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An Overview of International Submarine Cable Markets

Presented by:
Michael Ruddy
Managing Director
Terabit Consulting

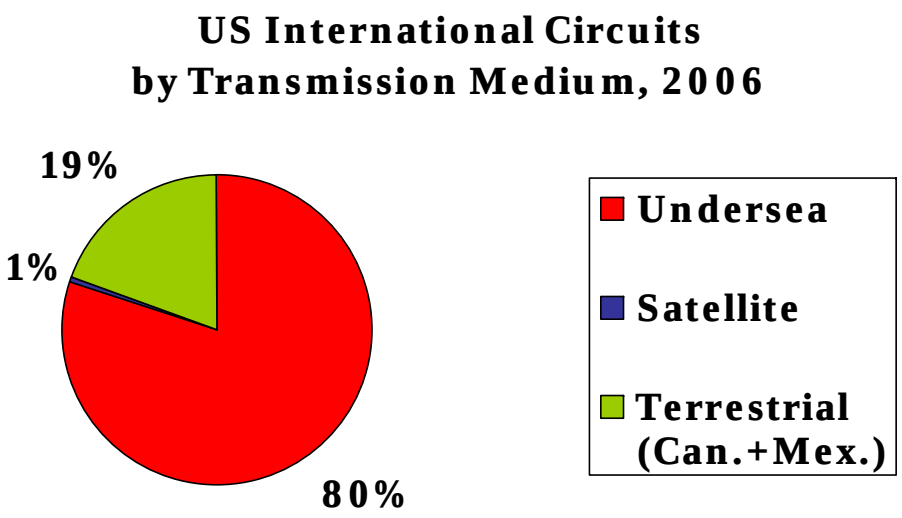
TERABIT Consulting

Part I: Understanding the Importance of Undersea Cable Networks

Submarine Cable Advantages

- Relatively low cost (well under $1 billion for a multi-terabit transoceanic ring system)
- Enormous carrying capacity (existing transoceanic networks capable of 7+ Tbps)
- High reliability (especially in ring and mesh configurations) and low latency

The Foundation of Global Networking



Source: FCC, Terabit Consulting Analysis

- Truly the backbone of the global telecom and data network
- Have been the preferred int'l. transmission medium since shortly after the advent of the fiber optic cable in the late-1980s

Part II: A Brief History of Submarine Fiber Optic Cable Markets

20 Turbulent Years

- The first fiber optic cables were deployed in Europe and Japan in the mid-1980s
  - Repeatered and unrepeatered
  - Experimental (shark bites were a problem!)
- First transoceanic fiber optic cable = TAT-8
  - RFS = 1988
  - Cost: $360 million
  - Capacity: 560 Mbps (3 STM-1s); “3R” repeaters
  - Consortium of 35 carriers (AT&T = 35%)
  - Point-to-Point

20 Turbulent Years (Cont'd.)

- First "Private" cable = PTAT-1 (1991)
  - Sprint and Cable & Wireless
  - NYNEX prohibited from participating by Judge Harold Greene
- FLAG (1997): A private cable on a quintessentially consortium route (Europe-Asia)
  - NYNEX gets to have a cable, finally

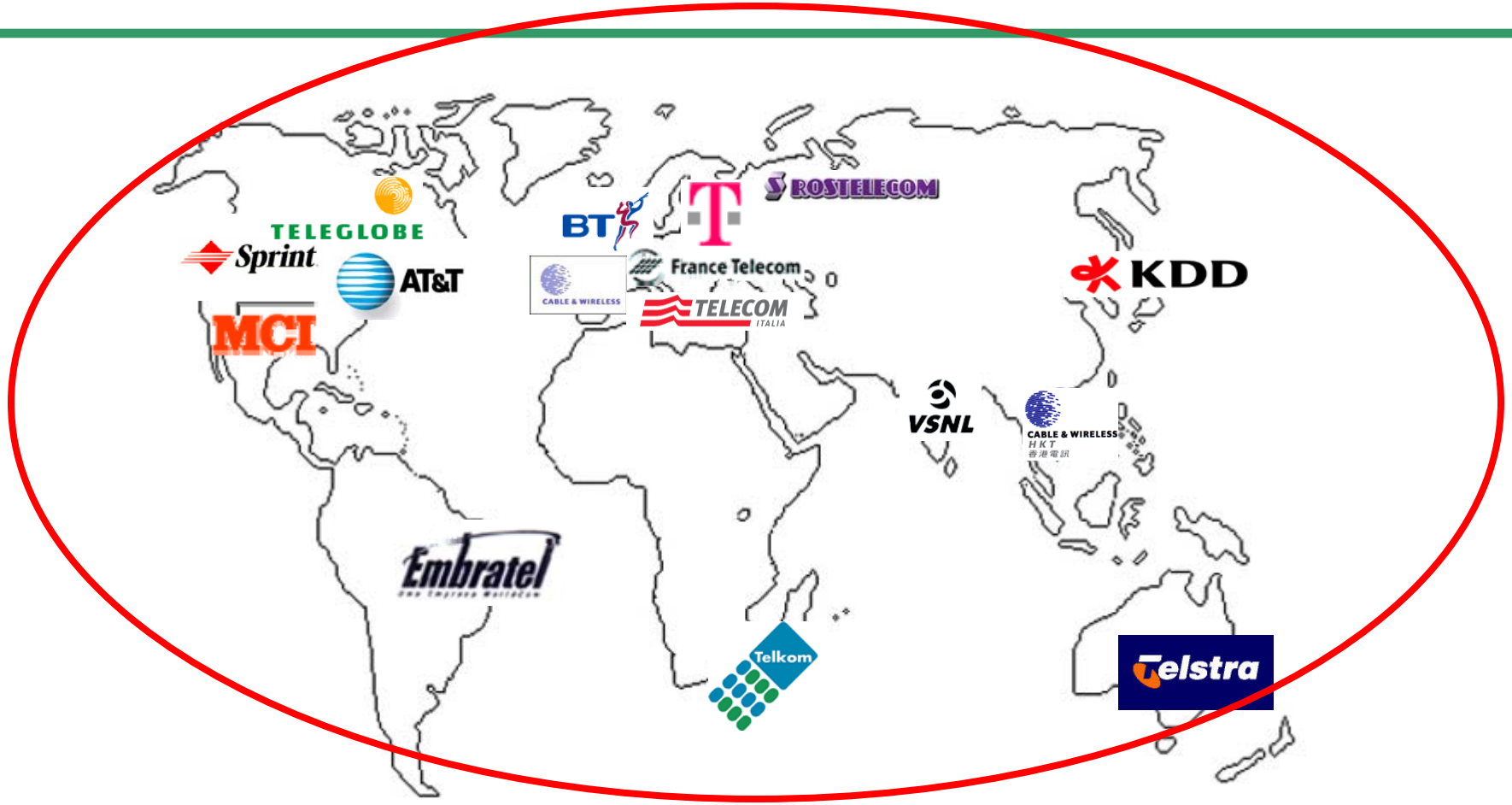
20 Turbulent Years (Cont'd.)

- The turning point: Atlantic Crossing-1 (1998)
  - AT&T outsources cable to investors
  - Perfect timing: Internet boom and liberalization (especially in EU); proliferation of competitive operators; incumbents caught short-handed
- Global Crossing goes global
- Dozens of imitators flood the market

Submarine Cable Landscape: 2000

- Global Crossing
- 360networks
- FLAG
- Tyco
- Level 3
- Singtel/C2C
- Others: Telefonica, Cable and Wireless, Telstra/Reach, TCNZ
- (Consortia? What consortia?)

Cable Capital: 1995



Cable Capital: 2000

The Bubble Burst: 2001-2002

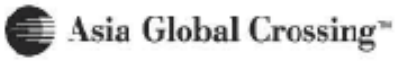
Bankruptcy, June 2001 → 360atlantic sold to Columbia Ventures

Bankruptcy, January 2002 → Purchase by Singapore Technologies

Bankruptcy, April 2002 → Sale to Reliance Group

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

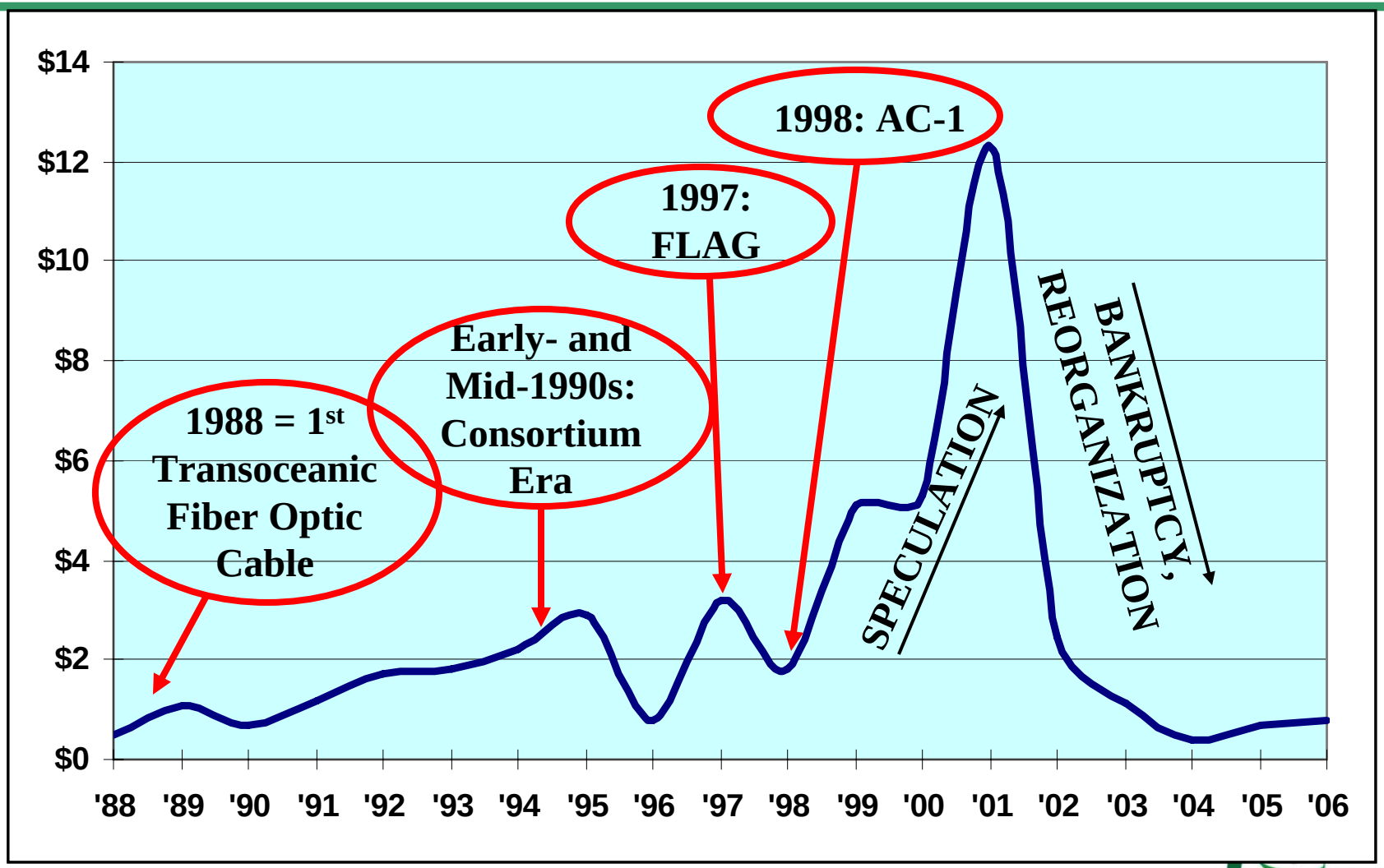
Bankruptcy, July 2002



Bankruptcy, November 2002 → Sale to China Netcom

Investment in New Undersea Systems, 1988-2006

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



What Went Wrong?

- Not enough customers for capacity:
  - CLECs couldn't survive; RBOCs dominated local loop and consolidated
- Broadband deployment never met expectations (penetration remained low and prices remained high worldwide)
- Demand for undersea capacity is not very elastic?!
  - Consumers' voice minutes went up when capacity prices dropped, but voice was only a few percent of total traffic
  - Otherwise, cable operators could cut prices all they wanted, but carriers still wouldn't buy

Unable to Sell Capacity, the Industry Unravels

- Cable operators' bankruptcies set off downward spiral
- Distressed assets were acquired for pennies on the dollar
  - Impossible to compete with
- Price erosion of 70% on some routes

Post-2002: A Badly-Beaten Market

- Market fell from $10+ billion per year to only a few hundred million, maximum
- Investors in south Asia and east Asia stepped in to purchase global networks at pennies on the dollar
- Years passed with virtually no activity (shuttered cable factories, etc.)
- Eventually, some normalcy returned...

Part III: Recovery and Market Trends

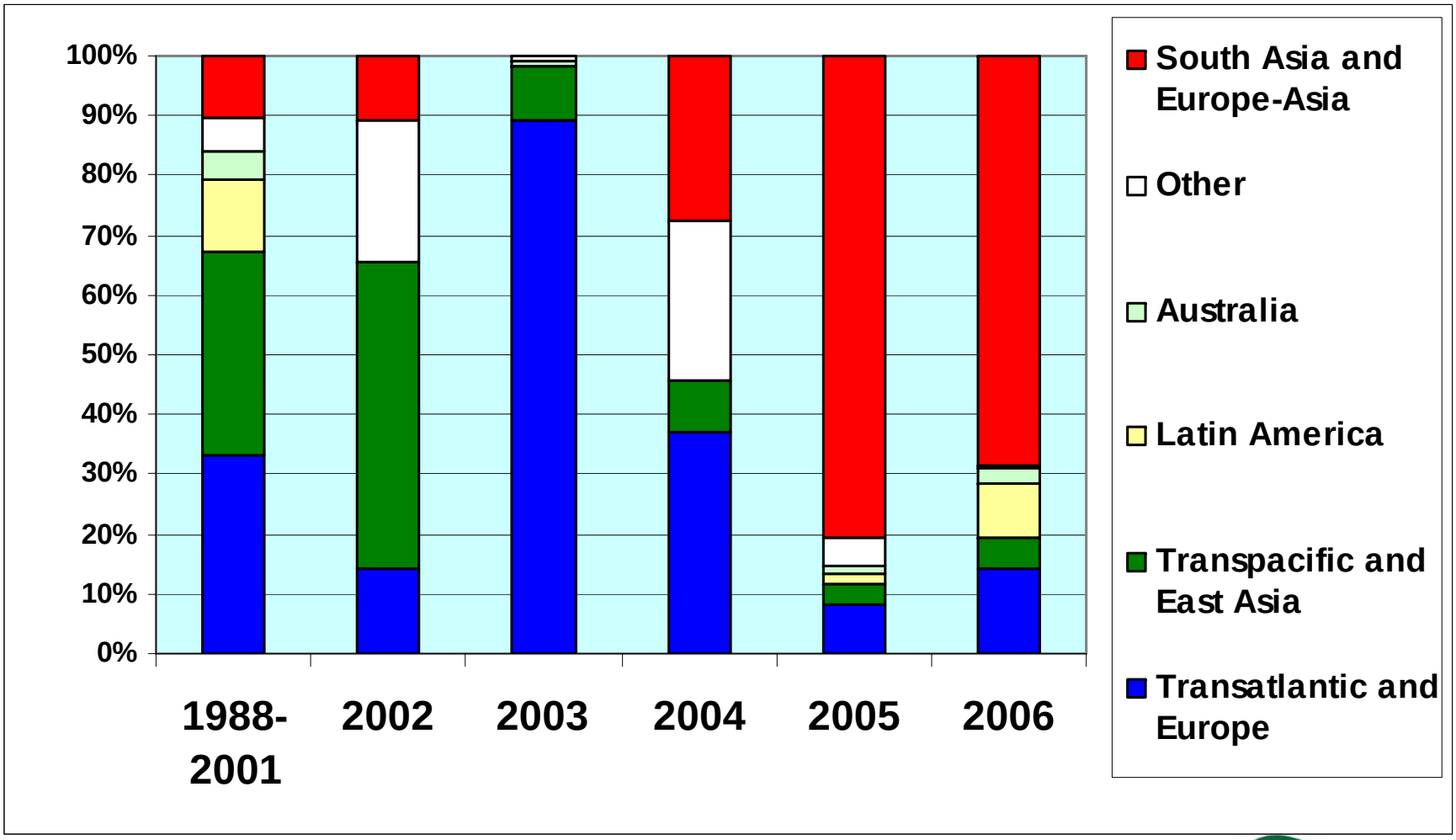
Some Reason for Optimism

- Many new systems are on the horizon
- India and China = fueling demand through economic growth; injecting cable market with capital
  - Latest wave of deployment started with Sea-Me-We-4, Falcon
- Speculation seems to have disappeared from the market
  - If for no other reason than: Wall St. won't allow it
- Cable operators are of a different quality and are approaching the market with more diligence
- Capacity is coming to developing markets one way or another (IFIs, Re-lays)

Trend #1: Geographic Shift in Investment

- Investment has shifted toward South Asia
- Two of the largest owners of submarine cable networks are in India
  - Reliance (FLAG)
  - VSNL (Tyco)

Investment by Region, 1988-2006

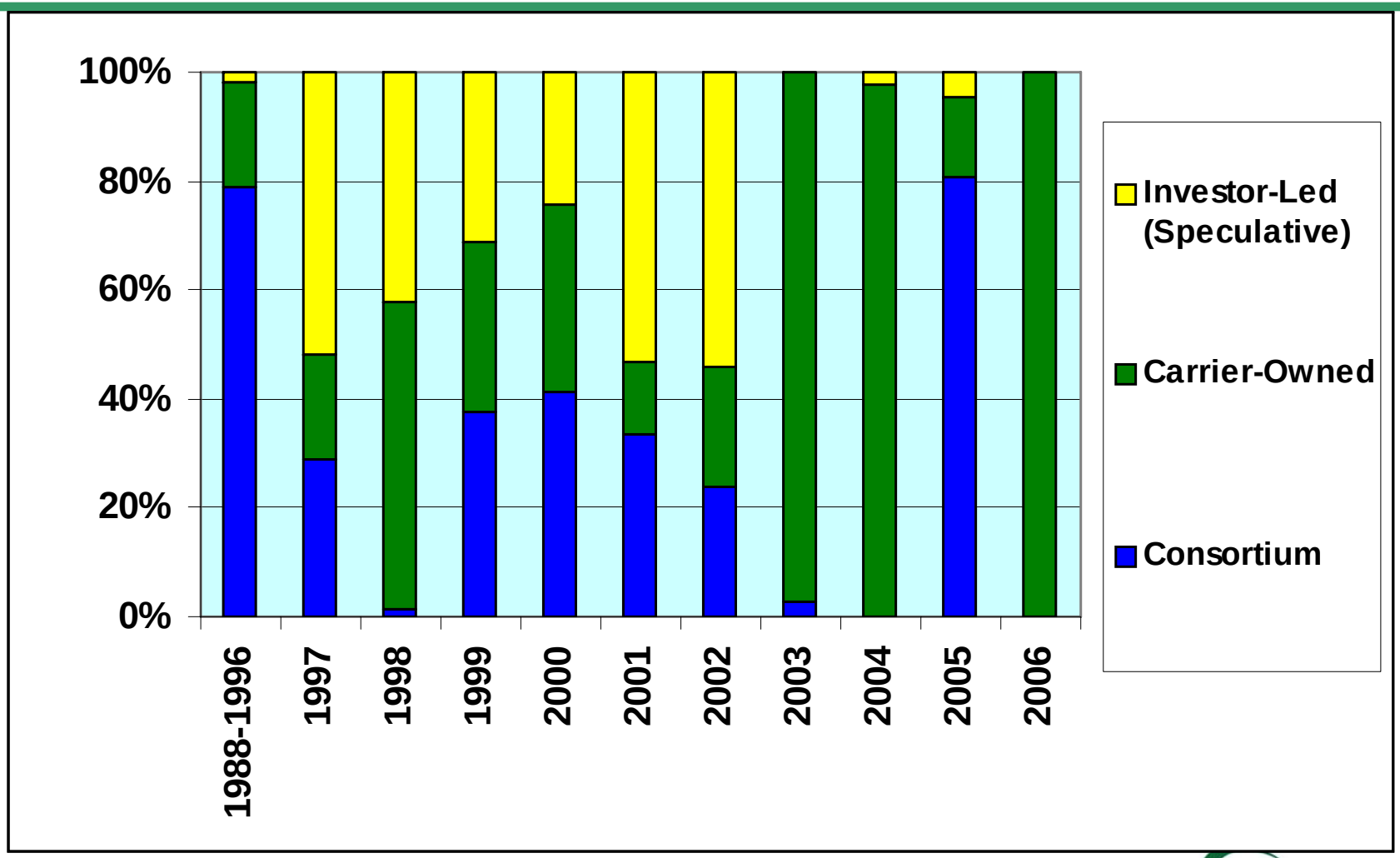


Source: Terabit Consulting

Trend #2: Shift in Financing of Cables

- There are few viable entrepreneurial systems in the pipeline
- Almost all new cable systems are being built by carriers

Investment by Type, 1988-2006



Source: Terabit Consulting

Trend #3: Increase in Investment

- Capacity demand growth (in bit terms) has remained constant
- Price erosion is becoming more controlled and capacity prices have leveled off
- RESULT: There are many viable systems planned for the next 3-4 years
- Very optimistic scenarios call for an annual market of as large as $3 billion
- Upgrade market is extremely robust

Planned Investment

- New Systems:
  - Transpacific systems (AAG, TPE, JNAC, etc.)
  - I-ME-WE (Consortium)
  - MTNL India-Europe
  - VSNL Singapore-HK-Japan-Guam
  - BSNL/MTNL India-Singapore ($390 mil)
  - African systems (EASSy, WAFS, Kenya cable)
  - Caribbean

VSNL – Aggressive Strategy

- Will upgrade VSNL (TGN) Transpacific to 1 Tbps in 2007
- August, 2006: Announced plans for I-ME-WE as well as a pan-Asian Singapore-Hong Kong-Guam-Tokyo network (total investment = several hundred million dollars)
- Effectively closing holes in TGN Global Network, which it acquired in July, 2005 for $130 million
  - also purchased Teleglobe in 2006 for $239 million

Verizon: Emerging International Superpower?

- US landing party for the Trans-Pacific Express System (China-US)
  - RFS 2008; $650 to $800 mil.
- December, 2006: announced creation of a mesh-based transatlantic network across six geographically-diverse paths using Ciena's CoreDirector switch
- Aggressive in China and India
  - Partnering with China Telecom, Reliance

Trend #4: Submarine Connectivity in the Developing World, One Way or Another

- IFIs: The IFC and the EIB are participating in undersea infrastructure projects
- Military: US DoD is considering sponsoring a system that would bring connectivity to the South Pacific
- The Re-Lay…

The Re-Lay

- Issue: cables' economic lifespan getting shorter and shorter
- Problem: Law of the Sea (UNCLOS) requires recovery of inactive cables
- Solution: re-lay of cable on long, thin routes
- Examples:
  - Pacrim West relayed as APNG-2
  - segments of Gemini may also be re-layed

Part IV: Conclusions

CONCLUSIONS

- The industry has learned many lessons from the bubble of the late-1990s
- Recovery seems to be taking shape
- Cables are being funded by carriers rather than speculators
- Investment is shifting toward Asia
- Developing markets are finally being addressed

Appendix

TRANSATLANTIC CABLES

TRANSPACIFIC CABLES

EUROPE-ASIA AND SOUTH ASIAN CABLES

Transatlantic: Historical Center of the Industry

Transatlantic Cables, YE06

Cable Name	RFS Date	Route Km	Capacity (Gbps)	Design Capacity, Est. (Gbps)	Owner(s)	Investment ($Millions)	Supplier(s)
Columbus-2	1994	12,188	2	2	Consortium	$345	AT&T-SSI (Tyco), Alcatel, Pirelli (Alcatel)
CANTAT-3	1994	7,500	5	5	Teleglobe (VSNL)	$385	STC (Alcatel)
TAT-12/TAT-13	1995	12,553	30	30	Consortium	$750	Alcatel, AT&T-SSI (Tyco)
Atlantic Crossing-1 (AC-1)	1998	14,000	140	140	Global Crossing (ST)	$875	AT&T-SSI/TSSL (Tyco)
Columbus-3	1999	10,000	20	40	Consortium	$273	TSSL (Tyco), Alcatel, Pirelli (Alcatel)
Yellow (Level-3) / Atlantic Crossing-2 (AC-2)	2000	6,960	320	1,280	Level 3, Global Crossing (ST)	$700	TSSL (Tyco)
Hibernia Atlantic	2001	11,700	220	1,920	Columbia Ventures	$680	TSSL (Tyco)
FLAG Atlantic-1 (FA-1)	2001	12,800	530	2,400	FLAG Telecom (Reliance)	$750	Alcatel
TAT-14	2001	15,000	640	640	Consortium	$1,400	KDDI-SCS
VSNL Transatlantic (Tyco)	2001	12,500	480	2,560	VSNL	$900	Tyco
Apollo	2003	13,000	320	3,200	Cable and Wireless	$950	Alcatel
Total: 11 Systems, 22.2% lit		128,201	2,707	12,217	7 operators plus consortia	$8,008	

Source: Terabit Consulting

Transpacific: Fueling the Asian Tigers

Transpacific Cables, YE06

Cable Name	RFS Date	Route Km	Capacity (Gbps)	Design Capacity, Est. (Gbps)	Owner(s)	Investment ($Millions)	Supplier(s)
TPC-5	1995	22,560	20	20	Consortium	$1,240	AT&T-SSI (Tyco), KDDI-SCS
Pacific Crossing-1 (PC-1)	1999	13,076	180	640	Pacific Crossing Ltd.	$1,350	TSSL (Tyco)
China-US Cable Network	2000	30,800	80	80	Consortium	$1,400	Alcatel, Fujitsu, KDDI-SCS, NEC, TSSL (Tyco)
Japan-US Cable Network	2001	21,000	400	640	Consortium	$1,150	Alcatel, Fujitsu, NEC, KDDI-SCS
VSNL Transpacific (Tyco)	2002	24,100	640	7,680	VSNL	$900	Tyco
Total: 5 Systems, 14.6% lit		111,536	1,320	9,060	2 operators plus consortium	$6,040	

Source: Terabit Consulting

South Asia – The Industry's Hot Spot

South Asian Cables, YE06

Cable Name	RFS Date	Route Km	Capacity (Gbps)	Design Capacity, Est. (Gbps)	Owner(s)	Investment ($Millions)	Supplier(s)
Sea-Me-We-2	1994	18,000	1	1	Consortium	$780	AT&T-SSI (TyCom), STC (Alcatel), Pirelli.
FLAG (Fiberoptic Link Around the Globe)	1997	27,763	10	20	FLAG Telecom (Reliance)	$1,600	AT&T-SSI (TyCom), KDD-SCS
Sea-Me-We-3	1999	39,000	58	80	Consortium	$1,300	Fujitsu, Alcatel, KDD-SCS, TSSL (TyCom), Pirelli
i2i (ISCN)	2002	3,200	160	8,400	Bharti Group, Singtel	$259	Alcatel, Fujitsu
SAT-3/WASC/SAFE (South Atlantic-3/West Afr	2002	27,850	30	120	Consortium	$581	Alcatel, TyCom
Tata Indicom Chennai-Singapore (TICSCS)	2004	3,100	320	3,175	Tata (VSNL)	$96	Tyco
Sea-Me-We-4	2006	20,000	160	1,280	Consortium	$500	Alcatel, Fujitsu
Falcon	2006	10,300	90	2,560	FLAG Telecom (Reliance)	$270	Alcatel
Total: 8 systems, 5.3% lit		149,213	829	15,636		$5,386	

Source: Terabit Consulting

Thank You!

Michael Ruddy
Terabit Consulting, Inc.
First Street Center
245 First Street, 18th Floor
Cambridge, Massachusetts 02142 USA
Tel.: +1 (617) 444-8605
Fax: +1 (617) 444-8405
Email: mruddy@terabitconsulting.com
http://www.terabitconsulting.com