

Wedgewood View. First Quarter 2006

QUALCOMM: Future in Hand



BigCharts.com

Our little story begins in San Diego during 1968... before the advent of digital communications and the deregulated telecommunications market with a small company named Linkabit that specialized in technical consulting and advanced communications. Doing work primarily for the military, San Diego was fertile territory due to the presence of the Navy which kept our little company afloat with a myriad of opportunities to develop potential commercial applications. Not to stereotype, but Linkabit was a partnership formed by 3 brainy types who all had studied at MIT and were treading the waters of academia as engineering/information theory professors - two from UCLA and one from the University of San Diego. Andrew Viterbi, Len Kleinrock (who went on

pioneer ARPAnet after leaving Linkabet and is known as the father of the internet... sorry Mr. Gore) and last but not least, Irwin Jacobs. Linkabet grew rapidly at an average pace of over 50% per year and from the three founding employees to over 600 employees in their first ten years, grabbing the talent from the likes of MIT, the University of Illinois and University of San Diego. No project was too complex for this tenacious group and the company's reputation grew due to their expertise in digital information theory. A key engineering first for Linkabit included the implementation of time division multiple access communications (TDMA) and the development of encryption circuitry for HBO - which was used in satellite television broadcasting. In August 1980, Linkabit (1400 employees by this time) was purchased by M/A-COM. M/A-COM was focused on the near term and stymied many of the projects Linkabit was developing, refused to fund new ones and sold off many of the most promising projects developed by the Linkabit team. Frustrated with the situation, by the spring of 1985, Irwin Jacobs would leave M/A-COM. A few months later, Linkabit co-founder Andrew Viterbi also left. In July 1985, Irwin Jacob recruited five choice team members from Linkabit along with Mr. Viterbi and these seven founded QUALCOMM.

QUALCOMM realized the tremendous potential of cellular networks. After decades of government intervention, which slowed and thwarted the development of efficient cellular systems, commercial cellular networks were finally deployed in 1983. The cellular standard at that time was AMPS (advanced mobile phone system: FDMA - frequency division multiple access) which was analog based and posed irreconcilable capacity issues for the growing cellular market. An average cell phone cost \$3000 in 1983 and eventually dropped to less than \$1000 in a few years due to improvements in integrated circuitry. As laughable as it seems today, AT&T had predicted the cellular market would grow to one million cellular users by 2000 - there are currently over 300 million cellular users today in the U.S. and 400 million in China. The cost of maintaining an analog system would prove to be prohibitively expensive, plus as we all can remember calls were dropped frequently. With computers advancing to digital technologies whereby information was compressed into less space, in was time for cellular networks to follow suit in order to grow their markets and resolve capacity constraints.

In 1988, the Cellular Telecommunication Industry Association (CTIA) published User Performance Requirements for the industry that dictated the development of a digital wireless standard with at least ten times the capacity of the then current analog networks in addition to better reliability and quality. Qualcomm proposed their seemingly radical and unproven concept of code-division multiple access (CDMA) based on spread spectrum technology while the rest of the industry settled for and supported time-division multiple access (TDMA). Benefits of CDMA over TDMA included numerous promised benefits for network operators - enhanced and flexible capacity, better security, full frequency reuse, easy transition from analog, reduced number of towers, along with benefits for end users - better voice quality, enhanced privacy, better connection quality, and longer battery life. A no brainer right? WRONG! In 1989, the CTIA protected its backside and chose the “safer, proven” TDMA as the standard for cellular networks in the United States. Not to give our storyline away, but many shortcomings of TDMA were exposed in the early 1990’s enabling Qualcomm to also become a national standard by 1993.

The following cocktail party analogy, retold by author Dave Mock (*The QUALCOMM Equation*), illustrates how QUALCOMM explained to network operators the superiority and technological differences of CDMA over both FDMA and TDMA.

To make them easier to understand, the various wireless technologies in mobile networks were likened to a social event at a large mansion. If the communications at the party were based on frequency division (FDMA), each one-on-one conversation would take place in a separate room. While you were in a room talking with a friend, no one else could join you there, so you and your friend could each hear each other just fine. And since you were alone in the room, you could speak as loudly as you wanted without disrupting anyone who was conversing elsewhere. The room represented your assigned frequency channel, and you could use it for as long as you liked. No one else could come into your room and hold another conversation until you were done. Other conversations that were going on simultaneously would be taking place in other rooms, on other frequency channels. But if the mansion had only twenty rooms, only twenty conversations

could be held at once. If there were hundreds of guest who wanted to talk, the party would be a drag for many, because they would just plain be left out.

A better party to attend would be one based on time division (TDMA), because it would allow more people to hold conversations simultaneously. Let's say those same hundreds of guests were to drop in on a time-based party. Here, several couples could enter a room to have one-on-one conversations, but the pairs would have to take turns talking. One pair would talk for, let's say, thirty seconds, then would stop to allow the next couple time to talk. The couples would rotate their conversations so that more than one pair could be in the same room talking. Since they were confined to the time periods they could talk within, no one would talk over someone else and disturb the conversation. Like the FDMA party, everyone could talk as loudly as he or she wanted, but the capacity for conversations would be increased---as long as each pair of conversationalists followed the rules, many more conversations could be carried on at the same time, through rotation. But even the time-based party was somewhat limited in the number of guests it could accommodate. If you put ten or twenty couples in each room, they would have to wait an awfully long time before they could talk. Let's say that it was practical only to have three couples in a room. So even this cocktail party had its limitations.

While no one would really ever host a party this way (based on FDMA or TDMA), a spread-spectrum (CDMA) environment is more analogous to a real cocktail party—in other words, it is much more similar to the natural way in which humans communicate. In a spread spectrum party, everyone shares the same space; no one is cordoned off in separate rooms. But the background noise level is much higher in this scenario, and it can often be difficult to be heard. However, CDMA solved this noisy party problem, especially for those suffering from “cocktail ear”—mostly older people with degraded hearing, who had difficulty understanding speech in a noisy environment. At the code-division party (where all the cool people go, of course), more people are allowed to flood into any one space at the same time to hold discussions. At this party, though, each pair speaks in a different language. This way, their conversations are encoded in each couple's dialect. All couples can talk simultaneously, as the separate language makes it surprisingly easy to hear your partner. Because you would be keying in on the nuances of your spoken language, all the other languages would just sound like gibberish in the background. Even though thousands of dialects were available for couples to speak, there was still a limit on how many could be spoken at the same time—basically the limit that resulted from the overall noise. If there were fifty couples, all talking different languages, it could get too noisy

for anyone to hear. So at the CDMA party it was important to regulate how loudly everyone spoke, to make sure that the maximum number of couples could be heard. By using code division, conceivably ten or fifteen couples in the room could talk at the same time---far more conversations than any of the other methods allowed.”

Although TDMA was first chosen as the U.S. cellular standard, in order to stimulate American cellular technology, the FCC would allow a network operator to use CDMA if inclined to do so. Armed with this knowledge, Irwin Jacobs enlisted the support of PacTel Cellular, Motorola, AT&T, NYNEX Mobile, Ameritech Mobile Communications, and OKI Electric to subsidize the large scale field validation of CDMA to bring it to commercial use. The Korean government was the first to help QUALCOMM establish an international presence due to their desire to gain an early foothold on the manufacture of equipment and network infrastructure which would be needed globally in support of CDMA. This relationship brought in substantial licensing revenue for Qualcomm and established a strong Asian presence, which still exists today.

QUALCOMM has fought many battles throughout the 1990's to establish CDMA as the premier cellular network and a national wireless standard. Cash crunches, dogged persistence in protecting their intellectual property rights, design of their own chipsets, fighting inefficient government regulatory bodies both here and abroad, cultivating relationships and fighting public relations efforts to paint CDMA as questionable all have made QUALCOMM a leader. Although much larger, a rare corporate culture emphasizing innovation and tenacity is still present today. Unlike the competing European standard GSM (global satellite for mobile communications - TDMA based) in which dozens of companies contributed intellectual property and share in royalties, Qualcomm holds over 4000 patents plus one-half of the current patents used in CDMA handsets allowing them to dictate licensing terms and royalty fees on each and every CDMA handset sold. In addition, most CDMA-2000 based phones utilize Qualcomm chipsets as well, creating another revenue stream for the company.

QUALCOMM's uniquely successful commercialization of IP is a wonder of profitability.

QUALCOMM derives about 40% of its revenues and 60% of their operating income from royalties and patent licenses. The chipset part of the company's business generates as much as 60% of revenues. While the chipset business generates decent operating margins of 25% to 30%, the royalties and licensing business generates operating margins in excess of 90%! (No typo). All told, Qualcomm is a cash-generating machine. Free cash flow has averaged a staggering 40% of revenues for the last three years and clocked in at 52% of revenues in the company's most recently reported quarter.

As you can see from the chart on the first page of this Letter, Wall Street more than embraced the potential of QUALCOMM during 1999. The parabolic price move in the stock that year became synonymous with the tech bubble during that infamous year. From stock price boom to stock price bust, the stock from 1999 to 2003 certainly was a rollercoaster ride.

Alas, the corporate story did not stop there, but we believe has gotten considerably better.

With the proliferation of global demand for Third Generation (3G) services which allow advanced capabilities for wireless networks including broadband speeds, entertainment, productivity and computing, again QUALCOMM is in the driver's seat as GSM is transitioning to 3G utilizing (are you ready—another acronym) WCDMA (wideband code division multiple access) technology - which is a form of CDMA. GSM handset sales currently comprise about 80% of the 850 million worldwide 2005 shipments of handsets. WCDMA shipments are estimated at 105 million for 2006, a growth rate of about 130% over 2005. There are an estimated 1.5 billion outstanding GSM handsets which will in time transition to WCDMA. This transition offers huge operating leverage and advantages for Qualcomm and will be a key driver of future revenues. In effect, whether Qualcomm chipsets are used or not, they will receive a royalty payment on every handset sold. Currently, they receive royalty payments on 15 to 20% of all handsets sold. Qualcomm currently provides about 15% of the chipsets for WCDMA and their market share is estimated to grow to by 50% within 5 years. Progress in this area could be realized this year as Qualcomm is well positioned to gain WCDMA business from

Motorola who currently depends solely on inferior products from Freescale Semiconductor – Motorola’s recently spun out semiconductor division.

Beyond 3G, comes 3.5G, whereby Qualcomm offers HSDPA chipsets (high speed downlink packet access) which supports higher data rates for enhanced multimedia and increases overall network capacity. Several laptop manufacturers have announced plans to produce laptops with embedded HSDPA connectivity. With 3G technology, QUALCOMM offers their BREW solution that is comprised of software on a handset and software for servers that belong to the network operators that adopt the BREW solutions. BREW is an operating system that can download applications such as games or business tolls and these are billed accordingly by the BREW solution.



Forbes

Another QUALCOMM product currently in development and is expected to be released this year by Verizon and possibly by Sprint is MediaFlo. MediaFlo offers interactive wireless multimedia services providing 20 video channels, 10 audio channels, and 800 minutes per day of clipcasting. Local TV will also be offered. Samsung and LG, two of Verizon’s larger handset suppliers indicated they would develop MediaFlo capable handsets.

In preparation for Fourth Generation networks, again, showing their aggressive nature to protect future revenue streams, QUALCOMM purchased Flarion Technologies, a developer of OFDM (orthogonal frequency division multiplexing) which is a technique for transmitting large amounts of digital data over a radio wave. OFDM works by splitting the radio signal into multiple smaller sub-signals that are then transmitted simultaneously at different frequencies to the receiver.

Investing in technology stocks is always a difficult endeavor. Technological obsolescence is an unforgiving and unrelenting taskmaster. What was once proprietary can become a commodity overnight. Rare is a technology company that possesses sustainable competitive advantages. We believe QUALCOMM is that rare company. Simply put, QUALCOMM is the both the gate keeper and toll keeper of next generation cellular networks and handsets. By March of this year, there were more than 272 million reported 3G CDMA subscribers worldwide. We expect fiscal (September) 2006 earnings to exceed \$1.65 per share. The ratio of WCDMA royalties as a percent of total company royalties is already 46%. Furthermore, WCDMA handset shipments in excess of 150 million units in fiscal 2007 could be a key driver in earnings reaching \$2.00. At a valuation of 25X fiscal 2007 earnings for a company with the economic moat of QUALCOMM seems very attractive to us.

David A. Rolfe, CFA
Chief Investment Officer

Dana L. Webb, CFA
Senior Portfolio Manager

April 2006

The information and statistical data contained herein have been obtained from sources, which we believe to be reliable, but in no way are warranted by us to accuracy or completeness. We do not undertake to advise you as to any change in figures or our views. This is not a solicitation of any order to buy or sell. We, our affiliates and any officer, director or stockholder or any member of their families, may have a position in and may from time to time purchase or sell any of the above mentioned or related securities. Past results are no guarantee of future results.