



---

## Maintaining an Edge at ADI (C): Cellular Handsets

In early 2006, Christian Kermarrec, who led ADI's vertical unit focused on cellular handsets, packed his bags for Barcelona. He was headed to a major industry conference — the world's largest gathering of cellular handset manufacturers. It was an event that promised a terrific opportunity to meet senior-level business and engineering managers from all the large handset manufacturers.

This was Mr. Kermarrec's 13th year at ADI. He had come to the company after early career experiences left him desiring a greater opportunity for impact and a faster-paced environment. He felt he had found both and had risen to lead a global team of nearly 350 people.

Would 2006 be the year that ADI struck gold in the cellular handset market? One major contract with one of the top-tier companies dominating the industry—Nokia, Sony Ericsson, Motorola, and Samsung—could quickly add \$300 million or more in revenue and carry the DSP division to profitability. ADI remained in the DSP segment in part because it carried the promise of explosive growth. Handsets could become the overwhelming driver of that growth.

The handset business also drove sales of other ADI components. In fact, cellular handsets exemplified the systems-level challenges for which ADI's customers increasingly sought solutions. Handsets included an analog “baseband” chip, a digital baseband chip, a radio frequency transmitter/receiver (an RF chip), a power amplifier, memory, software, and, now, peripherals, such as MP3 players and cameras. ADI had strengths across the board. Mr. Roche, who led ADI's centralized worldwide sales function, elaborated:

Cellular handsets are among the most complex applications because of the wide range of hardware and software technologies they utilize. Every piece of technology that ADI makes—from DSPs to motion sensors to converters and amplifiers to radio frequency circuitry to extraordinarily sophisticated power management systems—is a part of the modern handset. Servicing this sector requires leading-edge sophistication in design, service, and supply chain management. It requires a deep commitment of people, capital, and infrastructure.

---

This case was written by Professor Chris Trimble of the Tuck School of Business at Dartmouth. The case was based on research sponsored by the William F. Ahtmeier Center for Global Leadership. It was written for class discussion and not to illustrate effective or ineffective management practices.

© 2008 Trustees of Dartmouth College. All rights reserved.

To order additional copies please call: 603-646-4055

---

In 2005, ADI's largest contract was with the largest of the second-tier companies. Revenues from this contract had dropped recently, however, because the customer had built up a significant inventory surplus. While hoping for a breakthrough with a major new customer in Barcelona, Mr. Kermarrec prepared for disappointment. In fact, his strategy emphasized turning second-tier providers into new competition for the dominant players in the industry.

Mr. Roche described how ADI would operate at the conference:

The sales team and the division will collaborate to set an agenda and invite the appropriate people from our target customers to meet the appropriate people from ADI. Typically, the meetings involve the management teams and the discussions tend to be strategic in nature. Customers want to talk about not just the next product generation, but several generations out. They are outsourcing more and more. We will have to be prepared to collaborate with complementary suppliers—and sometimes even competitors—to put together a systems-level solution.

## The Handset Team

In the early 1990s, ADI had little experience in RF, software, or systems design. Thus, to build its handset unit, ADI had to acquire and integrate a wide range of new skills. Approximately 70 percent of the staff had come from outside sources. It took nearly four years, 1994 to 1998, to build up the needed application-specific DSP expertise, and it proved even harder to build up the systems and software capabilities. ADI acquired a small company in the U.K. to deepen its software skills and built a systems group in Denmark focused on GSM, an emerging standard for cellular communications. The team also included a 30-person applications group in China. Thus spread out over several time zones, the team was able to work around the clock.

Mr. Fishman noted that the business unit was one of the hardest working in the company. Several of the people in the business unit credited Mr. Kermarrec with a leadership style that helped keep the team together, even when working exhausting hours through trying times.

Mr. Kermarrec hired people with minimal egos (even the ADI Fellows in the group downplayed their status), emphasized team success over individual success, insisted on customer focus, and took as hands-off an approach with his engineering staff as possible. His staff was motivated by the startup feel of the unit, and some felt there was no better place in the company to have an impact. Because of the preponderance of outside hires, the business unit felt to some individuals within it as though it was a separate company.

## Operations

Mr. Kermarrec's leadership role demanded managing his direct reports plus coordinating interactions with other ADI groups, including component-level experts in horizontal

---

business units and ADI's centralized sales and manufacturing groups. Because the industry was fast moving, product development was always a high priority.

In 2006, Mr. Kermarrec's division was designing its sixth-generation handset. Mr. Kermarrec hoped this new design would carry the company to the next level and score a hit with one of the handset giants.

The product development effort was coordinated by Mark Martin, whose direct reports were each responsible for one major handset component, such as RF. In addition, leads for systems engineering, software engineering, and product testing reported to Mr. Martin. Designing handsets often involved modifying components designed by ADI's horizontal divisions. The digital baseband, for example, was based on Blackfin technology.

Paul Ferguson, a mixed-signal expert, led collaborations with analog signal-processing experts within the company to ensure ADI incorporated the best possible analog technology in its chipset designs. He found he could use his status as an ADI Fellow to gain influence and motivate across business lines. However, differences in the market demands faced by different business units challenged collaborative efforts. The handset team felt that to make collaboration productive, it had to work hard to raise expectations for timeliness and cost consciousness and downplay expectations of perfection.

A number of informally organized engineering forums facilitated sharing of technology across business units beyond the specific demands of product development projects. While many engineers viewed these forums as valuable, they also noted that without a formal organizational frame, the forums were always at risk of being de-prioritized.

The product development process started with overall product goals, followed by overall systems design, in which questions, such as what would be done in hardware versus software, were addressed, and then chip design. There were opportunities for feedback and refinement throughout the design process. One crucially important checkpoint was the movement of designs into silicon, because once that was formalized, changes became much more expensive.

Early on, product development teams might consist of fewer than five people, but these teams would grow much larger over time. An incremental redesign could be completed in less than six months, but a more revolutionary redesign, such as the sixth-generation design, took one to two years.

With each generation, ADI endeavored to improve speed, power consumption, and cost. It also tried to increase the degree of flexibility and programmability with each design to enable customers to meet the specific needs of their target markets.

Once a handset design was complete, the handset business unit coordinated with sales and manufacturing. In sales, there were several FAEs fully dedicated to the handset market. They had been hired, trained by, and reported to Mr. Roche. One experienced sales manager noted that compared to his peers, Mr. Kermarrec made an unusually heavy

---

commitment to spending time in the field with the sales force and interacting with customers.

Mr. Kermarrec felt he had sufficient FAE support in countries where handset sales volume was high enough to justify *full-time* FAEs. However, in European countries, where revenue was low, the handset sales task was a part-time duty for an FAE who worked across other product lines. Mr. Kermarrec felt this was potentially a “chicken-and-egg” trap and believed that a critical mass of FAEs dedicated to handsets around the world, sharing ideas and perspectives, could accelerate sales. The shared sales model made it easier to incrementally scale up and down the size of the sales force and thus reduced the volatility of profitability as the business went through its inevitable ups and downs. However, it took months to train a salesperson on the intricacies of handset designs, so there were limits to how quickly the sales force could grow.

Although the handset business unit outsourced manufacturing, it coordinated supplier management through ADI’s centralized manufacturing group. This resulted in occasional tensions. For example, Mr. Kermarrec felt it necessary to maintain higher levels of inventory than ADI standards dictated. The handset market was more prone to spikes in demand than was ADI’s core customer base.

## The Evolution of ADI’s Handset Business

ADI began serving handset manufacturers in the late 1980s, offering only analog components. In the first half of the 1990s, however, the handset market underwent a rapid transition from analog to digital technologies. Government and industry leaders in Europe had come together to agree to a single European standard for digital handsets, —GSM, —and that, in turn, propelled growth. (The United States government chose to leave standard setting to the market and suffered the consequences, with a far less capable cellular infrastructure even a decade later.)

ADI responded by offering its first “chipset,” an analog and digital baseband pair, in 1993. The company also formalized a new communications business unit that year and laid plans to continue to expand its capabilities, with an eye towards offering full handset systems.

For example, the company invested a great deal in building radio frequency expertise—in fact, that was the impetus for hiring Mr. Kermarrec, an RF expert, in 1993. Design of RF chips required extraordinarily careful design and manufacturing controls because of the potential for interference that destroyed sound quality.

ADI’s initial strategy was to offer the highest quality RF chip, based on the belief that superiority in RF was the key to winning system sales. The division learned, however, that RF was not the strategic lever they anticipated. The choice of the digital baseband had greater implications for the overall system design.

---

In the mid-1990s, the company suffered two major disappointments. It lost one big customer, who was pleased with the RF chip but later chose to use a chip manufactured in house. Later, ADI became lead supplier to another major manufacturer, only to see that customer make a strategic choice to exit the cellular handset market altogether. Meanwhile, Texas Instruments deepened its relationship with the top tier and started building its lead over ADI in the market.

ADI's ups and downs in perceived performance always took sharp turns when a major contract, either the company's or a competitor's, was won or lost. Mr. Ferguson recalled the major customer losses as a "black days."

In 1998, ADI made some organizational changes, and the communications business unit became part of the DSP division. Mr. Kermarrec was promoted to vice president and was named to head the business unit. From that day forward, he reconceptualized his role from "build the best RF technology" to "help customers win."

By 2005, ADI had worked through five generations of chipset designs and launched the sixth-generation redesign effort. Through this succession of redesigns, ADI improved component-level speed, power consumption, and cost. ADI also expanded flexibility. Each generation was more programmable (in fact, one generation was branded SoftFone to emphasize flexibility) and offered a dizzying array of expansion options—from cameras to email and Internet access to music players to mobile TV.

The expansion of features represented an opportunity for ADI because it raised the demands on the analog and digital chips at the core of the system. With its sixth-generation redesign, ADI anticipated being able to compete at the highest end of the market.

## Stiff Market Challenges

Even if ADI offered the best systems, however, there were any number of pitfalls of operating in the handset market. There was enormous variation in standards, progressing in sophistication from GSM to GPRS to EDGE to 3G.

In designing its offerings, ADI had to bet on which standards would be most widely adopted. The standards established a wide range of design constraints and limited the possibilities for innovation. On the other hand, *new* standards represented an opportunity for ADI to break into the market. For example, the Chinese government was developing its own standard, TDSCDMA, and that potentially opened a promising window for ADI. Still, so great was the market demand for interoperability, there would never be more than a handful of standards worldwide.

Another dimension of complexity was that the handset market was exceptionally fast moving. Product cycles were extremely short. Consequences of being slow to market were severe. Customers would not accept delays; instead, they simply changed suppliers. Contrary to ADI's experience in other markets, it was better to be on time than perfect

---

because missing a market window could mean missing out on an entire product generation.

Not only were product cycles fast, handset consumers were difficult to read. Few in the industry had anticipated the success of camera phones or MP3 phones, for example, and many industry insiders seemed at a complete loss to explain the success of Motorola's late 2004 product introduction, the RAZR.

Further, the sales process was lengthy and demanding. Choosing a supplier was a major strategic decision. In smaller handset manufacturers, senior executives, even CEOs, selected suppliers.

Finally, distribution models were varied and evolving. In the U.S., handsets were distributed primarily by telephone network operators, but globally, there was a much wider array of channels, including major retailers.

All this complexity was tricky for ADI, but it also made the handset market unstable for even the biggest players, who could be late to market or bet on the wrong standard and suddenly find themselves in a sharp decline.

## ADI's Strategy in Handsets

Traditionally, the major handset manufacturers did most of their own design work, including designing their own chips. TI had locked up manufacturing contracts for the biggest players and thus had an inside track for winning the limited design work it chose to outsource.

Mr. Kermarrec and his colleagues believed the way to catapult to the front of the industry was to overthrow the existing value chain. They had anticipated since the mid-1990s that the handset supply chain eventually would resemble the PC supply chain. In that model, the major brand names did little more than final assembly and shipping—sometimes not even that. An array of specialists farther back in the value chain handled various aspects of component and system-level design and assembly.

The transition to a disaggregated handset value chain was not happening quickly, though. ADI measured the “attach rate”—the fraction of customers who bought the entire handset system rather than just the core processors—to monitor the market trend. Attach rate had increased to 30 percent by 2005. The larger players were outsourcing design only in the bottom tier of their product offerings. Second-tier players, on the other hand, outsourced product development and manufacturing almost entirely.

Nonetheless, the hypothesis that even the biggest handset manufacturers would eventually choose to outsource product design was an important element of ADI's rationale for continuing its investment in the handset market. Mr. Kermarrec elaborated:

Development costs are skyrocketing, so outsourcing product design is one way for handset manufacturers to diversify risk. Also, there are a limited number of expert

---

product designers worldwide. They are likely to concentrate in a few companies that specialize in design.

Mr. Kermarrec hoped that if a few second-tier providers rose to the top by outsourcing system design and manufacture to ADI, the entire industry would disaggregate, and ADI's fortunes would make a sharp upward turn. Still, Mr. Kermarrec acknowledged that the biggest players would resist disaggregation of the value chain as long as they believed that proprietary technology gave them a competitive advantage.

Second-tier players valued their relationship with ADI because they did not have the scale to take on the design and manufacture themselves. They also lacked the skill and experience to survive the rapid product life cycles that defined the industry. The second tier needed ADI, and ADI needed the second tier.

ADI invested heavily in a relationship with a Chinese handset manufacturer that had ambitions to be the Sony of China. ADI built the handset and, in the process, trained the customer to make incremental design changes on their own. In parallel, ADI worked directly with the Chinese government to influence the development of the TDSCDMA standard. If the customer succeeded, they would be tied to TDSCDMA and ADI both. No other company understood their phone.

With ADI behind them, the Chinese customer had become a worthy competitor in its market by 2004, surprising some of the industry giants. In fact, the years 2002 through 2004 were boom times for ADI's handset business. China was looking more and more like an engine for ADI's growth.

## Performance

After years of investment, the business reached a major milestone, cumulative breakeven, in 2004. ADI's market share had grown to roughly 10 percent of the \$3 billion GSM market.

However, after a peak year in 2004, sales declined sharply in 2005. Because of an inventory glut, ADI's largest customer reduced orders by 75 percent in one quarter. Once again, the business unit operated short of breakeven. As a result, 2005 was a difficult year. Because of the market's volatility, Mr. Kermarrec and his crew received far more attention from ADI's senior management team than did their sister business units.

Some executives on the senior team were pained by the apparent impossibility of making money in the industry. Cellular handsets were incredibly sophisticated devices, and yet, the network operators were training customers to expect to get the handsets for free. Success required scale, and ADI did not serve any of the four largest handset providers.

Mr. Fishman expressed his viewpoint:

We serve smaller customers, and they are whipsawed the hardest by industry cycles. We also face tough competition, high levels of up-front investment, and it's

---

a departure from our business model. There are plenty of reasons to get out. But if we can build scale in DSPs, we'll be able to use our DSP expertise as a competitive weapon against companies that only operate in analog.

Mr. Fishman had to answer to investors. Although he felt it was his role to protect nascent units from undue short-term pressures (he never let Mr. Kermarrec in the room to listen to investors because they were too negative about the handset business), in late 2005, he pointed to the decline in the handset business to explain sub-par performance for the company as a whole. It was a tough shot to the morale of Mr. Kermarrec's team.

Gross margins, a commonly watched metric within ADI, were some 20 points lower than those seen in the analog division. With scale, however, the handset business could compete on the operating margin line. In fact, Mr. Kermarrec had found it much easier to compete for capital during the upswing in 2004, when his operating margins approached the standard for the analog division, around 25 percent. Unfortunately, the margins proved fleeting.

### **Developing the Sixth Generation**

With performance sagging in 2005, Mr. Fishman weighed his options. It was clear that if ADI did not finish development of the ambitious sixth-generation chipset, it almost certainly would be squeezed out of the business altogether. Mr. Fishman chose to remain patient and persistent and reconfirmed his commitment to handsets.

In the last quarter of 2005, ADI once again logged record sales. In fact, it led the market in TDSCDMA. The company had pulled out of an unexpected slide but still could not declare victory.

For that, it would have to break into the top tier. Mr. Kermarrec boarded the plane for Barcelona.



---

**Questions:**

1. Should ADI remain in the handset business?
2. Is the handset business unit organized optimally? Can coordination across organizational boundaries be improved?
3. Who determines how much to invest in the handset business?