

GLOBAL BANDWIDTH RESEARCH SERVICE

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Executive Summary

The rise and fall of the wholesale market has become a cautionary tale equivalent to a Grimm Brothers story for telecom executives. In the late 1990s and in the beginning of the new millennium, the wholesale bandwidth market witnessed remarkable engineering achievements, unprecedented volumes of capital expenditures, and, judging from companies' market capitalizations, limitless optimism. Of course, things didn't work out exactly as planned. By 2001, the supply of long-haul capacity had vastly outstripped market demands for bandwidth and capacity prices collapsed, dragging dozens of carriers into bankruptcy, wiping out billions of dollars of market capitalization and destroying tens of thousands of jobs. Wholesale carriers struggled to regain their footing while working through an immense glut of capacity.

The passage of time, combined with steadily growing demands for network services, have largely eliminated the capacity glut. Balance sheets have stabilized and carriers are beginning to write a new chapter to their story. Developments in this story include new capacity deployments driven by actual demand rather than blue-sky projections, improved pricing stability, and circuit prices reflecting

KEY POINTS

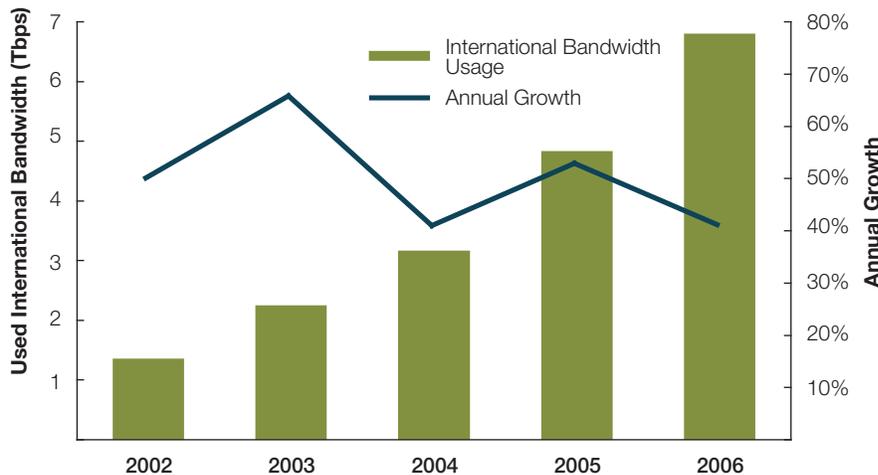
Only 15 percent of potential subsea capacity was lit by year-end 2006. →

The cost of lighting long-haul network DWDM capacity has fallen nearly 30 percent per year since 2001. →

Given the increasing importance of operating costs relative to construction and upgrade costs, the wave of mergers and acquisitions will almost certainly continue. →

High-capacity wavelength prices are falling more than 20 percent on some routes and will continue to fall in the near future. The price of a 10 Gbps wavelength from Los Angeles-New York decreased 30 percent in 2006. →

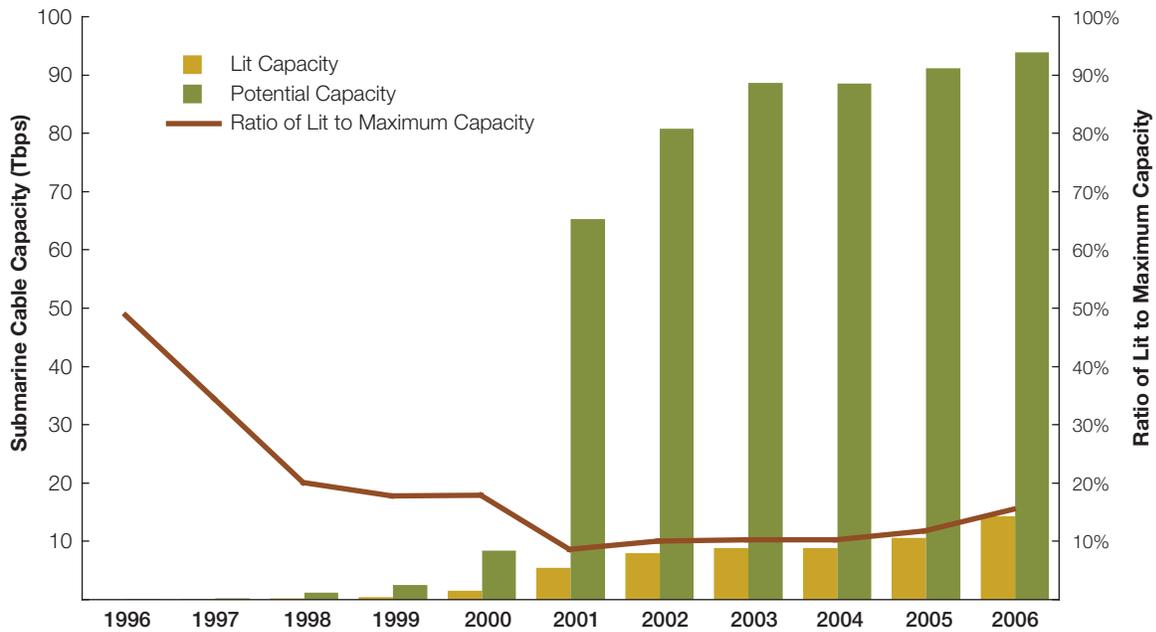
FIGURE 1
Worldwide International Bandwidth Growth, 2002-2006



Source: TeleGeography research

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FIGURE 2
Submarine Cable Lit and Maximum Capacities, 1996-2006



Source: TeleGeography research

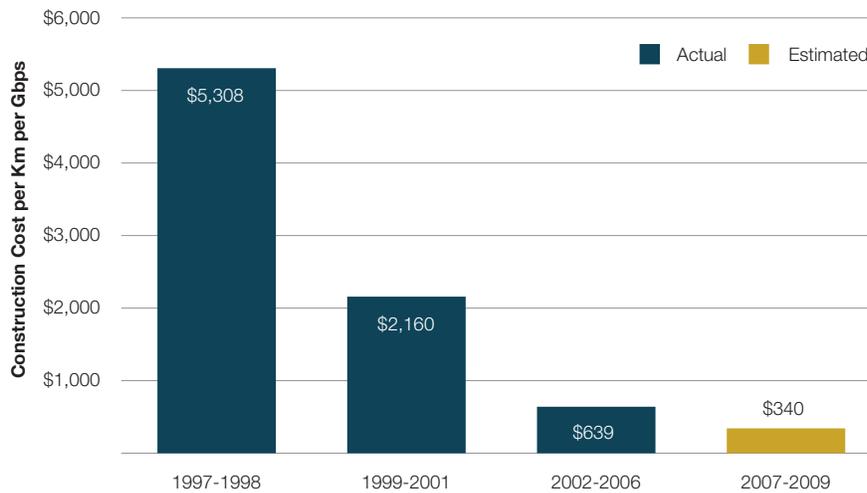
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providers' underlying costs. However, it is hardly clear whether the tale will end with sunshine and lollipops. The wholesale market is a complex and rapidly changing environment. While the market meltdown dragged down all providers, it is likely that this new phase of the market's evolution will see a greater diversity of fortunes, both by carrier and by region. TeleGeography's *Global Bandwidth Research Service* analyzes, quantifies, and explains how the wholesale bandwidth market got here and where it is headed.

Demand. The latest chapter in the wholesale bandwidth market's history begins with the idea that burgeoning Internet traffic is absorbing existing bandwidth. The wave of bandwidth demand projected in the late 1990s is finally materializing, albeit more than five years too late to save most network operators from bankruptcy. Broadband subscribers in Europe have increased over 90 percent since 2004 to more than 80 million households. Similarly, in the U.S., more than 65 million households now have broadband connections. The growing ubiquity of broadband access has enabled the development of new, high bandwidth applications—particularly, video. Video is now the primary driver of Internet traffic growth, including YouTube, iTunes online store, and especially, video delivered via peer-to-peer applications such as BitTorrent. As broadband penetration continues to increase and new bandwidth-intensive applications emerge, wholesale network demand will remain strong.

Supply. Growing demand for long-haul network capacity has eliminated the surplus that plagued the market and brought supply and demand into balance. Capacity upgrades are occurring because carriers have depleted their network inventories. Figure 1 (Worldwide International Bandwidth Growth, 2002-2006) shows used international bandwidth growing steadily between 40 and 50 percent since 2004.

FIGURE 3
Unit Cost of Submarine Cable Systems, 1997-2009



Notes: Unit cost defined as initial cable construction cost divided by total route kilometers divided by RFS capacity. Cables included are over 3,000 kilometers in length and have a maximum design capacity of at least 10 Gbps. Unit costs for 2007-2009 based on announced contract values and TeleGeography estimates.

Source: TeleGeography research

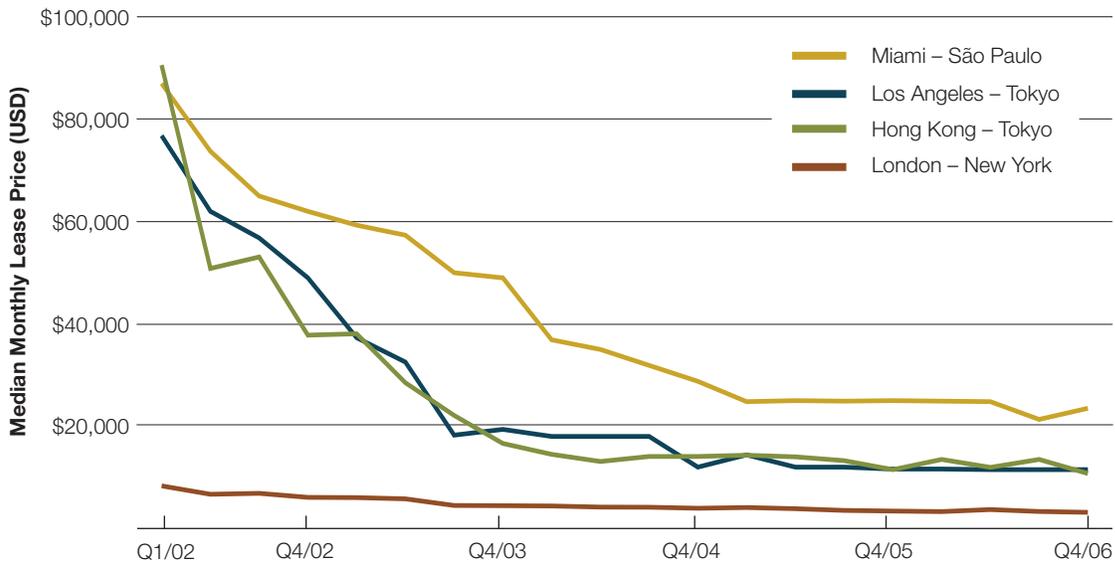
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While traffic growth has absorbed the excess inventory of active circuits, network operators have no shortage of *potential* capacity that can be lit to meet future demands. On subsea routes, the ratio of lit to potential capacity is only about 15 percent, up from 8 percent in 2001 (see Figure 2. Submarine Cable Lit and Maximum Capacities, 1999-2006). Even on the trans-Atlantic route, which has the highest ratio of lit-to-potential capacity worldwide, only 28 percent of potential capacity has been lit. The relative ease of adding fibers to a terrestrial network during construction led to a vast amount of unused potential capacity in the ground. Because of this, the ratio of potential capacity to lit bandwidth on most terrestrial routes is even higher than on undersea cables.

Ample capacity exists on most major routes, yet some regions still appear underserved. Sensing opportunity, cable operators are rushing to get a foothold in these markets. Most of these new projects are in developing regions, such as Africa, the Caribbean, and the Middle East, or on routes with limited numbers of competitors, such as the trans-Pacific span. Australia, where broadband subscribers have grown nearly tenfold since 2002, is slated to receive two new undersea cables by the end of 2008. However, in their eagerness to bring new systems to market, cable builders may jeopardize the fragile stability of the market. For example, if all of the proposed new trans-Pacific submarine cables were built, the amount of potential submarine capacity available would nearly double in the span of a few years.

Costs. The renewed wave of cable construction is facilitated in significant part by the decreasing cost of building a new submarine cable system. The unit cost (cost per kilometer per Gbps) of constructing a new submarine cable has decreased from \$5,308 in 1997-1998 to an expected unit cost of \$340 in 2007-2009, a decrease of nearly 94 percent (see Figure 3. Unit Cost of Submarine Cable Systems, 1997-2009).

FIGURE 4
STM-1 Price Trends, 2002-2006



Notes: Prices reflect median STM-1 monthly lease prices, exclusive of installation fees and local access.

Source: TeleGeography research

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While undersea cable construction costs have fallen precipitously, most operators are not building new cables and are instead adding capacity to their existing networks by lighting additional wavelengths or fibers. For example, VSNL, the operator of the largest trans-Pacific cable, upgraded its cable twice in 2006. While the cost of upgrading submarine cables has fallen dramatically over the past five years, it remains significant and must be carefully cost-justified.

The cost of adding capacity to terrestrial networks has also fallen sharply. The cost of lighting long-haul DWDM capacity has fallen nearly 30 percent each year since 2001. However, this progress has not come in steady increments, nor has it benefitted all operators equally. Typically, costs drop sharply with the introduction of new generations of equipment. Not surprisingly, operators with the newest generation of equipment usually also enjoy the lowest cost structure. These reduced cost structures are allowing carriers to simultaneously add capacity to their networks and underprice rivals that existing inventories of lit capacity.

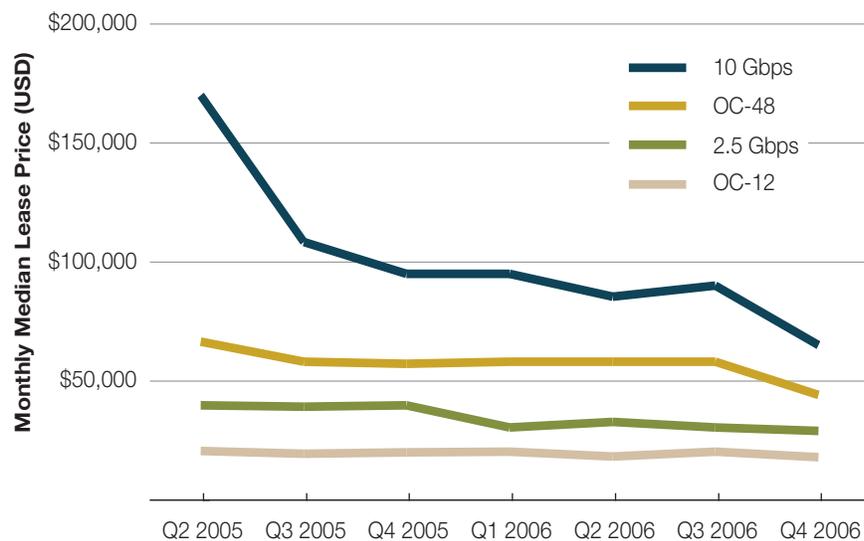
While the cost of adding capacity has fallen sharply, operational and maintenance costs (O&M) and overhead account for the lion's share of terrestrial network operators' costs. Unlike network deployments and upgrades, O&M costs don't lend themselves well to an easy technological solution. Instead, carriers are finding the most effective means of reducing per-unit O&M costs is to acquire rival carriers and to reduce overhead.

Pricing. The direction of wholesale price trends are the clearest indicator of supply, demand, and costs. During the early years of the decade, as carriers were writing off network construction costs and supply vastly exceeded demand, prices frequently dropped by 40 percent or more annually. Those days appear to be over: median prices of STM-1 (155 Mbps) circuits have stabilized on most competitive routes worldwide in the past two years (see Figure 4. STM-1 Price Trends, 2002-2006).

While prices of mid-sized circuits, such as STM-1/OC-3 and STM-4/OC-12, are showing improved stability, prices of high capacity circuits, such as 2.5 Gbps and 10 Gbps wavelengths, have recently begun to tumble, particularly in the U.S. For example, the median price of a 10 Gbps wavelength from New York to Los Angeles has fallen more than 30 percent in the past six months alone (see Figure 5. Los Angeles-New York Circuit Prices, 2005-2006). As carriers' costs have declined, continued fierce competition has forced them to pass these cost improvements to their customers.

Outlook. Most fairy tales feature a happy ending and teach a lesson (usually, “don’t trust your stepmother”). Despite the improving market conditions, it’s not yet clear that we’ve arrived at the happy ending carriers would like to see or that market participants have learned from the lessons of the lat bandwidth bust. Price declines in high-capacity circuits, combined with providers pushing bandwidth supply ahead of demand, could lead to another catastrophe for the wholesale market. Will the next twist in our tale feature a disaster equal to the crash brought on by the burst of the telecom bubble six years ago? Probably not. Wholesale providers are attempting to ward off trouble by acquiring and merging with rivals to improve operational efficiencies and expand their potential markets. Continued consolidation and strong demand give hope to a market that has a history of dramatic up and downs.

FIGURE 5
Los Angeles–New York Circuit Prices, 2005-2006



Notes: Series represent median monthly lease prices for each circuit during 2005-2006.

Source: TeleGeography research

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Table of Contents

I. EXECUTIVE SUMMARY

II. SUPPLY AND DEMAND

- Supply and Demand Trends
- Long-Haul Network Supply
- Long-Haul Network Demand
- Regional Supply and Demand Overview
 - Europe*
 - United States*
 - Intra-Asia*
 - Trans-Pacific*
 - Trans-Atlantic*
 - U.S. – Latin America*
 - Europe-Asia*
 - Middle East and North Africa*
 - Sub-Saharan Africa*
- Emerging Bandwidth Demand Drivers
- Lessons Learned?

III. WHOLESALE PRICING

- Regional Bandwidth Pricing Trends
 - Trans-Atlantic Routes*
 - U.S. Domestic Routes*
 - Intra-European Routes*
 - Trans-Pacific Routes*
 - Intra-Asian Routes*
 - Europe-Asia Routes*
 - Latin America Routes*
- Other Bandwidth Products
 - Dark Fiber*
 - Long-Haul Ethernet*
 - IRUs*
- General Pricing Trends
- Factors Affecting Prices
- Outlook

IV. COST

- Submarine Cable Costs
- Terrestrial Network Costs

V. PRODUCTS & CONTRACTS

- Products
- Contract Types

List of Figures

I. EXECUTIVE SUMMARY

1. Worldwide International Bandwidth Growth, 2002-2006
2. Submarine Cable Lit and Maximum Capacities 1996-2006
3. Unit Cost of Submarine Cable Systems, 1997-2009
4. STM-1 Price Trends, 2002-2006
5. Los Angeles–New York Circuit Prices, 2005-2006

II. SUPPLY AND DEMAND

1. Worldwide International Bandwidth Growth, 2002-2006
2. Selected Submarine Cable Upgrades
3. Major Network Industry Acquisitions
4. Four Main Types of Submarine Cable Ownership
5. Submarine Cable Lit and Maximum Capacities, 1996-2006
6. Lit versus Potential Capacity on Major Submarine Cable Routes, 2006
7. International Internet, Switched Voice and Private Networks Capacity Growth, 2000-2006
8. Comparing Potential, Lit, Purchased, and Used Trans-Atlantic Capacity
9. International Bandwidth Usage in Selected European Cities, 2003-2006 (Gbps)
10. European Broadband Subscriber Growth, 2004-2006
11. European Network Upgrades, 2006 & 2007
12. Wholesale Bandwidth Providers in Selected European Cities
13. Wholesale Bandwidth Providers in Selected U.S. Cities
14. U.S. Network Upgrades, 2006 & 2007
15. U.S. Broadband Subscriber Growth, 2004-2006
16. Used, Purchased, and Lit Intra-Asia Bandwidth, 2000-2006 (Gbps)
17. Intra-Asia Bandwidth Supply and Demand, 2000-2006
18. Intra-Asia Submarine Cable Supply, 2000-2006 (Gbps)
19. Intra-Asia & Trans-Pacific Submarine Cable Connectivity
20. Used, Purchased, and Lit Trans-Pacific Bandwidth, 2000-2006 (Gbps)
21. Trans-Pacific Bandwidth Supply and Demand, 2000-2006
22. Trans-Pacific Submarine Cable Supply, 2000-2006 (Gbps)
23. Used, Purchased, and Lit Trans-Atlantic Bandwidth, 2000-2006 (Gbps)
24. Trans-Atlantic Bandwidth Supply and Demand, 2000-2006
25. Trans-Atlantic Submarine Cable Supply, 2000-2006 (Gbps)
26. Used, Purchased, and Lit U.S.-Latin America Bandwidth, 2000-2006 (Gbps)
27. U.S.-Latin America Bandwidth Supply and Demand, 2000-2006
28. U.S.-Latin America Submarine Cable Supply, 2000-2006
29. Used, Purchased, and Lit Europe-Asia Bandwidth, 2000-2006 (Gbps)
30. Europe-Asia Bandwidth Supply and Demand, 2000-2006
31. Europe-Africa-Asia Submarine Cable Supply, 2000-2006
32. Middle East and North Africa Bandwidth Usage, 2000-2006
33. African Submarine Cable Capacity
34. Sub-Saharan Africa Bandwidth Usage, 2001-2006
35. Submarine Cable Supply by Route, 2000-2006 (Tbps)
36. Submarine Cable Supply by Route, 2000-2006 (Gbps)

List of Figures

37. International Bandwidth Usage by Country, 2002-2006 (Mbps)
38. Map of International Bandwidth Usage per Capita by Country, 2000 & 2006
39. International Submarine Cable Capacity, 2007
40. Supply and Demand Methodology and Definitions

III. WHOLESALE PRICING

1. STM-1 Price Trends, 2002-2006
2. London-New York STM-4 Lease Prices by Carrier, 2004-2006
3. London New York STM-1 Monthly Lease Price vs. Unit O&M Costs, 2002-2006
4. Trans-Atlantic Demand, Revenue and Effective Price Change 2002-2006
5. Trans-Atlantic Median OC-3/STM-1 Monthly Lease Prices, Q4 2004-Q4 2006 (USD)
6. Los Angeles–New York OC-3 Lease Prices by Carrier, 2003-2006
7. Los Angeles–New York Circuit Prices, 2005-2006
8. Los Angeles–New York OC-48 versus 2.5 Gbps Wavelength Prices, Q4 2006
9. U.S. Indicative Capacity-Price Multiples
10. Intra-U.S. Median OC-3 Monthly Lease Prices, Q4 2004-Q4 2006 (USD)
11. OC-3 Lease Prices on Major U.S. Routes, Q4 2001–Q4 2006
12. STM-1 Lease Prices on Major European Routes, Q4 2001–Q4 2006
13. European. Indicative Capacity-Price Multiples
14. Intra-European Median STM-1 Monthly Lease Prices, Q4 2004-Q4 2006 (USD)
15. Trans-Pacific STM-1 Annual Lease Prices, 2002-2006
16. Los Angeles–Tokyo STM-1 Lease Prices by Carrier, 2003-2006
17. Trans-Pacific Demand, Revenue and Effective Price Change, 2002-2006
18. Trans-Pacific Median STM-1 Monthly Lease Prices, Q4 2004-Q4 2006 (USD)
19. Hong Kong–Tokyo STM-1 Lease Prices by Carrier, 2003-2006
20. Intra-Asian STM-1 Annual Lease Prices, Q4 2002-Q4 2006
21. Intra-Asian Demand, Revenue and Effective Price Change, 2002-2006
22. E-1 Monthly Lease Prices to India Q2 2004 – Q4 2006
23. Monthly Lease Prices to China, 2003-2006
24. Intra-Asian Median STM-1 Monthly Lease Prices, Q4 2004-Q4 2006 (USD)
25. Europe-Asia Median STM-1 Monthly Lease Prices, Q4 2004-Q4 2006 (USD)
26. London–Tokyo STM-1 Monthly Lease Prices versus Underlying Route Prices, 2002-2006
27. U.S.–Latin America Median E-1 Monthly Lease Prices, Q1 2004-Q4 2006
28. U.S.–Latin America Demand, Revenue and Effective Price Change, 2002-2006
29. U.S.–Latin America Median OC-3/STM-1 Monthly Lease Prices, Q4 2004-Q4 2006 (USD)
30. London-Paris Median Price per Mbps, STM-1 versus FastE, by Carrier
31. IRU versus Lease Prices 2006
32. Absolute versus Relative Price Ranges on Major Routes, Q4 2006
33. Median Price per Mbps for U.S. and European Routes, Across Capacities
34. Circuit Mix of International Internet Backbones, 2002 - 2006
35. Lease Price versus Distance on Major U.S. and European Routes Q4 2006
36. Unit Price versus Distance in Europe and the U.S. Q4 2006
37. Median OC-3/STM-1 Monthly Lease Prices on Major Terrestrial Routes, Q4 2004-Q4 2006 (USD)

List of Figures

IV. COST

1. Construction Cost of Submarine Cables, 1997 - 2009
2. Unit Cost of Submarine Cable Systems, 1997 - 2009
3. Sample Submarine Cable Costs
4. Unit O&M Cost and Cable Retirement
5. Upgrade Cost of Submarine Cable Systems by Route
6. Integration Lowers Costs
7. Short-Term versus Long-Term Costs of Adding Capacity, 2007
8. Breakdown of Network Operations and Maintenance Costs, 2006

V. PRODUCTS & CONTRACTS

1. Alternatives to Raw Capacity
2. Advantages and Disadvantages of IRUs and Leases
3. Guaranteeing Network Availability in Short-Term Leases