Interview of Bill Krause

Interviewed by:
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James Pelkey: My understanding is that Wally Davis found you and introduced you to Bob Metcalfe, who was looking for money and the venture capitalists were concerned with whether Bob had the business skills to pull this off.

Bill Krause: Well actually, there are two points that I think are worth pointing out. Yes, it's true, actually, the way it worked was that Wally Davis met Bob and heard Bob speak at Stanford. And Gib Meyers was a good friend of mine. And, while the question had been raised with Bob by some of the original potential investors about whether or not he had the business skills, he himself had thought about recruiting a president.

Pelkey: Ok.

Krause: In fact, he then changed to a more aggressive position of saying to the venture capitalists that "one of the ways I will evaluate whether or not" -- cause this was in 1981 when money was falling like apples off a tree -- "one of the ways I will evaluate whether or not I'm going to accept your money or not is if you can present a good candidate for president of 3Com." And so that became the call to the venture capitalists. So Wally Davis, who had heard this from Bob, went back to his firm and raised this issue, and Gib Meyers, who knew me from HP where I had just gotten knee deep into an assignment of getting HP into the PC business and had developed a strategy for HP to use Ethernet technology to network the PCs to become a competing alternative architecture to the HP 3000, which I launched. In other words, better to have HP eat its own young rather than somebody else, and so Gib called and suggested, it was actually Gib who called me and said -- and he knew that I wanted to start a company and had been looking to start a company and had had several conversations with him -- so he said: "You ought to meet this guy that we've been talking to that's involved in starting a local area network company," and I said: "Fine. Who is it?" And he said: "It's Bob Metcalfe." I said: "He's the inventor of Ethernet, you know, god, he's an industry leader. I'd love to meet him." So that's actually how it came about.

Pelkey: Fantastic. Why did you agree -- why did you join?

Krause: Actually, that was a big struggle, mainly because of my wife who -- first of all, I was on a fast track at HP and, you know, she and I and, with good reason, having been encouraged by people at HP, had -- I was amongst a group of people who were potential successors to John Young. John Young had, by this time, been president since, I guess, oh, I'm going to say the late 1970s. So you worked out his succession thing -- we were all in this age group. So why leave HP when you're on that track? I felt that I was a much better entrepreneur than I was a "corporocrat" and had expressed this around the venture community. But the issue, or the -- so that was the issue. The reasons were several fold. First and foremost for me, and actually what eventually convinced my wife, was the people -- that I had not met somebody as charismatic and smart as Bob Metcalfe, with one exception, Howard Charney, who was smarter than Bob Metcalfe, and I had not seen as strong a technical group as Ron Crane and Greg Shaw, as the initial technical leaders. So the first reason, as is always in venture capital, was the people. It really was the people. The second reason was that Bob and I shared exactly the same vision of how Ethernet was going to eventually be used for PCs, although Bob had lots of other ideas of ways that Ethernet could be used, because, of course, he'd been in all these early seminal

conversations with Ungermann-Bass and Bridge and Sytek and all these other things that they were doing, but, you know, we kind of had this same notion, and I think actually maybe this is something I added to the party of this evolution from mainframes to minis, from batch mainframes to timeshared minis, to networked PCs. We saw that same vision. So that was the second reason, that we had common vision for the market opportunity. Third is that I really did think it was going to be the third wave of computing and I always thought that if you got behind the mainstream -- or in front of the mainstream of something -- a lot of the rest was made easy, and I had my own career at HP. I had joined HP just as they were getting into the minicomputer business, so that just made me getting on the fast track at HP a lot easier, being in front of something, of the new wave. So that was -- so the three reasons were, that I remember, one was the people, two was the fact that Bob and I shared the same vision, and three was that I really did believe that networked PCs were the next wave of computing.

Pelkey: Where did you develop your instinct for that notion?

Krause: At HP -- from getting HP into the personal computer business. I had looked at other people who were entering the market; certainly Apple, and Apple at that time was the principal company to look at as a frame of reference. I think Cromemco, at the time, was also another early player. I'm sure I'm leaving out somebody really important. Um -- Radio Shack, I think it was called Radio Shack at that time . . .

Pelkey: Right, it was.

Krause: The TRS-100 --

Pelkey: Yes.

Krause: No, the TRS-80, sorry.

Pelkey: TRS-80, yes.

Krause: You know, so those were the early machines, so I was thinking about what unique strength could HP bring to this market that would clearly allow it to have a competitive advantage over those kinds of players. So what became clear to me is -- Aha! HP sells to corporations. So what is it we're going to sell to corporations? We're not going to sell them individual standalone PCs. That's what other people do. What we should sell them is networked PCs as the next generation of minicomputing, because that was something that the HP sales force could get their arms around. That was a big enough ticket sale to use a direct sales force. So you had the combination of technology plus marketing, direct selling, which none of these other guys had; they were all selling through, yuck, dreck retail channels. So that's what sort of got me enthused about it, and literally -- I mean, I probably still have the old documents where Fred Gibbons was integral to this. He was involved in this whole process. Janelle Bedke was early on in it, so there's a whole crop of us that were the PC crowd at HP. Dan Feilstrobe -- I met Dan early on. Oh, what's his name? The guy that came from Intel that -- Dan's successor -- at any rate, you know who I'm talking about.

Pelkey: Yes.

Krause: And Gary Kildall. They were all involved in helping us sort through what the PC industry -- We were going to take CP/M as the operating system and network it with Ethernet.

Pelkey: And so, in the process of doing it, your investigative work within HP, you met these people?

Krause: Yeah, these other people, and I had only heard of Metcalfe because we were going to use this Ethernet technology and started working on how we might do that, and how could break into the "DIX" crowd, DEC Intel Xerox, how could we get into that? Were we blocked out? Was DEC going to be the real serious competitor? All those sorts of things.

Pelkey: The original business plan that, obviously, you had a hand in crafting as well, that venture capitalists put money into the company . . .

Krause: I had very little hand in the original business plan. Basically, Bob and Howard had created it, and it was a business plan that was aimed to water the roots of the tree that would sprout Ethernet products. The reason I describe it that way is that Bob had drawn this cascade of -- it was an upside down tree. Here was the, what did we call it, the Ethernet book, the original --

Pelkey: Drawing.

Krause: Well, I'll draw that in a minute, but Metcalfe's first product, you know, was not actually the Blue Book it was a compendium -- we had a name for it which I can't remember right now -- it was the compendium of all the Ethernet companies that his wife Robin had put together, and this book was the first product -- selling this book.

Pelkey: Gotcha, yes.

Krause: And that's what then got him the consulting contracts etc. and this tree -- it looked like this. It was sort of this and there are these branches. (drawing)

Pelkey: Umhm. Gotcha.

Krause: And, you know, it ranged from terminal servers to adapters to network management to -- I mean, everything that's there now he had the vision for back in the -- and the original business plan was doing all of it.

Pelkey: (Laughs).

Krause: So that's why I called it -- it was sort of the root that --

Pelkey: At that time, in terms of what the company had, it had the Unibus.

Krause: No, it had -- the transceiver was first.

Pelkey: Correct.

Krause: And actually, when I joined, none of the products were finished when I joined.

Pelkey: Ok.

Krause: The brick was closest. We called it "the brick" because we eventually solved a lot of the design problems by putting epoxy into it to stabilize it. The original transceiver, which was designed by Ron Crane, which was a very intensive analog device because it shaped the signal on and off the network, and so it had all these capacitors and resistors dangling all over it, and so we were worried that, you know, that if anybody banged -- it was going to go up in the ceiling -- if you banged it around and they got touching each other that you might have a lot of failures. And we couldn't afford to have failures because we couldn't afford to have people going up in the ceiling and pulling out this $500 device because we couldn't make it run. So we decided, well why don't we put some epoxy in it and that will stabilize all these ballerinas on this printed circuit card? Plus the fact that it will give it some weight, so it will feel like it's worth $500. This is true. That was literally true. So there's the technical reason and then there's the marketing reason. So "the brick" was done. We shipped the first brick, I think, in March, just after I joined, and then the -- I'll take Bob at his word -- I thought the Q-bus came before the Unibus, but maybe not. Maybe not. The Unibus was first, because Exxon had the -- so the Unibus was coming along, but it was -- it didn't get released until -- I'm going to guess, mid to later '81. And then we followed that up -- then we started getting involved with DEC and they suggested we do a conversion for Q-bus. So then we began to formulate this notion of, well, maybe we ought to use these Ethernet boards with the transceiver as a learning curve for both technology and marketing. In other words, we gotta come down a learning curve, and that was another thing I did. I drew -- this blew Bob away. There are very few things that I blew Bob away with, but this was one of them. (drawing) This I did, like, in April or May of '81 after having been there a couple of months. I drew this curve. And I said: "OK, this is 1981 and this is 1986, and this is whatever it was." Let's see, it was 35 plus six, so let's say it was around five -- something like 4,100 or 4,300. And this had to be less than 400. A beautiful curve. And I said: "OK, we've got to go from here to here." And Bob said: "What do you mean? How are we going to do that?" So I said: "Well, Bob, first of all, that's your job, figuring out how we're going to do it, but if we're going to make a mass market out of this, and we're going to connect PCs together, we've got to go from here to here, because taking a $2,000 Apple and spending $4,000 to connect it isn't going to compute. So we've got to figure out how to do that. And a way to do that is through semiconductor VLSI integration over time, so let's start with this Unibus thing. Let's do the Q-bus which is smaller." Then we stumbled onto the Multibus. "Let's do the Multibus which is smaller yet, and we'll learn the technology over time, get teamed up with a semiconductor company -- Intel or whomever -- and then, in addition to that, we'll have some products that we can market and we'll learn about marketing." So really, sort of the first phase of 3Com was all about building a foundation and learning about the technology in the market.

Pelkey: And so the Seeq relationship came from that thinking?

Krause: It came from that thinking totally serendipitously.

Pelkey: How? It doesn't need to be a long story but . . .

Krause: No, it's short. I want to say it came from Sequoia. So we did the second round.

Pelkey: Sequoia came in that round.

Krause: Sequoia came in. This was late '81, right after the IBM PC had been introduced. The IBM PC was introduced, and so ...

Pelkey: Your Round B was in January of '82.

Krause: So in August of '81 the IBM PC was introduced. The credit Bob should get here is that he went out and bought an IBM PC and he brought the IBM PC and set it up in the middle of the design lab, and just set it there. And Ron Crane started pouring all over this thing and, before you knew, we understood everything we needed to know. We knew what the power slot budget was, we knew the physical size, we knew the chip count that we had to get to meet the power budget. So we began learning a lot of things. So we're doing this next second round and we needed an LSI semiconductor something, so Pierre Lamond, who was affiliated with Don Valentine, and they were investigating doing the round, and they said: "Hey, we know this company that's just getting started that has a lot of technology and we heard that they were looking at using the technology to do an Ethernet chip," and it was Seeq. So they introduced me to Gordy Campbell. He had this guy who was designing the chip, a guy by the name of Dado Banatao, who went on to become the cofounder with Gordy of Chips and Technologies. He was the founder of a company called S3, which had gone public and been very successful. S3 got its name because it was his third startup. It's funny how the world goes on. So Dado was the design engineer. And so Pierre knew these guys and introduced us and they saw in Ron Crane the brilliance of analog engineering that they needed to combine with their brilliance of digital engineering to create this chip that had to both an analog and a digital chip. So Ron and Dado teamed up to produce this chip, and they did it in an unbelievable nine months.

Pelkey: Because you shipped it in October.

Krause: It's -- in October. Well we had -- right, we shipped, so we actually had prototypes before then. So they had, basically, FCS finished product in October of '82, and we started in the November/December time frame.

Pelkey: Ok. Now, was EtherSeries conceptualized at this point?

Krause: No. Ethernet didn't get conceptualized until the spring/summer time frame. Traditionally at 3Com, we had planning meetings in the April/May time frame, to button up our fiscal year plan, which began in June, and so, as an outgrowth of that planning process, Larry Birnbaum and Larry Hartge, two ex-HP guys, concocted the concept of EtherSeries. And then we actually took that EtherSeries pitch on the road to a number of people, one of which was

IBM, the other of which was Microsoft, who was a customer of ours, and early customer of ours for UNET. In fact, they had standardized a lot of their Unix networking. They networked all their Unix machines for development purposes -- they were developing on Unix machines in C and they networked their Unix machines with 3Com boards and UNET, because they were VAXes.

Pelkey: Now, at this point in time, at the beginning -- in January of '82, it was also now when Interlan comes into the market with products. Did you see them for a while?

Krause: Right, so remember I'm going back -- so we had started this Multibus thing. Now, the way we got started with Multibus was that Bob -- and this happened in, I'd say, early -- April/May of '81, somewhere in that time frame -- Bob was trying to educate me about the Ethernet gestalt, so he took me over to PARC and wandered me around there, and he took me over to Stanford, and he introduced me to this guy over there who was working on something called the Stanford University Network. So that had led us to the notion: "Hey, why don't we do this 68000 thing? And there's this Multibus standard and it looks like that's going to proliferate. Why don't we do this Multibus thing?" So, OK, that's cool -- and we had heard about this company back east called Interlan, because we heard about them through DEC, because some of the people came out of DEC.

Pelkey: Dave Potter.

Krause: Right, OK. And so they were going to do Multibus. So, OK, we don't want to let those guys get a competitive advantage, so everything we see we ought to do a Multibus. It gets us on the learning curve, staves off competition, etc., etc. So then, just to complete the story, so in, like, September, I want to say September/October of '81, this guy comes to visit us from Stanford and he says: "Look, I've got this idea. I want to take my research work here that I've been working on at Stanford doing the Stanford University Network, and I want to commercialize it, and I've always admired Bob and his technical skills, and now that you, Bill, have joined up with him, I've heard about your reputation at HP, and so I'd like you guys to commercialize my product and I'd like to join the company to commercialize this product."

Pelkey: Was this Andy?

Krause: This was Andy Bechtolsheim. So I'll never forget this. So we went away and thought about it and it was Bob and myself and Larry Birnbaum who by then had joined and become the head of engineering. And we had -- yeah, actually it probably was -- we must have met Seeq in the October/November time frame. So we had a couple of meetings with Andy and we were thinking about doing it and then, coincidentally, got introduced to Seeq, and that was the breakthrough we knew we needed to have to be able to do the IBM PC. And so we went to Andy and we said: "Andy, we're very flattered. You have a brilliant idea. It's going to be a huge success, but it's oriented to the scientific and engineering market. It's 68000 and Unix, and we've made a decision as a matter of strategy to go for PCs and DOS and the office market, and we only have limited resources, so we have to focus them on that. Godspeed. Let us introduce you to some venture capitalists. Go get some partners, and we'd like to work with you in supplying technology to you." So it turned out, as you see in there, Sun was our largest customer

for a long time, for this Multibus product. And so Andy went off and did his thing, and so I get the pleasure of telling the story that I was the first guy to turn Sun down. Shows how smart I was.

Pelkey: So when Interlan -- Paul Severino tells me the story that he came out to try to pitch Sun, and Sun was concerned about their price points and said their board was too expensive and all these other sorts of things. But, unbeknownst maybe to Paul, was that there was this really strong relationship that existed that, I mean, 3Com was going to get this business no matter what.

Krause: No matter what. I mean, Andy thought Bob walked on water, and Paul could have had the greatest product in the -- well, if he'd had the greatest product in the world, but -- you know, his product was good, but it wasn't significantly better. So he could have pitched his heart out and he wasn't going to get it. He wasn't going to win that one. He won a lot of other ones, but not that one.

Pelkey: So, when you had your planning meetings in the spring of '81 --

Krause: '82.

Pelkey: Excuse me, '82, spring of '82, Interlan has now become a competitor.

Krause: Right.

Pelkey: You're conceptualizing the EtherSeries, and you've raised a couple rounds of money and, in fiscal '82 you did like $1.8 million and $500,000 the year before. So, was cash a big issue for you in terms of thinking about what you're doing as you're doing it?

Krause: Right, and in fact, that's when we made the decision to cash cow all the minicomputer based products and we made the decision to bet the company on networking PCs. And that's when Larry and Larry, "Larry Squared," came up with the EtherSeries concept. And there was a lot of gnashed of teeth and deep breaths, because it was very clear to everybody what the opportunity was in minicomputer stuff and workstation stuff, and the PC was nascent. I mean it was -- who knew? Who knew? And so it was matter of luck and timing.

Pelkey: Now also in that spring there's a management change relative to Bob's role and your --

Krause: That's more significant to him than it is to me.

Pelkey: That's when he went over to do marketing and sales?

Krause: Right. He -- I was promoted to become CEO which, for all practical purposes was what I was doing anyway, and I think part of this had to do with the fact that we were betting the farm on networking PCs which I had taken a fairly strong position on. So the board wanted to be absolutely sure that they knew who was accountable for this, so they said: "OK, Krause, this is your baby."

Pelkey: Put up or shut up.

Krause: Right, so Bob went over to head up sales and marketing and helped get this thing launched.

Pelkey: And at this point you see your competition as being the Corvuses and Nestars.

Krause: Exactly. So now our competition shifted from Interlans and Ungermann-Basses to -- when did we start seeing --

Pelkey: You probably never saw anybody, because they only had terminal servers.

Krause: Right, and we saw that as a competitor in the sense that, if people were going to use terminals instead of PCs, then they were a competitor in that sense, but we weren't in business of convincing people to buy PCs. That had to be IBM or Apple or somebody else -- or Compaq at the time. Actually, there's a very important Compaq story here which I'll get back to in a minute. It's real interesting. So you're right, so the competition then shifted to Nestar and Corvus, who were -- whose companies were built on networking of Apple computers.

Pelkey: And you also had this other dimension of distribution channels. Of retail stores versus -

Krause: Yeah, versus manufacturer's reps and --

Pelkey: And Nestar was starting to go direct.

Krause: Nestar was using direct selling more and Corvus was in the dealer channel.

Pelkey: Right, but Corvus, round about then, was also coming out with their Unix workstation, so --

Krause: But they had been fairly successful, and so they were off getting distracted, much like we did later on, but they were in the period where they were getting distracted. But they were selling through retail, and a very controversial decision that we made, because all the LAN companies before us had been selling direct. Ungermann-Bass and Bridge and Sytek, Interlan -- all the LAN companies before us sold direct.

Pelkey: Or through reps or maybe distributors, but it certainly not retail.

Krause: It was industrial sales, one way or another. So Larry Hartge and I -- Larry Hartge convinced me, and then I convinced everyone else, that Hartge was right -- that if everybody was going north, we ought to go south, and we ought to go become the dominant supplier of PC LANs to the retail channel. And that was going to take a lot of work and a lot of education, but if we were successful in that, then we would be recognized for that. We'd have the brand recognition. So that's what we did. And that was very controversial amongst our board members and within the company.

Pelkey: Yeah, that was a big decision, because it was, maybe 'right angle' might not be the right decision, but it was certainly a big difference from where the momentum of the company was heading.

Krause: Right, because we were also selling through reps.

Pelkey: Right.

Krause: All our business was going through reps or direct OEM. One hundred percent of our business was reps or direct OEM. Because we had no EtherSeries product at that time.

Pelkey: When did you --

Krause: Businessland was -- there were two very important elements here: Compaq and Businessland. Again, another piece of serendipity, timing and luck: Compaq came to see us in '82, sometime, about the time they heard had heard that we were doing this Ethernet board through Tecmar because somehow or another I had run into Marty Alpert at Tecmar, and that was who I -- I took the first Ethernet board chip that was actually made in September. There was a prototype chip hand carried by me to Marty Alpert. Two of them, so that we could show the two of them communicating. And so Compaq had heard about us, I think, through Tecmar, who was a fairly visible PC add-on company, and -- god, I used to be able to remember his name, he got to be a big shot after a while -- one of their earliest -- he was, like, VP of Technical Support or something, and now their number two or three guy was -- or it was another guy. So they came to see us and they actually, they brought one of the early prototypes of the Compaq, the original Compaq portable, and we put the board in, and -- our board had this little BNC connector, you know, and a little face plate, and the BNC connector didn't stick out enough so that you could get the T-connector onto it when you put it in the Compaq. They went back and redesigned that thing so that it would work.

Pelkey: That's wonderful.

Krause: I couldn't believe that. I mean that's how passionate they were about ensuring that this product worked with anything that worked with an IBM PC. And that's what drove it, because this could plug into an IBM PC, it worked in an IBM PC, and by god it's going to work in a Compaq.

Pelkey: Well, that's wonderful.

Krause: So they redesigned it so that the faceplate was closer -- the tolerances were closer so that it could sit right. So that was serendipity. Then, about that time, Businessland, who was funded by Mayfield, was getting started, right. And so Businessland was looking for a way to differentiate itself, and somebody put a bug in Dave Norman's ear about: "Hey, why don't you differentiate yourself by selling LANs to corporations?" And so he teamed up with us to begin pitching the concept of networking PCs as the third line of computing. And so then I was one of -- let's see if I can remember them all -- I think I was one of five or six principal speakers at the first Businessland conference that Dave held up in Silverado. I mean this is incredibly heady. It

was Steve Jobs, Rod Canion,

Pelkey: Mitch?

Krause: Well, I can't remember whether Kapor was there. Don Estridge had to be there at that time, he had some software guys. You had Gates there, and -- who did we have from IBM? And I was on a panel with Jobs, and Canion, and Estridge and myself. This is when Jobs told IBM that the IBM PC is brain dead.

Pelkey: And this is when?

Krause: This is sometime -- it had to be '83.

Pelkey: When you were doing the EtherSeries, the notion of networking software, this XNS/TCP -- did that ever become an issue, or was it just because there was so much Xerox it was just XNS and --

Krause: Oh, yeah, because it was what we knew. There wasn't any religious part to it, it was just what we knew, and of course, we also knew TCP/IP pretty well from the UNET, because UNET was the first TCP/IP implementation of that -- it was the first implementation of TCP/IP protocol with an operating system. But XNS, we felt was slimmer --

Pelkey: Back in the days when memory mattered.

Krause: Right, and so that was a very important consideration for us, and OSI was a dream in people's eye that no one even defined, and so here was something that was defined, had a reasonable installed base, and so

Pelkey: It worked.

Krause: It worked, and it had a small footprint, so we -- I mean the genesis behind EtherSeries was "How in the hell do you demonstrate the connection of two Ethernet adapters? What are we going to use it for? How do we help customers understand what the application is?" Well, so then actually Metcalfe figured out this vision, which he was dead right on: first it's going to be peripherals -- see if I remember this -- peripheral sharing, information sharing, and then personal communication. No, it was -- because you had the get the sharing out of there -- It was peripheral sharing, information access, and personal communication. Those were the three application phases that LANs would evolve through over the next 10 to 20 years, and he was dead right on again. So we first started out -- I want to be able to share my printer and I want to be able to share my disk, because this was back in the days when 10 megabyte disks were expensive, and laser printers, which came along -- thank God -- in early 1985 or 1984, became an important element to be shared as well, because that was an expensive -- I think they were $5,000 or $6,000 or something. So that played out the peripheral sharing and here's where Novell came out, you know, they made information access the name of the game. You know, we were the peripheral sharing guys, they were the information access guys, and somebody else is the personal communication guys. I guess that would be people like Lotus with Notes and

others. At any rate -- so how did we get there? The way we got there was EtherSeries and XNS --

Pelkey: But this was, to quote Bob, and -- people outside thought that 3Com was history at this point in time, in early '82. Maybe in '81 as well, but certainly in '82 --

Krause: The end of '81 --

Pelkey: Bob's position was "We almost sunk."

Krause: Well, yes, but it's not that people thought we were history. This was in the days when everybody was questioning Ethernet because you had -- because this was in the days when you had broadband, token -- you had two forms of broadband. You had the bus and ring broadband -- token ring was rumored. IBM introduced the PC Net with Sytek which gave credence to broadband. What else did we have? ah -- so you had all this confusion surrounding what technology, and it was an important infrastructure investment for people to wire the building, so it stalled. Everything stalled. And, you know, we were struggling along, just trying to get people to buy into the concept of local area networks first and Ethernet second, and there was all this confusion around. So we had a real hard time getting our second round of funding, and Don Valentine played hardball with us. He made, right at the end, he made Metcalfe give up some of his equity, because he told Bob right at the last minute that Bob owned too much stock, and Valentine wasn't going to do the deal unless Bob got rid of some of his stock. And so I think what Valentine was really hoping Bob would do was that Bob would put more stock in the pot and sell to the VCs and Bob said: "Fuck you! I'll sell it to the people in the company." And that's what he did. So he took -- he and Greg Shaw -- because Greg always needed money -- he was programming to fund his music habit. So Bob and Greg did a -- I don't know what you'd call it -- a private round where they sold common stock and actually, my mother -- I bought a bunch for my mother and some for my wife to put in her name, and this was 19 -- well, January 1982. And so he diminished his holdings by selling it to employees -- but that's where this thing, where the company almost sunk, was that we had a hard time closing the second round of financing.

Pelkey: And --

Krause: The other thing was that -- the other thing, just to be clear -- is that here in -- maybe this is way out by 'Krause: farms' -- is that coming out of HP, I never really thought much about cash flow. I was used to running this huge organization of some 500 people, or something, and so, hey, when I got to 3Com there were nine of us, and -- we got to get staffed up to get ready to grow this company. So I ramped up to 30 people, or something like that. So we're burning through cash reasonably fast and -- So that was part of the company cash flow, cash burn rate. Those were all big issues.

Pelkey: So then sometime in '83, after you're out in the marketplace and Businessland sells your product and so on. Then, in October, you do a deal with Bridge. Some kind of a joint development or joint --

Krause: Oh, yeah. What did we do? We did technology sharing --

Pelkey: There were no dollars exchanged.

Krause: No, what did we do? I can't remember. It doesn't stand out. That was sort of what got us introduced to Bridge. What did we do? I think they used Multibus for something. Yeah! They -- We licensed, well, we did Multibus and TCP or something for their terminal servers. So their terminal servers used Multibus and they used our Multibus to connect to the Ethernet. So they became another OEM of ours, and we did some technology sharing.

Pelkey: In that October you also do a deal with Texas Instruments.

Krause: I know what the technology sharing was. It was to get us to a PC version of TCP/IP. In other words, to take the EtherSeries and put TCP/IP as protocol in it. So we -- I think we actually took their TCP/IP stack and in return we gave them a license to the Multibus or something. I forget what it was. Bill and Judy would be able to tell you.

Pelkey: You also do a deal with TI. An OEM deal with TI.

Krause: Yeah, they OEMed -- what did they OEM? They OEMed our PC cards and used them in their PCs, in fact. NO! Actually, it was supposed to be an OEM deal, but actually what they were doing is they were using them internally. And it was -- we called it an OEM deal because the MIS Department was buying it, packaging systems together and reselling them for internal use. That's why we called it an OEM deal. They became a very large customer just using it internally.

Pelkey: Sun, in '83, Sun is, even through November -- the six months ending in November -- Sun is still 12% of your business and 76% -- only 24% of your sales are from EtherSeries.

Krause: Right. That's true. I remember this 24 and 76 -- this must have come out of -- I bet it comes out of the prospectus, because I remember those numbers.

Pelkey: And you haven't been investing a lot in the non-EtherSeries, I would guess.

Krause: Right, I mean we're cash cowing. Any order we got for Unibus, Q-bus, Multibus was gravy on the train, because now we had to take -- we were using the AP server. We bought Altos. We used the Altos box, which ran Unix, to run the server code. We were getting hit over the head -- was this when Novell came into the market by this time?

Pelkey: Novell comes in in '85.

Krause: '85. Ok. So we recognized that we had to improve the price performance of what was called the AP Server, which was the Altos -- why did we call it AP? Altos something. Altos Processor? It must have been Altos Processor, is what it was, Altos Processor.

Pelkey: So you were OEMing their products?

Krause: We were OEMing their product and passing it through and reselling it, and we were getting a lot of feedback from the market that it was very expensive, which it was. We were selling it for $12,000 or something like that. So we had to do a PC based server, and we felt there was an opportunity to do our own server and do it right. So this was when we launched the 3Server project. So here we were investing -- you look at the spectrum of investments we were making -- we were investing in adapters; we were investing in the software, 3+; and we were investing in doing our own 3Server hardware. This was in the '83-'84 time frame. So that was across a fairly broad -- so, I mean, that's all we were investing in. All of our R&D was put on that.

Pelkey: Now, according to the information I have, March 30th is when you introduced the 3+ product. March 30 of '85, when you introduced the 3+ or the 3Server.

Krause: Alright, they probably came together.

Pelkey: And Novell had introduced a product sometime before and you introduced your 3+.

Krause: Correct.

Pelkey: It sounds like that effort got started maybe in '83? That was a late introduction for you. I mean, you had presumed that you would have had it earlier than March of '85, no?

Krause: The introduction wasn't late at all. WE just made a fundamental technical decision that was wrong. We chose to continue with our architecture of disk sharing, volume sharing, for compatibility with DOS. In other words, our products were 100% compatible. Any application that ran DOS will transparently run on EtherSeries. Novell figured out that the customer valued file sharing and performance more than they valued volume sharing, and so they introduced their product with the concept of file sharing. It gave them the ability to go across volumes, and therefore deal with larger files, allowing them to deal with real databases, and it gave them speed. So it moved the battleground from peripheral sharing to information access, just as Metcalfe predicted.

Pelkey: So your 3+ series was originally architected to be a volume architecture.

Krause: That's correct. Disk sharing and volume sharing, and it was architected to run on two platforms: PCs and 3Servers.

-- Tape Side Ends --

Pelkey: So Novell, in 1984, when you see the Novell product --

Krause: '84, yeah. I think it's around '84, I'm guessing.

Pelkey: That must have been a moment in time for you.

Krause: We ignored it. We didn't think it mattered. We thought they were dead wrong. We thought they were totally wrong, because without the applications, how could they succeed? And they just went after a different set of applications. They worked with dBase IV and we didn't.

Pelkey: So their view of what was needed was very different than yours -- and there was this feedback process from who your customers are and who you're selling to, that leads one to believe that you're doing the right thing.

Krause: Right, I mean we worked great with Lotus 1-2-3 and Microsoft Word and that kind of stuff, we just didn't see the significance of people doing real database work on PCs. Probably, part of that had to do with the culture. A lot of us came from HP with minicomputers and "How can you do really serious database processing on a PC? I mean, come on!" You know, peripheral sharing is cool, and Metcalfe was being really visionary then about information access. That must be out ten years from now. You know, not NOW.

Pelkey: When did it start to dawn on you, the fact that that was an issue? That they had it --

Krause: Well, they started growing fast and the mistake that we made is we -- I can't remember if it was 3+ or if it was 3+ Open. I think it was 3+. We did an update to 3+. We tuned it for performance, and we challenged them -- oh, and Novell was going along touting benchmarks, performance benchmarks, and we thought we had them beat. We knew we had them beat in a particular area, so we challenged them -- we challenged their benchmarks, and they challenged back. We ran an ad that said: "Hey, look here. We're faster than Novell." And so then Novell responded by saying: "Hey, we'll challenge you to a shoot-out. It will be an open shoot-out and it will be an open shoot-out and we'll let some third party define what the benchmarks are and we'll see who wins." And they got the press to write about it and so there was no way we could back out. And we made the mistake of running this ad when our product was only faster in certain instances. It wasn't faster across the board, so they won the shoot-out, and when that happened, we knew we were in trouble. That's when we began thinking about: "Oh, shit! Now what do we do?" And we were thinking about one of three things. We were thinking about -- let's see, we had this debate about sticking with DOS; going to Unix; or teaming with Microsoft to do OS/2.

Pelkey: Do you remember the shoot-out date?

Krause: I'm going to guess it was '86.

Pelkey: Going back to '85, when you introduced the 3+, you introduced it as workgroup computing.

Krause: Yeah, we started promoting the concept of workgroup computing. That led to --

Pelkey: Which is a different slant than you had been?

Krause: Right, we had been talking about it -- sort of peripheral sharing, and this was sort of --

taking the next step to getting more value out of what we were selling into the proposition other than just LANs, adaptor cards, and software. We wanted to sell servers, and so we were looking to become the Sun of the PC market. In other words, what Sun had done for the 68000 based Unix clients and Unix servers we were going to do with DOS clients and DOS servers. So we were going to become the Sun of the DOS PC world.

Pelkey: And all through this, the way you're thinking about it is, your competitor is a computer company.

Krause: Eventually, right. So, along about '85-'86, now that we had some success under our belt and things were really sort of steaming along, with my background, a lot of the other people that I brought from HP, we were computer guys, and the computer guys greatly outnumbered the networking guys. So they capitulated, not in an ugly way, but in a pragmatic, practical, trusting way, that: "OK. We understand the logic. Makes sense to us. We buy in and support it. Let's go for it." So we went off to go be a computing company. Well, we left a few things out along the way. One is, this wasn't solving any problems that our customers had. Our customers not only were perfectly happy with their PC servers, they were adamant that they wanted to use their PC servers, because it meant no additional hardware that they had to inventory or worry about becoming obsolete, because, if their PC server became obsolete, they could give it to somebody to use as a client and buy another server. So this was the first clue that I got that the computer and communication industries were changing from being the emerging growth phase to where you could just take any technology and throw it up in the air and the vacuum for product would just suck it up, to being a more mature market where you actually had to do market research, market analysis, go out and talk to your customers and understand what they wanted and needed. So --

Pelkey: And you also had a competitor in the case of Novell and, particularly Ray Noorda, who came from a minicomputer background, and people felt -- he really wanted to go compete with the minicomputer guys. So he had a strategy that was being driven that way as well.

Krause: Right. Ray was looking to compete with the minicomputer guys too, but more in the sense of replacing minicomputers with his operating software. And if he can make hardware free, he can sell more software. So he was looking -- he was promoting the clone business, because that lowered the price of PCs, and he was promoting adapters everywhere, to lower the price of adapters.

Pelkey: Did they ever buy adapters from you?

Krause: Actually, they offered to do it and, in sort of a fit of emotional bravado, we said we didn't think we wanted to OEM our adapters to him.

Pelkey: So now, in '85, in November -- in October, you have the IBM announcement of Token Ring.

Krause: Yeah, your stuff there says that we announced too, and I don't remember that.

Pelkey: I had it there was a group of you that followed up very quickly.

Krause: No, what we did is we followed up very quickly with a white paper on Ethernet vs. Token Ring.

Pelkey: Oh, ok.

Krause: And we convinced the press that it was all prepared.

Pelkey: You were in Business Week.

Krause: Right, we had a bunch of ads and articles and so, we got a lot of credit from the press on, A) Educating the public about what the real issues were. But, you know, here was the little guy fighting the big guy, so you got the underdog thing, and we showed a lot of good marketing panache. So that's what we really did. Actually, we internally debated about doing Token Ring products for a long, long time. It wasn't really until after Bob had decided -- it was close to lead or not to lead, and we really got serious about doing Token Ring products.

Pelkey: Now, in November you announced a merger with Convergent.

Krause: I guess that's about right.

Pelkey: And Paul Ely now was over at Convergent --

Krause: Right.

Pelkey: HP.

Krause: Actually, no we -- Paul and I thought up the idea while we were sailing that summer. So -- that's a true part of the story. He had introduced me to sailing in the Caribbean. And, let's see, this was '86, yeah. Just to digress for a second. I was a protege of Paul's and he was my mentor at HP. When I left HP in '81, he didn't speak to me again for three years, maybe? I don't know, quite a long time; three or four years. Even though I had recruited to 3Com both of his sons -- not because of him, just because they were good -- and so I had both of his sons working at the company and we had not spoken a word since the day I walked out of HP. It turned out that I owned a boat in partnership with his oldest son's best friend, a guy by the name of John Colter. You don't have to know who he is, it's not really important. But he had worked for Pete McCloskey -- a really smart guy, and I had recruited him to come to HP, and he was the best friend of Paul's oldest son, which is how I met Paul's oldest son, who was designing disk drives at Univac, and he became the project lead manager for the EtherLink, because it was very much like designing controllers to a disk. This is like a controller to a disk. So, at any rate, so they arranged an '84-'85 sailing trip down in the Caribbean, and John and I were on a boat together, and we were at this harbor and Ely met us in the harbor at the same time, and we patched things up. So then we continued to see each other -- so we reacquainted ourselves -- Oh! We did an OEM deal with HP where we did a special card for the HP Touch Screen PC -- We did a -- oh, what was it called? The HP 125 or -- no the HP 150. The HP-150 Touch Screen machine. So

we did a special -- and they didn't do anything that was IBM. That was, you know, that was the mistake Paul made, is that it had to be different. It had to be different than IBM, so they had a different backplane, they had a different interface, and all that. So we did a special card. So that began the HP relationship, and Paul leaves and goes to Convergent. So we're sailing that summer again, the summer of '86, and I was telling him about the workgroup computing vision, and he says: "You know, at Convergent, we have exactly the same vision, only we use CTOS. Why don't we merge the companies? We'll cash cow CTOS and we'll build on yours. We'll use all of our OEM relationships with Burroughs and AT&T and all those guys, to fund really becoming the Sun of DOS. And we'll cash cow CTOS." Great. So that's how that went. So in November we announced the intent to do that.

Pelkey: In December it was approved by the boards.

Krause: Yeah, and then it went through the due diligence process, and then two or three days before it was to close, our bankers told us that they couldn't give us comfort on the deal because they felt that Convergent was overvalued and we were undervalued, and it turns out they were right.

Pelkey: That was not a very happy time, then.

Krause: It was a very difficult thing, because we really had sort of emotionally consummated the merger, and it was a very hard time for me personally, because here I had patched up things with my old mentor and was really looking forward to working with him again, and more importantly I thought we had the right vision for the industry, and I think -- who knows what would have happened. If that merger would have gone through, I think both companies would have been extremely successful. I agree with the assessment of the bankers, but -- at any rate, so, actually, something that I attribute to myself, the fact that I was able to regroup my own emotional energy to gather up our own internal efforts and refocus them and getting us moving down the path -- on a different path, wondering whether or not -- this became, sort of what I call the period of oscillation, going back and forth with 'should we be a workgroup computing company or should we go back to our roots in networking?' Then we did the merger with Bridge with my hopes for two things: one is -- let me step back further -- there were two goals that Metcalfe and Charlie and I started out with. The primary goal was to create a company that would withstand the test of time and live beyond its founders. This was our emotional carry-over I had from my HP experience, that I really wanted to be part of building something that became an icon in Silicon Valley. So that was goal one; build something that would live beyond its founders. Goal two was that I had seen too many of my colleagues overstay their time. It was because it was easy to start companies at a young age and we didn't have the natural, built-in age barrier that more mature companies had where you became president at 50 and retired at 60, so at the end of 10 years, you're out of there, and the company got some new, fresh thinking. So I made a commitment that, at the end of ten years, "I'm out of here, and I encourage you guys, you, Bob and Howard, to do the same thing. We should turn the company over to a younger group." So here it was getting on about -- when was it, about '87-'88, and so it wasn't clear –

Pelkey: Yeah, '86, because in '87 is the January board meeting where you come out with this notion of becoming the second largest communications company to DEC.

Krause: OK, so, and then when did we do the Bridge merger? September of '87?

Pelkey: That's right, July was when you announced it, July of that year.

Krause: So this all sort of fit in with the fact that there were three of four more years to go before ten years was up for me -- four years -- and we needed to get somebody in place to be our potential successor. Workgroup computing looked pretty good, plus the fact that this would help us move down this path of becoming the second largest communications company, so we did that. Then we had this moment of uncertainty about whether or not we should be a computer company or a communication company.

Pelkey: But that all preceded this.

Krause: And I bet on the wrong idea, but the right guy, who was one and the same. Carrico had the right idea, which was become a communication company. Metcalfe wanted to continue with being a computing company and continue with the -- because he had now championed the 3Station project, and he wanted to continue with that, thought we were on the right track. So I bet on Metcalfe's strategy, which was the wrong thing to do, but Metcalfe was the right guy, because it turned out that Carrico really didn't have the tickets to run a large company, and to Bill's credit, he recognized it and recognized that he was an entrepreneur and that he should bail out and go start another -- or do whatever he was going to do, start another company, retire, whatever.

Pelkey: So help me understand. On one hand you're betting on Bob and workgroup and yet you do Bridge, and Bridge is --

Krause: Well, no, no, no. This came later. We did Bridge with the intent of being the second largest communication company. So now we merged, and now we're having this debate. Carrico is now president and chief operation officer, wants to become CEO -- Metcalfe hasn't given up on being CEO. So here I have this debate going on between Carrico and Metcalfe in all of our management planning sessions. Carrico, communications; Metcalfe, workgroup computing. We can't do both. We've got to do one, we've got to choose. We've got to choose.

Pelkey: That must have been a very unenjoyable period of time.

Krause: Well, no, not actually. I was mostly disappointed that Bill and Bob couldn't sort it out themselves. And one of the things that I thought I did really well is I turned the company over to Bill. I didn't interfere, didn't meddle, stayed out of his way.

Pelkey: Because he was --

Krause: Because he was president. He was president and chief operating officer. I accepted responsibility but stayed out of his way, and I think anybody would attest to that fact. He was frustrated because Metcalfe wasn't going along with the gag, and I wasn't quite sure what to do there. I was staying out of publicly supporting either, until I understood the situation a little bit

better. But, I don't know how this fits into building an industry, other than building an industry is never a straight line from point A to point B.

Pelkey: Ain't that the truth. Now, 3Station was introduced in March, so before the --

Krause: Of '87.

Pelkey: '87, right, before the merger. Now, you've got 70% retail.

Krause: Now we've made the switch to retail, and we had a good product line. What I underestimated, didn't recognize, was A) the conviction of the customer to use industry standard products. That was mistake one. Mistake two was underestimating the capability of our own company. When we merged -- this was now after we merged with Bridge. We now had quite a core of people that understood networking. And, to fast forward for a second, one of the primary reasons that I chose Eric [Benhamou]
as the guy to succeed me is because he was a networking guy. I had concluded that I had made a serious strategic error in trying to become a workgroup computing area, because we really didn't have the horses to compete with people like IBM and Compaq and Dell and AST and all these other guys. We just didn't have it.

Pelkey: So he replaced Bill?

Krause: So Bill left. We didn't replace Bill. I took Bill's presidency back, and we formed the divisions, and Eric moved over to head up the software division, and we -- Bob was heading up the distributed systems division, but we hadn't sorted out, at that time, because we were now -- I had chosen Bob, and Bill had opted out. So we were off to go do our workgroup computing strategy, and we were organizing to do that, and it wasn't until 1989, 1990 until I realized that this wasn't going to fly.

Pelkey: So some of the seeds of all of this come from who you were when you came to the situation, and Bob and Ron having come out of Xerox PARC. Plus, computer companies are big companies.

Krause: Quite frankly, Bob and I sat there with Andy kicking ourselves in the ass saying: "Why didn't we listen to this guy Andy Bechtolsheim in the first place?"

Pelkey: DCA chased Bridge before Bridge ended up with you, right?

Krause: If they did, I didn't know it. Bert Nordin was chasing everybody. He badly, badly wanted to merge with 3Com. He flew me down to Atlanta and gave a big pitch and everything, and the he took me out of dinner.

Pelkey: Do you remember when this was? This was '87? This was pre-merger with Bridge, right?

Krause: Right, it would have to be early '87, ok. He had an incumbent president at the time,

and he told me about how much he wanted to merge with 3Com, because he wanted me to be president and succeed him as CEO. The president's name was Jim something or other. It doesn't matter, now. I had met him and he was a nice guy, a good guy. So I said: "Well great, Bert, how do we help Jim get comfortable with this?" And he said: "We can't repeat a word of this to Jim." "Well, why not?" "Well because that will just mess things up. We just shouldn't tell him about anything. That's the way it has to be." "Ok."

Pelkey: Different style.

Krause: So I called and said: "OK. Let's get together. I had talked about this with Bob and explained the situation to Bob, because Bob and Howard were fully aware that I was going down there. So we go to the board. And they say "Hey, we don't want to get involved with this guy."

Pelkey: In 1985 --

Krause: So the point for your book is consolidation in the industry was beginning in the '86-'87-'88 time frame.

Pelkey: We're coming out of the competitive -- I mean the competitive phase is leading to this consolidation. Now, in '85, slightly before the Sytek -- there are some conversations between you and Sytek.

Krause: Yep. We were right across the street from each other and, you know, we were a little worried that they had the lead. They had the front position with IBM and, Jesus, what happens if they leverage that into a bigger play? One way to sort of alleviate that as a concern is to initiate a merger. They had an investor in their company -- they had two guys there that were involved. One guy was the CEO of General Instruments, whose name I forget right now, and the other guy they had involved was Mort Meyerson. So Mike Pliner had proposed this idea to these guys. So they had a meeting, and we came and did a presentation. They did a presentation to -- I forgot who the CEO was (unintelligible) -- and they really got captured by our management team. So both Mort and this other guy were really pushing the idea of merging, and we weren't sure that it all made a lot of sense. But, basically, Mike came to us with a deal and said: "Hey, let's do this merger, and put you guys in charge, and be reasonable about the price, but it doesn't look like we're going to be able to get to go public based on what we're doing." So we said: "Alright, well let's just think it through and we'll talk about it." So we did. I think this was also about that '87 time period. And about that time, Bill and Judy -- and we had talked to Bill and Judy all through this period that we had --

Pelkey: Did you have monthly or quarterly or whatever --

Krause: Yeah, reviews and stuff. And, you know: "Gee, should we do something more serious?" -- particularly when we broke our Convergent thing. So Bill called and said: "We ought to get together and talk." So, it was, "Hey, let's cut off our conversations with Sytek, DCA, anybody else."

Pelkey: So then Bridge happened in '87, and I understand Sytek came to you in '85. So that

would have been pre-Convergent.

Krause: Yeah, I guess that's true. Was it '85? It must be. Yeah, you're right, so that was -- yeah, you're right --

Pelkey: Because '85 is when IBM announces Token Ring, because PC LAN hasn't been working for Sytek, from Sytek's perspective.

Krause: So, I guess the reason we backed out was because, when IBM announced the Token Ring, we said: "Ah, IBM is confused. We don't need Sytek." I mean, we really never got serious about that. It was really optimistic. Pliner called and said: "Hey, why don't we get together?" And what became more clear is that those guys were really pretty desperate.

Pelkey: Did you have any -- was Excelan ever an issue for you in terms of competition? No, because they were basically engineering and scientific.

Krause: Right, they were competing against Interlan. Interlan and Excelan became big competitors.

Pelkey: There were never any conversations between you and Interlan?

Krause: No, nor Excelan.

Pelkey: And data PBXs and data communication companies were never --

Krause: They never got it.

Pelkey: Yeah, you never saw them, you never interacted with them?

Krause: Right. I mean, Ken Oshman, who was in the Melcor Investment Group, thought that digital PBXs were the answer, not LANs. He was absolutely convinced that LANs would never fly, that a digital PBX would be the medium by which people will --

Pelkey: There's a mention about an AMD chip in the IPO prospectus. Was that the LANCE chip?

Krause: Right. And we had worked with them on that to get a second source to Seeq, because Seeq was sort of on the ropes, and we were unsure about that.

Pelkey: But the LANCE chip was a much bigger power chip than the Seeq. The Seeq was kind of really a low cost, low functionality --

Krause: Yes, because we kept the Seeq in for quite a long while and we brought -- in fact we -- I don't know if we ever brought the AMD chip in, if we actually wound up going to the Intel chip? I forget.

Pelkey: I think you went to the Intel chip.

Krause: Yeah, I think we helped AMD do the chip, then wound up going to Intel.

Pelkey: Because CMC did the emulator on the LANCE chip. That's how they got into the business and ended up competing with Excelan. You bet an awful lot on OS/2.

Krause: Oh, yeah, I mean that was --

Pelkey: And Microsoft being able to make this transition over to -- IBM and Microsoft making this happen and so on --

Krause: Right, we were betting on being on the inside with IBM and Microsoft, and we had -- we were one of the companies that were really blindsided badly by Microsoft's switch to Windows, but, unlike -- I think Bob really harbors that as a strong emotional feeling, whereas I don't. I admire them for -- it's nothing personal, it's just business. They saw the opportunity to blow IBM out of the water with a better product. They knew what we didn't know, but what we should have known, is that IBM was just incompetent and impotent to perform, and so now that it's all out, we know that behind the scenes Microsoft just got fed up with the frustrations of trying to deal with these Bozos and said: "Let's do this stuff ourselves."

Pelkey: SynOptics -- and Cisco, maybe to a lesser extent, but SynOptics -- you were early into twisted pair, SynOptics –

Krause: We were first, actually, as soon as Ron finished doing thin Ethernet, which was the combination of putting the transceiver on the printed circuit board in conjunction with the Seeq chip, that's what made the EtherLink possible for the IBM PC, the combination of those two ideas, and I contributed the notion of "Hey, why don't we make this a simple, like, scope cable where you just push, twist and lock and you're on. So I said: "Now that we've done that for scope cable wire, Ron, I want you to do the same thing for phone wire." So, he had designed this desktop calculator, and he said: "Guys, ok, I want you to design one that goes in my pocket," and so Ron went off and figured out how to do it. And, let's see, what did we call it? We called it -- Twisted pair Ethernet? Or something, we had some brand name that we were promoting. I forget what it was, but we were able to use standard telephone wire, and we were able to multi-drop it. What we underestimated was, again, the importance of the infrastructure is that using standard telephone wire, we only worked in -- to get 100 meters of distance, we only worked in 90% of the cases. The other 10%, the distance from the telephone to a wire closet was longer than 100 meters, so it wouldn't work. SynOptic's contribution was that they used shielded twisted pair wire, and therefore it didn't have any distance connotations. So it was really weird. People were willing to pull shielded twisted pair wiring and use that for both -- it's more expensive, but you can use that for both the telephone wires and your network wires. So again, we were a little too arrogant. And then we got into this standards brouhaha with the standards committee.

Pelkey: It's ironic that the product architecture, when you go into a hub, it starts to look more like a data PBX again.

Krause: That was the other thing. We were trying to be, you know, daisy-chained, like Ethernet, and so we -- and this was all in part of the area where we were going like a rocket ship, and we could do no wrong, and we basically let both SynOptics and Cisco into the market.

Pelkey: Yeah, because before you got focuses back on communications, you still, until '89-'90, were workgroup computing. So being the best at doing twisted pair wasn't the issue --

Krause: It was figuring out how to do servers and OS/2, 3+ Open, and getting that part of the equation down.

Pelkey: So, then you get SynOptics and the Cisco who become gigantic successes very quickly.

Krause: Well, we didn't really care that much about SynOptics, actually. We didn't care. We worried more about Cisco quickly.

Pelkey: You competed with them first.

Krause: Right, with bridges.

Pelkey: The second generation, by the way.

Krause: That's right.

Pelkey: And their DEC relationship and their bridges and --

Krause: That's right. And that was when we saw a lot of our people starting to really notice this thing called Cisco, which raised that flag. That's why I began worrying about whether or not we had the tickets to do this workgroup computing, whether or not we were pissing away a better and bigger opportunity in communications.

Pelkey: Is there something that you think we haven't touched on.

Krause: No, I think that was great. It was really a fun walk through memory lane.

Pelkey: Thank you very much.

END OF INTERVIEW

