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THE ATM PILOT NETWORK OF THE SWISS TELECOM

A POWERFUL REAL PLATFORM

The continuously growing requirements for new and extended telecommunication services for mass data transfer, text, picture, video and multimedia communication exceeds the possibilities of even the most powerful of today's networks. The Swiss Telecom has accepted this challenge by establishing a new network based on the Asynchronous Transfer Mode (ATM).

Optimal information and communication are important factors for competing in the business world. The resulting and continuously growing requirements in respect to telecom-

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munication services can only be satisfied if powerful, flexible and reliable networks are available which fully provide not only the present but also future services that often include high bit rate services. A broad selection of possible requirements to modern telecommunication networks can be satisfied with the introduction of a broadband network based on ATM technology. Being aware of its advantages, the Swiss Telecom decided to build a pilot network, intended to serve as a basis for a later extension to a national network.

Arguments for realizing an ATM pilot project

By realizing a pilot network, international standards concerning ATM issued by ITU-T, ETSI and EURESCOM may be tested in respect to benchmark specifications for specific services. To ensure a future interworking of networks consisting of products of

different manufacturers as well as an interworking of networks on an international scale, stable and unambiguous standards are required. At the same time, the existence of standards supports an accelerated implementation of equipment conformal with standards. For the Swiss Telecom, there is a series of further arguments that support the realization of an ATM pilot project:

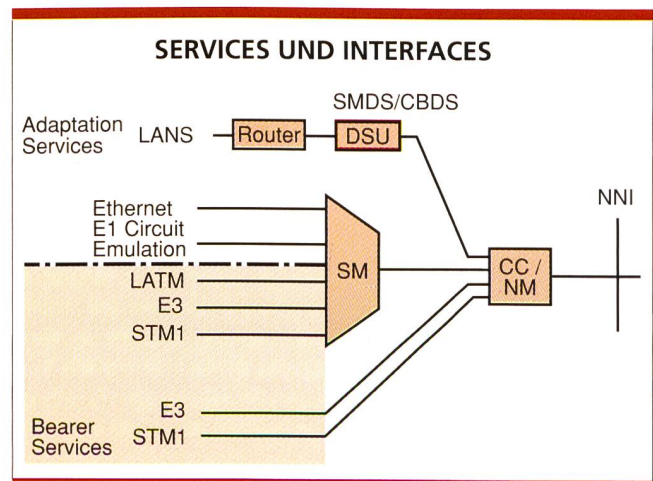
- The presence in a market of a future-oriented network technology
- Building up the knowledge in the

technical as well as in the operative area

- Experience in the area of marketing
- Initialization, promotion and test of new service implementations
- Examination of the market readiness and the interoperability of ATM products

The ATM pilot network was established on the basis of powerful ATM cross connects, being able to switch virtual paths (VP), service multiplexers (SM) and digital service units (DSU) that adapt to existing services and interfaces. An interconnection of these nodes is accomplished by the existing transmission network (PDH, 34 Mbit/s or SDH, STM-1/ 155 Mbit/s). In a trial, ATM transmissions have also been realized successfully and without any noticeable degradation over satellite links. The initiation of the control functions, required for the services within the network, is accomplished from a network management center (NMC) being positioned in a strategic location. The NMC controls the whole national network portion. Whereas the emphasis of the core network is to ensure a safe operation of the necessary transmission resources, the emphasis within the access network is on high

Fig. 1. Services and interfaces



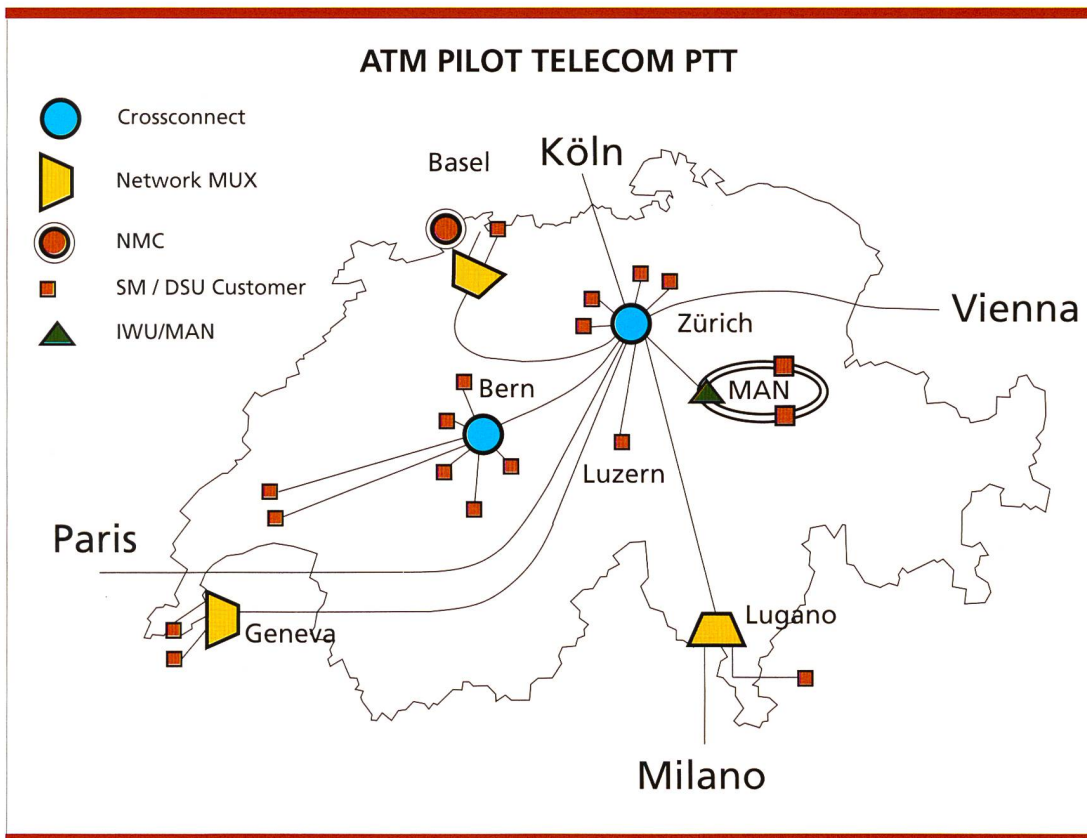


Fig. 2.
ATM Pilot Project of
the Swiss Telecom PTT

flexibility in respect to the network structure as well as the network element configuration. An important component of the pilot network is also the MAN-ATM interworking unit that allows using the connectionless service of the MAN to be implemented on the ATM network infrastructure. This also opens the possibility of coupling MAN's across ATM WAN's. To offer the connectionless service including its specific features also within the ATM network that operates strictly on a connection-oriented basis, a connectionless server (CLS) is integrated into the pilot project.

Services within the pilot network

Already in the first phase of the pilot project, ATM bearer services such as the connectionless broadband data service CBDS as well as ATM adaptation service interfaces have been offered (Fig. 1). Whereas the ATM bearer service requires a direct ATM interface at the user network interface (UNI), this is not the case for

adaptation services where interfaces of terminal equipments without ATM interface are supported.

Features of the pilot network

With the pilot network as it has been realized, the Swiss Telecom exceeded the minimum requirements of the MoU being limited on the realization

of an international node. Besides the strategically arranged large CC-62 nodes in Zurich as well as in Bern, additional CC-16 nodes are installed in Basel, Geneva and Lugano (Fig. 2). Thus, already a relatively complete coverage is achieved and potential customers can be connected to the nearest ATM node by using a reasonable expenditure.

The whole network is controlled and managed from the network management center in Basel. Due to the expected heavy traffic, the transmission links between the crossconnects are being realized by SDH-links at the level STM-1, 155 Mbit/s, whereas the network elements within the access range are largely connected by links of the plesiochronous digital hierarchy PDH (E3, 34 Mbit/s).

Customers connected to the pilot network

Already in an early stage, Swiss Telecom has contacted customers which were known to be interested in ATM technology. They were asked to participate actively in introducing and

EUROPEAN INITIATIVE

The Euro-ATM project is the result of a memorandum of understanding (MoU) for a harmonized introduction of the ATM technology based on a European pilot project. The MoU was initialized in November 1992. Today, already 17 network operators from 16 European countries are participating at the project, among others the Swiss Telecom.

using the new ATM technology. It is self-understanding that in the actual selection of projects, those applications proposed that actually utilize the advantages and strengths of ATM have been preferred, others that are evidently best covered by existing technologies were of less interest. Since this is an experimental operation with reduced operational warranty and it is also expected that the pilot users document their experiences according to the agreements, the tariffs have been drastically reduced compared with existing services. The experimental phase has started on 1 July 1994 and will last to the end of 1995.

The Euro-ATM pilot network

As shown already in *Figure 2*, the Swiss pilot network is forming a mesh with all surrounding countries. Direct links thus exist between Germany, France, Italy and Austria. By the meshing involving the various national ATM pilot projects in the spirit of the MoU, an Europe-wide international pilot network is created that demonstrates the strong intention of the network operators to advance ATM technology together.

As shown in *Figure 3*, a tightly knit web of ATM transmission links and international ATM nodes is placed over the whole of Europe. Thus, even companies active on an international scale can profit from the advantages offered by the ATM procedures, since it offers an optimal utilization efficiency on the normally costly international transmission links. For the time period of the symposium and exhibition TELECOM '95, this international network is put to the disposition of the exhibitors to demonstrate ATM applications over a real ATM-wide area network. The response has been correspondingly great.

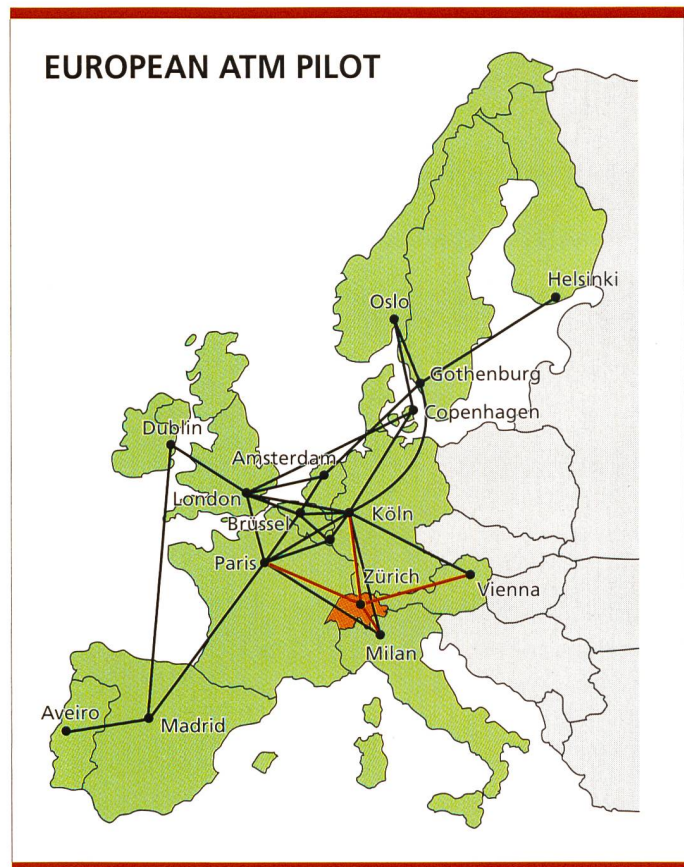


Fig. 3. European ATM Pilot

Results

The initiative of the European network operators has offered a powerful real platform to potential users of ATM services. The well-known vicious circle 'without network, no new applications – without applications, no network' was successfully broken by the project. Many have profited from the opportunity. Alone within the network portion of the Swiss Telecom, 40 different applications were being tested by totally 17 pilot users. The goals that were set for the ATM pilot network are considered to be fully achieved. The VP bearer service was provided with high quality and availability during the whole period used. The ATM adaptation services as well as

the support of the connectionless services including MAN-DQDB interworking and CLS have been provided to the full satisfaction of the users, despite some difficulties at the start. This ATM platform will now be used as a base network for the SwissWAN services and it is expected to also provide its services for the expected pilot project for the introduction of VC switching.



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SIEMENS

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