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Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH, AND DEVELOPMENT

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23 FEBRUARY 1987

WORLDWIDE REPORT
TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

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RESPONSE TO BROADCASTING BOARD PROPOSALS SUMMARIZED

Hong Kong SOUTH CHINA MORNING POST in English 27 Nov 86 pp 1, 2

[Article by Michael Chugani]

[Text]

THE Attorney-General, Mr Michael Thomas, yesterday unveiled a far-reaching policy package that will change the face of television and radio broadcasting in Hong-kong.

Speaking in the Legislative Council on the Government's long-awaited response to proposals by the Broadcasting Review Board (BRB) on the future of the industry, Mr Thomas revealed that:

- An independent Broadcasting Authority would shortly be set up to police the industry.

- A tribunal would be established within the authority to deal with public complaints on the quality of programs and advertising.

- A total ban on tobacco advertising and sponsorship on television and radio would come into force in four years.

- The licences of the two television stations, which will expire in December 1988, would be extended for 12 years.

- An independent board of governors would be appointed to run the Government-owned Radio Television Hongkong, but the station would continue to be funded by the public purse.

THE Government has decided to implement a ban on tobacco advertising on radio and television in three stages to lessen the impact on the industry.

The Attorney-General, Mr Thomas, told the Legislative Council the first step would be stricter controls on cigarette commercials by amending the advertising code of practice.

When new television licences were issued in December 1988 the existing 4.30 pm to 6.30 pm ban would be extended by four hours to 10.30 pm, thus banning prime time cigarette commercials. The same restrictions would apply on radio from August 1989 when the current licence expires.

The final stage will see a total ban on tobacco advertising and sponsorship on television and radio in 1990.

- The two television stations would have to surrender some of their prime time to programs produced by RTHK.

- TVB would be allowed to keep its offshoot companies despite a BRB recommendation that it should concentrate on television alone.

- The Government next year would call for formal tenders to operate cable television.

Meanwhile, the Government will examine ways of restricting tobacco advertising in other forms as well.

"The Government is firmly committed to a policy of discouraging tobacco smoking," he said.

The Secretary for Administrative Services and Information, Mr James So, said one change to the existing code of practice would be to ensure that the current Government health warning appeared on the screen throughout the duration of cigarette advertisements instead of the existing five seconds at the end of the commercial.

And a new three-second verbal warning would be added at the end of each tobacco advertisement. For tobacco advertisements on radio, he said the form had still to be decided by the Broadcasting Authority.

Mr Thomas said legislation would be introduced to set up the Broadcasting Authority next year to allow wider public participation in controlling the industry.

The Governor would appoint members of the public to the authority, which would ensure that advertising and program standards were adhered to by television stations, radio and cable TV, he said.

Mr Thomas said the Government had rejected a BRB proposal for a separate independent tribunal to handle complaints and resolve disputes within the industry. Instead, a similar tribunal would be set up within the Broadcasting Authority.

He ruled out the issuing of extra licences when the existing franchises of Television Broadcasts (TVB) and Asia Television (ATV) expire in December 1988, saying the costs would deter outsiders from entering the field.

Instead, 12-year franchises would be offered to both TVB and ATV, but the current licence conditions

would be revised and the franchises would be subject to review in 1994.

The BRB recommended an eight-year licence while TVB fought for a 15-year one.

Mr Thomas said the 12-year licence compromise would "give the broadcasting industry the confidence to plan ahead and to make the necessary investment to improve the quality of television so that the industry can face up to the drastic and rapid political changes in the years ahead".

Another BRB proposal that TVB should be forced to dispose of its subsidiary companies and concern itself solely with broadcasting was also rejected.

"The Government is reluctant to be thought to be penalising commercial success," he said.

Existing policies and the spirit of existing laws would continue to govern the structure, ownership and control of TV licences, but the new Broadcasting Authority would have the power to examine the books and accounts of the TV stations and their associated companies.

As proposed by the BRB, the royalties to be paid by TV stations will be based on gross receipts rather than net profits.

"Since TV stations use air waves which are community facilities, it is right that they should be required to pay for their use irrespective of whether a profit is made," Mr Thomas said. ATV in past years has not paid royalties because it has not made a profit.

Mr Thomas said the Government was "unable to accept" suggestions to make RTHK financially viable in its own right, adding there was little support for the BRB proposal that RTHK be given a prime time monopoly on the TV stations.

It was also not right to make the commercial TV stations pay for RTHK out of hypothetical royalties.

Mr Thomas said that after much soul-searching and debate within the Government, it was decided that laws would be introduced to make RTHK answerable to an independent, statutory board of governors to be appointed by the Governor, Sir Edward Youde.

To ensure the board reflected public views and to ensure its independence, members would be selected from the community, with a representative from the Government.

Policies to be laid down in the new ordinance would emphasise RTHK's duty to inform and educate the public as well as to disseminate widely news and current affairs.

"RTHK must continue to be and be seen to be a balanced and objective public broadcaster," Mr Thomas said.

RTHK would be funded by the Government.

Conditions written into the new TV licences would give RTHK increased access, especially during prime time, to the commercial stations to enable it to air its own programs.

On cable television, Mr Thomas said policies were now being formulated and formal tenders for licences would be invited some time next year.

The Secretary for Administrative Services and Information, Mr James So, said later that the Broadcasting Authority would have more power than the existing Television Advisory Board.

Of its 12 members, nine - including the chairman - would be appointed from the public.

The three official members would be the Secretary for Administrative Services and Information, the Postmaster General and the Secretary for District Administration.

The authority would be able to impose fines, to advise the Executive Council of serious licence breaches and to revoke the licence of any station, Mr So said.

Drafting of the ordinance to set up the authority had started and he hoped it would come into being by late 1987.

On RTHK, a provisional committee would oversee the transition and draft the ordinance to create the board of governors.

CABLE AND WIRELESS REDUCES FACSIMILE SERVICE

Hong Kong SOUTH CHINA SUNDAY MORNING POST (Supplement) in English 21 Dec 86
p 1

[Text]

CABLE and Wireless is to stop its public facsimile service to the United States, large parts of South America and Australia.

Bureaufax is losing its competitive edge to Intelpost, an international facsimile network handled by various national post offices.

More and more private telecommunications companies have stopped providing the Bureaufax service, and fewer destinations can be reached by businessmen in Hongkong using it.

In Hongkong, the Bureaufax service is handle by Cable and Wireless. Its counterpart in the US, RCA Global Communications Inc, has just terminated the service.

That means local businessmen can no longer send facsimile messages to the US, Guam and Hawaii through Bureaufax, although they can reach the same destinations with the Post Office's Intelpost service.

RCA Global Communications' Bureaufax services to Argentina, Chile, Costa Rica, El Salvador, Netherland Antilles, Peru and Puerto Rico have also been suspended.

Apart from Argentina, none of these countries can be reached through the Intelpost service. The facsimile service in these countries have been completely terminated.

"We will resume the Bureaufax services to these South American countries if we can find an appropriate receiver

on that side of the world," said Mr Mark Kwong-jim, manager of telegraph services in Cable and Wireless.

In addition, the Overseas Telecommunications Commission in Australia has also decided to merge its Bureaufax and Intelpost services. From January 1, local businessmen will have to use the Intelpost services if they want to send any facsimile messages to Australia.

However, Cable and Wireless still provides Bureaufax services to other 40 destinations, including China, Britain and Japan.

"It is the worldwide trend for Intelpost to provide to the public facsimile services. For example, when a facsimile message is sent to the US through Bureaufax, it has to be posted or delivered to the right individual," said Mr Mark.

"It seems to be rather reasonable to merge the Bureaufax service with the Post Office's Intelpost service."

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CSO: 5550/0067

RADAR CONTROL SYSTEM TO ENHANCE PORT SAFETY

Hong Kong SOUTH CHINA MORNING POST in English 11 Dec 86 p 3

[Article by Brian Wong]

[Text]

A NETWORK of radar stations equipped with computers and advanced communication facilities is to be set up at strategic locations to cope with increasing marine traffic.

The Marine Department and Canadian Commercial Corporation (CCC) yesterday signed a contract to install and commission the new vessel traffic management (VTM) system.

The system will monitor and control vessel movements to improve safety for a traffic flow that has quadrupled in the past 20 years in some areas.

"In order to maintain Hongkong's attractiveness as an international trading port, in addition to the need to maintain an acceptable safety level, it is necessary to maximise the operational efficiency of the port, to minimise congestion and de-

lays and avoid ineffective utilisation of existing facilities," a Marine Department spokesman said.

An average of 2,229 ocean-going vessels entered and departed from the port each month last year and this number is expected to increase by four per cent annually.

River trade craft and international ferry traffic have also grown, with about 13,660 movements a month last year.

Additionally, the annual cargo throughput is anticipated to reach 72 million tonnes by 1997.

A VTM for the port of Hongkong and its approaches was proposed after examination of a report submitted by the Canadian company in late 1984 and the evaluation of proposals submitted by potential equipment suppliers.

According to the study undertaken by CCC, a sophisticated VTM will not make the port totally risk-free, but it has been shown that it can address 80 per cent of the existing risk.

Signing the contract at the Canadian Commission yesterday were the Director of Marine, Mr Chan Yue-yan, and the vice president of the Canadian Commercial Corporation, Mr Robert Hollingsworth.

Under the contract, the Canadians will establish a comprehensive VTM, including all service equipment.

In addition, through CCC, the services of the Canadian Coast Guard will be used to develop operational procedures manuals for the Hongkong VTM and to provide the appropriate levels of operator training.

/7358

CSO: 5550/0068

TELEPHONE DUCT NETWORK CLAIMED SUITABLE FOR TELEVISION

Hong Kong HONGKONG STANDARD in English 18 Dec 86 p 20

[Text]

HONGKONG Telephone Company yesterday hit back at Hutchison Cable Vision — its main rival for a cable television licence — saying their current optical fibre network and duct system would enable them to carry television programmes to the public at a lower price.

On Tuesday, the general manager of Hutchison Cable Vision, Mr Melvyn Sears, attacked the telephone company for failing to have a network which was suitable for cable television transmission.

In a statement issued yesterday, in response to Mr Sears's attack, the Hongkong Telephone Company said it was correct that normal telephone wir-

ing is not suitable for the transmission of television signals.

"What we have said is that we have an optical fibre network (12 million metres) which is already carrying television as well as voice, data and facsimile.

"We also have a network of pipes, called ducts, which reaches all the buildings in urban Hongkong and which has plenty of spare space for the new local cables needed to reach most households."

The telephone company, who is the major partner of Cable Television Hongkong which is bidding for a cable television licence, said this local duct network takes their cables right into buildings, which is unique to Hongkong.

The statement said the system is not the British experience as stated by Mr Sears, where the last few yards of cable are carried on poles and overhead wires.

"Therefore, unlike in the UK, the Hongkong duct network is well suited to install a cable television system," the statement continued.

"In the UK, British Telecom, a partner in Hutchison Cable Vision, uses its own cable TV switching equipment currently costing more than twice that produced by its UK rivals and we wonder whether they intend to foist this expensive equipment on Hongkong."

/7358

CSO: 5550/0065

MACAO TELECOMMUNICATIONS IMPROVEMENTS, PLANS TOLD

Hong Kong SOUTH CHINA MORNING POST in English 27 Nov.86 p 25

[Text]

Prior to 1981, Macau's telephone system was falling behind the quickening pace of growth of the Portuguese administered territory, west of the Pearl River Delta. There was a waiting list of 10,000 potential subscribers; international calls, even to Hong Kong, were via the operator only, this meant that services were slow and fallible.

Recognising the primary importance of efficient and reliable telecommunications in the development of Macau's prosperity, the Macau Government concluded an agreement with Cable & Wireless for improving and expanding Macau's telephone and telex services.

Companhia de Telecomunicacoes de Macau (commonly referred to as CTM) was formed in October, 1981, as a joint venture between Cable & Wireless (75%), Companhia Portuguesa Radio Marconi (15%) and the Macau Post Office (10%). Under the terms of the agreement, CTM has the exclusive franchise to install, operate and maintain the national and international public telecommunications services of Macau.

Direct dialling

Less than a year after CTM was formed, International Direct Dialling facilities were made available to Macau residents. During the first month following the installation of IDD, 75% of calls to Hong Kong were being dialled directly by subscribers. That figure has now risen to over 98% whilst during the same period the usage of the system has more than doubled. Over 90% of all international calls are now dialled

directly by the subscribers. Recently a new service allowing IDD calls to be made from payphones to Hong Kong and some locations in China has been introduced and is proving very popular.

International services

CTM also introduced an Automatic Telex Service which was inaugurated

within ten days of the company's formation. Private Data links are also now available and this facility is well used particularly by the banking community.

As Macau opened its links to the world, it added another system to its growing communications network. The Portuguese-administered territory's first Satellite Earth Station was opened to provide Macau with an independent international telecommunications link which at present operates direct services to Portugal, U.K. and Japan.

Digital exchanges

Aside from satellite connections, a 32,000 line Digital Telephone Exchange was opened for operation in 1983. So rapid has been the expansion of service that a second Digital Exchange had to be brought into service this year to meet demand. The size of the national system has been increased from about 15,000 in October, 1981 to 45,600 as of October, 1986. Now that the waiting list has been reduced to less than 2,000 the rate of growth of the system may be expected to drop to around 7,000/8,000 per year. All of the traditional lines which have been connected are supported on a new

digital network which at this time forms nearly 75% of the total network and most of the subscribers lines have been replaced with a modern ducted cable system.

CTM has also increased its communication capacity to Hong Kong by the installation of a 480-channel Digital Microwave System which was brought into service at the end of 1985. This new system supplements an existing 300-channel analogue link.

Links with China have also been expanded and improved. A cross-border Digital Microwave Link was brought into service in May, 1985, to supplement an existing 48-channel cable system between Macau and the People's Republic of China.

Staff development

CTM's efforts have not been restricted to developing the physical side of the telecommunications system.

Considerable effort has been expended in training its Macanese staff of over 500 in the wide variety of skills necessary to maintain and operate one of the most modern telecommunications systems in the world efficiently.

Fastest project

The expansion and modernisation of Macau's telecommunications services in

such a short time must rank as one of the fastest projects of its kind carried out anywhere in the world.

CTM now plans to establish direct satellite links with Singapore and Australia and an agreement has been signed with the Guangdong Posts & Telecommunications Administrative Bureau for an optical fibre cable linking

Macau with Zhuhai. The system will initially be equipped for 300 voice channels but will have capacity to meet anticipated demand for many years and to support a variety of other telecommunications services. At the Zhuhai terminal facilities will be provided to interconnect much of the capacity to a major optical fibre system stretching as far as Guangzhou.

Plans are also being made to install a Mobile Radiotelephone Service which will be designed to allow it to become part of a unified service offered to subscribers anywhere in the Pearl River delta.

Macau now has one of the most technologically-advanced telecommunications systems in the world, which will be compatible with other advanced systems until well into the 21st century. □

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CSO: 5550/0070

FIRM'S PART IN DEVELOPING PRC TELECOMMUNICATIONS TOLD

Hong Kong SOUTH CHINA MORNING POST in English 27 Nov 86 p 25

[Text]

As the giant economy of China opens up to foreign trade and payments, the need to modernise the communications infrastructure becomes vital. The liberalisation of the economy, the devolution of power of decision down to provinces, towns, and even individual farms and factories, requires vastly improved and expanded telecommunications especially. All roads, and all communications, used to lead to Beijing, but not any more.

Cable and Wireless has been doing its part to increase and upgrade China's internal and external links since the 1970s, and in recent years has assisted China to take a quantum leap into advanced technologies — for instance, last year a joint project began to furnish optic fibre capacity between Hong Kong and Guangzhou.

And by the end of this year, no fewer than 40 cities in China can be reached from Hong Kong by direct dialling.

The landmarks

These are the main landmarks, over recent years, in the growing relationship between Cable and Wireless, together with Hong Kong Telephone, and the People's Republic of China:

- 1974 — Joint project for the Hong Kong-Guangzhou land telephone cable completed.
- 1981 — Contracts were signed for a microwave system in the Hong Kong-to-Guangzhou area, which would also link Zhuhai (the special zone north of Macau), Shenzhen (the special zone north of Hong Kong) and Dongguang.
- 1983 — The high-capacity Hong Kong-Shenzhen-Guangzhou Microwave Communication System with 2,700 channels was completed.

At the inauguration ceremony, Mr Brian Pemberton, then managing director of Cable and Wireless (HK), said that it was now possible to conduct nine times as many simultaneous telephone conversations over the new link as were possible using the previous coaxial cable.

1983 — Huaying Nanhai Oil Telecommunication Service Co. Ltd., a joint venture between the China Nanhai Oil Joint Service Telecommunications Company and Cable and Wireless, was established in Chiwan. The letter of intent for this project had been signed the previous year in the presence of the British Prime Minister, Mrs Margaret Thatcher. The first phase provides telecommunications services to the oil and support services offshore in the South China Sea, and the control and supply bases in Guangdong Province. It includes microwave facilities and the latest high frequency radio techniques.

- 1983 — Shenda Telephone Co. Ltd., a joint venture with Shenzhen Municipality and the Guangdong provincial telecommunications authorities, was established in Shenzhen to provide the public telephone service in the special trade zone. The zone authority has the aim of providing one telephone for every four people by the end of the century. The company was one of the first to be established under new laws governing foreign investment in the People's Republic. The latest digital techniques are being used in this project.
- 1984 — A Guangzhou Long Distance Telephone Tandem Exchange joint project was completed.

- 1984 — Direct dialling was introduced between Hong Kong and Guangzhou.
- 1985 — A joint project for semi-automatic dialling facilities for ten Guangdong provincial cities was established.
- 1985 — Feasibility studies were undertaken for a Yangtze Delta Trunk Project.
- 1985 — Eastern 380 km of a microwave communication system for Guangdong Province was commissioned.
- 1986 — Western 595 km of the microwave system for Guangdong Province was commissioned. The system now reaches from Shantou in eastern Guangdong Province across to Sanya, on the southernmost tip of Hainan Island.
- 1986 — Shenda Telephone Co. Ltd. in Shenzhen achieves 14,076 line connections by end-July.
- 1986 — Implementation of a joint project for a Hong Kong-Guangdong optical fibre cable begins.
- 1986 — Direct dialling is now available from Hong Kong to more than 40 cities in the People's Republic.

Spectacular Improvement

At the inauguration of the first phase of the Guangdong microwave links last year, Sir David Akers-Jones, Hong Kong's Chief Secretary, referred to the "economic and social benefits that have resulted from the spectacular improvements in telecommunication between Hong Kong and Guangzhou over the last few years," and that the completion of the new link would spread

those benefits to other areas of the province.

Recently this year, the Chairman and Chief Executive of the Cable and Wireless Group, Sir Eric Sharp, and the Director of the Guangdong Provincial Posts and Telecommunications Administration (GPTB), Mr Yuan Jia Wen, signed an agreement to develop the unified operation of mobile radio telephone and paging services in the region.

This will allow subscribers of these systems operated by GPTB and the Group companies to use their mobile telephones or pagers while in each other's areas (the "Roaming Facility").

Total access system

Accompanying Sir Eric at the signing ceremony was Mr Brian Kennedy, Managing Director of CSL, a member of the Cable and Wireless worldwide telecommunications group. Mr Kennedy advised that the recently-announced TACS (Total Access Communication System) would be an integral part of the unified regional system in Guangdong, and that therefore users would be able to utilise their hand-held portable telephones, and transportable and car-phones, throughout the region.

Sir Eric said the added convenience of being able to "roam" between these cellular systems in the Pearl River Delta area would contribute to the already rapid economic development of the area, and also stimulate the use of the new service technology that is now occurring worldwide.

Yangtze delta plan

Earlier this year, two agreements were signed on co-operation in the development of telecommunications facilities in the Yangtze Delta Area (which includes Shanghai), between the Ministry of Posts and Telecommunications of the People's Republic of China and the Cable and Wireless Group.

Phase 1 of this development covers the provision of some 1,000 kilometres of digital trunk microwave and five long-distance toll exchanges, linking 27 cities and towns in Jiangsu and Zhejiang Provinces. Total project cost, including civil works, is estimated to be between US\$15M and US\$20M. Completion of this Phase 1 development is expected in two years' time.

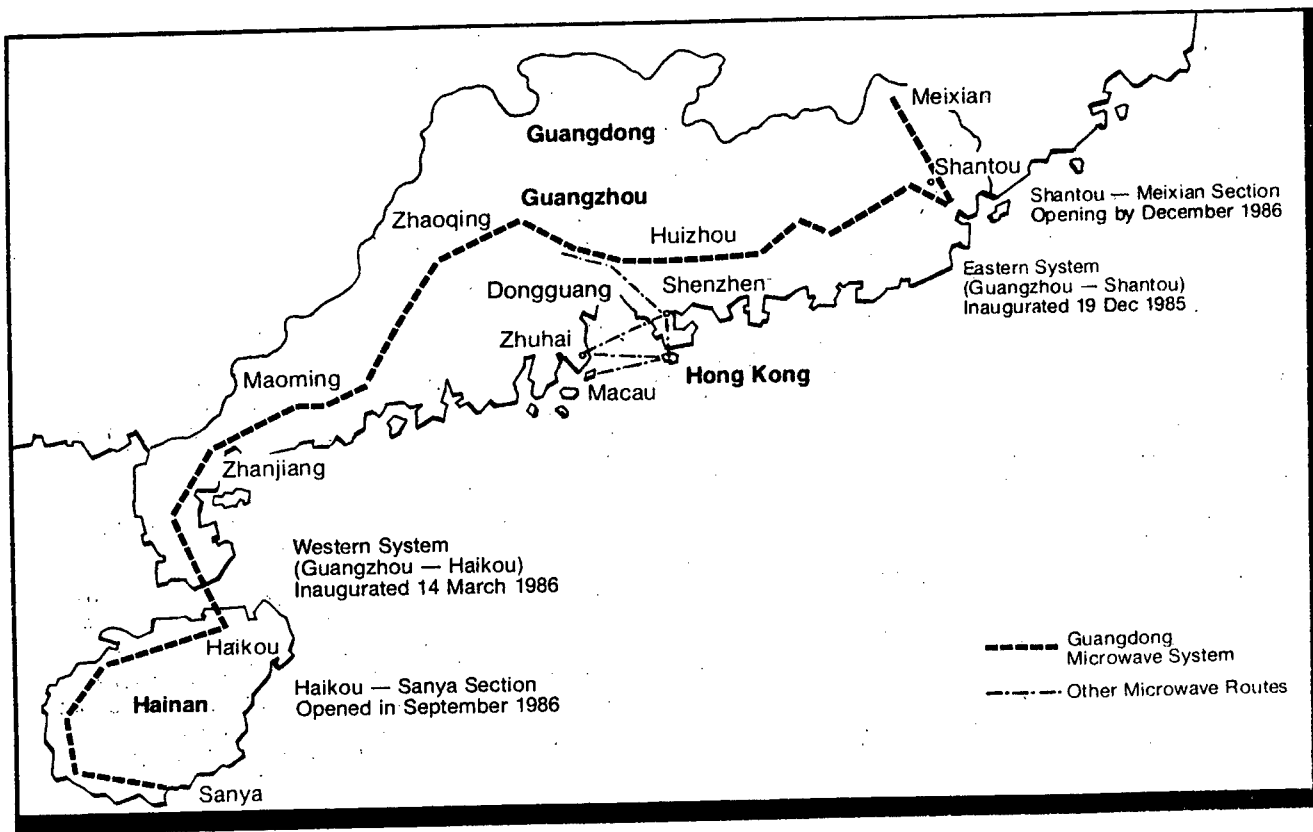
The second agreement paves the way for further co-operation by agreeing to carry out joint feasibility studies which will identify the telecommunications infrastructure projects to be included in the next phase.

Special seminar

The signing ceremony, which also included the signature of contracts by a number of other British telecommunications companies, took place during a telecommunication seminar hosted by the Sino-British Trade Council, of which Sir Eric Sharp is Chairman. The seminar was timed to coincide with the visit to Shanghai by Her Majesty the Queen.

On signing these agreements, Sir Eric Sharp said: "It is very satisfying to see

how earlier initiatives, taken in Beijing in 1985, have resulted in the concrete developments represented by these two agreements. The projects to be undertaken will bring benefits both to the social and economic development of the Yangtze Delta Area and, by means of interconnection with the rapidly expanding trunk network in the region, to subscribers elsewhere in southern China and in HongKong and Macau". □



The Guangdong Microwave System

The Guangdong Microwave Communication System, 1,000 kilometres long, links Hainan Island in the west and Shantou in the east. The system is joined by another microwave route which connects with Hong Kong, Shenzhen and Macau in the south. The project took 2½ years to complete. Its 1,800 communication channels provide a major part of the telecommunications infrastructure for the economic and social development of Guangdong Province and Hainan. This is one of the most rapidly developing regions of China. At the opening of the system, Sir Eric Sharp, Chairman of Cable and Wireless plc, demonstrated the potential of the microwave system by sending an auspicious message by facsimile from Hainan. The use of facsimile, which is ideally suited to transmitting Chinese characters, is growing rapidly. The completion of the project is a further step in the close collaboration that exists between the telecommunication authorities in China and the Cable and Wireless Group.

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CSO: 5550/0069

PEOPLE'S REPUBLIC OF CHINA

EXPANDING TELECOMMUNICATIONS SERVICE ENHANCES BUSINESSES

OW172158 Beijing XINHUA in English 1541 GMT 17 Jan 87

[Text] Beijing, 17 Jan (XINHUA)--China now has eight million telephone sets with [word indistinct] switchboards with a combined capacity of 467,000 lines added in 1986.

The Ministry of Posts and Telecommunications announced today that China also added 6,059 long-distance telephone lines last year.

The country completed 650 projects including urban telephone facilities, [words indistinct] satellite stations.

Yang Taifang, minister of posts and telecommunications, said, "With the new facilities in operation, we can meet the demand for telex service in coastal cities open to foreign investment."

According to the ministry, South China's Guangdong Province added new telephone switchboards with a combined capacity of 77,200 lines while Shanghai and Beijing added 20,000 and 10,000 lines respectively.

China's 12 cities have opened program-controlled telex switchboards with a total of 253,000 lines [word indistinct] 6.5 percent of the total urban telephone capacity.

A ministry official said that China has begun using satellite communications to link Beijing, Lhasa, Urumqi and Hohhot while optical communications is available in 23 cities in 18 provinces.

Express delivery service has spread to cities in 35 countries and regions. Facsimile service is available in all large cities, linking Japan, Singapore, and Hong Kong.

Although a big increase was registered in telecommunications capacity, the official noted, it is still short of the demand.

About 230,000 clients are waiting for the telephone in the country, he said.

/8309

CSO: 5500/4142

YANGTZE DELTA COMMUNICATIONS NETWORK PROGRESSES

OW260332 Beijing XINHUA in English 0223 GMT 26 Jan 87

[Text] Shanghai, 26 Jan (XINHUA)--A ground satellite station in Shanghai will open next year as part of the efforts of the Yangtze River Delta to build an updated telecommunications network.

China will launch communications satellites this year and next, according to the Ministry of Posts and Telecommunications. Fifteen new ground satellite stations will be built throughout the country during the 1986-90 period, bringing the total number of such stations to 20.

The Delta, which includes the whole of Shanghai Municipality, China's leading manufacturing center, has made notable advances in telecommunications over the past two years, local officials said. The Delta, one of the most developed areas in China, opened to foreign investment and trade two years ago.

For example, direct telephone dialing services to Hong Kong and 10 countries, including Britain, Japan and the United States, have opened in 10 major hotels in Shanghai since October 1984.

Exchange equipment for program-controlled telephones imported from Belgium will go into operation in the second half of this year in Shanghai to help improve telephone services between the city and other parts of China and the rest of the world.

The Yangtze River Delta covers 35 counties and towns in the Shanghai area, and part of Jiangsu and Zhejiang Provinces. It totals 32,000 sq km and has a population of 30 million.

Installation of program-controlled telephone exchanges with a total capacity of 32,000 lines began in downtown Shanghai early last year, and the project is now more than half completed. In all, the city expanded its telephone exchange capacity by 51,800 lines last year.

Moreover, a coaxial cable communications line between Hangzhou, capital of Zhejiang Province, and Fuzhou, capital of neighboring Fujian Province, opened last month. The 750-km line involved 45 million yuan in investment (about 12 million U.S. dollars).

The Chinese Ministry of Posts and Telecommunications has signed a contract with the cable and wireless company of Britain on jointly expanding the delta's communications network.

In addition, Shanghai and other major cities in the delta, such as Ningbo and Hangzhou, have introduced program-controlled telephone exchanges from Belgium, Japan and Sweden. Suzhou, Shaoxing and other cities in the delta will also import telecommunications equipment later this year.

/8309

CSO: 5500/4142

PEOPLE'S REPUBLIC OF CHINA

BRIEFS

ZHEJIANG-FUJIAN TELECOMMUNICATIONS CABLE--Beijing 13 Nov (XINHUA)--A 750-km underground telecommunications cable between Hangzhou and Fuzhou, capitals of Zhejiang and Fujian Provinces, passed inspection and has gone into partial operation. A key state project, the line can accommodate up to 3,000 telephone calls simultaneously. [Text] [Beijing XINHUA in English 1214 GMT 13 Nov 86 OW] /8309

GUANGZHOU-HONG KONG OPTICAL FIBER COMMUNICATION--Guangzhou, 5 Dec (XINHUA)--An optical fiber communications system will connect Guangzhou, capital of Guangdong Province, and Hong Kong, according to a contract signed here today. The system will be able to accommodate 20,000 telephone calls simultaneously. It can also be used to transmit TV programs and data, as well as journalistic facsimiles. Completion is planned for the first half of 1988, when the system will link up with the program-controlled telephone networks on the Pearl River Delta. Equipment will be imported from Britain by the builders of the project--the Guangdong Posts and Telecommunications Administration, Cable and Wireless (Hong Kong) Ltd and the Pirelli Company of Britain. [Text] [Beijing XINHUA in English 1316 GMT 5 Dec 86] /8309

IMPROVING, EXPANDING TELEPHONE SERVICE--Beijing, 17 Jan (XINHUA)--China is to add 700,000 telephone switchboard lines and install 350,000 telephone sets in its cities this year in a bid to improve the nationwide telephone service. Yang Taifang, minister of posts and telecommunications, said today that China will also speed up projects for long-distance telephone services, opening automatic telephone switchboards with a combined capacity of 20,000 lines in eight cities this year. He told a national conference on posts and telecommunications which opened here today that the country will make efforts to use more digital program-controlled switchboards and optical communications. At the same time, the minister said, the country will build a number of posts and telecommunications terminals, while expanding paging services and mobile telecommunications services in 20 coastal and hinterland cities. The Chinese government has decided to earmark 1.96 billion yuan (530 million U.S. dollars) for capital construction for posts and telecommunications projects this year. [Text] [Beijing XINHUA in English 1509 GMT 17 Jan 87] /8309

CSO: 5500/4142

BID TO BUY CROWN-OWNED TELEGLOBE CANADA REJECTED

Windsor THE WINDSOR STAR in English 31 Dec 86 p A13

[Text]

OTTAWA (CP) — The federal government has rejected a bid by Canada's major phone companies to buy 40 per cent of Crown-owned Telelobe Canada because it doesn't comply with the terms of sale set down in November.

In yet another complication in the sale of the Crown corporation, the government has ruled the phone companies can still bid in partnership with somebody else, Ian Sadinsky, communications adviser to Barbara McDougall, minister of state for privatization, said in an interview Tuesday.

Telelobe, the national overseas telecommunications carrier since 1949, was one of four Crown corporations put on the block in the Mulroney government's privatization drive in 1985.

The sale has been fraught with complications ever since.

First, Ottawa let several million dollars worth of bids expire last fall because it couldn't make up its mind whether Telelobe should continue as a monopoly after its sale or whether the phone companies should be allowed to hold controlling interest.

Nov. 19, Telelobe was put back on the market in a renewed round of bidding with a promise that it would keep its monopoly on overseas calls for at least five years.

Telecom Canada, an association of major telephone companies such as Bell Canada, was eliminated from the original bidding for control because the government decided a telecommunications company should not hold controlling interest.

INSTEAD, THE phone companies were given first crack at a minority

stake not to exceed 40 per cent of Telelobe.

They had until Dec. 29 to submit a bid.

Sadinsky said a bid from the phone companies was submitted Monday but was rejected Tuesday because it didn't meet all the conditions set down in November.

Bidders for controlling interest in Telelobe now have until Jan. 9 to submit proposals.

Sadinsky said there was nothing to prevent the phone companies from acting as junior bidding partners in the Jan. 9 round, providing their stake in Telelobe will not exceed 40 per cent.

He refused to comment on the reasons for the phone companies' bid being rejected.

John Morris, a spokesman for Telecom Canada, also refused to comment until after Jan. 9.

Unlike Canadair Ltd. and de Havilland Aircraft of Canada Ltd., the two major Crown corporations the Mulroney government has sold, Telelobe makes money.

It turned a profit of \$53.2 million in 1985 and is believed to have a book value of \$400 million to \$450 million.

The Conservatives believe it no longer serves any policy purpose as a Crown corporation.

Industry analysts have estimated it could sell for between \$700 million and \$800 million.

Although the list of potential buyers of Telelobe has never been disclosed, a consortium of pension funds led by the powerful Caisse de depot et placements du Quebec has long been considered the front-runner.

DEVELOPMENTS IN POLICY, ADDITIONS TO INFRASTRUCTURE

Telephone System Modernization

Warsaw ZYCIE GOSPODARCZE in Polish No 44, 2 Nov 86 p 14

[Article by (K.F.): "Renovation of Telephony"]

[Text] Much could be written about the backwardness of Polish telecommunications and especially the telephone system. Hence, the recent more resolute stress on modernization can be viewed as rather positive. Besides, this is the only way of overcoming the barriers to further development. The ministry of communications is fully aware that unless qualitative changes are made, quantitative changes are not feasible. At present, there are 1.7 million applicants on the waiting list for telephones. But the addition of 750,000 new subscribers during the present 5-year plan will require of the tele-electronics industry that it "produce" 1.2 million new numbers. This reveals the vast scope of the needed modernization of existing connections and facilities. This is a prerequisite for any progress in a situation in which so-called elementary potential has been depleted.

Thus there is nothing surprising in that one-fourth of investment outlays on telecommunications during the present 5-year plan period will be spent on research and application programs. Such an allocation of resources has no precedent in the modern history of the ministry of communications. At the end of last July was signed an agreement for implementing the Central Research and Development Program (CPBR) for Telecommunications, which is to be executed by the Institute of Communications. The outlays on implementing the projects specified in that agreement during the years 1986-1990 are set at 5.4 billion zlotys, and hence that is a substantial sum. It is estimated that its utilization will serve to provide the foundations for accelerating the development of Polish telecommunications and commencing the manufacture and operation of modern systems and equipment. The work conducted under the CPBR will be oriented toward propagating materials- and energy-conserving technologies as well as creating possibilities for the export of technical thought and contributing to the activation of domestic anti-import production and the standardization of the equipment being manufactured.

Government orders include seven R&D and application tasks. They comprise the manufacture and application of telecommunication cables and optic fibers (during the years 1986-1990 it is expected that optic-fiber lines for digital telephony will be built and put into operation in the Warsaw, Lodz, and Poznan hubs), as will be new generations of automated exchanges, along with modernization of E-10 electronic exchanges based on microprocessor technology, and the manufacture of stationary radiotelephone subscriber communications equipment. Government orders also include electronic telegraphic-teleinformation exchanges, portable "2700" line telephones (equipment for the simultaneous conduct of 2,700 conversations on a single line), and multiplex switchboards.

In addition, this year the ministry of communications concluded an agreement with MERA-BLONIE Works for the development of an electronic teletype. The serial production of that equipment should commence in 1988. Poland will thereby become the fourth CEMA country to manufacture electronic equipment of this type (after the GDR, the USSR, and Czechoslovakia).

Bearing in mind the former accomplishments of Polish scientists in the telecommunications branch (e.g., the work on fiber-optic technology conducted in this country as early as in the years 1976-1977, almost parallel with the work being done at renowned world research centers, although unfortunately its practical application in Poland leaves something to be desired, despite the advances made in this field in recent years), it is to be hoped that end-of-the-century Polish telephony will finally succeed in attaining a decent standard.

New Koszalin Exchanges

Koszalin GLOS POMORZA in Polish 23 Sep 86 p 1

[Article by (b): "The Number of Telephone Subscribers and Exchanges is Growing" surtitled "But What About Quality of Services, Readers Ask"]

[Text] (Own information) According to the heads of the Koszalin Province Telecommunications Office, during this year's vacation season previous investments serving to facilitate and expedite national and regional communications began to bear fruit.

The number of transfer calls declined in favor of direct dialing connections. This was possible owing to, among other things, the expansion of telephone exchanges in Kolobrzeg, Dzwirzyn, Dabki, Darlow, Szczecinek, and Goscin. Subscribers also benefited, because they received their own telephones. A new exchange is also operating in Ustron Morski, where network cable installation and the connection of new subscribers still are under way.

The situation in this respect has also improved in Sarbinow. In 1987 a new exchange in Kolobrzeg, serving 1,000 subscribers, will be put into operation. Even so, more than 3,000 applicants in that city are still waiting for telephones. Koszalin continues to be in a most difficult situation. The list of applicants for telephones has broken a record, for it rose to as many as 7,000 persons. A slight improvement can be expected next year once the new

telephone exchange in Rokosow is put into operation. It will serve to connect 1,000 new subscribers. On the other hand, the prospects for small towns and the countryside are rather optimistic. This year a large automated exchange has already been put into operation in Goscin, which made it possible to meet nearly all of the gmina's needs and facilitated rapid connections with Koszalin and other larger towns in the region. The modernization of the exchange in Dygow, resulting in 150 new subscribers, is nearing completion. In addition, the exchange in Kalisz Pomorski is being expanded while at the same time installing network cable. The quality of connections will improve markedly and 200 new subscribers will be added.

The modernization of the exchange and installation of network cable in Bobolice are continuing. This will result in 200 additional subscribers. In 1987 a completely new exchange will be put into operation in Drzonow near Kolobrzeg. By the end of this year the number of rural subscribers in Koszalin Province will increase by as many as 800. By the same token, the index of 3 subscribers per 1,000 capita will be attained. This will rank Koszalin among the nation's leading provinces as regards the expansion of the rural telephone system.

New Automated Exchange in Torun

Bydgoszcz GAZETA POMORSKA in Polish 15 Oct 86 pp 1,2

[Article by (b): "New Automated Exchange in Torun" surtitled "On the Occasion of the Day of the Communications Worker"]

[Text] At the end of June there existed in Torun Province 155 telephone exchanges with about 40,000 subscribers. Owing to the investments undertaken, these figures no longer apply. A new exchange in Chelmo will be released for use by the end of this year, and yesterday, following operating trials, an automated exchange was released for use in Torun; it is the first in the city to be equipped with "Pentaconta" system facilities.

In its present initial stage the exchange is designed for 8,000 subscribers, but its capacity can be increased to 20,000 subscribers by the year 1990. It is located in the Rubinkow Quarter. At present, installation brigades of the Province Office of Telecommunications are performing the necessary reconnection of subscribers and the expansion of the telephone network in that quarter is still continuing.

The opening of the new exchange was linked to the celebration scheduled for the Day of the Communications Worker on 18 Oct. During the ceremony organized yesterday at the WOKI auditorium, WUT [Province Telecommunications Office] and WUP [Province Post Office] personnel were joined by, among others, First Secretary of the Province PZPR Committee Zenon Draminski, Sejm Deputy Zbigniew Bialecki, Vice Governor Erazm Chojecki, and the Torun city authorities. Also present were Vice Minister of Communications Kazimierz Czarniecki and Director of the Gdansk Post and Telecommunications District Jan Wisniewski.

In recognition of the occupational achievements and civic activism of communications employees, state and ministry decorations were conferred on them. The Chevalier's Cross of the Order of Poland's Rebirth was conferred on Henryk Trojan of the WUP; the Gold Cross of Merit was received by Mikolaj Kraszewski of the WUP; the Silver Cross of Merit was conferred on Edmund Makowski, Wanda Bochat, and Mirosława Jagielka; and the Bronze Cross of Merit was conferred on Anna Jablonska. Medals of the 40th Anniversary of People's Poland were conferred on Henryk Hajdus and Jan Wisniewski.

Investment Focus on Warsaw, Katowice

Katowice TRYBUNA ROBOTNICZA in Polish 16 Oct 86 pp 1,5

[Article by (ww): "No More Postillions, But the Computers Are Not Yet Here" surtitled "Communications Personnel Assure Us That We Will Have Polish Satellite Television by 1992"]

[Text] "Unprecedented advances in the development of communications" have occurred during 1983-1985; "dynamic growth" during that 5-year period [as published]. Figures confirm this assessment: during that period the number of telephone subscribers increased by 371,000, and plans exist for adding 750,000 more subscribers.

Prior to the traditional "Day" of the 200,000 communications personnel, the heads of the ministry presented, at a conference in the Government Press Office, a self-assessment of the recent past and intentions for the near future.

At the ministry [of communications] people are perfectly aware that, despite this unprecedented progress, especially in telecommunications, the results have been incommensurate with the needs and expectations (1,700,000 applicants are waiting for telephones), precisely because no progress in this field had previously been scored. Communications investments were the first to be cut among the traditional reductions.

According to this self-assessment, the Post Office is meeting the demand quantitatively across the vast territory of this country. An exception is the large cities of Warsaw and Katowice in which queues in front of post-office windows are excessively long. The reasons are prosaic: a personnel shortage (altogether the postal service is short of about 9,000 employees), as well as an equipment shortage. The quality of services, on the other hand, does not meet the expectations. Letter and parcel deliveries are tardy (owing to a shortage of 450 Star trucks and 100 postal freightcars), and there are thieves among post office employees, most often among junior personnel. But then the possibilities for personnel selection are limited. More than 15,000 inspections conducted in the course of a year revealed 725 malfeasances.

The reform has somewhat improved the financial status of communications as a branch, but the postal service continues to operate at a deficit of about 3 billion zlotys and rate increases, even if quite moderate, are indispensable. In order to partially compensate for the consequences of delays in investments and other neglect, letter-sorting machinery has been acquired in the GDR and

plans exist to install computers in post offices. Among others, the District Postal Delivery Office in Katowice is being modernized. Attention has been drawn to the huge, unprecedented, and relatively senseless burden on our postal service due to the unpopularity of charge-and-savings accounts: only 200,000 such accounts have been opened; and each month postal carriers deliver 6,500,000 rental and annuity payments which subsequently are returned to postal circulation in the form of fees for various services.

An accelerated expansion of the telephone system, on which detailed statistics exist (this year several score exchanges have been put into operation or are being installed, and the expansion of exchanges in, among other places, Siemianowice and Czestochowa, is under way), is indispensable. The current situation is such that, in terms of the number of subscribers per 100 capita (fewer than 7), Poland ranks nearly last in Europe. Telecommunications investments in the next few years will be focused on two hubs -- Warsaw and Katowice. Direct dialing is now possible on more than a thousand interurban trunk lines and 46 international trunk lines. In the immediate future Katowice will be linked by new direct dialing systems with Zakopane, Zywiec, and Nysa. By the end of the 5-year plan period optic-fiber telephone lines will be put into operation at several hubs.

The following information on satellite television should be of interest. During the first stage, the central channel of Soviet television, transmitted by a satellite, and received within a radius of 20 km, will be beamed from the Warsaw Palace of Culture. Next, by 1992, satellite television programs will begin to be beamed at a frequency of 12 gigahertz for collective and individual viewers. The Ground Satellite Center in Psary will be provided with equipment adapted for utilizing the satellites inserted in orbits over the Indian Ocean.

One has to be fully in accord with the ministry's assessment that "the telephone, modern postal service, and radiocommunications cannot be treated as unnecessary luxuries."

Details on Sejm's CT2 Exchange

Warsaw KURIER POLSKI in Polish 16 Oct 86 pp 1,2

[Article by (paf): "CT2 for Warsaw" surtitled "Under the Watchful Eye of the Computer" and "130,000 New Subscribers"]

[Text] Prior to the Day of the Communications Worker, which falls due on 18 October, Vice Chairman of the Council of State and Chairman of the SD [Democratic Party] Supreme Committee Tadeusz Witold Mlynczak toured Warsaw's latest investment project in communications, the E10-system electronic telephone exchange built by the Poznan TELKOM-TELETRA Works in Poznan.

This exchange, known by the name CT2, was installed in the Sejm building. It plays a twofold role; first, it operates as a conventional telephone exchange for 4,500 subscribers and second, it transfers calls between telephones with six- and seven-digit numbers (3,060 connections). Supervision of the performance of this facility and of the entire attached telecommunications

network is exercised by a computer built by the Hungarian Videofon Company. The CT2 is expected to reach its full operating capacity by year end. During his tour of the exchange Tadeusz W. Mlynczak was accompanied by the Minister of Communications Wladyslaw Majewski.

This year's plan provides for installing 130,000 new telephones in the country as a whole, of which 10,600 telephones in the countryside. Judging from the advanced fulfilment of this target so far, the above figure will be attained or perhaps slightly exceeded. During the January-to-September period nearly 93,500 telephones have already been installed. This figure is nearly proportional to the time elapsed, and as known, in our economy the fourth quarter of the year is usually characterized by an intensified production effort. Hence, by year end this country will have 2,615,000 telephone subscribers, of whom 10.7 percent in the countryside.

Unfortunately, despite the advances in telecommunications observable in recent years, the index of 11.29 [as published] telephones per 100 capita causes Poland to rank in one of the bottom places in Europe and to rank much below the worldwide average, which as far back as 4 years ago had already amounted to 17.8 telephones per 100 capita.

The waiting list of applicants for telephones in Poland as a whole numbers 1.7 million, with 200,000 applicants in Warsaw alone. The 1986-1990 National Socioeconomic Plan provides for the installation of 750,000 new telephones, which, to be sure, means a marked increase (by more than 40 percent) compared with the previous 5-year plan period, 1981-1985, but still is far from meeting the demand.

Sieradz Region Developments

Lodz GLOS ROBOTNICZY in Polish 17 Oct 86 pp 1,2

[Article by K. Lisiecki: "New Telephone Exchange for Blaszkki; Another 1,000 Subscribers for Zdunska Wola; Dzialoszyn Gets a New Post Office"]

[Text] As late as in 1981 Sieradz Province had been a Cinderella so far as telephony was concerned; there were only 3.14 subscribers per 100 capita in that province, ranking it in an inglorious 48th place among Poland's provinces. Early in the 1980's energetic attempts were undertaken to overcome this lag. In 1985 the number of subscribers per 100 capita increased to 4.14 (compared with the national average of 6.34) and Sieradz Province, an agricultural region, ranked 39th in this respect. During that period a large number of investment projects has been carried out by the Sieradz Province Telecommunications Office. It includes, among other things, new telephone exchanges in Sieradz, Zdunska Wola, Iasek, Brzezien, and Warta. Owing to the efficient execution of investment processes, during the 1981-1986 period Sieradz Province gained nearly 8,000 new telephone subscribers.

Communications personnel in Sieradz Province celebrated their holiday [the "Day of the Communications Worker"] with deeds. The other day, an automated telephone exchange was opened in Blaszkki. This Strowger-type exchange, with 600 operating numbers, can be expanded to 2,000 numbers, and will provide

subscribers from the city and gmina of Blaszkki with direct-dialing connections to nearly every large city in Poland. In addition, operating trials of the exchange at the Zachod Housing Project in Zdunska Wola, which was expanded by an additional 1,000 numbers, commenced on 15 October. These projects will result in increasing the number of telephone subscribers in Sieradz Province to 20,600 before year end. Furthermore, the construction of new automated exchanges in Poddebice and Sedziejowice has reached a highly advanced stage. These exchanges will be put into operation next year.

Proper cooperation between the province authorities and the ministry of communications and the telecommunications and post offices in Sieradz has also borne fruit in the form of the new post and telecommunications building that was released for use yesterday (16 October) in Dzialoszyn. This is the largest (more than 850 sq m in area) postal facility in Sieradz Province. Built at a cost of more than 60 million zlotys, it will markedly streamline postal and telecommunications services in the southern part of Sieradz Province.

These indubitable accomplishments were described by the Director of the Sieradz Province Telecommunications Office Jerzy Stopczyk at yesterday's gala celebration of the Day of the Communications Worker. He emphasized that communications employees are aware of the tasks posed to them and attempt to accomplish them so as to improve postal and telecommunications services year after year.

The 428th anniversary of the introduction of the first public international postal connection, between Krakow and Venice, served as an occasion for honoring with decorations distinguished postal and telecommunications employees. Badges of "Merit to Sieradz Province" were conferred on Jerzy Stopczyk and Mieczyslaw Pilarski. Gold, silver, and bronze badges of "Merited Communications Employee" were received by 94 persons.

The ceremony, held at Piast Cinema, and presided over by the Director of the Sieradz Province Post Office Ryszard Hartlinski, was attended by First Secretary of the Sieradz Province PZPR Committee Janusz Urbaniak, the Chairman of the Province People's Council Ryszard Lewik, Vice Governor Roman Owskiak, and Director of the Lodz Postal and Telecommunications District Marek Gutowski.

Thanks and best wishes on behalf of the province authorities were expressed to those present, for conveyance to the 1,400 employees of the ministry of communications in Sieradz Province, by First Secretary of the Province PZPR Committee Janusz Urbaniak.

1386

CSO: 5500/3007

POLAND

BRIEFS

NEW DIRECT DIAL SERVICE FOR POZNAN--Subscribers in Poznan can dial many cities in this country without the mediation of telephone operators. New centers are continually being connected to direct dialing. Since a few days ago Poznaners can rapidly communicate with subscribers in Skarzysko Kamienna and Starachowice. For the former locality it suffices to dial the area code 0-473, and for Starachowice, 0-474. But we dial Kielce in a different way. Owing to the opening of the Kielce ACMM station, the call number has been changed. Instead of the area code 846 we now dial 0-41 for that city. Let us add that, following the selection of area codes for the localities named above, seats of telephone districts, direct dialing of other cities in these districts (Dyminy, Borkow, Debska Wola, Laczna, Maslow, Nowiny, Obiegorek, Sukow, Swieta Katarzyna, Wisniowka, Paszow, Skarzysko Kos, Michalow, Pawlow, and Swietomarz) will be possible. [Text] [Poznan GAZETA POZNANSKA in Polish 18-19 Oct 86 p 5] 1386

CSO:5500/3007

BERMUDA

BRIEFS

CABLE TV FUNDING SITUATION--Bermuda Cablevision is repaying \$1.1 million raised in a recent share and debenture offering which failed to reach its \$1.6 million target. The cash will be returned to prospective investors with interest, following a shareholders meeting yesterday. Company president Mr Gavin Wilson said Cablevision's directors would now be looking at alternative ways of financing its nearly \$3 million plan to launch the Island's first cable television system. These included bank loans and bringing in corporate partners with capital. Mr Wilson said the Government had extended until the end of January its deadline for confirming Cablevision's licence to transmit. He blamed the failure to raise the necessary capital from private investors on a number of factors, including the Bank of Bermuda's recently-announced \$20 million share offering. "The bank's offer is not speculative in the way ours is. Bermudians are, on the whole, more likely to invest in less speculative plans, rather than put up the sort of ventures capital we need," he said. [Text] [Hamilton THE ROYAL GAZETTE in English 30 Dec 86 p 2] /9317

CSO: 5540/053

ENTEL STUDIES PROJECTS TO BENEFIT SOUTHERN TOWNS

La Paz EL DIARIO in Spanish 7 Dec 86 p 4

[Text] The National Telecommunications Enterprise (ENTEL) is considering expanding its services to the smaller towns of the country, in both the mining and agricultural areas, announced the general manager of that entity, German Quiroga Gomez.

He indicated that the project entails providing and installing a comprehensive telecommunications system including everything from telephone devices and coin boxes to long-distance exchanges, the cable network, local exchanges, radio links, and others. In this way, a completely automated service will be available.

He stated that the project, known as the National Telecommunications Network Expansion (ERNT), is of vital importance in terms of connecting the public pay phone service for national and international long-distance calls, given that this service is provided to a large population and is also highly profitable.

He reported that at present, ENTEL is serving 83 towns throughout the country: 19 in La Paz, 15 in Cochabamba, 8 in Oruro, 7 in Chuquisaca, 21 in Potosi, 10 in Tarija, and 3 in Santa Cruz.

Project

The construction required by the project will create a demand for labor in rural regions, with an immediate multiplier effect in the economies of these areas. The investment will amount to US \$4,978,119.

A total of 202 permanent jobs were created in seven departments of the country. Direct or indirect benefits will be derived by 1,971,156 inhabitants, 31 percent of the national population.

The project will generate approximately \$5 million in taxes for the General Treasury of the Nation each year.

Other benefits range from the integration of isolated towns to commercial activities, and include emergency medical care and strengthening state administration by making communication more direct and speedier.

The project will make local and long-distance rates lower than they are now. In addition, it calls for a constant and steady reduction of these rates throughout the life of the project.

Estimated Production

In the first year, 5,880,000 local calls, involving 6,650,000 minutes of conversation, are expected to originate from the newly-connected towns. This traffic represents an increase of 33 percent over the traffic recorded throughout the country in 1982.

The initial investment is estimated at \$46,783,678. Foreign contributions for equipment and some services will total \$31,057,392, while local contributions will amount to \$15,726,287.

The local amounts correspond to the construction of buildings, repeaters, and roads, installation services, and national consultations, reactivating the national economy.

Financing will probably come from the governments of Japan and France, and from the interconnecting firm, AT&T. Because ENTEL has positive financial indices, however, it is possible that financing can be arranged with suppliers on terms that are advantageous to the enterprise.

Since the project was submitted to the General Telecommunications Office on 26 December 1984, a number of steps have been taken. Pursuant to Decree 21060 of 10/18/85, it was submitted once again to the Ministry of Planning and Coordination for the corresponding execution. And on 19 November 1985, that secretariat ordered that the ERNT project be considered once again by the appropriate entities for action in 1986.

At present, the specifications for this project have been drawn up in their entirety and are awaiting final revision.

The plans for the buildings in the towns of Llallagua, Uncia, Uyuni, and Monteagudo are also finished and ready for bidding.

Quiroga Gomez completed his report by stating that to continue carrying out this project, the following steps must be taken: ratification of the project by the National Economic and Planning Council (CONEPLAN), and final decisions on sources of financing and the contribution of the National Telecommunications Fund.

8926

CSO: 5500/2020

SANTA CRUZ-PUERTO SUAREZ MICROWAVE NETWORK INSTALLATION

La Paz EL DIARIO in Spanish 7 Dec 86 p 12

[Text] Santa Cruz--With an investment of approximately US \$6 million, derived from its own resources, the National Telecommunications Enterprise (ENTEL) is taking measures to construct the Santa Cruz-Puerto Suarez microwave network. This will enable Bolivia and Brazil to interconnect their telecommunications networks, and will also help integrate a vast region along the border that has been without communications until now, asserted ENTEL Regional Manager Ronald Saucedo.

According to that executive, early this month an ENTEL technical evaluation committee opened the bids that were submitted for these projects, and is now working on them. The firms that submitted bids were Oki-Mitsubishi (Japan), NEC (Brazil-Japan), GEC (England), and ATT (United States).

The ENTEL project consists of installing a microwave network between Santa Cruz and Puerto Suarez on a wide band, with 960 voice channels. In this way, the following services can be obtained: telephony, telex, data transmission, facsimile, and color television.

In addition to connecting the Bolivian system with its Brazilian counterpart, the same services will be provided to the important areas of Sa San Jose de Chiquitos, Robore, Puerto Suarez, Quijarro, Mutun, and all the towns that are within the project's sphere of influence.

This major ENTEL project, according to Saucedo, will be on line by the latter half of 1988, and will cover approximately 660 km in length.

Connection

Through this microwave network to be built as far as Puerto Suarez, the Bolivian system will be linked to the Brazilian system, thereby taking one step further toward establishing an inter-American telecommunications network, reported the ENTEL Santa Cruz manager.

He noted as well that this inter-American telecommunications network includes Argentina, Chile, Peru, Brazil, and Bolivia, all to be connected with microwave links.

In this regard, he reported that ENTEL is already linked to Peru through wide-band microwave connections on the Copacabana-Yunguyo route, which is in operation now.

There is also a fully-operational link to Argentina along the Tarija and Campo Duran route.

After the current Santa Cruz-Puerto Suarez project is completed, work will begin on installing the La Paz-Arica section to connect Bolivia with Chile.

The ENTEL Santa Cruz manager, Ronald Saucedo, expressed genuine satisfaction with all of these projects being carried out by the enterprise. He emphasized that "now we are working a lot, and we are trying to make up for lost time, to some degree."

DDI

Direct International Dialing (DDI) will be available by the latter half of 1987, reported Ronald Saucedo.

This new service, which ENTEL is about to bring on line, means that there will be enough equipment to allow long-distance calls from any part of the country without having to go through the infamous long-distance exchange in the city of La Paz, which has caused so many problems for customers, especially those living outside of that city.

This new ENTEL project, according to the Santa Cruz manager, is an indication that work is being done to correct the deficiencies that arose in the past due to the lack of organization in previous efforts.

It should be noted that this DDI service is sorely needed in this and other cities of the country; so much damage has been caused by the centralization of communications that even human lives have been lost just because of that.

8926

CSO: 5500/2020

BRIEFS

TV CHANNELS OFFICIALLY AUTHORIZED--Transportation and Communications Minister Andres Petricevic officially announced yesterday the television channels that have been authorized for the city of La Paz, Trinidad, and Cobiya. It was confirmed in our capital that the five private channels which have already been operating daily for more than 2 years have been authorized. These channels are: 2 (Carlos Cardona), 4 (Carlos Palenque), 6 (Javier Zuazo), 9 (Raul Garfulic, Illimani de Comunicaciones), and 11 (Hugo Roncal). Minister Petricevic stated that the Television Channel Authorization Board, made up of the ministers of education, information, and transportation, assigned the frequencies in the districts of La Paz, Beni, and Cobiya. He added that the corresponding permits for UHF Channels 15 and 20 have been granted to Sonomac and Technitron, respectively. He reported that in Beni, four TV channel permits were issued to Benevision, Illimani de Comunicaciones, Milton Moscoso, and Trinivision. In Pando, the only application was submitted by Illimani de Comunicaciones, and the permit was granted. He explained that in La Paz, the two bids that were not accepted, due to the evaluation and to the lack of channels, were those submitted by Somera Ltda (owned by Miguel Dueri), and Empresa Nueva America (Raul Salmon). They may be able to obtain UHF permits if they so desire, he noted. "I think we have behaved in the most responsible way," he added, "both in evaluating the bids and in issuing the permits." He went on to say that a meeting was held yesterday with the recipients of permits for the five private television channels in La Paz to explain to them that the Communications Ministry will strictly enforce the Telecommunications Regulations, especially with regard to the "pirating" of television broadcasts from abroad. He stated that this practice cannot be tolerated in a civilized and democratic country. He asserted that the owners of the channels have agreed, through their association UNITELE, to comply with the Telecommunications Regulations to the letter. As for UNITELE, he said that the Ministry has acknowledged its existence, although at present the association is still in the process of obtaining legal status as a corporation. [Text] [La Paz EL DIARIO in Spanish 7 Dec 86 p 4] 8926

POTOSI NEW TV CHANNEL--Potosi--A new television channel may be installed in this city if approval is granted and the necessary steps are taken under the plan drafted and submitted by the chairman of the Board of Directors of the Potosi Telephone Cooperative (COTAP), Dr Jaime Herrera. This interesting study indicates that financing would be the responsibility of the partners in the telephone cooperative, who would pay affordable monthly installments to

amass a total of 24 million Bolivian pesos. With this guaranteed, secure financing, COTAP could make the necessary disbursements to implement all the measures related to the television channel, which would thus be owned by the cooperative members. Every telephone customer would have to make a minimum payment each month along with his phone bill to pay for Potosi television. The project, which has gained strong initial support from several institutions and the Potosi Telephone Cooperative itself, would have to go through the following phases for final implementation: first, purchasing the equipment and obtaining the license, with broadcasts of experimental programming (3 to 4 months); second, consolidation and infrastructure (a maximum of 8 months); and third, establishing the channel's independence and forming its own board of directors, and producing its own programming through videos in order to revive and highlight the traditions, culture and customs of the region and of the nation. [Text] [La Paz EL DIARIO in Spanish 7 Dec 86 p 12] 8926

CSO: 5500/2020

BRAZIL

BRIEFS

SATELLITE TRACKING STATION CONSTRUCTION--A third Brazilian satellite tracking station will be built at Tanabi, northeastern Sao Paulo State, by 1988. The Ministry of Aeronautics has started building the facility which will house the tracking equipment. The other two stations are located in Mato Grosso and Santa Catarina. [Text] [Brasilia Radio Nacional da Amazonia Network in Portuguese 0900 GMT 13 Jan 87] /9604

PRC NEWS AGENCY OFFICIAL'S VISIT--The General Director of the PRC news agency NEW CHINA will visit Brazil in April to learn about the activities of Brazilian communication organizations. (Mu Qing) will visit Brazil in response to an invitation extended by Brazilian Foreign Minister Abreu Sodre. During the official's visit the PRC news agency and the Brazilian news agency [EBN] will sign a cooperation agreement. [Text] [Brasilia Domestic Service in Portuguese 2100 GMT 16 Jan 87 PY] /7358

CSO: 5500/2024

ST CHRISTOPHER AND NEVIS

BRIEFS

CABLE AND WIRELESS LOAN--St Kitts and Nevis Telecommunications Ltd (SKANTEL) on Monday signed a 27-million (East Caribbean) Dollar loan agreement with Cable and Wireless (Financial Services) Ltd to help finance an ambitious Telephone Development Programme for St Kitts and Nevis. A Press Release from Skantel's main office in Basseterre, St Kitts, said the money will be used to continue Skantel's Telephone Development Programme projected to cost approximately 50 million (East Caribbean) Dollars over the first five years of the company's operation. Skantel is a joint venture company established in October last year by the Government of St Kitts and Nevis and Cable and Wireless (W.I.) Ltd. [Text] [Kingstown THE VINCENTIAN in English 5 Dec 86 p A] /9317

CSO: 5540/051

MICROWAVE, DIGITAL LINKS AMONG PLANNED IMPROVEMENTS

Castries THE WEEKEND VOICE in English 8 Nov 86 p 1

[Text]

CABLE & WIRELESS' recent inauguration of the West Coast digital telephone system which cost EC\$2 million, marked the completion of Phase one of the reconstruction of the entire national telephone system.

The system, which was first installed 20 years ago this year, has witnessed changes in technology employed from the electro mechanical then to present day digital.

In 1982, a new 7,000 - line digital exchange was opened at Sans Souci to replace the existing 4,800-line capacity in the Castries/Reduit area. External cables were placed underground and pressurized for protection against water; most significantly, direct dialling on overseas calls was introduced.

The ensuing four years have been taken up with the extension of the external cable network to distribute the additional exchange capacity in the north, plus planning for the next stage of the development, which is to be centred around Vieux fort, and which has now commenced.

At a cost of EC\$8 million, planned or in progress are:

- a sub office at Vieux Fort providing facilities for public international direct dial booth service, telegrams, telex, payment of bills, local maintenance, queries, applications for service, etc.
- a new high capacity digital microwave link between Castries and Vieux Fort to triple existing capacity.

- a new 1000-line digital exchange at Vieux Fort.
- a new digital link between Castries and Micoud to upgrade the trunk service.
- parallel with the above, new external cabling networks to connect subscribers in Vieux Fort, Laborie, Micoud, and environs.

In order to accommodate the above, a range of civil works is already in progress, including building extensions at Moule-a-Chique, new office building at Vieux Fort, and digital microwave towers at Monier, Moule-a-Chique and Micoud.

To meet the increased demand in the north, expansions on Reduit and Sans Souci exchanges are also being implemented at the same time as the southern development. The

capacity of Reduit will be doubled to 2,000 lines, and Sans Souci will also undergo a software upgrade to provide additional facilities, a Company Spokesman said.

Since the appointment of four St. Lucian managers in February 1984 local staff have played an increasing role in planning the development and project management of the system. Also involved are specialists from Cable & Wireless London and the manufacturers Alcatel-Thomson.

The radio links will be completed by March 1987 and the exchange expansion during the subsequent three months. Upon completion of Phase two, a total of EC\$35 million will have been invested in capital development since 1982.

/9317

CSO: 5540/050

REVIEW OF STATUS OF CABLE, OTHER TV SYSTEM PLANS

Bridgetown DAILY NATION in English 8 Dec 86 p 9

[Article by Earl Bousquet]

[Text]

CASTRIES, St. Lucia — As the intense debate about the merits and de-merits of United States satellite television continues in St. Lucia, new elements include the launching of the island's first pay-television system, continuing plans for the first cable television system, and the start of what seems like a crusade against cable television.

As of November 1, the John Compton administration ruled that the local television service, HTS, restrict its broadcasting hours from 24 hours daily, as had been the case for the two previous years, to 12½ hours during weekdays, and 18 hours on Saturdays and Sundays.

In a live "phone-in" programme over HTS last month, the station's director, Steve Annius, said he supported the government's decision, as he'd been bombarded with complaints, particularly from school principals, that students were watching too much television during school-hours.

Annius said it also allowed HTS to improve its programming and presentation, and indeed, the station was attempting to improve, with the assistance of a producer from Trinidad and Tobago Television (TTT), whose services they were also trying to contract for a longer period next year.

The HTS managing director also took the opportunity to announced that the station was now ready to offer a new pay-television service, in which subscribers would have direct individual access to up to four American channels on a 24-hour basis.

This would be facilitated through the installation of what he said was a "custom made and custom designed black box" into the home of the subscriber. The installation fee is EC \$150, and there's a charge of \$30 monthly thereafter. It can be cut off from the HTS control room, if it is interfered with by the subscriber, he said.

According to the HTS official, among the stations available are: CNN, The Movie Channel, Cinemas, HBO and ESPN — The Sports Channel.

At the same time, plans are continuing for the introduction of the island's first cable television system by the British multinational company, Cable and Wireless (C & W).

The company is mounting poles and numbering them throughout the city, in preparation for running the cables to the first areas to be serviced.

Unlike HTS' service, which is facilitated by the black box, C & W will run cables to the homes of subscribers, in a service that will cost \$50 for 24-hour access to up to ten channels, which may include both United States and British.

C & W has been criticised in some quarters, including the island's Media Workers Association (SLMWA) for not including any plans for local production. In a public lecture organised by the SLMWA, C & W general manager, Ian Boatman, said local programming was too costly and involved activities the company did not wish to get into.

The SLMWA had similarly criticised HTS for its very limited local programming, and in the phone-in programme, the HTS managing director indicated that this was being attended to.

However, it seems an anti-cable television campaign is developing here, as a new element in the television debate.

For over a week now, Castries residents have been waking up to see large painted signs on prominently-placed buildings proclaiming: "No Cable TV" and "Ban Cable TV".

No person, group or organisations has been identified with the slogans, but in the HTS call-in programme, many persons expressed support for the local station over the impending C & W service.

C & W's cable television system will be the company's first venture into television, and the word in some circles here is that if the venture proves successful here, it may be repeated in some of the several countries in the world where it operates.

TELEPHONE COMPANY MAY SEEK GOVERNMENT PERMISSION TO PRIVATIZE

Port-of-Spain SUNDAY EXPRESS in English 11 Jan 87 p 27

[Text]

WITH a billion dollar debt on its hands, the Trinidad and Tobago Telephone Co (Telco) may be the first public utility in the country to be seeking to go private.

The Sunday Express has been reliably informed that the telephone company is considering a proposal to the Government for divestment.

Clarence Hordatt, Telco Chief Executive Officer, has disclosed that the company was considering "all kinds of alternatives" in its bid to get on a sound financial footing. He conceded that the possibility of divestment was one of them. He said the company would also seek the authority to float long term bond issues as another alternative.

From elsewhere on the company's board of directors, the Sunday Express has learnt that Telco plans to approach the British-based multinational telecommunications firm of Cable and Wireless as a possible partner in a joint-venture arrangement.

Hordatt told the Sunday Express also, in answer to a question, that the company had put several of these recommendations to the previous government, but to date there was little follow up. He did not agree that the proposals had been rejected by the Government.

He said the company had been pressing for

some action in order to reduce the load on the exchequer in the repayments of the company's debt, portions of which became due at the end of 1986. It is understood that Bank of Nova Scotia Trinidad and Tobago Ltd released on December 31, some \$52 million to Telco's foreign creditors.

The World Bank, the Export-Import Bank of Japan, a Japanese Consortium, and the Export Development Corporation of Canada are among Telco's foreign creditors.

/9317

CSO: 5540/054

COMMUNICATIONS TO BE RECEIVED FROM FRENCH SATELLITE

Calcutta THE TELEGRAPH in English 10 Dec 86 p 5

[Text]

Paris, Dec. 9 (PTI): The Indian space department is to sign a major contract with a French space company that will enable India to receive high quality pictures of the earth directly from the French satellite, Spot.

India will start getting Spot pictures from April or May, according to a spokesman for Spotimage; the company responsible for the worldwide marketing of Spot pictures.

Spot, which was launched on February 22, will beam data directly to an Indian ground station operated by the National Remote Sensing Agency near Hyderabad, the spokesman said. Test runs for direct reception from Spot were conducted by the agency two weeks ago and the station will become fully operational in four months, he said.

Under the final agreement with Spotimage to be signed very soon, the agency will be free to distribute the pictures to any user organisation in India.

Under the contract, the agency will pay the French company an amount depending on the duration of satellite data recep-

tion but it will not be less than \$1 million a year, the spokesman said.

The agency's ground station has already been receiving pictures from US satellite, Landsat, since 1976 and it was recently upgraded by McDonald Associates of Canada to be able to receive Spot pictures that are superior in quality.

Orbiting over the Poles at a height of 830 km, Spot takes pictures with a resolution of 10 minutes which enables one to distinguish a truck from a car. It is also the only satellite with a stereoscopic vision which provides pictures in three dimensions, essential for topography.

Currently, Spot data is received by stations at Toulouse, Kiruna in Sweden and two stations in Canada. A ground station in Bangladesh will soon become operational and another French company called Sep's building what is to be the world's biggest station at Islamabad.

The spokesman said Spotimage has in its possession more than 1,000 excellent cloud-free pictures of India.

/7358

CSO: 5550/0074

INFORMATION MINISTER ON ALLOCATION OF TELEVISION CHANNELS

Calcutta THE SUNDAY STATESMAN in English 14 Dec 86 p 1

[Text] The Union Minister of State for Information and Broadcasting, Mr Ajit Panja, on Saturday ruled out any possibility of the second channel of Doordarshan being handed over to the States. The channel would however be utilized for promoting regional programmes, he said at a Meet-the-Press programme at Calcutta Press Club.

Referring to the West Bengal Government's demand that the second channel be given over to the States, Mr Panja remarked. "They want it to propagate Marxism. We can't allow this". But when told that Mr Rama Krishna Hegde, Karnataka Chief Minister, had made the same demand before Mr Jyoti Basu, he said the channel would be "for the people and not for the States".

The basic idea behind operating the second channel was to get more time on television, he said. Mr Panja also said that the Government had no intention at the moment to cut down on commercial programmes. Apart from the money raised through the commercials, these provided employment to many people.

According to him, Doordarshan planned to cover 80 percent of the country's "geographic area" by the end of the Seventh Plan. At present, the coverage was about 70 percent. In West Bengal, the coverage was expected to be extended to 98 percent from 94 percent at present.

He announced that the Government had plans to introduce a morning news service on Doordarshan. "You may get the good news in the new years". Talks were also in progress on showing films between 11 p.m. and 1 a.m. on weekends.

Mr Panja did not believe that the Prime Minister was being projected on Doordarshan for too much. "The Prime Minister is the Prime Minister" he remarked. "Whatever he says is a statement on national policies." He also denied the allegation that the Opposition received a raw deal from the Government media.

He said the Government was working on a "media policy". Already it had decided to allow small and medium papers to buy imported newsprint up to 300 tons. He urged newspaper owners to devise methods to check hoarding of newsprint because Government interference in this regard might be [words indistinct] an infringement on Press freedom.

COMMUNICATIONS MINISTER INAUGURATES CALCUTTA EXCHANGE

Bombay THE TIMES OF INDIA in English 8 Dec 86 p 9

[Text] CALCUTTA, Dec. 7 (PTI): The Union communication minister, Mr. Arjun Singh, said here today that the Centre was committed to bring about a radical change in the entire telecommunication network in the country in respect of its quality and extend.

Inaugurating the 10,000-lines electronic telephone exchange at the Telephone Bhavan here, Mr. Singh said that the Centre was fully aware of the importance of telecommunication as a basic input for economic and social progress.

Modernisation processes now taking place in the system in Calcutta and elsewhere in the country would be a corner stone in this regard, he said.

The new electronic exchange built at a cost of Rs. 5.58 crore replaced the old 10,000-line "23" exchange at the busy Dalhousie Square here.

Mr. Singh made the inaugural call from the new exchange to the West Bengal chief minister, Mr. Jyoti Basu who was sitting beside him at the dais "It is good that at the first ring I got you," Mr. Basu replied to Mr. Singh.

Mr. Singh said that the telephone system had been affected during the last few years because of various problems. It was more acute in Calcutta due to power shortage, work on the roads by various utility services causing serious damage to the underground cable network and frequent cable thefts, he said.

In his speech, Mr. Jyoti Basu, criticised the "present state of affairs in the telephone systems in Calcutta and West Bengal" and said planners had neglected the telecommunication services, during the first-five year plan,

although some realistic steps had been taken in the 6th and 7th plans.

Stressing on the need for a close monitoring of the working of the entire system, Mr. Basu said that the management would have to review every month the complaints of the customers and redressal measures ought to be taken immediately.

He said that in many cases complaints were received that the postal articles did not reach the addressees on time and inflated bills were submitted to the customers even when their telephones were not working.

The chief minister also took strong exception to the recent hike in Telecom and postal rates and asked "was it absolutely necessary? "I do not believe so".

Mr. Basu said that "we cannot accept the plea that the Centre had been forced to raise an additional Rs. 450 crores annually through such hikes to pay off increased emoluments of the staff.

The chief minister said that in the 7th plan, proposal had been made for the expansion and modernisation of telecommunication. But unfortunately "I find, because of lack of constraints, the programme for expansion had been given up."

Stating that there seemed to be a communication gap between the management and the employees in their functioning, Mr. Basu said that this should be bridged without delay.

Mr. Singh said under a time-bound action plan for modernising the tele-

graph network in the country, we were developing store and forward message switching systems and electronic key boards as terminal devices.

The electromechanical teleprinters in telegraph offices would be replaced by the electronic teleprinters. The objective of modernisation was to deliver 98 per cent of telegrams within a period of 12 hours and 100 per cent within 24 hours.

The Union minister of state for commerce and the WBPCC president, Mr. P. R. Dasmunshi, joined the issue with the chief minister and said that the deterioration in the quality of telephone services and the poor conditions of city roads and hospitals would have to be put in the same bracket.

He, however, agreed with Mr. Basu that better telephone services should be extended to the district industrial growth centres in the interest of the entrepreneurs.

Mr. Arjun Singh, Union communication minister told a Congress-delegation at Calcutta Rajbhavan, today that he would take appropriate remedial measures to bring about improvement in telephone services.

The team comprising the WBPCC general secretary, Mr. Pradip Bhattacharjee, the secretary, Mr. Sudip Bandopadhyay and the youth Congress president, Mr. Prodyut Guha drew the minister's attention to "the unsatisfactory telephone services" and for automation and STD facilities at Berhampore telephone exchange in Murshidabad district, which is the connecting district between north and south Bengal.

/7358

CSO: 5550/0072

COMMUNICATIONS PROBLEMS HURT EXPORT SITUATION

New Delhi PATRIOT in English 10 Dec 86 p 9

[Text]

Calcutta, Dec 9 (PTI)—Some foreign orders to Indian parties in the engineering sector have found their ways to other supplying countries because of communication problems in eastern India, particularly Calcutta, according

to Mr S R Kedia, eastern regional chairman, Engineering Export Promotion Council.

In a press statement, Mr Kedia said the telephone and telex breakdowns in the eastern region and poor service from the public utility had posed a great threat to the export activities of the units in this area.

In view of a number of vital telephone lines and telexes remaining out of order, unattended and unserved for months together, Mr Kedia said, overseas importers were not in a position

to contact them and Indian exporters were being deprived from bagging such orders.

Mr Kedia said "some of the overseas parties, after being frustrated due to communication problem, have established contacts with some other suppliers of other foreign countries. If such a situation continues, it will be difficult for the eastern region to come out of the present stagnated situation in export front", he added.

The chairman also urged the Union Communications ministry to accord top priority to allotment of ne telex and telephone lines to exporters as also wireless facilities between their offices and factories to enable them to bring efficiency and better management control in production for exports.

/7358

CSO: 5550/0076

TELECOM PLAN TO LINK ISLANDS WITH MAINLAND TOLD

Bombay THE TIMES OF INDIA in English 5 Dec 86 p 19

[Text]

The Times of India News Service

NEW DELHI, December 4.

A MAJOR thrust of the telecom expansion programme will be on setting up communication facilities between the islands in the west and east with the mainland.

The parliamentary consultative committee of the communications ministry was today informed of several proposals finalised by the department.

These include induction of a containerised electronic exchange at Port Blair, commissioning of ten new exchanges, an electronic telex exchange at Port Blair and seven satellite earth stations.

More than half of the islands having a population of 2,000 or more, located around seven major islands, will get connected to one another and the mainland.

Port Blair also will be connected to the Calcutta SPC trunk automatic exchange for nationwide subscriber dialling.

For Lakshadweep islands, the proposals include expansion of existing

exchanges at Kavarathi, Androth, Amini, Kalpani and Agatti, provision of new exchanges at Chetlat, Kiltan and Bitra and setting up of four satellite earth stations so as to link a majority of the islands with each other and the main land.

Special attention and priorities have been accorded by the department for speedy development and improvement of communication facilities in remote and backward areas, specially in the North-Eastern region of the country.

A task force under the charge of a general manager has been created to expedite the projects in that region.

The administrative functioning of all the units in the states and Union territories have been strengthened and upgraded. High priority has been accorded for the supply of equipment and it has also been decided to induct modern technology in the network.

During the current year 5,300 lines of switching capacity will be added to the network, which includes commissioning of electronic exchanges at Halfong (Assam), Linglaih (Mizoram) and Itanagar (Arunachal Pradesh).

/7358

CSO: 5550/0071

MICROWAVE LINKS, SATELLITES FOR TELEVISION RELAY

Madras THE HINDU in English 8 Dec 86 p 1

[Text]

NEW DELHI, Dec. 7.

The Madras Doordarshan Kendra is expected to start regular relay of TV programmes using the transmitter now being erected at Kodaikanal, during the current year. About 70 per cent of Tamil Nadu's population will be able to view programmes from Madras once the microwave link between Madurai and Rameswaram is provided and erection of the 10-kw transmitter at Rameswaram completed, before the end of the Seventh Plan.

This was stated by the Union Minister for Information and Broadcasting, Mr. Ajit Panja, in a communication to Mr. V. Gopalaswami, DMK member of the Rajya Sabha. He had, during the current session, raised this matter.

No satellite mode: Mr. Panja, however, expressed his department's inability to use the satellite mode to relay programmes from Madras. "Within the available resources and projected satellite capability (in INSAT-1B) it will not be possible to use the satellite mode of linkage for relay of primary service in several States, including Tamil Nadu," he observed.

Mr. Panja said the TV transmitter at Kodaikanal was energised on reduced power of 1 kW in August, 1984 and commissioned on full rated power of 10 kW in June 1985. Firm demand for providing a TV-bearer microwave link between the Doordarshan Kendra, Madras

and the Kodaikanal transmitter had been placed on the Department of Telecommunications (DOT) way back in 1981. The I and B Ministry had been regularly pursuing the matter with DOT and, as a result, work on the link was now nearing completion. Regular relay was expected to start during 1986-87, after the link was completed and tested.

Links on major routes: Mr. Panja said DOT had established microwave links on major routes in various parts of the country. Dedicated TV-bearer channels along these routes, provided by DOT on Doordarshan's request, were used to relay TV programmes. Taking into account the development of microwave circuits in various parts of the country, the terrain in various States and the availability of satellite transponders, it was decided to adopt the microwave link mode for relay of State-level primary TV service in Punjab, Haryana, U.P., Bihar, West Bengal, Tamil Nadu and Kerala.

On the other hand, it had been decided to use the satellite for relay of primary service in Jammu and Kashmir, Rajasthan, Gujarat, Maharashtra, Karnataka, Andhra Pradesh, Madhya Pradesh and Orissa, because the development of wide-band microwave circuits in these States was relatively poor and dedicated circuits had not been engineered for Doordarshan. Satellite for primary service relay was never envisaged for Tamil Nadu.

/7358

CSO: 5550/0073

ELECTRONICS DEPARTMENT SETS STANDARD FOR COMPUTERS

Calcutta THE TELEGRAPH in English 10 Dec 86 p 8

[Text]

Calcutta, Dec. 9: The Department of Electronics (DoE) has decided to have a standard for computer production and have chosen the eight-memory integrated circuits (IC) as a basic standard, like the 20-inch television sets, according to sources in the DoE.

The production of these eight-memory IC computers will begin in another year or so. For the present the import of these computers are allowed, sources added.

They said that there are numerous advantages to be derived from standard equipment used all over the country. Such standardisation helps in ensuring quality and developing an expertise which will ultimately lead to faster indigenisation, they added.

It was learnt that the decision to have a standard computer was taken after the experience with television sets. Initially when a decision was taken to produce TV sets here opinion in the department varied widely and a section of experts felt that it would be wise to have a standard 20-inch screen set rather than a mix of various screen sizes as is prevalent in the developed countries.

The advantages of having the 20-inch screen is now quite obvious, specially in the black and

white TV manufacture, where the tools have been standardised and the country has developed the necessary expertise to cut down on import of B&W components to a bare minimum.

It was also learnt that the DoE is now keen to indigenise up to 90 per cent of colour television manufacture. In the next couple of years a total investment of Rs 1000 crores will be made by six private sector companies, four of which will be manufacturing CTV picture tubes and two firms will be engaged in the manufacture of glass shells which is a vital component in the tube and is still imported.

The DoE has also fixed an investment target of Rs 300 crores in the electronic component sector for 1987-88. The investment in the current year is likely to be about Rs 250 crores. The Seventh Plan has a target of Rs 2,100 crores worth of investment in the component sector.

The overall Seventh Plan electronics equipment production target is set at Rs 10,000 crores

Sources in the industry said that it will be difficult for the industry to achieve the targeted production as a major consumer the telecommunication department has cutback on its orders due to a reduced budgetary allocation for it. As a result the demand for electronic communication has been sharply cut.

/7358

CSO: 5550/0075

FIRST INDIGENOUS ELECTRONIC TELEPRINTER PLANNED

New Delhi PATRIOT in English 10 Dec 86 p 9

[Text]

Bombay, Dec 9 (PTI)—The Hindustan Teleprinters Limited (HTL), a public sector undertaking, is poised to usher in the 'information era' in the 21st century with the production of the country's first indigenous electric typewriter and the electronic teleprinter.

Set up in 1960 at Madras as a single product agency to manufacture teleprinters, the HTL has adopted a new corporate mission to branch off into other industry areas of new and high technology, its chairman and managing director, Mr R P Subramanian told newsmen here last night.

As part of its modernisation and expansion programme, HTL in collaboration with Sagem of France will be introducing the first discriptural electronic teleprinter, with Roman and Devanagiri scripts, Mr Subramanian said.

Mr Subramanian said the HTL will be phasing out its production of electro-mechanical teleprinters since the Department of Telecommunications would be going in for electronic teleprinters for its public network.

Initial assembly with imported kits in semi-knocked down condition of electronic teleprinters was started in March last and about 3,000 have been scheduled for delivery for deliver during the current financial year.

In order to meet the requirements of the official language policy, the company has developed along with its collaborators and the telecommunication research centre of the department of Telecommunications, a bilingual model—English and Tamil — of the electronic teleprinter.

A special team is now working on the calligraphy, Mr Subramanian said, and added that 20 such models are on field trial and by the first quarter of next year 500 bilingual models will be manufactured.

The new electric typewriter 'editor 920', being made to the design of the collaborators — Olivetti of Italy, will also enter the market shortly, Mr Subramanian said.

To begin with it would be available in four regional languages Hindi, Tamil, Kannada, Marathi and English. The cost is Rs 8,000 plus taxes.

The high cost of import of SKD/CKD kits necessitated the company to embark on a major programme of indigenously man-

ufacturing the parts, which has since been achieved, Mr Subramanian said.

In the seventh Plan, the company has envisaged investments of Rs 24 crore for expansion and modernisation. Of this, Rs 12 crore will be spent for the existing projects of electronic teleprinters, electric typewriters, etc and the balance will be used as a capital base for a Rs 50 crore investment. 'The company may even float joint sector projects in high technology areas' he added.

/7358

CSO: 5550/0076

BRIEFS

SATELLITE LAUNCH DELAY--Paris, Dec. 7 (UNI)--The launching of Insat-1C, the Indian telecom and television satellite to be put into geostationary orbit by an Ariane rocket, is likely to be further delayed because of the unresolved engine problems in the rocket system. A spokesman of Arianespace, the European consortium that launches the Ariane rockets, told UNI that the satellite could not be put into space before mid-1988 as the ignition system of the rocket engine has to be redesigned to rectify the defects that failed its last launch on May 30. Even when the launches are resumed, Arianespace will have to clear a backlog of launch orders from other countries. The contract for launching of the Insat-1C was signed with Indian Space Research Organisation last July following suspension of the United States space shuttles, one of which was to carry it into space. [Text] [Calcutta THE TELEGRAPH in English 8 Dec 86 p 5] /7358

INDO-BANGLADESH PACT--Dhaka, Dec. 5--India and Bangladesh have agreed to improve communication facilities between the two countries including introduction of direct dialing for telephone and telex and direct linking of Dhaka and New Delhi by air. The agreement came at the end of the two-day meeting of the standing committee of the Indo-Bangladesh joint economic commission here on Tuesday, a press release said. Both sides, noting the existing trade imbalance, agreed to step up efforts for achieving stable and balanced growth of trade. There was broad interest expressed by both countries to have long-term arrangements for commodities like newsprint and refractories. Bangladesh will hold an investors' forum in January and Dhaka informed New Delhi that Indian investors were most welcome to participate in it. Bangladesh has also identified certain projects for joint collaboration with India. [Text] [Calcutta THE TELEGRAPH in English 6 Dec 86 p 5] /7358

CSO: 5550/0078

ARABIC-LANGUAGE RADIO PROGRAMS USED FOR PROPAGANDA

London AL-MAJALLAH in Arabic 22 Oct 86 p 61

[Article by Dr 'Ali Nuri Zadeh: "Iran's Arabic-Language Radio: Propaganda for Khomeyni"]

[Text] "This is the Iranian Radio Station from Tehran."

"This is Ahvaz Radio from Iran."

"This is Bandar Abbas Radio from Iran."

These names have not been strange to the Arab world listener for 33 years, i.e., since Iranian Prime Minister Dr Mohammad Mosaddeq, who led the movement to nationalize the Iranian oil industry, instructed Dr Bashir Farhamand, the then director of the Information Department to allocate 1 hour of the Iranian radio programs for broadcasting Iran's news in Arabic. Two weeks after the meeting, Tehran Radio announced that it would be broadcasting a nightly 30-minute program in Arabic to review Iranian events to the Arab brothers. It is worth noting that in the short period Dr Mosaddeq allowed Dr Farhamand to begin broadcasting in Arabic, the latter was not able to conclude a contract with a professional Arab announcer and could find nobody other than a Kurd who spoke Arabic well, but with a Kurdish accent, to present his Arabic program. This Kurd was the official in charge of the Iranian radio's Kurdish programs and the man who presented those programs. When Radio Tehran began its Arabic-language programs, a large number of Arab listeners sent letters inquiring about the nationality of the announcer who spoke Arabic well, but with an accent unfamiliar to the Arab listener.

Shortly after that day at the end of 1952 when Tehran's Arabic voice reached the Arab listener, Tehran's Arabic-language radio became one of the radios heard in the Arab world. The success of Tehran's Arabic-language radio is attributed to two reasons: First, this radio's strong opposition to the pan-Arab movement led by the late President Jamal 'Abd-al-Nasir, especially this radio's appeal to the faction hostile to 'Abd-al-Nasir. Tehran Radio did not fear Ahmad Sa'id, Voice of the Arabs, or even the "masses' wrath."

Second, the fact that a large number of professional Arab male and female announcers from Egypt, Jordan, Lebanon, Syria, and Iraq joined the Arabic section of the Iranian radio.

It is essential to point out the role played by Nadhir Fansuh, a well-known Syrian journalist who took refuge in Iran in the wake of the Syrian-Egyptian unity, in encouraging Arab writers and journalists to help the young Tehran Arabic-language radio with their articles, reports, and commentaries. Since the early 1960's, Tehran's Arabic-language radio has increased the duration of its Arabic-language programs from 2 hours to 4 hours daily, adding to them another Arabic voice from Ahvaz, the capital of Khuzestan Province. This second radio, i.e., Ahvaz Radio, soon turned into a "successful station" which some people have called the "second Radio Monte Carlo." This success has been attributed to a broadcaster from the first radio, namely, a Lebanese from a Haddad family.

In the early 1970's, Iran set up its third Arabic-language radio in Bandar Abbas, at the Gulf entrance, to cover the neighboring Arab Gulf states and the Sea of Oman. After setting up its 1,000-kilowatt strong station in Qasr-e Shirin on the Iranian-Iraqi borders in 1972, Iran used this station to strengthen its Arabic-language programs, increasing the transmission to 12 hours daily. Mahmoud Ja'faryan, the deputy director of the Iranian Radio and Television, personally supervised the Iranian radio's Arabic-language programs. Because of his strong love and admiration for the Arab culture, considering that he was born in Karbala', Ja'faryan allocated a large budget for the Arabic section of the Iranian radio. It is to be noted that Ja'faryan, who was executed by Khomeyni in the wake of the revolution, is the man who instructed all the Iranian Arabic-language programs to broadcast the military communiques issued by Egypt and Syria during the October 1973 war. The Iranian Arabic-language radio was the only radio station outside the Arab world to completely disregard the Israeli communiques and claims in the October war.

As in the case of the Arab broadcasts, the Arabic section of the Iranian radio devoted great attention to Arabic music. Its programs never lacked a variety of Arabic songs and songs requested by Arab listeners. Every Thursday night, the radio broadcast from Tehran, Bandar Abbas, and Ahvaz song concerts by Umm Kalthum, 'Abd-al-Halim Hafiz, Wardah al-Jaza'irriyah, Farid al-Atrash, and Fayruz. When Khomeyni assumed power, the number of hours allocated by the Iranian radio to broadcast Arabic-language programs rose to 96 hours weekly. The Iranian radio has turned from an instrument of entertainment used by the pre-revolution regime to serve its purposes into a propaganda agency whose objective is to brainwash the listeners inside Iran and to export the so-called Khomeynism to the outside world. It is necessary to acknowledge that there is no regime in the world as interested in propaganda as the ruling regime in Iran. As the regime officials have repeatedly declared, the Arab and Islamic worlds are the main target of the propaganda machine, the regime uses to exports its revolution. The revolutionary regime's interest in the Arabic-language programs is stronger than its predecessor's interest, especially in the wake of the eruption of the Iraq-Iran war. The Iranian radio's Arabic-language section has increased its broadcasting hours from Tehran, Bandar Abbas, and Ahvaz to 22 hours daily and the regime has employed four strong stations in Qasr-e Shirin, Hamadan, Dezful and Qashm Island to serve its Arabic-language programs and to launch its propaganda campaigns against the Arab and Islamic regimes.

In contrast with Dr Bashir Farhamand, who could not get a professional Arab announcer, Khomeyni has not needed such an announcer because the imam has hundreds of Arab radicals whom he has mobilized against their countries. At present, the Iranian radio's Arabic-language section is supervised symbolically by a committee headed by Dr Mohammad Ali Hadi, the deputy chief of the Islamic Consultative Council's Defense Committee. But this committee's actual chairman is Dr Mohammad Hashemi, the son of Mahmoud Hashemi who is the official spokesman of the Higher Council of the so-called Islamic Revolution in Iraq [sic].

A number of Arab journalists and writers, such as Egyptian writer Safinaz Kazim, Palestinian researcher Munir Shafiq, and scholar Hani Fahs, cooperate with the Arabic section.

8494/6662

CSO: 5500/4706

CHAH BAHAR TERMINAL TO BECOME OPERATIONAL BY YEAR'S END

Tehran KEYHAN in Persian 19 Oct 86 p 3

[Text] Zahedan—KEYHAN Correspondent—Construction operations for the great Chah Bahar government terminal at Port Martyr Beheshti, with an area of 300,000 square meters, will be completed by the end of the current year [20 March 1987] and the terminal will be put to use.

An official from the Martyr Beheshti Chah Bahar Terminal Transportation Coordination Committee gave a talk in which he made the above announcement. He said: This terminal can accommodate 300 trucks per day, and its construction will cost 250 million tomans.

He added: This terminal includes a complete restaurant, an ice plant, a bed service, an administrative building, and a small market.

He discussed the shipment of goods out of the terminal. He said: Last year 440,000 tons of merchandise, including wheat, barley, corn, rice, manure, sugar and other goods of various kinds were shipped from the Martyr Beheshti Chah Bahar Terminal to the provinces of Khorasan, Sistan va Baluchestan and the country's other provinces by 24,623 trucks.

Noting that the Ministry of Transportation currently has 150 to 200 freight trucks based at the Martyr Beheshti Chah Bahar Terminal, he added: To make it easier for drivers to obtain parts, representatives of gasoline truck drivers are now active at this port and are making truck parts available at government prices, and representatives from Velo and Nayz will soon be assigned here.

The official from the Martyr Beheshti Chah Bahar Terminal Transportation Coordination Committee discussed the fact that in the vicinity of the terminal an authorized repair facility is to be installed. He said: In order to raise the quality of work and alleviate the problem of the shortage of native workers in the area, steps will soon be taken to form an Islamic cooperative for dock workers, so that in addition to increasing efficiency, work opportunities will be created for indigenous people.

In conclusion, he noted that one of the factors for attracting truckers to this area is reducing the problems with loading and unloading and providing and providing facilities. He added: There are three ships loaded with basic goods docked at this port, and truckers may report to this port to haul goods from the Martyr Beheshti Chah Bahar Terminal.

9310

CSO: 4640/0049

IRAN

BRIEFS

AIRBASE TELEPHONE HEADQUARTERS INAUGURATED - Zahedan - **KEYHAN**
Correspondent - The 2,000-number airbase telephone system of Chah Bahar was inaugurated Thursday in the presence of the Minister of Post, Telegraph, and Telephone, the Air Force Commander, and the supervisor of the Airforce Political and Ideological Organization. Engineer Gharazi, Minister of Post, Telegraph, and Telephone, after inspecting this system, attended a gathering of Chah Bahar Airbase personnel and gave a talk praising the efforts of the airbase personnel in moving the Air Force in the direction of self-sufficiency. In an interview with our correspondent, he said: In my relatively long background in industrial centers, I have seen that wherever foreign personnel have been in charge of projects in this country which were not completed because of the Islamic revolution, they have had hopes of returning and completing the projects. For example, I have heard that the Americans, who were in charge of the project to start this same 2,000-number telephone system at Chah Bahar Airbase, told some of our brothers at the World Court at The Hague to use Egyptian and Nigerian specialists to launch and maintain this system. Our brothers have now shown such creativity that they have no need of any kind of foreign advisors for such affairs. Noting the expansion of the cable communications network in the country, especially in the deprived areas, Engineer Gharazi said: Since the Chah Bahar area is one of the country's deprived areas, and since it is also a sensitive strategic area, we hope that by installing cable facilities and adding to the inter-city telephone circuits, the communication problems for airbase personnel and the people of this area will be solved in the near future. [Text] [Tehran KEYHAN in Persian 4 Oct 86 p 3] 9310

CSO: 4640/47

IVORY COAST

FRENCH AID FOR TV, RADIO TRANSMITTING CENTER

AB101944 Abidjan FRATERNITE MATIN in French 11, 12 Jan 87

[Excerpts] A ceremony for the signing of financing conventions was held at the Ministry of Economy and Finance on 8 January. Under the conventions, Ivory Coast will acquire a transmitting center that will provide television and radio to the northeastern part of the country. Thanks to this center, which will be built in Dabakala at the cost of slightly over 1.5 billion CFA francs, northeastern Ivory Coast will henceforth be in audiovisual contact with the rest of the country.

The contracts relating to the implementation of the project and the financing conventions include a purchasing loan of 816.5 million CFA francs granted by Parisbas which is aimed at purchasing the equipment, a loan of 464.671 million CFA francs granted by PARISBAS-CI (branch of the former) to finance the installation, and another loan of 250 million CFA francs by PARISBAS-CI to finance the civil engineering to be carried out by an Ivorian enterprise.

The signatories are, on the one hand, Leon Naka, director of the Autonomous Sinking Fund, and PARISBAS-PARIS for the financing, and on the other, Laurent Dona Fologo, minister of information, culture, youth, and sports, and Thomson Group (as well as two other French companies) for the implementation of the project.

Speaking on this occasion, Abdoulaye Kone, the minister of finance and economy stated: "The implementation of this transmitting center in northeastern Ivory Coast--which is one of the last parts of the national territory to be covered by the National Television and Radio--has been made possible thanks to the decisive action of the president of the Republic, His Excellency Felix Houphouet-Boigny."

/7358

CSO: 5500/34

FRENCH COMPANY TURNS OVER TELECOMMUNICATIONS OPERATION

Monrovia NEW LIBERIAN in English 31 Dec 86 p 3

[Text]

The French Cable, a company operating telecommunications facilities in the country, has turned over its facilities to the Liberian Government.

Turning over the company's assets to the Director-General of the General Services Agency (GSA) Tuesday, the General Manager of the company, Mr. Rene Pouech, said the closure of the company was a result of the present global financial crisis and the introduction of new telecommunications technology.

According to a release from the GSA, Mr. Pouech said the turning over proceedings were in consonance with section 12

of the resolution granting the company the right to operate in the country, which states that whenever the "company shall cease operation, all lands which shall have been granted them shall revert to the Government of Liberia with their improvements, free of any cost or charge whatsoever."

Receiving the keys to the French Cable building, Director-General Momolu thanked Mr. Pouech for his company's tenure of

service in the country, and for duly honoring the resolution of March 1910.

The company which ceased operation in early November, operated telecommunications facilities comprising transmitting and receiving stations along with a central radio office and auxiliary equipment necessary to establish and maintain international telephone connections and telex service.

/9274

CSO: 5500/35

BRIEFS

SATELLITE TO BE TESTED--The next satellite picture you could see on these pages may show much more: buses, streets, flats, houses, driveways and even builders' huts. The new razor-sharp imaging technology will be tested over South Africa next year by the French Spot satellite which measures objects 10m across, against 80m for Landsat 5, and 1000m across for the weather satellite which can "see" only one object in the whole of South Africa, the white beach off Coega near Port Elizabeth. Spot, launched this year, will be partly operated by South African scientists at the National Physical Research Laboratory of the CSIR, and will transmit half a million spot images a year observed through its two telescopes and 6000 photodiodes. It looks like a giant bird with its 12m solar panel wingspan. Its superior remote sensing wizardry will be able to distinguish various crops on Earth, even if they are drought-stricken. This year Spot has been looking at sick forests in Sweden, measuring their ages, but in South Africa it will be used for crop mapping, measuring soil suitability, Antarctic mapmaking and measuring plankton along the west coast. [By Jaap Boekkooi] [Excerpt] [Johannesburg THE STAR (METRO) in English 10 Dec 86 p 1] /7358

CSO: 5500/33

GOVERNMENT FUNDS FOR U.S., FRG FIRMS IN BIDS FOR FRANCE'S CGCT

Frankfurt FRANKFURTER RUNDSCHAU in German 6 Dec 86 p 5

[Article by Peter Ziller: "Telecommunications Giants Fight for a Midget: Bonn and Washington Join In: Sale of the Telephone Firm CGCT Puts Paris in a Tight Spot--Siemens and AT & T Secure Backing Through Their National Governments"; first paragraph is FRANKFURTER RUNDSCHAU introduction]

[Text] A new trade conflict is brewing between Bonn and Washington. This time, in the view of the United States, the trouble is being caused not by large German exports of machine tools or by an excessively meager appetite of Europeans for Californian citrus fruit. On the contrary, the dynamite is in a relatively small, unprofitable and technologically unimportant enterprise in France. A few months ago, the government in Paris announced that it would welcome buyers for CGCT, the nationalized producer of telecommunications equipment. There is no shortage of interested parties, for the takeover of this firm would permit access to the French market. The U.S. telecommunications giant AT & T, which has so far had a very hard time with its desired expansion in Europe, is therefore one of the bidders, as is the Siemens concern from the FRG. Both firms secured the support of their governments. In appealing to the French prime minister, Federal Chancellor Helmut Kohl strongly stressed a European solution. Washington presented clear threats in regard to this interference by Bonn. Siemens was even given to understand that its U.S. subsidiary could face problems if AT&T is unsuccessful in France. No one is bothered by the fact that Paris is now willing to concede a foreign participant only a 20 percent share. In France, it is important to get a foot in the door, because in the displacement competition in the research-intensive market, one can survive only by obtaining orders worldwide.

The Compagnie Generale des Constructions Telephoniques (CGCT) is truly not a thing of beauty. Not even a drastic diet that allowed not only losses but also a smaller business volume could change anything here. Nevertheless, the telephone building firm with the tongue-twisting name is inducing illustrious top managers from the entire world to visit Paris. Ministry of Industry Alain Madelin has had a steady stream of suitors since the French Government signaled that the maiden, nationalized just a few years ago, is available. Above all Siemens chief Karlheinz Kaste and representatives of the American telephone giant AT&T emphatically announced their interest.

Meanwhile, to show how serious they are, company managers have even involved the governments of their countries. Thus, when French Prime Minister Jacques Chirac visited Frankfurt a few weeks ago, Federal Chancellor Helmut Kohl made it clear to him how much he would welcome a European arrangement; in so doing, however, he very much annoyed another friend on the other side of the Atlantic. Ronald Reagan's commerce secretary also let Bonn's ambassador in Washington know that a rejection of AT&T in Europe could have bad results.

Pressured in this manner, even the father of the bride became uneasy overnight. In the last minute, so to speak, it occurred to responsible officials in Paris that, because of the bill for the privatization of their state property, they could turn over at most only 20 percent of the firm's capital to foreign hands. In the view of observers, however, the inspiration for such considerations is not so much a reawakened xenophobia as the fear of conflicts and the search for a way out of a diplomatic dilemma. Nevertheless, the competitors have by no means given up: It is understood that even a 20 percent participation is attractive for Siemens if such an alliance can be secured through certain constructions.

With its 2,100 employees, the state-owned firm achieved sales of a half billion DM. That is actually not much: all told, the worldwide sales of Siemens and AT&T amount to 100 to 150 times as much, respectively. This year, just as in 1985, CGCT could well end up with a loss of some Fr200 million (DM65 million). The only consolation is that the financial deficit had previously been as much as Fr1 billion.

The two multinational firms are no more frightened by this than are the electrical firms of Ericsson, Italtel or Plessey. CGCT is attractive for Swedes, Italians and the British as well. After all, it has what they do not have, namely a 16 percent share in the otherwise completely protected French market for telecommunications installations. "We would certainly like to have a part in that," says a Siemens manager. "There are fewer and fewer brides who are still available."

That is probably true. After the recent past, when the cooperation and merger fever in this branch spread as never before, there is an increasing shortage of candidates for takeover. Even worse is the fact that the national markets are generally controlled by syndicates or monopolists:

--NED/Fujitsu/Hitachi/OKI cover 100 percent of Japanese requirements.

--In Sweden, Ericsson and Televerket likewise have complete control over the scene.

--Alcatel-Thomson serves 84 percent of the needs of the French postal service.

--The same thing is true for the U.S. multinational firm ITT in Belgium.

--Philips (how could it be otherwise, secured three-fourths of the pie in the Netherlands.

--The British duo Plessey/GEC (General Electric Company) has about the same margin on the island.

--In Italy, Italtel and partners claim two-thirds of the orders for themselves.

--Four manufacturers share the German scene for public orders.

With an estimated 45 percent, Siemens takes the largest piece of the pie. Standard Elektrik Lorenz (SEL) in Stuttgart, the German subsidiary of the U.S. multinational firm ITT, claims about 30 percent. At a separate table sit the Frankfurt subsidiary of the Bosch group Telenorma (TN) and the Berlin firm DeTeWe, with the remaining 25 percent. A glance at the budget of the Federal Ministry for Post and Telecommunications shows that it is certainly worthwhile to take part. The house of Schwarz-Schilling is investing a good DM2.8 billion in the highly contested market segment of relaying technology; transmission technology gets 1.5 billion, and cabling consumes another 2.8 billion.

Siemens, however, finds insufficient consolation in its large participation in the domestic market. Worldwide sales of digital switching systems bring in not quite DM4 billion annually. Meanwhile, there are outstanding orders from more than two dozen countries. But what is a huge commitment for Argentina or Colombia is rather minor on a world scale. In the Third World, only the growth rates are important and not the numbers of units. In terms of the global market, the share comes to 8 to 9 percent, which does, to be sure, put Siemens in third place but is considered too little by the Munich firm. "More than 10 percent is needed to survive," says a director in the communications and security technology business group who is responsible for the talks with the French.

The competition sees it the same way and acts accordingly. "I share the opinion that only a few financially strong groups will survive," declared the Frenchman Pierre Suard in a recent interview. The chairman of the board of the state holding company Compagnie Generale d'Electricite (CGE) knows what he is talking about; after all, he is currently in the process of putting together the second-largest telephone technology company in the world. "The man who is to leave Siemens behind," according to INDUSTRIEMAGAZIN, must in the coming months form a viable joint enterprise from more than two dozen subsidiary companies of the U.S. multinational firm ITT in Europe, the United States, the Far East and Australia as well as the CGE subsidiary Alcatel-Thomson. This joint venture with group sales of about \$12 billion and 150,000 employees could certainly stack up well against the giant AT&T (with a world market share of over one-fourth). It is no question, then, thinks Suard, that the CGT/ITT scion, which journalists have named Eurotel, will enjoy a long life. Only a firm with market shares can meet the tremendous development costs. So Siemens and SEL may well have invested over DM1 billion, respectively, in basic research for their EWDS or System 12 switching systems. Those are expenditures that pay for themselves only with the corresponding deliveries of sizeable follow-on units.

The fact that financial problems could make ITT want to get rid of its communications firms was just fine with the French, who heretofore have had to live primarily from orders from Paris. Cooperation with ITT opens up markets that were previously foreign to them, including German markets through which the ITT subsidiary SEL is also successfully selling its digital switching systems of the System 12 type to the postal service.

It is no wonder that Siemens is taking matters up at precisely this point. If the French CGE is getting indirect access to the postal budget, ask the people in Munich, then why can we not acquire some orders to the west of the Rhine through the CGCT?

To be sure, the competitors from AT&T have similar free-trade arguments to offer. The Americans stress in particular that foreigners have an equal right--at least on paper--to present offers in their liberalized private telecommunications market. They presented the following deal to Paris: Give us CGCT and we will help introduce the Alcatel-Thomson product "E 10," one of the first high-tech switching systems, in the United States. And that is not so easy. Indeed, tremendous hurdles must be overcome before the first dollar can be pocketed in Reagan's deregulated America.

The Bell Corporation Companies (still closely associated with AT&T) have established "norms" that go far beyond even the not exactly minimal requirements of the Federal Post Office. It will cost Siemens \$200 million to \$300 million to adapt its EWSD "machines" to the U.S. standard. But the corresponding expenditures alone do not by any means guarantee success. Precisely the U.S. multinational company ITT has recently failed in the American market with its System 12 formulated for its European subsidiaries. That is an unprecedented handicap. There are 600 telephone connections worldwide, about one-third of which are in the United States alone.

Correspondingly, Siemens is celebrating the breakthrough in this "tremendous market." The marketing managers had driven their EWDS system installed on a semitrailer truck up to the front door of Bell Companies so that "they themselves can test its technical advantages." Things have worked out so far. In the meantime, two of the seven regional holding companies have accepted the Germans as a third company permitted to bid after AT & T and the Canadian firm Northern Telecom. A first "computer" linking 10,000 connections is going on the network at Southern Bell next year. America is again attractive as the land of unlimited opportunities: "With a 10 percent market share in the United States," an expert reasons, "Siemens could double its current production."

Some things are indeed possible in Ronald Reagan's land afflicted with immense deficits in foreign trade, including the fact that matters might work out quite differently from what was planned. In Washington, there is, for example, a certain Mark Fowler, head of the supervising authority Federal Communications Commission (FCC) responsible for telecommunications. After he had asked the Bell Companies about their business "connections" with Siemens a few weeks ago, according to newspaper reports, he announced a directive for the end of the year that would allow him to exclude foreign companies from U.S. contracts in the interest of the "national security" and "free and fair

trade." It is expected that this year the United States will spend \$150 billion more for goods from other countries than it will take in through imports. What does it matter that Fowler is probably greatly exceeding his competence with his action? Lately, after the recent election successes of the Democrats, a cold wind of protectionism has been blowing through the U.S. Congress more sharply than ever before. What is especially vexing in Washington is the tactful manner in which Federal Chancellor Helmut Kohl supposedly indicated to Prime Minister Chirac that SEL, or ITT, or CGE/Alcatel could lose postal contracts if Siemens is not successful with CGCT.

In the Federal Ministry for Economics in Bonn, they have no knowledge of such clumsy-courageous support for decisions. They have "understanding" for the interest of Siemens but "have not yet taken action," says Bangemann's speaker Dietrich Vogel, who likewise knows that the Americans have recently been actively threatening "all sorts of things."

Siemens also considers itself unjustly attacked. "A government is fighting against its trade deficit, but in this case it is affecting the wrong party." In Munich, they cite a study by the Central Association of the Electrical Industry (ZVEI), according to which the United States exports DM260 million more in communications goods than it imports. The U.S. Siemens subsidiary is also a net exporter of these products.

In any case, a conflict with Washington would necessarily have an unpleasant effect on the electrical concern. After all, the enterprise now has \$2.2 million (just under DM4.5 million) in annual sales in the United States. There are 22,000 employees on the wage and salary lists. One-third of these earn their bread rolls with products of the telecommunications technology that Fowler is so distrustful of. The fact that in the meantime 1,200 scientists and engineers are working on the other side of the big pond is not least a result of the further development of the EWDS in accordance with U.S. requirements.

What remains to be done in the stormy transatlantic trade climate over the North Atlantic? The answer from Siemens: "We must offer the best technical solution."

9746

CSO: 5500/2444

EEC BEGINS SMALL-SCALE ISDN PROJECT: INSIS

Luxembourg ECHO NEWS in English No 4, 1986 pp 3, 4

[Text] Europe needs modern, integrated, high-speed information services if it is to maintain its international competitiveness. Unless the introduction, development and connection of information systems are coordinated, Europe will find itself with an electronic Tower of Babel.

That is why the Community is promoting the joint development of European integrated services networks that will point the way to the future. It was decided that one of the best ways to start is by tackling the complex information requirements of the EC institutions and administrations themselves. A programme to link up the Community institutions and governments is now being prepared and should be operational by 1990. This is INSIS: the Inter-Institutional Integrated Services Information System.

The aim of INSIS is to create rapidly the necessary environment for the harmonisation of new information services, setting a wider example by tackling the needs of a particular, representative, user community. In the short term, INSIS is a development programme for new IT applications and for new communication services. In the long term, it will be a communications system making optimal use of new information technology. INSIS currently consists of a number of pilot projects aimed at addressing priority requirements, validating various technical options - particularly as regards standardisation - and working out the economic aspects of future operational systems.

A few of the current INSIS projects have been outlined below:

1. INSEM (Inter-Institutional Electronic Mail System)

The Community Institutions exchange a vast amount of paper and the costs of printing, duplication, distribution, etc are considerable. Within the framework of the INSIS programme, the Inter-Institutional Electronic Mail System - INSEM - is designed to deal with the exchange of written office material, notably documents and mail.

The main aims of INSEM are to develop new services which can help to reduce the amount of Community documentation printed, to reduce costs, and especially to reduce the amount of time for a document to be delivered.

With the aim of achieving results at an early stage, INSEM has been limited from the start to users within the Community Institutions. One of the present INSEM challenges is to provide the technical environment which will allow both the interconnection of existing electronic mail systems and further interconnection when new systems are developed and implemented.

2. OVIDE (Organisation du Videotex pour les Deputes)

OVIDE, the INSIS experimental videotex system, will not only aim to improve the working conditions of Members of the European Parliament, but will also contribute to the Community-wide interconnection of videotex networks.

The aim of the OVIDE project is to allow any individual MEP (either in Strasbourg/Brussels/Luxembourg, or in their home constituency) to have access to information stored in central databases. This information would mainly concern the day-to-day work of the European Parliament, the preparation of meetings, the press service etc.

Via OVIDE, Parliamentarians will be able to access statistical and documentary databases and will also have the opportunity of sending short messages directly from their terminal keyboards via the electronic messaging system.

3. Videoconferencing

In 1982, in the framework of the INSIS programme, it appeared that rapid development of videoconference technology, plus early availability of broadband telecommunication structure, could provide the best means for improving the technical and infrastructural organisation of conferences, community meetings and working meetings between the Community Institutions based in Brussels and Luxembourg.

The development of electronic systems combining technical and infrastructural facilities for holding conferences etc without requiring participants to spend so much time away from their normal working place could drastically improve the management of the European Community Institutions as a whole.

The studies initiated by the European Institutions in the field of videoconferencing are expected to pave the way and stimulate developments towards videoconference services open to a larger user population and adapted to a broader geographical coverage.

Conclusion

The progressive establishment of the systems outlined above will have far-reaching effects. To make them work, users and manufacturers will have to implement international standards. This will be a major step towards creating the homogenous electronic infrastructure to meet the requirements and needs of the European Community.

CSO: 3698/A013

ITALCOM IN YUGOSLAVIA

Milan AUTOMAZIONE E STRUMENTAZIONE in Italian May 86 pp 99-100

[Text] The forming of Ei Digital under the joint venture between, on the one hand, Italcom, the majority shareholder in Italtel (Iri-Stet Group), in which GTE and Telettra are also shareholders, and, on the other hand, Elektronska Industrija Nis, one of the principal Yugoslav industrial groups in the electronics sector, has been officially announced. Ei Digital will produce and commercialize in Yugoslavia the exchanges of the Italian national digital-switched public telecommunications system.

The agreement, which stipulates terms, conditions and developmental timetable of the new firm, was signed by Marisa Bellisario, managing director of Italtel; Sergio Treves, president and managing of GTE Telecomunicazioni; and Ljubisa Igic, president of the Elektronska Industrija group.

The system, based on a distributed control architecture, considered today to be among the most innovative, is in service in Italy with more than 150 exchanges and is predesigned to evolve towards the ISDN [Integrated Services Digital Network].

Italcom, with a 35-percent share of the joint venture, will furnish the licenses and production facilities for the manufacture of the exchanges; Elektronska Industrija will provide the necessary infrastructures and local facilities and the working capital for the startup of the firm. The research needed to adapt the communications systems to the Yugoslav market will be done jointly by Italcom and Elektronska Industrija. Investments totaling around \$12 million are planned for the production, in Yugoslavia, of the Italian digital switching system.

The Yugoslav market is of particular interest to the Italian telecommunications industry, given the close relations between the two countries. By the end of the 1986-1990 five-year period, Ei Digital is expected to be in a position to acquire 40 percent of the public digital switching sector in Yugoslavia (a share equivalent to an average annual volume of 100,000 lines).

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9399

CSO: 3698/89

BRIEFS

RACE'S SECOND PHASE--Brussels--The EEC still plans to allocate another 1.8 billion guilders for R&D on broadband technology in the second phase of the RACE project. But first a problem involving the FRG must be resolved. Director-General M. Carpentier recently outlined the German problem as follows: "They think they already have a lead over other European countries. However, I am convinced that looking ahead 8 or 10 years, almost everyone thinks he can be the best." Yet, this is not the goal of the proposed project. Indeed, Carpentier envisages basic research which may not result in a range of highly advanced broadband network services before the year 2030. The top EEC official expects RACE (R&D in Advanced Communication) to go beyond merely developing telecommunications standards. He therefore wants to expand the scope of research. The Germans have not yet considered anything beyond the standards themselves, because they can pave the way to a vast, single European market, thus expanding potential demand for the German telecommunications industry. However, it is now believed in Brussels that a solution for the German problem is forthcoming. [Excerpt] [Amsterdam COMPUTABLE in Dutch 31 Oct 86 p 9] 25048/12859

CSO: 5500/A005

FIRMS SHOW PRODUCTS FROM ESPRIT WIDEBAND NETWORK PROJECT

Munich COMPUTERWOCHE in German 14 Nov 86 p 20

[Unattributed article: "Gateways and Controller for Backbone Wideband Network: Esprit Project Closes Network Circuits"]

[Text] Liege--The companies which participate in the Esprit Project 73--Stollmann, ACEC, Bell Telephone, SG2, France Cables & Radio, as well as the University of Liege--have taken stock. New communications software and hardware for the construction of the planned Backbone Wideband Network (BWN) was presented.

The core of the new communications system is said to be a broad-band fiberglass network which serves as a backbone for a total of 25 heterogeneous LANs. BWN supports a baud rate of 140 Mbits per second and is connected to the various local networks by gateways where the three LAN structures Ethernet, Token Passing Bus and Token Passing Ring can be used. At the same time, bridges to public data buses or services and satellite links are planned. The duplex connectors work with an access time of 2 Mbit per second. According to the firms involved the new network will meet the requirements of industrial, scientific and administrative organizations. Project 73 started in 1984 and will result in a pilot installation on the campus of the University of Liege towards the end of next year. A network length of 25 km is planned.

A total of DM25 million is available for the Esprit project, 50 percent of which is made available by the European Communities and 50 percent by the firms listed. At present, it has not yet been determined whether and how the products developed for the project will be marketed. In this connection, Axel Wegner, a Stollmann systems designer and chief of the Esprit partial project at Stollmann comments: "We are not yet approaching the market itself". Rather, it would be interesting to see how a joint European development project would result in a European product.

At the press conference held in Liege, the Belgian firm ACEC (Atelier du Construction Electric des Charleroi) showed a prototype access controller for the Backbone Wideband Network. This equipment fits the MAC-architecture (MAC: Medium Access Control) of the BWN which is intended to optimize the network throughput, among other things.

The Hamburg firm Stollmann GmbH produced the first version /line missing/ BTM (Bell Telephone Manufacturing) from Antwerp demonstrated interfaces for connection to public services. For the time being, such an interface is a digital link with a baud rate of 2 MBit per second, for which BTM also developed a layer-2 protocol to avoid performance bit errors.

The Belgium company also showed a video conferencing facility. This is supposed to make it possible to translate analog video and audio signals into digital data with 2 MBits per second and to transfer them to the BWN. Furthermore, BTM showed an electronic mail connection in the form of a gateway for the public telex service, a BWN/CC-Controller (CC: Communications Controller) and a throughput tester for the Internet-layer. Incidentally, for Project 73 this layer or the third layer of the ISO/OSI model is based on XNS.

During the most recent project demonstration the French Societe Generale de Serve et de Gestion SG2 produced X.21 hardware for its satellite gateway, and finally, the University of Liege contributed testing and measuring instruments for the BWN which can check the new network under various "loads".

12831

CSO: 5500/2448

PAN-NORDIC TELE-X TO TAKE OVER AFTER 1988

Helsinki HUFVUDSTADSBLADET in Swedish 13 Dec 86 p.11

[Article by Lennart Utterstrom]

[Text] Stockholm--TV cooperation between Finland and Sweden will continue in its present form through the end of 1988. This was decided at a meeting in Stockholm on the minister's level.

Tele-X should be in service within 2 years. This will alter the situation in favor of broad Nordic cooperation in the television field.

Experience with Finnish TV broadcasts in the Stockholm region and in limited sections of Malardalen is extremely positive, Swedish Culture Minister Bengt Goransson and Finnish Traffic Minister Matti Luttinen said on Wednesday.

This means that the temporary broadcasting permit granted earlier this year will be extended until Tele-X is in service. It is still impossible to say precisely when the transition to joint Nordic broadcasts via satellite will be made, but both Luttinen and Goransson expressed their hope that the new system would be in operation by late 1988.

A statement made public on Wednesday after the negotiations were concluded confirmed that the approximately 100,000 Finns in the Greater Stockholm area will continue to have access to Finnish programs by way of the Nacka transmitter for the next 2 years.

The problem of Swedish TV broadcasts to the Swedish-speaking regions of both countries, especially the Nyland region of Finland, has not yet been solved. The Finns have proposed appointing a working group at the staff level to solve this problem.

During the months in which Finnish TV has been available in Stockholm, there has been some criticism concerning limited reception. This applies primarily to neglect on the part of certain property owners, who have failed to adjust central antennas to facilitate reception in multifamily dwellings.

Bengt Goransson, who occasionally watches Finnish TV, believes that property owners should be informed that the antenna adjustments are simple and can be made at a modest cost.

"In addition, the Swedish public should be made aware that Finnish TV is also a service to them. Many programs are in Swedish and others use subtitles."

Tele-X

And what will happen after 1988? When Tele-X begins operating, the Finnish broadcasts in Sweden will cease, while all the Nordic countries will begin participating, to a certain extent, in a joint TV system.

Of course, service for Finnish viewers in Sweden will decline, in terms of the number of TV shows in Finnish. But the total number of broadcast hours will increase, thus increasing the availability of TV from other countries.

The situation may be somewhat worse for Finns in Sweden, Goransson admitted.

"But cooperation in the area of television must be seen in a much broader perspective. We must concentrate on a functioning system of Nordic TV cooperation. It is a cultural issue, in that we must counteract the commercialism that now controls international television. In this context, a successful Tele-X program is most important."

9336

CSO: 5500/2438

ALCATEL THOMSON ESPACE SUPPLIES RADAR FOR ERS-1 SATELLITE

Paris ELECTRONIQUE ACTUALITES in French 14 Nov 86 p 10

[Article by P. Prost: "Alcatel Thomson Espace Manufactures the ERS-1 Satellite Observation Radar"]

[Text] The aerospace division of Alcatel-Thomson Espace (ATES) is currently participating in the manufacture of the ERS-1 satellite. This European earth observation program should allow a satellite to be launched (at the beginning of 1990) in low-earth orbit, the mission of which will be to ocean visualization. Observation will be carried out with radar equipment, in contrast to what is currently used for SPOT (optical equipment). This is an important change, because this equipment will allow observations to be carried out during all kinds of weather twice daily. In addition, observation is not limited by any timetable, so it can use available luminosity, in contrast to what occurs with an optical device, and it has a large field of observation. The sweep (width of the observed band) is 80 to 100 km.

The Dornier Company (FRG) is the general contractor for this program in which France's total share is 23.8 percent. Matra is manufacturing the platform and Marconi is manufacturing the radar. ATES is the subcontractor for the radar signal processing radio frequency and calibration, which make up the technologically sensitive portions (the system is calibrated to .01 decibel).

The AMI (Active Microwave Instrument) radar operates in two modes, imager and scatterometer. The imager mode uses a large antenna (12m x 1.8m) in a C 5.3 GHz band. For a 100 km sweep, an image resolution of 5 x 25 m. is obtained. For improved radiometry, a 25 x 25 m. image is used, which yields good results at the levels of both contrast and resolution. The scatterometer mode uses three antennas and its purpose is to measure the speed and direction of surface winds. With the use of the third antenna, this original design eliminates any uncertainty about direction. Note that Alcatel is manufacturing the antenna switching matrix. Vizir systems (SEP) [European Propulsion Society] are used for image reception as with SPOT. By contrast, the telemetry rate will be 100 Mbits, or twice as fast as currently, which will require ground recorders to be modified. The 8 GHz channel used for this connection also corresponds to a transmission standard of earth observation satellites. Note that for this program, Thomson is manufacturing the ultrahigh frequency switching matrix, which

allows energy to be switched to different antennas as well as signal generation by surface acoustic waves. There is now equivalent at the satellite level is the world.

The altimeter is also an important part of this on-board system because it will allow fine topography of the oceans to be carried out. The state of the ocean can be determined from wave height, and currents and eddies can be documented.

Currently, the development of the ERS-1 program has allowed a prototype to be completed, and an identification model (flight model) is in development. In parallel with this development, CNES [National Space Study Center] has made a synthetic antenna radar which allows satellite images to be simulated. Following a flight campaign, terrestrial observation photos relating to agriculture, geology, oceanography, and ice floes were given to several European organizations. They will analyze these images to assess the advantages of imagery in potential applications. For example, ocean observation by ERS-1 will allow weather forecasts as well as weather statistics to be determined. The choice of the application will also have an effect on the radar. It may be dedicated to a particular function, which would limit its dimensions on board the satellite (with effects on the resolution, sweep width, antennas, processing thermic and energy platform levels).

The military sector is also involved because the radar system supplements the optical system. The Helios satellite, which should be launched in 1991, uses an optical device, and its observation could be backed up by a radar system. The latter ensures greater and more frequent coverage and allows the detection of objects rather than a precise definition. In addition, its extremely rapid transmission capacity allows information to be processed on a near-real time basis. Low-capacity ground reception systems can be installed on ships and shelters (tactical stations).

The Alcatel-Thomson Espace operation has sales of 810 million francs for 1980 (680 million francs in 1985) and involves nearly one thousand staff. This budget is divided among three operations: civilian telecommunications (370 million francs) which are involved in the TDF 1 and 2, Eutelsat, Intelsat 6 and the Swedish Telix programs; military telecommunications (270 million francs) with Syracuse 1 for supplying ground stations; and the aerospace department (170 million francs) which is devoting 80 million francs to the ERS-1 satellite. This department is also participating in the Ulysses program (satellite co-produced by NASA and ESA), IOC (experimental satellite for communication relays with Olympus, a satellite in geostationary orbits), SPOT (formatting, coding, and information modulation), Columbus (presentation of cabin information to pilots) as well as the Hermes project for telecommunications.

13146/8309

CSO: 5500/2429

CSELT CEO ANALYZES RACE PROGRAM IMPACT ON COMPETITIVENESS

Turin MEDIA DUEMILA in Italian No 10, Nov 86 pp 14-23

[Article by Basilio Catania, general manager of the Research Center and Laboratories for Telecommunications (CSELT), of Turin, Italy: "The Language Spoken by Communications of the Future Will Be European;" first four paragraphs are MEDIA DUEMILA introduction]

[Text] In Brussels on 16 October the EC Commission approved the RACE program (Research on Advanced Communications for Europe). This year the program will be submitted to the Council of Ministers of the European Community for final approval.

The main objective of RACE is to make EEC telecommunications industries and operators extremely competitive (if not leaders) in the world market for IBC (Integrated Broadband Communications), a market in which the use of advanced technologies makes it possible to implement high-speed voice, data, and image telecommunications at low cost.

The RACE program follows a strategic study phase conducted by more than 400 researchers from 109 European companies and is to be implemented in the 5-year period from May 1987 to May 1991, with EEC financing of 800 million ECUs, approximately 1.2 trillion lire. The RACE program will mobilize a total research effort equivalent to 20,000 man-years or, in other words, the work of 400 European researchers over the 5-year period.

In this era of great change, the role played by telecommunications in the economic and social progress of the Community assumes great strategic importance. What, therefore, is the concept underlying RACE and what does the program consist of? The program was presented in Brussels to 300 of the top representatives of the sector 24 hours before the decision was made by the EEC Commission. Mr Basilio Catania, general manager of CSELT in Turin, gave the technical presentation of the program, the Italian version of which is given below.

If it is true that in the next century, in the United States at least, 94 percent of the labor force will be involved in the service sector

and if, moreover, not only laborers but also children, housewives and older people will be inundated by floods of information, in schools, in the home and elsewhere (places other than offices), using all types of terminals, and if, finally, Europe has political unity, then there can be no doubt that we will need a sort of nervous system to be able to interconnect many thousands of persons and machines so that they behave as a single system which we could perhaps call the "European society of information."

Just when and how this nervous system--IBC--comes into being is not terribly important, nor whether its nerve fibers are to be made of copper cables or fiber optic cables, or whether the neurons of the system will consist of ground stations or space stations, that is, satellites, provided that this nervous system is capable of performing its role of creating integration at a European level, rather than being the result of a "mosaic" of individual national systems.

In other words, IBC must be designed as a single system comprising all types of users, all types of suppliers, all types of networks, owned either by users or suppliers, and all types of information services and formats. In every city, all this must converge on a single centralized structure known as the IBCN (Integrated Broadband Communications Network).

As confirmation of the fact that all this will derive from a more general law of evolution of the universe toward more complex forms of integration, it can be seen that not only Europe, but all the more advanced nations of the world are moving in the direction of systems similar to the IBC.

IBC, INS, UIS and the RACE Program

Apart from IBC, the two best-known systems are INS (Information Network System) and UIS (Universal Information Services). INS was first presented by the Japanese company NTT at the beginning of 1983, that is, about 1 year before IBC was designed. UIS, on the other hand, was first presented by ATT (USA) at the beginning of 1985 or about 1 year after IBC was designed. Today there are also several important international regulatory authorities, such as the CCITT (Consultative Committee in International Telegraphy and Telephony) and the CEPT [European Commission for Post and Telecommunications] which use the term B-ISDN (Broadband ISDN), limited to aspects of IBC networks, to emphasize the fact that IBC developed from ISDN. One advantage of the IBC concept, as opposed to either INS or UIS, is the fact that it was developed on a joint basis, during the preparatory phase of the RACE program, by telecommunications industries and operators, with a substantial contribution also being made by a number of areas in the

information sector. We must compare this to both INS and UIS. The former was developed by only one, albeit important operating company, NTT while the latter was developed by only one company, AT&T, however important that company may be. I would also like to draw attention to the fact that the word "communication" used in the term "IBC" is far more general than either the words "Information network" or "Information services" employed in the other two terms. The reason for this is that "communication" involves both information and the network and services.

In order to create IBC, a collaborative research and development program known as RACE (Research in Advanced Communications for Europe) was set up. Two major characteristics of the RACE program should be emphasized here. These are, first, that the aim of the program is to encourage the introduction of IBC and, as such, ends with the development of precompetitive prototypes or demonstration models and, second, that the start of the commercial phase of the program, that is, initial introduction of IBC, must follow the industrial developments implemented on a competitive basis during the period 1990-1995. Similar projections have also been made for UIS (which is expected to start up "in the nineties") and for INS, which may start a little earlier. It must be remembered, however, that it will be a number of decades before we will have an IBC which has the wide coverage of today's telephone network. I would also like to point out that, in the RACE program, great emphasis has been placed on the fact that both sellers of products, that is, industry, and sellers of services, that is, operating companies and suppliers of information, will have to be extremely competitive in relation to the overall market.

Nonetheless, this emphasis on the market aspect should not overshadow the other two foundations on which construction of IBC rests. These are technology and financing, all under the influence of politics, in both the positive and the negative sense of the word.

Since, as a general rule, technical experts prefer to discuss first technology and then markets, leaving financial considerations until last, allow me to deal with these aspects in the opposite order. In this way, I can also demonstrate the extent to which economic and financial problems and market factors can influence decisions of a technical nature.

Starting with the financial question (see Table 1), let us first look at the matter from the point of view of industry, taking as a theoretical example two manufacturing companies, A and B. Let us suppose that company A has total sales of 40 million lines of its switching system, whereas company B's sales are only 50 percent of this figure, 20 million lines. If we suppose that each of the two companies

has a development cost of 1 billion ECUs (1 GECU) (taking the two companies as being equal in technological terms) and, finally, that this figure represents 8 percent of the income from sales, then this means that the two companies should achieve total sales of at least 12.5 GECUs.

However, because of the fact that company A has a higher sales volume, it can afford to apply a minimum selling price of 312.5 ECUs per line, while company B would have to sell the line at twice this price, or 625 ECUs per line. Therefore, the final market price is 500 ECUs per line, A will make a profit, B will suffer a loss and, moreover, A will have a greater advantage over B in any subsequent development activity since it will be able to invest more than B, will be able to increase its market share still more, and will be able to offer even lower prices.

Company B could request the government of the country in which it operates to intervene with protective measures or with a variety of subsidies. Such measures can never be taken for granted, however, and even if they are introduced they do not apply for an indefinite time.

There are two ways in which RACE (or EUREKA or other forms of industrial collaboration) aims to improve the overall position of the manufacturers taking part in the program. These are, first, by reducing the R&D costs for each company, thereby reducing the initial cash flow required and, second, by increasing each company's potential market share as a result of the so-called "aggregation of supply" or, in other words, alignment of the specifications and standards in all the nations belonging to the Community.

As a result of this, the slope of the theoretical curve on a graph plotting cash flow against volume of sales--a curve which represents the unit selling price--will be reduced twofold, thus making the companies taking part in the program more competitive, as stated above.

Two Theoretical Operating Companies

Now let us take a look at the opposite side of the coin, considering the question from the point of view of telecommunications operating companies (Table 2). More specifically, let us compare two theoretical operating companies, one operating over the whole of the EEC and the other operating over the whole of the United States. In these two areas there are approximately 100 million subscribers. Supposing that each subscriber represents an investment of 1800 ECUs (equal for both operating companies), then the "book value" of the respective networks will be in the region of 200 GECUs. In turn, however, this means that each operating company must spend about 10 percent of its book value annually to meet the cost of about 5 percent of replacements and 5

percent of growth, that is, an outlay of about 20 GECUs per year. And now this is where the great difference emerges, as we can see from recent statistical studies. While the average American subscriber buys services from the U.S. operating companies for a value of about 1300 ECUs per year, the average European subscriber buys services for a value of only 490 ECUs per year; in other words, he spends about one-third of his American counterpart.

Moreover (and this is even more serious), sales of services in the United States are continuing to grow at an average rate of 16 percent per year, while sales of services in the EEC are growing at an average rate of about 6 percent per year. This means that, in 10 years time, income for telecommunications services in the United States could be as much as four times the income for similar services in the European Community (unless something occurs in the meantime to alter the habits of the average subscriber in each of these two areas).

There are also several interesting considerations which can be made regarding Table 2. These are:

- 1) If one owns and operates an extremely extensive network one also is dealing with an extremely high book value. This, in turn, means that a high annual level of investment is required if these assets are to be maintained and expanded. Because of this, the financial problems confronting telecommunications operating companies are much greater than those confronting, for example, industry. Financial problems of this kind and of the same magnitude are encountered only by other types of companies which own networks (such as the railroads, highways, and electricity companies). The financial problems encountered by broadcasting companies are much smaller since their networks are basically intangible and, moreover, subscribers to these networks own the receiving part of the network, with the result that the cost to the operating company is zero.
- 2) In order to meet the massive investments required, operating companies can either use their own resources (income or capital) or can raise money on the free capital markets. If, however, (with reference to the first column for operating companies in the European Community), the ratio of investment to income is so high that the investments required represent a large portion of annual income, this will lead either to a direct increase in tariffs or to progressively increasing indebtedness of the operating companies which, in turn, will also lead to an increase in tariffs. Ultimately, all this will lead to a loss of income in a vicious cycle that may result in renewed government intervention in order to prevent the operating company from going out of business altogether.

- 3) A third consideration concerns the so-called inherent slowness of operating companies (or, rather, the inherent slowness of the possible changes to the network operated), particularly when we compare this slowness to the rapidly changing world of the equipment and services provided by suppliers of information and the users of this equipment and services (a world which will change even more rapidly in the future).

It must be remembered that telephone exchanges must not be out of service for more than 1 hour in 40 years, according to their specifications. Similarly, copper cables should last for 40 years underground, performing within specification.

In practice, the rate of replacement is much higher than the 2.5 percent a year which corresponds to a life cycle of 40 years. In addition, equipment which is still fully operational is often discarded by operating companies because new technologies make it possible to increase profits or to reduce maintenance and operating costs, thus justifying early replacement of the equipment.

Nonetheless, because of the exceptionally high ratio of book value to income, the process of replacing the network cannot be very rapid (and generally occurs at a rate of about 5 percent per year), or at least cannot be as rapid as replacement of the services carried by the network and the equipment in the home of the subscriber or on the premises of the supplier. As an indication, we can assume the life cycle in the two areas outside the network to be 10 years (replacement of 10 percent per year), and that of the area inside the network to be 20 years (replacement of 5 percent per year).

From all this it can be seen that it is of the utmost importance that all new network architectures--and the future IBC architecture in particular--are as flexible and transparent as possible, in order to avoid the danger of being supplanted by the appearance of new services and the terminals used for these services.

The Market

We can now start to consider the second foundation, the market. First of all, we must point out that it would be unrealistic to think that we can play in a market area which is limited in geographical terms or, worse still, in an adequately protected region of the world market. The game is played over the entire planet, today as in the future.

In the case of IBC, there are essentially three market segments with which we are concerned (see Figure 1). These are the telecommunications market (now worth approximately 50 GECUs per year),

the consumer electronics market (about the same size as the previous one, that is, 55 GECUs per year) and, finally, the computer (EDP) market, which is at least three times the size of either one of the previous two segments, worth about 160 GECUs per year. However, there is also another market segment which should not be overlooked, and this is the market for components (mainly semiconductors), worth about 28 GECUs per year and which supplies the other three segments in which it often appears to be "vertically integrated."

Let us now try to evaluate the position of Europe in these three markets. Starting with the "telecommunications" segment (Figure 1), we can see that European producers (the green stars in the firmament) are in an excellent position as a result of the mergers, agreements and acquisitions (shown with a dotted line in the figure) which have either been implemented or are being implemented. Outside Europe, AT&T, Northern Telecom and NEC, besides IBM and Fujitsu, are more or less the same size as the European manufacturers. As things stand today, though, there have been no large-scale exports (shown in the figure as shares existing inside the rectangle of Europe) to Europe by these companies, despite the fact that every one of the manufacturers mentioned plans to attack the European market. There can be no doubt that AT&T, a company three times the size of the largest European manufacturers, represents a force to be reckoned with (see the earlier example of the two manufacturing companies, A and B). On the other hand, European manufacturers are also planning to attack the American market, one of the reasons for this being the recent agreement whereby the American operating companies (BOC - Bell operating companies) became independent of the major American manufacturer, AT&T.

I should like to point out that the "firmament" shown in Figure 2 (and in the following figures) is seen with the naked eye and that "stars" below a certain size are therefore invisible. We could well come to find, however, that the thousands of tiny stars which could be seen using a telescope constitute an extremely important fraction of the total firmament.

The situation for EDP manufacturers (Figure 3) appears to be far worse, not only for Europe but also for American and Japanese manufacturers because of the presence of the "giant" IBM, a company which is between six and seven times the size of the two largest American stars and between eleven and fourteen times the size of the largest European and Japanese stars. Even if we consider the European market alone, we can see that the penetration of this market by the "red stars" outstrips the internal capacity of Europe by a long margin.

The segment of consumer electronics represents another somewhat negative situation for Europe (Figure 4). This segment is

characterized by the clear predominance of the Japanese companies Sony, Sanyo, and Matsushita, each one of which is between 1 and 1/2-2 times the size of the largest European company, Philips, and is between three and four times the size of the two largest American stars, RCA and Zenith. We could say that, compared to Japan, Europe has a clear deficit, while America has an even more serious deficit.

To complete our exploration of the heavens, let us now take a look at the last "galaxy" (Figure 5). This figure shows components manufacturers (mainly semiconductors), indicating the areas of so-called "captive" production with a dotted line. The first comment to be made here is that there are a number of extremely large stars in the United States which are completely "vertically integrated," with IBM once again the largest star not only in the United States but also at world level. The same phenomenon also appears to be widespread in Japan and Europe, though for less than one-third of the total sales volume of each company. The second comment concerns the fact that this is an extremely crowded market segment, one of the reasons for this being that it includes a large number of the companies operating in the other three segments described above. The European deficit in this segment is as serious as the deficit in the consumer electronics segment; in other words, it amounts to about half the size of the European market.

This emerges more clearly from the summary shown in Table 3, from which it can be seen that:

- A basic balance exists in the telecommunications markets in all areas of the world, with a certain amount of exchange between the different areas. The small amount of overproduction in each area is sold to the rest of the world;
- The EDP segment is dominated by the United States, not only because of the production capacity of this country but also because of product demand, which is more than double the demand in Europe and more than four times the demand in Japan. Europe has the highest deficit, amounting to approximately one-third of this area's market. Japan is in a good position, exporting at least 20 percent of its production;
- The "consumer electronics" segment is dominated by Japan. The United States is in the worst position in this segment, with a deficit amounting to approximately 64 percent of this area's market. Europe follows with a deficit of 44 percent, while the rest of the world has a good level of exports (mainly thanks to certain companies in the Far East);
- In the "components" segment, both North America and Japan export approximately 16 percent of their respective productions, while imports by Europe account for about 50 percent of this area's internal market;

--If we add up the figures for the four markets discussed above, which total about 300 GECUs per year, we can see that despite the fact that Europe represents 27 percent of the world market connected up with IBC, this area sells only about 20 percent and therefore has a negative balance of 21 GECUs per year. The United States compensates for its serious deficit in the consumer electronics market with a strong position in the EDP market, which gives it a small margin of 1.7 percent. Japan is well placed in all markets, with a predominant position in the segment of consumer electronics, and with total exports which account for approximately 50 percent of the country's production.

Japan and the United States

The above figures referring to Japan give rise to an interesting consideration in that, although there can be no doubt that the picture of modern Japan given above is correct, a similar picture taken 25 years ago, that is, at the beginning of the 1960s, would show a Japan which was in an almost desperate situation, perhaps because of displacement at that time by Italy with its famous "economic boom," which exploded in the 1950s. What lesson can we learn from this? The reply is that if the Europeans were to roll up their sleeves they could modify this situation, and quite drastically (though this could take decades), provided that they make the right decisions and move in the right direction with courage and perseverance.

The second consideration which leaps to mind is this. The main reason why Japan has overtaken the United States in the consumer electronics market is because of the marked supremacy it has achieved in solid state technologies (hardware). At the same time, the supremacy of the United States in the EDP segment is mainly the result of this nation's marked superiority in software technologies. History is full of examples like this. The Egyptians lost their supremacy to the Scythians, by whom they were conquered, because of the fact that the Scythians fought with iron swords while the Egyptians fought with copper swords (which were easily destroyed by iron swords). Just one more instance of better technology (and specifically the technology of materials!).

Therefore, we Europeans should invest heavily (and this is where the importance of the financial aspect comes into play) in hardware and software technologies, which represent the basic point of departure for conquering the market. On the other hand, if the European Community can make regular and substantial investments in agriculture (a sector which, according to projections, will account for 3 percent of the labor force in the year 2000), why then should it not invest in information technologies, a sector which will account for 94 percent of

that same labor force? The shining example of ESPRIT--an undisputed success for the activity of the European Community--should encourage us to invest in RACE, the forerunner of IBC.

One danger we must avoid is the possibility of the three major areas of 1) telecommunications, 2) consumer electronics and 3) EDP moving in different directions, since each one of these areas follows a strategy of its own which aims to optimize the market segment with which it has traditionally been concerned. The "informed" citizen would not understand an approach of this kind.

An excellent example of this is provided by the networks, which at one time represented totally unknown quantities for both consumer electronics companies and EDP companies, but which today represent an essential objective, when optimized within the context of private informatics networks and domestic networks.

If we look at the range of networks (Figure 6) we have today in the whole world (not just in Europe), we would be perfectly justified in saying that there appear to be at least as many separate networks as there are types of services. Next year, however, 1987, will be the magical year in which ISDN, based on the normalized speed for the customer standardized by the CCITT at 144 Kbit, will be introduced almost everywhere. The private networks, however, such as LAN (Local Area Network) and MAN (Metropolitan Area Network), as well as the distribution networks for audiovisual broadcasting by radio and by cable, will resist integration. There is a sound argument for this, which is that the bandwidth offered by this initial version of ISDN is inadequate (the same is true of 2 Mbit videoconference or videotelephone services). When, however, ISDN using a greater bandwidth is introduced (about 5 years from now), the only network that will still have a good reason for not being integrated will be the television distribution network, since this network requires a bandwidth which exceeds the capabilities of even the wider band variant (2 Mbit) of ISDN.

What is the danger of all this? If each network is given enough time to reach an adequate size, to consolidate operating procedures and so on, and if we take into account the inherent slowness of the public network to reach all subscribers requesting it at the same time and if, finally, we consider the pressing need for standards for the domestic network in the consumer electronics sector to be issued as soon as possible, well, what will happen is that the networks mentioned above will be able to survive for a long time only as separate entities, since they were not even designed to be compatible with the public telecommunications network.

The operating companies are attempting to detract from LAN and MAN systems by offering private "virtual" networks or, in other words, networks that are equivalent to a private network in every way but which use the infrastructure of the public network under software control, as part of first and second generation ISDN.

The last stage shown in the figure, the IBCN, should ultimately include television distribution networks which, moreover, may well have grown independently in the meantime, possibly using coaxial cables rather than fiber optics and with a substantial subscriber public connected to the network.

The Evolution of IBC

And so? First of all, perhaps, we have to understand the pattern of development that will be followed by IBC in the theoretical situation in which, ultimately, there would be full convergence of all services and all networks in this system. We know from experience that all substantially innovative networks (such as, for example, the present IDN or the future ISDN and IBCN), following a period of 1 or 2 years for the initial on-site testing with a limited number of subscribers (a few thousand, say), require a period of about 5 years to gain the first 1 percent of subscribers (based on the expected maximum number corresponding to saturation of the service). The majority of these early subscribers fall within the category of large business subscribers, who can afford the initially high tariffs for the services provided and the high cost of equipment. Subscribers from the sector of small and medium-sized businesses are gained during the following 5 years, bringing overall penetration up to a perfectly respectable level of 8 percent. In the 6 or 7 years which follow this 5-year period, another category of subscribers is gained, that of wealthy private subscribers, increasing overall penetration to about 20 percent. In the final phase, which may last for more than 15 years, IBCN will have reached almost all areas of the community, including all those private users who presently subscribe to the telephone network.

Can things be speeded up? The "Analysis and Forecast Group" (GAP) of the EC Commission maintains that at least 2 years should be gained by development of the ISDN compared to the theoretical penetration curve described above. In any case, we must bear in mind that, as we have already said, the entire process may take several decades to complete.

The four phases we have mentioned above can, in a certain sense, be likened to the four gears of an automobile. This is shown in Figure 4, which gives the total number of subscriber lines for each phase and the number of lines per year corresponding to each phase, based on the supposition that the European market consists of a certain number of

shares, each one made up of 20 million lines and corresponding, for example, to the average European nation or the average European manufacturer. It can be seen from the table that with the first "gear" we reach a penetration "speed" of approximately 35 thousand lines per year, while in fourth gear our penetration is 1 million lines per year. At the same time, there will be reductions in price (which will initially be based on the well known law of "halving the price every decade") and which will smooth the way for the next class of subscribers.

As a result of what we have said, it can be maintained that during all four phases there will be a substantial number of potential subscribers who live in less densely populated areas and who are not reached by IBC. The reason for this is that IBC will develop patchily, spreading out from small areas with a high concentration of large business subscribers and this is one of the reasons why satellite communications should be regarded as a valid forerunner of the ground network and, as such, as an integral part of IBC strategy.

A further consideration concerns the fact that IBC should, from its earliest stages, be designed to allow for the connection of private subscribers, resisting the temptation to provide a service for business subscribers alone because of the fact that private subscribers will only come forward many years after introduction of IBC. Indeed, if IBC were designed solely to serve the business subscriber, it would never be capable of reaching the maximum speed of penetration, just as if it were an automobile which had been designed with the first two gears only.

Technology

Now let us examine the third and final aspect, technology. If we put together all the crystal balls of specialists in technology, we can see the ingredients which can be used for the initial version of IBC (1995), always supposing that these ingredients have successfully completed the preliminary research phase and have already started the stage of mass production (though not necessarily very many years previously). From the results of the RDP (Race Definition Phase) it would appear that the theoretical "catalog" we can put together today includes very few technological components that will not be available in 1995. These include organic semiconductors, active fibers and fibers in the infrared band, organic optical switches and flat screens for high definition television (HDTV). Therefore, there will be a wide range of choices.

Signal coding technologies deserve special attention. The progress which has been made in the 20 years of this very young but extremely

powerful technology shows that the coding frequencies for both audio and video have consistently been reduced at a rate of 5 to 10 times every decade. After about one decade, the first laboratory demonstrations were followed by the formulation of international standards (the CCITT standards, for example). This means that during the whole life of IBC (which, as we have already said, will be at least 30 years), the speeds of the coded signals could be reduced by several orders of magnitude, totally replacing any IBC architecture which was rigidly designed on the basis of fixed coding speeds. In this respect, the latest techniques based on ASD (Asynchronous Time Division) could guarantee a substantial degree of flexibility, since they instantaneously make use of the different statistics and frequencies of voice, video, and data signals in order to create, both at the transmitting terminal and at the receiving terminal, a single flow of labelled packets in which all the different signals are arranged in sequence, with no distinction being made between the various sources. In this way, the individual channels occupied by a specific signal are replaced by packets which are "lined up" and which use a single channel. This means that the network switches and transmission lines could be designed only for the maximum speed of the single "information duct," ignoring the nature of the signals transmitted.

Unfortunately, this technique would require extensive modifications to the architecture of the networks as designed today. In addition to this, it is expected that there would be resistance to this technique both on the part of the operating companies, who will tend to keep their massive investments in the telephone sector, and from those people who believe that the statistical properties of video signals are such that no obvious advantages will be produced using ATD. However, it is too soon to draw any hard and fast conclusions, since this method, which forms the basis of the so-called "scenario 2" of the RDP, is still being carefully studied by the technical experts of the European Community. This technique will also be measured both against the techniques planned for use in "scenario 1", based on a gradual evolution from ISDN, and against a third, equally fascinating technique known as CMC (Coherent Multi Channel) transmission. CMC transmission forms the basis of "scenario 3", which is also being analyzed as part of the present RACE definition phase.

I feel that it is only right to give a well earned acknowledgement to the engineers of the European Community for their enthusiasm and the quite outstanding degree of commitment they displayed during the RDP. Unfortunately, for reasons of time, the results of this work cannot be described fully here, despite the fact that they provided the inspiration for all these presentations, mine included.

I would like to conclude this presentation with a simple question to

you all. You will undoubtedly have noticed that throughout this presentation I have made extensive use of your "broadband optical channel," as well as of your hearing, in order to reach your brain. Which of these two channels do you feel has been the more effective? And what would have happened if this had been a silent presentation, using pictures only? (I would like to try doing that some time!) or if it had been a spoken presentation, without pictures, which was common practice some decades ago?

The answer to these simple questions could throw some light on certain fundamental ideas which form the basis for IBC. Because IBC is "integrated broadband communication"--a global concept for Europe.

Table 1

Economic and Financial Comparison Between Two Manufacturers of Switching Systems

	Manifatturiera "A"	Manifatturiera "B"
* Volume complessivo prodotto ⁽¹⁾	40 milioni di linee ⁽²⁾	20 milioni di linee ⁽²⁾
* Investimenti complessivi ⁽¹⁾	1 GECU	1 GECU
* Introito minimo complessivo ⁽¹⁾⁽³⁾	12,5 GECU	12,5 GECU
* Prezzo unitario minimo di vendita	312,5 ECU/linea	625 ECU/linea

(1) Si intende lungo tutto il ciclo di vita commerciale del sistema

(2) Supponendo un ciclo di vita di 15 anni (escludendo i transitori di avvio e di obsolescenza) la manifatturiera A venderebbe 2,7 milioni di linee/anno, la B 1,35 milioni di linee/anno

(3) Si suppone una incidenza della spesa di R&S pari all'8% degli introiti delle vendite

	Manufacturer A	Manufacturer B
*Total product volume (1)	40 million lines(1)	20 million lines(2)
*Total investments (1)	1 GECU	1 GECU
*Total minimum income (1)(3)	12.5 GECU	12.5 GECU
*Minimum unit selling price	312.5 GECU/line	625 GECU/line

(1) Along the entire commercial life of the system.

(2) Supposing that the life cycle is 15 years (excluding start-up and obsolescence periods), manufacturer A would sell 2.7 million lines per year, whereas manufacturer B would sell 1.35 million lines per year.

(3) Taking spending for R&D to be 8 percent of income from sales.

Table 2

Economic and Financial Comparison Between Two Telecommunications Network Operating Companies (*)

	Esercente A (CEE)	Esercente B (USA)
* Numero complessivo di abbonati	110 milioni	100 milioni
* Patrimonio (valore a libro) ⁽¹⁾	200 GECU	180 GECU
* Investimento annuo ⁽²⁾	20 GECU	18 GECU
* Introito annuo (registrato nel 1985)	54 GECU	130 GECU
* Introito annuo/abbonato (1985)	490 ECU ⁽³⁾	1300 ECU
* Previsto tasso di incremento degli introiti annui	6% all'anno	16% all'anno
* Rapporto patrimonio/introito annuo (1985)	3,7	1,4
* Rapporto investimento annuo/introito annuo (1985)	37%	14%

(*) Ved. R. Teesdale "The Economic viability of IBC" Rapporto interno del RACE CENTRAL OFFICE c/o CEC Bruxelles

(1) Si suppone un investimento/abbonato pari a 1800 ECU per entrambi gli esercenti.

(2) Stimato al 10% del patrimonio (5% per sostituzioni, 5% per crescita)

(3) Valore medio, risultato da:
 - 1.500 ECU/anno " " piccoli-med " (-20% " ")
 - 190 ECU/anno " " degli utenti residenziali (-80% " ")

	Operating company A (EEC)	Operating company B (USA)
*Total number of subscribers	110 million	100 million
*Assets (book value) (1)	200 GECUs	180 GECUs
*Annual investment (2)	20 GECUs	18 GECUs
*Annual income (recorded 1985)	54 GECUs	130 GECUs
*Annual income/subscriber (1985)	490 ECUs (3)	1300 ECUs
*Expected rate of growth of annual income	6 percent per year	16 percent per year
*Ratio of assets to annual income (1985)	3.7	1.4
*Ratio of annual investment to annual income (1985)	37 percent	14 percent

(*) See R. Teesdale: "The Economic Viability of IBC," internal report of the RACE central office, c/o CEC, Brussels

- (1) Taking each operating company's investment per subscriber to be 1800 ECUs;
- (2) Estimated to be 10 percent of assets (5 percent for replacements, 5 percent for growth);
- (3) Average value, given by:
 10,000 ECU/year from large business subscribers (1 percent of subscribers)
 1,500 ECU/year from small/medium subscribers (20 percent of subscribers)
 190 ECU/year from private subscribers (80 percent of subscribers).

Table 3

World Markets and Production Affected by IBC

		1		2		3		4		5		6	
7	REGIONE	NORD AMERICA		EUROPA OCC.		GIAPPONE		ALTRI.		TOTALI PARZIALI			
	COMPARTO	MERC.	PROD.	MERC.	PROD.	MERC.	PROD.	MERC.	PROD.				
10	TELECOMUNICAZIONI	23	24	16	18	5	6	6	2	50			
	Δ	+1		+2		+1		-4					
11	EDP	90	103	40	28	20	24	10	5	160			
	Δ	+13		-12		+4		-5					
12	ELETTRONICA DI CONSUMO	22	8	18	10	12	28	3	9	55			
	Δ	-14		-8		+16		+6					
13	COMPONENTI	13,5	16	5,5	2,5	8	9,5	1,5	0,5	28,5			
	Δ	+2,5		-3		+1,5		-1					
14	TOTALI	148,5	151	79,5	58,5	45	67,5	20,5	16,5	293,5			
	Δ	+2,5		-21		+22,5		-4					

15. Nota: Δ rappresenta la differenza fra Produzione e Mercato, cioè è positiva quando la bilancia commerciale è in attivo, negativa quando essa è in passivo.

Key:

- | | |
|-------------------|--------------------------|
| 1. Region | 8. Market |
| 2. North America | 9. Production |
| 3. Western Europe | 10. Telecommunications |
| 4. Japan | 11. EDP |
| 5. Other | 12. Consumer electronics |
| 6. Sub-total | 13. Components |
| 7. Sector | 14. Total |

15. Note: Δ represents the difference between production and market, i.e. it is positive when the balance of trade shows a surplus and negative when the balance of trade is in deficit.

Table 4

The Four Gears of IBC Penetration

	1	2	3	4	5
	FASE	Durata (anni)	Dimensione raggiunta n° abbonati (1) %	Velocità di penetrazione (n° abbonati/anno)	Prezzi a fine fase
6	0 - Esperimenti in campo	1-2	2.000	0,01	-
7	1 - Grandi Utenti Affari	5	200.000	1	- 35.000
8	2 - Piccoli/medi Utenti Affari	5	1,6 milioni	8	- 250.000
9	3 - Utenti residenziali facoltosi	6-7	4 milioni	20	- 500.000
10	4 - Utenti residenziali	15	20 milioni	100	- 1.000.000

(1) Si suppone un mercato potenziale di 20 milioni di abbonati per Nazione (o per Manifatturiera di una certa dimensione)

(2) Si suppone valida la legge del "dimezzamento per decade" dei prezzi

(3) Nell'ipotesi che una ulteriore riduzione dei prezzi possa derivare dalla automazione della produzione

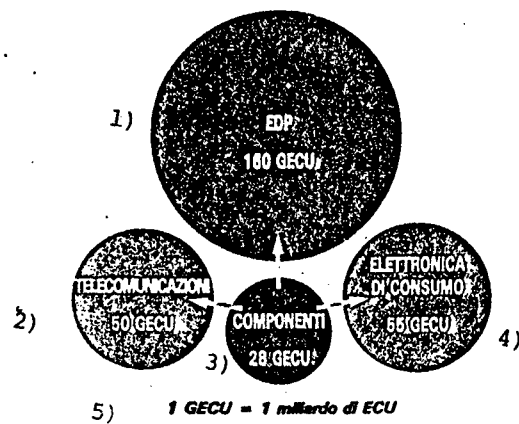
Key:

- | | |
|-------------------------|--|
| 1. Phase | 6. 0 - On-site testing |
| 2. Duration (years) | 7. 1 - Large business subscribers |
| 3. Size reached | 8. 2 - Small/medium business subscribers |
| Number subscribers (1) | 9. 3 - Wealthy private subscribers |
| 4. Speed of penetration | 10. 4 - Private subscribers |
| Number subscribers/year | |
| 5. Prices at phase-end | |

11. (1) Given a potential market of 20 million subscribers per nation (or for each manufacturer of a certain size);
12. (2) Supposing that the law of "halving the price each decade" applies;
13. (3) In the event that automation of production further reduces prices.

Figure 1

The Four Markets Affected by IBC

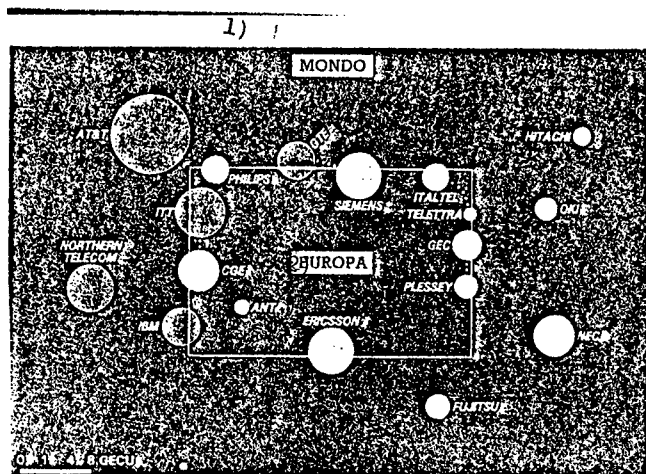


Key:

1. EDP (160 GECUs)
2. Telecommunications (50 GECUs)
3. Components (28 GECUs)
4. Consumer electronics (55 GECUs)
5. 1 GECU = 1 billion ECUs

Figure 2

The Firmament of Telecommunications Manufacturers

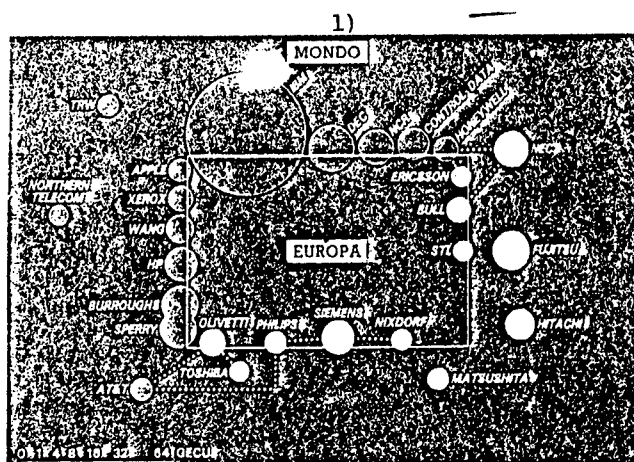


Key:

1. The world
2. Europe

Figure 3

The Firmament of EDP Manufacturers

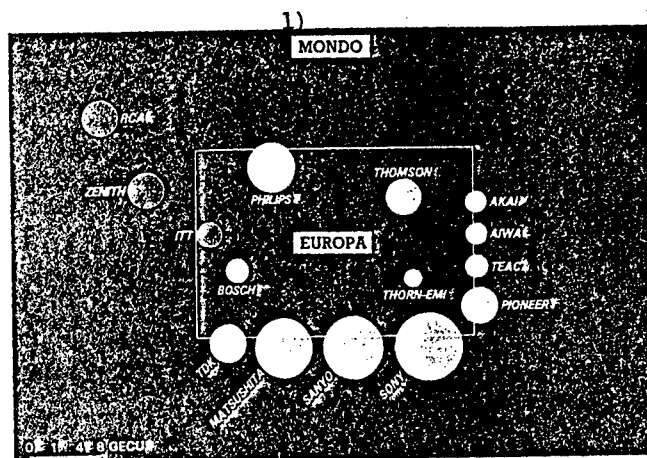


Key:

1. The world
2. Europe

Figure 4

The Firmament of Consumer Electronics Manufacturers

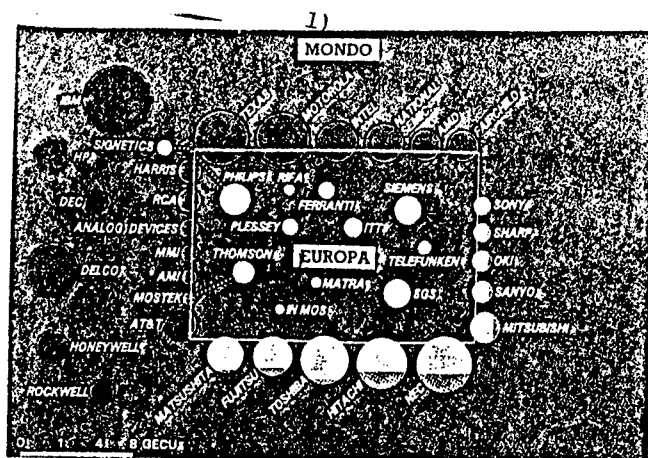


Key:

1. The world
2. Europe

Figure 5

The Firmament of Components Manufacturers

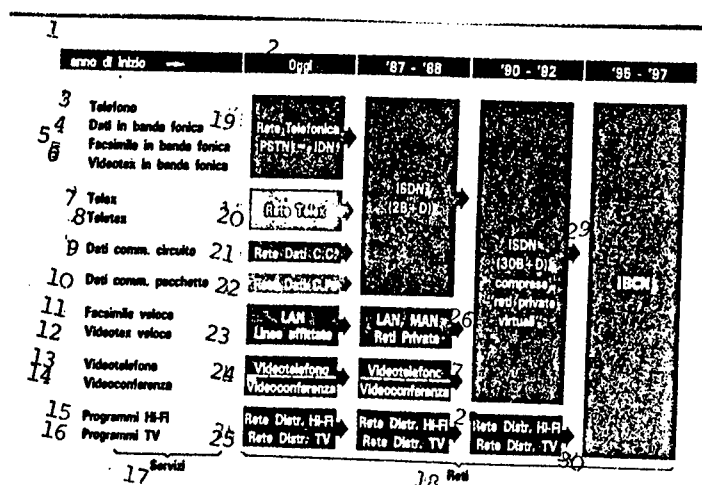


Key:

1. The world
2. Europe

Figure 6

The Subsequent Stages Toward Network Integration



Key:

- | | |
|--------------------------------|---|
| 1. Starting year | 16. TV programs |
| 2. Today | 17. Services |
| 3. Telephone | 18. Networks |
| 4. Data in voice band | 19. Telephone network PSTN-IDN |
| 5. Facsimile in voice band | 20. Telex network |
| 6. Videotex in voice band | 21. Network - data with circuit switching |
| 7. Telex | 22. Network - data with packet switching |
| 8. Teletex | 23. LAN - rented lines |
| 9. Data with circuit switching | 24. Videotelephone - videoconference |
| 10. Data with packet switching | 25. Network for hi-fi distribution
Network for TV distribution |
| 11. Fast facsimile | 26. LAN, MAN - private networks |
| 12. Fast videotex | 27. Videotelephone - videoconference |
| 13. Videotelephone | 28. Network for hi-fi distribution
Network for TV distribution |
| 14. Videoconference | 29. ISDN (30B+D) incl. private "virtual" networks |
| 15. Hi-fi programs | 30. Network for hi-fi distribution
Network for TV distribution |

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CSO: 5500/M100

TELETTRA GAAS RESEARCH, INDUSTRIAL POLICY REVIEWED

Gallium Arsenide Versus Silicon

Turin MEDIA DUEMILA in Italian No 10, Nov 86 pp 25-29

[Article by Giorgio Riveccio: "The Master of Light (Stage Name: Gallium Arsenide);" first paragraph is MEDIA DUEMILA introduction]

[Excerpts] Two semiconductors are in the race toward the chip of the 1990's. They are the long-established silicon and the recently arrived GaAs. Which will come out on top? To discover the answer, MEDIA DUEMILA visited the Telettra laboratories in Milan, the only "blacksmith" in Europe capable of producing certain types of high power devices for telecommunications systems with new materials. The following is a report on the virtues and vices of the two contenders.

The Telettra Firm and Arsenide

With 1985 net sales of 497.5 billion lire (a figure which grows to 715 billion lire if one includes the production of foreign affiliates), an increase of 20.6 percent over 1984, net earnings of 30.8 billion lire, research investments of 87.8 billion lire (17.17 percent of the sales figures), the Telettra firm has never been in the red since its inception in 1946. Today it is one of the principal telecommunications firms in the world with more than one record to its credit, such as the first European digital microwave two-way radio (1967), the world's longest microwave radio link (360 kilometers to bridge the Red Sea between Sudan and Saudi Arabia in 1979), and the first Italian fiber optics connection at 140 megabits per second (1980).

It would serve no point to say that gallium arsenide is today one of the fundamental ingredients in Telettra's transmission and reception equipment, in which it coexists happily--it seems--with the long-established silicon. These two elements play distinct and separate roles in the most advanced fiber optics or high frequency "ether" telecommunications devices. But will silicon continue to exist much longer?

"It does not make sense simply to set the two materials up against each

other," replies Gianfranco Piacentini, the man in charge of the public telecommunications components and technologies department of the Telettra Group. "Each of the two materials has a specific use. It would be a mistake to envisage the complete replacement of silicon with arsenide, as some people are predicting; this would be going to the opposite extreme."

A Fast Highway for Electrons

In Telettra's laboratories at Vimercate, the raw material is first of all transformed into round "slices," about as large as the saucer for a coffee cup. The first difference can be seen immediately: the silicon wafers are 5 inches in diameter and cost about \$20 each; those made of gallium arsenide are 2 inches in diameter and cost ten times as much. "The gallium arsenide crystals," explains Piacentini, "cost more, in fact, because of the greater scarcity of the raw material. In addition, they have a larger number of structural "defects" precisely because of their geometric form. Also, the material is more fragile and does not dissipate heat as well as silicon."

But, set against these negative aspects, there are some advantages which Telettra's experts are quick to point out. First of all, gallium arsenide allows electrons to move at a speed four or five times greater (up to 20 million centimeters per second) than silicon. In the race for increasingly higher speeds, gallium arsenide is like a highway compared to silicon's mountain rail.

This characteristic has immediate practical implications. Only with gallium arsenide can very high transmission frequencies and power be achieved in telecommunications systems. In fact, this material will allow Telettra to completely satisfy the requirements of earth and space communications for the 1990's (these will "travel" at 28 gigahertz, that is, at 28 billion cycles per second) as well as fiber optics communications at 2.4 gigabits a second, (that is, 2.4 billion bits of information). These are goals that no longer can be achieved with the solid, reliable "draft horse," which does not allow the use of frequencies higher than 4 gigahertz.

There is more. Gallium arsenide, as they explain at the Telettra firm, is a semiconductor with insulating properties superior to silicon; therefore, gallium arsenide chips can more easily be miniaturized because they need fewer insulating layers between the various sections which make up an integrated circuit. In addition, this material is not very sensitive to external electromagnetic radiation, a characteristic which makes it particularly suitable for military equipment which must be protected from electromagnetic waves emanating, for example, from nuclear arms. It is also suitable for devices used in artificial satellites, which must withstand a storm of charged particles from the sun during their journey to distant earth orbits.

The "Master of Light"

But perhaps the greatest advantage of this new material, emphasizes Piacentini, is its ability to integrate electronic and optical circuits. "If the computer," he says, "has been the leading edge in the sector between the 1960's and 1970's, and if military research has played a similar role in the 1970's and 1980's, then the next decade will witness a boom in telecommunications and telematics. And in this latter field, developments will certainly depend on integrated optics."

With slight modifications gallium arsenide can work equally well with electrons or with light, thus becoming the key for the development of high speed fiber optics telecommunications devices. With silicon, on the other hand, it is necessary to produce coupling devices between electric and light circuits; this results in power loss and a decrease in transmission speed.

In fact, Telettra is designing gallium arsenide circuits for long-distance fiber optics connections. For microwave transmissions, it is the only European producer of one-watt amplifiers made of this material. The potential for Telettra's gallium arsenide production line is very great; it can produce 80 slices a day, taking into consideration that 3000 to 6000 components can be made from each slice or wafer.

The Milan company is also involved, along with Britain's GEC firm, in a project for the European Esprit telecommunications program which envisages the production of chips in which the connections between various stages are made of microscopic optic fibers instead of the usual metal tracks. In this way, there is an enormous savings in the number of connections, and parasitic interferences between the various "tracks" are reduced.

"If we wanted to sum up briefly the difference between silicon and gallium arsenide," says Piacentini, "we could say that silicon is more suitable for logical circuits (mathematical elements), while gallium arsenide is better suited to analog circuits and therefore for the telecommunications of the immediate future."

Gallium Arsenide and Computers

Will it then be difficult to introduce gallium arsenide chips into computers to make them even faster? "In this field," replies Piacentini, "it is more likely that these chips will make their name only for certain specialized functions, where the higher costs of gallium arsenide compared to silicon can more easily be borne. I refer here to circuits for voice recognition or image recognition and processing where it is sometimes necessary to work in real time. For traditional mathematical elements, on the other hand, the higher costs do not correspond to real advantages. For example, to increase the speed of a VAX computer, there are two paths to follow: either install silicon chips for parallel processing (with 5 percent increase in cost) or install gallium arsenide chips which would achieve the same speeds but with 20 percent increase in cost."

The Creative Chip

In substance, they explain at Telettra, gallium arsenide is more suitable for specialized functions where the higher costs are balanced by results which silicon cannot offer. "Silicon presupposes substantial investments in production systems, while arsenide presupposes investment in creativity, in a constant search for new applications." This new material has, in a certain sense, permitted the "reinvention" of the transistor and the elaboration of increasingly new technological solutions in order to obtain original electrooptic equipment based on principles different from those of the traditional silicon chip. Telettra has also been involved on this front for years. The majority of its telecommunications systems, from radio links to devices for fiber optics transmissions, in fact use chips and circuits with slightly esoteric names (MesFET, GaAsFET, PinFET), which were developed in-house and even sold to competitors of the Milan firm.

[Box Insert page 27]

What Future for Telecommunications

Raffaele Palieri, managing director of Telettra: "In Italy Industrial Policy Is Not Well Defined."

"Europe is the leader in telecommunications technology, but it is too highly fragmented into a large number of firms to have the commercial weight it deserves." This is the opinion of Telettra's director, Raffaele Palieri, expressed in a conversation with MEDIA DUEMILA on the future of telecommunications in Italy and Europe.

At present, however, several large companies in the sector are getting together or developing commercial agreements in order to acquire greater strength against the competition. How will the telecommunications scene in Europe be transformed over the next few years?

"The new elements," replies Palieri, "are essentially two things. The first concerns the ATT-Philips agreement as well as the agreement between the French CGE company and ATT (which involves only the manufacturing sector). The second involves the Siemens and GTE agreement." This refers to an 80 percent joint venture with the German firm.

Thus, Palieri emphasizes, in the public switching sector "two contenders are emerging with a completely changed look." FACE Standard, formerly ATT, controlled by the French and GTE, which is, in fact, the property of the German Siemens firm.

In what way will these agreements have an impact on the Italian market?

"The situation is confusing," Palieri observes, "above all because in

Italy there is no well defined industrial policy in the telecommunications field, especially with respect to the switching and transmission sectors. The switching area is growing at the rate of 900,000 new lines per year (representing 35-40 percent of total investments in the telephone sector); the transmission field represents 12-15 percent but is destined to grow even more because its development is a function not of the number of subscribers, but of services requested."

"Therefore, it is increasingly necessary," Palieri affirms, "to have an industrial policy that determine suppliers based on their effective capacity to work and to innovate. And those who demonstrate greater capacities should be given advantages."

New Development Areas

Milan ALTA FREQUENZA in English No 3, May-Jun 86 pp 207-213

[Paper by Gabriele Marzocchi of Telettra Microwave Communication Labs, Milan, presented at the workshop on "GaAs Discrete & IC Devices: Trends in Telecommunications" in Milan, Italy from 20-21 February 1986]

[Excerpts] Telettra's Major Contributions to GaAs Application in Telecommunication Transmission Systems

Telettra has been active in radio link design and development since 1948. The use of GaASFET devices in radio links must therefore be considered an evolution of the vacuum tube and bipolar transistor generations of RF circuits.

Major milestones of the introduction of GaAs devices in radio links may be indicated as follows:

- Application of GaAs FETs in large scale manufacturing of low noise RF amplifiers from 2 to 11 GHz started in 1976.

- Applications of medium power GaAs FETs in direct microwave local oscillators operating from 6 to 15 GHz: more than 5000 cavity stabilized oscillators using GaAs FETs have been manufactured since 1979 (figure 6).

- Design and realization of linear power amplifiers from 4 QAM and 16 QAM; as of January 1986, 1000 units of 2 W, 4 QAM amplifiers chains and (figure 7) 1500 units of 5 W, 16 QAM amplifier chains were manufactured.

- Design and realization of 17 to 20 GHz medium power amplifier chains; more than 200 units manufactured until now.

In the field of fiber optics:

- Application of low noise GaAs FETs in 140 Mbit/s PIN-FET preamplifier stages.

Concerning the fabrication of GaAs devices:

--Design and realization of medium power devices aimed specifically at oscillator applications and linear power amplification; more than two thousand 250 mW, 12 GHz packaged GaAs FETs manufactured and used in radio links.

New Areas of Development

New Microhybrid Technology

A new technology with hermetic microhybrid modules has been implemented to manufacture power amplifier drivers for medium power applications in the 2 to 23 GHz range.

The main features of microhybrid modules are:

- Saturated output power of 1 W at 8 GHz and 200 mW at 23 GHz;
- Pretuned to standard loads;
- Thin film with GaAs FETs in chip form;
- Integral self-bias circuit up to 8 GHz;
- External load connection with a standard tin soldering technique.

The main advantages are:

- Compact size
- Wider operating bandwidth
- Manufacturing process suitable for automatic assembly
- Improved EMC
- Easier maintainability.

Figure 13 shows the block diagram of a 4 GHz linear power amplifier manufactured according to the standard teflon-fiberglass technology compared with the new microhybrid technology (figure 14).

Figure 15 shows the block diagram and associated characteristics of the 19 GHz 4QAM transmitter where two micromodules have been implemented (figure 16).

Future Developments in Radio and Fiber Optic Transmission Systems

Figure 17 gives a review of GaAs transistor applications in telecom equipments, and includes a forecast to the end of the 80's. From the device point of view:

- Low noise GaAs transistors will evolve from FET to a High Electron Mobility Transistors (HEMT) structure, particularly suitable for very low noise amplification at frequencies higher than 20 GHz with operation at normal temperature.
- Power microwave devices will go through further improvement: new FET structures, such as Air Bridge Gates patented by Telettra, will achieve higher power levels at higher frequency and lower noise figure; new heterojunction bipolar transistors will be introduced. Figure 18 shows

these new GaAs device structure and the corresponding main performance parameters.

--Linear medium power monolithic circuits will extend their applications to frequencies higher than 4 GHz.

--Digital small and medium scale integrated circuits on GaAs will see industrial application for high speed base band systems.

Major evolving factors in radio link systems are:

--A further increase of level numbers in the M-QAM modulation method to obtain spectrum utilization efficiency higher than 5 bit/Hz;

--The maximum operating frequency will reach millimeter wave bands, in particular for data transmission system application.

Major evolving factors in fiber optic transmission systems are:

--The operating optical window will further move to longer wave lengths for very low loss optical fiber connections suitable for very long distance, repeaterless (e.g. transoceanic), transmission applications:

--The base band capacity will increase to 2.4 Gbit/s and higher;

--New coherent modulation methods will be introduced to increase receiver sensitivity.

Some Example of Future GaAs Device Applications

GaAs monolithic technology requires large volume production to achieve cost effectiveness.

For this reason repeatable circuits must be identified.

Figure 19 reports the schematic diagrams and preliminary specifications of a gain controlled linear amplifier for use in intermediate frequency stages at 70 MHz; and also of a gain controlled amplifier for microwave 4 GHz circuits.

Each transceiver will use at least 6 such gain controlled amplifier units for the main IF amplifier chain and 2 gain controlled microwave amplifier units.

In particular, for gain adjustment, use is made of a GaAs FET as a voltage controlled resistor, inserted in a cell structure (figure 20).

For preliminary realization, the vapor phase epitaxial process will be used (figure 21).

Two additional applications suitable for implementation in monolithic form are:

--Digital devices such as microwave frequency dividers.

--5 bit analog to digital flash converters for 64 and 256 QAM demodulators (figure 22).

Millimeter frequency band applications require transistor operation up to 60 GHz. The structures shown in figure 18 appear suitable.

Near future developments in fiber optic transmission systems will require a base band capacity increase up to 2.4 Gbit/s as well as the use of a new modulation system to improve system performance.

In particular, the following applications for analog (MMIC) are foreseen (figure 23):

- A low noise preamplifier connected to the APD receiver. GaAs transistors are suitable for these applications thanks to their low input capacitance, high transconductance and low noise figure;
- A wide band amplifier with a flat gain, ranging from 10 Hz to 2.4 GHz, or, alternatively, a D.C. coupled amplifier with a flat band characteristic up to 4 GHz.

For digital integrated circuits:

- A laser driver with a signal period of approx 100 ps which is directly connected to the laser;
- A sampler with a switching speed of less than 50 ps, consisting of a threshold comparator followed by a flip flop;
- A multiplexer and a demultiplexer.

These circuits are presently fabricated using hybrid microstrip circuits and GaAs FETs in chip form; implementation in monolithic form is presently under study.

Finally, the increasing importance of GaAs devices in radio link equipment manufactured by Telettra can be evaluated from table 2, which shows the evolution during the past decade, and the anticipated development up to 1990, of the following parameters:

- Percentage of manufactured equipment employing GaAs FETs;
- Average quantity of GaAs FETs per transceiver;
- Percentage of cost of GaAs FETs on the equipment total cost;
- Percentage of failure rate of transceivers.

Conclusion

The most important applications of GaAs devices in present and future radio and fiber optic transmission systems have been described, and important contributions by Telettra emphasized.

The need has been stressed for constant interaction between application requirements and technological developments, with the aim of improving equipment performance and at the same time reducing costs.

Fig.6 Various versions of cavity stabilized GaAs FET oscillators.

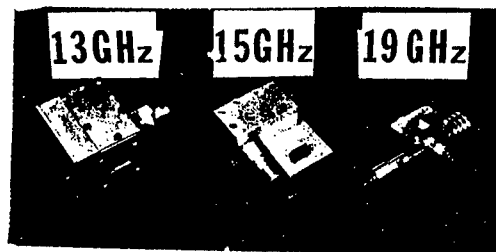


Fig.7 5 W saturated power amplifier, employed on radio links using 16 QAM. Usable output power is 1 W, with adequate linearity.

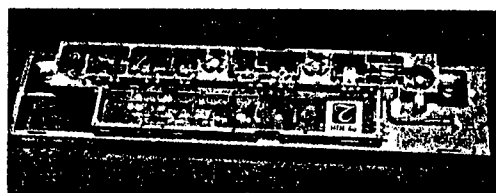


Table 1

GaAs FET Flicker noise source	DEVICE STRUCTURE	Bulk	- A.1 Neutral channel region - A.2 Depleted channel region - A.3 Deep level defects
	D.C. OPERATING POINT	Interface	- B.1 Semiconductor-air - B.2 Semiconductor-passivation - B.3 Active buffer-layer
		G-S junction breakdown at the signal peaks	

Fig.13 Block diagrams of a 4 GHz linear power amplifier designed for teflon-fiberglass technology compared with microhybrid technology.

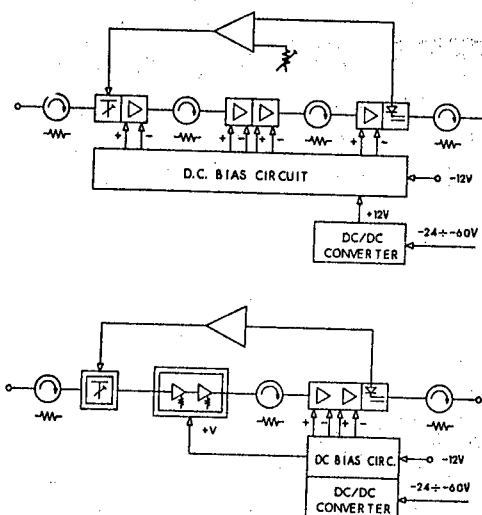


Fig.14 4 GHz power amplifier using new microhybrid module technology, (lower) compared to a similar power amplifier using teflon-fiberglass technology (top).

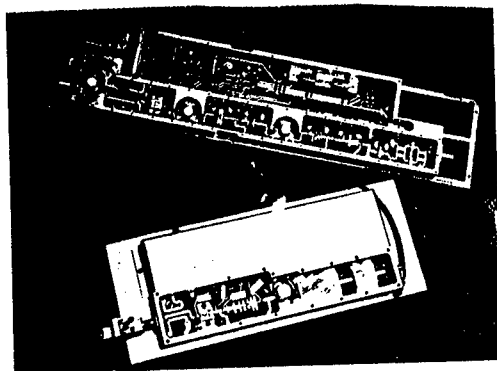


Fig. 15 19 GHz QUAM transmitter block diagram.

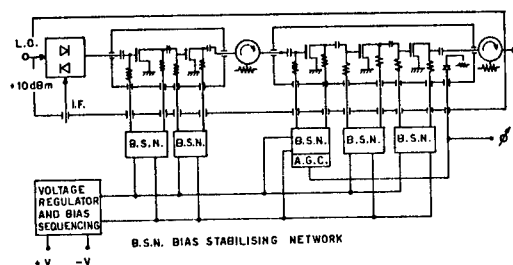


Fig.16 19 GHz power amplifier with P_{out} 120 mW using new microhybrid technology (right) compared with similar power amplifier using MIC technology (left).

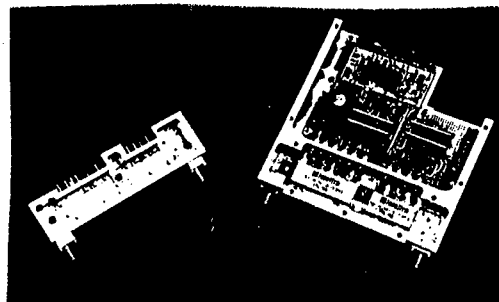


Fig.17 Review of GaAs transistor applications in telecom equipments.

YEAR OF INDUSTRIAL APPLICATION	FIBER OPTIC APPLICATIONS	GaAs TRANSISTOR			TERRESTRIAL RADIO LINK APPLICATIONS
		LOW NOISE POWER	ANALOGIC DIGITAL	MMIC IC	
76-78		MESFET 1 μ			4 GHz IF JUC PA (Z) DC IF FM/800
79-81	0.8 μ 34 Mb/s BP AM	MESFET 0.5 μ	MESFET 1 s1		6-13 GHz 2-8 GHz IF JUC PA (Z) DC IF FM/2700 4750/34Mb/s 8-13 GHz
82-84	0.8/1.3 μ 140 Mb/s BP AM	MESFET 0.25 μ	MESFET 2 s1	HPA / LNA 2 GHz	4-18 GHz 2-11 GHz DIG MOD IF JUC PA (Z) DC IF DIG 40MB/140Mb/s 160MB/140Mb/s 6-15 GHz
85-87	0.8/1.3/1.55 μ 56.5 Mb/s BP AM	MESFET 0.25 μ HEMT	MESFET 3 s1	HPA / LNA 4 GHz	0.4-23 GHz DIG MOD IF JUC PA (Z) DC IF DIG 4-16-64 QAM
88-	1.3/1.55/2 μ 2.4 Gb/s BP AM/COHERENT MOD	HEMT 0.25 μ	HBT	PA / LNA 8 GHz MS1 SS1	0.4-50 GHz DIG MOD IF JUC PA (Z) DC IF DIG 256 QAM

Fig.18 GaAs transistors for mm-wave applications.
a) Air Bridge Gate MESFET
b) HEMT (High Bridge Electron Transistors)
c) BHJT (Bipolar Hetero Junction Transistor)

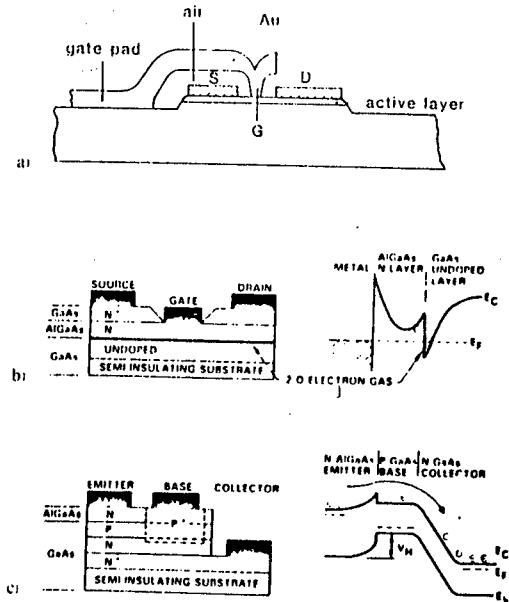


Fig.19 Analog monolithic circuits.

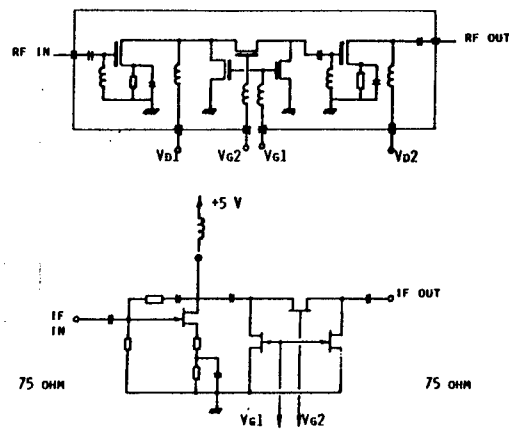


Fig.20 R_{CH} vs. V_G behaviour of the GaAs FET used as a voltage controlled resistor.

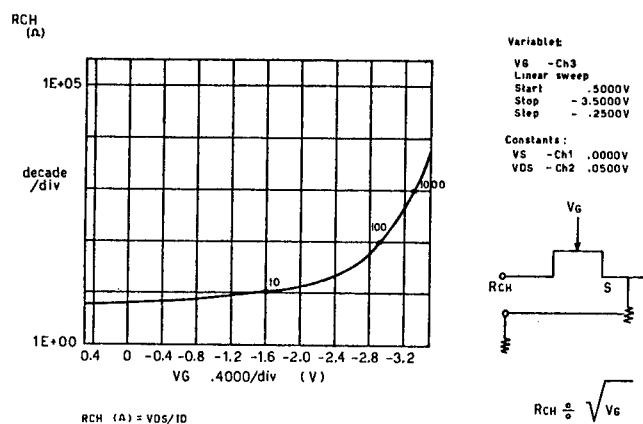


Fig.21 GaAs IC process sequence.

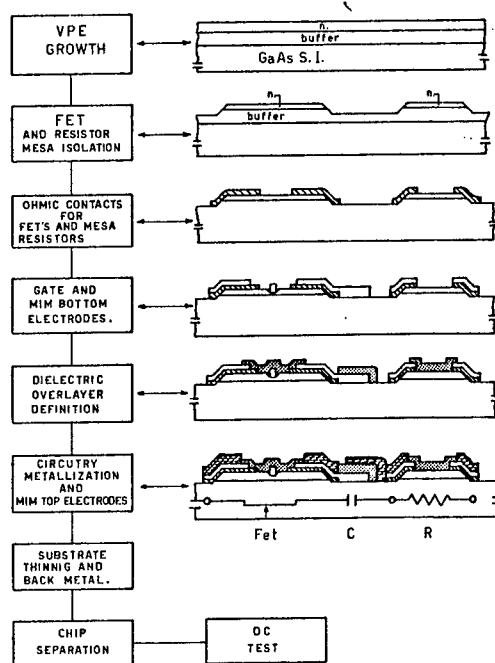
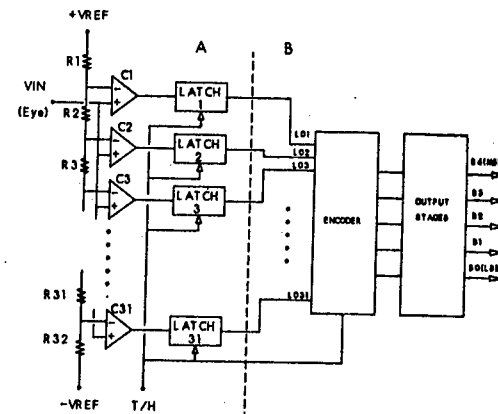


Fig.22 Monolithic digital circuit application.



Eye pattern characteristics at 144 Mbit/s			
ΔT (ns)	TSIMB	Roll Off = 0.5	Roll Off = 0.3
64 QAM	42 ns	6.1 ns	4.2 ns
256 QAM	55 ns	3.8 ns	2.6 ns

Fig.23 Typical F.O. transmission system block diagram.

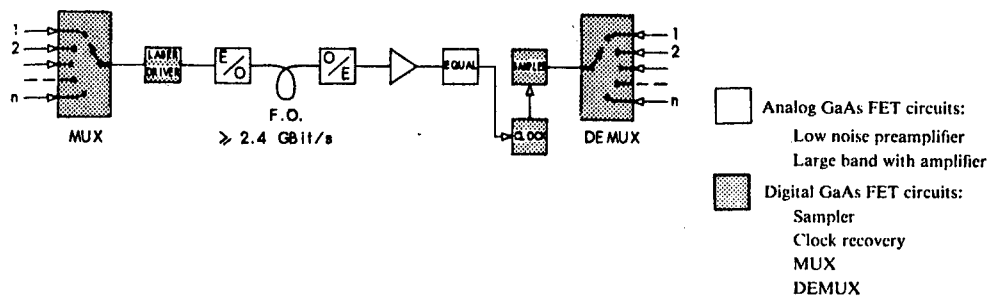


Table 2 Importance of GaAs devices on radio link equipment manufactured by Telettra.

	76-78	79-81	82-84	85-87	88-90
Equipment using GaAs FET (% of total production)	10%	35%	70%	90%	100%
Number of GaAs FET per transceiver	1	3	7 ÷ 8	10 ÷ 12	15 ÷ 25
Total cost of GaAs FET (% of transceiver total cost)	3%	6%	10 ÷ 15%	10 ÷ 25%	15 ÷ 35%
Total failure rate (% of transceiver failure rate)	1%	1 ÷ 5%	2 ÷ 25%	10 ÷ 25%	20 ÷ 30%

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DIGITAL TELEPHONE SYSTEM TO BE INSTALLED IN SALAMANCA

Madrid DIARIO 16 (CIENCIA supplement) in Spanish 27 Nov 86 p VI

[Article by correspondent Carlos Alonso]

[Text] Salamanca--The Salamanca digital telephone exchange, the first of its kind in Spain, will be ready to go on line before the end of the year. This prototype, which has served to perfect others that are already in service, is able to transmit data and work with telematics.

A 1240 system, the exchange is stored-program-controlled. Thus, in contrast to current exchanges, its control network is completely decentralized; in other words, programs are not concentrated in large computers but are decentralized in the various microprocessors in modules.

The exchange consists of a digital switching network connected to various terminal modules. Each module, in turn, has a control unit consisting of a microprocessor with memory and a hookup terminal, along with the circuits, which differ according to the type of terminal they serve.

The control units put through, monitor and charge for calls, handle maintenance and correct mistakes.

The main advantage of the system is that provides fast connections and a series of complementary services (others may be developed in the near future). For example, customers with touch-tone phones will be able to dial any number, whether local, national or international, by pressing three or, at most four keys.

In addition, through the use of a coded number customers can prevent all or certain types of calls from being made from their phones. Moreover, they can order a reminder call made to their number at a specific time over a 24-hour period.

One of the most useful services for people who are at work or on vacation is to have their calls forwarded to another number. An operator or a recording will then inform the caller that the person is not home.

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TURKEY

BRIEFS

NEW GAZIANTEP RADIO TRANSMITTER--Minister of State Hasan Celal Guzel has inaugurated the new 600 kilowatt Gaziantep radio transmitter that will be linked to the Turkish Radio's first program and will broadcast on medium wave. Speaking at the inauguration ceremony, Turkish Radio and Television Director General Tunca Toskay said that the new transmitter will broadcast on 765 khz medium wave and will be heard within a diameter of 300 kilometers during the day and throughout Turkey at night. [Summary] [Ankara Domestic Service in Turkish 1700 GMT 25 Dec 86 TA]

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