modelling alone

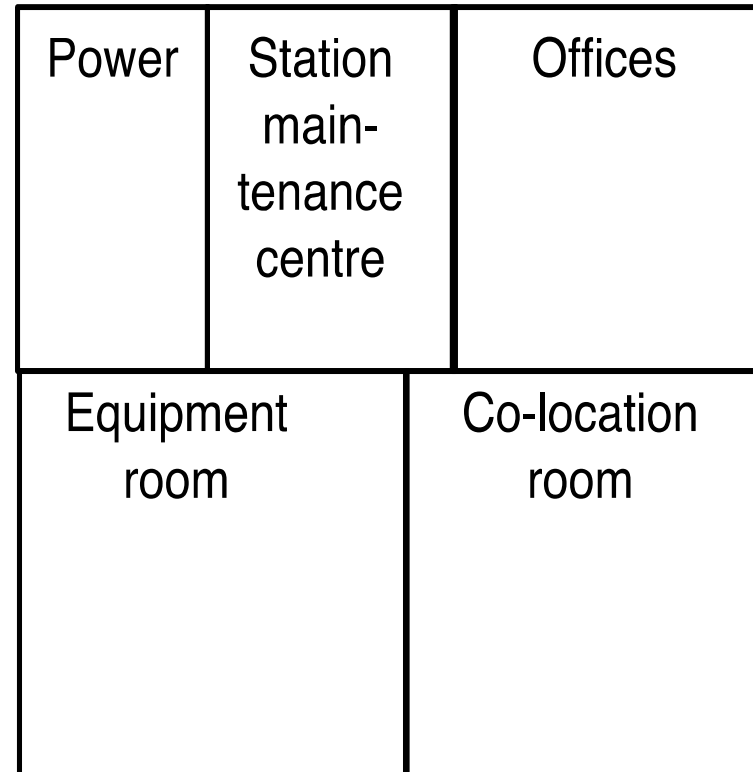
Undersea cable costs

- 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.

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.

Illustrative example taken from a ITU CLS training cost model

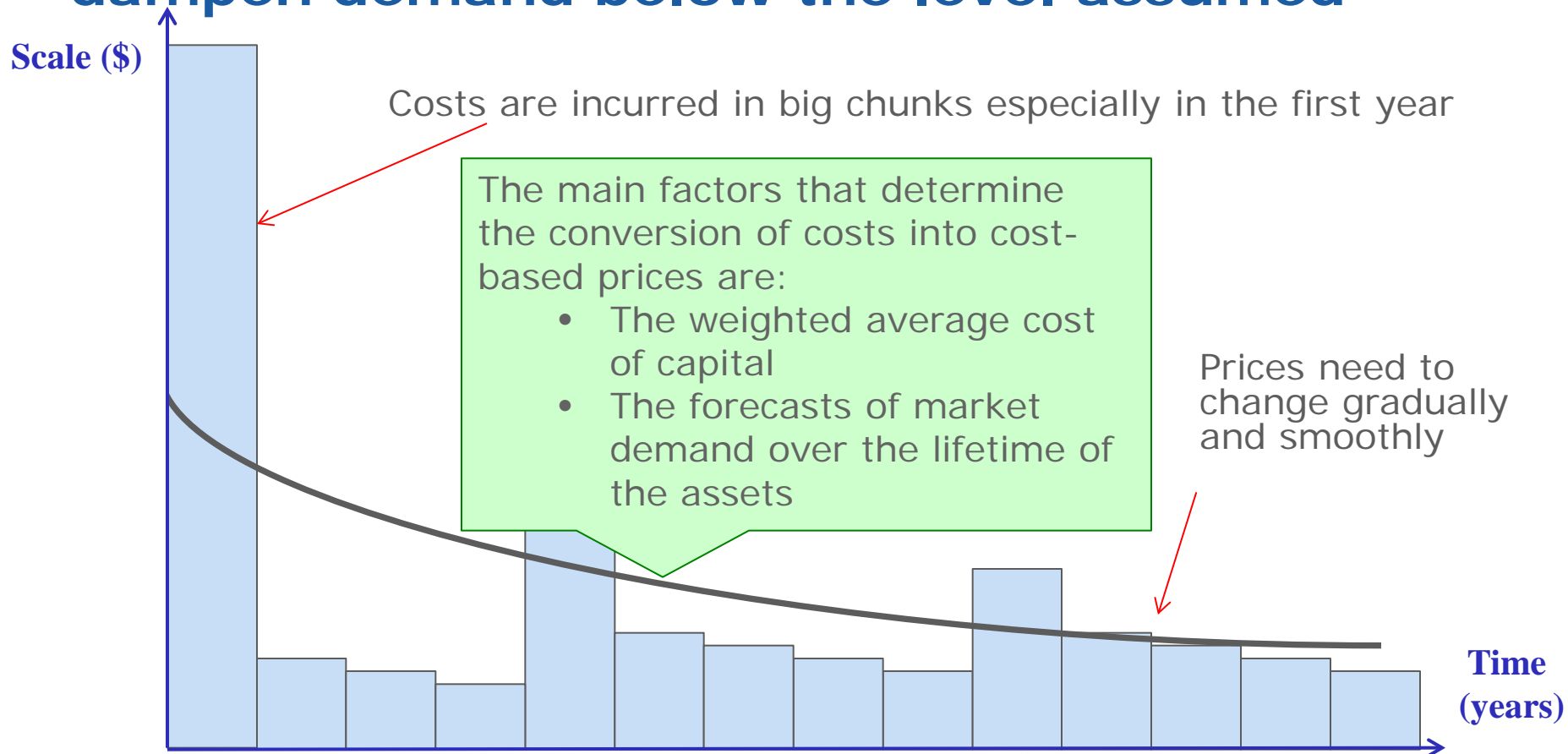
Capital costs

Capital costs	USD
Submarine cable cost	\$3,045,472
Wet plant	\$2,000,000
Marine survey and operations	\$2,066,451
Terminal station equipment	\$2,169,600
SLTE set	\$1,181,100
Project management	\$400,000
Contingency	\$880,000
TOTAL CAPITAL EXPENDITURE	\$11,742,622

Operating expenses

OPEX	USD
Wet segment operations and maintenance	\$437,500
CLS operations and maintenance	\$145,758
Annual licence & regulatory fees	\$125,000
Sales, general and administration	\$62,500
Staff expenses	\$157,000
Contingencies	\$15,000
TOTAL OPEX	\$505,258
Total OpEx as a % of Total CapEx	4.30%

Pricing that tries to recover cable and CLS costs as they are incurred is likely to dampen demand below the level assumed



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%
- So the source of funding can substantially affect investment risks, costs and prices.



Illustrative example taken from a ITU CLS training cost model

Pre-tax weighted average cost of capital (WACC) for initial investment

Component	World Bank grant	Equity	Commercial loan	Total
Weighting	25.0%	50.0%	25.0%	100.00%
Nominal cost	0.0%	15.0%	9.0%	
Tax rate	25.0%	25.0%	25.0%	
Tax adjusted nominal cost	0.00%	11.25%	6.75%	
Inflation rate	0.5%	3.0%	3.0%	
Real cost	-0.50%	8.25%	3.75%	
Weighted component of WACC	-0.13%	4.13%	0.94%	4.94%

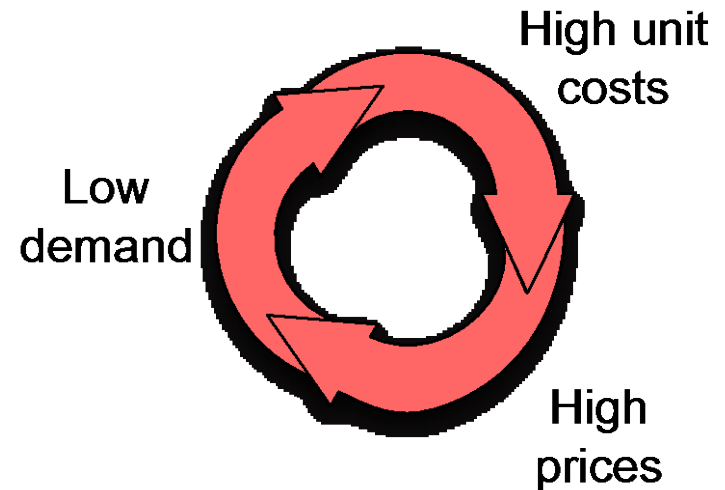
Pre-tax weighted average cost of capital (WACC) for incremental investment

Component	World Bank grant	Equity	Commercial loan	Total
Weighting	0.0%	60.0%	40.0%	100.00%
Nominal cost	0.0%	15.0%	9.0%	
Tax rate	25.0%	25.0%	25.0%	
Tax adjusted nominal cost	0.0%	11.3%	6.8%	
Inflation rate	0.5%	3.0%	3.0%	
Real cost	-0.5%	8.3%	3.8%	
Weighted component of WACC	0.0%	5.0%	1.5%	6.45%



Why might cost model outcomes without more be poor pricing decisions?

- Specially in the first year of operation of a country's submarine cable demand is very hard to forecast not to say impossible
- Aiming for full cost recovery during these initial years will keep prices high and suppress demand
- Low demand will keep unit costs high



A vicious circle in which profits are constrained and with little or no economic welfare gain

What actions can the CLS operator or the Government take to break this vicious circle?

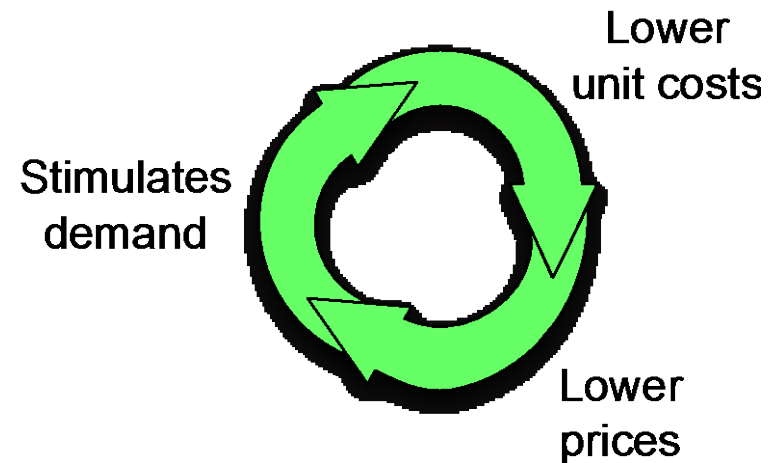
Government as a consumer (without regulating)

- Government ministries are potentially a very large consumer of broadband internet access
- Government can therefore help stimulate retail demand for wholesale cable capacity by increasing its demand (and its spending) on broadband connectivity for all Ministry / Department offices
 - Aggregating the demand of multiple ministries might also help
 - Retail, not wholesale
- This obviously comes at a cost
 - Higher bills for telecoms services and perhaps more IT equipment
 - But all retail consumers potentially benefit from lower prices



CLS operator ROCE objectives

- Return on capital employed
 - $\text{EBIT} / \text{Capital employed}$
 - Maximum may be set by the regulator in the form of a regulated WACC
- CLS operator can stimulate demand by accepting a very low or negative ROCE during the early years
 - Reduces value of annual capital charges and thus unit costs
 - Private versus PPP ownership



A virtuous circle with the possibility of enhanced long-term profits and substantial economic welfare gain

Depending on legal provisions, a essential facility status or dominance designation within a CLS market may be necessary

- In Singapore the regulator added the undersea cable landing station to the Reference Interconnection Offer (RIO) of SingTel. Prices for co-location access and connection to submarine cables are set on a cost-orientated basis using a forward looking economic cost (FLEC)
- In India the regulatory authority capped the international connectivity prices (cost based) and required dominant players to elaborate a Reference Interconnection Offer (RIA).
<http://www.tatacommunications.com/downloads/providers/cls/cls-rio-vs-b-mumbai.pdf>
- Mauritius regulator, ICTA, in 2006 set the price of IPLCs on a cost-oriented basis. Regulation is applied to both the cable landing station and the submarine cable. The charge for IPLCs was determined on the basis of a fully allocated historic costing methodology with an allowance for a reasonable rate of return.

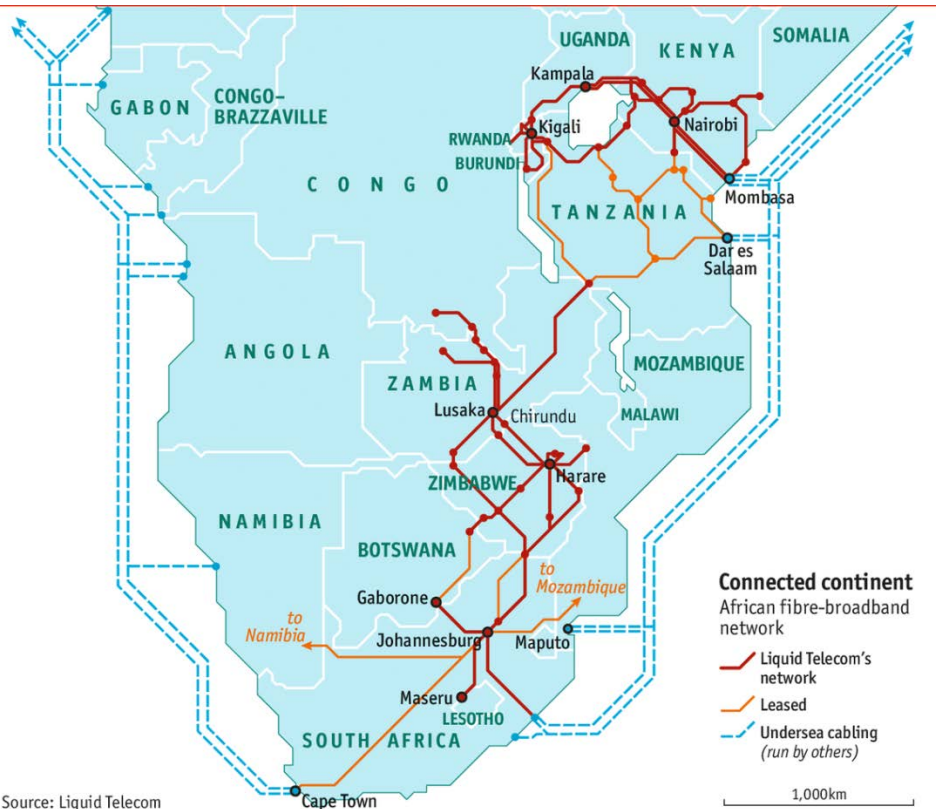
Source: Regulator's websites and "The regulation of undersea cables and landing stations" accessed at http://www.cablesm.fr/2007_esselaar-et-al-2007-undersea-cables.pdf January 2015



Effects of undersea cables will be stronger when accompanied by terrestrial networks

- Weak competition at the national level to link population centres to the international gateways
- Mobile operators networks in the region have been built for their own use, rather than for resale and aiming at national coverage purposes
- Only a few countries (Kenya, Nigeria, South Africa, Zambia and Zimbabwe) can be said to have some level of competition due to the presence of multiple players.
- Cross border networks are rare
- Regional approaches and solutions based on political cooperation are needed to address the problem of access faced by landlocked countries

Private sector initiatives such as Liquid Telecom show the relevance of access to other's fiber networks



- Liquid (founded by former Ecomet shareholders) has built through acquisition and construction Africa's largest single fibre network (17,000km) including Uganda, Kenya, Rwanda, Zambia, Zimbabwe, Botswana, DRC, Lesotho and South Africa
- Liquid has so far spent \$350m on its internet network
- Though mainly a wholesale business, Liquid also has 50,000 homes as customers in Zambia and Zimbabwe

Source: *The Economist*, "Cabling Africa's interior. Many rivers to cross", July 5th 2014, printed edition

Even when the state holds a substantial stake in the incumbent regulatory barriers should be removed

- Landlocked countries of which there are 16 in the region depend on terrestrial links and access to cables for connectivity
 - *“The Communications Regulators’ Association of Southern Africa (CRASA) is spearheading the effort, aimed at giving all countries in the Southern African region equal access to the cables. Crasa’s legal and policy committee wants the region’s landlocked countries to have access to the region’s undersea cables at the same price as countries along the shore.”*

Source: <http://www.cio.com/article/2874973/regulators-push-for-open-access-to-africas-undersea-cables.html> accessed January 2015



Broadband services development in Africa will depend a lot more on mobile

- In Africa copper legacy networks are small compared to developed countries , South Africa maybe the exception
- Last mile access will probably depend on wireless networks which need more investment to achieve higher levels of service (reliability, higher speeds) so competition among mobile operators can lower prices
- An open access policy for the backbone and backhaul networks may allow MNO's to increase coverage and the quality of the network by redistribution of the investment
- The emergence of bundles (data with voice and sms) will increasingly turn more difficult to evaluate and regulate prices at retail level



Conclusions

- Liberalization of gateways and national backbones
- Strategic pricing of connectivity: Pricing based on recovery over the long term to facilitate early take-up
- Cost and time of rights of way access
- Sector-specific taxes
- Regulatory certainty
- Facilitate infrastructure sharing
- Public private partnerships
- Retain ex-ante cost-based regulation for broadband infrastructure access



Obrigado
Thank you
Merci
Gracias

