Ambient Technologies: 1998-2000

As part of the divestment effort I was given the assignment to make the technical presentations to potential prospects and I did so together with Wesley Smith, a key engineer on my team, to Globespan and to a Japanese PCMCIA card manufacturer. None was willing to make a bid in the price range that Cirrus was looking for, which was a minimum of 30 million. Since French seemed eager to sell, Fred and Clement thought that it might be feasible for the management team to do a leveraged buyout. We proceeded to form a new company which we called Ambient Technologies Inc (the name was my idea) and proceeded to make Cirrus an offer. Our organization was as follows: Fred was CEO, Clement VP of marketing and I was VP of Engineering as well as manager of the Raleigh site. We agreed that the three of us would retain 30% of the shares, divided equally among us, 20% would be reserved for the other employees and 50% would be reserved for investors and Cirrus. I tried my best to grant significant options to the people in Raleigh and largely succeeded, including significant outright grants to a couple of key employees, by describing the attractive offers that our people were being tempted with. I ran into a brick-wall, however when I tried to protect my people from the potential tax liability due to the imputed income rule when above-water options are exercised. My scheme was to use something called “reverse vesting”, which I learned about at Optigraphics. In this method the employees are allowed to exercise the options immediately upon signing a reverse vesting agreement that states that they will forfeit those shares that would have been unvested under a normal vesting scheme. In other words if they left the company after one half of the vesting period they would have to give back half their shares, if after a quarter of the period, three fourths of their shares, and so on. Our attorney, Klaus Burmeister, a tough Prussian type and Fred’s old buddy, said absolutely not. Why, it doesn’t cost us anything and it could save a lot of money for our people, was my question. If they own shares they could be in a better position to sue us and this we don’t want was the answer.

Another indication of the relative power relationships in our new company was the news that the company would also include a group of ex-Creatix engineers in Saarbrucken, Germany, and it was part of my engineering responsibilities to figure out how to fit them into our department and make effective use of them.

To finance the buyout we taught that venture capitalists would be the most likely route so we put together a business plan to shop around to that community. I had maintained contact with a former modem distributor/rep in Florida by name of George Goebel who was then dabbling in venture financing so I told him of our plans and gave him some copies of our business plan to see what he could scare up. He did take it to three or four prospects, including a venture group at A.G. Edwards, but did not get any bites. The A.G. Edwards people thought that the founders were too greedy in trying to hang on to 30% for themselves.

I also contacted Jim Wylie to see if he would be interested in being involved in some way, thinking that he would be able to put us in touch with several VCs but he said thanks, but no thanks. He had retired from the field and was not eager to get back in. So my efforts to be a hero and come up with the financing solution fizzled out. The more important task that I was responsible for was to hold the Raleigh engineering group together because without it we had no company. This was at the time in the Internet history when the bubble was still growing exponentially with no end in sight, so an engineering team with high-speed modem and communications expertise such as ours was in great demand and head hunters were continually circling our building like eagles looking for prey. One of the competitors for our talent was Munther who was trying to build his new company. I did lose a couple of people to him and had a couple of tense conversations with him about it, but since it all ended so well for us both, all is forgiven.

The offer we made to Cirrus was: 10 million in cash, 5 million in a short term note, 10 million in a long term note and 19% of the new company for the business, the designs, the IP, and all the inventory, assembled as well as in wafer form. Cirrus accepted the deal so all we had to do was come up with 10 million in cash and we would be in business. With the VCs efforts looking unpromising, Fred and Clement focused their attentions on their contacts in Taiwan and were able to engineer an almost miraculous deal with a distributor there. In return for favorable pricing they advanced the money as prepayment on 10 million dollars worth of modems and we were off and running. The inventory in assembled and wafer form was sufficient for us to generate the revenue to pay off the short term note and to proceed with product development.

With the V90 modem available in both controller based and PCI configurations and in reasonable working shape we were able to make sales of about 40 million per year and with a slimmed down staff of about 45 people we were on fairly solid financial footing at least for the medium term. Besides supporting the ongoing modem sales, the immediate order of business for the engineering department was the development of new products. Home networking was then a hot topic in PC communications and we settled on two products for this market, a G.lite compatible DSL modem and a power-line based home networking product. We settled on G.lite because it was easier than full DSL, especially in terms of the silicon development, and we were totally convinced by the fact that Intel and some other significant companies in the business were backing the G.lite standard. In our naiveté back in those days we saw Intel as the 800 lb gorilla that could sit anywhere it wanted and set any standard it wanted.

Time was of the essence, and we had done almost no work on the DSL technology so we decided we had to outsource most of the work. I had made

contact with a company in Bangalore, India called Silicon Automation Systems (later it became SASKEN) which had been working on a PC based DSL modem implementation that it was interested in licensing to modem manufacturers. This fit our schedule requirements as well as our desire for an uncomplicated silicon development so we made a deal with them. Our two IC designers in Fremont went to work on the chip and two engineers in Raleigh were assigned to handle the interface between the SAS code and the chip. The project manager, Kanna Krishnan (Veda's husband), was responsible for interfacing and coordinating with the SAS team.

The rest of the engineering department was divided into two groups, one to support the current modem product and one to work on the power-line networking product. We chose the power-line method instead of wireless primarily because we had no RF expertise in the group but we worked hard to convince ourselves and others that our approach was technically and economically the best choice. Adding some comfort to my secret misgivings was the appearance on the scene of a couple of start-ups that also went for the power-line approach.

One minor incident in the beginning of the project was our involvement with a local engineer who claimed to have some fundamental IP in power-line data transmission, including a prototype that he offered to bring in for a demo. I was very encouraged by what he told me and asked him to come and give the demo. It turned out that the prototype consisted of capacitors coupling the signal into and out of the power line and the demo consisted of plugging a signal generator into one plug in the lab and an oscilloscope into another. My heart sank right away when I realized that this was all there was to his great invention. I knew hardly anything about transmitting data signals over power lines but I knew that this was ridiculously naïve. I had got myself into an embarrassing situation by letting this guy come in with his "prototype" to help us get up to speed on this strange new technology. The only thing I could do was to let him go ahead so we attached a signal generator to the transmitter terminals and a scope to the receiver terminals and he proudly showed us how the received signal tracked the transmitted waveform. I just went over to the signal generator and turned the frequency selector back and forth and we all observed how the received waveform dipped down to zero several times as I swept the frequency band. What we were seeing were the spectral nulls that are *the* problem on power lines and that have to be dealt with or you don't have even a feasibility demo, let alone a product. Our visitor obviously had no idea about this fact and now it was my problem to explain to him how worthless his demo was. In my office he produced a ready made IP license agreement that spelled out the rights he would have in any product based on his concept. When I told him that he had no concept, that the prototype was trivial, had nothing innovative or useable and that I couldn't sign anything he became quite angry and accused me of trying to steal his ideas. It was a quite painful situation for a while, but then he went away, mad, and never came back.

We agreed that in addition to my engineering duties I should do some market research to verify or invalidate our product development plans, as well as try to do some consciousness raising in the industry on behalf of Ambient . As part of this effort I attended some conferences to talk to people, look at exhibits to see what other companies were doing, listen to the presentations, and give some presentations. One conference I attended was on home-networking in Palm Springs which was organized by a consulting company from Dallas. There I gave a talk on how internet access and home networking were each other's necessary and sufficient conditions. The argument I made was that these facilities would enable the "smart home" concept with much of the smarts being located on-line. The kinds of applications I talked about were:

Internet-based smart Heat/AC control and optimization
Internet energy management
Internet-based alarm monitoring tied into Outlook
Reporting of home/away information to newspaper and other delivery people

Another conference I went to was a DSL standards meeting on the Big Island in Hawaii. Anne-Berit came with me for our first Hawaiian adventure. The surroundings, the hotel, the beach, the mountain were beautiful and impressive. We attended a timesharing sales spiel and wound up buying a two-week time share condo. When we came home we took advantage of the 4-day cooling off period and cancelled the deal.

I met a couple of people from Intel at the standards meeting, and overcoming my awe and tendency to be intimidated by someone from Intel I started discussing our product plans with them. Instead of trying to sell them on our ideas I told them to try to "shoot me down". "Tell me what's wrong with our ideas and how we should fix them." I don't remember any specific suggestions they had but I believe it was no coincidence that a week or so later I got a call from a guy named Chad Taggard at Intel saying that they wanted to come and talk to us. We set up the date and I started to prepare a presentation. In it I gave a company overview, talked about past products, current products, and future product developments. I created the presentation in Powerpoint and included the use of hyper-links. Thus when I went over the bullet points on the overview slide I just clicked on them and it took me to the detailed slides. I had just previously read a paper on the development of 56k modems which called them the "driveway to the information super highway". I liked this expression so much that I incorporated it into the presentation. The tag line on the title slide was:

Ambient Technologies,

Paving contractors for the information driveway.

Intel sent two people to the meeting, a guy named Alan John (AJ) who was the engineering manager for their Access Products Division and an engineer from the Boston engineering group in that division. Fred came from California to attend the presentation but he let me handle it and just stood by to answer questions. They seemed to be favorably impressed by my presentation and by my use of hyper-links to navigate in the Powerpoint. The engineer said that's something he was going to start doing as soon as possible also. AJ liked the tag line as well as the hyper-links.

Shortly after this presentation we started getting email requests from for various kinds of information regarding our products, our sales, our sales channels, our numbers, etc. At some point in this correspondence we started to refer to the two companies as Milan (Intel) and Athens (Ambient). We responded to these requests as promptly and completely as we could and just kept wondering when they would tell us exactly what their interest was. Another modem company, Altocom which had been spun out of General Magic, had just been sold to Broadcom Corporation for a reported 180 million dollars, and naturally this news had us both envious and excited.

Finally we could contain our curiosity no longer so we asked them straight out: "gentlemen, what are your intentions?" They then admitted that they were thinking about an acquisition and wondered if we had thought about a price. "No, we haven't thought too much about that, but we understand that Altocom was just bought for 180 million dollars" we innocently answered.

A short time later when I was in Austin attending a DSL standards meeting I got a call from Fred, saying that he had received an offer to acquire Ambient for 150 million dollars. Actually the offer was 100 million for the modem business and 50 million for the home networking business, with our option if we wanted to sell one or both. Naturally we said both. (After we became part of Intel we found out that they had at least three other home networking projects under way, using phone wires, wireless, and ethernet. A few weeks after the acquisition there was a high-level decision that they should focus on just one approach, and it wasn't power-line, so our project was cancelled.)

The news that we had a deal just about set my head spinning and I remember thinking on the way home that it would be a damned shame if the plane were to crash now that we had just struck it rich. I called Anne Berit of course as soon as I got off the phone with Fred but I have no memory of what we said or what her reaction was. To celebrate our fortune, Anne Berit organized a family get-together at the Hay Adams Hotel in Washington DC which also turned out to be my 65th birthday party.

Intel Corporation: 2000-2002

We closed the deal with Intel in February 2000, within a few days of the NASDAQ all-time high. As they say, timing is everything.

Ambient was folded into the Intel organization in the Platform Networking Group (PNG) headed by Greg Lang and Gil Frostig, in the Intel two-in-a-box manner. The Ambient unit was named Modem Silicon Operations (MSO), with Fred Schuckert as the lone General Manager and the organization under him pretty much as it was in Ambient.

The personal deals for Fred, Clement, and me were that we would be paid 25% on closing and then 25% per year with the incentive of full payment at the end of two years if we met certain Benchmarks. The main benchmark was Completion of the G.lite modem development to make it ready for production by a certain date, plus there were some other smaller items. As usual, the project did not quite finish on time, and consequently AJ's and Chad's boss informed us that the objective had not been met so the accelerated payout would not take place. Later on we agreed on a new set of benchmarks which were less demanding and those we met so that the two final payments were made at the end of two years, at which point I decided to retire.

During my two years at Intel I got a whole new insight into the strengths and weaknesses of that company. They had tremendous structures, systems, standards and processes with people and resources dedicated to support functions of various kinds (legal, architectural, communications, indoctrination, etc) that most companies I had been associated before handled practically out of the pocket, in comparison. It was quite impressive to watch this multi-faceted organization move into action as it proceeded to absorb Ambient into the mother ship. It goes without saying that this level of bureaucracy brought its disadvantages as well as its advantages. The main disadvantage, as is obvious to most people, was that it added an enormous amount of inertia to the system. People were so busy doing process that they had little time to perform their operational work. The aspect of this culture that I became the most intimately involved with was the structured development process. The key feature of this process was a series of project decision points, or gates, at which certain key criteria had to be satisfied before allowing the project to continue to the next phase. These criteria were established through lengthy checklists and process specifications ranging from market considerations and financial projections in early phases to technical considerations later in the project to support and continuation still later and finally release preparations. The objective was, of course, to prevent mistakes and insure course corrections as early as possible but the problem is that it fosters a culture of avoiding mistakes, which is exactly the opposite of what you need in an development organization that hopes to compete in the PC-based high tech market with its hectic product release pace.

Project teams spent man-years doing the studies and planning, filling out the forms, and conducting project reviews before any pen was put to paper to actually design something. As a consequence they could never hope to deliver product releases on the time frames required by marketing, so with its ample resources Intel just opened the wallet and went out and bought the technologies they needed. Then the development teams had to be devoted to integrating these out-sourced technologies into the Intel product strategies and their primitive processes into the Intel structured environment. Aside from the enormous diversion of efforts away from the job of growing an in-house expertise that such work represents, its even more insidious effect is the spirit and enthusiasm it drains from the development engineers. It reminds me of the shrewd approach Verney Brown took at Paradyne when we were starting the MP-48 modem development. We had read an article by a guy from Bell Labs about a micro-processor implemented modem and invited him down to Largo for an interview, hoping to hire him so he could show us how to do it. After the interview we sat around and discussed the candidate and I and some other engineers were in favor of hiring him so we could get up and running quickly. Werney disagreed and said basically, you guys don't need him, you are just as good as he is and you can do it on your own. It was the absolutely brilliant thing to do, the results were spectacular, and it has been one of the dumbest things in my life that it took another 30 years for me to realize how smart Verney was and to apply that lesson.

A consequence of this inertia was that development projects had a very difficult time to get started and once started they had a great deal of difficulty in making progress. An example is the Firelake project to develop a fully compliant 6 Mbps ADSL modem. In this project the DSP engine and control processor/logic was from DSP Communications in Israel, and data-pump firmware came from Analog Devices

When it became obvious that G.lite was not a sellable solution Intel decided to cancel our G.lite project and have MSO (Modem Silicon Operations, i.e. our group) focus on modem sales and support, and let the Hudson group take the lead on DSL development, first by finishing the Firelake project and then moving on to a revised version called Beacon Hill which, in addition to the DSP cores, sported about eight ARC cores and a third-party multi-port memory controller/scheduler. As time went on and the projects dragged out, painfully recorded in weekly PM meetings where things were "bin-listed" and held over more often than decided, it became clear that neither Firelake nor Beacon Hill would result in competitive products, and the strategy meetings became the occasion for ever more wishful scenarios and desperate strategies. My job became more and more a matter of attending net-meetings and giving our weekly status report using colorful Power-point slides on standardized progress report templates. The bottom line was that the two projects which had been the main reason for Intel's acquisition of Ambient, the power-line networking and the

G.lite developments, had both been cancelled and the only thing left was the maturing and decreasingly profitable dial-up modem business, which to top it off was suffering from the downturn in the PC market after the bursting of the Internet bubble. Still, the consolation I took from this state of affairs was the fact in the “Broadband Access Group”, which we were a part of, we accounted for about 25% of the headcount and produced about 70% of the revenue. In 2002, when our management agreed that we had met the new set of benchmarks, I informed my boss, AJ, that I intended to retire on the second anniversary of the acquisition. To make it seem less like taking my money and running I pointed out to him that I would then be 67 years old and ready to hang it up. He certainly had no great objection to my reasoning or my decision.

The retirement party that Anne Berit organized and produced, including an absurdly complementary video presentation of my career was one of the highlights of that career, with people from California to Germany attending the party. All our sons as well as our then sole remaining daughter-in-law were also there to help us celebrate.

So after describing this working life of 2260 weeks as an electrical engineer some concluding thoughts:

Technical or engineering work was the most satisfying to do and the easiest to write about, and quite obviously the kind of work I was most suited for. My decision to get on the entrepreneurial path was at least partially motivated by my fear that I would not be able to stay up to date technically as I got older; “I don’t want to be a 50-year old engineer” was my guiding idea. Later, at the relatively fogey age of 54, as I was able to dive into the Clarkspur chip and program a V29 modem into it in a few weeks of part-time work in our spare bedroom, I realized that my fear of technical obsolescence had probably been unwarranted. The other reason for going the entrepreneurial route was that I wanted to achieve more financial success than engineers seemed to realize; “engineers like to make money too” was my thought on this subject, and it was a principle I tried to apply as a manager of engineers, and my business. In the end, of course, this part of my strategy turned out to be successful. It is possible that as an engineer, by casting my lot with some other entrepreneur I could have made some significant money, but very likely nothing like what we finally realized as an entrepreneurs ourselves. But the path to get to the final payoff was not pretty, and it was not enjoyable most of the time. I basically was out of my depth in most business situations and realized it, but was too scared to take the time off to learn even the basics; scared of what could happen while I took time off and scared of finding out that even with actual training I would find out I still couldn’t do it. So I just kept muddling along hoping for the best, and in the end, through a fluke known as the Internet boom, it turned out to be a winning strategy. So when I think back on my career the things that stand out in the entrepreneurial stage of it is mostly embarrassments and disappointments except for the final hurrah.

When I think back on the technical phases I remember with pleasure and satisfaction things like the following:

As the youngest engineer on the character recognition team at Burroughs I figured out how to stabilize cascaded emitter followers and published a paper on it in the respected magazine Electronic Design

Taking an evening class in computers at University of Pennsylvania I aced a homework problem by designing a Turing Machine, given a set of instructions and the number of states.

Taking over the technical proposal effort for a bid to General Dynamics for an oceanographic buoy data acquisition system I figured out the technical requirements and designed a computer to perform the required functions from the ground up.

At Paradyne I invented the products Bisync-48 and PIX and wrote papers and articles about them that were published in the trade press. These were major elements in putting Paradyne on the map of the data communications market and formed the basis for our business case presentations that resulted in additional investments to keep the company from going belly up.

Also at Paradyne I virtually single-handedly invented the DSP processor for the MP48 modem and wrote the program that implemented that product. This was another make or break product for Paradyne and my effort was key in producing the “make” result.

Working as a consultant for American Microsystems, Inc (AMI) I designed the first commercial DSP chip, the AMI 2811. Unfortunately, problems with the VMOS technology they were trying to implement it in caused to never become a practical product.

Starting Kinex Corporation I designed and programmed the DSP processor and digital parts for another V27 modem, as well as designed and built with Anne Berit’s help the prototype and the development system that I used to bring it up on.

Working in our spare bedroom evenings and weekends for about five or six months I programmed a V29 modem on the Clarkspur 2400 chip developed by my friend Hiromitsu Yagi.

Nokia’s decision to accept my proposal for a joint development with Kinex of a DSP implemented V27 modem resulted in several young engineers there learning the basics of digital signal processing and becoming enthusiastic practitioners of that then novel and advanced technology. As a result, when the time came to develop the first GSM phone they turned to engineers who had

honed their skills on Nokia-Kinex modems to do the heavy lifting, which they did so successfully that Nokia hit the market first with a GSM phone and has been number one since. It is recognized by industry observers in Finland that the techniques Nokia learned from Karl Nordling were a key advantage that allowed them to leap-frog the competition. When I first met Anne Berit I used to talk about how I wished to do something good for Finland; by teaching DSP to Nokia I believe I did that to a greater extent than I had dreamt possible.

110 Horizon Dr.
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Raleigh, NC 27615

Ambient logo with the "worm-hole" generator Back

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The Ambient North Carolina team outside our offices at 110 Horizon Drive

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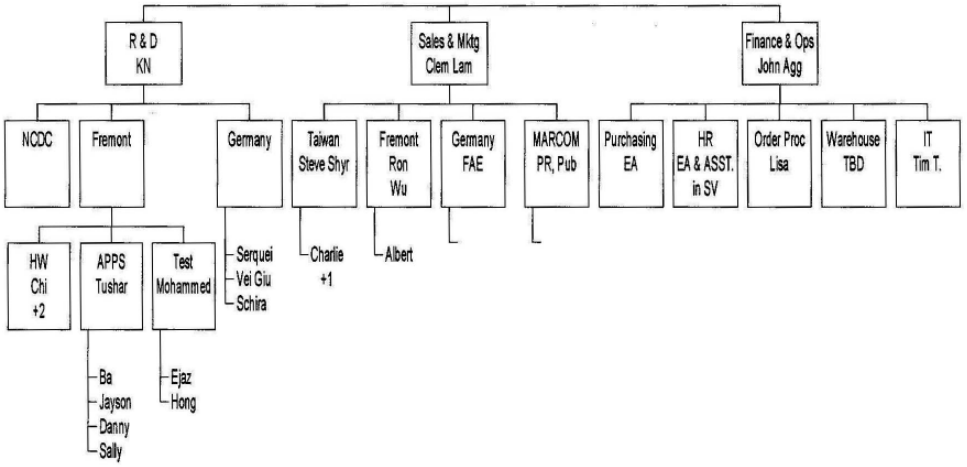
Organizational Chart



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November 5, 1998

Mr. David French
President & COO
Cirrus Logic, Inc.
3100 West Warren Avenue
Fremont, California 94538

Re: Letter of Intent

Dear Mr. French:

This letter ("LOI") expresses the intent of the undersigned, Ambient Technologies, Inc., a California corporation, either itself or through a subsidiary (collectively, "Buyer"), to enter into a transaction with Cirrus Logic, Inc. ("Seller"), pursuant to which Buyer would acquire specified assets and properties (the "Assets") held in connection with, necessary for, or material to the operations of Seller's Modem Business Unit (the "Business Unit").

The terms of our proposal are as follows:

1. Assets Transferred. The Assets to be purchased or transferred would be:

a. Listed fixed assets and tangible personal property owned by Seller used in the operations of the Business Unit.

b. All inventory of the Business Unit, including supplies, work-in-process, finished goods, spare parts and packaging materials (the "Inventory").

c. All accounts receivable of Seller relating to the operations of the Business Unit, a comprehensive list of which would be attached to the Definitive Agreement (as defined below).

d. A license to all of Seller's right, title and interest in and to the intellectual property listed on Schedule 1(d) attached hereto the ("Intellectual Property") in accordance with section 13 of this LOI.

e. To the fullest extent permitted under applicable law, all of Seller's right, title and interest in and to the certain material contracts of the Business Unit to be identified by the parties and identified in a comprehensive list to be attached to the Definitive Agreement.

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Company Press Release

Cirrus Logic Spins Out PC Modem Product Group

Action underscores Cirrus Logic's commitment to focus on core businesses

FREMONT, Calif.--(BUSINESS WIRE)--Nov. 12, 1998--Cirrus Logic Inc. (Nasdaq:CRUS - news) today announced it has signed a letter of intent to spin out its PC modem business unit of about 40 employees to form Ambient Technologies Inc., a private company.

Under terms of the agreement, Ambient will acquire Cirrus Logic's PC modem products and become a licensee of Cirrus Logic's PC modem patents. Cirrus Logic will work closely with Ambient to assure full customer support through the transition, and retain an equity position in the new venture.

``This action represents another milestone in our program to leverage our precision linear and advanced mixed-signal chip expertise, and sharpen our focus on high-margin chip solutions for the mass storage, audio and precision data conversion markets," said David D. French, president and COO of Cirrus Logic. French confirmed that the modem product line being acquired by Ambient accounted for about 6 percent of Cirrus Logic's consolidated revenue.

Cirrus Logic is a premier supplier of precision linear circuits and advanced mixed-signal system-level chip solutions, the latter of which demand high-performance mixed-signal processing, embedded DSP, algorithms and firmware. The company's products, sold under its own name and the Crystal product brand, enable high-volume applications in mass storage, communications, consumer electronics and industrial markets. Additional information about Cirrus Logic is available at http://www.cirrus.com.

Contact:

Cirrus Logic
Tom Rigoli, 510/226-2259
trigoli@corp.cirrus.com

Startup Profiles

(Continued from page 3)

sists of a controller, DSP and AFE. The software-upgradable chipset features ISA plug-and-play compatibility and speakerphone. It includes industry-standard features for data, fax and voice applications, including telephone emulation for headset applications, Caller ID, voice mail, call progress detection, tone generation, videoconferencing and full-duplex speakerphone. The MD566X is an enhancement of the MD565X and eliminates the need for 64K of external SRAM for the DSP. Board size, power consumption, and cost have been reduced as well.

The MD567X is a controller-based V.90 modem chipset featuring a USB interface. The MD567X interfaces to the USB host utilizing the National USBN9602 USB node controller. Drivers are available for both Windows and MAC based systems. Ambient is also planning to release a PCI modem solution for the Mac market in the near future. The MD562X is a controllerless V.90 modem chipset featuring a PCI interface.

The software upgradable MD563X-HaM V.90 chipset is a Host Accelerated Modem (HaM) solution that combines and optimizes the best features from software and hardware modems. It is cost competitive with software modems, without the corresponding performance and patent issues. The MD563X-HaM uses the host computer's CPU to replace the modem's controller. Some of the DSP functions are diverted to the CPU, however, to prevent a decrease in CPU and modem performance a separate, and less expensive, DSP chip is used to share the load. Unlike software modems, there is no performance penalty because the CPU does not handle all of the controller and DSP functions. The device has a PCI interface and connects to a Silicon Labs CODEC/DAA on the line side.

In Q1 2000, Ambient will introduce the iModem, a single-chip controller/DSP V.90 modem optimized for the cost and size constrained non-PC market. The device requires a minimal Ambient believes that its solution will be more cost effective than existing solutions. By the end of 2000, Ambient plans to introduce a home networking product based on 10Mbps powerline networking technology. While HomePNA is all the rage these days, Ambient believes that it can add little value in this commodity market and can better utilize its resources by focusing on the value added powerline networking market. And like us, Ambient believes that powerline is more ubiquitous than phone lines. It also eliminates the need for an extra cord.

Ambient is seeing strong demand for its controller-based products for serial-based external modems. The company believes that its HaM solution is well positioned to compete against software modems. Ambient claims that it's the #1 vendor in the European and Australian markets. Acer Netxus, a communications company within the Acer Group, has recently selected the Ambient MD567X chipset for use in a new USB modem product.

Fred Schuckert, President and CEO (formerly GM of Cirrus' modem division and CEO of Creatix, the largest modem company in Germany)

Karl Nordling, VP of Engineering (formerly VP of Engineering at the Cirrus Design Center in Raleigh, NC. He was also the co-founder of Paradyne, VP of Engineering at Nokia, and the founder and President of Datapump International)

Clement Lam, VP of Sales and Marketing (formerly Director of Marketing and Business Development of Cirrus' Modem Business Unit, VP of Marketing at Genoa, and founder and VP of Sales and Marketing at UniPen)

Tracy Doten, CFO (formerly Executive Director of Baker and McKenzie)

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www.ambient.com

tors include Cirrus Logic, and several private investors including Dr. Suhas Patil, founder and chairman emeritus of Cirrus, Kanwal Rekhi, founder, CEO & president of Excelan, Safi Qureshey, cofounder and former CEO and chairman of AST Research, and Gordon Bell, the former VP of R&D at Digital. Cirrus incubated the technology in March 1995 with a $6 million investment. Cradle spun-out of Cirrus in July 1998 and has raised approx. $10 million to date. Additional capital is being raised now. The company has 45+ employees.

Cradlle's Universal Microsystem (UMS) microprocessor platform permits embedded applications previously requiring combinations of custom ASICs, standard processors, and configurable logic to be implemented entirely in software on a single, off-the-shelf UMS chip. The UMS permits a broad range of embedded imaging, multimedia, digital video, communications, navigation, and high-speed networking applications to be created entirely in software. The UMS system will reduce development cycles and cost, simplify design, enable software re-use, and permit third-party software support. Cradle claims that its architecture yields 1-to-2 orders of magnitude increase in performance, and a similar reduction in power, cost, and design effort over existing approaches.

The UMS architecture will enable Cradle to produce a line of low-cost, high-performance 100%-software-programmable single-chip platforms that combine data processing, DSP, and I/O processing elements in one IC. The new UMS platforms will permit the low cost, fast-turnaround design of a variety of ultra-high-performance products in the digital video, image processing, and high-speed communications arenas, without requiring the use of ASICs or custom processors. Initial applications for the UMS include copiers, fax machines, video game controllers, printers, LAN switches and hubs, digital television and HDTV, personal television servers, multifunction devices, video and digital video camcorders and editing camcorders.

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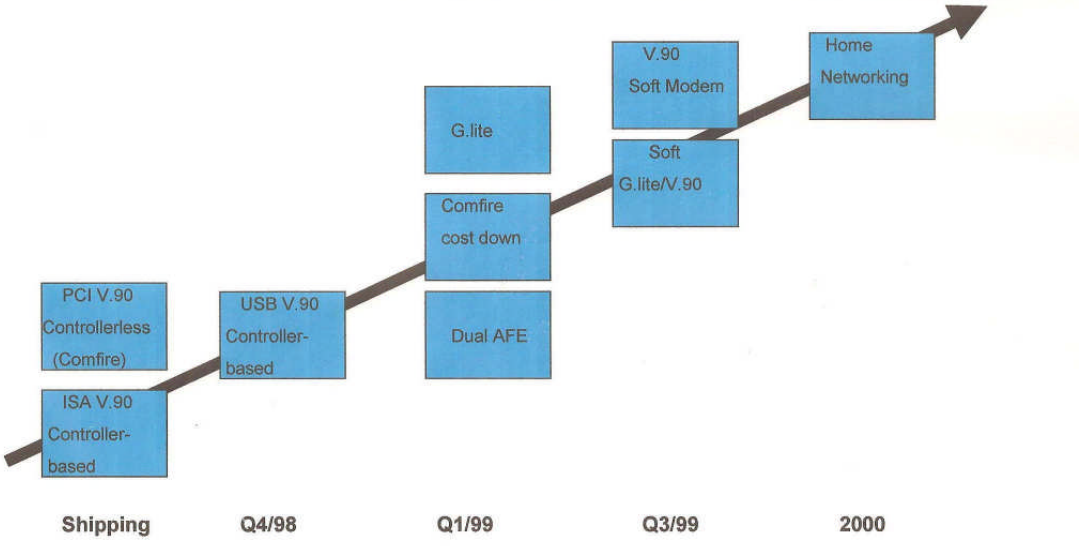
Ambient Technologies Product Roadmap



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House calls: Web realty agency says access to MLS listings gives sellers a break. **Page 11**

$150M Intel payday for chip firm

Ambient has key office in Raleigh

By Lee Weisbecker

RALEIGH – California chipmaking giant Intel Corp. made its first major acquisition of a Triangle operation and has crafted immediate expansion plans for the firm.

On March 10, Intel completed the purchase of Ambient Technologies for $150 million in cash. The Fremont, Calif.-based firm has its main engineering and research operations in the Triangle.

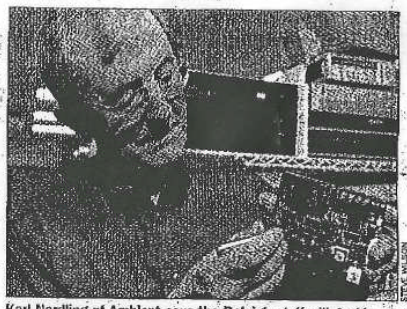
Karl Nordling, Ambient's chief technology officer and vice president of engineering, says plans call for doubling the Raleigh engineering design staff, housed in offices on Horizon Drive, from 25 to about 50.

"With the kind of resources Intel can bring to the table," he says, "I think we should see significant growth and a better market share."

Operating out of California where it employs about 30 people, Ambient designs and produces silicon chipsets for V.90 (PC) and digital subscriber line (DSL) modems aimed at home and small business users.

Intel will use Ambient chip technology to combine the V.90 and "G lite" DSL capa-

See **AMBIENT**, Page 71



STEVE WILSON

Karl Nordling of Ambient says the Raleigh staff will double.

Celebrating at the Hay Adam

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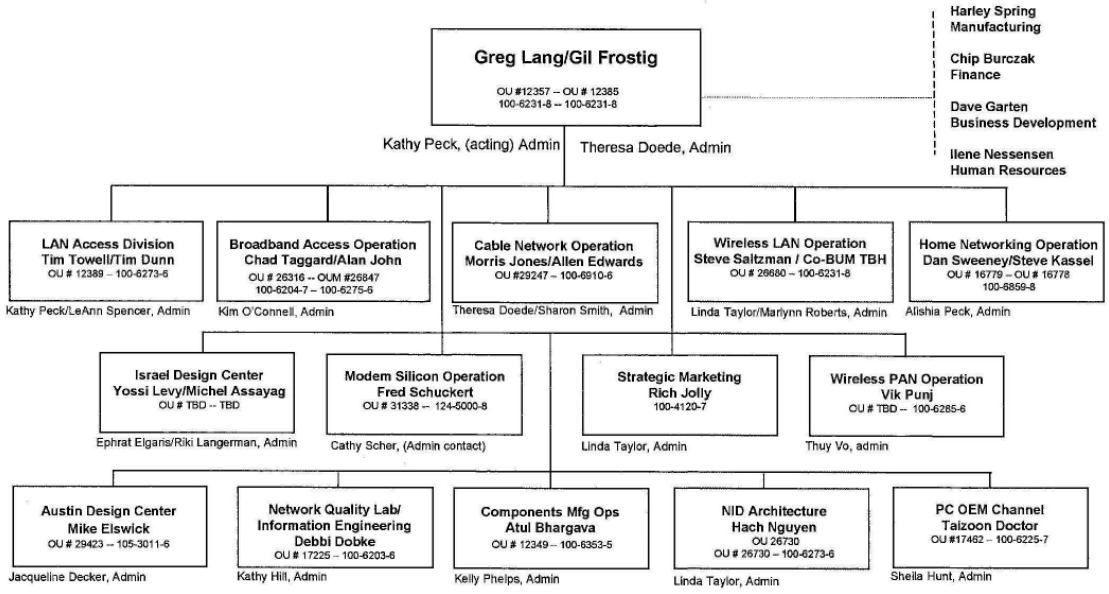
PLATFORM NETWORKING GROUP



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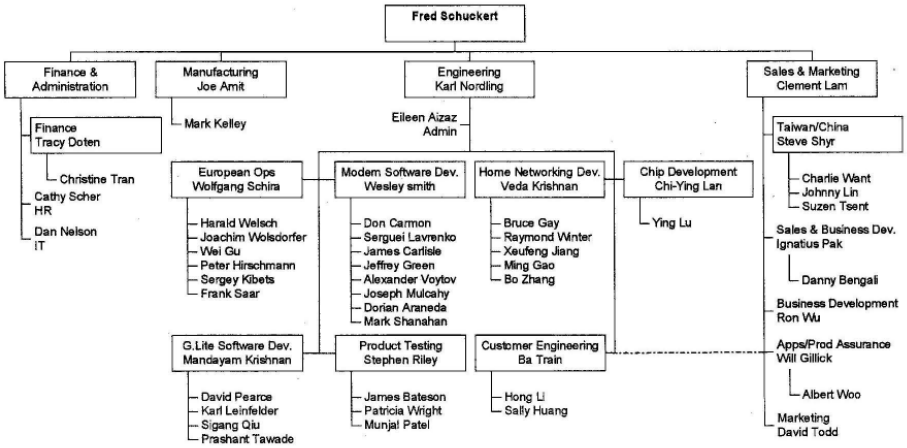
Modem Silicon Operation



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EVALUATION: AREAS FOR IMPROVEMENT/DEVELOPMENT:

Professional Growth

- Setting his team expectations in the areas of matching the group's capabilities and with opportunities available within RAD. Better matching his capabilities to the organization's needs will result in more successes.

Leadership

- Delivering negative messages to individuals and his team. Karl picked this item to work on and feels he just needs to be more comfortable and effective in accomplishing these tasks when they arise.

RELATIVE RANK SUMMARY: Karl was ranked in the 2nd quartile within his peer group.

PERFORMANCE SUMMARY: Karl retired form Intel on March 29, 2002. We wish Karl well in his new endeavors and will miss his contributions to our group and Intel

RATING: Karl was rated as Successful among his peers.

Immediate Manager	Date	Employee	Date
Immediate Manager's Name Printed		Employee Name Printed	
Next Level Manager	Date	HRD Representative (IR only)	Date
Next Level Manager's Name Printed		HRD Representative's Name Printed (IR only)	
Matrix Manager	Date		
Matrix Manager's Name Printed			

Return the original of this form, with signatures, to the Employee Services Center for your region.

Karl,
Thanks for leadership + experience to the Raleigh team + RAD. Good luck in your retirement.
Steve Kosel

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On the way to the retirement party

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Ambient Technologies, Inc.

Business Plan

November 23, 1998

Control Copy Number _____to _____ on _____

1. Executive summary

1.1 Objectives

Ambient Technologies, Inc (Ambient) is a spin-off of the profitable Modem Division of Cirrus Logic. The new entity will generate revenue of $52 million in calendar year 1999 and a net operating profit of $5.4 million. The objective of the company will be to expand from its present product portfolio into the high-speed Internet access market, first with G.lite ADSL modems and later with Home Networking devices. The company forecasts revenues of $70 million in calendar year 2000 and $105 million in calendar year 2001 with corresponding net operating profits of $9 million and $17 million respectively.

1.2 Success factors

World-class V.90 modem

The basis for the first year's business are the V.90 modem chip-sets which, based on industry standard tests, are the best performing modems available today. Leveraging off this world-class design, Ambient will introduce a combined V.90 plus G.lite silicon solution in the first quarter of 1999. This will position the company as one of the leading technology providers in the emerging ADSL-based Internet access market Although DSL technologies, with their ability to provide megabit speeds on existing phone lines, are widely expected to be the successor to traditional voice band modems, they still cannot replace them. For the foreseeable future, G.lite modems can only be sold as combination G.lite/V.90 products. One of the challenges for entrants into this market is the need to incorporate a credible V.90 solution with their G.lite modem. Ambient meets this challenge by combining its world-class V.90 modem with the proven G.lite solution licensed from SAS into a product that offers complete concurrent operation of both modems. Concurrent operation is a key differentiating feature that enables the user to

make V.90 connections or receive FAXes on the same line that is used for the ADSL connection.

Strong DSP and Communications engineering team

One of the company's major strengths is in its nucleus of 35 R&D engineers, which includes some of the pre-eminent IC and communications designers in the industry. The quality of this staff is reflected in the fact that this relatively small team has out-performed industry icons such as Lucent, Rockwell and 3COM in creating the top-performing V.90 modem. This staff will be focused on developing the next generation products, including networking chips based on power-line communications (PLC), that will form the basis for the company's proprietary IP portfolio.

Experienced Organization

The management and staff of Ambient Technologies (a total of 60) are comprised of the present personnel from the Cirrus Logic Business Unit (44) and 16 additional design and support staff. The company will include a nucleus of 35 development engineers.

2. Company Background

Ambient Technologies was formed as a management buy-out of the Modem Division of Cirrus Logic, Inc.Cirrus Logic, an $800 million semiconductor company engaged in PC multimedia technologies, made a strategic decision in September 1998 to re-focus in three core areas: mass storage, audio and advanced linear products. Some business units were phased out, others were spun off and the most valuable part, namely the Modem Division, was slated for divestiture. The Modem Division consisted of 44 individuals who sold 1.2 million chip-sets last year, generating approximately $41 million in revenue. The $1 million per person represents the highest ratio of revenue per employee in the industry. The new PCI 56K modem (Comfire) launched in July 1998, ramped up to 400K units by the end of the quarter, which was a record for any Cirrus Logic modem product.

In addition to a world-class family of modem products and a proven development team, Ambient inherits a profitable operation, a solid customer base, and an on-going development program for advanced Internet access technologies. The acquisition includes all tangible assets and all intellectual property rights of the Modem Division. Please see Appendix A for a partial list of the company's customers, Appendix B for a list of current products and Appendix C for the future product roadmap.

The company's goal is to capture a significant share of the emerging high speed Internet access market by combining its superior V.90 technology with G.Lite. Ambient will become a significant player in this market by leveraging its customer base and well established position as a leading provider of modem technology.

3. Products

The current product line consists of 56K V.90 modems in four different configurations:

1. The Controller-based internal ISA-bus version.
2. The Controller-based PCMCIA version.
3. The Controller-based external version.
4. The Controller-less internal PCI bus version for Windows 95, 98, NT 4.0 and NT 5.0.

All configurations share the same basic signal-processing and layer-2 software and provide approximately the same performance for the user. Each version is designed for a specific market segment and supports a different pricing model.

While the market for standard internal modems is moving from Controller-based to Controller-less products, the Controller-based PCMCIA segment is still growing and supports a higher ASP and margin. Sales for the third quarter 1998 of 630,000 modems included 237,000 Controller-based units, or 38% of the total, sold at an ASP of $16.10. The Controller-less segment accounted for 393,000 units, or 62% percent of the total, at an average selling price of $11.40.

USB peripherals are in much demand since the introduction of Windows 98. Their portability and ability to operate without an external power supply makes them an ideal end-user product. The Instat September 1998 USB report forecasts that USB modems will represent 36 percent of the total analog modem market by 2002.

> Ambient will introduce its 56K V.90 USB modem in December 1998 and will ship in volume in January 1999. Because of the high-performance controller used in the company's modems, the USB interface can be implemented with a very simple interface chip, in contrast to the expensive components required in the Rockwell and Lucent solutions. Consequently, the company expects to achieve a gross margin of 49% with this new class of modems even while pricing the product significantly below the competition. With this aggressive pricing Ambient expects to become the leader in USB solutions. The USB product line will account for one third of the company's 1999 revenue of $53 million.

Ambient will introduce its first generation G.Lite product in the first quarter of 1999, placing it among the first in the market. A greatly cost reduced second-generation design will be launched in the fourth quarter 1999. G.Lite modems have captured the media limelight this year because of their projected downstream speeds of 25 times that of the current 56K V.90 modems. However, the rate of G.Lite volume deployment depends on infrastructure buildup by local exchange carriers, which will not occur simultaneously everywhere. PC makers who sell to a wide audience across geographic boundaries cannot afford to include an expensive G.Lite board in their systems unless the board provides V.90 modem capability to insure that the customer can use it regardless of the state of ADSL deployment in his area. Ambient's solution, in contrast with other G.lite modems, provides this capability.