TECHNICAL MEMORANDUM

230

Report on the ninth meeting of Member State Computing Representatives, 7-8 October 1996

A. Lea (Compiler)

Operations Department

October 1996

European Centre for Medium-Range Weather Forecasts
Europäisches Zentrum für mittelfristige Wettervorhersage
Centre européen pour les prévisions météorologiques à moyen

CONTENTS

PREFACE

PART 1: ECMWF STAFF CONTRIBUTIONS

1. ECMWF'S COMPUTER STATUS AND PLANS - Geerd-R. Hoffmann 1
2. FUJITSU OVERVIEW AND SERVICE - Neil Storer 5
3. SecurID BASED SERVICES - Dieter Niebel 9
4. WIDE AREA NETWORK DEVELOPMENTS - Tony Bakker 11
5. THE NEW ECMWF DATA HANDLING SYSTEM - Richard Dixon 15
6. MARS AND DISSEMINATION UPDATE - John Hennessy 17
7. GRAPHICS UPDATE - Jens Daabeck 20
8. DAWN PROJECT - Walter Zwieflhofer 22
9. GENERAL DISCUSSION - Geerd-R. Hoffmann 25

ANNEX 1 - List of Participants 29

ANNEX 2 - Programme 30

PART 2: MEMBER STATE CONTRIBUTIONS

BELGIUM 1

DENMARK 5

GERMANY 15

SPAIN 23

FRANCE 29

IRELAND 33

ITALY 37

NETHERLANDS 43

NORWAY 49

AUSTRIA 57

SWITZERLAND 79

FINLAND 85

SWEDEN 89

UNITED KINGDOM 95

PREFACE

The ninth meeting of Member State Computing Representatives took place from 7-8 October 1996 at ECMWF. Fourteen Member State personnel took part, the list of attendees is given in Annex 1.

As in previous meetings, the Head of Computer Division (Geerd-R. Hoffmann) opened by giving an overview of the Computer Division's status and plans. This was followed by each Member State Computing Representative giving a short presentation about the use their particular service makes of ECMWF's computer facilities. The remainder of the meeting was a mixture of discussion sessions on the Centre's computer services and technical presentations about some specific aspects of the Centre's computer facilities. The programme is given in Annex 2.

This report briefly summarises each session, in particular concentrating on the discussions. Part 1 covers ECMWF's contribution, Part 2 the Member State contributions. All the report in Part 2 have been provided by the Representatives themselves.

PART 1

ECMWF STAFF CONTRIBUTIONS

ECMWF'S COMPUTER STATUS AND PLANS

G.-R. Hoffmann

Overview

The computer configuration in 1995 was based on Cray, IBM ES/9000 and SGI/Sun systems. This year has seen a lot of change. The Cray systems have been replaced by two Fujitsu VPP series machines, three IBM RS6000 systems have been added as the first part of the new data handling system, and three HP 9000 servers have been installed as a high availability server cluster. Each of these will be discussed in more detail later.

Over the 18 years the Centre has had Cray equipment the availability of that equipment has in general improved year by year, starting from 45 hours mean time between unscheduled interupts in 1980, to 437 hours in 1996.

The overall use of the main systems (Cray C90, T3D) so far this year shows Member States using 11% of the resources, compared with 25% allocated, while the forecast has been using 17%. Re-analysis, which successfully completed its work before the Cray service terminated, was able to take advantage of the fact that some other work had moved to the Fujitsu system earlier, and so used 13% of the resources in total (up to September).

Looking at the forecast delays we were doing well this year up to September. The forecast suite was moved to the VPP700 system in late September, and as is inevitable with any new system, delays were then experienced as the system was tuned.

Turning now to Computer Division personnel, there have been a few changes recently. Following the sudden death of Peter Gray, Claus Hilberg has taken over Computer Operations Section temporarily and Neil Storer has thus become Acting Head of Systems Section. Two posts are currently being filled. There are a few new consultants:

Jim Almond	working on a FECIT (Fujitsu European Centre for Information Technology) project concerning seamless High Performance Computing
Mike Connally	working in the new Data Handling System area supporting AIX etc.
Ken Kagoshima	from Japan working on systems support for the VPP machines
Umberto Modigliani	working on general User Support duties
George Mozdzynski	working on a European Union funded project looking at extensions to HPF (High Performance Fortran) which would remove the need to write IFS code using message passing explicitly.

Computer servers

As said before, the Cray systems (C90, T3D) were generally stable towards the end of their lifetime, although the C90 continued to experience problems at roughly three months intervals. The availability at 166.7 hours per week (averaged over 12 months) was excellent for such a system, while the user utilisation at 93.1% was the best the Centre has ever achieved. The job load increased towards the end

of its lifetime as some users attempted to complete their work and so avoid migrating to the Fujitsu systems, even so there were no major queue delays.

The reliability of the T3D was very good, 167.4 hours per week availability over the past 12 months, with very little downtime. Its main workload was the Ensemble Prediction System (EPS) which it ran continuously to capacity at nights and weekends, with a more general load during the working day.

Turning now to the Fujitsu systems, the timetable set up at the beginning was well met by Fujitsu Corporation. The preliminary system (a 16 processor VPP300) arrived in March and was accepted soon after. The secondary system (a 46 processor VPP700) arrived in June and passed its initial acceptance on 2 July. The configuration of these systems will be gone into a later talk, but in summary we have

VPP300 — 16 processors, 10 ns cycle time per processor, 2 Gbytes memory per processor, 1 I/O PE, 15 secondary PEs, 200 Gbytes RAID disks;

VPP700 — 46 processors, 7 ns cycle time per processor, 2 Gbytes memory per processor, 7 I/O PEs, 39 secondary PEs, 1 Tbyte RAID disks.

The enhancements to the VPP700 will be done in two phases in 1998, to 153 processors in March of that year, and finally to 240 processors in September. Currently, ECMWF possesses the most powerful system in Europe, the VPP700 being rated at just over 100 Gflops peak rate.

Within the Computer Hall we have currently moved all the tapes out of the Tape Library so that we can re-enforce the floor under that area. Once that has been completed, the area where the Crays were installed will be done. This follows the floor strengthening we had to do before we could install the VPP700. The problem was that the original design was based on a load that would be spread evenly across all the floor. In practise, however, the floor can be subject to much higher point loads immediately under each piece of equipment, and so strengthening was required.

To date the reliability of both Fujitsu systems has been excellent, with each machine showing only 0.6 hours per week (average) lost due to hardware or software faults. The CPU utilisation depends critically on which PE you look at. The primary PE (PE0) is heavily used, typically 50% going on system time. This is an area of concern that we are currently discussing with Fujitsu, because once the system time on PE0 reaches 100%, then all other machine scheduling etc. halts. The 16 processors currently used by the forecast are averaging 20% utilisation, the processors used by general user work are 30% loaded. This is roughly in line with expectation. Transferring a fully loaded C90 to a machine 5 x as powerful should initially load that new machine to only 20%.

Other equipment

The CFS based archive on the IBM ES9000 has reached 51 Tbytes held in 9.8 million files and is still growing strongly. Looking at the volume of data transferred per week into/out of CFS, the Fujitsu systems have practically doubled the amount, 800 Gbytes to 1700 Gbytes per week with a daily peak of over 400 Gbytes. This is in line with predictions.

Our VAX based telecommunications system is now really only handling telecommunications because the data pre-processing has moved to the HP system. The old ECMWF defined protocols are no longer used, and only two Member States (Portugal, Turkey) rely exclusively on DECnet protocols. All other Member States use either TCP/IP exclusively, or a mixture of TCP/IP and DECnet.

The server systems are much as before, except the HP cluster has taken over the handling of the home file system (from the CD4860 which has now gone) plus some functions from the SUN based servers.

We have recently taken delivery of 30 SGI Indigo 2 workstations. However, they have not been accepted yet as there has been a manufacturing problem which caused half to fail within the first week. SGI replaced all the processor boards, subsequently two more systems failed. Discussions with SGI are ongoing.

Another SGI server has been ordered based on the MIPS R10000 processor.

The availability of the current servers is very good. For example, ecgate1 has been fully (100%) available over the past 12 months. Usage is rising quickly, sometimes we see peaks of 100% usage for short periods. Some of this load increase is due to member State MARS jobs being migrated from the Cray system.

The HIPPI based internal network now connects the Fujitsu and IBM (old and new) systems plus one of the workstation servers. Two Gigarouters control this network. The FDDI network has expanded to three rings. However, despite (or perhaps because of) the LAN complexity it all continues to work very well. Breakdowns are rare, the users are happy with the service they get.

The wide area network now runs at 64 Kbps to all Member States, except Austria and France (128 Kbps) and the UK (2 Mbps). Data dissemination continues to increase, currently averaging 1600 Mbytes per day total (was 900 Mbytes a year ago). The incoming data is largely static at around 100 Mbytes per day.

Changing now to discuss the work on parallel systems

- the RAPS work continues, with the next workshop to be held at ECMWF on 4 December

- the PPPE project (tools environment) completed in June, resulting in the Centre obtaining VAMPIR to run on all systems to time parallel codes

- the HPF+ project (as mentioned earlier) started January this year.

Plans

The major items in the 1996 annual plan have either been completed, or are well on the way to completion.

The IBM RS6000 based new data handling system contract was signed in July 1995, the equipment for phase 1 arriving in October 1995. There are two further phases, the relevant equipment being scheduled for 1997 and 1998 respectively, to enhance the system to a level where it can cope with the full load from the final VPP700 configuration.

The phase 1 configuration consists of three servers (each with 4 PowerPC 604 processors and 1 Gbytes memory), 375 Gbytes of disk, and an IBM 3494/L10 tape robot system with 16 tape drives (10 Gbytes per tape). The software is AIX plus ADSM. Because of problems passing its initial acceptance, IBM have now provided an additional 8 tape drives (on top of the 8 original drives), an extra 400 Gbytes of disk (to enable RAID 1 running instead of RAID 5 as originally proposed), plus some tape partitioning features to be delivered in December. Various stages in the provisional acceptance have been successfully passed, final acceptance should be completed before the end of the year.

Looking ahead to 1997 the major items planned are:

- install phase 2 of the new DHS, consisting of another system and another tape robot, plus additional disks and memory for the present systems. The contract for this phase now goes to the TAC, FC, and then Council;

- a full MARS service on the new DHS will be introduced. Currently it is being developed and tested. This new MARS service should be more flexible than the present one. The old MARS should become read only around the middle of 1997;

- phase 3 of the new DHS has to be agreed, and the necessary contract amendments put before the committees and Council;

- better facilities for the Member State network, in particular the RMDCN proposal where it is proposed to merge the ECMWF WAN with that of the WMO GTS Region VI. Technically, it looks quite feasible, the political aspects may be more difficult to resolve. For Member States it would mean 128 Kbps links minimum, with possibly higher speeds for some larger ones;

- it is recognised that full access to ECMWF's computer systems is hindered by the (relatively) low speed links. Hence the DAWN project which will hopefully provide a proof of concept of using the high speed (2 Mbps and higher) European research networks to give much better access from Member States to the ECMWF systems. The first links, based on a 34 Mbps backbone should be available next year, with higher speeds 155 Mbps coming a couple of years later;

- a new accounting system for our Administration Department, the current system being based on 15 year old technology.

Beyond that into the 1998-2000 time frame plans become more vague, but should include:

- two upgrades to the Fujitsu system in 1998;

- installation of phase 3 of the new DHS and de-installing the current IBM ES9000 (1 July 1998);

- an ITT for the continued supply of workstations and servers beyond the end of the current three year contract;

- upgrade of the LAN in 1999 to be ready for gigabit per second transfer speeds required from 2000 onwards;

- possible replacement of the VAX VMS system which may well not be supported by DEC at that time. This will require the full co-operation of the Member States who, we hope, will all have moved to TCP/IP by then;

- the contract with Fujitsu finishes at the end of the year 2000, hence an ITT will be required in 1999 followed by a parallel run in 2000.

In 1998 Council will need to decide what computing capacity the Centre requires in 2001 and beyond, and how the Centre could acquire it.

Questions

Dr. Wihl (Austria): What has happed to the Cray EL?

G.-R. Hoffmann: It has been switched off and given back to Cray Research.

FUJITSU OVERVIEW AND SERVICE

N. Storer

Overview

This talk will cover various aspects of the current operational environment of the Fujitsu systems, followed by some of the requirements we still need.

We have two systems installed:

VPP300

- 16 processors (1.6 GFLOPS peak per processor)
- provided by Fujitsu to satisfy the contractual need for a system as powerful as the C90 to be delivered before 1 April 1996
- to become a test system shortly, and degraded to fewer processors (PEs)

VPP700

- provides power 5 x the C90
- 46 processors (2.2 GFLOPS peak per processor)
- a 47th processor available as a spare for any failing PE
- one primary PE for system functions and interactive access
- six I/O PEs for disk and network access
- 39 secondary PEs
- all PEs are identical as far as their computation capability is concerned
- 4 HIPPI connections, 2 each to a Gigarouter
- 8 and 16 Gbyte disks configured as RAID, totalling 1 Terabyte of disk space in all
- each disk is dual ported, so that if a connection from one PE fails the same disks can be accessed from another PE
- the secondary PEs have no I/O capability except to/from the crossbar (0.5 Gbyte/sec transfer rate)
- each PE runs a full version of the operating system
- two types of file systems exist, UFS (standard UNIX style of file system) and VFL (Very Fast and Large)
- UFS is used for small files, and is cached

- VFL is used for big files, and is not cached
- one file system can reside on one I/O PE only
- the home file system is kept on PE0
- 2 Gbytes of memory per processor, 92 Gbytes in total.

Operational issues

The VPP700 is fully integrated into ECMWF's NQS, NIS and DNS domains. Thus one can submit work to the 700 from any other Centre system running within the overall NQS environment.

We currently split the machine into three partitions - 16 processors for operational forecast work and certain Research work, 7 processors for Research's analysis work, and 16 for all other general user work.

The job scheduling available is quite primitive, basically it round-robins the jobs, submitting each job to the next processor in turn until all processors are full.

In general, user work is not run directly on an I/O PE, except for jobs doing excessive I/O such as archiving. User work running on any other PE then uses NFS to access the disks attached to a given I/O PE. Standard NFS is used for small files and hence can be rather inefficient. A stripped down version of NFS, known as PXNFS, is available for handling large files.

We need to ensure the main system (VPP700) has as little down time as possible. Therefore to this end:

- one spare PE is always in the system and available at short notice to replace a failed PE
- the majority of the disks are RAID, which means we can lose a disk and still continue to work without problem. The failed disk can then be replaced without having to stop any part of the machine. This has been shown to work well
- all I/O PEs are dual ported, so that if one fails its "twin" can take over
- similarly all HIPPI and FDDI connections are duplicated
- if there is a problem with one PE it can be dumped and rebooted without affecting any of the others. This has been done several times already
- the whole machine can be run, if necessary, with one or more PEs switched off
- "gated" (gate daemon) is running continuously to monitor the health of the network connections, and then automatically handle changes or bypass failing parts of the network
- the VPP300 is available for system testing before those changes are made on the VPP700. Fixes are coming regularly from Fujitsu, so having the VPP300 means we can check them out without having to stop the user service on the VPP700.

Current experiences

Using the IFS model as a benchmark we have shown that one PE is approximately 1.5 to 1.8 x one C90 processor. This means that many C90 single tasked jobs can port very easily to run on one VPP700 PE. This has simplified migration a lot.

However, the machine architecture and operating system design means that there is a heavy requirement on users to optimise their I/O. It is all too easy for one program with poorly designed I/O to severely adversely affect not only its own performance but that of every other program running in the machine at the same time. This is a consequence of most I/O being handled across the crossbar, often using standard (inefficient) NFS, involving at least two PEs (the originating PE, and the I/O PE handling the required disk or network connection). Thus we are currently using the following features to alleviate this I/O problem:

- system memory resident file systems (one per PE) can be used to hold commonly used commands
- a large memory resident file system (MRFS) is used on the primary PE to hold files and libraries that are heavily used throughout the machine, e.g. MARS interpolation files, to save reading them frequently from disk
- a job MRFS is available to any job to allow it to hold heavily used data, then a read or write of that data only involves a memory to memory copy, which is very fast
- VFL file systems can be used for large files involving big records. Also VFL disk space can be pre-allocated to ensure it is contiguous, further improving I/O transfers
- the RAID disks allow the striping of data, that is different parts of one file can be simultaneously read or written to 5 disks in parallel, reducing the transfer time by a corresponding factor of 5
- the HIPPI connection is used to transfer at high speed data to/from the data handling systems
- job swapping is kept to a minimum
- the standard UNIX utilities such as cp, tar, are not optimised for the VPP700 architecture. Thus locally written alternatives have been provided which transfer data much more efficiently.

We are also advising users on the best ways to do their I/O, for example:

- make as few system requests as possible
- transfer data in multi-megabyte pieces, by using large buffers
- avoid unbuffered I/O, for example all writes to "stderr" are unbuffered
- pre-allocate VFL files
- use job MRFS if at all possible, even if reading or writing the file only once
- avoid the UNIX utilities such as cp, tar, etc. Use one of the more efficient versions now being written locally
- analyse the data movements within your program and modify to do this more efficiently, especially in parallel programs.

A secondary problem I will mention is connected with memory allocation. On the Cray if you asked for 100 Mbytes of memory that was an upper limit. The actual memory your job used would grow and shrink as required, thus for a simple copy step you may only be using a few Mbytes, leaving the rest of your 100 Mbytes available to others to use. On the Fujitsu the memory you ask for is both a limit and an allocation. If you ask for 100 Mbytes your job will not start until there is 100 Mbytes of real memory free. As your

program executes if a step uses a lot less than 100 Mbytes, the unused memory is not released for others to use, it just remains allocated to you yet unused. Thus it is

(i) important to be reasonably accurate in your memory requests

(ii) worth considering splitting your program into several programs, if some stages use vastly different amounts of memory.

Conclusions

There are some improvements we can see that if implemented will improve efficiency a great deal. For example, almost all the operating system currently runs in scalar mode, and the VPP700 scalar processor is less powerful than that in the current of workstations. Fujitsu are now working on porting key parts of the operating system to the vector processors.

The MPP series of machines did not exist before 1996, the operating system is also very new. Fujitsu have done very well so far to get these machines up and running in such a short time. However, they need to keep working on software improvements to ensure that users can get the best out of what is probably some of the best hardware in the world.

Questions

A. Dickinson (UK): Are other Fujitsu users making the same points regarding efficiency and I/O optimisation?

N. Storer: At a recent Fujitsu User Group meeting in Manchester there were six sites giving reports. All made similar points. There are short-term changes that both Fujitsu and ourselves can make, these are being done within the next month. There are medium and longer term changes that Fujitsu can do such as coding changes to speed up common utilities, looking at alternative file systems, etc. For example, the hardware is ideally suited to using distributed file systems, and Fujitsu are indeed looking at this.

B. Barg (Germany): What jobs go into the very big (39 PE) job queue?

N. Storer: This queue is currently to handle all jobs requesting more than 16 processors (the normal partition definitions are limited to 16 PEs). It can also be used when you want to run up to 39 similar large memory single PE jobs, because then each job will be assigned to a separate PE.

G. Holt: The Centre is committed to running a larger ensemble EPS system in November (probably a T106 50 member ensemble). Each ensemble member will run in two PEs, and so we propose to run 17 simultaneously using 34 PEs, leaving five PEs spare for product generation and related tasks.

B. Barg (Germany): I looked at a description of the Fujitsu system a year ago. At that time the crossbar was still under development. Today has the crossbar the performance Fujitsu promised a year ago?

N. Storer: Yes. We did tests when we received the machine, and indeed the promised performance has been achieved.

SecurID BASED SERVICES

D. Niebel

Overview

In early 1994 a trial was conducted of a secure batch service based on smart cards. Resulting from this was a paper which was presented to the October 1994 meeting of the Technical Advisory Committee (TAC). The TAC proposed to Council (December 1994 meeting) that it be accepted, which it was.

The implementation of the system, based on SecurID cards, has largely followed the strategy proposed in that TAC paper, although we have managed to improve security beyond that which was envisaged in 1994. The take up of the service by Member States has been variable to date. Currently we are at the stage where we are ready to consider enhancing the system.

Operational service

The first operational service was telnet to ecgate1, which started in May 1995. An administrative utility was made available to Computing Representatives which allows spare cards to be assigned, PIN codes to be reset, etc. Since November 1995, telnet from a Member State to ecgate1 has only been permitted using SecurID cards.

The second operational service was a batch job service which has been available since May 1996. It provides the ecqsub function to submit batch jobs, ecqdel and ecqstat to manage those jobs, and eccert to create certificates which are required to permit the other functions to take place. Alternatively, if you do not use eccert, then first use any of the other functions (ecqsub, ecqdel, ecqstat) will trigger an implicit request for a passcode which then creates the certificate.

A certificate includes your user identifier and passcode, plus a check sum. The whole certificate is then encrypted using PGP encryption (PGP is public domain software). By default the certificate is valid for 12 hours, after which it must be renewed. This means a user only has to use his passcode once per day. However, to permit unattended batch working, e.g. for jobs submitted automatically every day (say), the period of validity of a certificate can be extended up to 7 days.

A SecurID based ftp service to ecgate1 is also available. This permits files to be transferred in either direction. However, since July 1995 eccopy has been available which provides automatic file transfers (without the need for a SecurID card) from ECMWF to a Member State. It is also used to move the output from ecqsub launched jobs back to the Member State.

The latest function to be provided is embedded in the MARS client software which is now being offered to Member States. It allows MARS requests to be submitted from a Member State to a MARS server running on ecgate1. This service also uses the idea of a certificate, but here the certificates are valid for three months making it very suitable for automated processing. This facility is also available to Co-operating Member States.

Another SecurID based service being worked on is to provide telnet access to ECMWF via the Internet. This will be covered in more detail in the talk by Tony Bakker.

Finally, I would like to thank those member States who have been active in helping testing and finding problems, in particular Ireland and the Netherlands.

Questions:

O. Brinkhof (Netherlands): If a normal user has a cron job which is launched at night or over the weekend, then he has a problem as his normal certificate is only valid for 12 hours.

D. Niebel: Correct. This would have to be discussed with the Centre on a one to one basis.

W. Zwieflhofer: This question was discussed at the last Security Representatives meeting. Basically we can extend the validity of a certificate on a per user basis. However, we would only like to permit this for a few, controlled, users per Member State.

A. Dickinson (UK): When do the SecurID cards expire? Do they all expire on the same date?

D. Niebel: Basically the cards expire at differing dates, depending on when we bought them from Security Dynamics. We can assure you that we will issue replacement cards well before these expiry dates. By that time the administrative interface should have been improved to allow the efficient exchange of new cards for old.

O. Brinkhof (Netherlands): Is it possible to transfer operational data via eccopy and another queue? We have the problem that some data from other projects holds up the transmission of operational data at night.

D. Niebel: This is a feature which we could add depending on demand.

S. Orrhagen (Sweden): Has anybody had quality problems with the cards? We had one card which displayed wrong figures when you typed them, e.g. typed a 4 but it displayed the figure 1.

D. Garçon: We have had one or two problems with such cards, which have been returned to Security Dynamics. If such problems occur you can swap it for a spare, and return the faulty card to us for a replacement.

WIDE AREA NETWORK DEVELOPMENTS

T. Bakker

Member State connections

In August 1995 the last Member State link was upgraded to 64 Kbps. Since then, France and Austria have further upgraded to 128 Kbps, the UK to 2 Mbps. We also have lines to two Co-operating Member States (Iceland at 64 Kbps, Hungary at 9.6 Kbps) on which we disseminate our products, and will later provide them with MARS access.

A third Co-operating Member State, Croatia, has joined and is in the process of connecting. Lastly, an agreement has been signed with EUMETSAT for them to use MARS, their access being via the line from DWD.

Most Member States, plus Iceland and Hungary, use a CISCO based connection, running TCP/IP and DECnet Phase IV protocols. Those still using the DECnet protocols (Ireland, Italy, Norway, Finland, Sweden, UK) use them for receiving the dissemination products. However, most are beginning to use ecbatch etc. via TCP/IP and, hopefully, will then also move to TCP/IP for dissemination, meaning that we can stop using DECnet on those links.

At the low level, Belgium is still using X25 protocols, while Greece is using a PPP protocol (as they do not have CISCO equipment at their end). Everyone else uses the HDLC protocol.

Two Member States (Portugal, Turkey) are still only using a DEC based router connection, and hence can only use DECnet protocols. It is believed that Portugal may move to a TCP/IP based link later this year. The problem with DEC routers is that they have no access control facilities, meaning that security has to be done at the host level, which is not an ideal situation.

ETR group

Council, at its June 1992 meeting, decided that Member States could transfer data between themselves using ECMWF's network. Those Member States involved in this have become known as the ETR (electronic traffic routeing) group.

There are currently six Member States in this group (Denmark, Germany, France, Iceland, Austria, Switzerland), transferring data mostly in pairs

Germany	-	Switzerland
Denmark	-	Iceland
Austria	-	France.

On a few occasions, because ECMWF traffic has higher priority, there has been some hold up of ETR data. Usually this has been the result of one individual user transferring a large amount of data. These situations have been resolved by asking the user(s) concerned to send their data at different times.

VAX cluster

There have been a few changes over the past two years, including:

- the removal of unused user identifiers (unused for two years or more), as they pose a security risk (as highlighted in a recent security review). This has removed roughly 350 (out of 650) user identifiers from the VAX cluster;

- the replacement of sendtm by eccopy-c. This has been done especially for those Member States who do not have a TCP/IP link yet;

- the introduction of the ecbatch service has meant less use being made of the VAX based remote job submission system. However, the VAX based service will continue for some time yet;

- the investigation into the use of SecurID cards on the VAX based DECnet links. This has proved successful and so we still start to introduce SecurID cards on the VAX cluster links as well. This will tighten up the security on the VAX cluster.

The hardware still consists of three systems (2 x VAX 4100, VAX 3100) plus 10 GB of shadowed RAID disks. The main applications are:

- dissemination of ECMWF products
- remote job submission (mainly for DECnet only Member States)
- batch output transfer
- file transfer via eccopy-c
- receiving the data acquisition files
- pre-processing (but a parallel system is now running on the HP servers and so, hopefully, the VAX based pre-processing will cease soon).

Internet and the Firewall

The link to the Internet was upgraded to 2 Mbps in May 1995, and currently connects at ULCC (University of London Computer Centre). Also our domain name has changed from ecmwf.co.uk to ecmwf.int.

We currently have the following services in a pilot stage:

- interactive access to ECMWF using SecurID access control (tn_gw.ecmwf.int);
- anonymous ftp (ftp.ecmwf.int) providing a read only service;
- World Wide Web server (www.ecmwf.int).

For staff, the Internet provides the following services:

- telnet, ftp, and www access
- USENET news
- X application gateway (currently under test via the firewall) where the user can start a remote X application and through the firewall display the X window on his local system.

The firewall itself is based both on the public domain Firewall Toolkit and on the equivalent commercial version called Gauntlet. Both are from Trusted Information Systems Inc. We need both versions because initially only the Firewall Toolkit permitted the use of SecurID card access. This SecurID access has been tested by a user from the University of Graz (Austria).

Over the next few months the following changes are planned:

- upgrade to the latest version of Gauntlet, which now supports SecurID fully;
- implement an HTTP gateway which will allow better control of access to the WWW, and disallow the use of JAVA applets (there are known security risks with the JAVA language);
- split the e-mail reception/delivery, because there are still a lot of security reports concerning sendmail;
- introduce new WWW server software, for example the Apache server software as it is faster and better than the server software we currently use. We have had reports that it can be slow accessing ECMWF's WWW server pages;
- generate German and French versions of the ECMWF external WWW pages.

With the implementation of this firewall one of the important points to get right is our domain name service (DNS):

- it really must be used in any TCP/IP network, without a DNS a TCP/IP network is very difficult to control;
- it has been split between our internal network and the Internet, with only a small list of allowed server names on the Internet;
- our internal DNS is visible from our Member States as a secondary service. In principle, we would like to get reciprocal access to our Member States' own DNS as well. It helps to access host names rather than IP addresses;
- consideration is being given to setting up a similar firewall service between ECMWF and its Member States on the internal network. This should give better access control without any loss of visibility over the current services.

Questions:

H. Müller (Switzerland): You mentioned you have disabled JAVA, why?

T. Bakker: Reports have been received of security violations in the JAVA language, which have been demonstrated by some university people in the USA. Because it is a major design flaw in the language, an applet can use resources on your local host that it should not normally be permitted to use. Documents are available on the Internet describing what these security concerns are.

G. Wihl (Austria): A remark - I wish to express my gratitude to all those who were involved in the testing of SecurID access via the Internet and the Firewall.

L. Campbell (Ireland): There is a European based project underway currently which is providing telematics based training for meteorologists. It is based almost exclusively on JAVA and its applets. I am therefore concerned to hear it is such a security risk.

W. Zwieflhofer: The JAVA concept is a very good one which we would like to use as well. For example, it would make code maintenance and distribution much easier. However, as mentioned before there are security problems, and there has been a CERT advisory recommending it be disabled, hence we have followed its advice.

T. Bakker: If you use JAVA only on an internal network where you have complete control, then it is safe. However, on the Internet it is all too easy to trigger a JAVA applet without realising it, with all its consequential dangers. It is now back with the developers to work on it.

G. Wihl (Austria): If ECMWF and the GTS Region VI form a joint closed network, is it possible to introduce JAVA on that network?

W. Zwieflhofer: The underlying network technology will be fully discussed in the TAC, PAC, etc. and will probably not be introduced before 1999. The JAVA issue is a concern for today, SUN is working very hard to resolve the problems and hence well before 1999 JAVA will either be a success or it will have faded away.

H. Müller (Switzerland): Is the basis for this concern the well publicised problem with JAVA Script earlier this year?

W. Zwieflhofer: No, JAVA Script is not actually related to the JAVA language at all. All the problems we presented at the ECMWF Security Representatives meeting relate to JAVA proper.

B. Barg (Germany): What is the Centre's current policy with respect to the former Yugoslavia? I have heard that the UN has dropped its restrictions, hence what happens to the line to Yugoslavia that was cut by ECMWF?

A. Lea: Currently there is no change, the original Council decision still stands. I am not aware of any plans to raise this issue at the next Council meeting.

THE NEW ECMWF DATA HANDLING SYSTEM

R. Dixon

Plans and time scales

The new Data Handling System (DHS) is being implemented in three phases. The first phase is an initial production service (or extended pilot study) handling only part of the possible load. It was installed in 4Q95 and is designed to handle part of the VPP700 load, thus reducing the current CFS based system load. The project is running approximately three months late. Originally, it was planned to take some of the VPP700 load in July, it is actually beginning to take it now (October).

Phase 2 of the project takes place in 1997 when we upgrade the hardware to cope with the entire VPP700 load, and thus will stop writing any new data into CFS. Finally in 1998 to cope with the load from the upgraded VPP700, further hardware will be added increasing both the capacity and the transfer rate. The current plan is to switch off the current CFS based service entirely in mid 1998.

Phase 1

The hardware consists of three IBM RS6000 servers each with four PowerPC604 processors, over 400 Mbytes of protected disk space, an IBM 3494 tape robot with 16 drives, plus HIPPI, FDDI and Ethernet network connections. The configuration is such that if one server fails its disk system can be picked up by the remaining two. The tapes used in the tape robot have a capacity of 10-12 Gbytes, compared to 600-800 Mbytes the existing CFS based system tapes hold. There have been problems in meeting some of ECMWF's performance requirements with the equipment IBM originally installed, hence some additional hardware (disks, tape drives) has been provided by IBM in order to meet the required performance criteria. In addition, IBM have redesigned the method used to write files to tape in order to reduce lost tape motion when retrieving a random set of files.

Comparing ECMWF's archive data volume over the years shows that it is increasing in proportion to the supercomputer power installed. Now it is well known that computer power doubles roughly every 18 months (Moore's law), and the Cray systems we have had followed that trend very closely. The same rule has therefore given us the data growth we have seen in the past. Looking ahead the VPP enhancement promises to give more power than originally expected, and hence the data growth could be higher than originally planned for. It is hoped therefore that the new DHS can also be improved to meet the possible higher growth figure.

Software

The complete system is rather complex. However, in outline the central core consists of an ADSM tape library server which provides a proprietary data repository, the users accessing it through purpose built interfaces. The hierarchical storage manager (HSM) running under AIX provides a conventional UNIX file system. In practice, HSM keeps frequently used files in a cache store while all other files are given to ADSM to store in the tape library. Another way into ADSM is through third party clients which can reside on any UNIX system, e.g. SUN, SGI, HP and (later) Fujitsu. These allow data to be moved between specific UNIX systems and ADSM directly. An ftp interface to ADSM is being built that will allow ftp requests to be sent direct to ADSM, and an application interface (API) allows specially written software to store data into ADSM. The new MARS system will use this API.

ECFS is the replacement service for ECFILE. It differs from ECFILE in that its user interface is UNIX like, this in fact was requested by users in surveys made before we constructed ECFS. An enhanced

TCP/IP ftp is used as the mechanism to move files. ECFS is written in PERL to allow quick development of the system. It is hoped to recode it in C once it has stabilised to make it more efficient. ECFS is in service now from all the major systems within the Centre.

There are a number of disadvantages using plain ftp for moving files around the system. In particular it asks the user for an identifier and password every time it is invoked, this is not popular. ECMWF ftp on the other hand uses a validation mechanism which does not require an identifier and password for every request. In future, the ADSM ftp direct interface will be used for large files, primarily to/from the supercomputer. This avoids moving them through the HSM ftp interface which would have the adverse effect of pushing all the small files out of the HSM cache every time a large file was stored.

It is very inefficient if a user working from a workstation uses normal UNIX ftp to retrieve a file from ECFS and store it in an NFS mounted file system. Normal UNIX ftp would copy the file twice, first from ECFS to workstation, then from workstation to the NFS server. Thus we have implemented a scheme whereby ECFS ftp first checks if the data is to come from, or go to, an NFS server. If that is true, then ECFS will read from (or write to) the NFS server direct, thus involving only one copy action. That copy is also usually over the fast FDDI or HIPPI networks, whereas the double copy (to/from workstation) would involve the much slower Ethernet. All in all, a vast improvement over the simple UNIX mechanism.

MARS

Finally, a few words about the new MARS service. Based on an initial study the following are the main requirements for that MARS service:

- maintain the existing MARS command language
- provide a more flexible system for the metadata (i.e. the data that describes files and where they are held) by using an object orientated database (ObjectStore was chosen for this)
- store up to one billion meteorological fields
- become operational in 1997, taking over the full MARS load by the middle of that year
- to be able to add new data types more easily than with today's system. The current system has most data type definitions coded into the program, the new system keeps information on data types as yet another object which can be then changed or added to much more easily
- make it transparent to the MARS service which files the data is stored in, or what storage media is being used. This is to allow future flexibility in adding new media as they become commercially available.

The current state of the new MARS service is that much is in place now, and a test server is running. However, as yet it is using a normal UNIX file system rather than ADSM as its file store.

MARS AND DISSEMINATION UPDATE

J. Hennessy

MARS

For many years MARS was coded in Fortran. That version disappeared once the Cray systems were switched off. It was replaced by a C version that has been running for over 12 months now on some of the Centre's systems. The C version has none of the options available under the Fortran version (e.g. -C, -Z, etc. have gone). The C version also uses the new interpolation software, and the same software is now used, regardless of which machine the interpolation is carried out on.

The current MARS system is built on a different principle. Although it has almost the same user interface, it now has access to several databases rather than one. When you submit a request you may get the data from one of several databases that exist on different machines, e.g. IBM, Fujitsu, etc., or from one of the on-line caches. The list of database and cache systems available to MARS is also held in a file, and thus can be tuned easily as circumstances change. With this new configuration it is also possible to run it in a client-server fashion across a network. For example, the client could be in a Member State, giving that Member State direct access to the ECMWF MARS archive. Again with this configuration it is now possible to add a new database very quickly, for example that on the new data handling system (DHS) as soon as it will be available.

MARS on the new DHS consists of a MARS server that passes requests to a data server, that in turn talks to ADSM. ObjectStore "object" databases are used to hold information on where the data is, and is thus used to translate meteorological requests into file requests.

There have been a couple of publications issued within the past 12 months:

- an update of the MARS User Guide (Revision 11, Sept. 95); it is planned to update it again shortly as there have been several recent changes;

- a GRIB encoding/decoding Meteorological Bulletin.

A lot of additional data is now being archived, especially from the Ensemble Prediction System (EPS), e.g. ensemble means and standard deviations, probabilities for temperature, rain, etc. We are also receiving ensemble forecasts from NCEP Washington and these too are being archived in MARS.

There have been a couple of additions to the monthly means, first-guess data and wave data means. With the introduction of 3D-Var initialised analyses are no longer produced. Additional grid point model level data is now being archived. Finally, SSMI data (polar observations) are also archived.

MARS is now available on the Fujitsu, and also as a batch service on ecgate1 for Member State users. Thus Member State users who are only doing data retrieval should do this on ecgate1 rather than the Fujitsu.

Finally, as stated before, MARS client software is now available to Member States.

By the way, we do very much welcome feedback from Member States on all aspects of the MARS service, including both on the manual we provide and the examples.

Dissemination

Dissemination is now only available in GRIB and GRID formats, the old ECMWF bit code has finally been withdrawn. Additional GTS products, out to day 7 for Northern and Southern Hemispheres and winds out to day 4 or 5 for the tropical belt, are now available. The number of products sent out each night has reached 115,000 which is twice the number disseminated two years ago. The volume disseminated has gone up by a factor of three to reach 940 Mbytes per day.

The current schedule was introduced on 22 November 1994. It brought the 12 UTC forecast forward by about 70 minutes (day 10), and also brought forward the wave products. We have, at times, had difficulties meeting this schedule, especially at the beginning of 1996 when the 3D-Var analyses became operational. However, we believe we are now coping.

Some new products have been made available:

- spectral orography
- rotated grids
- from the EPS both the control and perturbed forecast fields (upper-air fields only)
- the specific humidity (Q) is now a Gaussian field rather than spherical harmonic
- EPS probabilities for temperature, rain, wind, etc.

The Centre is distributing its products to some new customers:

- Greece has joined the Optional Wave project
- Iceland and Hungary (Co-operating Member States) take their data directly from us via leased lines
- MDD products are sent to Toulouse.

There are some items which have been discontinued:

- initialised analyses
- convective cloud
- ECMWF bit code
- three letter country codes (having been replace by the two letter country codes).

There has been a very big effort this year in migrating all the product generation software to the Fujitsu. It uses the new interpolation software (as MARS does). It also took a lot of effort to check out the products generated on the Fujitsu. We had a number of problems the first few nights when we switched over, for example some U and V products were faulty due to jobs being run out of sequence. However, in general the migration seems to have gone well, my thanks to all those involved both in the migration and in the testing.

Questions

O. Brinkhof (Netherlands): I have a user who has problems with the -G option, can anything be done?

J. Hennessy: We have just recently sent that user a utility that should help. In general, if users do have a problem because of the old options being withdrawn, they should contact us, as we are usually able to help. However, what we do not want to do is to continue to support these old options indefinitely.

S.Orrhagen (Sweden): The MARS client software that runs in the Member State, is there any documentation about it and how to acquire it?

J. Hennessy: There is no documentation on how to acquire it, please just request it from the Centre. At the back of the MARS manual is an appendix outlining the new features available in this client.

S. Orrhagen (Sweden): Member States can change their dissemination requirements using the VAX system, any proposals to replace that mechanism?

J. Hennessy: In the longer term I expect we would like to have it on a UNIX platform. The VAX DECnet based dissemination can be quite tricky, pure binary files sent via TCP/IP are much easier. However, there are no concrete plans at present to move it.

L. Campbell (Ireland): When Member States have switched from DECnet to TCP/IP dissemination, have there been any decoding problems using GRIBEX?

J. Hennessy: No change should be required in GRIBEX. The change will be in reading these files, and for this we provide the PB (pure binary) read routines. If you are using the PB routines already on the DECnet based dissemination files then, hopefully, there should be no change when switching to TCP/IP.

R. Rudsar (Norway): Is there still a limit on the amount of data we can request for dissemination?

J. Hennessy: There are some limits, because of a finite amount of VAX disk space. But they are not as restrictive as before. If you feel you are being constrained, however, please let me know.

GRAPHICS UPDATE

J. Daabeck

MAGICS

This is a Fortran callable library that ECMWF started many years ago. Since then, most Member States have acquired a copy.

MAGICS is constantly being added to as more and more requirements are put forward. It is heavily biased towards the GRIB and BUFR standards for data formats. The current release is 5.2 on SGI and HP platforms. It is being tested on DEC Alpha and SUN Solaris systems in CPTEC Brazil and METEO-FRANCE respectively. As always, it is available to Member States on an as-is basis, through ECMWF's Data Services group. To implement it at your site you need Fortran 77 and C compilers, a GKS interface, and an X Windows system. In addition to the MAGICS library you also get EMOSLIB from the Centre.

The main additions to MAGICS since version 5.1 are:

- plotting of 3D-Var analysis feedback data
- plotting of scatterometer and TOVS radiance data
- a new method of shading for field plotting, known as marker shading
- a new method of interpolation (from EMOSLIB) for spectral to grid etc.
- improved colour shading.

METVIEW

As you know, METVIEW has become an important tool at ECMWF for visualising meteorological data on our workstation system, either interactively or through macros. It is based on ECMWF's standards, i.e. data access via MARS, graphics via MAGICS, and the WMO GRIB and BUFR data formats.

The current release is 1.5A which is in production on the SGI systems. It is also in final testing on HP, DEC Alpha, and SUN Solaris systems. It too is available to Member States on an as-is basis via Data Services. By the way, this version now contains MARS client software so that, if you wish, you can access remotely data stored in ECMWF's MARS system from your copy of METVIEW. To install METVIEW you require C++, C, and Fortran 77 compilers, X Windows, MOTIF, Xelion S-GKS and Xpm (public domain software). You get source code from us, we prefer not to distribute binary code as there are too many options that have to be catered for. In addition, you need the MAGICS and EMOSLIB libraries from ECMWF.

Within the Centre, METVIEW is now used to generate all the operational forecast suite plots, via macros run in UNIX scripts launched via SMS. It is in the Centre's plans for the coming year to create a library of macros that can then be used by Member States to access, manipulate, process and display all the Centre's data. You can modify and add to these macros as you wish to create your own particular plots. As new data types become available so ECMWF will probably create macros to handle them, e.g. GRIB data type 2, Ensemble Prediction System data files, etc.

The future plans are to continue to support it on the Centre's SGI and HP workstation platforms, and to enhance its visualisation capabilities and colour scheme.

Regarding documentation, first there was the article in the ECMWF Newsletter (No. 68, Winter 94/5), now we are producing a manual and issuing it chapter by chapter. Available now are Chapter 1 (basics) and Chapter 4 (macro language). On the way are chapters on the classic metgram and the user interface (in more detail). After that will come chapters on each application within METVIEW.

Questions

Dr. Barg (Germany): I understand Brazil may develop an IBM version of METVIEW, have any Member States requested such a version?

J. Daabeck: Two months ago we had one enquiry from an institute in Germany, but they never followed it up. We have had no requests from Member State meteorological services for an IBM version.

DAWN PROJECT

W. Zwieflhofer

TEN-34

TEN-34 is the Trans-European Net at 34 Mbps, which is funded under the EU's Fourth Framework Program at a level of 12 M ecu. It is mainly a consortium of 18 national research networks, with a number of European telecom operators as associated partner. They have founded a company called DANTE to organise and manage the project.

The objective of TEN-34 is to interconnect the European national research networks. Many of these networks are powerful entities in their own right, but their current interconnections are often poor (maximum 2 Mbps in the best cases). Initially, the production network will only be based on IP Technology, as currently ATM is deemed to be too expensive (on a per megabit basis). However, ATM will be used wherever IP connectivity is not available. Nevertheless, there is a separate European ATM backbone for research into ATM issues, it is called the JAMES project and is a separate network from TEN-34.

The topology for the TEN-34 production network is as follows:

- BT, Deutsche Telekom, France Telecom and Telecom Italia will provide transmission services based on ATM but carrying IP packets

- Unisource (a consortium of PTTs from The Netherlands, Spain, Sweden and Switzerland) will provide a direct managed IP network

- the above two networks will be interconnected at three points: Frankfurt, Geneva and London.

A diagram of the overall network can be found on Internet at URL http://www.dante.net/ten-34/ten34net.gif/. It should be noted that 34 Mbps is the ultimate aim, many of the initial links will be less than this, e.g. 4, 6, 10, 22 Mbps.

DAWN

Some meetings have been held to discuss the participation of ECMWF and its Member States in this EU funded project, starting with the September 1994 session of the Technical Advisory Committee. The outcome was the DAWN project (Distributed Applications over Wide-area Networks) which will become part of Work Package 13 of TEN-34. There are three partners in DAWN, their responsibilities being:

DWD	Distributed model suites
METEO-FRANCE	Coupled models
ECMWF	Modeller's workbench.

In a little more detail these three areas are:

(i) Distributed model suite

DWD is developing a new forecasting system, a high resolution non-hydrostatic model. Output from this model will be used as input to various secondary models, e.g. transport models. At the moment, DWD does not have enough computing resources to drive all scientific investigations required on their own system, hence they propose to use their allocation at ECMWF for part of this work. To use this effectively will involve transferring a large amount of data, e.g. 4 Gbytes, on a regular basis, and requiring it to be moved within one hour. This leads to a sustained bandwidth requirement of 10 Mbps. The data will be generated at ECMWF, transferred to DWD, and then on to various other university based partners in Germany. The benefit foreseen using TEN-34 is the timely development of this new model.

(ii) Coupled models

METEO-FRANCE wish to couple atmospheric and oceanic models for seasonal forecasting purposes. In particular by coupling various models together they hope to investigate how errors arise, especially the systematic errors. The alternatives are either to port all models to one machine and couple them there, or couple them across a network. The DAWN project proposes the latter approach. Thus each model will run on the machine it was developed on and optimised for, then for research purposes they will be interconnected in various combinations across the network. An interface library (called OASIS) has been developed by CERFACS and is already available. It will be used to facilitate this coupling across the network.

The data exchange will be "bursty" in nature, small messages (~ 1 Mbyte) being exchanged frequently. Because each model takes substantial resources when they run, each data exchange should be fast (< 1 second real time) in order not to hold up each model, so avoiding the waste of resources at each end.

The overall benefit is seen as allowing the coupling of all these models without extensive manpower being involved in large scale conversion of each model to one given system.

(iii) Modeller's workbench

Assuming TEN-34 provides proper access between research centres, allowing researchers at one site to login and effectively access another site, there are still problems for the users. In particular, the remote environment will differ from that at home, the tools available will differ, job submission methods will be different, etc. This often deters researchers from attempting to use a remote system. Thus the aim of the Modeller's workbench is to provide a uniform environment and set of tools such that a user can use to access any site in exactly the same manner. Overall such a task is a big one, hence three sub-areas will be concentrated on in the DAWN project:

- experiment preparation, e.g. a wide-area network version of ECMWF's PREPIFS
- process supervision, e.g. scheduling the transport of data before a model run can begin, and after it has finished
- real-time visualisation of data as it is generated on the remote machine.

The benefits foreseen are to enable modellers to use remote systems efficiently and quickly, without the overheads of having to learn the details of the remote environment before they can begin.

Finally, a word on the current status:

- the EU has approved the overall TEN-34 project, the contract having been signed in the spring of this year
- the actual network topology has not yet been formally approved. However, once it is approved orders can be placed and a trial service should begin early in 1997. The aim is for a production service by March 1997
- the EU funds 40% of all the costs, 60% then comes from the partners
- for DAWN the EU asked the project cost be restricted to 600 K ecu
- finally some modifications to the proposed work plan are required as DANTE will not accept a project where new code is developed.

Questions

T. Bakker (ECMWF): The proposed topology - is that just an initial phase, will it be upgraded or extended later?

W. Zwieflhofer: There are no definite plans. However, some of the links are virtual ATM based connections which can easily be upgraded at very short notice, it is only a matter of funding!

Dr. Barg (Germany): What's the capacity between Madrid and Lisbon, the topology chart does not specify it?

W. Zwieflhofer: Sorry, I do not know. I can only assume such details have yet to be finalised once further costing is done.

D. Niebel (ECMWF): Will SecurID protected services be used in this project in some way?

W. Zwieflhofer: As long as it is an IP connection then it will not differ much from the existing Internet connection, it will just be faster. Thus a firewall and SecurID server could be used just as now. However, a problem starts when ATM services become available, because each packet is fragmented and sent separately. A router thus cannot handle packet security as it does now. However, there will be time to address this issue as ATM will probably not be available for at least the first two years.

GENERAL DISCUSSION

G.-R. Hoffmann

Internet access

D. Birman (France): I would like to raise the question of permitting access to ECMWF via the Internet under the control of SecurID cards, especially for those users not in national meteorological services. Would this be possible?

G.-R. Hoffmann: A trial has been conducted with one user from Austria, plus a few Centre staff when they have been on mission. As background to this, remember that some years ago there was a TAC proposal to Council to permit Internet access. However, it was turned down by Council. Two reasons were given: (i) security concerns, (ii) Member State national meteorological services wished to keep control of who from their Member State could access the Centre. Since then attitudes may well have changed, as shown for example by the Austrian request. Dr. Wihl has to present his request to the TAC and I suggest that he states that there was support for his proposal from the Computing Representatives' meeting.

Dr. Wihl (Austria): The main idea is that via the SecurID card there is both security provided and a degree of control, as the SecurID is issued by the national meteorological service. I feel that is sufficient. Also, if now some users will use the Internet link it will mean less traffic on a Member State line.

H. Müller (Switzerland): I support this proposal, we have some users in Switzerland that this would help.

L. Campbell (Ireland): Is it intended that the administration of the SecurID cards will remain with the Computing Representatives?

G.-R. Hoffmann: Yes, no change is proposed to that.

A. Dickinson (UK): I support the concept, but question if the SecurID card is adequate to do the job. Another security facility could be used, namely dial-back links so that the Centre knows where the person is coming from.

W. Zwieflhofer: We use this locally within the Reading area for support staff access. However, we have not considered it internationally because the Centre would then have to pay the costs of all the phone calls.

G.-R. Hoffmann: The idea was that Member State users would use the existing Internet links rather than using dial-back links. There are two drawbacks to dial-back, namely the high cost (already mentioned) and relatively low speed (typically 19.2 Kbps, compared to Mbps speeds on Internet).

W. Zwieflhofer: I do not believe the combination of SecurID cards plus the firewall Internet interface are a weak point from the security point of view. The weakest point is the institution from where the connection originates. A typical university campus will involve routing a link across several LANs before it gets to the Internet router interface, this could be the most vulnerable part. Thus we may therefore wish to put restrictions on exactly where the link originates from. But I have no worries on the SecurID side itself.

A. Dickinson (UK): I accept that dial-back may not be appropriate. However, you could still check that the person requesting access comes from a known host that is on a list of permitted hosts.

W. Zwieflhofer: Yes. We have been looking already at whether we can do this on a per user basis, but it does not seem possible. However, we can certainly do it via router filters where links are only accepted from a list of known sites. Thus when we register users we may ask for an IP address the link will originate from.

Fujitsu changing formula

A. Lea: You all received a letter (dated 23 September) that outlined a charging formula we have in trial use. In a sense it looks familiar as it is similar to formula used on the Cray. There is a measure of CPU activity (user plus system) which is the first term. The second term is a memory integral (CPU times total memory) which is not perfect as we would also like to have something like I/O wait time times memory a well, but at this point in time there is no such term available. The third term is a measure of input/output, and all we have available today is "characters transferred".

The formula we then put together was based on the load on the Fujitsu at that time, which was before most of the forecast suite was working and certainly before most users had begun to migrate. It is now clear that the constants we chose at that time were not representative of the average load, in particular they give too much weight to the I/O term.

Thus we have not put this formulate into regular production, but have been experimenting with different values for the constants. When we are happy with the formula we will then reprocess all the accounts data back to 1 October, the formal date the service switched from Cray to Fujitsu.

Finally, bear in mind that the Centre reserves the right to adjust the formula again in light of further experience.

G.-R. Hoffmann: In view of the crude basic measures that we have available at the moment, the Centre will not enforce any limits on your accounting for the rest of this year. For the rest of the year we will try to find a suitable formula which we will then introduce into service for 1997.

Date of next meeting:

G.-R. Hoffmann: Sweden has proposed an annual meeting, what are your views?

D. Birman (France): I support the Swedish proposal. We last met two years ago, which is a long time. Some of us (Computing Representatives) are not regular users of ECMWF and hence find it difficult to keep up to date. Often our users know more than we do. An annual meeting could help the Computing Representatives to keep better in touch with the Centre's progress.

A. Dickinson (UK): I have been to several of these meetings and we have discussed this point many times. I believe the present (two year) frequency is about right, as it allows significant progress to be made. Even so some of the presentations to this meeting did not have a great deal to say as there had not been much change in that specific area. Thus hold every two years so there is enough to say.

S. Orrhagen (Sweden): I raised the point originally. It is easy for Alan to keep in touch as he is close to the Centre, whereas most of the rest of us are not. However, there is one point I would like to stress. It is not so important to me to know what has happened, but what will happen, especially before any big change takes place. It will help me then support my users a lot more easily.

Dr. Barg (Germany): If the Centre has a lot of changes it must be useful to meet annually. However, there are similarities between this meeting and the TAC. Thus if TAC delegates give a good report when they return home then it should be adequate for the Computing Representatives to meet biennially. I suggest we discuss this matter in the TAC.

S. Orrhagen (Sweden): It is obviously important to look at security issues, hence the Security Representatives meet on an annual basis. However, from our point of view we are the ones, not the TAC Representatives, who work most closely with the users.

O. Brinkhof (Netherlands): Once every one year, or two years, is not important. What is important is to meet just before something is changing.

G.-R. Hoffmann: If that is your general view when do you believe is a good time to meet next? Next year will see MARS move to the new DHS in mid year, RMDCN may come in 1998/9, the VPP700 upgrade is planned for 1998.

O. Brinkhof (Netherlands): Do we have to set a date now, or wait for ECMWF to announce a date when changes are known?

G.-R. Hoffmann: No, we do not have to set a date now. We really are looking for guidance as to when we shall invite you to another meeting. Currently you seem split on this. Our view would be sometime in 1998, but this would be after the VPP700 upgrades, etc. However, maybe it is better in 1997, before these upgrades take place, i.e. a year from now rather than two years from now.

A. Dickinson (UK): If there is a big impact on the users by these changes then I would support a meeting in a year's time.

G.-R. Hoffmann: I think there is an argument for a meeting in a year's time. I see by the nods that most of you agree, hence we will propose that to the TAC.

AOB

A. Dickinson (UK): Could some of the information that is currently sent by fax also be sent by e-mail. I often find things appear by fax on my desk after they have expired. If received earlier via e-mail I can easily pass them on to my colleagues electronically. Currently we scan some of ECMWF's letter into our workstation system so that we can pass them around easily, an electronic version would therefore help us.

A. Lea: This is something we can look into. However, I know some of you do not have e-mail addresses.

G.-R. Hoffmann: Technically it is not a problem. It is more an administrative problem as letters plus enclosures are often made up from different sources. However, we will look into it.

N. Olsen (Denmark): Could the e-mail addresses of the Computing Representatives be distributed to all of us so that we could use them?

G.-R. Hoffmann: It might be a good idea to have a mail reflector set up at the Centre for Computing Representatives, which will have all the names in it.

J. Greenaway: We already have such a list but it is not complete as some Representatives do not have e-mail addresses.

S. Orrhagen (Sweden): When this distribution list is set up please send it using the distribution list itself, so that we can contact individuals if required.

G.-R. Hoffmann: Will do. If there are no other points I would like to close this meeting by thanking you all for coming, and all the work you do back home on our behalf. I apologise if sometimes we cause you too much work, or unnecessary work. I also wish to thank my colleagues who prepared the meeting and gave presentations. Finally, I hope to see you all again in a year's time.

ANNEX 1

PARTICIPANTS

BELGIUM	Liliane Frappez
DENMARK	Niels Olsen
GERMANY	Benno Barg
SPAIN	Eduardo Monreal
FRANCE	Dominique Birman
IRELAND	Liam Campbell
ITALY	Guiseppe Tarantino
NETHERLANDS	Oscar Brinkhof
NORWAY	Rebecca Rudsar
AUSTRIA	Gunther Wihl
SWITZERLAND	Heinrich Müller
FINLAND	Timo Hopeakoski
SWEDEN	Sten Orrhagen
UNITED KINGDOM	Alan Dickinson
ICELAND	Gudmundur Hafsteinsson (Observer)
ECMWF	Tony Bakker
	Jens Daabeck
	Dick Dixon
	John Greenaway
	John Hennessy
	Claus Hilberg
	Geerd-R. Hoffmann
	Norbert Kreitz
	Andrew Lea
	Dominique Lucas
	Umberto Modigliani
	Dieter Niebel
	Pam Prior
	Neil Storer
	Walter Zwieflhofer

ANNEX 2

PROGRAMME

Monday, 7 October

09.00	Welcome	G.-R. Hoffmann (Chairman)
	ECMWF's computer status and plans	
10.30	*COFFEE*	
11.00	Member States presentations	

Each representative will be asked to speak for a maximum of 10 minutes, outlining their Member State's involvement (actual or planned) in the computer service at ECMWF. This should include:

* diagram of own computer equipment, and of connection to ECMWF
* projects run at ECMWF
* experience using ECMWF computers, including suggestions and queries regarding the present service
* plans (involving ECMWF usage over next couple of years)

12.30	*LUNCH*	
14.00	Member States presentations (cont.)	
15.00	*COFFEE*	
15.30	Fujitsu overview and service	Neil Storer
16.30	SecurID based services	Dieter Niebel
17.00	Wide area network developments	Tony Bakker
17.30	*COCKTAIL PARTY*	

Tuesday, 8 October

09.00	New data handling system and service	Dick Dixon
10.00	*COFFEE*	
10.30	MARS and dissemination update	John Hennessy
11.00	Graphics update (MAGICS, METVIEW)	Jens Daabeck
11.30	DAWN project	Walter Zwieflhofer
12.00	Discussion session	
12.30	*FINISH*	

PART 2

MEMBER STATE CONTRIBUTIONS

9th Member State Computing Representatives'Meeting
7/8 October 1996

Belgium

1. Computer equipment and connection to ECMWF

An important part of the computer environment in the Belgian meteorological computer center was changed in June 1995.

A part of the installation is shared by three scientific institutions situated in the area of the "plateau d'Uccle" in Brussels (Royal Observatory, Royal Institute of Meteorology, Institute for Space Aeronomy):
- a number crunching unit: CRAY J916 (8 processors, 1 GB memory, 22 GB internal disks);
- a file server: HP 9000/K 410 (3 processors, 384 MB memory, 6 GB internal disks, 60 GB external disks, 200 GB optical disks);
- a batch server: HP 9000/k 210 (3 processors, 384 MB memory, 4 GB internal disks);

The external disks connected to the file server may be switched to the batch server in case of problem.

The other part of the installation shown in the figure concerns the meteorological service:
- a login server: HP 9000/K 210 (2 processors, 384 MB memory, 4 GB internal disks);
- a communication server: HP 750 (1 processor, 128 MB memory, 2.6 GB internal disks);
- a graphical application server: HP 735-125 (1 processor, 176 MB memory, 5 GB internal disks);
- a Weather Office server: HP 9000/K 100 (1 processor, 256 MB memory, 6 GB internal disks);

About 45 X-terminals and work stations and also PC's are connected to these computers via an Ethernet LAN. The main servers are also connected together through an FDDI network.

For the external communications the following connections are available:
- to ECMWF: 64 kbps line and a CISCO router;
- to the belgian national airport (GTS server for Belgium): 4400 bps leased line through a Megapac X25 router;
- to BELNET (belgian academic network, gateway to INTERNET): 256 kbps line through a CISCO router.

The modifications scheduled within two years are:
- on 22/10/1996: doubling of the capacity of optical disks storage (upgrade to 400 GB);

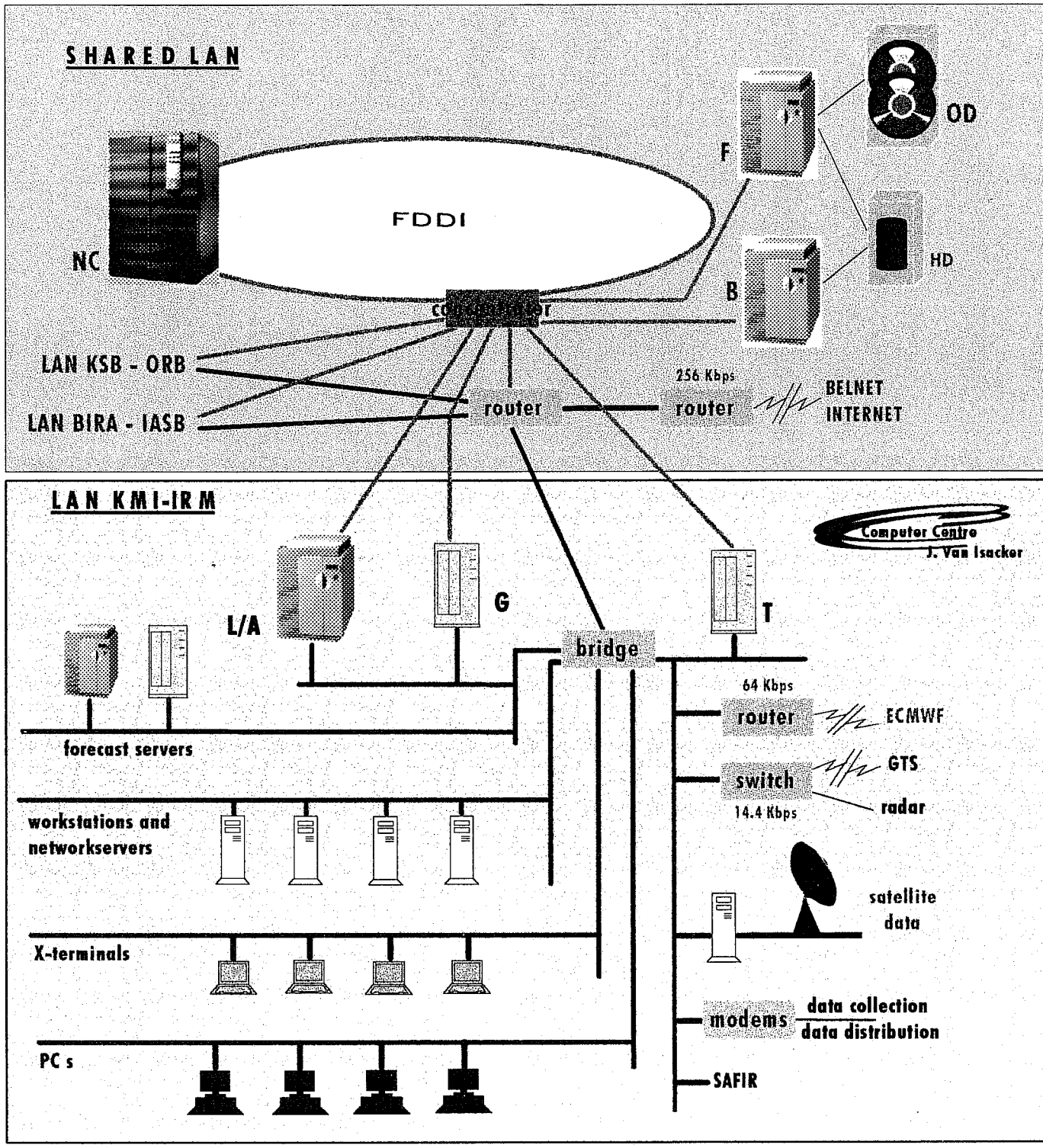
- in the following months: solving of some ethernet network problems by
  . the replacement of some cables by UTP cables;
  . migration to star topology;
  . replacement of the bridges between the institutes by switch routers;
  . reconfiguration.
- addition of processors and mass memory to the number crunching unit (30 GB external disk);
- replacement of the communication server by a HP D350 (1 processor, 128 MB memory, 4 GB internal disks, with FDDI, X25 and mux connectors). This machine will share disks with the Weather Office server and use disk mirroring. It will be used as backup for the Weather Office. The previous communication server will be used as firewall. Its installation was scheduled until 1st October 1996 for the second half of 1997.

2. Projects run at ECMWF

Four projects registered at ECMWF use ecgate1 to extract MARS archives with some treatment on the C90 until short before. They are satisfied.

Two other projects were using the ECMWF computing facilities for number crunching programs:
- Error growth study in a quasi-geostrophic atmospheric model developped by Dr F. Molteni at ECMWF;
- Study of mean field evolutions in coupled map lattices with great spatial extension;
- 3-D global model for the chemistry of the troposphere developped and used in studies focussing on the global capacity of the atmosphere (distribution and budget of species like ozone, methane and hydroxyl radical,...);
- Study of polar stratospheric clouds (PSC's) with a 3-D chemical transport model.

Since the installation of the CRAY J916 in Uccle last year, these users tend to use our local installation rather than the ECMWF computing facilities. One of them has had storage management problems with the Fujitsu and thinks for the moment he will give up.



LEGENDE

NC : number cruncher (CRAY J916)
F : file server (HP 9000/K400)
OD : optical disks storage (400 GB)
HD : hard disks (60 GB)
B : batch server (HP 9000/K200)
L/A : login/application server (HP 9000/K200)
T : telecom servers (HP 9000/750)
G : graphics server (HP 9000/735)

coax or twisted pair

FDDI

The computersystem at DMI has been somewhat modified since late 1994.

In the beginning of 1996 the maincomputers for receiving GTS-data and decoding data. a VAX-6410 cluster, were replaced by 2 sun-sparc 5 stations for receiving of data from GTS-lines and domestic lines. and 2 SGI challenge computers for the decoding and re-distribution of the received data.

The new communication system, that is developed by DMI, stores the received data on local disks for a period of 35 days. The communication-system is dubblicated by using a manually A/B switch on each line.

The received data is then transferred in real-time to the decoding-system placed on the SGI's by using socket-interface. The two decoding-systems is running in parallel.

The decodingsystem, which is based on the ECMWF decodingsystem, has been modified to fulfil the demands set up by DMI, and new programs has been added e. g. message-switch, bulletin-generation and metar-decoding.

Bulletins handled by the decodingsystem are distributed by the message-switch to the Danish airports, to Greenland, to the GTS-system via the ESWI-line, and to workstations placed in the weatherdepartment for use by the forecaster.

Bulletins including observations are decoded and reformatted into BUFR, while GRID bulletins are converted into GRIB.

The BUFR-records are stored in a database developed by DMI, and is available for a period of 35 days.

The GRIB records are stored in the GRIB-database for a period of 7 days.

In rewriting the decodingsystem from ECMWF we have achieved that the overall processing time for the received bulletins is approximately 1 second i. e. the decoded observation is available for the user within one second after reception, under normal conditions.

Plotting of observations are done by HP inkjet plotters in Copenhagen and by CalComp plotters on the airports.

The disseminated products from ECMWF are send to one of the SGI challenge computers by use of ftp into a pipe-device. If the transfer fails, the data will be send to the other SGI.

When the data has been extracted into the different fields, the data are stored in the GRIB-database and distributed to the other SGI and the Convex.

Some of the GRIB-data are used for plotting of prognostic maps and for other purposes in the daily forecasting suite. Other GRIB-data are used as boundary data for the hirlam analysis and prognosis system.

The prognosis is made for an area around Denmark and an area around Greenland. The prognosis data are stored in the GRIB-database on all the computers with a GRIB-database. After a few days the prognosis data are stored on the metrum-storage, a storage system that is driven by the software UNITRE.

In summer 1996 DMI installed a NEC-SX4 computer to run the forecasting models instaed of the convex. The models are running in parallel on the two computersystems and will be operationel on the SX4 when it has been upgraded later this year. In spring 1997 the SX4 will be upgraded again to have 16 cpu's and 4 Gbyte main memory.

Data used by external customers are put on our commservers. The external users get s the data by calling the system via the public telecommunications network. It is not possible for external users to pass through the commservers into the internal net.

Users that needs access to the computers at DMI needs to connect to a Remote-Office systems that uses the call-back feature. To connect via this system the user have to give a userid and password in order to be called back via a pre-defined phonenumber.

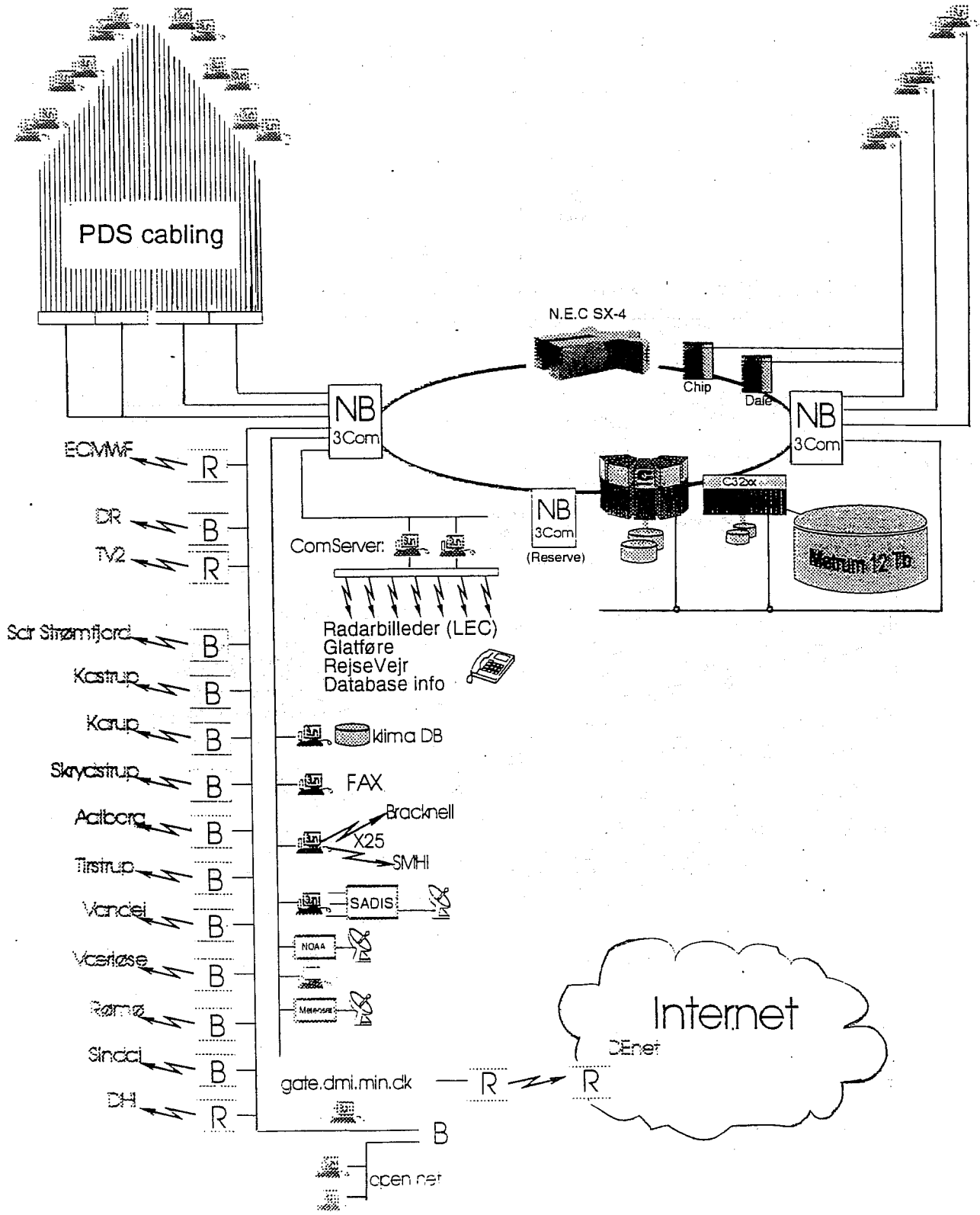
Submission of jobs are done from the SGI computers.

The remote jobs running at ECMWF are to a large extent data retrieval from the Mars archives.

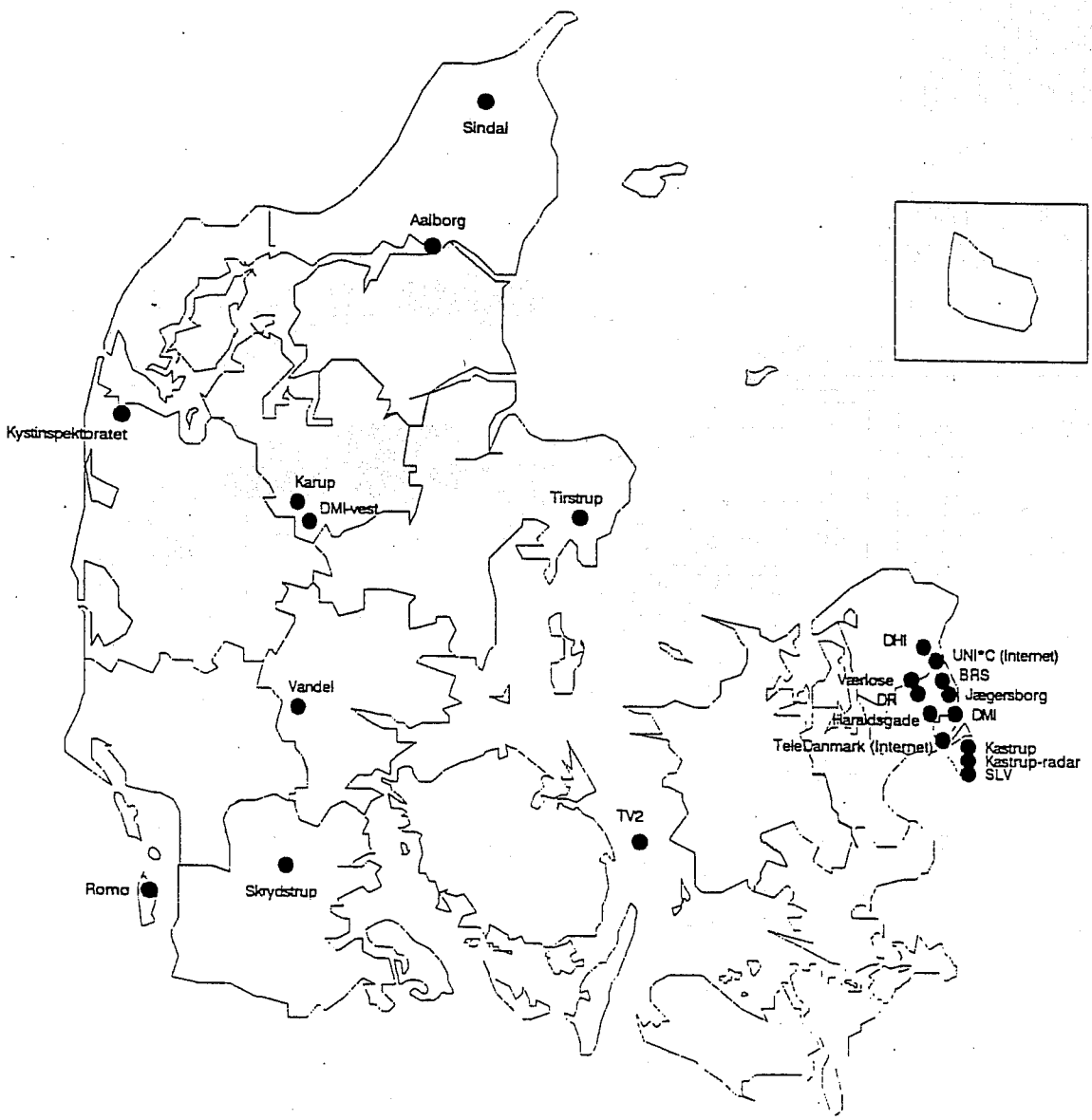
The research department has made some experiments with the HIRLAM model, and the ECMWF computers have been used in calculating trajectories for the stratosphere and projects about ozone.

The need for delayed dissemination of products is increasing because of the growing needs for retrieval of data. In this connection we would like to ask if it is possible to receive the ensemble forecast via the dissemination system instead of via telefax.

Netværks topologi



Der er sket enkelte ændringer i DMI's eksterne netværksforbindelser. Lokalnettet på Lyngbyvej er ultimo 1995 med broer og routere forbundet til følgende indenlandske lokaliteter:



Tasks

Datacollection

Observations 70MB/day
Data from satellite 2GB/day

Communications

Data storing

10GB+/day

Presentations

Prognosis Calculations

Forecasts

The Network of DMI

DMI

150 Workstations

250 PC's

70 other Network Units

5 Novell Servers

2 SGI Challenge

Convex 3220 -> HP/Convex SPP2000

NEC SX/4 (Convex 3880)

Massstorage 12TB Metrum

DMI

DMI SX-4

Phase 1 (now)

8 CPU's

2 GB MMU

4GB XMU

136 GB Disk

Phase 2 (November 96)

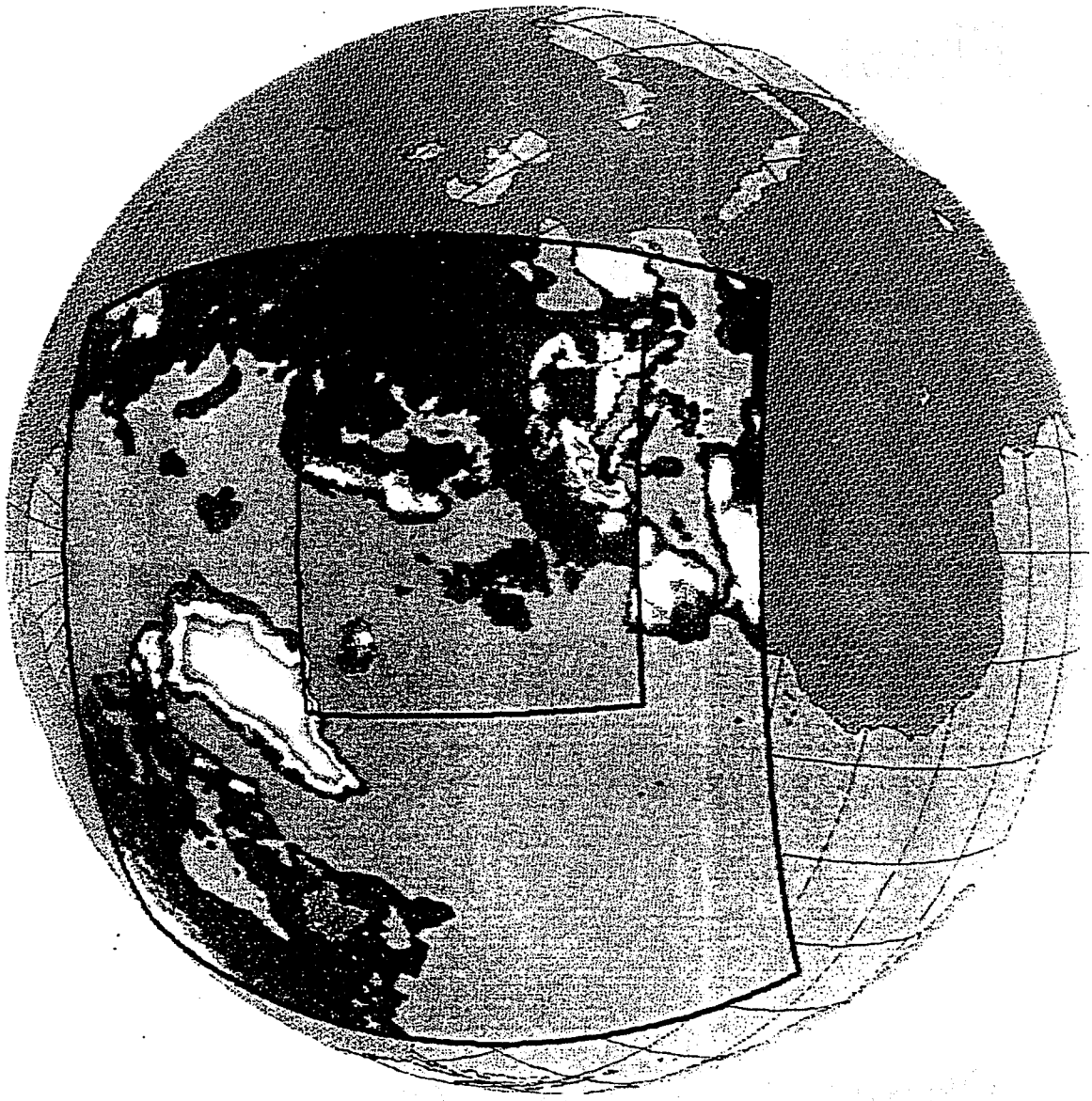
12 CPU's

4 GB MMU

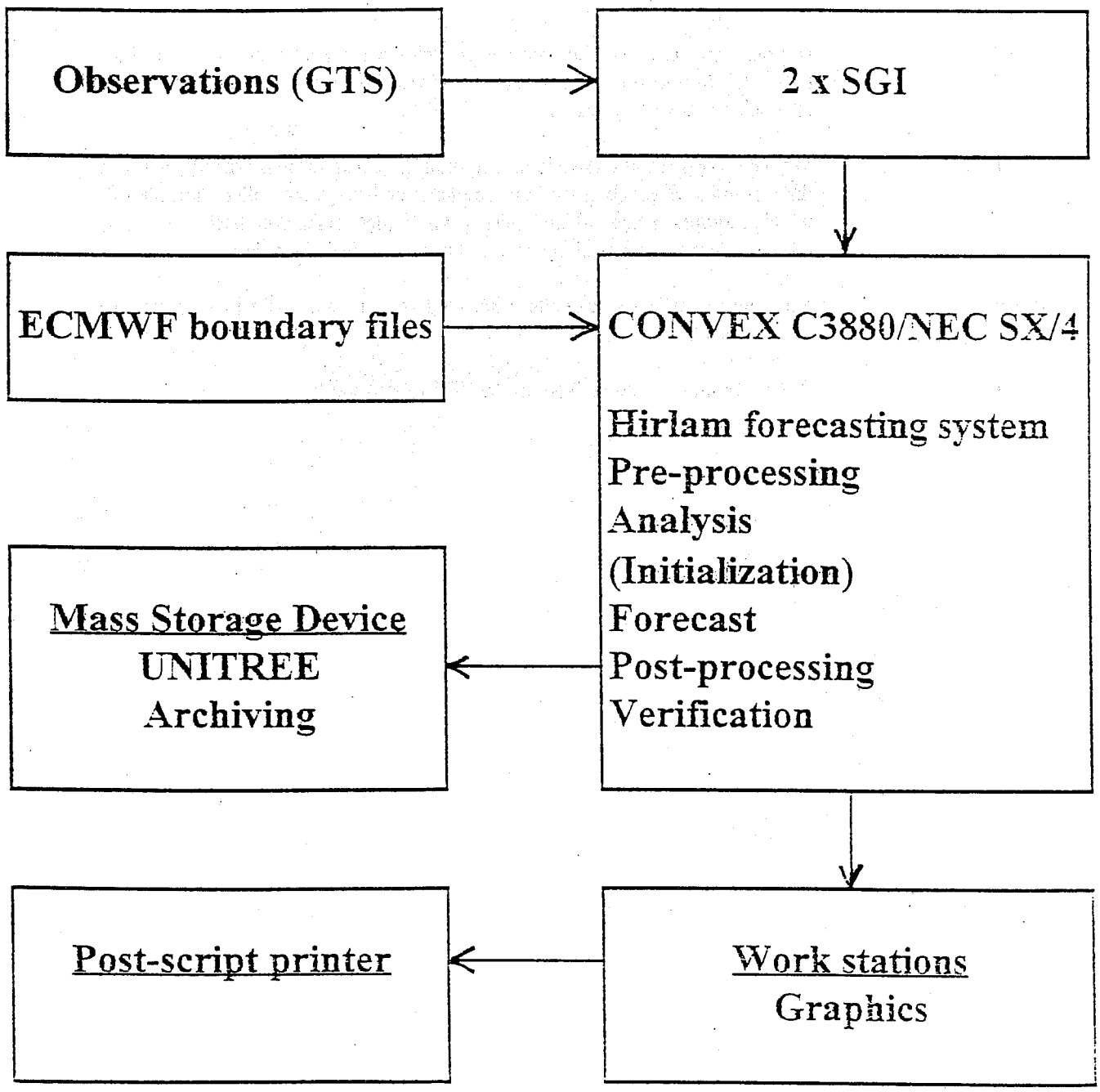
8 GB XMU

Phase 3 (Spring 97)

16 CPU's



Danish Meteorological Institute



QUESTIONS AND COMMENTS

DENMARK

H. Müller — In your connection to the Internet you showed a router going to the internal network. Have you had any good or bad experiences with this kind of solution to block out unwanted traffic?

N. Olsen — We have not seen any intruders. Originally, external access was via VAXs with dial up links. Since then we have implemented a system called "remote office" which requires a user id and password. It then calls you back (on a special number). We are currently not worried about possible intruders.

B. Barg — Your picture on nested models, what kind of boundary conditions do you use for nested models?

N. Olsen — We use boundary values from ECMWF for both models.

Deutscher Wetterdienst
Dr. B. Barg

Member States Computing Representatives Meeting, 7-8th October 1996

1. Computer equipment and connections to ECMWF

There have been some changes to the computer environment at the meteorological computer center since the last Computing Representatives' Meeting in September 1994.

The main computer system is shown in figure 1 and consists of

- one CRAY Y-MP 4/432, one CRAY Y-MP 2E/232
- two CYBER (1x CY 180/860 A, 1x CY 2000)
- two CDC 4680
- two StorageTek ACS with 3.6 TB nearline storage

The CRAYs are used for operational work and model development, the Cyber 2000 for pre- and postprocessing, the Cyber 860 for program development, and the two CDC 4680 are used for the migration of all programs - running on the Cyber-equipment under the system NOS/VE into the UNIX-world - and their operational usage. The goal is to finish the usage of the Cyber-equipment in 1997.

The telecommunications computer system is shown in figure 2. It consists mainly of a STRATUS CONTINUUM 620 which handles the communications. More technical information about this new system you will find in figure 2 a. STRATUS CONTINUUM systems achieve continously available computing by a fault-tolerant system architecture. One logical CPU is built on two boards with two CPUs. If one Board fails, the system runs without any impact for the application. System-bus and all controllers are duplicated. Operating system FTX is a UNIX System V Release 4 with multiprocessing support. In order to achieve high availibility, modifications have been made which do not destroy compliance with POSIX and XPG standards. The FDDI interface of the operational system is fault tolerant. For the testing and development system a single attached non fault tolerant interface meets the requirements.

The link to the ECMWF is shown in some more detail in figure 3. The line to the ECMWF is rated at 64 kbit/s and runs TCP/IP and FTP under X.25.

2. Projects run at ECMWF

There are at present mainly 5 programs which include approximately 30 users.

demppt22	- a small project mainly for referencing and testing purposes These include • running the DWD-Benchmark-Suite • developing and testing benchmark programs for parallel systems • reference site for the CRAY Y-MP4 at the DWD (compiler, libraries and tools)
dewflspm	- spectral (global) modelling
dewf2clm	- regional climate modelling
dewf3eum	- development of forecast models
dewk7wzn	- within this project the global precipitation center in Offenbach gets results of the forecasts of precipitation done by the ECMWF

3. Experience using ECMWF-equipment

In general there are no difficulties in using the computer equipment at the ECMWF.

As a result of our last meeting we reached the following improvements

- a special "Group Code" for test-data was created
- we get actual documentation in a very short time
- we have sufficient space on all computer resources to install our libraries.

The limits of enhancing the usage of the ECMWF computer systems we see today in

- the 64 kb/s-link between DWD-ECMWF, which is used also for the operational work (for example transfer of ECMWF-products to Offenbach and transfer of our EM-data to the SMA)
- incompatibilities for example in the structure of data-banks and the graphic programs.

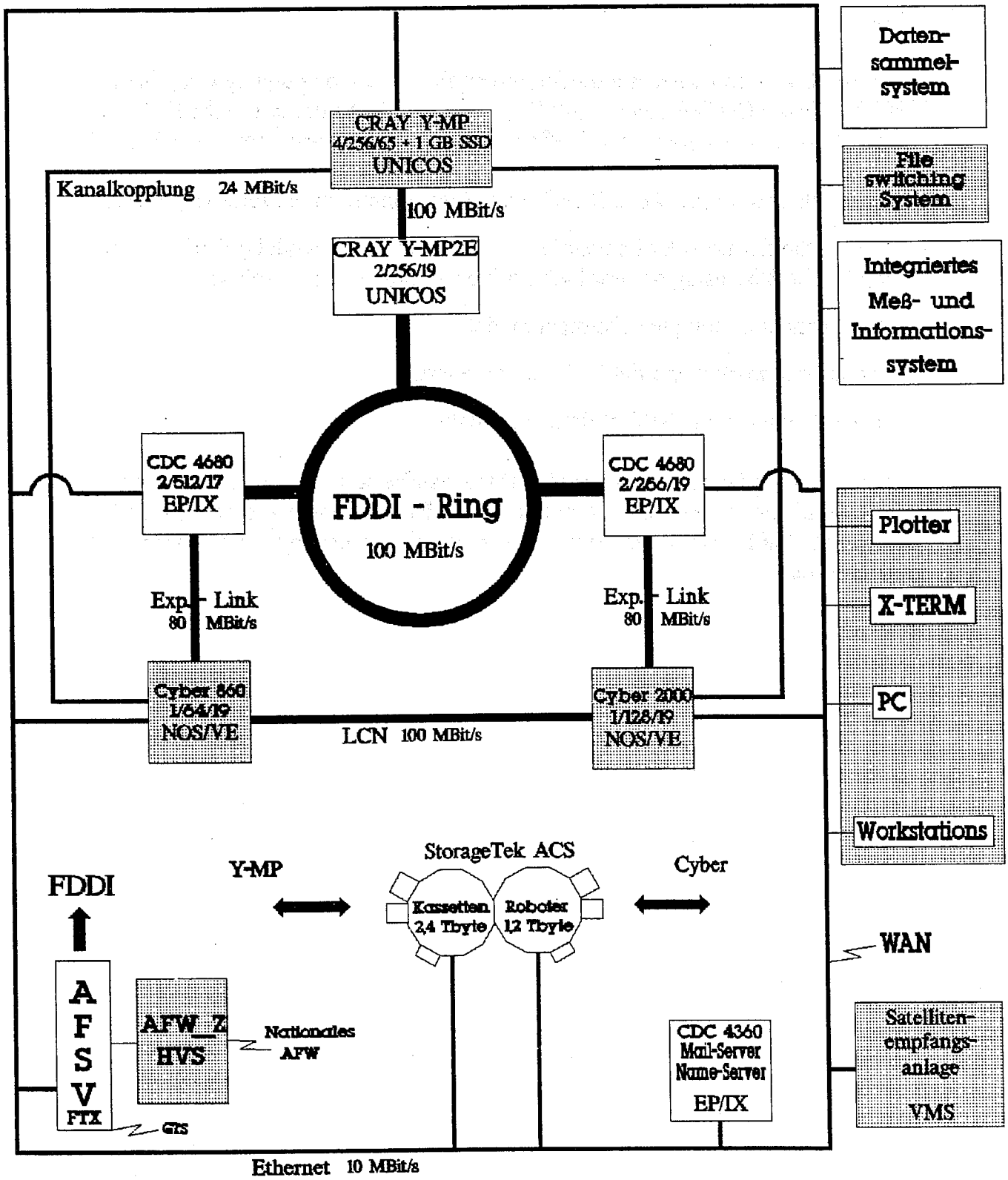
4. Plans

If the new DWD-computer is a moderate-parallel vectorcomputer system, like the VPP700 of the ECMWF, than it will be possible in the future to use the ECMWF-equipment without extensive work of adaption of the programs from the DWD.

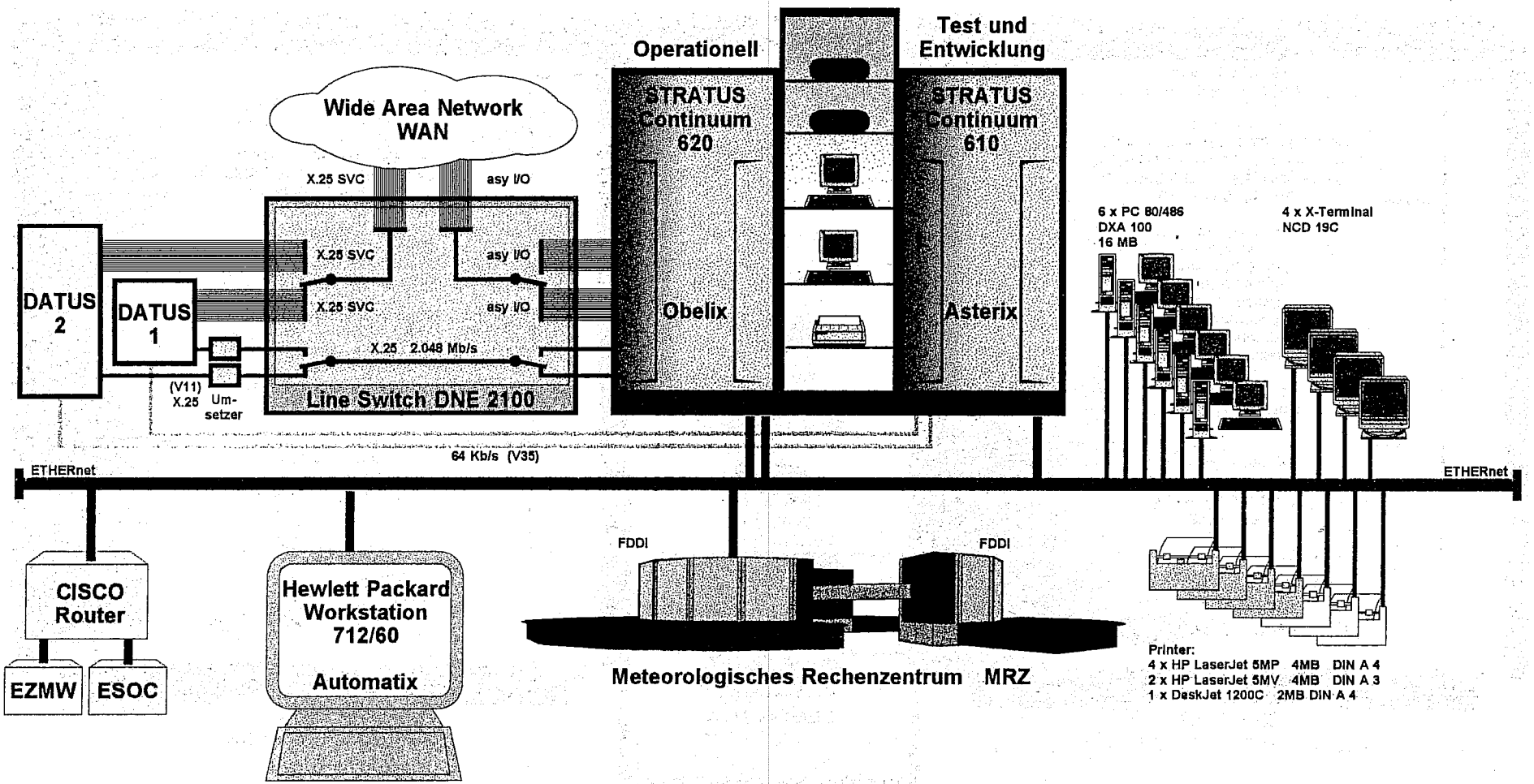
Than it is planned to use the ECMWF-equipment mainly in the following areas:

- tests in the framework of developing of the new global model (GME) and local model (LM) by using of very high horizontal and vertical resolution
- development of complex chemical models
- operational work in the field of climate reports
- research work in the field of data-assimilation.

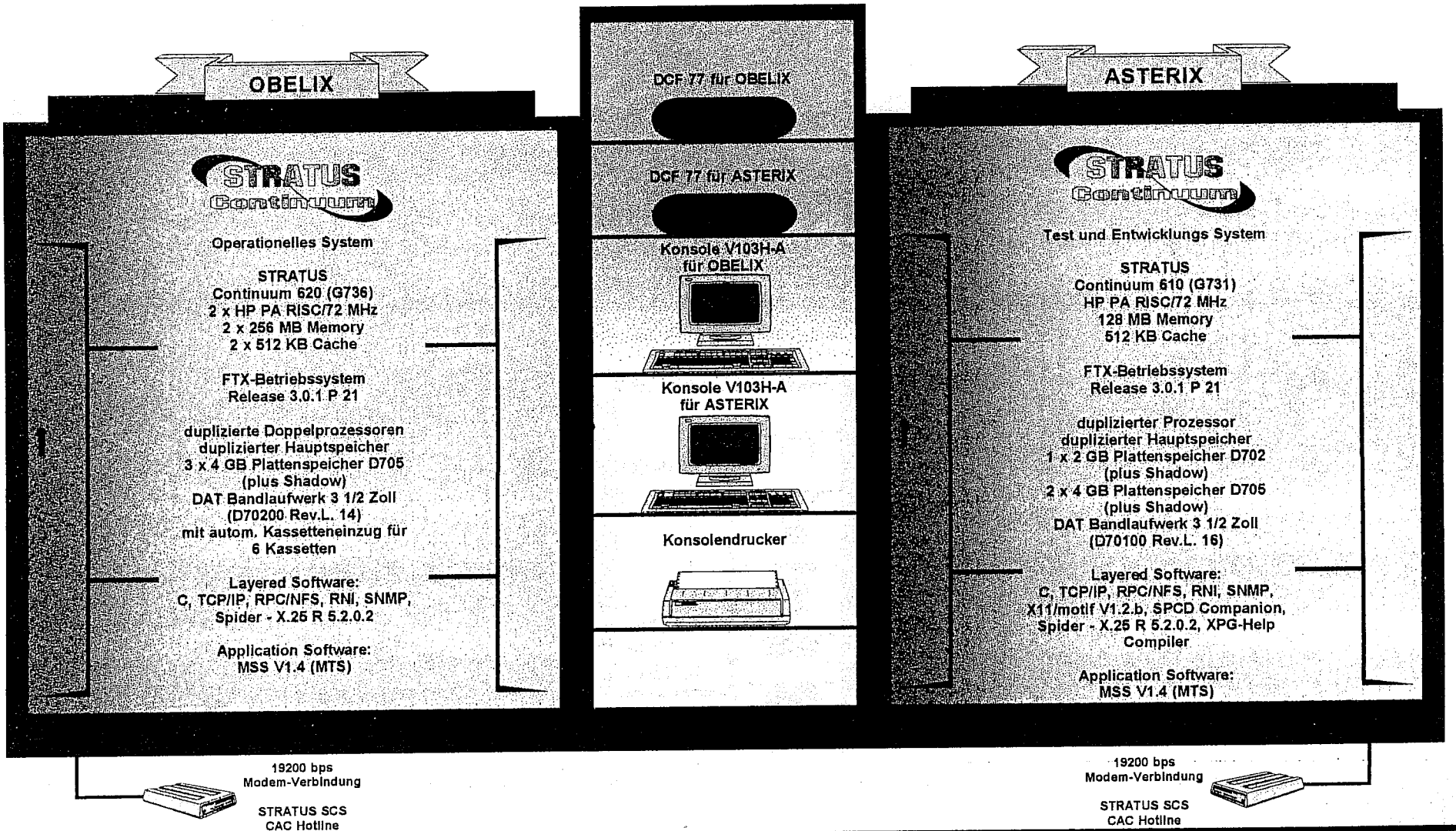
To realize these plans it must be said that this can be done on condition that the DWD participates in the TEN-34-project of the EU with the object to install a 34 Mb/s-link to the ECMWF; otherwise it is impossible to convey the necessary transfer of data.


Daten-
sammel-
system
CRAY Y-MP
4/256/65 + 1 GB SSD
UNICOS
File
switching
System
Kanalkopplung 24 MBit/s
100 MBit/s
CRAY Y-MP2E
2/256/19
UNICOS
Integriertes
Meß- und
Informations-
system
CDC 4680
2/512/17
EP/IX
FDDI - Ring
100 MBit/s
CDC 4680
2/256/19
EP/IX
Plotter
Exp. Link
80 MBit/s
Exp. Link
80 MBit/s
X-TERM
PC
Cyber 860
1/64/19
NOS/VE
LCN 100 MBit/s
Cyber 2000
1/128/19
NOS/VE
Workstations
StorageTek ACS
Y-MP
Cyber
FDDI
Kassetten
2,4 Tbyte
Roboter
1,2 Tbyte
WAN
A
F
S
V
FTX
AFW_Z
HVS
Nationales
AFW
CDC 4360
Mail-Server
Name-Server
EP/IX
Satelliten-
empfangs-
anlage
VMS
GTS
Ethernet 10 MBit/s

Neue Konfiguration der AFSV des Deutschen Wetterdienstes

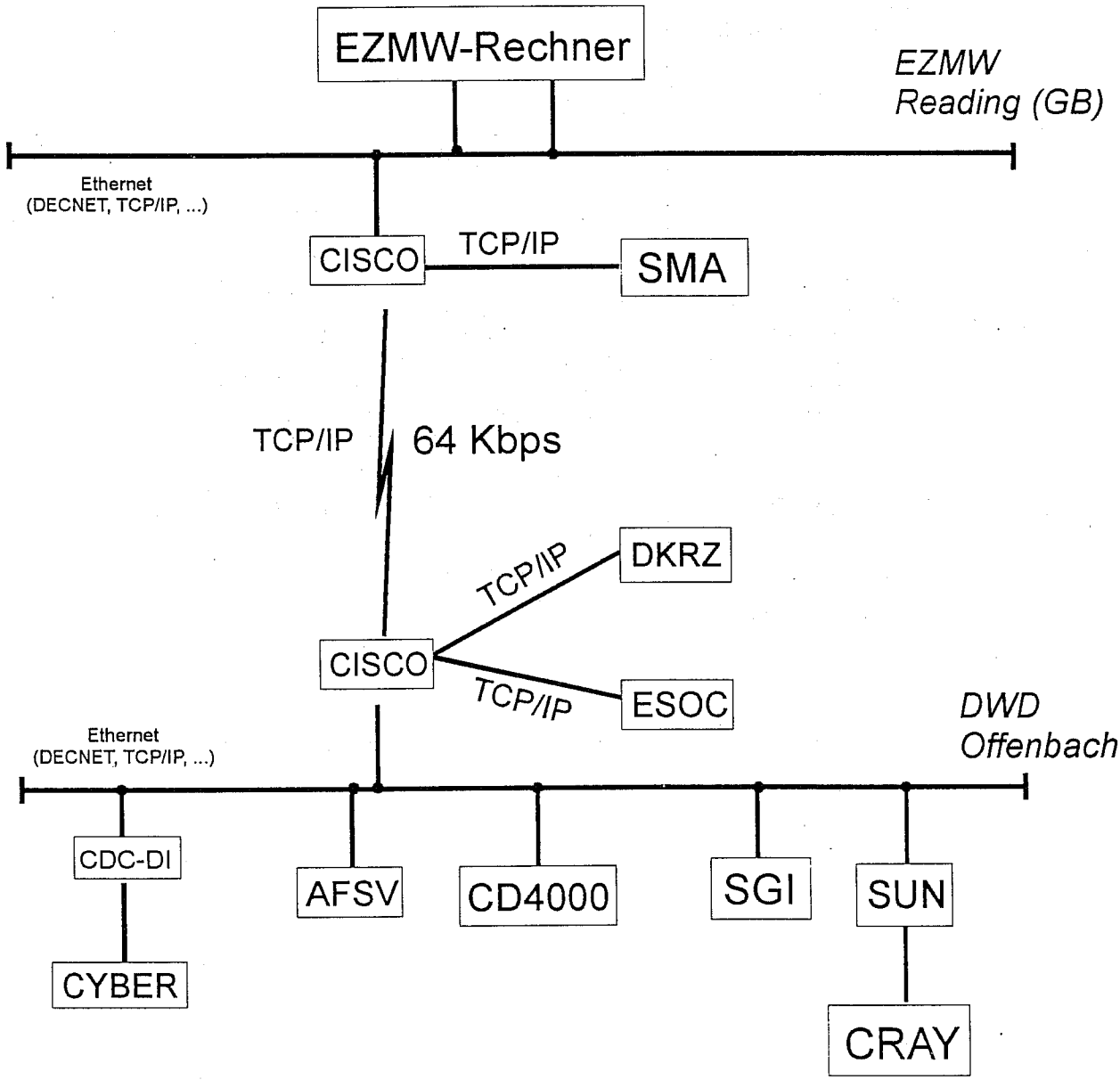


Technische Daten der AFSV



Ti 15 b

Prinzip der Datenkommunikation zwischen DWD und EZMW



QUESTIONS AND COMMENTS

GERMANY

T. Bakker — I understand there will be a connection between EUMETSAT and DWD, for EUMETSAT to then connect to ECMWF.

B. Barg — It is on the last slide, as ESOC.

INSTITUTO NACIONAL DE METEOROLOGÍA, SPAIN

E.Monreal

Member States Computing Representatives' Meeting, 7-8th October 1996

1. Computer equipment and connection to ECMWF

The main computing environment is shown in figure 1. There have only been minor changes to the computer and network configuration at INM over the past two years.

Main computers:

The main computing system consist of a 4 processor CRAY C94A with 1Gbytes of memory, 1Gbytes SSD and 42Gbytes of disk storage. It is used for numerical weather prediction and climate studies in cooperation with climate reaserch centers. The HIRLAM model runs 4 times a day in .5° resolution and twice a day in .2° resolution.

The 12 years old, 2 processor mainframe FUJITSU M-382 (IBM compatible) is still handling part of the operational suite. It supports the MCIDAS production system (satellite image processing and forecasters' WS) although the new UNIX based MCIDAS wiht a distributed environment is running in parallel and it is hoped to be in production at the end of this year. The mayor data bases (Report DB and Climate DB) that still rely on the M-382 are now being migrated to UNIX servers.

Other computers:

Message switching: A dual DECsystem 5900, running Ultrix. Deals with GTS, AFTN, MOTNE, etc.

Graphics dissemination: A cluster of two HP9000 k200, configured with 2 proccesors, 128 Mb of memory each and 2 x 8Gbytes of disk storage (with disk mirroring) accesible from both systems. It runs Service Guard (High Avalaibility System from HP). This system replaces the facsimil dissemination.

Radar Network: A Vax 785 is used for national radar image composition.

Main UNIX servers:

Sun SPARCserver 1000: 2 processors, 64Mb of memory, 44Gbytes of disk space (36GBytes are RAID). It is the main NFS server; it stores the homedir for all the NIS users. It is also the eccopy server.

2 Sun ULTRAstation-1 140: 128Mb of memory, 4Gbytes of disk each. This two systems handle the new UNIX data preprocessing and Report DB as well as ECMWF products reception, most of graphics production and post-processing. Tasks are distributed among the two systems but if one system fails the other takes all the tasks (manually switched).

Sun SPARCsercver 1000: 2 processors, 512 Mb of memory and 20Gbytes of disk storage. It will support the Climate DB.

MCIDAS servers:

3 Sun ULTRAstation-1 170E: 256 Mb of memory and 4 GBytes of disk storage. They are used for data and image ingestion into MCIDAS system (GOES, grids and conventional observations).

2 Sun SPARCstation 20/712: 2 processors, 128 Mb of memory and 4 Gbytes of disk storage. They run TIROS and METEOSAT image ingestion.

UNIX WS and X-terminals:

There are about 80 UNIX WS, most of them Sun SPARCstation 4 and 5, a few Sun IPX and IPC and about 15 X-terminals

Network:

The Local Area Network consists of several ethernet networks linked by routers and a backbone FDDI ring which connects the routers and the CRAY C94A. It is hoped that part of the UNIX servers will be connected to this FDDI ring through a concentrator whithin the next months.

At the 15 regional centers (CMT) there are also ethernet networks linked through leased lines. All have 9.6 Kbps lines, 12 of them have another line which has been upgraded to 64 Kbps for 9 centers.

There are 64 kbps links to ECMWF, Meteo-France and RedIRIS (the spanish academic and research network which is our connection to Internet). This Internet connection is protected by a firewall implementation.

Except for a small DECnet traffic due to the radar network systems all the Wide Area Network traffic is TCP/IP.

Connection to ECMWF:

Figure 2 shows a logical diagram of INM connection to ECMWF. ECMWF products dissemination is now received in GRIB code on a Sun ULTRA-1 140 server via ftp from the Vax cluster. Another similar system (a secondary destination) is prepared in hotstandby mode to receive it in case of system failure in the primary. The data is then decoded and plotted as well as sent to the C94A to be used as boundary conditions for the HIRLAM model and to the FUJITSU M-382 where is again decoded, ingested into MCIDAS and archived.

Our users of ECMWF computing facilities are authorized to access ECMWF only from an interactive session on a Sun server. Eccopy from ECMWF is received on the NFS server which stores the homedir of all NIS users. Remote job submission to ECMWF computers via ftp to the VAX Cluster is still used in operations but we plan to move to the new remote batch services protected by SecureID cards in a short term.

2. Projects run at ECMWF and experience using ECMWF computers

At present, SPAIN has not any project registrated at ECMWF. ECMWF computing resources are used mainly to run the KNMI trajectory model, the HIRLAM reference system and for MARS data retrievals and decoding. MARS queries are mainly model outputs not included in automatic dissemination. This year we have also used the distributed memory systems (CRAY T3D, FUJITSU VPP300 and VPP700) to port to MPI message passing the Swedish/Finnish distributed memory version of HIRLAM model.

In general we are very satisfied with ECMWF computing services. The use of the SecurID card instead of a password is regarded as "comfortable" for most of our users. The only complaint we have is about the long compilation times on the VPP's (in particular on the Vpp300) which are quite long even after avoiding I/O following the Center recommendations.

3. Future plans

There is not any special project involving the use of ECMWF computers for this period so it is hoped to use ECMWF resources in the same manner as it has been described above. Work on the MPI version of the distributed memory HIRLAM is foreseen to continue next year in order to serve as a possible benchmark for future replacement of the CRAY C94A.

INSTITUTO NACIONAL DE METEOROLOGÍA

COMPUTER and NETWORK CONFIGURATION

September 1996

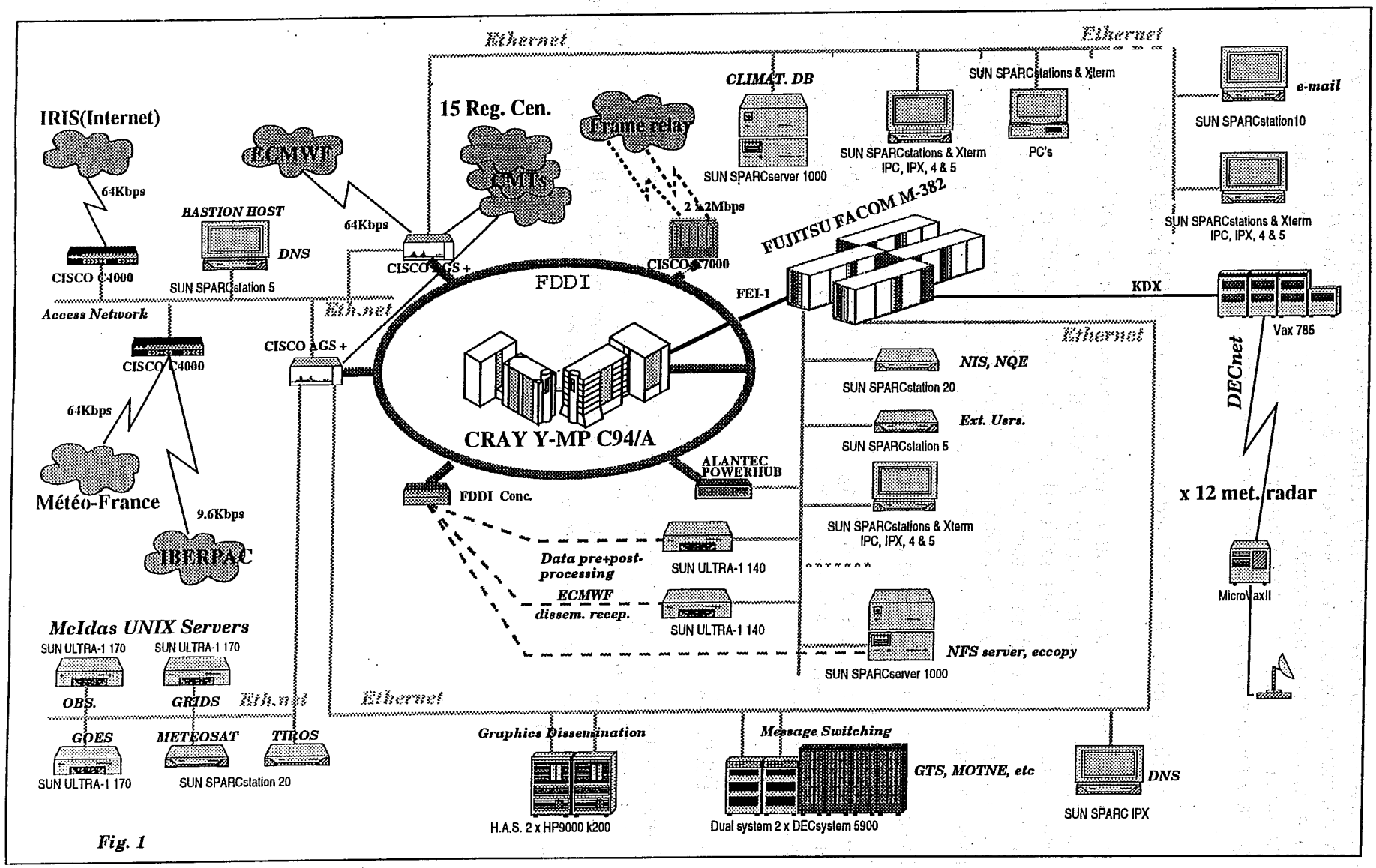


Fig. 1

INSTITUTO NACIONAL DE METEOROLOGÍA

ECMWF - INM 64 Kbps TCP/IP LINK

September 1996

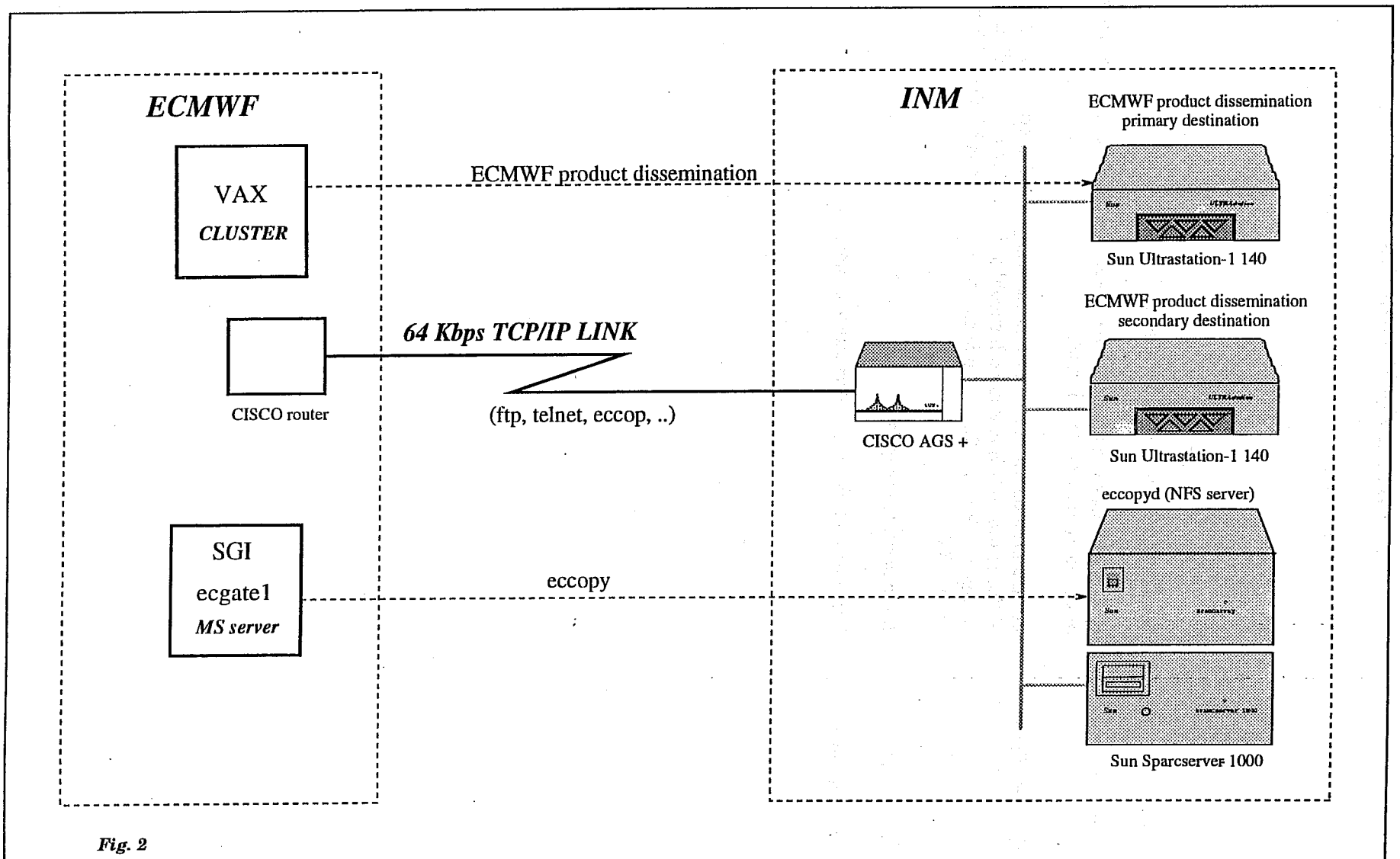


Fig. 2

QUESTIONS AND COMMENTS

SPAIN

B. Barg — What does the abbreviation KDX stand for?

E. Monreal — It is an old connection between the VAX and the Fujitsu. It simulates a tape drive, and runs channel to channel.

G.-R. Hoffmann — Let me mention that the Centre is expecting to get a cross-compiler for the VPPs, to run on SGI machines. It should arrive next month. It will be available on ecgate1. You can then compile on ecgate 1 and compare that with compiling on the VPPs.

E. Monreal — It is expected to be quicker?

G.-R. Hoffmann — We expect a factor of two decrease in compilation time.

Member State Computing Representatives Meeting
7 - 8 October 1996

Computers and networks at Météo-France

Vector computers
The main computer system consists of an 8 processors Cray Y-MP C98, with 2 GBytes of main memory, 4 GBytes of SSD and 70 GBytes of disk space.
Usage in 1995 : operations = 30%, development & applications = 13%, Meteo and Climate research = 54%, other research = 3%.

The second vector computer system is a Cray J916 (12 CPUs, 2 GBytes of memory and 44 GBytes of disk space).
It is almost dedicated to climate research with little operationnal use.

Operationnal suite computers (DIAPASON)
H-P servers (running HP-UX) :
- pretreatment, data-bases, production : T500 4 procs (PA-RISC 7100, 90MHz), 2 GB memory, 90 GB disk ;
- products data-base, query system : H50 1 proc (PA-RISC 7100, 96MHz), 256 MB memory, 20 GB disk ;
- monitoring, supervision : 715/75 1 proc (PA-RISC 7100, 100MHz), 192 MB memory, 4 GB disk ;
- tests & integration : T500 2 procs (PA-RISC 7100, 90MHz), 1 GB memory, 30 GB disk ;

Other computers
5 H-P servers for users : access to data and development tool.

Two Control-Data systems dedicated to a specific use :
- 4680 running ORACLE for a climate data base ;
- 4360 acting as a network and mail manager.

File service
The file server is made of a Convex C3840 (4 CPUs, 2 GByte of memory) with 210 GBytes of disks, of which 180 GBytes are acting as a disk-cache.
- StorageTek silo (ACS 4400) with 4 drives. Total capacity is about 2.5 TBytes (with about 600 MBytes per cartridge).
- IBM 3494 with 4 drives, 1250 cartridges (IBM3590 : 10 GBytes).
- ACL2640 (3 drives, capacity 2.64 TBytes on 264 DLT cartridges) in a remote location.

The software used is Unitree (version 2.0).
The use of the system today is over 6.5 TBytes for 990 000 files. Mean file size = 6.6 MBytes.

Network
The main network equipment consists of an FDDI ring connecting together ethernet lans and computers, we plan to migrate to an ATM network in '97. A HiPPI switch (NSC PS32) is used for the access of supercomputers to the file server.

Connections to outside :
- the TRANSMET system, which is used for collecting (gathering) observed meteorological data (GTS, nationwide...) and distribution of data and results ;
- leased lines : ECMWF (128 Kbits/s) , CERFACS, Météo-France Regional Services ;
- TRANSPAC (french X25 public network) ;
- RENATER (french part of the Internet).

Connections from Internet are filtered by a gateway (TIS Toolkit).

Projects run at ECMWF

For France, there are 28 registrated projects, of which about 9 are really active :

FRLMDCLI : climate simulation
ECMWF resources usage : MARS retrievals, few CPU

FRSCFKAL : predictability studies
ECMWF resources usage : MARS retrievals

FRSCPMAR : marine prediction, wave prediction
ECMWF resources usage : MARS retrievals, few CPU

FRSCTRAN : various use of observed data
ECMWF resources usage : MARS retrievals

FRSCSTAT : interpretation of IFS output for France
ECMWF resources usage : MARS retrievals

FRTODCLI : validation of models outputs ; climate simulations
ECMWF resources usage : MARS retrievals, CPU intensive

FRTORAD : data analysis related to ST radars measurement
ECMWF resources usage : MARS retrievals

FRTOSNOW : snow cover simulation on the Alps
ECMWF resources usage : MARS retrievals, few CPU

ECSN participation.

Usage of ECMWF resources(today and for the next future)

MARS is the most used resource, as all projects more or less use it. And this will continue during the next two years. Users seem to be very satisfied with the service.

The CRAY CPU was used for MARS retrievals post-treatment and, very intensively, for large climate simulations. We can expect some change about that, with MARS access from *ecgate1*.

Our Cray C98 will not be replaced before 1998, but there are more and more users asking for more and more CPU! We are trying to let them make a more intensive usage of ECMWF resources when possible, and we can expect an increase in **CPU** usage.

Dissemination : IFS12Z (200 MBytes), Wave model (10 MBytes), EPS (1.7 MBytes). Little growth is planned for next years (mainly EPS).

Irish Meteorological Service

1. Computer configuration

The computer configuration at the Irish Meteorological Service is shown in Fig. 1.

- The Communications VAX Cluster, comprising two VAX 4000/200's and a MicroVAX 3100, handles communications and data pre-processing.

- The HIRLAM Numerical Weather Prediction model runs on an SGI Challenge L server. Tenders are currently being sought for a replacement server with approximately 10 times the power of the present machine.

- Two MIPS computers decode and process bulletins and files received from the GTS, ECMWF etc., They also operate as file servers for a series of SGI workstations on which an X-based graphical display system, which was developed in-house, is run.

- Radar data is processed on a VAXserver 3300 and displayed on VAXstation 3100 workstations.

- The AWS Data Collector system is a PC-based UNIX application which collects weather reports from a number of automatic weather stations.

- Office services are provided by a Novell Netware PC network.

- The Climatological Database System, based on the Ingres RDBMS, has recently been upgraded by the addition of a SUN Ultraserver 170, which is approximately an order of magnitude more powerful than the older DECsystem 5000/200 server.

- The connection to ECMWF is a 64 kb link via a CISCO router. Both DECNET and TCP/IP protocols are used.

2. Use of ECMWF Computers

The main uses of the ECMWF computer facility include

- data retrieval from the MARS archive
- experimental runs of the HIRLAM model
- maintenance and development of trajectory model
- running Metview in batch mode

Users have commented that the recent implementation of eccopy and ecbatch has improved the 'user-friendliness' of the system.

3. Future Plans

The routine dissemination currently uses the DECNET protocol; this will probably be changed to TCP/IP during 1997.

Computer Configuration

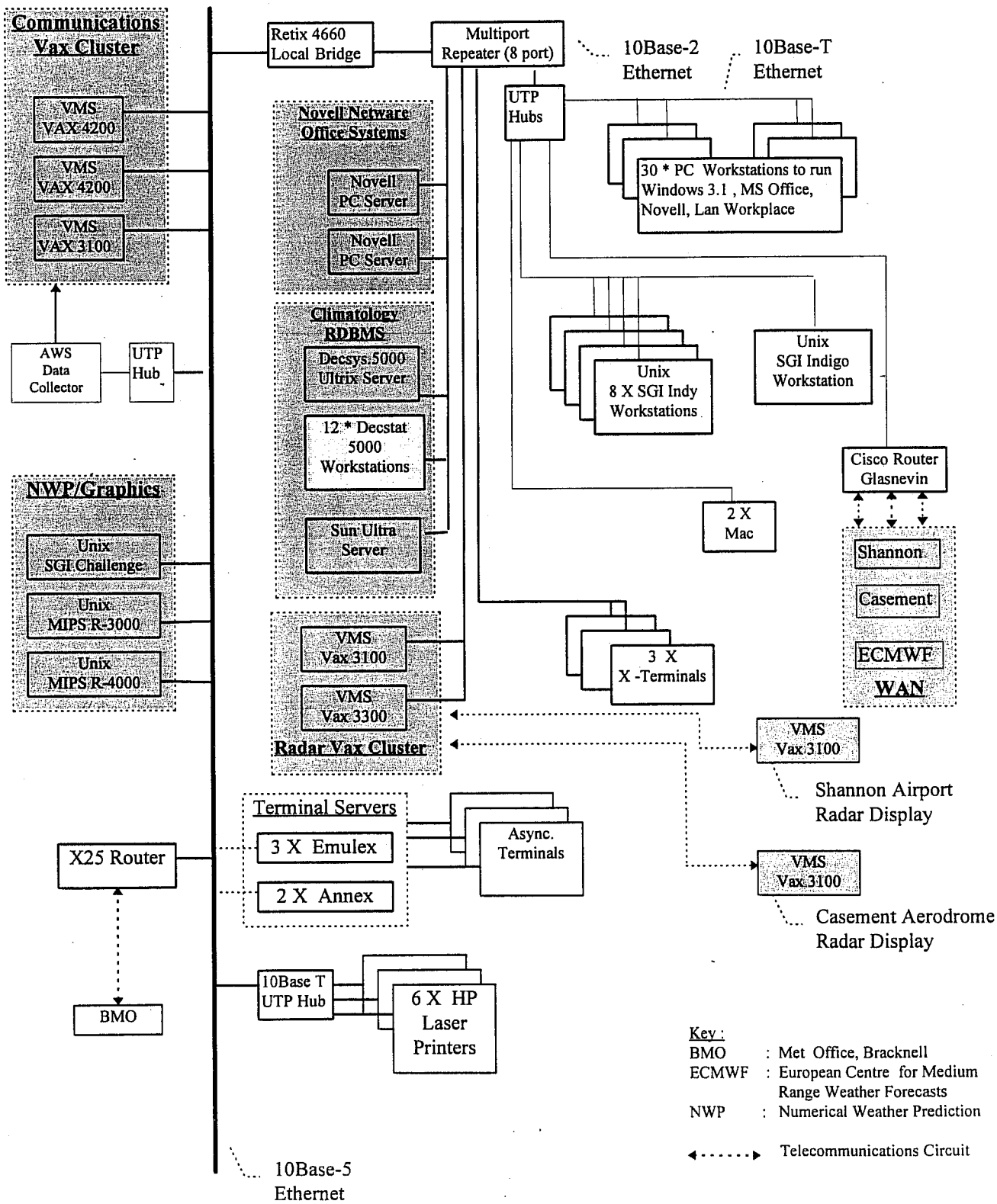


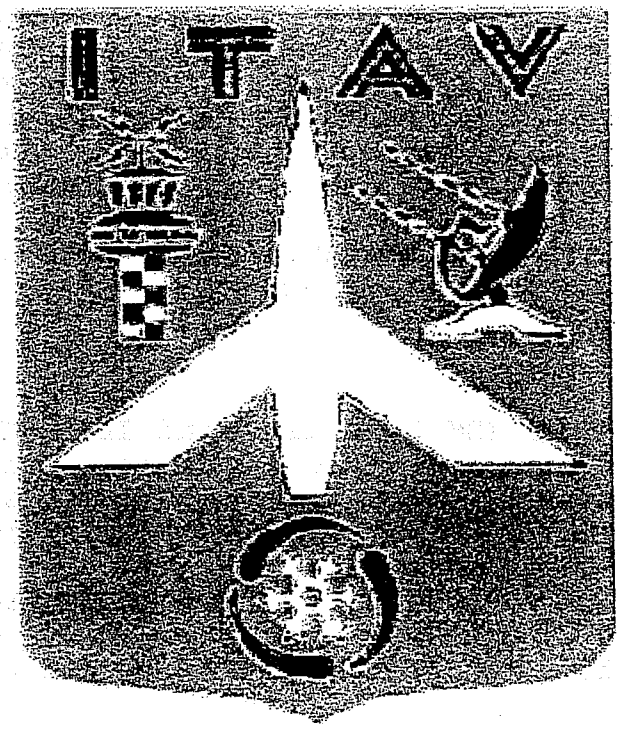
Fig. 1

NINTH MEMBER STATE
COMPUTING REPRESENTATIVES' MEETING

ECMWF
Shinfield Reading U.K.

7-8 October

ITALIAN METEOROLOGICAL SERVICE



LTC Giuseppe TARANTINO

ITAV
2° Reparto
P.le Degli Archivi, 34
00144 Roma

Tl. +39.6.5996.526
Fax +39.6.5924760
E-mail: CNK@ECMWF.int

Italian Member State Representative

1. Computer equipment and ECMWF connection.

The main components of the central computer system showed in figure 1. are the following:

a. Front-End area

It handles telecommunications concerning both WMO and ICAO networks. At the end of 1996 at the new building of the IMS operational branch in "Pratica di Mare", 20 Km from Rome, the new "Front-End" system based on DIGITAL equipments with ALPHA processors (figure 2.) will be operational. The message switching system UMS (Unified Message Switching) is by Global Weather Dynamics. The system will be able to handle alphanumerical and binary data, analog and coded digital facsimile (t:4 format). The operating system will be UNIX and the system will be fully authomatized and able to exchange data among different systems:RADAR, Satellites and Host area. The characteristic configuration allows the system to get a warm back-up in case of failure

b. Host area

It is made up IBM 3090 12 E and IBM 4381 P13. The 3090 performs the operational tasks concerning the analysis and forecast model, post processing, graphical applications and meteorological data base. The 4381 is not only used as back-up in case of failure of main computer but also for research and development. Just now there is a procurement action aimed to replace the main frame systems with a distributed networked architecture.

c. Users area

It deals with the access of remote users to the meteorological database (inquiry) and to the interactive graphical services.

d. ECMWF connection

It is based on varius VAX systems (figure 3) and, at moment, it handles the 64 Kbps link based on DECnet/NTS SW and CISCO routers. Moreover the VAX system handles two PSS connections with the Italian Public Switched Data Network called ITAPAC and links with the computer networks of national Agencies to allow the access to the ECMWF computer systems and meteorological archives by remote users.
The 64 Kbps link is used to transmit ERS-1 data to ECMWF.

e. Satellite area

It deals with the reception of data and images from the meteorological satellites Meteosat and TIROS. The system provides image animation and TOVS retrival. The satellite area is connected via Ethernet with the Front-End area and the meteorological radar image processing system that will be operational next year.

2. Project, experience and plans

The main usage of ECMWF services has been the retrival of MARS data associated with the decoding software and MAGICS.
ECMWF data in GRIB form are disseminated in real time to users for their operational activity (civil emergency, agriculture, pollution etc.). Italy has joined the 00 UTC and ocean waves optional project. The number of italian remote users will increase as soon as the new system will be completely installed and operational.

The current special projects are:

- TESTING AND APPLICATION OF A THIRD GENERATION WAVE MODEL IN THE MEDITERRANEAN SEA.
- TOVS 1B RADIANCES AND MODEL SIMULATION.
- INFLUENCE OF SPRINGTIME LAND-SURFACE CONDITIONS ON THE ASIAN SUMMER MONSOON

Rome - RTH

present configuration

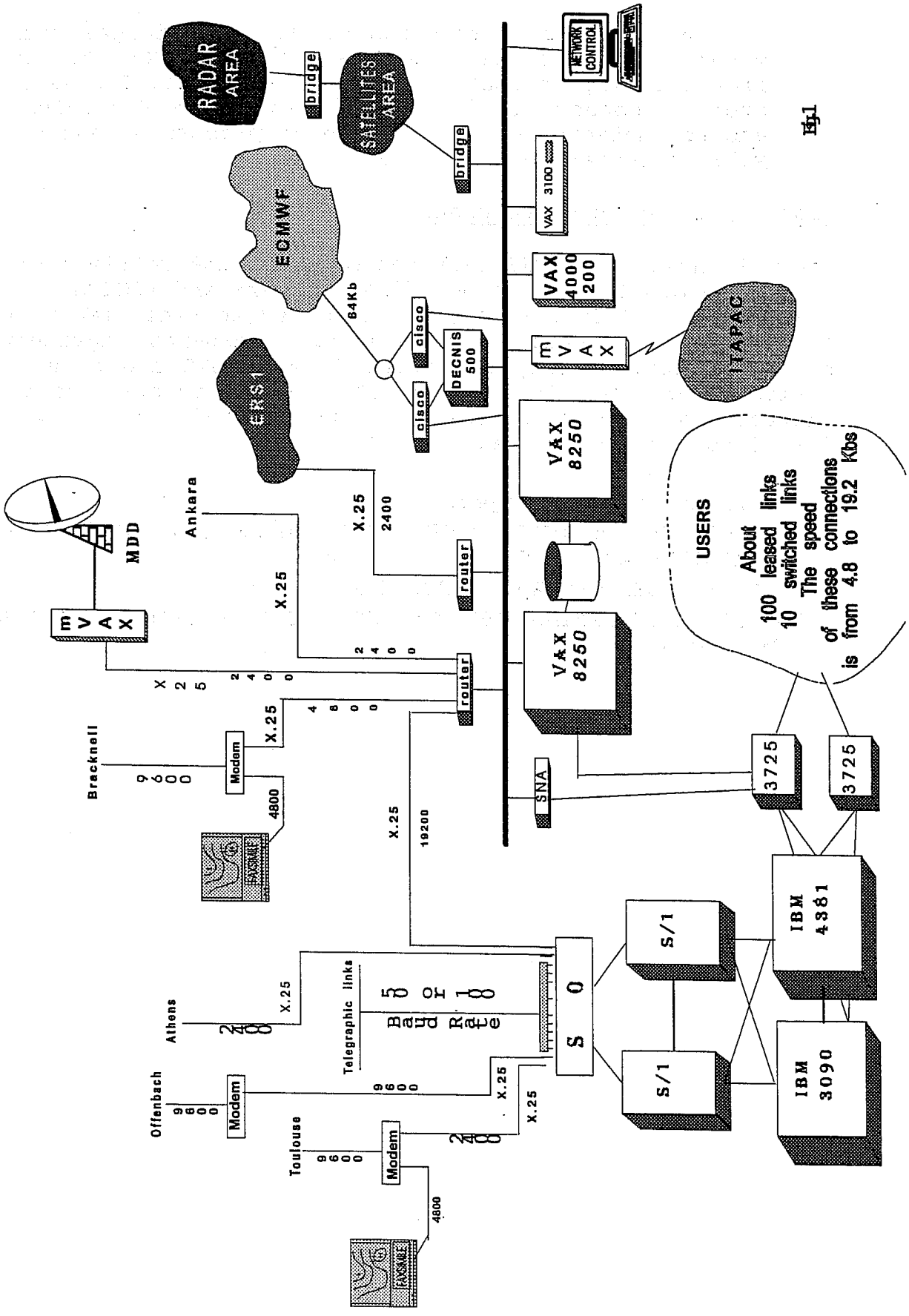


Fig1

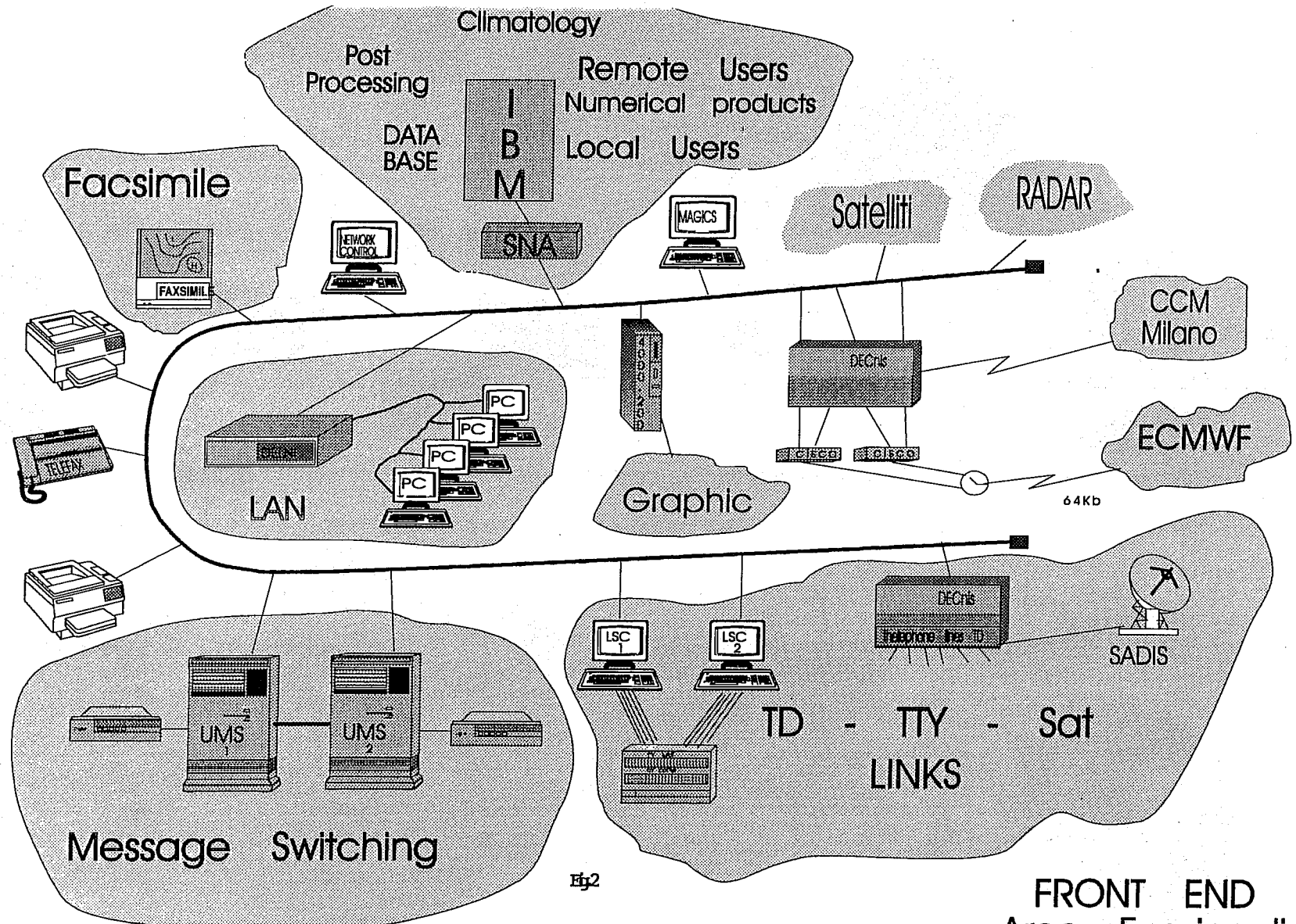


Fig2

FRONT END
Aree Funzionali

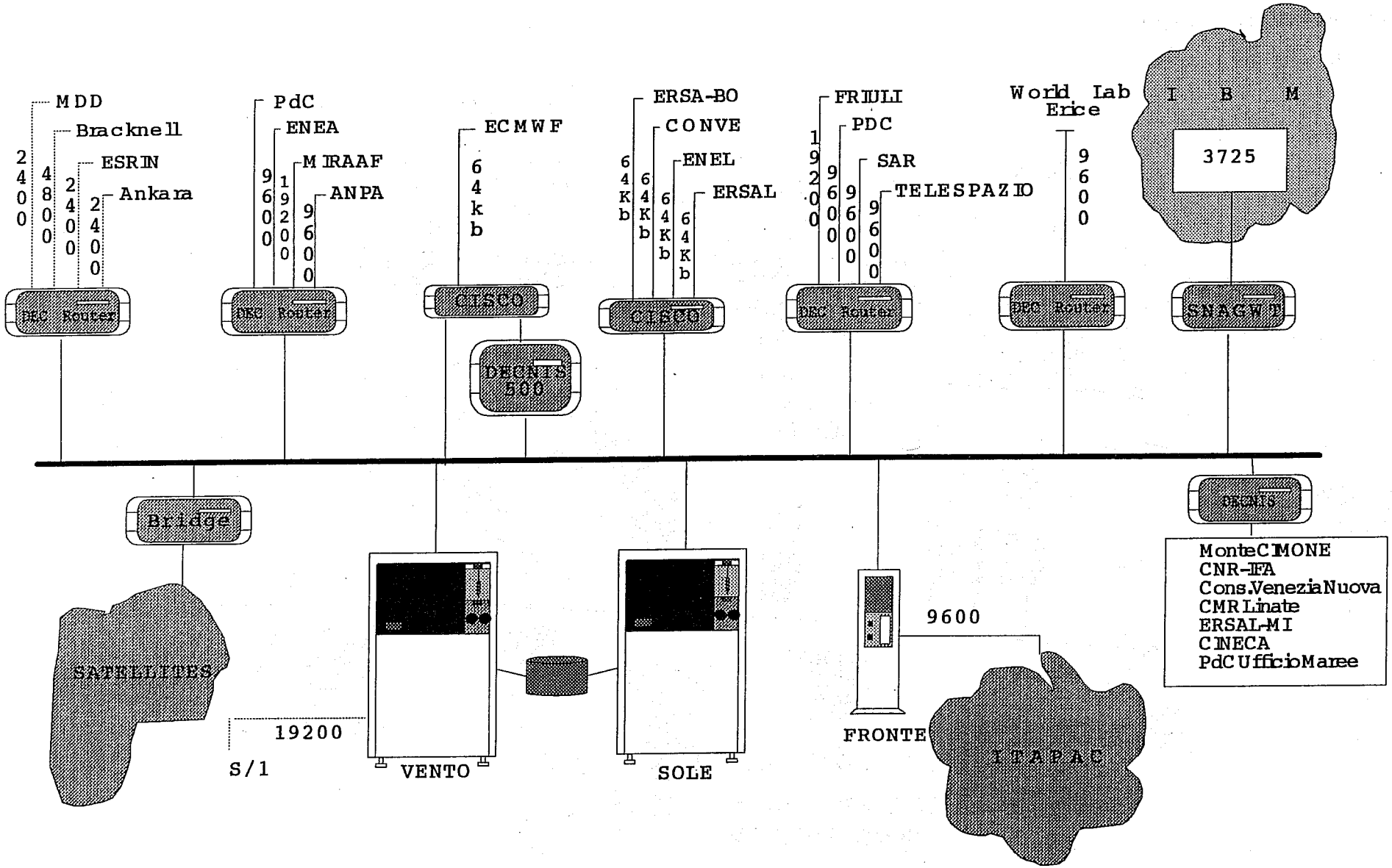

MDD
Bracknell
ESRIN
Ankara
2400
4800
2400
2400
DEC Router
PdC
ENEA
MIRAAF
ANPA
9600
19200
9600
DEC Router
ECMWF
64kb
CISCO
DECNIS 500
ERSA-BO
CONVE
ENEL
ERSAL
64Kb
64Kb
64Kb
64Kb
CISCO
FRIULI
PDC
SAR
TELESPAZIO
19200
9600
9600
9600
DEC Router
World Lab
Erice
9600
DEC Router
I B M
3725
SNAGWAY
DECNIS
MonteCIMONE
CNR-IFA
Cons.VeneziaNuova
CMR Linate
ERSAL-MI
CINECA
PdC UfficioMaree
Bridge
SATELLITES
19200
S/1
VENTO
SOLE
9600
FRONTE
ITAPAC

Fig.3

MEMBER STATE COMPUTING REPRESENTIVES' MEETING

7-8 October 1996

The Netherlands

1. Local computer equipment at the KNMI

The two next pages are showing the layout of the KNMI datacommunication network. The first figure shows the Wide Area Network (WAN) where the solid lines denote 64 Kb connections, whereas double solid lines are used for 2x64 Kb connections. This WAN connects the various secondary sites with the main office and with the ISDN (Integrated Services Digital Network).
The second scheme shows the Local Area Network (LAN, 10Mb) and main computers at the KNMI main site at De Bilt. A part of the LAN (the double solid lines) consists of a FDDI 'network highway'. This is a Fiber Distributed Data Interface, which is a double fiber ring with a bandwidth of 100 Mbit per second.
Connected to this FDDI-ring are several LAN's with their own purpose :

- SO -LAN for the seismology
- PROD -LAN for production
- DEV -LAN for development
- COMM -LAN for internal communication
- IBDS -LAN for image processing and distributing
- MOS -LAN for the archiving system
- 'site' -LAN LAN sections at the secondary sites (Schiphol, Rotterdam, Eelde, Beek, MMD, HMZ)
- regen -LAN for various VAX-clusters
- COPLA (COmmunication PLAtform) Firewall environment for reliable external communication (zone-LAN and front-LAN)

Routers have been installed for communication between the various sites, with ECMWF, internet/surfnet and the Message Switching System (MSS). The KNMI is connected to ECMWF through a CISCO-router, running TCP/IP and DECNET protocols and a 64 Kbyte line. The variety of computer systems, most of them are not shown, are connected to these LAN's.
These computer systems constists of :

- Convex-220 Mainframe computer for the operational models, modeloutput databases and graphic applications. This Mainframe will be switched of at 7 October 1996. The operartional models will run on workstations by then.
- Convex-C4 Compute-, data- and archiveserver.
- SG WS.-INDY About 40 Silicon Graphics (Indy) workstations. Most of these workstions are used for research. Two are SG Power-Challence (HIRLAM production model and Climate compute server)
- DEC Alpha About 50 workstations of which the most are DEC Alpha 3000
- SUN SPARC About 12.
- DEC MVAX About 15 Digital Micro VAX systems, mostly used for communications
- PC's Many Personal Computers on a PC-LAN for all kind of purposes.

2. Use of computing facilities at ECMWF.

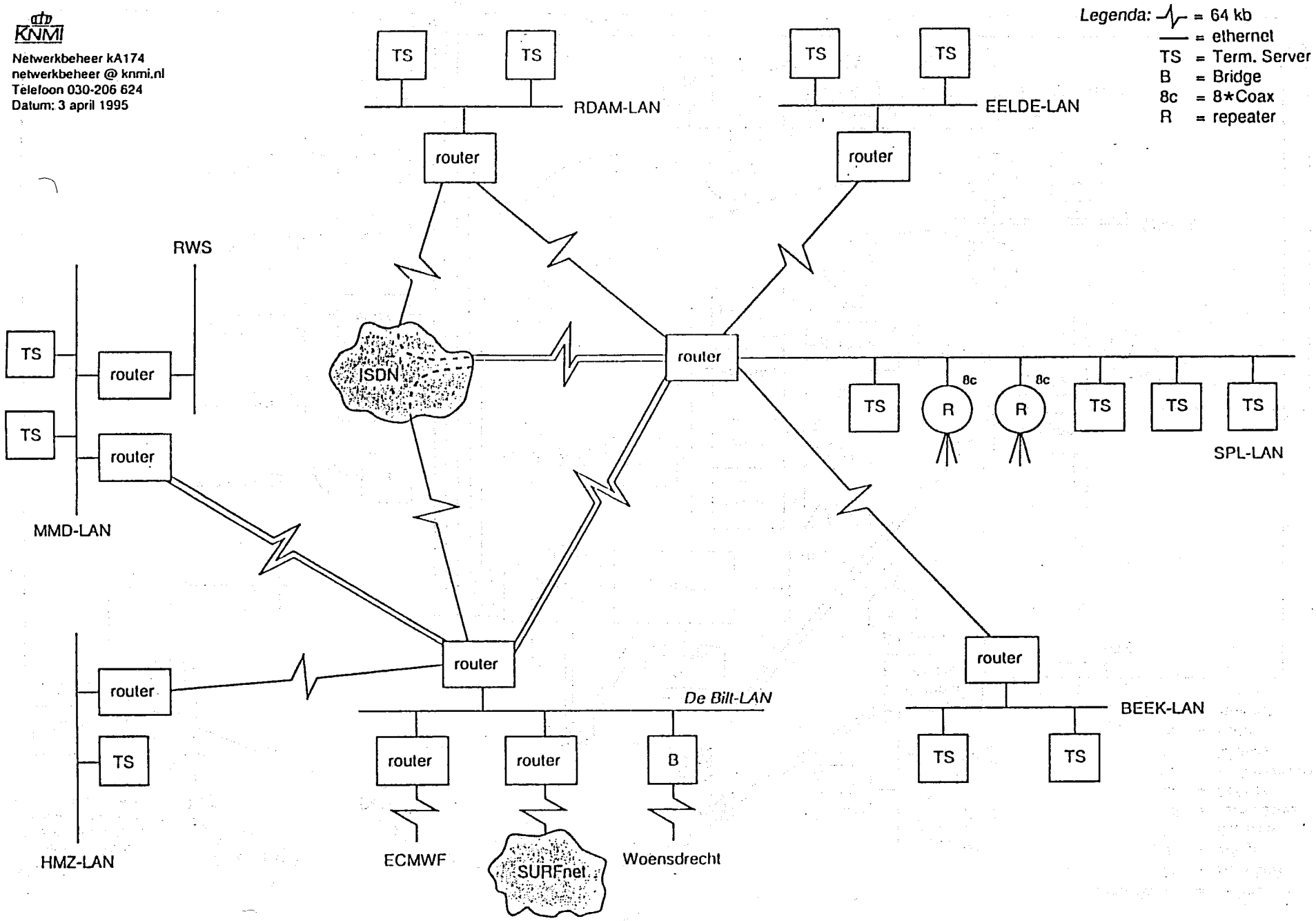
Currently the KNMI has got 58 SecureID-cards registrated of which 39 are used frequently. These 39 users have been used the Cray C90 and now using the Fujitsu vpp700 for simple MARS-access to the running of complex tracer programmes supporting air pollution research.

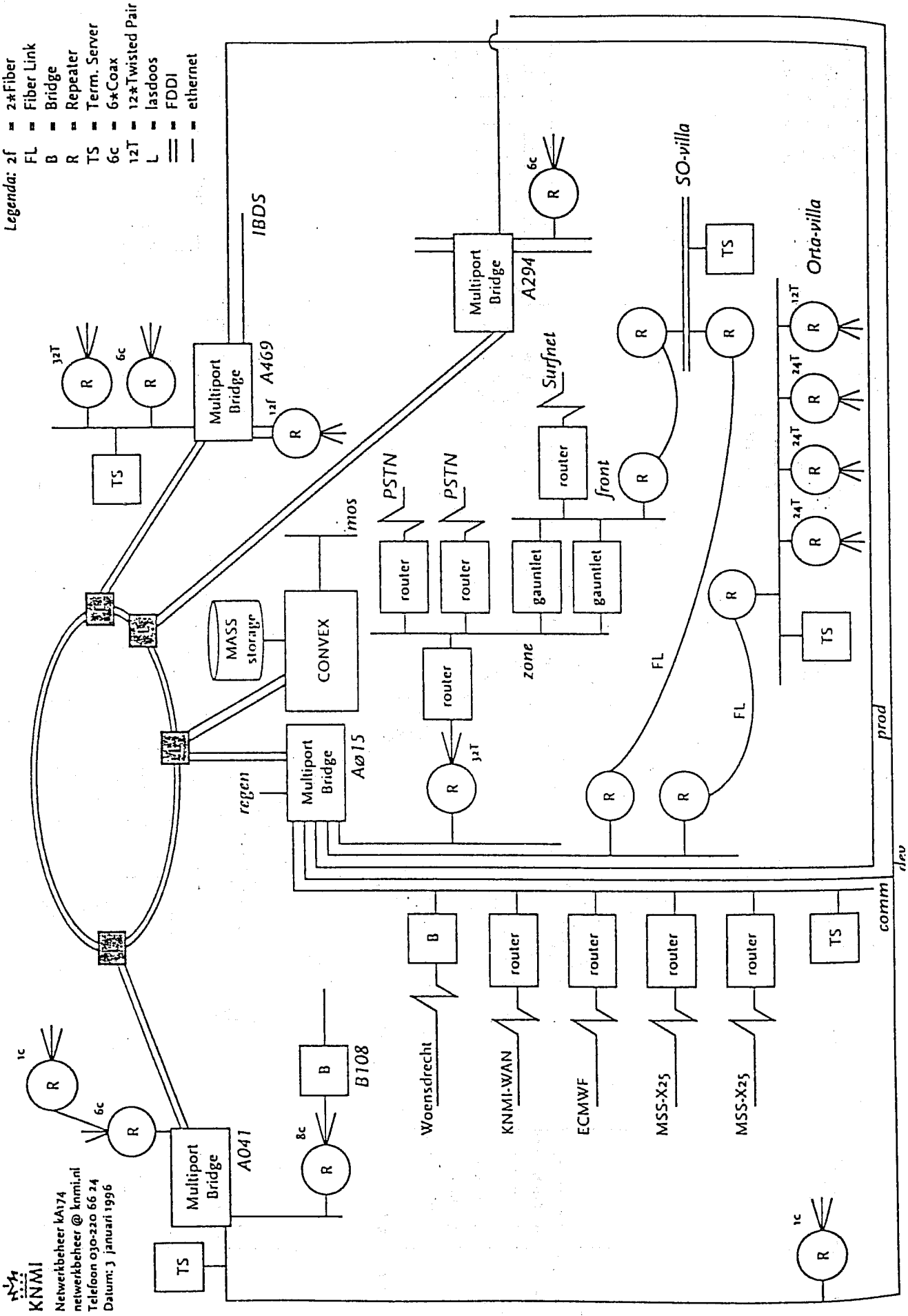
In 1995 the netherlands got a council allocation of about 159 Kunits. After deductions for Wave, 00UTC, ECSN and HIRLAM we left a net allocation of 96.15 Kunits. At the end of 1995 95.2 Kunits (92%) has been used for projects like :

- Trajectory computation for local emergencies
- Retrieval of MARS-data
- Climate research with HIRLAM
- Ocean modeling
- Development/maintenance of HIRLAM

In general the Dutch users are satisfied with the facilities offered. A tool like ECCOPY has found his way into transferring data from ECMWF to the KNMI. Version 1.0 of ECCOPY is now installed at the Convex C4 and at about 20 workstations. Version 1.1 will be installed soon and short after the testing and installation of ECCMD, a remote batch facility which makes it possible to submit jobs from workstations at the memberstates to ECMWF.

KNMI
Netwerkbeheer kA174
netwerkbeheer @ knmi.nl
Telefoon 030-206 624
Datum: 3 april 1995




Legenda: 2f = 2*Fiber
FL = Fiber Link
B = Bridge
R = Repeater
TS = Term. Server
6c = 6*Coax
12T = 12*Twisted Pair
L = lasdoos
= FDDI
— = ethernet
IBDS
A469
A294
SO-villa
Orta-villa
Surfnet
PSTN
PSTN
imos
MASS storage
CONVEX
router
router
router
gauntlet
gauntlet
router
front
zone
FL
FL
regen
Multiport Bridge
Aø15
A041
B108
B
Woensdrecht
KNMI-WAN
ECMWF
MSS-X25
MSS-X25
router
router
router
router
TS
TS
TS
prod
comm
dev
KNMI
Netwerkbeheer kA174
netwerkbeheer @ knmi.nl
Telefoon 030-220 66 24
Datum: 3 januari 1996

QUESTIONS AND COMMENTS

NETHERLANDS

B. Barg — There seems to exist a northern HIRLAM, and a Finnish HIRLAM. The one you use, is it a Netherlands HIRLAM, or is it the northern HIRLAM again?

O. Brinkhof — As far as I know it is an "international" version.

Rebecca Rudsar
DNMI, Olso, Norway October 1996

THE COMPUTING ENVIRONMENT AT DNMI

Computer Resources

Computers :

Tandem CLX820 (Communication)
- dual CPU, 2 * 8 Mbyte
- disk system, a mirrored pair of 648 Mbyte each

Silicon Graphics 4D/480 (Database)
- 8 CPU's
- memory 256 Mbyte
- disk storage capacity 30 Gbyte

Silicon Graphics Challenge L (Operational suite)
- 2 CPU's
- memory 256 Mbyte
- disk storage capacity 6 Gbyte

Silicon Graphics POWER Challenge XL (Operational suite)
- 2 (R8000) CPU's
- memory 512 Mbyte
- disk storage capacity 14 Gbyte

Raid disk system
- 32 Gbyte shared (16 and 16)

VAX3300 (Radar)
- memory 20 Mbyte
- disk storage capacity 570 Mbyte

VAX-station 3100 (Radar)
- memory 24 Mbyte
- disk storage capacity 330 Mbyte

VAX4000-200 (Nordrad)
- memory 32 Mbyte
- disk storage capacity 1.35 Gbyte

VAX4000-200 (MISAT)
- memory 32 Mbyte
- disk storage capacity 2.85 Gbyte

Alpha-200 (Meteosat)
- memory 64 Mbyte
- disk storage capacity 2.1 Gbyte

Workstations * 100
- Silicon Graphics Indigos and Indys, Sun SPARC stations, IBM RS6000, VAX3100, IVAS(I2S)

Terminals / PCs
- approx. 330

Networks :

Ethernet

- connecting all computers and workstations and several PCs. Most of the network is Switched Ethernet giving 10 Mbps to each machine.

Novell

- connecting some PCs. This is being phased out.

Graphical Devices:

- Hewlett Packard pen plotters
- A3/A4 laser printers

The Tandem CLX820 has a dual CPU and mirrored disk system and manages the communication for data acquisition and routing of observations.
Two IBM RS6000 computers, with the AIX operating system, are used to extend the communication capabilities of the CLX.

Observation data is transferred to a Unix computer for decoding. The decoding programs for SYNOP, TEMP, PILOT, AIREP and DRIBU obtained from ECMWF are run on a Unix platform. These have been modified to handle the decoding of National Groups. A decoding program for METAR has been written based on the same structure as the programs obtained from ECMWF. The decoded observations are stored in an internal DNMI format.

VAX4000-200 is used for communication with ECMWF. The telecommunication link is 64 Kbps.
This computer is used for running the Nordic Radar system, NORDRAD, which is a communication system for the distribution and collection of radar data between Nordic countries.

VAX3300 is connected to a radar unit covering Southeast Norway and is used for communication to the previously mentioned VAX4000-200.

VAX4000-200 is used for the MISAT satellite system which processes digital image data from NOAA and Meteosat. This system will gradually be phased out.

Alpha-200 is used for processing the data obtained from the geo-stationary satellite Meteosat. The data consists of satellite pictures, DCP (Data Collection Platform) data and MDD (Meteorological Data Distribution) data.

Oracle database software is installed on the S.G. 4D/480. Oracle software is used for the Climate database and a Verification database.

DNMI's internal net is connected via the University network to a CRAY J916/8128 situated at Trondheim. The CRAY has 8 processers, 1 GByte memory and 72 Gbyte of mass storage. The architecture is Shared memory parallel vector and peak performance is 200 Mflops per processor / 1.6 Gflops total. The Operating System is UNICOS (Cray UNIX). The telecommunication line (Supernet ATM) from the University of Oslo to CRAY has a theoretical speed of 34 Mbps. DNMI has a 10 Mbps connection to Supernet. The TCP/IP protocol is used for data transfer.

The Norwegian version of the HIRLAM model became the Operational Numerical Weather Prediction model in June 1995. It is run on the Cray-J90.
The Maritime Prediction models for ocean waves and storm surge are also run on the Cray-J90 as part of the operational suite.
All pre- and post- processing is at present performed on the S.G. POWER Challenge. The Supervisor Monitor Scheduler (SMS) and the X Command and Display program (XCDP), developed at ECMWF, are used to control and monitor the operational suite.

The RAID disk system is connected to the POWER Challenge XL and to the Challenge L computers. 16 Gbyte containing the file system for the operational suite and data is mounted on POWER Callenge XL. In the case of a machine failure the RAID disk system is mounted on the Challenge L and SMS continues from checkpoint state.
If the CRAY=J90 is unavailable the POWER Challenge XL computer is used to run a simpler version of the NWP model.
An MPP version of the HIRLAM model has been tested and it is planned to run this model operationally on a Cray T3E with 64 nodes early in 1997.

Routers have been installed at the forecasting centres at Bergen and Tromsø and at the airports at Oslo-Fornebu and Bergen-Flesland. The tele communication links are 128 or 64 Kbps. ISDN links are used as backup. Two Indy workstations are installed at each of the centres at Bergen and Tromsø. For backup purposes the workstations have identical file systems for operational products. They function as file servers as well as being used for some graphics for the meteorologists. They also function as file servers for the PCs.
Fornebu, Flesland and Bodø airports each have an RS6000 as fileserver.
Distribution of products uses the TCP/IP protocol.

ECMWF Products

Disseminated data from the operational forecast model, the global wave model and the Ensemble Prediction System are received from ECMWF.
This data amounts to approx. 40 Mbyte per day. The data is transferred from the VAX computer to the RAID disk system.

Dissemination data received from ECMWF is converted from GRIB format and placed in our present fields database.
The data is then accessible by the graphics package which has been developed at DNMI.

The data is also used
1) for general forecasting by the forecasting department.

2) as boundary values for the Norwegian limited area models.

3) as backup for the Norwegian limited area models.

4) as input to the maritime and air pollution models.

5) as input to a ship routing program for the Pacific.

6) the Norwegian Institute for Air Research still receives ECMWF data on a regular basis. The data is utilized in the European Arctic Stratospheric Ozone Experiment.

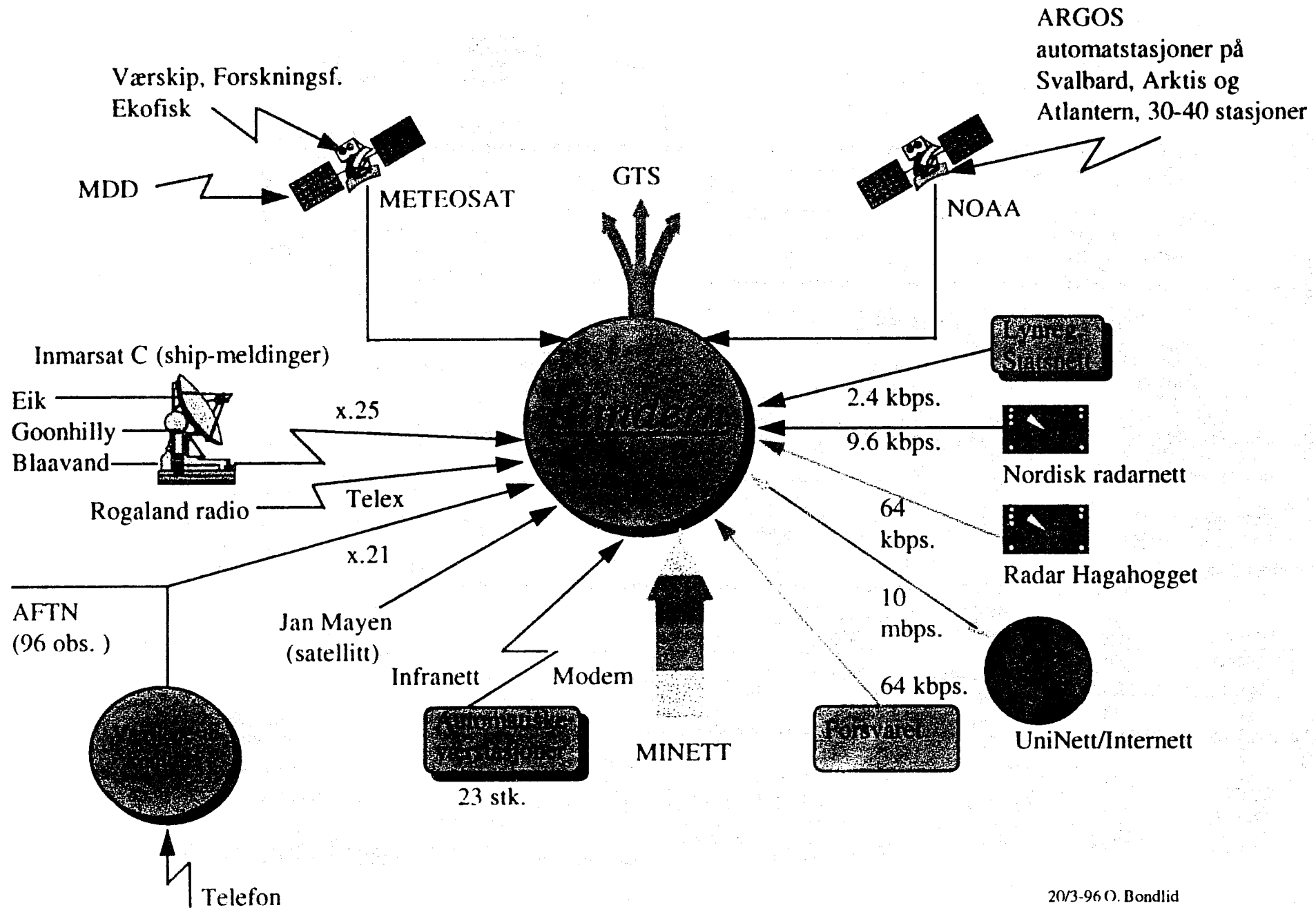
Data retrieval from MARS is used for research projects.

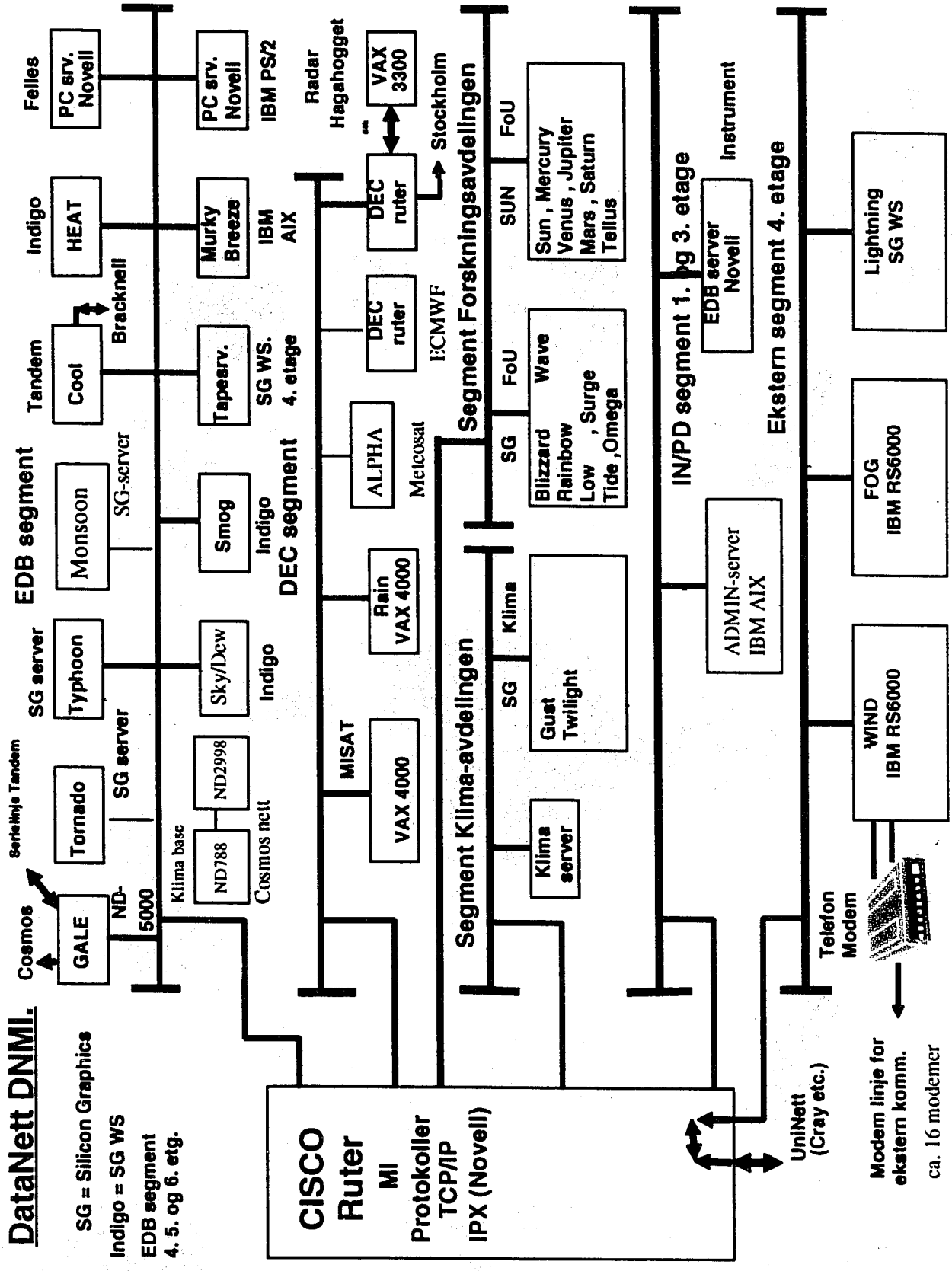
Projects at ECMWF

The following are registered as Special Projects in 1996:
- Parametrization of clouds in general circulation models.
- The role of mesoscale features in the heat transport in the Nordic seas.
- Climatic impacts on anthropogenic aerosols.
- Ozone as a climate gas.
- The HIRLAM Project.
  Norway is a member of the HIRLAM project. The reference version of the Hirlam system is implemented on the ECMWF computers (Cray/ Fujitsu), and will continue to be a platform for experiments. A system for validation of the Hirlam system, including 4 different weeks which cover several weather types, is utilized by the member states.
  The results of experiments are exchanged via the official HIRLAM libraries at ECMWF.
  Experiments include :
  - The generation of climatological fields.
  - Testing of different physical parametrization schemes in HIRLAM.

Users are on the whole satisfied with the services available at ECMWF. DNMI has a closed network and access to ECMWF is only available from computers on this network. University research students would like to be able to access ECMWF via Internet.

Nasjonal observasjonsinnsamling.




DataNett DNMI.
SG = Silicon Graphics
Indigo = SG WS
EDB segment
4. 5. og 6. etg.
Cosmos
Serielinje Tandem
GALE
ND-5000
Klima base
Tornado
SG server
ND788
ND2998
Cosmos nett
SG server
Typhoon
Sky/Dew
Indigo
EDB segment
Monsoon
SG-server
Smog
Indigo
DEC segment
Tandem
Cool
Bracknell
Tapeserv.
SG WS. 4. etage
Indigo
HEAT
Murky Breeze
IBM AIX
Felles
PC srv. Novell
PC srv. Novell
IBM PS/2
Radar Hagahogget
VAX 3300
Stockholm
DEC ruter
DEC ruter
ALPHA
Meteosat
ECMWF
MISAT
VAX 4000
Rain VAX 4000
Segment Klima-avdelingen
SG
Klima
Klima server
Gust Twilight
Segment Forskningsavdelingen
SG
FoU
Blizzard Rainbow Low , Surge Tide ,Omega
SUN
FoU
Sun , Mercury Venus , Jupiter Mars , Saturn Tellus
IN/PD segment 1. og 3. etage
EDB server Novell
Instrument
ADMIN-server IBM AIX
Ekstern segment 4. etage
Lightning SG WS
FOG IBM RS6000
WIND IBM RS6000
Telefon Modem
CISCO Ruter
MI
Protokoller
TCP/IP
IPX (Novell)
UniNett (Cray etc.)
Modem linje for ekstern komm.
ca. 16 modemer

QUESTIONS AND COMMENTS

NORWAY

H. Müller	I see a lot of different operating systems on your network. How many people do you have in the group maintaining these systems?
R. Rudsar	About 10. The IBM machines run AIX, that's UNIX. The SGI systems also run UNIX. The VAXs run VMS. The Tandem runs Guardian, but is being phased out.
R. Rudsar	An earlier question was asked to Finland (by B. Barg) about sharing a Cray system. We do the same. We also use about 20-25% of the machine. When we start running, all other jobs are stopped. This happens for only short periods though, and mostly out of working hours. It amounts to about half an hour (for three models) four times a day.
G.-R. Hoffmann	The research students you quoted as wanting to use Internet access to ECMWF, are these students you would vouch for, they would use SecurID cards?
R. Rudsar	Yes.

National Organisation

Central Institute of Meteorology and Geodynamics:

The Director: Permanant Representative with WMO

Responsible in principle for all meteorological tasks except of

International Communication : GTS

and National Communication : ACN (former AMCON)

and

Flight-Meteorology in the sense of ICAO

Austro Control

Responsible for

GTS

Austro Control Network ACN (former AMCON)

Flight Meteorology

Hydrological Survey

Responsible for Hydrology

CENTRAL INSTITUTE OF METEOROLOGY AND GEODYNAMICS

Organisation

Director

Vice-Director

Departements:

Climatology

Synoptic

Environmental Meteorology

Geophysics

ADP

Technics

Administration

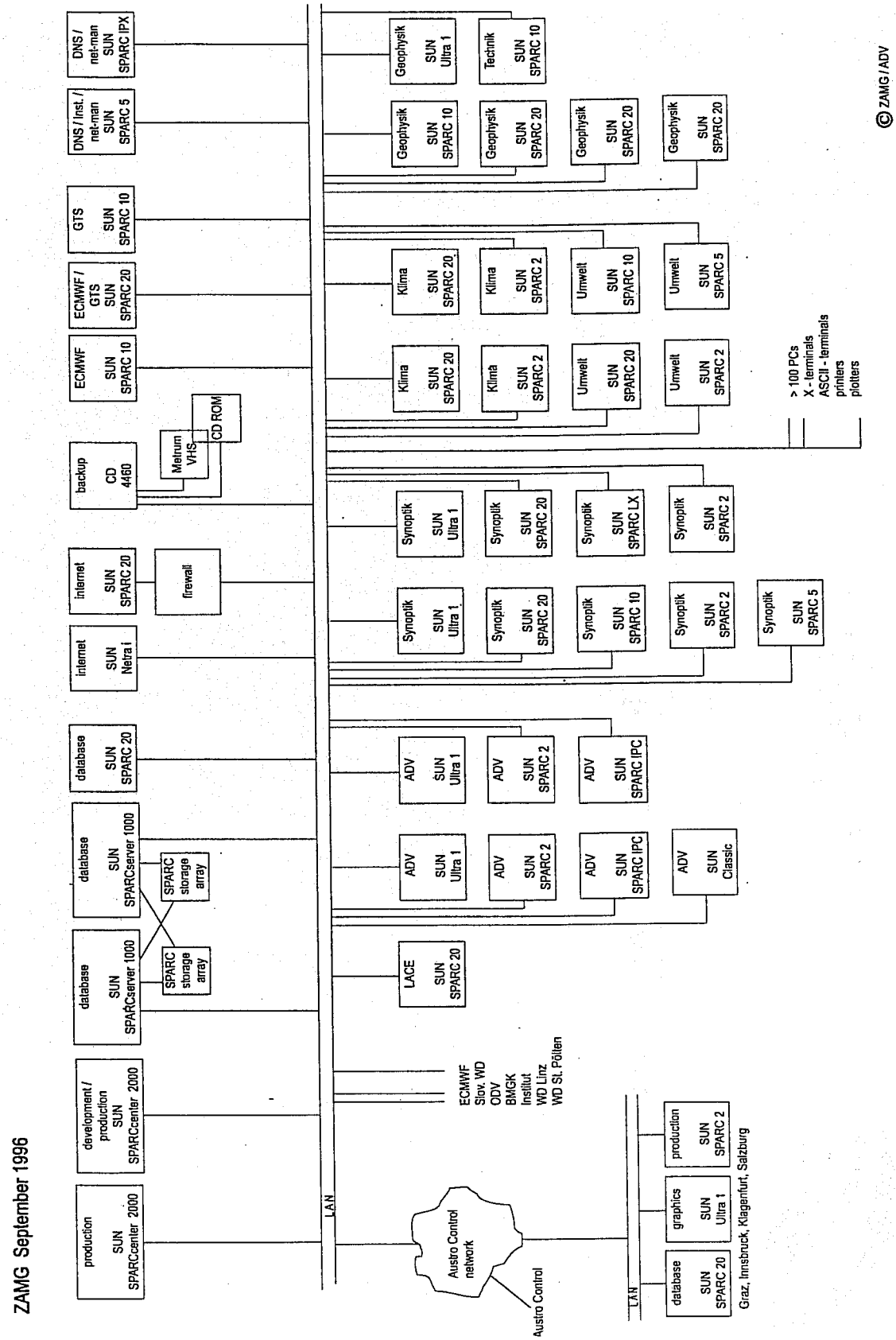
Regional Plant for Tyrol and Vorarlberg

Regional Plant for Salzburg and Upper Austria

Regional Plant for Carintya and Eastern Tyrol

Regional Plant for Styria

The Dpt.of Climatology is also responsible for Vienna,Lower Austria and Burgenland


ZAMG September 1996
DNS / net-man SUN SPARC IPX
DNS / Inst. / net-man SUN SPARC 5
GTS SUN SPARC 10
ECMWF / GTS SUN SPARC 20
ECMWF SUN SPARC 10
backup CD 4460
Metrum VHS
CD ROM
internet SUN SPARC 20
internet SUN Netra i
firewall
database SUN SPARC 20
database SUN SPARCserver 1000
SPARC storage array
database SUN SPARCserver 1000
SPARC storage array
development / production SUN SPARCcenter 2000
production SUN SPARCcenter 2000
LAN
Austro Control network
Austro Control
ECMWF
Slov. WD
ODV
BMGK
Institut
WD Linz
WD SL Pölten
LACE SUN SPARC 20
ADV SUN Ultra 1
ADV SUN SPARC 2
ADV SUN SPARC IPC
ADV SUN Classic
Synoptik SUN Ultra 1
Synoptik SUN SPARC 20
Synoptik SUN SPARC LX
Synoptik SUN SPARC 2
Synoptik SUN SPARC 10
Synoptik SUN SPARC 5
Klima SUN SPARC 20
Klima SUN SPARC 2
Umwelt SUN SPARC 10
Umwelt SUN SPARC 5
Umwelt SUN SPARC 20
Geophysik SUN Ultra 1
Geophysik SUN SPARC 10
Geophysik SUN SPARC 20
Technik SUN SPARC 10
> 100 PCs
X - terminals
ASCII - terminals
printers
plotters
© ZAMG / ADV
production SUN SPARC 2
graphics SUN Ultra 1
database SUN SPARC 20
Graz, Innsbruck, Klagenfurt, Salzburg

ZAMG

Systems

- 40 Unix - Workstations
- 12 Unix - Server
- Central database with more than 100 Gbytes capacity
- Hierarchical storage systems with several 100 Gbytes capacity

Software

SUN-Systems

Operating System :	**(SunOS and) SOLARIS (UNIX)**
Compiler:	**Fortran 77**
	C, ANSI C
Graphics:	**XELION GKS**
	MAGICS
	PV-Wave
Libraries	**IMSL**
	Nag
Database:	**SYBASE**
	High Ability System

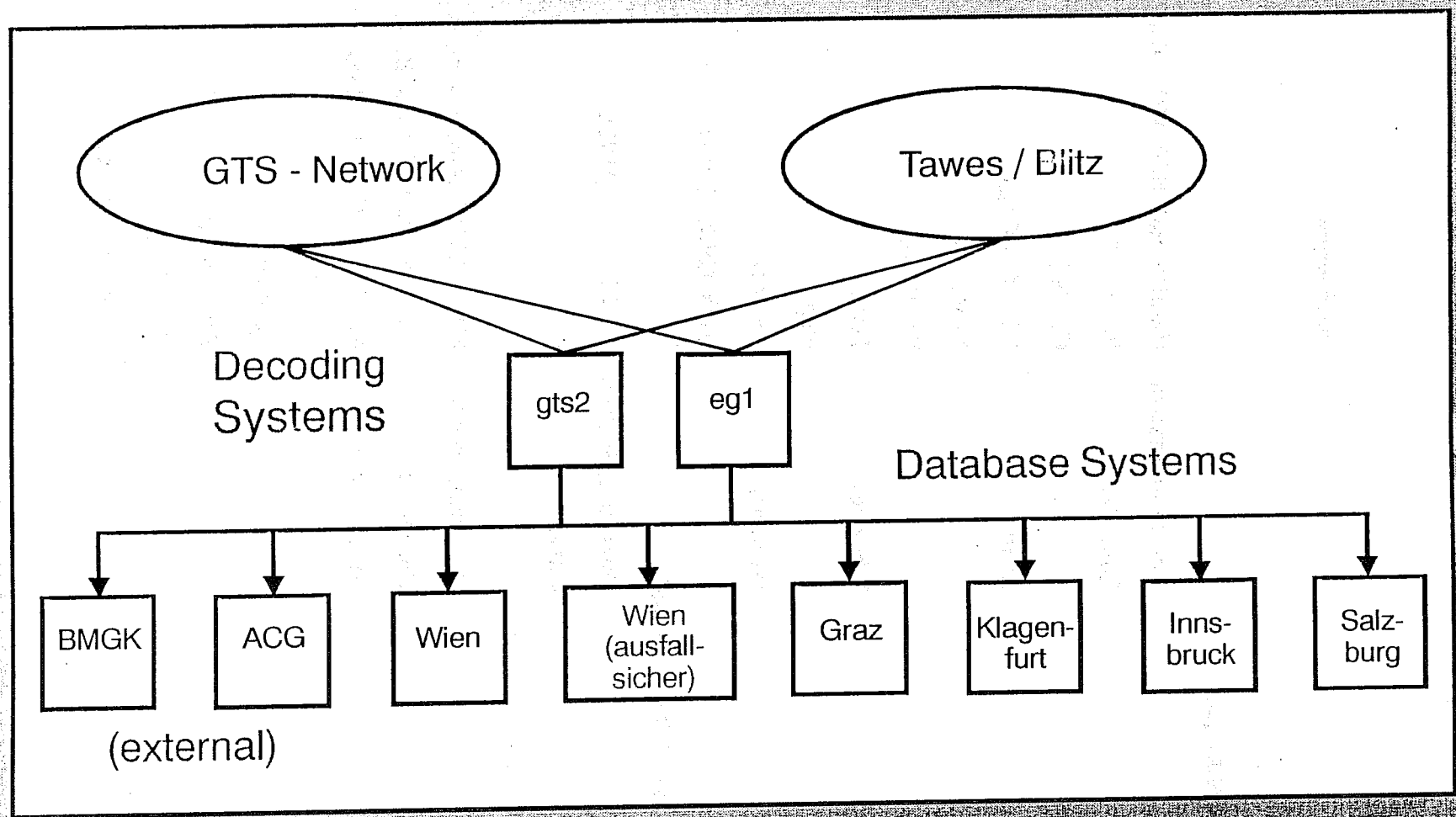
Control Data CD 4460

Operating System:	**EP/IX (UNIX)**
Compiler:	**C**

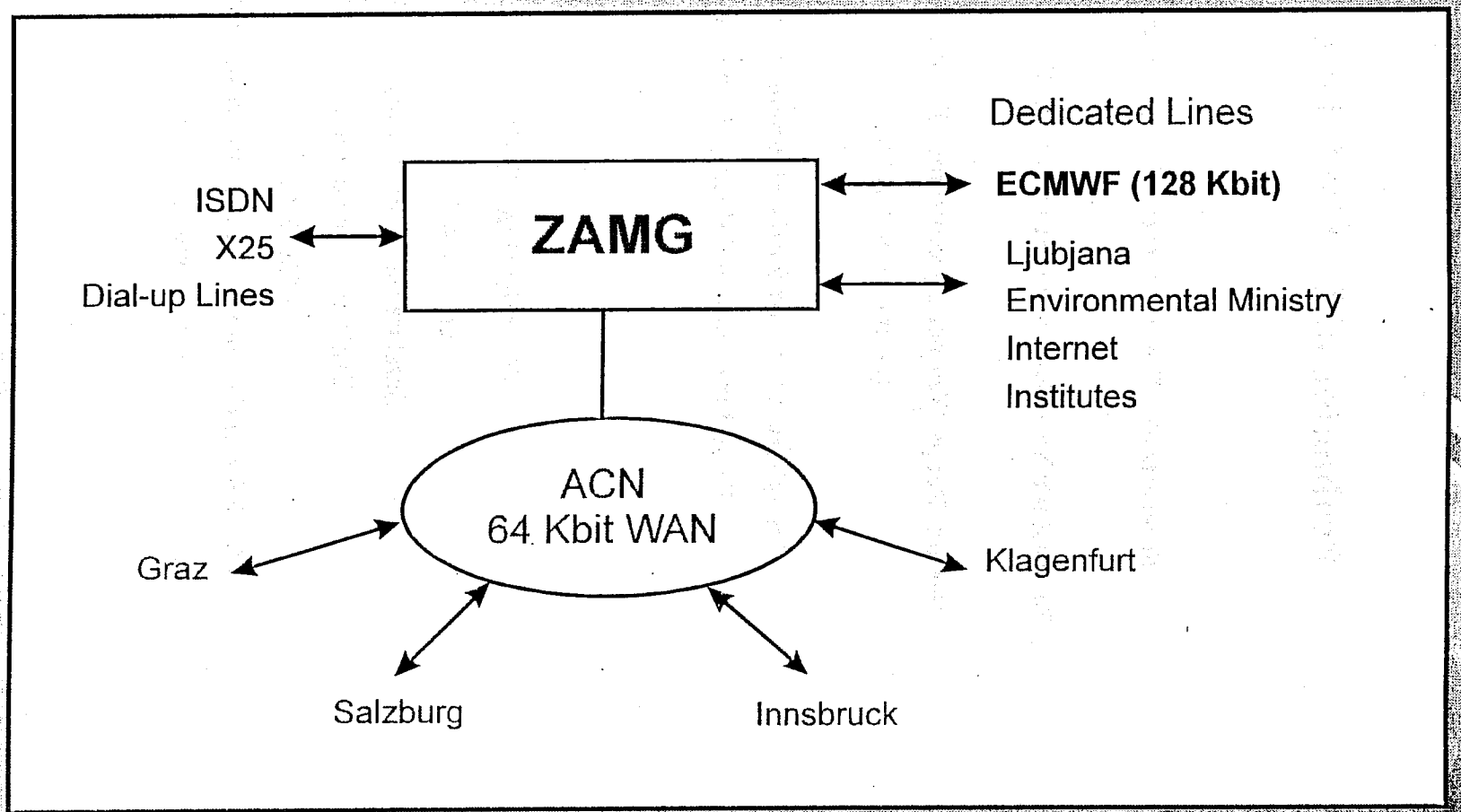
Personal Computer

Operating System:	**MS-DOS,Windows,Windows NT**
Compiler:	**Fortran, Turbo Pascal, Basic, C**
Application:	**MS-Word, Word for Windows**
	EXCEL
	ACCESS
	Powerpoint
	Corel Draw
	Ventura Publisher

Data Flow


GTS - Network
Tawes / Blitz
Decoding Systems
gts2
eg1
Database Systems
BMGK
ACG
Wien
Wien (ausfall-sicher)
Graz
Klagen-furt
Inns-bruck
Salz-burg
(external)

Telecommunications



Evaluation of ECMWF-Products:

Forecasts (N, Wind) for several Towns (worldwide)

Forecast for Newspapers and Broadcasting Company (ORF)

Medium Range Weather Forecast: incl. Frontal Parameter:
(Graphics and Tables)

Precipitation forecast for the Hydrological Survey
(Flood Protection and Energy Porduction)

Visualisation TPVIS

using MAGICS

Satellite Image Processing

Trajectory Calculations

GTS-Data

TAWES-Data(from semi-automatic weather stations)

Environmental Data

Wetterwerte für den STANDARD - Städteprognosen für Freitag, 4. Oktober 1996

Amsterdam wolkig,starker Wind 12 14
Athen heiter 19 26
Azoren/Lajes heiter 21 25
Bangkok stark bewölkt,Gewitter 27 33
Beirut heiter 20 30
Belgrad wolkig 12 20
Berlin heiter 8 15
Bozen wolkig 8 17
Bruxelles wolkig 11 14
Budapest heiter 6 16
Buenos Aires stark bewölkt 16 21
Bukarest heiter 9 21
Casablanca wolkig 15 25
Chicago heiter 5 11
Dakar wolkig 25 30
Dublin stark bewölkt,starker Wind 9 12
Frankfurt wolkig 8 15
Genf wolkig 7 15
Helsinki stark bewölkt,starker Wind 9 11
Hongkong wolkig,Regenschauer 25 29
Istanbul heiter 16 22
Jerusalem heiter 15 27
Johannesburg heiter 16 27
Kopenhagen stark bewölkt,Regen 11 14
Laibach wolkig 9 16
Lima bedeckt 15 18
Lissabon heiter 13 22
London wolkig,starker Wind 9 14
Los Angeles heiter 18 24
Madrid heiter 5 19
Mailand wolkig 7 19
Mexico City stark bewölkt,Regenschauer 14 18
Montreal wolkig 3 13
Moskau stark bewölkt,Regenschauer 7 8
Nairobi wolkig,Gewitter 19 29
Neu Delhi stark bewölkt,Gewitter 28 32
New York heiter 9 19
Oslo stark bewölkt,Regen 10 11
Palermo stark bewölkt,Gewitter 19 21
Paris stark bewölkt 12 15
Peking stark bewölkt 12 23
Reykjavik stark bewölkt,Schneeregenschauer 3 5
Rom stark bewölkt,Regen 16 19

WETTERLAGE

Im Westen Wetterverschlechterung, sonst trocken und sonnig

Im Alpenraum schwächt sich der Hochdruckeinfluß ab. Eine Kaltfront greift von Westen her auf Österreich über.

Dienstag: Im Westen verdichtet sich die Bewölkung und es kommen Regen und Regenschauer auf. Im übrigen Bundesgebiet bleibt es allgemein noch trocken und zumindest teilweise sonnig mit einigen Nebelfelder am Morgen. Der Wind kommt aus Südost bis West. Die Frühtemperaturen liegen zwischen 5 und 13, die Tageshöchsttemperaturen zwischen 16 und 22 Grad.

Mittwoch: Bei veränderlicher bis starker Bewölkung gibt es wiederholt noch Regen und Regenschauer. Die Frühtemperaturen liegen zwischen 5 und 10 Grad, tagsüber nur noch zwischen 10 und 15 Grad.

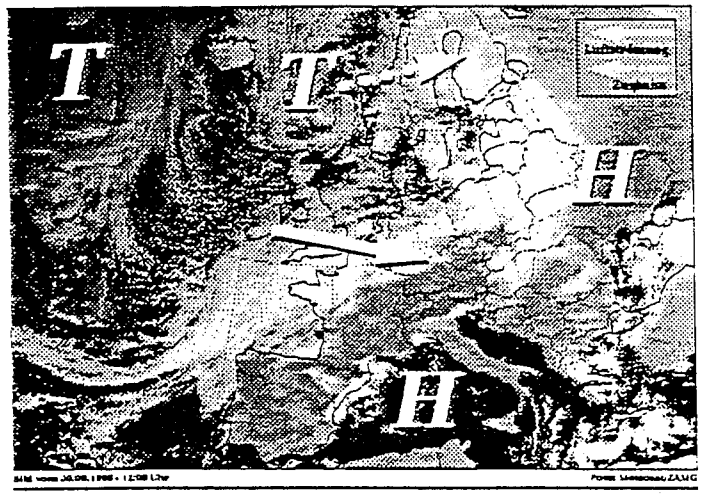


Bild vom 30.09.1998 - 12:00 Uhr — Quelle: Meteosat/ZAMG

Wetterwerte Österreich

Gemessen am 30.09.1998, 14.00 Uhr MESZ

Stadt	Bewölkung	Rel. Luftfeucht.	Temp.	Höchstwert*	Tiefstwert**	Langj. Durch. ***	Sonne aufg.	01.10. aufg.	Untergang
Wien				25°('91)	11°('57)	13°	06:54		18:34
Bregenz				30°('75)	10°('54)	13°	07:20		19:01
Eisenstadt				28°('91)	10°('57)	14°	06:53		18:33
Graz				25°('81)	9°('57)	13°	06:57		18:38
Innsbruck				29°('75)	8°('73)	13°	07:14		18:54
Klagenfurt				28°('81)	8°('57)	12°	07:02		18:43
Linz				28°('56)	10°('78)	13°	07:03		18:42
Salzburg				27°('81)	8°('57)	13°	07:07		18:47
St. Pölten				26°('81)	9°('54)	13°	06:57		18:37

* Höchster je am 30.09. gemessener Wert (14.00 Uhr MEZ), Jahreszahl in Klammer
** Tiefster je am 30.09. gemessener Wert (14.00 Uhr MEZ), Jahreszahl in Klammer
*** Tagesmittel vom 30.09. (1. 1. 1950 - 31. 12. 1995)

Europa

Werte für 01.10.1998

		Min/Max
Amsterdam	Regen	13/16
Athen	heiter	18/24
Belgrad	wolkig	12/20
Berlin	Regen	12/16
Bozen	Gewitter	15/20
Brüssel	Regenschauer	12/16
Budapest	wolkig	13/23
Bukarest	wolkig	10/15
Dublin	Regenschauer	10/12
Frankfurt	Regen	12/16
Genf	Regen	12/15
Helsinki	stark bewölkt	4/14
Istanbul	heiter	13/23
Kopenhagen	Regen	11/14
Laibach	wolkig	13/23
Lissabon	heiter	18/24
London	Regenschauer	12/14
Madrid	wolkig	13/19
Mailand	Regen	14/18
Moskau	wolkig	5/15
Oslo	Regenschauer	10/13
Palermo	heiter	18/24
Paris	wolkig	12/17
Reykjavik	stark bewölkt	3/10
Rom	heiter	18/23
Stockholm	Regen	9/13
Venedig	Gewitter	18/22
Warschau	stark bewölkt	10/17
Wien/Hitta	stark bewölkt	1/5
Zagreb	wolkig	13/23
Zürich	Regen	12/17

Übersee

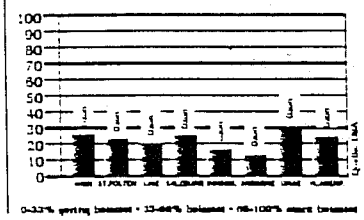
Azoren/Lajes	heiter	21/26
Bangkok	wolkig	27/32
Beirut	heiter	23/29
Buenos Aires	heiter	10/15
Casablanca	wolkig	20/29
Chicago	wolkig	8/13
Dakar	heiter	23/29
Hongkong	wolkig	24/29
Jerusalem	wolkig	18/22
Johannesburg	heiter	12/24
Lima	wolkig	15/20
Los Angeles	heiter	18/20
Mexico City	wolkig	12/19
Montreal	stark bewölkt	13/18
Nairobi	wolkig	18/24
Neu Delhi	heiter	25/33
New York	Regen	18/21
Peking	stark bewölkt	15/25
Sydney	wolkig	13/19
Tokyo	bedeckt	18/23
Washington	stark bewölkt	13/21

Biowetter

Bei wetterfühligen Personen treten Kopfschmerzen und Migräne auf. Konzentrationsstörungen, Reizbarkeit, nervöse Unruhe und depressive Reaktionen sind möglich. In Tälern und Ballungsgebieten ist mit einer erhöhten Belastung für Herz- und Kreislaufkranke zu rechnen. Genußgifte, vor allem Alkohol, entfalten mit Medikamenten eine erhöhte Wirkung.

Schadstoffe

MO, 07.00 Uhr
Höchstwerte in %



0-33% gering belastet • 33-66% belastet • 66-100% stark belastet

Mond

am 01.10.1998 (MESZ)

Aufgang:	21.20 Uhr
Untergang:	11.37 Uhr

○ 4.Oktober ● 19.Oktober
● 12.Oktober ○ 26.Oktober

Quelle: ZAMG

Sechs-Tage-Vorschau

TEMPERATUREN (Min/Max)

DI	MI	DO	FR	SA	SO
12° 22°	10° 15°	9° 16°	10° 14°	11° 14°	12° 16°

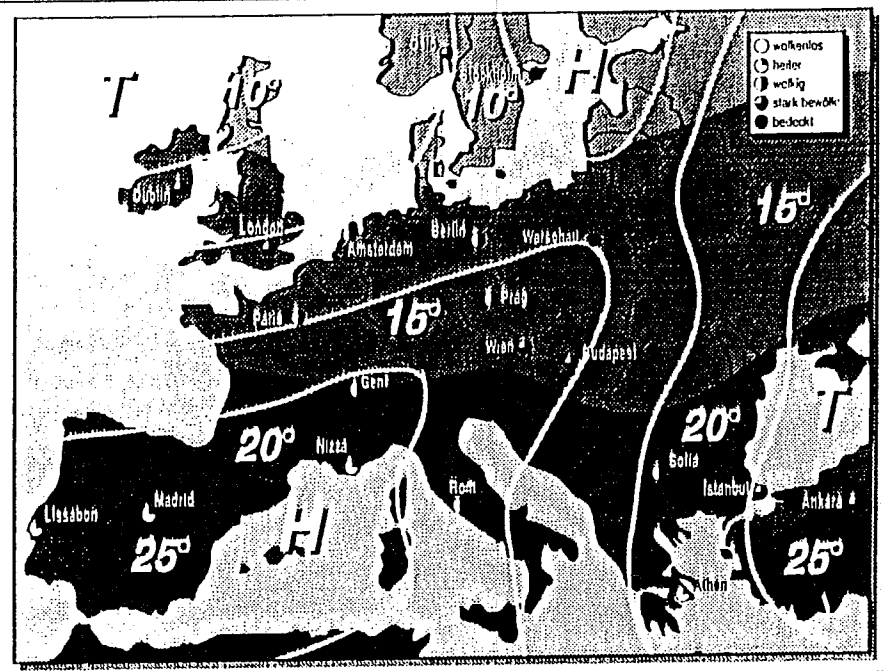
Wetter
Wiener Zeitung

Bild vom 27.09.1996 - 12.00 Uhr — Foto: Meteosat ZAMG

Eine atlantische Störung überquert das Bundesgebiet von West nach Ost.

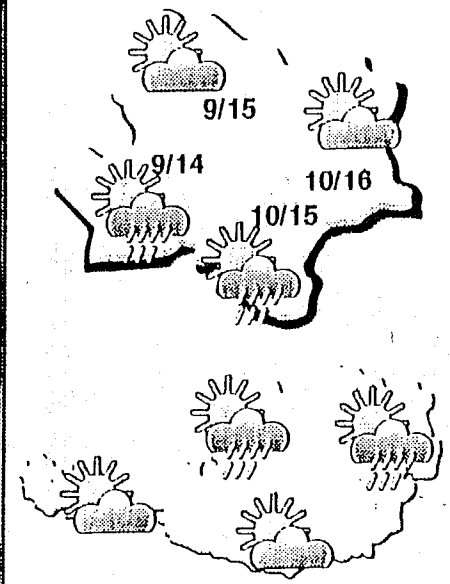
Nördlich des Alpenhauptkammes und im Osten anfangs noch starke Bewölkung und örtlich auch etwas Regen, sonst häufig schon sonnig. Im weiteren Tagesverlauf überall abnehmende Bewölkung und Übergang zu sonnigem Wetter. Mäßiger, im Osten auch lebhafter Wind aus West bis Nordwest. Frühtemperaturen 5 bis 12 Grad, Tageshöchsttemperaturen dann 14 bis 19 Grad.

Am Sonntag herrscht meist freundliches Wetter. Es ist zwar zeitweise etwas bewölkt, aber der Wind ist schwach und die Temperatur angenehm mild.



QUELLE: ZAMG WIEN, Hohe Warte

TAGESWERTE für heute



WETTERWERTE
Tiefstwerte / Höchstwerte

Wien	Regen	10/18	Linz	Regen	11/16	Budapest	Regen	7/15	Madrid	heiter	10/25
Bregenz	stark bewölkt	11/15	Salzburg	Regen	11/14	Buenos A.	heiter	11/18	Mailand	heiter	11/22
Eisenstadt	Regenschauer	9/18	St. Pölten	Regen	11/15	Bukarest	Regenschauer	12/15	Moskau	stark bewölkt	5/8
Graz	wolkig	10/18				Helsinki	starker Wind	8/10	München	Regenschauer	10/13
Innsbruck	Regenschauer	10/14	Amsterdam	wolkig	13/15	Istanbul	Gewitter	17/18	New York	stark bewölkt	17/19
Klagenfurt	wolkig	9/18	Athen	heiter	19/23	Johannesbg	heiter	9/22	Nizza	heiter	17/21
			Bangkok	Gewitter	26/32	Kopenhagen	wolkig	11/14	Oslo	stark bewölkt	9/12
			Berlin	wolkig	10/14	Lissabon	heiter	16/25	Palermo	heiter	19/23
			Bozen	heiter	10/20	London	starker Wind	12/17	Palma M.	heiter	19/24
			Brüssel	wolkig	11/15	Los Angeles	heiter	18/22	Paris	wolkig	11/16

Prag	wolkig	10/14			
Reykjavik	Regenschauer	8/9			
Rom	wolkig	18/22			
Stockholm	Regen	9/11			
Sydney	Regen	16/20			
Tel Aviv	heiter	22/30			
Triest	wolkig	13/20			
Tunis	heiter	19/25			
Venedig	wolkig	12/20			
Zürich	wolkig	11/15			

BIOWETTER

Nach dem Durchzug einer nicht allzu wetterwirksamen Störungszone, setzt sich vom Westen her langsam Wetterbesserung durch.

Bei akuter Neigung zu Verkrampfungen im Magen-, Darm-, Gallen- und Harnwegsbereich müssen Diätfehler vermieden werden.

Rheumatische Beschwerden können derzeit vermehrt auftreten. Personen mit erhöhtem Blutdruck und mit Neigung zu pectanginösen Beschwerden sollen ungewohnte Belastungen weitgehenst meiden.

SONNEMOND

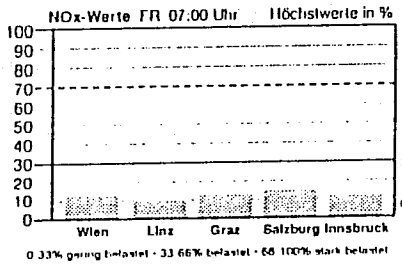
6:50 Uhr
18:40 Uhr

19:28 Uhr
8:14 Uhr

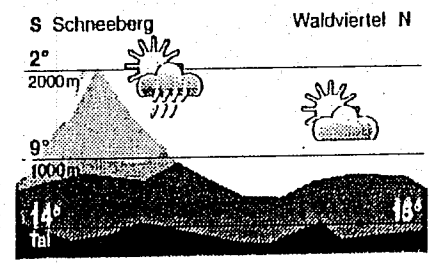
SCHADSTOFFWERTE

Der mäßige bis lebhafte Wind aus West bis Nordwest bewirkt eine gute Durchmischung der bodennahen Luftschichte. Trotz des Windes ist die Staubbelastung nur gering.

Auch die übrigen Schadstoffe belasten die bodennahe Luft nur wenig.

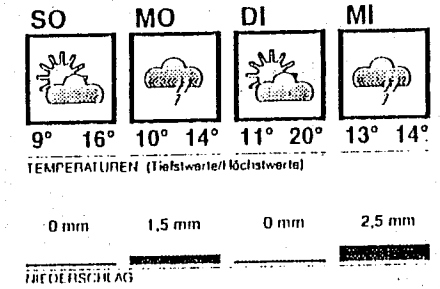


BERGWETTER



Die höheren Berggipfel sind oft in Wolken und örtlich gibt es einige Regenschauer. Die Schneefallgrenze liegt um 1800m. Aufgrund des lebhaften bis stürmischen Nordwestwindes lockern die Wolken im Bereich des Nordstaus nur stellenweise auf. Die Mittagstemperatur in 1500m Höhe liegt um 5 Grad.

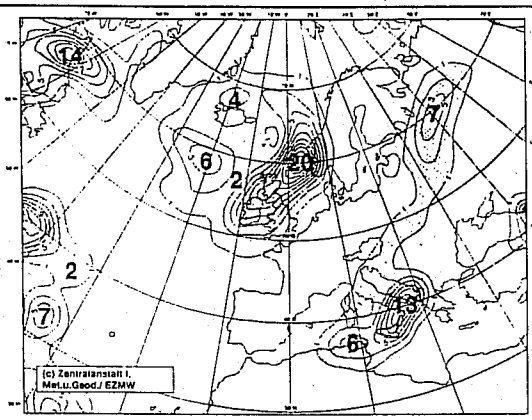
VIERTAGEVORSCHAU



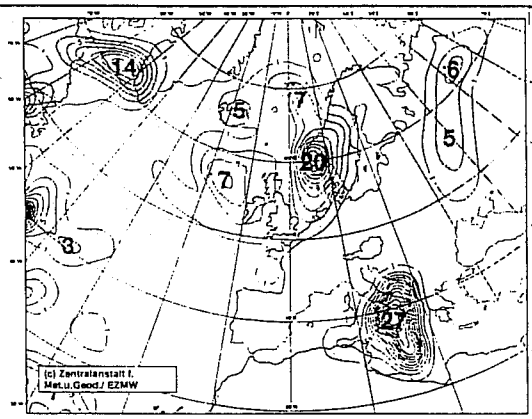
WETTERPHONE 0450 199 1566+

Gesamtösterreich +00 · Bundesländer:
+01 Wien +02 NÖ +03 B +04 OÖ +05 S +06 K +07 Stmk +08 T +09 V
5-Tage +10 · Segel +11 · Berg +12 · Schnee +13
Meer +14 · Europa +15 · Agrar +16 · Bio +17
KOSTEN 65.6 Ansa 18.00-8.00 Uhr · 69.8 Ansa 8.00-18.00 Uhr

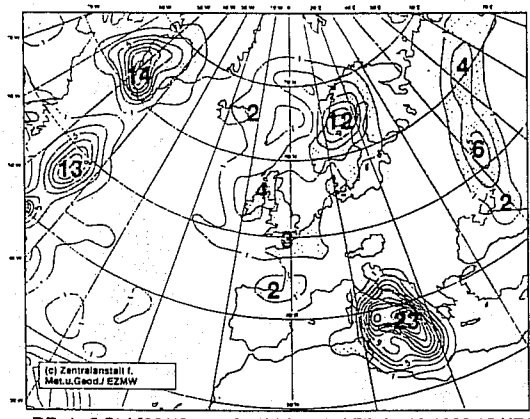
blatt22



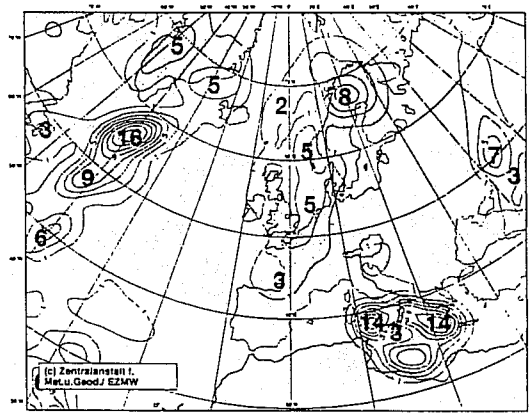
RR -/+ 6 Std [001/2 mm] A(2.10.) f.DO,03.10.1996,12 UTC



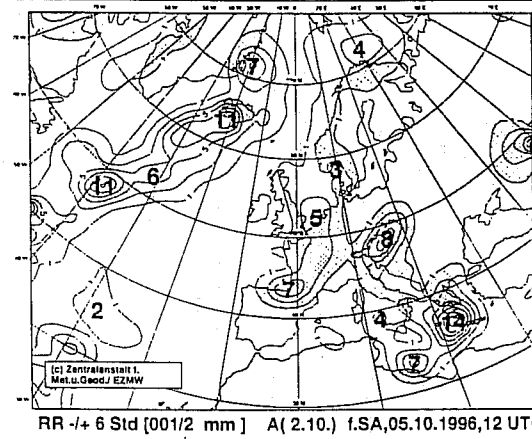
RR -/+ 6 Std [001/2 mm] A(2.10.) f.FR,04.10.1996,00 UTC



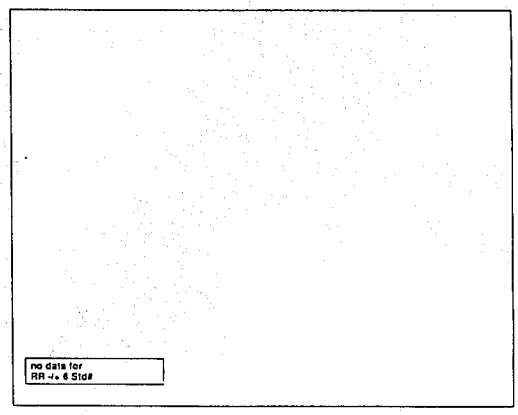
RR -/+ 6 Std [001/2 mm] A(2.10.) f.FR,04.10.1996,12 UTC

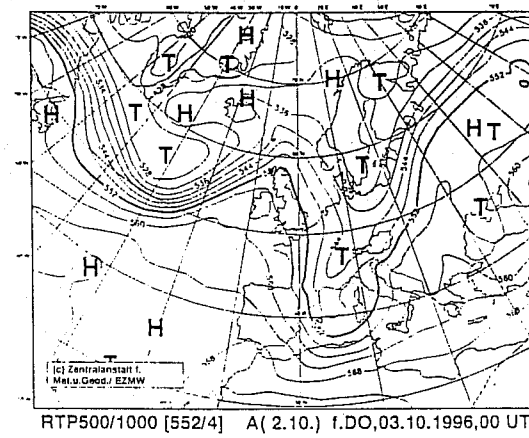


RR -/+ 6 Std [001/2 mm] A(2.10.) f.SA,05.10.1996,00 UTC

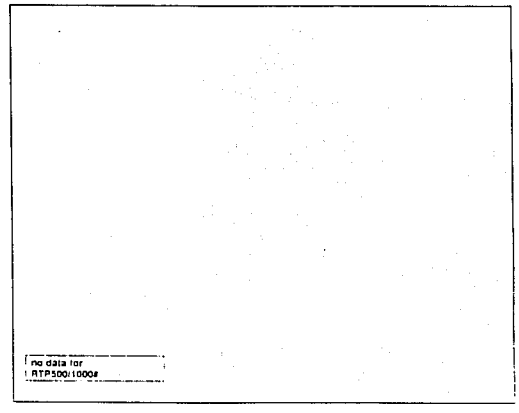


RR -/+ 6 Std [001/2 mm] A(2.10.) f.SA,05.10.1996,12 UTC



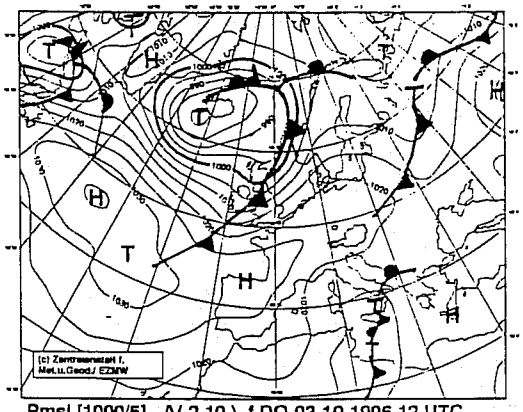


RTP500/1000 [552/4] A(2.10.) f.DO,03.10.1996,00 UTC

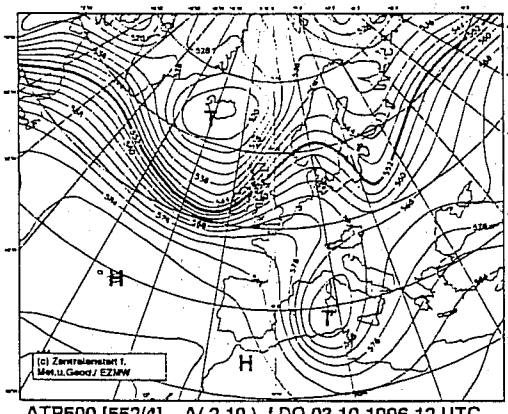


ZENTRALANSTALT FÜR METEOROLOGIE UND GEODYNAMIK
Abteilung für Synoptische Meteorologie Tel (0222) 36 0 26/2310 Fax (0222) 368 45 70

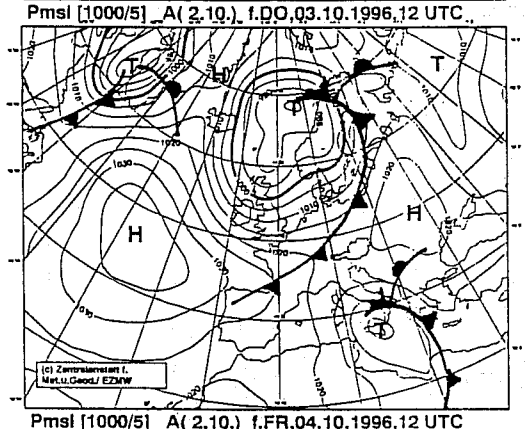
Mittelfristige Wetterentwicklung bis Dienstag, den 08.10.1996



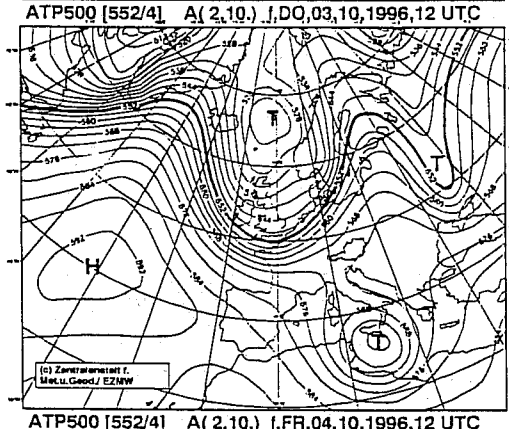
Pmsl [1000/5] A(2.10.) f.DO,03.10.1996,12 UTC



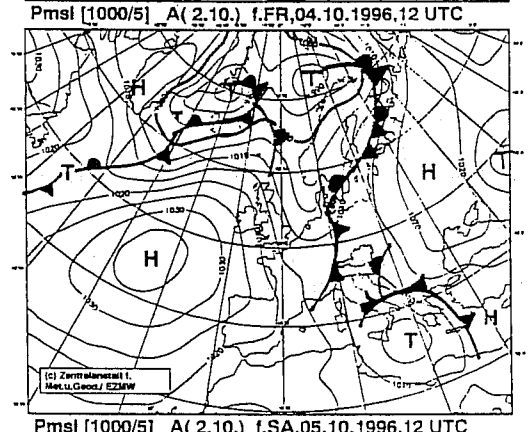
ATP500 [552/4] A(2.10.) f.DO,03.10.1996,12 UTC



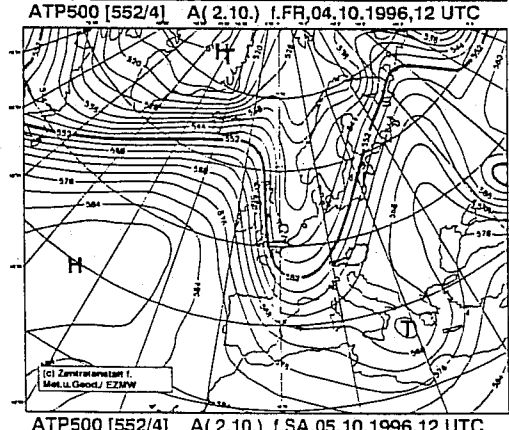
Pmsl [1000/5] A(2.10.) f.FR,04.10.1996,12 UTC



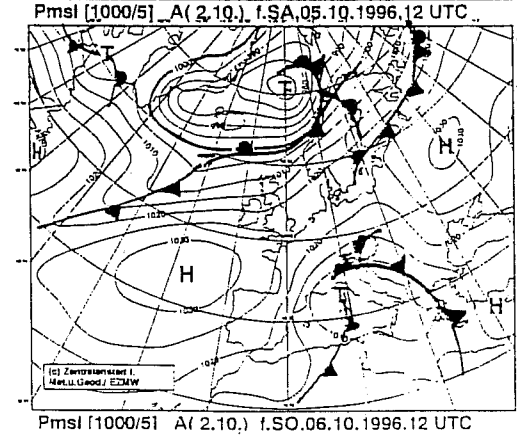
ATP500 [552/4] A(2.10.) f.FR,04.10.1996,12 UTC



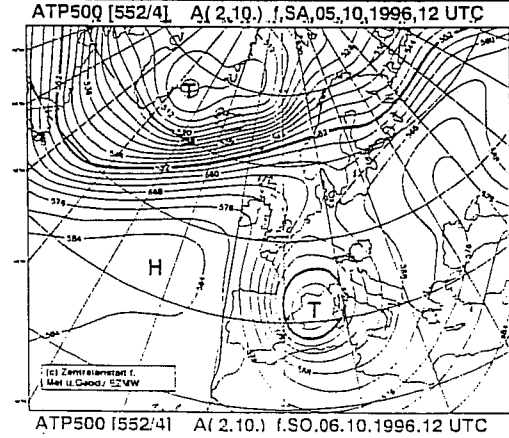
Pmsl [1000/5] A(2.10.) f.SA,05.10.1996,12 UTC



ATP500 [552/4] A(2.10.) f.SA,05.10.1996,12 UTC



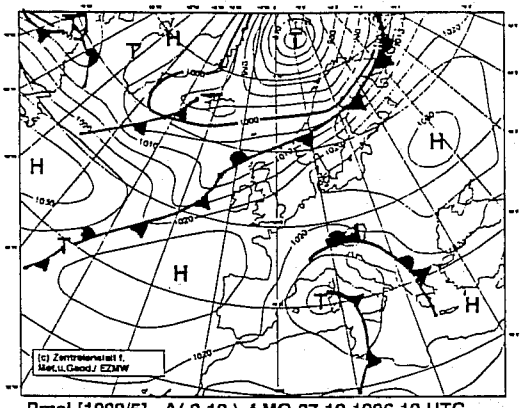
Pmsl [1000/5] A(2.10.) f.SO,06.10.1996,12 UTC



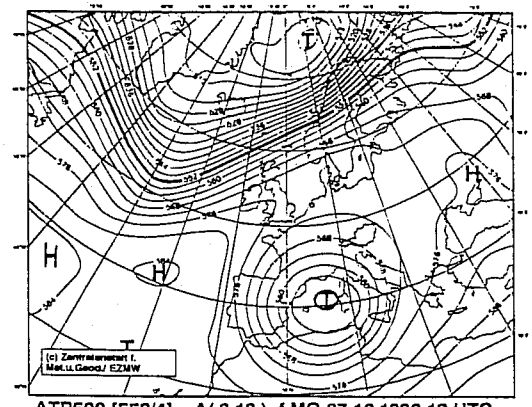
ATP500 [552/4] A(2.10.) f.SO,06.10.1996,12 UTC

ZENTRALANSTALT FÜR METEOROLOGIE UND GEODYNAMIK
Abteilung für Synoptische Meteorologie Tel (0222) 36 0 26/2310 Fax (0222) 368 45 70

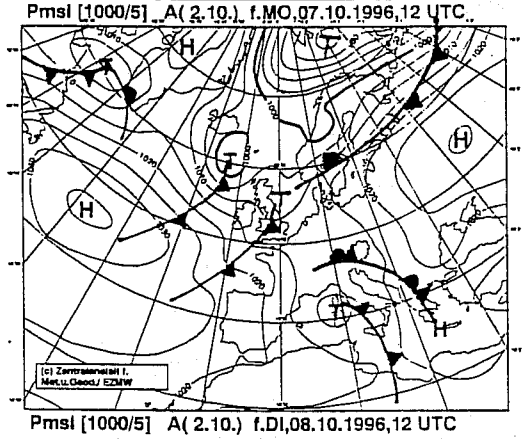
Mittelfristige Wetterentwicklung bis Dienstag, den 08.10.1996



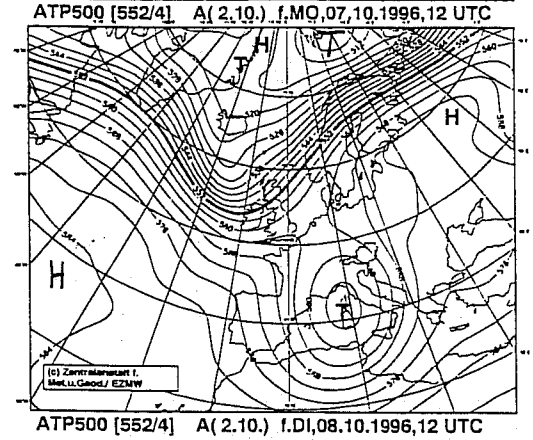
Pmsl [1000/5] A(2.10.) f.MO,07.10.1996,12 UTC



ATP500 [552/4] A(2.10.) f.MO,07.10.1996,12 UTC



Pmsl [1000/5] A(2.10.) f.DI,08.10.1996,12 UTC

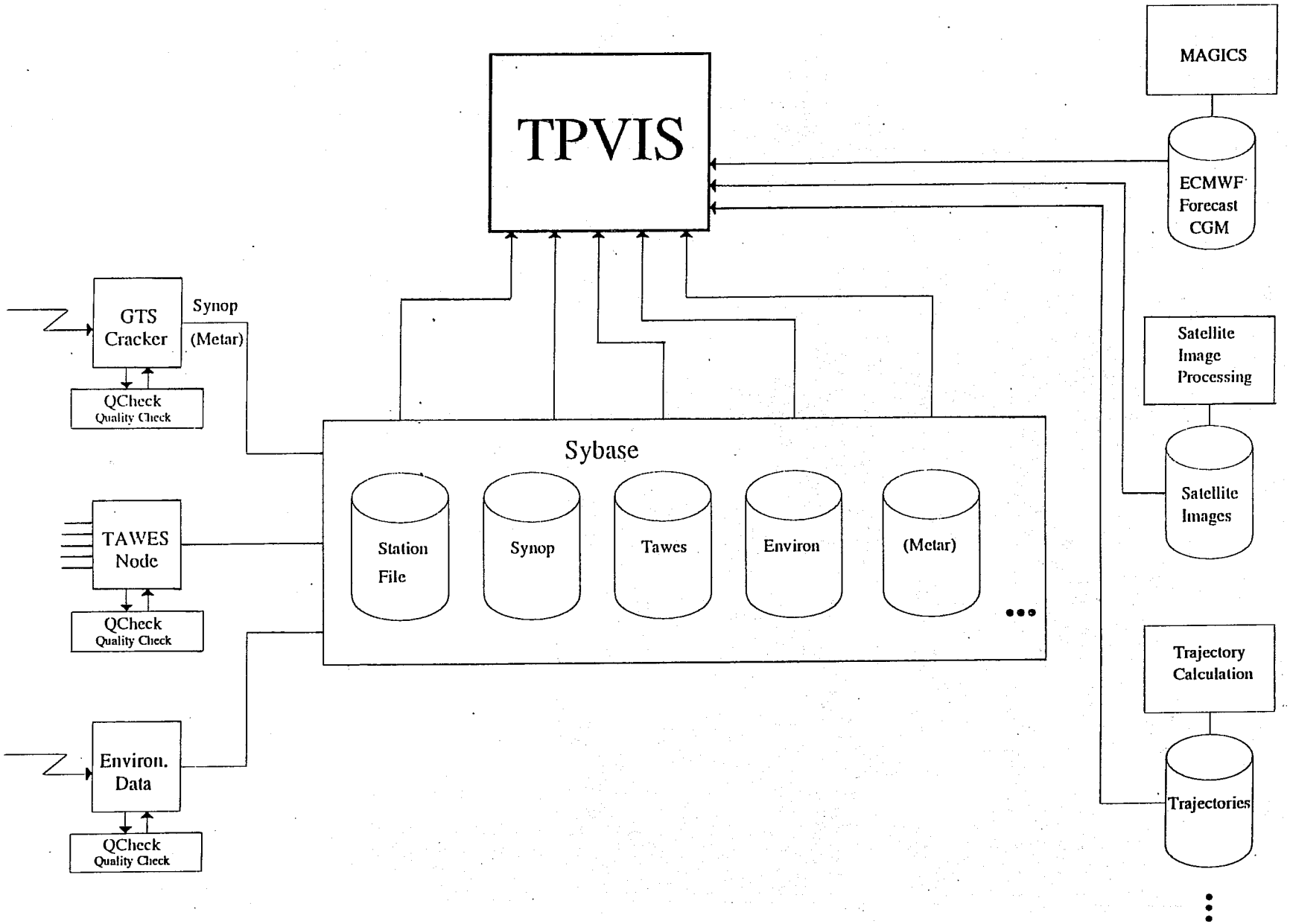


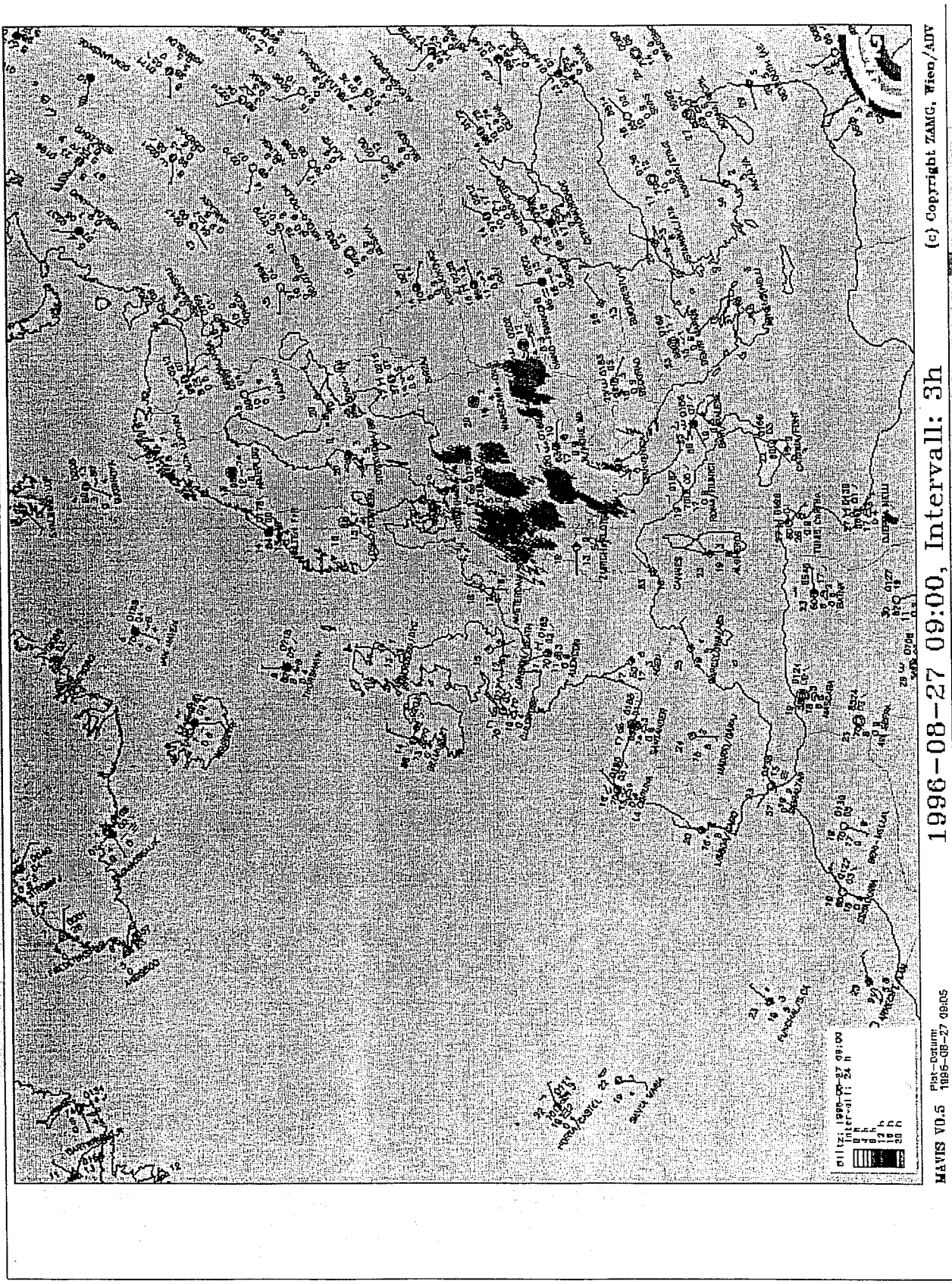
ATP500 [552/4] A(2.10.) f.DI,08.10.1996,12 UTC

Mittelfristige Wetteraussichten bis Dienstag, den 08.10.1996

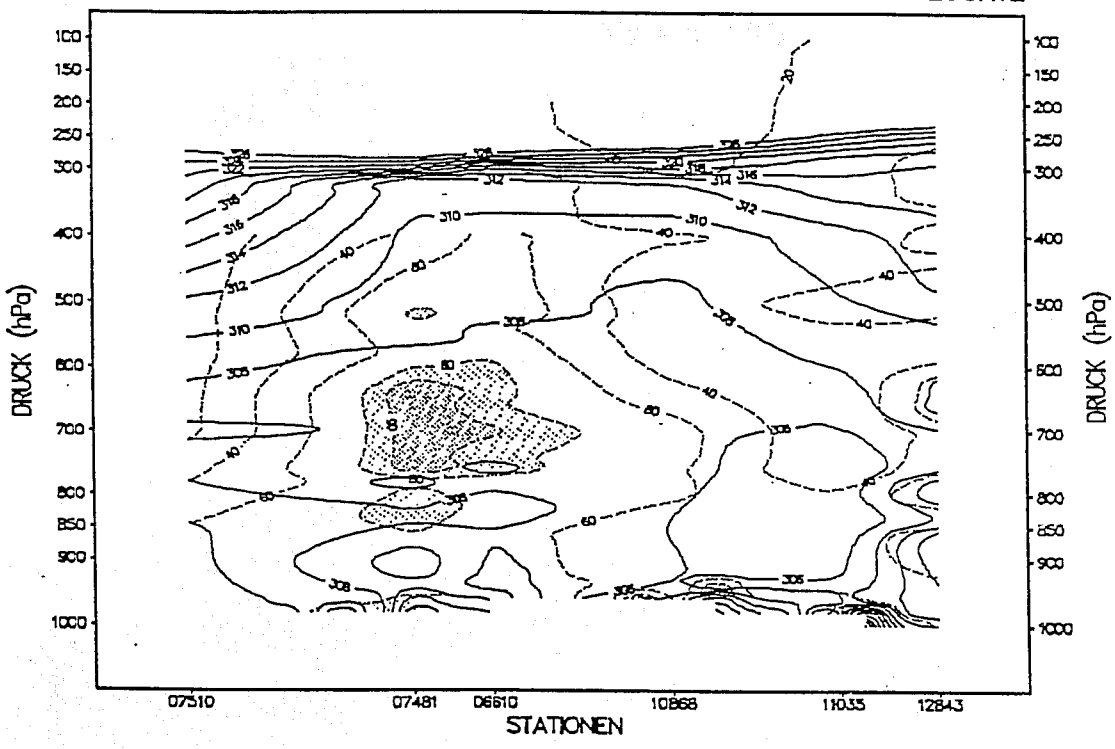
Freitag: Zwischenhocheinfluß. Nach zum Teil langsamer Auflösung der Nebelfelder meist sonnig. Gegen Abend im Westen Bewölkungszunahme. Frühtemperaturen 0 bis 8, Tageshöchsttemperaturen 14 bis 19 Grad.

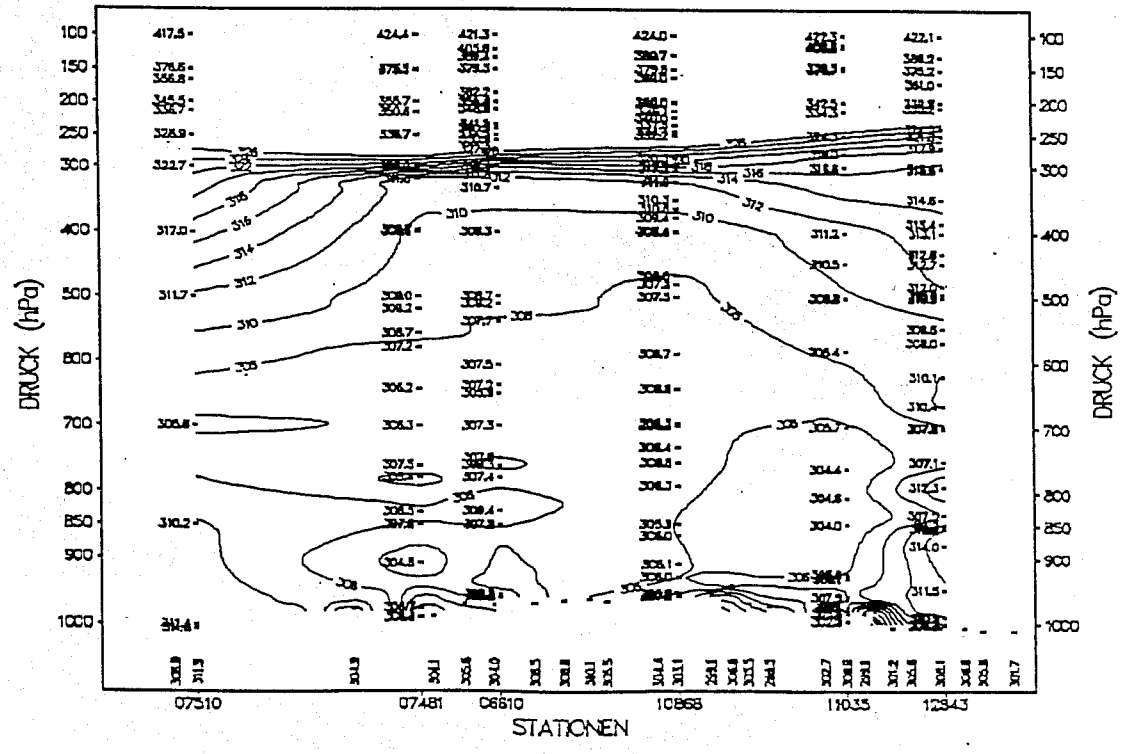
Samstag bis Dienstag: Erneut Tiefdruckeinfluß. Bei vielfach starker Bewölkung zeitweise Regen, im Süden und Osten auch ergiebiger Niederschlag. Schneefallgrenze zwischen 1400 und 1800m. Meist nur schwacher Wind. Recht kühl. Frühtemperaturen 5 bis 12 Grad und Tageshöchsttemperaturen nur 10 bis 16 Grad.




MAVIS V0.5 Plot-Datum: 1996-08-27 09:05
1996-08-27 09:00, Intervall: 3h
(c) Copyright ZAMG, Wien/ADV

AEROLOGISCHER QUERSCHNITT VOM 22.5.1992, 00 GMT
AEQUIVALENTPOTENTIELLE TEMPERATUR–KOND. + RELATIVE FEUCHTE





QUESTIONS AND COMMENTS

AUSTRIA

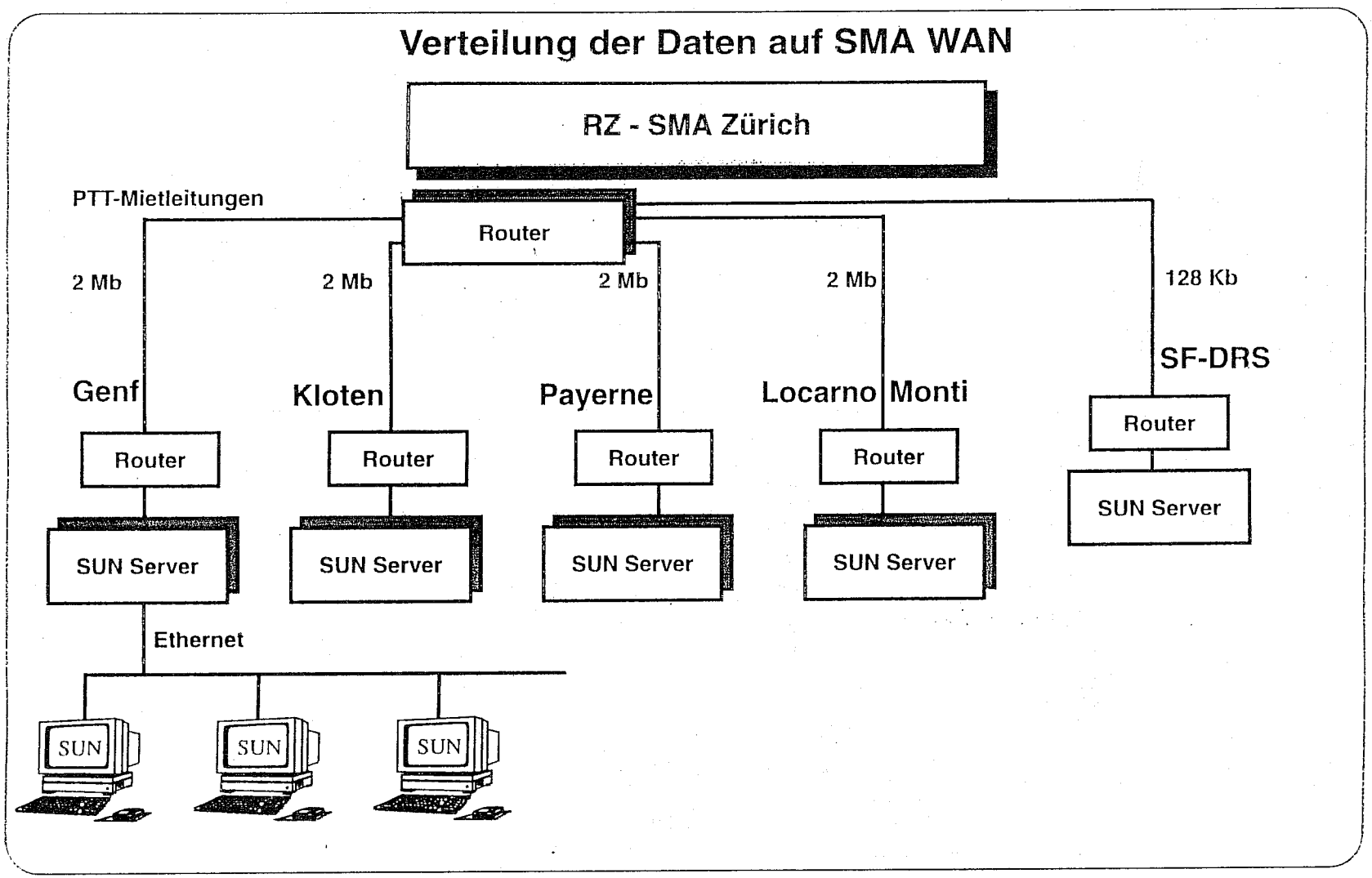
B. Barg — The lightning observation system you use in Austria, is it the same as we use in Germany:

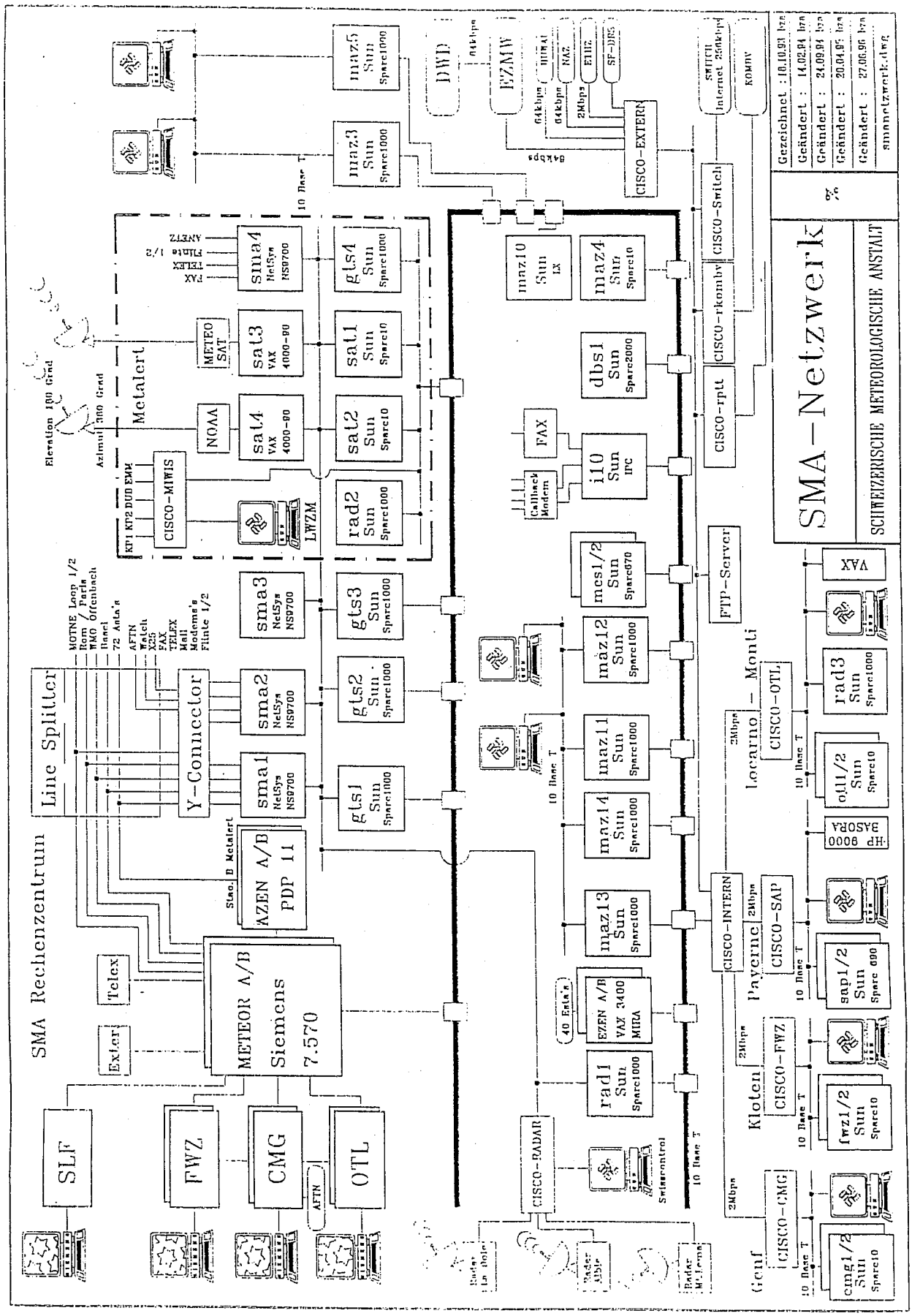
G. Wihl — I believe so, it is a combined system.

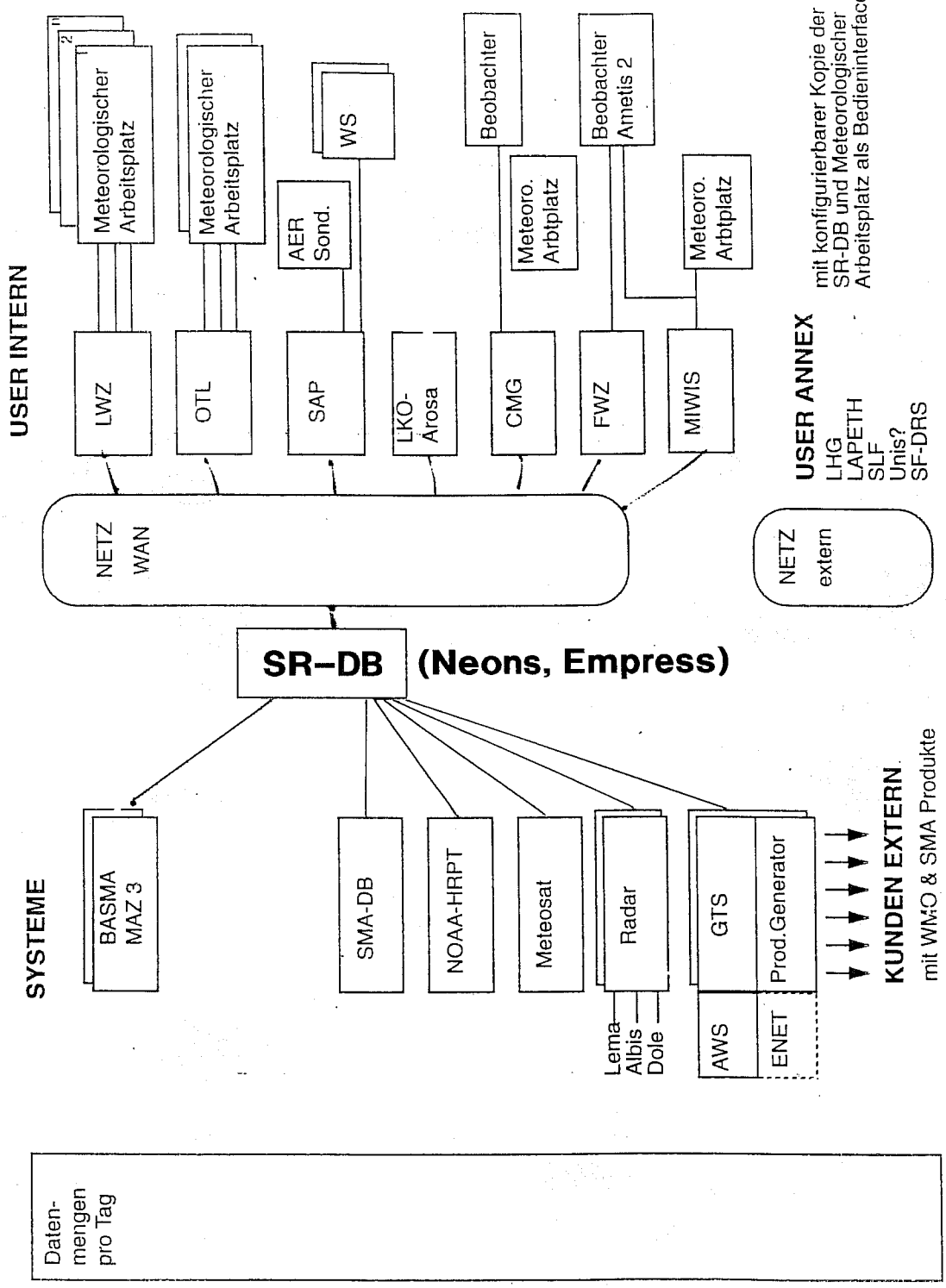
B. Barg — On your first slide you showed some towns. What were the numbers at the end of each line:

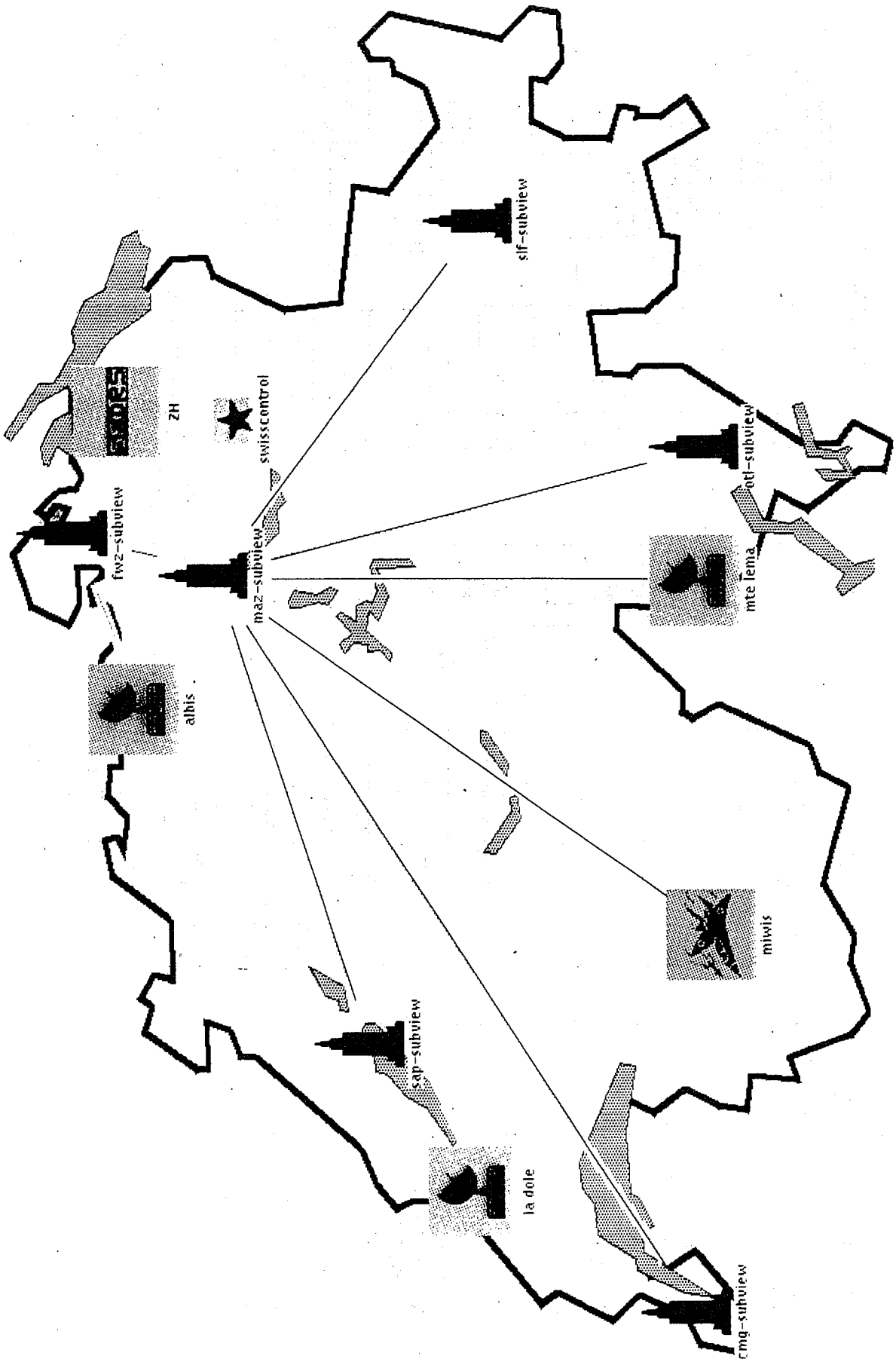
G. Wihl — This is either information about temperature or about special wind information, I am not quite sure.

G. Wihl — One further comment. We work closely with some former Eastern European countries on the project called LACE. We are therefore very interested in a possible combined network covering all Europe carrying both GTS and ECMWF traffic.


Verteilung der Daten auf SMA WAN
RZ - SMA Zürich
PTT-Mietleitungen
Router
2 Mb
2 Mb
2 Mb
2 Mb
128 Kb
SF-DRS
Genf
Kloten
Payerne
Locarno
Monti
Router
Router
Router
Router
Router
SUN Server
SUN Server
SUN Server
SUN Server
SUN Server
Ethernet
SUN
SUN
SUN


SMA Rechenzentrum
Line Splitter
Y-Connector
METEOR A/B
Siemens
7.570
AZEN A/B
PDP 11
SLF
FWZ
CMG
OTL
Telex
Exter
AFTN
Metalert
Elevation 100 Grad
Azimut 300 Grad
CISCO-MIWIS
LWZM
DWD
EZMW
CISCO-EXTERN
CISCO-Switch
CISCO-rkombvf
CISCO-rptt
SMA-Netzwerk
SCHWEIZERISCHE METEOROLOGISCHE ANSTALT
FTP-Server
CISCO-INTERN
CISCO-SAP
CISCO-OTL
CISCO-FWZ
CISCO-RADAR
CISCO-CMG
Kloten
Payerne
Locarno - Monti
Genf
sma1
sma2
sma3
sma4
sat1
sat2
sat3
sat4
gts1
gts2
gts3
gts4
rad1
rad2
rad3
maz1
maz2
maz3
maz4
maz5
maz10
maz11
maz12
maz13
maz14
i10
dbs1
mcs1/2
fwz1/2
sap1/2
cmg1/2
alt1/2
VAX
FAX
Gezeichnet : 18.10.91 hzn
Geändert : 14.02.94 hzn
Geändert : 24.09.94 hzn
Geändert : 20.04.95 hzn
Geändert : 27.06.96 hzn
smanetzwerk.dwg


DATENQUELLEN
Daten-mengen pro Tag
user als Dokument-ersteller
ANETZ
ENET
Klimastation Konven-tionell (Ferneingabe)
AERO, Alpenwetter
WMO - GTS
ICAO - MOTNE
AFTN
CIDIN
EZMW 10 Tage GRIB
DWD EM GRIB
Bracknell AFC'S GRIB
USA? GRIB
Meteosat Bilder
NOAA-HRPT Bilder
Radar Bilder
Internet
SYSTEME
BASMA MAZ 3
SMA-DB
NOAA-HRPT
Meteosat
Radar
Lema
Albis
Dole
GTS
Prod.Generator
AWS
ENET
KUNDEN EXTERN
mit WMO & SMA Produkte
Teletext
SR-DB (Neons, Empress)
NETZ WAN
NETZ extern
USER INTERN
LWZ
OTL
SAP
LKO-Arosa
CMG
FWZ
MIWIS
Meteorologischer Arbeitsplatz
Meteorologischer Arbeitsplatz
AER Sond.
WS
Beobachter
Meteoro. Arbtplatz
Beobachter Ametis 2
Meteoro. Arbtplatz
USER ANNEX
LHG
LAPETH
SLF
Unis?
SF-DRS
mit konfigurierbarer Kopie der SR-DB und Meteorologischer Arbeitsplatz als Bedienoberface


ZH
swisscontrol
slf-subview
fwz-subview
maz-subview
otl-subview
mte lema
albis
mlwis
sap-subview
la dole
cmg-subview

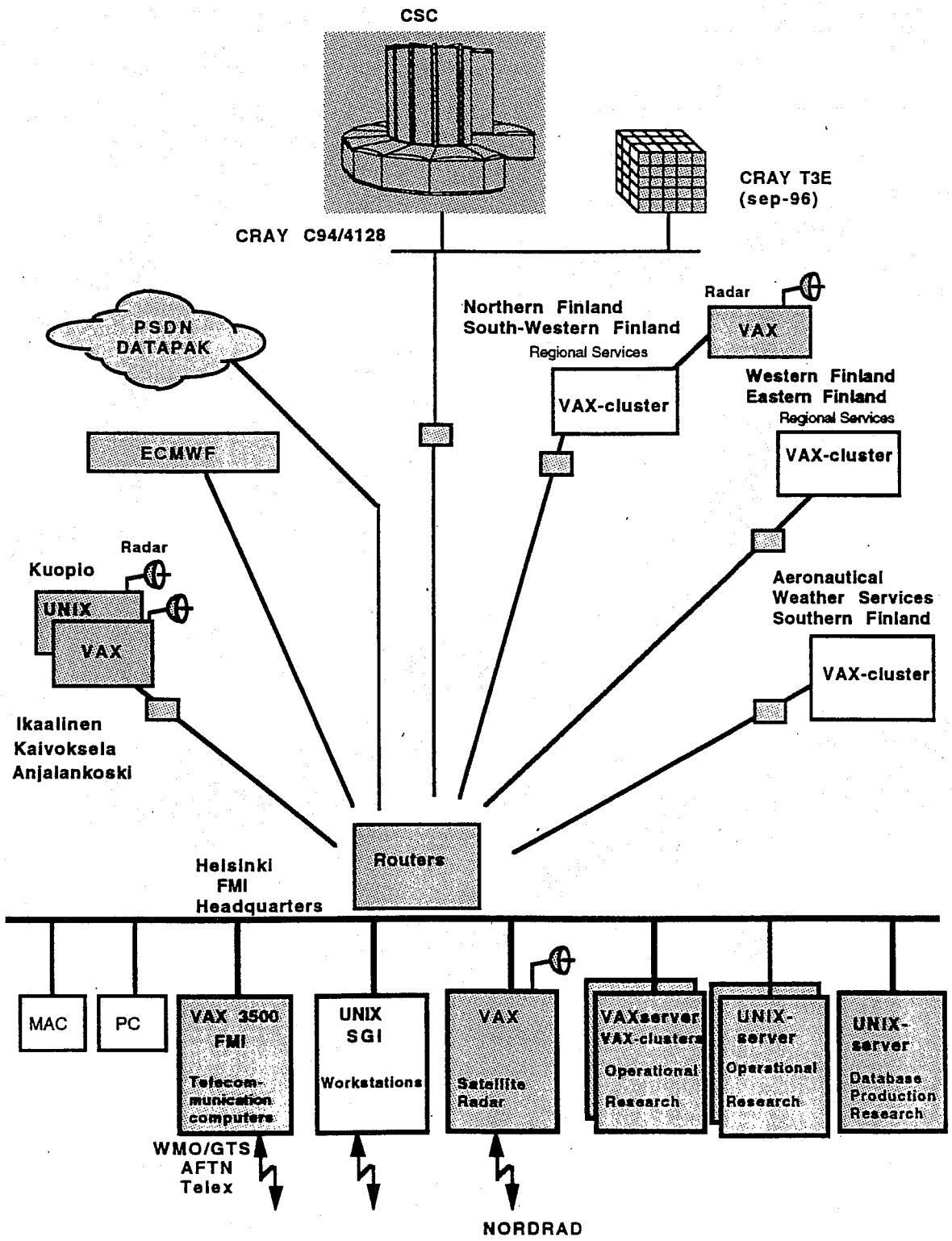
QUESTIONS AND COMMENTS

SWITZERLAND

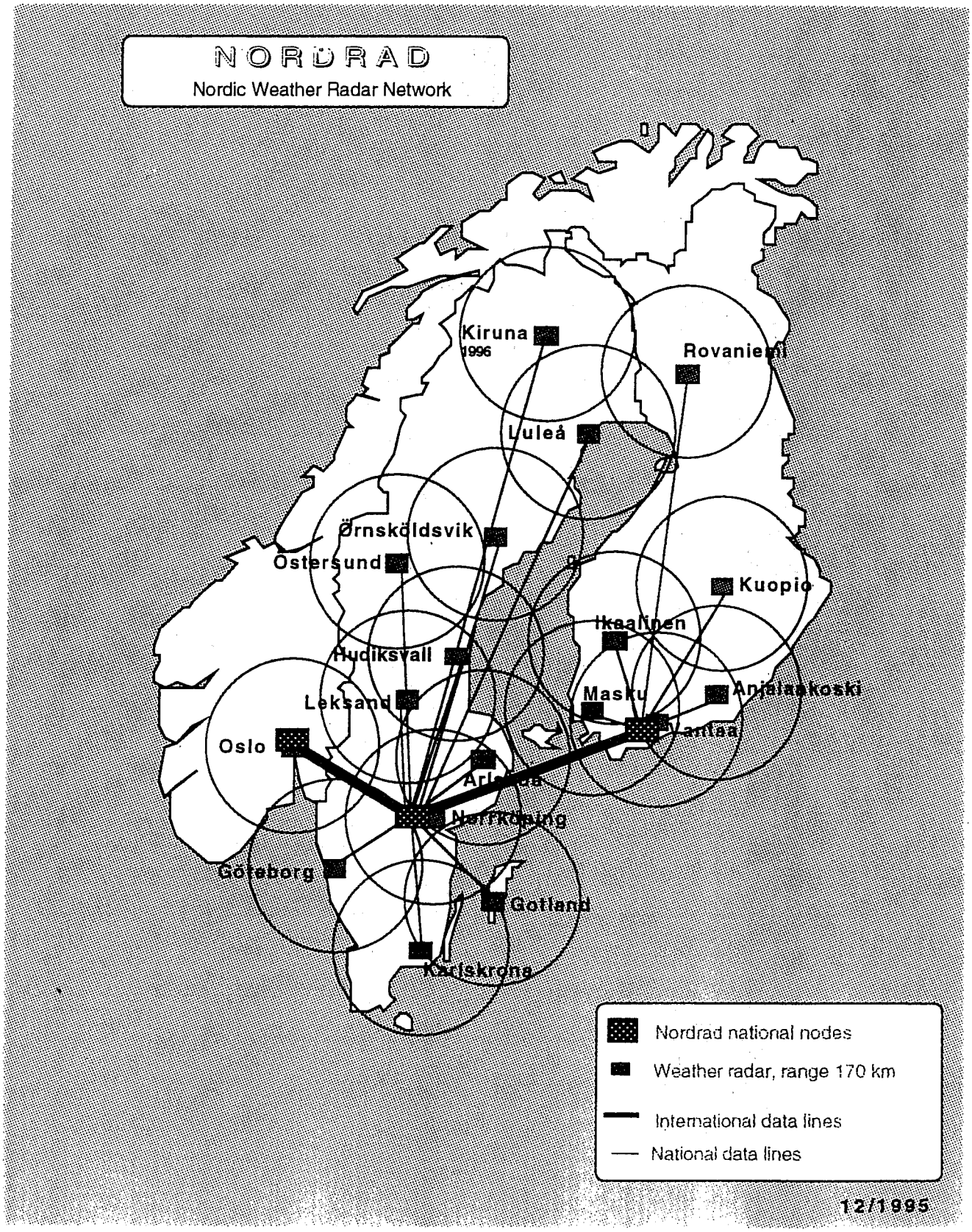
G.-R. Hoffmann	How many programmers support Siemens's BS2000?
H. Müller	We are not programming the Siemens's at all. Four years ago we froze the system, since then it has been very stable. The programmers have now been moved to UNIX systems.
G. Wihl	How long will you continue to use the Siemens?
H. Müller	Until the end of next year.

FINNISH METEOROLOGICAL INSTITUTE

COMPUTER NETWORK AT FMI



FINNISH METEOROLOGICAL INSTITUTE



FINNISH METEOROLOGICAL INSTITUTE

PROJECTS RUN AT ECMWF

C90

1. Nordic HIRLAM

2. Finnish HIRLAM

3. MARS requests

4. Trajectory models

T3D

1. Finnish HIRLAM

QUESTIONS AND COMMENTS

FINLAND

J. Greenaway — Do you have any plans to replace your VAX systems and, if so, over what timescale?

T. Hopeakoski — Yes, within 2-3 years from now.

B. Barg — I think the supercomputer you use belongs to the Academy of Sciences. What percentage of time do you get on it for meteorological work? Do you have priority over other work?

T. Hopeakoski — We have very high priority in using the supercomputer. Every time we run the HIRLAM we get the whole machine practically. Overall, we get between 20 and 25% of its CPU power.

B. Barg — Is it difficult to share this resource? Do other institutes object?

T. Hopeakoski — It is covered by a formal agreement. Even so at the beginning it was a little bit difficult, but now it is ok.

SMHI/Idd 1996-10-03
Sten Orrhagen

Sweden

A BRIEF OVERVIEW OF SWEDISH ACTIVITIES IN RELATION TO ECMWF.

i) The computer equipment at SMHI:

The main computer system is based on Digital Equipment VAXs.
At location in Norrköping there are three VAX clusters. One mixed interconnect Vax cluster (MIVC), using FDDI and ethernet, including one combined CI- and DSSI-cluster, comprising of one VAX 6610, one VAX 6510 and one VAX 6410 with a total disk capacity of 100 Gbyte and one Vax 4200, one µVax 3100 and one Vaxstation 3100 with local disks. This cluster provides the means to access the main disk-system and a variety of different supporting equipment. Within this cluster there are also equipment for backup and archiving, two cassettetape station TF857 with 7 tapes each, total storage capacity 36.4 Gbytes. The second cluster is a real-time DSSI-cluster comprising of one Vax 4300 and two Vax 4200. This cluster is the basis for a system that produces customer oriented products for distribution. The third cluster is a cluster with a servernode (Vax 4200) supporting 8 Vaxstation 4000. There is also an Alpa-based cluster (SCSI-cluster) which primary purpose is to provide the means for collecting and controlling data from the new automatic weather stations.
As decnet node for communication with ECMWF there is a X25-Router (DECnis600) serving. Presently the line-speed is 64 kbits.
The systems to serve the satellite receiving and processing system are completely changed since last time. The receiving system now comprises of two AlphaStation 200 4/166 running OpenVms. One system for Meteosat data and one system for NOAA data. The software systems are delivered by the German company VCS. The system for image processing and for production of various image products is based on two AlphaServers 1000 4/200 with a total of 6 Gb diskspace. The system for operational production and the system for research and development are delivered by a Swedish company called IV Image Systems. All four computers are connected to the FDDI-network in the computer-room. There is also one AlphaStation 200 4/166 dedicated for maintenace and development of the systems.
A µVax 3100 provides the means for distributing data to customers via modems located on a Decserver 900TM on ethernet. It supports around 800 clients with 20,000 products per day.
There is a system to provide fileservice to the PCs scattered around the institute. This system is a NT-system with three powerful PCs and a total storage of some 22 Gb.
On site there is a system of a Unix-server (Decstation 5000 Model 240) supporting presently about 10 Decstation 5000 of various models all running the DEC version of Unix namely Ultrix. This system is in the process of being put to an end.
Since last time two worksation environments have been established. One supporting DEC Alpha-based systems and one supporting Sun Microsystem workstations. There are presently one DEC 3000/400 (dedicated to the Geographical Information System, Arc/Info), five DEC 3000/300X workstations and seven AlphaStations of various models and a server AlphaServer 1000 4/233, all running Digital Unix (OSF/1). The Sun environment is built around an Ultra 1 M140 as a server and six similar machines and fourteen SPARCstn4 as workstations. There is also one workstation DEC 3000/300LX running OpenVMS.
SMHI has the responsability for running the Swedish system connecting to the GTS. For this purpose there is powerful Tandem CLX740 system installed called Metcom.
On site there is also a double HP1000 system mainly for data collection from GTS via a direct link to the Metcom system and plotting of observations in near real time. This system also provides the means for collecting data from old automatic observation stations.

There is also a remote system, a Convex 3840, a four CPU vectormachine, used to run the local implementation of the Hirlam model. This system is connected to the main SMHI system by five 64 kbits lines.
A new sytem is in the process of being installed in the nearby city of Linköping of which SMHI is planned to use about one third of it processing power. The system will comprise of one Cray C94/4256, four CPUs, 256 Mword (2 Gb) memory, 9 DD-41 disks (4.8 Gb) and 3 DD-42 disks (9.7 Gb) and one Cray T3E, 184 PEs, 28 Gb memory and 21 disks (8 Gb). Sounds a lot like the old ECMWF system, doesn't it?
At the regional centers there are µVax 3100-80 systems connected to the central system by means of decnet using bridges interconnecting the local area networks using 256 kbits lines. There is also a PC-based NT-server to serve the local PC-network and for presentation purposes one or two powerful PCs with 21'-displays.
We are still supporting a system for distribution of meteorological data to the Baltic countries. The communication is to a Vax in Riga from which the products are distributed onwards to identical systems in Tallinn and Vilnius. The Vaxes are connected to PC-based presentation systems.
Another system is a system for automatic distribution of and handling of on call requests for faxproducts and products to PCs. This system is supported by a Vaxstation 4000.
All production of plotted charts has been moved from pen-plotters and raster-plotters to A3 laserwriters.
There are presently five Vax systems supporting weather-radars, one in Norrköping, one in Stockholm, one in Göteborg, one on the island of Gotland and one in Leksand. There is also connections between Norrköping and the military weather radars in four different locations (Karlskrona, Luleå, Hudiksvall and Örnsköldsvik) and between Malmö and the Kastrup weather radar in the vicinity of Copenhagen. A new system that connects the radars in Sweden, Norway and Finland has been into operational service. This system connects concentrator nodes in the three countries, which in turn will be connected to the computers of each radar system.
All SMHI Vax systems are supported by local area networks (FDDI and/or ethernet).
Various upgrades are planned in the near future, such as UNIX-production servers, migration from VAX-based systems to Alpha-based systems, a new firewall and inter/intra-net servers and a mjor modification of our in house network to become fibre-based (FDDI- or ATM-based). There is also a major undertaking in replacing our systems for datastorage and archiving.
For further details see the attached diagram outlining the SMHI computer network.

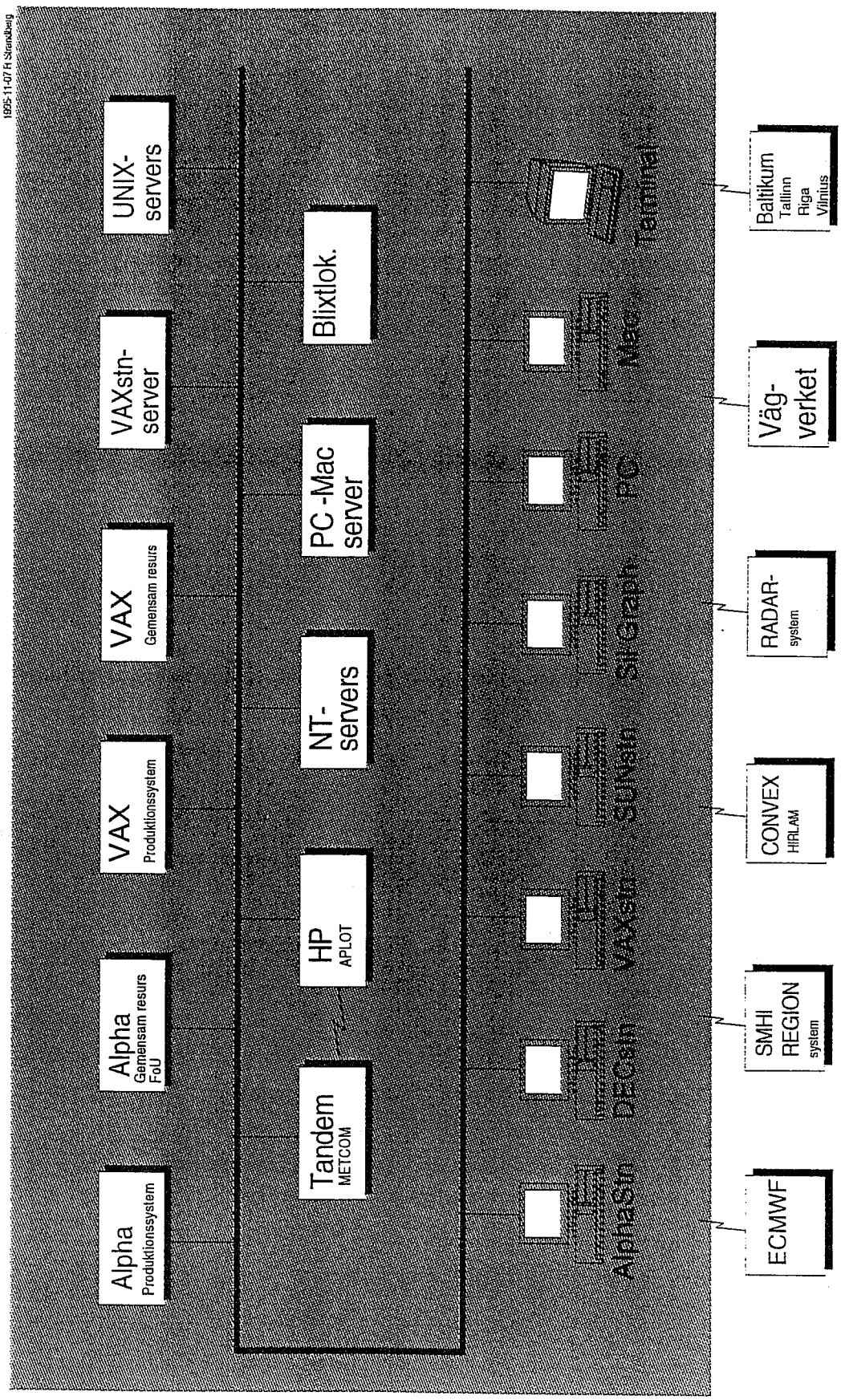
ii) Projects run at ECMWF:

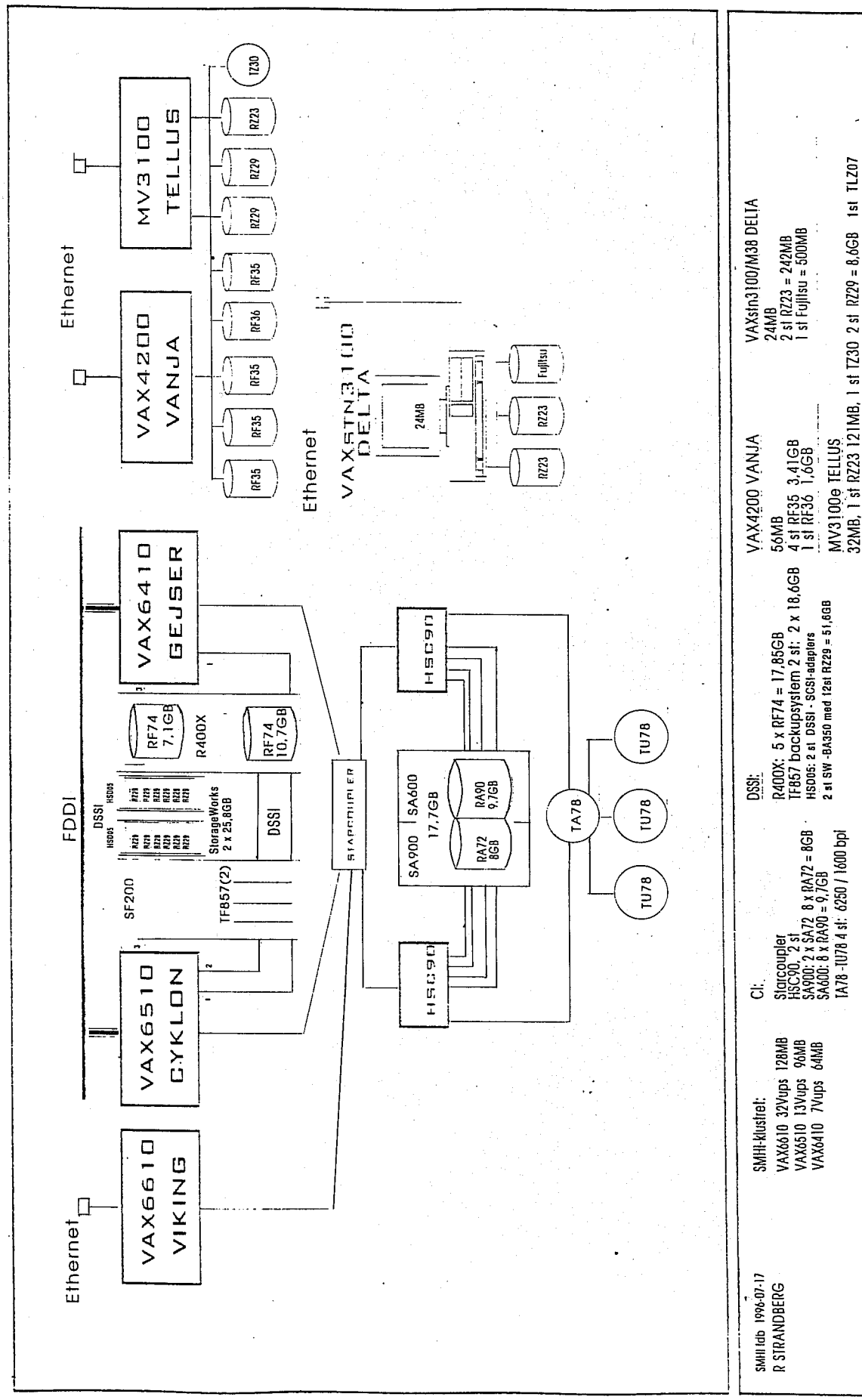
- High resolution limited area model development
- Research on regional transport
- Aerodynamics and airpollution modelling
- Extraction of data for operational usage
- Hydrodynamic models
- Trajectory studies
- Atmospheric chemistry

iii) Experience using ECMWF computers:

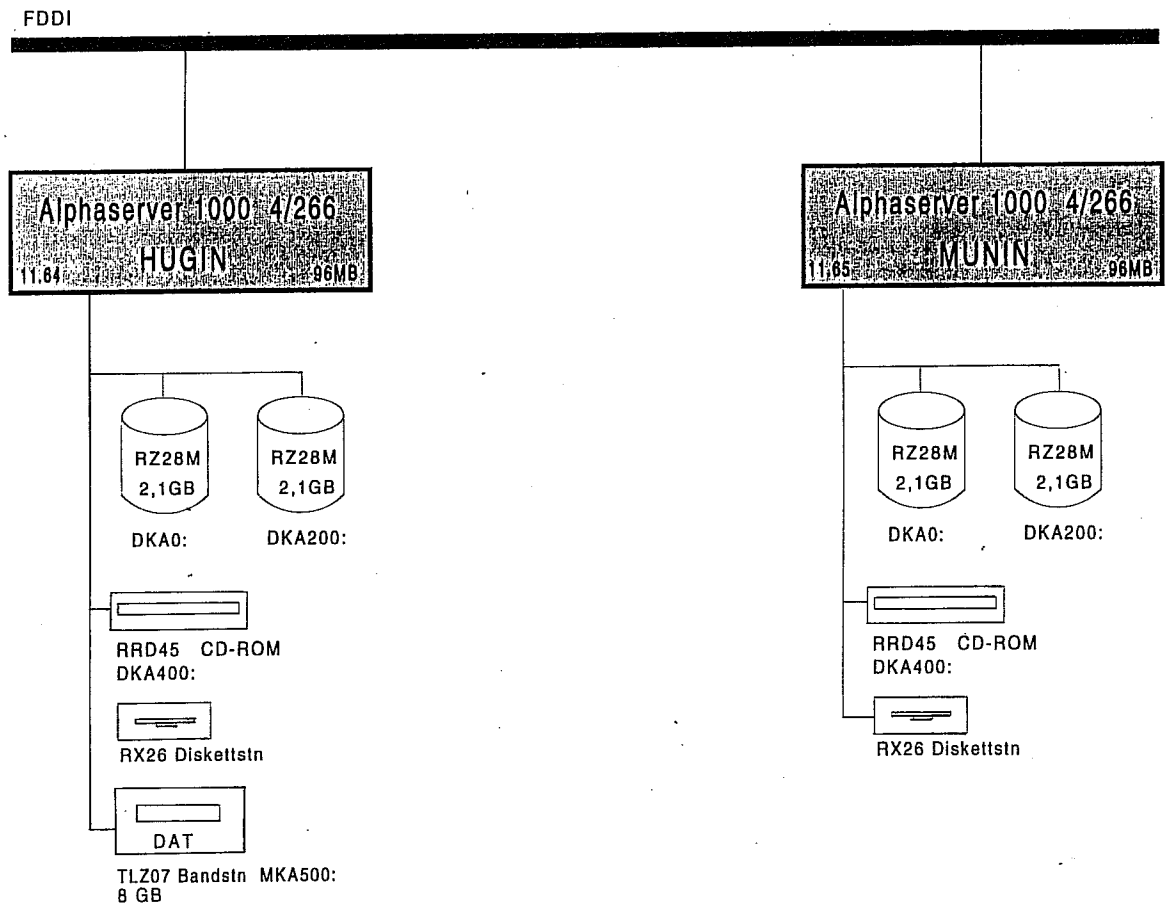
• I again suggest that the Member State Computing Representative meeting will become a yearly event because I find it difficult to act as representative when I feel that I lack the close contact with and the good knowledge of operational work at ECMWF that I feel needed. This is probably partly because I am not a regular user of the ECMWF computer system.

iv) Plans:
In the near future we will most probably decrease our usage, hopefully temporary, of the Centre computer resources due to the fact that a lot of our personell recources will be heavily involved in the start of using the new supercomputer.


SMHI Datorsystem Norrköping
1995-11-07 H.Strandberg
Alpha
Produktionssystem
Alpha
Gemensam resurs FoU
Tandem
METCOM
VAX
Produktionssystem
HP
APLOT
VAX
Gemensam resurs
NT-servers
VAXstn-server
PC-Mac server
UNIX-servers
Blixtlok.
AlphaStn
DECstn
VAXstn
SunWstn
SilGraph
PC
Mac
Terminal
ECMWF
SMHI REGION system
CONVEX HIRLAM
RADAR-system
Väg-verket
Baltikum
Tallinn
Riga
Vilnius


KLUSTER SMHI
Ethernet
VAX6610 VIKING
FDDI
VAX6510 CYKLON
SF200
VAX6410 GEJSER
DSSI
HSD05
StorageWorks 2 x 25,8GB
TF857(2)
DSSI
RF74 7,1GB
RF74 10,7GB
R400X
Starcoupler
HSC90
HSC90
SA900
SA600 17,7GB
RA72 8GB
RA90 9,7GB
TA78
TU78
TU78
TU78
Ethernet
VAX4200 VANJA
RF35
RF35
RF35
RF36
RF35
Ethernet
VAXSTN3100 DELTA
24MB
RZ23
RZ23
Fujitsu
Ethernet
MV3100 TELLUS
RZ23
RZ29
RZ29
TZ30
SMHI-klustret:
VAX6610 32Vups 128MB
VAX6510 13Vups 96MB
VAX6410 7Vups 64MB
CI:
Starcoupler
HSC90, 2 st
SA900: 2 x SA72 8 x RA72 = 8GB
SA600: 8 x RA90 = 9,7GB
TA78 -TU78 4 st: 6250 / 1600 bpi
DSSI:
R400X: 5 x RF74 = 17,85GB
TF857 backupsystem 2 st: 2 x 18,6GB
HSD05: 2 st DSSI - SCSI-adapters
2 st SW -BA350 med 12st RZ29 = 51,6GB
VAX4200 VANJA
56MB
4 st RF35 3,41GB
1 st RF36 1,6GB
MV3100e TELLUS
32MB, 1 st RZ23 121MB, 1 st TZ30 2 st RZ29 = 8,6GB 1st TLZ07
VAXstn3100/M38 DELTA
24MB
2 st RZ23 = 242MB
1 st Fujitsu = 600MB
SMHI tdb 1996-07-17
R STRANDBERG

NORDRAD



SMHI Idb
Rolf Strandberg

Datum: 1996-03-05
Rev. datum

Fil:

SWEDEN

QUESTIONS AND COMMENTS

SWEDEN

H. Müller — I counted 11 different systems, how many people support all these operating systems?

S. Orrhagen — Basically for script system management there are six people. The SGI systems are not part of our main system and are supported elsewhere. Otherwise it is VMS and dialects of UNIX.

UK METEOROLOGICAL OFFICE

A. Dickinson

Member States Computing Representatives' Meeting, 7-8th October, 1996

1. Computer equipment and connections to ECMWF

The computing environment at the UK Meteorological Office is shown in Figure 1. The computer configuration currently consists of three mainframe computers:

- IBM 9672 R73 Parallel Enterprise Server
- CRAY C90
- CRAY T3E

The IBM 9672 acts as a front-end processor, controlling the flow of work to the CRAY C90 and CRAY T3E. It also supports the telecommunications links to the GTS message switch, some interactive terminals and batch work. The IBM 9672 is a seven CPU machine and is split into MVS and UNIX partitions. The 16 processor CRAY C90 is used for all of our numerical modelling work. The CRAY T3E is a distributed memory parallel computer. An initial configuration comprising 128 processing elements was delivered on 1 October. By April 1997 the T3E will have been upgraded to a 696 PE system. Once all of our climate modelling and numerical weather prediction software has been migrated to the T3E, the CRAY C90 will be decommission. All research users are connected to a workstation network based primarily on HP 9000-735 servers and X-terminals. This network supports in excess of 200 users. The CRAY C90 and T3E resources are split 70:30 between climate modelling and numerical weather prediction.

	IBM 9672	CRAY C90	CRAY T3E
Installation date	Oct 1995	May 1994	Oct 1996 - April 1997
Processor	Scalar	Scalar/Vector	Scalar
CPU's	7	16	696
Main Memory	2Gb	2Gb	92Gb
SSD Memory	1Gb	4Gb	0
Disk Capacity	294Gb	140Gb	720Gb
Peak Performance	200Mips	16GFlops	0.5 TFlops

Table 1: Specification of UK Meteorological Office mainframe computers

The telecommunications link to ECMWF is shown in Figure 2. A 2MBits/Sec link between CISCO routers supports TCP/IP and DECNET protocols. Data is sent to and from a VAX 4500 on the Central Data Network (CDN) at Bracknell, a second VAX 4500 acts as backup. The connection supports the receipt of observational data and the dissemination of ECMWF products. Along with Offenbach, the UK provides one of the connections between ECMWF and the GTS. DECNET is being used for the transfer of operational products and data using the ECMWF NTS software while TCP/IP is increasingly being used for the connection to ECNET and non-operational access to ECMWF computer facilities. Telnet, ftp, eccopy and ecqsub are available from the HP workstation network.

2. Projects, experience and plans

It is expected that over the next few years our Fujitsu allocation of resources will be almost totally devoted to ensemble forecasting. Some work will also be done on migrating and optimising the message passing version of our prediction model for the Fujitsu. MARS data will continue to be accessed in support of a number of small projects undertaking diagnostic work.

The ensemble forecasting work is being carried out in conjunction with ECMWF. Over the past two years this work has been aimed at evaluating the benefits of multi-model ensembles. While the CRAY C90 has been available, two 33 member ensembles have been run each week. This usage is consistent with a *pro rata* consumption of our annual allocation. Further running of these ensembles has been suspended until our model is converted to run of the Fujitsu.

Plans for using next year's computing allocation have not been finalised and depend, in part, on whether Council give the go ahead to multi-model ensembles following the positive recommendation of the recent SAC meeting. A number of projects are under consideration. All will run at increased horizontal and vertical resolution to match the expected resolution of the operational ECMWF ensembles. It will also be necessary to increase the ensemble size from 33 to ~50, again to match the ECMWF configuration.

Expected work includes a joint project with ECMWF and NCEP to examine the effect of using different ways of perturbing the initial conditions on medium-range ensemble forecasts. This will require us to run a number of cases using both the ECMWF and the NCEP perturbations. Other plans include the study of the effect of perturbing model formulation.

It is envisaged that these proposals, if pursued, will easily use all of our 1997 allocation.

3. Current concerns

There are a number of issues that are causing concern. All are as a consequence of the withdrawal of the CRAY C90 service and the use of the TCP/IP link.

- The retrieval of data from MARS using ecgate1 appears to be slower than was the case when using the CRAY C90. Is this a temporary problem? We expect to be accessing

increased amounts of data from MARS for both our seasonal and medium-range programs in the near future.

- We would like unattended batch access to allow the automatic submission of jobs from Bracknell triggered by our operational suite. This feature is not available via the TCP/IP link.

- Our workstation network is run as a small number of separate IP segments. In order to give easy access for our users to ecqsub etc, a node from each IP segment will need to be allowed access to ECMWF via the firewall.

- We are currently porting our prediction code to the Fujitsu. What information is available about the Centre's experience, particularly in terms of obtaining efficient I/O?

UK METEOROLOGICAL OFFICE MAINFRAME COMPUTERS

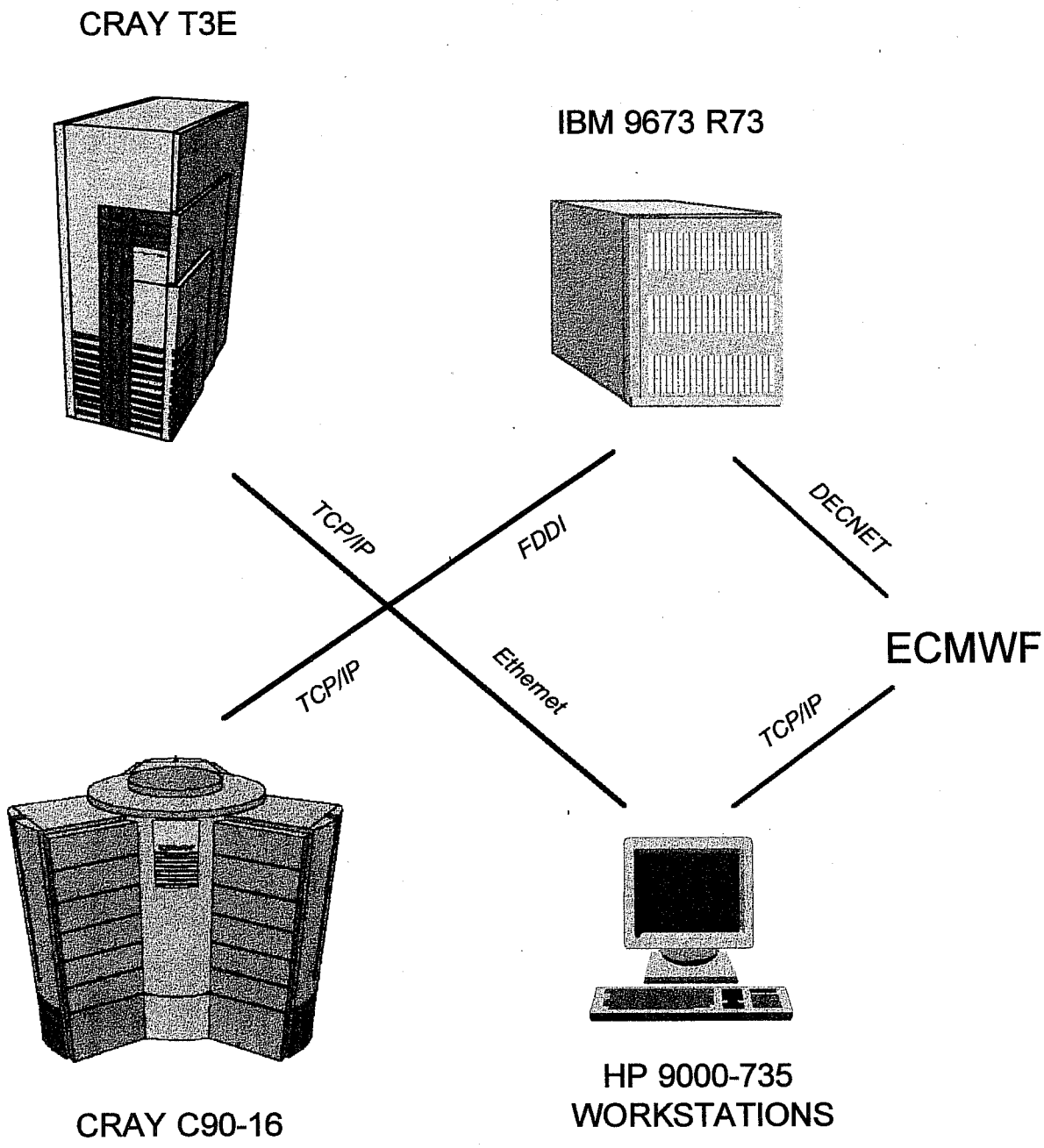


Figure 1

BRACKNELL-ECMWF LINK

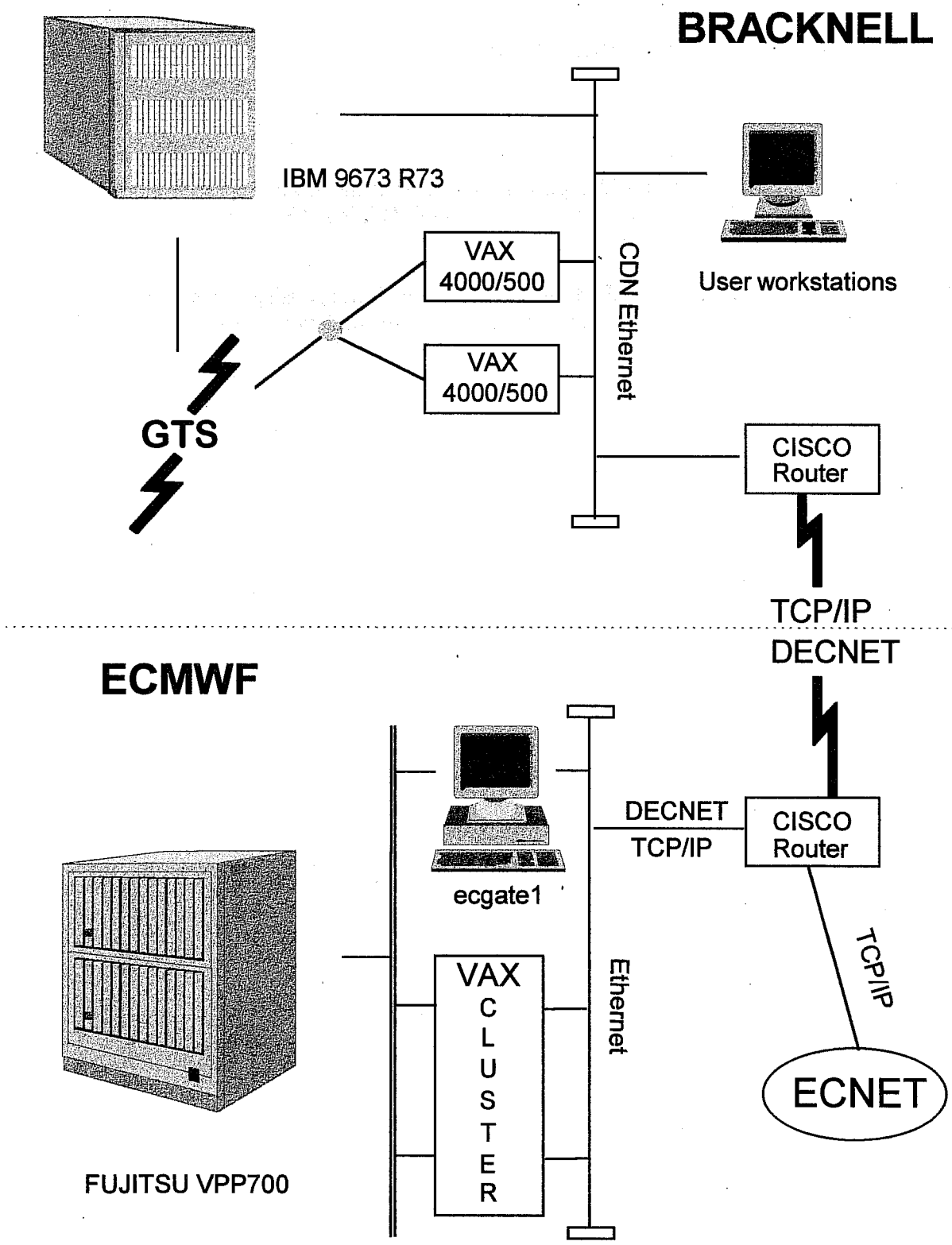


Figure 2

QUESTIONS AND COMMENTS

UNITED KINGDOM

G.-R. Hoffmann — One question with regard to your data handling. It was suggested at one time the UKMO may wish to participate in ECMWF's MARS development, is that still being talked about?

A. Dickinson — That is waiting for the next release of the IBM operating system. There are some problems with the treatment of the TCP/IP stack under the current release. Until the new release is available, we cannot do much more.