System Planning in Developing Markets
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Market Analysis Today and in 10 years

1. GDP trends
   a. Be aware of any technology, demographic, legal changes that can change your model.
   b. Trends linear or polynomial?

2. STEM graduates per annum
   a. University expense per anticipated income trends
   b. Innovation from technology or demographics that can change your model.

3. Mobile broadband available to population*

4. Kms of fiber per person ratio

5. Internet exchange maturity, traffic ratio per population, traffic ratios in country vs. international.
Market Analysis Today and in 10 years - cont.

1. Carrier Neutral Data Centers
   a. Amount of critical IT load (MWs) available in country trend
   b. Power sustainability (% renewable and green)
   c. Power availability (timelines and MTBF)
   d. Land ownership
   e. Geography, environmental, weather, sustainability

2. Literacy rates
   a. Reading literacy rate
   b. Rate graduating with at least a grade 12 education
   c. Coding literacy rate*

3. Existing cable market
   a. Price trends per 10G / 100G / 1T
   b. Telcos willing to swap and trade
Market Analysis Today and in 10 years - cont.

Do the previous two slides with your futures hat on - how will this country / region change in 10 years?

- Trendline from previous data.
- Inject strategic initiatives discounting for probability of success.
- Run Monte Carlo simulations to narrow down your assumptions.
Site Selection and Land Choice

a. Zoning
b. Ownership
c. At coast or PFE at coast with CS inland?
   i. $150,000 / km for concrete encased conduit x two paths
   ii. $50,000 / km for direct burial but this is a risk for critical infra.
   iii. ROW fees.
d. Expansion space around your cable station for future use.
e. BMH and conduits to your station / PFE
f. Access to skilled labor
g. Diversity from other assets
h. Minimize distance to continental shelf and BU
i. Insurance on the property and annual cost
Cable Station Design - Developing Markets Cont

Electrical

a. Deviation and trend of power costs.

b. Availability of high voltage feeds.
   i. HV via tower tends to have higher reliability than LV delivered by pole.
   ii. Timing for construction of the substation

c. Substation (build yourself or have power company manage - trade-offs)*

d. Genset (minimum dual gensets - N+N / Active + Active)

e. Power storage
   i. Two tanks if possible to clean old fuel while still providing protection.
   ii. Determine tank size by fuel consumption rate over 96 hours + buffer.
   iii. Filtering/warming if needed.
   iv. Choose gensets that have trained local experts + supply chain for parts.

f. Power distribution
   i. Battery strings should be available for 8 hours
   ii. N+N
Cable Station Design - Developing Markets Cont

Mechanical

a. Choose a cooling technology for the market
   i. DX for high humidity markets
   ii. Chillers can be used for medium to low humidity markets.
   iii. Choose technology based on the environment (sand, humid, dry, artic)
   iv. Building Management System (BMS) should be tied into OSS if possible.

b. Seismic zone considerations, engineer based on the zone

c. Install and monitor leak detection sensors around electrical gear inclusive of roof.

d. Choose materials to match the useful life of the asset and environment

e. Ensure your drainage can move water away from the site at 1.25x peak historical amounts.

f. Be aware of climate change - PFE / CS should be a few meters above sea level if possible and engineered to withstand more dramatic temperature / weather shifts than historical.

g. Local permitting should be studied.
   i. The best designs sometimes cannot be implemented because of construction code challenges.
   ii. Choose architecture of sites that match the environment or have positive historical significance.
Cable Station Design - Developing Markets Cont

Security

a. Have a physical perimeter around the site.
   i. Concertina wire / barbed tape on top of a two meter high fence.
   ii. Automobile blocking bollards
   iii. Motion sensors around the security perimeter.
   iv. Mantraps to control entry
   v. Biometrics for recording

b. Cloud based security system with local backup.
   i. Cameras should not have any non-monitored areas.
   ii. Cameras should be hard wired to a security office.

c. Use a cloud based OSS to prevent cyber attacks.
Cable Station Design - Developing Markets Cont

Local Telecoms Considerations

1. Have 8 x 4” / 100mm duct times two diverse paths to the property boundary
   a. Insert pull ropes / lines for ease of install later
   b. Build a large lockable vault near the cable station property line and near telecoms ROW.
2. Site should be carrier neutral for anyone to pull fiber into
3. Dual right of way (ROW) for local telcos to enter (road, rail, gas pipe, or OPGW)
4. Call before you dig and/or civil penalties for fiber disturbance should be sponsored and/or advocated for with government.
5. Fiber should be sourced / placed to other cable stations in market for backup and restoration.
Cable Station Design - Developing Markets Cont

Seaward telecoms considerations

1. Maintain route position lists and marine maps.
2. Liaise with fisherman in market.
3. Audit and maintain BMH, ROW, and any HDD
4. Armoring considerations
Cable Station Operations

1. Operations support software should be in the cloud with a local backup.
2. Security (physical and cyber) should be audited annually.
3. Training courses should be recorded for future new employees.
4. Mechanical, Electrical, and Telecoms equipment should follow regular maintenance schedules.
5. Attend supplier training and be tested on operations & maintenance. Have a succession management plan.
6. CAD / Document building allocations, as-builts, and designs.
Cable Station Operations - Cont

1. Own methods and procedures for the site.
2. AIS monitoring for marine outages
3. Monitor backhaul fiber (either via OTDR or Acoustic sensing)
4. Maintain outage escalation list as well as methods and procedures.
5. Audit outside plant (BMH, beach erosion, backhaul) regularly.
6. Maintain, test, and replenish spares. If supply chain is lengthy, maintain a spare of all critical components on site.
7. Train on any power work with the marine NOC as well as supplier trainers.
8. Each station should maintain a power safety officer as well as deputy PSO.
Government, Licensing Analysis

1) How many telcos and wireless operators, what are the barriers to entry?
2) How has the regulator made decisions over the past 10 years? What is the head of the regulators CV / Resume?
3) What are the government’s goals now and in 10 years?
4) What are societal goals now and in 10 years?
5) What are import / export laws and supply chain health?
6) Meet with the local economic development ministry / bureau.
7) What is the history of nationalization of cables or default on sovereign debt?
8) What is the mean time between coups (ie non peaceful transitions of power)?
9) What is the process to receive a new license (if needed)
Marine Maintenance

1. AIS monitoring for marine outages
2. Maintain outage escalation list as well as methods and procedures.
3. Audit outside plant (BMH, beach erosion, backhaul) regularly.
4. Distribute accurate route position list / coastal marine maps once per year.
5. Develop relationship with marine NOC, monitor utilization, location of repair vessels, DMOQ with repair vessels using AIS.
7. Monitor environmental laws (sea bed, coastal, and any time of year restrictions). Which agencies need to be notified and which timelines are needed.
System Design

1. Single landing or dual landing
   a. Do you have two in country players who want the cable to land in their CS?
   b. Can you build a “Y” landing for increased protection?

2. Cable armoring
   a. Plough / bury where possible within budget
   b. Repair with armor (what has been cut likely to be cut again)

3. Type of landing or branch?
   a. Full landing
   b. Full BU
   c. Full BU with ROADM / WSS (part of a fiber)
   d. Fiber switched BU (can route around a shore end cut)