Submarine Cables: A Key Economic Facilitator

- Submarine cables are the world's primary path for international communications, international e-commerce, and international digitally-enabled services
  - Satellite handles less than 0.5% of international traffic
  - International terrestrial fiber optic networks, while a key complement to submarine connectivity, do not currently offer coherent, cost-effective international capacity
Submarine Cables Have Connected the World

• As of 2016, almost no mainland coastal country* or major island is without submarine fiber optic connectivity

• In nominal terms, the industry’s efforts to connect the unconnected have been impressive.

• Civilian-inhabited countries and territories unserved by fiber:
  - 79 in 2005
  - 29 in 2015
  (0.5% of population)

*exception: DPR Korea
The Economic and Developmental Impact of Submarine Cables

- **Economic Growth**: submarine cables stimulate the following:
  - Increased demand for output (demand multiplier), new opportunities for production (supply multiplier), new goods and services for consumers (final demand)

- **Benefits to Consumers**
  - Increased international bandwidth
  - Increased consumer affordability of broadband services
  - Increased reliability of international Internet and data services

- **Increased Government Revenue**
  - Growth in output as a result of increased ICT investment (tax revenue, employment)

- **Regional Stability**
  - Improved political, economic, and intercultural relations
  - Opportunities in educational, healthcare sectors
$70 Billion Worth of Investment To-Date

New Submarine Cable Investment by RFS Date
Source: 2016 Undersea Cable Report (Terabit Consulting)
The Primary Driver of New System Demand: International Bandwidth

Intercontinental submarine cable bandwidth has increased from ~50 Tbps in 2011 to ~140 Tbps in 2015.

Growth is highest in:
- Southeast Asia
- South Asia & ME
- Australia
- Latin America
- Africa
An Optimal Time for New Investment in Submarine Cables

• Healthy competition in supply market

• Lower overall system costs

• Tremendous efficiencies offered by mature 100G technology

• Sophisticated financing options
  • More experienced private lenders, multilateral development banks, and supply community
  • Strong understanding of the path toward project success
A New Development-Oriented Model of International Fiber Investment

PPP Structures
- SPV w/ Gov’t. Sharehold
- SPV w/ Gov’t Contribution
- BOT Concessions
- Project Mgmt. Contracts

Appropriate Cost-Sensitive Solutions
Submarine Investment Has Shifted toward Emerging and Less-Developed Markets

- Since 2003, the share of submarine investment serving less-developed and emerging markets has increased from 33% to more than 60%.

Regional Share of Total Investment in New Submarine Systems
Source: 2016 Undersea Cable Report (Terabit Consulting)

- Africa
- South Asia & Middle East
- Europe & Mediterranean Regional
- Transpacific
- Pan-East Asian
- East Asian Regional
- Latin America
- Transatlantic
- Other
- Australia
- Pacific Islands

The Bandwidth Divide Remains: 43% of Countries Have Insufficient Bandwidth

Classification of Countries and Territories by International Bandwidth per Capita, 2015

- Average (10-29.9 Kbps): 29%
- High (50-99.9 Kbps): 15%
- Very High (100 Kbps or greater): 13%
- Low (less than 10 Kbps): 43%

Source: Terabit Consulting International Bandwidth Databank

Average Per-Capita GDP of Countries and Territories in Each International Bandwidth Classification, 2015

<table>
<thead>
<tr>
<th>Classification</th>
<th>Average GDP per Capita, 2015 (PPP terms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High (100+ Kbps)</td>
<td>$45,776</td>
</tr>
<tr>
<td>High (50-99.9 Kbps)</td>
<td>$38,582</td>
</tr>
<tr>
<td>Average (10-29.9 Kbps)</td>
<td>$22,126</td>
</tr>
<tr>
<td>Low (&lt;10 Kbps)</td>
<td>$6,839</td>
</tr>
</tbody>
</table>

Source: Terabit Consulting International Bandwidth Databank
The Bandwidth *Haves* and the Bandwidth *Have-Nots*

- Terabit Consulting analysis very clearly reveals a *bandwidth divide* that prevents 43 percent of countries and territories from basic levels of affordable, reliable, quality access
  - Weak international bandwidth is accompanied by high prices and low competition
- Even in countries with higher international bandwidth levels, there can be uneven distribution
  - Broadband is often concentrated in urban, coastal, affluent communities
Where the Bandwidth Divide is Most Pronounced: ASEAN Region

International Bandwidth per Capita in ASEAN Region, YE2015

Source: Terabit Consulting International Bandwidth Databank

Bandwidth of 10 Kbps or less: Serious obstacle to development

Difference between Singapore and Myanmar: 700x
The Economic Impacts of Weak Submarine Connectivity & Weak International Bandwidth

• There is a strong correlation between international bandwidth and per-capita GDP
  • Bandwidth inequality serves to perpetuate economic inequality
  • Digital communications have been identified as an essential economic flow (with transport, trade, and finance)

• At the macroeconomic level: obstacles to economic and human development
  • Detachment from the digital economy
  • Continued economic inefficiencies and restrained growth
  • Impediment to regional integration
    • (submarine connectivity is essential for ASEAN common market)
  • Lack of access to critical social development tools
    • (telemedicine, distance learning, scientific/research networks)

• Weak international bandwidth constrains the telecom environment
  • High wholesale and consumer prices
  • Lower broadband penetration rates
  • Compromised services and applications (lower reliability and utility)
Solutions for Improving Asian Regional Connectivity

1. Multilateral participation in project development
2. Pan-regional cooperation, coordination, and harmonization
3. In cases of market failure: promotion of open access and non-discrimination
4. Elimination of downstream obstacles that prevent bandwidth utilization
   - Greater competition in backhaul, int’l. gateway
   - Development of intercity and metro fiber networks
   - Promotion of advanced broadband services
   - Programs to encourage ICT adoption
   - Investment in supporting rural infrastructure (e.g. electricity)
THANK YOU

Intelligence, Analysis, and Forecasting for the International Telecommunications Infrastructure Community

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