Reflections of a Retired Telecom Engineer

by Adam M. Farson *July 2002*

There is an interesting article in IEEE Spectrum, June 2002, which details the manner in which the Telecommunications Act of 1996 helped to bring the telecom industry to the sorry pass in which it finds itself today - $700bn out of the $900bn invested in the telecom sector now irretrievably lost, $2 trillion in market capitalisation up in smoke, over 300K jobs lost... Many good friends and ex-colleagues are out of work now. I was fortunate in that I retired at the end of 1999, before the industry imploded.

These events were not directly attributable to dishonesty or malfeasance; it was the nature of the beast. Telecom, unable to shed its monopolistic culture or the Bell Labs mindset of dictating the rate of technological progress, was unable to anticipate the Internet. The telcos engineered their networks to carry revenue toll minutes of voice traffic, at 80% occupancy in the busiest hour of the day, and now the Internet "freeloads" on those networks at 100% occupancy for 8 to 12 hours each day. That is, when it is not migrating off telco lines onto cable-TV.

These remarks are not intended to disparage Bell Labs. "The Labs" were once one of the most important engines of scientific and technological research and development in the world, let alone the U.S. - and are still a pretty good industrial R&D house. Sadly, though, the spirit which competed worthily with the MIT Radiation Lab during the war, and then gave us 7 Nobel Prizes, is gone forever. This is what deregulation hath wrought; with the break-up of the Bell System, the funding contributed by the BOC's which facilitated pure research at the Labs has dried up. I can recall when one of the boys in my class at the University of Cape Town landed a job at Bell Labs, starting in 1964. We all felt honoured just being around him.

Yes, if one single invention changed the course of modern human history, it was the transistor - a product of Bell Labs. There are so many other contributions that I would wear out my keyboard and fingers enumerating them. However, in telephony, their core discipline, the Bell System lagged surprisingly behind the Europeans in several areas. The UK deployed "999" emergency calling (equiv. 911) in 1932; I remember the "999" on our phone dial in London during WW2. (999 saved untold lives in the war.) The service is funded very cleverly; the local authority, which provides police, fire & ambulance services, pays monthly fees to BT (then Post Office Telephones) for the 999 access lines, terminating equipment and dispatch consoles. Calls to 999, unlike other local calls, are free.

The Europeans also instituted national, then international direct dialling with automatic billing long before the North American telcos did. Bavaria had a DDD network as far back as 1935. I recall making a direct-dial call to my mother in Toronto from an old electromechanical payphone in the Frankfurt railway station in 1975, and wondering why a similar call in the reverse direction was not possible at that time.

A competitor, Automatic Electric (AE, later part of GTE) developed the Strowger (step-by-step) automatic exchange before Bell Labs; the Bell System was forced to license this technology from AE. Direct inward dialing (DID), by which an outside caller can reach a PABX extension without attendant assistance, was first developed

in Germany in 1925. The New York Telephone Co. designed and installed the first Strowger DID PABX in New York City in the 1950's, without assistance from "the Labs".

France-Telecom first deployed **Minitel** – its videotex offering – in 1982. The service is still up and running (the carrier provides in-home terminals to customers). Minitel has eliminated the need for traditional telephone directories in France. It also provides consumer services such as train schedules and restaurant guides. In many ways, Minitel presaged the Internet.

My previous comment that Bell Labs dictated the pace of technological progress in telecom is relevant here. In Europe, the government telecom agencies drove technology. They had a number of strategic objectives, one of which was to encourage calling by reducing operating costs (and thus service charges). Another was to make calling more convenient by increasing dialling range and automating the call billing process. So they could not replace operator service with subscriber dialling fast enough. The Bell System did not perceive these objectives as imperatives until union wages for operating personnel went out of sight, and competition (which they fought tooth and nail) began to erode their revenues.

Data communications were another area where the Bell System was in no hurry. Not that long ago - in the late 70's - your local BOC's idea of a data line was a C4-conditioned voice-grade line with a leased Bell 103 modem (300b/s) hooked up to it. A 1200b/s modem was a costly luxury, and 2400b/s existed only in the lab. Then came competition, the Carterfone decision, the FCC registration program for customer-owned terminal equipment - and a computer owner could buy a really fast (14.4kb/s) modem and mount it in his PC! Progress was unstoppable after that.

ISDN technology (developed mostly in Europe) was a natural outgrowth of 64kb/s (per channel) PCM telephony. The Europeans were able to deploy it rapidly and offer it at competitive rates, as they were in the process of replacing old electromechanical exchanges with digital ones from suppliers such as Siemens, Ericsson, Alcatel and Philips. All these new switches had embedded ISDN. Basic-rate ISDN offers two 64kb/s user channels and a 16kb/s signalling channel; primary rate offers 23 (T1) or 30 (Europe) 64kb/s user channels, and a 64kb/s signalling channel. Back on this side of the Atlantic, two things went wrong with ISDN. The FCC, in its infinite wisdom, allowed each vendor to set its own "standard" (all variants of basic ITU-T recommendations). A common, vendor-independent standard is in force across the EU. Then the telecom operators, viewing ISDN as yet another "premium" offering, were allowed to set rapaciously predatory service prices. The result was the development of 56kb/s (V.90) phone-line modems.

In Europe, ISDN (offering 128kb/s, bidirectionally) is often cheaper than analogue phone service, although timed local-call charges apply. The Europeans are now also installing ADSL.

In North America, ADSL has leapfrogged ISDN, but is not available everywhere. ADSL is much more dependent on loop length and quality than ISDN, although it is much faster. Cable has also relieved the telcos of much broadband business. All this has now come home to hit the telecom operating companies (and their equipment suppliers). Their relationship to the Internet is becoming similar to that of the pipeline operators to the natural-gas industry.

How might the industry have developed had the courts not broken up the Bell System? AT&T and GTE might still have been good blue-chip stocks, but the Internet might never have got out of DARPA and its sister government labs. These labs would have been paying the telcos through the nose (with your tax dollars and mine) for the required high-speed inter-nodal data circuits. A Bell 103 modem just does not cut it for Web-surfing.

To quote a good friend who left the industry a little after I did: “In the future, a company will need to be in the communications business, not the telecom business.”

In conclusion, I feel that I left the telecom industry at the right time – just as its raison-d’être began to run away from it. The flight has now reached maximum velocity. Retirement now allows me the time to expand my knowledge of the new technologies which are beginning to drive all aspects of human communication.