DATA COMMUNICATION IN AUSTRIA — THE TELECOMMUNICATION INFRASTRUCTURE AND RELEVANT ADMINISTRATIVE PROCEDURES

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PREFACE

This working paper is part of the IIASA study "Experimental and Operational East-West Computer Connections: The Telecommunication Hardware and Software, Data Communication Services, and Relevant Administrative Procedures". This work is supported both by the Control Data Corporation in Minneapolis and the Austrian Ministry for Science and Research in Vienna.

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CONTENTS

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I. Sebestyén

0. INTRODUCTION

Because of its geographical location and international functions, Austria plays a key role in the communication of data between East and West. To be able to fulfill this role, Austria had to develop both its own data communication infrastructure and also provide international links to various data communication services abroad. Not only did the necessary hardware infrastructure have to be built up but this had to be accompanied by necessary administrative procedures and managerial arrangements. Because the development process in this especially fast changing field had not been completed by the time of writing, this report describes the present status of this process. In this paper a detailed description of the various Austrian data services, their technical characteristics, availability, costs, and necessary administrative procedures is given with

special emphasis on the international aspects of these services. Since technical characteristics, tariffs, and organizational arrangements change rapidly, this paper should only be used as a guide to provide general information and should not be considered as a reference.

1. GENERAL INFORMATION [11]

1.1. Legal Basis of the Telecommunications Administration

The telecommunications monopoly, i.e., the exclusive right of the Republic of Austria to install and operate telecommunications facilities, is based on the Telecommunications Act of 13 July, 1949, published in Federal Law Gazette Number 170, as amended. The decrees with respect to telecommunications matters issued under the Telecommunication Act have been raised to the level of laws by virtue of the Federal Act of 5 July, 1972, published in Federal Law Gazette Number 267.

1.2. PTT Organizational Structure

The senior management in the field of posts and telecommunications is provided in Austria by Division III of the Federal Ministry of Transport, the "Head- quarters of the Postal and Telegraph Administration" (Generaldirektion fuer die Post- und Telegraphenverwaltung--PTV) or in short Austrian PTT (Figure 1). Five Regional Directorates and one Inspectorate are controlled by the Headquarters and these regional units are shown on the map in Figure 2.

The regional directorates may authorize individuals and organizations to install and operate telecommunications facilities.

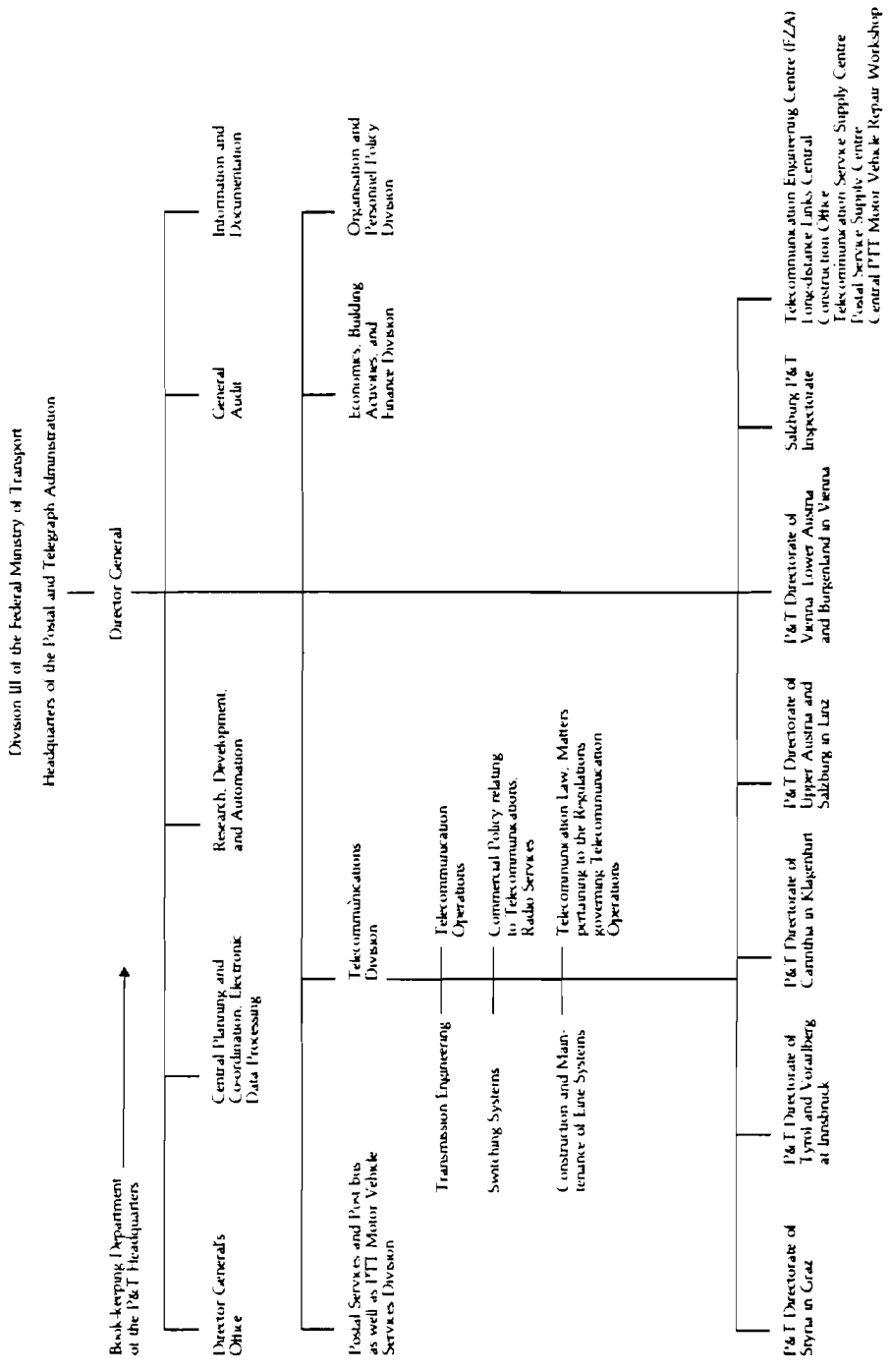


Figure 1. Structure of the Austrian Postal and Telegraph Administration

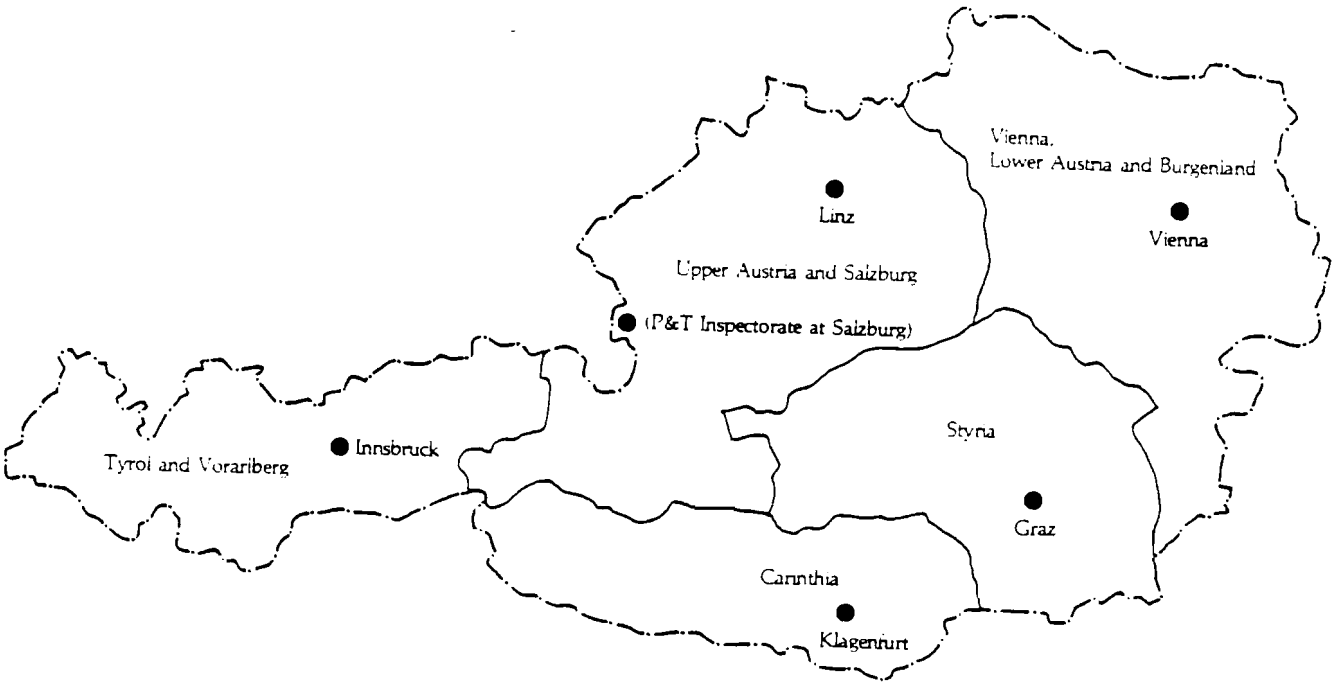


Figure 2. Regional Directorates and Inspectorates in Austria.

The regional directorates are in control of the establishments responsible for field operations, namely 2,281 post offices, 5 Broadcasting Service Administration Offices, 6 Telecommunication Operation Offices, and 12 Telecommunication Construction Offices. In addition, a Telephone Operation Office, an International Telephone Exchange, a Central Telegraph Office, a Cable Construction Office and a Telephone Accounting Office are established on the territory of the Vienna Directorate.

The administrative structure also includes the Telecommunication Engineering Center (Fernmeldetechnisches Zentralamt or FZA) which is responsible for the technical specifications of the network, for the granting of permission to connect private equipment to the network and for research.

Not all international services are performed by the Austrian PTT. Certain services are also provided on an exclusive basis by another government owned firm, namely, Radio Austria AG. Radio Austria AG, founded in 1922 as the successor to the Austrian Marconi Company, is a recognized private operating agency owned by the state and has, for example, the responsibility for providing intercontinental telegraph and telex services, including intercontinental private telegraph circuits.

1.3. General Policy in Respect of Data Transmission

Data communications facilities are provided by means of the Public Switched Telephone Network (PSTN), the telex network, private leased circuits, and last but not least on the new Public Data Networks.

Generally, the PSTN data service provided conforms to CCITT recommendations. It is possible, however, because of the technical characteristics of the telephone network, that full duplex transmission at speeds in excess of 200 bit/s may not be attainable on all connections. This difficulty is gradually being overcome and, depending on the circumstances, PTT will assist subscribers in overcoming any transmission speed limitations. The inland telephone service is fully automatic.

A fully automatic telex service is also available within Austria, to all countries in Western and Eastern Europe and a number of countries outside Europe including the USA, Canada, Japan, and Israel.

Private leased telegraph, telephone, and wideband circuits are available from the PTT.

The PTT does not supply modems (except for digital services) or data terminal equipment, the provision of which is the responsibility of the subscriber. Permission from PTT is required for connection of private equipment. There is currently a long list of modems which have been granted permission for attachment and further details can be provided by PTT. Although it does not supply modems, the satisfactory functioning of each modem to be connected must be tested by the PTT who carry out the installation. Subscribers must make their own arrangements for modem maintenance.

The Administration has introduced a public circuit switched data network (DATEX-L) based on the Siemens circuit-switched EDS exchange and a public packet switched data network (DATEX-P) based on Canadian Northern Telecom system. The first exchange of the circuit switched net-

work was installed in Vienna at the end of 1978 and the second at Salzburg in early 1980. At the moment this network provides a 50 baud, 300 bit/s low-speed circuit switching services (DATEX-L) and higher speeds (2400, 4800, and 9600 bit/s) from the end of 1982. At the same time, a packet switched network (DATEX-P) was also introduced with PTT providing the data control units, but no terminals.

1.4. Permission to Attach Equipment

Before any private equipment can be connected, permission must be granted by the Fernmeldetechnisches Zentralamt (FZA) in Vienna. The address for application is:

Fernmeldetechnisches Zentralamt
Arsenal, Postfach 111
1030 WIEN

Telephone: (0222) 781511

The application procedure requires the submission of technical descriptions, full wiring diagrams, and a sample of the equipment for testing. Currently, the elapsed time for evaluation and testing is of the order of three months from the time of receipt of the equipment sample, although time required for the initial processing of the application prior to provision of a sample will increase this period.

Charges raised for evaluation and testing in connection with the application for permission to attach private equipment are time and materials based. Currently, the average staff cost is approximately 250 schillings per hour. In addition, the charge raised for the use of testing equipment is 320 schillings per hour and between four and 10 hours use is required during the process of a normal test. A list of the

telecommunication equipment approved by the Austrian PTT is annexed.

2. TEXT COMMUNICATION

2.1. Telex and Telegraph

2.1.1. Basic service

The PTT provides only the basic two- or four-wire connection, including a plug-in telegraph modem. The teleprinter, without a plug-in telegraph modem, and all other subscriber equipment must be provided by the subscriber, including all switches and connection lines needed for data transmission. The PTT handle installation of the equipment and a maintenance service is available from the Administration.

Currently, only three manufacturers are allowed to supply teleprinters for connection to the network. These manufacturers are ITT, Olivetti, and Siemens. Also, it is PTT policy to allow connection of the most recent electronic teleprinter equipment. Thus for the establishment of a new telex station in Austria, it is necessary to install one of the following models:

ITT	SEL LO 2000
Olivetti	Model 431 (SES)
Siemens	Model T 1000

The teleprinters have to be provided by the users; it cannot be rented from the PTT.

Within Austria and Europe, service is provided by the PTT, but Radio Austria AG are responsible for intercontinental connections. Private

leased telegraph circuits for transmission at a speed of 50, 100, and 200 bauds are available.

2.1.2. Telex Service

The present telex net in Austria serves about 20,000 domestic subscribers. The old telex system (TW39) is gradually being replaced by the new Siemens electronic EDS system, which integrates both telex and all circuit switched data services. The first part of the EDS system went into operation between 1978 and 1980 and is scheduled to be complete by 1986. In addition to the classical telex network functions, the systems offers a full range of new capabilities.

a) Technical characteristics:

- Transmission speed: 50 Baud
- Transmission mode: asynchronous, halfduplex
- Transmission code: international telegraphy alphabet No. 2 (ITA No. 2).

b) Special telex services available to users on subscription:

- closed user group
- concentrator connections
- short dialing mode
- direct dialing through separate buttons

c) Special telex services available to all users:

- simultaneous telex transmission to more than one user
- tariff request

d) Service applications:

Applications (form DS 44080) for new telex services have to be forwarded to the respective "Telegraphenbauamt" of the PTT.

2.1.3. Additional Facilities

Message switching facilities and private telegraph branch exchanges (PTBXs) are not supplied by PTT but can be privately supplied.

3. SERVICES USING PTT PROVIDED DATA COMMUNICATIONS EQUIPMENT

3.1. General

The PTT provides only DCEs for the public data networks and the direct data networks; it does not provide modems for other purposes. DTEs have, in all cases, to be provided by subscribers. Permission from the PTT is required before connection of private apparatus. There is currently a comprehensive list of modems available at the FZA which have been granted permission to attach, covering a large number of manufacturers, with a wide range of facilities and speeds.

The circuit switched public data network, the direct data network and the packet switched data network offer services at 300, 2400, 4800, and 9600 bit/s. Services at higher speeds will be offered later.

Table 1. Summary of PTT Services.

Service	Transmission media	Transmission speed	Operating mode	Mode of operation	Local and junction lines	Interface connection	Other remarks
Up to 50 bit/s	Public switched telex network	50 bit/s	Depends on equipment	Half duplex	2 wire	Depends on equipment	—
Up to 200 bit/s	Leased telegraph circuits	50, 100 200 bit/s	Depends on equipment	Half duplex Full duplex	2 wire 4 wire	Depends on equipment	—
300 bit/s	Public switched network	300 bit/s	Asynchronous	Duplex	2 wire	X.20 or X.20 bis	Also for PAD in DATEX-P
300 bit/s	Direct data network (circuit switched)	300 bit/s	Asynchronous	Duplex	2 wire	Mechanically the same as X.20	Also for PAD in DATEX-P
Up to 2400 bit/s	Public circuit switched telephone network	Up to 2400 bit/s	Depends on modem	Half duplex	2 wire	Depends on modem	Service up to 2400 bit/s may not be available on all connections. Also for PAD.
Up to 9600 bit/s	Leased telephone circuits	Up to 9600 bit/s	Depends on modem	Half duplex Full duplex	2 wire 4 wire	Depends on modem	For transmission in excess of 2400 bit/s CCITT M1020 quality may be required
48 Kbit/s or 240 Kbit/s	Wideband	48 Kbit/s or 240 Kbit/s	Depends on modem	—	—	Depends on modem	As available
2400 6800 9600 bit/s	Public circuit switched data network	2400 4800 9600 bit/s	Synchronous	Duplex	4 wire	X.21	Also used for teletex
2400 4800 9600 bit/s	Direct data network (circuit switched)	2400 4800 9600 bit/s	Synchronous	Duplex	4 wire	X.21	—
2400 4800 9600 48000 bit/s	Packet switched data network	2400 4800 9600 48000 bit/s	Synchronous	Duplex	4 wire	X.25 X.21	—
2400 4800 9600 48000 bit/s	Direct packet switched data network	2400 4800 9600 48000 bit/s	Synchronous	Duplex	4 wire	X.25 X.21	—
2400 bit/s	Teletex	2400 bit/s	Sychronous	Duplex	4 wire	X.21	—
1200/75 bit/s	Videotex	1200/75 bit/s	Asynchronous	Duplex	2 wire	PTT modem V.24	—

3.2. Transmission paths

Data transmission is available over the public data networks, the direct data networks, the telex network, the PSTN or private leased circuits (point-to- point and multipoint).

Private leased speech band circuits (two-wire and four-wire) of normal voice grade CCITT M 1040 and special CCITT M 1020 quality are available. Additionally, branching equipment for construction of multipoint circuits can be provided by the PTT. On a multipoint circuit, up to six remote stations can be connected to a central station.

Wideband circuits can be provided, depending on the exact location of the terminal sites, if required. Bandwidths of 48 kHz, 240 kHz, 4 MHz and 10 MHz are available. (See also Section 4: Leased Private Circuits.)

3.3. PTT Network Terminating Points (NTPs) and Line Statistics

According to the official Austrian PTT statistics, 14,166 NTPs were registered by the FZA [1] at the end of June 1982. Table 2a shows that at present the most frequently used line speed in Austria is 2400 bit/sec, but the number of higher speeds is growing. The majority of NTPs are still linked to the telephone network, both leased and switched telephone connections count for around 94% (!) of all NTPs. Digital services -- basically the low speed circuit switched DATEX network -- only accounted for less than 1% of all NTP connections. There is, however, no doubt that this proportion will change in the future; and this will be strongly supported by the introduced new digital data services and the general Austrian PTT policy.

Table 2a. Statistics of Network Terminating Points (NTPs) in Austria.

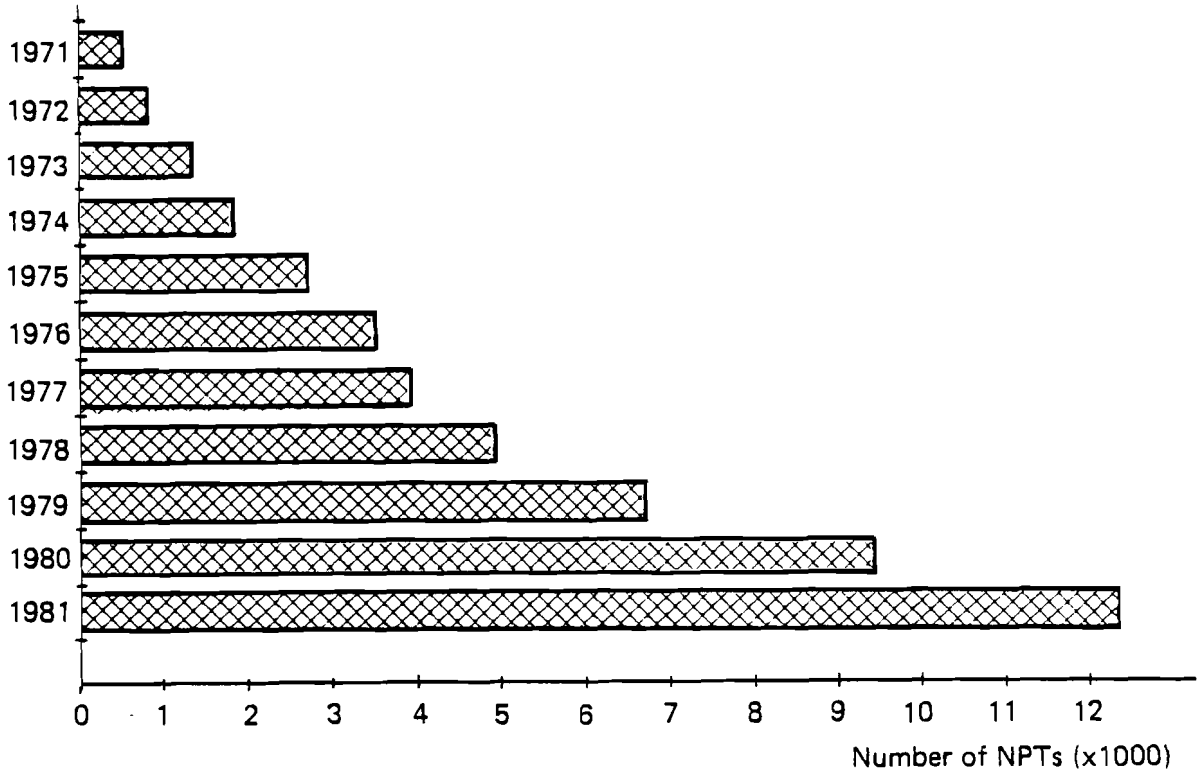
Speed	Switched data network (WDN-L) (DATEX-300L)	Direct data network (DDN-L) (DATEX-L)	PSTN (telephone)	Videotex (BTX)	Leased telephone lines	Leased telegraph lines	Radio link	Total (number)	Total (%)
Analog signal			12		—			12	0.08
20/40 char/s			539		4			534	3.83
up to 50 bit/s			—		—	492		492	3.47
up to 300 bit/s	48	78	811	4	212	217		1370	9.67
up to 1200 bit/s			1766	213	1329		3	3311	23.37
up to 2400 bit/s			1458		2962			4420	31.20
up to 4800 bit/s					1850			1850	13.06
up to 7200 bit/s					1			1	0.007
up to 9600 bit/s					2110			2110	14.89
up to 19200 bit/s					57			57	0.4
up to 48k bit/s								—	—
Total (number)	48	78	4586	217	8525	709	3	14166	100%
Total (%)	0.33	0.55	32.4	1.53	60.17	5.0	0.02	100	—

Source: Fernmeldetechnisches Zentralamt FZA, Vienna.

Similar to other countries the number of NTPs in Austria is growing fast (Table 2b). In general, the Austrian yearly growth is between 30 and 40%; higher than the average for Western European countries. Table 2c shows the changing pattern of line speeds used. As can be seen there was a shift from the lower speeds (300 bit/sec) towards the higher speeds (2400 bit/sec and above) during the 1970s. The growth in the number of very high speed lines (between 9,600 bit/sec and 48 kbit/sec) during the last couple of years has been remarkable.

Table 2d shows that the telex has actually been little used for data communication in Austria and although the telegraph network is still used, its role is declining. There is still some growth in the use of switched telephone networks for data transmission but the backbone of data communication in Austria at present is the use of leased telephone lines; the recently introduced digital network services have only a limited significance yet. The role of videotex in data communication is still moderate. Table 2e shows the distribution of NTPs by the major user groups with some interesting aspects. There are very few terminals used for educational purposes in Austria. Surprisingly, the use of data communication in the travel and transportation industry is also rather low, although the potential for this sector in Austria should be significant. The majority of NTPs, over 5000 (40%) are used in banking applications, while insurance companies playing a smaller role.

Table 2b. Statistics of Network Terminating Points (NTPs) in Austria as of 31 December 1981.



Source: Fernmeldetechnisches Zentralamt—Vienna

Table 2c. Statistics of Network Terminating Points (NTPs) in Austria according to line speeds used.

Year as at 31.12	20/40 bit/s	= 50 bit/s	< = 100 bit/s	< = 300 bit/s	< = 1200 bit/s	< = 2400 bit/s	< = 4800 bit/s	< = 9600 bit/s	< = 48k bit/s	Total
1971	5	264	0	137	84	16	0	0	0	506
1972	23	447	0	193	137	32	3	0	0	835
1973	58	641	0	263	223	79	10	2	0	1276
1974	94	673	2	465	368	170	40	3	0	1815
1975	129	762	4	590	673	410	108	19	0	2695
1976	190	781	15	665	1085	587	164	47	0	3534
1977*	—	—	—	—	—	—	—	—	—	3876
1978	262	551	10	663	1595	1178	420	250	0	4929
1979	310	527	139	741	2069	1754	745	441	12	6738
1980	383	499	178	871	2670	2677	1299	912	21	9448
1981	497	508	1138		3175	3732	1652	1596	25	12323
1982 up to 30.6	543	492	1382		3311	4420	1850	2111	57	14166

*Only total data available.

Source Fernmeldetechnisches Zentralamt, Vienna.

Table 2d. Statistics of Network Terminating Points (NTPs) in Austria according to type of connection.

Year as at 31.12	Telex network	Leased telegraph lines	Switched telephone network (PSTN)	Leased telephone lines	DATEX 300-L	DDN-L (DATEX)	Videotex	Radio Link	Total
1971	0	264	109	133	0	0	0	0	506
1972	1	446	185	203	0	0	0	0	835
1973	1	640	321	314	0	0	0	0	1276
1974	1	674	623	500	0	0	0	17	1815
1975	4	762	1019	892	0	0	0	18	2695
1976	4	792	1471	1249	0	0	0	18	3534
1977*	—	—	—	—	—	—	—	—	3876
1978	0	561	2095	2270	0	0	0	0	4929
1979	0	666	2752	3317	0	0	0	0	6738
1980	0	685	3506	5245	0	8	0	4	9448
1981	0	697	4167	7238	23	26	169	3	12323
1982 up to 30.6	0	709	4586	8525	48	78	217	3	14166

*Only total data available

Source: Fernmeldetechnisches Zentralamt, Vienna.

Table 2e. Statistics of Network Terminating Points (NTPs) in Austria according to main classification of users in 1981.

Group	Number of NTPs	%
Government	1527	12.42
Public organizations (e.g., authorities, hospitals)	595	4.84
Research institutes and education	254	2.07
Medicine (doctors, pharmaceutical shops etc.)	632	5.14
Industry	1291	10.50
Business and sales	1088	8.85
Banks and insurances	5429	44.17
Travel and transportation	308	2.51
Computer service bureaus	165	1.34
Press	21	0.17
Others	979	7.97
TOTAL*	12290	100.0

*In 1981 total NTPs in Austria was 12323.

Source: Fernmeldetechnisches Zentralamt FZA, Vienna.

3.4. Description of PTT Data Services [5]

3.4.1. Asynchronous circuit switched data services

The low-speed asynchronous circuit switched data services DATEX-300L and DDL 300 are provided by the Austrian PTT through their integrated telex and data system EDS. The DATEX-300L service works with switching, while on the DDL 300 fixed asynchronous connections are provided.

a) Technical characteristics:

- Transmission speed: 300 bit/sec (according to the CCITT recommendation X.1. Class 1)
- Transmission mode: asynchronous, duplex
- Interface between DTE and network:
  - 15-pole connection according to IS 4903, or
  - 25-pole connection according to IS 2110
- Error rate: better than 3.10^{-6}.

b) Technical characteristics only for DATEX- 300L:

- Call establishment: manual or automatic, about 0.5 sec after dialing has made
- Transmission code and protocols: for call establishment, code according to IA No. 5 (IS 646), pro character 1 startbit, 7 information bits, 2 stopbits with even parity, protocol according to CCITT X.20; for data transfer, code IA No. 5 also with even partity, transmission protocol, however, is free up to the user.

c) Technical characteristics only for DDL 300:

- Transmission code and protocols: free up to the users. Codeframe 11 bits pro character, with maximum 8 databits, 1 startbit and 2 stopbits.

d) Special services for DATEX- 300L network only:

- closed user group
- short dialing code
- direct dialing
- concentrator connection
- subscriber identificator

e) Application for service

Application should be made to the PTT Regional Unit responsible. Technical advice and help with problems is given by the "Abteilung T" of the "Fernmeldetechnische Zentralamt" in Vienna.

f) International connections

First connection was introduced in April 1, 1982 to the Federal Republic of Germany, and Switzerland and it is planned to connect the Hungarian NEDIX network and all appropriate European PTT data networks.

3.4.2. Synchronous circuit switched data services

Medium and high speed synchronous circuit switching data services were introduced to the service during the second half of 1982. They are built on the above mentioned integrated telex and data communication system EDS. Two different synchronous services are provided: DATEX-L for switched synchronous services, and DDL synchronous for fixed medium and high speed connections.

a) Technical characteristics:

- Transmission speeds: 2400, 4800, 9600 bit/s (according to CCITT Recommendation X.1 Classes 4, 5, and 6)
- Transmission mode: synchronous (timing signal provided by the network), duplex
- Interface DTE to DCE:
  - 15-pole connection according to IS 4903, or
  - 25-pole connection according to IS 2110 (V.24) (only for the direct network)
- Error rate: better than 10^{-6}.

b) Technical characteristics for DATEX- L synchronous only:

- Call establishment: about 0.5 sec after completion of manual or automatic dialing
- Transmission code and protocol: during call establishment and call termination code according to IA No. 5 (ASCII) and protocol according to X.21 of CCITT. During data transmission phase

code and protocol are free up to the users.

c) Technical characteristics for DDL synchronous only:

- Transmission code and protocol: free up to the users
- Possible connectionss are point-to-point and multipoint

d) Special services for DATEX- L synchronous only:

- direct dialling
- closed user group
- short dialing code
- concentrator identificator
- subscriber identificator

e) Application for service:

Application should be made to the next regional PTT unit responsible. Technical advice and help with problems is given by the "Abteilung T" of the "Fernmeldetechnisches Zentralamt" in Vienna.

f) International connections:

The first planned are to the Datex network of the Federal Republic of Germany, Switzerland, Scandinavia, and Italy. This will be followed by a connection in about two years to the Hungarian NEDIX network, whereby the X.50 - X.51 protocol conversion has to be performed. Since this service is one of the possible lower level layers for teletex services, it can be expected that interconnection of the DATEX-L synchron service to similar PTT data networks abroad will take place relatively soon. Actually, the

synchronous circuit switching services between Austria and West Germany are already experimentally connected and used especially for telex.

3.4.3. Packet switched data services

The packed switched data services in Austria will become fully in operation at the end of 1982 (Figure 3). The packet switching data node of the PTT in Vienna has been available since the beginning of 1982 for experimental operation. The Austrian PTT provides two types of packet switched data services: DATEX-P for switched connections and DDP for fixed connections. The backbone of the packet switching service is a separate data network made by Northern Telecom in Canada. Major network nodes in Austria are interlinked with 64 kbit/sec high speed lines.

a) Technical characteristics for transmission speeds and modes:

- 2400, 4800, 9600, 48000 bit/sec for DTEs (according to X.1 user classes 8, 9, 10, 11) with packet switching capabilities according to CCITT X.25 for:
  - level 1: CCITT X.21, synchronous, duplex interface; 15 pole connection IS 4903
  - level 2: HDLC (ISO) and LAPB (CCITT)
  - level 3: virtual calls
- 300 bit/sec for asynchronous, character oriented DTEs with interfaces according to CCITT Rec. X.20 (X.20 bis) over direct links for the circuit switched data network to the PAD function of the packet switched network.

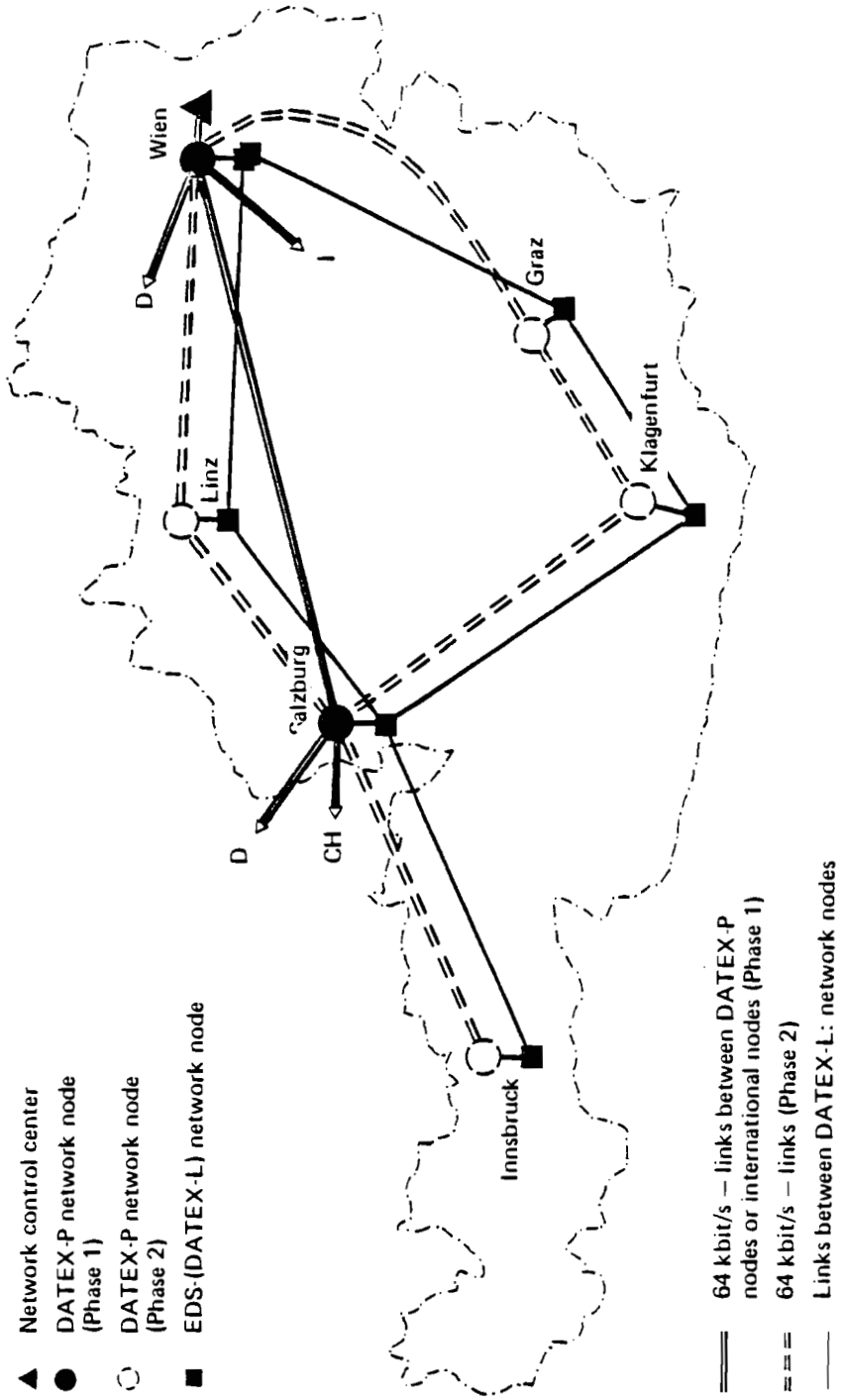


Figure 3. The Austrian PTT packet switched data network DATEX-P and its link to DATEX-L.

- 2400, 4800, 9600 bit/sec for synchronous, character oriented DTEs with interfaces according to CCITT Rec. X.21, also over direct links or the circuit switched data network. The necessary protocol transformation is also handled by the packed switched network.

b) Further characteristics:

- speed conversion
- address multiplex techniques
- protocol conversion
- gateways to other data networks
- call establishment in less than 400 msec
- data transfer delay of network less than 100 msec

c) Special services provided for limited periods:

- directed traffic (sent or received only)
- connection authorization
- closed user group options
- definition of maximum packet length
- concentrator connection
- direct dialing
- flow control options, etc.

d) Special services for all users during any session:

- request for taking over payment
- setting of flow control parameters

Interworking between DATEX- P and DATEX- L

Interworking of DTE's of DATEX-P and DATEX-L is in principle possible, according to the following scheme (Figure 4).

Figure 4. Connection possibilities between DATEX-L and DATEX-P

Called DTE \ calling DTE		DTE DATEX-P (X.25)				DTE (X.20)* asynchronous		DTE (X.21)* synchronous	
		Direct terminal	Direct host	Direct host (64 KByte/s)	DATEX-L	Direct	DATEX-L	Direct	DATEX-L
DTE DATEX-P (X.25)	Direct terminal	●	●	●	●	●	●	●	●
	Direct host	●	●	●	●	●	●	●	●
	Direct host (64 KByte/s)	●	●	●	●	●	●	●	●
	DATEX-L (direct call)	○	○	○	X	○	X	○	X
DTE (X.20)* asynchronous	Direct	●	●	●	●	●	●	X	X
	DATEX-L (switched)	○	○	○	X	○	X	X	X
DTE (X.21)* synchronous	Direct	●	●	●	●	X	X	●	●
	DATEX-L (switched)	○	○	○	X	X	X	○	X

● possible
○ implementation may be at later point
X not planned
* realized through the PAD function of DATEX-P

Interconnections between DATEX-P network nodes and connections to international packet switched data are provided by 64 kBit/s links.

e) International connections from DATEX- P (country code Austria: 232)

At the end of 1982 the DATEX-P network is interlinked with the West German DATEX-P network (country code: 262) and for 1983 it is planned to make connection to the Swiss PTT packet switched data network (country code: 228). Through the West German network when agreement with the respective PTT is achieved it will be possible to reach the following PTT networks: The Netherlands (202), Belgium (206), France (208), Spain (214), Italy (222), United Kingdom (234), Denmark (238), Sweden (240), Luxembourg (270), Ireland (272), Canada (303), USA (310), Japan (440). Connection of the DATEX-P network to oversees will most likely be done through the node of RADAUS in Vienna.

f) Application to the service

Applications are sent in a letter to the responsible PTT Directorates:

PTD Vienna, Abt. 17, Bäckerstrasse 1, A-1010 Wien

PTD Linz, Abt. 5, Huemerstrasse 4, A-4020 Linz

PTD Innsbruck, Abt. 6, Maximilianstrasse 2, A-6010 Innsbruck

PTD Graz, Abt. 6, Neutorgasse 46, A-8011 Graz

PTD Klagenfurt, Abt. 4, Sterneckstrasse 19, A-9020 Klagenfurt

3.4.4. Telepost

A facsimile service (Telepost) with group 2 equipment has been offered since 1981. In the initial phase, equipment are located in 60 post offices, further 13 are to be connected soon. Compatible equipment for use in subscribers premises are approved so that a facsimile service (Telefax) may also be provided. The transmission time for an A4 page over the PSTN of analogue facsimile data is 3 minutes, and the telepost service guarantees that the recipient will receive the transmitted page in about 3 hours.

The cost of this service is Austrian Schillings 45 for the first page and 25 for any subsequent pages. Major advantage of the system is that telepost is faster than express mail and it is cheaper than telegrams, in addition also drawings can be transmitted.

3.4.5. Videotex (Bildschirmtext)

The Austrian videotex trial (called Bildschirmtext) with 300 participants started in 1981. The national videotex network is a starlike system with a central GEC computer located at the FZA in Vienna. As an experiment, the German version of the British Prestel system--with alphamosaic coding--was taken over. Telephone connection from all over Austria is provided for local call charges.

a) Technical characteristics of the trial system:

- Transmission speed: videotex computer to subscriber 1200 bit/sec, subscriber to videotex computer 75 bit/sec

- Transmission mode: asynchronous, duplex
- Transmission code and protocol: videotex code according to Prestel (10 bit/character; startbit, 7 databits, parity bit, stop-bit), higher level protocols also according to Prestel.

b) Applications supported in the:

- information retrieval
- message sending including gateway to traditional mail service (expected to start in 1983)
- transactions, ordering
- games
- teleprograms.

c) Terminals

All equipment, such as TV and editing computers have to be approved by the PTT. Among the terminals in use is MUPID, the first intelligent videotex decoder in the world developed by the Technical University of Graz at the request of the PTT, and with the support of the Federal Ministry for Science and Research, which allows a number of new original applications. MUPID is also used to provide the experimental gateway function to external service computers, such as to a bank computer [7,8].

Future Plans

The first national videtotex system will be put into operation in 1984. Austria is taking over the new CEPT videotex standard for its new system. The data communication backbone of the service will be the national

DATEX-P packet switched network with speeds of 64 kbit/sec (Figure 5). Transmission speed between terminals and videotex center will be the classical 1200/70 bit/sec asynchronous full duplex, and 2400 bit/sec in asynchronous and duplex transmission mode. Connection through the DATEX-L and DATEX-P network and through the teletex service will be possible too. Links to videotex networks abroad will also be provided through the DATEX-P network. The PTT hopes that videotex in Austria will have 4000 subscribers in 1984 which would grow to 100,000 subscribers not before 1987. In the first version of videotex 100,000 frames of information will be stored and an additional 30,000 frames will be reserved for messages and transactions.

3.4.6. Teletex Services

Teletex in Austria is based on the DATEX-L 2400 synchronous service of the Austrian PTT. By this transmission, messages of A4 format take less than 10 seconds. Gateways to the national and international telex networks will be provided. First links to the FRG teletex service were established in August 1982. Connection to other national teletex networks are also envisaged, such as to Switzerland and Italy, and over Germany to Sweden. In countries such as the United Kingdom, the Netherlands and France, where teletex will be based on the national packet switching service, connection through X.71 is foreseen, as is a connection to the future Hungarian teletex system. The introduction of teletex took place in 1982, when the appropriate DATEX-L 2400 synchronous services were introduced.

a) Technical characteristics:

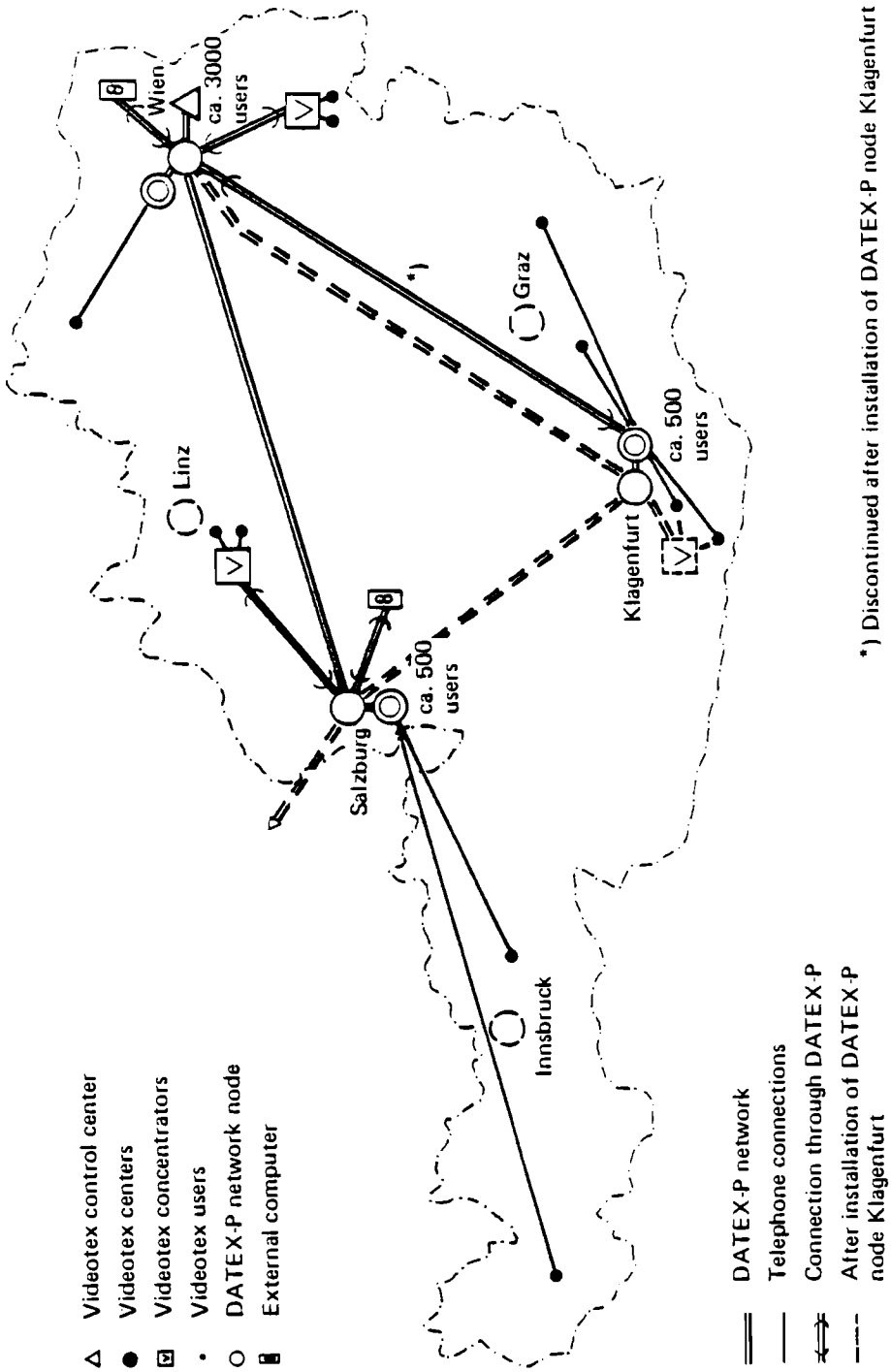


Figure 5. Phase 1 of the Austrian national videotex network in 1984.

- Transmission speed: 2400 bit/sec (according to CCITT recommendation X.1 class 4)
- Transmission mode: synchronous, duplex
- Transmission code and protocol: teletex protocol with the following CCITT recommendations (Figure 6)

- X.21 -- interface between data terminal equipment and data circuit terminating equipment for synchronous operation on public data network
- S.70 -- network independent basic transport service for teletex (in connection with X.75)
- S.62 -- control procedures for teletex
- S.61 -- character repertoire and coded character sets for the international teletex service
- S.60 -- terminal equipment for use in the teletex service
- F.200 -- Teletex service.

4. LEASED PRIVATE CIRCUITS

4.1. General Information

Private leased telegraph, telephone, and wideband circuits are available from the PTT. All equipment operated in conjunction with private leased circuits is subject to a PTT license. Access of private leased circuits to the public networks may be authorized, in which case increased rental tariffs are payable.

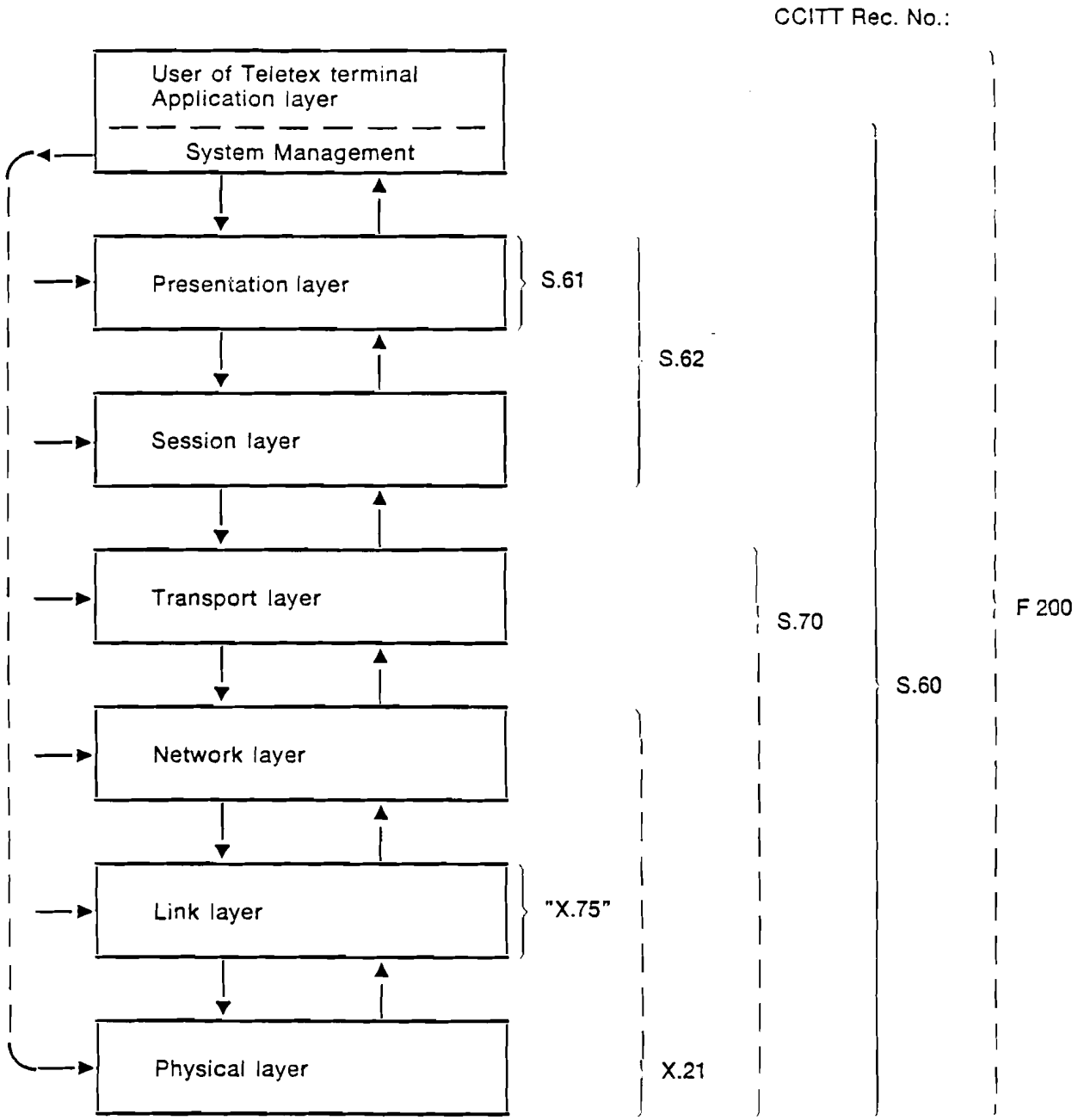


Figure 6. CCITT recommendations relevant to Teletex.

4.2. Telegraph Circuits

Telegraph circuits are available for serial and digital transmission up to 200 bauds. Two-wire and four-wire connections can be provided. All data terminal equipment for telegraph circuits has to be provided by the subscriber.

4.3. Speech Band Circuits

Private leased telephone circuits with two-wire or four-wire connections can be provided by the PTT. Normal and special quality (CCITT M1020) circuits are available, the latter normally being required for transmission in excess of 2400 bit/s up to 9600 bit/s.

Multipoint configuration circuits can be provided by the PTT using PTT branching equipment. Up to six remote stations can be connected to a central station.

4.4. Wideband Circuits

Depending on the exact location of the terminal sites, wideband circuits of bandwidths 48 kHz, 240 kHz, 5MHz, and 10 MHz can be provided.

5. INTERNATIONAL SERVICES

5.1 General Information

When discussing the different data and other telecommunication services earlier references were made to international connections. In this chapter we give a summary of those and describe the present status quo of international links and policy implementations with hints to future directions.

Data transmission is possible internationally via the telex network, the PSTN, the different data networks or international private leased circuits. Private leased circuits for international transmission can be provided to normal voice grade quality or the specially conditioned CCITT M-1020 quality.

5.2. Present and Proposed Public Data Network Interconnections

It is planned that the new Austrian Public Data Network, based on Siemens circuit-switched EDS exchange on the one hand (DATEX-L), and the Canadian made Northern Telecom public packet switched network on the other, will be increasingly interconnected to other national public data networks.

At the time of writing, the oldest domestic data network of the PTT in operation (DATEX-300L) is connected to similar data networks in the FRG and Switzerland. It can also be expected that the DATEX-L network will be interconnected with the Hungarian NEDIX network soon. The interconnection with the Hungarian asynchronous DATEX-300L network will not be particularly difficult. The higher speed synchronous connections (2400 bit/sec; 4800 bit/sec), however, will need a so-called "envelope conversion" with an envelope structure according to the CCITT X.50 recommendation on the Hungarian NEDIX network and an envelope structure according to the CCITT X.51 recommendation on the Austrian DATEX-L network. Because of relevant CCITT recommendations the conversion has to be performed by the Austrian PTT.

The DATEX-P PTV packet switching network is planned to be linked to other PTT packet switching networks, with links to the West German

DATEX-P network planned from the outset. Plans for a future connection to the EURONET network could not yet be realized because no agreement between Austria and the European Community in Brussels could be reached. Thus, the experimental node of the Austrian EURONET connection--run at the Technical University of Vienna--will not be able to provide public services for Austria. The experimental EURONET node of the University had a 9600 baud X.25 packet switching connections to the EURONET node in Frankfurt and ran on a PDP 11/34 computer. Early 1982 due to lack of agreement the line to Frankfurt and the pilot access project was cancelled. Plans for the interconnection of Western European PTT packet switched data networks, however, also exist and are shown in Figure 3.

The interconnection of these networks is proceeding well. According to [3]:

> DATEX-P, the German public packet switched data network, is already connected to Euronet as well as to TRANSPAC (France) and PSS, the British Packet Switched Service, and to Scandinavian (NORDIC network).
>
> This development is one further stage in the far-reaching plans of the European Postal and Telecommunications Administrations (PTTs) to improve international and, later, intercontinental telecommunications facilities, benefiting directly users of online information services.
>
> In Europe, France, the UK and the Federal Republic of Germany have installed international gateway systems which act as switches between their national networks and the rest of the world.

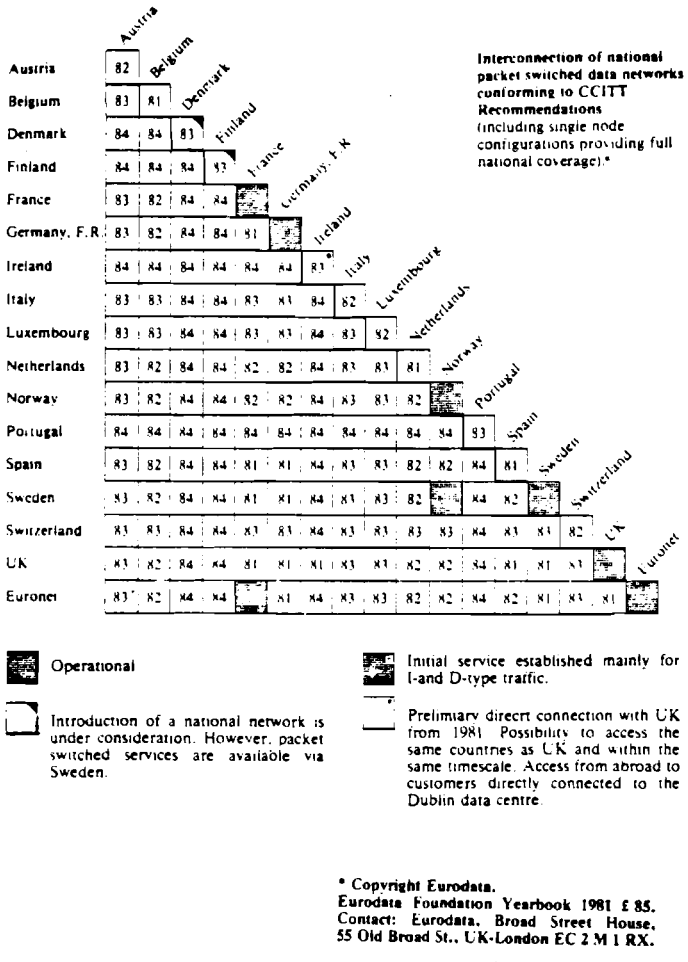


Figure 7. Interconnection of West European national packet switched data networks.

world. The French International Transit Node (NTI) in Paris, for example, is already connected with the USA, all EEC countries and Switzerland through EURONET and by bilateral links to Spain, Portugal and the Antilles. Further connections include the Canadian networks DATAPAC and INFOSWITCH and the Japanese DDX-P.

British Telecom and the Deutsches Bundespost has similar plans and these three countries will probably constitute the main Western European switching sites for intercontinental traffic.

Naturally some countries may choose to operate their own international switching facilities, but others have already opted in the short-term to transit their international connections over Paris, London or Frankfurt.

The diagram (Figure 8) describes the probable shape of worldwide interconnections over the next few years, however it is by no means complete. This view is drawn with some modifications, from a comprehensive review of packet switched networks by Michael Casey [2].

The Austrian PTT network interconnection to DATEX-P would also be linked to this large mesh of emerging PTT networks.

Radio Austria--the second international carrier of Austria--established its data network node in 1978, and the first transmission service, called RADUSDATA, was between the USA and Austria [4]. During the first few years of its operation Radio Austria served as the Austrian node of the TYMNET network, which is one of the largest public networks in the US. The USA part of the TYMNET network has gradually been extended by

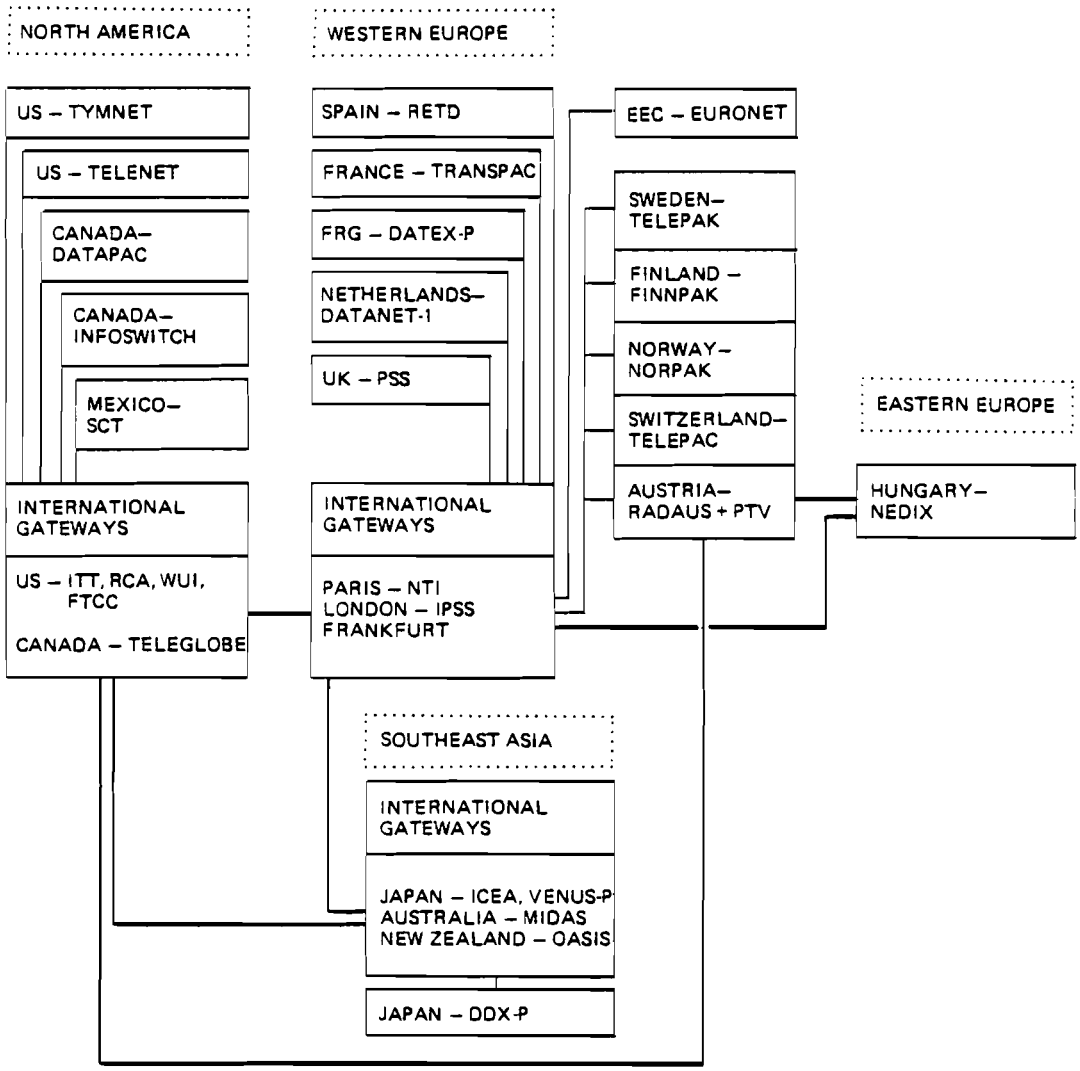


Figure 8. International network interconnections in Western Europe.

(probable shape)

leased lines between the USA and remote destinations outside the country, operated by US international carriers. The remote network nodes, usually operated by the national PTT or similar administrations, provide services to TYMNET and vice versa for domestic and US users respectively. This has been Radio Austria's main function in this field too: they have serviced a number of Austrian users seeking US databases and computational services, and have also provided the necessary technical means for foreign customers to obtain access to the Austrian TYMNET hosts, such as the International Atomic Energy Agency (IAEA) and their databases INIS and AGRIS; the International Patent Documentation Center (INPADOC) and their patent databases; and to IIASA's inhouse computers, to carry out joint research.

The increase in traffic on the TYMNET node of Radio Austria has been growing at a considerably high growth rate: over 150% per year (Figure 8). The data services of the Radio Austria node have been gradually extended according to an agreement between Radio Austria and the Austrian PTT. In 1981 a connection to the TYMNET node of Radio Swiss--the Swiss equivalent to Radio Austria in Bern--was established with the aim of increasing the reliability of the Vienna-New York cable connection by setting up a "reserve" route over the node in Bern. An interesting side effect of this link was that the first Swiss database host DATA-STAR (operated by Radio Swiss) could be accessed for the first time from Austria. This possibility urged for a special agreement between Radio Austria and Radio Swiss and accordingly, under the present rules, Radio Austria may now establish and operate links to other data services in Europe on a temporary basis until such a time as the appropriate PTT data services are

able to take over.

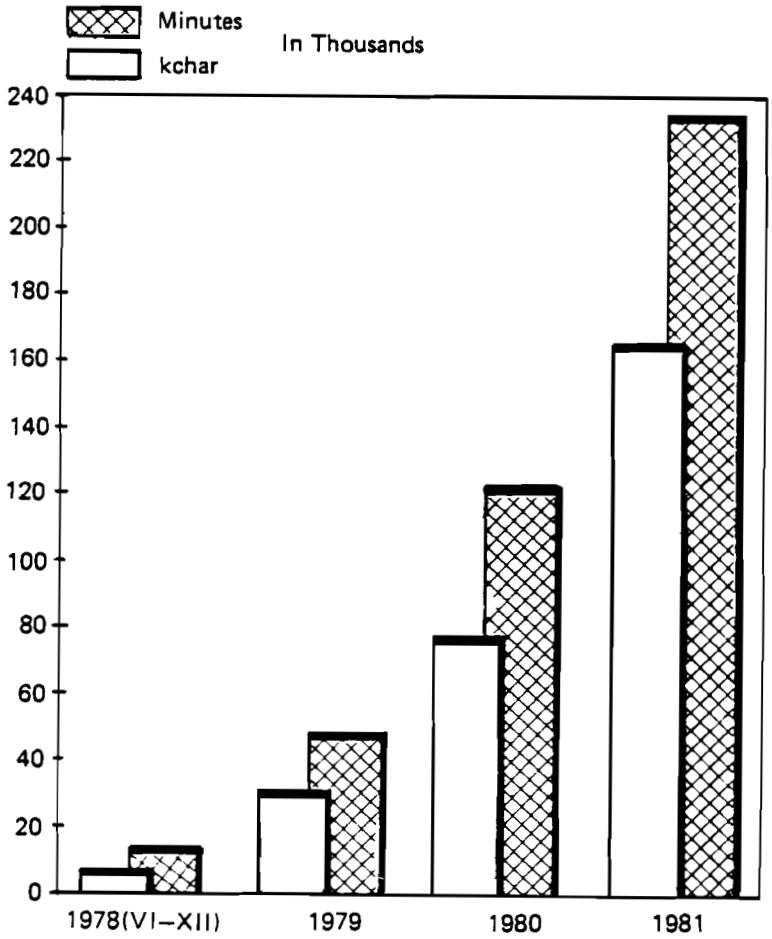


Figure 9 Data traffic of the TYMNET node of Radio Austria.

Along the same lines, inter-European links have been established and are serviced by Radio Austria. The first link they took over was the direct IAEA-Europan Space Agency (ESA) link, which also became the first public data link between Austria and Italy. The protocol for data transmission corresponds with the packet switched protocol of the TYMNET network. This new connection was introduced at the beginning of 1982 and for the first time Austria users were able to access some 40 bibliographical and statistical databases of the IRS service of ESA.

During the summer of 1982, further new links were put into operation. The connection between the Radio Austria node and the German DATEX-P network node in Frankfurt became available for the first time. Of course, this link to the West German PTT network also enabled the physical connection of all those networks to which the German PTT network was already connected, for example, to TRANSPACK in France, the PSS in the United Kingdom, and NORDIC, the Scandinavian network. In July 1982 the link with the Hungarian NEDIX-PTT network went fully into operation. About the same time, a separate cable link was opened between the TYMNET node and CTNE, the Spanish PTT administration, and through this link the Spanish packet switched PTT network hosts could be accessed and vice versa.

All in all, with the massive efforts of both Radio Austria and the Austrian PTT, Austria is gradually becoming integrated into the growing data communication infrastructure of the world.

6. AUSTRIAN TARIFFS

All tariffs are valid from the 1st January 1982 and are quoted in local currency (Austrian Schilling AS). All services are free of tax.

6.1 Inland Tariffs

Exchange line service

	Monthly rental AS
Exchange line	160.00
Extra charge for data transmission	180.00

Connection charges are especially assessed on time and materials basis.

Inland telephone call charges

Charge per minute Kilometers	Local (Same Area) < 5	Trunk 1 5-25	Trunk 2 25-50	Trunk 3 50-100	Trunk 4 > 100
Standard rate (Mon-Fri 0800-1800)	0.50	1.00	4.00	6.50	7.50
Reduced rate (Mon-Fri 18.00-08.00) (Fri 18.00-Mon 08.00)	0.50	0.50	3.00	4.00	5.00

Telex

Installation fee:	Includes actual costs but with a minimum of AS 1,750.--
	Monthly rental AS
Telex line	300.00
Maintenance charge (per telex machine)	550.00

Note: Telex machine maintenance is available from PTV and the rate sometimes varies, depending on the installation. The rate quoted is the normal rate for maintenance.

Inland telex call charges

Charge for each 3 minute period or part thereof	Local (same exchange) AS	Trunk 1 (same province) AS	Trunk 2 (adjacent province) AS	Trunk 3 (non-adjacent province) AS
Standard Rate (08.00-18.00)	0.85	5.10	10.20	12.75
Reduced Rate (18.00-08.00)	0.85	3.40	6.80	8.50

Note: Non-local telex call charges given in the above table are based on the division of Austria into nine autonomous Provinces (Bundeslaender), the Provinces of Vienna and Lower Austria counting as a single Province for charging purposes.

Datex-L 300 (DDL 300)

Installation fee:	actual costs but with a minimum of AS 1,750.–
	Monthly rental AS
Datex line (300 bit/s)	650.00

Datex call charges (300 bit/s)

Charge for each 3 minute period or part thereof	Local (same exchange) AS	Trunk 1 (same province) AS	Trunk 2 (adjacent province) AS	Trunk 3 (non-adjacent province) AS
Standard rate (08.00-18.00)	1.275	7.65	15.30	19.125
Reduced rate (18.00-08.00)	1.275	5.10	10.20	12.75

In 1983 a new DATEX-L tariff structure will be introduced and will consist of the following time charges:

Charge for each minute or part thereof	Local (same Datex exchange) AS	Trunk 2 (Austria wide) AS	International (FRG, Switzerland) AS
Standard rate (08.00-18.00)	-.90	4.20	6.06
Reduced rate (18.00-08.00)	-.60	2.82	6.06

Note: For every successful call an additional AS -.30 will be charged.

DDL-300

	AS
Installation fee:	Minimum 1,750.–
Monthly rental	120
Monthly line charges per km:	
Less than 10 km	150
Between 10-50 km	75
Between 51-100 km	65
More than 101 km	30

Bildschirmtext (Videotex)

	AS
Installation fee:	750
Monthly modem rental:	200
Connection fee to videotex center:	local phone tariff
Access charge per frame:	defined by Information provider (between 0-50)
Monthly charge for Information providers:	100 (incl. 10 free frames)
Monthly frame reservation charges:	AS per frame
Between 11-100	7
Between 101-500	6
Between 501-1000	5
More than 1001	3
Closed user group:	500 per month
MUPID terminal rental:	90 per month

Telepost

First page (A4 format or smaller)	AS 45
Subsequent pages (A4 or smaller)	AS 25

Connection charges are specially assessed on time and materials basis.

Additional charges on the above tariffs are:

1. For data transmission usage	25% increase
2. For multi-user usage	50% increase

3. Provision of access to PSTN	AS 2,000 per month
4. Circuits to M1020 quality	AS 4,000 per month

Multipoint circuits

Multipoint configuration circuit tariffs are specially assessed. Reference to PTV should be made.

Wideband circuits

Monthly rental	48 KHz AS	240 KHz AS
First 10 km per 100 meters	150.00	650.00
Next 40 km per km	1,300.00	5,000.00
Next 50 km per km	1,000.00	4,000.00
Further kms per km	500.00	2,000.00

Wideband circuits are subject to a minimum lease period of one month. Connection charges are specially assessed on a time and materials basis. Additional charges on the above tariffs are:

1. For other type of communication (e.g., speech, facsimile) in addition to data transmission	25% increase
2. Multi-user usage	50% increase

Tariffs Planned for New Services

At the time of writing no revenues are collected for a number of the new services outlined above. It is planned to start charging users in the middle of 1983; thus exact tariffs will only be introduced at that time.

However, we provide a preliminary tariff structure for these services in the following.

DATEX-L Synchronous (2400, 4800, 9600 bit/sec)

1. Installation fee: Actual costs but with a minimum of AS 1,750.--

2. Monthly charges per station in AS:

	Transmission speed in bit/sec		
	2400	4800	9600
Monthly rental	1300	2200	4000
Special services --closed user group	200		

3. Connection charges in AS (between 1800 and 0800; night fares being reduced by one-third).

	Transmission speed in bit/sec		
	2400	4800	9600
Charges per minute			
- Regional (within the same DATEX exchange)	3.60	5.70	7.86
- National wide service	6.90	10.98	15.06

4. Gateway service from DATEX-L to DATEX-P AS 200 per month

DDL-Synchronous

1. Installation fee: Actual costs but with a minimum of AS 1,750.--

2. Monthly charges per station in AS:

	Transmission speed in bit/sec			
	2400	4800	9600	48000
Monthly rental	1300	2200	4400	6000
Line charges --regional --national		 2600 5800		

DATEX-P

1. Installation fee: Actual costs but with a minimum of AS 1,750.--

2. Monthly charges per station in AS:

	Transmission speed in bit/sec				
	300	2400	4800	9600	48000
Monthly rental	650	1300	2200	4000	6000
Additional charge per virtual channel	40				
Special services --closed user group --"toll-free" call service	200 100				
Gateway between DATEX-L and DATEX-P	200	200	200	200	---

3. Connection charges in AS (reduced by 33.3% during the period 18.00 and 06.00)

	Transmission speed in bit/sec				
	300	2400	4800	9600	48000
Connection charge per minute --regional --national	 0.06 0.10	 0.08 0.14	 0.10 0.19	 0.14 0.26	 0.30 0.56
Volume charges per 1000 segments* --regional --national			 14.00 26.00		

*1 segment = 64 Octetts = 512 bits

DDP

1. Installation fee: Actual costs but with a minimum of AS 1,750.--

2. Monthly charges per station in AS:

	Transmission speed in bit/sec				
	300	2400	4800	9600	48000
Monthly rental*	650	1300	2200	4000	6000
Additional charge per virtual channel					
--regional	250	340	420	590	1260
--national	420	590	800	1100	2350

3. Usage charges in AS (reduced by 33.3% between 18.00 and 06.00)

	Transmission speed in bit/sec				
	300	2400	4800	9600	48000
Volume charges per 1000 segments**					
--regional			14.00		
--national			26.00		

*If DATEX-P channels are also rented there are no DDP charges.
**1 segment = 64 octetts - 512 bits.

Teletex

1. Telex charges are identical with those of DATEX-L 2400 synchronous.

2. Charges for gateway teletex/telex connections are according to the telex tariffs in both directions. This also holds for international connections.

Inland Private Leased Circuits

Telegraph circuits (2-wire)

Monthly rental	50 bauds AS	100 bauds AS	200 bauds AS
First 10 km per 100 meters	15.00	15.00	15.00
Next 40 km per km	50.00	60.00	75.00
Next 50 km per km	40.00	45.00	65.00
Further kms per km	20.00	25.00	30.00

Note: Telegraph circuits (4-wire) are charged at double the above tariffs and connection charges are specially assessed on time and materials basis. There is an extra charge for provision of access to the Public Telex Network of AS 2,000.-- per month.

Speech Band Circuits

Point-to-point Circuits

Monthly rental	Normal quality (2-wire) AS	Normal quality (4-wire) AS
First 10 km per 100 meters	15.00	30.00
Next 40 km per km	125.00	250.00
Next 50 km per km	100.00	200.00
Further kms per km	50.00	100.00

6.2 International Tariffs

Tax: All services are free of tax

Country	Telex call charges			Telephone call charges		
	No of secs for 0.85$	Charge per minute $	Min charge 3 mins $	Automatic service zone	Operated connected service Charge per minute $	Min charge 3 mins $
Albania			86.40	—	25.—	75.—
Andorra	10.0	5.10		2	17.—	51.—
Balearic Islands	8.2	6.23		3	20.—	60.—
Belgium	10.0	5.10		2	17.—	51.—
Bulgaria	8.2	6.23		—	25.00	75.00
Canary Islands	8.2	6.23		3	20.—	60.—
Cyprus	6.7	7.65		3	20.—	60.—
Czechoslovakia	10.0	5.10		1	14.—	42.—
Denmark	10.0	5.10		2	17.—	51.—
Faroe Islands	10.0	5.10		2	17.—	51.—
Finland	8.2	6.23		3	20.—	60.—
France	10.0	5.10		2	17.—	51.—
German Democratic Republic	10.0	5.10		2	17.—	51.—
German Federal Republic — Band 1	10.0	5.10		1	14.—	42.—
— Band 2				2	17.—	51.—
Gibraltar	8.2	6.23		—	20.—	60.—
Greece	8.2	6.23		3	20.—	60.—
Hungary	10.0	5.10		1	14.—	42.—
Iceland	6.7	7.65		3	20.—	60.—
Ireland	8.2	6.23		3	20.—	60.—
Italy — Band 1	10.0	5.10		1	14.—	42.—
— Band 2				2	17.—	51.—
Liechtenstein	10.0	5.10		1	14.—	42.—
Luxembourg	10.0	5.10		2	17.—	51.—
Malta	6.7	7.65		3	20.—	60.—
Monaco	10.0	5.10		2	17.—	51.—
Netherlands	10.0	5.10		2	17.—	51.—
Norway	8.2	6.23		3	20.—	60.—
Poland	10.0	5.10		2	17.—	51.—
Portugal	8.2	6.23		3	20.—	60.—
Rumania	8.2	6.23		—	17.—	51.—
San Marino	10.0	5.10		2	17.—	51.—
Spain	8.2	6.23		3	20.—	60.—
Sweden	8.2	6.23		3	20.—	60.—
Switzerland	10.0	5.10		1	14.—	42.—
Tunisia	6.7	7.65		3	15.00	45.00
Turkey	6.7	7.65		3	15.00	45.00
United Kingdom	8.2	6.23		3	20.—	60.—
USSR	6.7	7.65		3	15.00	45.00
Vatican City	10.0	5.10		2	17.—	51.—
Yugoslavia — Band 1	10.0	5.10		1	14.—	42.—
— Band 2				2	17.—	51.—
Algeria	6.7	7.65		3	15.00	45.00
Argentina		72.00		5	56.00	168.00
Australia		72.00		5	56.00	168.00
Brazil		72.00		5	56.00	168.00
Canada		40.00		4	41.00	123.00
Colombia		72.—		5	56.—	168.—
Ecuador		72.—		5	56.—	168.—

International Tariffs continued

Country	Telex call charges: No of secs for 0.855	Telex call charges: Charge per minute S	Telex call charges: Min charge 3 mins S	Telephone call charges: Automatic service zone	Telephone call charges: Operated connected service: Charge per minute S	Telephone call charges: Operated connected service: Min charge 3 mins S
Egypt		54.—		4	41.—	123.—
Gabon		72.—		5	56.—	168.—
Indonesia		72.00		5	56.00	168.00
Iran		54.00		4	41.00	123.00
Iraq		54.00		4	41.00	123.00
Israel		40.00		4	41.00	123.00
Japan		72.00		5	56.00	168.00
Korea, Republic of		72.—		5	56.—	168.—
Kuwait		54.00		4	41.00	123.00
Lebanon		40.00		4	41.00	123.00
Libya		7.65		3	15.—	45.—
Morocco		7.65		3	15.—	45.—
New Zealand		72.—		5	56.—	168.—
Nigeria		72.00		5	56.00	168.00
Philippines		72.—		5	56.—	168.—
Saudi Arabia		54.00		4	41.00	123.00
South Africa		72.00		5	56.00	168.00
Syria		40.—		4	41.—	123.—
United Arab Emirates		54.00		4	41.00	123.00
USA		40.00		4	41.00	123.00
Venezuela		72.00		5	56.00	168.00

Charge per minute (Automatic services)	S
Zone 1	9.00
Zone 2	11.50
Zone 3	14.00
Zone 4	40.50
Zone 5	55.50

International Leased Circuit Tariffs

The tariffs below represent only amounts payable to the Austrian Administration.

Short term rentals are possible for both national and international private leased circuits. The tariffs for temporary leases of international circuits are calculated on the basis of CCITT Recommendation D1 and are as follows:

1st & 2nd day	1/10 of normal monthly rental
For each of the next 8 days	1/20 of normal monthly rental
Thereafter	1/25 of normal monthly rental

International Leased Line Rates (AS/month)

Country	Speech band Coefficient 1	Speech band Coefficient 0.75	Speech band M1020 quality Additional rental	200 bauds	100 bauds	50 bauds
Belgium	38.304.00	28.728.00	1.425.00	15.321.60	11.491.20	9.576.00
Bulgaria	37.346.40	28.009.80	1.425.00	14.938.60	11.204.00	9.336.60
Cyprus	54.583.20	40.937.40	1.425.00	21.833.30	16.375.00	13.645.80
Czechoslovakia	28.728.00	21.546.00	1.425.00	11.491.20	8.618.40	7.182.00
Denmark	40.219.20	30.164.40	1.425.00	16.087.70	12.065.80	10.054.80
Finland	48.358.80	36.269.10	1.425.00	19.343.60	14.507.70	12.089.70
France	38.304.00	28.728.00	1.425.00	15.321.60	11.491.20	9.576.00
German Democratic Republic	31.122.00	23.341.50	1.425.00	12.448.80	9.336.60	7.780.50
German Federal Republic	32.558.40	24.418.80	1.425.00	13.023.40	9.767.60	8.139.60
Greece	45.007.20	33.755.40	1.425.00	18.002.90	13.502.20	11.251.80
Hungary	27.770.40	20.827.80	1.425.00	11.108.20	8.331.20	6.942.60
Italy	33.516.00	25.137.00	1.425.00	13.406.40	10.054.80	8.379.00
Luxembourg	37.346.40	28.009.80	1.425.00	14.938.60	11.204.00	9.336.60
Netherlands	38.782.80	29.087.10	1.425.00	15.513.20	11.634.90	9.695.70
Norway	45.964.80	34.473.60	1.425.00	18.386.00	13.789.50	11.491.20
Poland	32.079.60	24.059.70	1.425.00	12.831.90	9.623.90	8.019.90
Rumania	32.079.60	24.059.70	1.425.00	12.831.90	9.623.90	8.019.90
Spain	45.007.20	33.755.40	1.425.00	18.002.90	13.502.20	11.251.80
Sweden	40.698.00	30.523.50	1.425.00	16.279.20	12.209.40	10.174.50
Switzerland	36.388.80	27.291.60	1.425.00	14.555.60	10.916.70	9.097.20
Turkey	51.710.40	38.782.80	1.425.00	20.684.20	15.513.20	12.927.60
United Kingdom	44.049.60	33.037.20	1.425.00	17.619.90	13.214.90	11.012.40
USSR	36.388.80	27.291.60	1.425.00	14.555.60	10.916.70	9.097.20
Yugoslavia	30.643.20	22.982.40	1.425.00	12.257.30	9.193.00	7.660.80
USA and Canada	91.200.00	—	1.425.00	36.480.00	27.360.00	* 22.800.00

*75 baud: 25.080.00

International Tariffs

Tariffs for Data Services Provided by Radio Austria

	Country			
Charges in AS	FRG (DATEX-P) & via it to France & UK	Switzerland (Radio Swiss-DATASTAR)	Italy (ESA, Frascati)	North-America (USA,Canada)
Traffic charges for every started minute through telex PSTN*, data network	1.80	1.80	3.00	6.00
Traffic charges for every started minute through dedicated line to Radio Austria	1.20	1.20	1.50	3.00
Volume charge for every started kilo-character of input or output	0.05	2.00	4.00	8.00

7. CONTACT POINTS

7.1 Fernmeldetechnisches Zentralamt (FZA)

FZA, the Telecommunications Engineering Centre, is the contact point for Permission to Attach Equipment, for Domestic and International Service information and can be contacted at:

Fernmeldetechnisches Zentralamt
Arsenal
1030 Wien

Telephone: 78 15 11 Extensions 280, 281, 284, 286
Telex: 133722

Both German and English languages are accepted for telexes and written communication.

7.2 Regional Directorates

For national service information for Vienna, Lower Austria, and Burgenland:

Post- und Telegraphendirektion fuer Wien,
Niederoesterreich und Burgenland
Baeckerstrasse 1
1010 WIEN

Telephone: 52 68 11
Telex: 112352

For Upper Austria and Salzburg:
Post- und Telegrahendirektion fuer Oberoesterreich
und Salzburg

Huemerstrasse 4
4020 LINZ

Telephone: 721
Telex: 21105

For Tirol and Vorarlberg:

Post- und Telegrahendirektion fuer Tirol
und Vorarlberg
Maximilianstrasse 2
6020 INNSBRUCK

Telephone: 26761
Telex: 53599

For the Steiermark:

Post- und Telegraphendirektion fuer Steiermark
Neutorgasse 46
8020 GRAZ

Telephone: 91 22 33
Telex: 31530

For Carinthia:

Post- und Telegraphendirektion fuer Kaernten
Sterneckstrasse 19
9020 KLAGENFURT

Telephone: 7951
Telex: 42338

8. THE AUSTRIAN DATA LAW

The first data protection law in Europe was introduced in 1969 in Hessen (FRG). In 1972 it was Sweden which followed this step. Later data laws were issued in France, Denmark, Laxenburg, Norway, the FRG. In the USA, Canada and new Zeeland there are data protection laws in force for certain application areas. From the socialist countries it was Hungary which first released a special data protection and security regulation in 1981. In international forums guidelines were issued by the OECD and the Council of Europe on the protection of privacy of computer readable information. There is a strong tendency to harmonize internationally the different data laws and regulations; this with special emphasis to the understanding of transborder data flow issues and the solutions of some of the problems involved.

Austria, a country with an open economy and open information flow, has issued its data protection law (Datenschutzgesetz or DSG for short) [8, 10] in 1978, and a novellation thereof is expected by 1984. The main emphasis of the data law lies on the protection of personal data, which includes in Austria also protection of data of so-called legal persons, such as of a company, a village, a country, etc.

Special emphasis is given to the transborder data flow of data, which according to the law has to be registered by the so-called Datenschutzregister, a registration instance belonging to the Central Statistical Bureau of Austria. Applications to such registration has to be submitted on special application form and for the registration entry charges have to be paid.

For the export of computer readable information including personal data with the intention of processing abroad according to § 32 - § 34 of DSG a permission from the Data Protection Commission (Datenschutzkomission) of the government (Vienna 1, Ballhauspl. 2) is needed. In the application for such permission the nature of the data to be exported has to be described, the aim of the export and the recipients of the data and it has to be explained how it is assured that the interests of the data subjects will be protected abroad.

The importing of computer data is free and is not subject of the data protection law.

The Federal Government and the so-called Data Protection Council of the National Assembly have to report to the National Assembly every two years on the issue of data protection. More on the Austrian DSG can be found in [12].

9. SUMMARY

Austrian data communication services are developing rapidly with a proliferation of different services being offered by the Austrian PTT and Radio Austria. According to the general policy of the administration in all seven layers of the ISO model for Open System Interconnection, different types of data services are provided by the PTT: the usual data services on the physical level, circuit and packet switching services up to layer 3, and finally teletex and videotex services up to the higher layers.

At the time of writing, the development phase of these new services were just completed, and it is hoped that they will provide sufficient infrastructure for future data communication both domestically and internationally. It is also expected that Austria will be able to successfully fulfill its special role in data communication between East and West.

ANNEX 1: LIST OF APPROVED MODEMS IN AUSTRIA

Coding of the So-called PTT-'Ordnungsnummer'

HHH	SSS	LLL	'PTV-ORDNUNGSNUMMER' (9-POSITION)
100	...	...	MAIN GROUP : DATA TRANSMISSION EQUIPMENT
...	SSS	...	CHARACTER GROUP
			1. POSITION: TRANSMISSON OVER 1. Public switched telephone network (PSTN) 2. Leased telephone lines 3. PSTN + leased lines 4. Radio link 5. Telex network 6. Leased telegraph network 7. Telex network + leased telegraph network 8. Special network 9. Others 2. POSITION: CONNECTION 1. Two wired 2. Four wired 3. Two or four wired (switchable) 4. Accoustic 3. POSITION: DATA TRANSMISSION SPEED 1. <= 50 BD 2. <= 75 BD 3. <= 100 BD 4. <= 300 BD 5. <= 1200 BD 6. <= 2400 BD 7. <= 4800 BD 8. <= 9600 BD 9. > 9600 BD
...	...	LLL	SEQUENTIAL NUMBERING IN THE MAIN GROUP

LIST OF APROVED MODEMS BY THE AUSTRIAN PTT

As of 1982/11/12

Code-number	'Ordnungsnummer'	Type
		SAT / SCHRACK
0101	100 227 044	Codex 4800
0102	100 228 044	Codex 7200
0103	100 228 045	Codex 9600
0104	100 227 112	Codex LSI 48 I
0105	100 228 113	Codex LSI 96/V29
0106	100 228 114	Codex LSI 96/FP
0107	100 238 130	Codex SAT 8200
0108	100 228 128	Codex LSI 48FP
0109	100 115 140	Codex 5540, Codex 5544
0110	100 336 144	Codex 5510, Codex 5513
0111	100 238 150	19 K2 B J T
0112	100 225 151	5440
0113	100 336 153	M X 2400
0114	100 227 162	Modem CS 48 FP
0115	100 228 163	Modem Codex CS 96 FP
		IBM-AUSTRIA
0303	100 114 034	IBM 3976/2
0304	100 335 010	IBM 3976/3
0305	100 336 035	IBM 3977/1
0306	100 336 035	IBM 3977/2
0307	100 226 018	IBM 3978/2
0308	100 235 051	IBM MINI 12
0309	100 227 048	IBM 3878/14
0310	100 226 055	IBM 3872
0311	100 228 056	IBM 3875
0312	100 227 072	IBM 3874
0313	100 215 082	IBM MINI 6x6
0315	100 228 091	IBM 5979/L11 or L12
0316	100 611 004	IBM 3945
0317	100 227 142	IBM 3864 MOD.I
0318	100 226 141	IBM 3863 MOD.I
0319	100 228 143	IBM 3865 MOD.I and MOD.II
0320	100 116 146	IBM 3863 MOD.II
		TEKADE, NUERNBERG
0401	100 227 092	DTE 310
0402	100 228 093	DTE 320
0403	100 228 094	DTE 330
		ITT-Austria Datensysteme Ges.M.B.H.
*0501	100 314 005	GH 1101-H
*0502	100 335 003	GH 2002

*0503	100 335 025	GH 2002-H/J/N/K/L/Q
*0504	100 336 029	GH 2003-R
*0505	100 334 059	GH 1151 A,C
0506	100 335 058	GH 2052 A/B/C/F/G/K
0507	100 336 057	GH 2054 A/B/C/F/G/K
*0508	100 228 060	GH 2005
0509	100 238 079	DCB 9600
0510	100 237 099	4800-I
0511	100 315 106	GH 1161
0512	100 238 111	DCB 19200 H
0513	100 237 121	GH 2058
0514	100 228 120	GH 2082
0515	100 335 124	GH 2084
0516	100 336 123	GH 2084
0517	100 227 119	GH 2068
0518	100 238 137	DCB 19200 MK2
0519	S100 115 002	VT 1200 Bildschirmtextmodem (Videotex modem)
0520	100 228 159	Modem GH 2089
		Datentechnik
*0601	100 236 012	4400/24 PB
0602	100 237 011	4400/48
0603	100 228 041	5500/96
0604	100 315 052	300
0605	100 236 053	24 LSI
*0606	100 227 054	COM-LINK II
0607	100 236 014	2200
0608	E100 224 003	Modem 300 - Four wire
0609	100 335 067	ARE MD6-12
0610	100 227 066	4500/48
*0611	100 238 084	COM-LINK II with SCRAMBLER
0612	100 237 096	27 LSI
0613	100 215 102	DM 600 D
*0614	100 237 098	4700/48
0615	100 113 100	PDM 20/40-A
0616	100 228 101	96 MULTI-Mode
0617	100 237 103	MPS 48
0618	100 336 104	26 LSI
0619	100 238 105	COM-LINK II with SCRAMBLER, VERS.A
0620	100 114 110	ARE MD 3
0621	100 238 115	COM-LINK IV
0622	100 228 118	MPS 9629
0623	100 111 127	ZPDM 10
0624	100 314 132	MPS 3021
0625	100 111 138	V20 ZPDM 20/40
0626	100 111 152	MODEM TV 19
0627	100 114 161	MD 300
0628	100 215 154	ZUE 300 (600)
		NIXDORF, WIEN
0701	100 235 015	506

0702	100 335 030	506/09
0703	100 237 039	NGD 504
		AUSTRO-OLIVETTI
0801	100 334 008	TD 2330
0802	100 234 031	MD 200-M6
		PHILIPS-AUSTRIA
*0901	100 335 037	8 TR 652
*0902	100 336 043	8 TR 683
0903	100 235 049	DTE 201
*0904	100 314 065	SEMATRANS 202
*0905	100 237 070	SEMATRANS 1001
0906	100 335 075	SEMATRANS 1203
0907	100 336 089	SEMATRANS 2403
0908	100 227 117	SEMATRANS 4804
0909	100 228 116	SEMATRANS 9063
0910	100 314 125	SEMATRANS LSI 311/312
0911	100 238 129	SEMATRANS LSI 1012
0912	100 335 131	SEMATRANS LSI 1212
0913	100 238 136	SEMATRANS LSI 1011
0914	100 336 135	SEMATRANS 2405
0915	S100 115 001	D-BT02 BILDSCHIRMTEXTMODEM (Videotex Modem)
0916	100 314 024	D 200 E
0917	100 314 016	D 200 D
0918	100 238 157	SEMATRANS LSI 1021
		SIEMANSDATA
1001	100 111 026	8340
1002	100 111 027	8341
1003	100 111 028	8342
1004	100 334 019	200-200 (8335)
1005	100 335 032	8331
*1006	100 336 042	8332
1007	100 235 050	GDN 4800
1008	100 335 087	8336 (600/1200)
1009	100 227 090	8333 (4800 A)
1010	100 238 107	N 10 (8353)
1011	100 314 109	8330 (300A)
1012	100 228 126	9600 TRANSDATA 8334
		HONEYWELL BULL AG.
1101	E100 114 001	TRADAN 1100
		THOMSON CSF, WIEN
*1202	100 314 020	TRC 598 B
*1203	100 335 036	TRC 585 B
*1204	100 335 036	TRC 586 B
		ING. MAYERHOFER, WIEN
1301	100 226 013	DATA PUMP 680 ADMD 0041

		NCR, WIEN
1401	100 235 069	C 752 100
1402	100 235 076	M 51-4-STD
1403	100 235 077	C 698 500
		CARDIAC-EKG COMPUTER SYSTEM
1501	100 111 134	EKD 4000 T, (AUSSENSTELLE)
1502	100 111 133	MUSE EKG, (ZENTRALSTELLE)
		GLOBOTRONIK
2401	100 238 147	IDS 6000 H
2402	100 238 148	IDS 6000 L
		ICA ING. FEGERL, WIEN
2601	100 111 139	ICAM 40P
2602	100 114 149	BUILT IN MODEM ICAM 300
		GEBRUEDER SCHOELLER
4001	100 238 155	BASE BAND MODEM SERIES 100
4002	100 238 156	BASE BAND MODEM SERIES 300
4003	100 228 158	PARADYNE T 96
4004	100 336 160	PARADYNE MODEM LSI 24B/V26

* Not for new connection.

ANNEX 2: PTT LEASED DATA COMMUNICATION EQUIPMENT

As of 1982/09/01

Code-Number	'ORDNUNGSSNUMMER'	Type
		Equipment of PTT
9901		DFG-300
9902		DAG-300V
9903		DAG-300X
9904		ED1-EDB
9905		ZM1-ZMB
9906		SES (B)
9987		DAG-1V with ADA
9988		DAG-1V
9989		DAG-1X

ANNEX 3: LIST AND CODING OF THE SO-CALLED PTT 'ORDNUNGSNUMMER' FOR THE DATEX NETWORK

HHH	SSS	LLL	'PTV-ORDNUNGSNUMMER' (9 POSITIONS)
104	...	...	MAIN GROUP: DATA TERMINATION EQUIPMENT (DTE)
...	SSS	...	CHARACTER GROUP
			1. POSITION: DATA TRANSMISSION OVER 1. Telex network 2. Leased telegraph lines 3. Telex network or leased telegram lines 4. Data network circuit switched (WDN-L) 5. Direct data network circuit switched (DDN-L) 6. (WDN-L) or (DDN-L) 7. Switched data network packet switched (WDN-P) 8. Direct data network packet switched (DDN-P) 9. (WDN-P) or (DDN-P) 0. Others 2. POSITION: TYPE OF INTERFACE BETWEEN DCE AND DTE 1. Two or four wired with ADOS 8 2. Multiwired Asymmetrical (V.28) with 25-pole connection (ISO 2210) 3. Multiwired Asymmetrical (V.10) with 15-pole connection (ISO 4903) 4. Multiwired symmetrical (V.11) with 15-pole connection (ISO 4903) 5. Integrated data transmission technique 0. Others 3. POSITION: DATA TRA. SPEED: ALPHABET: SYN-/ASYNCHRONOUS 1. 50 BIT/S; ITA Nr. 2; Asynchronous 2. <= 100 BIT/S; ITA Nr. 2; Asynchronous 3. <= 100 BIT/S; Other alphabet; Asynchronous 4. 300 BIT/S; ITA Nr. 5; Asynchronous 5. 2400 BIT/S; Synchronous 6. 4800 BIT/S; Synchronous 7. 9600 BIT/S; Synchronous 8. 48000 BIT/S; Synchronous 9. > 48000 BIT/S; Synchronous 0. Others
...	...	LLL	SEQUENTIAL NUMBERING OF THE MAIN GROUP

DTE CODE TABLE FOR DATEX DTES.

As of 1982/11/12

Code-number	'ORDNUNGSNUMMER'	Type
		IBM-Austria
03301	104 224 008	IBM 3101
03302	104 224 009	IBM 3705
03303	104 224 010	SYSTEM/7
		DATENTECHNIK
06301	104 224 023	HASSLER SP 300
		SIEMENSDATA
10301	104 224 013	IVR/CVR
10302	104 224 015	TD 967 X
10303	104 224 014	TD 966 X
10304	104 224 012	TD 968 X
10305	104 224 017	3974 X
10306	104 224 024	TD 9770
		THOMSON CSF, WIEN
12301	104 324 011	TVT 6060
		SIEMENS-AUSTRIA
16301		PT80
		GENERAL ELECTRIC
31301	104 224 006	TN 200 KSR
31302	104 224 007	MC III
		I.P. SHARP
35301	104 224 020	ALPHA/LSI
		TU-WIEN
39301	E104 224 002	TR 100-S.NR. 55191
39302	E104 224 003	TR 100-S.NR. 37014
		GEBRUEDER SCHOELLER
40301	104 224 021	8318 ASR
		PHILIPSDATA
41301	104 224 016	P2000
41302	104 224 019	P5002
		VOEST
42301	104 224 026	LA 36
42302	104 224 027	VAX 11/780

		IIASA
43301	104 224 025	KFKI-TPA/70
		SPERRY-UNIVAC
44301	104 224 018	UTS10/T3510
		BUERO-MATIC
45301	104 224 022	ALPHATRONIC
		RM-ELEKTRONIC
58301	104 524 028	RME-TC

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