Interview of Jerry McDowell

Interviewed by:
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James Pelkey: It's April 10, 1992. I'm with Jerry McDowell at Dataquest. Jerry, thank you for your time. As I indicated, I'll get a copy of the transcription to you and I appreciate your time this morning.

Jerry McDowell: I don't mind doing it at all, in fact, I look forward to it . . . this will probably be a little disjointed because I really didn't prepare anything, it's just kind of off-the-cuff. I was just beginning to tell you I got into local area networks by default -- I had been in network design and network implementation from probably mid-1960's onward, initially through government contracts and then I went down to New Zealand and built networks. In fact, I think, I was involved in the design and implementation of the largest banking network in the world at the time, Databank Systems down in New Zealand. They had like 3,000 nodes on that network, and for a banking network that was really large.

Pelkey: And what year was this?

McDowell: That was in the '70s – early to mid-'70s. The reason that was able to be facilitated to a size like that was that in New Zealand there's only a population of three and a half million people and there were five trading banks vying for their business, and computer technology was gaining a rapid foothold in the ability to automate bank branches and to transmit things electronically so that it wouldn't take five or six days for a bank to process a check. And, as you know, that's time that they lose money because it's called a float. They'd lost a lot of money and they wanted to do it electronically, and none of the banks were in the position to build their own network, but collectively, they had enough money and enough wherewithal to do, so they formed an organization called Databank. Databank was owned wholly by the five trading banks and their idea was: "we can put computer systems around the country in centers owned by Databank and that we, as the banks, can tell them the types of services we want delivered to our particular branches." Now, obviously there were a lot of security issues involved and things like that, and, more importantly, we had to develop a networking system that allowed them the flexibility to choose any kind of terminal at the time they wanted. So, rather than go with all IBM, and at that time IBM had just recently introduced SNA and the 3705 processors for front-ending the IBM mainframes, we chose to front-end the mainframes with a minicomputer. Let the minicomputer be the communications controller because we could program it to look like anything we wanted, but the driving force behind it was to find a mini that could actually sit on an IBM channel and there were only two in the industry at that time. DEC had a system that you could front-end an IBM and so did Data General with a channel interface. Because Data General said they had an organization in New Zealand, we chose Data General. It turned out that organization was one individual and we ended up literally designing all of their communications boards from the breadboard. We'd get the original breadboards and my engineering group would redesign the board for async and sync communications. That's kind of how we got – I got started in the user's side. Before then it was as a technician or an engineer developing products and modems. But, my interest in local area networks started when I came back to the U.S. in '78 and they were just forming these committees – the 802 committees on LANs – and we in effect, in New Zealand, had built local area networks in our bank branches. We had tied everything together, but it wasn't through any technology that was called local networks at the time, it was just putting everything on a single cable distribution system and managing communications within the facility that way. When I came back, I was with Paradyne. They had brought me in as a product

planning manager for mostly network management products and some data encryption products. Because I was in product planning, I had an interest in any new technologies that were evolving and I got myself on a lot of standards committees – the 802 in particular, I helped found. I was one of the original members of the 802 Committee in '78 and I stayed on that committee until '84. What I was talking about that I found so interesting was that at one point in product planning I decided at Paradyne that it was really important for Paradyne to become part of the LAN industry. This was back in 1979. They were a data communications company. They were pretty much leading their field, at the time, in modem technology. They had recently introduced the first 14.4 modem.

Pelkey: They did that in '79?

McDowell: They did that in '79. They charged a buck a bit for it, like I was telling you, because nobody else had anything like it. Obviously, Forney at Codex was telling us that it didn't work, would never work, but it did, and people bought it and they used it. We proved it. It was 14.4 in both directions. It wasn't the "gearshift" that they came out with up at Codex. Tom Armstrong was the guy that developed that -- a really, really sharp engineer, one of the best I've ever worked with.

Pelkey: From what I understand during that period of time, Bob Wiggins was really very cost-conscious in terms of how engineering was done, making sure that things could be produced and paid a lot more attention to the total cost, the total cycle of getting a product out into the marketplace . . .

McDowell: Well, he wanted to leverage what they'd already done. That was Maury's concern. Paradyne got itself founded in 1972 by Carl Nordwing and a few other engineers, and the mainstay product line at the time in '72, the thing that they developed was a bi-sync modem for IBM environments. They were the first to come out with anything like that, and in fact, that was the core that later became the PIX product line in the later '70s -- the parallel-interface extender that allowed people to get the appearance of channel-attachment across the country. That's what really founded it, and when Wiggins came in, in about 1976 I think, the company was only about a million dollar a year company, it was pretty small… in fact, they almost didn't make payroll. If it wouldn't have been a guy, Jules Zeph going up and getting pre-payment from John Hancock, they wouldn't have made payroll one month, but he got Hancock to actually spring . . .

Pelkey: Jules Zeph?

McDowell: Jules Zeph. He was one of the sales guys out in New York, and unfortunately, he died about five years ago of a heart attack . . . down in Florida.

Pelkey: How do you spell it?

McDowell: Z -e-p-h. Jules. J-u-l-e-s, I think it was, really neat guy, he really was. They kept him on for a long time when he'd actually outlived his usefulness, simply because of that, they had a long memory.

Pelkey: Oh yeah, that's good.

McDowell: . . . and they did treat people well.

Pelkey: How did you get involved with the 802?

McDowell: I just put myself on it because . . .

Pelkey: How did you hear about it?

McDowell: Oh, Maris Graube. And, a guy that I'd worked with in the past that was with HP, Bob Shatzer, I don't know if you've talked to Bob, he and Allen Rochkind were pretty much driving the 802, what became 802.2 subcommittee, then it was called HILI or "hilly" depending on how you pronounced it, the higher level interface architecture. It was our responsibility to develop the service specifications between layer two and three.

Pelkey: So, you were at the Jack Tar hotel for the first meeting?

McDowell: Oh yeah, the very first one, and I was also out at Gaithersburg at the second one, and that was when we had to figure out who had voting privileges and what we were going to do in the subcommittees and what our charter was, and we spent three days massaging one particular paragraph about our charter. It was incredible. All these high-paid engineers sitting in a room spending three days arguing over words in the charter . . . didn't anyone talk to you about that? It was ridiculous! Three whole days, oh, we went crazy for three days just arguing about what the charter would say.

Pelkey: Was that the Jack Tar meeting?

McDowell: No, this was Gaithersburg. The Jack Tar meeting simply was a getting together to say, "This is what we're going to do folks. How do we proceed? What're we gonna do? How do we divide ourselves?" And it went from there.

Pelkey: And, how much longer after the Jack Tar was the Gaithersburg meeting?

McDowell: It was about four months. And then, from that time on it just, it blossomed, and we were meeting anywhere from three to four times a year.

Pelkey: Now, Paradyne obviously was paying for you to go to these things.

McDowell: Yeah.

Pelkey: There was an interest on theirs and LANs?

McDowell: No, no, see, it was just because I was gone, I mean Paradyne literally didn't know and didn't really care how we used our time in product planning as long as it had some benefit at some later date, I mean, that's the way it was. You were characterizing Wiggins' attempts to be

cost efficient in engineering. One of the things Bob did put in place that set Paradyne apart from any of its competitors at the time was a lot of resource in sales support. We had a proposal generating group. We had people that were in product management and product marketing all working together with sales, so the customer was literally exposed almost from the first sales call to some technical people and had the ability to call in. We had technical people putting proposals together, actually laying out their networks, and we won a lot of business that way.

Pelkey: What I understand was that Jay Hill and Jerry, who Jay brought in, who became president of Paradyne after Wiggins, Jerry . . .

McDowell: Racing car driver . . . Kendall . . .

Pelkey: Kendall, thank you, they kind of put that system in.

McDowell: Jay did. It was Jay, Jerry . . .

Pelkey: Because he didn't understand a goddamned thing about modems, and he wanted to hire salespeople that could do . . .

McDowell: But, Jerry doesn't either.

Pelkey: . . . so they could account sales, but they needed some kind of technical support to do the technical selling.

McDowell: That's really it. Yeah, Jay brought a lot of those people in, and a lot of very good people. And, in fact, a lot of very technical people went into sales at Paradyne, because there was a lot of money to be made at Paradyne in sales, and a lot of people did very well.

Pelkey: So, you're going to these 802 meetings and have a background in LANs and you thought that Paradyne should be thinking about doing LANs.

McDowell: Yeah, I really thought that they ought to start re-directing themselves, not only just with local area network technology but with OSI technology as it was evolving at the same time, but we had some SNA bigots in there, IBM bigots, and I don't want to mention names on the tape but there were a few. And, when I brought Bob Metcalfe in to make a presentation to Paradyne about what 3Com could do to work with Paradyne to get them into the LAN business, it made a lot of sense.

Pelkey: Do you recall when that meeting was?

McDowell: Let's see, it was right after Bob started at 3Com, right in '81.

Pelkey: Ok, he started in '79.

McDowell: It was probably late '80 early '81.

Pelkey: Ok.

McDowell: But, Paradyne had become enmeshed by that time in the Social Security thing that they were going through. This was before they actually started the suit. We were trying to put this stuff together, and they just lost sight of the fact that things ought to be open and there ought to be standards and they ought look toward new architectures. I truly believe that if Paradyne had gotten themselves involved in '80 they would probably be one of the major players in LANs today. They had that opportunity, especially with 3Com because Bob was willing to work very closely with them. Actually, I did exactly the same thing at Gould, I brought Bob in again, same thing. When, it wasn't Gould it was Systems Engineering Laboratories that Gould bought – the really supercomputer systems…

Pelkey: And, when did you join SEL?

McDowell: I joined SEL in '81, right after I left Paradyne.

Pelkey: Ok, and again, because this is an important issue to me, Paradyne wasn't receptive to local area networking?

McDowell: No, it just fell on deaf ears. Bob came in, made the presentation and I never heard another word. Wrote memos that didn't get anything back.

Pelkey: His presentation was to technical people?

McDowell: Technical, sales and marketing.

Pelkey: Why do you think it was, again that they didn't hear it?

McDowell: They were too focused. First of all, Wiggins' first projects were PIX and later the Response System, and the fact also that we had just been enmeshed in a bid for the Social Security Department on intelligent terminal systems, so he was taking Paradyne away from communications pretty much and going toward system processing, IBM-type stuff. That's what was going on, literally taking away the core business.

Pelkey: And LANs and IBM environments didn't make any sense.

McDowell: LANs didn't make any sense to them anyway. What's the need? PCs weren't out then, and somebody was talking about what about IBM office automation and things like that and somebody quoted Amy Wall who had said in the press that a "paperless office is about as functional as a paperless toilet" and they believed it so they said, "no way, we don't want to be a part of it." So, they didn't look at it, they didn't care but by that time I was convinced that LANs were going to be a major, major issue in networking and, because neither Paradyne nor SEL was willing to move forward on that, I went to what I considered was going to be a major player, I went to Wang Laboratories to head up communications, late '81. I stayed on the 802 Committee. Unfortunately, as with Jonathan Schmidt down at Datapoint, Wang was in a situation where they had developed a technology – broadband communications. They decided to use broadband

coaxial cable to connect things together in a local environment and their major competitors were DEC and Xerox for the office marketplace. Now, Wang at that time had the best word processor in the industry -- nobody's was better -- and the idea was that Wang could control the office. They got into the processor business with their OIS processors, and then later VS processors. They were going to automate offices. It looked to the industry, as a matter of fact, that the way LANs were going to evolve was to be automating offices, tying processing systems, word processing systems, print capability together and then communicating to a host if that was needed, and Wang said, "We got the technology." And, I believed it. In fact, I still think that the industry is the loser in this because broadband technology was there; it was stable because CATV had been around since 1947. So, the componentry itself was really stable, and the argument was well you couldn't use a single cable because we don't have bi-directional components and Weiner agreed with that -- we went to a dual-cable system. One for transmit and one for receive. Twice as many components, granted, that could fail, but it was solid components, people knew them. Gerald was making them, Allan Bradley was making them, GI, absolutely lots . . . Gerald was GI. So, there was a lot of that going on, and a lot of those companies recognized the need so what tended to happen was that every time that there was a trade show I'd get invited to speak about broadband and Liddle or Metcalfe would be talking about the baseband technology and the press wars were: baseband vs. broadband, which is better? And we'd cast spears at each other, and I'd say, "Look, on broadband I can do video and I can do voice and I can do data," and they'd turn around and say, "Yeah, but who needs it? The infrastructure's already there." And the point was well taken, who does need it? That was the question. There's room for both.

Pelkey: And during that period of time, you also had the PBX companies . . .

McDowell: They were only just beginning. That was the very early stages of a PBX company feeling that they could handle data. Very early, I mean, I guess that was about the time Ztel and CXC got themselves founded and said that they wanted to provide the integrated office controller, and believe me, as a consultant when I went into the consulting business in late '83, I'd been predicting from that time and I can even show you the presentations, I had these big pictures up of the integrated office controller and all the things that were going to be a part of that. And, at that time, I was betting people’s paychecks, literally, and nobody would take my bets, that one or the other of the PBX vendors by '84 was going to have this product out and thank God nobody ever took the bets. They just couldn't figure out how to do it. They couldn't even make modem pooling work correctly. But, I, you know, everybody has been talking about that Holy Grail switch for years and years and years – the switch that'll do everything – and I think we're finally beginning to see that. I think that's finally starting to . . .

Pelkey: Now, when you joined Wang, did they have WangNet at that point?

McDowell: Yeah, they had just started it.

Pelkey: And they were selling it?

McDowell: Yeah, well actually, they'd installed their first one by that time. It had a lot of work to do and we pushed that forward through engineering. The difficulty with Wang was it was an

engineering-driven company. Engineering would develop a project, or a product, and then come up to sales and marketing and say, "Here's what it is, here's what it does, here's what it costs to build it, go find a place for it." And, essentially, that's why Wang didn't make it, because people at that time were also convinced, other companies were also convinced, that broadband technology was going to be a winner, and literally cut Wang's modem costs in half, their RF modem costs in half. They would go into the Wang accounts and the only thing Wang would get to do was design the network and install the cable and wouldn't sell the products that attached to it because everybody else was building them.

Pelkey: Do you recall where Wang got their broadband technology, or did they develop it internally?

McDowell: No, no, they had bought a company, a New Hampshire company that had the fundamental technology, broadband technology, don't remember the name of that company, but that's essentially where it came from. They bought that company in 1978, and the guy they put in charge of the project to make it all happen and bring it together outside of engineering was Bill. As I said, we were starting to talk in the industry about what was better baseband or broadband, and even while I was at Gould and Paradyne I was speaking on the subject as an 802 representative, the 802 perspectives on networking, and where things were going. I think the most significant conference of the time was the one that was held in November of 1982 down in Sydney, Australia. It had every major player in the LAN business speaking down there, and that was some pretty exciting times. I had just started with Wang, just, I had only been with Wang a month and a half when I went down there to make that talk.

Pelkey: It was November '81 or November '82?

McDowell: I believe it was '82. Maybe it was '81.

Pelkey: You said you joined Wang in late '81.

McDowell: Then it was '81 because I had just joined.

Pelkey: And you're certain about joining Wang in '81?

McDowell: Yeah, I believe so. You know, it's so far back I have to look, but I believe that's it.

Pelkey: You were telling me this funny story about the Datapoint and the…

McDowell: I was going to do that, yeah, I just wanted to mention that because that conference showed the differences in what companies were doing. Obviously, Bob Metcalfe was invited to speak. Gordon Bell was invited to speak to present DEC's viewpoint. I was there representing Wang. Michael Pliner had been invited but declined, I think Wayne M(?) gave the talk down there. Let's see, what other companies, Amdax, who was the guy, south African guy that founded Amdax, he was there. They eventually went down to Boca and eventually became part of Sytek.

Pelkey: Ungermann-Bass?

McDowell: No, not UB.

Pelkey: UB bought Amdax.

McDowell: Is that who it was? Yeah, well I can't remember the south African's name… he was speaking. They had Rosenberger speak. They had Bill Ladinski from the 802 Committee talk. They had kind of a whole panel, and just after Bob Metcalfe has made his presentations, Jonathan Schmidt from Datapoint who hadn't been invited to speak but was there, jumped up and started screaming about how good Arcnet was and why it was so much better and superior in performance than this Ethernet concept was and that they had a large install base of 5,000 networks already, and the arguments ensued as to . . . you know, Bob was looking right at Jonathan and says, "Well, if it's so good, why don't you open up the architecture so the world can implement it? You won't tell us anything about it. You won't tell us what it is. You just go out and build the product." There was some argument, there was quite a lot of it, and it was rather heated, and the audience loved it. And it continued that way too, by the way, Ken Thurber was there too. He, as I told you, was the founder of Architecture Technology and they did the LocalNetter. In fact, he was the guy that, I can't remember Malcolm's last name, but he's . . . Malcolm Cartes from Sydney, Australia, he's the one who put this conference together. I think he made enough money to go out and live for three years before he had to do anything else just on the conference alone. He paid for 14 speakers, internationally. I can't remember the guy he got out of Zurich from IBM, Hemely, Hermely? Oh, he's well-known in LAN circles . . . anyway, he came out of Zurich labs and he was there. So, he brought in a lot of international speakers. He paid for the trip, first-class airfare, gave them a three-day vacation up on one of the Great Barrier Reef islands and everything else, and he still made a ton of money. There must have been at least 400 people at that conference if not more, and he charged a lot for it, I think the price he had set for the conference was 1500 Australian dollars, so he did well.

Pelkey: Do you have any materials from this?

McDowell: I think I do have the book. I think I have the proceedings of the conference.

Pelkey: I'd love to take a look at that.

McDowell: I hope that's not one of those that I told you I dumped. I mean, I literally dumped a vanload. All of the local area network conferences, every one of them that was held up in Minneapolis from '77 onward, so I had all of those, but they're still available, you can still get those things. The IEEE has them in their libraries and they still sell them.

Pelkey: So, during, when you joined Wang, you were at Wang a couple of years?

McDowell: No, actually I was only at Wang 9 months. Just long enough to give birth and get out, and there was a reason for that. I told you that while I was there, I got approached from this guy out here in California who was running this company that produced home security systems, that was his business. But, he had kind of a skunk-work in the back that he'd been running, and

he had Mark Dinason, one of the guys that helped Sytek get started, I don't know if you came across that name, but Mark is one of the guys, one of the engineers that actually put Sytek on the map initially, and he had somehow stumbled onto Mark and couple of technicians had built this RF broadband modem. And, the president of the company, his name is Ron Godsingen, he's no longer there, but Ron had founded this company and thought that there was an interesting business opportunity to go forward because they already had 80% of their particular market and he wanted to expand the business. So, he was acting as the sales and marketing guy for the product as well as being the president of the security system and he came out to Wang because he knew we were in broadband, and he tried to convince us that we ought to use the product . . . that there ought to be some room within the WangNet architecture that would allow his modems to be used and I told him that we already had our own modems but that there certainly was a market for those modems and I did everything I could to encourage him to keep moving along because I wanted to foster the broadband industry as much as I could. As our conversations progressed, he literally made me one of those offers that you can't refuse, he was going to make me the general manager of a new division of his company that was going to get involved in communications. However, about the second month into employment, his board of directors decided that they ought to take the company public. The potential investors saw this as a drain that it would jeopardize their stock sale and they chose not to continue with that, which I thought, again, was a big mistake. And then they let their technology that they developed languish for about a year and then asked me to come back in and try to sell it for them, by then I was an independent consultant, but by that time the technology was outdated and been passed. We had the modem. We actually had it installed in Beta sites, but I guess these investors felt that because of the main-line business this didn't fit, and they didn't want to do it. But I thank him for one thing, he got me to California, I'll never leave. That was what did it and especially to Carmel Valley.

Pelkey: Let me go back and ask you one thing. The 802 meeting in Phoenix…

McDowell: Oh, that was an interesting one, I'll never forget. By the way, who the hell ever holds a meeting in Phoenix in July? God, it was crazy! Sit out by the pool burning up.

Pelkey: That's right.

McDowell: But what had happened was, and I'm sure you've probably talked to other people about this, we had gotten to the point where we were being pressured by the press and by the world community at large to issue our standard. We had gone through the draft iterations and we had taken the DEC, Intel, Xerox blue book…

Pelkey: So, this is 1980?

McDowell: This is '82. We took the blue book in '80, but we had taken that, we had modified it, beat it to death for two years, done everything we could to make it palatable to everybody in the committee to make this a standard. We were ready to actually go forward to the TCCC, which is the governing body in the IEEE that governs the standards groups, and say, "We're ready to put this out as a standard. We need your stamp of approval." In order to do that, what the TCCC does is send around this draft prospectus to all members of the IEEE, not just members of the

Committee, but everybody, and they have the right to make technical comment. And, the IEEE Project 802 committee has an inherent responsibility to consider all comments of technical merit and answer those. Well, I guess 95% of everything that came in we had already addressed in different sub-committee meetings, but there were several people that had written in saying that there was another technology that we had been totally ignoring. There was another facet of the industry that this CSMA/CD could not address, and that was real-time situations, because CSMA/CD was non-deterministic. They said you need determinism in a lot of networks. Two or three people in particular came forward and said, "We have a technology in place. People are using a technology that's well understood. It's been around since the Newhall ring and the Cambridge rings. Why don't you consider ring technology with token passing?" Well, the Committee hadn't considered it, so they invited these guys to come in and make a presentation. So, Bob Gordon from Prime came in. Mike Crisco came in, he was with Gould at the time, and I can't remember who else. They spent about two hours in front of the full committee of the 802 with a flip chart making a presentation. At the end Maris said, "Alright, now we have to consider whether or not this presentation has merit and we need to go forward with it, or whether we can now settle on a standard," and the committee was thrown in a turmoil because when we took a vote, the token-passing people got more votes than the CSMA/CD people, so right away it went crazy. So, right away they had a meeting of our advisory committee and we decided to break up the 802 group into, then, five different sub-committees. 802.0 which was administrative, 802.1 because we knew that no matter which network, we had to have the same logical packet format, so the LLC frame formatting became 802.1. 802.2 was the, I'm sorry, that was 802.2, 802.1 was the old HILI committee, that was us. We'd already developed the service specification, but what we had to work on then was network management and internetwork issues, and we had to be the liaison group between ISO, NC, and other affected standards bodies as we progressed with the 802 standards. 802.3 became the CSMA group. 802.4 became token-passing but on bus technology, and 802.5 was the token ring headed toward what IBM was eventually proposing. That really threw the Committee into turmoil, it gave us the Chinese menu for local area networks, but everybody knows that that's what it takes anyway now. We didn't know it then, but we certainly know it now.

Pelkey: My understanding was that there was 2/3 vote required to pass…

McDowell: And they couldn't get it.

Pelkey: …And you couldn't get it, but like you say, token…

McDowell: …got more votes! It actually got more votes. After a two-hour presentation and after we'd been working for four years, two with that blue book.

Pelkey: Why do you think that? Was there just so much resistance to this…

McDowell: Yeah, there was. There was a lot because it was obvious that DEC and Xerox were having pre 802 meetings to map out strategy. It was obvious to people in the committees. But, understand the make up of a standards committee, Jim. That's what's really important. It's made up of engineers primarily, and the one thing you know about engineers is that when they come into a group, they think what they did is right. Unfortunately, we were represented in the 802 by

a very diverse group of people. People that sold to the government, people that sold in the commercial sector, and some people that were just into it for R&D. Now, the guys that sold to the government could develop anything, it didn't matter what it cost, so their techniques were always elegant, maybe good solutions, but not really good for the general market. The guys that did R&D were really hung up on their own ideas and their own technologies. Now, the only way to get a group of engineers like that focused on anything is to give them somebody else's work and say, "Tell us how to make it better." And, that's what the Ethernet Blue Book did. That's exactly what it did. They threw it out and everybody was saying, "oh, well this will never work, and this won't work," and everybody went together and decided to make it better, so they had focus. Not that there weren't better ideas, but this was the only palatable one that was documented in front of the committee, and since it was documented, they took on the task of working with it. Obviously, Bob had a lot to do with pushing that through, and Gordon Bell and a few others pushing that into the committee.

Pelkey: So, CSMA/CD, in '83 became a standard?

McDowell: Yeah, in '83.

Pelkey: Towards the end of the year as I recall.

McDowell: Yeah.

Pelkey: And then in '84…

McDowell: 802.4 and 802.5.

Pelkey: And 5 was that slow because IBM, as I understand, just, everybody knew IBM was critical to that process.

McDowell: No, it wasn't just IBM. There were two major factors that held up the standardization of token-passing in a ring. The first was the development of the state tables that had to be present to recover from lost or multiple tokens on a network and to be able to have that reduced to silicon so it didn't use a lot of overhead processing, and TI was developing the chip set for IBM and they just couldn't get it done. From a technology standpoint, the way the committee laid it out, it could work, but to reduce what we'd developed to silicon was a different thing entirely. And, there was always this question hanging over us all the time, what about this Eric Söderblom character? And, what's he gonna do to us? And, he actually came in and made a presentation in either late '83 or '84, and he wanted to charge $45 per node. That's what he wanted to make his licensing fee, and the people in the committee said, "Get the hell out of here! What're you, crazy?" I mean, literally, that was the case, because you could have things as little as a fire alarm hanging on a local area network that cost you $10 and you're not going to pay $45 to connect it. It was ridiculous. There were a lot of technical issues that really got driven in those meetings that had major impact on network architectures world-wide.

Pelkey: You said there were two reasons. One is Söderblom, then and the other one is…

McDowell: The TI, TI just wasn't producing. We didn't have anyone that was producing silicon to make it a standard, I mean, you can say here's a standard, but if nobody implements it, so what?

Pelkey: But, the same was true for token bus in a sense that there was no standard, there was no one producing silicon.

McDowell: No, but the difference was there was a ready-made market for token bus technology. And it was only directed toward one market anyway.

Pelkey: Manufacturing.

McDowell: Absolutely. They needed it. They needed a standard way of connecting things. They'd already presented a map architecture in 1980, and that was driven by an end user it wasn't driven by vendors. General Motors said, "All my vendors get together, and you better develop me a networking architecture. Now, you've got six months. Go away, work together and come back with one." Six months later they came back and they hadn't even talked to each other. General Motors said, "Alright, piss on you guys, we're gonna do it ourselves." And, they contracted consulting groups which eventually they became -- they bought EDS, to help them develop that. They issued the manufacture automation protocol and they went to their vendors and said, "Now, we got the architecture, you will implement it or we won't buy from you." That really makes a difference.

Pelkey: Did you go to the, I presume you went to the NCC in '84.

McDowell: Yeah, that was the last big NCC, the last big one. And also, we saw an awful lot of the implementation of the manufacturing-automation protocol in what was it, Telcom '88 over in Geneva. A lot of groups got together and produced the ability to demonstrate that.

Pelkey: Those must have been exciting days, though in terms of what was happening.

McDowell: Well, you know, they still are. They still are. It was a shame to see the NCC die the death that it did, but Jesus that last show in '84 when they had it, there was actually a vacuum cleaner sales guy on the floor. I mean, that's how dilluted the the people that ran the show had become. They were selling booths to anybody. There was a guy that had a booth set up selling briefcases, this was at the NCC. And you think to yourself, where did it go? What happened? That was really the last year that that show really made it big. It didn't go much beyond that.

Pelkey: Just because AFIPS said, "This is crazy, we're not gonna do this."

McDowell: Oh yeah.

Pelkey: Where did AFIPS go?

McDowell: Well, they started re-focusing. They went to industry-specific kinds of shows. Vertical market segment shows like the American Banker's Association or CETA or TCA or

ICA, and Communications Networks started to pick up the slack for the generalized communications industry.

Pelkey: How about the interface?

McDowell: Well, interface was dying too.

Pelkey: What's the one that in January, that's usually in January?

McDowell: That's Communications Networks. That's the one who picked up. When they stabilized on a venue and they stabilized that in '83, was it '83 or '84? One of those two years they stabilized on Washington D.C. because they had gone to Atlanta the year before and had gotten hit with an ice storm and people couldn't get in or out. Couldn't get in or out, this was, I mean Atlanta it was in a January timeframe and it was awful. I remember trying to drive Dale Kutnick to the airport and I was sliding all over the highway, it was just sheet ice on the way out to the airport.

Pelkey: Do you remember those days? Do you remember Ken Miller?

McDowell: Sure, I know Ken real well, from the 802. I met him first at 802.

Pelkey: And you went to Gould when?

McDowell: I went to Gould, I guess it was in '81 and I wasn't there very long. I left Paradyne, went to Gould, didn't stay there very long, went to Wang, didn't stay there very long, came out to Radionics – this doesn't sound good for a career progression – but after Radionics and bringing me out here, I decided that I didn't want to work for a company anymore until I came here. From '84 onwards I just didn't…

Pelkey: And, when did you join Dataquest?

McDowell: I joined Dataquest about 7 months ago. It's hard to, right now it's hard to understand why I did that. I'm having a tough time figuring that one out.

Pelkey: Because, Ken was working with Gould as a consultant.

McDowell: But, Ken was not working with Gould down in Florida, he was working with Modicon division and that was where Kryskow was, and that was how his association with Kryskow came to be. Because Mike literally holds the patent on 802.4. He put it in the public domain. Modicon was fighting him over that, so rather than take it himself, he put it in the public domain. Modicon couldn't fight. He holds the patent on 802.4.

Pelkey: And Modicon was fighting with him over what?

McDowell: They wanted the rights to the patent. They wanted to license people. And, he said, "I tried to convince you guys you ought to do this, they didn't want anything to do with it, I did it on my spare time. I did it at home. I got it patented, and now you want a piece of it? No way."

Pelkey: See, I didn't know this.

McDowell: And the only reason Mike is not a major player, was not a major player in Concord Data Systems, and I think Ken will back me up on this, is that he got really sick and he was hospitalized for about six months during the start-up phase of Concord and they had to go get somebody so they got Tom Finney. Tom was working out of Arizona, I mean, he was working out of Phoenix, he really didn't go back. He never really did go back to Boston. Even till the time he dropped out, he never really did go back. He was one of the co-founders. I remember, listen, sitting at the 802 meetings I saw four companies formed. Bridge Communications got formed at the 802 meetings, Concord Data Systems got formed at the 802 meetings.

Pelkey: Interlan?

McDowell: Interlan didn't really, not at the 802 meetings, because I never saw Severino out their ever. I never saw Paul at an 802 meeting.

Pelkey: But, the guy from DEC…

McDowell: Potter, Dave Potter. Yeah, Dave was there a lot. Ralph Dement was there from DEC a lot too. I used to see Ralph at all those meetings. A number of people from DG, Greg Hopkins was out there all the time, and they had a lot of influence on the founding of these companies.

Pelkey: So, you said Bridge…

McDowell: Yeah, I was about to finish. Excelan got started out there -- Dale when he attended the meetings and felt that there was a need to standardize on the software issues as well as the hardware technology issues -- and, I know there were four, there was another one that got its start, really the genesis of the, well, obviously architecture technology that's when Thurber decided to do his own thing.

Pelkey: Now, I didn't think that Bridge got, that that founding was related to 802.

McDowell: No, it was the idea of the companies. The idea of the companies because I used to see Judy a lot out there and Bill and they used to go to seminars that were put on by Yankee Group and always would attend the 802 presentations all the time. I used to sit and talk to them.

Pelkey: Ok. And Excelan, the fact that they standardized on TCP/IP became very important to their eventual success.

McDowell: It sure did. You know, Excelan was really the company that got Interop started. They used to chair the meetings when Interop was first getting started and Dan Lynch wasn't

even out there on his own. When I attended one of the first meetings, there was like 12 people at this meeting. They got me involved very early on in that process, and then I went to the first conference they held down at the Doubletree in Monterrey and they had like 125 people.

Pelkey: Yeah, I remember.

McDowell: And, two years later, it gets 30,000, it's incredible.

Pelkey: Wow. What a big success that's been for Dan Lynch.

McDowell: Oh yeah, it certainly has, especially getting somebody like Ziff-Davis to buy him out. I wish I was Dan Lynch right now. Like I said, I wonder where I went wrong, I don't know. I'm already passed it. God, we've got VPs in here that are 30 years old, it's amazing.

Pelkey: So, during this period of time, the data communications companies like Paradyne and such never really…

McDowell: They lost sight. Multiplexor vendors, modem vendors were still convinced that digital was going to have a very slow grow. There was going to be an awful lot of analog, and they were right in effect, but what they didn't see was the price erosions that were going to hit their markets. And, what really changed the modem industry was the CCITT recommendations, V.22, V.32, V.28, V.29, V.33 . . . all of that stuff so that everybody could build the same thing and anybody's modem could talk to anybody else's modem. Initially, you use different sender frequencies, you used different modulation techniques and it kept them separate and kept your customers locked. Now they're not locked.

Pelkey: And, the de-regulation of AT&T and the price reductions in lines hurt the statistical multiplexor business.

McDowell: Oh, sure it did.

Pelkey: And, so now you had this kind of cash cows of modems and statistical multiplexor really taken out of profit…

McDowell: Oh yeah.

Pelkey: …combined with the T1 multiplexing, having to respond to that innovation, and, I think generally a view that these companies had was that they were dealing with a telephone wire, or was it a telephone system, and LANs just didn't seem that way.

McDowell: They weren't, that's right.

Pelkey: Very alien technology and more computer stuff than communications.

McDowell: That's exactly right and they lost sight of it. But, you know, if you examine the technologies in communications today, they're really re-iterations of stuff that we were doing in

the '70s and early '80s. I mean, it's really not new technology. I don't see a lot of major innovation or breakthrough. The innovation is coming from the infrastructure not from the hardware. The infrastructure meaning we've gone to fiber. Digital technology has been around for years. If you look at the transmission systems on satellites, TDNA was around in the late '60s early '70s with code division. We're starting to apply that now. The concept now that's real big in LANs is how to connect a LAN to a wide area network and get bandwidth on demand and a smart inverse multiplexing. God, we had smart inverse multiplexing in 1977, '78. Timeplex had a product called the Biplexor that took two 9.6 lines and made a 19.2 and they… Micom built us a product for Paradyne that would take six 9.6 lines so that we could get 57.6. It was expensive, granted, you had to buy 12 modems and two muxes and six lines, but you still got what you needed in speed. So, the concept isn't new it's a re-iteration, I mean, you look at U.S. Robotics and Penril today offering modem products that work with LANs – modem pooling for LANs. God, like that's a new technology concept. Modem pooling has only been around since around '72.

Pelkey: Do you have any explanation as to why Micom, when they bought Interlan, as an example, and Digital Spectrum…

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McDowell: What Micom did was grab companies that looked like they were on a fast ramp-up that would broaden their base, their communications base, but these were entrepreneurial companies and you'd think that given what was happening in the early '80s with a lot of other acquisitions -- that was a time of mergers and acquisitions as the '80s all were -- you'd think that company like Micom would have learned its lesson and said, "Look you don't go in and try to orchestrate management; you let the company operate and continue to operate the way it was, instead of force fit it into your mold," and they didn't do that. So, for example, when Micom bought Interlan, right away Potter goes away, Severino goes away, Pat Clark goes away, all the innovators and strategists of the company just go away. They're gone and the only difference between Black Box and them is that's not a technology, when they bought the company, it was just mail order. It was great for them. They kept Gene. I think Gene just recently retired.

Pelkey: I think you're right.

McDowell: But, they didn't own it anymore. They sold it off again because now Racal Datacom has it. But, the idea was, from a Micom point of view, they were very successful in TDM multiplexors, and in fact, had a very good name in TDM multiplexors but that market was dying. They didn't see the light and go towards the digital multiplexing techniques of companies like NET, Stratacom, Timeplex and others, so they missed that boat and the opportunity was: "Let's get into LANs, let's buy a company that can get into LANs and get us there," but, they didn't know how to manage it. So, it died.

Pelkey: So, they enforced their management style on them.

McDowell: And, I think that had a lot to do with Roger Evans' view about how it ought to be run. I mean, that's just how Roger thinks things ought to be and he tried to drive it that way, and

when the Odyssey Partner Group bought him out, I mean, Roger's days were done. And, even Frankel left, for God's sake, he went to Emulex for a while and then went somewhere else, I don't know where…

Pelkey: Retix.

McDowell: Retix. That was another one. How could he go from Micom to Emulex, I can't figure that out?

Pelkey: Because it was in southern California and was a presidency job.

McDowell: Yeah, I think that's it. You know I don't… Fred Cox was on our board of directors at Radionics when I went there, that was the company that did alarm systems, and I got to talk to Fred a lot about where… he was one of the guys on the board that was in favor of going through communications.

Pelkey: Mike Pliner says that Wang and Wangnet were critical to the early success of Sytek because they were the ones out spending money in advertising and proselytizing broadband and selling all these features, and Sytek kind of came in behind that. The customer had already been convinced they wanted to do broadband and could sell them the system.

McDowell: Now, we were critical for one very specific reason -- they were trying to do single cable broadband instead of dual cable, ok, and single-cable required an upgrade of all the components on the cable system. That meant that you could not take advantage of the institutional networks that the CATV companies had put in every major metropolitan area because they were all one-way. That meant that you had to swap out all the componentry across the system to make it active instead of passive components in a bi-directional fashion and that's what LocalNet 20 was all about, and LocalNet 40. They wanted to use a single cable system. So, they had to go to companies like Jerrold, Sencor and Allan Bradley and others and say, "Develop us a transceiver, develop us a head-end, develop us amplifiers that'll go in the network that are active and bi-directional." We said, "Look, our components you can go buy down at Radio Shack if you want,' and you could.

Pelkey: Yeah, big difference.

McDowell: There was a big difference, and the test equipment wasn't there to test those networks either.

Pelkey: And Gerald and General Instruments made an investment in Sytek because they thought that this technology could be used in terms of going to the home…

McDowell: Yeah, they did, and they hired one of my best people up at Wang to go down to GI and do that, Mark Stallman, who is now at one of the investment companies. He's a regular columnist in Network Computing Magazine. Mark was the head of that, and another company that thought they were going to get into it was Warner Amex and they hired Jerry Clancy who

was very instrumental in the early days of the 802 Committee, and neither one of those companies…

Pelkey: Jerry being different than Tom Clancy?

McDowell: Yeah. And, if you look at it, that's what happened -- these companies thought that they could walk right into the broadband area and convince people that it was easy to put in and manage, and it was not. Broadband is very sophisticated. People didn't know what RF time to main reflectometers were, and they never heard of a lost budget analysis. And, you're talking to network managers who are supposed to keep this thing up and running. They had no idea how to use a frequency sweep generator, or to look at whether or not they're getting noises between bands. And, a lot of the components that were being built and hoisted onto the community on broadband were very noisy components.

Pelkey: I understand that during that early '80s there's also an effort in EIA to standardize RF modems, or that, I know that Ken Miller was involved in that.

McDowell: Yeah, the standardization was not on the RF modem per say, but the bands that they would be able to use and the tolerances that they were going to set from a noise level standpoint between bands . . . you had to do that. And, the cutoff point at minimum was 55db below the noise level, otherwise you had a noisy modem and you couldn't participate. I actually set up my major competitor when I was down at Radionics, a company up here in the Valley called Zeta, Z-e-t-a, which eventually became Haley Systems and they're still there, got into the broadband modem marketplace based on their government contacts. They moved more broadband modems, I think, than any other company. They were selling modems individually and they were doing quite well at it. As twisted pair became popular, people lost any interest in trying to run multiple communication systems over a single cable because it's easier to manage individual ones. If I can use what's in my walls and my floors and my ceilings already and take advantage of those, why should I pull this new cable?

Pelkey: It seems to me kind of ironic that in the early days, the early '80s, when there was this movement of the local area network to a kind of distributed communication system from the centralized communication system . . . that later on, when you get Ethernet over twisted pair that wiring closets and the whole centralized notion comes back with Synoptics being extremely successful in that marketplace, which again is essentialized architect, topology, if you will, that became possible because of getting Ethernet over the twisted pair.

McDowell: That's a part of it. Even then, when Synoptics became fairly successful, the recommendations in the industry were shield your cable. There were too many considerations within a building that dictated that you don't try communications over any unshielded copper wire, any of the elevator shafts that you wanted to run up and down, these generated noise and we were telling people that it just was not really feasible right now to do that because it wasn't the cable distribution system so much as it was the interface card technology, the transceiver technology that had to be modified and worked in order to make that successful. And, that's really what did it. You gotta look at a couple of things in terms of how people developed networks and what they put in place. The initial concept of local area networks, even when 802

was working on it, was resource sharing, I mean, that was it. There weren't any applications. There wasn't anything people could do with this LAN once they installed it except resource sharing, sharing printers, I mean that was literally it. And, for the cost of the technology, it didn't make sense. Now, when did it make sense? It made sense in 1982 when the first PC hit the market. By '84, 50% of the workforce had PCs sitting on their desks at management level, they were there. Now, there's a driving need to connect them, but prior to that time, prior to the introduction of the PC, there wasn't any real driving force to make local area network technology the way people want to do things, it was still in the domain of MIS when MIS decided whether or not you were going to put in a LAN.

Pelkey: But, all the early companies other than 3Com that were successful were terminal servers, was the big product line for them.

McDowell: Oh, sure, that was because it was a MIS decision, but, when it got to the department level, and the department manager had PCs sitting on a half a dozen people's desks and they were running around sharing disks for a spreadsheet, he started to look at this and say, "Doesn't it make sense to at least have these things talk to one another?" And, he didn't talk to the OIS guy because somebody in the sales organization was beating on his door saying, "Hey, I can do that for you, and I can do it fairly inexpensively, too." The problem that that created, however, is one that we're still suffering with: every department bought its own LAN and they wouldn't talk to each other, and a lot of it was still proprietary and that's why a company like Synoptics became successful, because they said, "We'll give you a way to glue these things together and allow them all to talk to one another. We'll do essentially what a matrix switch does for computer terminals with your LANs." That's what Latisnet was about, so that we can glue these things together and, by the way, we can take advantage of the cable that's already in the walls, the floors and the ceilings to do that and you don't have to go out and restructure your facility and tear up everything to do it. And, that's when Synoptics started making the push for unshielded twisted pair which first became 2 Mbps and later 10. That was the reason. ATT was really a driver. They had that Starlan system, that was the one that really drove unshielded twisted pair, really drove it, and Synoptics picked up on it and ran further than they ever could. People just didn't trust ATT anyway so why buy from them?

Pelkey: And Starlan really didn't become the basis for the standard?

McDowell: No, it did not, although they wanted it to.

Pelkey: And, why do you think that? Because of the mistrust of ATT?

McDowell: Absolutely. Just like IBM trying to get anything as a standard. People don't trust them because they think they're going hold something back and change it and own the market. That was the whole idea. That's why IBM has had . . . it's taken IBM, what, 10 years to get LU6.2 accepted by the ISO people? Ten years! They had to… I guess it was the test period to find out if IBM actually would change so that people couldn't do it, and now that it's understood and there's open standards, now the OSI says ok, we'll do it.

Pelkey: Why do you think the LAN companies missed out on the Cisco opportunity?

McDowell: I don't think the LAN companies missed out. It depends on how you define a LAN company. You see, the LAN market began to segment itself about 1985. Those that built interface cards either for token ring or for CSMA/CD and primarily it was CSMA/CD, those companies that developed the infrastructure of your building that actually laid the cable, it was no longer the IBM, it was the old construction companies, ACC, for example, and people like that who said they were datacom experts now because they had two people certified by IBM or Wang or whoever it was, and we'll pull your cable, so you could call that a LAN market. You could also call Novell a major innovator in LANs because they said, "Geez, if you want to tie software systems together, you've got to have an operating system." And, I think that's where Ray made his best move. He said look, let's no longer produce these terminals and terminal servers, let's do the operating system and allow people to do something useful with software on the local area network. Like I said, up until then, all it was was resource sharing. You didn't do anything else except play games and share cable systems and stuff like that, but now you could do a lot more. So, the LAN market now has segmented itself by '85 into those three areas: those that were providing software, those that were providing the interface cards or boxes that allowed you to interface and those that were installing the cable. It was about that time that some companies started to say, "Well, gee, a lot of different departments have LANs, why don't we try and restructure the cable distribution system so that we have control of the LAN from some centralized place to allow terminal A on network 1 to talk to terminal C on network 5. How do I do that? I mean, how can I do it? Well, the only way I had at the time was to put in a repeater and then somebody said that's not going to work on different cable systems. How about if I had the same cable systems? What can I do then? Well, we built a bridge to logically extend the network and that's how Bridge Communications got started. Let's logically extend, and by the way, they're protocol independent so I don't care, but the problem is, since they're protocol independent, I have mix and match networks out there that really can't, by addressing structure, talk to each other anyway. That's when the concept of routing, single protocol routing by the way, protocol dependent routers that said it has to be this protocol before I'll move the message onto this network. And, that's only just beginning to kick itself off. It wasn't until about '89 that multi-protocol routers in a true sense hit. Before then, you had the combination bridge-router where you had filtering, packet filtering. And, all of the technologies that they represented also started to manifest a lot of problems in networks that people weren't anticipating, meaning the people who developed the product, not the end user, and that was things like broadcast storms and all the rest of that stuff. How do we define what they are? So, in a segmentation sense, and how the market started to evolve itself, the guys that did the interface cards, there were lots of them. And the more people that entered into that market, the lower the cost became, and it was reduced to silicon just recently. I remember it made big news in 1983 when Metcalfe's group introduced the first interface card that was below $1,000. Now, you get them for below $50, depending on what you want to do, street price. It gives you an idea of what happened to that market and how many people got into it. Same thing happened with bridges. When you combine the capability of a bridge with a router, why did I need two separate boxes? I'll do both. And, by the way, let me have multi-port, multi-protocol capabilities and now I have a fairly complex box that can work on several different protocols, and not only transparently pass data if I want bridge capability, but will also route if I want routing. So, you started to see those guys come in. Now, you asked the question why didn't they see the evolution? Well, I think they did. It wasn't the guys that were selling LANs. You're talking like, back then in was Corvus, Sytek . .

. to some extent Wang and Xerox. Xerox never has been able to promote a technology once they build it, ever -- X10 went down the tubes, all that.

Pelkey: During the last few years, at least, Cisco becomes worth over a billion dollars as a company and…

McDowell: That's street valuation. They're only doing about $250 million in revenue, so I think they're way overvalued. I'll tell you why they're overvalued . . . there's some perceived market growth ramp up here, but you better look at what the market really is doing, and what the market really is doing is they've been selling to Fortune 500 companies. They've saturated that market. Every company that needs router capability now has it. That's gonna flatten out. They're going to do the same thing to you on… Look what NET's valuation was back in 1984. Then it went right off the face of the earth.

Pelkey: But, as an example, $250 million in revenue, Synoptics at $250 million in revenue, I mean, a 3Com or an Ungermann-Bass or . . . that's a meaningful amount of revenue to those companies and while they have some bridges and some routers, they're not perceived as being market share leaders or technology leaders.

McDowell: Not in the communications market because people that lead the market in communications markets are billion-dollar-a-year companies that are perceived as communications companies, these are perceived rightly or wrongly so as a niche market player, and unless you can expand your product base, either through merger, acquisition or product development you're not going to be there very long because the buyer looks to a single source for communications resource, if they can. They have to have somebody who pulls it together, and that's why the ISVs have become so very important to large corporations. I want you to give me a turnkey system. And, Metcalfe recognized that early on. He almost had it done with Convergent. That deal with Convergent may have really changed the face of what 3Com eventually became. If he could have pulled that off…

Pelkey: Oh yeah, because it was interesting that Metcalfe's vision clearly was one of building up a new kind of computer environment of diskless workstations and all these sorts of…

McDowell: That was the eleventh hour that that fell through and it was a stock vote, I mean, Convergent stock had started to decline, and 3Com's had started to go up and the trading wasn't worth it anymore. It's a shame. We had the same thing at Paradyne back in 1980. We tried to by CASE who was a major supplier to us out of England and it was the eleventh hour, Paradyne stock went through the roof and it didn't make sense for the stock trade any longer, because that would have got Paradyne into the multiplexing business.

Pelkey: But, it's interesting to me that Ralph Ungermann and Charlie Bass and Bill Carrico and Judy Estrin, they came out of Zilog which is really -- they had a terminal versus a computer orientation and Metcalfe because of Xerox Parc came out and had this computer orientation towards what the companies were going to become. So, 3Com invested in this computer technology which they eventually had to write off because they couldn't compete successfully in

it. And then they have to buy a Bridge, 3Com has to buy a Bridge in order to be able to get into the MIS and in order to be able to provide a complete solution. It's fascinating.

McDowell: It's going to continue to happen, by the way. These companies that have fairly narrow market segments, I don't talk narrow in terms of dollar volume but narrow in terms of product orientation, are eventually, sooner or later are going to be forced to either be acquired, to acquire other technology or they better have under development now the next step and where they're going to take those technologies. I think Cisco and Synoptics, and maybe to a lesser extent, Wellfleet understand that and are working toward doing that with each other because they know they're going to be stepped on. Look, every major player now -- IBM, HP, DEC -- they all have bridges, they all have routers, they all have wiring products, and if they don't have their development and they don't develop them, they're buying them. They're the players. And, if you're going to compete with those players who have the force to go into the MIS guy and say, "Here's the solution, we got it all," you're gonna be in real deep sneakers. I think a company that's destined for ultimate collapse is Cabletron . . . because they don't want to work with people. You talk to any company that's tried to work with Cabletron and they're saying they ain't going back to those guys again.

Pelkey: Another observation if you would please. It seems to me, if I understand correctly the facts, that Sytek partnering with IBM led to NetBIOS and that Sytek's protocol competence was important to NetBIOS, and that became the interface for software applications development and was profoundly important in terms of changing how the industry evolved and changed and Sytek really didn't benefit from that.

McDowell: No.

Pelkey: And yet, they were critical in getting it done.

McDowell: Sure. Any company that puts its hopes and pins its growth on working with IBM is destined for failure. They refocused themselves solely toward IBM with the expectation that IBM was going to continue development of that broadband network technology. IBM gave them assurances of that, and in fact, continued for at least two years after Sytek went belly up by doing business with them. To tell their customers that they were behind the broadband network when they really weren't, not in any sense other than words, because their salesmen were going in and saying, "This ain't it, token ring's the way we're going as our architecture," and change it out.

Pelkey: Given that you have a technical knowledge, is it generally perceived that Sytek was important to NetBIOS?

McDowell: Yes.

Pelkey: That IBM didn't really have that.

McDowell: Oh, they obviously had the kernel of what they needed to do for an operating system, but it took somebody who knew LANs to do it.

Pelkey: Right. And, it's interesting Sytek just never, always stopped with their 120 kilobit channels as opposed to going to an Ethernet or…

McDowell: Yeah, it's amazing isn't it?

Pelkey: …going to some higher-level protocol.

McDowell: But that's -- I think the reasoning behind that was the same as we had at Wang. We had different bands on the broadband cable, and should you want to run an Ethernet on our cable, well you could do it. We'll give you the bandwidth and you just do it. All you have to do is have the RF transceiver, that's all. And, there were a lot of companies willing to develop that. We don't care what you run on it, it's bandwidth, it's free, use it. And that was the concept that Sytek had too, just like we did: "Hey, there's bandwidth there, you want to run Ethernet? Well, run 30 of them on our cable, go ahead. We break it up in 6 MHz chunks and we got a hundred of those channels, go ahead, do what you want. You can even run CATV if you want." In fact, our engineers at Wang were always watching TV. We really did, we had a satellite antenna up on the roof and you'd go down to engineering to find out what progress they're making and they're watching an HBO movie -- really! And, when you ask them what they're doing they're saying, "We're seeing if our modem interferes with the signal." Honest to God, they always had a reason, we're doing a test right now just to make sure we're not interfering with the signal, and they'd plug a scope in and say, "Look, it's ok, we're quiet," "Well, how long are you going to watch?" "Well, we want to see how long it will last." Yeah, that was some fun times there.

Pelkey: Well, this has been very helpful. I appreciate your time and it's a great fortune to have run into you because this, out of the blue…

McDowell: I've enjoyed it, too, I really have, Jim. This industry has been my whole life so far, 25 years of it.

END OF INTERVIEW

