TECHNICAL MEMORANDUM

191

Report on the seventh meeting of Member State Computer Representatives, 28-30 September 1992

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Operations Department

September 1992

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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. USER SUPPORT SERVICES - Andrew Lea, John Greenaway 12

3. OPERATIONAL SERVICES - Peter Gray 17

4. EXTERNAL NETWORKS - Tony Bakker 21

5. WORKSTATION EXPERIENCES - Richard Fisker 24

6. INTERNAL NETWORKS - Walter Zwieflhofer 30

7. MARS AND DISSEMINATION UPDATE - Rex Gibson 33

8. SMS - Rex Gibson, Otto Pesonen 37

9. SYSTEMS PLANS - Claus Hilberg 41

10. INITIAL INVESTIGATIONS INTO MPP SYSTEMS - Lars Isaksen 45

11. GRAPHICS UPDATE - Jens Daabeck,Paddy O'Sullivan,Arne Jørgensen,Keld Petersen 49

12. GENERAL DISCUSSION 54

ANNEX 1 - LIST OF PARTICIPANTS 56

ANNEX 2 - PROGRAMME 57

ANNEX 3 - ECMWF COMPUTER BULLETINS - CURRENT STATUS (1 SEPTEMBER 1992) 59

ANNEX 4 - ECLIB - ECMWF LOCAL LIBRARY 61

ANNEX 5 - COMPUTER REPRESENTATIVES' ADDRESS FOR ELECTRONIC MAIL 64

PART 2: MEMBER STATE CONTRIBUTIONS

BELGIUM 1

DENMARK 9

GERMANY 13

SPAIN 19

GREECE 23

IRELAND 28

ITALY 30

NETHERLANDS 36

NORWAY 39

SWITZERLAND 45

FINLAND 49

SWEDEN 55

UNITED KINGDOM 59

PREFACE

The seventh meeting of Member State Computing Representatives took place from 28-30 September 1992 at ECMWF. Thirteen 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 contributions, Part 2 the Member State contributions. All the reports in Part 2 have been provided by the Representatives themselves.

PART 1

ECMWF STAFF CONTRIBUTIONS

1. ECMWF'S COMPUTER STATUS AND PLANS

Geerd-R. Hoffmann

1. INTRODUCTION

Council at its December 1991 session approved a proposal for a new staff post to cover the area of computer security. The opportunity has thus been taken to create a new Section within Computer Division, with the new post as Section Head. Bearing in mind the close link between computer security, networks and user workstations, the responsibilities of the new Section covers these three topics - with the Section Head himself being personally responsible for computer security. The new section was created on 1 February this year, and Walter Zwieflhofer appointed as Section Head.

Several consultants have been appointed this year, to work on massively parallel system investigations, temporary workstation support, and within User Support. The User Support consultant (Dominique Lucas) has been hired because one existing member of User Support (Ditlef Martens) has been moved to the new Section. Dominique Lucas thus has been hired to balance out the staffing of User Support Section. Fig. 1 shows the current staff.

Over the past 12 months there have been several hardware and system changes:

* the IBM 3090 data handling machine has been replaced with an IBM ES/9000-580;
* two more StorageTek 4400 ACL tape silos have been installed;
* a second diesel house has been built and two diesel systems installed;
* the internal TCP/IP network has been consolidated;
* 64 kb/s links have been installed to France, Germany, Italy, Denmark, Netherlands and Switzerland;
* all LCN network links have been replaced;
* a Cray YMP-C90 has been installed and is currently undergoing acceptance.

Fig. 2 shows the basic hardware configuration as it will be at the end of the year.

I am pleased to report that up to the end of August this year there have been fewer major delays to the forecast dissemination, Fig. 3 shows the details. Most of the delays this year have been due to Cray incidents in the first six months of the year. However, since June the Cray service has been very stable and reliable. Problems seen in previous years with the forecast suite, and VAX cluster, now seem to have largely disappeared.

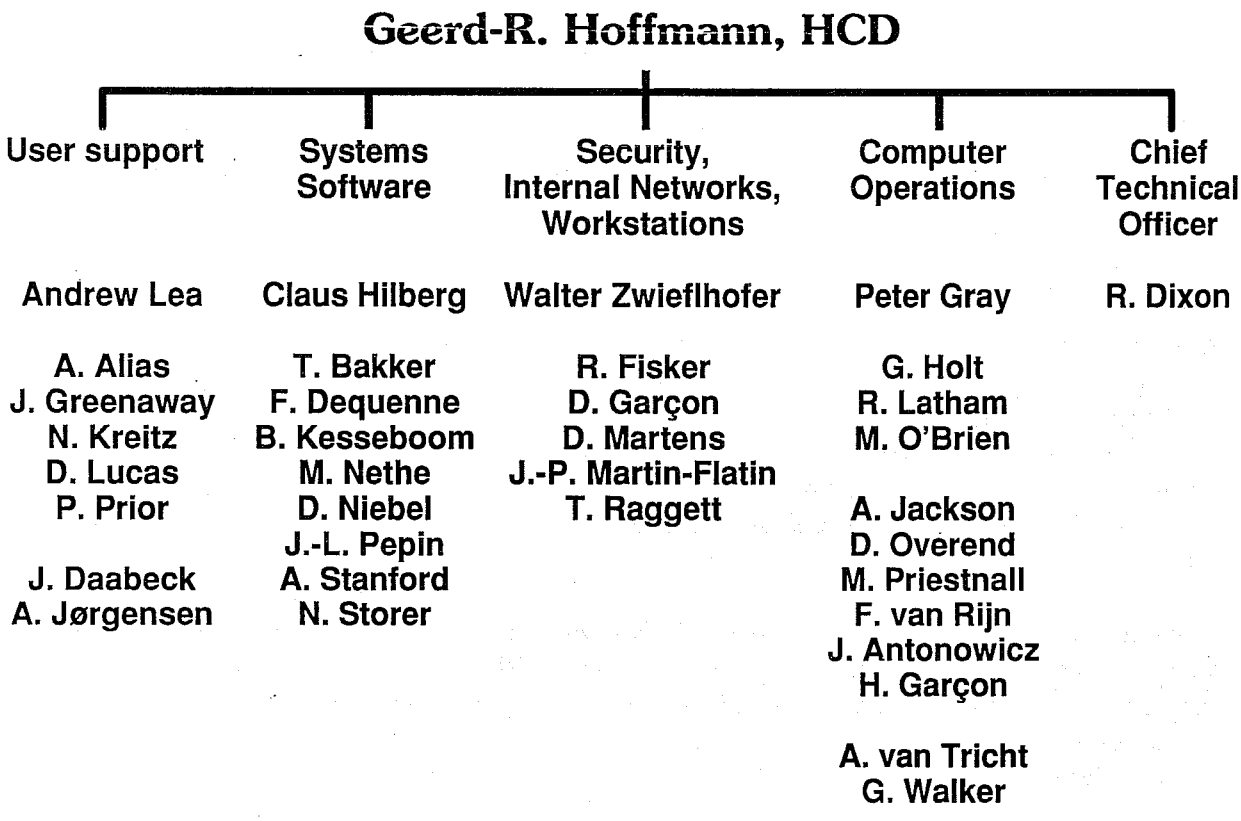

Fig. 1: Current staff in Computer Division

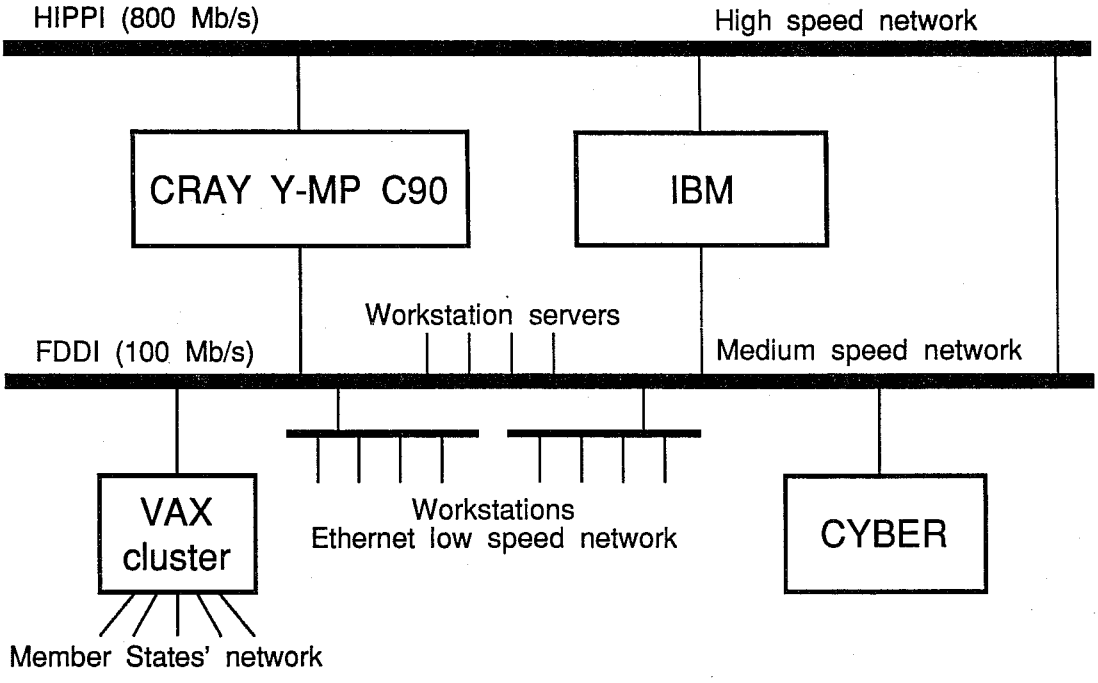

Fig. 2: ECMWF configuration at the end of 1992

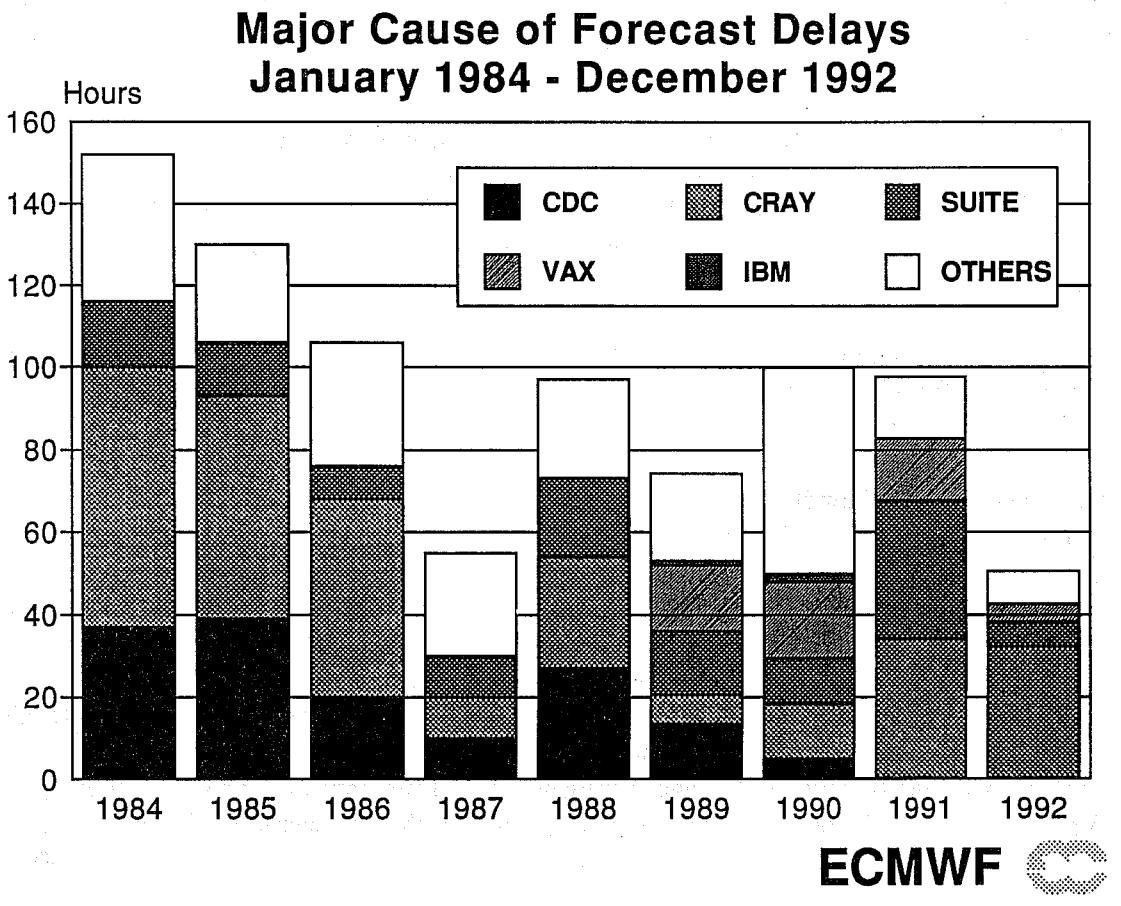

Fig. 3: Forecast delays

2. CRAY SERVICE

The Centre has currently three Cray systems installed, the original YMP-8, a YMP-4 and a C90. The YMP-4 was installed in late May 1992 as a goodwill gesture by Cray Research to make up for the loss of throughput due to a 6-week delay in the installation of the C90. It is also being used as a testbed for the UNICOS 7 operating system, this version being required for the C90. Overall the YMP-4E will be at the Centre for five months.

The YMP-8 suffered a couple of serious hardware faults earlier this year, in particular we had 13 hours downtime in the month of May, plus a burnt out memory module in November 1991. However, since June 1992 the service has been reliable. In addition, preventative maintenance (PM) has been reduced to 6 hours per month. Overall the user availability over the past 12 months has been 98.2%.

Now that we begin to understand the timing of the UNICOS system we have been able to increase CPU utilisation from its low point of 60% (end of 1990) to well over 80% today. This is more than we had originally expected to achieve.

Overall usage figures show that the forecast takes a little over 40% of the YMP-8, Member States just under 6%, and ECMWF Research most of the rest.

The C90 was installed in mid-August and it passed its provisional acceptance on 15 August 1992. However, final acceptance has been delayed due to a hardware error, uncovered by an ECMWF program, that could result in any part of memory, including the operating system itself, being overwritten. The cure was to modify a CPU chip. This has now been done and all 14 CPUs (12 official, 2 spares) have been fitted with the new chip. Final acceptance has recommenced and will continue for another 45 days in all if everything goes well from now on. The C90 will be upgraded to 16 processors in mid-December this year. Fig. 4 shows the C90 configuration as of September 1992.

Member State access to the C90 will begin on 29 September, it is not yet known when the production workload will be moved to the C90.

3. IBM SYSTEM

The IBM ES/9000-580 went into service in January, the changeover itself went very smoothly being completed in just one day. Fig. 5 shows the configuration.

The overall availability has been good, with only two hardware incidents since it was installed.

The additional capacity provided by the new machine has relieved a bottleneck in providing data to the Cray. Link traffic has increased from around 100 Gbytes per week towards the end of 1990, to almost 300 Gbytes per week now.

Work is underway to provide TCP/IP access to the IBM, so that any UNIX based system can access CFS (ECFILE) via TCP/IP links. Because Superlink (the Cray-IBM link) will not be supported by UNICOS 8, we also have to alter the Cray link to be TCP/IP based.

Cray Y-MP C90 Configuration - Sept 1992

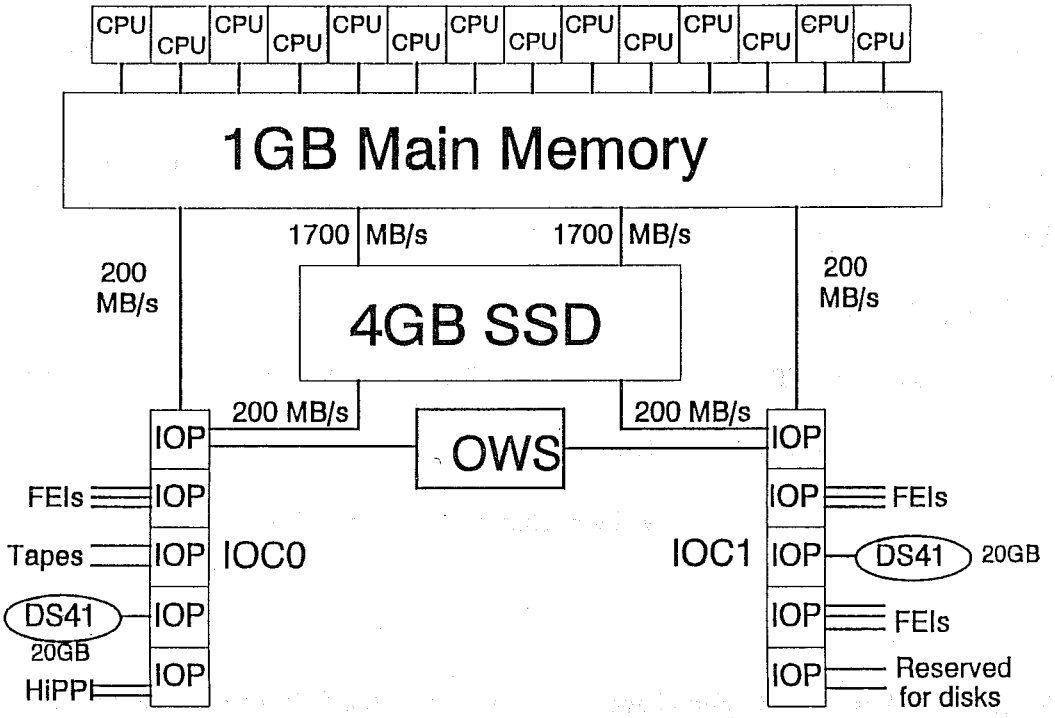

Fig. 4

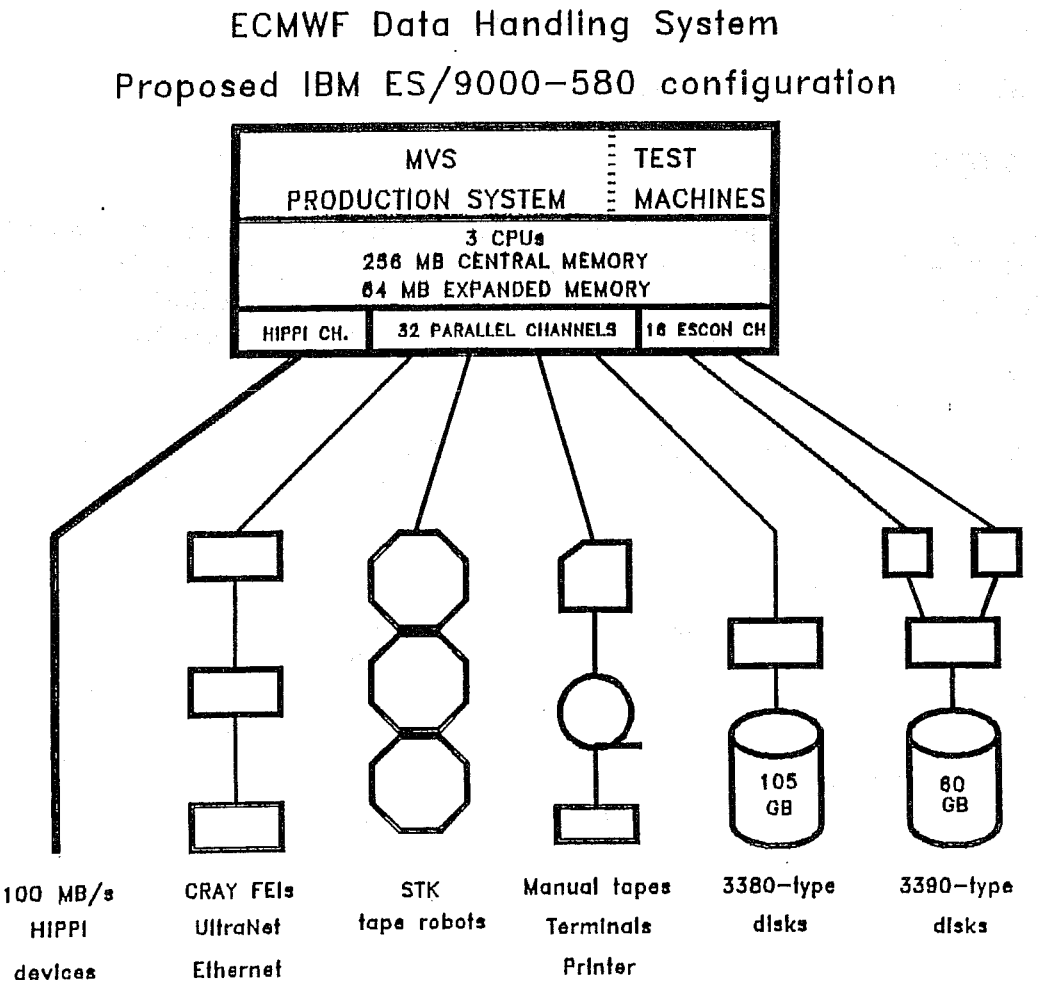

Fig. 5

The growth in the total volume of data stored on the IBM is currently running at twice the rate originally expected. This will cause us a problem shortly as we are running out of physical storage space in the tape library. All users are being approached to reduce the amount of files they have stored in CFS, also priority is now being given to produce the time series data in MARS thus enabling old forecast data to be deleted. Hopefully, the rate of growth can then be brought down to that originally predicted.

It is planned towards the end of 1992 to begin tests on UNITREE, as a possible replacement for CFS. CFS is totally dependent on IBM's MVS operating system, whereas UNITREE is UNIX based and hence more generally available.

4. CDC SERVICE

Fig. 6 shows the current CDC Cyber configuration. The Cyber 962 runs the NOS/VE service. The CDC 4680 acts as a gateway to the FDDI network for the Cyber, and it also holds workstation users' UNIX home directories on its DAS disks.

The Cyber 962 will be replaced in 1993 by workstations, the NOS/VE service itself will terminate on 30 November 1993.

5. VAX SERVICE

The VAX cluster has been simplified over the past 12 months. The oldest machines are two VAX 11/750s which are there to provide support for those three Member States that still are on ECNET level 2 protocols. It is hoped shortly to replace these 11/750s with one VAX 8250. The other systems in the cluster are an 8350, a 6310 and a 6210.

Reliability of the cluster has improved, so that now it provides a good service overall.

6. WORKSTATIONS

Currently workstations have been provided to some of those who migrated Cray software from COS to UNICOS and to system developers. We are now working on providing services that all users will require when they are provided with workstations next year. In addition, we have recently upgraded the servers to increase their resilience, and also to provide more NFS accessible disk space for users.

The Centre is about to issue an ITT (Invitation To Tender) for the supply of workstations to those Centre staff who currently do not have them. Delivery of these systems is planned for early 1993.

7. NETWORKS

The internal Ethernet has been consolidated and split into subnets to cope with the increase in traffic. A network monitor (LANCE) has been installed to check overall traffic growth.

A test installation of Ultranet has been done, it is hoped to connect it to HiPPI next year to provide the main Cray-IBM link.

ECMWF Cyber 962 configuration October 1992

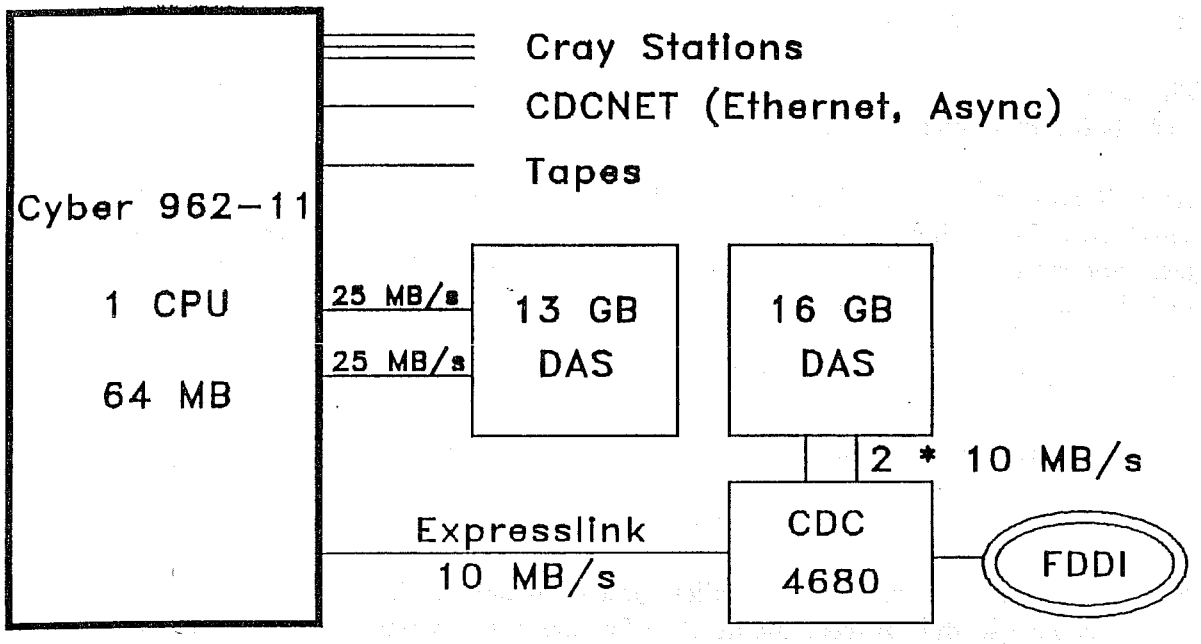

Fig. 6

An FDDI network is now in place, it has already replaced the old CDC LCN network, and it will be enhanced over the coming years to provide the main Ethernet based backbone service.

On the wide area network we have 7 lines to Member States at 64 kb/s and on 6 of these lines we run TCP/IP based protocols in addition to either ECNET or DECNET. We are experimenting with Switzerland in sending the forecast dissemination via TCP/IP, and also in allowing Member State batch job access to the Cray via RQS running on a Member State system. However, there are still some security related issues to be resolved first. The data traffic on the external network is within reasonable limits and is not currently a cause for concern.

The Centre has a 64 kb/s link to the UK universities' JANET network, this provides the Centre with its Internet access.

An X400 based mail service has been installed within the Centre, allowing us to integrate within the Centre of all mail services. Users can now choose on which system they want to receive their mail, and mail will automatically be forwarded to them no matter where it originated from. This includes external mail to/from Internet.

Fig. 7 shows our current internal network.

8. FOUR YEAR PLANS

The following are the current major plans for the next four years:

* to benchmark massively parallel systems using the Centre's IFS model code. It is envisaged that to meet the demand for increased computer power a massively parallel system may be installed in the 1995/96 time frame. A workshop covering recent advances in these systems will be held at ECMWF on 23-27 November 1992 to which all Member States have been invited;

* to upgrade the IBM 3480 tape cartridges to double the number of tracks, and then to double length tapes,ultimately leading to about 1 Gbyte storage per cartridge;

* to replace the Cyber 962 service by workstations;

* to extend the HiPPI based network;

* to decide on the successor to CFS;

* to decide on the Cray YMP-C90 replacement in 1994, for use in 1995;

* to upgrade the Data Handling system in 1995, if required.

ECMWF Computer Networks - 1993

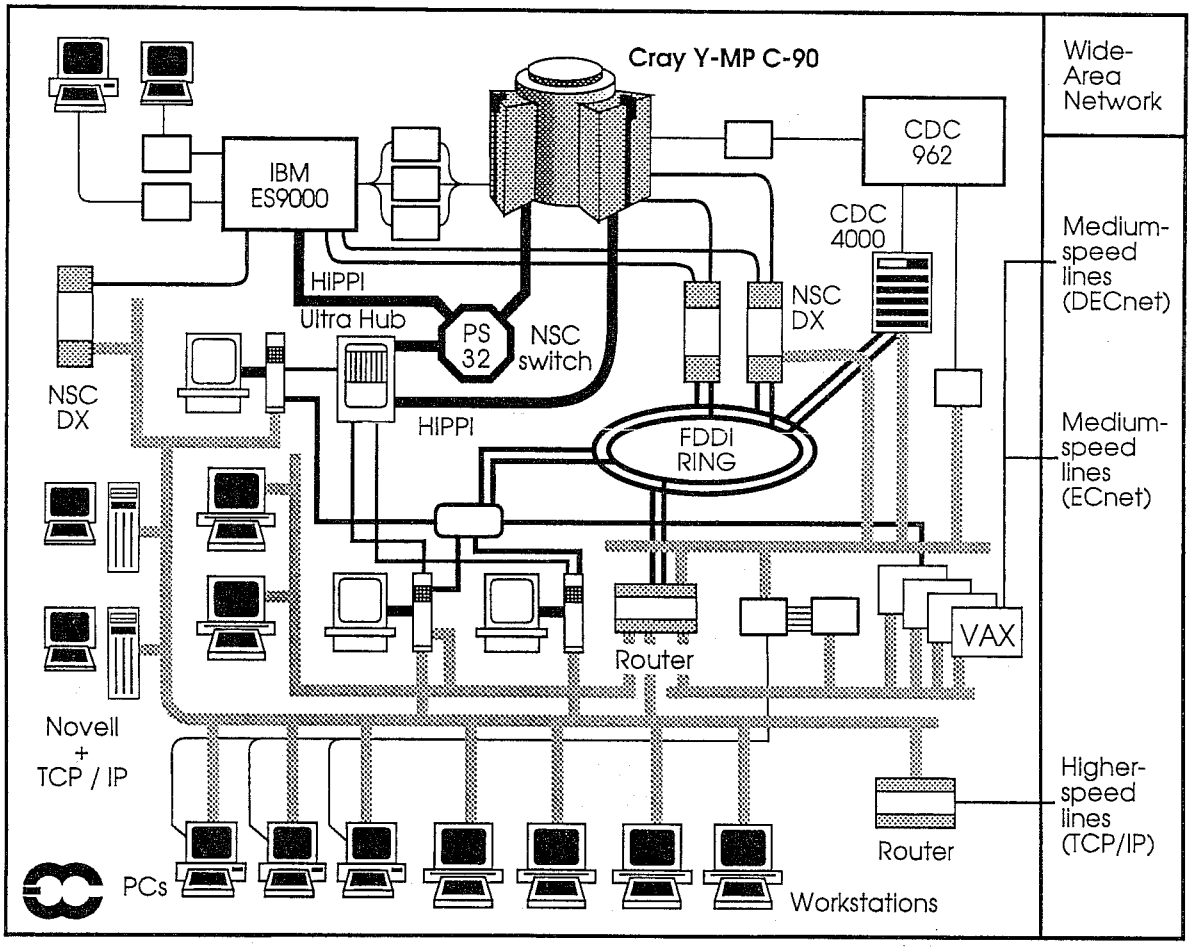

Fig. 7

QUESTIONS

S. Pasquini: Is there any plan to move all Member States away from DECNET to TCP/IP?

G.-R. Hoffmann: There are no plans currently to move away from DECNET as there are so many Member States still reliant on it.

S. Pasquini: Is it possible to login to the Cray from a Member State direct using a TCP/IP link?

G.-R. Hoffmann: It is available now.

P. Henning: Currently batch job access to the Cray must go through the VAX cluster?

G.-R. Hoffmann: Yes, currently. However, we are testing with Switzerland direct batch job submission from a Member State via RQS running on a Member State machine. This method bypasses the VAX cluster, and hence in the long term the cluster will not be needed for batch job access.

P. Henning: Can Member State users also continue to use the very good facility whereby they can change their daily dissemination requirements interactively via the VAXes?

G.-R. Hoffmann: This will continue as now for the foreseeable future.

J. Juega: Is it correct that a Member State who wants a TCP/IP link to ECMWF should get an official TCP/IP address?

G.-R. Hoffmann: Yes, we would like you to register with the official body and get such an address. This is so as to avoid potential address clashes.

R. Rudsar: Workstations - what files systems are where?

G.-R. Hoffmann: Each workstation has a local disk that contains the operating system and a swap space. All other file systems reside on servers and are NFS mounted.

R. Rudsar: Does this overload the network? At Oslo with a similar set up the network become badly overloaded.

G.-R. Hoffmann: Using multiple subnets, plus FDDI backbones, we do not see an overload. An application which is heavily data dependent should run on the server where the data is, rather than on the workstation.

B. Bachofner: Any plans to allow Member States to route files between themselves via their ECMWF links?

G.-R. Hoffmann: There is a TAC subgroup now looking into this idea. They will report to the TAC meeting (30 Sept.-2 October 1992) and propose that it be allowed on the 64 kb/s links, with some conditions, e.g. each Member State must approve it, and that it be for a 2-year test period only.

J. Juega: How many Centre users will migrate from NOS/VE to workstations? Such users will need training.

G.-R. Hoffmann: About 50 users, mainly Research. There are already plans for on-site tuition. We have had experience of this already with training the existing workstation users.

2. USER SUPPORT SERVICES

Andrew Lea, John Greenaway

1. STAFF

There has only been one change since the last meeting. Ditlef Martens has moved to the new section (Security, Internal Networks, Workstations), Dominique Lucas has joined User Support. Table 1 shows the current User Support staff and the various ways of contacting them.

2. COMMUNICATING

As requested during the last Computing Representatives' meeting, a VAX mail group (@COMP_REP) has been set up to allow you to broadcast mail messages amongst yourselves. A similar group has been set up on the ECMWF mail server, it is called "comp-rep".

All users can now use the ECMWF mail server to route mail messages to the system of their choice, including systems at your site accessed by DECNET or Internet. The ECMWF Computer Bulletin B3.4/2 has the details. In the back of that bulletin is a form with which users can register their choice with the mail manager.

3. DOCUMENTATION

As mentioned in the last meeting we are beginning to gather together all our documentation in electronic form, and place it in a common location. That location is the directory

/usr/local/information

and is currently accessible from UNICOS and from workstations. It contains sub-directories holding the various documents, these sub-directories have obvious names like news_sheets, write_ups, etc.

Two simple commands are available to help users locate material: ***echelp*** and ***lookfor***. Man pages exist for both these commands. The echelp command displays pages of text giving summaries of the rest of the material, including some indexes. The lookfor command takes a user provided text string and it searches through all the documents in these directories for that text string. Within the Centre we are also looking at an X Windows front end to these documentation directories.

Paper copies of the bulletins will still be made available, but we will reduce the number of bulletins to those covering major topics only. Annex 3 details the current Computer Bulletin contents.

Small topics will be covered by documents held only in electronic form. Currently most of the items are about workstation topics, only a few are about UNICOS.

HOW TO CONTACT USER SUPPORT

Telephone (ECMWF operator): +44 734 499 000 **Facsimile:** +44 734 869 450 **Telex:** 847 908 ECMWF G

Postal address: ECMWF, Shinfield Park, READING, RG2 9AX, UNITED KINGDOM

	TELEPHONE			ELECTRONIC MAIL			
	INTERNAL	BLEEPER	EXTERNAL	INTERNAL	EXTERNAL (INTERNET)	USER IDENTIFIER	ROOM NUMBER
ADVISORY	2801		+44 734 499 801	ADVISORY	ADVISORY@ECMWF.CO.UK	ADVISORY	
ANTOINETTE ALIAS	2382	154	+44 734 499 382	UST@ECMWF	AALIAS@ECMWF.CO.UK	UST	224
JOHN GREENAWAY	2385	155	+44 734 499 385	USJ@ECMWF	JGREENAWAY@ECMWF.CO.UK	USJ	226
NORBERT KREITZ	2381	156	+44 734 499 381	USN@ECMWF	NKREITZ@ECMWF.CO.UK	USN	207
ANDREW LEA	2380	138	+44 734 499 380	USA@ECMWF	ALEA@ECMWF.CO.UK	USA	227
DOMINIQUE LUCAS	2386	139	+44 734 499 386	USL@ECMWF	DLUCAS@ECMWF.CO.UK	USL	206
PAM PRIOR	2384	158	+44 734 499 384	USP@ECMWF	PPRIOR@ECMWF.CO.UK	USP	225

* Other alias names can also be used, see ECMWF Computer Bulletin B3.4/2

TABLE 1

4. CONTROL AND ACCOUNTING

Member State Computing Representatives have now been given the ability to change passwords of their users. This facility is available on UNICOS, NOS/VE and VAX/VMS. From comments received both before and during this meeting this facility seems to have been generally welcomed.

As a reminder, users can check the states of their Cray allocation via the acct_status commands, while Computing Representatives can alter allocations for their projects using the acct_admin utility.

The current annual registration system requires all Member State users to be re-registered every year, in particular they must sign the registration form each year. This must be a tedious and time consuming task for the Computing Representatives, hence for 1993 it is proposed to change it as follows:

* each user will now only sign once, when they are initially registered. A new form will be provided for this;

* each year the Computing Representative will send to ECMWF a list of accounts, the initial allocation per account and a list of user identifiers valid under each account;

* users will not now be required to sign a registration form each year.

5. SOFTWARE LIBRARIES

A project is underway to provide both the ECLIB and NAG libraries for the workstation users. Initially both libraries are being ported to the SUN workstation environment. Currently NAG Mark 15 has been set up, ECLIB has almost been done, both these being provided at double (64 bit) precision.

The opportunity has been taken to remove some out of date software from ECLIB, Annex 4 lists its current contents.

Man pages have been created for each ECLIB routine, based upon the old printed ECLIB documentation. Also by typing '***man eclib***' the user can get a list of all routines currently provided.

The NAG on-line help supplement has been installed, allowing workstation users to browse through NAG's documentation. Attempts are now being made to make it NFS accessible from UNICOS.

It must now be decided if we continue to provide printed documentation for ECLIB, or whether on-line man pages are sufficient? The meeting felt that printed copies were not necessary, but for those Member States who cannot interactively access man pages, then these write ups should be copied into a file in /usr/local/information which can then be printed off by anyone from a batch job.

QUESTIONS

S. Kruizinga: What format will the documents in /usr/local/information be held in?

A. Lea: One format is common throughout, namely simple ASCII text files. If the original came from WordPerfect then we try to make that available too. Sometimes we can provide a PostScript version which can be printed directly on any PostScript printer. This provides a better layout, when printed, compared to the ASCII version. Finally, some of the old bulletins are in a text format that uses Fortran style carriage control.

J. Juega: I could not find the MAGICS bulletins in the documentation directory, is it there? Secondly, do you have a WordPerfect version?

A. Lea: I am waiting for the Graphics Group to release the next version of the MAGICS documentation. There is an unpublished WordPerfect version, it will be put into the documentation directories once the Graphics Group release it.

P. Henning: Are the news sheets in the documentation directories? And all the Computer Bulletins?

A. Lea: Yes, all the currently valid news sheets are, except perhaps for the very last one published. Of the Computer Bulletins we managed to find electronic copies of most of them. We are missing only the graphics (MAGICS) ones, and perhaps two very old ones.

J. Juega: I use the UNICOS password change facility via batch. The system in Spain through which ECMWF batch jobs are sent requires an end-of-job card at the end of each job. On receipt at ECMWF the password change utility rejects this end-of-job card, and then aborts. Can this be rectified please?

A. Lea: I will take it up with the Systems person who wrote this utility.

R. Vanlierde: Is acct_admin specified in any Computer Bulletin?

A. Lea: No, not yet. There is a draft one in preparation that will cover acct_admin. Otherwise see the letter that was sent to all Computing Representatives (ref. OD/109.2/AL/GRH/HM/021 dated 10 Jan. 1992) describing this facility.

S. Orrhagen: Please could the list of Computing Representatives electronic mail addresses be updated (by circulating a list at this meeting), and that updated list attached to the report of this meeting?

A. Lea: Will do. (The updated list is to be found in Annex 5)

A. Dickinson: Will your workstation procurement be open or to just one vendor?

A. Lea: It is an open procurement (ITT), it is not a single tender exercise.

J. Juega: Does the present form of eclib on the workstation tie it to a specific hardware?

J. Greenaway: No, we have standard Fortran versions of almost all routines which means it can be quickly ported to practically any hardware. As an aside, NAG is similarly available for a great variety of hardware and/or systems.

A. Dickinson: What is the cost of putting these library routines into double precision?

J. Greenaway: On SUN systems tests show there is a degradation factor of about 1.5 to 1.6 in CPU time. A more important factor for users may be that going into double precision requires twice the amount of memory for data storage. However, Research users here overwhelming asked that these libraries be in double precision to allow for the accuracy they require.

R. Rudsar: After the workstation tender has been completed does it mean that the Centre will stick with only one type of workstation?

A. Lea: The Centre always attempts to standardise where it can on equipment and supplier. This is to simplify support. Experience has shown us that although most workstations run UNIX, and that from the user view point these varieties of UNIX are very similar, from the system maintenance point of view workstation systems differ considerably.

3. OPERATIONAL SERVICES

Peter Gray

1. OVERVIEW

The day-to-day work of Computer Operations Section now has to cover the following major items of equipment:

Hardware	Software
3 Cray systems (YMP-8D, YMP-4E, C90)	UNICOS
IBM ES 9000-580	PR/SM, MVS/ESA, VM/SP
CDC Cyber 962	NOS/VE
CDC 4680	EPIX
VAX cluster (6210, 6310, 8350, 2 x 11/750)	VAX/VMS
MicroVAX 3100 (graphics server)	VMS
3 SUN servers (workstation servers)	SunOS
2 Novell servers (PC servers)	Netware
LAN (Ethernet, FDDI, Ultranet, HiPPI)	TCP/IP
WAN (18 Member State lines)	NTC X25 Levels 2&3
	DECnet
	TCP/IP

This amounts to 17 different hardware systems and 8 different software systems, all of which our operators have to understand. In addition, the operators have to monitor the progress of the forecast suite, and out of office hours they are responsible for site security.

Each shift has one shift leader and either 2 or 3 console operators. There are 10 console operators of which maybe one or two are on holiday or training at any one time, leaving 8 to actually man shifts. During the day shift there are also contractor staff to man the output area, and to mount tapes. The shift pattern is 12 hours, with change overs at 07.30 and 19.30 daily. We therefore operate a lot of equipment with few people, which means we must ensure they are well trained.

On the service support side we run:

* **a tape library** - introducing new media, maintaining existing media, data copying, virus checking etc. Currently we add between 100 and 150 cartridges per day into the tape library, a big job overall;

* **an output area** - 5 monochrome and 4 colour single sheet printers, plus one continuous page printer;

* **service statistics** - held in an IBM VM data base now, later to be moved to the Empress data base running on a SUN system;

* **problem handling** - problem chasing, procedure writing and updating, service and operations scheduling etc;

* **technical support** - PC maintenance (~ 120 PCs), first line SUN support (~ 45 SUNs), local and wide area network diagnosis, air conditioning and electrical services;

* **operating tools support** - for example, a forecast monitoring tool has been provided.

Overall there are 12½ day staff to provide all the above service support, and of these, 3 staff also act as standby shift leaders.

2. SERVICE PROVISION

Since the last Computing Representatives' meeting we have moved the Telecommunications Control Centre for a second time, it is now closer to the operators' console area. This move was achieved in a few hours one day in May, due to the fact the Control Centre is so well designed now. The original move took 4 months to complete!

We are using more and intelligent terminals to manage the systems. These allow much graphical information to be displayed, and have really helped the operators. We use them to monitor the Cray status, the suite supervisor, the TCP/IP network, and the VAX cluster.

The LCN network has disappeared, fibre optic FDDI has been introduced, tests are underway with HiPPI and Ultranet.

The availability of the CRAY YMP-8D has been considerably improved over the past months. Looking at 13 week moving averages one can see that the service availability (as seen by the users) has risen from 93% two years ago to over 98% now. Early in 1992 UNICOS 6.1 caused a lot of instability in the service. On the hardware side we have reduced the amount of preventative maintenance, leading almost to an extra 1.5% availability for users. However, we are a factor 8 to 10 worse in software reliability than Cray's worldwide average, this is still worrying for us.

In the last 18 months we have introduced 4 StorageTek silos. Their effect has been to reduce manual tape mounts from 1500 to about 35 per day. In addition, there are about 300 cartridges entered or ejected from the silos each day.

The replacement of the IBM 3090 by an IBM ES-9000 went very smoothly. It was delivered in December 1991 and went into service around 10 January 1992.

The YMP-4E installation took just 60 days from conception to delivery, involving doing all the site preparation in a very short time. Within a week of delivery the machine was doing useful user work.

The C90 installation was similar to previous Cray supercomputer installations, except everything was just that much bigger - more power, more cooling, heavier, etc.

Two diesel backed mains conditioning systems have been installed, providing 2000 KVA of clean power. They also overcome mains failures by bringing in very quickly the standby diesels should

the main supply fail for any reason. All the computer systems now run off these two units. The air conditioning is powered in emergencies by the old diesels still.

On the electrical distributed side we have:

* added a new primary distribution system;

* eliminated the 60 Hz Cray and 400 Hz IBM power;

* rationalised the 400 Hz supply for the Cray and Cyber systems;

* improved the overall electrical efficiency, saving 60 Kwatts of power.

Our ongoing saga of the computer hall roof has reached the stage where the roof is now impermeable to water coming in from outside, however, condensation on the inside is still an unsolved problem!

In our tape library we have 39,000 BASF cartridges which are all faulty (due to problems in the original manufacturing process). Particles in the binder are migrating through the oxide to the tape heads. BASF have been very accommodating over this problem and are helping in every way they can. We are thus taking advantage of this problem, in that before we copy all these tapes to new ones, we are trying to delete as many unwanted files as possible. BASF are also supplying, free of charge, slightly larger replacement tapes that hold 250 Mbytes per cartridge (cf. 200 Mbytes on the old ones). Additional hardware compression will push the capacity of these new cartridges to 300 Mbytes each. The copying will begin in November 1992 and probably be completed around August 1993.

3. FUTURE PLANS

Our aim is always to improve the service quality, and to this end we are continuing to work with our suppliers to identify and eliminate weak points that are leading to poor systems resilience.

We plan to introduce a call desk, either late this year or early in 1993. Many problems are reported to the section members. The call desk will be there to ensure we handle them consistently, log them, progress chase as necessary and, finally, produce management statistics on the frequency and variety of problems.

The new take vault in the Office Block should become operational within 4-6 weeks from now. It will store about 20,000 cartridges, but not in VSN order. Thus a bar code data base will be used to keep track of where every tape is in the vault.

The site services required for whatever will ultimately replace the C90 are something that we already have to start thinking about, for example extra cooling may be required.

Finally, I would like to say that the good service we provide is due to two things, first the excellent efforts of the section staff, and secondly the users who by keeping up their demands help keep us on our toes.

QUESTIONS

J. Juega: Are the VAX 11/750s only there to support the NTC level 2 connections?

P. Gray: Yes.

J.Juega: What about EUMETSAT, how do they communicate with the Centre?

P. Gray: We do not have a direct line to EUMETSAT. They get ECMWF data either via Offenbach or Rome.

J. Juega: What does it cost ECMWF to maintain the 2 x 11/750s?

P. Gray: About the same as to maintain an 8350, and a lot more than to maintain a 6000 machine.

B. Barg: What level of qualifications do the service support staff have?

P. Gray: On the service support side four are of degree level, the others are at least high school level. Everyone has a lot of experience, their average age is probably around 40, and each has at least 15 years experience.

B. Barg: Will the call desk operate 24 hours a day?

P. Gray: Yes. There will be dedicated staff during office hours, and the shift staff will provide cover at other times. The dedicated staff will also provide statistics etc. as part of their duties.

4. EXTERNAL NETWORKS

Tony Bakker

1. MEMBER STATES - NTC/NTS

We have some Member States still using the NTC protocol which was developed at the end of the 1970's. This is an old protocol, limited to 9600 bits per second or below. It supports file transfer up to a limited file size for a few specified file types, one interactive session to the NTC VAX only, and remote job submission via RQS to the Cray. Three Member States (Spain, Greece, Switzerland) run with a NTC level 2 connection, and three others (Austria, Belgium, Portugal) with level 3 connections. France also uses an NTC level 3 connection, running over a 64 kb/s line in parallel with TCP/IP protocols. ECMWF would like to remove these NTC level 2 connections. Switzerland plan to move away soon, Greece and Spain have both indicated they wish to move away also.

2. MEMBER STATES - DECNET

We have several Member States who use DECnet connections. These use X25 as the low level protocol with DECnet running on top. The line speeds can run up to 64 kb/s, for example the UK line is configured like this, and we believe that Sweden will request such a link also. File transfer is done via the NTS software and it can handle any file type. DECnet allows multiple interactive sessions to any VAX in the cluster, and through them to any other system in the Centre. Job submission to the Cray is carried out via RQS again running on the VAX cluster.

The NTS software can run on any VAX in the cluster, allowing hot standby capability to improve resilience. Additional disk capacity and extra DECnet routers provide further resilience. Seven Member States use this type of link.

DECnet Phase V is now available from DEC. It supports OSI routing. The DECnet routers we have are supported under Phase V and, in turn, these routers can support TCP/IP as well as OSI. Experiments with the DECrouter for DECnet/OSI Phase V has given some problems with OSI routers from other vendors (CDC, CISCO). Later this year we will try again. Currently we are running DECnet VAX Extensions 5.4 (which contains partial support for OSI), DTSS (Distributed Time Services System) which coordinates the time across all our VAX systems, and the DEC DNS (Distributed Name Service) which helps with DECnet node administration.

3. MEMBER STATES - CISCO ROUTERS

These routers run our 64 kb/s links using X25 as the low level protocol. On top we can run various network protocols, including TCP/IP, DECnet, and in the future the OSI protocol suite.

Our current dissemination scheme still uses the NTS software on the VAX cluster for all Member States, and is independent of the network protocol used to the Member State. Remote job submission is still done via RQS running on the VAX cluster.

Other services via these routers include direct telnet and ftp connections from a Member State to any ECMWF service that supports these features, for example all UNIX based services.

If a Member State requests a TCP/IP connection, we normally advise them to buy a CISCO router (typically a 2E-2T router), plus X25 software to run on that CISCO router. At the ECMWF end 6 Member States can share one router, to cover this a once only charge of £6,000 is levied on each Member State involved as their share of the ECMWF router costs. Buying a CISCO router and downloading the software from a UNIX based system to that router has so far provided a very easy and trouble free way to connect to ECMWF at 64 kb/s.

Currently we are testing dissemination to Switzerland via ftp instead of using ECNET or DECnet protocols.

CISCO routers also provide very good security features, whereby using access lists for both hosts and applications one can limit the traffic that passes through them to only that permitted. Also they have a feature for giving priority to selected packets.

In practice we have found that using X25 over these 64 kb/s links results in a very satisfactory 60 kb/s throughput.

4. PUBLIC CONNECTIONS

We have a 9.6 kb/s X25 based link to the British Telecoms PSS network to provide access to various bulletin boards which are not accessible via Internet (e.g. OMNET, Telenet, Sciencenet). This link has 16 logical channels, although it is very slow if more than 2 people are using it simultaneously. Outgoing access can be achieved from any workstation or VAX system. Incoming access is restricted, for security reasons, from known X25 addresses where permission has been given to access us. Such access is only to either NOS/VE or VAX/VMS, plus access to the VAX/VMS email (PSI) system.

We have a 64 kb/s link via ULCC (University of London Computer Centre) to the UK university network known as JANET. We use it to carry our traffic to/from the Internet, not for direct connection to JANET as such. Incoming access from Internet is restricted to email and DNS (Domain Name Service) requests only. We do not allow any incoming interactive access or ftp requests. From 1 October 1992 we will stop outgoing access direct from our Cray system to Internet. Such file transfer traffic will first have to be routed internally to one of our other systems (e.g. NOS/VE, VAX/VMS, workstations) and from there to Internet. This restriction is again for security reasons.

QUESTIONS

R. Vanlierde: Will TCP/IP be permitted over 9.6 kb/s links?

T. Bakker: Technically it is possible and as far as I know Council has approved it. It is up to the Member State to request it. An experimental TCP/IP link with Spain,on a second 9.6 kb/s link, has been authorised by Council.

S. Pasquini: Last year problems were mentioned when disseminating via TCP/IP, have they been solved?

T. Bakker: Dissemination is via the NTS software, and is possibly using ftp. The application at the remote end must be able to read these dissemination files. An experiment with France, where they receive products in a NOS system, found that the ftp transmission did not provide that hence they have had to make some changes.

L. Campbell: Can we operate with DEC routers across a 64 kb/s link?

T. Bakker: Yes, no problem. DEC routers support 64 kb/s.

5. WORKSTATION EXPERIENCES

Richard Fisker

About half the technical users at ECMWF have workstations, most of these stations being SUN SPARC systems. By early 1993 we hope to equip all scientific staff with workstations, and to achieve this an ITT (Invitation To Tender) is being issued shortly.

The workstation is intended to provide all those services currently provided by PCs and the NOS/VE system. To support the workstation environment there are currently two staff members (R. Fisker, D. Martens), plus two consultants (A. Bracewell, P. Kogel) who will cover the period when extensive support will be needed to introduce all users to these workstations.

There are currently three SUN servers, two of which were originally purchased to act as gateways between the Ethernet and the Cray YMP-8. In addition, there is a CDC 4680 system, which is currently being introduced into service (to replace the CD 4360). It has RAID disk arrays, which provide great resilience. It will then be used to hold all the user home directories. All workstations and servers are connected via Ethernet. Fig. 1 shows the current servers configuration, Fig. 2 shows the configuration as it will be shortly.

One of the servers also acts as the Centre's mail server, handling both internal and external mail facilities. Later it is hoped to use the CDC 4360 server, which is being retained on loan from CDC, for experiments with the file storage system known as UNITREE.

The SUN SPARC stations (1, 1+, IPC) are quite old now. Most have 200 Mbytes of local disk, 24 Mbytes of memory, and a high resolution colour monitor. They are run in a "dataless" mode, that is on the local disk is only the operating system plus some local swap space. All the users' data, and applications, are held on the servers. Thus any user can login to any workstation and see the same environment.

We also have a few X terminals which provide a cheaper way to get at X based applications. The user needs to login to a server to run his applications as the X terminal has no local processing power.

All workstations and servers run UNIX, but each UNIX is not the same. SUN workstations run SunOS which is based on BSD, the CDC 4680 runs EP/IX which is based on System V release 3, while the DEC stations run Ultrix which is again based on BSD. These different versions cause a few problems for users, but a lot more problems for system programmers who have to maintain them.

All these systems share files using NFS and automounter to make access to files and applications on the servers as simple as possible. This allows a new application to be quickly added as a change to the mounted file systems has only to be done in one place, not on every system separately. We use NIS (Network Information Service - formally Yellow Pages) for all workstation user administration and DNS (Domain Name System) for Internet address look up.

Current Servers Configuration

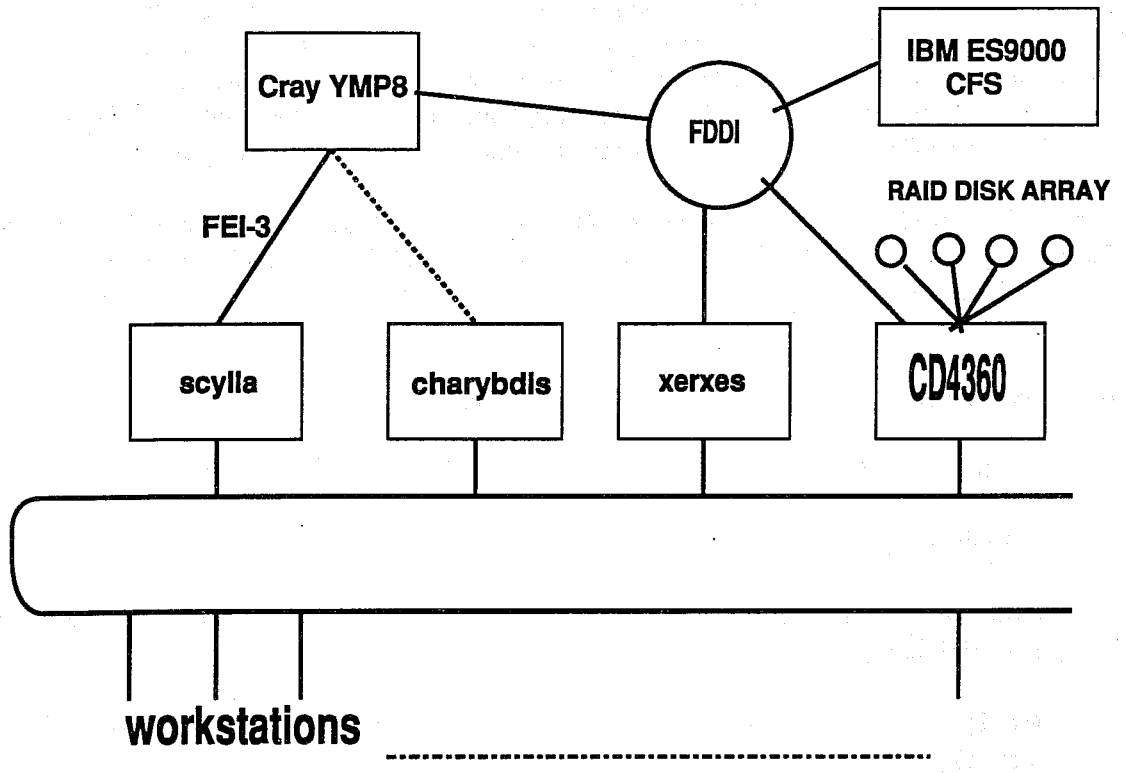

Fig. 1

Future Servers Configuration

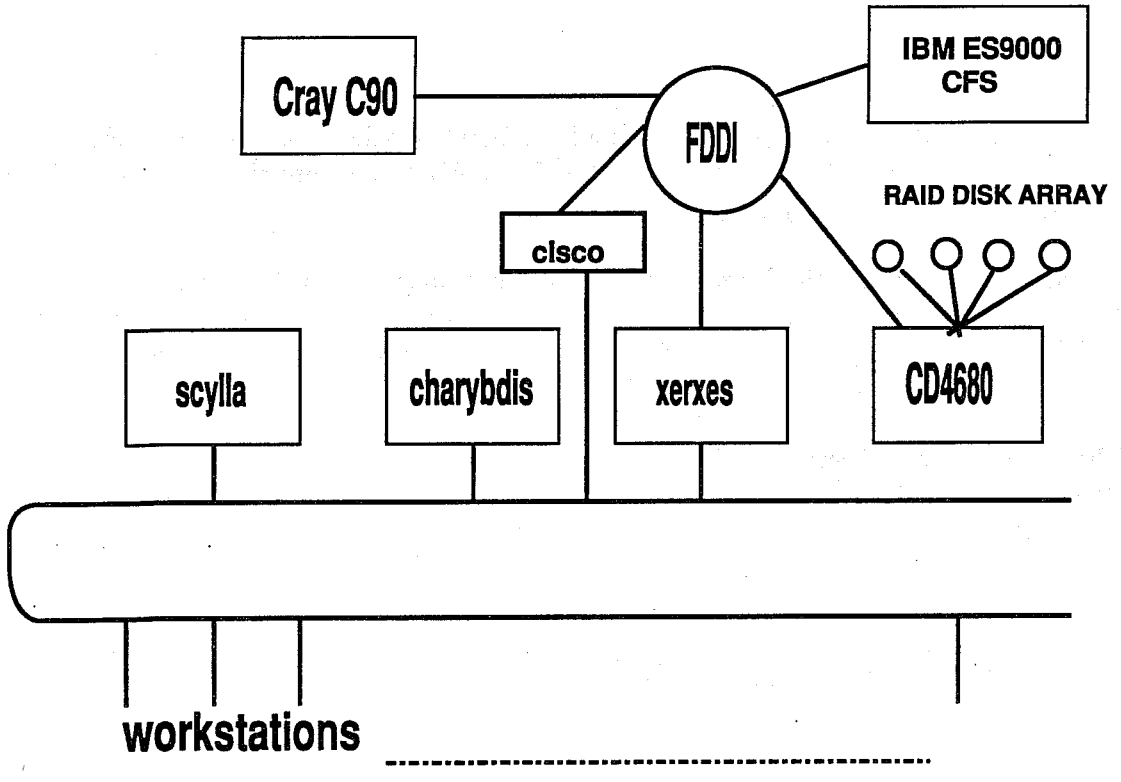

Fig.2

The user will use his workstation for file editing, source code maintenance, script debugging etc. Some Cray file systems are mounted on the workstations, meaning that a user can get at his main Cray files immediately with no user initiated copying or file transfer required. There are the normal "office" facilities (e.g. word processing, email, calendar, spread sheet) plus, in the future, program development tools (for C, C++ initially) and data visualisation packages (including METVIEW - an ECMWF meteorological data visualisation system currently under development).

For a windows environment there is either MOTIF or (on the SUN systems only) Open Windows. ECMWF applications are developed to use MOTIF for portability. Open Windows provides a set of tools, called "deskset", which include an icon based file manager, a graphical mail tool and a calendar manager.

Other services provided by these workstations include:

* an xterm based terminal emulator to access the Cray (UNICOS), NOS/VE, VAX/VMS, etc.;

* RQS for Cray job submission;

* online documentation (including the UNIX man pages, SunOS manuals, Centre produced material, etc.);

* MS DOS emulation (to run PC software that is not yet available in the workstation market);

* normal UNIX text editors (vi, emacs, ed, sed);

* the Iris Editor (ie), an X windows based editor for SUN systems only;

* WordPerfect;

* TeX, LateX, runoff.

As for source code maintenance we have still not found a package comparable to NOS/VE's SCU. We are currently experimenting with Aide_De_Camp (ADC), and hope shortly to study ADCM from CDC (ADCM being in fact an interface to ADC).

We have been investigating some CASE tools to aid program development. We have installed CodeCenter, which is a C debugging package, and have found it very useful. We also have a tool (QA Fortran) to analyze Fortran codes which searches through complete programs looking for possible problems, it also tries to quantitatively measure the complexity of the code.

There is a Fortran 77 compiler, that has some Cray extensions. We thus try to persuade users to develop their Fortran on the workstation before moving it to the Cray. That way we hope to reduce the short job load on the Cray.

In the area of graphics and visualisation tools we have:

* DEC Present and Island Presents on evaluation, both are used to produce overhead foils and slides;

* PostScript Previewer -which is used to take a quick look at plots produced by Cray programs, before deciding whether to print them or not;

* xvgr - a public domain plotting package;

* GKS - for use by MAGICS etc.

In addition, ECMWF staff have already developed some packages and tools:

* ecfile - a workstation version of the UNICOS ecfile package for accessing CFS held files;

* Xcfs - an X windows interface to CFS held files;

* sms - the Supervisor Monitor Scheduler (SMS) that is used to control the operational forecast suite;

* Xcdp - an X windows interface into the SMS control program;

* MAGICS - ECMWF's meteorological graphics package;

* METBATCH - a package which generates Cray batch jobs for visualising meteorological data;

* Metview - a system which is currently under development to incorporate all the meteorological graphics based packages into one coherent scheme.

In summary we have found that workstations make users more productive, especially in being able to have multiple windows showing different aspects of the total environment, being able to move information between windows, and being able to see more of whatever one is working on. However, the lack of consistency between systems and applications can be a problem, and one still needs a knowledge of the underlying UNIX system!

QUESTIONS

A. Dickinson: What about Cray's source code manager, USM?

R. Fisker: We are not sure of the status of this product. It is not at all clear whether they will market it or not.

A. Dickinson: Is USM similar to UPDATE?

R. Fisker: It is a command line based tool, more like CDC's SCU than UPDATE. Other than that we do not know a great deal about it yet.

J. Juega: What will external users coming to ECMWF need to know before being able to use a workstation on a visit?

R. Fisker: If you know how to use the Bourne shell, and to use the vi editor, then you will be able to use a workstation in the simplest mode. Knowing these two you can be productive on any UNIX system fairly quickly. You will also need to know how to submit jobs to the Cray.

L. Campbell: How do people use emacs at ECMWF?

R. Fisker: I have not personally used it. It is mainly for compatibility with UNIX systems elsewhere. For example, one Research consultant brought his own emacs configuration file with him, it was then (for him) identical to the one he used at home. For anyone else there is a lot to learn in the way of strange key combinations. However, it is very powerful and it can be used to create a complete environment. The emacs software comes from a shareware source,it is not shipped (usually) as part of standard UNIX systems.

P. Henning: Which compilers do you have on your SUN systems?

R. Fisker: We have Fortran 77 (from SUN), a C compiler that came bundled with the SunOS system, and an ANSI C compiler. I can give you details outside this meeting.

S. Pasquini: Any multitasking possible on a workstation, in the same sense as multitasking on the Cray?

R. Fisker: Nothing is provided.

R. Rudsar: How to you propose to update the operating system on a 100 workstations?

R. Fisker: We have not solved this one yet! There are some products, e.g. from DEC, which do solve this problem but they tend to be expensive. At the moment we go round to each workstation with a plug-in hard disk.

R. Rudsar: PERL - ever thought about using it?

R. Fisker: We have it installed, but we have no experience with it.

R. Vanlierde: Do you use the Korn shell?

R. Fisker: It is not available with the current SunOS release. However, it is available on UNICOS, and with later releases of SunOS. We may consider using it as it is similar to the POSIX shell, which is the shell we want to eventually end up using.

6. INTERNAL NETWORKS

Walter Zwieflhofer

At the meeting of Security Contact Points (5/6 October 1992) we will be discussing the question of remote job batch access to UNICOS. As at least a couple of the delegates to the Computing Representatives have asked questions about this topic of remote batch access, I will take this opportunity to discuss it here with you today.

There are two aspects to this question, the user aspect and the security aspect. The security aspect will be discussed next week, I would like now to get your views on the user aspect.

The topic I will address covers RQS use from a Member State across a TCP/IP link, a typical requirement for a 64 kb/s link user. On UNICOS NQS (Network Queuing System) exists to allow users to submit scripts which are then run as batch jobs, to check job status, and to exercise some control (e.g. kill a job).

NQS was originally developed 10 years ago by Stirling Software for NASA, this version is now in the public domain. It was then significantly enhanced by Cray Research (e.g. security features added) for their customers. Both these versions can operate together, however, the public domain version does not, of course, support the Cray specific extensions.

RQS (Remote Queuing System) covers the requirement to run jobs on a remote machine only. It can pass jobs to other systems via pipe queues, but it has no capability of running jobs on the local machine that RQS itself is running on. Cray provides a matching RQS for their NQS, it is available on several platforms, including SUN, DEC (Ultrix and VMS), CDC 4000, RS/6000, etc.

To use RQS, a user submits a job to RQS running on his local system or server. RQS then submits the job across the network to the relevant NQS host (e.g. ECMWF's UNICOS system) where it executes. The output (both standard out and the error file) is returned via the same path to the user.

In order to set up the initial connection between the remote RQS and local NQS systems, configuration files exist on both systems to say whether a given interconnection is allowed or not. There are two types of validation that goes on using these configuration files. The first is using validation files, the second is password validation.

If validation files are used, each side in its relevant configuration file has the host name of the other side. Then any job coming from an allowed host is allowed to execute, providing the name of the submitting host is in the validation file of the receiving host. At ECMWF we will not support this method as it relies totally on the submitting host carrying out any necessary user validation checks. We wish to ensure that such user validation checks are carried out on our local UNICOS machine.

There is a variation on this validation file method, namely each host has listed in its relevant configuration file the host name and user id of users who are allowed to submit work from a given remote host. This type of validation file we do not like either. We feel it is not secure enough, because on the remote system all an unauthorised user has to do is to submit his (unauthorised)

job from the id of an authorised user and the ECMWF host will execute it. There is no password checking involved at ECMWF, and as we make no attempt to hide ECMWF identifiers this method is open to immediate abuse.

Using either of these forms of validation files disables or bypasses any password checking at ECMWF, and hence we do not wish to allow them.

The second method is password validation. Now when a user submits a job from a remote site using RQS he is prompted interactively for a password and that password is then checked by the host on which the job will execute. If it is valid the job will be accepted for execution, if not the job is dropped. If the receiving host has an empty password for that user then file validation can be tried (as described above). ECMWF would like to enforce this idea of password validation but it does present a problem. The user password is requested **interactively**, this means that where a batch is not submitted by a user at a terminal then there is a problem. Such situations occur when from a remote site an automatic system (e.g. CRON) submits batch jobs at specific times of day without any user being involved, or where a remote executing batch job submits a batch to our UNICOS system. This latter situation is especially difficult to solve, but it is not impossible.

QUESTIONS

S. Orrhagen: We have a need to submit an ECMWF UNICOS job from an SMHI executing job, it is done today.

A. Dickinson: There is a similar requirement from UKMO users.

R. Gibson: There is a local system that does submit jobs on behalf of Member State users, is this affected?

W. Zwieflhofer: No, because it is submitted locally it will have no problem.

G.-R. Hoffmann: An experiment with Switzerland is now underway to look into these problems. In the longer term we may issue "smart cards" to all our users.

R. Rudsar: Does it mean that we have to buy either NQS or RQS, or buy smart card readers?

G.-R. Hoffmann: There are public domain versions of RQS which can be got free of charge. Also these days some workstation vendors are supplying RQS. Alternatively, you can buy it from Cray. If you have a requirement to run UNIX batch jobs on your own site then you will need NQS anyway. That then can talk to our NQS.

It seems from the reaction of this meeting that the requirement is there for batch job submission to UNICOS from remotely executing batch jobs, hence we will have to try to solve this problem. Thank you for your input.

7. MARS AND DISSEMINATION UPDATE

Rex Gibson

1. MARS

Many of our dissemination products are now in GRIB edition 1 format, where GRIB edition 1 is the revision of FM 92 GRIB that WMO approved for implementation on 1 November 1991. Amongst the changes are:

* total length is now in the front (section 0);

* support for many additional map projections;

* support for complex packing and quasi-regular grids (of the type ECMWF now uses);

* optimal scaling by a decimal scale factor;

* rudimentary support for image data.

Many of the above changes are of interest to ECMWF, especially the quasi-regular grid support as this is the type of data we archive out of the T213 model.

To accommodate these changes we have developed new software for our GRIB format handling package. The original interface, known as DECOGB, was not general enough to handle the new extensions. Thus we provided several new routines and combined it all into a new interface called GRIBEX. GRIBEX includes:

* new routines and calls to decode/encode GRIB edition 1;

* backwards compatibility with GRIB edition 0 when decoding;

* encoding only for the new edition of GRIB (however a -Z option was added to MARS to encode in edition 0 format if required, say after interpolation of old data);

* a DECOGB "outer shell" style to assist users during the transition. However, users of DECOGB should move to GRIBEX as soon as possible, as the DECOGB interface may not be supported in future releases.

We inserted this new GRIBEX software into MARS on 18 June 1991, and moved all archived dissemination products to GRIB edition 1 in November 1991. All the T213 data, and all older data which has been interpolated or had a sub-area extracted as a result of a MARS call, is now recoded in GRIB edition 1, even if the original data was in edition 0. At the same time we also added to GRIBEX an interpolation option from a quasi-regular to regular grid.

Some other changes:

* on 17 September 1991 we moved to the T213 model with 31 model levels;

* on 10 December 1991 we added to the pressure level archives the 925 hPa pressure level (now a WMO standard level), and first-guess errors;

* on 1 July 1992 we added support for the wave model optional project, with a new parameter DOMAIN to differentiate between global or Mediterranean wave model data.

Support within MARS for observations has gradually been introduced over the past few years. Over the last year we have dealt with the back archive of observations which were in the old NOS/BE format. These have been converted and replaced in MARS, covering the period 01.01.80 to date.

Although initially the retrieval options for observations were rather limited, full support for time, type or subtype, area, WMO block(s), and station number(s) has now been provided. However, we have not as yet completed support for specific identifiers (e.g. ships, AIREPS etc.) but it is progressing and should be available shortly. Another outstanding item we are working on is time series support for observations, our present archive really being only suitable for case study type research. We are in particular working on time series support for TEMP data, and hope to have that available by the end of the year.

A few bugs have been revealed as a result of processing some of our observational back data, these are mainly in the area of high level satellite data. We know what the problems are, they mostly affect pre 1986 data, we hope to have fixed and corrected them by the end of the year.

To request observations from MARS one uses a RETRIEVE verb with TYPE=OBSERVATIONS. The data is returned to you in FM 94 BUFR format, and decoding software for this is available from ECMWF.

It is hoped to produce by the end of the year a fully updated version of the MARS manual, incorporating all the recent changes.

2. DISSEMINATION

Last year at the TAC we presented the results of a Member States questionnaire suggesting various possible enhancements to the dissemination scheme. The outcome was a wishlist of enhancements that we have tried to address over the past year. The following have now been done:

* the economical production of boundary products;

* a bit map option;

* a method of receiving large products (> 15,000 bytes) across the Member State links;

* support of the quasi-regular grid as used in the forecast surface parameters;

* data in METGRAM format, sent in BUFR format as a time series out to day 10;

* wave model product dissemination;

* preliminary work on 00 UTC product dissemination;

* a lot of work to improve the internal codes, monitoring procedures, operator tools for answering Member State queries, and the internal tools available to the analysts. All these make it easier to see what is going on and to keep track of the dissemination as it occurs.

The support for boundary data has been done in two ways. First we have introduced a FRAME parameter that allows a rectangle to be defined and then a product to be constructed that consists of (say) 6 points in from that rectangular boundary all the way round. This can save a lot of time in transmission where it is going to be used as a boundary for a limited area model (say).

The second way is the ability to define which points to be included/excluded in a product by means of a bit map and that bit map can be highly irregular. A copy of the bit map is then included in the GRIB product so generated.

For wave model product support, as well as adding the new DOMAIN parameter, we have introduced several new parameters suitable for wave model output. Initially we got into some confusion over the way that wave direction was specified, we believe that we have got it right now. We are currently working on adding support for dissemination of the 2D wave spectra.

To distinguish between products from the 00 UTC project and the normal forecast, the TIME parameter is used. Any product we support from the normal forecast can now be provided under the 00 UTC project also.

The Member States requirements checking and dissemination monitoring package has been re-written and improved. We believe we have now eliminated some earlier problems seen in this system, although if any Member State is still having problems, please let me know as soon as possible.

QUESTIONS

R. Vanlierde: What is the latest version of the MARS manual?

R. Gibson: Revision 9, dated July 1991. The next revision is planned for the end of this year.

P. Henning: Regarding 00 UTC products, when will they be available?

R. Gibson: We need the C90 to run this project operationally, but we are not able to use it yet. Therefore we are planning to run temporarily on the YMP-4 and disseminate the products in the normal way, but as test products until we can go operational on the C90. Hopefully, the first test products can be sent tomorrow night (30 September).

P. Henning: How will we distinguish between the 00 UTC and 12 UTC products?

R. Gibson: The technical instructions as to how to deal with 00 UTC products was sent to all Technical Advisory Committee Representatives in a letter dated 11 September 1992 (ref. OD/C/TAC/10/HB/MJ/pt/431).

P. Henning: Will hollow box products be available from the 00 UTC project? and rotated grid?

R. Gibson: Hollow box, yes. All normal 12 UTC type products will also be available from the 00 UTC project. However, the rotated grid has not been added.

P. Henning: We need two areas around Denmark and Greenland.

R. Gibson: Then I suggest you use the bit map approach as I described earlier.

R. Rudsar: How do we differentiate between files received covering 00 UTC and 12 UTC products?

D. Jokic: In the 7th position of the file name will be the number 4 for 12 UTC products, and 0 for 00 UTC products. To specify 00 UTC in the requirements then specify TIME = 0 (by default it is 12 for 12 UTC products).

R. Gibson: Again all this has been specified in the letter that went to the TAC Representatives.

8. S M S

Rex Gibson, Otto Pesonen

SMS (Supervisor Monitor Scheduler) is a general purpose package designed to schedule a large number of (potentially related) computer processes. Although constructed originally to schedule the daily operational forecast at ECMWF it is general enough that it can schedule any set of computer processes, either running on one system or on multiple systems. All that is required is that the multiple systems support intercommunication amongst themselves using SUN RPC which, in turn, uses TCP/IP and UDP/IP. Note that SMS is not a queuing system (such as NQS or RQS) but it is a scheduler.

SMS supports the following major features:

* flexible interdependencies;
* complex automated scheduling;
* access to monitoring information;
* facilities for dynamic and interactive supervision;
* simple error recovery (up to a specific, user defined number of times).

SMS manages suites. A suite is a collection of families and a family is a collection of tasks and possibly other families. Tasks may have *events*. If it does not matter which one is in question we use the term *node* to refer to any of them.

By default the suites are independent of each others, but if the user wants to, the suites can have dependencies with respect to other suites. We call these *cross-suite dependencies*, which really should be avoided, since the idea of a suite is that it is a complete unit.

There is an analogy between suite definition and UNIX filesystem hierarchy.

* Suite	Filesystem
* Family	Directory
* Task	File (executable)
* Event	Signal (not part of the filesystem)
* Dependency	Soft link (can span filesystems).

There are two types of dependencies, time and node. Time dependencies may be expressed using the time of the day, the weekdays and the date. There can be multiple time dependencies. The node dependency is expressed as a logical combination of other nodes (preferably in the same suite) and their status, e.g. *taskname == complete*.

Normally the suite is defined by means of commands using a file, but users trying simple things may type commands directly into the CDP.

The suite definition is normally placed in a *definition file*. Typically the name for the file is *suitename.def*, but any name may be used.

Users interact with SMS via a separate program known as CDP (Command and Display Program). Two versions of CDP exist, a command line one that has some full screen capability, and an X Windows/MOTIF version (known as XCdp). The initial "programming" of SMS is done via CDP, then subsequently CDP provides monitoring. It also allows manual intervention if necessary. In addition XCdp has access to helpful information (manuals, job output, etc.) that might be needed by an operator or analyst while SMS is running.

SMS and CDP are UNIX based programs, written in C. Versions have been tested on various hardware and software configurations, the current list is shown in table 1.

This session then concluded with a live demonstration of SMS.

TABLE 1: SMS AVAILABILITY

Hardware	Software
CDC	EP/IX 1.3.2 and 1.4.2
CONVEX	ConvexOS 9.1 and 10.0
CRAY (XMP/YMP/C90)	UNICOS 6.0 UNICOS 7.0
IBM	AIX Version 3
Silicon Graphics	IRIX 3.3 and 4.0
SUN	SunOS 4.1.1
VAX	Ultrix VMS 5.4 and 5.5 (using UCX 1.3+ and SUN RPC)

QUESTIONS

J. Greenaway: What happens to XCdp if the Cray is down?

O. Pesonen: XCdp is largely helpless then. However, a checkpoint file is kept for restart purposes.

R. Rudsar: This system must rely upon each task reporting accurately.

O. Pesonen: Yes, good logfile reporting needs to be done by each task.

R. Gibson: At ECMWF we develop all operational suite tasks (scripts) to a given standard, which ensures that such logfiles are generated.

9. SYSTEMS PLANS

Claus Hilberg

1. OVERVIEW

The recent reorganisation within Computer Division has meant that Systems Software Section now restricts itself to operating system software installation, maintenance and support on the "big" machines. Table 1 shows the machines, their operating system(s) and major software that we support, plus the names of the relevant support staff.

TABLE 1: SYSTEMS SOFTWARE SECTION RESPONSIBILITIES

MACHINE	OPERATING SYSTEM(S)	SUPPORT STAFF
CRAY YMP	UNICOS	Neil Storer, Matthias Nethe, Cray Analyst
IBM ES/9000	VM, MVS, CFS	Tony Stanford, Françis Dequenne, Jean-Luc Pépin
CDC	NOS/VE	Dieter Niebel, CDC Analyst
DEC	VMS, Ultrix	Tony Bakker, Bert Kesseboom

2. UNICOS

We have a policy that we will always upgrade to the most recent level of UNICOS. This is so that we can take advantage of new features, UNICOS after all is still a developing operating system. Also it ensures we continue to get excellent support from Cray's own software people.

Currently we run UNICOS 6.1.5a on the YMP-8. There are no plans to change this any further, as hopefully the YMP-8 will disappear by the end of the year. On the YMP-C90 we are running UNICOS 7.c. Because UNICOS 7 has not been officially released yet for the YMP range, a special version (now known as UNICOS 7.c) was put together by Cray to specifically support the C90 range of machines. It is a restricted release, and as far as we know will only go to one further version, namely UNICOS 7.c.2 in November. That release has no user impact as far as we are aware.

The next major release of UNICOS from the user point of view will be UNICOS 8, now scheduled for 1Q94. At this stage we do not know a lot about UNICOS 8, other than again we believe there are only minor user changes likely. The main impact will be "behind the scenes", namely that it will conform to the B1 security level (as defined by the USA Defense Department). In addition it will provide multi-threading of the kernel. Currently only one CPU at a time can execute important parts of the kernel, and on a 16 CPU C90 that can be restrictive. Assuming that Cray succeed, this feature should be important for us bearing in mind that system overheads are more than 15%. Finally, we believe that the default shell will be the POSIX shell.

As you know we have a Cray YMP-4 here currently. One of the reasons for installing this machine was so that we could gain experience with UNICOS 7.c before the C90 arrived. It has proved very useful in this respect, we have found some errors but in general UNICOS 7.c has been very stable, a marked change from UNICOS 6 which really had many problems. The YMP-4 has been available to all users for trials for a couple of months now.

One final warning, please recompile everything when moving to the C90, do not try to move binaries from the YMP-8 (or even the YMP-4). Although the C90 has a YMP-8 compatibility mode whereby it will execute YMP-8 binaries, this mode is not recommended.

All Member State users,passwords, and the /ec file system were copied from the YMP-8 to the C90 on 29 September 1992. Note that no attempt will be made to keep the /ec file systems in step between the two systems. Currently /tmp is only 14 Gbytes, this will increase when the C90 becomes the default machine. Note that at that time you can expect to lose the contents of /tmp on both machines, no attempt will be made to copy /tmp from the YMP-8 to the C90.

3. CFS/ECFILE

A major effort is underway at the moment to upgrade CFS to level 61. This level is required to support larger file sizes and higher capacity 3480 cartridges. In addition it will provide a wild card delete function, plus the concept of a delayed delete (i.e. a waste basket). Later it should support file spanning across cartridges, which will then effectively remove the file size limit.

A new ECFILE implementation under UNICOS is also being worked on. This will be based on TCP/IP protocols, rather than Superlink. This is required because Superlink will not be supported at UNICOS 8 and beyond. At this time there should be a throughput increase between IBM and Cray, as TCP/IP will run on the HiPPI connection. There will also be one user change, the "get" command will be restricted to one file per get command. By the way, this will be the same user interface as available on other UNIX platforms at ECMWF.

The current default retention period for CFS files is infinite retention. Discussions are underway to change this to something like (say) 1 or 2 years. It is also possible that the retention period of existing files may be changed at the same time. Further information will be released later.

4. NOS/VE

The likely termination date of this service is 30 November 1993, to be discussed at the TAC meeting tomorrow. Because of this we do not propose to upgrade NOS/VE any further. We may apply minor upgrades if they fix significant bugs.

As a replacement for NOS/VE Member States will be given access to a UNIX facility at ECMWF for interactive work (from early 1993 onwards). Which UNIX system it will be will not be known until the workstation ITT has been completed. Note that when you register your users for 1993 you will be asked whether they wish to register for this UNIX service also.

5. VAX/VMS

It is unlikely that users will see any changes over the next year or two. Although we always try to upgrade to the latest release in general it will not affect the user interface.

The current version VMS A5.5 has two forms, one with the old style queue manager, the other with a new style queue manager. We currently use the old style queue manager but will upgrade to the new style as soon as possible. Those Member States who run NTS software can upgrade now to VMS V5.5 if they wish. Finally, we expect a major new release, VMS 6.0, some time in 1993, as yet we do not know a great deal about it.

QUESTIONS

J. Juega: How long before the UNICOS queue NORMAL90 becomes the default?

C. Hilberg: Sometime within the 45-day Final Acceptance period, which is now underway. It is being debated now when this switch may take place.

10. INITIAL INVESTIGATIONS INTO MPP SYSTEMS

Lars Isaksen

An MPP (Massively Parallel Processor) system is one where thousands of cheaper (but slower) CPUs are connected together, to give the same or higher processing power as the traditional supercomputer. As an example, the Intel Paragon XP/S has at each processor node a 75 MFLOP (peak performance) processor with up to 128 Mbytes of memory per node. Up to 4,000 nodes are then connected in a 2D grid using one iMRC (Intel Message Routing Chip) per processor. The iMRC has a raw throughput of 200 Mbytes per second.

Why is ECMWF interested in MPP systems? The traditional shared memory supercomputers are now close to their ultimate performance. The clock speed is very high, circuit sizes are very small, removing the heat is a problem and wiring is becoming difficult. All this makes the traditional supercomputer very expensive to design and build. Using a processor which is (say) 100 times slower reduces the cost by at least a factor of 1000. Therefore, by combining 1000 such processors, then for the same price as the traditional supercomputer one now has a machine with a performance 10 times that of the supercomputer, at least in theory! The main problem though is how to utilise all these processors to get a viable working system.

ECMWF has a high performance requirement, that is a few highly optimised CPU demanding programs (models) that must run each day in a time critical window. The more power that can be made available in that time window so much the better. This type of situation suits very well the MPP system. Other weather forecasting or weather research establishments around the world are likely to move to MPP systems during the next decade. For both these reasons ECMWF should study such systems seriously as potential replacement for the C90.

ECMWF already has considerable experience with Cray macrotasking on systems with up to 8 processors, and in fact gets some of the best parallelisation of its code compared to any other in the world. Now we must gain similar experience on systems of several thousands of processors. Today the hardware of parallel systems is becoming reliable, but software difficulties still remain. ECMWF's plan is therefore to study and, hopefully, solve some of those software difficulties.

The Centre's current goal is to define a good strategy (both algorithmically and programming-wise) for introducing MPP systems into operational weather forecasting. To reach this goal the Centre is adopting the following method:

1. analyze the computational requirements and data structures/flow of global weather models;

2. calculate the communication costs of different parallelisation strategies, for 1D, 2D, 3D and hypercube topologies of processors;

3. implement simplified models, such as spherical Helmholtz solvers and shallow water models, on existing parallel computer systems;

4. extend the above techniques using more realistic codes such as the Optimum Interpolation (OI) analysis code, and the Integrated Forecast System (IFS);

5. evaluate the effort required to program MPP systems and the usefulness of the tools provided.

To date the Centre has been involved in several MPP related projects, both internal and external. The manpower has been provided mainly by consultants, but with some Centre staff involvement too. In addition, an internal group, known as GEOP, has been formed to evaluate the possible use of an MPP system for running the operational forecast in the 1994/95 time frame.

A couple of the current projects we are involved in are PPPE and RAPS. PPPE (Portable Parallel Programming Environment) is an EC funded Esprit 3 based project to produce software tools to help people use MPP systems. For example, one will need a good debugger; remember that debugging on a vector system can be difficult, on an MPP system it can be an order of magnitude worse. Also, we will need performance analyzers and data flow monitors to help optimise codes. Vendors (e.g. Meiko, IBM, Intel, etc.) produce the tools, ECMWF's role is to recommend what tools are required and then to test them.

The RAPS (Real Applications on Parallel Systems) is an ECMWF originated project whereby various organisations interested in running real applications get together to port large production codes on to various MPP systems. The participants in RAPS include CERN, AVL, ESI, GMD, the University of Southampton, and others. RAPS provides a forum for jointly consulting with and influencing the various vendors, as well as offering tutorials and experiences amongst the participants. ECMWF's contribution to RAPS will be the big IFS code.

From all the work done so far at the Centre we can draw up the following list of difficulties and points to watch:

1. It is more difficult to write programs for MPP machines that have distributed memory, than for traditional supercomputers.

2. Data structures and algorithms must be chosen with greater care.

3. Load balancing becomes an important issue. For example, the physics calculation at a given grid point can vary enormously depending on where the grid point is. If you have one grid point assigned per processor then a lot of time can be wasted if all processors have to wait for the calculation at the most complex grid point to complete. A better way then might be to assign several grid points per processor.

4. One should keep the costs of rewriting code as low as possible. For example, the IFS code is currently 950 subroutines and 220,000 lines of code, having taken 50 man years to write. One does not want to have to rewrite all of that!

5. The data communication should be structured so that it can be isolated as much as possible from the rest of the code. That would ease problems when porting it to either a shared memory or a distributed memory system.

6. Use the parallel extensions to Fortran 77 and, if possible, use the Cray macro tasked code as a guideline.

As an aside it should be noted that there are two efforts underway to produce further parallel extensions to Fortran. The first is PARMACS (PARallel MACros) which consist of a set of simple macro extensions to Fortran 77. These macros are essentially a set of message passing commands (send, receive, barrier, etc.) to move data between processors. Such macros are now available on many MPP machines, plus a simulator is available on the Cray YMP. The second is HPF (High Performance Fortran). This is a set of more advanced features to be added to Fortran 90, and should be available sometime in the 1993/94 time frame. These features should be easier to use than PARMACS, as a lot of the detailed work is done for you behind the scenes. HPF is a joint effort between most parallel machine vendors and many of the large users.

There are in the market place quite a few hardware vendors, here are just some which are of interest to ECMWF, those marked with a * indicate system on which we have run some trials already:

Intel iPSC2*
Suprenum*
nCUBE-2*
Thinking Machines CM-2, CM-200, CM-5
Intel iPSC/860*
IBM RS 6000 network*, Vulcan
SUN network*
Meiko*
Parsytec*
Cray MPP
Intel Paragon XP/S
Fujitsu VPP 500.

We have mainly been investigating parallelisation strategies with simplified versions of ECMWF's operational models, to check if it is possible to utilise the present spectral method on an MPP system. Our initial results look promising. It seems possible to implement an efficient solution where the communication between the processors is isolated to a few interface routines, and then retain most of the meteorological model parts unmodified.

In conclusion, ECMWF has investigated both spectral and multigrid methods. The spectral method is more efficient at low resolutions, the multigrid method is more efficient at high resolutions. However, the multigrid method is only some 10% better, hence it does not seem advantageous to us to rewrite the spectral model as a multigrid code. ECMWF will continue to benchmark the PARMACS based shallow water code on as many MPP systems as possible, to study further parallelisation and data communication of 2 and 3D semi-Lagrangian advection codes, and to produce a parallel version of the IFS benchmark code.

QUESTIONS

S. Pasquini: In your opinion can the scientist who wrote the code parallelise it himself, or will a specialist be required after the code has been written to port it to a MPP system? Does one also need to know the structure of the MPP system on which it will run?

L. Isaksen: At the moment one does have to know the structure of the machine to use it efficiently (cf. the early days on the Cray when one had to know the Cray architecture in order to produce the most efficient code). If one attempts to use an MPP system now without thinking one would probably only use 5% of its capability. Hopefully, this will change over the next 1-2 years when the vendors want to expand their potential market then they will need to make the software much easier to use.

11. GRAPHICS UPDATE

Jens Daabeck, Paddy O'Sullivan, Arne Jørgensen, Keld Petersen

1. MAGICS

MAGICS support at ECMWF is now largely restricted to UNIX platforms, currently Cray and SUN systems. There is also a VAX/VMS version but this is being used less and less within ECMWF, hence support for it is now low priority.

A new release has been thoroughly tested within ECMWF and has just been released to internal users. It is planned to release it to Member States at the end of this year. The new release contains the following new or improved features:

* completion of the curve and bar chart plotting facilities;

* addition of automatic date/time axis plotting, based on the range of the input data;

* support for wave observation plotting;

* interface to GRIB edition 1 decoding software;

* reduction of memory requirements when plotting a local area from a global field;

* interface to the new BUFR decoding software for observations;

* enhanced polygon shading for contouring;

* increased performance, especially in the areas of spectral to grid point conversion, and the CONICON contouring method;

* improved portability.

Finally, some further development within MAGICS:

* support for plotting satellite images. The input image will be in GRIB or matrix data format, the grids for display will be the spaceview grid (for Meteosat) or cylindrical, mercator and polar stereographic for all other satellites;

* updating the MAGICS manuals;

* further improving its portability and performance.

2. MicroMAGICS

Because ECMWF hopes to replace most of its PCs by workstations next year, the Centre will no longer have a use for MicroMAGICS (PC version). At ECMWF, METVIEW/ws will supersede MicroMAGICS as the preferred means of visualising meteorological data on a workstation.

3. GKS

ECMWF has now changed its supplier of GKS. The new version comes from a company called Xelion and was chosen for two reasons - first it provides the same GKS version on all the Centre's hardware platforms - second it provides a good interface between GKS and X Windows for the METVIEW/ws system. This new version of GKS is called S-GKS. Although ECMWF has switched its version of GKS this does not mean that Member States who take MAGICS must do the same. MAGICS will still work with any version of GKS that conforms to the standard and has been certified.

The S-GKS features of interest to ECMWF are:

* one implementation for all platforms. There is one source code, with a different definition file for each hardware platform;
* the source code is in C;
* bindings available to both Fortran and C;
* X Windows drivers;
* PostScript support (all ECMWF plot files are in PostScript today);
* Fax standard support;
* the CGM (device independent metafile) format;
* good performance.

Because of the Centre's move to workstations it is very important that X Windows drivers are available. S-GKS provides such drivers and a lot more, namely:

* Window manager support (MOTIF and Open Windows);
* allows the mixing of GKS and X based input/output;
* portable environment variables that permit tuning from within GKS;
* raster operations;
* support for all the hardware X fonts, including Greek and mathematical fonts;

* sharing of colours between applications, or the approximation of colours to match any colour of another application;

* extended input;

* input/output to existing windows;

* the generation of pix maps, e.g. for icon generation or for images;

* a resource file for tuning GKS to a specific application.

The PostScript driver is important to us as all our plots are now in PostScript, and we therefore require good performance in the handling of such files. Support within S-GKS for hardware fonts improves the performance. At ECMWF there are some 14,000 pages of plots printed each week, hence performance is vital to us. S-GKS provides that performance we believe.

4. METVIEW/ws

The objectives of this project are as follows:

* to provide an interactive environment for

  (i) accessing meteorological fields, observations and images;

  (ii) manipulating those fields, observations or images;

  (iii) visualising any of the above (in 2D only);

* to base this development on approved or de facto standards;

* to re-use as much of the existing software as possible;

* to follow the existing operational and research procedures at ECMWF.

In practical terms this means:

* creating an interactive meteorological visualisation system;

* designing it so that each independent (graphics based) application shares common resources as much as possible. These can include such things as: physical data management, database searches, common data units, visualisation definitions and plot layouts, macro facilities, etc;

* providing a full set of facilities from initial data access through data manipulation to final visualisation;

* designing it so that it will function across various systems i.e. distributed processing etc.;

* using ECMWF's MARS facility for all data input, and MAGICS for all plotting.

METVIEW/ws will therefore consist of a set of applications, e.g. Cross Section, Metgram, observation plotting, etc., each of which feeds into a main module where all the common services are to be found. The main module will also, where appropriate, offload some CPU intensive items to "service modules" which can be run either on the current host in parallel with the main module, or be sent as a batch job to another system. In ECMWF's workstation environment all this is feasible, with batch work going to the supercomputer as appropriate.

A critical point to consider is what is an application. There are certain applications that do specific things, e.g. cross section application. However, there is a need for a general application where the user is given the freedom to manipulate and plot the data as he chooses, in order that he can experiment with the best way to explore the subject he is investigating. Finally, there is a need from some users to be able to control some of their own external applications from within Metview, e.g. McIdas.

One can consider that there are 3 things involved in any visualisation process, first some data is required, e.g. a field, second there are instructions how to present it, e.g. with dotted blue contours, and finally where (or on what) to plot it. The data can come from external sources (e.g. the MARS archive), or be held locally, and it can be in one of several formats, e.g. GRIB, BUFR, etc. METVIEW will know where the data files are, and what type of data each file contains (specified in a MARS-like language format). The visualisation instructions are in the form used within MAGICS, in the so-called "visdef" attributes format. The plot view is based on the current idea of a plot window looking at a general plot area that can be much bigger, or smaller, than the actual plot window. That plot view can be adjusted interactively, e.g. zooming, overlaying, etc.

In conclusion what we are trying to do is to

* provide a sound structural foundation on which all applications can be built;

* aim for a long-term life cycle for this product;

* make it open ended so that, by using the well defined interfaces and protocols, adding a new application will be easy (either interactive or batch);

* make it easy to use by the meteorologists themselves;

* design it so that it can be built and maintained by only a small team.

QUESTIONS

L. Campbell: Will PGRIB now take both GRIB edition 0 and edition 1? And also both the ECMWF and WMO formats for Table 2?

P. O'Sullivan: Yes.

R. Rudsar: What is the current status of the development of METVIEW?

K. Petersen: The main module, the general application module, and a visualisation module currently exist separately. We are now in the process of bringing them together, but are not quite yet at the stage where we can see the first pictures.

R. Vanlierde: When the new version of MAGICS is ready, will it be automatically sent to those Member States who have it already?

J. Daabeck: We will send a letter announcing it, and inviting Member States to request it, if they want a copy.

J. Juega: Satellite images - is today's GRIB code definition flexible enough to cover all satellite and image parameters?

R. Gibson: The GRIB implementation for satellite imagery is still in its infancy. WMO is anxious that what has been proposed to date (and remember it is experimental only, it has not been fully approved) is studied fully by experts in the field, and that it then be developed further as to what is useful in the context of GRIB. Thus it is not foreseen that it will be able to represent everything that comes out of a given satellite system, e.g. not the navigation data. The initial definition includes the ability to represent the spaceview and the ability to represent pixel type data.

12. GENERAL DISCUSSION

A. Lea: At this meeting, ECMWF has attempted to update you on everything ECMWF has been, and is currently, doing. Also, we have attempted to present the plans and changes that we believe will have an impact on you in the immediate (1-2 years) future. The obvious and hopefully immediate change will be the introduction of the Cray YMP-C90 into service. Next year (within ECMWF) will be dominated by the introduction of workstations. Towards the end of the year will be the termination of the NOS/VE service, requiring a replacement of that service by some UNIX based service for your users.

T. Hopeakoski: Will there be any ECMWF run computer user training courses in 1993?

A. Lea: The plan is to continue as we have done for several years now, namely to offer one (3-week) course just before Easter.

A. Lea: We need to consider when it might be appropriate to have the next Member State Computing Representatives meeting. The last TAC (Sept. 1991) discussed briefly the frequency of such Computing Representatives meetings. Unfortunately, the TAC did not like the idea of an annual meeting and therefore requested that, as before, the Computing Representatives should meet whenever major changes occur. As far as Member States are concerned we do not see any major change in 1993, however, in 1994 the present Cray contract will terminate. Therefore, there could well be a major change in 1994 and hence that is when we suggest the next meeting be held.

J. Juega: What are the plans to provide dissemination via TCP/IP?

G.-R. Hoffmann: Such dissemination can be done today, it has been tested with France, and Switzerland receive their dissemination regularly via ftp. It is therefore up to you to request it. Also there is no change planned in the way you request products to be disseminated.

S. Kruizinga: Will it be possible to leave one's products on the VAX and then get them by some means via a request from the Member State?

G.-R. Hoffmann: In principle there is no reason why not. It is not our current method, but it is something we can consider. The only risk is that if you do not take the products within 24 hours they will be overwritten with the next day's dissemination.

Another way, used by some countries in the past, is to switch off your line and let the products queue on our VAX cluster. When you switch your line back on, the dissemination will then take place.

G.-R. Hoffmann: If there are no further discussion points it just leaves me to thank you all for attending. I hope that you all found the meeting valuable. Also thank you for your co-operation in the past and the good working relations that I believe exist between us. As always, if you need information or wish to discuss something, please do not hesitate to contact the relevant ECMWF staff member, or if you do not know who that is, then your User Support Contact Point or myself are always very willing to help. Finally, I must thank User Support, and all the other ECMWF staff involved, for setting up and running this meeting.

COMPUTER REPRESENTATIVES' MEETING

28-30 September 1992

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LIST OF PARTICIPANTS

BELGIUM	Mr. R. Vanlierde
DENMARK	Mr. P. Henning
FINLAND	Mr. T. Hopeakoski
GERMANY	Dr. B. Barg
GREECE	Mr. X. Giannakos
IRELAND	Mr. L. Campbell
ITALY	Dr. S. Pasquini
NETHERLANDS	Mr. S. Kruizinga
NORWAY	Ms. R. Rudsar
SPAIN	Mr. J. Juega
SWEDEN	Mr. S. Orrhagen
SWITZERLAND	Mr. B. Bachofner
UNITED KINGDOM	Dr. A. Dickinson

ECMWF:

Geerd-R. Hoffmann, Head Computer Division (Chairman)
Antoinette Alias, User Support
Tony Bakker, Systems Software Section
Jens Daabeck, Head Graphics Group
Richard Fisker, Security, Intern.Netw. & Workstation Section
Rex Gibson, Head Meteorological Applications Section
Peter Gray, Head Computer Operations Section
John Greenaway, User Support
Claus Hilberg, Head Systems Software Section
Lars Isaksen, Consultant (Research Department)
Norbert Kreitz, User Support
Andrew Lea, Head User Support
Dominique Lucas, User Support
Pam Prior, User Support
Walter Zwieflhofer, Head Security, Intern.Netw. & Workstation Section

SEVENTH MEMBER STATE

COMPUTER REPRESENTATIVES' MEETING

E C M W F

Shinfield Park, Reading, U.K.

28-30 September 1992

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Monday, 28 September

14.00	Welcome	Chairman, G-R. Hoffmann
	ECMWF's computer status and plans	
15.15	**C O F F E E**	
15.45	Member States	

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)

Evening informal dinner with User Support

Tuesday, 29 September

09.00	Member States (continued)	
10.00	**C O F F E E**	
10.30	User Support services	A. Lea
11.15	Operational services	P. Gray
12.00	External networks	T. Bakker
12.30	**L U N C H***	

* During this lunchbreak machine room tours will be arranged if required. Interested participants should contact their User Support Contact Point.

14.00	Workstation experiences	R. Fisker
15.00	**C O F F E E**	
15.30	Internal networks	W. Zwieflhofer
16.00	MARS and dissemination update	R. Gibson
16.30	SMS	R. Gibson
17.30	**COCKTAIL PARTY**	

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Wednesday, 30 September

09.00	Systems plans	C. Hilberg
09.30	Initial investigations into MPP (massively parallel processor) systems	L. Isaksen
10.00	**C O F F E E**	
10.30	MAGICS and MicroMAGICS update	J. Daabeck
11.30	Discussion session	
12.30	**Finish**	

ECMWF COMPUTER BULLETINS - CURRENT STATUS (1 SEPTEMBER 1992)

Following the withdrawal of many bulletins after the Cyber NOS/BE and Cray COS services had terminated (see ECMWF Newsletter March 1991, No. 53, page 30), a further rationalisation has been carried out. The following ECMWF Computer Bulletins are now obsolete and can be thrown away: B0.2/2, B1.2/2, B3.4/1, B5.2/7, B5.2/12, B5.2/13.

Updates of the following bulletins are in progress or have been done: B0.1/1, B1.0/2, B1.0/3, B1.5/1, B2.8/1, Index, Classification and Contents.

Finally, three new bulletins have been recently distributed: B2.8/2, B3.4/2, B3.4/3.

Therefore, the up-to-date set of ECMWF Computer Bulletins (excluding those specialist ones on restricted distribution) are as shown below.

Reference	Title
B0.1/1(4)	ECMWF division management and personnel list
B0.2/3	Security
B1.0/2	An introduction to the VAX interactive system
B1.0/3(1)	Introduction to the UNICOS system of ECMWF
B1.1/1(2)	Naming conventions and registration procedures
B1.5/1(1)	Advisory services
B2.5/1(1)	NOS/VE service - self tuition notes
B2.5/2(1)	Summary of ECMWF provided features in NOS/VE
B2.8/1(2)+	Terminal emulators for PCs - a basic introduction
B2.8/2+	An (outgoing) fax service for PC users
B3.4/2	Integrated electronic mail services
B3.4/3	INTERNET
B3.5/1	Data transmission to and from Member States
B4.1/1	New features of Fortran 77
B4.1/3	Bit operations in Fortran
B5.2/5(1)	ECMWF meteogram system
B5.2/8(2)	Reference manual for MAGICS
B5.2/9(2)	User's guide for MAGICS
B5.2/10	Pocket guide for MAGICS

Reference	Title
B5.2/14(3)+	The diagnostic and plotting package BPP
B6.0/1	Software libraries available at ECMWF
B6.1/1(1)	The ECMWF software library ECLIB
B6.1/2	Program library documentation standard
B6.1/3	ECLIB documentation
B6.7/2(9)	MARS user guide
B7.6/1	FORMAL reference manual
B7.6/2	FORMAL for pedestrians
B8.2/1	Supporting incoming/outgoing magnetic tape at ECMWF
B8.3/1(2)	ECFILE concepts
B8.3/3	ECFILE access from NOS/VE
B8.5/1(1)	Alphanumeric Microfiche

NOTE:

+ Bulletins issued within ECMWF only

ECLIB(3) Local ECMWF Utility ECLIB(3)

NAME

ECLIB - ECMWF local library

DESCRIPTION

ECLIB is a package of local fortran, assembler and C utility routines. To use the routines, you should link the library to your object files. ECLIB can be referenced via the variable name $ECLIB. (see examples)

The following summary provides a list of the routines included in ECLIB, giving the name and the purpose for each routine. Each routine is documented in a more detailed manual page.

1. Routines or functions available on both systems : Unicos and workstations.

NAME	PURPOSE
ADEWPT	calculate dewpoint
ALOGHF	half precision logarithm
ARELHM	calculate relative humidity
BRELHM	calculate relative humidity
CD2DAT	convert century day to date
EXPHF	half precision exponential function
FAX	calculate factors for FFT
FFTRIG	Trigonometric calculations for FFT
FFT99	multiple fast fourier transform
FFT991	multiple fast fourier transform
GBYTE	extract a field from an array
GBYTES	extract fields from an array
GD2GD	convert between lat/long and p.s. grids
HMR	calculate humidity mixing ratio
HMR2	calculate humidity mixing ratio
I_ACCESS	return access mode or existence of a file.
I_EXIT	terminate process with status
I_GETCWD	get pathname of current working directory
I_GETENV	get value of environmnet variable.
I_GETUSR	return user and process information
I_SYSTEM	execute a command in a new shell.
IC2YMD	convert CENTURY DAY to YMD
IDAT2C	convert DATE to CENTURY DAY
IDAT2Y	convert DATE to year DAY
IUCOMP	find first element in integer array
IULAST	find last element in array
SBYTE	store a field in an array
SBYTES	store fields in an array
SD2UV	convert wind (speed & direction) to U & V
SET99	initialise fast fourier transform
SQRTHF	half precision square root function
SVPICE	calculate saturated vapour pressure
SVPWTR	calculate saturated vapour pressure

SYMINV	invert a symmetric matrix
SYMSOL	solve a set of symmetric linear equations
UV2SD	convert wind (U & V) to speed & direction
VPICE	calculate vapour pressure
VPWTR	calculate vapour pressure
YD2DAT	convert YEAR DAY to DATE

2. Routines or functions only available on UNICOS.

LOCKF	FORTRAN callable file locking routine
GATHR	random gather of real array elements
IGATHR	random gather of integer array elements
ISCATTR	random scatter of integer array elements
SCATTR	random scatter of real array elements
SIGMA	summation of vector or scalar product

IMPLEMENTATION

ECLIB is available to users of both systems : UNICOS and (sun-4) workstations.

WARNINGS

1. The following out-of-date packages/routines have been removed from ECLIB.

NAME	PURPOSE
CONVAR	convert between lat/long and p.s. grids
GP...	general purpose plotting package

2. Some ECLIB routines or functions are only implemented on UNICOS. See above.

3. The workstation version of the following routines or functions is only provided for compatibility and merely calls the fortran library routines or functions.

NAME	PURPOSE
ALOGHF	half precision logarithm
EXPHF	half precision exponential function
SQRTHF	half precision square root function

4. On the CRAY, the functions I_ACCESS, I_EXIT, I_GETCWD, I_GETENV, I_GETUSR and I_SYSTEM are also available as F_ACCESS, F_EXIT, F_GETCWD, F_GETENV,F_GETUSR and F_SYSTEM. You are advised to use the (I_) names.

EXAMPLES

Cray:

```
cft77 myprog.f
segldr -o myprog -l $ECLIB myprog.o
```

or

```
cf77 -o myprog -l $ECLIB myprog.f
```

Workstation:

```
f77 -o myprog myprog.f $ECLIB
```

FILES

/usr/local/lib/eclib.a

REFERENCES

Specialist : ECMWF software librarian.

SEE ALSO

Detailed manual page for each ECLIB routine or function.

COMPUTER REPRESENTATIVES' ADDRESS FOR ELECTRONIC MAIL

BELGIUM	Mr. R. Vanlierde	Roger@meteo.oma.be
DENMARK	Mr. P. Henning	dmivax::ph
FINLAND	Mr. T. Hopeakoski	puisto::hopeakoski_t
GERMANY	Dr. B. Barg	----
GREECE	Mr. X. Giannakos	OPERATOR_GRE
IRELAND	Mr. L. Campbell	IRMET::LCAMPBELL
ITALY	Dr. S. Pasquini	SOLE::CNF
NETHERLANDS	Mr. S. Kruizinga	seijo@KNMI.NL
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SPAIN	Mr. J. Juega	UNICOS mdl mail
SWEDEN	Mr. S. Orrhagen	SMHI::Orrhagen
SWITZERLAND	Mr. B. Bachofner	Bat@SMA.CH
UNITED KINGDOM	Dr. A. Dickinson	----

PART 2

MEMBER STATE COMPUTING REPRESENTATIVES' CONTRIBUTIONS

BELGIUM

R.M.I. 29-09-1992

Computer installation and budget shared by 3 institutes :

- ✓ Royal Observatory of Belgium (ROB)
- ✓ Royal Meteorological Institute (RMI)
- ✓ Institute for Space Aeronomy (ISA)

This infrastructure is operational since mid 1990 and consists of:

- 1 Convex number crunching unit.
- 3 DN10000 number crunching units (2 processors).
- 3 DN10000 departemental units (1 processor).
- workstations (HP).

All computers are connected to an Ethernet LAN.

BELGIUM

R.M.I 29-09-1992

SOFTWARE

OS:
- Domain OS (environnement : AEGIS , BSD4.3 and SYS5).
- 90% in SYSTEM 5.
- Korn Shell.

NCS: network computing system from HP.

BACKUPS:
- OMNIBACK through the lan for UNIX stations.
- OMNIBACK uses NCS.

LAN:
- Ethernet.
- Between the apollos :
  - all the commands are networks wide.
  - Domain contains functionalities of TCP/IP and NFS.
- With other computers :
  - Decnet with ROB VAX computers.
  - TCP/IP + NFS for HP stations and Unix or Xenix PC's.
- With DOS PC's :
  - Domain Personal Computer Interconnect (DPCI).
  - Same functionalities as PC NFS.

R.M.I. 29-09-1992

EXTERNAL COMMUNICATIONS

✓ With the GTS :

- Through a micro-programmed Smart Hostess board.
- The protocol entirely implemented on the board.
- 2 Boards implemented on 2 DN10000 for backup.

✓ With ECMWF :

- Domain / X25 with Eclink on 2 Apollo Workstations.
- All software problems are solved and both dissimination and RJE are working fine.
- Plans for implementing TCP/IP over X25 via an HP 750.

✓ With public network :

- Through an HP of ISA.
- HP 750 will take over.

BELGIUM

R.M.I. 29-09-1992

LIBRARIES

✓ MATHEMATICAL

- Naglib 13.0g2.0 on DN10000 and Apollo workstations.

✓ GRAPHICAL

- Uniras 6.1f (GKS) on Apollo workstation.

✓ RELATIONAL DB

- Ingres 6.2 on DN10000 and client on workstations via NCS.

BELGIUM

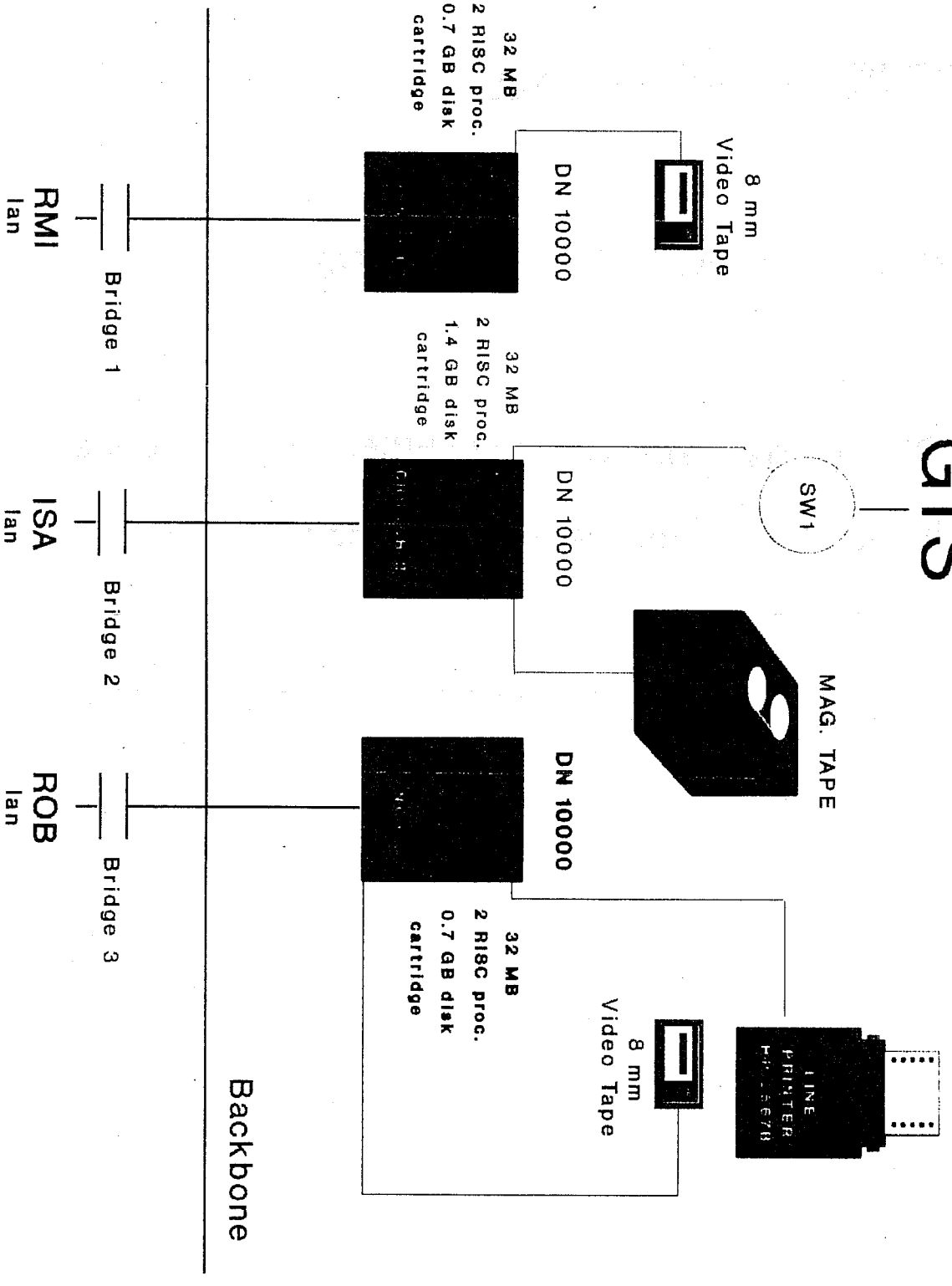
R.M.I. 29-09-1992

PROJECTS AT ECMWF

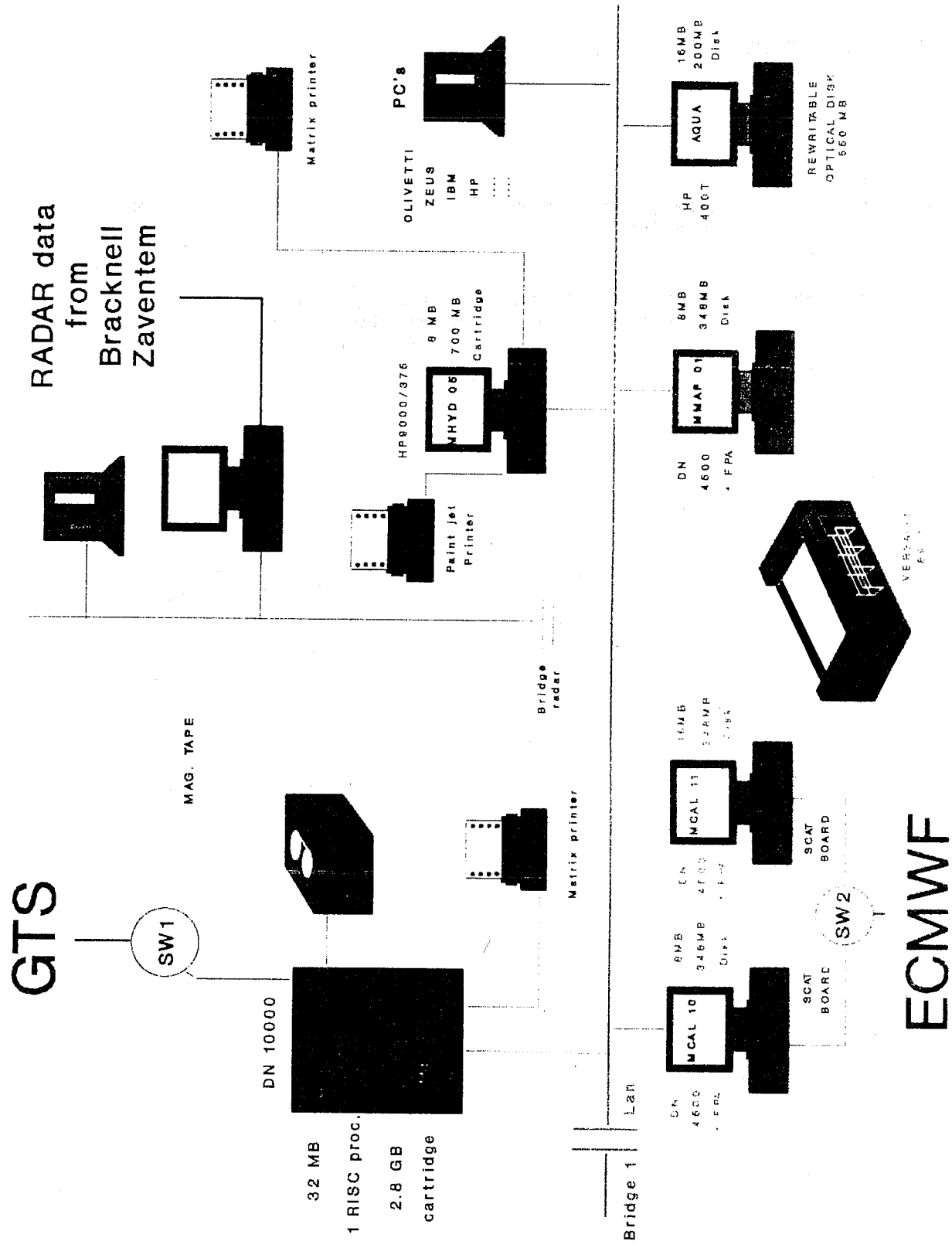
- Data retrieval through MARS.

- Study of the predictability of a system in a one dimensionnal space in which chaos appears.
  Method of KURAMOTO - SIVASHINSKY.

BELGIUM


GTS
SW1
MAG. TAPE
8 mm
Video Tape
DN 10000
32 MB
2 RISC proc.
0.7 GB disk
cartridge
32 MB
2 RISC proc.
1.4 GB disk
cartridge
DN 10000
32 MB
2 RISC proc.
0.7 GB disk
cartridge
DN 10000
8 mm
Video Tape
LINE
PRINTER
RMI
lan
Bridge 1
ISA
lan
Bridge 2
ROB
lan
Bridge 3
Backbone

BELGIUM


GTS
SW1
DN 10000
32 MB
1 RISC proc.
2.8 GB
cartridge
MAG. TAPE
Matrix printer
Bridge radar
Bridge 1
Lan
MCAL 11
MCAL 10
SCAT BOARD
SW2
RADAR data from Bracknell Zaventem
Matrix printer
PC's
OLIVETTI
ZEUS
IBM
HP
HP9000/376
MHYD 06
8 MB
700 MB Cartridge
Paint jet Printer
DN 4600
MMAP 01
8MB
346MB Disk
HP 400T
AQUA
16MB
200MB Disk
REWRITABLE OPTICAL DISK 650 MB
ECMWF

Questions and comments (Belgium)

J. Juega: Can you please describe in more detail your CONVEX configuration?

R. Vanlierde: Sorry, but I cannot give many more details as it is not situated at our Institute, but at the Institute of Space Aeronomy. It is a C130 machine.

The system at DMI.

The DMI system is shown on the diagram. It is not quite correct as the Unisys 2200 is still running, but as it will be gone in a short time it has not been drawn and I shall say nothing more about it.

The mainframe computers in the DMI system are two VAX 6410 computers coupled into a cluster and two Convex vector computers, a 3240 and a 3880.

Furthermore there are approximately 70 Sun work stations, only a few of which have been drawn on the diagram and approximately 200 PC's.

The network are based on a segmented 10 Mbit ethernet coupled by a multiport bridge (3Com NetBuilder II).

The multiport bridge which is central in our present configuration uses a 800 Mbit bus to connect the (maximum) 8 ethernet segments.

The VAX'es are the computers which are doing most of the telecommunication.

The bulletins enters the system at devices connected to an ethernet segment. The danish bulletins at the terminal server and the GTS bulletins and the bulletins from the other scandinavian contries at the X25 router.

The decoding (pre_processing) programs are running at the mivax2.

These programmes are based on the ECMWF pre_processing system, but it has been heavily modified, and new programmes are added e.g. a programme for decoding of metar bulletins.

Some of the bulletins are distributed to other parts of Denmark e.g. the airport in Kastrup and others are sent to the GTS, via the ESWI line at the X25 router.

Some programs for plotting of observations (mainly synoptic ones) are running at the VAX - system.

3 Calcomp penplotters are connected to the terminal server.

The VAX'es also run programmes which transmits forecasts and observations lists to DMI's customers. This is done partly by VAX - mail, partly by telex and partly by telefax.

As can be seen on the diagram some 64 kbit lines are connected at an ethernet segment via bridges.

There is one line EKCH to Kastrup , where we send bulletins. On the same line we receive observations from a radar which is placed in the airport.

As you see the new 64 kbit line from ECMWF is also connected to the ethernet segment,but configuered to only allow access to the Convex 3800.

The disseminated analysis and prognosis from the centre are received and stored at the VAX'es.

We use the trigging system implemented in the system to start some actions when an analysis or prognosis has arrived.

The received data are sent to on the network using the TCP/IP protocol to the Convex system.

Here the fields are put in a GRIB database for different use.

Some of the data are used for plotting of prognostic maps or for for other use in the daily forecasting suite.

The plotting is done as follows:

There are two Sun workstations which gets data from the Convex.

From those data Post-Scrips files are generated which are then sent to one of the two QMS laser printers. The one prints in A3 format the other in A4.

Other fields are used for extraction of data used as boundary values for the HIRLAM analysis and prognosis system.
The prognosis are made for an area around Denmark and also for an area around Greenland.
We have implemented some security messures.
The users have to change their passwords with regular intervals and admittance to the system from the outside world can only be done through the Convex 3880.

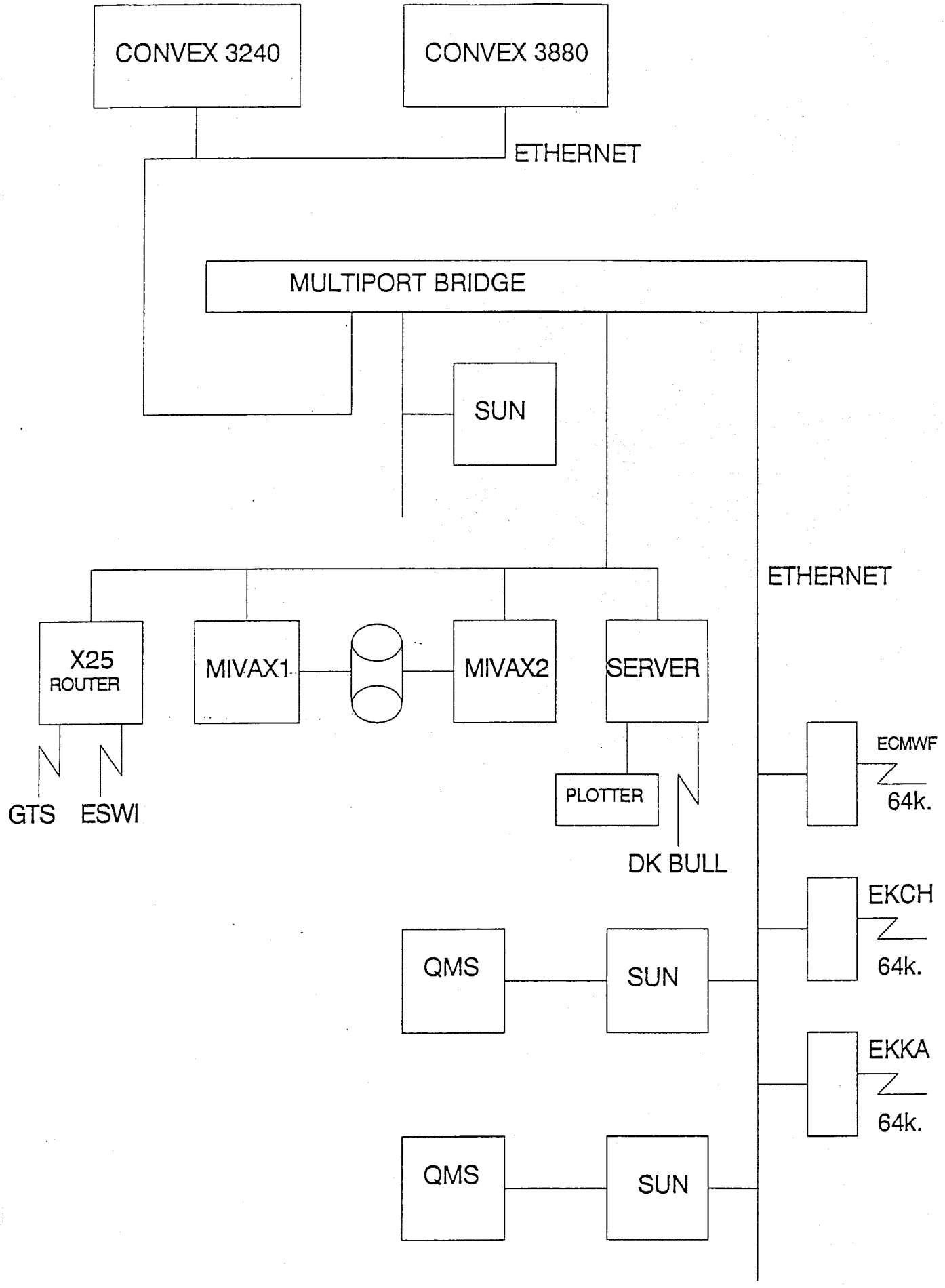
Concerning the use of the ECMWF system I have already mentioned some of the use of the disseminated files which we receive.
The reception of those files works fine. There have been very little trouble in this direction.
There has been improvements which makes life easier, at least for the computing representative.
The possibility of changing the requests for disseminated fields online have now been running for some years, and I appreciate that very much.
Also the possibility of giving the users which have forgotten their passwords a new one is a progress.
Would it be possible to activate deactivated users interactively?
It seems not to be the case.
A short time ago a user which had not used the system for a long time and therefore had been deactivated asked me to change his passwords on the Cray and the VAXES.
This was done easily, but afterwards he was still deactivated and I had to phone our contact person.
Everything was then settled quickly, so it is not a great problem, but nevertheless.

We will want more disseminated fields. For example 00Z products and the wave prognosis that you are making now.
The submission of jobs are still done from the VAXES.

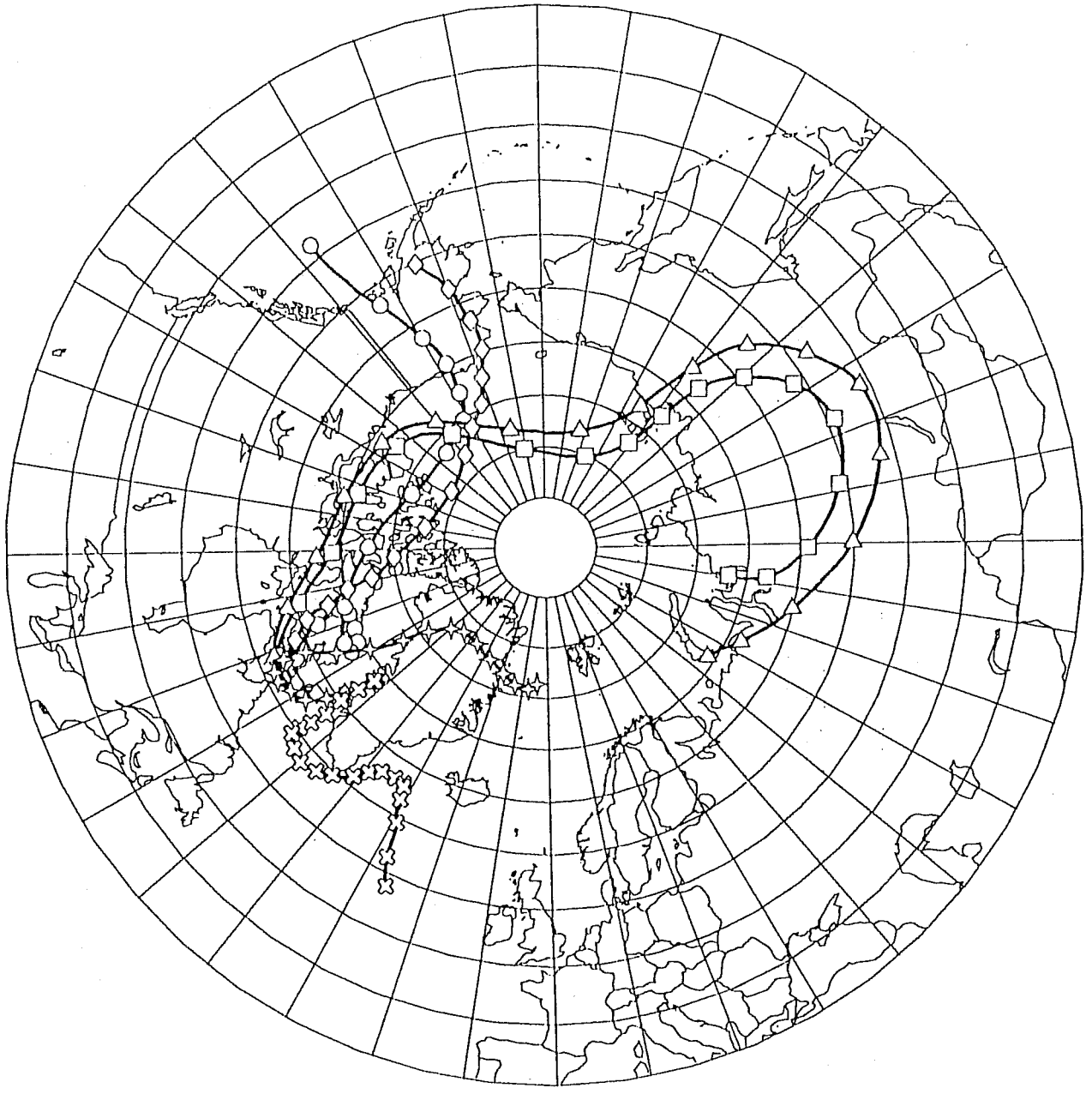
The remote job running at ECMWF are to a large extend data retreival from the MARS archives. This will continue in the future.

Our research department has also run experiments with the HIRLAM model. This has been resting for some time but will probably be resumed in the near future.

The reasearh department has also used the centres computers for calculating trajectories for 6 levels in the stratosphere.
Those calculations were based on initialised analysis and prognosis from the centre. You can se an example of this on the map.
Those calculations are among other thing used in the ozone studies.
They were used in the EASOE campaign in 1991-1992.
Calculation of isentropic potential vorticity were done and used in interpretation of ozone measurements.


CONVEX 3240
CONVEX 3880
ETHERNET
MULTIPORT BRIDGE
SUN
ETHERNET
X25
ROUTER
MIVAX1
MIVAX2
SERVER
GTS
ESWI
PLOTTER
DK BULL
ECMWF
64k.
EKCH
64k.
QMS
SUN
EKKA
64k.
QMS
SUN

DENMARK



DENMARK

ECMWF

TRAJECTORIES

10 days analysis

Hours/mark: 12

(Filled mark if PSC since previous mark)

○ End loc: Egedesminde
Date: 29.Apr.1992 12 UT
Level : 350 K

□ End loc: Egedesminde
Date: 29.Apr.1992 12 UT
Level : 380 K

△ End loc: Egedesminde
Date: 29.Apr.1992 12 UT
Level : 400 K

◇ End loc: Egedesminde
Date: 29.Apr.1992 12 UT
Level : 475 K

✧ End loc: Egedesminde
Date: 29.Apr.1992 12 UT
Level : 550 K

⧖ End loc: Egedesminde
Date: 29.Apr.1992 12 UT
Level : 700 K

Plotted at DMI , MAY 6 1992

12

1. COMPUTER CONFIGURATION AT THE METEOROLOGICAL COMPUTER CENTRE OF THE GERMAN WEATHER SERVICE (DWD) IN OFFENBACH

1.1 Main computers

1.1.1 CRAY Y-MP 4/432 (Operating system UNICOS)

4 CPUs with 256 MBytes memory, cycle speed 6 ns
1 GByte sheared memory
Theoretical maximum speed in one CPU
330 MFlops (vector) and 20 MFlops (scalar)
3 separate I-O-processors (32 MBytes buffer) with
4 * 6 MByte, 3 * 100 MByte and 1 * 1000 MByte
channels for connection with tape units and disks, the CYBERs and the local CDCNET
2 tape units and 14 disks (total 31.2 GBytes)

Used for operational forecasts, plotting of forecast products and research.

1.1.2 CDC CYBER 180-995 (Operating system NOS/VE)

2 CPU with 32 MBytes memory, includes vector processor
Theoretical maximum speed 60 MFlops (vector) and 7.4 MFlops (scalar) each processor
3 tape units and 24 * 611 MBytes disk storage

Used for decoding of incoming data (ASCII or binary), preparation of output products and other operational business.

1.1.3 CDC CYBER 180-860A (Operating system NOS/VE)

1 CPU with 64 MBytes memory, speed 2.6 MFlops
4 tape units and 28 * 611 MBytes disk storage

Stand-by reserve for the CYBER 995, otherwise used for non-operational business like programm developing and other non-real-time business.

1.1.4 STORAGE TEK ACS 4400 with 1.2 TBytes on 18 track cartridges

1.2 Networks

1.2.1 Loosely coupled network (LCN) (50 Mbits/s)

Connects the two CYBERs and the telecommunication computers

1.2.2 CDCNET (10 Mbits/s)

Connects the two CYBERs and the CRAY with terminals, printers and plotters, graphical work stations, satellite data system and external users (via public networks and dedicated lines)

1.3 Special systems

1.3.1 Satellite data system
2 Microvax II (Operating system VMS)

Used for preparation of satellite pictures (from METEOSAT and NOAA), vertical profiles of temperature and humidity (from NOAA).

1.3.2 Interactive graphical system
18 CYBER 910-400 work stations and electrostatic color plotter CalComp 5825

Used for preparation of movies of satellite pictures, significant weather charts and other graphics.

1.3.3 Telecommunication system
Mixed-Interconnect-Cluster of VAX 8550, Microvax II computers and CISCO-Routers

Used for connections to GTS, ECMWF, ESA, national PTT network.

1.3.4 Network Service System
CD 4360 used as host system for domain name service and mail service (will be available until the end of 1992).

2. PRESENT PROJECTS AT ECMWF

Development of a high-resolution limited area model ("Deutschland-Modell")

Co-operation with ECMWF in global modelling

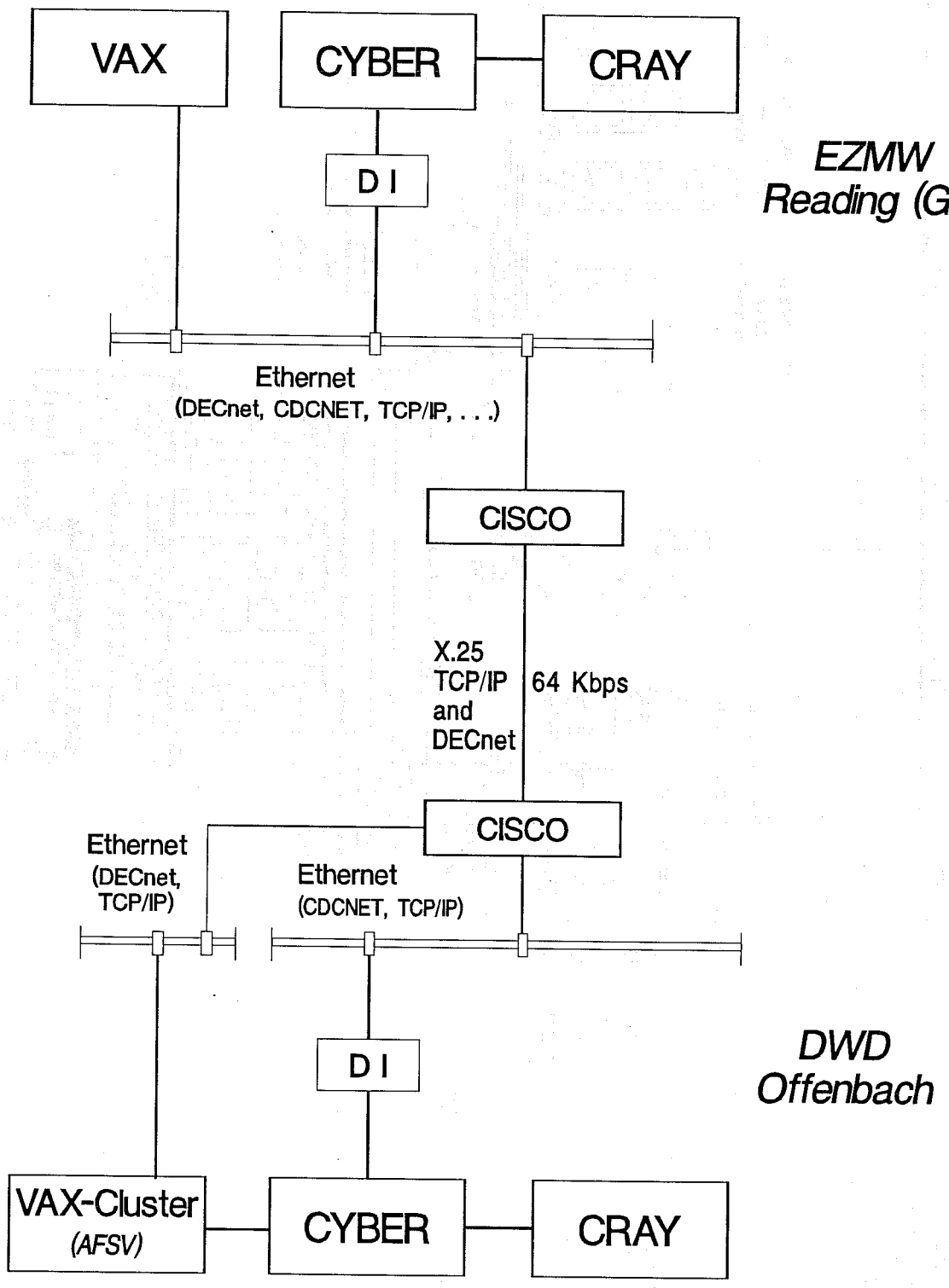
Simulation of regional climate with the "Europa-Modell"

3. PLANS TO USE ECMWF IN FUTURE

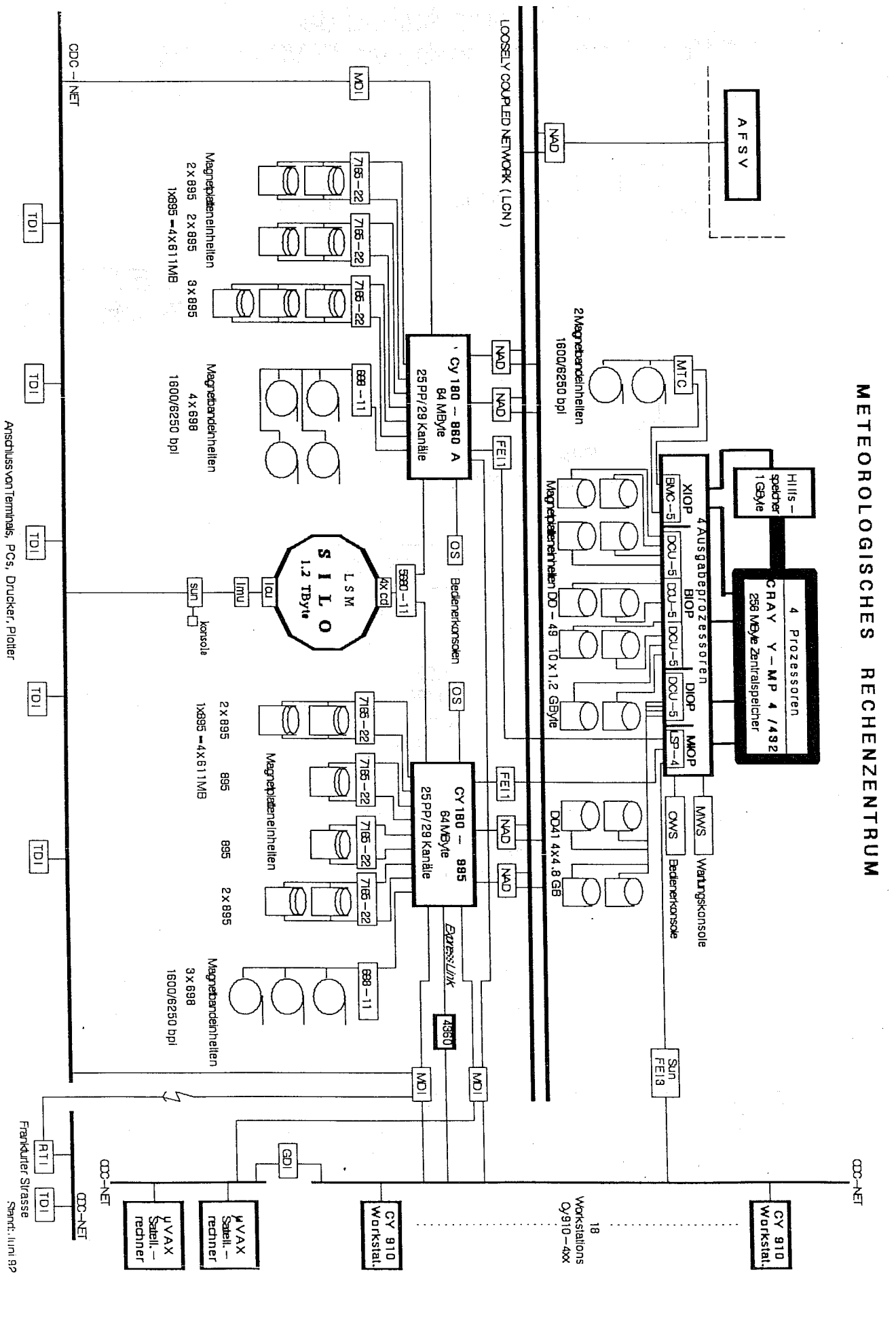
Continuation of present work extended by the project "Development, testing and application of a complex Eulerian air pollution model". Use of the meanwhile upgraded connection between Offenbach and Reading
(64 kbits/s X.25 : TCP/IP and DECnet)

GERMANY

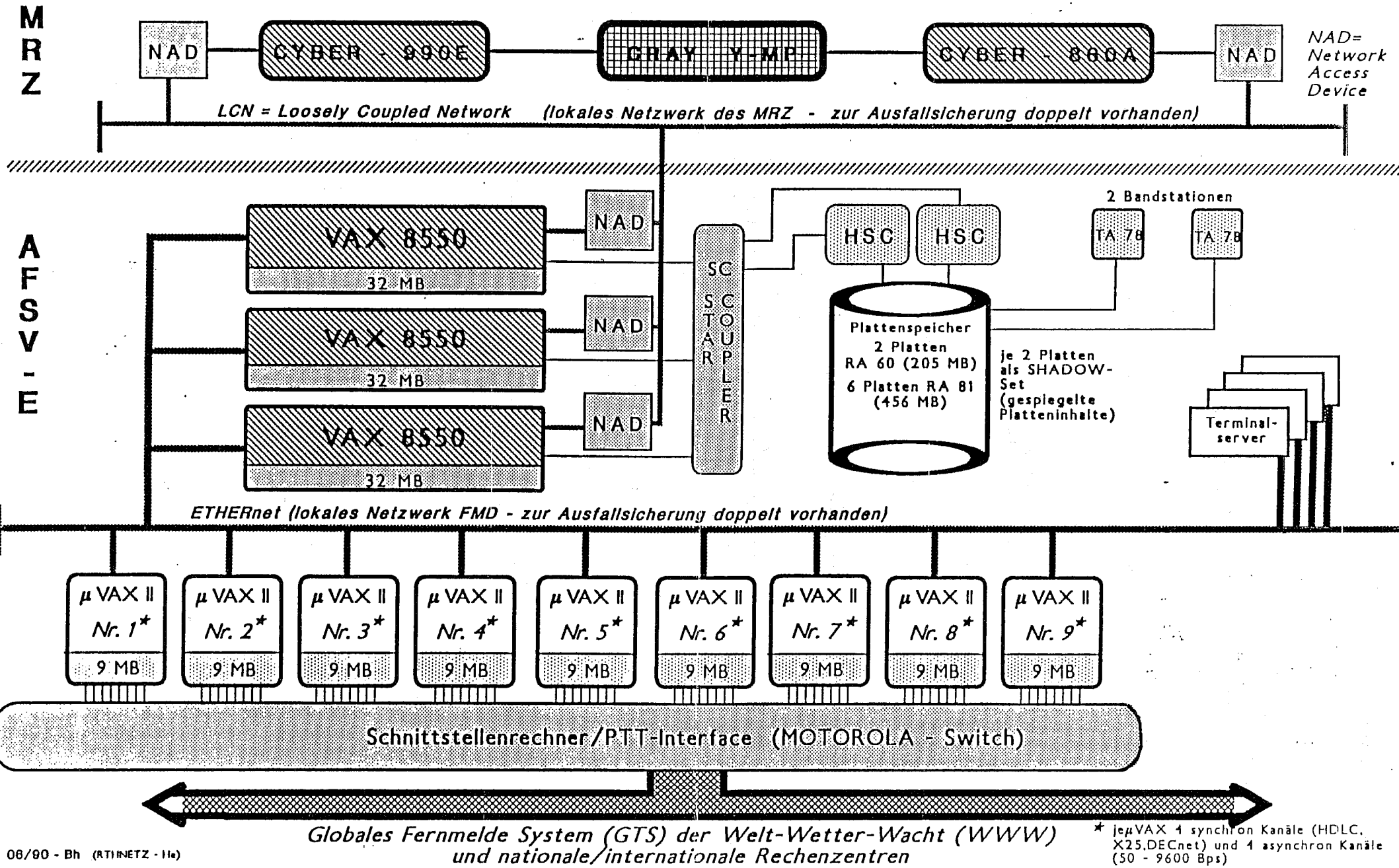
Prinzipieller Aufbau der 64 Kbps-Verbindung zwischen DWD u. EZMW



GERMANY


METEOROLOGISCHES RECHENZENTRUM
AFSV
NAD
LOOSELY COUPLED NETWORK (LCN)
4 Prozessoren
CRAY Y-MP 4/432
256 MByte Zentralspeicher
Hills-speicher 1 GByte
4 Ausgabeprozessoren
XIOP
BMC-5
BIOP
DCU-5
DIOP
MIOP
LSP-4
MTC
2 Magnetbandeinheiten 1600/6250 bpi
Magnetplatteneinheiten DD-48 10 x 1,2 GByte
DD41 4x4,8 GB
MWS
Wartungskonsole
CWS
Bedienerkonsole
Sun FE13
CDC-NET
CY 910 Workstat.
18 Workstations Cy910-4xx
CY 180-880 A
64 MByte
25 PP/29 Kanäle
CY 180-885
64 MByte
25 PP/29 Kanäle
FE11
OS
Bedienerkonsolen
7165-22
888-11
Magnetplatteneinheiten
2x895 2x895 3x895
1x895 = 4x611 MB
Magnetbandeinheiten
4x698
1600/6250 bpi
LSM
SILO
1.2 TByte
4x cdi
880-11
icu
imu
sun
konsole
2x895 895 895 2x895
3x698
ExpressLink
4360
MDI
GDI
TDI
RTI
Frankfurter Strasse
µVAX Satell.-rechner
CY 910 Workstat.
Anschluss von Terminals, PCs, Drucker, Plotter
Stand: Juni 92

RTH OFFENBACH - Telecomm-Centre



Globales Fernmelde System (GTS) der Welt-Wetter-Wacht (WWW) und nationale/internationale Rechenzentren

* je µVAX 1 synchron Kanäle (HDLC, X25,DECnet) und 1 asynchron Kanäle (50 - 9600 Bps)

08/90 - Bh (RTINETZ - He)

17

GERMANY

Questions and comments (Germany)

S. Pasquini: What is the resolution of the Deutschland and Europa models?

B. Barg: The Europa model is 50 km (horizontal), the Deutschland model is 15 km. Both models have 20 (vertical) levels.

S. Pasquini: Is the global model you use the same as the ECMWF global model?

B. Barg: Yes, but with small changes.

S. Pasquini: Have you noticed any differences between the global and Europa models, as they appear to have the same horizontal resolution?

B. Barg: The Europa model has different physical constraints and conditions. Sometimes one is better than the other, but it is usually not easy to decide between them.

B. Bachofner: Have you replaced your Telefunken telecommunication network?

B. Barg: Yes.

J. Juega: Why is your 64 kb/s link split between DECnet and TCI/IP?

B. Barg: Dissemination from ECMWF is still done via DECnet to our VAXes, hence the need for a DECnet link.

Madrid, 25 de Septiembre de 1992

Spanish Report for the VIIth M.S.C.R. Meeting.

1. Computing Environment + Communications

Based on last year's report, (See Tech. Memorandum No.182), only updates to the computing environment, Telecommunications and actual plans will be included this year.

Our data processing center in Madrid has remained basically the same, except for the addition of a UNIX based minicomputer (Fujitsu S1600), and hardware/software tools to include TCP/IP protocols at our mainframe. An Ethernet main trunk (LAN) has been settled linking both to a PC Novell network distributed through the building. An IBM RISC 6000 320 workstation has also been linked for UNIX training and software development (McIDAS).
At our regional centers, LANs have been set up, based on similar S1600s.
Apart from low level climatological applications, this UNIX + TCP/IP based network will serve as 'ice braker' for the transition to open systems philosophy.

As mentioned last year, we are in the decision phase to acquire a vector processor for our LAM and climatological modelling. This will be a UNIX based machine.

A replacement for our Message-Switch system is also being procured. It will adhere to the conectivity requirements of the Open Systems Architecture.

The figure depicts the final configuration, after replacement of our mainframe for a somehow more compact interactive server that could share the SAIDAS (McIDAS) load.

2. Use of ECMWF computing resources.

Our link to ECMWF still runs the classic ECNET L2 protocols, and the plans to complement the link with an additional TCP/IP line have not materialized yet. The original intentions when requesting this extra line, were to access interactively to available functions not operational at the L2 interface. Adapting to TCP/IP and setting up LANs at our institute have consumed most efforts and resources. It is now intended to execute the original plans, and a date inside the first quarter of 1993 is being contemplated.

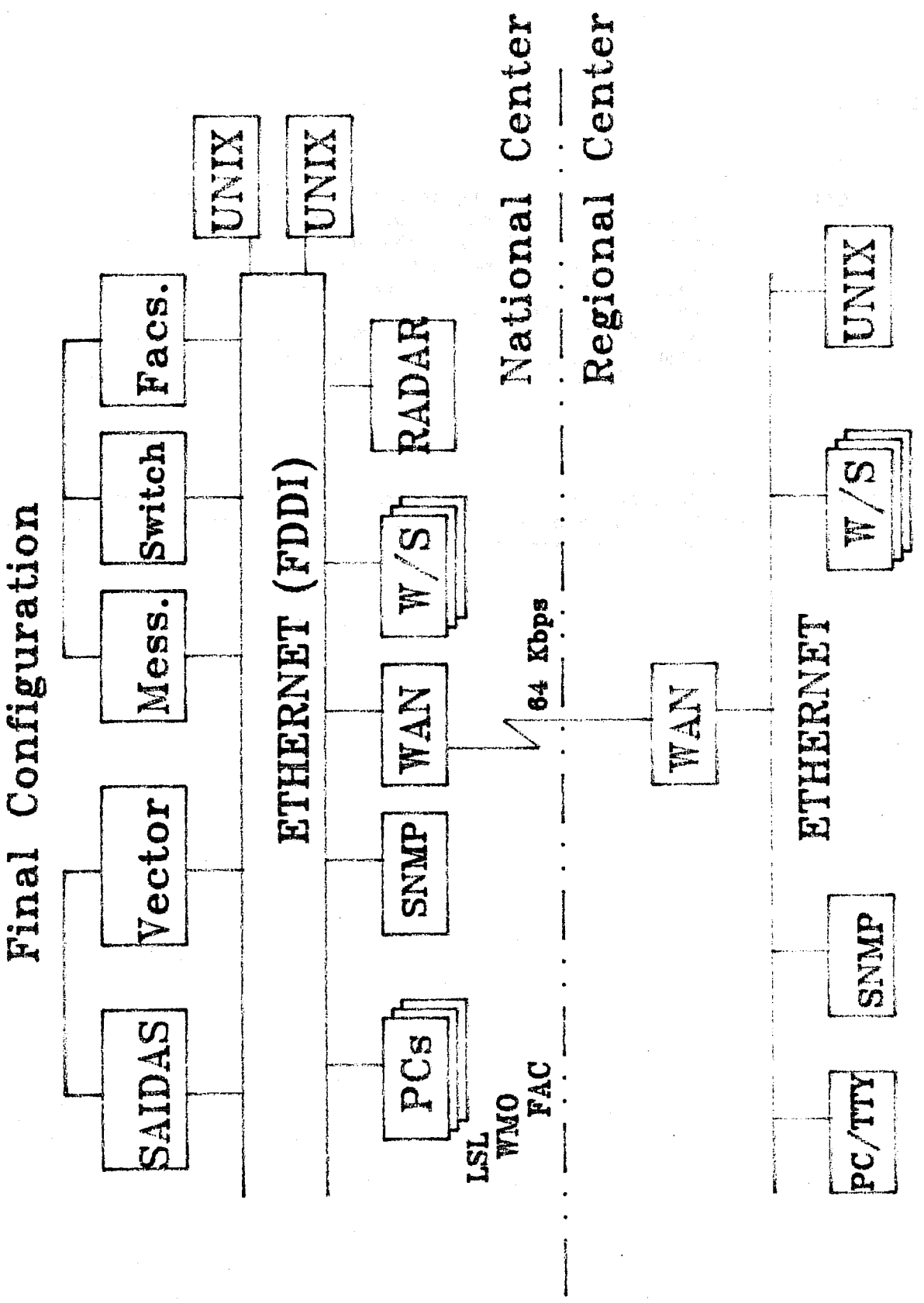
Use of MARS has been made rutinely for retrieval of experimental fields for our numerical forecasting staff. MARS, Trajectory Model and related databases use has covered the meteorological support of other proyects like the Olimpic Games at Barcelona and the Vth centennial cellebration. A study on the error statistics of upper air sounding stations, has made use of software tools available at ECMWF. Extraction of a subarea of the orography data was made. Familiarization with the IFS model (T21) was possible and a few runs attempted. HIRLAM 2 source code for benchmarking use was

obtained from SMHI, and initial exploration has started using ECFILE as storage area. The automatic job submission was tested and checked for operational use. User Support service for these and other matters was always prompt and efficient.

3. Future Plans.

Depending on the timing of our actual contracting activities, it will be necessary to make an increasing use of ECMWF resources next year. Our numerical forecasting office will need to experience with the use of the HIRLAM code, and the climate modelling group, which has already gained contact with available models at ECMWF, will also start phased runs at the CRAY computer. If TCP/IP access is still not available at the time on our side, we can anticipate a need of NOS/VE service for our staff at ECMWF headquarters.

SPAIN


Final Configuration
SAIDAS
Vector
Mess.
Switch
Facs.
UNIX
UNIX
ETHERNET (FDDI)
PCs
SNMP
WAN
W/S
RADAR
LSL
WMO
FAC
64 Kbps
National Center
Regional Center
WAN
ETHERNET
PC/TTY
SNMP
W/S
UNIX

Questions and comments (Spain)

S. Pasquini: What might replace your present message switching system?

J. Juega: Currently we have three contract ITTs going on. The first is for a message switch, the second for the network, the third for the vector processing mainframe. The problem is some of the later ones have been "attached" to the first one, that is some of the bids for the later ITTs have included equipment for the first ITT. We have three reasonable offers, one from Digital and Global Weather Dynamics, another from a company selling the same software that Austria has installed. We have not yet made a decision.

R. Vanlierde: Just one comment. Belgium also entered the transatlantic balloon race, and we won. The winner said it was in part due to the good forecast which we supplied from ECMWF data.

GREECE

HELLENIC NATIONAL METEOROLOGICAL SERVICE (H.N.M.S.)

COMPUTER CONFIGURATION

A. PRESENT STATUS

1) Mainframe.

The H.N.M.S. uses as a mainframe a CYBER 170/825 of 262 Kwords main memory. The total available on-line disk storage is 6 GBytes. There are also connected two tape units , a central printer , an on-line plotter CALCOMP 1070 and 20 terminals.

Operating system	:	NOS 2.1
Compilers	:	FORTRAN 77

Main tasks for the mainframe are:

a. To carry out the connection to E.C.M.W.F. (X.25 protocol level 2 ,9600 bps.)
b. To plott the observations and to do the contouring of E.C.M.W.F. products. (By the on-line plotter or by a grapgical display TECTRONICS 4010 and a serial graphics printer.)
c. To archive our national observations.
d. To run scientific programs.

2) Telecommunication system.(CIRRUS)

The s/w for the telecommunication has been developed in the Hellenic Met.office.The h/w which has been used consists of:
Two ALTOS 486 micro computers of 32 Mbytes and two of 16 MBytes main memory. Each one has also 440 MBytes disk space.

Operating system	:	UNIX system 5
Compilers	:	C
Data base	:	Informix

The operational Message Switching System is supported by two micros while the other two consist the buck up system.
On the GTS circuit,Athens is in the middle of the line from Rome to Sofia. For the connection to Rome we use X.25 standard protocol while for the connection to Sofia the WMO protocol is used. Very soon our connection to Sofia will be done by the X.25 standard protocol.
64 lines are dedicated to the national network. (Airports and weather stations.) Finally, 9 terminals are connected with the back-up system for the needs of development.

3) Network of automatic weather stations.(A.W.S.)

Three months ago 13 automatic weather stations were installed. All of them are in operation and through VHF we get their observations in the Met. office of Athens. The collection of the observations and partly the control of A.W.S. is carried out by a central unit.

4) W/s for Hydrological data base.

A month ago through an E.E.C. project we got an HP APOLLO 9000/730 w/s which we are going to use for establishing a data base of meteorological data using INGRES DBMS.

B. MAIN PROJECTS USING E.C.M.W.F. COMPUTERS

We use the computers of E.C.M.W.F. in two cases:
1) To run a Trajectory Model.
2) For MARS retrieval.

C. FUTURE PLANS

1) A w/s , within the next few months , will take over the connection with the E.C.M.W.F. We are going to establish TCP/IP over X.25 protocol at medium speed line . This w/s will also carry out the graphics.

2) A new L.A.N will connect together all our computers i.e the two w/s , the telecommunication system , the central unit of A.W.S and , in the future , our new mainframe.

3) A new mainframe , in UNIX environment , will replace our old one CYBER 170/825.This computer will be dedicated to scientific projects.

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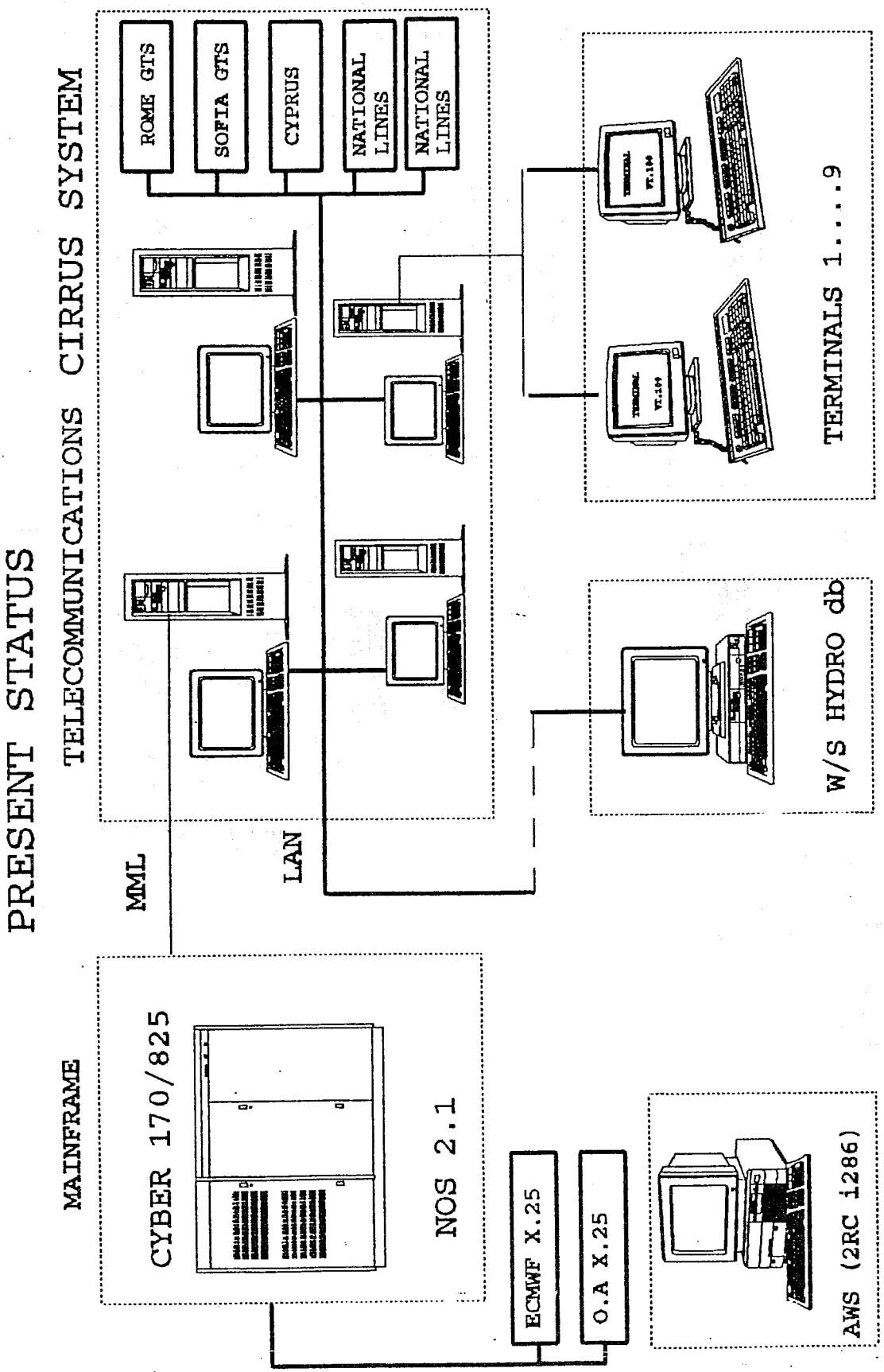
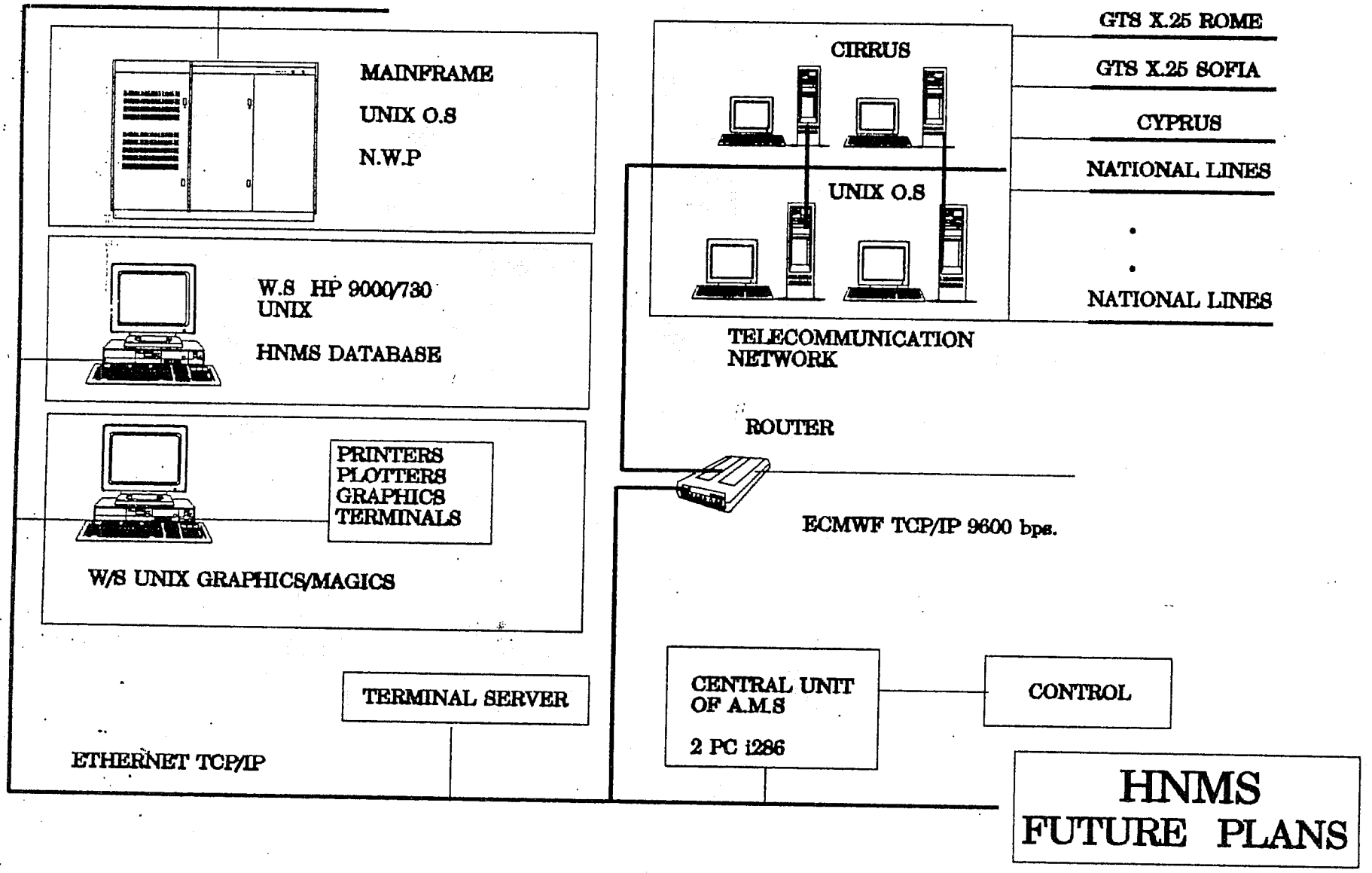
GREECE


PRESENT STATUS
TELECOMMUNICATIONS CIRRUS SYSTEM
ROME GTS
SOFIA GTS
CYPRUS
NATIONAL LINES
NATIONAL LINES
MML
LAN
TERMINALS 1....9
W/S HYDRO db
MAINFRAME
CYBER 170/825
NOS 2.1
ECMWF X.25
O.A X.25
AWS (2RC i286)



HNMS
FUTURE PLANS

Questions and comments (Greece)

S. Pasquini: How do you collect the data from your automatic weather stations?

X. Giannakos: We have repeaters with VHF links. There were some problems in the beginning, now things are getting better. We are going to buy more automatic weather stations, and we are studying several other ways to collect the data, e.g. using satellites to improve reliability.

IRELAND

Irish Meteorological Service

1. Computer configuration

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

The VAX cluster, comprising two VAX 4000/200's and a MicroVAX 3100, handles communications and data pre-processing. The Numerical Weather Prediction suite and graphical services are run on a DEC 2060, and will shortly be transferred to a MIPS R-4000 workstation. The MIPS R-3000 workstation is used for development work. Radar data is processed on a VAXserver 3300 and displayed on a series of VAXstation 3100 workstations.

The climatological database system comprises a DECsystem 5000/200 server machine and several Decstation 5000/120 client workstations. These are connected over thin-wire Ethernet and further connected by means of a bridge to the main Ethernet cable. The bridge is an active device which can differentiate between traffic which is local to either side of the network and traffic which needs to be forwarded.

A series of PC's is similarly connected over thin-wire Ethernet.

Both DECnet and TCP/IP protocols are used over the network.

The connection to ECMWF is a 9600 baud link via an X25 Router.

2. Use of ECMWF Computers

Among the main uses of the ECMWF computer system are operational running of a trajectory model and data retrieval from the MARS archive in support of a number of operational and research projects (eg HIRLAM). A significant fraction of our computer allocation is now committed to the ocean wave and 00 UTC forecast projects.

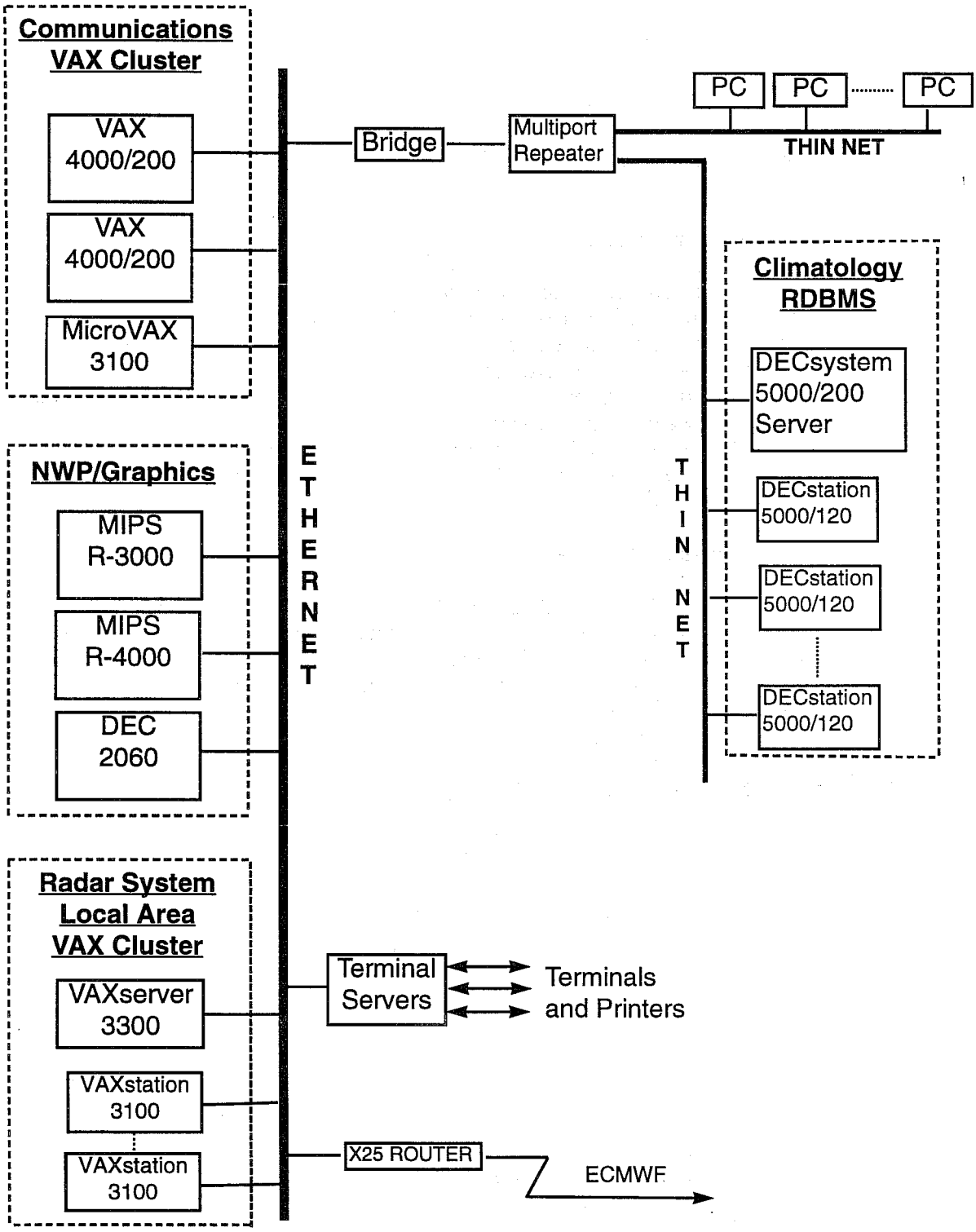
The recently-introduced facility to enable user passwords to be changed by the member-state computing representative has proved useful.

3. Future Plans

1. At present, ECMWF dissemination products are received operationally in ECBIT code, and a second test dissemination of the same products is received in GRIB code. During 1993 we intend to transfer the operational product dissemination to GRIB code.

2. In conjunction with the development of the HIRLAM project we anticipate an increased requirement for analysis and forecast fields at model resolution. It may become necessary to consider increasing the capacity of the communications link between Ireland and the Centre.

Irish Meteorological Service
Computer Configuration



September 1992

Fig. 1

ITALIAN METEOROLOGICAL SERVICE

Computing representative: S. Pasquini.

I. Computer equipment and ECMWF connection.

The main components of the central computer system are shown in figures 1 and 2. From a functional point of view it can be divided in the following areas.

A. Front-end area.

It handles the telecommunications concerning both the WMO/GTS circuits and the ICAO (MOTNE, AFTN) networks. It is based on two IBM S/1 minicomputers, one operational the other in standby. The system is able of an automatic switchover in case of failure. The software has been developed by IBM. Because of the IBM S/1 computing power limitations some links are now handled by DEC systems (Bracknell ecc...).

B. Host area.

The IBM 3090 12 E (O.S.: MVS/XA) performs the operational work concerning the analisys and forecast model, post processing, graphical applications and meteorological database.
The IBM 4381 P13 provides interactive services and it is used for research&development and as back-up.
There is an procurement action aimed to upgrade the IBM 3090 to an IBM 9021-500.

C. Back-end area.

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

D. ECMWF area.

It is based on various Vax systems and, at the moment, it handles the 64 kbps link based on DECNET/NTS software and Cisco routers. Moreover the vax systems handle a PSS connection with the Italian Public Switched Data Network called ITAPAC

and the links with the computer networks of national agencies (CNR, Worldlab, Enea, MAF) to allow the access to the ECMWF computer systems by remote users. In the future the Vaxs will be used to support the message switching software developed by DEC/GWDI in order to replace the IBM S/1 computers. The 64 kbps link is also used as back-up of the ERS-1 data transmission to ECMWF.

E. MDD area.

It deals with the dissemination of meteorological data via the Meteosat satellite mainly to African and Middle East countries.

F. Satellite area.

It deals with the reception of data and images from the meteorological satellites Meteosat and NOAA. Moreover the computer system, based on two microvax 3800, provides image animation and TOVS retrieval (fig.3).

II. Projects, experience and plans.

The main usage of ECMWF services has been the access of MARS data. Some user has asked for a more friendly interface in preparing the jobs for MARS; some other has found difficulties in the degribbing process and setting the output format. This should probably be more important for remote users without the direct ECMWF staff support.

The current projects are:

1. DIAGNOSTIC STUDIES
2. WAVE MODELLING
3. MESOSCALE MODELLING
4. POSTPROCESSING

The number of ECMWF remote users will probably increase according with the new links established with the national agencies and the data traffic should also increase as soon as the 00Z run will be operational.

ITALY

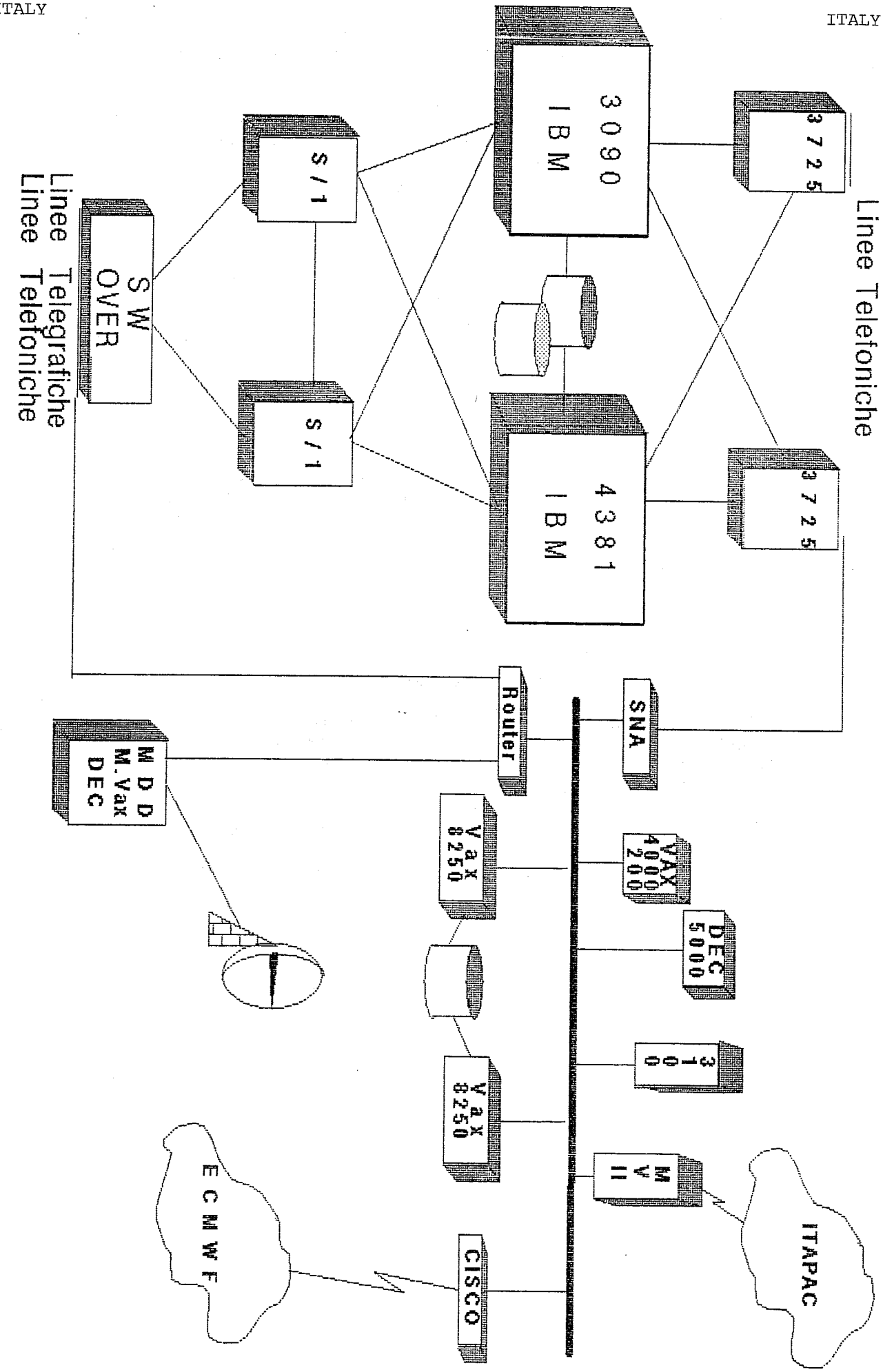

3090 IBM
3725
S/1
S/1
SW OVER
Linee Telegrafiche
Linee Telefoniche
4381 IBM
3725
Linee Telefoniche
Router
SNA
MDD M.Vax DEC
Vax 8250
VAX 4000 200
DEC 5000
3100
Vax 8250
MVII
ECMWF
CISCO
ITAPAC

Fig 1.

ITALY

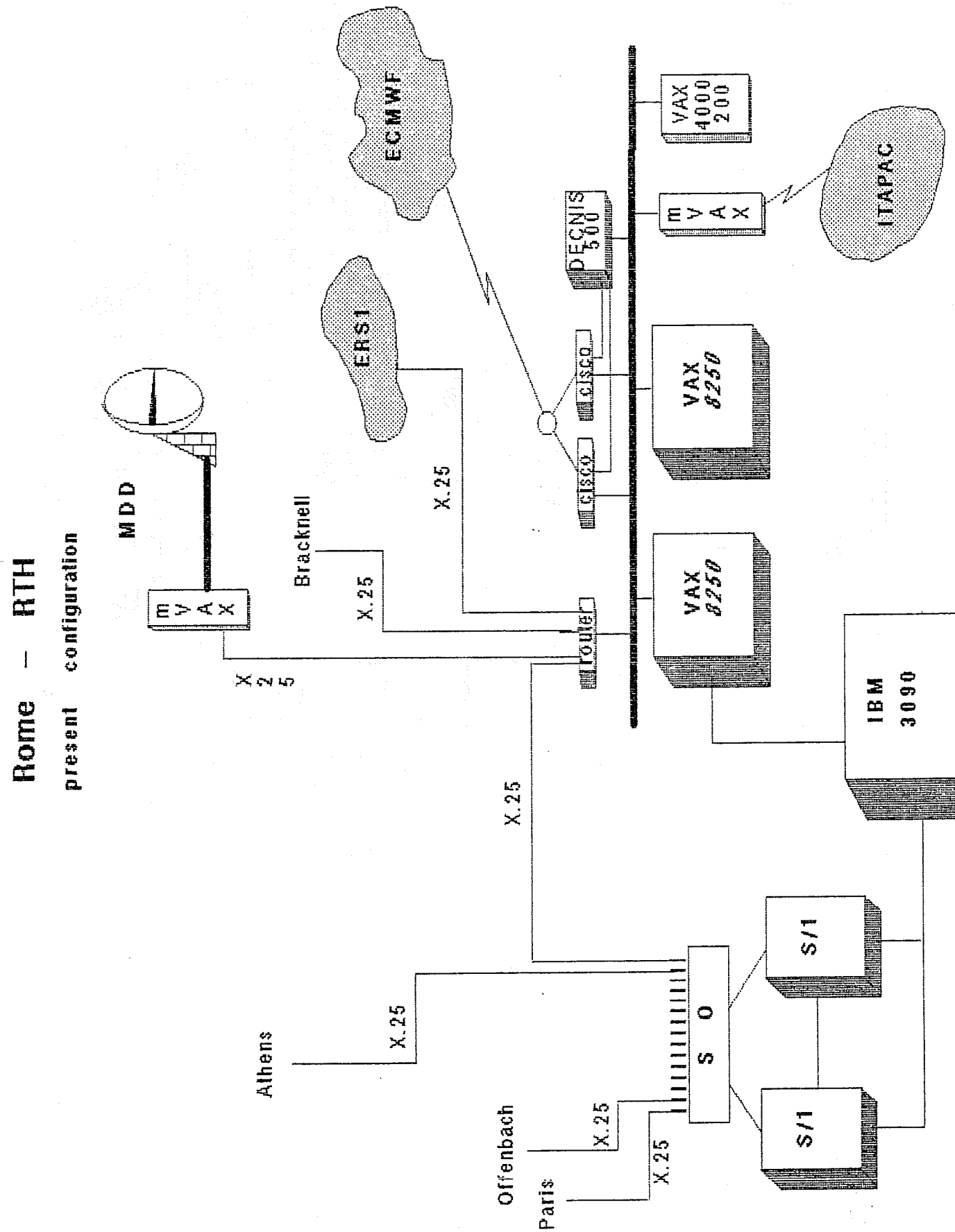

Rome – RTH
present configuration
MDD
mVAX
X25
Bracknell
X.25
ERS1
X.25
ECMWF
router
CISCO
CISCO
DECNIS 500
VAX 4000 200
mVAX
ITAPAC
VAX 6250
VAX 6250
IBM 3090
X.25
Athens
X.25
SO
S/1
S/1
Offenbach
X.25
Paris
X.25

fig. 2

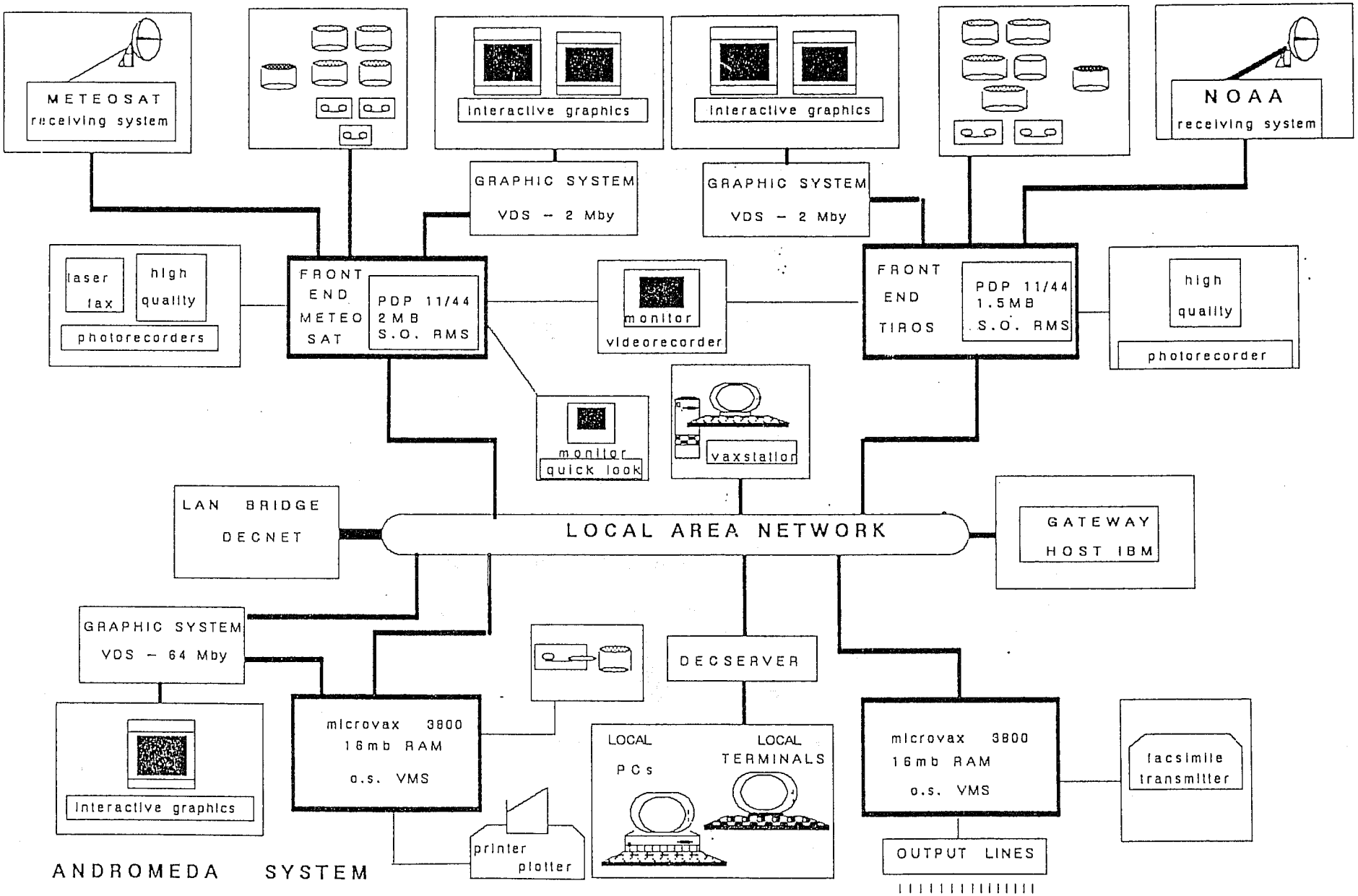

METEOSAT
receiving system
Interactive graphics
Interactive graphics
NOAA
receiving system
GRAPHIC SYSTEM
VDS – 2 Mby
GRAPHIC SYSTEM
VDS – 2 Mby
laser
fax
high
quality
photorecorders
FRONT
END
METEO
SAT
PDP 11/44
2 MB
S.O. RMS
monitor
videorecorder
FRONT
END
TIROS
PDP 11/44
1.5MB
S.O. RMS
high
quality
photorecorder
monitor
quick look
vaxstation
LAN BRIDGE
DECNET
LOCAL AREA NETWORK
GATEWAY
HOST IBM
GRAPHIC SYSTEM
VDS – 64 Mby
DECSERVER
microvax 3800
16mb RAM
o.s. VMS
LOCAL
PCs
LOCAL
TERMINALS
microvax 3800
16mb RAM
o.s. VMS
facsimile
transmitter
Interactive graphics
printer
plotter
OUTPUT LINES
ANDROMEDA SYSTEM

fig. 3

Questions and comments (Italy)

S. Orrhagen: Do you get processed ERS-1 data from ESA or do you have some sort of down link?

S. Pasquini: We receive from ESA buffered WMO messages, and we distribute them following GTS procedures. We get them from ESA in the same format as we distribute them.

B. Barg: Institutes in your country have access to ECMWF, is that direct or via your Met. Office?

S. Pasquini: They access ECMWF via the Met. Office in Rome.

J. Greenaway: Why have you moved your headquarters?

S. Pasquini: This move was dictated by the government in order to reduce costs.

NETHERLANDS

MEMBER STATE COMPUTER REPRESENTATIVES MEETING

28-30 September 1992

The Netherlands

1. Local computer equipment.

In figure 1 a simplified layout of the computer network used in the Dutch service is given. This network has four main segments:

- PROD-LAN
  all systems used in the weather offices and the links to the other main offices (Schiphol and Hydro Meteo Rijnmond) are connected to this segment
- DEV-LAN
  this segment serves all systems in use at the research department
- MIX-LAN
  this segment connects the "main frames" two UNISYS-A6, a CONVEX-220 and a CONVEX-210 (replacement of the CONVEX-XP)
- COM-LAN
  on this segment most of our external communication, like SURFNET, DN1 and so on, is concentrated. Recently two CISCO routers were connected to this segment one serving SURFNET (an academic network) the other one serving the recently installed 64 kBit connection to ECMWF.

2. Connection to ECMWF.

As said recently a 64 kBit connection was installed. On this connection two protocols are used TCP/IP and X25. The X25 still serves the DECNET connection for the dissemination of the operational products and for the remote job entry service through the RQS system. TCP/IP is used for a new service: a direct connection between the CONVEX-220 and the ECMWF-systems allowing iteractive work with TELNET and FTP. Up to now our experience with this new service is very good.

The local handling of dissemination files, described in the report on the sixth meeting will be changed in the next few month. In the new handling scheme files containing GRIB will be routed directly to the CONVEX-210 and inserted in a so-called ASIMOF file. This first records of such an ASIMOF file contain keys and pointers to the different GRIB-products. No headers and/or envelopes will be needed and each GRIB product will be accepted.

3. Projects run at ECMWF.

In 1991 we used about 25% of the account assigned to the Dutch service was used. In 1992 we expect to use about the same amount. The Dutch accounts with a high usage in 1992 are:

Account	Usage	Short description
NLDMLAM	4300	System management of HIRLAM
NLDMWGAC	890	Modelling of atmospheric blocking
NLOOEDDY	3000	Eddy heat transport in the ocean
NLGLOMAC	3300	EUROTRAC, Ozone transport
NLDMARCH	500	Retrieval of archived data

The total use on September 14 was 12000 units out of a total account of 68000.

In the coming years we expect to use about 25% of our account in the Optional Programs: Global Wave Model and 00 UTC run.

4. Experience and plans.

Mostly the users are satisfied with the services offered by ECMWF. The main complaint of all users is the large variation in the turn around time of similar jobs.

Currently there are no specific plans for new projects involving substantial computer resources at ECMWF.

NETHERLANDS

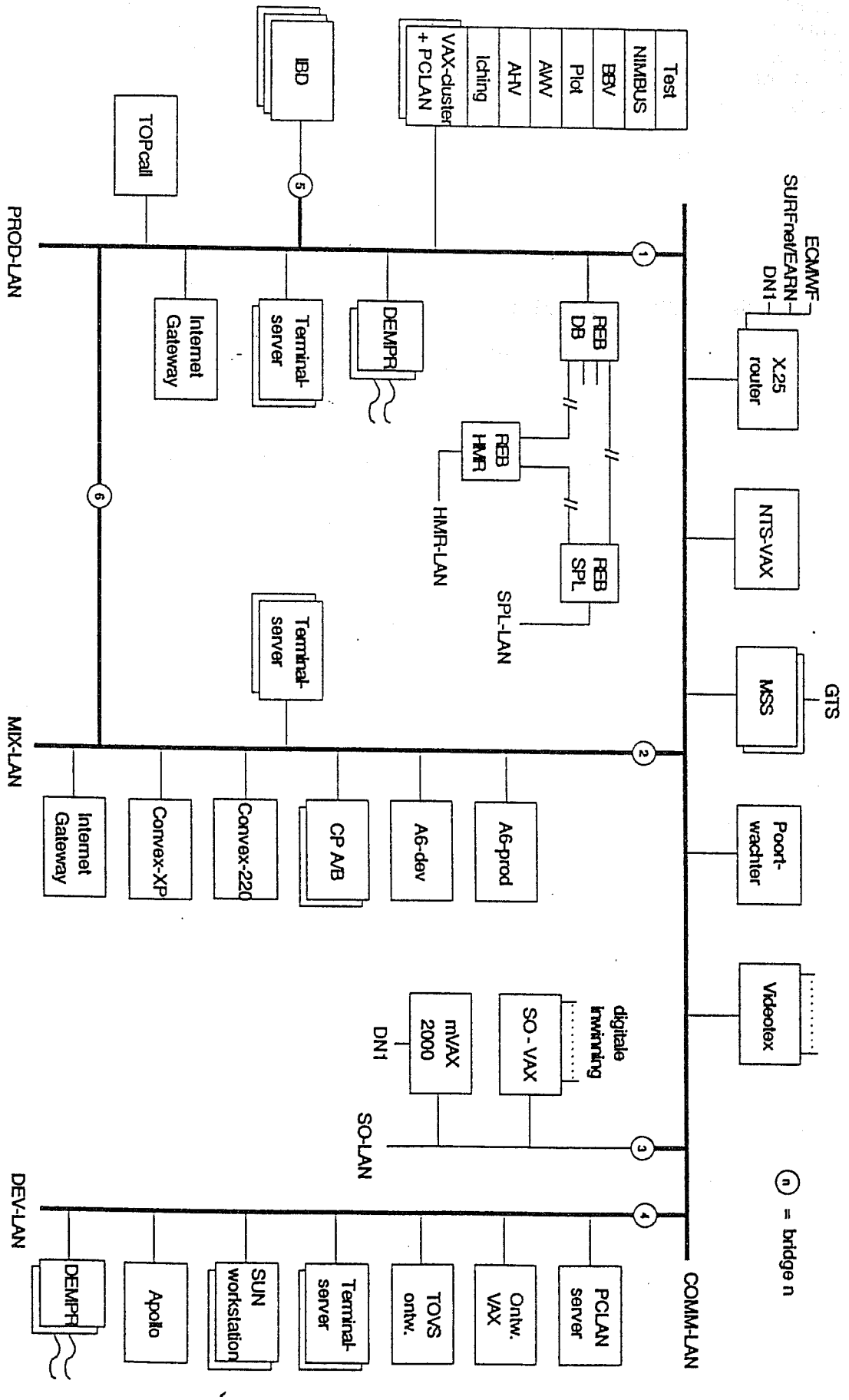


Figure 1. Computer equipment and network at KNMI.

Rebecca Rudsar
DNMI, Oslo, Norway September 1992

THE COMPUTING ENVIRONMENT AT DNMI

Computer Resources

Computers :

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

IBM 9370 model 90
- memory 16 Mbyte
- disk storage capacity 5 Gbyte

Silicon Graphics 4D/420
- 2 CPU's
- memory 128 Mbyte
- disk storage capacity 13.8 Gbyte

Silicon Graphics 4D/320
- 2 CPU's
- memory 64 Mbyte
- disk storage capacity 4.6 Gbyte

VAX4000-200
- memory 16 Mbyte
- disk storage capacity 1.35 Gbyte

VAX3300
- memory 20 Mbyte
- disk storage capacity 570 Mbyte

VAX4000-300
- memory 32 MBYTE
- disk storage capacity 2.85 Gbyte

Norsk Data (NORD) * 10
- total online disk storage capacity approx. 4.5 Gbyte (interchangeable disks)

Norsk Data (NORD) * 2
- situated at the forecasting departments at Bergen and Tromsoe.

Workstations * 36
- Silicon Graphics, Sun SPARC station, IBM RS6000, VAX3100, IVAS(I2S)

Terminals / PCs
- approx. 220

Networks :

Cosmos
- connecting NORD computers

Hyperchannel
- connecting IBM 9370 and a NORD computer.

Ethernet
- connecting all computers (except NORD) and several workstations and PCs.

Graphical Devices :

- Versatec electrostatic plotters
- Hewlett Packard pen plotters
- Laser printers

The Tandem ext10 computer was upgraded to a Tandem CLX820 in October 1991.
It has a dual CPU and mirrored disk system and manages the communication for data acquisition and routing of observations.
Two PS/2 computers, with the AIX operating system, are used to extend the communication capabilities of the CLX.
Observation data is at present transferred to a NORD computer for decoding and further processing.

VAX4000-200 has newly been installed and is used for communication with ECMWF. The telecommunication link has a speed of 9600 bps.
This computer will also be 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 will be connected to the radar unit, which is being moved to a new situation, and will be used for communication to the VAX4000-200.

VAX4000-300, to be installed in the near future, is an upgrade for the MISAT satellite system.

The IBM 9370 is connected via the University network to a CRAY YMP/464 situated at Trondheim. The CRAY YMP has 4 processers, 64 MWord memory and 64 Gbyte of mass storage. The telecommunication line has a theoretical speed of 2 Mbps. The TCP/IP protocol is used for data transfer.

The two Silicon Graphics Power Center Servers were installed in July and December 1991. Oracle database software is installed on the 4D/420. The design and implementation of the historical and online databases is progressing.
The 4D/420 and 4D/320 have a disk cabinet consisting of two racks, with a total of 16 Gbytes of storage. The two racks can be switched between the two computers. This was intended as a possible form of backup if the database computer 4D/420 should fail but this function has not yet been tested.

The NORD computers are the oldest part of the system and are gradually being replaced. Hyperchannel is still used for communication between the NORD computers and IBM, this will be replaced by TCP/IP within the next two momths.

All data products have previously been distributed to the forecasting centres at Bergen and Tromsoe, and to the airports via the Cosmos network. Routers have now been installed at Bergen and Tromsoe and the distribution process will use the TCP/IP protocol.

The Norwegian Limited Area Model for Numerical Weather Prediction has been run on the CRAY since May 1990. The Maritime Prediction models for ocean waves and storm surge are also run on the Cray-YMP as part of the operational suite. Experimental models, both atmospheric and maritime, are run in a quasi-operational suite.
All pre- and post- processing is at present performed on the IBM 9370.

It is DNMI's policy to move to the Unix operating system where possible. During 1992 there have been held a number of courses on Unix and Shellscript and a lot of effort has been put into increasing the level of competance in Unix.
Copies of ECMWF's decoding programs have been obtained and some work has been done on converting these programs to run under Unix. However, a fair amount of work still remains to be done and testing of data throughput has not begun.

The pre- and post processing for the model runs, the distribution system and applications will gradually be moved to a Unix platform.

ECMWF Products

Disseminated data from the operational forecast model and the global wave model are recieved from ECMWF. This data amounts to approx. 8 Mbyte. The data is transferred to a Unix computer and to the IBM.

Dissemination data received from ECMWF is, at present, 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.

NORWAY

The data is also used

1) for general forecasting by the forecasting department.

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

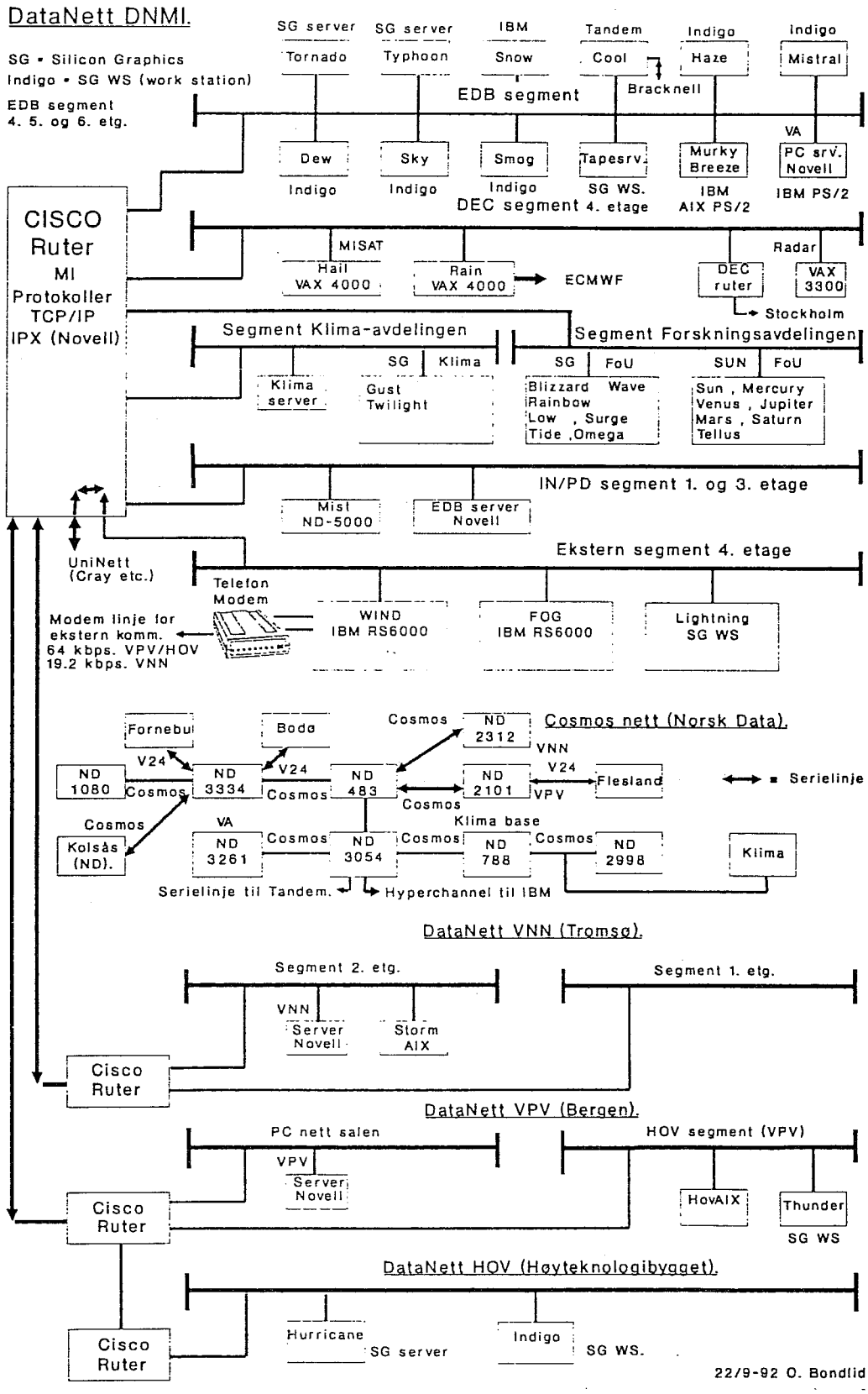
3) as backup for the Norwegian limited area models.

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

5) Norway was involved in the European Arctic Stratospheric Ozone Experiment during the period November 1991 to March 1992. During this period data was regularly received from ECMWF and transferred to the Norwegian Institute for Air Research. Some of this data is still transferred on a regular basis.

Planned Projects at ECMWF

Norway is a member of the HIRLAM project. Programs and data are transferred to DNMI and experiments are run on the Cray at Trondheim The results of these experiments are exchanged via the official HIRLAM libraries at ECMWF.
DNMI is involved in the development of a non-hydrostatic fine resolution model.


DataNett DNMI.
SG = Silicon Graphics
Indigo = SG WS (work station)
EDB segment
4. 5. og 6. etg.
SG server
Tornado
SG server
Typhoon
IBM
Snow
Tandem
Cool
Indigo
Haze
Indigo
Mistral
EDB segment
Bracknell
Dew
Indigo
Sky
Indigo
Smog
Indigo
Tapesrv.
SG WS.
Murky
Breeze
IBM
AIX PS/2
VA
PC srv.
Novell
IBM PS/2
DEC segment 4. etage
CISCO
Ruter
MI
Protokoller
TCP/IP
IPX (Novell)
MISAT
Hail
VAX 4000
Rain
VAX 4000
ECMWF
Radar
DEC
ruter
VAX
3300
Stockholm
Segment Klima-avdelingen
Segment Forskningsavdelingen
SG
Klima
Klima
server
Gust
Twilight
SG
FoU
Blizzard
Wave
Rainbow
Low , Surge
Tide ,Omega
SUN
FoU
Sun , Mercury
Venus , Jupiter
Mars , Saturn
Tellus
IN/PD segment 1. og 3. etage
Mist
ND-5000
EDB server
Novell
Ekstern segment 4. etage
UniNett
(Cray etc.)
Telefon
Modem
Modem linje for
ekstern komm.
64 kbps. VPV/HOV
19.2 kbps. VNN
WIND
IBM RS6000
FOG
IBM RS6000
Lightning
SG WS
Cosmos nett (Norsk Data).
Fornebu
Bodø
Cosmos
ND
2312
VNN
V24
ND
1080
Cosmos
ND
3334
V24
Cosmos
ND
483
Cosmos
ND
2101
V24
VPV
Flesland
Serielinje
Cosmos
Kolsås
(ND).
VA
ND
3261
Cosmos
ND
3054
Cosmos
Klima base
ND
788
Cosmos
ND
2998
Klima
Serielinje til Tandem.
Hyperchannel til IBM
DataNett VNN (Tromsø).
Segment 2. etg.
Segment 1. etg.
VNN
Server
Novell
Storm
AIX
Cisco
Ruter
DataNett VPV (Bergen).
PC nett salen
HOV segment (VPV)
VPV
Server
Novell
HovAIX
Thunder
SG WS
Cisco
Ruter
DataNett HOV (Høyteknologibygget).
Hurricane
SG server
Indigo
SG WS.
Cisco
Ruter
22/9-92 O. Bondlid

NORWAY

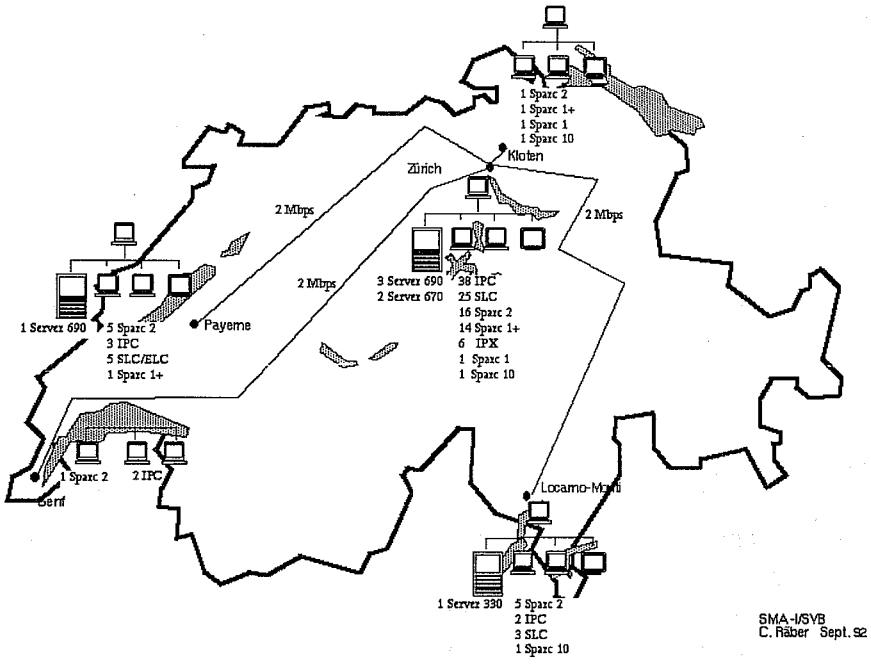
Questions and comments (Norway)

A. Lea: Do you have any idea yet what you might replace your IBM with?

R. Rudsar: We may move the current projects off the IBM to other existing machines, and then perhaps buy a backup for those machines. The Institute is definitely moving to UNIX though, we just do not have the staff to support different operating systems.

Swiss Meteorological Institute
B. Bachofner
Member States Computing Representatives' Meeting, September 28 - 30, 1992

SUN NETWORK CONFIGURATION



1. Computer equipment

The six years old Siemens Meteor system has to be replaced until 1995. The function will be taken over gradually by individual UNIX-systems. Each staff-member has his own SUN-workstation, which serves as a multifunctional work environment. Office automation with word-processor and spread-sheet can be applied as well as technical-scientific and graphical applications.
2 Mbps-links have been installed at our annex-Institutes, Locarno, Payerne, Geneva and Kloten. The LAN's are connected by CISCO-Router. Three SUN Sparc 690 MP function as servers for central data, data bank and back-up.
All communication functions for MOTNE, WMO, AFTN, X25 and our automatic weather station network, are connected by the new system of Netsys. The frontend is served by two SUN Sparc 670. All systems are connected by Ethernet 10Base5 (later FDDI/Hippi).
For the wind measuring network two VAX 3400 are in operation, which are periodically connect the 40 measurementstations.
To receive Meteosat, NOAA and radar-pictures, we have planned to install systems with Sparc 10. The pictures will be transferred by WAN and will be visible on all SUN-workstations.
Connections to ECMWF, SLF (Snow and avalanche research) NAZ (Nationale Alarmzentrale) and ETH (Federal Institute of Technology) are made over CISCO-Router (external). SMI has financed a CRAY CPU at the ETH in order to run the numerical models twice a day.

2. Connection to ECMWF

At present a 9600 bps line and a 64 kbps line exist to ECMWF. Dissemination-files are transferred to Meteor over the slow line. Remote jobs run also via Meteor to ECMWF. The 64 kbps line is in

operation since one month. The line runs via CISCO-Router. The dissemination files will be transferd periodically via TCP/IP filetransfer to GTS1 and 2. From there on they can be visualized on SUN-workstations with Micromagics and Magics. The interactive access to UNICOS, VE and Grafix is made possible by telnet. Thanks to the fine cooperation of the ECMWF-staff, the lines could go into operation without any major problems.

3. Projects run at ECMWF

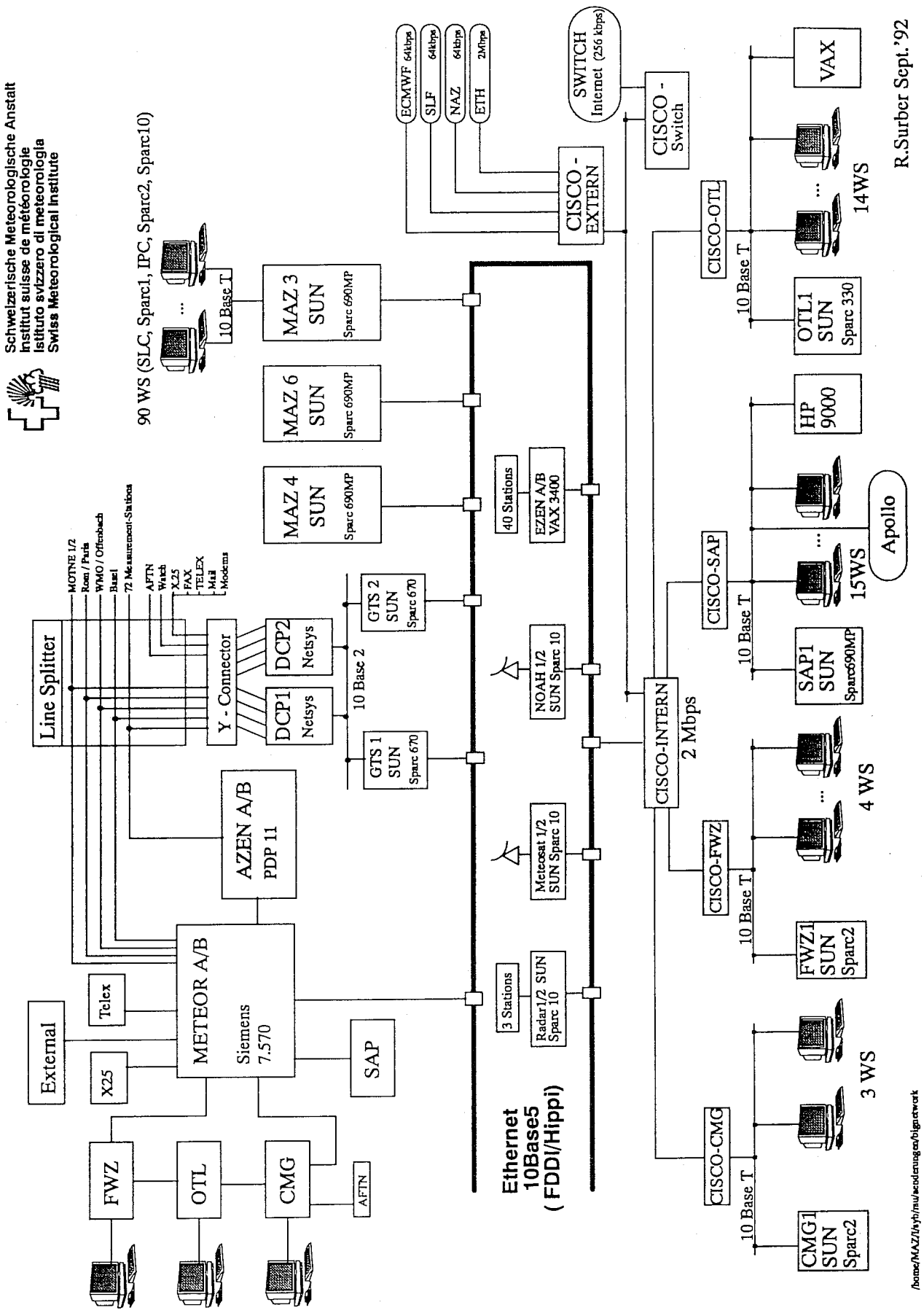
a) Operational Weatherforecast

- Dissemination products
- MARS data retrievals
- Precipitation probabilities (based on MARS)
- Precipitation forecast
- Surface temperature forecast
- Trajectory model of KMNI

b) Research division

1991:	- Intensive usage of CRAY resources
	- MARS data retrievals
1992:	- Transfer of components from CRAY/ECMWF to CRAY/ETH
Future:	- No more model development
	- MARS data retrieval for historical case studies
	- Telecom. facilities will be intensively used
	- More interactive users

SWITZERLAND



Questions and comments (Switzerland)

S. Pasquini: Concerning your message switch system, what hardware and operating system do you run it on?

B. Bachofner: It is based on UNIX system V and it runs on an Intel 486 processor. Later we want to change it to Solaris 2 on a SUN workstation.

S. Pasquini: Any others in Europe use this software?

B. Bachofner: It is used in Poland, and Chile.

B. Barg: Have you got the source code from this company?

B. Bachofner: Yes.

S. Pasquini: You have decided not to model development locally, are you completely based on ECMWF?

B. Bachofner: No, we do our development work on a Cray at ETH Zürich, not at ECMWF.

Finnish Meteorological Institute
Computers and Networks

General

53 VAX/VMS Systems
- 34 workstations
- 11 dedicated systems (radars,satellites...)
- 8 general purpose systems

9 UNIX systems
- 6 SiliconGraphics, 1 server, 5 workstations
- 2 Digital ULTRIX workstations, running Decnet/ULTRIX GateWay
- 1 SUN running name server for the domain fmi.fi

Program developement, Data dissemination to the customers

about 200 PC's
- Networked with Nowell NetWare, TCP/IP and Digital PCSA
- some running UNIX

Text-editing, Graphics, program developement etc.

about 150 Macintoshes
- networked with AppleTalk, TCP/IP, Digital LanWorks
- some running UNIX

Text-editing, Graphics, program developement etc.

Software

Compilers: Fortran, C, C++, Pascal
Program Developement: Language sensitive editor
Statistical and Mathematical packages: IMSL, SPSS
Database: Oracle
Data Communication: X.25, X.400, telefax, Cray-station, ECMWF-NTS

FINLAND

VAX/VMS Hardware

Operational cluster
•Prosessing of operational data, Data dissemination to Met. Workstations, Data dissemination to customers.
•VAX6000-410 server, Oracle database
•VAX8200, Videotex system
•VAX3600-server, Decnet Area router
•VAX3100, administration
•VAXStation3100, X.400, telefax-GW, supervising
•2*VAXStation3100, µVAXII/GPX as Met. Workstation

Message Switch
2*VAX3500, WMO/GTS

Satellites
• 2*µVAXII/GPX TIROS/NOAA
• µPDP, Meteosat

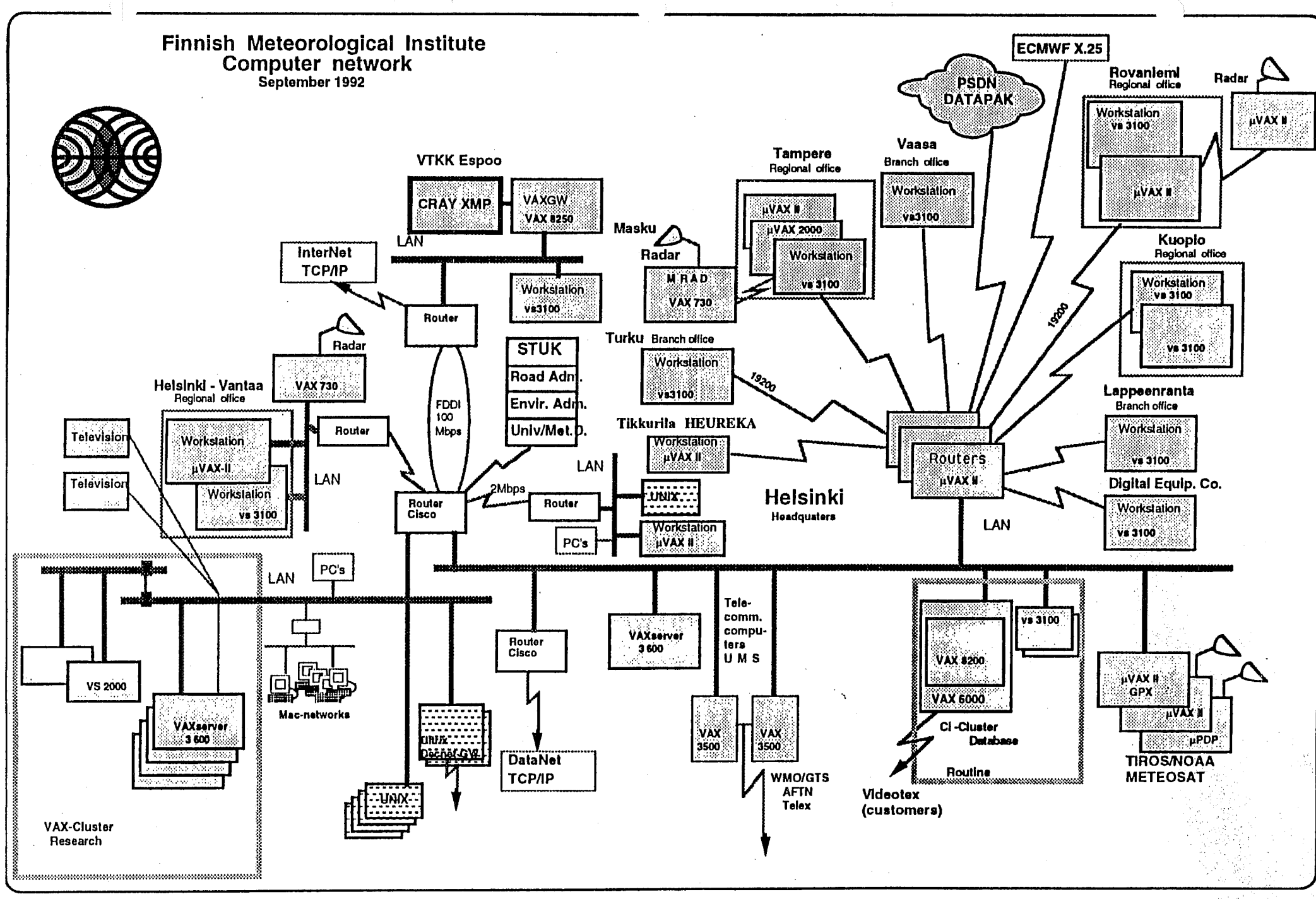
Weather Radars
5 VAXes, replacement has begun

Sources of data
WMO/GTS, domestic observations, ECMWF, Weather radars, Weather satellites

HIRLAM model runs four times in a day in VTKK/TLP Cray-XMP

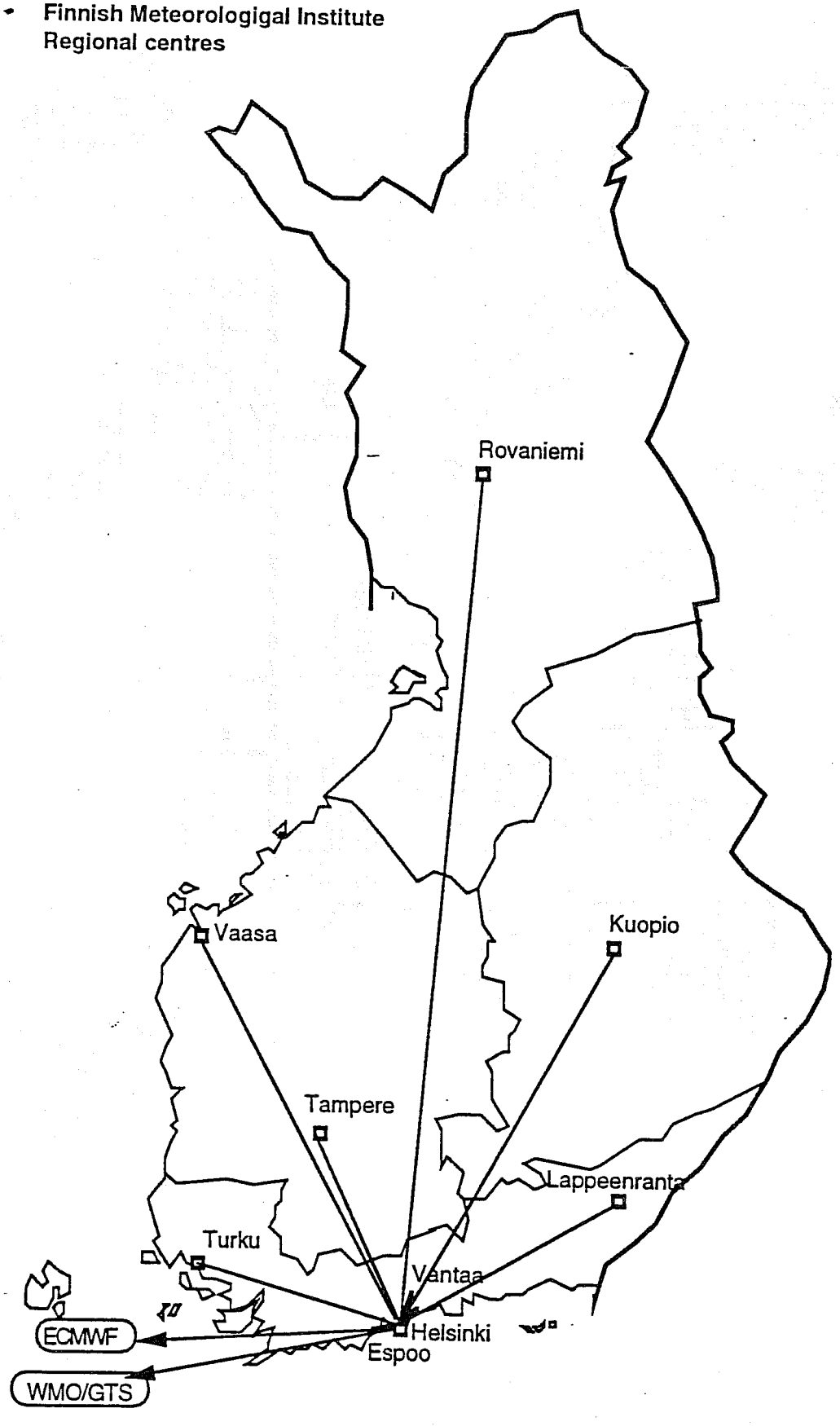
Data dissemination
• the Met workstations: 7 Regional Offices, 7 Met.ws in the Meteorological institute, 5 customers
• two television companies, broadcasting companies.
• several newspapers
• power plants
• aviation, road administration
• videotex
. . .

Research cluster
•VAX3600-server, file server
•VAX3400, program developement etc.
•µVAXII, program developement etc.
•12*VAXstation workstations, program developement etc.
VAXStation3100, µVAXII/GPX, Met. workstation.


Finnish Meteorological Institute
Computer network
September 1992
ECMWF X.25
PSDN
DATAPAK
Rovaniemi
Regional office
Radar
Workstation
vs 3100
µVAX II
VTKK Espoo
CRAY XMP
VAXGW
VAX 8250
LAN
Masku
Radar
Tampere
Regional office
µVAX II
µVAX 2000
Workstation
vs 3100
Vaasa
Branch office
Workstation
vs3100
InterNet
TCP/IP
Router
Workstation
vs3100
M R A D
VAX 730
Kuopio
Regional office
Workstation
vs 3100
19200
Radar
VAX 730
STUK
Road Adm.
Envir. Adm.
Univ/Met. D.
Turku Branch office
Workstation
vs3100
19200
Helsinki - Vantaa
Regional office
Lappeenranta
Branch office
Workstation
vs 3100
Television
Television
Workstation
µVAX-II
Workstation
vs 3100
Router
LAN
FDDI
100
Mbps
Tikkurila HEUREKA
Workstation
µVAX II
Routers
µVAX II
Digital Equip. Co.
Workstation
vs 3100
LAN
2Mbps
Router
Cisco
Router
UNIX
Workstation
µVAX II
PC's
Helsinki
Headquaters
LAN
PC's
VS 2000
VAXserver
3 600
Mac-networks
UNIX
Router
Cisco
VAXserver
3 600
Tele-
comm.
compu-
ters
U M S
VAX
3500
VAX
3500
WMO/GTS
AFTN
Telex
VAX 8200
VAX 6000
vs 3100
CI -Cluster
Database
Routine
Videotex
(customers)
µVAX II
GPX
µVAX II
µPDP
TIROS/NOAA
METEOSAT
VAX-Cluster
Research

FINLAND

- **Finnish Meteorologigal Institute**
  Regional centres



FINLAND

USE OF ECMWF COMPUTERS 1992

7 projects

18 users

FIHIRL
- development of the Nordic HIRLAM

FINGEN
- MARS retrievals

FISUPPE
- MARS retrievals for ozone research

FIPREP
- ECMWF preprocessing system

FIUPPA
- handling of satellite data

FITRAJ
- use of trajectory models

FINSEA
- use of Baltic Sea Wave Model

FINLAND

Questions and comments (Finland)

J. Greenaway: What are you doing your graphics on?

T. Hopeakoski: We are starting a new project where we have both PCs and Silicon Graphics hardware. We are now studying and testing which is best.

B. Barg: What is the abbreviation VTKK?

T. Hopeakoski: It is the State Computing Centre.

SMHI/Idd 1992-09-25
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 ethernet, including one combined CI- and DSSI-cluster, comprising of one VAX 6000-510 and one VAX 6000-410 with a total disk capacity of 22 Gbyte and one Vax 4000-200, one µVax 3100, two Vaxstation 2000 and four 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 and a jukebox system with magnetoptical disks, storage capacity 33 Gbytes. The second cluster is a real-time DSSI-cluster comprising of one Vax 4000-300 and two Vax 4000-200. 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 4000-200) and twelwe Vaxstation 4000.
Since last time an effort has been made to introduce Unix-stations into the local environment. This has resulted in a system of a server supporting presently 23 Decstation 5000 of various models.
As decnet node for communication with ECMWF there is a X25-Router (DEMSA) serving. In the near future the line-speed will be upgraded to 64 kbits.
There is also a Vax 4000-300 to serve the satellite receiving and processing system. This Vax-system also supports a system for regional forcasting. It is also equipped with two very powerful systems for image processing.
A µVax 3100 provides the means for distributing data to customers via modems located on a Decserver 200 on ethernet.
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 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 two 64 kbits lines.
At the regional centers there are µVax II systems connected to the central system by means of decnet using bridges interconnecting the local area networks using 64 kbits lines. On all systems there are Teragon image-processing systems connected to the Vaxs. At the regional centers there are also HP 1000 systems connected to GTS for reception and plotting of observations.
There are presently four Vax systems supporting weather-radars, one in Norrköping, one in Stockholm, one in Göteborg and one on the island of Gotland. There is also connections between Norrköping and the military weather radar in Karlskrona and between Malmö and the Kastrup weather radar in the vicinity of Copenhagen. The plans call for a few more weather radar systems to be installed within the foreseable future. A new system to connect the radars in the Nordic countries is in the process of being installed. This system will connect concentrator nodes in the countries, which in turn will be connected to the computers of each radar system.
All SMHI Vax systems are supported by local area networks (ethernet).
For further details see the attached diagram outlining the SMHI computer network.

SWEDEN

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:

Usage of ECMWF computer resources for HIRLAM development.

The joint Nordic-Dutch-Irish HIRLAM system is now operational in Finland, Denmark and Sweden on local supercomputers. In parallel with the routine operations, further development of the system is taking place on the ECMWF Cray system. The basic idea of using the ECMWF computer system for the HIRLAM work is to keep a "master" version of the system available for all group members. This master system, known as "HIRLAM-1" is used for research and development, and as master copy for local installations, benchmarks etc. During the year an upgraded version HIRLAM-2, has been developed and implemented.

The development work is carried out by group members in all the HIRLAM member states. For this, parts of the national resource allocations in the different countries, as well as allocations in a special project, are being utilized. Since the work is carried out by several group members in different countries, it is not possible to separate what work has been done under which account. Below the most important tasks worked on so far during 1992 are described.

Recoded forecast model. The forecast model, both the "dynamics" and the "physics" has been recoded to improve efficiency, modularity, parallelizability and readibility.

New formulations. Alternative formulations for the dynamics of the forecast model are being developed and tested. Semi-Lagrangean time integration techniques, both with two time-levels and three, are being tuned and evaluated. A spectral formulation on the limited area has also been implemented.

A new condensation scheme including forecast equations for the liquid/solid phase has been implemented.

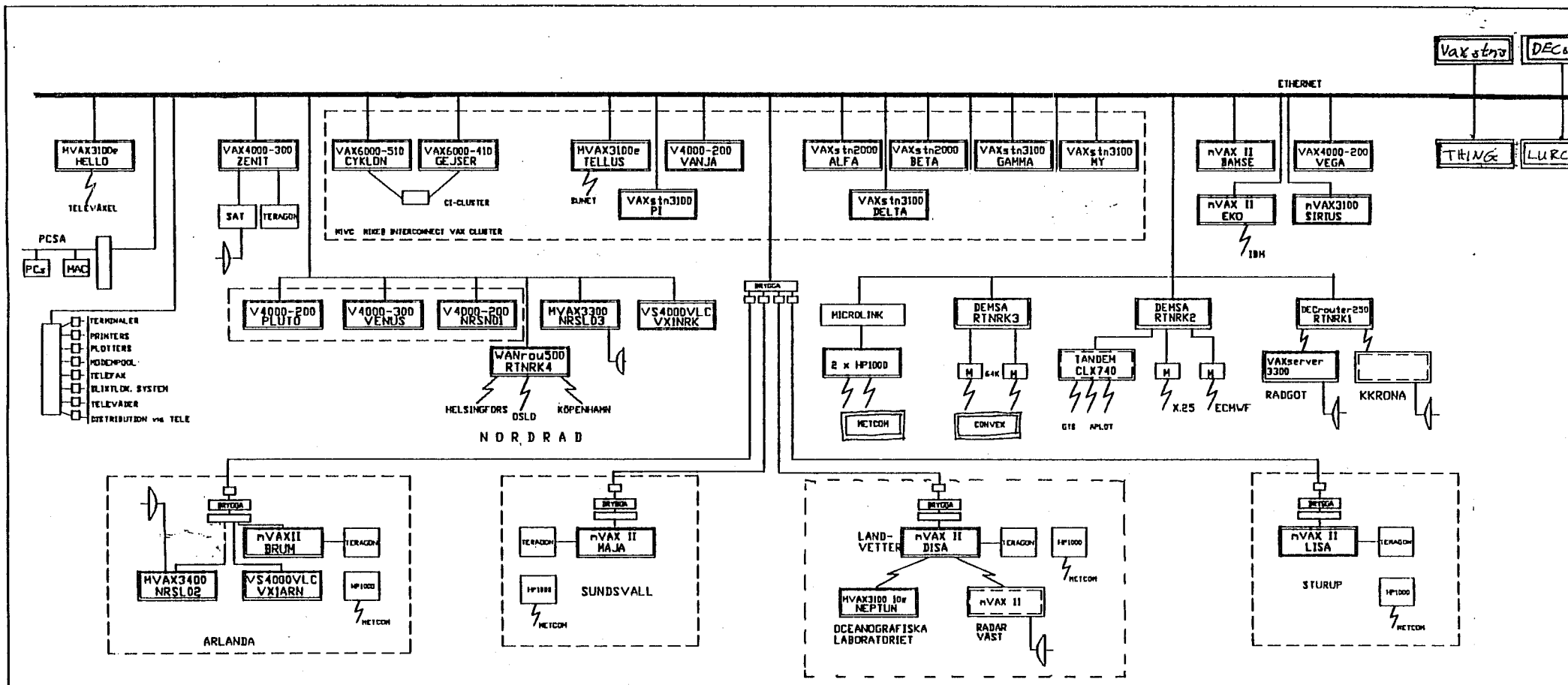
Usage of ECMWF computer resources for trajectory calculation.

In cooperation with the University of Virginia, USA, trajectory calculations are carried out for a research project on long range transport of soil particles.

Minor modifications that has proved to be useful:

- Itroduction of special Member state queues has improved throughput significally
- Remote modification of allocations has made life easier
- Remote change of member state users passwords also has simplified things.

SMHI COMPUTER NETWORK



SMHI/Tdtp 1992-03-30
ROLF STRANDBERG

SWEDEN

Questions and comments (Sweden)

J. Juega: How do your users get their jobs into the special Member State queues at ECMWF?

S. Orrhagen: It is done automatically at ECMWF.

ECMWF: Any job coming in which is from a user not in the group ECMWF goes automatically into the Member State queues. There are three such queues, Member State high, normal and background.

UK METEOROLOGICAL OFFICE

A.Dickinson

Member States Computing Representatives' Meeting, 28-30th September, 1992

1. Computer equipment and connections to ECMWF

There have only been minor changes to the computing environment at the Met Office since the last Computing Representatives' Meeting in June 1991. The main computer system is shown in Figure 1 and consists of two 8-processor Cray Y-MPs with an Hitachi HDS EX100 (IBM compatible) mainframe acting as the front end. The first of the Crays is used for operational work and model development while the second Cray is used for climate prediction studies.

The telecommunications computer system is shown in Figure 2. Links to ECMWF go via NETLINK which consists of 2 MicroVaxs, one acting as backup. NETLINK is a node on the Office wide ethernet network known as CDN (Central Data Network). The line to ECMWF is rated at 64 Kbits/sec and runs DECNET under X25. Receipt of observational data and dissemination of products via the GTS is performed by the PHASE IV system. Along with Offenbach, the UK provides the connection between ECMWF and the GTS.

Batch job submission to ECMWF is done via menus from the Hitachi mainframe. Files returned from ECMWF may be directed to any node on CDN. Interactive access to the Centre's Cray or VAXs is potentially available from any workstation on the network, but we have decided to limit it's use to just the computing representative.

2. Projects, plans and experience

2.1 User projects

We are currently developing software to enable our models to run more or less transparently on the ECMWF Cray. Users will be able to specify which target system (Met Office or ECMWF) they require and a user interface will create the appropriate job control information. Once this system is working, we will begin making much greater use of our allocation of units.

Binary file transfers to and from the ECMWF Cray are required to support this facility in order to avoid data conversions. At the present time files sent to ECMWF arrive on the VAX system, but ftp must be used from the Cray in

UNITED KINGDOM

order to complete the transfer. This is a two stage exercise in which enough time must be allowed for files to arrive at ECMWF (which depends on network traffic) before issuing the ftp command. For this reason it is difficult to automate the process. In addition ftp requires a VAX password to be specified which must be kept up to date by each user. It is not currently possible to transfer binary files from the Cray. *sendtm* only works with COS blocked and text files.

We would therfore like to propose that binary file transfers be fully supported between the ECMWF Cray and Member States.

2.2 New telecoms connections

Figure 3 shows proposed changes to the Met Office-ECMWF link which will allow Electronic Traffic Routing to other member states. This will be implemented if approved by Council and used to exchange research data. The CISCO router at the Met Office will be configured to ensure that only DECNET traffic to/from ECMWF is directed to NETTLE. All other traffic from ECNET and JANET(Joint Academic NETwork) will be sent to the remote TCP/IP gateway which is protected from CDN by a secure gateway. The routers will also be configured such that operational DECNET traffic between ECMWF and the Met Office has priority over the TCP/IP traffic. In the event of a CISCO router failure at either the Met Office or ECMWF the DEC routers will be directly connected to ensure operational traffic is not interrupted.

UK METEOROLOGICAL OFFICE MAINFRAME COMPUTERS

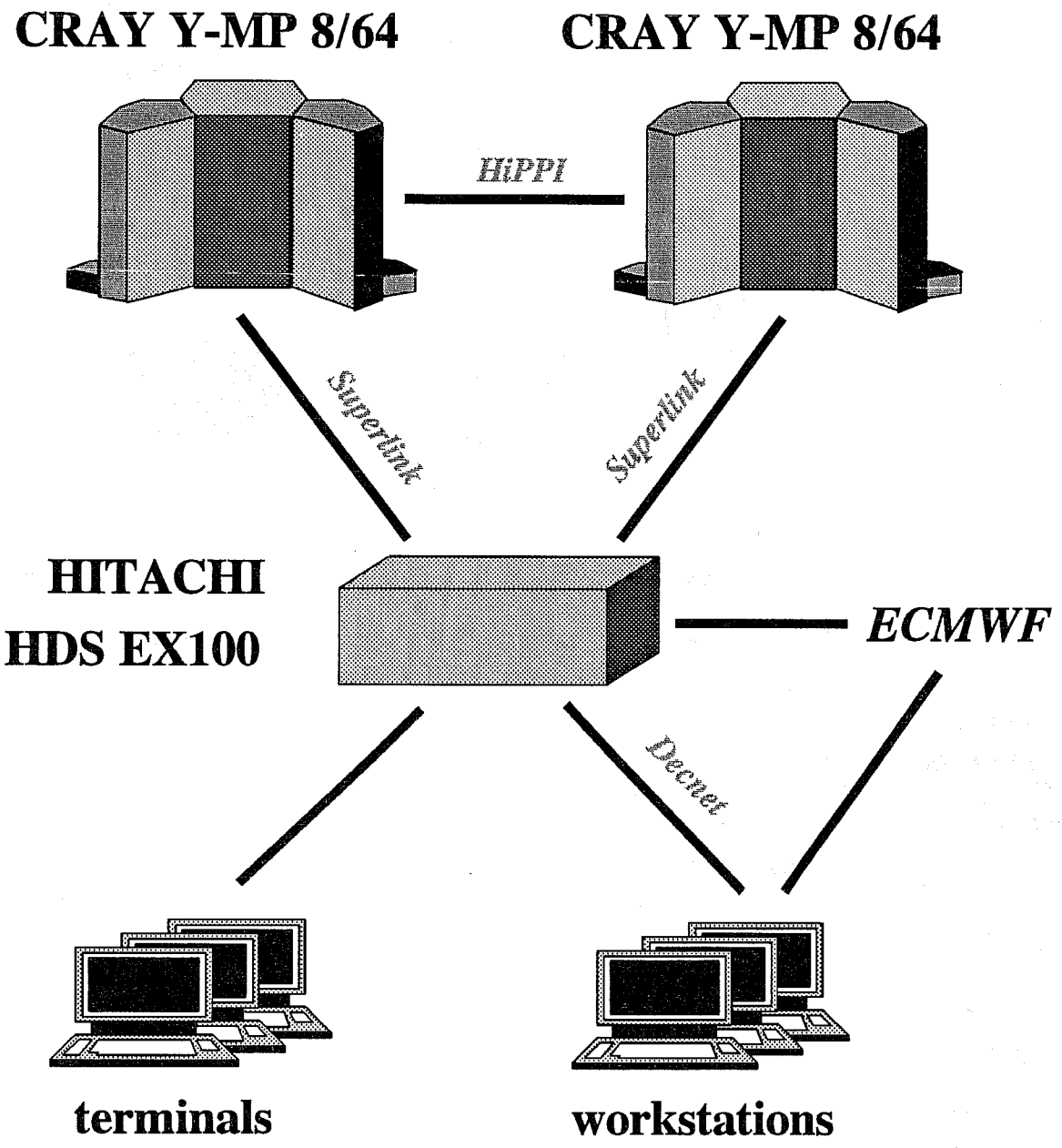


Figure 1

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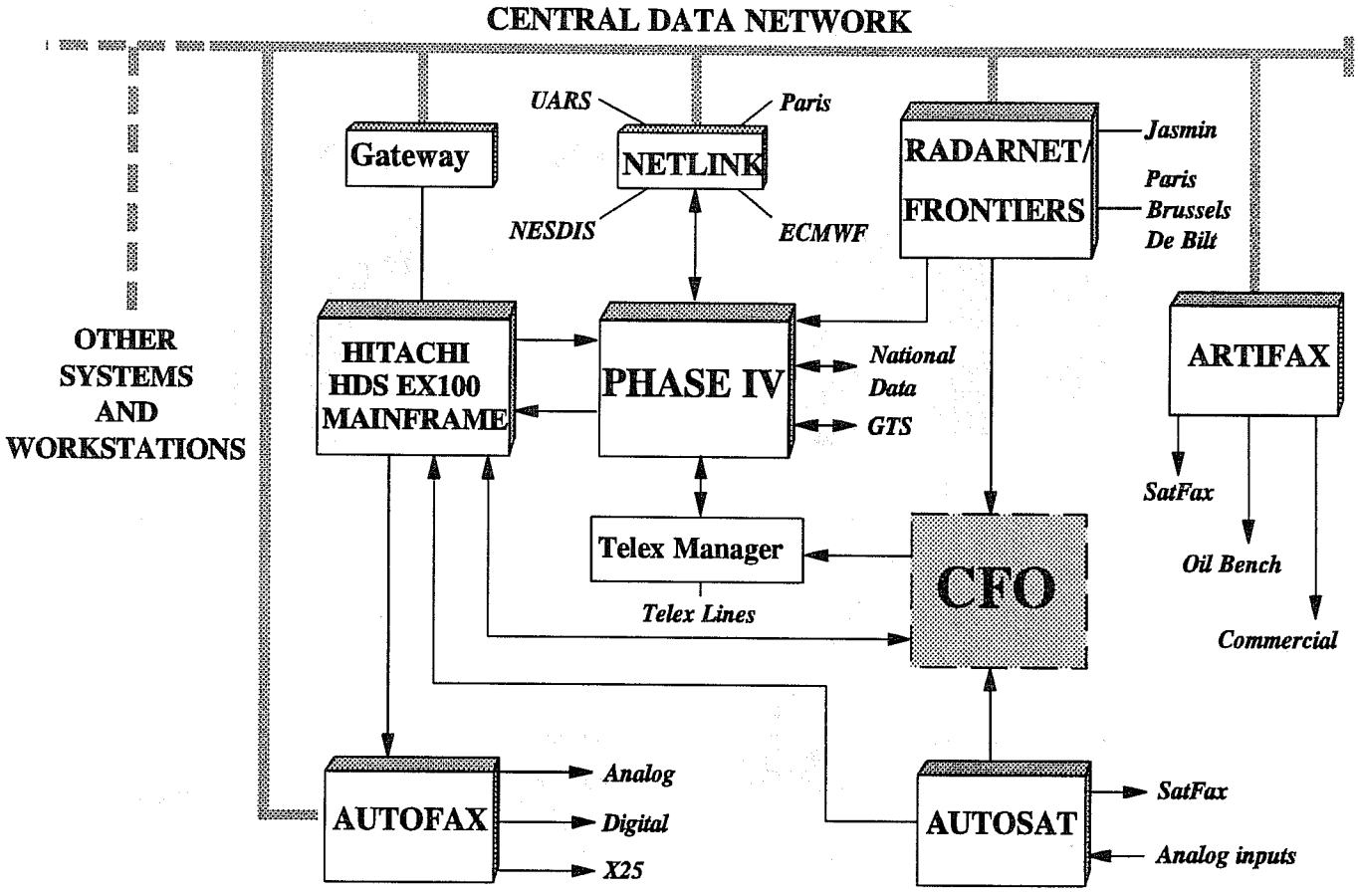
UK METEOROLOGICAL OFFICE TELECOMMUNICATIONS COMPUTER SYSTEM



GATEWAY

3 x DEC MicroVAX
Interlink gateways to mainframe computer system

NETLINK

2 x DEC MicroVAX plus 2 x X25 router
Support of links to ECMWF and other centres using X25 and DECnet protocols

ARTIFAX

2 x DEC MicroVAX plus PC fax gateways
Automated distribution of T4 code fax

PHASE IV

7 x Tandem TXP
Control of national and international data networks; specialised data handling

AUTOSAT

2 x DEC PDP 11/60
Provision of satellite imagery

AUTOFAX

2 x Ferranti Argus 700 GX
Automated distribution of facsimile products

RADARNET\FRONTIERS

DEC PDP 11/44; DEC VAX 11/750
Composites UK and European radar data; combines satellite and radar data to produce short range rainfall forecasts

Figure 2

UNITED KINGDOM

MET. OFFICE NETWORK CONFIGURATION FOR CONNECTION TO JANET AND ECNET

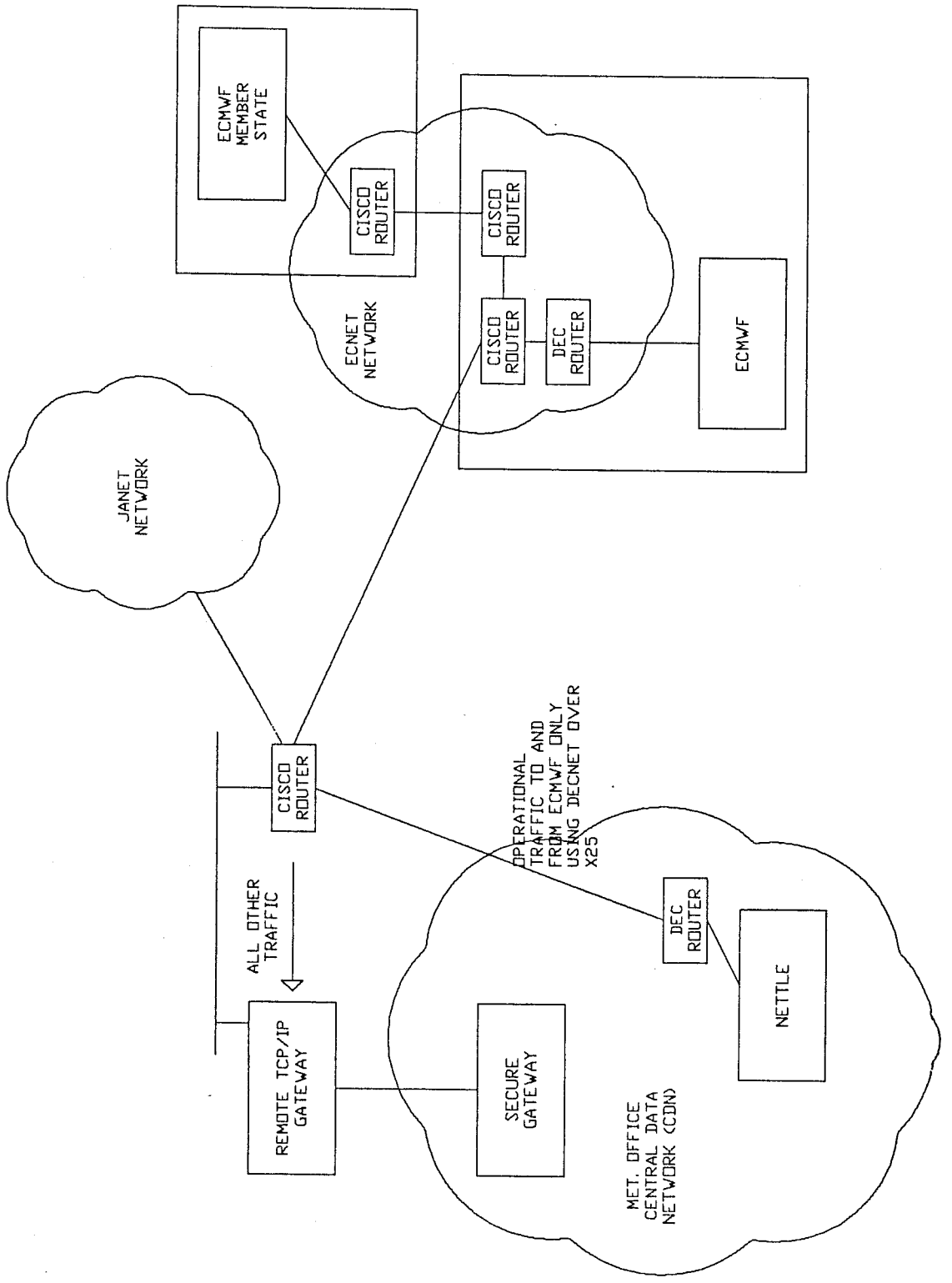


Figure 3

UNITED KINGDOM

Questions and comments (United Kingdom)

N. Kreitz: Regarding the SENDTM utility sending files across DECnet, I have now a new version which includes binary file transfer (i.e. unblocked Cray files) and I am just starting to test it. Of course, most other Member States will use TCP/IP which inherently does a binary transfer.

A. Dickinson: The UKMO telecoms people do not wish to run TCP/IP on the link to ECMWF, as they believe DECnet is more secure. It is hence a security issue.

S. Orrhagen: There may be some software from DEC which may solve this problem for you.