

APPENDIX **1E****Sprint on Real Options in Telecommunications**

The following is contributed by Marty Nevshemal (FM DP, Global Markets Division) and Mark Akason (FM DP, Local Telecommunications Division) of Sprint. Sprint is a global communications company serving 23 million business and residential customers in more than 70 countries. With more than 80,000 employees worldwide and \$23 billion in annual revenues, the Westwood, Kansas-based company is represented on the New York Stock Exchange by the FON group and the PCS group. On the wireline side, the Sprint FON Group (NYSE: FON) comprises Sprint's Global Markets Group and the Local Telecommunications Division, as well as product distribution and directory publishing businesses. On the wireless side, the Sprint PCS Group (NYSE: PCS) consists of Sprint's wireless PCS operations. Sprint is widely recognized for developing, engineering, and deploying state-of-the-art technologies in the telecommunications industry, including the nation's first nationwide all-digital, fiber-optic network. The Global Markets Group provides a broad suite of communications services to business and residential customers. These services include domestic long-distance and international voice service; data service like Internet, frame relay access and transport, Web hosting, and managed security; and broadband.

In the twentieth century, telecommunications has become ubiquitous in developed countries. In 1999, total telecommunications revenues in the United States were in excess of \$260 billion and had grown in excess of 10 percent per year for the prior four years.¹ By December 2000, there were more than 100 million mobile wireless subscribers in the United States.² Even more staggering is the capital intensity necessary to drive this revenue and provide this service. In 2000, the largest telecom company, AT&T, required assets of \$234 billion to drive revenue of \$56 billion, a ratio of greater than 4:1.³ Not only is simple growth in population and locations driving the industry, but also new technologies and applications such as wireless and the

Internet are fueling that growth. Given the capital intensity and sheer size of the investments, to be successful in the telecom industry it is critical that companies make decisions that properly value and assess the new technologies and applications. This is where real options can play a role.

The goal of any company is to make the right decision regarding its investments. One of the goals of any investment decision is to optimize value while preserving flexibility. Often though, optimum value and flexibility are at odds. An example of this dichotomy is that one can choose a strategy of leading the industry by investing in and implementing new, unproven technologies that will hopefully become the platform(s) for future profitable products and services. Or one can choose a wait-and-see strategy, holding back on investments until the technology standard is recognized industry-wide. Both strategies have obvious advantages and disadvantages. The first strategy opens a telecom company up to the risk of investing in a technology that may not become the industry standard, may be a dead end (remember BETA tapes?), or may not meet all the desired specifications. Furthermore, the magnitude of the “cutting edge” technology bet, if it does not work, could adversely impact the financial viability of the firm.

Therefore, it is critically important for a telecommunications company such as Sprint to ensure that their decision-making process includes a structured method that recognizes both the benefits and pitfalls of a particular technology investment as soon as information about that technology becomes available. This method should quickly obtain information in a usable form to decision makers so that they can take appropriate action. Finally, this structured method must ensure that timely decision points be identified, where actions can be taken to either improve the development results or obtain the option to redeploy resources to better opportunities.

One of the ways that Sprint believes that this strategic flexibility for technology investments can be systematically implemented throughout the organization is through the adoption of real options analysis. The very nature of the analysis forces managers to think about the growth and flexibility options that may be available in any technology investment decision. Real options analysis has a process for valuing these options, and it identifies decision points along the way.

Systemic to the telecom industry is the requirement of management to make critically important strategic decisions regarding the implementation and adaptation of various telecom technologies that will have significant impact on the value of their firm over the long term. Overall, these technologies are extremely capital intensive, especially in the start-up phase, and take an extended period to develop and implement, and have an extended payoff period.

Here are a couple of examples of capital-intensive telecom technology bets that a telecom company has to make:

- Selection of wireless technology (e.g., TDMA—Time Division Multiple Access, CDMA—Code Division Multiple Access, or GSM—Global System for Mobile Communications).
- Third Generation (3G) build-out and timing of a commercial rollout.
- 3G wireless technology applications.
- Location and construction of Metropolitan Area Networks (MANs), Central Offices (COs), and Points-of-Presence (POPs).
- Capacity of its backbone fiber network.
- Technology of the backbone network (ATM—Asynchronous Transfer Mode versus IP—Internet Protocol).

Generally speaking, there are three basic outcomes to any technology decision using a strategy to lead. Each outcome has distinct effects on the company, both operationally and financially:

- The right technology choice generally leads to success in its many forms: sustainable competitive advantage in pricing/cost structure, first-to-market benefits, greater market share, recognition as a superior brand, operational efficiencies, superior financial results, and industry recognition.
- The wrong technology choice without strategic options to redirect the assets or redeploy resources could lead to a sustained competitive disadvantage and/or a technology dead end from which it takes considerable financial and operational resources to recover.
- However, the wrong initial choice can also lead to success eventually— if viable strategic and tactical options are acted on in a timely manner. At a minimum, these options can help avoid financial distress and/or reduce its duration and/or the extent of a competitive disadvantage.

It is important to implement valuation techniques that improve the analysis of business opportunities, but perhaps more important, telecom managers should strive to implement a structured thought/analysis process that builds operational flexibility into every business case.

This is where real options analysis has shown to have definite benefits. More specifically, the thought process that forces management to look for and demand strategic flexibility is critical. Furthermore, similar to the value of Monte Carlo simulations that educate management to better understand the input variables as opposed to concentrating on a final output NPV (net present value), real options analysis also forces management to better understand these input variables. However, it goes a couple of steps further by valuing strategic flexibility and identifying trigger points where the direction of the business plan may be amended. The challenge is how to implement the mechanics of real options analysis.

In the telecom industry there are typically no natural trigger points where hard-stop reviews are required as there are in the pharmaceutical industry or in the oil and gas industry. Within the pharmaceutical industry, for example, there are natural gates/decision points, such as FDA reviews, that act as trigger points where the strategic direction of the product/project can be and typically must be revisited.

For technology companies like Sprint, these trigger points are not implicit. Instead, they need to be actively defined by management and built into a structured analysis. These trigger points can be based on fixed time line reviews (monthly/quarterly/yearly) or can occur when a technology reaches a natural review stage such as the completion of product design, product development, market analysis, or pricing. Other milestones include when financial and operational thresholds are realized (project overspent/competing technology introduced/growth targets exceeded).

When implementing new technology, historical benchmark data regarding the chance that a particular event will occur is not available. For example, there is no historical precedent to show the percentage chance that CDMA rather than GSM technology will be the preferred wireless technology in the United States over the long run. Yet, the adoption of one technology over the other may have serious financial ramifications for the various wireless carriers. Therefore, management, in many cases, will base the value of the option on their subjective analysis of the situation. With real options, the final outcome of management's analysis is determined through thorough analysis and critical thinking, and the result has considerable value.

Similar cases are present throughout the telecom industry and may result in considerable subjective leeway that allows for wide swings in the value of any particular option. This is not to say that this dilutes the value of real options analysis. On the contrary, just having the structured thought process that recognizes that there is value in strategic flexibility and in trying to put a value on this flexibility is important unto itself.

In summary, applying the key principles of real options analysis is important and valuable; and overall, real options analysis complements traditional analysis tools and in many cases is an improvement over them.

The following examples are telecom-specific areas where various types of real options can be used to determine the financial viability of the project.

- ***Wireless Minutes of Use (MOU) and Replacement of Wireline MOU.*** In today's competitive wireless landscape, most, if not all, of the nationwide wireless carriers are offering long-distance plans as part of their wireless package. As wireless penetration increases, this drives MOU to the long-distance carriers and may change the economics of the wireline build-out for some carriers. Furthermore, because wireless subscribers have long distance bundled into their monthly recurring charge (MRC),

many are replacing their wireline phones with wireless phones for long distance. Therefore, real options analysis can be done to place a value on both wireless and wireline carriers.

- **Valuing New Technologies Using Sequential Compound and Redeploy Resources Options.** 3G can be seen as both a sequential compound and redeploy resources option. Some wireless carriers in the United States, such as Sprint, will be able to implement 3G by deploying software upgrades throughout the existing network, while others will need to build out new networks. Companies that find 3G a *sequential compound option* can upgrade their network to 3G capable with very little (if any) incremental investment over what the wireless company would normally invest to build-out capacity. In addition, the subscribers of these companies will be able to utilize existing phones that are not 3G capable for voice services.
 - Wireless companies that cannot upgrade sequentially to 3G must redeploy resources from the existing wireless network. These companies must spend billions of dollars acquiring the spectrum to enable the build-out of 3G networks. In Europe alone, an estimated \$100 billion was spent acquiring the spectrum to allow 3G. These companies must redeploy these significant resources to build out their 3G-capable network, while maintaining their existing networks. In addition, the customers of these companies must purchase new handsets because their existing phones will not function on the new 3G-capable networks.
 - The options that wireless carriers face today can be traced back to an option that faced the companies years ago. As stated earlier, a real option existed between CDMA, TDMA, and GSM for wireless technologies that the industry is just now getting better visibility on. The decisions made then have consequences today and in the future for the viability of these companies' 3G offerings.
- **Leveraging Local Assets Using New Market Penetration and Change Technology Options.** Incumbent local exchange carriers (ILEC) are in a unique competitive position and therefore can use a new market penetration option analysis when valuing expenditures on their existing local infrastructure. This can be used to offer long-distance service with minimal infrastructure upgrade to allow the ILECs to enter new markets as well as to offer new technologies like high speed data, video, and the Internet to existing local customers.
 - The change of technology option is one that is facing or will be facing all major ILECs. The existing circuit-switched network is not efficient enough to handle the increasing amount of traffic from both data and voice. Carriers built their networks to handle peak voice traffic during the business day, but in actuality the peak times of the

network now occur during the evening because of Internet and data use. The change to a packet-based data network is an option that local carriers are facing today. The change to packet technology will create a much more efficient network that will handle both the increasing voice and data traffic. This change technology option to a packet-based network also enables more options in the future by opening the possibility of creating new markets and products that cannot exist on the old circuit-based network.

- ***Infrastructure Build-Out (Expand versus Contract Options)***. The expand/contract option is gaining more and more validity in the current telecom environment. Network build-out is a capital-intensive requirement that has forced many carriers to leverage their balance sheets with a large amount of debt. However, demand for telecommunications services has not kept up with supply, resulting in excess fiber capacity. Depending on the location and availability of excess capacity, it may be cheaper for a telco to lease existing capacity from another telco than to build out its own network. In addition, due to the strained finances of some carriers, this capacity may be acquired at prices that offer a considerable discount to any unilateral build-out scenario.