

ISDN DEVELOPMENTS IN THE USA

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Introduction

From reading a number of reports in the UK technical press, I have the impression that ISDN proponents tend to hold up the USA as a shining example of where ISDN ought to be going in Europe. While it is true that there are a number of interesting pilot activities going on in the USA, I believe that the USA falls a long way short of being a shining example of ISDN progress.

One of the problems in getting ISDN off the ground in the USA is that every new venture in the USA is subject to the test of the marketplace. This is in contrast to much of Europe, where monopolist PTTs can go full steam ahead with ISDN implementation and cover their costs with subsequent tariff increases. Also, in the USA, the timescale within which new ventures are judged as successes or failures is tending to become shorter. As a result, the USA is strewn with technological ventures that didn't make it. The USA as a whole is getting increasingly less good at doing things that require a major investment that does not pay off for many years. Company boards are under increasing scrutiny by shareholders and stock market analysts on a quarter by quarter basis, with the result that long term planning in many companies means "what are we going to do next quarter?". This is not a nurturing environment for an idea such as ISDN.

In telecommunications in particular, the divestiture of AT&T, combined with the continuing competition between AT&T and other carriers like MCI in the supply of long distance services, makes it (a) almost impossible to do anything on a national scale, and (b) particularly difficult to get funds assigned to new ventures that do lead to a competitive advantage in the short term.

The ISDN trials are therefore very small in scale, and do not involve large investments. Their aim is as much to "test the water" in terms of commercial potential as to validate technical approaches.

The trials

Following the 1984 AT&T divestiture, there are now seven Regional Bell Operating Companies (RBOCs) which were spun off from AT&T. AT&T provides long distance services, in competition with the "Other Common Carriers" (OCCs). The RBOCs provide local services for roughly three-quarters of the country. The remaining quarter is served by the many hundreds of independent telephone companies that were never under the AT&T umbrella.

Each of the RBOCs has started, or announced plans for, an ISDN trial of some sort. AT&T has also announced plans for a trial. The trials consist of installing a limited number of digital exchanges that are available from their manufacturers with ISDN interfaces. Some of the RBOCs will be installing several different vendors' exchanges, others only one or two.

The exchanges being used are:

- ESS5 (AT&T)
- DMS100 (Northern Telecom)
- SL10 (Northern Telecom)
- GTD5 (GTE)
- NEAX61 (NEC)
- EWSD (Siemens)
- AXE (Ericsson)

By far the most common exchange in the trial is, not surprisingly, the AT&T ESS5.

Most of the trials focus initially on the "basic" interface (2B64+D16) - by which I mean two B channels of 64 kbps each plus one D channel of 16 kbps. These basic-interface lines are being used mainly in a centrex situation (i.e. the user does not interpose a PABX between the exchange and the socket at the user's desk). A few users will implement a "primary" interface (23B64+D64 - the American variant of the international 30B64+D64) for PABX-to-exchange connections.

In total only 12 corporations have made firm commitments to become ISDN trial sites. All the other "trials" that have been announced (about 15 of them) are internal telephone company trials. The most publicised of the external customer trials is McDonalds Corp. Others include three "tame" telecomms switching equipment vendors (i.e. vendors that supply equipment to the RBOCs), two state government organisations, and two banks. In total, across all the external trials, only about 1500 ISDN lines have been ordered.

Although some of the trials are officially listed as having started, it is difficult to find anyone who is actually doing anything worth shouting about. For example, the most important trial - the McDonalds one - will be truly live mid-1988 when its new headquarters opens, although service was theoretically available in December 1986. So far, McDonalds has tested a few simple data applications.

Trial experiences

Almost all of the applications being tested in the trials are data applications. These include:

- PC to PC file transfer via the B channel.
- Terminal to mainframe communication via X.25 over the B or D channel.

- Coaxial cable elimination using a "throttle-down" device (made by AT&T) that matches the IBM3270 terminal output to a B channel. Improved performance comes from channel attaching the cluster controller at the distant host location.
- Mainframe to mainframe links via the B channel, as an alternative to conventional 56 kbps leased circuits.
- Access to public packet switching networks over the D channel.
- Group 4 facsimile (64 kbps).
- "Advanced voice features" - which nearly always turns out to be nothing more than Calling Number Indication.
- Slow-scan video.

Some of the trials scheduled to start in 1988 are based on linking new digital PABXs to the public network via 23B+D links. However, there seems to be some uncertainty about whether PABX-to-main-exchange signalling over the D channel will be fully in conformance with ISDN standards in the first instance.

The few public comments that have been reported so far from the trial participants are:

- On the subject of terminal to host communication: "I'm impressed with the baud rate increase."
- On the subject of coax elimination: "Each user now gets more bandwidth than the whole cluster used to get, so the response time on the terminals is much faster."
- On the subject of Group 4 facsimile: Compared with other ISDN applications, this is "a more popular application".

Not very stunning comments, admittedly, but if I said they said "ISDN is the best thing since sliced bread", I doubt if you'd believe me.

Criticisms of ISDN development in the USA

Users have so far voiced the following criticisms of what is going on in ISDN in the USA:

- o Because the bulk of money spent on telecomms goes on voice services, voice services are being given priority over data services in ISDN development, in spite of the fact that almost all the initial trials have shown that users are most interested in data applications.

- o Almost all demonstrations so far have exhibited nothing in the way of unique applications. They mimic services available through conventional technologies.
- o Because the US regulatory environment has caused national packet networks to evolve as separate entities from the telephone companies (Telenet, Tymnet, etc), ISDNs will not support packet services in a native mode, but will simply provide circuit switched connections into each of the large packet networks.
- o No carrier, local or long distance, wants to commit itself to detailed prices, thus making planning for ISDN by corporate telecommunications managers impossible.

Non-ISDN trials

In parallel with the "true" ISDN trials, some of the RBOCs are considering alternatives to ISDN in case ISDN does not move ahead as quickly as expected. The one that has received the most publicity is Pacific Bell's Project Victoria, an integrated residential service that provides up to seven information channels per line: two for voice, one for medium-speed data, and four for low-speed data. Its goal is to provide residential users with a variety of entertainment and personal electronic services, including access to information services, home banking, and remote electricity and gas meter reading. The service is based on existing multiplexer technologies, not ISDN standards. Bell South is offering a similar service aimed at business users.

Unfortunately the FCC (Federal Communications Commission) has caused Project Victoria to be put on hold by ruling that the multiplexer used at the customer's end is "customer premises equipment" which, under the rather bizarre post-AT&T-divestiture regime, is unregulated equipment that cannot be offered by the regulated RBOC network. However, if the FCC can be persuaded to change its mind, then the project will resume.

Personal views on ISDN

The concept of using the same digital switching systems, and the same inter-city transmission systems, to handle voice, data, and other services, has been around for at least 20 years. In 1970, when I started my first job at the Dollis Hill Post Office Research Station, I joined what was to later evolve into the System X development team. At that time, and during all subsequent development work, integration of services was a fundamental assumption, not a debating point. All the major PTTs in Europe, and BT, have been planning for integration of switching and transmission systems for many years. However, it was generally accepted by the PTTs that it would be late in the century before this effort produced any significant benefits for users.

About five years ago someone decided that it would make good press to start talking about ISDN as if it were a new brand of soap powder. While it was nice to bring the integration efforts of the PTTs to everyone's attention, the premature focus on user aspects of ISDN raises a number of problems:

- o The original concepts of integration were based on the desirability of achieving economies of scale in switching and transmission, leading to lower costs for the PTTs in the long run, and hence lower prices. The idea that the end user services themselves might become integrated is a more recent concept. Unfortunately there are very few useful examples of service integration that users really need, and almost all of these can be delivered through the application of conventional technologies.
- o Disregarding whether integration of services is achieved by ISDN techniques or by conventional technologies, the ideas for integrated services that have been put forward so far are rather weak: two people editing the same document while talking to one another, users exchanging facsimiles while talking, and of course the old favourite - Calling Number Identification - which raises issues of privacy that still need to be resolved.
- o ISDN, as featured in the initial trials, is only integration of access, not integration of the underlying services. While it is nice to have the opportunity to test out the basic and primary access multiplexing schemes at an early date, the lack of a substantial network of integrated switches, interconnected by signalling links operating under CCITT Signalling System No.7, means that users gain access only to conventional services outside the immediate area served by their local ISDN exchange. As a result, there is little that the ISDN-style access can make available that could not be made available using more conventional access techniques.
- o Because of the lack of underlying integrated services, integrated access on its own does not justify the sort of increased tariffs that would be needed to cover the incremental costs of installing ISDN-type facilities. In the USA and UK this creates a conflict between the desire for cost-based pricing and the need to attract initial users to get ISDN off the ground.

In addition to these fundamental problems, even the access arrangements seem to me to be flawed:

- o The CCITT's acceptance of the 23B+D scheme as an American alternative to 30B+D creates confusion for vendors who hope to sell public exchanges and PABXs internationally. While the divergence of p.c.m. standards in the 1960s between the "baseball" countries and all other countries was a shame, the missing of the chance to steer the world in the direction of a single standard this time around is lunacy.

- o The basic access format, 2B+D, is not based on any analysis of user's needs for either business or the home, but is simply an arbitrary technical standard, based on what can be achieved over a local line a few miles long. Why not B+D? Or 3B+D? Perhaps home users would like one format, and business users another.
- o There are still doubts about whether the schemes for carrying 2B+D over a local line will work satisfactorily on real cables under real streets in real cities. Tests that have been carried out in some US cities indicate that crosstalk, causing unacceptably high error rates, starts to become a problem as more than a certain proportion of the twisted pairs carry 2B+D. Maybe it would make more sense to make installation of optical fibre a pre-condition for providing ISDN access to business users, instead of battling with a marginal technology. The PTT theory that we cannot throw away the huge investment in copper wires over-emphasises the residential requirement for ISDN, and ignores what is happening with optical fibres for the business communities in major cities like London.
- o The whole issue of what gets carried over the D channel seems to be becoming terribly confused. The original idea, dating back to the early 1970s, was that the D channel would be purely for signalling, and the B channel or channels would carry the actual communication (voice, data, or whatever). Now we are hearing that the D channel is also for low speed data, particularly packet switched data. To me this seems to add too many variants to the fundamental ISDN architecture. Also, it could be viewed as a way of locking the user into telephone-company/PTT provided packet services.

Conclusion

In summary, I think that the USA should (and to some extent does) look to Europe for leadership in ISDN developments right now, not the other way round. The fragmented telecommunications environment of the USA, lacking nationwide cohesion, and subject to strange mixtures of regulation and free-competition, will make it difficult or impossible to build a single ISDN for the whole country. The early US trials, like many other trials of ISDN, will test integrated access techniques, not integration of services.

There is much that must be done before inter-city ISDN and true integration of services becomes a possibility - such as installing ISDN exchanges in all major cities and widespread implementation of Signalling System No.7. Even then, I think there are many unanswered questions about what ISDN should give the user. Does the user want integration of access? Or would users be happy to keep separate telephone lines, data lines, fax lines, and so on - and just convert them to digital operation? Will users pay for integration of access if it provides no direct benefit? Does the user want integration of services?

Does that mean anything in the real world? Or should the integration be behind the scenes - that is, just a pooling of switching and transmission resources by the service provider to achieve economies of scale?

Perhaps the trials going on around the world will provide us with answers to these questions before we stampede down any expensive technological blind alleys.