Interview of Stephen (Steve) Frankel

Interviewed by:
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James Pelkey: I know you were at Tran before joining Micom, and I'm more interested in the Micom experience than the Tran, but in terms of my understanding your mind set when you came to Micom, maybe you can share some of your background with me.

Steve Frankel: I think you might be surprised at -- you probably will find a lot of interest in the Tran experience, because it turns out Tran was a leader in a number of technologies which were at the forefront of the industry at that time; a leader more in terms of defining the future of the business, not in successful implementation of -- the creation of the business. In other words, we did some advanced things that were novel and first of the industry, and other people advanced the state of the art, but you'd be surprised at how many firsts actually occurred as a result of Tran.

Pelkey: For example?

Frankel: The most important first was Tran produced the first data PBX in the world. It was designed by myself and another fellow named Don Mueller, and it was literally the first data PBX in the world.

Pelkey: And what year was this?

Frankel: That's a good question. The data PBX -- let's see. Let me just go back for a minute. I would say it was probably 12 years ago -- probably 1975 to 1976, somewhere in the 1975 to '76 world. Prior to that time, there were dumb port selector devices, which did not provide for interaction with a human being who requested a particular switching resource that would allow him to be switched. It was kind of a hard wired switching mechanism. There was no human interface based switching device of any type at that time.

Pelkey: Because Gandalf had what -- they referred to one that Case was selling, as I recall.

Frankel: The Gandalf one came after the Tran one. I was there.

Pelkey: I understand that Bill Norred thought the Gandalf one wasn't very effective, and he wanted to go build one of those. I guess it was in '76 that he wanted to build one of those.

Frankel: I'm trying to remember whether it was '75 or '76, and we built it. It was built around the needs as defined by Indiana University, and it was for the IUPUI campuses, which were a number of -- that's a consortium that involves Indiana University and Purdue University and some integration of those schools. Anyway, they had a requirement, and out of that requirement we defined a product, and we developed this product, and it was a product that was a minicomputer based switching device, and to my knowledge, it was really the first device that allowed for human interaction to request -- requesting a machine to provide a particular switched path on the data side, of course, not on the -- the voice side had that many years prior to that. It was built, it was installed in the IUPUI campuses, and was up and running, and subsequent to that, as I recall, Gandalf came out with their machine, and then quite a number of others as well.

Pelkey: So you think that was installed in '75 or '76?

Frankel: Yes, I'm saying installed. I think it was installed in '75.

Pelkey: And when did you start that project?

Frankel: Year before.

Pelkey: And when did you join Tran?

Frankel: I joined Tran -- let's see. I joined Tran in '73, so it might have been -- the switch might have been built in '74. It's either '74 or '75. It was -- there's a reasonable chance it was '74 that we built that switch. It could have been as early as '74, now that I think about it.

Pelkey: And the spec came -- were you involved in working with IUPUI?

Frankel: Yes. Basically, IUPUI had a requirement and -- it was one of the professors there who had a requirement, and he defined the requirement --

Pelkey: How did he find you?

Frankel: Well, he had done some business with Tran previously and had some multiplexers from Tran and kept on discussing the fact that he had a switching problem and: "Gee, if there was some way that you could get the students on all of these different campuses to have access to the general computing power of these combined schools, that would be a really valuable tool." Out of that evolved this whole data PBX industry.

Pelkey: How about that. I thought Tran was kind of like an IBM front end box.

Frankel: No. Tran went in a number of directions. Tran built one of the industry's first packet switching machines, for X-25. We were one of the first implementers of X-25 switching, and installed and was selling those switching systems. It was PacTel's first switched X-25 network. It was the South African Post Office's first X-25 network.

Pelkey: This would be post '76, right?

Frankel: Yeah, post '76. That was the major switching system that was built after the data PBX.

Pelkey: So the progression went from the data PBX and then after that you built that packet switch product?

Frankel: That's correct, because by that time, X-25 was being defined, and we were participating in the definition of X-25 with the CCITT organizations in Geneva, and it was clear that there was going to be a requirement for packet oriented -- in terms of efficiency of using transmission facility -- of a need for packet oriented traffic.

Pelkey: Were you involved in any of this CCITT?

Frankel: Yes. Really on the periphery, but, yes, we involved.

Pelkey: You weren't part of the US delegation?

Frankel: No, I was not.

Pelkey: Because Larry Roberts at Telenet was the prime pusher, as I understand history.

Frankel: That's correct. He was. To my understanding that's correct, and I had dealt with Larry a couple of times in that area.

Pelkey: Let me jump ahead for a second. When did you join Micom?

Frankel: I joined Micom in, I would say, December of '79 --

Pelkey: So you were at Tran up through that period of time?

Frankel: That's correct -- '73 to '79.

Pelkey: And your role during -- you joined --

Frankel: Joined Micom?

Pelkey: No.

Frankel: Tran? I came into Tran as the first software guy in the company, and then built a software team. I ended up running a little of the -- I became Vice President of Engineering and then Vice President of Marketing.

Pelkey: How large was Tran when you joined it?

Frankel: Tran was relatively small; just a few million, but had previously won the contract to build the first digital network for the Trans-Canada Telephone Company, TCTS, and this is an amalgam of a number of the operating companies in Canada, Bell Canada being the largest, Alberta Government Tel being another, Vancouver, BC Tel being another, and their network -- what happened was, Bell Canada was a very gutsy group. They put together an organization called CCG, Computer Communications Group I think it was. Very gutsy decision to go advance the state of the data communications transmission offerings. So they, in fact, defined -- they wanted to have the first digital nationwide transmission network, preceding DDS here in the states, and in fact, Tran was selected to build the multiplexing equipment and --

Pelkey: Was this multiplexing equipment a derivative of what was happening over in ARPA, or was it more modem and traditional multiplexers?

Frankel: Traditional multiplexers. The system was installed and it was, in fact, it's called the Dataroute Network. The Dataroute Network was actually in place and in service, that is providing service, nationwide digital transmission service in Canada, prior to the DDS facilities were in place in the United States, and it was really the brainchild and the gutsy move of Bell Canada's CCG group. They basically got together and put the -- came up with an agreement for all the TCTS companies to install it so they could build a nationwide network, and so, as I said, I think you would be surprised at --

Pelkey: Yeah, I am already.

Frankel: So, in fact, that was built and was a very successful program and, in fact, they're still, as my understanding is, there still exists the Canadian Company which was created by Tran at that time to supply all these products and build new products of that type for the Canadian market. That company is still in business, and growing, as I understand it, and doing quite nicely.

Pelkey: When was Tran founded?

Frankel: I would say the early '70s, maybe '71 or thereabouts.

Pelkey: And its mission was to be a data communications company?

Frankel: Yes, to be a data communications company and went after --

Pelkey: Was it a venture capital backed company?

Frankel: Yes. Rothschild was one of the venture funds and I don't remember who else, but certainly Rothschild was a key.

Pelkey: So when you joined, you joined as software, so you must have done some work on this project that was going on into Canada then?

Frankel: Oh, sure, I helped develop that product and built a nationwide alarm system, to where all of the failures and all of the equipment through Canada would be delivered to a central facility, who would

monitor the alarms and initiate service calls and all of that. I built that system, as well as some of the other facilities in that network, and then went off and did this world's first data PBX.

Pelkey: And how many people were involved in the data PBX project?

Frankel: It was very small. It was a couple of hard working guys got together. It was only about -- in terms of software people there was one, me, and the architecture was done by two of us and the hardware was implemented by about five engineers, and just one software guy. It was a multi-noded network on its first day, because the first application for IUPUI was a two or three switched network -- I think two, as I recall -- and so on the first day, we were delivering and installing a multi-noded switched network.

Pelkey: How were the nodes connected?

Frankel: They were connected via multiplexed streams between the switches, and I created a signaling procedure between the two switched to signal connection requests and queuing requirements and all of that.

Pelkey: My goodness.

Frankel: It was a circuit switch. It was clearly not a packet switch, it was a circuit switch. Now the other things that's novel about Tran is Tran also created the first hybrid switch in the world, hybrid meaning combination circuit and packet switch, which today is getting a lot of fanfare as being a technology that is an emerging technology. That technology was founded on something called Pacuit, which is a technology that was basically invented by Ray Sanders and myself, and I named it 'Pacuit' and I built -- myself and one or two other guys -- the architecture of that machine, and that was a packet and circuit switched network; packet for asynchronous traffic and circuit switched primarily for the synchronous traffic, and that was a switch that was created by Tran, and it was the first hybrid packet/circuit switch in the industry.

Pelkey: And when did you do that?

Frankel: Mid '70s, I'd say -- no, maybe later, maybe '77, in that time frame.

Pelkey: And then you got involved and -- did the packet switch product that you ended up selling to South Africa, did that --

Frankel: That was the Pacuit.

Pelkey: Ok.

Frankel: I believe that was the Pacuit system. As I say, I thought you would be surprised. There were a lot of firsts.

Pelkey: How big a company was it when you left?

Frankel: I think Tran had only reached about $20 million in sales when we sold it to Amdahl, to become Amdahl's communications division.

Pelkey: Which was in '79?

Frankel: Yeah. The deal was negotiated to sell it -- this is a story. This is one you'll put in your back pocket for a long time to come. This is an incredible one. We had been working to negotiate the deal, and the deal had been negotiated by Ray Sanders and Quentin Parsley, who was the CFO, and I was involved to a degree, and the deal was being negotiated for quite some time. Dave Morgenthaler, if you know Dave at J. H. Whitney was there, and he was negotiating as a key negotiator for Amdahl.

Negotiations were going on for quite some time, and I recall that I was up at Amdahl, and I believe it was the Thursday previous to the following Tuesday when the announcement of the deal was to be made public. I believe that's the timing. On that day, I was there basically to be working with some of the people at Amdahl to be planning where Gene Amdahl would be on that day and where Ray Sanders would be on that day so that there would be a proper announcement to the public and people in each company would be informed and so all of that planning was going on, and I was up at Amdahl's facility to be doing that, and while I was there I came to find out that Amdahl was announcing on that day, or the next day, or two days later, I can't recall, that they were going to merge with Storage Technology. At that point in time, which was, of course, a major peripheral manufacturer at that time, and obviously the two companies felt that if they got together, they'd be a stronger competitor to IBM. So, that was literally four, five or six days prior to the formal announcement of the deal. Now, once the Storage Tech deal went down, or at least the announcement of the potential deal -- it turned out not to be a deal -- but the potential deal, it clearly made no sense for Tran to be acquired by Amdahl because we'd basically be a gnat on the back of two giants, and it made no sense. So that actually resulted in the Tran side backing off the deal, but the basic terms of the deal had been well defined. Subsequent to that, the Storage Tech Amdahl deal fell apart. I left Tran to go join these two other guys at Micom who were starting to build a business that looked quite attractive, and it was, I guess, five months or so later that the Amdahl Tran deal did, in fact, occur.

Pelkey: Sometime in the '80s -- mid 1980.

Frankel: Yeah, that's correct.

Pelkey: How did you first learn about Micom?

Frankel: Oh, I learned -- Bill Norred, I think, called me. I can't recall exactly how that happened, but basically I met Bill Norred, and we got chatting for a while, and it seemed to me that these guys were on the right track in terms of where things were going, and their view of what was to happen in the market was so coincident with my views, it was as though I was telling the story to Bill as he was telling his story to me, and it was just so incredibly coincident that it was kind of a natural progression for us all to get together.

Pelkey: Did he approach you in the context of looking for --

Frankel: Well, basically Bill was THE engineer for Micom in those days. He had -- when I got there, what I found was there was one engineer and five helpers and Roger Evans was the key marketing guy, although there was a more elaborate marketing/sales function in the company. Engineering was Bill Norred and one very capable programmer and a couple of helpers and that was it. It was the view at that time of Bill that what they really needed was to let Bill go and really become president, and act in that capacity formally, and so we kind of got together, and I came in initially just to run engineering, and I built the engineering team there.

Pelkey: And at that point in time, December of 1979, how long did it take them to recruit you to come to Micom?

Frankel: Well, it wasn't too long, because I had made my decision that -- I made my decision as a result of two factors that I was going to leave Tran. One was that the deal was expected to go through with Amdahl and I really wanted to act more in an entrepreneurial environment and less in a big company environment at that time, and in fact, maybe generate some net worth for myself. Secondly, to be quite candid, I, after many years at Tran, I grew from a very talented development guy into more of a general business man and a market guy, came to understand that the fellow who was the head of Tran and one of the people with the most foresight in the communications business in my view was Ray Sanders. Did you know Ray?

Pelkey: No.

Frankel: Very bright, very forward thinking guy. Very capable man. I decided, at that time, that Ray was a brilliant thinker and a guy with tremendous visibility as to where the market would head, but was not a businessman to the extent that he could grow a very large company. So, I decided at that point in time as well that I needed to go into another environment where the potential to build a large company was more evident. Ray is a fascinating guy to talk to.

Pelkey: Where is Ray now?

Frankel: Ray started a company a number of years ago, which was called Marcus International. I don't know what it's called today. I heard it was renamed. I don't know.

Pelkey: Where is this?

Frankel: They're somewhere here in Southern California. They're PC- based database product of some type; some very advanced architecture, some really way-out kind of thing, and I know it's been funded by Lockheed, so you might be able to find him through them.

Pelkey: In fact, I think I know where it is.

Frankel: H&Q brought them together.

Pelkey: Right, Bill Perry.

Frankel: No, I don't think so.

Pelkey: H&Q Technology Partners probably did it. So, in December of '79, you walk in the door at Micom with Bill presumably moving up to be president and not much of an engineering staff. They had the statistical multiplexer, which is -- 1979, Micom must be doing $20 million?

Frankel: No, they were doing, I think, about 10.

Pelkey: They were still selling some of their TDM?

Frankel: That's right.

Pelkey: And that's about it.

Frankel: That's correct.

Pelkey: So you went about having to build up an engineering team --

Frankel: That's right, we had to build an engineering team. We were growing nicely. We could afford a reasonable R&D budget, and were creating a strong channel of distribution, one which could take a lot of product if we could really be productive in new product development, and went about doing just that.

Pelkey: At that point in time, they were already doing the orange juice can ad?

Frankel: Yes, that's correct.

Pelkey: And they had already started the process of creating the distribution channel --

Frankel: That's correct.

Pelkey: -- of first manufacturing reps --

Frankel: Early stages.

Pelkey: -- and starting to move toward the stocking reps. Did you have any reaction to those two -- the orange juice advertising program or the stocking rep program at that point in time?

Frankel: Well, it was obviously very attractive and it was creating lots of visibility for the company. As far as the stocking rep program, that was really, I think, the guys who really developed that into a very excellent channel approach was Vadic, as I recall. Basically what Micom did was they tried to sign up essentially the same distribution channel that Vadic did, and just -- as long as the guy was walking in with a pair of modems, he might as well sell a statmux as well. That was the philosophy. So, Vadic really, I think, was the precursor to establishing that kind of a channel, and Micom, obviously, came in and did a superb job, and enhanced it, obviously, with the advertising campaign and an excellent product.

Pelkey: Now, there was no venture capital at that point in time? There was only Thornton's money?

Frankel: That's correct, but right at the time I came in was -- exactly at that time was when Greylock came in and H&Q came in and of course Oak came in.

Pelkey: So, 1980 --

Frankel: Well, no, no, no. H&Q, I think, came in only at the point in time when we were looking for IPO. I believe Oak and Greylock were in and also -- what's the other fellow -- Tom Stevenson also came in -- I forget the name of his firm.

Pelkey: I think four firms came in.

Frankel: Tom Stevenson came in on the board, Stu Greenfield at Oak, Charlie Waite at Greylock --

Pelkey: Actually, H&Q did come in as an investor.

Frankel: But they didn't join the board.

Pelkey: Greylock represented them.

Frankel: I think that's correct.

Pelkey: And this is, what, early 1980?

Frankel: I think about '80.

Pelkey: So when you got involved in engineering, what did you first do?

Frankel: Well, I guess the basics were to develop an organization that could churn out lots of product to meet the capabilities of that distribution channel.

Pelkey: What were the first products you began to work on?

Frankel: Well, we moved in a number of directions. You talk about link products -- we started building local data sets and that kind of thing, substantially enhanced the statistical multiplexer line.

Pelkey: When did you do your Codex deal, of OEMing to them and you also OEMed modems from them that you included --

Frankel: Codex was OEMing the Micom statmux for quite some time before we did a deal with them on the modem side. I'll tell you about that in a minute. Also, GDC had done a deal, and GDC was also OEMing the statmux.

Pelkey: And those were in place when you joined the company?

Frankel: It was about the same time, and I can't recall which was first. It was in the same window of time, and I don't remember which happened first and where that was. Let's see, how did it work as far as the modems were concerned? We later -- it was, I don't know, maybe it was a year after I joined that we decided that the statmux business was growing very nicely and it was clear to us that every time we were selling statmuxes, somebody else was getting some revenue for modems, for leased line modems. So, at that point in time, we did a deal with UDS to integrate UDS modems. They designed modems to meet our form factor and our interface at our spec, and we integrated 48 and 9600 bit per second into the box, and that created the 8000 line, the Micro8000 line, which was the modem integrated statmux line. Eventually that grew to, as I recall, 50% of the revenue stream of the statmux line was based on that.

Pelkey: So it was a UDS modem?

Frankel: It was a UDS modem at that time. Now, subsequent to that -- this is an interesting story too -- the basic technology in the Codex leased line modems was developed by Rockwell down here in Orange County. Codex had a very tight contract with Rockwell in that Rockwell could only sell, at that time, their technology to the facsimile industry, but the basic technology for the modems could not be sold to anybody except, as I recall, in the form of an integrated product. Now, what happened was, that was the precursor, the previous technology. So that was the agreement relating to the previous technology that was developed by Rockwell for Codex. Rockwell, subsequently, also somehow tied into Codex, and I don't know exactly the relationship there, built the next generation of technology, and that was another generation, more compact lower cost technology, and Rockwell decided, once that technology was in place, at that point in time, to try to go sell --

Pelkey: Prior generation --

Frankel: No, this current generation technology in the form of a data pump, a modem data pump, to Micom, and specifically to me. So I went down there and negotiated a deal to buy this technology from Rockwell, the idea being that we would integrate it into our statmuxes, get a lower cost for the modem piece of it, and also integrate it into the end user modem family that we had built by that time. Well, the story goes that I had negotiated the deal with Rockwell, got to the point that the fellow who was working for me who was responsible for the modem line for me was down at Rockwell finalizing some of the elements of the contract. I had negotiated the basic terms and he was finishing off some of the elements of the contract, the technical elements of the contract, at the time that a phone call was placed from Jim Storey, president of Codex at that time, to Bill Norred.

Pelkey: And this was what year?

Frankel: Ok, this was -- maybe it was '76, I would say. I'm sorry. Let me take that back. No, no, no. I take that back. This is, I would, '82 or '83. Scratch the '76. Wrong decade. '82, '83. So Jim Storey basically called Bill and said: "Hey, I've just called Rockwell and I've told them I'm going to sue them if they sell this stuff to you. I want you to know I'm going to sue you if you buy it from them," and all that. So Bill calls me; I get a hold of Ken Bainten who was my guy physically at Rockwell on that day, and had a little bit of words with the people at Rockwell at that time, and so a funny thing happened. Rockwell then panicked and decided they didn't know whether they could sell it or they couldn't sell it and they were in total shambles. What happened was, I got in touch with the president of UDS. No, he wasn't president at that time, he was VP of Marketing at that time, George Grumbles. Very fine gentleman. I called George and I said: "Hey, George, the bad news for you is I was about to replace your modems with the Rockwell modems. The good news for you is that there's all kinds of hassle here and we're kind of in disarray." I said: "The news will still probably be bad for you, because I'm probably going to now have to OEM it from Paradyne," which had a product alternative at that time. George didn't want to give up the business, so what George did was George got on the phone to Jim Storey and said: "What I want you to do. I want to keep that Micom business, so what I want you to do is I want you to -- let's do a four way deal where you will buy -- you Codex -- will buy, as you normally do, these data pumps from Rockwell, and you'll sell them to me, and I'll sell them to Micom, all right?" As it turned out, given the volumes and

the deal that Codex had, even with all the hands in the pie, the price was still an acceptable price. Everyone was shaving margins to take a piece of the pie and, of course, there were a lot of pies. In fact, that's how Rockwell was able to sell their first data pump was as a result of that circumstance. Subsequent to that, they became a major supplier of data pumps to many other companies around the world.

Pelkey: Now how about that.

Frankel: But it all happened through that experience.

Pelkey: That's a great story. Now, when did you take on the data PBX?

Frankel: Well, the data PBX was in development when I got there. It didn't work particularly well. It was in development and, not too much after I got there it was going out in beta testing. It really had some problems, but we fixed it and we improved it and -- it was basically as a result of getting some units in the field and dealing with customers and getting their reaction and working and bidding contracts and all, that we really found out what would be the next major set of enhancements to the data PBX world that would allow Micom to have a shot at taking the market, which, of course, at that time was dominated by Gandalf.

Pelkey: This is 1980-ish?

Frankel: '81, '82 kind of time frame. Basically, Tran, who started the data PBX market, went off into X-25, because that was sort of what Tran did. They were always looking at tomorrow's market and didn't cultivate today's market. Gandalf cultivated today's market and went ahead and built the leading company, at that time, in the data PBX business. Micom then entered it. We had enough channel strength and enough resources to find another layer of sales and supporting people to start making some real headway in that market, and then we really started evolving the data PBX into a much more wider capable product, distributing the access to the switch, multi-noded, increasing the capacity of the switch, adding data over voice facilities to the switch, and grew it into a much -- and integrating statistical multiplexers and protocol converters and a whole rash of other things. The end product of all of that integration of technology was that Micom ended up becoming the leading supplier of that product.

Pelkey: Now, what time frames did this involve?

Frankel: Well, the product was evolving all the way from '79 to '85, while I was there. It grew to a $60 million business, annualized business.

Pelkey: And you -- were you selling that with direct sales and marketing from the very beginning?

Frankel: No, it was sold, basically -- what happened was, clearly the distribution channel, the rep channel, had a tough time selling it themselves, so what was put in place was a tier of people, of sales guys, in each region who would support the reps and move in the product. Sometimes the reps would qualify a lead and our guy would go in and take the business, and sometimes they would do it together. It was combination, but when all was said and done, it was a joint effort to take the business.

Pelkey: Now, in '82, the IBM PC came out. When did you start to feel the impact in the data PBX, because that was starting to become an increasingly larger portion of your business?

Frankel: You're asking a very critical question here. The reason you are is that – I left Micom in December of '84. Some six months prior to that, the PC, and as a result of the PC, in my view, the local area network was really starting to come up, and right in parallel with that was a tremendous push being exerted by the voice/data PBX manufacturers. So you had this tremendous collision of evolving technology. Who would win out? Would the data PBX people sustain their market share to provide switched service or would, in fact, LANs evolve into a business, or would, in fact, the voice people take the data business? Given they already had to put a voice switch on the site, why not just add some

interfaces and take the business? It was becoming clear by early '84 that there was a tremendous frontal attack on the data PBX business. It was growing -- data PBX was growing by leaps and bounds, but it was very clear that there was a frontal attack. I don't know if Roger would --

Pelkey: Let me digress here. When you say it was very clear --

Frankel: It was clear because the growth in the data PBX business was slowing down. It was still growing, but growing at a lesser rate, number one. Number two, as we went around and talked to customers and potential customers, it became clear that their desire was, as a result of the advent of the PC, more file transfer, and a lot more desktop processing and that kind of thing.

Pelkey: Your channel wasn't telling you this, though?

Frankel: No, the channel was absolutely not. Absolutely not, at that time.

Pelkey: But your big customers were?

Frankel: Well, we started seeing the growth in that business diminish, and we started -- specifically, Roger Evans and myself started worrying a lot. We started doing research and trying to figure out what was going on. I don't know if Roger told you this, but --

Pelkey: This is early '83 that this is starting to become apparent to you?

Frankel: No, this was later. This was, I would say --

Pelkey: Mid '83?

Frankel: Yeah, in that time frame, and certainly we didn't do much about it until early '84. What happened was Roger evaluated -- took his position and I took mine. We had fundamentally different opinions at that time. Roger's view was that the company -- that it was a natural progression for the PBX companies, that in fact the company should launch a voice/data PBX product. That's correct. I, having researched the market and looked around, I decided no, the LAN market, the LANs were going to take the business. We fundamentally disagreed. He wanted to go launch a major investment, a multi-million dollar, tens of million dollar investment in that. Don't get me wrong, this was strategic planning going on. This wasn't: “go launch something tomorrow” kind of thoughts. This was where his analysis took him. My analysis took me to the LAN business.

Pelkey: His took him to the traditional PBX.

Frankel: That's correct, and we were the two guys who were trying to define the strategy.

Pelkey: Where was Bill in this discussion?

Frankel: He really wasn't particularly involved at that time in this area.

Pelkey: Was he aware of this?

Frankel: Yes, he was aware and he participated at times in the strategy discussions, and I don't know whether he was having discussions in addition with Evans on the side. I don't know, but I suspect yes. What finally happened was that it started becoming clear to Roger, after a while, that, number one, the investment in building a voice/data PBX was monumental, and secondly that maybe, in fact, the LAN business was going to win. So basically, he came over to my camp. We then --

Pelkey: Early '84?

Frankel: No, that was maybe mid '84 by then. Remember, Interlan was not acquired until early '85.

Pelkey: After you left?

Frankel: After I left. So what happened then was we decided: "Well, it sounds like LAN is going to win out, and we better go do something about this," and by that time Ungermann-Bass was in business, certainly, and growing nicely, and basically growing in 17 different directions, which is how they went, and Bridge was in business and in fact -- Bridge was in business -- well, 3Com was too, but we really wanted to -- the strategy was to preserve and enhance the minicomputer based market share we had, and we would then launch into PC stuff later if it made sense, but we had to sustain the revenue stream and the profit return from the core. So what happened there was, Bridge was a viable company. Bridge was interesting, also, because, at that time, they were still using some of the reps that Micom was. So, there was some very interesting synergy. Now, subsequent to that, not much after that, they went direct, and Interlan was in place. Now, at that time, later in '84, Alex Brown came to Micom and they were out trying to hawk, as you know, Interlan. Roger got turned on to Interlan. I was still looking around. I was talking with -- I went up to see Bridge and some others --

Pelkey: Was Excelan on your list?

Frankel: Yeah, I went up to see Excelan at that time. That was a time when Excelan was in trouble; basically a board provider and that really didn't -- while the fundamental technology, the core technology was there, it was the wrong product.

Pelkey: The scale wasn't there.

Frankel: Not only scale, but they were selling boards to workstation manufacturers as opposed to terminal server offering.

Pelkey: Whereas Bridge, most of their business was terminal servers.

Frankel: That's correct, and today, still is a big piece of it, although even as part of 3Com. The other thing that was happening at the same time that was another vector in the same sphere was that DEC announced their Ethernet line.

Pelkey: The DEUNA.

Frankel: Well, the DEUNA, but more importantly, their terminal server. The DEUNA and -- they announced the precursor to what became their terminal server line, and it became clear that DEC was going to start capturing the communications interface to their computers, as opposed to giving it up for the years prior to that.

Pelkey: Right, because before that, they had an expensive terminal multiplexer, but they weren't very competitive.

Frankel: No, they were just -- it was an easy win for Micom. Anyway, to make a long story short, Interlan was available. They were in the right technology. They had a terminal server line. Roger was very enthused with Interlan. I was troubled by Interlan because there appeared to be fundamental organizational problems there and people problems there. I didn't -- to make a long story short, I left before the decision was made to buy Interlan, but it was clear to me that Roger was headed down the pipe to buy Interlan. Would I have stood up to reject it at that time? I don't know, I really don't know, but clearly there were problems inside that company, and clearly they were 3,000 miles away and the management problems were going to be substantial, and that was very clear.

Pelkey: Roger thought there were management problems as well.

Frankel: I think he did. As a matter of fact, I know he did.

Pelkey: Because he moved Paul out of the management role when he took it over.

Frankel: That's right.

Pelkey: And brought him out to --

Frankel: California.

Pelkey: -- to play a kind of strategic role.

Frankel: Holding pattern.

Pelkey: Right. So at this point in time, when Alex Brown walked in the door, you had already been talking about LAN and --

Frankel: Both of us had reached the point -- I earlier -- but both of us had reached the point where it was very clear that the company had to have a terminal server based product. It was just a given; no debates; go do it.

Pelkey: Now, at that point in time, were issues about how those products got sold versus the way you were selling your current products, in terms of the channels of distribution, were those --

Frankel: Oh, lots of discussion about that.

Pelkey: Was that a concern?

Frankel: It was a concern, but remember, by that time, we were running a very substantial, $60 million dollar data PBX business. We were able to, as a result of that, fund a fairly substantial number of direct people, who sold direct and also who supported the rep chain, and it was a fairly substantial sales force out there, and we felt they could integrate the Interlan product very nicely.

Pelkey: Then it comes to December, and you leave Micom.

Frankel: Yeah, I left Micom, basically, because of a number of reasons. One was I saw the company slowing down and I thought the company needed a couple of shots of entrepreneurial spirit. We were almost 2,000 people by that time. We hadn't reorganized in quite some time. The company needed its next generation of organization to propel it into the next plateau, and it, in fact, was slowing down at that time. Secondly, it was appropriate for me, in my view, at that time, to go run a division or it was time and appropriate for me to do that. We talked a lot about that. The third reason, and the one that was foremost in my mind, to be honest, was that, after giving my life for five years to that company, I had amassed a pretty interesting capital base, based on the equity value I held in the company. I was very concerned that the company was not going to continue its profit, its fortunes, and would lose a substantial position. It was very important to me at that time. I could not convince Evans and Norred that the company was broken and needed to be fixed. The numbers were still looking good and . . .

Tape Side Ends

Frankel: . . . when you know --

Pelkey: To make decisions, and you know, you --

Frankel: That's right, you've got to do it, and I would have been there for another ten years if we could have launched the next plateau of the company, but Evans wouldn't agree to it and Norred, I think, believed that I was right, but I don't think he took a position.

Pelkey: Let me, if I could, ask you, conceptually, some questions about growth of companies. You were very instrumental, and you, as much as anyone I'm going to talk to, can help me understand the psychology of the events. You were doing extremely -- your profitability and your growth rates in the early '80s were phenomenal. You guys were considered one of the best-managed companies of all time, and certainly one of the best-managed companies at that point in time. When it came to deciding what you were going to invest in, in terms of having made a leap-frog -- the company had done the statmux, the company went into the data PBX, but the company didn't, in fact, come out with the next product. It ended up having to go buy the next product, the LAN. Why?

Frankel: I think, Jim, you're asking a question that has plagued the entire industry. You think of -- it's a very critical question -- you think of the leaders and the giants of the data communications industry in the '70s, notice that essentially none of them are the leaders in the '80s, not one of them, generally. Paradyne certainly is not; Micom certainly is not.

Pelkey: There are still some of them that are among the largest, but they're not the market --

Frankel: They're not creating the evolution of the industry. Codex is a large company, but they're not, by any means, driving the industry. General DataComm -- the same. So, the giants of the '70s became the also-rans of the '80s, and in every case, in my view, it's as a result of not understanding the repercussions of the PC. Protecting the base that they had created and defending that base was still the number one priority for those companies. Not understanding the ramifications of the PC is what caused every one of those companies, in my view, to be also-rans in the '80s, across the board. Those people who recognized what the PC would do to the industry, which was turn it upside down and inside out, are people today who have created a proper base in the industry, but it's interesting to see that every company who was a leader in the '70s, fell during the '80s across the board, invariably.

Pelkey: The only example of one of the '70s companies, if you will - -

Frankel: DCA.

Pelkey: Yes.

Frankel: But that was --

Pelkey: A different set of events. That was an acquisition.

Frankel: Right, that went haywire.

Pelkey: Was Racal-Milgo, with the Planet network, which went nowhere in this country -- but there's no example of any of those ever doing anything about local area networking, which, while it didn't really take off until the PC came along -- some of the terminal multiplexing happened a little bit, but -- it wasn't until post '82 that the LAN market really started to perk up. It was known -- the Blue Book came out in '80.

Frankel: The Ethernet book?

Pelkey: Yeah, the Ethernet book came out. There was an awful lot of activity around this. It was on the front pages of the papers. Why didn't datacom companies -- why didn't you start up a project? Why didn't you say: "Wait a minute, this is an interesting technology?"

Frankel: Well, in '80 is was irrelevant, because the PC wasn't out until '82, and in my view, there was no need, and there is no need today -- this is 1988 -- for a LAN, except, in my view, for -- as compared to alternative means to achieve the same goal -- except for file transfer. In other words, without file transfer, without processor-to-processor communication, there are many, in my view, less expensive and maybe more manageable alternatives. It's the processor-to-processor communication event which only made sense as a result of a low-cost desktop workstation like a PC that created the demand, the absolute demand, for the LAN. Furthermore, the terminal server alternative to the data PBX, in the minicomputer

environment, was really related more to people looking at new technology and buying new technology then, as opposed to it being a better solution, because it wasn't. It my view, it had no viability in terms of better solution. It was a pain in the neck cable to install, the twisted pair was in place already, and it had all kinds of attributes that I don't think were advantageous. It had some advantageous attributes as well, of course, but it was the processor-to-processor communications that created, in my view, the demand, the absolute demand, for --

Pelkey: What about Network System Corporation?

Frankel: But that was very high end, and that really didn't penetrate the minicomputer world, the world that Micom addressed.

Pelkey: They knew about it, right?

Frankel: But it was a high end, IBM environment.

Pelkey: But they were connecting more than IBMs. They were connecting VAXs and CDCs --

Frankel: Yeah, but it was --

Pelkey: You didn't see that was going to affect your mini market?

Frankel: Look, the number of host-to-host communications paths at that time -- for every one IBM machine that was tied to another IBM machine or a VAX machine, there were 10,000 terminals who needed access to a minicomputer. There wasn't this plethora of machines, processing power, that needed to communicate. Terminals needed to communicate with machines. Machine to machine was an: "oh, by the way, there's some need for that," but for every one of those interconnects, there were thousands of terminals that needed to communicate to minicomputers.

Pelkey: You as VP of Engineering, when did you take over marketing as well?

Frankel: Maybe '82, '81. I don't know, '81, '82.

Pelkey: What did Roger do, become Executive VP?

Frankel: Yeah.

Pelkey: Were you ever constrained in your engineering budget?

Frankel: No, not really. We had adequate budget. We were growing nicely and I was taking about 9% of revenue, typically, so we were growing very nicely.

Pelkey: So you had enough dollars to fund the projects you wanted to do?

Frankel: That's right, but remember, the planning was a strategic team planning, where -- when I took over marketing, what I did was -- what happened was, the company was not growing its data PBX business at the time that I took over marketing, and the reason it wasn't was because we had such a strong multiplexer, statmux business, that every time I had available resource, there was always things to do in that market, and I was draining all the company's resources to do that. So the only rational solution to that was to build mini-business units, which we called 'M&D teams,' Marketing and Development teams, where I put marketing and engineering people together, and those teams would focus on a particular marketplace, segment of the communications market. It was that strategic decision that allowed the company to create this very expensive data PBX business. Without that, the company never would have done it, because the resources would have been employed elsewhere. So, as a result of that, we created tremendous growth in other markets, and that's how we grew multiple arms for the

company. That's how we grew out of the statmux business into the modem business and short-haul modem line and data PBX line and that whole --

Pelkey: At some level, I'm being confrontative in order to understand, at that point in time, the energy of doing the new, of investing in something new and different -- what you did is you just went out and took existing products and improved them a little bit and tried to feed more to your distribution channel. You had this machine net set up there and you knew you'd sell modems, you knew you'd sell line drivers, you knew you'd sell all these things. It was easy business to pick up.

Frankel: The guy who limited some of the decisions to build products outside of the channel, outside of what the company's strengths were, was primarily a strategy that Roger Evans took, which was: "Build boxes, don't build systems. Drive everything you build through the channel, and don't do pure research, drive through the channel." The classic case, there, that was -- a lot of those decisions were very good. Don't get me wrong; it helped grow the company very strongly. Maybe the biggest weakness of that decision was the decision that, two years in a row, I wanted to build a T1 multiplexer line, and that was opposed, and we ended up not doing it, and that was probably -- maybe the most important mistake, on the negative side. There was a lot of tremendous strength out of those decisions, but --

Pelkey: Let's talk about that one. Timeplex --

Frankel: It was in two businesses -- what we did was when we put the M&D teams together, we created multiple groups, and the data PBX group also had the basic TDM multiplexer responsibility for the company. That group, working with me, two years in a row -- what we would have is we would create a plan, a product and business plan to plan for the following year, and each of these groups would do that. Well, two years in a row, the T1 multiplexer was a key element of the plan, and it got shut down two years in a row.

Pelkey: At the executive offices?

Frankel: Yeah.

Pelkey: How can that be? How could you let that happen?

Frankel: I fought against it, but it was Evans' view that it was not in concert with the channel.

Pelkey: In concert with the channel.

Frankel: The channel couldn't sell the T1 multiplexer. It was a direct sale. It required a field service force and it required a direct sales force.

Pelkey: But in discussions about LANs, you didn't think that was the case with LANs? LANs you could put through the existing channel?

Frankel: Sure, plus you install the entire LAN in a building, so there was no wide area access to a LAN in those days. You laid a cable in a building and so you didn't need this nationwide field service organization. One guy, servicing one building, can handle it.

Pelkey: Who was going to put the cable into the building?

Frankel: Oh, we actually acquired a cabling company who would do that, a company who sold cable and installed cable.

Pelkey: But the T1 -- your view is that it was a decision that was dealt with internally, it just --

Frankel: Two business plans in a row, meaning two separate years, had T1 in there as a plan. That's right.

Pelkey: T1, missing that, is a travesty.

Frankel: T1 and LANs were -- and the PC LANs were -- absolutely, it was in the business plan two years in a row.

Pelkey: The whole data communications industry -- Timeplex made the jump over to T1.

Frankel: That's right.

Pelkey: And other people had them, but no one really dealt with it in the way that --

Frankel: Well, I can tell you that the fellow that ran my data PBX and TDM business unit, M&D unit, and myself had it in the plan two years in a row.

Pelkey: Fascinating.

Frankel: It was in the plan two years in a row, two separate years.

Pelkey: Because this issue of -- Roger holds the view that you guys managed your income statement by percentages, and that there was 9% for engineering.

Frankel: That's correct.

Pelkey: And that you, much like many big companies, protect what you have. You get conservative. Once you have something -- like everything else in life -- once you have something, you get more conservative, because you don't want to lose it.

Frankel: There's not question.

Pelkey: So you lose a little bit here, and you want to be responsive to your channel to make sure --

Frankel: We -- the whole -- that's right. That's why I say, the strong companies of the '70s became the also-rans of the '80s because they ended up spending so much of their time preserving their position in what they thought was the market, when in fact, the market was evolving. In that case, the market -- there was a revolution, not an evolution. It was a revolution of the market, and every one of those companies we just talked about was protecting what they thought was an evolving market. It was not. It was a revolutionary market.

Pelkey: The other thing that was revolutionary about this market was that -- Micom, in those days, you went to efforts to communicate that you were a box company, not a systems company.

Frankel: That's right.

Pelkey: In fact, what was happening at the same time was that the marketplace was looking more and more towards a systems company, which today -- it's no longer technology. At this point in time, we're not in a technology driven market; we're in an end user driven market, in the sense that the end user wants a single vendor to come in, deal with my problem for me, because they can't hire the talent to deal with the problem.

Frankel: Box companies are little companies today, and that's ok. If you're interested in building a small company, and you can make it a profitable company, that's fine.

Pelkey: But it's a big systems company today.

Frankel: If you want to be a big company, boxes aren't going to get you there. Not today.

Pelkey: Maybe in five years time, when the end user environment gets sophisticated enough in order they'll have control and they're going to want to assert more control of their own, as opposed to looking to the vendor to have control, the systems integrator to have control, we'll come into another phase in which now they'll have the confidence to buy better boxes. The boxes will be bigger and more sophisticated.

Frankel: Well, standards will create a new market for boxes, because a box that's truly a standard box can plug into other boxes which are standard, and that will -- everything in my -- I've been in the computer business a little over 20 years, and you see cycles in the computer and communications business that repeat themselves, in different ways, but the cycles always repeat, and they will always repeat. The amusing thing to me -- the thing I get a big kick out of -- is everyone makes a big deal out of T1 multiplexers today. My god, TDMs were no big deal and it's just that they happen to run at higher speeds today and they have a different pin-out on the connector.

Pelkey: It's a tariff --

Frankel: It's a tariffing issue, but -- I mean, I built multiplexers in three different companies, but the company decided not to build the T1. It was in the business plan two years in a row, and that can be verified by the guy who ran my M&D group there, because it was in the plan he and I put together two years in a row, and it was rejected both years.

Pelkey: One other global question I'd like to ask you, and you've been kind with your time: I believe that we, both in the case of ARPA cutting back and with Bell Labs charter, which has changed, that the amount of research that's being put into this country in the computer communications field, is definitely under siege, and on a percentage basis, it's absolutely down and it's heading down every year, and that businesses don't do research, be they Micom or even DEC. They're development, as opposed to research. Do those issues concern you? Do you think about those issues, in terms of the research side, where the new ideas are coming from? Where the new opportunities are coming from?

Frankel: Well, I would say yes, that does concern me. It concerns me a lot, and you can see it very clearly if you look at . . .

END OF THE INTERVIEW

