Overview of Economic Regulation in the Telecommunications Sector

Presentation to Economics 435/835 of the Queen’s Economics Department -- Kingston, Canada
February 27, 2009

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Contents

1. Global Sector Trends
2. Global Reform Trends
3. Global Revenues and Expenditures
4. Regulation and Competition
5. Regulation of Prices
6. Universal Service
Section #1:
Global Sector Trends
Telecoms growth in last ten years

- Mobile broadband
- Internet users
- Mobile cellular subscribers
- Fixed lines
Regional differences remain, mostly due to national incomes...
As evidenced in fixed density...
As well as Internet
Econometric studies have found that an increase of 10 mobile phones per 100 people boosts GDP growth by 0.6%.

Similarly, a 1% increase in the number of Internet users increases total exports by 4.3%.

Countries with better Information Infrastructure have higher GNP per Capita Growth.

Less Developed Information Infrastructure: 1.9%

More Developed Information Infrastructure: 2.6%
Section #2: Global Reform Trends
Macro Sector Reforms - I

• With a few notable exceptions, the sector around the world 20 years ago was quite different…

• Government-owned and run operator (incumbent)
  – As other utilities, based on public interest considerations

• Providing all/most services in monopoly exclusivity
  – Economic argument of natural monopoly (scale economies means one firm could serve most / all demand at lowest cost)

• Policy and other considerations
  – Expansion, service plans and prices determined jointly with relevant Ministries, based on policy/political considerations
Macro Sector Reforms - II

- Three types of macro-level reforms:
  - **#A - Introduction of Competition**
    - Serve unserved markets, increase efficiency, lower prices
  - **#B - Privatization of Incumbents**
    - Attract financing, expand infrastructure; bring in professional management
  - **#C - Institutional Reforms**
    - Legal & regulatory frameworks, including institutional and functional separation:

<table>
<thead>
<tr>
<th>Telecoms Ministry</th>
<th>Regulatory Agency</th>
<th>Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determines Policy</td>
<td>Regulates Sector</td>
<td>Operates Networks</td>
</tr>
</tbody>
</table>
Reform of Institutions - I

• Competition & privatization brings to fore issues internalized in state monopolies (politicization of infrastructure)
  – Large, specific and sunk investments; Economies of scale; Wide-spread public consumption
• Incentive for “expropriation” by reduction of prices, etc.

• For reforms to take root in traditionally weak governance / low capacity jurisdictions
  • Governments that want to motivate private investment will have to design institutions that limit its own ability to behave opportunistically once the private utility has invested
    – Enforceable legal and regulatory framework
    – Proper administrative procedure
    – Judicial review
Reform of Institutions - II

• Telecoms Ministry
  – Can establish and update sector policy based on interests of sector, rather than be conflicted as (part or full owner) of operator(s)

• Regulatory Agency
  – Independent regulator can implement sector policy without conflict of interest
  – Sector confidence in independent regulator promotes investment

• Operators
  – Can take commercial decisions based on legal and regulatory framework
#A - Mobile voice competition - OECD

![Chart showing mobile voice competition in OECD countries from 1989 to 2004. The chart indicates the number of countries with four or more operators, three operators, duopoly, and monopoly.](#)
#A - Status of global competition

![Bar chart showing the status of global competition for various services like Basic services, Leased lines, Mobile cellular (2G), Internet services, Wireless local loop, VSAT, Cable TV, DSL, and 3G. The chart compares monopoly and competition scenarios.]
#B – Status of fixed incumbents

![Graph showing the status of fixed incumbents from 1991 to 2008. The graph compares the number of countries with private and state-owned fixed incumbents.](image-url)
#C – Global growth of regulatory agencies
#C - In all Regions of the world

- Africa: 93%
- Americas: 89%
- Europe: 80%
- Asia-Pacific: 66%
- Arab States: 62%
Section #3:
Global Revenues and Expenditures
Telecoms prices declined in OECD w.r.t. harmonized all items CPI (HICP)
OECD largest growth item from disposable income is communications
Hence revenues increasing absolutely
so while prices have gone down, there are more users and each user spends more…
Telecoms becomes more important, especially in developing countries...
So especially in Africa, some countries spend 5%-10% income on telecoms.
## “Stylized” telecoms relationships

<table>
<thead>
<tr>
<th>Category of Country (by income)</th>
<th>Annual National Income ($US)</th>
<th>Density: fixed/mobile/Internet per 100 pop (%)</th>
<th>Rev/User: fixed/mobile/Internet per month ($US)</th>
<th>Rev/Pop: fixed/mobile/Internet/Total per year ($US)</th>
<th>Rev/GDP: fixed/mobile/Internet/Total per year (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper-High</td>
<td>&gt;$20,000</td>
<td>57% 105% 40%</td>
<td>$55 $42 $35</td>
<td>$376 $529 $168 $1073</td>
<td>1.1% 1.5% 0.5% 3.1%</td>
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<tr>
<td>Lower-High</td>
<td>$11,456 to $19,999</td>
<td>27% 85% 20%</td>
<td>$56 $32 $25</td>
<td>$181 $326 $60 $568</td>
<td>1.2% 2.2% 0.4% 3.8%</td>
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<tr>
<td>Upper-Middle</td>
<td>$3,706 to $11,455</td>
<td>11% 70% 6%</td>
<td>$57 $18 $17</td>
<td>$79 $151 $12 $242</td>
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<tr>
<td>Lower-middle</td>
<td>$936 to $3,705</td>
<td>4% 45% 1.3%</td>
<td>$58 $12 $13</td>
<td>$29 $65 $2 $95</td>
<td>1.4% 3.2% 0.1% 4.8%</td>
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<tr>
<td>Low</td>
<td>&lt;$935</td>
<td>1% 17% 0.3%</td>
<td>$59 $10 $9</td>
<td>$7 $20 $0.3 $28</td>
<td>1.3% 3.7% 0.1% 5.1%</td>
</tr>
</tbody>
</table>
Section #4:
Regulation and Competition
Context and Rationale

• Characteristics constitute/have constituted legal, economic or competitive barriers to entry

• Some operators in some markets have market power which they may use to stifle the competitive process (anti-competitive conduct) or harm consumers directly (e.g. excessive prices, etc.)

• Governments have adopted regulation to ensure smooth transition in the liberalization process from monopoly to open-entry markets and address social objectives
  – Competitive markets (no market power exists) should not be regulated; competition ensures efficient economic outcomes; competition policy can address abuse of dominance, etc.
  – Where no competition allowed, regulation focuses on consumer protection aspects (etc. retail tariffs, etc.)
  – Where competition is allowed, but market power persists, regulation focuses on consumer protection aspects & preventing/identifying anti-competitive conduct
Forms of Regulation

• Contracts-based Regulation
  – Specific provisions, including with respect to economic regulation are included in a Government-operator contract-try document
    • Document could include licence, privatization agreement, etc
    • Provides long-term certainty to operator
    • Regulatory agency has limited powers other than to monitor compliance

• Norms-based Regulation
  – Higher-level principles and procedures enshrined in legal and regulatory documents
    • Documents could include laws, regulations, codes of practice, etc
    • Preparation requires participation of operators and other stakeholders
    • Regulatory agency has powers to make regulatory decision in the public interest subject to framework
Examples of economic & social regulation

• Regulation of Prices
  – Longest and deepest tradition of economic thinking, including in relation to public economics, elasticity estimates and optimal regulation of monopolies
  – Potentially area of largest economics influence, yet area that is likely the most subject non-economic decision-making

• Universal Service
  – A “left-over” of the utilities concept that “everyone has a right” to a certain service at an “affordable” price, independent of income or location
  – Long-standing utilities practice of uniform pricing independent of cost of providing service
Section #5: Regulation of Prices
Rate of Return

• Traditional form of rules-based regulation for utilities
  • Aim is to set operator’s rate of profit to a “fair” level – directly regulates profits; direct link between regulated prices and profits
  • Uses “known-and-measurable” accounting data to provides a reliable measure of net investment (depreciated original cost rate base)
    – Requires detailed, extensive and reliable historical and current data

• Process in summary:
  • Regulatory agency reviews operating expenses, depreciation expense, income taxes, and “regulated rate base”
  • Determine regulated rate of return on rate base based weighted average cost of capital (WACC)
  • Calculate total revenues that may be generated in a given period; and set individual prices so that they result in such total revenues

• Used in one form or another for decades in North America; subject of economic debate/criticism
Price Cap Regulation

- Sets maximum average prices for basket of services over a period of time; cuts link between regulated prices and operator profits
  - Focus on operator incentive to maximize profits by reducing costs & sharing of some productivity gains with consumers
- Theoretically, data needs could be as extensive as in ROR, but in practice can be done with much less
- Allows operators greater flexibility over setting of prices, hence also for rebalancing of prices
- “Locks in” a level of profits, therefore it is important to set “going-in” prices
  - Otherwise, prices “too low” or “too high” (and profits too high or too low), in comparison to ROR
Basic Features of Price Caps

• Basic formula focuses primarily on two variables:
  • Inflation index ("I")
  • Expected productivity improvement by operator ("X" factor)
    – Typically measured by total factor productivity ("TFP")
  – I - X constraint applied to a revenue-weighted index of the company’s prices
    • Aggregate service prices cannot exceed I – X
• Total Factor Productivity TFP is used to measure aggregate productivity or efficiency performance over time
  • Economic concept from growth accounting literature
    – Could be for an economy as a whole, a sector or an individual firm; improvements in TFP performance typically result from ongoing technological developments and, in the case of network industries, economies of scale & scope
    – When measuring TFP, all outputs produced by the firm should be properly taken into account, along with all corresponding inputs (i.e., labour, capital and materials) used by the firm
Graphical example of two-period price cap plans (First and Second): Assume initial “super-normal” profits (above WACC)
First Plan - Option #1:
Apply ROR to eliminate excess profit and separately apply price caps (with “pure” TFP-derived X) on new price levels.
First Plan - Option #2: 
Apply price caps (with X calculated by forward-looking financial model) to eliminate excess profits
First Plan - Option 3:
Apply price caps ("pure" TFP-derived X) on existing prices; will "lock in" super-normal profits
Price Rebalancing

• “Rebalancing” is moving prices for different services more closely in line with corresponding costs
  – Under monopoly model price structures in many countries were unbalanced, with some services priced well above costs and others below costs
  – Prices of telephone connections, monthly subscriptions, and local calls have traditionally been set below costs in many countries. Resulting deficits have been subsidized by higher-than-cost long distance and international calling prices

• Unbalanced prices not sustainable in competition
  – New competitors will generally enter those market segments where profit margins are highest, such as long distance and international calling
  – Incumbent operators will therefore be under pressure to reduce subsidies or risk losing customers in the more profitable market segments

• Unbalanced prices economically inefficient
Sample of unbalanced prices

Residential access (connections)

$\text{LRIC} = 235$

$P = 139.80$

6.45m

Business access (connections)

$\text{LRIC} = 235$

$P = 240$

2.76m

Local Calling (calls)

$\text{LRIC} = 0.099$

$P = 0.232$

11.2b

Domestic LD Calling (minutes)

$\text{LRIC} = 0.124$

$P = 0.311$

9.51m

International Calling (minutes)

$\text{LRIC} = 0.759$

$P = 1.129$

638m
## Sample of rebalancing scenarios & estimates of efficiency losses

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Variable</th>
<th>Res. Access</th>
<th>Bus. Access</th>
<th>Local Calls</th>
<th>Domestic LD Calls</th>
<th>International calls</th>
<th>Total</th>
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<td>Base Scenario</td>
<td>LRIC $</td>
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<td>235.00</td>
<td>0.099</td>
<td>0.124</td>
<td>0.759</td>
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<tr>
<td></td>
<td>Price ($)</td>
<td>139.80</td>
<td>240.00</td>
<td>0.232</td>
<td>0.311</td>
<td>1.129</td>
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<td>0.759</td>
<td>2909</td>
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<tr>
<td>Net. rev ($m)</td>
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<td>2909</td>
<td>0</td>
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<td>0</td>
<td>2909</td>
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<td>Eff. Loss ($m)</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>Scenario 2: Constrained Ramsey Prices</td>
<td>Price ($)</td>
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<td>350.00</td>
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<td>301</td>
<td>38</td>
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<tr>
<td>Eff. Loss ($m)</td>
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<td>27</td>
<td>5</td>
<td>0</td>
<td>45</td>
<td></td>
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<tr>
<td>Scenario 3: Constrained Ramsey Prices</td>
<td>Price ($)</td>
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<td>350.00</td>
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<td>0.158</td>
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<td>0</td>
<td>54</td>
<td>10</td>
<td>1</td>
<td>65</td>
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<tr>
<td>Scenario 4: Constrained Ramsey Prices</td>
<td>Price ($)</td>
<td>235.00</td>
<td>350.00</td>
<td>0.232</td>
<td>0.209</td>
<td>0.919</td>
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<td>318</td>
<td>1492</td>
<td>975</td>
<td>124</td>
<td>2909</td>
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<td>Eff. Loss ($m)</td>
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<td>0</td>
<td>26</td>
<td>67</td>
<td>8</td>
<td>101</td>
<td></td>
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<tr>
<td>Scenario 5: Constrained Ramsey prices</td>
<td>Price ($)</td>
<td>140.00</td>
<td>350.00</td>
<td>0.232</td>
<td>0.272</td>
<td>1.036</td>
<td>2909</td>
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<tr>
<td>Net. rev ($m)</td>
<td>-614</td>
<td>318</td>
<td>1492</td>
<td>1520</td>
<td>194</td>
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<td>Eff. Loss ($m)</td>
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<td>26</td>
<td>203</td>
<td>25</td>
<td>262</td>
<td></td>
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</tbody>
</table>
Rebalancing trends: OECD residential tariffs
Section #6: Universal Service
Mechanism to promote Universal Service/Universal Access ("UA/US")

- Different combinations possible
  - Traditional state-owned monopoly model
  - Government-funded initiatives
  - License-based roll-out/coverage obligations
  - Market-based reforms
  - Compensation via Universal Service Fund
Other Mechanisms - I

• **Traditional state-owned monopoly model.** Incumbent maintains UA/US as integral part of its mandate; traditionally resulting from “give and take” discussions and/or negotiations
  - **Advantages:** No admin. costs; costs borne operator via internal cross-subsidies
  - **Disadvantages:** Difficult to assess “give” and “take” amounts

• **Government-funded initiatives.** Vast number/variet, e.g. PCs in schools & other public institutions, broadband expansion, etc. - promoted and/or financed by Governments
  - **Advantages:** Low administration costs; price or initiatives shared by all population
  - **Disadvantages:** Not permanent; subject to political decision-making; amount may not be optimal
Other Mechanisms - II

• **License-based roll-out/coverage obligations.** Licenses obligating extension/maintenance networks and/or services; no explicit compensation
  
  – **Advantages:** Low administration costs; costs are borne by operator (internal cross-subsidies)
  
  – **Disadvantages:** Obligations modest; complex to co-ordinate in multi-operator competition

• **Competition** - monopolies restrict output & increase prices
  
  – **Advantages:** Incentive to operators to serve all commercially-viable subscribers/areas
  
  – **Disadvantages:** Non-commercially viable populations/areas not likely to be served

• **Privatization** - State ownership can restrict expansion –
  
  – **Advantages:** Budget constraints may be lifted/reduced as a result of privatization
  
  – **Disadvantages:** Private operators not interested in loss-making or profit-reducing initiatives
Best Practice – establish USF

- Given market reforms, explicit compensation arrangements / regulatory intervention often requested
  - Privatized operator will not have interest in loss-making activities that are not compensated
  - Incumbents that face competition from operators without same obligations will complain that “not level playing field”

- Universal service fund (USF) objective is to finance in a transparent manner expansion and/or maintenance of designated networks/services that would not otherwise be commercially sustainable
  - USFs provide financing (subsidies) to compensate designated universal service providers USPs
  - **Advantages:** Independent and transparent mechanism to implement UA/US initiatives
  - **Disadvantages:** High administration costs; USF could collect but not disburse
USFs - approaches to USPs

• Prior designation of USP
  – One operator (typically incumbent fixed operator) obligated to provide/maintain, designated services in designated area
    • Separate accounting and/or compensation calculated by USF
  – **Advantages:** Useful in competitive environment to “level the playing field” where focus is maintenance of existing networks
  – **Disadvantages:** Very high administration costs

• Project-by-project selection of USPs
  – Selection, usually based on auction, of one or more operator (could be incumbent or entrants) to provide and maintain designated services in designated area
    • Compensation based on results of tender for each project
  – **Advantages:** Useful in competitive environment to where focus is expansion/roll-out of new services
  – **Disadvantages:** High administration costs
Key elements of USFs

- **Scope**
  - National conditions and amount of money/resources devoted
  - Geographic, population and service coverage

- **Collection**
  - Telecommunications sector levy/contributions
    - Most common and generally most sustainable, based on % of revenues
  - Direct funding from Government
  - Privatizations, auctions, license fees, etc.

- **Administration**
  - Independence
    - Administrative, Financial, Operational (e.g. procurement process)
  - Governance and Internal Structure

- **Size:**
  - Amount of money to be collected, administered and distributed
    - Most mechanisms generally collect less than 5% of sector revenues and usually in the range of 0.5% to 2.5%; Examples (per year): India: US$450 million; USA: US$5,600 million
### Selection of current/future collection amounts (% sector revenues)

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1.2</td>
</tr>
<tr>
<td>Brazil</td>
<td>1.0</td>
</tr>
<tr>
<td>Canada</td>
<td>0.9</td>
</tr>
<tr>
<td>Chile</td>
<td>0.2</td>
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<tr>
<td>Colombia</td>
<td>1.3</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>2.0</td>
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<tr>
<td>France</td>
<td>0.2</td>
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<tr>
<td>India</td>
<td>4.9</td>
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<tr>
<td>Italy</td>
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<td>Malaysia</td>
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<td>Peru</td>
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<td>Saudi Arabia</td>
<td>1.0</td>
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<tr>
<td>South Africa</td>
<td>0.2</td>
</tr>
<tr>
<td>United States</td>
<td>2.2</td>
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</table>
Conceptual Basis: Universal Access – Zone and Gaps
Conceptual Basis:
Universal Service – Zone and Gaps

- Service real economic gap
- Service market efficiency gap
- Existing service zone

Income / revenues

Remoteness / cost
Country Approaches - I

• Larger (geography & population), high-income, with extensive fixed networks
  – Extensive fixed before extensive mobile networks
    – Mobile a complementary service for most; economic and other impact has been incremental
  – Full competition in all segments
    – No market efficiency gap
  – Establish USF; strategy: Identify fixed high cost geographic areas (maybe 5-15% of users); designate incumbent fixed USP to continues service, continuing subsidy calculated by separate (from operator) USF
    • No tenders
    • Size of fund varies, but generally in lower range
      – Always: voice individual fixed
      – Sometimes: internet public access
      – Experimental: Provide subsidized pre-paid mobile handsets
Canada Example: Monthly estimates of costs, by geographic area for fixed service

<table>
<thead>
<tr>
<th></th>
<th>Band A</th>
<th>Band B</th>
<th>Band C</th>
<th>Band D</th>
<th>Band E</th>
<th>Band F</th>
<th>Band G</th>
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<tbody>
<tr>
<td><strong>BELL CANADA</strong></td>
<td>9.04</td>
<td>12.82</td>
<td>15.10</td>
<td>17.35</td>
<td>28.07</td>
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<td>50.03</td>
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</table>
USFs in high-income with extensive fixed networks; maintain fixed private voice universal service

Funding

income / revenues

Population density / remoteness / cost

existing service zone

unprofitable Requires ongoing or permanent subsidies

service real economic gap
Country Approaches - II

- Larger (coverage & population) low-income with small fixed network
  - Very limited fixed network (main cities only; virtually none in extensive rural areas, where most population resides) before extensive mobile networks/uptake
    - Around 90% population coverage by mobile signal
    - Mobile a new service for almost all; economic & other impacts significant
  - Limited/no competition fixed; recent mobile competition
    - Fixed – large market efficiency gap
    - Mobile – Little or no market efficiency gap
  - Establish USF; strategy: Identify unserved rural areas & tender to select project-by-project provider, based on one-time subsidy from USF resulting from tender
    - Tender open to existing and yet-to-be-licenced operators
    - Size of fund varies, but generally in upper range
      - Initially: voice and/or public access (fixed and/or VSAT)
      - Now: voice private access (infrastructure to provide mobile signal)
Before: in low-income; expand fixed public voice universal access

- Access market efficiency gap
- Access real economic gap

Income / revenues

Remoteness / cost

Funding

existing access zone
Now: in low-income countries; expand mobile private voice universal service
The End

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