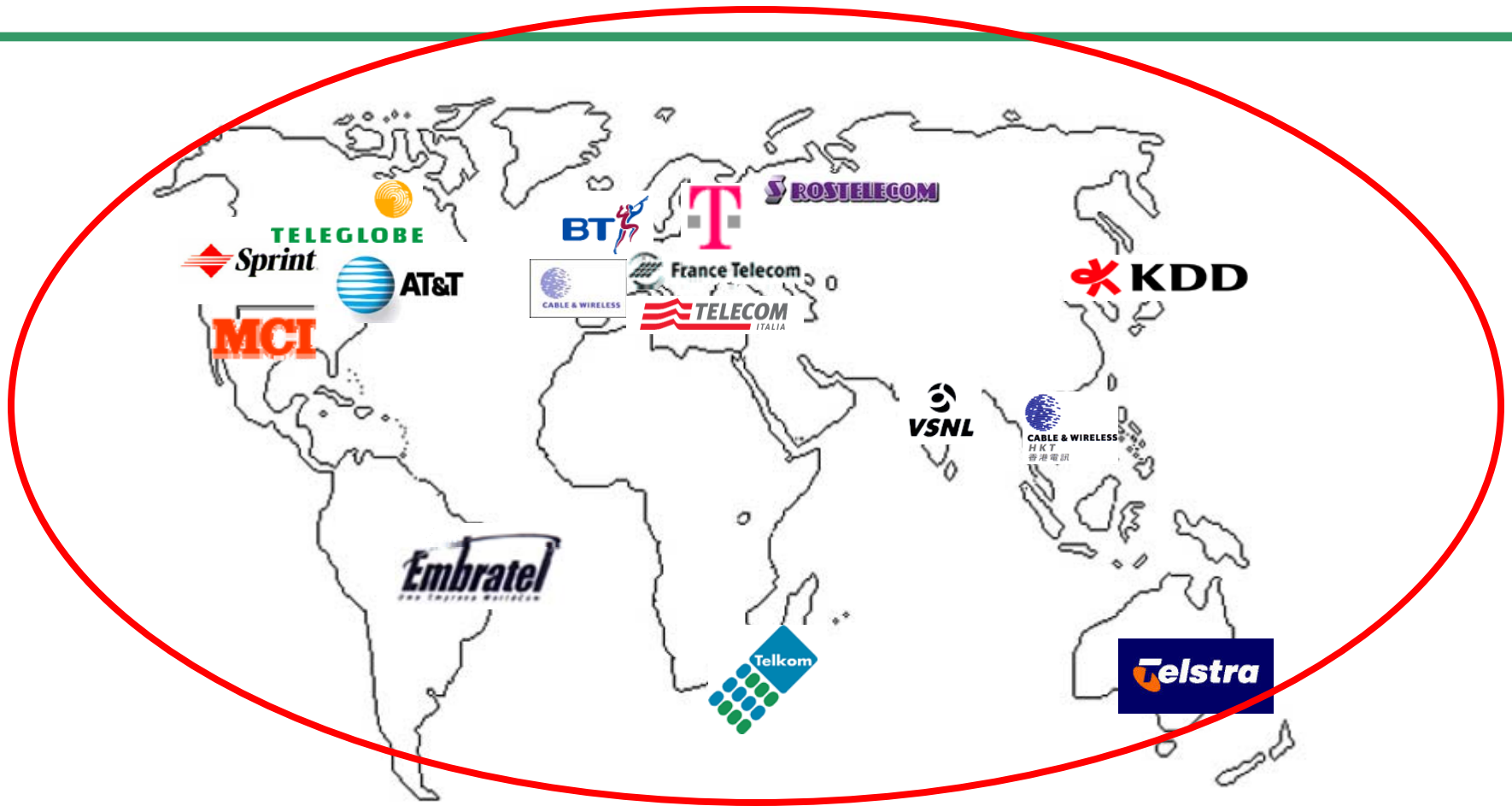


Analysis of the Caribbean Submarine Cable Market

**Presented by:
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Global Submarine Cable Market Dynamics

Cable Capital: 1995

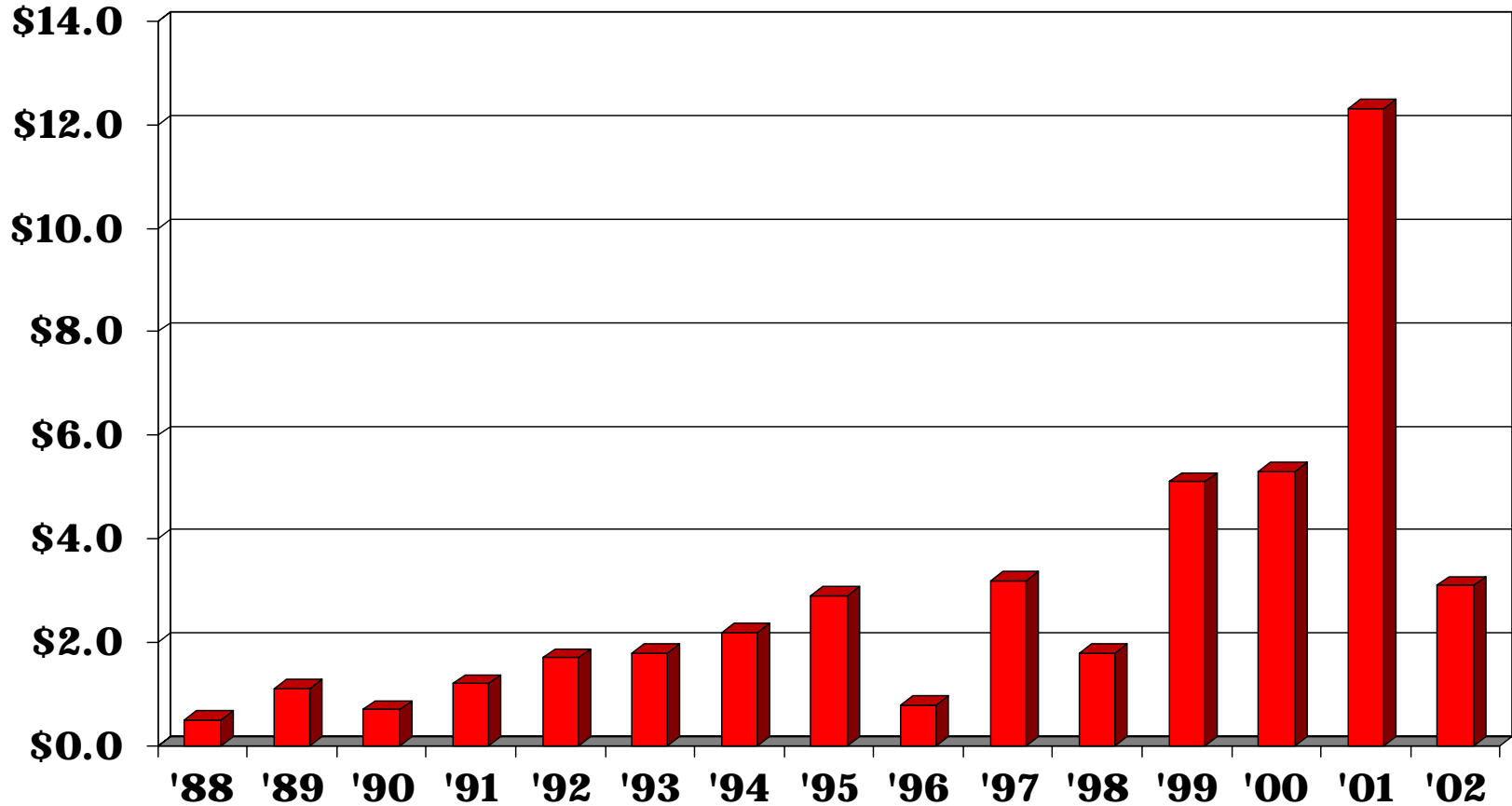


Cable Capital: 2000



Investment in Undersea Systems, 1988-2002

(\$Billions; By Ready-for-Service Date)



Economics after the Bubble Burst



Bankruptcy, June 2001 → 360atlantic sold to Columbia Ventures



Bankruptcy, January 2002 → Purchase by Singapore Technologies



Bankruptcy, April 2002 → Sale to Reliance Group



Sale of assets to Reach → Reach (Telstra, PCCW) written down



Bankruptcy, July 2002

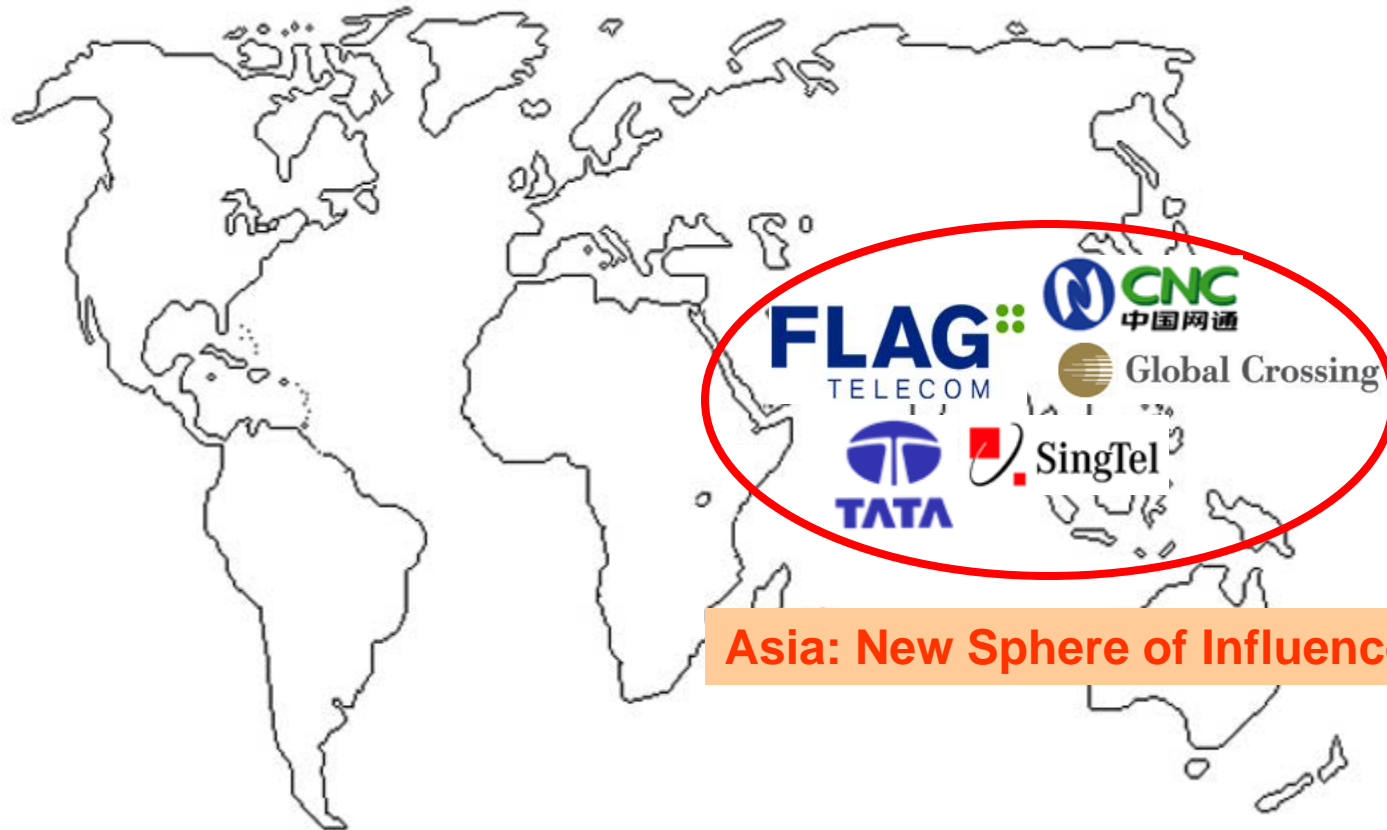


Bankruptcy, November 2002 → Sale to China Netcom

Post-2002: A Badly-Beaten Market

- Market fell from \$10+ billion per year to only a few hundred million
- Investors in south Asia and east Asia stepped in to purchase global networks at pennies on the dollar
- Cable operators' new cost bases led to unsustainable price erosion

Cable Capital: 2005



Asia: New Sphere of Influence

2006: Renaissance?

- Major Europe-Asia systems installed
- New transpacific system (Asia-America Gateway) being discussed for first time in four years
- June, 2006: Ashmore Investment and Spinnaker Capital pay \$402 million to buy Asia Netcom from China Netcom (which paid \$120 million in 2003)
 - By comparison, Tata paid \$130mil for TGN as recently as Nov., 2004
- Recovery of the value of undersea assets

Caribbean Submarine Cable Market Dynamics



Caribbean Submarine Cable Market: Largely Insulated

- Traditionally served by consortium systems (Americas-1, Americas-2, ECFS, Taino-Carib, etc.)
- None of the private global network operators have major investments
- As the bubble burst on transoceanic markets, entrepreneurial investors' attention shifted to regional markets such as Caribbean
- Result: wave of non-traditional systems (Arcos-1, GCN, Antilles Crossing, SMPR-1, Fibralink, TCCN, etc.)

Analysis of Individual Submarine Markets

Methodology

- Terabit Model of International Demand = dozens of specific variables used to forecast PSTN voice, voice-over-IP, private line, and Internet
- Impossible to paint the entire region with one brushstroke
 - examines the specific dynamics of each market and the opportunities that they present submarine cable operators
- Most important = sheer numbers (or potential) at the end-user level, and competition at the carrier level
- Broadband

Analysis of Individual Markets

- Puerto Rico
- Dominican Republic
- Jamaica
- Trinidad and Tobago
- Haiti
- French DOM
- Barbados
- Bahamas
- Cuba
- ECTEL countries



Puerto Rico: Demand for Int'l. Capacity

- **High competition: fully-liberalized market with 6 mobile operators, 20 ISPs**
- **Over 1 million Internet users**
- **Several cable modem providers: Liberty had 35,000 broadband subscribers as of YE05 and doubled its access speed; other providers include Choice Cable TV and OneLink**
- **DSL has been offered by PRT/Verizon since 2001; estimated 80k-100k subscribers**



Puerto Rico: Supply of Int'l. Capacity

- **Americas-II** (2000), **Emergia** (2001) and **Arcos-1** (2001) to US, Caribbean, and South America
- **Taino-Carib** (1992) to Virgin Islands; **Antillas-1** (1997) to Dominican Republic; **SMPR-1** to Saint Maarten (2005); **Global Caribbean Network** (2006) to Guadeloupe and Virgin Islands
- Planned: **TCCN** to US, Mexico, Caribbean, and South America



Puerto Rico: Submarine Cable Outlook

- North American design capacity > 2 Tbps
- On a supply-vs.-demand basis, Puerto Rico is relatively well-off
- However, high level of competition (proliferation of operators and ISPs) necessitates multiple sources of intercontinental capacity



Dominican Republic: Demand for Int'l. Capacity

- Verizon Dominicana estimated to have 88% of fixed-line market, 84% of Internet market, and 64% of mobile market
- Mobile market served by Verizon, Orange (France Telecom), Tricom, Centennial
- Indotel approved sale of Verizon Dominicana to America Movil of Mexico (Carlos Slim) in May of 2006
- 23 fixed + mobile licenses issued as of 2006, according to Indotel
- Increasing penetration of DSL



Dominican Republic: Supply of Int'l. Capacity

- **Antillas-1** (1997) to Puerto Rico
- **Arcos-1** (2001) to US, Caribbean, Central America, and South America
- Columbus Communications' **Fibralink** system to Jamaica was activated in April, 2006
- Planned: **TCCN** to US, Mexico, Caribbean, and South America



Dominican Republic: Submarine Cable Outlook

- Arcos-1 design capacity = 960 Gbps: theoretically, enough intercontinental capacity
- In the short-term, any new systems will likely require the participation of (or commitments from) America Movil
- In the long-term, higher market share on the part of competitors will necessitate alternative international infrastructure



Jamaica: Demand for Int'l. Capacity

- Competition was first introduced in 2000; C&W monopoly ended in 2003
- According to the Office of Utilities Regulation, licenses have been issued to 35 domestic carriers, 68 international carriers, and 83 ISPs
- C&W remains dominant in fixed-line market
- Digicel was awarded the first competitive mobile license in 2001 and has since gone head-to-head with C&W in Jamaica and throughout the region
- C&W ADSL = leading broadband offering, but “the size of the broadband market is small.” – C&W, March 2006
- OUR is expected to rule soon on the unbundling of C&W’s local loop
- Over 2 million mobile subs; target of 40% Internet penetration by 2011



Jamaica: Supply of Int'l. Capacity

- Existing capacity limited: **TCS-1** was removed from service in 2003; only other link until this year was **Cayman-Jamaica Fibre System (1997)**
- Columbus Communications' **Fibralink** system to Dominican Republic was activated in April, 2006; connected North America via Arcos (Columbus owns New World Network)
- Planned: **TCCN** to US, Mexico, Caribbean, and South America (**Digicel's** submarine cable license was not granted)



Jamaica: Submarine Cable Outlook

- It is expected that unbundling and the proliferation of competitive licenses will have a strong impact on international demand
- In January of 2005, submarine cable licenses were awarded to Fibralink and TCCN
- Design capacity of Fibralink is 320 Gbps
- Jamaica is arguably the Caribbean's leading candidate for additional submarine deployment



Trinidad and Tobago Demand for Int'l. Capacity

- TSTT = 51% gov't. holding / 49% C&W
- 323k fixed lines (25% teledensity)
- C&W/Bmobile = mobile service since 1991
- Digicel, Laqtel receive licenses (2005)
- 2-for-1 promotion causes chaos (12/05)
- Mobile penetration > 50% (650k + subs)
- Internet: 160k users, 9 major ISPs
- 5k DSL (TTST), 2k cable modem subs (CCTT), 2k B/B fixed wireless (Carib Link, Lisa Communications), GPRS, WiFi



Trinidad and Tobago Submarine Cable Outlook

- **Americas-1** (1.7 Gbps, 1994)
- **ECFS** (2.5 Gbps, 1995)
- **Americas-2** (40 Gbps, 2000)
- **Groupe Loret, Antilles Crossing, and TCCN** are among the planned systems
- The most important market in the southeastern Caribbean
- Any new system to the southeast will be required to capture a share of Trinidadian traffic in order to be viable



Haiti: Submarine Cable Outlook

- Teleco maintains fixed-line monopoly
- Comcel and Haitel dominate mobile market, but Digicel launched a GSM network in May of 2006
- 5th-largest mobile market in Caribbean
- Economic restraints and political turmoil have posed a major obstacle to telecommunications development (80% of country lives in poverty)
- Market has been neglected by undersea operators
- **BSDNi** (2006) has a node in Port-au-Prince
- Planned: **TCCN**
- Telecommunications and submarine capacity market locked in chicken-and-the-egg cycle



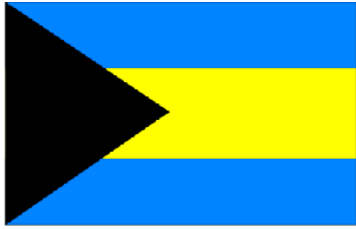
Martinique/Guadeloupe Submarine Cable Outlook

- Markets fully liberalized with EU in 1998
- Fixed-line market: France Télécom, XTS, Outremer
- Mobile market: Orange, Bouygues, Outremer
- Internet: 1/3 penetration rate; ISPs include FT, Outremer, Mediaserv, NetCaraibes, XTS, MTVC
- Broadband: about 20k DSL subs; cable modem service; fixed-wireless
- Capacity: **Americas-2** (40 Gbps, 2000) to Martinique, **ECFS** to Martinique and Guadeloupe
- **GCN**: Conseil Régional awarded “public services delegation” BOT contract to Groupe Loret for undersea cable development = Guadeloupe Numérique



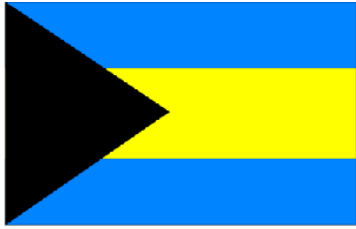
Barbados Submarine Cable Outlook

- C&W = dominant operator, 137k fixed lines
- 2005 – Movement in mobile sector: Digicel acquires Cingular, Laqtel bids for Sunbeach; Market > 200k lines
- Telebarbados building up fixed line business (2006)
- Internet: 160k users, 6 major ISPs; 11k DSL (C&W, Sunbeach), GPRS
- Until this year, **ECFS** was only source of undersea capacity
- Sept., 2004: Submarine cable licenses awarded to **Antilles Crossing** and **EC-1 (Island Fibre; now Southern Caribbean)**



Bahamas: Demand for Int'l. Capacity

- Telecom sector not liberalized – BTC controls fixed line and mobile markets
- 150k Internet users; however, BTC ADSL deployment stood at only 11,109 subs as of YE04 and growth has been sluggish
- Most viable telecom/Internet competition is Cable Bahamas, which has offered Internet access since 2000
- Both BTC and Cable Bahamas have invested heavily in undersea infrastructure
- BTC signed a \$60 million contract with Tyco in September of 2005 for the construction of the Bahamas Domestic Submarine Network (BDSNi)
- Cable Bahamas' Caribbean Crossings subsidiary owns BICS and Fibralink Jamaica



Bahamas: Submarine Cable Outlook

- **Bahamas-II (1997), Arcos-1 (2001), and BICS (2001)** to US and Caribbean
- **BSDNi (2006)** to Haiti
- Planned: **TCCN** to US, Mexico, Caribbean, and South America
- The privatization of BTC may invigorate telecom sector; until then, competition and demand will be limited
- Total design capacity to North America = approximately 1 Gbps



Cuba: Demand for Int'l. Capacity

- Restrictions on Internet access imposed in 2004 limit subscriptions to foreigners, academics, and top-level bureaucrats
- Internet is also available at Internet cafes, but access costs US\$6/hr. (avg. salary = US\$15/mo.)
- Gov't. argues that the island's limited bandwidth necessitates "prioritization" of Internet users in order to ensure that sectors such as education and health are able to get on-line
- Because of black market, Cuban Internet usage population is estimated at 200k to 500k



Cuba: Supply of Int'l. Capacity

- **Primary links are via satellite between the Caribe Earth Station in Havana and Canada and Italy**
- **Since 1994, AT&T has operated a WWII-era copper submarine cable with a few hundred circuits**
- **Florida-based QuestNet proposed Proyecto Unidad undersea cable to Florida in 1999**
- **Blue Telecommunications, which had been bidding for a stake in BTC, proposed Cuba-Bahamas cable in 2003**
- **Arcos expansion?**



Cuba: Submarine Cable Outlook

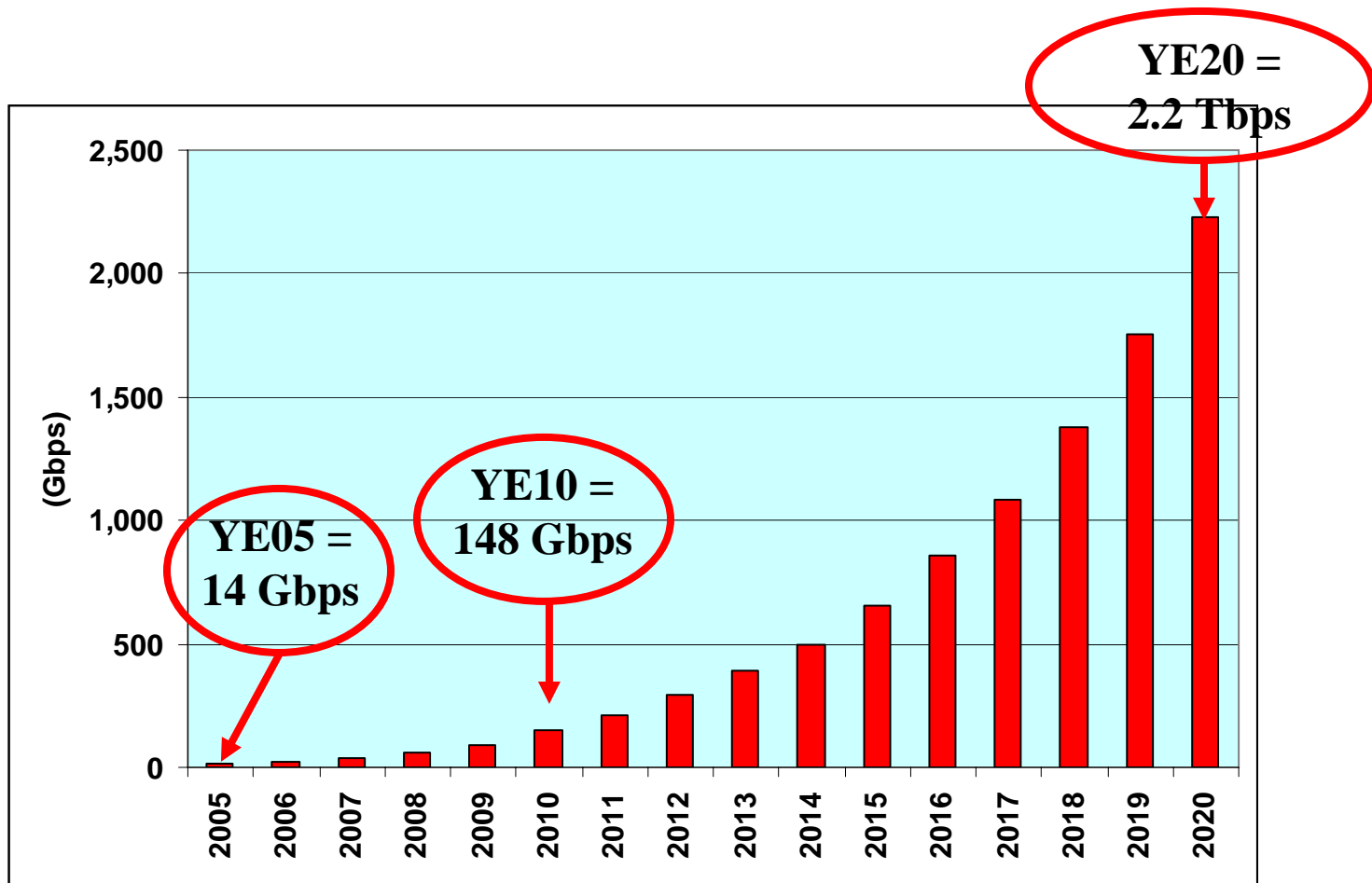
- Demand for capacity is restrained by the United States' embargo and by Cuba's information security laws
- High potential: largest population in Caribbean (11 million) and fixed-line market is third-largest in Caribbean, after Puerto Rico and Dominican Republic (800k lines)
- Although there are several schemes to provide undersea capacity to the island, there are unlikely to be any new systems deployed before the end of the Bush administration



ECTEL States: Demand for Int'l. Capacity

- **Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and The Grenadines**
- **The World Bank is working with ECTEL to promote connectivity to the region**
 - Terabit and partner firm Axiom of Paris recently completed feasibility analysis of an eastern Caribbean cable
 - Conclusion: the region needs at least one alternative to ECFS
 - New system must capture some of the market from Trinidad and Barbados
- **Southern Caribbean closed tender process in April: €20-30 mil system**

Forecast of Caribbean Int'l. Demand



CAGR, 2005-2010: 61%

CAGR, 2005-2020: 40%

Conclusions

- The Caribbean market has largely been insulated from the trends in the global submarine cable market
- With the exception of Arcos and TCCN, undersea systems have targeted individual markets and niches
- Demand forecast: YE2010=148 Gbps; 2020=2.2 Tbps
- Beyond systems that are already under development, the most attractive markets for additional investment are **Jamaica, Puerto Rico, and Cuba**
 - Near-term: **Bahamas**, once privatization and liberalization take place; **Trinidad**; and **Dominican Republic**
 - Long-term: **Haiti**, eastern markets (**ECTEL/Barbados**) and **French DOM**
- Strategy: cable developers must partner with operators

Thank You!

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