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JOURNAL ON

COMMUNICATIONS

VOLUME XLV.

JANUARY 1994

TELECOMMUNICATIONS POLICY

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JOURNAL ON COMMUNICATIONS

A PUBLICATION OF THE SCIENTIFIC SOCIETY FOR TELECOMMUNICATIONS, HUNGARY

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Phone: (361) 135-1097

(361) 201-7471

Fax: (361) 135-5560

(361) 201-7471

Subscription rates

Hungarian subscribers

1 year, 12 issues 5300 HUF, single copies 650 HUF

Hungarian individual subscribers

1 year, 12 issues 860 HUF, single copies 110 HUF

Foreign subscribers

12 issues 150 USD, 6 English issues 90 USD, single copies 24 USD

Transfer should be made to the Hungarian Foreign Trade Bank,

Budapest, H-1821, A/C No. MKKB 203-21411

JOURNAL ON COMMUNICATIONS is published monthly, alternately in English and Hungarian by TYPOTEX Ltd. H-1015 Bp. Batthyány u. 14., phone: (361) 202-1365, fax: (361) 212-2211. Publisher: Zsuzsa Votisky. Type-setting by TYPOTEX Ltd. Printed by Dabasi Jegyzetnyomda, Dabas, Hungary HUISSN 0866-5583

This issue has been brought together to review the events of 1993 related to the national telecommunications in Hungary. The title of the issue "Telecommunications policy" was given to cover all aspects of the topic:

- development of public network and services,
- new legal regulations,
- privatization and concessions,
- launching new mobile and paging services,
- manufacturing and development.

At the outset the job of editing this issue seemed to be a favourable task. The year 1993 was really eventful in telecommunications. Just to mention a few headlines:

- completion of the three years development plan of the Hungarian Telecommunications Company (HTC),
- putting into force the Telecommunications Act,
- privatization of HTC,
- issuing concessions for the mobile telephone service,
- progress in the manufacturing activities.

These headlines indicate events which are proudly reported by policy makers as successes of Hungarian telecommunications policy. And with objective judgement it can be stated that significant progress has been made on the way of establishing the conditions for modern telecommunications in Hungary.

The process, however, was not without contradictions and sharp debates:

- local telephone companies with promising plans were launched and got stucked due to financial difficulties,
- telecommunications regulations were debated and rewritten several times,
- in the GSM tender original financial terms have been modified,
- privatization of HTC was coincident with a change in top management causing embarrassment among professionals.

All these debates and perplexities have shown that the policymakers and the professionals were somewhat inexperienced for the huge task of the renewal process in telecommunications. It has to be noted that the whole process was aggravated by strict time limits which may have caused some contradictions.

Now after some time of subsidence it seems that 1993 was a good year for telecommunications in Hungary.

First the main points of the program laid down in the three years plan of HTC have been successfully accomplished. 4000 km of digital back bone network was constructed with optical fibers and microwave radio links.



András Baranyi graduated in electrical engineering from the Technical University of Budapest in 1960. He received the Candidate of Technical Sciences degree from the Hungarian Academy of Sciences in 1976. Since 1960, he has been with the Research Institute for Telecommunications, Budapest. He has worked on circuit design of microwave FM systems, FM distortion analysis and transistor modelling problems.

In the three years period 500 000 new subscribers were connected into the network.

In the domain of legal regulations several steps were taken. Telecommunications Act became effective and it was followed by a series of ministerial decrees: on the interconnection of service providers, on the structural plan of the national telecommunication network, on the tariff policy etc.

In the field of privatization the most important event was the privatization of HTC. The total income of the state budget was 875 M USD. Additional and important asset was the professional expertise of the winner companies the Deutsche Bundespost and the US company Ameritech. The plans and perspectives of the new HTC should have been included in this issue, however, the top officials invited to submit their manuscripts demanded some time to formulate their comprehensive views on future plans and actions. Obviously we had to comply with their request expressing our strong intention to publish their contributions in the near future.

We were more fortunate with the beneficiaries of the GSM tender. The concessions were given to the Westel 900 Ltd. and the Pannon GSM Ltd. With the GSM service Hungary has a priority in Eastern Europe, therefore it is interesting to read the articles of the leading personalities of the companies providing this exceptional service.

Antenna Hungária is the second largest telecommunications company in Hungary with basic responsibilities in broadcasting and wireless communications. General manager of the company reviews the versatility of activities and gives account on the preparations for privatization.

Three important manufacturing companies are represented in this issue. Two of them are Hungarian strongholds for the well known international telecom giants: Siemens Telefongyár and Ericsson Technika. The third one, BHG company was the largest in the past, however, they face difficult problems now. The papers of the three general managers give informative reports on their results and future plans.

The highest ranking author of this issue is the Minister of Transport, Communications and Water Management, expressing his views on the important process of liberalization and privatization of the Hungarian telecommunications market.

The editor expresses his gratitude to the eminent authors for devoting their time to express their ideas and wishes the readers a profitable use of the materials for the realization of a beneficial telecommunications policy.

A. BARANYI

From 1973 to 1976, he was head of a section working on data communication. From 1980 to 1986, he was heading a department developing satellite communication systems. His present interests are in the field of nonlinear circuit modelling and analysis. He has given several courses at the Technical University of Budapest, where he is an associate professor. In the academic years of 1970-71 and 1980, he was research visitor at the University of Maryland, College Park and the University of California, Berkeley, respectively. Since 1991, he is editor of the Journal on Communications.

CONNECTED TO EUROPE – LIBERALIZATION AND PRIVATIZATION OF THE HUNGARIAN TELECOMMUNICATIONS MARKET

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The paper outlines the contents of new regulations with special emphasis on the Telecommunications Act of 1993. Conditions on concessional services and the tariff policy aspects are emphasized. The concession on GSM service and the national concession on public switched telephone service are discussed with special details on the reviewing process.

The criminal situation of our telecommunications services seems to be one of the most burdensome legacies of the past regime adversely affecting social relations and economic development as well. Low penetration (13 lines per 100 inhabitants at 31. Dec. 1992.), shameless level of service quality, outdated technology (in many instances manually operated local exchanges), lack of mobile, data and value added services aggravated by an in every respect unsatisfactory Act of 1964, regulating the Hungarian Post Office, a Government Authority, providing traditional postal and telecommunications services until very recently.

In May 1990, when the present Government took office following the first democratic Parliamentary elections since 1945, the Minister of Transport, Communications and Water Management (the Minister) had to face a very crucial task. A brand-new legal framework was to be worked out and promulgated along with the elaboration of a development project for a partially liberalized multiactor service market having due regard to the huge amount of capital to be invested in infrastructure.

Other legislative topics of vital interest for the whole of the evolving domestic market - like the regulations on privatization, concessions, taxation and many others - falling into the competence of other Government Ministries, had to be enacted, too and harmonized with each other and with international instruments like European directives, recommendations and agreements. The latter aspect is emphatic, since Hungary has signed an Agreement of Association with the European Communities and their Member States as early as 1991, which was ratified by all Member States and promulgated in the Hungarian Republic in January this year.

Under pressure of time and accompanied by fierce public and Parliamentary debates the former Act on the Hungarian Post have been replaced by a package of three, regulating separately but coherently traditional postal services, telecommunications and frequency management. All three entered into force last year making way for a completely new and in Hungary never earlier existing telecom-

munications policy. Notwithstanding the importance of the other two Acts, I advert briefly to the major features of the Telecommunications Act (TA) only.

The TA defines first of all four public telecommunications services — as distinguished from any other ones — which shall be provided under concession agreements, the terms and conditions of which being stipulated by the Minister. The Minister concludes a concession agreement by the winner of an open tender. The number of concessions for a given service area shall be determined by the Minister.

The concessionary services are: public switched telephone services, public mobile radio telephone services, countrywide public paging services and countrywide and regional distribution and broadcasting of public service radio and television programs. The switched telephone services are further split into international and domestic long-distance as well as local services. The latter ones are provided in so-called primary areas, out of which 54 is defined by the decree of the Minister. The primary areas are geographically disjunctive and all together cover the entire territory of the country. Other — non-concessionary — services compete without restrictions on the free market, and are subject to a license issued upon request provided all prescription laid down in relevant decrees are met.

The decision on the exclusive or non-exclusive nature and the time-period of the concession as well as the determination of a one-time concession fee and the concession fee due on a yearly basis belongs under the discretion of the Minister. In addition to all that concession tenders for any given primary area shall only be called for if the majority of municipal self governing bodies recommends so, otherwise invitation is optional.

By the force of TA the Government and the Minister is authorized to issue decrees on certain issues like pricing and revenue sharing (with regard to local, domestic and international service providers), interconnection of networks, setting up a General Inspectorate of Communications (GIC) and few others. Many tariff regimes were deeply analyzed along with their possible influence exerted on many sometimes contradictory interests. As for tariffs decision was made for the favor of a price-cap regulation with the PPI (production price index) in the center. The decree on network interconnection safeguards the public service provider against by-pass by private networks. The GIC is the Government's supervisory authority monitoring

the activity of all the actors of the communications market (including postal services and frequency management), supervising the compliance with the terms and conditions set out in the concession agreements, granting licences for competitive services, carrying out type approvals etc.

Parallel to the legislative process structural changes were implemented. The Hungarian Post Office was separated into functional parts as follows: Hungarian Post Office (mail and telegraph services), Hungarian Telecommunications Company (HTC), and Hungarian Broadcasting Company. The new organizations have been divested from regulatory power and transformed into joint stock companies needed to get prepared for the privatization process. All the shares of the HTC were naturally held at that stage by the State, the ownership rights being exercised by the newly established State Holding Company. Thus ownership and operational functions were separated from regulatory ones, the latter being assigned to the Minister.

All in all the prerequisites for privatization and concession tender processes were there by the beginning of 1993 and GSM concession was the first to start with. The Minister has decided to grant two matching national concessions for countrywide mobile radio telephone services (including international roaming) in line with the GSM MoU in the 900 MHz frequency band. The winners — the HTC—US West and the Pannon GSM¹ consortia — or more precisely their joint stock company registered under Hungarian law, are granted concessions with equivalent conditions for a period of 15 years. For the benefit of the user they compete with each other on the market of mobile services and under the stipulations of the concession contract the Minister shall not grant similar concession to any other provider of that kind of services for a period of ten years.

The second type of concession to be granted, i.e. public switched telephone services was much more complex than the GSM one involving higher amount of financial means, too. Although I had the right to grant more than one concession for long-distance or local services I decided not to do so. I had to consider the advantages and disadvantages of a possible competition on our level of development. The huge amount of investment to be made to raise penetration rate at a forced pace and the assurance required by the investor for a moderate rate of return made me to believe, that competition even in a duopoly regime would discourage prospective bidders from the business. With respect to that I came to a conclusion as follows below.

A National Concession should be granted for international and domestic long-distance services and for local services in the primary areas where no demand for open tender was indicated to me by the majority of the municipalities concerned, which meant actually altogether 29 primary areas. Further on, local concessions should be granted separately in each of the primary areas — in 25 in fact — where the majority of the municipalities asked me to do so, provided any bid — meeting certainly the terms and conditions of the tender document — was made in a particular primary area at all. If, following the evaluation of the bids made for local concessions, there are primary areas where local concessions shall not be granted for any

reason, the National Concession holder shall be obliged — as stipulated in its Concession Agreement — to provide services for them as well. I finally note, that the procedure to grant the National Concession and the partial privatization of HTC, the national service provider had to go very naturally hand by hand, i.e. inseparable from each other.

According to the policy of the Government we had to pursue three aims simultaneously, i.e. to considerably raise the capital of the HTC and sell 30 percent minimum of its shares held by the State, to sign a concession agreement with the company and to provide for the rapid development of the services especially in (fixed) voice telephony. Consequently a Concession and Sale Tender was initiated by me in close co-operation with the President-Director General of the State Holding Company (SHC).

The stability of the Hungarian Republic in both political and economic sense, the progress made a bit faster than in other countries of the East Central European region, its slightly better position reached — despite all the troubles and difficulties — in the transition towards market economy, the ongoing support of HTC by international finance institutions like EBRD and IFC² proved to be attractive to the telecommunications giants. Four huge international consortia³ submitted indicative bids and three the final binding one. The Evaluation Committee found, that the best offer had been made by the Deutsche Bundespost Telecom and the Ameritech Consortium named Magyarcom. I and the P-DG of the SHC were satisfied with the suggestion, consequently the various regulatory and transaction documents were signed on the 22nd, December, 1993, opening up a new perspective for both service providers and consumers. The concession is granted for a period of 25 years, being exclusive for 8 years, i.e. until 2002.

The Contract on National Concession sets major development targets and quality of service requirements. The concession holder HTC is obliged to raise the number of main lines by a yearly minimum of 15.5 percent in the first six years of the concession period if demand so requires. From 1997 on HTC shall meet 90 percent of all demand for service in six months, while in primary areas under its concession any demand claimed by subscribers shall be met in 12 months. The non-compliance of HTC with these and other conditions shall be seriously sanctioned. In addition to that Magyarcom undertook to improve the quality of service to reach the levels of their own markets, and to make Hungary a recognized international telecoms hub within five years.

At the time of writing⁴ this paper the tender for local concessions has been called for, bids were submitted, but are under consideration of the Evaluation Committees. The call for tender regarding paging⁵ is prepared for publication.

It should be noted that as far as legislation and structure is concerned the situation in 1993 is very similar to that of the United Kingdom in 1984, when a new Telecommunications Act entered into force marking a new era in UK's telecommunications history. I shall not deny that British experience of the duopoly period, concession agreements

of the Office of Telecommunications with British Telecommunications or Mercury, network interconnection, price and revenue sharing regulations influenced our policy a great deal. I shall also admit, that the American experiences gathered since 1984 also, when the divestiture decree of the US Department of Justice became effective, taught us extremely useful lessons making us alert for the potential drawbacks of a liberalized on the American way market⁶. Finally, the thorough study of the 1987 Green Paper⁷ of the European Communities and many other

CEC materials helped us to make further steps on the way leading to what you call Europe.

It is up to the international telecommunications community to appreciate our achievements. Nevertheless I am convinced that the right direction has been chosen which is indicated by the successful — and unique in the continental Europe — privatization of our national telecom company as well as the rapid development perspectives of the services in a partially liberalized, multiactor market.

NOTES

- ¹ The Pannon GSM Consortium was formed by: Telecom Denmark Ltd., Swedish Telecom International AB, Norwegian Telecom, Telecom of Finland, PTT Telecom Netherlands BV, Magyar Olaj- és Gázipari Rt., Wallis International and Videoton Holding.
- ² In the framework of equity warehousing a package of preference shares of HTC were issued to the European Bank for Reconstruction and Development as well as to the International Finance Corporation amounting to 9.9 percent of the total capital of the company at that time.
- ³ The four consortia: (1) Telefonica (Spain), the Holland PTT and GTE (USA); (2) STET International (Italy) and the Bell Atlantic (USA); (3) France Telecom and US West; (4)

DB Telecom. Ameritech and Cable & Wireless (UK). The consortium led by Telefonica withdrew from, while C&W left its partners just before submission of the binding bid.

⁴ 28. January 1994.

⁵ The Minister determined to grant two matching concessions to provide countrywide paging services according to the ERMES specifications including international roaming.

⁶ See e.g.: The Geodesic Network II, 1993 Report on Competition in the Telephone Industry.

⁷ Precisely: Green Paper on the Development of the Common Market for Telecommunications Services and Equipment. Commission of the European Communities (1987).



György Schamschula graduated in industrial economics at the University of Economics in 1986 and in law at the Law University of Szeged in 1975. From 1986 he was employed by the National Oil and Gas Trust. From 1978 he was heading the Economics Department of the Water Company of Budapest. In 1983 he was appointed Deputy Director of economics at Chimney-Cleaning and Heating Technology

Co. From 1988 he was managing director of a heating technology limited company. From 1988 he is member of the Hungarian Democratic Forum (HDF). From 1989 he is elected to the national assembly of the HDF. From 1990 he is member of the parliament. From January 1991 he is Secretary of State at the Labour Ministry. From February 1993 he is Minister of Transport, Communication and Water Management.

PLANS OF ANTENNA HUNGÁRIA

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Antenna Hungária Hungarian Radiocommunications Corporation was founded as the legal successor of the Hungarian Broadcasting Company by the State Property Agency on the 1st of July, 1992. The transformation into the form of corporation has been a significant stage in our company's life, for the fulfilment of our strategic goals has got basic influence on the development of the national broadcasting and on the wireless telecommunication infrastructure. Antenna Hungária Corporation considers as its mission to provide services for each of its home and foreign users with broadcasting radio and television programmes at a European level and, on the basis of this, to take an outstanding place in the Hungarian wireless telecommunication, both technically and economically. Neither the company's financial resources are sufficient, nor the budgetary contribution can be provided in the present situation for further providing of high-tech level of the national broadcasting and for the initiating of the services of new technologies. The solution of this problem can be the privatization by outside investors who are able to support the initiation of new profitable services both in the respect of the resources and that of technology. The privatization and transformation of the company and the establishment of the legal conditions will provide favourable ground for the initiating of an up-to-date broadcasting and telecommunication services of European level and for the rapid fulfilment of the corporation's development projects.

The ANTENNA HUNGÁRIA Hungarian Broadcasting and Radiocommunications Company was founded by the State Property Agency on the 1st of July 1992 as the legal successor of Hungarian Broadcasting Company. The transformation to a share company was a significant event in the life of our company because the realization of our strategic goals bears fundamental impact on the development of national broadcasting and wireless telecommunications.

The legal predecessor Hungarian Broadcasting Company started its operation in 1990 as an independent economic organization of national jurisdiction. In the interest of fast development of Hungarian broadcasting and wireless telecommunications infrastructure the company management decided to initiate independently the transformation and privatization of the company. Therefore it has been our stressed goal to establish already in 1991 the economic and organizational preconditions to form the share company. An indispensable tool of realizing our goal was to create the new form of operation for the company. Our overall goals were determined by the strategy of our company.

ANTENNA HUNGÁRIA Rt. regards as a particular strategic goal that through broadcasting radio and television programs at an European level we should provide services for all our domestic and foreign users and on that basis we should take a prominent position both techni-

cally and economically in Hungarian wireless communication. We regard as a strategic goal that relying on Hungarian and international scientific achievements in wireless telecommunications we would be the initiators of introducing all such new services of broadcasting character by which we might be able to contribute to the economic and cultural revival of our country.

To preserve the level of Hungarian broadcasting and to introduce services applying new technologies the company resources are not sufficient and in the current situation no budgetary support can be obtained. The solution would be offered by the privatization of the company with such outside investors who are able to support the introduction of new profitable services both from resources as well as from technological aspects.

Following our transformation we started immediately with the steps which mean the goal of transformation, that is, the privatization. We begun to prepare the tender for selecting the financial consultant in order that in 1994 we shall have the opportunity realize the first capital increase.

The bids to the tender announced for selecting the company privatization consultants were received at the end of May 1993. The evaluation process progressed according to schedule and as a result the final decision was made at the end of August. The financial consultant of Antenna Hungária Company became the French consulting firm Credit Commercial de France. Based on our contract they shall prepare the privatization tender during the first half of 1994.

The work of the chosen consultant could be facilitated greatly by those negotiations and preliminary consultations which were conducted by the company management during the last two years. On the basis of established foreign relations beside the possibility of capital influx we also have direct opportunity to create state-of-the-art technological services.

The essence of transformation and privatization of our company is to satisfy both in qualitative and quantitative respects equally increasing demand for Hungarian broadcasting and telecommunication services at an European level.

However the key issue of privatization is the adequate profitability. That is quite evident because if a given venture is not profitable then no outside investor would put money into that. Therefore a fundamental issue is to create the relevant tariff system of broadcasting. In our opinion the prices of broadcasting should contain such a realistic profit level which ensures the planned developments, replacements and also provides acceptable dividends for the outside investor.

The Parliament passed the laws on telecommunication and on frequency management, which entered into force

on the 1st of July, 1993. By establishing the legislative background in the field of telecommunication numerous new services could be started either directly or through concession tenders. The laws cleared the way for the providers and users of telecommunication concerning the fast development of telecommunication infrastructure through up-to-date technology which corresponds to the demands of market.

Our existing favourable conditions might provide the proper foundation in the field of new telecommunication and broadcasting services however the development sources for starting the new services also should be ensured. Already at year's beginning it was visible that among our ventures several projects have arrived at a phase, when external conditions and technical preparations attain the phase of realization and thus the venture requires capital. The profitability of our company did not render possible to finance the investments of new business branches from own resources and by the reasons of delays in our privatization we also could not consider the possibility of inviting outside capital. Beside the capital demand of our ventures the financing of investments already in progress or freshly started also faced problems. Therefore at the beginning of 1993 we issued bonds in value of HUF 1,5 billion in order to realize above goals.

The investment funds available from bond issues and complemented with own resources provide the opportunity for our company to start such investments in 1993 which on the long term create the possibility for establishing the conditions of safe management while on the short term ensure the stable external and internal economic environment for the company in the current year.

Lets review first the 1993 investment plan of ANTENNA HUNGÁRIA which is in harmony with our strategic goals.

We are continuing the development and reconstruction of terrestrial radio and television transmitter network. In order to increase the supply of television programs we increase further the number of principal transmitter stations.

In 1993 we shall put into operation new TV-transmitter stations: at Aggtelek — to broadcast the program of TV1 for the north-eastern part of Hungary as well as for the areas beyond our borders inhabited by Hungarians — at Csengőd — to broadcast TV1 program for a part of the area between the Danube and Tisza rivers, — at Szeged — to supply the TV1 program for Csongrád county as well as for areas beyond the borders inhabited by Hungarians.

A 10/1 kW TV-transmitter shall be installed at Ózd in order to establish the adequate reception conditions in the South-Transdanubian region not supplied at present.

During the past decades we have installed 166 TV relay stations in total. In this year we are continuing the creation of reception possibility for areas not supplied with TV1 and TV2 programs by establishing new relay stations and we shall begin the replacement of obsolete, nearly 20-year-old transmitters still operating in the network, which despite continuous maintenance do not ensure the required reliability and because of high service demand their operation is not economic any more. For 1993 we

plan the reconstruction of 10 relay stations and installation of 7 new stations.

In the field of radio broadcasting we are prepared to construct the 100 MHz VHF transmitter network in accordance with the frequency plan. Therefore in 1993 we begun installing the 100 MHz antenna systems — which beside public programs also shall perform commercial type radio broadcasting tasks.

In order to introduce the modern operating method the new TV-transmitter stations shall operate in unmanned, remote controlled mode. In addition we begin to install the national remote control system to the scope of which all TV and VHF principal stations and part of the MW transmitter stations will be included.

The remote control system, which shall have 5 centres, establishes the conditions for up-to-date operation, better utilization of manpower and improvement of technological culture. Full implementation of the remote control system is expected for 1995.

For the reason of considerable cost expenditures there is no possibility to begin the reconstructing works which would represent the high technological level of the microwave network providing the transmission of modulating signals. However the supply of new stations with modulating signal shall be provided by 140 Mbit/s digital microwave connections.

The final configuration of upload station of Duna TV should be mentioned separately. The purpose of that investment is to upload the program of Duna TV to Transponder 33 of EUTELSAT II-F3 satellite by a fixed installation.

In order to satisfy the increased demand for live programs the mobile microwave network also must be expanded. The main purpose of mobile micro is to transmit the various on-location live programs of MTV — through the microwave trunk network systems of our company — to the Budapest regional studios of MTV, respectively.

The capital requirement of our 1993 development ideas presented here only in a sketchy and incomplete form surpassed our financial potentials however at the same time in harmony with our strategic goals we regarded their realization as an absolute necessity.

In recent years our company has founded several economic ventures for the efficient and successful operation of certain telecommunication services. One of the specific goals of our strategy is the expansion of scope of activities within the wireless telecommunication which are connected to our profile. In the followings I present a few more important investments and ventures, respectively.

Mobile telephone services present a radiocommunications task which belong to our company profile. We intended to undertake its organization on a national scale in accordance with the GSM standard. That system applying the state-of-the-art digital radio and telephone technology provides excellent services for users.

Within a consortium established with three large West-European partners (Deutsche Telecom, British Telecom and France Telecom) we submitted a bid to the Ministry for Transport, Telecommunications and Water Management in order to obtain one of the GSM service concessions. Unfortunately, according to the announcement of

tender results the right of concession for the services was awarded not to us. However we hope that in some or other form we shall be able to contribute to the introduction and propagation of that up-to-date technology radio-communications means in Hungary.

For the purpose of satisfying economically the telecommunication demands available in the Hungarian and foreign markets the ANTENNA HUNGÁRIA Company plans to establish a Hungarian satellite (MAGYARSAT).

The goal of the MAGYARSAT program is to realize a comprehensive, uniform service in Hungary with the aid of a Hungarian national communications satellite. According to our plans the services would include television and radio broadcasting, as well as voice and data transmission according to individual, business and public sector demands.

The scheduling of the program is extremely advantageous because the "Hungarian satellite" would be operative already for the opening of World Exposition 1996 in Budapest. Thus — beyond providing our traditional services — we would join that grandiose program which integrated with the declared main goal of EXPO'96: "communication", would provide new, perspective communication opportunities for Hungary which of course could be used for many years even after the event.

In order that the satellite for the planned early 1996 date shall be operative, the joint venture should be established soon, which together with the foreign partner shall launch and then operate the MAGYARSAT satellite. In case of realization that also will require considerable investment on behalf of our company already in 1993.

At present we joined 4 municipal telecommunication companies which were established because of the low level of rural telephone services.

The companies were formed with modest capital but after the initial phase those companies shall carry out capital increases in order to be able to begin with services in primary zone size area each, the investment costs of which amount to several billion HUF. For 25 primary zones the concession tenders for local public telephone

services were already published. Our company shall be able to provide various services adapted to its profile and facilities for the municipal companies.

ANTENNA HUNGÁRIA further on regards radio and tv broadcasting as its principal activity and therefore the beginning of local radio and television broadcasting — now realized in a market framework — was of extreme importance, because our monopolistic position thus ended. By utilizing our existing facilities we would like to make appealing our services in that respect for the circle of interested parties. For the time being we were successful in that because two third of applicants in the tendering have approached our company.

Beyond the already described venture I only mention as a listing those services for which we already have founded companies or in the near future we plan to establish economic associations.

We already created several economic associations for the application of satellite data transmission technology (VSAT), for television and radio data transmission and various value added services, for establishing optical networks and terrestrial data transfer systems, to design and operate AM-micro systems, as well as to establish a trunk radio network. Those companies are indispensable for the realization of our strategic notions and in the field of certain communications services considerably improve efficiency and profitability.

The monopolistic position of our company is eliminated in almost all fields of telecommunication and broadcasting services. Very soon we shall have to operate under market conditions. However that does not mean any change from the aspect of our company because we would like to provide services at high level and in good quality for all of our users.

I do hope that our efforts toward the development of Hungarian telecommunication and broadcasting infrastructure shall bear results and soon both our inland and foreign users shall be able to enjoy our European level services.



József Bartha graduated at the Technical University of Budapest on the faculty of Electrical Engineering in 1965. He got a special diploma of broadcasting and radio-communications at the same university in 1970. In 1988 he graduated at Budapest University of Economics. He started his work at the development department of the Radio and Television Technical Directorate of the Hungarian PTT. He was

charged with the activity in the spheres of development and investment of the Hungarian VHF-FM network. After 1974 he became the head of the development department. In 1985 he was nominated to technical director of the company. He directed the elaboration of the long term plans and investment programs, the development of the remote control operating system and the whole development and investment work of the company. In 1990 he was nominated to director general of the Hungarian Broadcasting Company. Since the first of July 1992 he has been the director general of ANTENNA HUNGÁRIA Hungarian Radiocommunications Corporation, the legal successor of the Hungarian Broadcasting Company.

THE SERVICE OF WESTEL 900 GSM LTD. POINTS AHEAD TO THE 21ST CENTURY

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Preparation for the GSM service has been started already in 1992. After official authorization planning and construction is performed actively by the Westel 900 Ltd. The interconnection with PSTN is discussed with reference to signalization and roaming possibilities.

The success of NMT 450 analogue mobile service showed both, abroad and in Hungary that the system will reach the saturation point sooner than it had been predicted. At the same time the development of the technology has opened the door to another possibility even greater than the earlier one. It is only 900 and 1800 MHz GSM (Global System for Mobile Telecommunication) which can fulfill the increasing need for mobility. The system can be called "Global" as by international cooperation it is interconnecting the "old continent" and even other continents into a world-wide communication service.

The official authorization to build up and to operate the Mobile system in Hungary has been awarded to two consortia one by MATÁV and US WEST and another one. The commercial service will be started in Budapest in 1994. After signing the concessional agreement WESTEL 900 GSM Mobile Telecommunicational Ltd. (in its shorter name WESTEL 900 Ltd.) was founded. Similar to WESTEL Rádiótelefon Kft. this company is owned by MATÁV and US WEST. Mr. György Schamschula, Minister of Transport, Communications and Water Management and the representatives of the two winner consortia signed the concessional agreement for 15 years on 27th October 1993.

In the past years WESTEL Rádiótelefon Kft. management and their cooperating experts were making significant contributions in GSM system related developments, moreover they were pressing for the introduction of the new service in Hungary. In the preparation period a memorable and instructive event was the Europa Telecom 92 International Conference held in Budapest, which provided a possibility for operating a GSM test configuration for demonstration. The demonstration proved the strong interest and activity of the Hungarian engineering community and it was highly appreciated by the professional participants of the international event.

Both GSM consortia entering into contract to operate GSM service will have to accomplish very strict requirements, of the concessional agreement. Specifications are given for the geographical coverage of the service, for the various operational modes of the service and last but not least for the expected quality of the service. These requirements can only be surpassed by the contractors.

WESTEL GSM 900 Mobile Telecommunicational Ltd. has called several respected suppliers to make bids for

the equipments building up the network. Considering the demands and the intention to surpass them WESTEL 900 Ltd. decided to choose the Ericsson system CME 20.

In the selected system relatively large capacity MSCs (mobile switching centres) and BSCs (base station controllers) are used. Both the MSC and the BSC are AXE switches by Ericsson. The network will contain just a few number of nodes (at the beginning of the service and for some time after that one MSC and one BSC will be used). Base station (BS) will be deployed successively according to the coverage and traffic demands, first in the area of Budapest later along the main highways. The traffic capacity of the MSC and BSC will be increased after having accurate traffic estimations and forecasts.

There is no doubt that WESTEL 900 Ltd. will take advantage of the possibilities offered by the infrastructure built up earlier for the NMT 450 network. This means the utilization of existing sites and installments and the use of the available transmission capacity, both on a contractual basis. This is indispensable for the rapid implementation of the GSM network and is a quite obvious solution for realizing an economical centralized network structure.

WESTEL 900 GSM network will be connected to the PSTN operated by MATÁV (or any further PSTN operator company). Interworking of the networks will be established relatively easily by means of R2 signalling. However, advanced GSM services are not supported by R2 signalling. GSM requires CCS No7 common channel signalling as this is used for intra network operation. The implementation of the GSM network will speed up the introduction of CCS No7. A certain level of cooperation with MATÁV is therefore necessary.

Interworking of networks means more than simple speech connection only. Cross border roaming has to be performed also. This presents new demand in the history and practice of the Hungarian telecommunications. The demand can be fulfilled by the use of CCS No7. Until MATÁV is not in the position to provide this service WESTEL 900 Ltd. will rent it temporarily from the Swiss PTT.

The condition of the cooperation with the other mobile operator is still to be agreed upon. It is the interest of both companies to interconnect the networks and to use the services offered by the other operator both, in commercial and in technical sense. We must not forget the competition: WESTEL 900 has to get an advantageous position in the quality of services, which, however, must not discredit the necessary cooperation between the two companies.

A special service of the GSM Mobile system is the

possibility of cross border usage, which suits the present day demand of mobility. As it has been mentioned already, this means on one hand the roaming of WESTEL 900 Ltd. subscribers in Europe, and on the other hand the connection of foreigners visiting Hungary to the GSM system. WESTEL 900 Ltd. will offer this possibility to its customers based on agreements concluded with operators of other countries. Bilateral agreements will ensure the correct accounting between the services. For international roaming the rules and terms of MoU are to be respected.

According to its previous plans WESTEL 900 Ltd. has started its GSM trials in the middle of December 1993 (Fig 1.) continuing them till 31st March 1994. WESTEL

900 Ltd. plans to provide all the services (call transfer, call waiting, call barring and conference call) offered presently, by the analogue mobile service to its subscribers. However, the privacy of the calls and the possibility of roaming are novelties. In the beginning small size, 30-40 dkg models of Motorola and Ericsson will be introduced, later Japanese mobiles will enrich the supply. The mobiles are very small, but extremely "strong": they are able to stand by for 15 hours while their talking time lasts 2-3 hours. The technology represented by the pocket mobiles and by the new 900 MHz rather by the 1800 MHz GSM cellular system leads us into the 21st century. . .

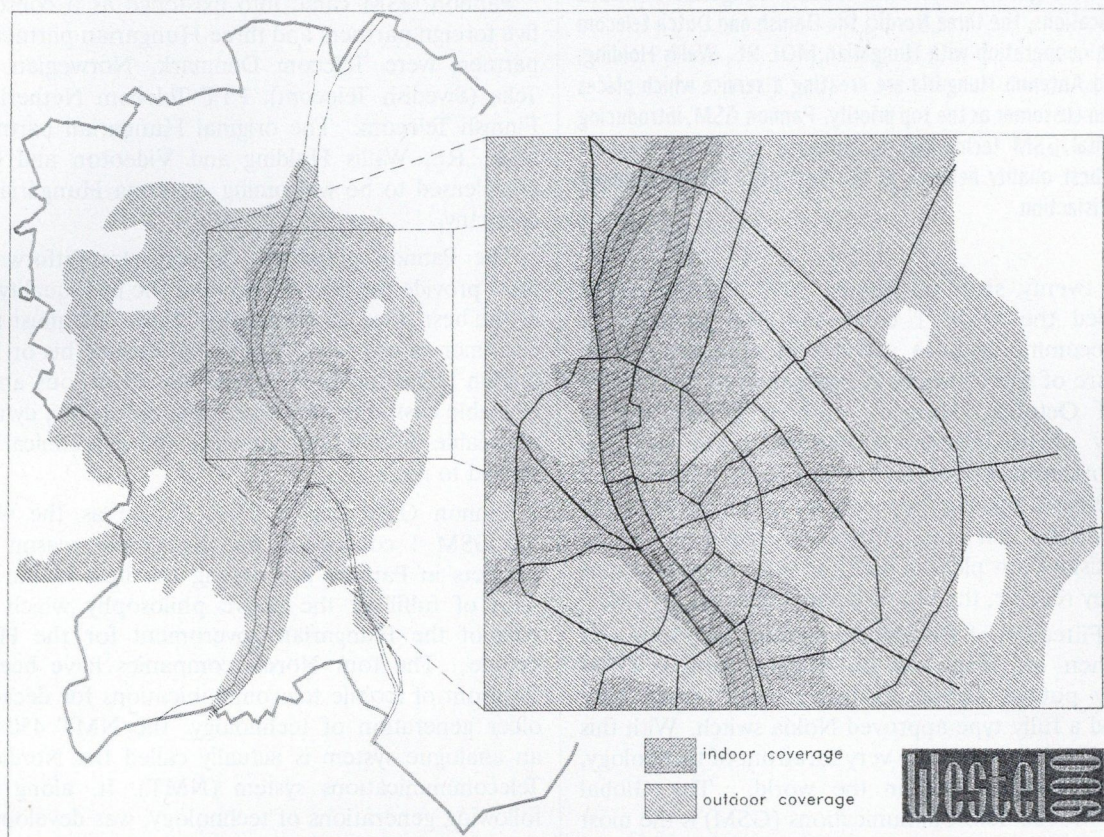


Fig. 1. WESTEL 900 GSM coverage, Budapest, December, 1993.



András Sugár graduated in electrical engineering at the Technical University of Budapest in 1969. From 1969 to 1974 he has been with the Electromechanical Company working on the development of FM radio transmitters. From 1974 to 1980 he worked for the Ministry of Foreign Trade on international cooperations and technology transfers. From 1980 to 1985 he was deputy counsellor at the Commercial Section of the Hungarian Embassy in New York. From 1985 to 1991 he has been managing director for foreign trading companies Intercooperation and Transelektro. In 1991 he joined WESTEL Rádiótelefon Kft. as general manager of the company. Presently he is general manager of WESTEL 900 GSM Mobile Telecommunication Ltd. His main fields of experience are radio engineering, international financing and management. In 1993 he was chosen by the Wall Street Journal into the group of leading businessmen in Europe.

OPENING A NEW CHAPTER IN THE HISTORY OF TELECOMMUNICATIONS

N. STEINBERG

PANNON GSM TELECOMMUNICATION COMPANY
H-1075 BUDAPEST, RUMBACH S. U. 21.

With the GSM 1 concession for provision of mobile telecommunications services awarded to Pannon GSM, the era of competition has arrived in Hungarian telecommunications. Vanguard of mobile telecommunications, the three Nordic, the Danish and Dutch telecom companies in cooperation with Hungarian MOL Rt., Wallis Holding, Videoton and Antenna Hungária are creating a service which places the Hungarian customer as the top priority. Pannon GSM, introducing the new digital GSM technology to Hungary, stands for the best service, the best quality network at the best price for the ultimate customer satisfaction.

On the twenty sixth of August 1993, Pannon GSM was awarded the GSM 1 concession for provision of mobile telecommunications services in Hungary. With the signature of the Concession agreement on the twenty seventh of October, Hungary entered a new age in the history of its telecommunications. For the first time Telecommunications services are to be offered on a competitive basis, placing the customer at the center of the process. For the first time, Hungarians can expect to be not just satisfied but pleased with the telecommunications services they receive, the era of competition has arrived.

On the Fifteenth of December, another milestone was passed, when on time and on budget Pannon GSM successfully put its service in the air with seven base stations and a fully type approved Nokia switch. With this event Hungary jumped to the very forefront of technology, not only in Europe, but in the world. The Global System for Mobile Telecommunications (GSM) is the most advanced commercial cellular telephone service on the market today. Ten years in development, GSM today represents the vanguard of a technology which will make mobility, security and accessibility the norms of the future.

Today's GSM phones are handheld, pocket sized models. They function on the basis of a SIM card (Subscriber information module) which holds in its smart card chip information about the subscriber, this means that every subscriber will have a telephone, not every phone. A subscriber may constantly change terminals or share several cards among one terminal, and yet always be called on his or her own phone number and billed at the proper address. The GSM is a European standard, quickly extending beyond Europe to the world. Today a GSM subscriber can expect roaming service in most of western Europe. Hungary is the first of the central European countries to adopt the standard, but tomorrow it is realistic to expect, in the words of the Financial Times, "Seamless mobile telecommunications" across all of Europe, the quality and capacity of the digital network is a surprise, no matter what one's background.

Pannon was a clear choice to provide these services in Hungary.

Pannon GSM came into existence as a consortium of five foreign partners and three Hungarian partners. Those partners were Telecom Denmark, Norwegian Telecom, Telia (Swedish Telecom), PTT Telecom Netherlands and Finnish Telecom. The original Hungarian partners were MOL Rt., Wallis Holding and Videoton and today we are pleased to be welcoming Antenna Hungária into the company.

The Pannon philosophy is very straightforward. We must provide the best service and the best quality network at the best price in the shortest time. We must place the customer as our top priority, and ensure his or her satisfaction. This means a supportive, courteous and knowledgeable customer care team, and accessible, dynamic and affordable distribution network, and a technical standard second to none.

Pannon GSM was a clear choice as the winner of the GSM 1 concession for the simple reason that the partners in Pannon are among the best in the world in term of fulfilling the above philosophy which was the goal of the Hungarian government for the Hungarian people. The four Nordic companies have been at the forefront of mobile telecommunications for decades. The older generation of technology, the NMT 450 which is an analogue system is actually called the Nordic Mobile Telecommunications system (NMT). It, along with the following generations of technology, was developed in the first instance in the Nordic countries. Today, the Nordic countries have the highest levels of penetration of mobile phones in the world. Sweden is the most mobile country in the world, Finland the second. Finland was the first and only country to launch commercial GSM service on the time schedule stipulated in the original memorandum of understanding, and today the international roaming is a part of everyday life in the Nordics.

Added to this wealth of specific GSM experience was the very broad international and central European experience brought in by all five foreign partners in Pannon GSM from the Ukraine to St. Petersburg, they are investing in the region. Hungary represents the most significant project thus far. Added to these assets were Hungarian partners familiar with the local market requirements and obstacles. Pannon GSM is in Hungary as a Hungarian company, and the local input is the most important ingredient in allowing Pannon to translate its foreign experience into benefit for Hungary. It is not enough to recreate even the quality already standard in Scandinavia,

we must improve upon it. MOL, the largest Hungarian company is certainly in a position to help us do so. Wallis Holding, a major private strategic investor who is, among other things the distributor of SAAB and BMW in Hungary, also brings a valuable perspective to the distribution and sales organization of Pannon GSM. Videoton is one of the best known names in Hungarian electronics, and Antenna Hungária is the leading radio company in Hungary.

The task which now stands before Pannon GSM is to convert this experience and these advantages into benefits for the Hungarian subscribers. It is the goal of Pannon GSM to set new standards for customer satisfaction in Hungary. A crucial part of establishing this satisfaction is the Customer Care component of Pannon GSM. This center and its staff is committed to answering all incoming customer questions as quickly and as effectively as possible. The entire staff will be trained to answer all general questions concerning both equipment and subscriptions and to accurately respond to customer concerns and inquiries in a timely fashion. Pannon considers the customer's feedback to be of utmost importance to the success of the venture.

Among Pannon's other benefits to Hungary will be the ease in which customers can purchase a mobile phone and subscribe to the Pannon GSM system. Pannon is in the

process of establishing a distribution network nation-wide which will seek out customers, making it easy and pleasant for them to subscribe. Moreover, the distribution of the handsets will be achieved through showrooms convenient for the interested customers to find. The dealer staff will be trained to provide basic information about the telephones and will also be able to subscribe the customer to the Pannon system.

National coverage is a top priority. Pannon has implemented its first coverage in Budapest in such a short period of time that others thought it could not be achieved. This tempo will only be increased in the future, as Pannon seeks to surpass expectation after expectation. Pannon will be the first GSM service to launch commercially in Hungary, the first to introduce voice mail, added services and roaming, and the first to offer an alternative to a monopoly.

The long term goal, however, is quite low key. Pannon GSM sees a future in which Hungarians consider it absolutely normal to be available to call or be called wherever they choose, whenever they choose, at a price they choose. Pannon seeks a future in which a large percentage of the Hungarian population has access to a mobile phone. Thereafter the subscribers on Pannon GSM's network will not just be satisfied, they will be delighted.



Noah Steinberg has been appointed marketing and distribution director for Pannon GSM, a new cellular phone company jointly owned by Scandinavian and Dutch telecommunication companies. Prior to working with Pannon, he was employed with Wallis Holding. He graduated from Princeton's Woodrow Wilson School and attended the Diplomatic Academy in Vienna.

SIEMENS TELEFONGYÁR ON THE TELECOMMUNICATIONS EQUIPMENT MARKET

G. BEKE-MARTOS

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In Hungary Siemens Telefongyár (Telephone Factory) represents the large multinational enterprise in all the fields related to public telecommunications networks. These fields are reviewed here with respect to our presence on the market. Our telecommunications equipment production has many decades of tradition in our country. Our actual equipment assortment is offered mainly for the large-scale network upgrading programme in progress of MATÁV (Hungarian Telecommunications Company) and for the private network owners those are operating large networks. As one of the successful winners of the telephone exchange tender we have already delivered telephone exchanges with hundreds of thousands of lines capacity and production within Hungary has also been started. Our main activity tends gradually to offer wide and more up-to-date services instead of equipment hardware. We have also started to offer the new generation of equipment simultaneously with the packet switching devices which can already be considered as conventional and are sold in significant quantities on the data transmission equipment market. Our up-to-date optical cables are laid in hundreds of kilometres throughout the country. We also undertake the delivery of telecommunications systems on a turn-key basis, e.g. supplying the telephone network of a whole district. We also render assistance in financing these projects. Our program development staff is ready to solve any computer engineering and data processing related task.

1. OUR PRODUCTS

The product assortment of the Siemens enterprise covers all branches of the electrical and electronic industry. Thus our company is able to satisfy any telecommunications requirement, using only self-made equipment. In this respect, it is unique in the world. This feature permits us to aim at the long term objective of marketing complete systems and to finding solutions for problems instead of marketing single appliances or equipment. It is obvious, that the appearance of the company in each national market can be different, characterised by the market particularities and by the history of appearing on the market.

There are various Siemens affiliated companies present in Hungary, two of them are also engaged in telecommunications engineering. Siemens Telefongyár is specialized in the field of public networks, marketing the products of this kind of the large multinational enterprise. Fig. 1 shows the most important ones presently marketed. There are some products among the listed groups which are manufactured here, however, the majority of them, of course, are produced in other countries of the world. The majority of the products in the listed groups have already been introduced to the Hungarian market, with the exception of the mobile telephone equipment. We are about to start marketing of these ones as well.

Transmission and multiplex equipment
Switching engineering — Telephone exchanges
Mobile telephones
Text and data transmission equipment
Main distribution frames
Cables and cable networks
"Turn-key basis" telecommunications systems
Program systems

Fig. 1. Product groups

Nevertheless, it is to be noted that the word "product" does not only mean equipment but also services, and the proportion of the two kinds of products can be different in each given field. The world-wide trend, however, is that this proportion is changing in favour of the latter one, in favour of the services rendered. (It is the same tendency that is also manifested in other fields of the economy and globally as well, e.g. in the change of the proportion between the fields of manufacturing and service). No equipment and services exist without each other and within constant total value the proportion of services is increasing more and more. This trend is also expected to realize in the future in the case of the products of Telefongyár.

2. PRODUCTS OF TRANSMISSION EQUIPMENT

Telefongyár, the legal predecessor of Siemens Telefongyár, started the manufacture and delivery of transmission equipment in the first half of the '60s for both the indigenous and foreign customers. The manufacture of these kinds of products will come to an end in the first half of 1994.

Our company started the marketing of Siemens transmission equipment after its establishment in 1991. Fig. 2. shows the dynamic increase achieved in this field.

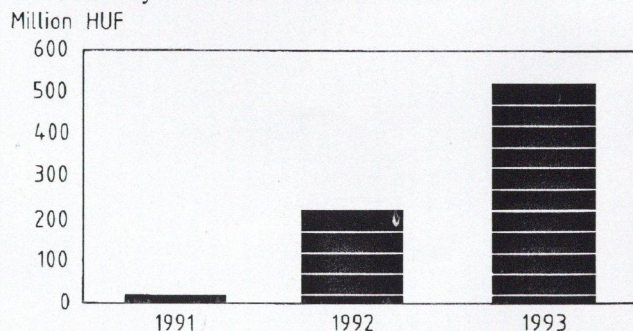


Fig. 2. Siemens transmission equipment yearly turnover

2.1. Our main activities

Fig. 3. shows the summary of the achieved results up to now.

		Projects	Applied technology
Public networks	Main trunk networks	Budapest — Szeged	140 Mbit/s optics
		Budapest — Mosonmagyaróvár	
		5 districts (microwave tender)	140 Mbit/s 11 GHz 18 GHz
	Regional and subscribers' networks	Szolnok Keszthely Ménfőcsanak Kecskemét Veresegyház Szeged Békéscsaba	34 Mbit and 140 Mbit optics PCM-30
Private networks	MÁV	Budapest — Ring-network Budapest — Miskolc	155 Mbit/s synchronous PCM-30
	Ministry of the Interior	Various links	PCM-30

Fig. 3. Major projects implemented and under implementation

We are delivering equipment for our largest business partner, MATÁV Rt. in three areas of use.

The Mosonmagyaróvár-Budapest-Szeged link, a part of the national optical main trunk, has been set up using our equipment and this provided the interconnection for the EWSD type telephone exchange of Szeged with the national network.

Another larger field of our business activity is the establishment of the optical links between the SPC exchanges and their remote units. In addition to the projects implemented up to now and the ones under implementation, we are aiming at the development of certain primary area projects which permit their implementation on a turn-key basis, e.g. the network development of Csorna and its environs.

In the field of microwave equipment manufacture we are proud of achieving the award in the microwave main trunk network tender which allowed us to install in five districts equipment operating in the 11 and 18 GHz band with 140 Mbit/s data transfer capacity.

In addition to the public networks we also pay considerable attention to the private networks. In this field MÁV (Hungarian State Railways) is a very important partner for whom synchronous digital equipment will, for the first time, be installed in Hungary on the Budapest ring and the Budapest-Miskolc line. The reconstructions of the other private networks have also been started and we highly appreciate the commission of MOL Rt. (Hungarian Petroleum Co. Ltd.) to set up the first optical link.

2.2. Our plans

The marketing of the equipment started in the previous period will also be continued in the future, first of all with respect to the regional and subscribers' networks.

In addition to the products which can be considered as conventional ones we take as primary task to introduce the new technical achievements in Hungary. Among these tasks the introduction of synchronous digital systems in the MATÁV network (SDH systems) is of prime importance. As a result of the MATÁV network upgrading program the number of subscribers significantly increases. In parallel with this the demand for the integrated services will also rise. We have the intention to take an active part in setting up the subscribers' optical networks (FITL) which satisfy such demands.

It is also in our interest to take an active part in the implementation of the network management system (TMN) which is to be set up in the future.

The assortment, up-to-dateness and quality of the Siemens enterprise transmission equipment, have in many other countries demonstrated its high standards. We would like to contribute to this fame providing the same quality and, first of all, by our intellectual contribution in the field of network design, and by the services in the fields of assembly and maintenance work.

2.3. Public telephone exchanges

The most important branch of telecommunications is the telephone with respect to both its quantity and widespread use. The largest "machine" all over the world is the telephone network which covers the whole world. The Hungarian telephone network is a very ill-equipped part of this machine. This is why the activity pursued in this field is of prime importance in our country. Siemens also delivers all the required parts for the telephone network. The transmission equipment which is also required here has been mentioned above. It is to be noted that the telephone sets and satellite exchanges, pertain to the private network branch within Siemens, this belongs to the line of Siemens Co. Ltd. The rest of the product groups used in the telephone networks, as mentioned above, are marketed by Siemens Telefongyár. Among these the telephone exchanges have the highest importance.

The EWSD system, well-known all over the world, can be applied to realize all types of telephone exchanges. Fig. 4. shows their list. The EWSD system has achieved a great success since its introduction, more than 10 years ago.

Local
Transit
Combined
International
Mobile (GSM) exchanges
Remote units (Remote DLU),
Sheltered (Shelter DLU) and
Independent remote units (SDE)

Fig. 4. Switching technology — Telephone exchanges (EWSD)

The main reasons for this success have been its open system and its suitability for further development. Year by year the technological development results and the international standardization achievements have been introduced in its construction. This has partly been the reason for the selection of this system for introduction in Hungary through the so-called "SPC Digital Telephone Switching System Selection Tender". Since then, year by year, an-

swering the commitments awarded through annual price competition Siemens has delivered, installed and launched hundreds of thousands of telephone lines. The more accurate figures, which are valid as of May 1993, are shown in Fig. 5. (the global figures of data and text transmission equipment, as well as of the main distribution frames are indicated here).

Telephone:	280 operating ports 13 exchanges 20 RSU
Data and text transmission:	
• telex:	6500 ports
• packet switching:	3300 ports
• videotext:	2500 ports
Main distribution frames:	national network 600 thousand pairs

Fig. 5. Siemens public switching technology in Hungary

There are really up-to-date EWSD system telephone exchanges in many places of the country which have been underdeveloped till now. Fig. 6. shows the national distribution of Siemens telephone exchanges. The large telephone exchanges are local or combined (local and transit) ones. The remote subscriber units (RSU) connected to a main telephone exchange facilitate access even to the most modern services in small villages and remote places.

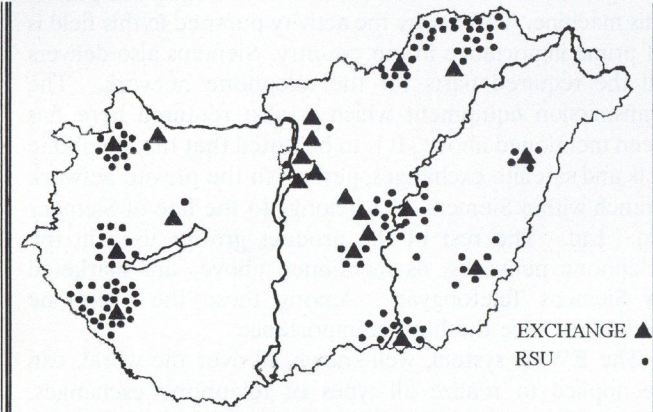


Fig. 6. EWSD exchanges at the end of 1993

Telefongyár gradually takes over the role of supplier, at an increasing rate, from the parent company in Munich. The domestic participation has been limited to the design and assembly of the first telephone exchange, while at the present time the domestic participation is also significant in the manufacture of the telephone exchanges being presently installed. The interface units of the shipments realized in 1993 which serve to establish the connection of the subscriber lines and the trunk lines to the telephone exchanges, respectively, being the most numerous units of the telephone exchanges, are manufactured by Telefongyár (representing a total of 120 thousand ports, namely, equivalent connection points). The German colleagues are participating only as technical supervisors in the assembly work and in the installation. Fig. 7. shows the yearly increasing turnover and, within this, the leap of the proportion of home production in this year.

It is obvious that the shortage in availability of telephones, will disappear sooner or later, at the present rate of development. This state was achieved in Western Europe more than a decade earlier. From this point onwards the telecommunications equipment suppliers offered new, previously non-existent products and services. Telefongyár must also do the same. The planned composition of the business activity shown in Fig. 8. is in accordance to this strategy.

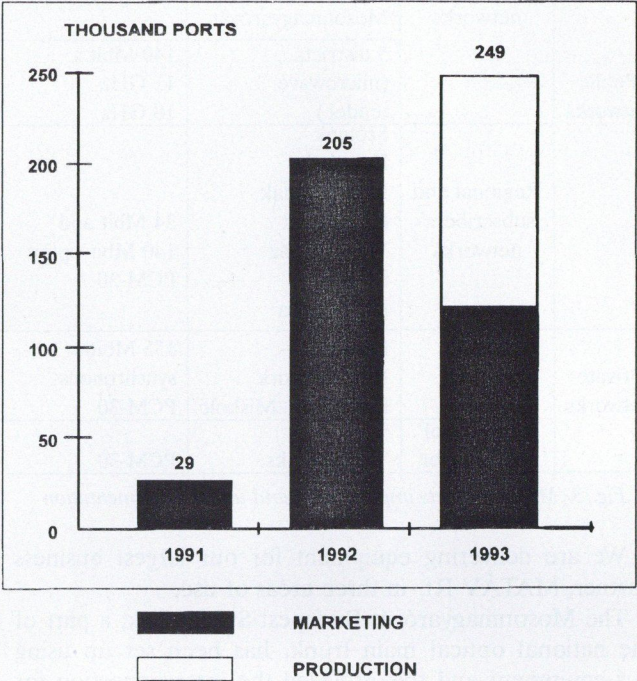


Fig. 7. EWSD deliveries in the 1991 – 1993 period

1991	1992	1993	1994	1995
EWSD	EWSD	EWSD	EWSD	EWSD
MDF	MDF	MDF	MDF	MDF
	SDE	SDE	SDE	SDE
		DATA	DATA	DATA
		MOBILE	MOBILE	MOBILE
			TMN	TMN
			No.7	No.7
				ISDN
				IN

Fig. 8. Switching technology related business activity

But let us return to the present or rather to the nearest future. MATÁV, quite correctly, would like to make up for the deficiency in the available number of telephones through a network development concept by working from the top to the bottom. According to this, up-to-date, quantitatively and qualitatively appropriate conditions will at first be created at the higher levels of the network, and the up-to-date digital technology will gradually spread to the lower levels. This way, districts will remain for years, or even for more than a decade, in larger localities and towns, where the telephone exchange is operating well, but is conventional, and where the network is also conventional – analogue. In these districts the manually operated exchanges can only be economically replaced with equipment which is compatible with the conventional

telephone exchanges and networks, and is economical in the capacity required for the given place.

Siemens has designed the small digital exchange, SDE, exactly for this purpose.

This equipment can operate independently in a conventional environment, too. It is economical even if a few hundred subscribers are connected, but more than 900 subscribers can be connected to it. It provides a lot of services which can only be rendered by up-to-date digital exchanges, but not by conventional exchanges. The additional advantage of this telephone exchange, compared to the conventional ones, is that when setting up a Siemens main telephone exchange in a nearby town, this small exchange can operate as a remote unit of the main one after introducing in it some small modifications and also provides all the services which are rendered by the brand new large capacity main exchange. Its early installation does not involve unnecessary investment costs, there is no need to discard it; it can be taken as payment in advance for a subsequent up-to-date technology, and for a possibly one decade temporary period, more and better telephone service can be provided for a small locality, a district of a town, locally, as compared to their neighbourhood.

We are delivering main distribution frames together with the telephone exchanges and individually as well. In the 1991 to 1993 period we have marketed a quantity of IDC 2000 type main distribution frames which make the connection of 640 thousand pairs possible.

4. DATA TRANSMISSION NETWORKS

In our country and in the surrounding countries a tendency is emerging which can be divided into two components:

- joining up to the developed industrialized countries in the field of the conventional data transmission networks (e.g. packet switching),
- introduction of new networking technologies (e.g. MAN = Metropolitan Area Networks and VPN = Virtual Private Networks).

Siemens has a product assortment which covers both the fields of conventional circuit and packet switching networks and the fields of recently emerged metropolitan area networks.

The whole equipment assortment required to set up virtual private networks is also available.

We must also mention the Frame Relay (FR) technology and the Asynchronous Transfer Mode (ATM). The latter is also supported by two product families of Siemens.

Here follows a list of the part of the product assortment of Siemens which fits into the tendency outlined in the introduction.

4.1. EWSP

High capacity packet switching data transmission network equipment family which also supports the virtual private network option. The MATÁV packet switching network is also based on this system and this equipment family is also used in the MÁV's internal network system.

4.2. EWSM

Equipment family which is used in setting up a metropoli-

tan area network of the DQDB operation mode and is used to interconnect local area networks of computers, PABXs and other very heterogeneous terminal systems, at a 34/144 Mbit/s data transfer rate.

The ATM compatible operation assures its integration into the B-ISDN (broadband ISDN) networks without problem.

In the USA and in Europe nearly a dozen of EWSM systems are already in operation.

4.3. SIMUX

Equipment family related to the intelligent multiplexers, the so-called Cross Connect equipment family, three characteristics of which are to be specially highlighted:

- supports the Frame Relay option with simultaneous Cross Connect operation mode (with virtual private network option, too),
- realization of ATM interfacing (ATM feeder),
- in ATM operation mode its throughput can be increased up to 10 Gbit/s bit transfer rate.

The supporting of the virtual private network option makes it possible for more users to operate their own network independently of one another using a common physical network and a common SIMUX equipment.

This can also be realized by the service supplier for his clients.

By now, preparations have been made to make available both of these facilities in Hungary.

4.4. ZDA

Intelligent multiplexer equipment the capacity of which can also be extended to obtain a relatively moderate capacity Cross Connect function. MATÁV basically relies on this equipment in setting up their leased line digital data transmission network.

Fig. 9. shows an overview list of the text and data transmission equipment, and as to the marketing result figures, the reader is referred to Fig. 5.

EWSP	—	X.25, X.75
SIMUX	—	Frame Relay, ATM
EWSM	—	DQDB, ATM
ZDA		

Fig. 9. Text and data transmission equipment

5. CABLES AND CABLE NETWORKS

The transition from the analogue network system to the partially digital and then to the completely digital networks started with the appearance of the EWSD exchanges and the digital telecommunications equipment.

This transition leads to the reduction of cable cross sections in case of the conventional copper core telecommunications cables. To provide services for hundreds of homes only large cross section Qv cables could previously be used. Today, the provision of services can already be assured by using small cross section cables and by remote equipment located close to the subscribers. To terminate the end of the copper core cables of the digital system a new digital terminal equipment family is introduced by us.

Today, the use of optical cables in the cable networks which interconnect the telecommunications equipment is

no longer considered to be a novelty. Optical cables are being used in more and more areas. With its numerous advantages it is beginning to replace copper core cables.

After the end of the experimental period the optical cables appeared in the telephone network of Budapest as trunk cables. They connected the main telephone exchanges to one another and to the long distance national and international exchanges. Siemens offered and delivered for use in this overcrowded network a reliable optical cable which combines all the latest technical achievements of the cable manufacturing technology. Only this cable structure could safely provide the 2000 m draw-in lengths. The massive increase in quality can be well demonstrated by the fact that the draw-in length of the "withstands all" type copper core cables is only 150 m. The first opportunity to introduce the very high technical standard single mode optical cables arose in Budapest. They do not only

satisfy the present traffic conditions and technical requirements but provide adequate background reserves to also satisfy the presently not known requirements which will be emerging in the coming 10 to 30 years.

The change in the technical approach of MATÁV has been a good lesson for Siemens. The reliable Siemens optical cables, which have stood up to the test in the national trunk network, could not be applied. A significant price reduction could be achieved by lowering the quality requirements.

Quality and reliability are also prime factors today at Siemens. A cable structure modernization has been introduced to reduce the cable costs and to stabilize the market positions. Our market policy is changing from individual product sales towards the delivery of complete systems. The summary of our results achieved until now are shown in Fig. 10.

	CABLE TYPE	LENGTH km
Environs of Budapest	Draw-in type optical cable, 4x10 fibres	50
Budapest – Hegyeshalom link	Armoured optical cable, 5x10 fibres	45
	Armoured optical cable, 4x10 fibres	40
	Armoured optical cable, 3x10 fibres	85
Győr – Mosonmagyaróvár – Rajka link	Draw-in type optical cable, 3x10 fibres	30
Vác – Szentendre link	Draw-in type optical cable, 2x10 fibres	20
Environs of Cegléd	Draw-in type optical cable, 2x10 fibres	5
Nagyigmánd – Kisbér link	Draw-in type optical cable, 2x10 fibres	14
Ács – Bábolna link	Draw-in type optical cable, 2x10 fibres	10
Environs of Dunaújváros	Draw-in type optical cable, 2x10 fibres	6
Baja – Bácsalmás link	Draw-in type optical cable, 2x10 fibres	37
Environs of Kisbér	Draw-in type optical cable, 5x2 fibres	43
	Draw-in type optical cable, 5x4 fibres	13
Environs of Szeged	Draw-in type optical cable, 5x2 fibres	15
	Draw-in type optical cable, 5x4 fibres	12
	Draw-in type optical cable, 5x6 fibres	5,5
Vác-Veresegyház link	Draw-in type optical cable, 4x10 fibres	4,5
	Draw-in type optical cable, 5x2 fibres	21,3
Environs of Keszthely	Draw-in type optical cable, 5x2 fibres	2
	Draw-in type optical cable, 5x4 fibres	18,3
Environs of Szolnok	Draw-in type optical cable, 5x2 fibres	7
	Draw-in type optical cable, 5x4 fibres	13
Environs of Kecskemét	Draw-in type optical cable, 5x2 fibres	10
	Draw-in type optical cable, 5x4 fibres	3,2
Environs of Békéscsaba	Draw-in type optical cable, 5x2 fibres	24
Optical cable ring-network of Budapest	Draw-in type optical cable, 5x4 fibres	11
	Optical overhead cable, 1x20 fibres	17
Budapest – Miskolc link	Optical overhead cable, 1x20 fibres	185
Szank – Kalocsa link	Draw-in type optical cable, 5x2 fibres	59

Fig. 10. Optical cables in Hungary produced by Siemens

Both MÁV and MOL Rt. rapidly upgrade and modernize their networks the same way as does MATÁV. We have hopes that, due to its quality and reliability, and the fact that it is the only domestic manufacturer and supplier of

complete systems, Siemens can carry on its already more than a decade long successful service of its customers.

Setting up the Budapest optical ring network for MÁV is an exciting task for the technical staff. Almost all

difficult tasks of cable installation can be encountered in this network. Some of the more interesting ones are as follows: building, assembling and securely operating under heavy railway traffic conditions in marshalling yards under the tracks, in a railway tunnel, in a METRO tunnel, on a Danube river bridge, on the overhead cable posts. To realize the task it was necessary to design the cable which operates without failure under these extreme building and operating conditions. We have received assistance in our development work from German and Austrian railway experts who already have many years of experience.

In addition to the draw-in type and overhead cables we have designed the wall mounted indoor type and switch type optical cable with a flame resistant cable jacket structure, the single optical core connecting cable and the optical connector family. We have also designed a complete system assortment for the assembly of the optical cables. The UC type joining seal fitting family, designed for use with conventional cooper cables, has been modified to extend its use also for optical cable joints. This way we achieved that the same technology can be used for the assembly of optical draw-in type, underground and overhead cables.

According to the international fibre welding requirements we have designed a microprocessor controlled, completely automatic welding equipment family for optical fibre welding purposes but we also have on offer in our product range a simple welding machine that can be operated under a microscope and can be manually adjusted.

Dozens of this machine are operating in the network. We have not neglected one of Siemens' classical product families, the measuring instruments, either.

Siemens' OTDR fibre classification instrument designed by us according to the quality requirements set up by the universities of the USA, will, we hope, also be available for Hungarian customers.

The optical standard level transmitter and receiver instrument pair for network building and assembling purposes with the optical line telephone set is also marketed by us including the optical fibre parameter measuring instrument set for technical development laboratories.

The installation of the system of the latest switching and telecommunications equipment also requires new cable structures. We are already prepared for the manufacture of the shifted and the smoothed dispersion optical fibres and cables.

6. PROGRAM SYSTEMS

We have previously mentioned the continuously increasing proportion of services. A part of these services are provided by the computerized appliances connected to the telecommunications equipment. Such systems are for example the tariff accounting systems, the Operation and Maintenance systems, the Network Management systems and many other ones, and possibly, a combination of these. Siemens Telefongyár is also ready to manufacture and deliver these products.

Abbreviations applied

Abbreviation	Description
ATM	Asynchronous Transfer Mode (B-ISDN)
B-ISDN	Broadband ISDN (see also ISDN)
DATA	Data Transmission
DLU	Digital Line (subscriber) Unit
DQDB	Protocol used in Metropolitan Area Networks
EWSD	Digital telephone exchange system
EWSM	Exchange system for MAN (see also MAN)
EWSP	Packet switching exchange system
FITL	Optical fibre in the subscriber loop
FR	Fast packet switching process
GSM	Global System for Mobile communication
IN	Intelligent Network
ISDN	Integrated Services Digital Network

Abbreviation	Description
MAN	Metropolitan Area Network
MDF	Main Distribution Frame
MOBILE	Mobile telephone service
No.7	Common channel signalling system, recommendation No.7. of the CCITT
RSU	Remote Subscriber Unit
SDE	Small Digital Exchange
SDH	Synchronous Digital Hierarchy
SIMUX	Switching machine (Cross Connect, FR, ATM)
SPC	Stored Program Controlled
TMN	Network management system
VPN	Virtual Private Network
ZDA	Intelligent data multiplexer



Gábor Beke-Martos graduated in 1976 at the Technical University of Budapest on the faculty of Electrical Engineering. He took his doctorate in probability theory in 1979. He graduated at the University of Economics of Budapest as an engineer-economist in 1984. As a development engineer he specialized in design of data transmission systems at the Telefongyár, Budapest. He became the Telefongyár's deputy manager for development. Later as a Marketing director he had managed the whole commercial activity of Telefongyár for 7 years. In 1990 he became the General Manager of Telefongyár. From 1st September 1991 he is the CMD of Siemens Telefongyár Ltd.

ERICSSON'S TECHNOLOGY IN HUNGARY

I. FODOR

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One can hear about difficulties, bad prospects of the Hungarian professional telecommunications industry at every moment. Unfortunately this pessimistic spirit resulted in measures taken on a decision making level. At the same time recent economic/political changes have produced results in this field that can be a reason for optimism. The history and results of Ericsson Technika, the joint venture established three years ago in the Hungarian telecommunications industry, are a good example of modern technology transfer and exploitation. The experiences of this dynamically developing firm, becoming the largest telecommunications company on the market by 1993, may be a reason for optimism not only for Hungarian experts, but also for experts of other countries of our region with similar past. There is a real possibility and there is away to re-create the home industry, although it has to be re-built from its foundations based on the existing intellectual values and professional culture.

1. HISTORICAL ENVIRONMENT

From the telecommunications point of view - one of the most important elements of the infrastructure - the present situation of Central and Eastern Europe can only be understood with a good knowledge of the past few decades. Because of the dramatically intensive political and economic changes since 1990, the past three years have to be analyzed separately from the 70's and 80's. This is valid both for the telecommunications services and the professional telecommunications industry.

From the mid 60's the telecommunications industry and the telecommunications system of this region was organized in the frame of the COMECON. The Hungarian telecommunications industry with traditions lasting back to the beginning of the century had an important role in this process. However, this was a market only for the technologies of the 60's, after this period the development declined rapidly in accordance with the whole economic structure of the region. The telecommunications gap — compared to Western Europe in quantitative measures — was primarily born in the 70's and 80's. By the end of the 80's, with the collapse of the COMECON market, the Hungarian telecommunications industry became paralysed very soon.

It is a fact, however, that the Hungarian PTT has launched a digitalization program already in the beginning of the 80's. In 1988, when the COCOM regulations permitted so, digital exchanges were put into operation. Because of the difficulties of the economic system, this was rather a change of technology than an intensive network development program. If we also consider the epoch-making role of Hungary in the political and economic changing of regime of 1989-90, the occurring events can be regarded as exemplary with good reason. In other words, the development processes of telecommunications in Hungary are likely to be repeated in other countries of the region with a certain delay.

Within one year after the democratic changes a joint venture was established by a Hungarian and an international company. The first three years of operation of this joint venture may result useful information and experiences. The name of the international company in the joint venture: Ericsson.

2. ERICSSON IN HUNGARY

The currently 117 year old Ericsson company came for the first time to Hungary in 1911 when it established its first factory in Hungary, the predecessor of the Budapest Telecommunications Factory (BHG). Ericsson was present on the market with a varying level of activity until the beginning of World War II. After World War II Hungary became isolated and Ericsson returned only in 1970 when the first crossbar exchange was put into operation. Crossbar exchanges were manufactured afterwards under Ericsson license at BHG and several million lines have been exported to Central and Eastern European countries.

The digitalization program was started in the early 80's in the previous economic environment. By the end of the period Ericsson signed new agreements with the Hungarian PTT and Westel. As a result, AXE digital exchanges have been installed (International, Mobile). The first sign resp. result of political and economic changes in telecommunications is the System Selection Tender. (Maybe it was the first professional tender in the region.)

According to the System Selection Tender two system providers were chosen to supply the Hungarian market with digital switching systems until 1995. At the same time both system providers established joint ventures to support their activities in Hungary. The Tender was won by Ericsson and Siemens was selected second.

During the Tender Ericsson's competitors signed agreements with the large, traditional manufacturers of the Hungarian telecommunications industry to establish joint ventures. Ericsson was the only company among the internationals to turn to a smaller, financially stable private Hungarian electronics company and signed an agreement with it. The Hungarian partner, Műszertechnika Rt., was one of the largest private companies with primary activities in computer hardware and software manufacturing. At the end of 1990 the two owners established their joint venture Ericsson Technika.

3. CHRONICLE OF ERICSSON TECHNIKA KFT.

The activity of Ericsson Technika began on February 1, 1991 with two employees. By the end of 1991 the staff number was 90, by the end of 1992 260 and by the end

of 1993 340 persons. A staff level of approximately 500 persons can be expected by the end of 1994. In the first year the main tasks were to organize the company, prepare for different professional activities, establish regulations, provide professional training, shape the image of the company. In the second year the company performed greater and greater parts of contracts.

Ericsson Technika has been established for two independent task groups. The basic activity is telecommunications network development (design, manufacture, deliver and install telecommunications equipment) for the Hungarian market. The other activity is telecommunications system software design, and a Software Development House has been established at Ericsson Technika.

Ericsson Technika performs several marketing and engineering activities, hardware and software production, support for operating systems, document supply and training. From 1992 agreements are already prepared by Ericsson Technika with activities ranging from engineering design to supervision of operating systems. These activities cover digital switching, transmission, radio communication, power supply equipment planning, construction, testing and operation support as well as management of turn-key projects.

The relationship between Ericsson Technika and its owners is regulated by agreements. The company is an independent business unit, activities are based on Ericsson's technology and methodology. After joining the company, new employees participate 3 to 6 months long training sessions. Later additional courses are held as required to maintain and improve the competence level. Different training programs are followed by on-the-job training sessions. The professional activity of the young Ericsson Technika - meeting Ericsson quality standards - is supported by foreign experts working in different parts of the organization. Foreign experts on short term assignment (some months) or on long term assignment (a couple of years) help the company in its daily operations to meet a high international quality level. It is a fundamental principle within Ericsson that expatriate experts teach local professionals - their successors - then after one or two years they return home.

The majority of shares of Ericsson Technika is owned by the Swedish Ericsson. The firm's start-up capital cash created good conditions to start activities. Considerable investments were required to launch high technology operations. During the first three years Ericsson Technika have spent more than HUF 1.5 billion on investments and training on different levels. Major part of these costs are hardware and software tools required by the large scale engineering activity.

Software designers are working in the world-wide Ericsson design network. The basic prerequisite for software design is to provide the most up-to-date development tools for all members of the network. Software designers at Ericsson Technika work on high capacity SUN workstations linked to the world-wide network through a 64 kB satellite connection.

This system enables the company's employees to access an integrated communications system the same way as any other Ericsson designers do in the world (access to

different software tools, electronic mailbox systems, news services, management tools, etc.).

The System Selection Tender brings an annual competition and market sharing between Siemens and Ericsson. The first year was 1991 with a newly established company. As the first construction technicians and testers completed their training Ericsson Technika was gradually involved into the implementation process. In 1992 the main contractor of HTC is still Ericsson Telecom, but since the planning, implementation and engineering capacity at Ericsson Technika was operational, the Hungarian company became the subcontractor of the parent company. In 1993 Ericsson Technika was the contractual party for HTC and the Swedish Ericsson Telecom was a supplier to Ericsson Technika.

The turnover of Ericsson Technika dynamically increased with the increase of the staff number and technical competence. In 1991 the turnover was around USD 4 million. In 1992 the turnover exceeds USD 10 million, in 1993 USD 30 million. The plan for 1994 amounts to more than USD 90 million.

The average age of employees at Ericsson Technika is 33 years. Not only the firm is young, but so are its employees. 30% of the employees are female and about half of the employees have a graduate degree. The quality of work of these young engineers can be characterized best by an internal evaluation report of a foreign expert stating the following about software designers: "All of them have graduated a Technical University, some of them have previous work experience. In an average, all of them speak very good English, some of them almost perfect. Their general software knowledge level is excellent, thanks to the very good educational background and to the highly developed 'software culture' in Hungary. All of them are highly motivated to participate in Ericsson's global R&D program".

The professional background of Ericsson Technika is given by the "big" Ericsson with its main products lines: public networks, mobile radio systems, office communication, cable and cable networks, components and defense communications systems. Ericsson Technika has established relationship with almost each of these product lines.

Ericsson is interested in several other Central- and East-European countries. As the capacity of Ericsson Technika allows, it is ready to participate in projects. Actions plans for these markets are included in Ericsson Technika's program.

4. PRESENT ENVIRONMENT

Economic reforms ensuring favorable conditions to joint ventures with foreign capital have already started in the second half of the 80's. From these reforms first of all tax relief has to be mentioned. Every other measure helping the operation of joint ventures were a result of measures, laws, etc., prompting a quick change of the Hungarian economic life. The developing bank system and totally liberalized imports help the operation of joint ventures.

Ericsson is one of the world's leading communications equipment manufacturers. From this results the fact that in order to keep its position and to reach even

better results it ensures its operation with the most modern implements. This means that several technological generations cannot be present concurrently. This is equally valid for the technology that has been or will be taken over by Ericsson Technika.

The basic philosophy of Ericsson is based on its relationship with the buyer. A long term relationship results from the awareness of the buyers' needs and taking complete responsibility. As Ericsson has business relations with more than a hundred countries of the world this philosophy can be employed only with a well organized network, and within this, independent and well developed local interests, companies in case of larger markets. Ericsson Technika is equally needed by the Swedish and the Hungarian.

Features of modern telecommunication are the fact that it is focused on services, mobility, and intelligence which is on the way of taking shape. In digital technology this is implemented by the decreasing volume of hardware and the increasing value of software. At the beginning of the 90's hardware amount to max. 40% of the total value of the telecommunications systems. More than 60% of the total value consists of software and engineering activities. On a world scale a new trend is that hardware production is more and more concentrated while software and engineering part, that is continuously being extended, is being decentralized.

For advanced technology to be transferred the recipient party's professional preparedness is needed. From this point of view the Hungarian environment is rather favorable. An interesting contradiction in the political and economic system of the past year is that in spite of the underdevelopment of the economic and productive system Hungarian education could keep its high level even during those decades. This was the main reason why no special difficulty could be observed when forming Ericsson Technika's professional capability and capacity during the past three years. Unfortunately this is not true in connection with some fields which practically did not exist, or at least not in this form, in the former economic system. Such fields are logistics, turn-key projects, marketing, etc. Another category is constituted by the positions where it is difficult to find well prepared professionals with a knowledge of English. Such is first of all the field of administration. (During the past decades knowledge of foreign languages was insignificant in the administration part of the productive sphere.)

Ericsson Technika's company development program is important even on an international scale. The shareholders have approved such a program only in case of stable market that supports development. Ericsson Technika's program is based on the System Selection Tender. For an unbroken development, as well as in order to advertise the joint ventures good example, it is needed that principles of the System Selection Tender should be kept by each party. Ericsson Technika's development and its operation is determined by a regulation of the System Selection Tender which states that until 1996 the Hungarian telephone network will be developed exclusively with Ericsson and Siemens made equipment, and on the limited price level stipulated in the frame of the Tender.

The underdevelopment in telecommunication of this re-

gion is also an obstacle to economic reform. An automatic by-product of the political and economic development is the boom in need of the society for telephone. At the time being impatient making up for quantitative backwardness can be observed in Hungary. This is shown in a way that in several parts of the country initiatives for investment arise.

There were also losers of the System Selection Tender. It is an unfortunate fact that in the period after the decision was made a series of actions disturbing the execution of the jobs could be observed. This was first of all due to the fact that this type of competition, when the loser and its environment have to respect the result, in lack of obvious reason for contesting, was not previously common in Hungary. Disputable industry policy concepts have also been announced in which the fact that new modern industrial capacity came into existence beside of the previous underdeveloped domestic technology has not been properly considered.

At the beginning of the economic changes the underdeveloped telecommunication network of these countries gives also a possibility to skip an intermediate technological phase. This means that it has to be considered a natural process that just after their introducing in Western Europe the most modern integrated telecommunications systems (GSM, SDH, OSS, etc.) will appear here within a relatively short period of time.

5. CONCLUSIONS

What happens these years in this region is history in politics and economy. New economic structures emerge in Central and Eastern Europe. The possibility to adopt modern technology is open. The question automatically comes up how this relatively underdeveloped region is able to receive modern technology in industry and services. Events flow very fast. It is no use to announce experiences from a historical distance as they are worth making use of them as soon as possible. Experiences from the processes that have taken place in the field of telecommunications since 1991 in Hungary can be taken into consideration by other countries of the region in similar situations. This is equally true for the joint venture activities that result from Ericsson Technika's three-years past. These are the following:

- Modern technology can be domesticated very quickly. The necessary intellectual capital on which the programs can be founded is to be found in the country. In the process of choosing professionals the tendency can be observed that young graduates are best suitable for tasks relating to new technology. Certainly, the fact that new technology needs new attitudes, the knowledge of modern tools, dynamic disposition and vocation has also a role in this situation. Out of the experts of the former technological era only those can join in the new process who are ready for a renewal. This latter group of experts can be, however, a foundation for this new industry.
- In the frame of the new technology the values of the industry will change. In the necessary basic education computer sciences are more and more emphasized, computers become an implement for everyday tasks.

The sphere of activity of blue-collars is re-organized and at the same time a quantitative decrease and a depreciation in value can be observed in respect of hardware. The role as well as the importance and value of engineering/software design expand several times compared to previous times. Highly qualified and organized engineering activity becomes a crucial factor.

- If Ericsson had established a joint venture with a former Hungarian telecommunications manufacturer, it certainly couldn't have been capable of such a dynamic development. Among other factors the knowledge of technological processes justifies that former Hungarian professional telecommunications industry cannot be renewed without external resources, former technology cannot be carried on in a competitive way. However, this industry can be re-built very quickly if it is founded on the intellectual values and the technical culture that can be found in the country. Without arguing with economic pros and cons it can be also announced that in case of a Hungarian company the fact that it pursues high-tech activity with local professionals is in itself a considerable value, independently from the firms profit situation.
- Ericsson Technika's example proves that an adequately organized company development program and a guaranteed market formed in a sound competition mean a

profitable enterprise to investors. In case of programs of such volume a consequent policy of the government supporting capital and technology to be brought into the country is absolutely needed.

Hungarian professional telecommunications industry had a determinative role from its beginning, i.e. from the beginning of the century, in Europe and first of all in Central and Eastern Europe. Taking this fact into consideration, Ericsson Technika's short history has a dual value. It is a success in itself that by 1993 Ericsson Technika became the company in the Hungarian telecommunications industry having the highest turnover. It is however unfortunate that this success is partly due to the considerable decline of the former traditional industry in the past decade.

World has changed in this region. Dramatic changes, the worsening economic situation may make us pessimist easily. This is true for both private and professional life. However, in this country we have good reasons for hope in the field of telecommunications. There are signs that returning from a state that has fallen during decades is possible, and we also have results. Among these belong what Ericsson Technika has proven since three years. High level activity can be created within a short period of time and there can be again advanced electronics industry in Hungary and in this region.



István Fodor electrical engineer, is the general manager of the Ericsson Technika Ltd. From 1967 to 1976 he was employed by the Design Institute of the Hungarian Post Office working on the design of wireless communications systems. He participated in the development of the national microwave communication system and in the launching of the first radiotelephony projects in Hungary. In 1976 within the

framework of an inter-state agreement he completed the project plan of the national communication system of South Yemen which became the basis of the subsequently realized system. In 1976 he organized the Network Design Department of the Budavox Co. Until 1990 he directed the preparation and execution of various export contracts in communications. The most important of these were the Algerian and Iraqi contracts. From 1990 he was manager of the Hungarian export contracts for Kuwait. In 1990 he has been appointed to the organization of the joint venture company Ericsson Technika Ltd., which he is directing presently.

RECOVERY OF BHG TELECOMMUNICATION WORKS: PLANS AND POSSIBILITIES

L. MIKICS

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BHG Telecommunication Works is a highly experienced representative of the Hungarian telecommunication industry, and it is continuously serving the ever increasing needs of the users from 1874. In the mid sixties the wide product range was narrowed down to switching technique in accordance with the existing market requirements which was extended again by TV transmission and UHF-VHF broadcasting transmitter and receiver techniques. In 1986 the company acquired the manufacturing rights of the most wide-spread digital telephone exchange system, Northern Telecom DMS-100, on the basis of which the technology preparation might have started. The economic-political system changes sweeping through the East-European countries caused the almost total loss of the earlier COMECON countries' market of BHG, and by the allocation of the public main exchange system selection tender for Hungary caused the advance of the competition. The company wants to break out of this extraordinarily difficult situation by concentrating its sources, by strengthening the quality concept, and by reasonable decentralization of its activities. This is helped by the consultancy provided by the PHARE program of EC, and on the basis of the Government's crisis-handling program by the Ministry of Industry and Trade.

1. BHG ROLE IN THE EVOLUTION OF THE NATIONAL TELECOMMUNICATIONS

As an introduction we shall show the role of BHG in the evolution of the national telecommunications on the basis of the results of the first 119 years. The enterprise registered in 1874 under the name "Béla Egger Telegraph Works", on the origination of Gábor Baross Transport Minister in 1887 became the largest and most important supplier of the telecommunication means for the post and railways, and its further evolution was determined by this forward looking ministerial decision. In 1910 already 2100 employees were employed by the Unified Incandescent Lamp and Electric Co. then, the main profile of which was the manufacturing of telecommunication products besides the vacuum-technique means. In 1928 the telecommunications business branch became independent as a subsidiary of the American ITT Co. under the name Standard Electric Co. with a product structure corresponding to the market demands of that time:

- telegraph equipment,
- telephone exchanges and telephone sets,
- radio broadcasting transmitter equipment,
- radio broadcasting receivers,
- transmission technique carrier equipment.

The excellent quality up-to-date products of Standard Electric Co. met not only the domestic needs but they were sought in the whole of Europe and the Near-East. It was characteristic of the modernity of the products

that this was the first place in Middle-Europe where the manufacture of the Rotary System automatic exchanges were provided (the manufacture of which was finished in 1977 and a few of them are in operation even today).

From 1938 the company has operated at its present central site at Fehérvári út which was bought in 1937 from Ericsson by Standard, and has been continuously extended. From 1967 with the building of the Tatabánya Factory unit the process of the establishment of countryside sites and factories was started for the manufacture of the products with high labour content. There was real need for the extension of the manufacturing positions and production area too.

In the middle of the 1960s the company was forced to discontinue a significant part of its earlier products (transmission technique carrier systems, microwave equipment, broadcasting transmitter, etc.) and in essence has become a single-profile company. The remaining profile was telephone exchange manufacture which is the most important activity even today. In the best years telephone exchanges with half million lines were produced from different types of equipment, with enormous subcontractor background. The number of employees reached its peak in the middle 1980s, when the nine manufacturing factories, the Development Institute, and the company headquarter employed together almost 11.000 employees.

A decisive participant of national telecommunications, the Hungarian Post relied on the preparedness and possibilities of the first Standard, and then BHG. New telephone exchange systems were selected by common decisions in 1968 and 1986. On the basis of these the majority of the main exchanges operating in the present Hungarian network are BHG manufactured equipment and digital main exchanges produced by BHG too. The situation is similar in the field of PABXs: the own developed and manufactured electronic SPC PABXs of BHG are capable of serving approximately 700.000 extensions in different institutions of the country. The creative product and production development workshop formed during long decades in the company was the most significant one of the Middle East European region which by its independent activity could become the basis of the successful export activity of the company too.

Till to the end of the 1980s BHG was the decisive large company, the "flagship" of the domestic telecommunication industry, the successes of which showed on the COMECON markets and on the market of a few developed capitalist countries that on the basis of its capabilities it can be a significant factor of East European in the change over process to digital systems. While in the

other neighbouring countries the emphasis was put on the development of the so called Unified Switching System (USS), the Hungarian Post for meeting the urging development needs, launched a common tender together with BHG, then in 1986 — a few years before the other COMECON countries — the contracts were born which ensured for BHG the manufacturing and selling rights of the European version of the most widespread digital public main exchange system of the world, the DMS 100. On the basis of the digital technology introduced at the Hungarian Post and the knowledge gathered by that, the large scale network development of HTC could be started from 1991 the first great result of which will be the realization of the national digital overlay network.

2. CHANGE OF THE MARKET SITUATION AT THE BEGINNING OF THE 1990S

The economic crisis which was sensible in the system of relations of the COMECON countries already one decade earlier had a significant contribution to the triggering reasons of the economic-political system change sweeping through the countries of East Europe. This was most palpable in the Hungarian—Soviet economic relations: the dragging commercial coordinations, the unproductive contingent debates, and later the excessively high volume Hungarian commercial surplus showed that the commercial partner being very important for the country arrived to the verge of insolvency. The system change was lived through differently in the economies of the different countries, but none of them could avoid the significant regression. Meanwhile the euphoria of the realized political freedom suppressed the economic standpoints and less attention was given to the fact that the external markets were regularly getting into other hands. Occasionally the decisions touching basic interests of the domestic economy were explained by the concept that large companies are harmful and useless (it is already known today that it was not correct, the real reason was that they can be competitive with other, large foreign companies on the domestic and export markets).

Unfortunately the above signalled problems have appeared at the domestic manufacturers of telecommunication means too, primarily at those which belong to the BUDAVOX group exporting more than 50 per cent of their production. The first reaction was (with one exception) their intent to start the manufacture of digital telephone exchanges, and they even found foreign partners for this. However, for the realization one basic difficulty should be overcome, namely the fact that the Hungarian Post decided together with BHG the type of the digital exchange to be applied in the Hungarian network already in 1986. Therefore in 1989 new tender was launched for the digitalization of rural regions, then in 1990 — in a meaningless manner — for main exchanges too. Other became the winners of the system selection tender, and in a surprising and peculiar manner even on Middle East European scale, the single domestic manufacturer was ousted. These decision sealed the fate of BHG and nullified all the mental and significant financial investments what were made with the right hope of the return, and further on the world level

technology represented by the partners of BHG could not come into the Hungarian telecommunication market in an appropriate measure.

3. CHANGE OF THE ECONOMIC SITUATION OF THE COMPANY ON THE BASIS OF THE DATA FOR THE LAST 5 YEARS

The following Figure shows how the weight and role of the company has been modified in the national economy, meanwhile HTC has carried out a telecommunication development program never seen before...

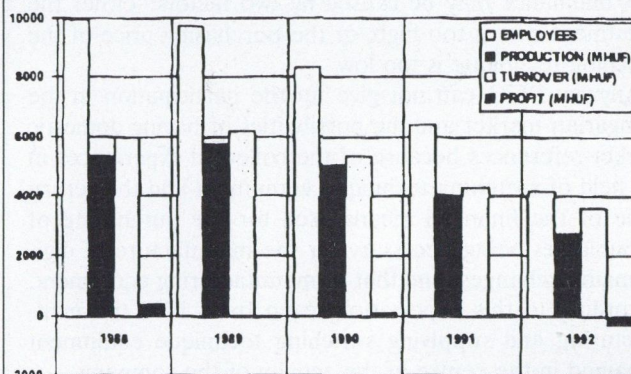


Fig. 1. Variation of the main data of BHG, 1988—1992

The data are self-explanatory. The large scale decrease of the production was combined with an even higher decrease of the number of employees, however, the balance of the company could be maintained only this way. Our difficulties were extraordinarily sharpened by the burden of the loan handling related to the licence buying and technology development in the frame of the preparation for the manufacture of digital main exchanges on the basis of the state decision in 1986. The interest burden exceeding 10 per cents of the production and the payment of the due instalments was only possible by turning into account a few high value real estates, making possible by this the reasonable utilization of the disadvantageous establishments.

4. COMPANY CRISIS MANAGEMENT, REORGANIZATION

From the memorable main exchange system selection dated to December 1990 the management of the company searches for way out as a solution of the situation seeming hopeless. The realistic evaluation of the case showed that the result of the switching technique system selection tender can not bring full joy for the "winners" neither because the price level formed brings economic result for the suppliers only in the case of manufacturing and supplying several million lines and the Hungarian market will need this quantity from none of the established three suppliers in the medium range. The result is: small added value for each domestic manufacturer what as a side effect brings also into grave situation the domestic supplier background industry. The profit formed is not enough for the reception of the technology even in approximately complete form thus the relative backlog of

the manufacturers compared to the world level will not decrease.

The average investment value of one telephone line is 1500–2000 USD in the international practice. (The data of HTC approach the upper limit from top down.) Similarly based on international data, switching forming the intelligent part of the network takes approximately 20 per cents of the total investment value. Accordingly on the Hungarian market this should have created a real price level in the range of 300–400 USD. (This is the usual price level in West Europe too.) As the contrary the specific price of the equipment offered in the state of ready for operation does not reach even the 200 USD. This imbalance may be caused by two factors: either the investment cost is too high, or the purchasing price of the switching technique is too low.

Anyway BHG can not give up the participation in the Hungarian market and the possibilities of having domestic market references because of the collected experiences in the field of switching technique equipment and the return force of the financial means used for the purchasing of technologies being necessary for the manufacture of digital main exchanges, and that of manufacturing equipment. According to this expectation, even from 1990 the manufacturing and supplying switching technique equipment remained in the centre of the activity of the company.

In January 1990 on the initiative of the Ministry of Industry and Trade our company got on the list of those companies the crisis handling of which has been backed by World Bank expert programs. The World Bank experts made the following statements:

- As a consequence of the economic-political changes taken place in Hungary as well as the liquidity problems of the Soviet Union and the COMECON countries the order stock of BHG significantly decreased, certain part of its present product range does not meet the requirements of the world market.
- The company should be prepared for competition with well-known foreign manufacturers both in the domestic and export markets. In spite of its relatively limited advantages it shall become attractive for the foreign cooperating partners.
- BHG should expand its marketing activity, it should introduce new products, and it should stop the activities generating losses.
- On the basis of the extension of the earlier sold ADS exchanges and on the basis of the orders of the newly founded independent telephone companies, BHG may continue its activity on manufacturing and selling digital main exchanges.
- A few of the strengths of BHG are the professional level Printed Wiring Board (PWB) manufacture (with UL qualification and on a quality level accepted by IBM too), the production of precision metal and plastic components. On these areas the increase of the market activity is reasonable.
- The willingness of the BHG Development Institute should be concentrated in the changed circumstances to attain new technologies and to match them to the domestic needs, respectively.

- BHG management, in the knowledge of the interrelations, should undertake the difficult and hard task of the drastic reorganization becoming necessary.

The expert report was accepted by the World Bank and it — considering the significance of BHG in the national economy — proposed to MIT to separate an appropriate sum of the PHARE aid program provided by the European Communities, for the elaboration of the transformation plan of BHG and for the preparation of the privatization by searching for appropriate privatization partners. Our application prepared on the basis of World Bank recommendations was accepted after the appropriate procedural processes, and this in turn made possible the launching a Tender for Consultancy in May 1992, and the Consultancy Contract with the selected company was undersigned in July 1992. On the basis of the Consultancy Contract — in December 1992 according to our original plans — the Transformation Plan was passed to SPA.

The Transformation Plan aims at the transformation of the company to a share-company, with such significant internal structural changes which make possible the economically independent accounting and evaluation of the separable activities. The Divisions to be created may also be appropriate for separate privatization. At the same time the separation according to the main activities of BHG (main exchanges, PABXs and CPEs, broadcasting technique, component and assembly manufacture, R&D activity and facilities) forces the formation of competition (first within the company) and by this the measurement and evaluation of the efficiency resulting in the improvement of the external judgement of the company. Such interest system will be realized where the priority is to increase the differences of the incomes and expenditures, to provide for the solvency, to reach and keep the quality corresponding to European norms.

On the proposal of the Ministry of Industry and Trade the Government fixed in a resolution in July 1992 the necessity of the elaboration of the crisis handling program for the 12 largest and most important Hungarian companies, respectively. Those companies were involved in this circle the economic operation of which may be ensured after the solution of the financial problems, at the same time because of national economic standpoints their survival is of national interest. BHG is part of this Government level crisis handling program, according to this MIT gives significant help for the solution of the basic market problems. The economic priorities have been radically changed as compared to the 1990 period, and — as in all the European countries — the protection of the domestic industry became conspicuous. In spite of this till today we have not been successful to get back the fair and square part of the domestic main exchange market of vital importance for us. Up till now the largest result of the MIT crisis handling program is that it pulled up a "confidential net" over the companies, thus the existing credit stock handling is more effective, the discussions carried out with the creditors lead more easily to correct and fair agreements. According to Law LIV of the Year 1992 in the case of BHG the foundation rights today already are not exercised by MIT but by SPA. This fact does not help the effective realization of

the domestic industrial policy, because the basic interest of SPA is not the operation of the industrial companies, but their privatization, that is, selling. It is another question that the Ministry of Industry and Trade by professional sense of decency and conducted by the responsibility towards the industry by the few means available strives to fulfill its task: maintaining the operational capability of the market lost and contracted domestic industry, including the telecommunication industry.

5. POSSIBILITIES OF TECHNOLOGY EVOLUTION, CONDITIONS OF OUR JOINING

During the past time period BHG produced large scale of telecommunication components, assemblies, and equipment. Wide technological vertical integration was primarily established for the manufacture of electromechanical switching equipment as the production of special components and assemblies in a safe and economic way could be imagined only within the company. According to this the fine mechanics component manufacturing technologies, the different surface finishing technologies, plastic technologies showed strong development, which was accompanied by up-to-date tooling and special purpose test equipment production. The coil, relay and crossbar switch production appearing gradually with the crossbar technique needed the introduction of productive machines and technologies matching to the large volume production.

From the 70s electronics gradually appeared in the production, which brought together the production of Printed Wiring Boards, the component insertion, soldering and test technologies. In the wired telecommunication on the field the connection of wires and cables requiring high labour content besides the traditional soldering technology the wire-wrap and the connection without wire clearing were introduced. In a wider sense of technology the developments carried out on the field of different test technologies, documentation preparation, production management and cooperations may be regarded as significant.

The main technologies enlisted above are partly related to the product families, and partly may be operated universally. The latter give good chance for flexible capacity use, for the product change, and for cooperation realization. In this sense BHG has significant technology sources which may be converted, especially when we are able to provide for the modernization of the given technology, the meeting of the economic product structure and quality expectations.

On the effect of the market needs and accelerated technical evolution experienced in telecommunications BHG gradually prepared itself already in the second half of the 80s for the introduction of digital switching technique the emphasized phase of which was the starting of the ADS technology transfer. Today this provides a live relation system for the access to new results of leading companies (Northern Telecom, Austria Telecommunication). BHG has sound basis for the introduction of new technologies. The efficiency of existing and designed technology base, however, is significantly dependent on the market requirements, within this on the domestic orders which at the same time may give reference on the export markets too.

The accelerating evolution which may be experienced in the world, the appearance of the ever costlier technologies, the price competition may force the equipment manufacturers to selection. The partly application of the technique represented by a few large companies, its on site adaptation, and making it marketable seems to give long range possibilities for the application of up-to-date technologies.

The development of the telecommunication needs large sources. Today at least 5-6 world leader companies deal with global development, the yearly 1 billion USD per company R&D application seems not to be an excessive data. It cannot be a question that in 2000 a few of them will be external spectators of this race. In the best of the cases — otherwise it may be justified by the reasonable use of sources — mergers will be created among the large companies as so many times in the past.

BHG also drives for appropriate partnerships to join the development and evolution of technique based on the above relations, by this also expanding and effectively using its own resources. However, the future picture may be justifiably optimistic only with the promise of a world-wide prosperity even with optimistic way of thinking. However, it is to be waited for a time...

Presently the company does not have sources enough for development purposes. According to this it searches for those professional investors who are capable and willing to take part in the coming privatization by the utilization of the existing advantages and by the use of BHG relation system. The present asset of BHG is not small and a significant part of it may be operative. In the case of the realization of the earlier mentioned transformation plan there is a realistic chance for the privatization in parts. By the consultancy activity provided by the PHARE program and as a result of the preparatory work of the company management the participation of several potential partners seems to be realistic. By the stopping of the crossbar technologies with high labour-consumption the number of employees working on switching technique may be 1000 heads at most, by taking into account the few hundred thousand line sales per year. The grave recession formed in West Europe forces the companies there too to apply severe cost economy. The significant (3–7 times) differences in the wages make the application of the Hungarian working power attractive — especially for products with high need of live work content — if the interest protecting organizations agree to the disposal of the work there. In relation to this several positive examples may be given on realized and continuously operating cooperation relations. It is characteristic of the volume of the works in 1993 that by this way possibility of employing approximately 750 heads opened up. These paid work cooperations do not need significant investments, but at the same time they help in keeping jobs and with a modest profit they contribute to the slow but continuous technological recovery of the individual factories too. At the same time it may be fixed as a fact that the privatization (by the use of external or domestic sources, respectively) of an operating production area is always more successful than that of already stopped units, it is not uninteresting from this standpoint to use the existing capabilities as completely as possible. During pri-

vatization we calculate with the different discounted forms of acquiring property for the workers and managers of the company.

6. SUMMARY

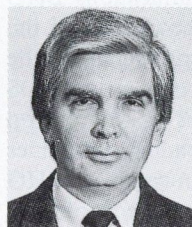
In the runningly changing world economy every entrepreneurship searches for the possibilities of its carrier-making on the market meaning occasionally rude race conditions. The race is the sharpest — as the consequence of the relative surplus production — in the fields of the electronics and telecommunication. Therefore it is not surprising that the large world-companies dictate then conditions in the otherwise generally wrong paying capability area as the redistribution of the markets will take place in these years and such a chance cannot be expected in this millenium again. Thus their main intention is to acquire positions even on the price of transitional losses. The most aimed point of these strives is Hungary where the market protection was earlier declared as an unnecessary wrong idea, and only the events of the latter few months in Western Europe made the responsible personnel suddenly realize that the protection of the domestic market is in practical operation, and it is reasonable to make them viable for us too.

The bulk of the domestic companies — left alone — can not be competitive in principle because of the both-way closed ends and of the postponement of the development,

and they become the victims of the agreements of the competition and domestic customers. For stopping the devaluation of these companies, in other Eastern European countries the cooperation with the domestic companies, as well as, the investments by foreign partners into these domestic companies providing significant, superviseable and up-to-date capacities were made a basic condition of joining the given market. This should be the aimed industrial policy target for us too because without this the best companies of the domestic industry also stop to be original value providers, job providers and job maintainers, as well as taxpayers further on. If this condition is not met the foreign companies investing earlier will get into a disadvantageous situation as compared to those who are willing to finance enterpreneurships with a few employees only.

In the case of BHG I trust in that with the necessary and satisfactory internal decisions, with the completion of the relevant Government Resolution, with the reasonable transformation, with the mutually advantageous privatization BHG Telecommunication Works will be the part of the Hungarian industry and technical culture in the future too, and by its operation may contribute to the development of the telecommunication and the country.

The long range ministerial decision showing the right direction would be necessary even today as the domestic entrepreneurs are not in a better situation than 106 years ago. The well founded hope of the Hungarian telecommunication equipment manufacturers is that it will be reality soon.



László Mikics graduated in 1965 at the faculty of Electrical Engineering of the Technical University of Budapest. In 1971 he got the diploma of Special Engineer for Transmission. He joined BHG Telecommunication Works in 1965. Till 1990 he took part in the development of electronically controlled, then analogue and digital electronic telephone exchanges, in different positions of the product development area. He is co-author of several patents, his publications appeared in the magazine *Híradástechnika* and in studies of the National Technical Development Committee. He is the General Manager of BHG from 1990.

STATE OF LEGAL REGULATIONS IN HUNGARIAN TELECOMMUNICATIONS

1. DEVELOPMENT OF REGULATION

Up to the new regulations the legal framework was circumscribed by the 1964 No. II Act on Post and Telecommunication. The Act declares that all the postal and telecommunications activities are the obligation of the State and are fulfilled with exclusive right by the Hungarian Post. The following telecommunications activities were duties of the Hungarian Post: telegraph and telephone services, transmitting of radio and television programs, the transfer and receive signals, writings, pictures, sounds or any type of messages by wire or by radio. Frequency management was also its competence. The Act and its enacting clauses assured monopoly rights to the Hungarian Post being an authority in the first instance in licensing and in complaints.

Already the prior Government looked upon public telephone service as a basic commodity, the provisioning of which constitutes an obligation for them. Therefore among its social and economic objectives the creation of appropriate conditions for the development of an efficient telecommunications system, contributing to the establishment of a modern economy, occupied a prominent position. Having been aware that closing the telecommunications gap have a key role in doing away the economical backwardness it was decided to give way for foreign investments in the telecommunications sector already in 1988. It was decided to break-off the monopoly which had been extended to every kind of telecommunications activity granted by the Act of 1964.

As a first step the commercial and the institutional (regulatory) activities were separated from each other. The tasks of the telecommunications authority were withdrawn of the Hungarian Post. The execution of these tasks were ordered by the Decree of the Council of Ministers (No. 127/1989 MT) to the Ministry of Transport, Telecommunications and Construction. The sphere of authority in the first instance was ordered in telecommunications matters to the Telecommunications Chief Inspectorate, in the matters of wireless communication and broadcasting to the Frequency Management Institute. These two authorities entered on the former duties of the Hungarian Post with further rights ordered them to be able to answer the demands of a multiple actor market. The Act 1989 No. LVIII orders the split of the Hungarian Post into three separate service provider companies: Hungarian Telecommunications Company (now MATÁV), Hungarian Broadcasting Company (now Antenna Hungária) and to Hungarian Post Company. As a next step in the privatisation process MATÁV was converted into a joint stock corporation. It was initially owned by the State Property Agency and after October 1992 by the Hungarian State Holding Company ("ÁV Rt.).

At the fall of 1993 issued the Ministry the tender for the privatisation of MATÁV. 30% of the propriety will be privatized increasing the equity of MATÁV by at least 40 Billion HUF. The winner ought to pay above this sum the concession fee which is a result of a bidding process. The privatized company has to pay one thousands of the gross yearly turnover to the state budget. The concession is given for 25 years and can be extended by half of this period. Among the duties of the concession company it is determined that from 1997 at least 90% of the telephone demands should be met within half a year. The privatized company will be defended from competition in the public local and in the long-distance telephone traffic for 8 years.

2. TELECOMMUNICATIONS ACT AND FREQUENCY MANAGEMENT ACT

The association agreement that Hungary has signed with the European Community has an impact on the telecommunications sector. This relationship calls for liberal market development policies and an increasing adherence to European norms and conventions. The legal steps already taken: adoption of a new Act on Telecommunication in November 1992 (Act No. LXXII/1992) and on Frequency Management in April 1993 (Act No. LXII/1993). These are in line with the partial liberalisation of the telecom market (complete liberalisation of premises equipment, extending the areas of full competition and the replacement of monopoly of services by concessions). The two acts are effective since June 30, 1993 after the issue of the necessary Government and Ministerial Decrees.

The Telecommunication Act defines the services to be performed exclusively by concession companies or organizations majority owned by the State as follows:

- public switched telephone services
- public mobile telephone services
- nation-wide public paging
- national and regional distribution and broadcasting of public radio and TV programs.

With the exception of the concession services listed above other telecommunications services (in particular national public switched data transmission services) may be performed by any organization subject to the necessary service license.

Out of the 54 primary districts (including the capital divided into 7 sub districts) 29 (including the capital) will be monopoly regions of MATÁV, for the remaining 25 primary districts concession could be awarded to other entrepreneurs after a tendering process. The tender to provide telecommunications services will be issued by the Minister of Transport, Communications and Water Management. In connection with the issuance of a tender the

following factors must be considered: the availability of the telecommunications services and the enhancement of the financial viability of the telecommunications organizations that are unprofitable for reasons beyond their control. The issuance of the tender could be initiated by the municipalities of the area. If more than half of the local municipalities is for the announcement and are ready to pay the costs in case of failure, the minister can not refuse it.

3. STRATEGIES RULING THE REGULATIONS

The strategies ruling the regulations are laid down in the Telecommunications And Broadcasting Distribution Policy Statement of the Republic of Hungary accepted by the Government. Because of the highly pressed legislative work both of the Ministry and of the Parliament the Telecommunications Policy was not yet submitted to Parliament. Thus the resolutions which may be decisive for the development of the Hungarian telecommunications will be made without the Parliament.

As discussed elsewhere to establish a high quality telecommunications infrastructure in Hungary access to external sources of funding is required. In the case of MATÁV, additional domestic and international borrowings are limited by the debt to equity ratio. Thus, privatisation not by the sale of the existing shares of the State but by increasing MATÁV's equity is inevitable whereby the company will be able to attract more borrowed funds. The level of fund raising by privatisation is restricted in the case of MATÁV (and Antenna Hungária): the ratio of private participation must be less than 50% of the equity.

MATÁV will be privatized through the selection of a strategic investor in an open tender already issued. The winner of the tender will form a concession company with MATÁV to provide public telephone services. The market structure is governed by the consideration that the broader segment of the market covered by the exclusive right to supply, the more attractive the option of investment is deemed to be, and the higher the price investors are prepared to pay for shares. The accepted legal framework reflects these considerations.

To provide favourable conditions for the public *switched telephone network* development (and together with it to be able to place MATÁV in a best possible position for the sake of a favourable privatisation) a new market model was worked out. In the market of public switched telephone services different regulations are effective for the international and long distance services and different for the local network services. According to this model the construction of the long distance digital backbone network (serving as a basis for the operation of local networks) is one of the key missions of MATÁV. In the international and long distance services monopoly position will be granted for MATÁV till the end of 1999. In the local network MATÁV can provide services without concession till April 30, 1994 after it under terms of a concession agreement. A competing second supplier will be able to acquire the rights from the Ministry to provide services through a concession tender. In case of the failure of the second concession company the Ministry will be enabled to revoke the concession, as MATÁV's national

concession will cover the entire country. It is hoped that the introduction of competition into local networks, which is a key element of the model, will improve the quality of service, support efficiency and offer a choice to users.

The *public mobile telephone* and the *nation-wide public paging* will be areas of limited competition. These services will be covered by a limited number of concessions issued by the Ministry. The number of concessions to be granted will be limited by the available frequency bands, demand, and factors relating to economics of scale.

Services belonging to the areas of full competition may be performed by all parties, including concession companies in whose permits they are listed.

Competitive subscriber services are, for instance:

- other mobile services linked to the public telephone network
- satellite services (operation of ground stations, VSAT services, data network links, etc.)
- public data services (circuit and packet switched)
- Value Added Services
- CATV services
- leased-line resale
- etc.

Competitive network services, are, for instance:

- dedicated network operation
- operation of closed loop network
- planning and implementation of networks
- etc.

4. REGULATIONS FOR THE INTERCONNECTION OF EXISTING AND PUBLIC NETWORKS

In line with the Act on Telecommunications (which grants monopoly position for MATÁV to operate long distance and international services till the end of 1999) the Ministerial Decree allows the connection of closed networks with the public networks only in the cases

- if the operator of the closed network has got a concession to provide telephone service
- in the state of emergency.

The most important points of the GSM concessions contract can be summarized as follows:

- The service licence will be given to concession companies
- Each of the concessionaires will be granted on 8 MHz wide duplex band
- No other concession for mobile service will be given in the 870-898/915-943 MHz band in the next 10 years. The Minister has the right to give temporary licensing for fixed, non mobile public telecommunications services in the 890-898/935-943 MHz band
- At least 25% of the concession company's capital should be directly or indirectly Hungarian owned
- No owner should have a part in both concession companies
- Both companies should provide nation-wide coverage (75% of the geographical coverage within 2 years) in the capital (within 1 year), in the county towns in the Balaton area (within 1 year), and along the main roads (within 1 year)
- The concession will be given for 15 years which can be

extended to further 7,5 years without further tendering process

- The capacity of each network is estimated to be 200 000 – 300 000 subscribers
- The concession companies are authorized to use their own fixed connections between the Base Transceiver Stations and the Base Stations connected to it
- The connections between the Base Transceiver Stations and the Mobil Switching Centres should be provided either by MATÁV, by a local telephone organization or by the operator of a private network. If these connections are not available within 3 month the concession companies are authorized to build it
- International roaming is allowed.

The most important financial terms are the following:

- The concession fee was originally 12 million USD but by a bidding process it was raised to about 50 million USD (binding the participants to the originally offered tariffs and services)
- The fee of authorisation is 1,5% of the equipment costs. (The total authorisation costs will be about 4–4,5% of the total investment costs)
- The fee to be paid for the availability of the frequencies is 256 million HUF/year, decreasing to zero as the final capacity is reached. In the first 2 years a discount of 50% will be allowed
- The yearly frequency usage fee is 200 000 HUF/base station for a 200 kHz duplex channel
- The yearly fee of quality assurance is 300 HUF/subscriber's equipment.

5. ROLE OF THE PARLIAMENT, THE MINISTRY AND THE REGULATORY BODY

According to the Telecommunications Act the responsibilities of the State are among others the following:

- adoption of a national telecommunications policy and the assurance of the conditions for its implementation, the implementation of governmental, national security and defence interests and the supervision of the implementation of the foregoing;
- regulation of the telecommunications market; coordination of the concession agreements, the assurance through legal regulation, of a level playing field to the participants of, and new entrants to the market;
- exercise of ownership rights with respect to State owned telecom assets;
- exercise of the telecommunications administration functions;
- assurance of the technical and traffic integrity of the national telecommunications network, the availability of the financial, technical standards and the legislative and administrative regulatory mechanism;
- supervision of service providers and operators of networks;
- actions resulting from the unforeseen early termination of a concession agreement or breach of a concession agreement by a concession company;
- etc.

Pursuant the above the Government shall have the following responsibilities:

- to develop the national telecommunications policy, submit a proposed policy resolution to Parliament and monitor the implementation thereof.

Although the intention of the Parliament (and presumably the Telecommunications Policy) was to create a Telecommunications Act assuring a more liberalized telecommunications market the Act provides the Minister a full scope in decisions regarding the Telecommunications. As a consequence of this in practice the telephone market remained (or turned to be) monopolistic and largely dependent on the decisions of the Minister. There is no independent Telecommunications Authority. All the administrative functions of telecommunications will be discharged by an integrated administrative body (consisting of the Chief Telecommunications Inspectorate and the Regional Telecommunications Inspectorate) responsible to the Minister. All the concessions (and their financial and technical conditions) will be issued by the Minister, the awarding and withdrawing of a concession is depending on his decision.

The changes in accents could be well traced by quoting the Telecommunications Policy:

"In the process of formulating and implementing telecommunications regulations it is necessary to establish predictable and calculable public processes and procedures where all concerned parties can express their views and positions. This process will be facilitated by the Telecommunications Reconciliation Council which has been established as an exclusive lobbying group under the Telecommunications Act. In its rule making authority, the Ministry will consider the views of the Telecommunications Reconciliation Council. The Council's autonomy will be respected by the Ministry and the Ministry will fund the operation of the Council."

The relevant wording of the 35. §(1) c) of the Act is the following:

"The Minister shall have the following responsibilities under the Act: to initiate the formation, and facilitate the operation of the Telecommunications Reconciliation Council and the Telecommunications Engineering Qualification Committee."

(At the end of 1993 the Telecommunications Reconciliation Council was not officially formed).

A concern seems to be justified, that the Inspectorate will take care mainly of the limited technical aspects of the network and of the interworking of the networks, while the supervision of the clearness of the competition will be far beyond their present possibility.

The tasks given to the Ministry and to the regulatory body by the Telecommunications Act would need a highly educated, highly experienced and highly esteemed staff. It is to be feared, that at present (and in the near future) the shortage in human resources could hinder the fulfilment of the above tasks.

I. SCHMIDEG

PRIVATIZATION OF ORION RADIO AND ELECTRICAL WORKS

The date of 1st September 1993 was a milestone in the life of the oldest and most well-known enterprise of the Hungarian electronic industry. From this date, following the privatization of the 80 years old ORION Radio and Electrical Works a new company, the YUGANSKORIONNEFTEGAZ Electronic Co. Ltd. continues the production and sale of TV sets and microwave radio relay equipment.

Our previous company, ORION Radio and Electrical Works had traditions of 80 years in the field of manufacturing consumer and professional electronic equipments. Majority of the consumer products has been TV sets while in the professional product line we have been manufacturing mainly microwave radio relay and multiplex equipments as well as auxiliary equipments; ORION has been the first manufacturer of digital radio relay equipment in Hungary.

The main market of the radio relay systems was the former Soviet Union and the neighbouring countries but a considerable export has been performed to India, China, Algeria, Kuwait, Peru, Syria, Vietnam etc. As an example, ORION supplied more than 8000 digital radio relay stations to the Soviet Ministry of Energy for gas and oil pipe-line networks, a lot of equipment for the Soviet Ministry of Telecommunication, also the complete microwave TV distribution network of the former Czechoslovakia has been delivered by ORION.

Considering the domestic market, ORION has been the main supplier of the microwave telecom network of the Army, the Electric Energy Supply System, the Paks Nuclear Plant, and ORION supplied many analogue and digital radio relay systems to the Hungarian PTT. One of our customer has been the WESTEL Cellular Radiotelephone Company to whom ORION supplied 15 GHz digital radio relay hops for the cellular system.

Collapse of the CMEA as well as the Warsaw Treaty resulted in rapid receding of the professional electronic industry in Hungary. As a side-effect of the liberalization of the economy the imported TV sets — mostly of lower quality — overrun and saturated the domestic market, just when the purchasing power drastically decreased. Repayment of the loans raised earlier couldn't be performed with decreasing production, thus the announcement of the liquidation of the ORION Radio and Electrical Works ensued as it could be expected.

The REORG Company, on behalf of the State Property Agency issued a tender for the sale of ORION, however, in lack of relevant bids the management started to prepare privatization by systematic selling of the properties not connected directly with the production as well as by searching for new, solvent customers.

The search has been successful, thus ORION — already under liquidation — achieved considerable purchase orders

both for TV sets and digital microwave equipment. This ensured maintaining the production and the continuous employment of the employees.

Those Russian oil- and gas exploring companies have proved to be the best partners, which had got acquainted with the ORION products during the past decades. These reinforced technical and economical relationships provided the basis for us to propose the participation of the biggest partners in the privatization of ORION.

ORION Radio and Electrical Works has been privatized on 1st September 1993. The name of the new company is the following: YUGANSKORIONNEFTEGAZ Electronic Co. Ltd. The invested capital of the new company has been 271 million HUF (2.7 million USD). The 83 % of shares is owned by YUGANSKNEFTEGAZ Production Association, which is the biggest Russian oil- and gas exploring company and one of the main users of our digital microwave and mux equipments in its technological telecom networks as well as of our consumer electronic goods and has the ability for providing a huge market background for both types of goods in the entire area of the Community of Independent States.

Two other Hungarian companies, formed by the previous management of ORION own 17 % of the shares of the new company, which possesses the full production facilities, the R&D results and the trade mark of ORION. The new company took upon itself all the contracts, commitments, guarantee obligations etc. of the predecessor.

The managements of the new company is fully Hungarian and according to the business plan approved is authorized to independent decisions.

A decision has been made for increasing the invested capital by 4 million USD (400 million HUF appr.) in 1994.

The new company to form a stable position with updating the production technology and prepares a further development by offering the chance of capital investment in the YUGANSKORION Co. Ltd. first of all by technological devices, licence and know-how of modern products. A part of this effort is the extension of the digital microwave product range with 18, 23, 38 GHz equipment.

In our business plans the domestic and the CIS market, as well as markets of other countries being our traditional partners (Arabic countries, India etc.) are taken into account.

We are convinced that experiences of 80 years, our qualified staff, the new company structure and the power of our majority owner provide the adequate basis for building up a long term profitable production and sales activity and for preserving the reputation of the ORION trade mark.

T VENEKEI

Yuganskorionneftegaz Electronic Co. Ltd.

■ EC POLICY ON TELECOMMUNICATIONS FROM 1984 TO MAASTRICHT

In effect, the Community's telecommunications policy dates back to 1984.

Since, that time, Community policy in this field has developed in three distinct stages. The first was heralded by the Council's adaptation of the first action programme in the telecommunications sector, on 17 December 1984. The second began in 1987 with the publication of the Commission's Green Paper on telecommunications services and equipment, which the Council endorsed on 30 June 1988. It was during this stage that a comprehensive programme for the development of the telecommunications industry was initiated. The third phase began in October 1992 with the publication of the Commission's first report on the situation in the telecommunications services sector. On the basis of this report, on 16 June 1993, the Council of Telecommunications Ministers adopted a resolution setting out the Community's main policy guidelines for the sector up to the turn of the century.

Over the same period, 1984 to 1993, the Treaty of Rome underwent two major reforms which substantially increased the powers of the Community in the field of technology and telecommunications: the Single European Act in 1987, followed by the Maastricht Treaty in 1992.

In 1984, the first Community action programme for telecommunications was set up. Its initial objective was to coordinate the future development of telecommunications in the Community in fields such as ISDN, Digital Mobile Communications, the introduction of broadband communication, the establishment of common standards and pre-normative, pre-competitive R&D activities. As far as case law is concerned, in a landmark judgement delivered in 1985, the Court of Justice of the European Communities declared that the competition rules laid down in the Treaty were fully applicable to telecommunications bodies.

With the publication of the Green Paper on telecommunications which was adopted on 30 June 1988, the scope of Community policy was extended to cover regulatory matters and the opening-up of the sector to competition.

Over the same period activities undertaken during the first phase developed at a spectacular rate, particularly within the framework of programmes such as RACE (R&D in integrated broadband communications) and STAR (development of telecommunications in outlying regions), and measures to promote GSM (the mobile telephone standard). Also in 1988, standardisation policy took a decisive step forward with the establishment of the ETSI.

At that stage, three main points were seen to justify new Community legislation:

- the fragmentation of the European market for telecommunications networks and services and its increasing importance for the Community, from a general macro-economic viewpoint;
- the inadequacy of existing regulatory frameworks in the majority of Member States for dealing with the latest technological developments and new market opportunities;

- the wave of deregulation which began in the United States and was boosted by the dismantling of AT&T in 1984.

With the increasing globalization of trade, the environment for telecoms operators and service providers has become ever more competitive. The onus was therefore on the Community to take decisive measures, suited to the needs of the European market, if its telecommunications industry was to avoid being left behind by its direct competitors.

Applying the objectives set out in the 1987 Green Paper, the Community determined to implement a Community telecommunications policy in accordance with the following principles:

- full liberalisation of the equipment market and establishment of procedures for the mutual recognition of equipment conformity;
- progressive but ultimately complete liberalisation of the market for telecommunications services;
- clear separation of regulatory and operational functions within Member States;
- a policy on harmonisation and open network provision (ONP);
- the application of Community competition law (Articles 85, 86 and 90), with the aim of preventing discriminatory practices and abuse of dominant positions on the part of operators and service providers;
- the application of the common commercial policy to the telecommunications sector, particularly in connection with GATT.

A number of other fields of activity should also be noted:

- the continuation of the standardisation process;
- the implementation of new R&D programmes and flanking measures designed to stimulate supply and demand in the field of information and communications technology;
- structural assistance measures for the least-favoured regions;
- the opening-up of public contracts to competitive bidding;
- the launch of a policy on radioelectric networks and services (space to earth, fixed to mobile);
- numerous initiatives on trans-European and general-interest networks.

On 7 December 1989, the Council of Telecommunications Ministers endorsed what were to be the main lines of action for the Community's telecommunications policy up to the present day. The basis for these lines of action was a careful balance between the twin objectives of harmonisation and liberalisation, which prompted the adoption of two directives in 1990: one on ONP and the other on competition in telecommunications services.

On 6 September 1991, the Commission set out its thinking on how these rules should be applied in its guidelines on the application of Community competition law to the telecommunications sector.

The third phase began recently with the publication, in October 1992, of a report on the implementation of the objectives set out in the 1987 Green paper, focusing particularly on network harmonisation and the first stage of the liberalisation of services, launched in June 1990.

This was an opportunity not only to review progress, but more importantly to start a process of collective debate — in full consultation with policy-makers and the two sides of industry in the sector — on the course the European telecommunications policy should take up to the turn of the century.

At a meeting of the Telecommunications Council on 16 June 1993, the Member States adopted a resolution paving the way for the liberalisation of public voice telephony services by 1988, and called on the Commission to prepare the publication of two Green Papers by the end of 1995. The first of these will deal with the future status of the use of public telecommunications and cable TV networks. The other will discuss mobile and personal communications systems.

Full liberalisation of voice telephony will necessarily make consideration of the issue of interconnectivity an urgent priority for the Commission, since it has practical implications for competition. Similarly, the phasing out of exclusive rights will modify the way in which competition law is applied, particularly regarding cooperation between operators on markets which are becoming ever more closely interlinked.

The Council also confirmed the principles of harmonisation and progressive open network provision. In addition, a variety of horizontal measures in support of the full liberalisation of the market were identified, with the aim of preserving economic and social cohesion and ensuring universal service within the Community.

Finally, a Green Paper on satellite communications was published in 1990. By 1995, therefore, the Community will have addressed all matters relating to telecommunications infrastructure, services and equipment.

At a purely institutional level, the revisions of the Treaty of Rome deriving from the Single European Act (1985) and the Maastricht Treaty (1992) have provided progressive legal reinforcement of Community competence in the fields of technological and network R&D, and consequently in the telecommunications sector.

It is in the provisions of the Maastricht Treaty, which will be the basis for all future Community initiatives, that we find the four main elements which mark out this third phase as a new departure, and which will determine the shape it is to take:

- the application of the principle of subsidiary, which clearly separates national and Community competence;
- the better institutional balance achieved with the application of the new co-decision procedure for the adoption of framework programmes, which from now on will each have their own budget;
- the establishment of a new legal basis, including a specific Treaty article on trans-European networks;
- the strengthening of the provisions on industrial policy, in order to create the right conditions for businesses in a competitive environment.

Reprinted from the
Magazine of the EC
Directorate General XIII.

■ "ERMES" PAGING FORSEEN TO LAUNCH BY 1995 IN HUNGARY

In October 1993 a Warning to Tender was published by the Minister of Transport, Communication and Water Management in the dailies on the concessions to provide two nation-wide paging services in Hungary. The system chosen by the concession provider is the pan-European Radio Message System "ERMES". Both of the two competitors of the Bid to be awarded will have to provide paging services covering the whole territory of Hungary with the extension of international roaming. The Invitation to Tender seems to be issued in January/February 1994. The ministry of Transport, Communications and Water Management is planning to launch ERMES services by the end of 1995.

As ERMES paging is a very new system and its roll-out is in an early phase even in the EC countries, a brief summary may be well suitable.

From 1987 on, operators and manufacturers in the EC countries have been starting to develop a new high capacity wide area paging system. In the early months of 1992 ETSI has issued the ETS 300 133-1...-7 standards of ERMES. During the second half of 1993 there have been put into operation pilot systems in several West-European countries. Commercial services of ERMES are in operation in Denmark and Finland from January, 1994. on.

Compared to the at present existing and popular paging networks using radiocode POCSAG, the ERMES system has many advantages in particular a number of new services including international roaming, and a much higher subscriber capacity over the radio path and further a data rate almost six times higher.

Architecture of an ERMES network consists of 4 hierarchic levels:

- interconnected telecommunications networks i.e. PSTN, Telex, ISDN, PSPDN, Videotext, CSPDN, including that terminals where calls are initiated from;
- PNC — Paging Network Controller, carrying the intelligence of the network, and handling the access procedures;
- PAC — Paging Area Controller, controlling the operation of several base stations (BS) located in the same area;
- radio path BS to paging subscriber (MS — Mobile Subscriber).

Remarks: There are 16 different common RF channels between 169,425 and 169,800 MHz allocated for ERMES services in Europe. Each country received a right of frequency usage for 4 dedicated channels.

Paging messages can be sent from different terminal devices of interconnected networks e.g. loop-disconnected telephones, DTMF telephones, telex machines, PCs etc. Before accessing paging subscriber, the calling party and PNC may exchange interactive code streams in order to check legitimization the employment of service(features) initiated.

ERMES system will offer a lot of basic and supplementary services as follows:

Basic services:

- Tone-only paging
- Numeric paging
- Alpha-numeric paging
- Transparent data paging

Supplementary services:

- Roaming
- Standard-text
- Group call
- Multi-address
- Diversion of traffic
- Message storing and retrieval
- Automatic retransmission of the last message number
- Repetition
- Temporary barring
- Messages sent with different priorities (1; 2; 3)
- Choice of destination
- Closed user groups
- Reverse charging acceptance
- Deferred delivery

Tone-only numeric and alpha numeric services are traditional facilities of paging network other than ERMES. Tone-only paging can have up to 8 different alert signals for each Radio Identify Code (RIC) in ERMES.

A numeric paging message may consist at least of 20 numeric characters. An alpha-numeric page is limited to 400 characters in extent. Transparent data paging is a new service and facilitates sending data streams to the subscribers, the extent of the message is limited to 64 kbit.

Roaming provides the customer the possibility to receive paging messages all over Europe, where ERMES paging is implemented. As paging is a one-way form of communications, roaming service is not fully automatic. The subscriber has to notify his home operator when he wants to direct the calls to the visited service area. All similar subscriber's features (SF) can be activated via some simple commands sent by a DTMF telephone or through a call to a Bureau Service for help. It is, however, an essential advantage of ERMES compared to paging systems previously used in Hungary, to have a direct access to subscribers mostly without the need of insertion any Bureau Services (i.e. dispatching persons).

Standard text makes it possible to generate alpha-numeric messages from a DTMF telephone device by entering a code. A menu of the usable standard-text messages will be provided by the ERMES operators.

There was signed a Memorandum of Understanding by 18 countries and 28 European operators by the end of 1992. That Memorandum of Understanding (MoU) was giving the commitment to launch ERMES networks.

Anyhow, it seems to be a great challenge implementing ERMES in Hungary simultaneously with the present rapid development of other telecommunications services, where new additional features (e.g. general use of DTMF instead of loop-disconnected subscriber lines and telephone devices) will help development of ERMES's possible facilities.

GY. HAVAS

AN OVERVIEW OF AT&T

The American Telephone and Telegraph Company (AT&T) traces its corporate lineage to Alexander Graham Bell (1847-1922), inventor of the telephone. AT&T was founded in 1885, six years after the introduction of the telephone, as a subsidiary of the American Bell Telephone Company. The company now operates world wide in intensely competitive, high-technology markets with only its long distance operation remaining under government regulation.

AT&T pioneered Private Branch Exchange (PBX) technology more than 85 years ago. From the early manual cord-board PBXs to the digital technology of the 1990s, AT&T has been, and will continue to be, the premier communications vendor in the world.

AT&T switches more voice and data calls than any other company in the world. In the 1940s, the United States Government and Sandia Corporation had the confidence in AT&T's quality and reliability to make it their vendor of choice for national defense communications.

As a single source vendor, AT&T designs, manufactures, markets, and services equipment for telecommunications networks and information systems (including computers and networks for offices and factories); telephone products for homes and businesses; and electronic components for high-technology products.

AT&T products are designed to operate in an integrated information system. An open architecture strategy ensures that AT&T products, networks and services are engineered for compatibility with each other and, with products and services designed and offered by others companies.

AT&T also provides a single-vendor concept, supporting research, design, development, manufacturing, sales, financing, installation, training, service, and maintenance.

AT&T Bell Laboratories has always had a reputation for innovative new technology. It is the birthplace of the transistor, laser, digital switching, communications satellite, cellular mobile radio, as well as many major contributions to the telecommunications network. With more than 23 000 employees, 4000 of whom hold Ph.D.'s, Bell Laboratories boasts seven Nobel Prize winners and has averaged one patent per day since its founding in 1925.

The AT&T Hungary Ltd. is a company of AT&T in Hungary. AT&T Hungary Ltd. sells, installs, and services AT&T PBX equipment, — DEFINITY communications systems, MERLIN LEGEND systems and PARTNER systems — and associated telecommunications equipment for large and small businesses. Hungarian Government approval for PICASSO STILL IMAGE PHONE has been applied for, so that this product can also be sold.

The AT&T DEFINITY Generic 3 communications system

The DEFINITY — Generic 3 digital communications system was developed with a view towards maximum fulfillment of the requirements for voice and data communications from small companies up to very large organizations with about 25 000 users.

The DEFINITY 3 family of digital communications systems offers the following variants for optimum adaptation of the system to specific capacity requirements while staying with the same type of board:

DEFINITY G3s — designed for a capacity of 40–200 simultaneous connections with a maximum of 120 trunks.

DEFINITY G3i — designed for a capacity of 2 400 subscribers, with 400/600 trunks.

DEFINITY G3r — designed for a capacity of up to 25 000 subscribers with 4000 trunks.

The DEFINITY family of digital communications systems:

- offers a common architecture and common components
- is based on international standards
- allows you to infinitely increase your capacity from the smallest system to the largest, and
- will protect your investment.

The original architecture of the DEFINITY system is based on the use of universal ports permitting flexible changes in the system as well its further development. The system architecture was developed with a view towards maximum system reliability and flexible changes in capacity. Software for the Generic 3 was designed for use with Intel 80286 and 80386 processors and for the RISC (Reduced Instruction Set Computing) processor in the case of the Generic 3r which represents the greatest evolutionary step in the development DEFINITY affords equal service for all users within the context of the entire capacity range.

The MERLIN LEGEND communications system

Versatile and powerful, the MERLIN LEGEND Communications System has a modular design so that you can start small, grow incrementally, and add applications as you need them. It will operate up to 80 Main Exchange (ME) lines and up to 144 telephones and has the flexibility to operate in one of three modes: Key, Hybrid/PABX, and

Behind Switch:

- **Key Mode:** Every line appears on each multiline telephone. The line buttons allow users to see activity on other telephones, join conversations, place or receive calls.
- **PABX Mode:** Handles large volumes of calls and users, and provides the flexibility of the three modes. The outside trunks can be grouped in pools for shared use. Outside trunks can also be assigned to line buttons for those who require a personal line.
- **Behind Switch Mode:** Used when the system is connected to another hybrid/PABX. The other system or "host" provides the interface to outside lines and additional features. This is for customers who require the appearance of multiple lines, that have a high volume of inter-office communications.

A variety of Telephones

A variety of telephones can be used with the system: industry-standard tip/ring single-line telephones, and four MLX-series telephones. The MLX phones combine ease of use with technological sophistication, e.g., menu-driven display capabilities, context-sensitive keys, posted messages, and full speakerphone with microphone disable.

The PICASSO STILL image phone

PICASSO Still-Image Phone is a revolutionary new business tool that can transmit picture-perfect still color images and voice simultaneously at any time, to any place, in just seconds.

Since PICASSO Phone is compatible with industry-standard camcoders, electronic cameras, document scanners and photo CD players, you can send full-color images of any type, size or dimension.

AT&T Sajtőinformáció

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20-22 JUNE, 1994

SECOND ANNOUNCEMENT and PRELIMINARY PROGRAM

The Workshop will be organized by the Scientific Society for Telecommunications, and sponsored by EURASIP, European Signal Processing Association and by ANTENNA HUNGÁRIA, Hungarian Radiocommunications Corporation and by IEEE Hungary Section.

Preliminary Program:

Monday, June 20, 1994:

Registration of participants; Opening: 1. Tutorial; I. Session: Image Compression, Coding; II. Session: Image Transforms, Transform Coding

Tuesday, June 21:

2. Tutorial, III. Session: Filtering; IV. Session: Restoration, Recognition; Poster Session;

Wednesday, June 22:

3. Tutorial; V. Session: Remote Sensing; VI. Session: Image, Texture Analysis; Round Table: The state-of-art of multiresolution image processing

The site of the Workshop:

**International Trade Center, Conference Room (1st floor)
Buapest V. Váci u. 19-21.**

CONTOURS Congress & Travel Bureau Ltd. is the official travel agent for our Workshop and handles accomodation and programs (H-1123 Budapest, Alkotás u. 47., phone/fax: 36-1-156-6712).

For further information and Application Form please contact the Local Program Committee: Ms. Katalin Mitók, Scientific Society for Telecommunications, H-1055 Budapest, Kossuth L. tér 6-8., Phone: 36-1-153-1027. Fax: 36-1-153-0451).

JOURNAL ON COMMUNICATIONS IN 1994

In 1994 we are continuing the practice of publishing English and Hungarian issues alternately. English issues will be devoted to topics in which activities and events in Hungary may be of international interest. Hungarian issues will be surveying important topics of telecommunications related to our domestic development.

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- **CODING IN COMMUNICATIONS**
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- **SECURE COMMUNICATIONS**
- **NETWORK '94**

Hungarian issues:

- **VOICE AND SOUND**
Supplement: **TELECOM-FORT BUSINESS RELATIONS**
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Other contributions may be included in the following sections:

- **INDIVIDUAL PAPERS** for contributions outside the focus of the issue,
- **PRODUCTS-SERVICES** for papers on manufactured devices, equipments and software products,
- **BUSINESS-RESEARCH-EDUCATION** for contributions dealing with economic relations, research and development trends and engineering education,
- **NEWS-EVENTS** for reports on events related to electronics and communications,
- **VIEWS-OPINIONS** for comments expressed by readers of the journal.

Manuscripts should be submitted in two copies to the Editor in chief (see inside front cover). Papers should have a length of up to 30 double-spaced typewritten pages (counting each figure as one page). Each paper must include a 100–200 word abstract at the head of the manuscript. Papers should be accompanied by brief biographies and clear, glossy photographs of the authors.

Contributions for the **PRODUCTS-SERVICES** and **BUSINESS-RESEARCH-EDUCATION** sections should be limited to 16 double-spaced typewritten pages.

Original illustrations should be submitted along the manuscript. All line drawings should be prepared on a white background in black ink. Lettering on drawings should be large enough to be readily legible when the drawing is reduced to one- or two-column width. On figures capital lettering should be used. Photographs should be used sparingly. All photographs must be glossy prints. Figure captions should be typed on a separate sheet.

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ALWAYS WITHIN REACH

MATÁV and US WEST are pleased to announce the establishment of a new joint venture, Westel 900. The venture's goal is to build and operate a new mobile telephone system which will connect Hungarian phone users to the rest of Europe. The partnership between MATÁV and US WEST has already proven to be enormously successful, through Westel Radiotelephone Ltd., a cellular company offering mobile phone service on 450MHz, covering the entire country.

The new phone system is called GSM, which stands for Global System for Mobile Communications. This digital system operates on 900MHz frequency, and is accepted as the standard in all European countries, as well as a growing number of countries around the world in Asia and Africa. GSM is set to become the world's most popular mobile phone system.

The soul of the system is a "smart" card, called a SIM (for Subscriber Identity Module), which contains all information on any individual subscriber. GSM is compatible with both fixed and other mobile systems and offers a wide range of new possibilities in telecommunications. The digital nature of the system offers a number of advantages, such as increased subscriber capacity, clearer voice quality, and secure conversations.

Westel 900 GSM service will first be available in Budapest from the spring of 1994. This will be followed by coverage in all county capitals, major highways and the Balaton area. Finally, by the end of 1995 we will offer full nationwide coverage. So with the help of Westel 900 you can be in touch whenever and wherever you want ... anywhere in Europe.

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