Terabit Consulting: Leader in International Broadband Market Analysis, Modeling, and Strategy

- Two decades of experience in analyzing markets for international submarine cables, terrestrial cable systems, and broadband projects
- Terabit has delivered feasibility studies, demand modeling, and due diligence for over 100 key telecom infrastructure projects
- Strong relationship with commercial and developmental lenders and a detailed understanding of their requirements
- Extensive experience in Africa: projects for Governments, Operators, World Bank/IFC
  - East African Submarine Cable System (EASSy)
  - East African Backhaul System (EABS)
  - Seychelles-East Africa System (SEAS)
  - Asia-Africa-Europe-1 (AAE-1)
  - Mauritius-Rodrigues Submarine Cable
  - Central African Backbone-I & -II (CAB-1/CAB-2), Trans-African Backbone
  - Maroc Telecom West African Market Analysis
Other Recent Terabit Consulting Projects

- **Digital Infrastructure Initiative (IFC/World Bank)**
  - Lead consultant for Asia and Eastern Europe
  - Detailed market, regulatory, and strategic analysis of 18 countries

- **Digital CASA (IFC/World Bank)**
  - Lead consultant
  - Feasibility study of multinational terrestrial fiber network

- **Asia-Pacific Information Superhighway (AP-IS)**
  - Lead consultant
  - Evaluation of market opportunity to leverage linear infrastructure in 30 markets

- **Middle East Connectivity Hub Strategy (Regulatory Agency)**
  - Detailed evaluation, benchmarking, best practices, and strategic plan for the development of Middle Eastern market as a regional connectivity hub

- **Seabras-1 (Seaborn Networks/Natixis)**
  - Due diligence for US-LatAm submarine cable (RFS 2017)

- **Montserrat Submarine Cable Project (DfID)**
  - Lead consultant
  - Market analysis, demand & revenue modeling, business planning, supplier evaluation

- **Pacific Light Cable Network (PLCN)**
  - Market and traffic study for PLDC and lenders
Key Clientele

- Project Developers
  - Network Developers
  - MNOs/Fixed Operators
  - ISPs
  - Content Providers

- Private-Sector Financial Institutions
  - Commercial/Investment Banks
  - Advisors, Arrangers, Lenders, Investors

- Governments
  - Seeking to Promote and Attract Projects with Incentives
    - Investments
      - SPV w/ Gov’t. Shareholding
      - SPV w/ Gov’t Contribution
      - BOT Concessions
      - Project Mgmt. Contracts

- Multilateral Development Banks & Agencies
  - SPV w/ Gov’t Shareholding
  - SPV w/ Gov’t Contribution
  - BOT Concessions
  - Project Mgmt. Contracts

- System and Equipment Suppliers
  - Identify Market Opportunity
  - Foster Incipient Projects
  - Supplier Financing
Goals of the Market and Traffic Study

1. To identify market opportunities prior to project development
2. To guide project design and structuring during development
3. To forecast the feasibility of a project that is fully conceived
4. To guide the project’s marketing strategy
5. To allow potential investors and lenders to evaluate a project
6. To serve as due diligence
Terabit Model of International Bandwidth Demand

• Top-down modeling of demand from carriers, OTTs, and other bandwidth customers
• Bottom-up modeling includes macroeconomic and telecom market analysis
  – Economic growth, buying power, and addressable market
  – Evaluation of Internet, private network, and voice traffic
    • Broadband technologies, penetration rates, speeds, and national broadband plans
    • Consumer usage patterns and profiles
    • Major non-consumer bandwidth users
    • Direction of traffic, hubbing, and caching
• Thorough analysis of pricing, bandwidth supply and competition
1. Are forecasted revenues and volumes realistic compared to competitors’ past performance?
2. Does a top-down analysis reconcile with a bottom-up analysis?
3. What are the macroeconomic prospects of the target markets?
4. What factors could limit consumer demand (especially in developing markets)?
   a) Income distribution / service affordability
   b) Literacy
   c) Hardware limitations (especially during 3G-to-4G and 4G-to-5G migrations)
   d) Electrification
5. What factors could limit wholesale demand?
   a) Financial health of operators/ISPs/OTTs
   b) Industry consolidation
   c) Regulatory intervention (including management of spectrum and local loop)
Key Bandwidth Market Drivers

1. Mobile data, especially in developing markets, where:
   A. Volume growth is typically 75% to 100% per year; potential step change on horizon with 5G
   B. Operators’ data revenues are growing at >50% per year and compensating for falling ARPU's
   C. Rapid rollout of LTE has been facilitated by infrastructure sharing and towercos

2. Successful FTTH deployments
   A. NBNs
   B. Operator buildouts
   C. Utilities leveraging linear infrastructure

3. Content: insatiable OTT and private network demand
Content Providers

- B4 (Google’s SDN WAN): most recent published traffic figures indicated 10x increase in 3.5-year period leading up to 2015: 93% CAGR
- Azure (Microsoft’s WAN): As of 2017, “Over the last three years, we’ve grown our long-haul WAN capacity by 700 percent”: 91% CAGR
- Private network traffic still forms a minority on all routes, but approaching 50% on transatlantic, transpacific, and pan-East Asian – expected to grow considerably with further infrastructure investments (Marea, PLCN, Monet, Indigo)
Strong Bandwidth Demand

Intercontinental bandwidth demand increased from ~50 Tbps as of YE 2011 to ~190 Tbps as of YE 2016.

Growth is highest in:
- Africa
- Southeast Asia
- South Asia & ME
- Australia & So. Pacific
- Latin America
Practical Obstacles to Fully Leveraging Bandwidth

Limitations in International Gateway Competition and Access

Limitations in Domestic, Inter-city Connectivity

Restricted local access & Expensive Consumer Broadband Services

Lack of ICT Equipment, Lack of Electricity
Downstream Policy Initiatives to Ensure Bandwidth Success

- Truly independent and transparent regulatory environment
- A strong commitment to competition and open-access, non-discriminatory tariff frameworks throughout the entire telecommunications ecosystem
  - International gateway, international bandwidth, and IP transit
  - Backhaul, interconnection, domestic transport, access networks, and ROW
- Local-loop unbundling and infrastructure access, as well as antenna and tower site sharing, to ensure competitive service offerings to end-users
- Promotion of content localization, content development, and Internet exchanges, to prevent inefficient traffic paths and “hairpinning.”
  - By encouraging private-sector IXP participation as well as requiring government entities (and possibly educational and research networks) to participate in IXPs
Strategy for the Improvement of African Fiber and Broadband Connectivity

Construction of Coherent Regional Fiber and Consistent Broadband Connectivity for all Regions

Continued Bandwidth Inequality and Fractured Continental Fiber Connectivity

Intervention by Government / DFIs to Facilitate Implementation

Marketplace Left to Implement Its Own Coherent Solution

Government Ownership and Project Management

Choice of Project Design and Engineering, Supplier, Maintenance Authority, Operational Plan

Special Purpose Vehicle (SPV) with Govt./DFI Shareholding (Investment)

Special Purpose Vehicle (SPV) with Govt./DFI Contribution (Subsidy)

Build-Operate-Transfer (BOT)

Public-Private Partnership (PPP) / Private Sector Project Management

Project Management Contract

Build - Operate - Transfer (BOT)