THE NEXT TRANS-ATLANTIC CABLE: AN INDEPENDENT ANALYSIS OF THE POTENTIAL FOR A NEW SYSTEM ON THE WORLD'S MOST COMPETITIVE UNDERSEA CABLE ROUTE

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Abstract: A significant number of trans-Atlantic cable systems in operation had their cost basis restructured via bankruptcy earlier this decade. As a result, pricing can be based on the incremental cost of provisioning capacity, rather than on recovering the cost of the initial investment. Operators continue to struggle with the price erosion of capacity, which is increasingly viewed as a commodity. Advances in upgrade technologies have enabled systems' capacities to be expanded far beyond their original design limits, extending their useful lives but further depressing the unit cost of capacity. In coming years, the ability to extract significantly more capacity from the existing wet plant will eventually cease, even as capacity demand continues to grow at a high rate.

Given these factors, operators will eventually face the question of whether to adopt a more advanced upgrade solution or to stop upgrading an existing system and invest in a new cable. How will network owners employ new technology to enhance their cables to remain competitive and meet their customers' needs in coming years? How will the evolution of new technologies, such as 40 Gbps wavelengths, affect when a new system is constructed and the shape such a system would take? How could a new cable create value on a route where capacity is largely commoditized?

1. THE ATLANTIC QUANDARY

The trans-Atlantic route is the most competitive submarine cable route in the world, with 13 cables in-service. No new trans-Atlantic systems have been deployed since the introduction of the Apollo system in 2003; nonetheless the large number of cables built between 1997 and 2003 has been adequate to support continual growth in demand to the current date. This paper is concerned with the implication of continued strong demand growth in the future, and the likelihood of new cables being built to handle the traffic of the coming decade.

After the collapse of the Internet Bubble in the first years of this century, most systems had their cost basis restructured due to bankruptcy or substantial financial restructuring. In this environment, capacity prices fell to a level only modestly above the incremental cost of upgrading since recovery of the initial investment cost was no longer a factor in pricing. The monthly lease price of an STM-1 between London and New York plunged nearly 98 percent from around $208,000 in 1999 to $4,400 in 2003.

Even though price erosion has persisted since 2003, the good news for operators is the pace of erosion has slowed, with the decrease in prices often reflecting reductions in upgrade costs. The median monthly lease price for London-New York 10 Gbps wavelengths has fallen from just over $43,000 in 2003 to below $13,000 in

2009 – a compound annual rate of decline of just 18%.

Despite a dramatic increase in demand, leading to sale of about 25% of the design capacity of these systems, a capacity crunch does not appear to be looming, since technological advances continue to push the potential capacity of existing cables higher. However, at a point in the foreseeable future, the existing wet plant will not be able to accommodate more capacity and new cable construction will be required.

The quandary is that the rapid collapse in pricing in the early years of the century created a situation in which capacity price levels would not support a reasonable return on investment to fund a new system—at least not for a pure-play wholesale operator, so it came to be "common knowledge" that the trans-Atlantic market would not support new system builds.

2. THE CURRENT ENVIRONMENT

The historical situation is about to change as the rate of growth of demand in recent years has been much higher than the rate of decline in price, resulting in a year-by-year brightening of the revenue picture for operators, despite capacity prices still being below those of any other region.

Fortuitously for network operators, continual advance in the technology for network upgrades has made it possible to upgrade systems well beyond their original design capacities, which has allowed expanded revenues and forestalled capital investments in new systems.

Also fortuitous for network operators has been the rise of new competitors in the market for the supply of capacity upgrades; the heightened competition has driven upgrade prices steadily downward in recent years, reducing the burden of upgrade cost on operators and facilitating further demand growth.

Note that even at a world-low price of $10,000 per month per 10 Gbps, each new Tbps of leased capacity in the Atlantic will generate $1 Million per month. In coming years, when tens of Tbps of new capacity will be needed each year in the Atlantic, tens of millions of dollars per month in new incremental revenues will be realized by operators.

3. THE CASE FOR NEW CABLES

To assess the need for a new trans-Atlantic cable the first step is to determine the latest date by which a new cable would be required. Based on unofficial estimates by suppliers, the maximum total capacity possible on the existing cables is likely to be at least 100 Tbps. This assessment takes into account the use of 40 Gbps technology applied to the degree possible on the existing wet plant. Depending on the original system design, existing cables could be upgraded to accommodate 1 to 3 Tbps per fiber pair. Assuming an average of about 2 Tbps per pair on the more than 50 fiber pairs installed yields a total capacity in excess of 100 Tbps. Experts differ in their estimates of exactly how much capacity can be carried on each system, so it is not possible to provide an exact value for potential capacity on existing systems, but 100 Tbps is a reasonable proxy.

Three distinct demand scenarios were used to discern when capacity exhaustion as a whole might occur. The first scenario assumes a constant annual growth of 50 percent. The second assumes a constant annual growth of 40 percent. In these scenarios complete trans-Atlantic exhaustion could arrive as soon as 2014 or as late as 2015. Only in the third scenario, in which the growth rate drops to 25 percent per year, a level lower than has been seen in many years, does total exhaustion occur as late as 2018.

Although the time at which total demand exceeds the likely potential capacity of existing systems represents the latest date by which a new system should be in service, there are several reasons a new cable could be introduced well in advance of total supply exhaustion. The most obvious reason is that some systems will be exhausted before others, leading individual system owners to build new systems before route-wide exhaustion. Also, some owners may choose to introduce new systems for purposes of route diversity or lower latency. Finally, new systems may be built by entrepreneurial carriers seeking to assert a more active role in capacity ownership and system development, or strategic investors may seek to build a new system to take advantage of a rapid growth scenario.

4. A LOOK AT THE NEXT TRANS-ATLANTIC SYSTEM

Given the magnitude of capacity demanded across the Atlantic new systems must be optimized for peak capacity. If demand grows at 40 percent annually, the need for new capacity will be well over 100 Tbps in the latter half of the decade. At this rate of growth the incremental demand in a single year would exceed the total capacity of all present systems. To meet this need, new systems will need to provide as much capacity as the technology will allow.

Vendors suggest that the technology to provide 8 Tbps per fiber pair will be available in the next year or two. Such systems could provide 200 x 40 Gbps wavelengths per pair using techniques such as dual polarization and quadrature phase shift keying to achieve very high spectral efficiency. To achieve a total capacity in the range of 60 Tbps at 8 Tbps per pair will require eight pair per cable, the largest currently made in the industry. It is worth noting that even with the introduction of a 60 Tbps system, if current demand trends continue, multiple new cable systems will be needed within the coming decade.

The configuration of landing points for a new trans-Atlantic system will also be influenced by two somewhat competing priorities – geographic route diversity and low latency. For route diversity, potential customers of capacity on a new system would undoubtedly value a path that avoids the widely-used New York/New Jersey area in the U.S. and the southwest United Kingdom. At the same time, reducing round-trip delay is a key selling point for many cable operators given that low latency paths are presently able to attract a slight price premium. The design of a new cable should seek to avoid familiar routes and limit the round-trip delay in order to enhance the attractiveness of the system. The development of new landing sites is likely in coming years as these new priorities are reflected in system design.

5. ECONOMIC VIABILITY OF A NEW SYSTEM

As we have stated earlier, it is possible for the market to sustain the development of new systems if current trends continue – that is, if demand growth remains robust, and the rate of decline of pricing remains low.

Using a basic cash flow model of the type typically used for undersea cable business planning, we modelled the introduction of a cable such as the one just described in 2014 that would cost $200 million. The baseline scenario assumed annual demand growth of 40% per year, and wholesale price decline at 15% per year. Only bulk wholesale revenues (90% lease and 10% IRU) were considered, along with Cap Ex and Op Ex typical for undersea systems.

If such a system can capture 15% of the incremental market demand (this is equivalent to an assumption that other systems are built), an internal rate of return

(IRR) of 15% can be realized over the period from 2012, when construction expense would begin, to 2022. At a market share of 10%, the IRR would be 8%, while a 20% market share would result in a 20% IRR. Incremental cash flows are positive after one year of operation even in the worst of these cases.

Were demand growth to reach 50% annually, the return numbers would improve dramatically to 26%, 19%, and 31% respectively in the three cases mentioned above.

Only if demand growth drops immediately to 30% per year would the calculated return become negative, and even then only at 10% incremental market share. This case is unlikely, since there would be no need to put a new system into service as early as 2014 were the pace of growth to drop so dramatically.

	Incremental Market Share		
Annual Demand Growth	10%	15%	20%
30%	-8%	1%	7%
40%	8%	15%	20%
50%	19%	26%	31%

Figure 1: Expected Internal Rate of Return (IRR)

6. WHO WILL BUILD THESE SYSTEMS?

This simple analysis suggests that the new systems that will be needed to support a rapidly growing market will be reasonable if unspectacular investments, especially for operators who already command significant market share and typically have revenue sources other than bulk wholesale capacity. Beyond the traditional players, content providers and other high-capacity users may opt to invest in a new system to secure long-term capacity at cost.

The likely returns from the wholesale business are probably not sufficient to attract private equity investors, *unless* a timing opportunity arises because carriers have not come in to fill the supply gap as capacity on the route approaches exhaustion. For example, if annual growth were to be sustained at 50% and carriers were slow to respond to the need for new capacity, an entrepreneur might step into the vacuum and potentially secure a 30% share of incremental demand. In that scenario a return on the order of 39% could be had.

In any case, while incumbent network operators will be able to derive significant lease revenues from their existing systems as long as those systems remain in service, it is those who build new systems in coming years who will own the bulk of the market of the future. The market could be re-ordered depending on who makes the requisite investments.

7. CONCLUSION AND CAUTION

Rapid demand growth will result in a need for new trans-Atlantic systems potentially as early as 2014. Fortunately, relatively stable pricing for wholesale capacity could make such systems reasonable investments (though not without risk) for incumbent network operators, and possibly for others who wish to play a role in the market going forward.

New technology has made it possible to expand the capacity of existing systems far beyond their design values; new competition in the upgrade market has allowed this to be done at relatively low cost. Further advances in technology promise to allow new systems to achieve far higher information capacity on each fiber pair than has been achievable through upgrade of existing systems, allowing operators to economically build new systems to handle the continuing growth in demand.

The one caution in all this is that the industry must somehow avoid a repeat of the scenario of a decade ago in which many operators and investors seeking to obtain market share built more new systems than were actually needed. How to so reign in human nature is beyond the scope of the current work but should provide many hours of interesting conversations in forums such as SubOptic.

