

Telex and TWX History

Donald E. Kimberlin
1986

(Document Notes)

Telex certainly should be called the original form of E-Mail. Far from "dead" on a global basis, UN reports published in the "Brittanica Book of the Year" indicate there are about three million Telex lines around the globe. Contrary to the impression international telephone people like to create, direct, immediate access via Telex still exists to more of the world's political entities than does telephone. This has been the case for many years. (Totalitarian governments must like Telex; they have been known to shut down telephone service, but not Telex. The suspected reason: It can be monitored with hard copy easily, and has often been done, too. Of course, they themselves use it for military messages.)

Telex sprang from the same source as the Volkswagen automobile: The creative growth era of the early Third Reich. It was devised as a means to distribute military command and control messages and data in a time before we even had a structure for data processing machinery. What existed at that point in time was 45.5 bps Baudot automatic telegraphy and dial-pulsing telephone exchanges. The original Telex was essentially (director-controlled; yes, the Europeans were doing that then) rotary telephone switches modified to carry DC telegraph lines, providing a switched service for teletypewriters in the same way as was done for telephones.

There was one major difference: Intercity transmission facilities were expensive and in short supply, and one analog telephone circuit between cities could carry 24 (and in some applications, 25) telegraph channels bearing Telex. The economics are obvious, and probably are what keep Telex important in the Third World today.

In that era of transparent analog transmission lines, Telex was easily able to use telephone dial-pulsing on the local telegraph loops followed by Baudot teletype for the messages ... and it did. Hence, this form of Telex operation became known as "type A Telex signaling." It is still used that way in many nations. In those you will see a teleprinter with a control box that has a telephone dial. When Western Union decided it had should enter into Telex in the U.S., it adopted the original style and Type A signaling. Similarly, many other Europeans adopted Type A operations, among them the U.K., France and Belgium as well as others. Meantime, (I think it was L. M. Ericsson leading the move for) others saw an opportunity to simply use the numerics on the keyboard for call set-up, thus some nations adopted what became known as "Type B" Telex. By this time, the CCITT had taken charge and was setting international agreements, one of which was to set the speed of international Baudot circuits at 50 Baud, instead of 45.5. Some

few nations were many years behind in upspeeding. In this writer's experience, Cuba and Pakistan are remembered as still running 45.5 Baud Telex trunks even into the 1970's.

Telex grew around the world very rapidly ... long before automatic telephony, again most likely due to its economics of channel usage. Considerable networks of Telex on HF (shortwave) radio to then-remote areas of Africa, the Middle East and Asia were established by the government-owned PTTs, operating non-stop with error-correcting, retransmitting time division multiplexers per CCITT Recommendation R.44 (so what's new about TDM ... Baudot built his first one in 1873, three years before Bell's telephone. Check it out, unbelievers!), with the common name "TOR" for "Telex Over Radio." Readers who are SWL's certainly hear of TOR, SITOR and Telex Mux on shortwave radio today ... there's still plenty around and on the air.

Also, the broad reach and universality of Telex around the world lead to the CCITT establishing the global network of International Telegram (commonly called Cablegram; RCA's product on its original shortwave radio was the Radiogram) channels on a switched network overlay of Telex called "Gentex." That's right: Your international cablegram goes on Telex, too. It's simply Telex channels dialed up permanently between telegram offices. The beauty is that of any switched service: Restoration in case of channel failure is simply dialing up another call.

The result of all this is that Telex was, and remains in many nations, the medium of communications for business and both civil and military government use. Airlines using the PARS (and internationally IPARS) reservations systems still run Baudot code today (although many lines have changed to high-speed modem traffic), because their plain-language text transmissions use only 7.5 bits per character, compared to the 11 bits of CCITT International Alphabet 5 (known as ASCII in colloquial North America). The economics are obvious. In many nations, the total minutes of international Telex still today exceeds that of international telephone traffic. Business uses Telex more than most Americans understand. West Germany has had more than 400,000 Telex lines for years, while the U.S. at its peak could count only 345,000 Telex and TWX subscribers. Americans simply grew up as sociological prisoners of "the phone," under a hegemony that taught them anything else must be insignificant.

Almost in parallel with the 1930's development of Telex, Bell interests saw the possibilities and decided to do Telex one better. Bell Labs was commissioned to develop a similar service, using dial pulse selection. It became known as Teletypewriter Exchange Service, or TWX. (In fact, Bell beat WUTCo to the marketplace punch and WUTCo came along later with Telex in the U.S.) The original TWX ran 75 bps with Baudot code and dial selection, until Bell Labs got its second generation ready. That one, called "four-row TWX" in telephone parlance, used **modems** called "101 Data Sets" (that's right, Daddy of the 103!) on two-wire ordinary telephone subscriber lines run to special exchanges called a WADS (Wide Area Data Service) exchange in each major city, where the billing and such was done. Actually, a WADS exchange was a partition of one local telephone exchange in the city. Because it was using the Public Switched Telephone Network (DDD in American parlance, TWX was given reserved area codes ... 510, 610, 710, 810 and 910. Some few remote locations on TWX are still on those area codes.

Four-row TWX used 11-bit characters to provide an expanded code set including "control characters" that permitted the TWX machine to be operated much like an office typewriter ...

more so than Telex and its Baudot limitations that at best used CCITT-standardized "character strings" to provide some degree of functionality beyond plain text (see the CCITT F, R and S Series of Recommendations). The control characters of TWX provided paragraph indents, form feeds and such that Telex never really had. And, with Four-Row TWX, transmission (on the 101 Data Set) was upped to 110 bps, and the code provided VRC "parity" error-checking. (One can show that 110 bps with 11-bit characters is equivalent to about 140-150 words per minute, a typing speed only Olympic-class typists could achieve on mechanical typewriters.) Even so, the "TWX code" had only 93 of its 128 possible characters assigned.

It just so happened that when the computer era came along, Bell's Teletype Corporation (at Skokie, IL, purchased from Dr. Kleinschmidt to get a supply of teleprinters for TWX) had its Model 33 teleprinter in production for TWX. That was, in its time, the cheapest keyboard instrument readily available for the then-"new" computer business. The Model 33 teleprinter and its mechanically-embedded TWX code became the `_de_facto_` I/O device for the computer. The computer people early on wanted use of all the character combinations in the code, so Teletype obliged with modifications for computers. Thus ASCII was born of TWX code, and it ultimately became CCITT International Telegraph Alphabet Number 5. The IA5 definitions in the CCITT books vary from ASCII only in wording. Study of both ASCII and IA5 can show roots of most of the character combinations back to Baudot (or its CCITT character strings) and even manual telegraphy.

However, computer programmers and computer mux makers who don't understand this have often done some horrible things to uses of the code, causing products that alienate people from data communications; wondering why their products don't migrate well or why people have trouble understanding them. There is a certain beauty of human logic in using these codes properly. They grew out of manual operations in sending messages. One can even see in IBM's BCDIC and later EBCDIC an emulation of what was in the telegraphic codes, but I doubt IBMers for their part would admit that.

While Telex was the rest of the world, insular America grew with its parallel Telex of WUTCo and TWX of Bell. Because Bell was strictly limited to dial telephony only for international business, and because WUTCo had given up its international operations in a 1939 deal to monopolize domestic telegraph business by taking over ITT's Postal Telegraph (which was a thorn in WUTCo's side), the U.S. developed a unique sort of "international telegraph" company known as an "International Record Carrier." The IRC's were an interesting catch-all sort of firm; an American answer to "how do we get a regulatory handle on all these characters?" Some were US-based, like WUTCo's "Cable System" that became Western Union International when sold off as a result of the 1939 Postal Telegraph deal. Others had "just been there," like ITT's World Communications that had been a gaggle of companies with names like Federal Telegraph, All American Cables and Radio, Globe Wireless, Press Wireless, and the common carrier part of Mackay Marine. RCA Communications had been around specializing largely in spanning the Pacific with radio as well as generally reaching ships and other places by radio telegraphy; today it is the RCA Globecom subsidiary of MCI (as is WUI, calling itself MCI International). Tropical Radiotelegraph grew out of putting radio telegraph on shipboard before WWI so its owners, the United Fruit Company of Boston could divert shiploads of bananas to the best market, expanding to communications to its plantations, then becoming in some nations the

public telegraph and international telephone company of the nation; today it is TRT Telecommunications. The French Telegraph Cable Company, owned by French investors in the PTT had been in the U.S. since the days of Monsier Puyer-Quartier laying telegraph cables from France to the U.S., hence its telegraphic routing address, PQ. Even the Firestone Tire & Rubber Company owned its own IRD, the Trans-Liberia Radiotelegraph Company, operating HF radio from Akron to its rubber plantations in Liberia. (TL is still there in Akron, as a matter of fact.)

All these firms formed the U.S. IRC business and enjoyed a period of regulated competitiveness for thirty years or so. They were the Telex interface between the U.S. and the world, all connecting out to WUTCo Telex and (by performing "protocol conversion" long before computers did so,) Bell TWX. International Telex users were confronted with some typical American confusion ... they had to prefix their Telex calls to America with added digits to steer their call via the IRC of their choice (in most nations) and then to either Telex or TWX for the U.S. domestic connection.

All that had to change when Congress "deregulated" the IRC's in 1982, four years before telephony had a similar change. Restrictions on AT&T providing only telephony were lifted; the IRC's were freed to operate anywhere as compared to a limited number of "gateway cities," WUTCo was permitted to go international once again, and everybody could compete for any kind of business.

That's what has happened in America, so you can call FTCC (formerly French Cable) as well as relative newcomers to the U.S. market like Cable & Wireless (from the U.K.) and ask them what deal they will offer in competition to AT&T or WUTCo, either domestically or internationally, for voice, data or video.

International Telex remains a basic business. The various companies made various deals to interface to their Telex connections. MCI's is, of course, via WUI, the first IRC that MCI bought. AT&TMail's is via TRT. Along the evolutionary course of the later days of the IRC business, a firm was established called Graphic Scanning (IRC's have always tried to do something with facsimile, long before Group III machines made them the Office Toy of 1990, and Graphic Scanning got into the IRC field in this way), and Graphnet is Telenet's Telex connection.

As our moderator said, the E-Mail services all "alias" your E-Mail address to their IRC connection. It's usually your numeric E-Mail address with a fixed prefix. Example: My own AT&TMail numeric is 7281481. Its Telex alias is 157281481. On MCIMail, my numeric is 4133373, and its Telex alias is 650-4133373.

The global Telex network has had since inception a handy "confirmation" convention called "Who Are You?" and each Telex machine is encoded with an "automatic answerback" that lets you know on connection and whenever you ask (WRU in Baudot; in ASCII) what machine you are connected to. So, if you are an E-Mail user, your overseas correspondent will want to know your "network" and "answerback." That's usually the Telex code for the IRC you're with and your E-Mail alpha address. So, mine on MCIMail is MCI UW dkimberlin and on AT&TMail mine is TRT UT dkimberlin. Really rather simple, when you understand the meaning and purpose of the IRC and international Telex.

One last word for this top-level exposition: Telex isn't so cheap compared to E-Mail. If you have a regular correspondent in another nation and want to DDD to batch files, or if you have an X.25 or Teletex route to another nation (WUTCo's Easylink E-Mail does, but the other E-Mails seem to say, "huh? Teletex?"), that may well be cheaper than Telex. It runs at 50 bps, just 66 words per minute, and you get billed at the Telex output rate.

All that said, then why bother? Well, Telex is still there and readily accessible from your E-Mail, and it reaches those 3-1/2 million or so machines in offices of foreign nations you may have only occasional traffic for. And, those machines are in global directories like the Jaeger u. Waldmann directories so you can look them up from home. And, those machines are in hotels all around the world, so you can get a message to the traveler who hasn't been able to get a phone line out for three days. And, those Telex lines connect to all the cablegram offices that will for their high price, still send a messenger to find your missing salesman (unlike the US' rapidly deteriorating telegram service). As well, they reach the ships at sea with your Telex to roust up the staffer who's on an ocean cruise. No matter where in the world they are; no matter what time zone they are in, no matter if they are on the Gregorian or Moslem or Hindu or Bhuddist calendar, your message routed by Telex should get to them far more efficiently than random dialing of the phone.

So, while most Americans discovered some of these advantages when the Group III fax came along, but still need to find a "fax number" that's not in a directory like Jaeger u. Waldmann, your E-Mail connection to international Telex is a potentially useful tool.

Document Notes

This document was formatted (and edited somewhat) by [Gil Smith](#), July 2001. The original file, [kimberlin--telex-twx-history](#), was shamelessly copied from someplace.