TECHNICAL MEMORANDUM

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Report on the thirteenth meeting of Member State Computing Representatives, 3-4 May 2001

P. Prior (Compiler)

Operations Department

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

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Preface

The thirteenth meeting of Member State Computing Representatives took place on 3-4 May 2001 at ECMWF. Eighteen Member States and Co-operating States were represented. The list of attendees is given in Annex 1.

The Head of the Computer Division (Walter Zwieflhofer) opened the meeting and welcomed representatives. He gave a presentation on the current status of ECMWF's computer service and plans for its development. Each Computing Representative then gave a short presentation on their service and the use their staff make of ECMWF's computer facilities. There were also presentations from ECMWF staff members on various specific developments in the ECMWF systems. The full programme is given in Annex 2.

This report summarises each presentation, with additional detail on those topics expected to be of particular interest to Member States and Co-operating States. Part I contains ECMWF's contributions and general discussions. Part II contains Member States' and Co-operating States' contributions; all the reports were provided by the representatives themselves.

Part I

ECMWF Staff contributions

ECMWF's Computer Service: Status and Plans

W. Zwieflhofer

The configuration of ECMWF's computer systems current at May 2001 is given in Fig. 1 below.

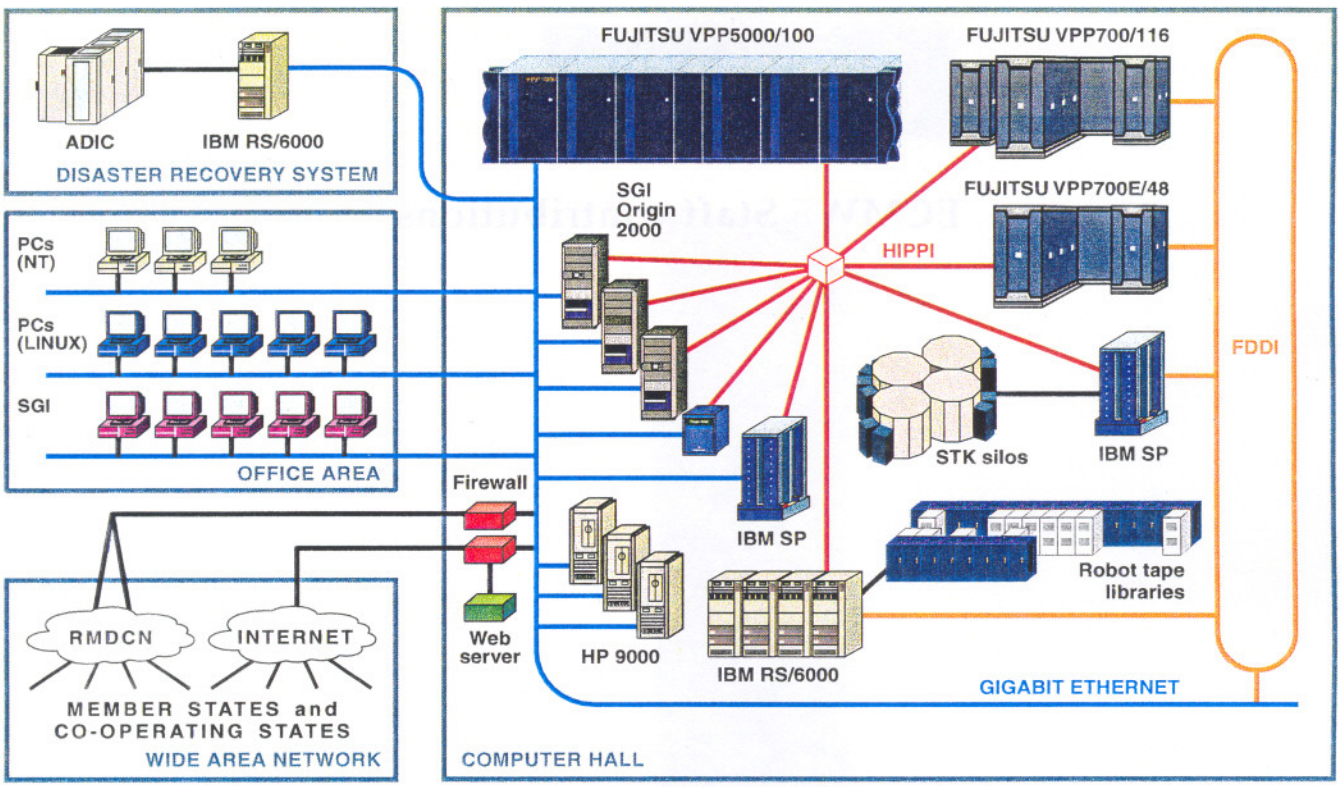

Figure 1

Fujitsu service

The Fujitsu VPP5000 was upgraded to 100 PEs in July 2000 and passed its Acceptance Tests on 1 September 2000. The Fujitsu systems are providing a very reliable service. Excluding units used for the BC project, approximately half the Member States' work runs on the VPP5000. To facilitate the running of Member State users' work, the size of the Member States TEMP/LTEMP file systems has been trebled recently.

Plans for the HPCF

The current Service Level Agreement with Fujitsu terminates on 31 December 2002. An Invitation to Tender (ITT) for a replacement was issued on 23 March 2001 with a closing date of 30 May. All the ITT documentation is available at http://www.ecmwf.int/pressroom.

Much effort has been expended in developing the benchmark used for the ITT, which now includes the data analysis system for the first time. The ITT contains many provisions aimed specifically at the needs of the Member States.

Data Handling System

Phase 5 of the Data Handling System has been successfully installed and accepted. This upgrade has led to significantly improved transfer rates for ECFS. The DHS now manages approximately 60TB of primary ECFS and 250TB of primary MARS data. Backup copies are now held solely in the Disaster Recovery System, which has been moved to its permanent, separate building.

In order to manage data handling requirements beyond mid 2002, an ITT for a new DHS was issued on 26 January 2001, requesting responses by 23 March. Tenders received are currently being evaluated.

Desktop systems and servers

In July 2000 Council approved ECMWF's plan to replace its SGI workstations with IBM Intellistation PCs running LINUX. The PCs for technical users will have a slightly lower specification than those for scientific users. The SGI servers will be replaced by IBM RS/6000 servers running AIX. So far, approximately 60 technical users have been equipped with PCs running LINUX with VMware/Windows 2000. The first general purpose AIX server has been installed and the installation of the first batch of desktops for scientific users is planned for later this year.

Member State server (ecgate1)

The ecgate service will remain on SGI/IRIX systems for the time being; there is no definite timetable for migration to IBM/AIX servers. The service is currently provided by an ORIGIN 2000 with 8 MIPS (400 MHz R12k) processors running IRIX 6.5. /scratch space has been increased from 72 to 180 GB.

Web services

The ECMWF Member State web site continues to be developed. To facilitate access to the site by National Meteorological Service users, a mechanism which accepts access from known domain addresses has been implemented. Certificates are still required to access some areas of the web site, such as the interface to the archives and committee documents. Certificates also remain available for users accessing from unauthorised domain addresses.

Local Area Network

The second phase of the Gigabit Ethernet LAN was installed in September 2000. It is working well and final acceptance is expected before the end of May 2001. The HIPPI network has been reorganised. The Gigarouters were removed and replaced by three Essential switches. HIPPI is becoming outdated but, as yet, there is no clear and obvious choice of successor technology.

RMDCN

RMDCN is now used operationally in 32 countries of WMO RAVI and ECMWF. All the leased lines have been terminated. The FrameRelay backbone is very stable and the bandwidth delivered meets the requirements of the Service Level Agreement. Russia is in the process of signing an Accession Agreement and the details of a possible EUMETSAT connection have been agreed. The installation of PacketShaper has been successful in regulating traffic and ensuring that product dissemination gets priority when required.

Web Services

H. Richter

H. Richter began his presentation by a brief demonstration of the facilities and information available on the ECMWF web servers, concentrating in particular on new web based services, such as Mars and PrepIFS. He gave an overview of the hardware and software being used, noting that much of the software was open-source. He noted that use of cgi and fast cgi made it difficult to maintain security, so CORBA/IIOP (Common Object Request Broker/Internet Inter-Orb Protocol) and SOAP (Simple Object Access Protocol) are being investigated as potential replacements.

Currently, developments of the service include investigating replacement of the in-house page access and CVS by a standard method such as WebDAV, introducing a three-stage server upload to facilitate the development of new services, extended use of JSP (Java Servlet Protocol) and support of XML/XSLT. W. Zwieflhofer noted that service restructuring would include a review of which information should reside on which server. Currently, much information which could be of use to Member State users is held on the public server. It is hoped to make the structure of servers more intuitive.

R. Rudsar commented that Netscape tended to crash whenever she used it to manage DNMI's dissemination from her SGI workstation. H. Richter stated that Netscape was known to be particularly unstable on SGIs. He advised all SGI users to ensure that they were running the latest version of Netscape (4.77) as this is more reliable than previous versions. He reported that a pre-release of Mozilla looked encouraging as a replacement for Netscape, both from the reliability and usability points of view.

ECBATCH

L. Gougeon

L. Gougeon explained that the current ECBATCH applications use the client-server model. They are based on lpd (the printer daemon) and lpq, which introduce many limitations, such as maximum file size. Since Member State users rely very heavily on ECBATCH applications, the limitations pose a considerable inconvenience for them, so the development of an ECBATCH version 2 is currently underway. The new version is built on a three-tier architecture model, based on J2EE, and is written in object oriented language. It will:

- remove the size limitation on transferred files
- allow simultaneous transfers per country
- extend ECGET to allow direct access to ECFS
- provide a window based client
- provide a web access to a restricted set of ECBATCH functions
- provide a web interface to allow Member State administration of SECURID users

The certificate security policy will be modified to allow an extended certificate duration.

L. Gougeon gave a demonstration of the current stage of development of ECBATCH version 2 and asked for Member State volunteers to beta test it in the near future.

R. Urrutia asked what was required on the client side to carry out the testing. L. Gougeon replied that it would just require the installation of a standard, stand-alone application on their system.

High Performance Facility (HPF) update

N. Storer

N. Storer gave a brief overview of the main computer systems at ECMWF before concentrating on the Fujitsu VPP systems. He described the process of upgrading the VPP 5000 from 38 to 100 processors, which took place in summer 2000 and went extremely smoothly. Figure (2) shows the main characteristics of the VPP systems at ECMWF.

	VPP700/116	VPP300/4	VPP700E/48	VPP5000/100
PEs				
P-PE	1	1	1	1
IMPEs	10	1	4	8
S-PEs	105	2	42	91
PE performance	2.2 GF	2.2 GF	2.2 GF	9.6 GF
Memory	2 GB	2 GB	2 GB	4 GB
Peak performance				
	257.4 GF	8.8 GF	105.6 GF	960 GF
Networks				
HIPPI	4	2	4	8
FDDI	8	2	4	0
Gigabit-ethernet	0	0	0	10
Diskspace				
	1752 GB	136 GB	960 GB	5300 GB
Fortran compiler (frt)				
	L98121	L98121	L98121	L99121
Operating system (UXP/V)				
	V10L20	V10L20	V10L20	V20L10
	X00051	X00051	X00051	X00061

Figure 2

He presented CPU utilisation statistics which showed that usage is fairly consistently at 80-85%. The idle time is mainly caused by waiting time for parallel jobs. He described some of the problems encountered following the installation of the additional 62 CPUs and reported that Fujitsu's co-operation and the speed of their responses had been very good.

G. Wihl (Austria) asked whether Fujitsu's good response times were usual. N. Storer replied that they were normal for ECMWF, who receive an excellent service from Fujitsu. M. Pithon (France) commented that, in her experience, Fujitsu were excellent at correcting bugs and solving identified problems but the development of new features or design modifications could take a very long time. Fujitsu tended not to communicate with their customers during the development of such new features, so sometimes what they produced was not exactly what was required.

Graphics update

J. Daabeck

MAGICS 6.4

J. Daabeck began by listing the platforms on which MAGICS 6.4 is available to the Member States:

SGI	IRIX64 version 6.5
LINUX	SuSE 2.2.16 – Portland Fortran Compiler
IBM	AIX 3.4 000AC7 CD4000
HP	HP-UX B.11.20 A 9000/803
Compaq	OSF1 V5.0 910 Alpha
SUN	SunOS Solar 5.7 Sparc SUNW, Ultra-1

He noted that the HP, Compaq and SUN versions were for Member States' use only and were not in production at ECMWF. He gave details of all the new features in MAGICS 6.4, including new projections, more flexibility for modification of the titles produced automatically, pie charts etc.

Metview 3

J. Daabeck drew attention to the new and improved features introduced with Metview 3, such as the customisable main user interface, the full implementation of all OpenGL based modules and support for new features in MAGICS and Mars/Emoslib.

Metview 3.0 export release was issued in October 2000 and became available also on LINUX platforms. It can be installed with OpenGL and/or GKS. It runs with a range of drivers: Postscript, OpenGL (optional but recommended), PNG (Portable Network Graphics) and JPEG can be used optionally to support web images; GKS support is optionally available but will be phased out in the future.

Metview currently runs on the following platforms but this list changes rather frequently:

SGI running IRIX64 6.5, using SGL_ABI=N32

Intel PC running LINUX SuSE 6.4

Compaq Alpha running OSF1 1 V5.0 910

HP running HP-UX B.10.20

IBM RS/6000 running AIX

SUN running Sun OS 5.7

The new user interface was then demonstrated and compared to the previous version. The ability to create personal environments which are held from session to session will allow far greater flexibility than in the past. There is a new visualisation module in Metview 3. The previous functionality (such as point value queries, reprojection and resizing) has been retained but new capabilities have been added, including the ability to display different types of plots in any arbitrary layout, providing effective WYSIWYG. The next export release of Metview 3 will be in June 2001.

Graphics on LINUX

There are new releases of graphics cards every 3–6 months with enormous leaps in price/performance at each release. The number of chip sets is fewer than before, with several appearing slowly to predominate. The driving market force remains games.

M. Demirtas (Turkey) stated that her service was using IRIX 6.4. What Metview version did J. Daabeck recommend they implement? J. Daabeck recommended that they wait until June for the next version.

Dissemination, MARS and GRIB Edition 2

J. Hennessy

Dissemination

J. Hennessy began by summarising the changes which had occurred in the last year which had led to increases in the data dissemination. Currently, more than 350,000 products are disseminated per day, which creates a volume of 3.7 Gbytes daily. In addition to the introduction of various new products, the following changes were made:

- time steps are now 3 hourly up to 72 hours
- the EPS now has a 1° x 1° maximum resolution
- GRIB headers have been modified; MARS and dissemination GRIB headers will eventually be made identical;
- additional products are disseminated on the GTS (in GRIB only)
- second order packing (compression) has been introduced as an option for grid point data and can reduce data volumes by up to 40%
- no padding (padding = 0) has been added as an option
- there has been a schedule change for the 1800 and 00 UTC analyses
- boundary conditions products are disseminated:
  - 4 forecasts from 3D Var analyses run at 00, 06, 12 and 18 UTC
  - forecasts have 3 hourly timesteps up to 72 hours
  - forecasts are disseminated in FRAME format and are not archived
  - almost any rotated grid can be produced at very fine resolutions

J. Hennessy reported that Member States seemed to appreciate the ease with which they can manage and alter their dissemination requirements over the web but that little use was made of the other services available. He pointed out that the "news" section contains a very useful description of all the recent changes to the model, products disseminated etc., since January 1999. A recent enhancement has been to add the ability to "Deactivate" hosts, so that if a Member State has two machines capable of receiving disseminated products and the primary host is down, then it can be 'deactivated', to prevent the ECMWF system from trying it continually before moving on to the backup system.

MARS

Since the introduction of the 12 hour 4Dvar, First Guess fields have been suppressed. Several new products have been introduced and parameters have been changed. New Streams have been added for Boundary Conditions and Seasonal Forecast products and new types have been introduced, mainly for the seasonal forecasts: means, max/min and standard deviations. Currently, 75.84 Gigabytes of data are archived daily from the operational forecast.

Many use the facilities available on WebMARS. Not only can users browse the contents, they can build a request for subsequent submission and view MARS activity to, for instance, investigate why a request has been delayed. There is good, comprehensive documentation on MARS available on the web, with links to BUFR and GRIB documentation.

GRIB Edition 2

GRIB Edition 2 will become officially approved for use in November 2001. ECMWF's first use of GRIB Edition 2 will be to put probability forecasts on the GTS, as agreed by Council at the request of the WMO. A transition plan will be established in the near future. There is an enormous range of software and applications which will have to be modified. J. Hennessy noted that the Aviation Authority has already obtained an undertaking that it can continue receiving GRIB1 products from the UK Met Office and DWD, Germany until 2008. ECMWF prefers to move to GRIB2 more quickly. The first step will be to generate new products in GRIB2 only.

R. Rudsar (Norway) asked whether there was any information on GRIB2 on the web. J. Hennessy suggested that representatives look at the WMO web site and offered to send paper copies of the definition to those who required them.

LINUX experience

Richard Fisker

R. Fisker gave some brief background: a contract for the supply of PCs and servers to ECMWF for the next 3–4 years was signed with IBM in July 2000. The first batch of 20 PCs was delivered in September and the second batch of 40 at the end of 2000.

The 60 PCs are IBM M-Pros. The first 20 are 733 MHz, Pentium III models with 384 Rambus memory, 13.5 GB disk space, Matrox G400 graphics cards and a 21" monitor. The later 40 PCs are 800 MHz Pentium III with 384 Rambus memory, 15 GB disk space, Matrox G450 graphics cards and a 21" monitor.

The SuSE version of LINUX is being used at release 7.0. The desktop is KDE1 with some customisation to add ECMWF menus. VMware Workstation 2.0.3 is used to run Windows 2000 as the guest operating system. LINUX is the host operating system.

R. Fisker noted that one important feature of the chosen systems was the ability to clone configurations for the initial set up and later upgrades. He described some of the issues which had to be confronted in integrating the systems to the ECMWF environment. Currently, no satisfactory replacements for Zmail (which does not run on LINUX) or the shared appointments calendar have been found.

He explained that there had been some problems, mainly quite minor, in starting to use the PCs. He also strongly recommended Member States to buy their PCs in as large batches as possible, in order to avoid the complications which occur when minor changes occur between models. He reported that most users found the LINUX/VMware/Windows 2000 system easy to use but added that only 6 research users had been allocated systems from the initial 60.

Currently support from IBM and SuSE is being tested. SuSE seems quite satisfactory and is almost "pay as you go" except that a certain number of calls must be paid for in advance. The IBM service, when tested on a single occasion, provided the same response as SuSE. It is likely that we will discontinue IBM Support.

To summarise, ECMWF's experience with using Linux has been exceedingly positive - it works, and it works well. By using Linux and VMware/Windows 2000, we get the best of both worlds – the versatility, ease of maintenance etc. of Unix and easy access to Windows for Office applications and other software only available under Windows. Although the systems cannot be considered as high-specification PCs, they still provide excellent response. The users are very happy with the systems, both their performance and their reliability. Very few problems have been encountered, which is excellent, considering the magnitude of the change from SGI workstations to Linux PCs.

H. Baldursdottir (Iceland) asked whether VMware used USB.

R. Fisker replied that VMware does not currently support USB devices. The current 2.2 version of the Linux Kernel provides very limited support. The next major version of the Kernel, 2.4, provides much more extensive support for USB, so we would expect to see support for USB in future versions of VMware.

User Support Service

Umberto Modigliani

U. Modigliani began by thanking the representatives for their expressions of appreciation for the help given to their users by ECMWF support staff. He explained that much effort had been put into improving and increasing the facilities of the Member States' web site. He noted that one of the additions is a table of contact details for Member State Computing Representatives and other Member State contact points, in order to facilitate communications between them and ECMWF. He reported that the reorganisation of the Computer User training courses, integrating an introduction to the general computer system with an introduction to MARS in the first week, had been a success. It was attended by 22 external participants. He noted that the proposal to increase to 20% the percentage of resources held in the reserve for late Special Project requests, following comments from the representatives at a previous meeting, had been supported by the TAC and approved by Council.

Member State activities on the ECMWF computing systems are closely monitored by ECMWF staff. This means that problems are identified quite quickly and changes to the partition configuration and queue structure to alleviate problems can be made on the spot. Monitoring can also reveal that individual users are not using the systems in the most efficient way, so support staff can contact them and offer advice.

Member States' usage of the ECMWF systems has increased considerably. Several Member States are expected to exhaust their allocations by the end of the year, if usage continues at the current rate. A range of statistics showing usage steadily increasing over the years was presented. D. Matthews (UK) commented that his users often required MARS access for a very short period or for one single batch of data, registration for which caused an enormous administrative overhead. Was there any alternative to this arrangement?

U. Modigliani replied that the registration procedure is in line with current Council policy regarding access to data. This policy would have to be reviewed before changes could take place. Currently, WebMARS allows the retrieval of a very limited number of fields in "demo" mode. It might be possible to set up a fast track procedure for National Meteorological Service users, but ECMWF recognised that many one-off data requests came from university users and it was unlikely that regulations for such users could be relaxed. W. Zwieflhofer undertook to investigate the situation to see whether any improvements could be made.

There were no dissentions from U. Modigliani's proposal to publish email and postal addresses and fax and telephone numbers on the Member State web site contact information section.

Discussions

There were no outstanding issues remaining from the previous agenda items. M. Pithon (France) agreed that Météo France's PrepIFS problems would need detailed invesigations She was optimistic that ECBATCH version 2 would provide all the changes they required.

M. Pithon and E. Krenzien (Germany) volunteered their services' users to test the new ECBATCH. ECMWF would welcome additional volunteers later, if possible.

Next meeting

Apart from G. Wihl (Austria), who considered that the next meeting should take place in October 2002, when the Centre would have had some experience with the new HPC, all the other representatives present (Turkey - absent) considered that enough changes would have occurred to warrant a meeting in 12 months' time, i.e. spring 2002.

The meeting was closed at 13.00 hours.

PART II

Member States' and Co-operating States' Presentations

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Central Institute of Meteorology and Geodynamics, Vienna, Austria

Computer equipment

The following equipment is mostly doubled (same type if not specially shown by *or special remark), new equipment in bold:

a) **Production Server**
SUN Server 420, 2 CPUs/450 MHz, 2 GB Memory, Disk 2 Gb, CD-ROM

b) **Development Server** (single equipment):
SUN Server 420, 4 CPUs/450 MHz, 2 Gb Memory, Disk 2*18 GB Raid1, CD-ROM

c) **Fileserver** (single equipment with double access):
NET APPLIANCE Network Attached Storage, Disk 500 Gb proprietary Raid (~Raid 4)

d) Short-Range-Database Server:
SUN Ultra Enterprise 450 Server, 2 CPUs/300 MHz, 2 GB Memory, Disk 4 @ 9,1 GB, CD-ROM, Floppy 3.5"

e) **Long-Range-Database Server**

SUN Enterprise E3500 Server, 4 CPUs/336 MHz, 2 GB Memory, Disk 4 x 9,1 GB, CD-ROM,
SUN StorEdge A3500 Disk Array, Disk 2 x 51 @ 9,1 GB

f) ECMWF-Server:
SUN SPARCstation 10, 1 CPU, 65 MB Memory, Disk 2.5 GB, CD-ROM,
*SUN SPARCstation 10, 1 CPU, 65 MB Memory, Disk 3.5 GB, CD-ROM

g) GTS-Server:
SUN Ultra-1, 1 CPU, 256 MB Memory, Disk 6.3 GB,
*SUN SPARCstation 20, 1 CPU, 192 MB Memory, Disk 4.2 GB, CD-ROM

h) Internet- and Product Server:
SUN SPARCstation 20, 2 CPUs, 96 MB Memory, Disk 6.3 GB, CD-ROM

i) Intranet-Server
SUN Ultra-1, 1 CPU, 65 MB Memory, Disk 10.5 GB, CD-ROM

j) Domainname-, Administration- and Operating Server
SUN ULTRA 5_10, 1 CPU, 132 MB Memory, Disk 5.2 GB, CD-ROM
*SUN Ultra-1, 1 CPU, 65 MB Memory, Disk 4.2 GB, CD-ROM

k) RC-LACE Distribution and Archive Server:
SUN SPARCstation 20, 2 CPUs, 96 MB Memory, Disk 9.45 GB, CD-ROM, Tape 4mm DAT
Single Equipment with double Access:
DLT Cartridge Roboter (960 MB, 4 drives)

l) Backup-/Archive-Server:
SUN Enterprise 250 Server, 2 CPUs, 128 MB Memory, Disk 26.4 GB
Single Equipment with double Access:
DLT Cartridge Roboter (3.5 TB, 4 drives)
Single Equipment:
Tape 0.5", 9-track, 6250/3000/1600/800 bpi)
Optical Disk Roboter (4 Drives, 144 Slots re-writeable Magneto-Optical Disk, 650MB Cartridge)

m) RC-LACE Model Group (single equipment):
Digital Personal Workstation 600 AU, 1 CPU, 1 GB Memory, Disk 8.6 GB, CD-ROM, Tape 4mm DAT

n) FIREWALL
XXXXXXX, *Confidential*

and more than 60 other Servers and Clients depending on special needs at the several Departments and Regional Services of ZAMG, and a flock of nearly 300 PCs, some of them used for routine work, e.g. for forecasters and to supply special Media (Broadcast and Television, Newspapers).

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Software

SUN-Systems

Operating System:	Solaris (UNIX)
Compiler:	Fortran 77, Fortran 90, C, ANSI C, C++
Script language:	Perl
Graphics:	Xelion GKS, MAGICS, PV-Wave, OpenGL
Libraries:	IMSL, NAg
Database:	SYBASE
GIS:	ARC/INFO
Backup SW:	Veritas Netbackup
e-mail:	Z-mail

Digital Workstation

Operating System:	Digital UNIX
Compiler	Fortran 90, C++
Graphics:	NCAR Graphics

Personal Computer

Operating System:	Windows NT, Windows 95, (Windows 2000), (Windows 3.11), S.U.S.E LINUX, SCO UNIX, MacOS
Compiler:	Fortran, Visual Basic, C
Graphics:	Xelion GKS, MAGICS
Applications:	MS Office, ABC Flowcharter, ARC/VIEW, CorelDraw, Exceed, Exchange, OnNet, PageMaker, PhotoShop, SYBASE ODBC, QuarkXpress
Internet/e-mail:	Netscape, Internet Explorer, Outlook / Outlook Express

Network ZAMGNET: WAN

Equipment

Cisco Routers and Switches

Communication Protocol

TCP/IP

Structure: ZAMG-intern

Vienna: LAN: Ethernet, 2 x FDD

Regional Plants (Innsbruck, Graz, Klagenfurt, Salzburg) and Regional Offices (Bregenz, Linz, St.Pölten): LAN: Ethernet

Remark: the connection between Vienna and the Regional Plants is performed by tunnelling through Austro Control Network ACN and to the Regional Offices by dedicated lines from Vienna directly

Structure: ZAMG-extern

Internet Access:	ACOnet (Austrian Academic Computernetwork) separated domain (zamg.ac.at), local domainname-server
ECMWF:	RMDCN
GTS Access:	RMDCN with special connection to Austro Control (RTH-Vienna)
RC-LACE:	RMDCN Bratislava, Budapest, Ljubljana, Prague, Zagreb)

Special Connections – National:

Austro Control: use of MAVIS, TAWES (Semi-Automatic Weather Stations): Network by Austrian Health Authority
National Ozone Compound: CNA (Corporate Network Austria)
Satellite Data Receiver
Radar Compound
Universities (direct lines to use MAVIS): with LANs in responsibility of ZAMG to avoid connections to the Information Services at the relevant Universities:
Inst. of Meteorology and Geophysics Univ. Vienna
Inst. of Meteorology and Physik Univ. for Agriculture, Vienna

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Special Connections – International:

Bozen, Arabba: AT&T Global Network (Use of MAVIS)

Use of ECMWF Products:

1. Data of Normal Dissemination

Modification of these products to produce charts for the local effort, partly published used within MAVIS (Met Austria Visualisation System)

Further special information to/for:

Energy Plants, Environmental Purposes, Leisure and Sports, Local Authorities: Street-Service, Transport

2. EPS Products

additional to 1., but not published

3. MARS-Data

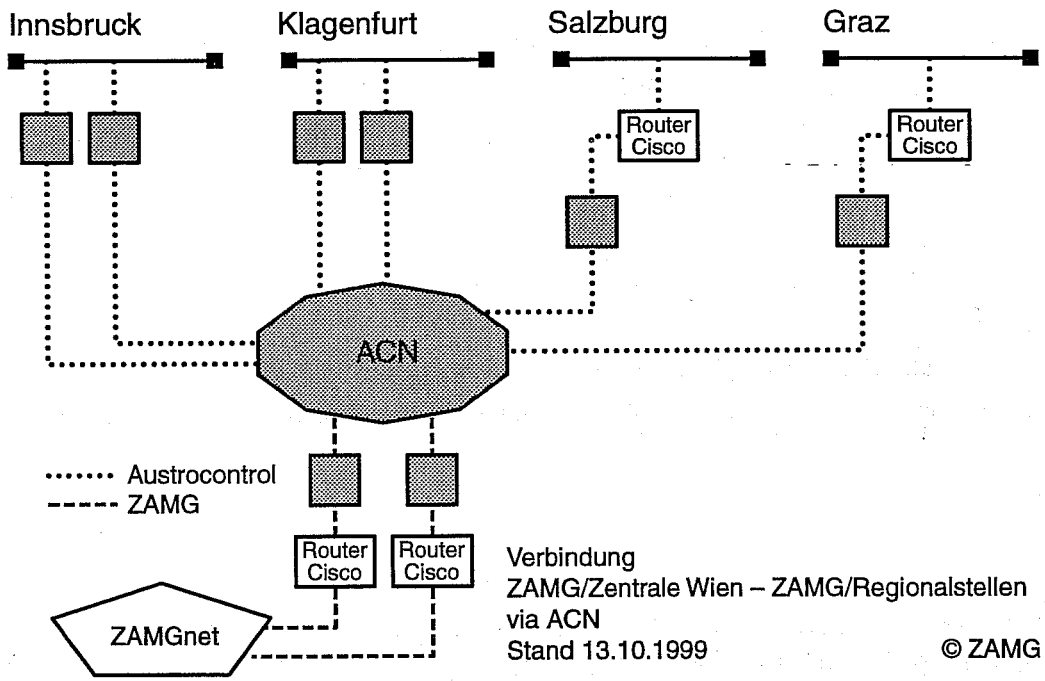
for special investigations, mostly together with Institute of Meteorology and Geophysics of University of Vienna

4. 00z Data (Frames)

till now no use of these data but planned

5. Metview

planned to use



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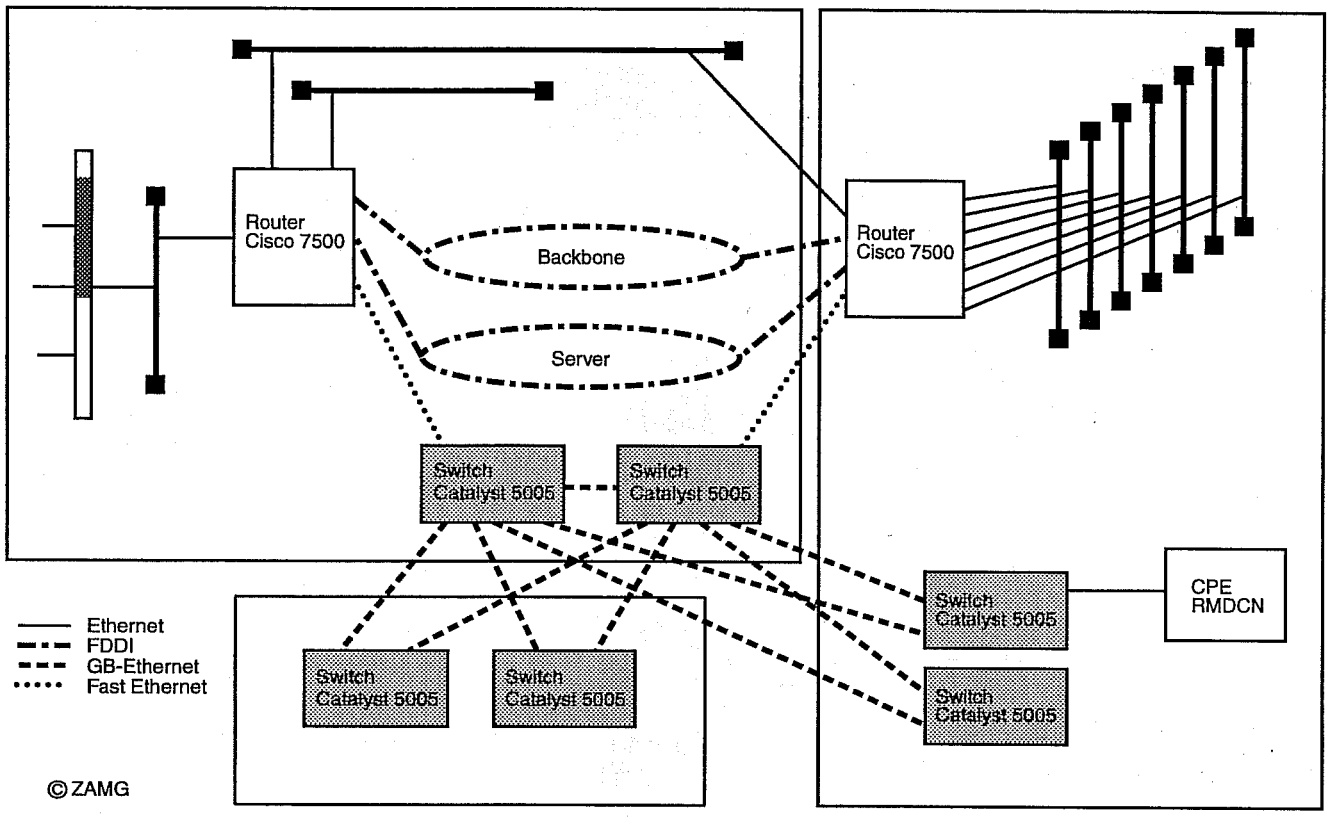
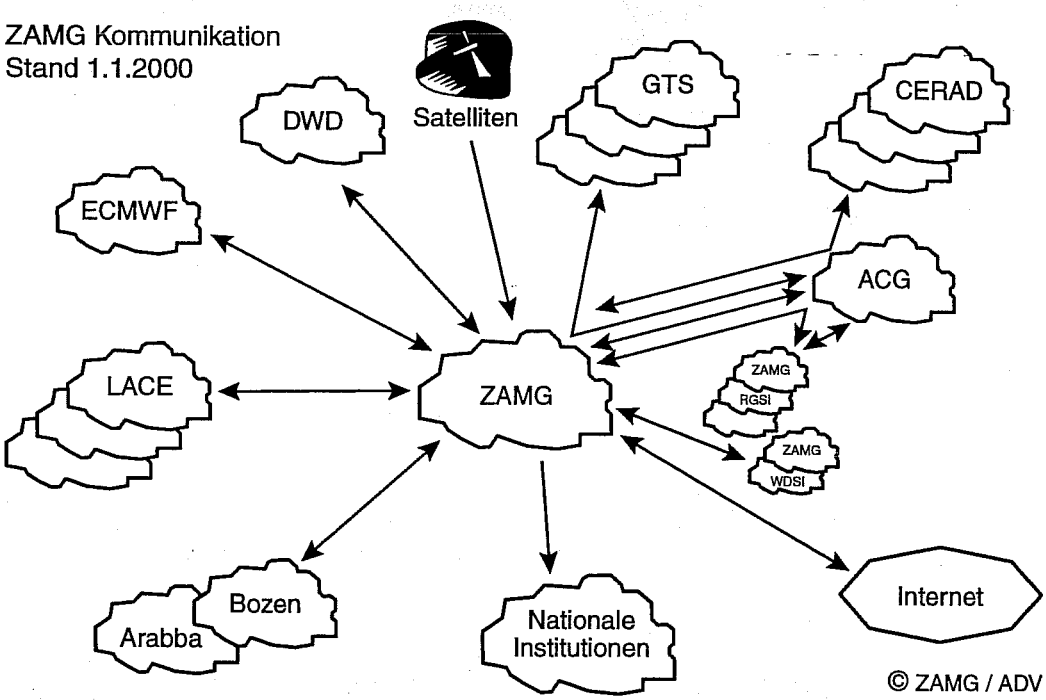
ZAMG internal Network



ZAMG Kommunikation
Stand 1.1.2000



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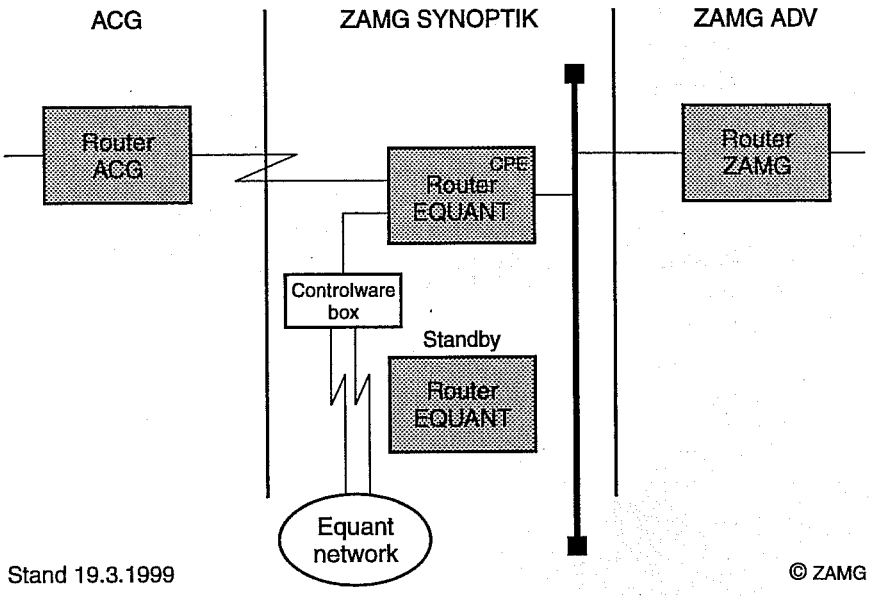


Connection		Port	CIR		GTS		CIR	GTS	% - LACE	Relation GTS / total (%)	GTS in / GTS total (*100 %)	Share		Remarks
FROM	TO		OUT	IN	OUT	IN	in + out = total	in + out				Connected State %	Country GTS %	
AUSTRIA		512	376	296										
	Croatia		64	8	16	8	72	24	66.67	33.33	0.33	88.89	11.11	RC-LACE
	Czech Rep		16	128	8	16	144	24	83.33	16.67	0.67	88.89	11.11	RC-LACE
	Germany		24	24	24	24	48	48		100.00	0.50	50.00	50.00	ACG
	Hungary		64	16	16	8	80	24	70.00	30.00	0.33	90.00	10.00	RC-LACE
	Slovakia		48	16	8	8	64	16	75.00	25.00	0.50	87.50	12.50	RC-LACE
	Slovenia		64	8	8	8	72	16	77.78	22.22	0.50	88.89	11.11	RC-LACE
	ECMWF		96	96	192									ECMWF

Budgetary costing for RC-LACE countries – percentage of account

BELGIUM

BELGIUM

B. Vetters pointed out that he was standing in for Liliane Frappez.

Bart Vetters

1. Computer infrastructure at the RMI

The past year has seen significant changes in the computer infrastructure at the RMI. The parts of the network and the computing resources that are shared between the three institutes sharing the same campus (the Belgian Institute for Space Aeronomy, the Royal Observatory of Belgium and the RMI) have been upgraded recently or are in the process of being upgraded.

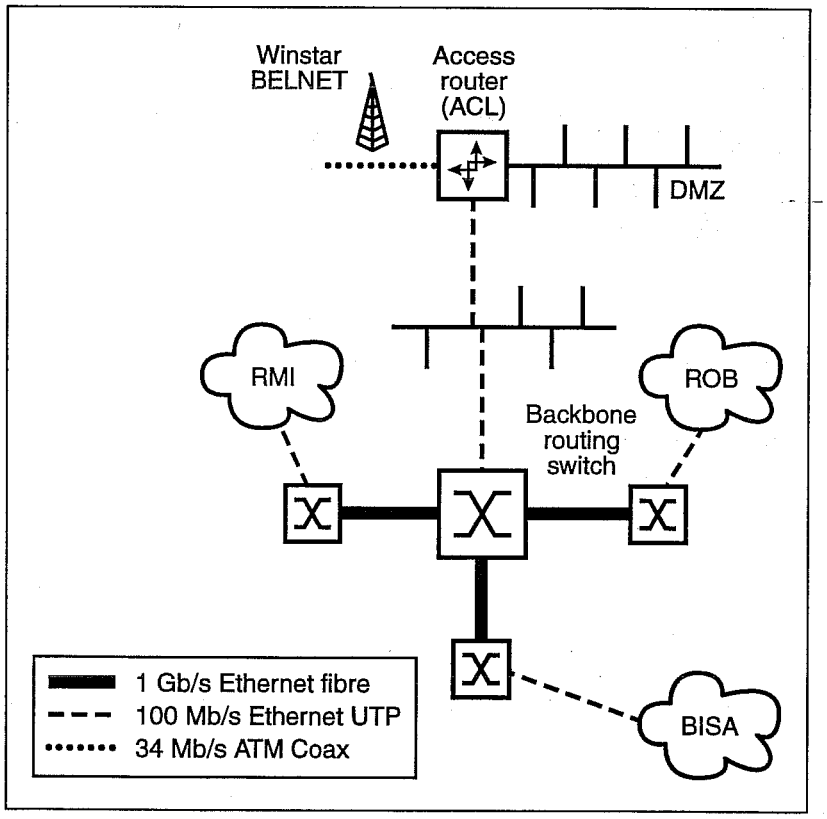
1.1. Shared infrastructure

1.1.1. Network

In the past, the backbone of the network consisted of a dual FDDI ring connecting the shared servers and each institute's most important servers. Each institute had its own switched Ethernet network in addition to this FDDI ring. The FDDI ring is currently still in use, but it has been supplemented by a Gigabit Ethernet backbone connecting the three institutes' networks. At the core of the backbone sits a Cisco Catalyst 4006 routing switch, which is connected with a gigabit Ethernet connection over fibre to one HP Procurve 8000 switch at each institute. The institute's networks are connected to these Procurves.

The FDDI ring is connected to the backbone through a switch further downstream in the ROB network. It is the intention to phase out the use of the FDDI ring as servers currently connected to it are replaced.

The newly acquired compute server and file server cluster will be directly connected to the backbone routing switch.



BELGIUM BELGIUM

1.1.2. Computing resources

Currently, the shared computing resources consist of a cluster of file servers and two computing servers:

- HP 9000/K410 (2 processors, 640MB memory, 6GB internal disks): first file server cluster node (active)
- HP 9000/K210 (2 processors, 640MB memory, 4GB internal disks): second file server cluster node (hot standby)
- 2 x 200 GB HP 12H AutoRAID disk arrays: storage for fileservers
- 400GB optical disk jukebox: Nearline storage
- Cray SV (8 SV1 processors, 4GB memory, 60 GB internal disks)
- HP 9000/V2200 (8 PA8200 processors, 2GB memory, 36GB internal disks)

The servers to replace the above have been ordered and will be installed over the following months. The new infrastructure will consist of:

- 2 HP 9000/L2000 (2 processors, 3 GB memory, 2 x 18 GB internal disks): file server cluster. Both nodes are active (load balancing).
- 1 HP FC-60 FibreChannel disk arrays with 2TB of storage, to be complemented by an additional FC-60 with 2TB in two years.
- SGI Origin 3400 (24 processors, 24 GB memory, 584 GB internal disks): compute server.

1.2. Computer infrastructure specific to RMI

In addition to the shared resources listed above, the RMI has the following servers in use:

- HP 9000/K210 (3 processors, 384 MB memory, 4GB internal disks): login and application server
- HP 9000/D390 (2 processors, 128MB memory, 9 GB internal disks): Met Office server. This server and the following two form a high availability cluster where each node is capable of taking over the functions of the other nodes.
- HP 9000/D370 (2 processors, 128MB memory, 2 x 2GB internal disks): Telecommunications server.
- HP 9000/K100 (1 processor, 256 MB memory, 2 x 3 GB internal disks): login server management and pilot database server.
- HP 12H AutoRAID disk array with 200 GB disk space: storage for the cluster detailed above.
- HP 9000/R380 (1 processor, 512MB memory, 2 x 9 GB internal disks): Nearline storage server and Intranet server.
- DLT jukebox with 2 drives and 30 tape slots: Nearline storage
- HP 9000/A500 (1 processor, 512MB memory, 2 x 18 GB internal disks): web server.

All but the last two servers are marked for gradual replacement over the following years, starting with a full database server (cluster of 2 HP 9000/L2000) and a new login and application server this year.

1.3. External communication links at the RMI

The Institute has the following external communication links:

- Internet connection: recently upgraded to 34 MB/s maximum, over a directional wireless link with Winstar, and from there to Belnet, the Belgian leg of the European research network.
- RMDCN: leased line to SITA POP Brussels (256 Mb/s) with dual ISDN backup.

The following CIRs are used:

- ECMWF: 96 kb/s
- Brussels to Toulouse: 32 kb/s
- Toulouse to Brussels: 96 kb/s
- Bracknell: 16 kb/s
- Belgocontrol (civil aviation service): 64 kb/s leased line through Cisco router
- MeteoWing (military aviation): 64 kb/s leased line through IBM router (up for replacement)
- Branch office in Zeebrugge (AWZ): 128 kb/s ISDN through Cisco Router
- Branch office in Dourbes: 96 kb/s leased line through Cisco Router, with binary radar data multiplexed on the line.
- Leased line to VRT (national television) - ordered but pending
- Several modems for data collection and distribution
- A modem pool for users (dialback)
- To the lightning detection system Safir
- To Météo France RETIM system (via satellite)

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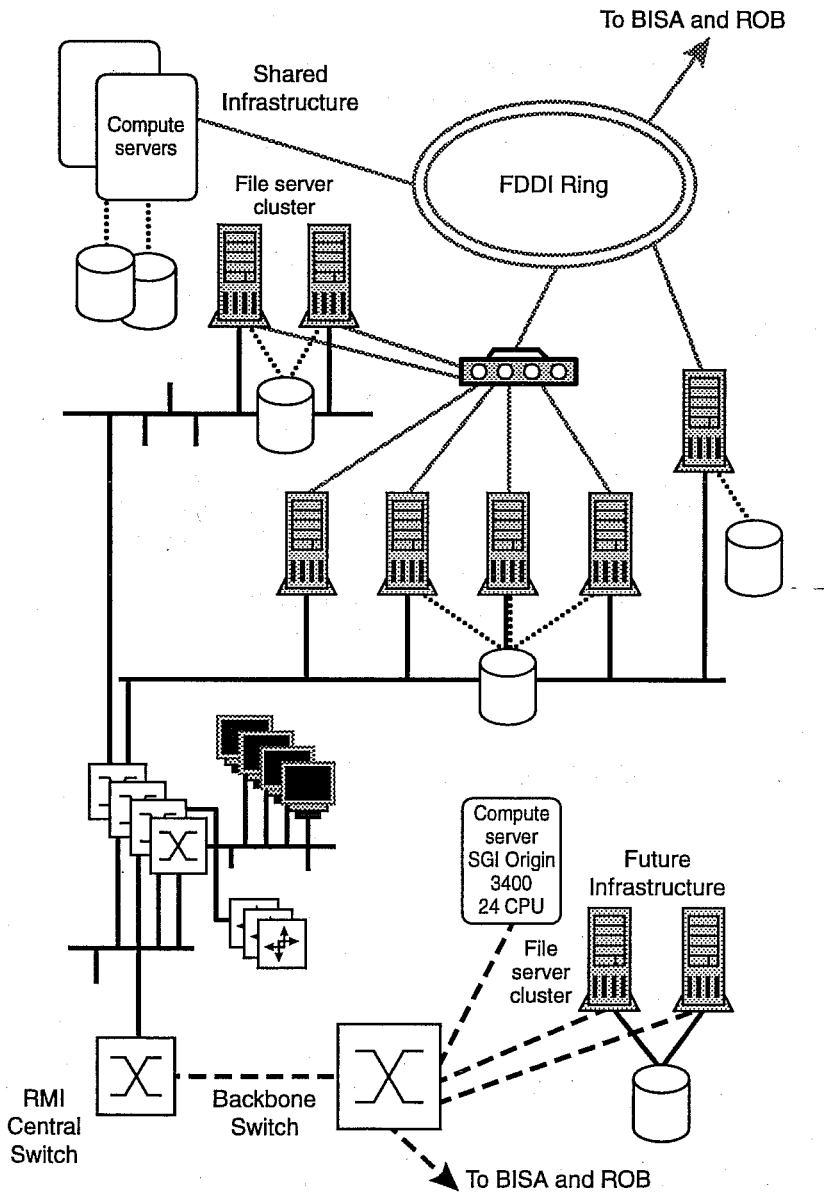
2. RMI use of ECMWF computer facilities

A number of projects are running at the RMI that use MARS archives, e.g. data for snow models and ozone calibration measurements, as well as the use of 15 year reanalysis data set in a study to improve regional climate modelling of extreme events.

Two specific projects use the Fujitsu compute servers:

- SPBECLIMOD, a coupled global atmosphere ocean sea-ice model (AOGCM) used to study the influence of air-sea-ice interactions in the Polar Regions on global climate.
- A study is underway and nearing conclusion on the use of the NCEP ETA model. RMI users are very satisfied of the service and support by and from ECMWF.



DENMARK

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The computer system at DMI

The software that manages the GTS communication is installed on to Sun Sparc stations and has functioned for several years without any problems.

The received data is transferred to the SGI Origin 200 computers for decoding and to two Sun Sparc stations for AFTN use.

The decoding programs for SYNOP, METAR and Sealevel has in the last year been modified in order to make some extra quality control of the observations from Denmark, Greenland and Faroe Islands. The new quality control will be taking the different climatological limits in account when checking the observations. The implemented controls consist of max/min check, step check and check for internal conflicts in the observation. All decoded observation is stored in the GTS-database in BUFR-format.

Data from 3 Danish weather radars are handled by micro-VAX 3100 computers and transferred from these to DMI via ISDN using ftp.

There has been installed a new weather radar in March 2001 at Stevns in the south-east of Seeland. Data is transferred to the radar server and will in near future replace data from the radar placed at Copenhagen airport.

Data from ECMWF are received on a Sun Ultra Sparc and stored in the GRIB database for use in the operational suite.

Meteosat and NOAA data are received on PCs and transferred to two Sun Ultra Sparc stations for processing and generation of products.

The main computing system for running different weather prediction models still consists of a 16 processor NEC SX-4 with 4 Gb MMU, 8Gb XMU, 136 Gb disc storage. The HIRLAM weather prediction model is run for an area around Greenland and an area around Denmark. The run consists of nested models, where the first model run uses ECMWF as boundary fields, while the nested models uses the HIRLAM as boundary conditions. The data generated is stored in the mass storage system that holds up to 16 Tb.

The NEC SX-4 computer was installed at DMI around five years ago and in order to replace the computer, DMI has send out an ITT.

The computers running the operational suite and the computers used by the forecasters are monitored by a software system called patrol. This software system makes it possible to monitor the computers for disk-usage, CPU-usage and queue-lengths. Further more it is possible to implement modules that makes it possible to monitor whatever you want. With one of these modules it is possible to monitor if the GRIB data from ECMWF has been stored in the GRIB database.

In order to make it easier for the operator a product-database has been implemented. This database holds information of the products made available for the customers.

ECMWF Products

Denmark receives approx. 400 Mbytes per day from the operational forecast model, the wave models and the Ensemble Predictions.

12Z based products:	295 Mbytes
00Z based products:	88 Mbytes
Ensemble Products:	1 Mbytes
Wave model products:	20 Mbytes

The data received from ECMWF is transferred to the computers holding the GRIB database. The data is the accessible by the graphics package which is based on Metview that is originally obtained from ECMWF.

Projects run at ECMWF

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

The research department are running some experiments on the HIRLAM 3D-Var code. Some jobs have been run in order to compare the new 3D-Var code with the reference HIRLAM system.

The VPP 700 has also been used in calculating trajectories for the stratosphere and there have also been run jobs connected to a research project on reduction of the ozone layer.

DENMARK

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DMI has recently send to requests for two special projects.

The two projects covers the areas 'Heavy rain in Europe' that is connected to 'A European Flood Forecasting system' and 'detection of Changing Radiative Forcing over Recent Decades'.

UNIX servers

3 SGI Origin-200

- 1 server with 4 R10000 processors, 2 Gb main memory, 300 Gb disk storage
- 1 server with 4 R10000 processors, 2 Gb main memory, 150 Gb disk storage
- 1 server with 2 R10000 processors, 2Gb main memory, 74 Gb disk storage

These systems handle the data pre-processing, message switching, the generation of the GRIB database, the post-processing and most of the production of graphical products.

SGI Origin-200

- 1 R5000 processor, 128 Mb main memory, 4 Gb disk storage.
- Applications development and testing.

SGI Origin-2000

- 4 R10000 processors, 1 Gb main memory, 64 Gb disk storage.
- File server for the research department.

SUN Ultra 10 Servers

- 1 processor, 128 Mb main memory, 9 Gb disk storage.
- Serves as file servers for the different departments.

SUN Ultra Enterprise Server

- 2 processors, 256 Mb main memory, 68 Gb disk storage of which 60 Gb is raided.
- Climatological database based on Ingres DBMS

2 SUN Ultra 10 Servers

- 1 processor, 128 Mb main memory, 9 Gb disk storage.
- ftp servers

2 SUN Ultra 10 Servers

- 1 processor, 128 Mb main memory, 9 Gb disk storage.
- ftp servers.

2 SUN Ultra 10 Servers

- 1 processor, 128 Mb main memory, 9 Gb disk storage.
- firewalls.

2 SUN Ultra 10 Servers

- 1 processor, 128 Mb main memory, 9 Gb disk storage.
- Internet servers.

2 SUN Sparc 5

- 1 processor, 96 Mb main memory, 18 Gb disk storage.
- Handling of GTS communication, receiving of SADIS data.

6 SUN

- Different models.
- Handling of data to be send to external users.

2 SUN Sparc 5

- 1 processor, 64 Mb main memory, 20 Gb disk storage.
- Handling satellite data from Meteosat and NOAA.

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Other computers

Data from the 3 Danish weather radars are handled by micro-VAX 3100 computers and transferred from these to DMI via ftp.

UNIX Workstations

There are about 50 UNIX Workstations, of which most are PCs that has installed Solaris. Most of these PCs are equipped with two screens.

Network

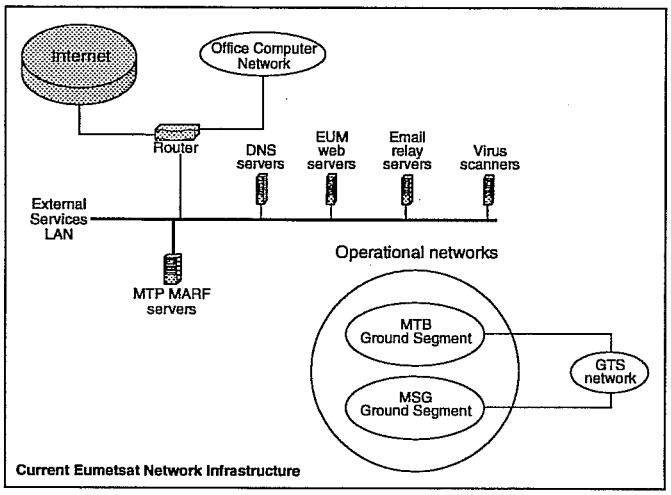
On the Local Area Network we link the network by use both routers, bridges and switches. The networks at the regional centres are linked by bridges via leased lines, using ISDN as backup.

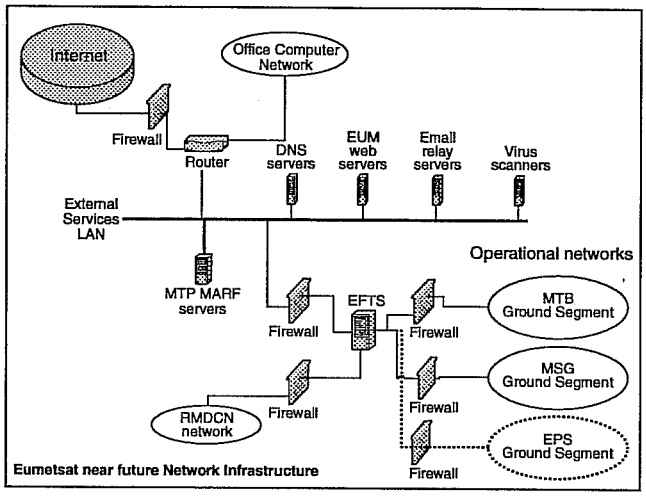
H. Baldursdottir (Iceland) asked whether the Patrol monitoring software was a commercial product. N. Olsen confirmed that it was.

1 The EUMETSAT Computer Systems

1.1 General Overview

The EUMETSAT computer equipment is separated in operational, office and external information services computer systems. The operational systems provide the satellite-related infrastructure, the office computer systems provide the internal office and research environments and the external information services systems provide Internet alike services.





1.2 The MTP Ground Segment

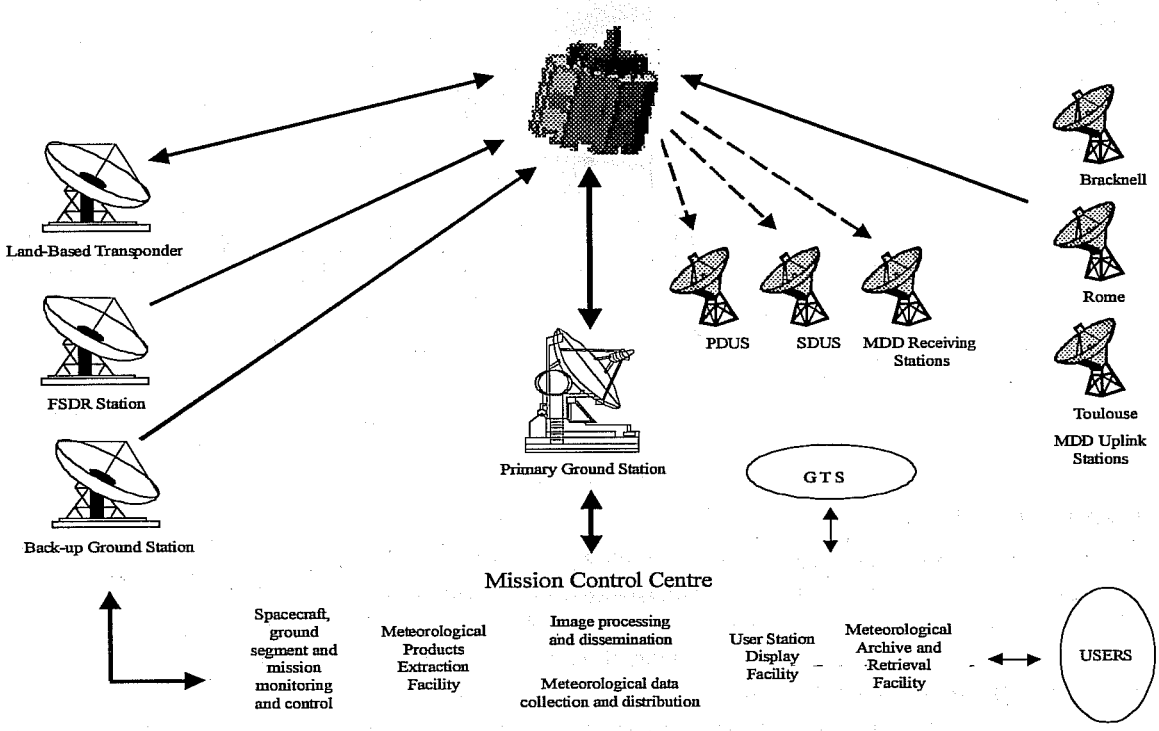
The Meteosat system provides continuous and reliable meteorological observations from space to a large user community. In addition to the provision of images of the Earth and its atmosphere every half-hour in three spectral channels (Visible, Infrared and Water Vapour), a range of processed meteorological products is produced. Meteosat also supports the retransmission of data from data collection platforms in remote locations, at sea and on board aircraft, as well as the dissemination of meteorological information in graphical and text formats.

- The MTP Ground Segment (GS) system includes the Mission Control Centre (MCC) located within the EUMETSAT Headquarters in Darmstadt, which is composed of five main facilities:
  - The Core Facility (CF), providing satellite, ground segment and mission monitoring and control functions, image processing and dissemination, meteorological data collection and distribution. This is facility is based on around 100 Compaq Digital servers and workstations running OpenVMS;
  - The Meteorological Products and Extraction Facility (MPEF) derives meteorological products by processing satellite images and ECMWF data supplied by the core facility; A second instance of this facility, the reprocessing MPEF (RMPEF), derives meteorological products from historical images retrieved from the MARF archive and using ECMWF analysis data retrieved from ECMWF via the MARS interface using an off-line workstation and then transferred to the RMPEF via tape. This is facility is based on around 30 HP servers and workstations running HP-UX.
  - The Meteorological Archive and Retrieval Facility (MARF) provides the means for the archive and retrieval of satellite images and meteorological products generated by the MPEF and RMPEF facilities. This is facility is based on around 40 SUN servers and workstations running SUN Solaris and two StorageTek DLT tape libraries.
  - The User Station and Display Facility (USDF) to visualise data/images disseminated over the satellites, based on around 11 Compaq Digital servers and workstations running OpenVMS;
  - The Encryption Facility (EF) for encrypting uplinked and disseminated data and the associated communication links equipment, based on 2 Compaq Digital servers running OpenVMS.

The backbone communications equipment is based on around 9 [Compaq] Digital Decnis routers. The main routing protocol is RIP, using static routes to WAN interfaces.

There are also a number of low speed data links connecting elements within the MTP Ground Segment either to provide services to various EUMETSAT users or to support maintenance activities. There are **two X.25 leased lines to the Deutsche Wetter Dienst (DWD) to allow information exchange over the Global Telecommunications Systems (GTS)** of the World Meteorological Organisation (WMO). ECMWF data (forecast atmospheric profiles, sea surface temperatures and radiosonde data) is received twice a day via the Core Facility and sent to the Meteorological Products and Extraction Facility (MPEF).

IP is the predominant protocol used within the MTP ground segment. For LAN interconnections, the IP packets are transported in Ethernet or FDDI frames. The two main exceptions are X.25 for the GTS and Decnet for the Core Facility layered products (DTSS, DNS, DFS). TCP/IP is used by the communication layers to provide a reliable transfer protocol.

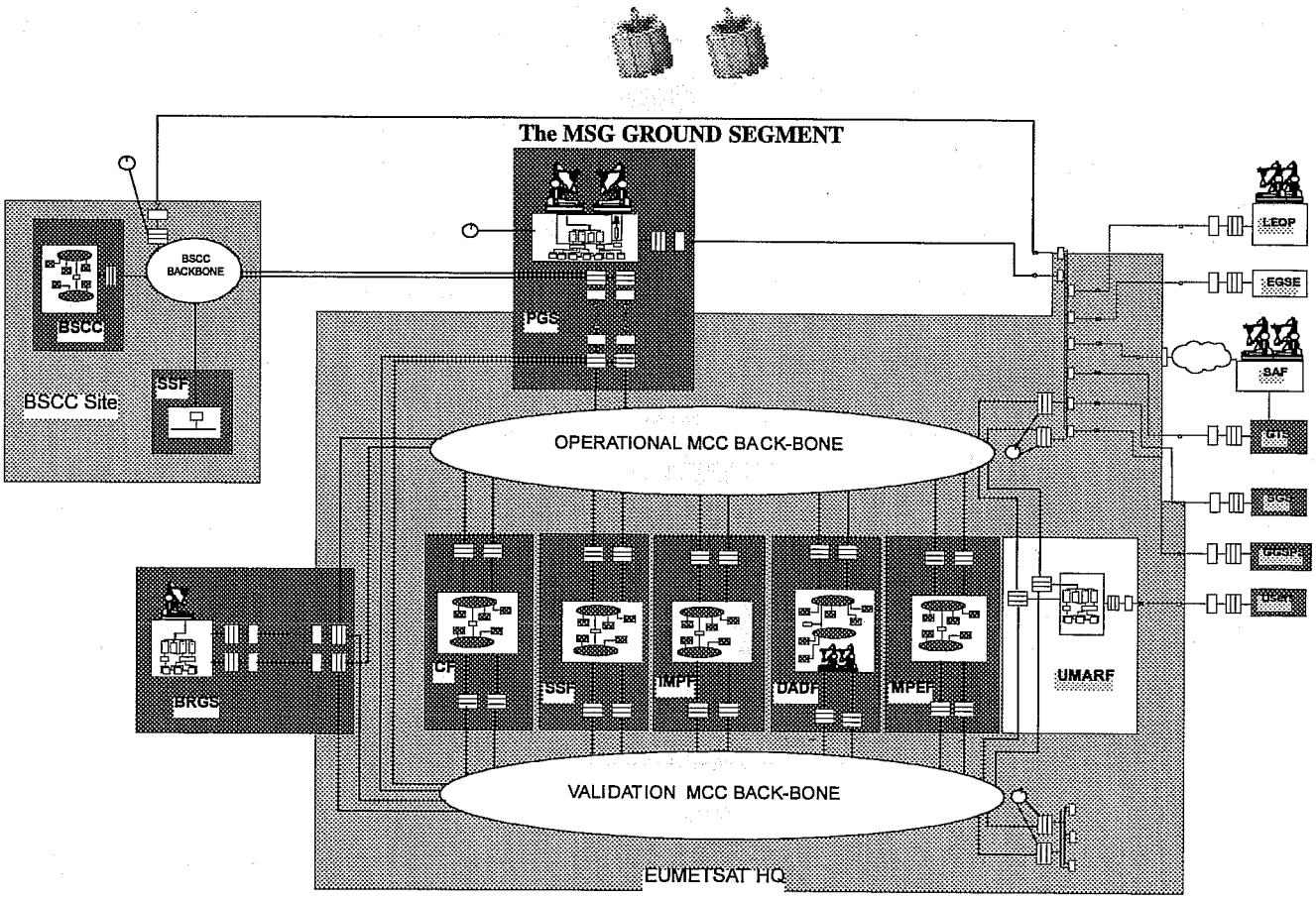


1.3 The MSG Ground Segment

- The MSG Ground Segment (GS) system includes the Mission Control Centre (MCC), which is composed of:
  - The MSG Central Facility (CF) provides integrated support for mission operations and is responsible for monitoring and control of all other MSG facilities including all MSG satellites, it is based on around 90 Compaq servers and workstations running Windows NT.
  - The Meteosat Second Generation Image Processing Facility (IMPF) is responsible for the reception, preparation and subsequent distribution of the MSG payload data. It is based on around 25 Compaq Digital servers and workstations running TRU64UNIX.
  - The Data Acquisition and Dissemination Facility (DADF) is responsible for the acquisition, dissemination and distribution of the MSG mission data. This includes acquisition of satellite images, DCP messages, foreign satellite data, meteorological data and SAF products. These data are then disseminated in encrypted and compressed form (if required). DCP bulletins and meteorological products are distributed via the Global Telecommunication Network (GTS). It is based on around 45 Compaq Digital servers running Windows NT.
  - The Meteorological Product Extraction Facility (MPEF) generates meteorological products. The MPEF receives input data for the generation of meteorological products from the IMPF and from the DADF (F/C Data, Observation Bulletins, and Foreign Satellite Data). Its is based on around 30 HP servers and workstations running HP-UX.
  - The Unified Archive and Retrieval Facility (UMARF) provides the archive and retrieval of MSG data. It also provides user services to the users via an Internet web server. Its is based on around 15 Compaq Digital servers and workstations running TRU64UNIX and two ADIC tape libraries using SONY AIT-2 media.

EUMETSAT

The connectivity between and within facilities is provided by means of a common networking approach, i.e. network management and communication protocols. The concept is based on an FDDI backbone architecture, which is operated in a dual-homing configuration to provide a high degree of fault tolerance. TCP/IP is used. The communications equipment is based on around 45 Cisco routers, 20 switchers and 45 concentrators. The main routing protocol is OSPF, using static routes to WAN interfaces.

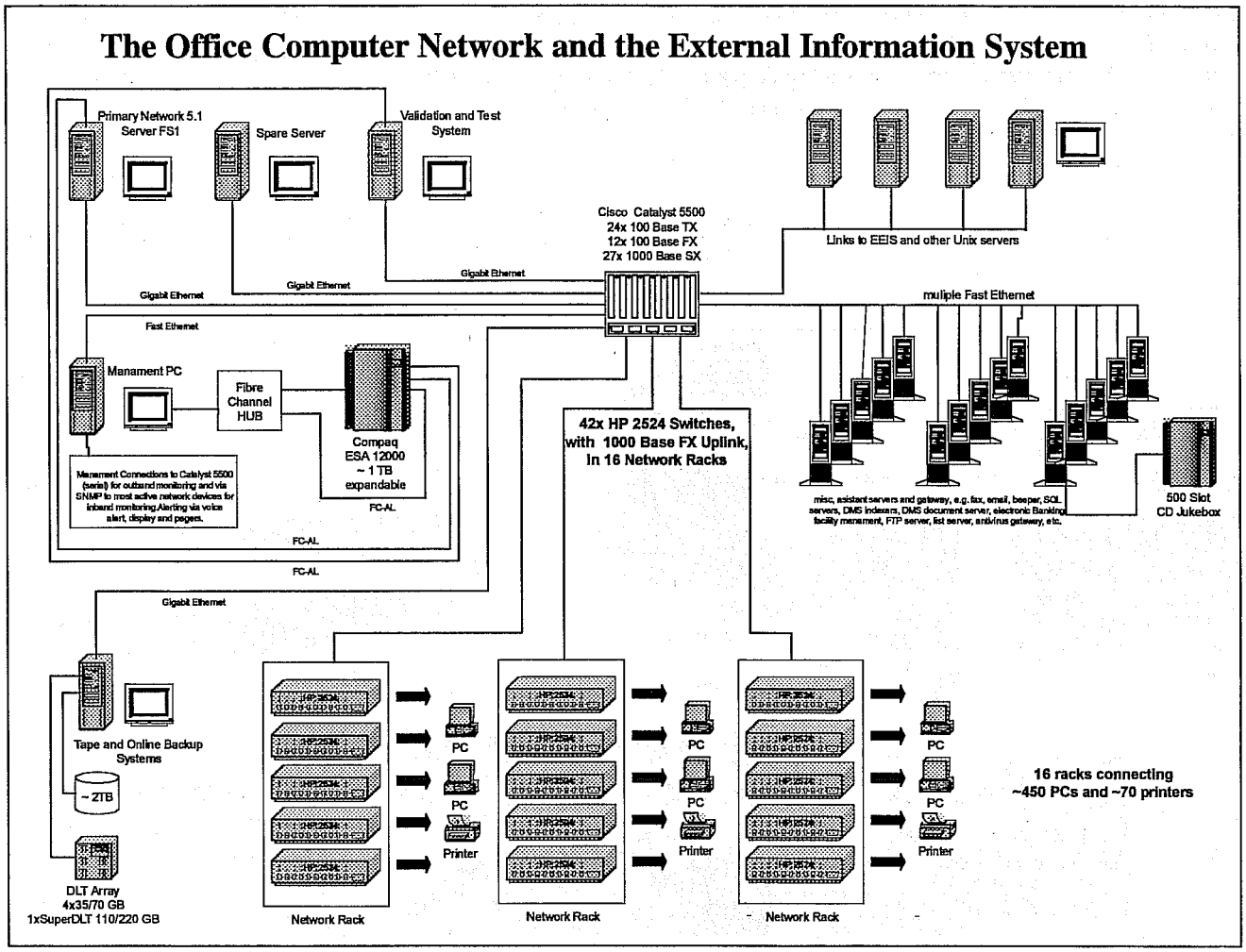


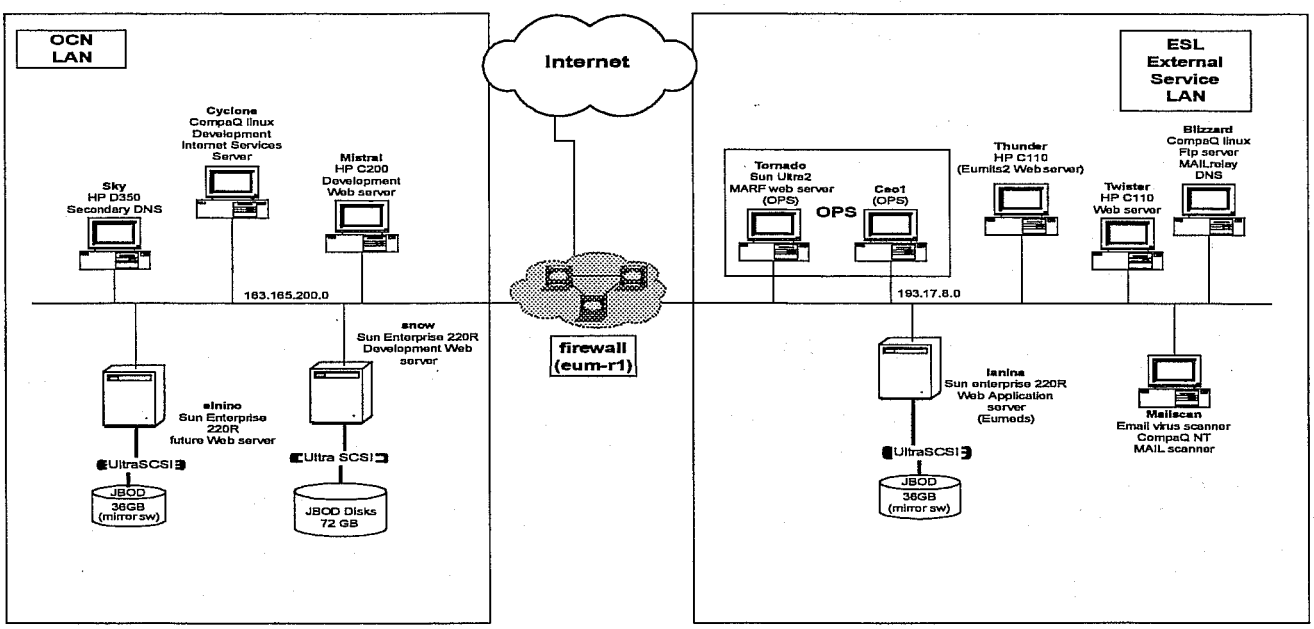
1.4 The Office Computer Network and the External Information System

The office computer systems provide the internal office and prototyping and research environments. There are 11 users registered with the MARS service. ECMWF data is used in those environments for testing new meteorological generation algorithms in the following ways:

- Telnet to tw-gw.ecmwf.int to run programs in interactive or batch mode
- Ftp to ftp-gw.ecmwf.int
- Using marsclient to ecgate on port 9100, for interactively accessing the ECMWF MARS service. This is routed via DWD
- On some hosts, the eccopy program is running, allowing batch access to the MARS (also routed via DWD).
- Metview1.8 is used daily for obtaining the ECMWF weather charts.
- Daily SMS jobs to produce metgrams and epsgrams for several European cities run at ECMWF.

The external information services systems provide connectivity to the Internet and Internet services like web servers, ftp servers, security, DNS, etc.


The Office Computer Network and the External Information System
Primary Network 5.1 Server FS1
Spare Server
Validation and Test System
Cisco Catalyst 5500
24x 100 Base TX
12x 100 Base FX
27x 1000 Base SX
Links to EEIS and other Unix servers
Gigabit Ethernet
Fast Ethernet
mulitple Fast Ethernet
Manament PC
Fibre Channel HUB
Compaq ESA 12000 ~1 TB expandable
FC-AL
42x HP 2524 Switches, with 1000 Base FX Uplink, in 16 Network Racks
misc. assistant servers and gateway, e.g. fax, email, beeper, SQL servers, DMS indexers, DMS document server, electronic Banking facility manament, FTP server, list server, antivirus gateway, etc.
500 Slot CD Jukebox
Tape and Online Backup Systems
~ 2TB
DLT Array 4x35/70 GB 1xSuperDLT 110/220 GB
PC
Printer
Network Rack
16 racks connecting ~450 PCs and ~70 printers

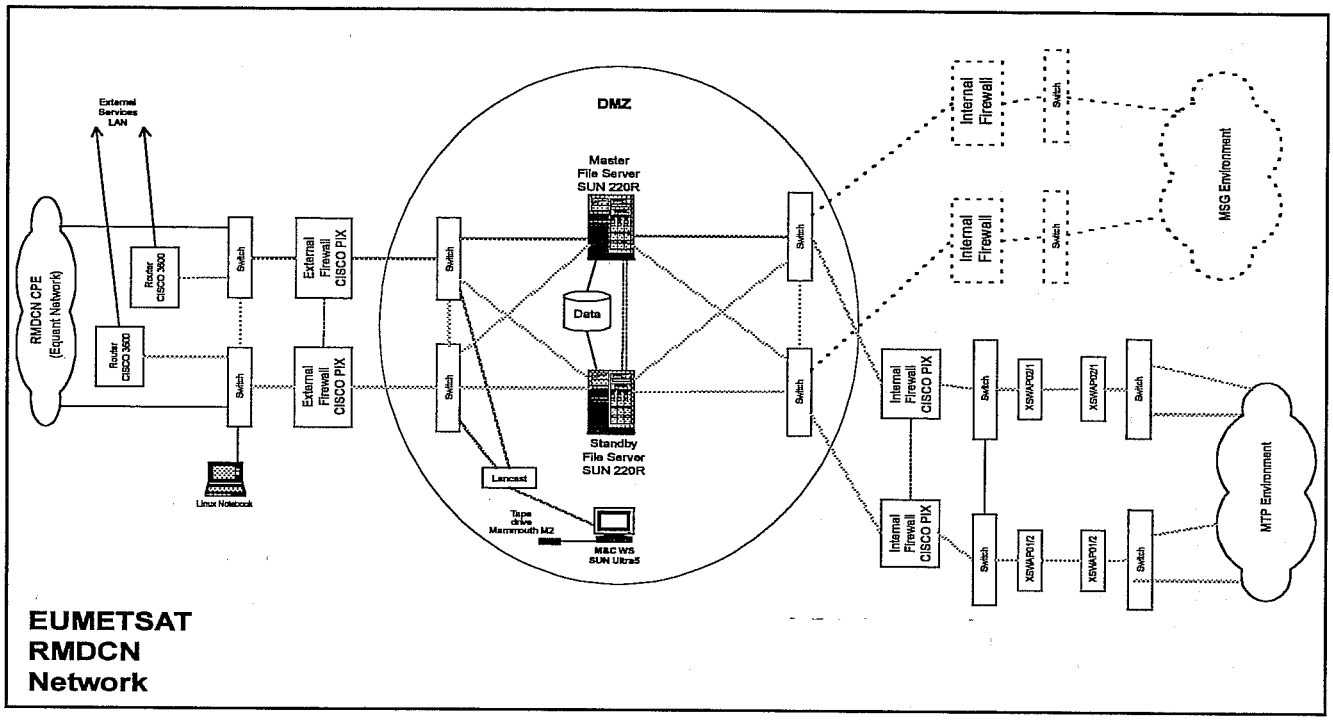

OCN LAN
Internet
ESL External Service LAN
Cyclone CompaQ linux Development Internet Services Server
Mistral HP C200 Development Web server
Sky HP D350 Secondary DNS
163.165.200.0
snow Sun Enterprise 220R Development Web server
elnino Sun Enterprise 220R future Web server
UltraSCSI
JBOD 36GB (mirror sw)
Ultra SCSI
JBOD Disks 72 GB
firewall (eum-r1)
Tornado Sun Ultra2 MARF web server (OPS)
Ceo1 (OPS)
OPS
Thunder HP C110 (Eumits2 Webserver)
Twister HP C110 Web server
Blizzard CompaQ linux Ftp server MAILrelay DNS
193.17.8.0
Ianina Sun enterprise 220R Web Application server (Eumeds)
Mailscan Email virus scanner CompaQ NT MAIL scanner

EUMETSAT

2 Overview of EUMETSAT future computer systems

2.1 The new RMDCN Infrastructure

In order to connect to the RMDCN and comply with the EUMETSAT security policy, a new infrastructure is being implemented. This implements a demilitarised zone (DMZ) surrounded by firewalls (fully redundant CISCO PIX). The DMZ is connected, on one side to the RMDCN and on the other side to the ground segments. The file servers in the DMZ are SUN 220R servers using Veritas Clustering software for high availability purposes. Files arriving from the RMDCN into the file servers are distributed to all the internal users using the Deutsche Wetter Dienst Automatic File Distribution (AFD) software.



FINLAND

FINLAND

Timo Hopeakoski, Finnish Meteorological Institute

Computing Environment at FMI

General

- the production environment is mainly based on centralised database systems
- the databases are built on Oracle 7.3.4 system and a great deal of data handling is based on C/C++ software
- the database servers are semi-clustered and the cluster consists of two Digital-Unix server
- the backup systems use Networker software, Oracle backup software and the Clone feature of the operating system
- the real-time database contains weather data which is stored immediately after its arrival and is available a couple of days

Projects run at ECMWF

- The international HIRLAM project
- MARS data retrieval and processing
- Finnish sea wave model
- Research of air pollution
- Trajectory models
- Air quality models
- Stratospheric chemistry model

Experience using ECMWF systems

- user support we have got has been excellent
- no major difficulties in processing runs
- the certificate system is now working perfectly

Computing statistics

Number of weather messages received daily	16,000
Number of production processes daily	2,500
Number of computers under control	170
Number of network devices	35
Number of local network (IP-networks)	30
(VLAN)	9
Number of IP-addresses	1,200
Number of Decnet addresses	60
Number of daily e-mail messages	4,000
Number of PCs	800
Number of Macintoshes	30

(Observations, HIRLAM and ECMWF products)

- the climatological database contains all weather information from Finland starting from the year 1880
- the administrative databases contain information about personnel, salaries, education etc.
- the size of the databases at present are real-time 30 Gbytes, climatological 15 Gbytes, administrative 4 Gbytes
- the speed of the connection to ECMWF is 96 Kbytes/s and uses TCP/IP protocol and RMDCN network

FINLAND

FINLAND

Hardware

ECMWF

- number crunching Fujitsu
- data archives SGI

CSC (Centre for Scientific Computing) situated in Espoo, Finland

- number crunching Cray T3E (512 + 32 CPUs)
- SGI O2000 (128 CPUs)

System security

- Firewall Digital Alpha
- backup systems Digital Alpha

Monitoring systems

- SMS
- PCM (Polycenter Console Manager)
- Netview

Personal workstations

- Unix SGI 25, Alpha 8
- VMS (Meteorologist's workstations) VAX 40
- Linux 60
- NT 15

Weather prediction servers

- Unix SGI 4, VAX 2

Research servers

- Unix SGI 3, ALPHA 1

Product servers

- Unix SGI 1
- Linux 1
- NT 3
- VX/VMS 1

Satellite operations servers

- VMS Alpha 2

Radar operations servers

- Unix (Iris) SGI 9 (2 O2 + 7 Indy)
- VMS (Nordrad) VAX 1
  Alpha 2

Database servers

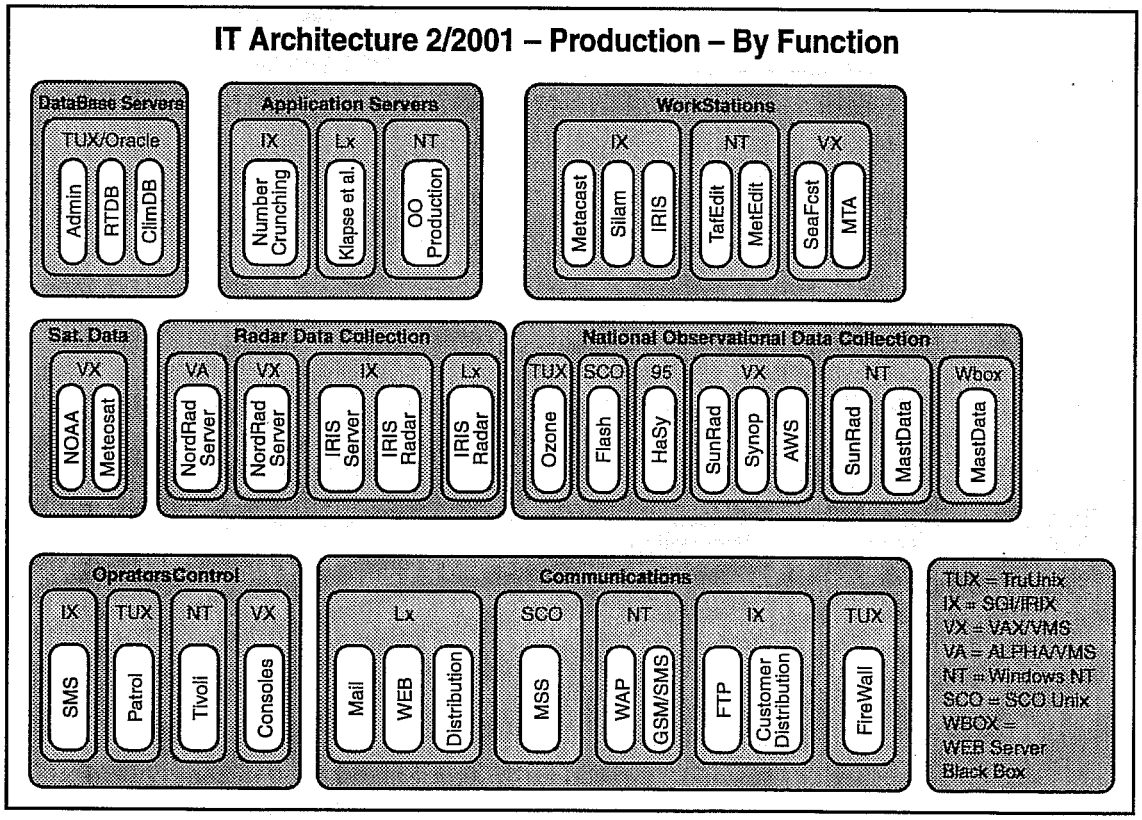
- Unix Alpha 3

WWW servers

- Linux 3

MAIL servers

- Linux 2
- Mail/DNS SGI 1

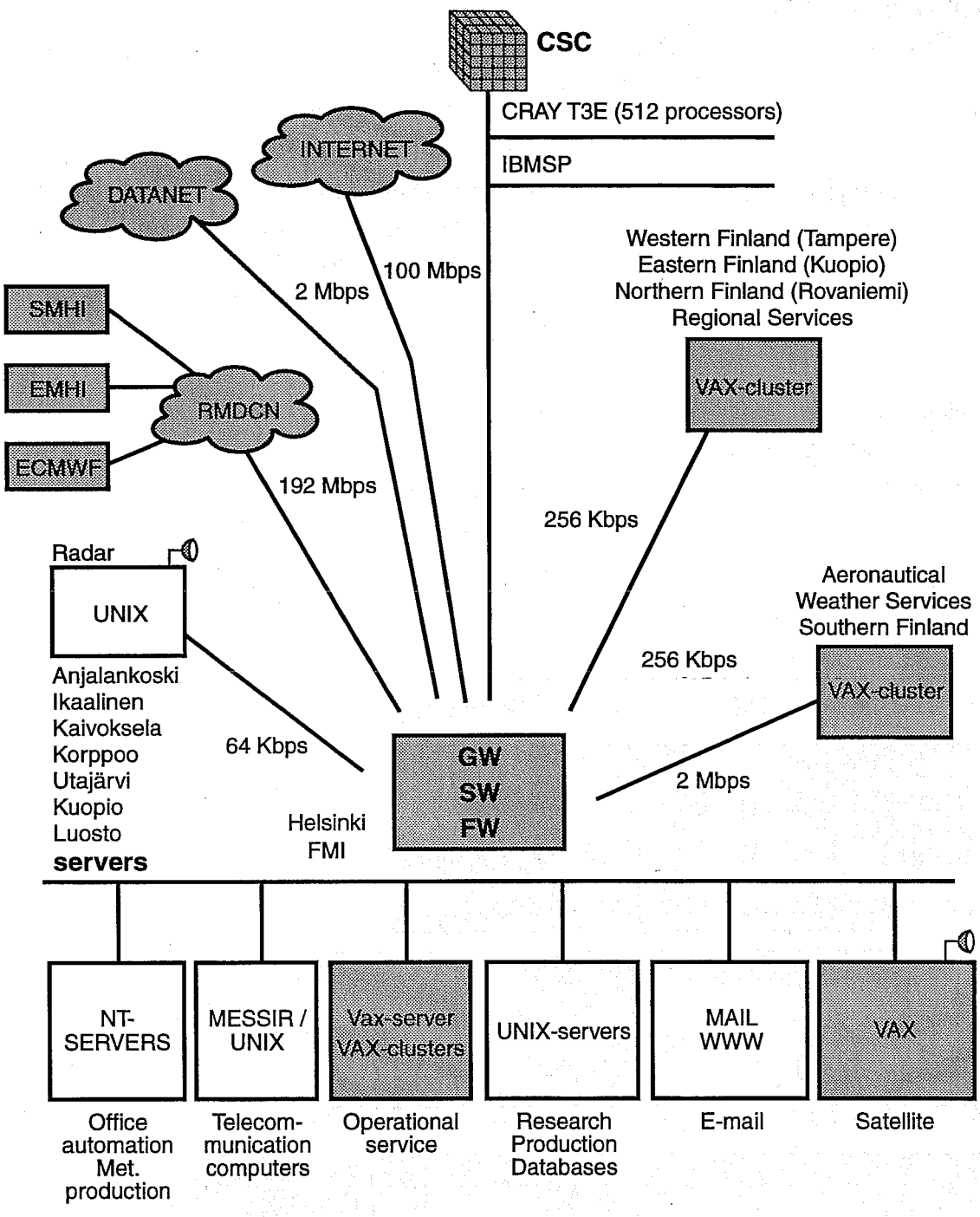


FINLAND

FINLAND

ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

COMPUTER NETWORK AT FMI



J. Greenaway asked whether FMI had any plans to upgrade their forecasting system from the Cray T3E to an SP. T. Hopeakoski replied that the move was planned for later in the year.

FRANCE

FRANCE

Marion Pithon, Météo France

1. Computing environment and Network Configuration at Météo France

1.1 Central computing system

No major change in the computing environment since last year.

The current configuration is the following:

- Vector computing: VPP5000 (31 PEs)
- File server and archiving system: O2000 (8 procs), 2 STK 9310 silos, an IBM 3494 library and a STK 9710 silo.
- Production system (pre and post processing, database . . .): HP servers
- Scalar systems: HP servers
- Visualisation system: SUN servers
- Climatological database: a SUN server
- Backup system: a SUN server and a STK9710 silo
- Telecommunication system: SUN servers
- Office servers: 4 Windows NT servers

Supercomputer

The VPP5000 is a distributed memory parallel vector computer with 31 PEs (delivering each a peak performance of 9.6 Gflops), 208 Gbytes of total memory and 2 Tbytes of RAID5 disks. The current configuration was installed in October 1999.

All operational tasks (different runs of a global model with a 4D-Var assimilation scheme, a limited area model, some post processing, two wave models, trajectories models, seasonal forecasts...) are run on the VPP5000 since February 2000.

Many research models (climate model, mesoscale model, chemistry model, coupled ocean atmosphere models) use also VPP resources.

About 15% of the total CPU delivered is used by operational tasks with important requirements (10 or 16 PEs for 4D-Var runs, highest priority . . .).

A replacement system is planned for 2003; this means an Invitation To Tender for next year.

File server and backup system

The data management is provided by an archiving system made of a SGI O2000 (8 processors, 4 Gbytes of memory and 1.8 Tbytes of RAID3 disk cache) which controls an IBM3494 library and two StorageTek 9310 silos (with 42 drives in total) and a STK9710 silo (with 6 DLT drives) in a remote location for double copies. The total capacity of the system is 120 Tbytes. The total volume of data stored is 60 Tbytes (with more than 3.5 Million of files) and a monthly growth of 3 Tbytes. The software used for the file service and archiving system is SGI's DMF.

The backup service is provided by the software "Time Navigator" from Quadratec on a SUN E450 and a STK9710 silo.

As this file server service will not face the flow of data generated by a new generation of supercomputer (a factor of 3, at least, is expected), it must be upgraded before the end of 2002.

HP servers

A set of HP servers (2 N4000, 2 D370 and 2L1000) is in charge of all the operational tasks: The 2 N4000 handle pre-processing and post-processing of data and the databases for observations and forecast products. Oracle software is used. The start of the models on the supercomputer, the monitoring and supervision of all operational tasks are made on the D370. There is also one server for tests and integration.

5 HP servers (1 L2000 with 4 procs, 2 K570 with 3 procs and 2 D and J class servers with 2 procs) are available to users for development purpose, use of graphical tools, code management, front end server for the VPP (cross compiling, job submission to the VPP, use of graphical libraries for visualisation . . .)

SUN servers

2 E3500, 1 E450, 9 Ultra 60 (2 procs), 9 Ultra 10 are used for the interactive visualisation system for forecasters.

A SUN E450 (2 procs) houses the backup system.

A SUN Enterprise 5000 is used for a climatological database (based on ORACLE).

A SUN E3000 (2 processors) handles the telecommunication system (locally developed software TRANSMET) which is in charge of collecting and broadcasting observed meteorological data.

Desktop systems and servers

The trend is to replace X terminals by PCs mainly running Windows NT and some of them with Linux (for the research department where more migrations to Linux are planned). Currently, in Toulouse, there are about 600 PCs (only 5% running LINUX), 200 X-Terminals and about 100 workstations.

1.2 Network

The major change since last meeting is the replacement of the wide area network.

Local area network: The backbone of our LAN is based on 2 CABLETRON devices (SSR2000) which provide Ethernet 100 connections between hosts.

A HIPPI link enables fast transfers between the VPP5000 and the O2000 (file server).

Computers dedicated to operational purpose are linked together through a FDDI ring. This should be replaced, this summer, by Ethernet Gbit connection. The choice of the provider should be made at the end of this month.

Wide area network: The leased lines to the 7 regional centres and other sites, and all ISDN connections to the different Meteo centres (about 90) are in process to be replaced by a Frame Relay network. This major change enabled a significant upgrade of the bandwidth. The Committed information rate (CIR) between Toulouse and the regional centres is now 1 Mb/s, and will be 64 kb/s between Toulouse and the local centres. Some leased lines remain for connection with outside services or X25 applications.

Connections to Internet (access to RENATER, the French academic and research network) is made through "GALACTIS", a high bandwidth ATM network in Toulouse, with a 4 Mb/s access. These connections are protected by a firewall implementation. The software used is Firewall1 from Checkpoint on dedicated equipment (NOKIA).

1.3 Connection to ECMWF

Our connection to the GTS and to ECMWF is made through the RMDCN network. The leased line to ECMWF, which remained for backup, has been cancelled recently since the provision of the backup configuration. The delivered bandwidth is asymmetric with a CIR of 512 kbps in and 256 kbps out.

Users also use Internet (with a maximum throughput of 4 Mbits/s) to connect to ECMWF and they are highly encouraged to use this mean for file transfers to avoid concurrent traffic with dissemination.

To insure the highest priority to dissemination traffic, ECMWF has to set a configuration on its "Packetshaper" in order to:

- prioritise (up to 90%) the dissemination products in the Meteo France's incoming traffic.
- throttle down also outgoing ftp-data traffic (France towards ECMWF) to a maximum of 200 kbps (for a CIR of 256 kbps) because ftp transfers were proved to affect incoming dissemination due to ACK packets getting delayed in saturated link.

Another way to promote the use of Internet among users is the availability of convenient transfer tools such as eccopy and ecget/ecput more and more widely used at Météo France.

2 Use of ECMWF resources

Operational products

Since the end of January, GRIB compression is used on the dissemination which enables 30 to 50% savings, depending on the product, without loss of information. This enables acquisition of more IFS products on 0.5 Grid. The total volume of data concerned by the dissemination of ECMWF products is about 730 MB compressed per day, which corresponds to 1.3 MB if not compressed. IFS, Wave model (100 MB) and EPS results are transferred. The sustained bandwidth is 440 kbps. Last month, the dissemination was moved on the MSS (TRANSMET) which leads to a change in file naming.

FRANCE

FRANCE

The projects

41 Météo France projects and 6 special projects are registered for this year with a total of 165 users registered; the main activity is data retrieval from MARS on ecgate1 (almost 75% of Météo France users).

The more active projects are:

- Climate simulations.
- Mesoscale model experiments.
- Participation in DEMETER project.
- Atmospheric predictability studies.
- Cyclones tracks forecasts with the limited area model ALADIN.
- Trajectories and backward trajectories computation.
- Statistical works on ECMWF data.
- Control and monitoring of data.
- IASI OSSE database exploitation.
- Studies on EPS.

The following are registered as special projects in 2001:

- MERCATOR project: build a global ocean circulation simulation tool based on a high-resolution model assimilating real time data
- Universal software for data assimilation: variational method for global ocean
- Chemistry cloud and radiation interactions in a meteorological model
- Seasonal to interannual predictability of a coupled ocean atmosphere model
- Decadal climate variability over the North Atlantic European region
- Forecasting optical turbulence of Astronomy applications with the MesoNH mesoscale model coupled with ECMWF products.

In 2000, the total amount of CPU used on the VPP was only 5% of CPU allocation for France. The only one project using VPP resources significantly is the one that participates in DEMETER.

To follow the advice given during last meeting we identify for 2001, 3 particular projects which will be able to use supercomputing resources: the 2 projects participating in DEMETER (frlmdcli and frauipsl), and a new project on atmospheric predictability studies which need to run big configurations of IFS 4D-VAR (frtorecy).

Experience and current concerns

- Users are satisfied with the good reliability of ECMWF various systems.
- Users appreciate the efficiency of the user support service. This service is more and more in demand due to the increase of the number of users.
- More use of the Web products (seasonal forecast), services (Mars and soon Prepifs) and access to the documentation. The simplification of the Web access procedure is very much appreciated and will save creation of new account and delivery of new secid cards for users who only need access to ECMWF MS Web server.
- More heavy use of ectools (eccopy and ecget/ecput) for file transfers through Internet. The majority of users find this tools convenient.

Eccopy: is very suitable for file transfers in batch mode, it would be just perfect if the following requirements were met: to raise the 30 MB limit for file size and enable more than one transfer per country simultaneously. These limits seem to be linked with the mechanism used (particularly lpr/lpd software). Are there plans for changes in that field?

Ecget/ecput: The problem of "broken connections" experienced because of HTTP time-out was rapidly solved by the local area network. The remaining issue is the limit set for passcode duration and number of files transferred (12 hours and 70 files). So transfers could not be done "automatically" during the weekend without resetting the passcode. Another issue is the requirement of direct transfers from ECFS to Meteo France system without temporarily storage on ecgate1 file systems.

- The use of Prepifs available on the Member State web site, on a regular basis seems to be difficult. We experienced problems with the load of gzip files (and the loss of them during connection) or the loss of the Netscape session. We didn't find yet, whether it is a configuration problem, whether it is due to lack of resources or insufficient network bandwidth.France

FRANCE

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M. Pithon reported that Météo-France users had experienced difficulties in using PrepIFS via the Member State web site: loaded gzip files were lost, Netscape connections were lost. Suspected causes of the problems (insufficient resources on Météo-France servers, configuration problems, inadequate bandwidth) are being investigated and the implications for future use of PrepIFS will be assessed. H. Richter reported that tests carried out by N. Wedi on a PC at Météo-France showed that after the load phase, the process ran fast and reliably. N. Wedi suspected that the limitations might be in the resources available on the shared HP system, as PrepIFS is very demanding of memory. H. Richter noted that some of the software required by PrepIFS could perhaps be installed locally at Météo-France, to reduce the volumes to be loaded. For instance, the Java graphics libraries take over 1 MB of space. W. Zwieflhofer suggested that the French user experiencing the problem be put into direct contact with the appropriate staff at ECMWF to best achieve an effective solution.

GERMANY

GERMANY

Elisabeth Krenzien, Deutscher Wetterdienst

1 Computer equipment at DWD and connections to ECMWF

In accordance with the five years' contract signed by DWD and SGI in 1997 DWD took the opportunity to reconsider the hardware solution for the last upgrade phase of the compute server and will soon decide on the system to be installed to reach the targeted sustained performance of 0.5 Tflops; the final upgrade of the data servers is about to be reflected and already introduced in the configuration table below.

	J90	**T3E-1200**	Routine Servers **O2000** Data Servers			
Processor	CMOS / Vector	DEC Alpha EV5	MIPS R 10 000 +			
CPU / Nodes	32	816	8	14	24	24
Main Memory (GB)	8	123	6	8	24	24
Disk Capacity (GB)	172	1024	94	680	7853	7853
Tape Drives	6	–	–	–	10	–
Networks	FDDI HIPPI	FDDI HIPPI	Fast Ethernet HIPPI / ATM			
Operating System	UNICOS 10	UNICOS/mk2.0	IRIX 6.5			

Table 1: Current specifications of the central servers

The major changes in the computer centre configuration (Figure 1) since the last meeting are further enhancements of the CPU and Raid disk capacity of the O2000 servers, the installation of a third StorageTek Powderhorn silo and a simultaneous withdrawal of the SD-3 tape drives from the data server and the migration of the AFD Software from the central communication server to a Linux system.

Currently the T3E and one of the routine servers are the main platforms for the operational model chain, Lokal Modell (LM)/ Global Modell (GME), that will stay in production until 2003 approximately. The second routine server and the Cray J90, the only vector system left, host non-time-critical operational tasks and user activity; that originate on X-terminals, SGI workstations and Windows NT4.0 systems within the DWD LAN.

The data handling system at DWD comprises two O2000 servers in Failsafe mode, AMASS/DataMgr, the Adic HSM software, a large number of Oracle database instances accessed via the proprietary csobank software and a 3-component StorageTek Powderhorn silo with 10 STK 9840 tape drives. The complete migration of 170 TB of data from SD-3 cartridges to 9840 greatly increased he stability of the whole system.

Much effort has gone into the successful setting up of the DMRZ (Deutsches Meteorologisches Rechenzentrum), a distributed computing centre based on HPC resources of the national (Offenbach) and military (Traben Trarbach) weather service. The implementation of the user environment still needs further improvements, since the deployment of the UNICORE software system is more elaborate than expected. The results of the two years of the DMRZ pilot operation will be evaluated in the near future.

DWD uses RMDCN as its main telecommunication link to Reading for exchange of operational data and products, while users are highly advised to use the Internet access to the Centre. DWD aims to finally set-up the backup management centre for RMDCN. The data communication to ECMWF is schematically shown in Figure 2.

2 Projects and experience using ECMWF resources

In 2000, about 35% of the allocated Fujitsu units have been used by nine DWD projects and twelve Special Projects indicating a steady situation since the LLM project succeeded to implement a working environment allowing to quasi automatically run the serial and sensitivity tests of the very high resolution mesoscale model. Additionally specific LM and GME experiments have been performed. Special Projects of the Max-Planck-Institute of Meteorology run their climate and coupled ocean/atmospheric model studies on the VPP5000 with great success.

The implementation of the ECFS software on DWD platforms, tailored to meet the high availability standards of the data servers, is nearly completed and the full production is expected to begin in late summer, giving the users more time to accept the changed functionality when accessing their archival data.

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The majority of new users now comes from outside DWD and requests access to MARS data with growing interest in the operational forecast data to support short term international field campaigns, an easy procedure to handle the resulting amount of administration work would be helpful.

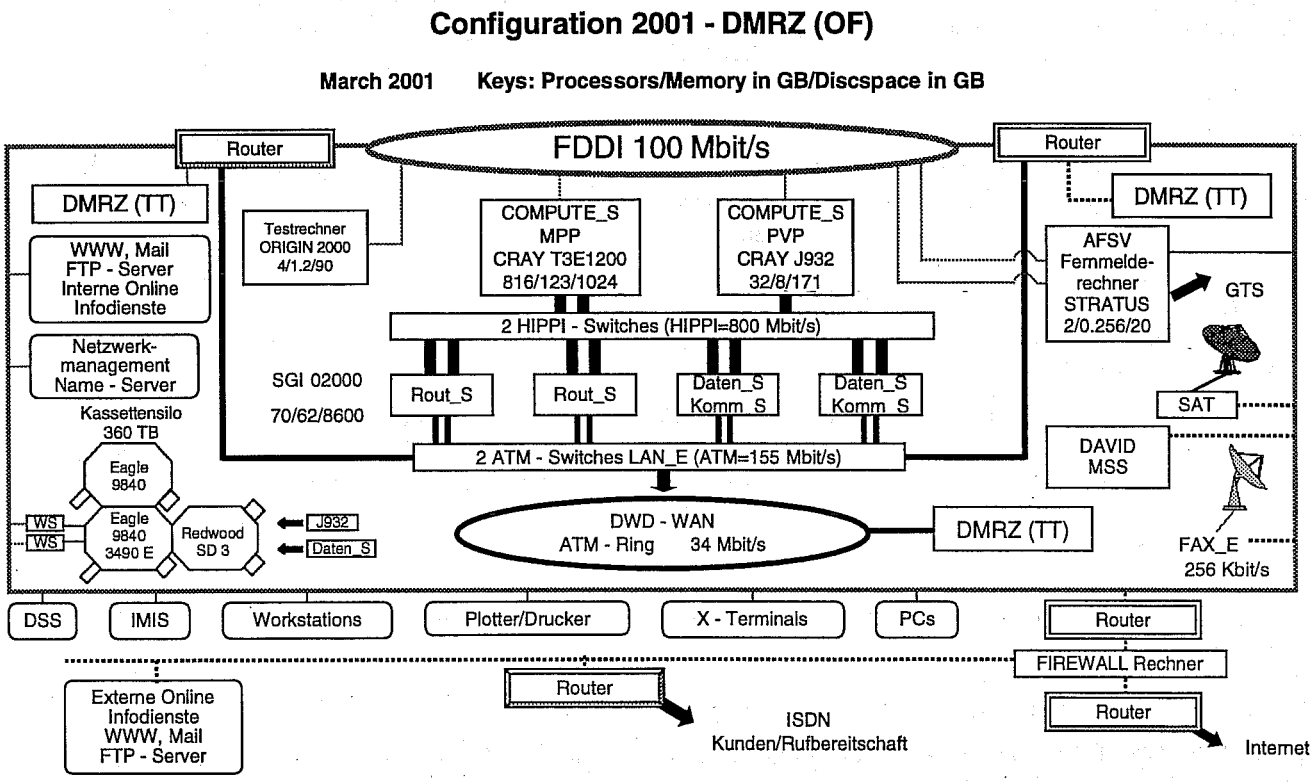
In principle, there are no difficulties in using the computer equipment because of the portable code development strategy at DWD in general. The professional support provided by the ECMWF user support certainly is part of this success.

3 Plans

Based on the experiences gained in the LLM project, which will end in summer and on the current shortage of computational power the next generation of the operational GME/ LM NWP system will undergo pre-operational testing on the VPP5000 system. The test suite will consist of the global model GME with a mesh size of 30 km, 35 layers and a forecast range of 174 h and the local model LM with a mesh size of 2.8 km, 45 layers and a forecast range of 48 h. Both models will run in data assimilation mode plus one forecast per day.

The Research Department of DWD considers implementing the Observational Data Base (ODB) developed at ECMWF to meet NWP requirements and plans to test it in a systematic comparison of observational data sets at DWD and ECMWF.

The goal of the co-operation contract signed in late 1999 by DWD and ECMWF is to provide DMRZ users an interface to both computing sites in a seamless environment based on UNICORE. As a first step, an external consultant employed by ECMWF is at present implementing a site-independent access to MARS and the German databases via csobank. ECFS will follow shortly, before the complete interface will be available early next year.



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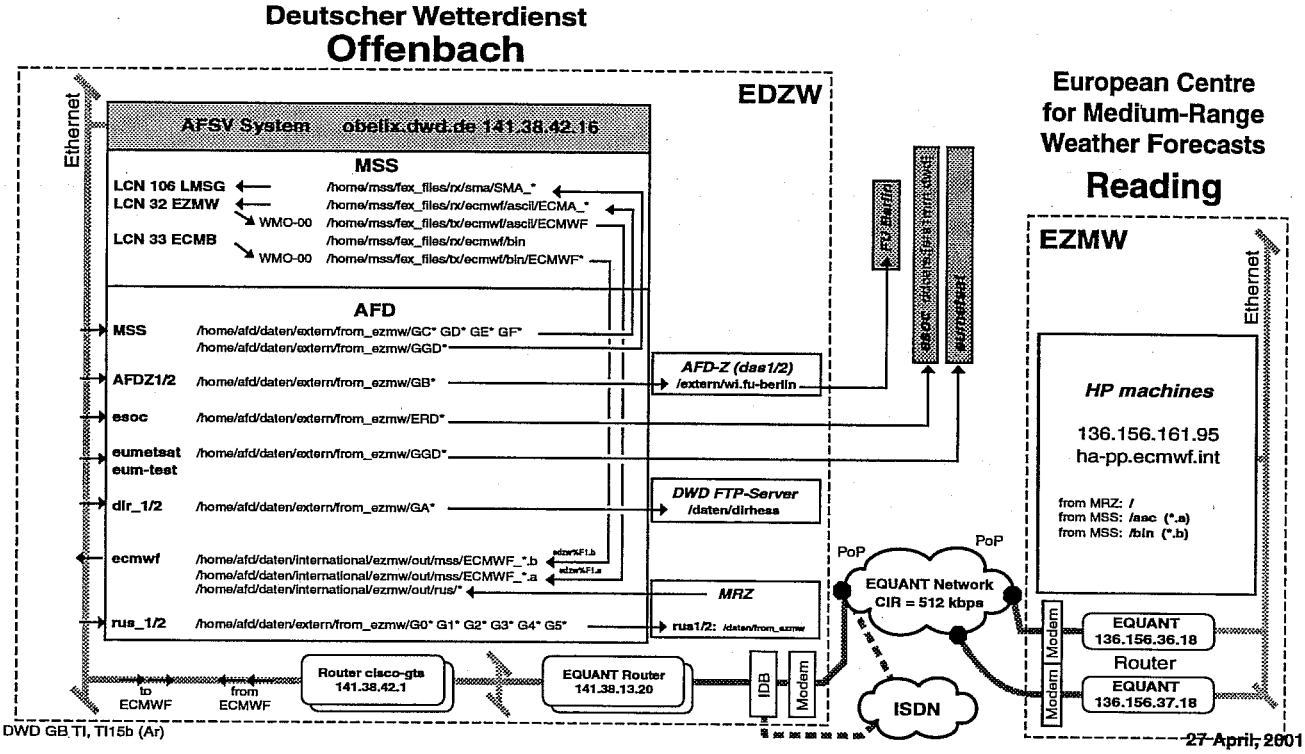
Link between EDZW (RA VI) and ECMWF



W. Zwieflhofer asked for clarification regarding the timescale for DWD's plans to run the presented workload at ECMWF. E. Krenzien replied that staff would begin working on 1 June and first results were expected in the last quarter of 2001.

E. Krenzien noted that DWD's 155Mbps Internet link reaches a major bottleneck at ECMWF's 8Mbps connection. Germany supports an upgrade to the ECMWF Internet link.

GREECE

GREECE

Hellenic National Meteorological Service

We don't have major changes from the previous year.

Computer equipment

Numerical Weather System

A new computer system cluster HP with 3 nodes J6000 (2 CPU each) and one control Workstation C3000 have been installed. The use is for the LAPS (data assimilation), RAMS (Non hydrostatic model – 3-way nesting) and WAM (Wave Model). The step up with two extra nodes is on future plans

Telecommunication System

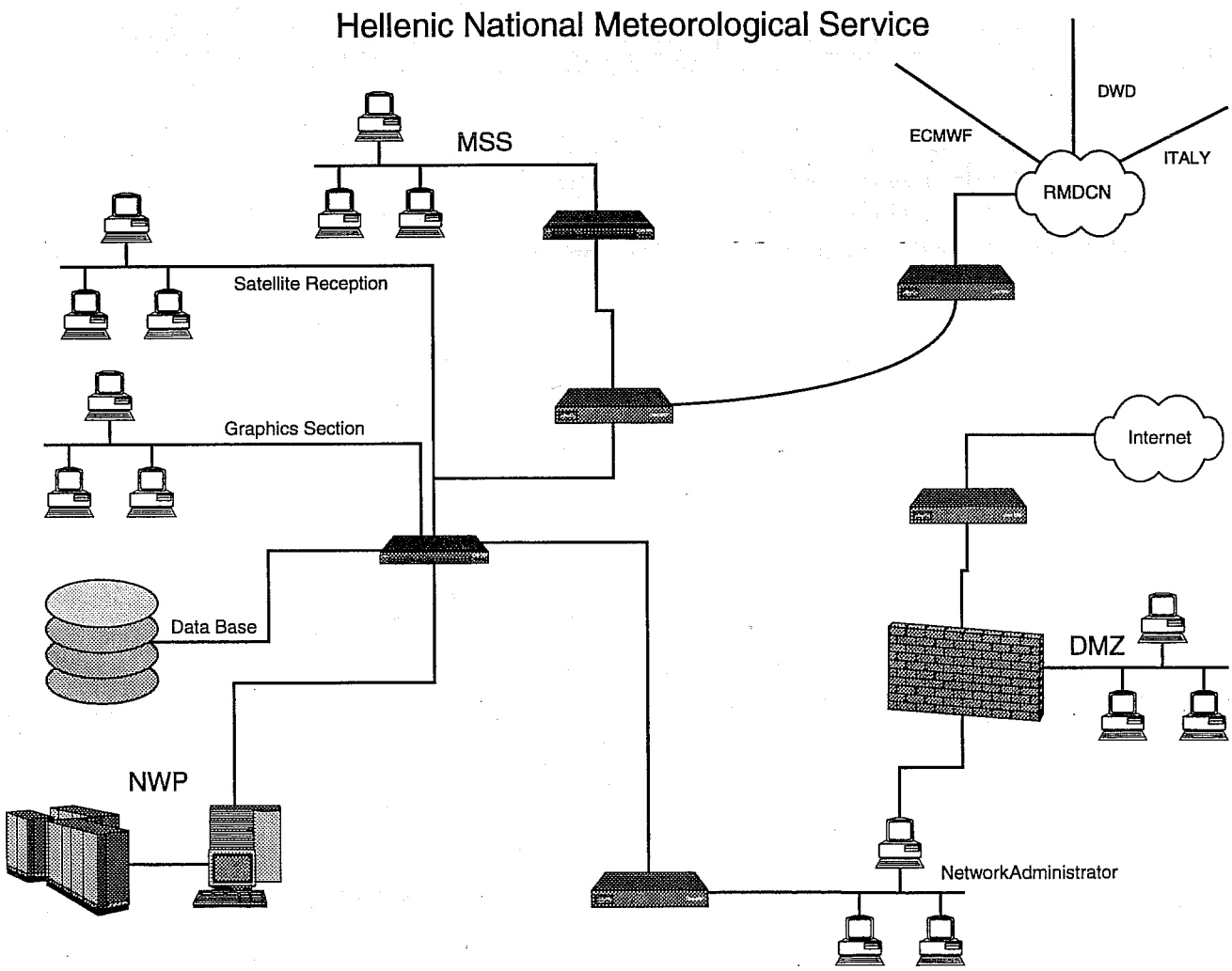
We are in the installation procedure (80%) for a new MSS system (Corobor Messir).

Future Plans

All our future plans have strong relation with the Olympic Games of 2004. We move fast to upgrade all our systems.

Usage of ECMWF Computer facilities

We are very satisfied with the staff of ECMWF.



ICELAND

ICELAND

Halla Björg Baldursdóttir, The Icelandic Meteorological Office

Overview

- IMO's Computer Department
- IMO's Computer System
- RMDCN
- Model output received at IMO
- Usage of ECMWF products
- Services done by IMO, based on ECMWF products

IMO's Computer Department

- The population of Iceland 280,000
- IMO 100 people
- Computer Department 5 people
  - Operating systems and network
  - Data processing and database administration
  - PCs and World Wide Web
  - Programming

IMO's computer system

- Servers
  - VAX/VMS (5)
  - Sun/Solaris (6)
  - Compaq, Alpha/Digital Unix (3)
- Clients
  - PCs running Windows 95/98, NT (60)
  - PCs running Intel Solaris or Linux (15)
  - Sun workstations running Solaris (15)
- Communication systems related to ECMWF
  - RMDCN to ECMWF, Bracknell and DMI
  - Specially designed message switch for GTS traffic (VMS, X25)
  - Simple home made programs for low level processing of model output
  - *Needed in near future: A better tool to observe and follow up the data flow through RMDCN.*

RMDCN

- Operational March 2000 ECMWF, DMI-IMO (TCP/IP)
- Operational February 2001 UKMO-IMO (Decnet)
- Problems:
  - ECMWF link, minor
  - UKMO link, up to 2 hours delay the first 2 months
- RDT – seems promising!
- Comments:
  - *Better statistics needed!*

Model output over RMDCN

- Operational forecast model, UTC 12, 6 Mb/day
- Global wave model 1 Mb/day
- UKG, UKL, 6 Mb/day
- Operational forecast model, UTC 00, 15 Mb/day
- HIRLAM, 83 Mb/day
- Planned changes:
  - More details from HIRLAM and ECMWF
  - EPS data from ECMWF

Usage of ECMWF products

- Real time usage
  - Forecasting data for meteorologists using a workstation tool from DMI, NumModel (based on Metview macros)
  - Automatic map plotting for special end users (Metview Macros)
  - Kalman filtering of ECM 12 for up to 70 local weather stations
  - Local forecast presentation by meteograms, based on MAGICS
  - Use of EPS on ECMWF website, recent

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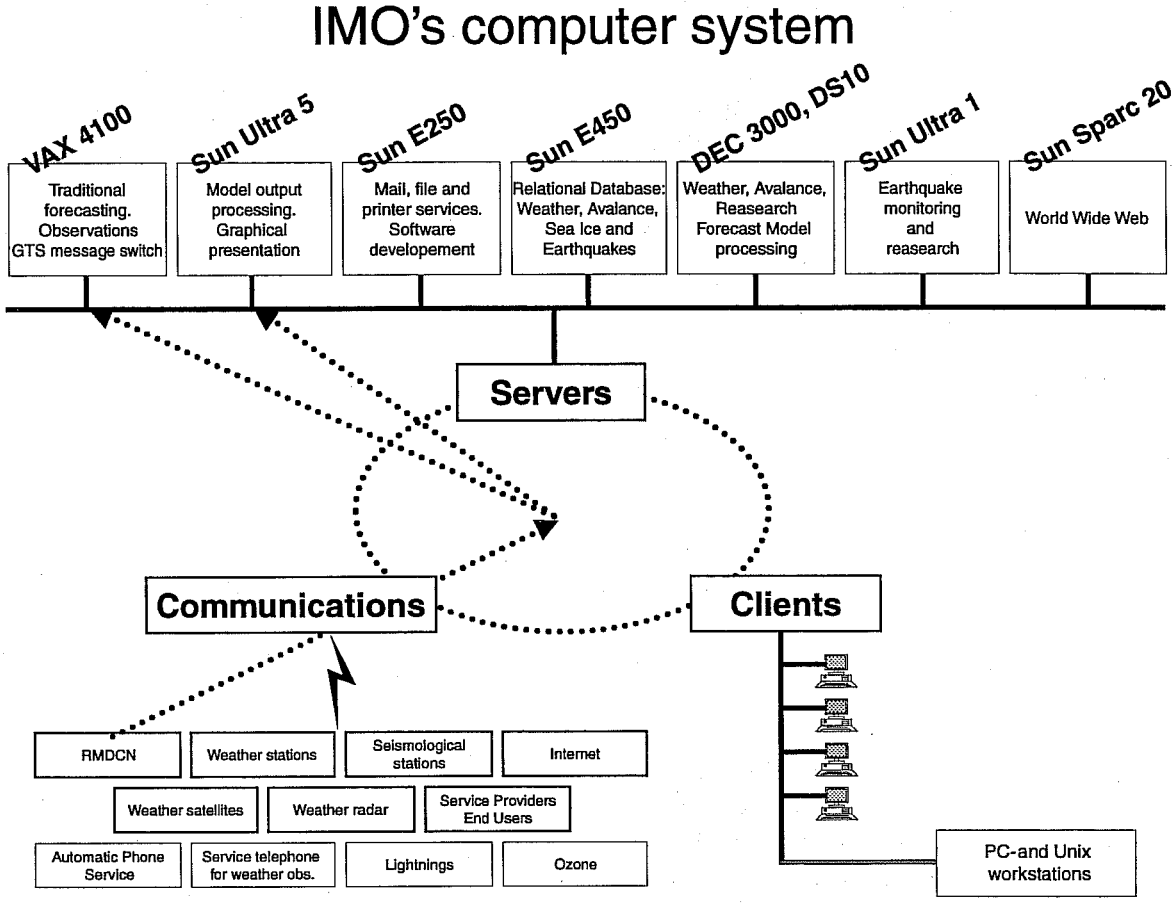

- Research usage
  - Rely on the MARS system for archiving model data
  - Only store point forecasts, both raw forecast data and Kalman filtered
  - Improvement of model output statistics (Kalman filter)
  - Boundary conditions for limited area models (from MARS)
  - Increased use of Metview

Services using ECMWF products

- Input to traditional weather forecast
- Service providers like TV, Maritime Administration, Radiomidun (a service company for the Icelandic fishing fleet)
- End users like avalanche observers, road authorities, shipping companies,
- WEB-sites (new!)

The Icelandic Meteorological Service would like to have more comprehensive line usage statistics available, preferably on-line. For instance, they would like to receive more disseminated products, but do not know whether they have any spare bandwidth. M. Dell'Acqua explained that statistics on PVC usage are planned to be made available for all RMDCN members but that this would require an upgrade to the network monitoring workstation, which is planned soon.

IRELAND

IRELAND

The written report below was submitted, although P. Halton was unable to attend

Paul Halton, Met Éireann – the Irish Meteorological Service, Dublin, Ireland

1. Computer Applications Equipment at Met Éireann

The main computing environment at Met Éireann is shown on Figure 1. The Linux Operating System (Red Hat version 6.x) is now used extensively, particularly for the development of new in-house applications.

NWP and Graphics servers

- On 1 November 2000, IBM was awarded the contract to supply Met Éireann with the replacement NWP compute server and it was delivered on 21 December. Installation was delayed until several improvements were made to the computer room including floor strengthening, 3-phase power supply and an enhanced air-cooling system. On 13 February 2001, the new system was site accepted when the benchmarks were run successfully. This was followed by an in-house workshop on the new system given by Mr. Bob Walkup. The initial workshop introduced the IBM system architecture and the AIX operating system. It was followed by modules that specifically focused on the use of MPI methodologies for the porting and optimisation of the HIRLAM model and the 3-D VAR ANALYSIS system.

  The process of porting the fine-mesh (15 km) HIRLAM model to the new system was halted when the recent FMD outbreak occurred, as the Research team was required to install and update the old FMD model on the dual-processor, high spec, workstation used to run the hourly HIRLAM analysis. This unplanned interruption has impacted on the schedule for the operational introduction of parallel runs on the new distributed memory architecture. It is estimated that at least four months of development work is required to port the operational HIRLAM production to the new system and to verify its forecast products.

  The SP/6000 Winterhawk II server has 9 x Power3 SMP Nodes (each with 4 x 375 MHz CPUs). It has one I/O node. Each node has a 9.1 GB disk pair. It has a total of 19 GB of distributed memory, distributed as follows: 2 GB per compute node and 1 GB for the I/O node. The system has RAID-5 SSA disk management with two spare disks. Total available disk space is (10x18.2) = 182 GB. The disks are connected in a loop configuration and there are two paths to each disk. The system is managed via a Control Workstation that has 256 MB memory and 3 x 9.1 GB disks. The Control Workstation is connected to the SP through a private Ethernet connection. Each node has its own IP address and is connected to a private Ethernet. To minimise traffic on the LAN, the system has been connected up so that only one IP address is accessible from the LAN.

  Operating System and supporting software: AIX, PSSP and LoadLeveller;

  Compilers: 15 user licences for Fortran and VisualAge C++ development environments.

  It is supplied with a 10-slot media stacker that uses 3590-E11 cartridges. Backup software is SYSBACKUP.

  The new server (with 36 CPUs) ran the B31 benchmark in 68 minutes. This fulfilled the mandatory and the 'highly desirable' requirements specified in the ITT. The system uses three-phase power supply and this means that no modifications were required to the balance of the UPS power distribution over the three phases.

- The HIRLAM and WAM applications continue to be run 4 times daily on the SGI Challenge L server. Configuration: 6 x MIPS R10000 processors (194 MHz each), 512 MB Memory, IRIX V6.5, and 21.9 GB disk capacity. It is expected that it will be phased out by year end.

- Two SGI Origin 200 servers decode and process GRIB bulletins received from the GTS and ECMWF over the new RMDCN circuit. Configuration: 1 x MIPS R10000 processor (180 MHz each), 128 MB Memory, IRIX 6.5, and 12.7 GB disk capacity each.

  These servers function as graphics file servers for X-based graphical display systems. X-clients, using XCHARTS, can access and display NWP products from HIRLAM, UKMO, DWD and ECMWF. These two servers also support Plotting applications; ADE database, DNS services and file and print services for UNIX systems.

- A SGI O2 is used as a FAX server to store and forward Analysis, Forecast and WAFS charts. Selections of aviation weather charts are automatically faxed to aviation weather offices. This server also supports the preparation and delivery of weather forecast products for the new Met Éireann web site (www.met.ie) that will be launched on 8 May 2001.

IRELAND IRELAND

UNIX Workstations

- The SGI Indy workstation at Shannon Airport, used for displaying NWP products with XCHARTS was successfully replaced in June 2000 by a high spec PC with Red hat Linux. A similar spec PC was made available for the FASTEX project and the disk capacity of this workstation was later doubled so that the user could run the HIRLAM model locally.
- In January 2001, 3 x IBM dual processor PCs with Red Hat Linux 6.1 were successfully installed for Research Division users. These will replace the SGI Indy workstations.

Climatology and Intranet servers

- Sun Ultra 170 running Solaris (2.5); Ultrasparc 170 MHz processor; 18.5 Gbytes storage. Runs Openingres RDBMS from Computer Associates (CA). This is the database server. It processes incoming climate data and automated e-mail and fax messages to customers.
- Sun Enterprise 250 Server running Solaris (2.6); Ultrasparc 300 MHz processor; 13 GB storage. Runs Openingres RDBMS from Computer Associates. This is an applications server. It handles incoming climate data processing and automated outgoing data transmissions. It also hosts user logins, mostly supporting X-windows displays on PCs. The Climate INTRANET web site is also supported by this server.
- Internet browser enabled PCs and workstations, accessing the INTRANET site, can extract and view climatological, radar, satellite, and synoptic data through an easy to use Graphical User Interface.

Weather radar systems

- The EWIS (Ericsson) Radar data from Dublin Airport is received over a 2 Mbps Microwave link and stored on a VaxStation-3300 linked to a MicroVAX-3100 through a Local Area VAX Cluster. Runs VMS V5.5-2 and Multinet 4.1.

  The RAINBOW (Gematronik) Radar data from Shannon Airport is distributed on a network of 5 x DEC AlphaStation 200 4/100, running Compaq Tru64 UNIX V4.0E. Two servers (Shannon & HQ) have 128 MB RAM and 10 GB disk capacity each. Three clients have 64 MB RAM and 6 GB of disk capacity each. RainBow V3.3 is installed. High Resolution 1 km x 1 km Irish Radar Composites are generated and sent to the TV graphics presentation systems.
- UKMO RadarNet Composites are received and stored on a dedicated WRADS PC running SCO Zenix.. The WRADS system was upgraded for RMDCN by WSI.

  After the BUFR format was introduced for sferic reports, the WRADS server and the microRADAR clients failed to handle the data reliably. Work has begun to develop an in-house replacement that is expected to be available for testing by August 2001.
- Radar images are downloaded to the INTRANET. A selection of the radar data is archived in, and can be retrieved from, the climatological database. A decision was taken during 2000 that, initially, radar products would not be made available on the Web Site Phase-1.

Communications computers

- The VAX-4200 cluster handles the real time reception and pre-processing of data from the AFTN, IAA and Irish observing stations. During the RMDCN project in 2000, several data handling applications were ported to Unix platforms. The VAX-cluster will be replaced during 2001.

RMDCN servers

- 2 x PC's running Red Hat Linux are used to handle the processing of all incoming RMDCN data, including data from ECMWF and the GTS. On reception the files are split up, named and transferred to the existing back-end servers. The RMDCN servers also handle the processing of outgoing data by compiling large files and sending them to Bracknell using ftp.

Internet firewall

- A permanent Internet 128 kbit link to a local ISP, Eircom.net, is protected by a Gauntlet Firewall running on a Windows NT server. The bandwidth will be doubled during 2001. Early in 2000, an e-mail Spam problem was highlighted by an advisory message received by Met Éireann. The firewall supplier updated the Gauntlet Firewall and the spam problem was resolved.

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Data Collection Systems (DCS)

- 2 x Linux Servers support the DCS system for the collection of weather reports from Automatic Weather Stations. The DCS has been extended to collect reports from manual synoptic stations using a new OBS application. Reports collected by the DCS are sent to the VAX-4200 cluster for bulletin distribution. The DCS servers will be upgraded in 2001.
- The Linux-based PC application OBS, written in-house, is installed at each of the manual synoptic stations. The OBS system applies local quality control to all Synoptic reports before they are sent by dial-up to the DCS at HQ.

Road Ice Prediction System (RIPS)

- A Linux Server supports the RIPS system which collects reports from 50 Road Side Automatic Weather Stations. 2 x Windows 98 client PCs are used to view the observation data and to input NWP forecast data which is transferred to the National Roads Authority.
- It is expected that the output from the fine-mesh version of the HIRLAM model on the new IBM WinterHawk II server will be of particular benefit to the users of the RIPS.

Office systems

- Two Windows NT Servers provide office services, including e-mail, file and print facilities.
- MS Exchange on the Windows NT servers supports MS-Outlook on user PCs.
- An SMTP Gateway Server on BSD UNIX supports Internet mail and DNS services.
- Dr. Solomon's Anti-Virus guard is centrally managed and regular updates are distributed to all networked PC's.

PDUS system

- Satellite data from METEOSAT and GOES are received, stored and processed on a DecAlpha Station 255, with OpenVMS v6.2H with Y2K patches. VCS, Germany, supplies the PDUS software. Special images are produced for the SATREP project, TV Graphics Systems, and INTRANET.

Graphics output devices

- The HP old HP Draftmaster Pen Plotters at CAFO and Shannon were replaced with new HP DesignJet 1050C plotters with Postscript. The adjustment of the in-house plotting applications, to work interchangeably with the old and new plotters, was completed without major difficulties. A 5-year maintenance contract was agreed with the suppliers. A subsequent problem with the plotting of hourly charts on three of the plotters, manufactured in Singapore, was eventually resolved by representatives of HP by substituting metal guides on the three plotters that were supplied with plastic guides.
- Laser printers in use include: HP 4000N, 4050N and 8000N; 1 x Tektronix Colour A4 LaserJet. A new Mita photocopier with multiple printing options, was connected to the HQ LAN during 2000 providing users with improved networked printing facilities.

TV graphics systems

- 5 x SGI O2 workstations, running IRIX v6.5, 512MB RAM are installed- one at TV3, two at RTÉ and two at HQ. All systems run Metacast Ultra from Metaphor AB, Norway. At HQ two O2 workstations are used for TV forecast preparation. At the TV stations, the O2's are set up as clients. Each client gets its non-NWP data from the servers in HQ. The NWP data is pushed to each TV client that requires it, as soon as it is ready on the Graphics Servers.

Networks

- 2 x Cisco Catalyst 2100 Ethernet Switches and AT Hubs manage the Ethernet.
- The Ethernet connects all computers, workstations, PCs and network devices. The network is Switched Ethernet with 10Mbps to each computer with UTP connections.
- Extensive use is made of NFS for moving files from one server to another on the LAN. FTP is used for automated file transfers. FTP and RCP are used for interactive file transfers.
- Early in 2001, the upgrade of the HQ LAN to 100Base-T (Fast Ethernet) was started. Each server will be gradually changed over to the upgraded LAN without loss of service.
- The new LAN equipment consists of 5 x Cisco 3548-XL switches, 5 x GBIC 50cm cable, a cabinet with cable management, 240 patch leads. The installation also includes a one-year maintenance contract (7-day, 9-5) and CiscoWorks for Windows
- Network cabling and active LAN equipment was installed at Valentia Observatory to that the instrument PC and desktop PCs can be networked and managed from a central point.

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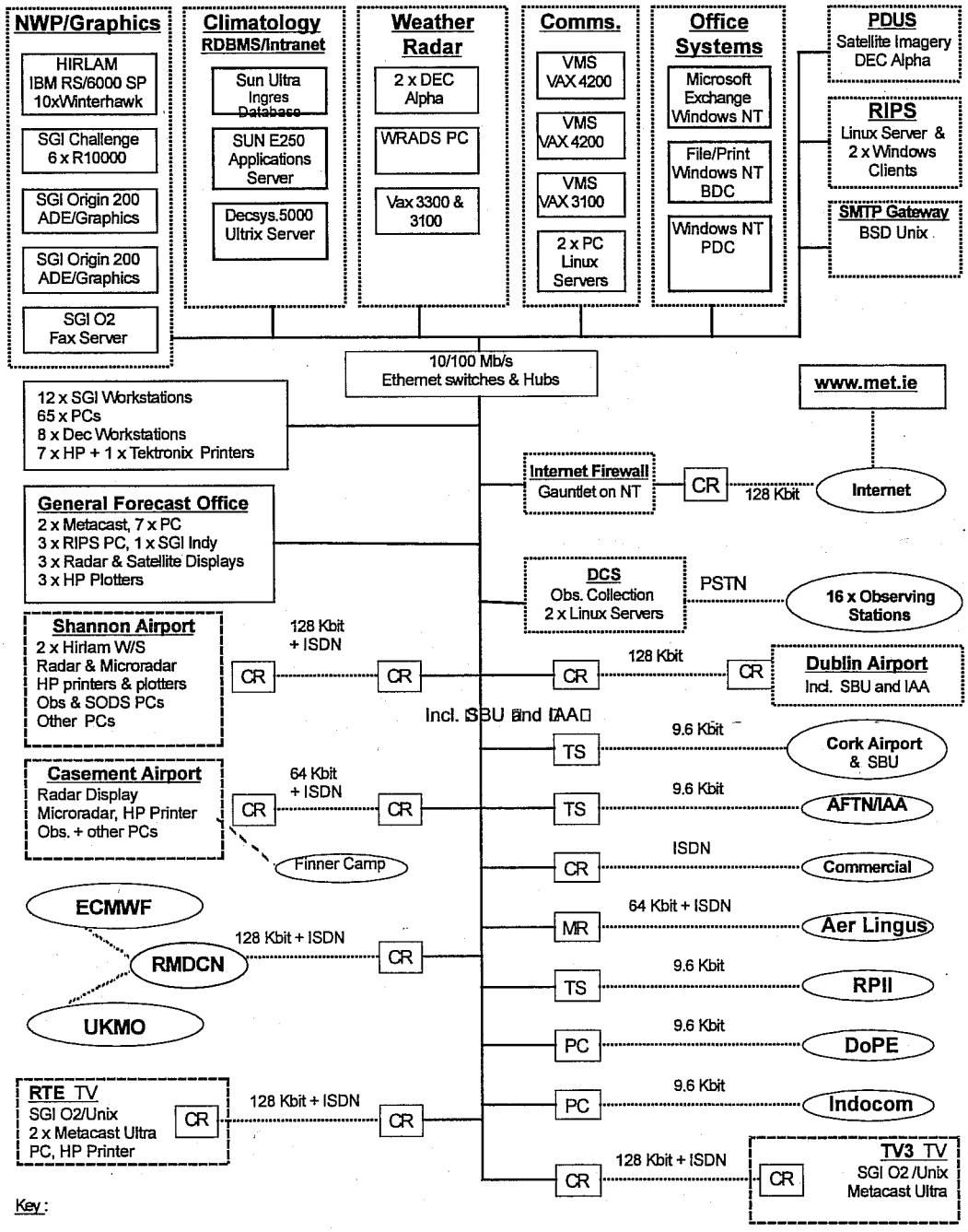
Met Éireann

I.T. Infrastructure at Glasnevin, Dublin and remote sites



Key:

Telecommunications Circuit

Ethernet LAN

AFTN : Aeronautical Fixed Telecom Net
BDC,PDC: Backup,Primary Domain Controller
CR : Cisco router
DCS : Data Collector System
DoPE : Dept. of Public Enterprise
ECMWF : European Centre for Medium Range Weather Forecasts
IAA : Irish Aviation Authority
ISDN : Digital Telephone Network
MR : Motorola Router
NWP : Numerical Weather Prediction
PDUS : Primary Data User Station
PSTN : Public Telephone Network
RIPS : Road Ice Prediction System
RMDCN : Regional Met. Data Comms Network
RPII : Radiological Protection Inst.
SBU : Pilot Self Briefing Unit
SODS : Shannon Opmet Distribution
TS : Terminal Server
UKMO : UK Met Office

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2. Connection to ECMWF

- The connection to ECMWF is through the new RMDCN service. Data is exchanged over the link using TCP/IP protocol. The old X.25 links to UKMO and ECMWF were permanently disconnected on 15 August 2000..
- The nodes on the LAN /WAN, including the EQUANT supplied router on the ECMWF link, are monitored using SNMPc which will be replaced during 2001 by a CiscoWorks display.
- ISDN backup links are monitored using an ISDNwatch utility.
- The timely reception of routine products from ECMWF is monitored by IT Operations

3. Projects currently running at ECMWF

The computer facilities at ECMWF are mainly used as follows:

- Data retrieval from the MARS archive
- Experimental runs of the HIRLAM model
- Trajectory model
- Running Metview in batch mode
- The FASTEX project (Specially funded Research project)
- Boundary Condition data for the HIRLAM model

4. Future plans

The following projects will be undertaken during 2001:

- Phase-1 of the Met Éireann WEB site and FTP server will be launched on 8 May 2001. (Phase-2, with e-commerce will be planned for 2002).
- Participate with proposed ECMWF testing of Boundary Conditions backup procedures
- Install Fibre Optic link to Cork Airport.
- Install Fibre Optic link from Shannon Airport to the Irish Aviation Authority at their new Air Traffic Control centre at Ballycasey.
- Install the new Airport Information Board facility for aviation users at Irish airports.
- Install general purpose office systems at all manual observing stations
- Complete installation of LAN equipment at Valentia Observatory

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Col Giuseppe Tarantino, CNMCA 4° Servizio – P.le Degli Archivi, 34 – 00144 Roma, E-mail: g.tarantino@flashnet.it

1. Computer equipment and ECMWF connection

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

a. Front-End Area

The "front-end" system, based on COMPAQ equipment with ALPHA processors, handles telecommunications concerning both WMO and ICAO networks. The UMS (Unified Message Switching) system is software developed by Global Weather Dynamics Inc. The system can handle and monitor alphanumerical and binary data, both analogue and coded Digital facsimile (T4 format) and can exchange data, by LAN, among the different systems of RADAR, Satellites and Host areas. The operating system is DEC UNIX OSF1 and the characteristic configuration allows the system to get a warm back up in case of failure.

All GTS links were moved to RMDCN.

- DEC ALPHA Server 2100, two 64 bit processors, 704 MB RAM, 6 x 4.3 GB Disks in RAID 5 configuration + 2 x 2 GB internal HD- main computer;
- DEC ALPHA Server 2100, two 64 bit processors, 704 MB RAM, 6 x 4.3 GB Disks in RAID 5 configuration + 2 x 2 GB internal HD - Hot-Swap backup computer;
- Two MULTIA, 32 MB RAM, 1 GB Disk - Telecommunication operational job.

b. Operational Suite Area

It consists of WorkStations and Servers to check data, to run numerical analysis model and graphic products:

- DEC ALPHA WS XP 1000, 64 bit processor, 512 MB RAM, 2 x 8 GB HD;
- DEC ALPHA WS XP 1000, 64 bit processor, 512 MB RAM, 3 x 9 GB HD - METVIEW;
- DEC ALPHA WS AU-SERIES 433, 64 bit processor, 256 MB RAM, 2 x 9 GB HD + 1 HD 4 GB;
- DEC ALPHA WS AU-SERIES 600, 64 bit processor, 256 MB RAM, 2 x 4 GB HD;
- COMPAQ DS20 E Server, two 64 bit processor, 2 GB RAM, 4 x 18 GB HD in RAID 5 configuration + 1 HD 9 GB.

MDD Area (still located in Rome).

Equipment to carry out the MDD mission.

Uplink: MicroVAX II with internal storage of 12 MB and a HARD DISK of 70 MB.

User Station: ALPHA STATION 200 4/100, 32 MB RAM, 1 GB Disk.

At the end of May will be operational in Pratica di Mare.

c. USER Area

Peripheral users can receive data and products in real time. This area is located in Rome and a back up is located in Pratica di Mare. It is based on:

- DEC ALPHA Server 4100, 64 bit processor, 512 MB RAM, 4 x 4.3 GB HD in RAID 5 configuration, dedicated to intranet Web Server;
- DEC ALPHA Server 1200, 64 bit processor, 256 MB RAM, 3 x 4.3 GB HD in RAID 5 configuration, dedicated to intranet FTP Server;
- DEC ALPHA WS 433 AU, 64 bit processor, 512 MB RAM, 2 x 4.3 GB HD, dedicated to back-up for intranet Web and FTP server;
- 2 VAX 8250, each with internal storage of 16 MB, 4.9 GB HD;
- MicroVAX II with internal storage of 12 MB and a HARD DISK of 70 MB;
- VAX 4000-200 with internal storage of 24 MB and a mass storage of 1.4 GB;
- MicroVAX 3100 with internal storage of 8 MB and a mass storage of 850 MB;
- 2 DEC ALPHA Server 800 in cluster configuration, two 64 bit processors, 2 x 256 MB RAM, 2 x 9 GB internal HD, 2 x 9 GB HD + 1 x 4.3 GB HD in an external storage box, located in Pratica di Mare, as intranet Web and FTP Server.

The VAX cluster is used for users application.

d. INTERNET Area

It's based on COMPAQ equipment with ALPHA processor and DENKEN equipment with INTEL processors. The operating system is DEC UNIX OSF1 and LINUX and the characteristic configuration allows the system to get data from the Front - End systems.

- DEC ALPHA 1000, 64 bit processor, 128 MB RAM, 2 x 2.1 GB Disk, as Internet WEB SERVER;
- DENKEN Intel Pentium III two processors, 2 x 256 MB RAM, 2 x 20 GB HD as Firewall.

e. ECMWF Connection

It is based on a DEC ALPHA Server 2100, two 64 bit processors, 704 MB RAM, 6 x 4.3 GB Disks in RAID 5 configuration + 2 x 2 GB internal HD, connected to RMDCN CISCO 2500 router.

f. Satellite Area

It deals with the reception of data and images from the meteorological satellites METEOSAT and TIROS. The system provides image animation and TOVS retrieval. The satellite area is based on a VAX Cluster Architecture an DEC Alpha WS:

- DEC ALPHA 4600, 128 MB RAM, 3 x 760 MB Disk;
- 2 MicroVAX 4200, 48 MB RAM, 6 x 4 GB Disk;
- MicroVAX 3000/100, 32 MB RAM 70 MB Disk;
- DEC WS 3000/400, 48 MB RAM, 6 GB Disk;
- DEC Alpha WS AU 500 series, 256 MB RAM, 27 GB Disk;

g. Radar Area

Three COMPAQ Met RADAR have been installed and their signals are collected by special computing system, located in Pratica di Mare, and connected by LAN with the other areas. At present, due to technical difficulties, the project has suffered a slowing down and is not fully operational yet. The system is made up five subsystems:

Supervisor: CPU Motorola 68030, 8 MB RAM, 150 MB Disk.

Application oriented SW: 4 CPU Motorola 80100, 256 MB RAM, 600 MB Disk.

Data collection: 2 CPU Motorola 80100, 128 MB RAM, 600 MB Disk.

Data distribution: VAX 4000/610, 64 MB RAM, 6 x 381 MB Disk.

Development environment: 2 CPU Motorola 88100, 128 MB RAM, 600 MB Disk.

2. Project, experience and plans

We have more-or-less 90 users using ECMWF services and some of them use INTERNET access too. The main usage of ECMWF services has been the retrieval of MARS data associated with the decoding software to run either models or MAGICS and METVIEW applications.

ECMWF data in GRIB form are disseminated in real time to users for their operational activity (civil emergency, agriculture, pollution etc.).

A subset of ECMWF GRIB data are also distributed to MDD users by Rome MDD Uplink Station.

About the use of the allocation of Fujitsu units, at present we use them to run a pilot version of Italian Local Model. We are also considering running a Downscale on the Mediterranean using Reanalysis data, as boundary condition, for a High resolution Model for a Climate simulation on the Mediterranean area. Another possibility is to use part of the resources to run projects (COSMO, LM Reference Test Suite, Downscale EPS with LM) in cooperation with some Member States.

At the Operational Center ECMWF data are also used:

- as support for the operational meteorological activity
- as boundary condition for the forecast model
- as input for post processing programs
- as input to produce information and maps useful for aeronautical activity
- to compute and plot:
  - metgram (figure 2.)
  - see state map+10 mt. Wind (figure 3.)
  - see state map (figure 4.)

New projects are under consideration to compute:

- automatic searching of fronts

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The current special projects are:

- testing and application of a third generation wave model in the Mediterranean Sea.

  Application of a high resolution third generation WAM wave model to the Mediterranean Sea and to explore in detail the model response to small variations in the input wind field. With this aim the same storms will be run with different wind fields. This will allow an estimate of the sensitivity of the model output with respect to the input wind fields. Also we expect to begin to explore the influence of the wind data from satellite on the model performance.

- Limited Area Model Targeted Ensemble Prediction System (LAM-TEPS)

  The purpose of the project is the evaluation of the result obtained nesting a limited area model (the model running operationally at ARPA-SMR) in some of the 50+1 members of the TEPS runs. The aim of this work is to provide a contribution to the definition of a flood risk alarm system by producing different evolution scenarios in terms of high-resolution (20 Km at present) precipitation forecast.

- Non-linear aspects of the systematic error of the ECMWF coupled model

  The aim of the above mentioned project is to assess the ability of the ECMWF model to represent non-linear dynamical processes affecting large-scale atmospheric systems (particularly in the Euro-Atlantic sector), and to study their interactions with the systematic errors of both the uncoupled and the coupled GCM.

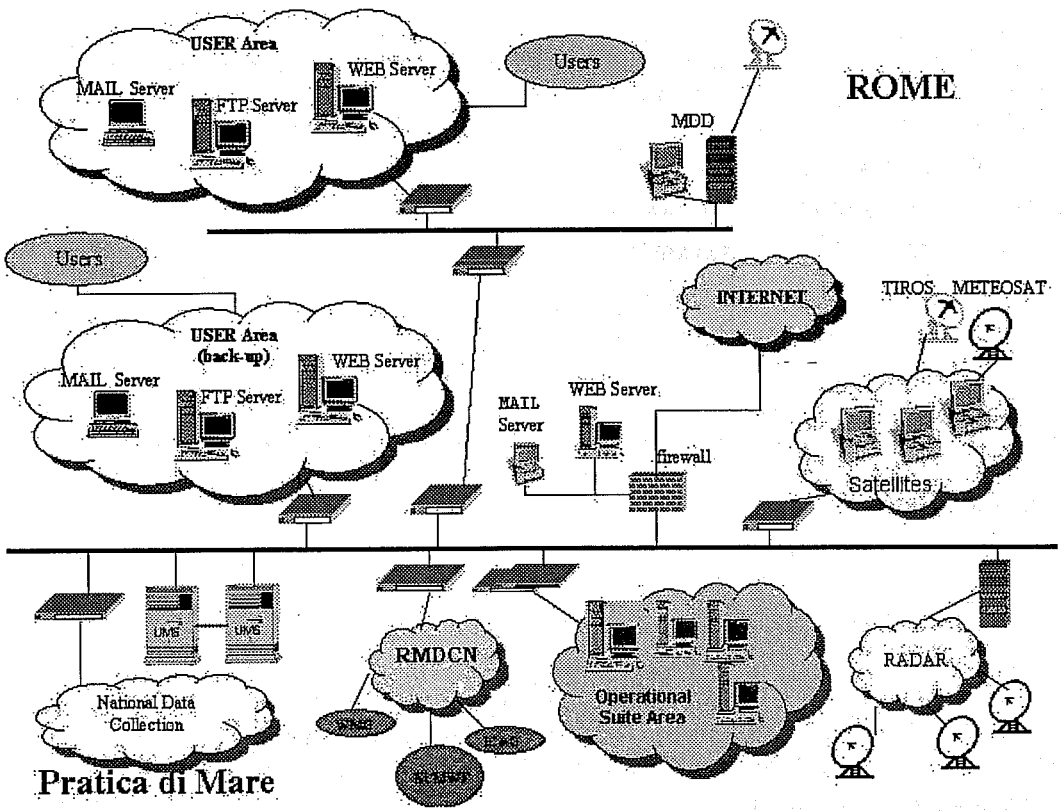

Figure 1

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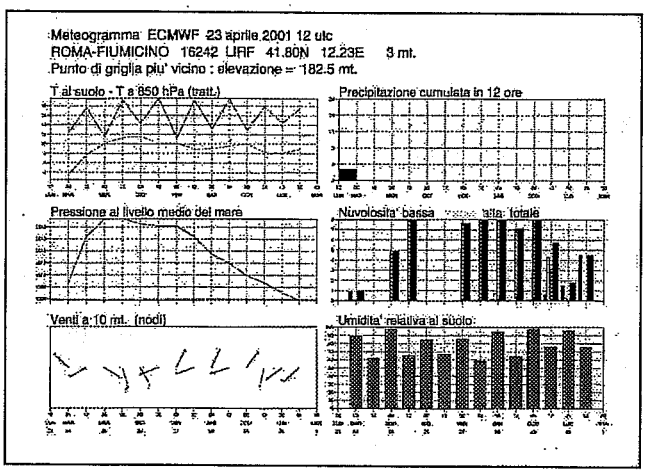

Figure 2

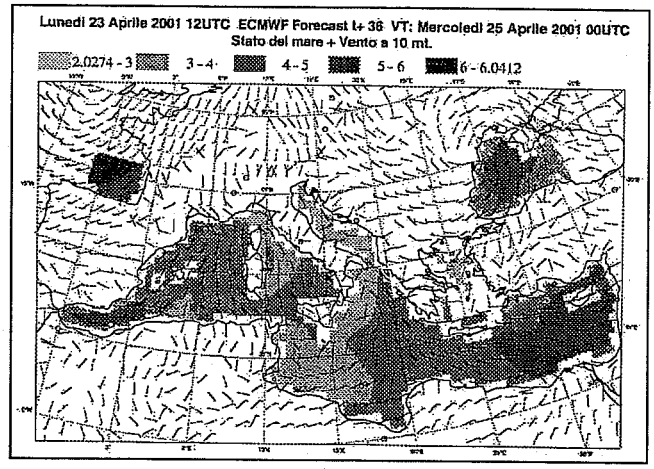

Figure 3

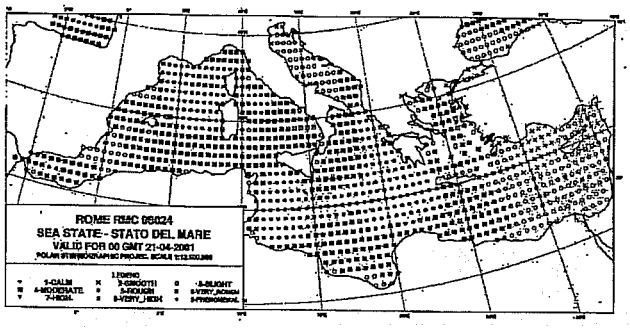

Figure 4

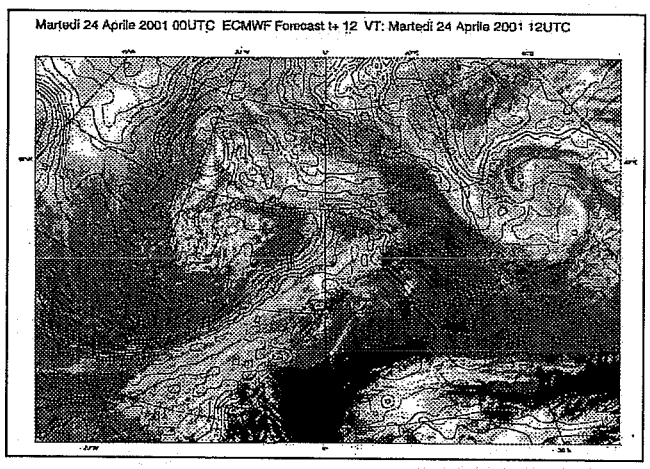

Figure 5

NETHERLANDS NETHERLANDS

The Netherlands and ECMWF

KNMI's Computer Infrastructure and ECMWF

KNMI is the Dutch national data and knowledge centre for weather, climate and seismology. It performs scientific research, maintains the extensive infrastructure for observations and information processing and provides data and services, general weather information and severe weather warnings.

In 1999 all market related ('commercial') activities have been transferred to a newly established company HWS. Since then the only products which go directly to the public are the severe weather warnings and weather reports and forecasts on the Internet.

KNMI operates from a main office in De Bilt and branch offices at Schiphol Airport (aviation) and Hoek van Holland (maritime meteorology). Furthermore, there are meteorologists at other airports and at the Hydro-Meteo Centre in Middelburg (SW of the Netherlands).

Infrastructure

Figure 1 shows KNMI's current computer infrastructure.

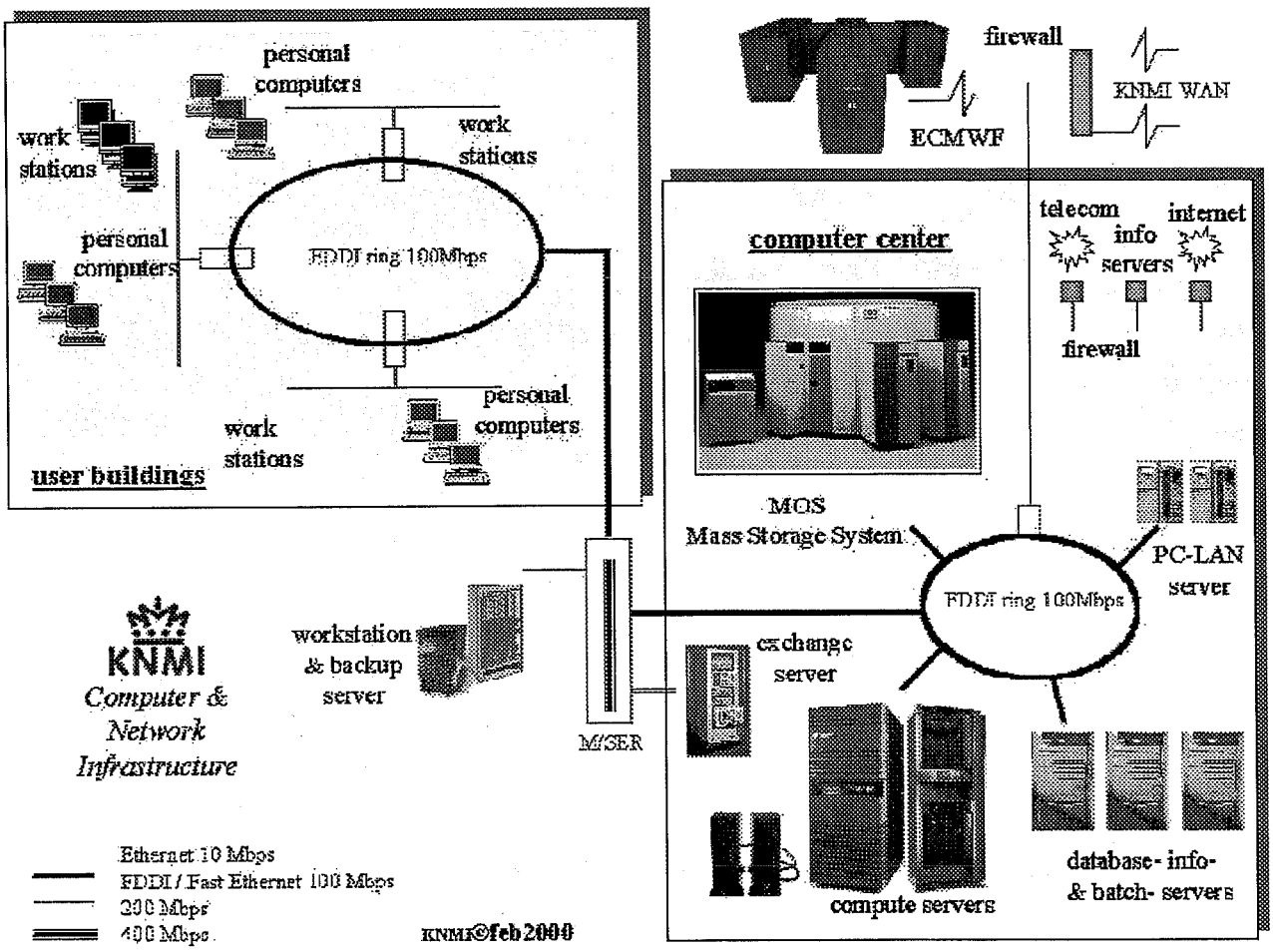

Figure 1 KNMI's computer infrastructure

The heart of the network are two 100 Mbit/s FDDI rings, one which connects the general servers in the computer centre and one which connects the 10 Mbit/s ethernet LAN network segments in the different user buildings. The WAN connects to the branch offices. Connections to the Internet (2 Mbit/s) and other telecommunication services are separated from the LAN by a firewall. KNMI's external web server (www.knmi.nl) is located outside this firewall.

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Computer facilities in the LAN are:

- A StorageTek PowderHorn 9310 mass storage system, current capacity ≥15TB; maximum capacity of 120 TB (by adding more tapes).
- A 2 CPU SGI Origin 2000 (backup 2 CPU Origin 200) server for the mass storage system (DMF software).
- A 16 CPU SGI Power Challenge for Climate research.
- A 16 CPU SGI Origin 2000 for operational hirlam and applied research.
- A cluster of 4 DEC-Alpha workstations for operational applications.
- Many (≥ 20) DEC-Alpha meteorological workstations.
- Several (~ 5) DEC-Alpha workstations for development of operational applications.
- A growing number (sim 45 at present) of SGI-Linux workstations.
- Many ($gtrsim$ 100) SGI-Irix (Indy and O2) personal workstations.
- A Sun workstation server with general software for e.g. the SGI's and DEC-Alphas.
- Many (≥ 500) Windows(-95) PCs.
- 5 SGI Origin 200 Web servers.
- A WNT exchange server which handles all e-mail.
- A WNT Windows Terminal Server to give access to WNT applications in a UNIX environment (Citrix client).
- Several WNT application servers.
- A VMS cluster (2) for message switching.

Developments in 2000

- An ITT for a new generation of personal workstations lead to a choice for Linux machines supplied by SGI.

Developments in 2001

- Upgrade of the HIRLAM machine (aiming at 15-20 times more capacity now, 30-40 times in 2 years).
- Upgrade of the Internet bandwidth from 2 Mbit/s to 1 Gbit/s.
- Start of LAN upgrade towards ≥ 100 Mbit/s everywhere in 2 years.
- Installation of a dual SGI-Linux workstation server with automatic fail-over.
- Participate in Datagrid (build a distributed computing environment): Indy-farm and mass storage.
- Centralization of all meteorological services in De Bilt.

ECMWF use

Operations

For its weather forecasts, KNMI uses various ECMWF products. To give an impression:

- The deterministic model for medium range (up to day 5) forecasts.
- The Ensemble Prediction System for forecasts up to 9 days ahead (also available on the Internet).
- Trajectory computations.
- Boundaries from the deterministic model for HIRLAM.

Software packages

The following software packages from ECMWF have been installed for general use:

- emoslib
- eccopy
- Magics
- Metview
- SMS is being investigated for management of our suite of numerical models.

Users

On April 2, 2001, there were 90 Dutch users (86 on April 20, 2000) with an account on ecgate. Of these 31 had logged in to ecgate in the previous 10 days; 28 had logged in earlier in 2001; 10 had not logged in since May 19, 2000. One user had not yet logged in.

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Thirteen users are from outside knmi: 8 from Utrecht University, 3 from Wageningen University, 1 from the Netherlands Energy Research Foundation ECN, and one from the National Institute of Public Health and the Environment.

Table 1 Netherlands' projects in 2000

		1999		2000	
		Used [kSBU]	Alloc [kSBU]	Used [kSBU]	Alloc [kSBU]
Operations					
nlcwdtra	Trajectory computations for local emergencies	0.2		0.2	
Climate research					
nlglomac	Atmospheric Composition	1.4		3.1	
nlhirkli	Climate research with hirlam	0.2		3.5	
nloocean	Oceanography	7.1		6.7	
nldmwgac	Other climate research	39.4		21.3	
Applied research					
nldmlam	HIRLAM maintenance	14.3		25.0	
nlsatnwp	Satellite data research	14.1		0.0	
nlwmcalc	Other applied research	0.3		0.5	
Total		**77.0**	**142.0**	**60.4**	**348.0**
Special Projects					
spnlagul	Limited area ocean model of the Agulhas Retroflection	1.7	15.0	0.3	20.0
spnlctmk	Chemistry and transport studies	1.8	3.0	0.3	3.5
spnlflux	Validation of reanalyzed A/S fluxes	17.1	20.0	0.0	20.0
spnlles	Large Eddy simulations BL clouds	0.7	10.0	2.5	15.0
spnlmix	OGCM mixed-layer modules and assimilation	2.5	15.0	0.0	15.0
spnlozas	Assimilation of GOME and SCIAMACHY chemical species	0.0	21.7	0.0	1.7
spnlprob	Short-term regional probabilistic fc using IFS	5.4	5.0	8.7	10.0
spnlsiep	Stratosphere - troposphere exchange	1.2	2.0	2.5	5.0
Total		**30.3**	**71.7**	**14.3**	**90.2**

Projects

Table 1 lists the Dutch projects for access to the Fujitsu services with their total use of resources in 1999 and 2000. Of the allocated 348 kSBU in 2000 (142 kSBU in 1999), 60 (77) kSBU or 17% (54%) have been used. Special projects used another 14 kSBU or 16% (30 kSBU, 42%) of the allocated 90 (72) kSBU.

46 users have access to the Fujitsu machines in one of the regular projects, 23 of which did really use it in 2000. Furthermore, 22 users have access to at least one of the special projects.

For 2001 the total allocation for regular projects is 336 kSBU. Until April 18 34 kSBU had been used. If one extrapolates this, the total usage for the whole year amounts to 36%. But experience learns that usually some projects use large amounts of SBU's in relatively short periods, unevenly spaced over the year.

Experience and suggestions

The help of User Support, especially John Greenaway, is very much appreciated. Any questions are always answered promptly and adequately.

Changes in the post processing of the operational model (output) sometimes cause problems with boundaries for KNMI's operational HIRLAM.

Users are generally satisfied with the Fujitsu services. Only a few suggestions were put forward:

- Parallelizing programs is difficult
- The NETCDF library is not available
- Debugging is not easy

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Recently a new system for running HIRLAM at ECMWF was released: MARS access and pre- and post processing take place now at ecgate, and only the analysis and forecast run on a VPP machine. The system is controlled by a mini-SMS and has its own queues on the Fujitsu machines. Turnaround times are good. Disk space on ecgate was a point of concern.

There is a need to get large amounts of data conveniently from ECMWF to KNMI. The network department is looking into possibilities to use slshape eccopy over the Internet, but taking into account the 8 Mbit/s bandwidth at the ECMWF side.

Do we still need Special Projects? They might have once been useful as an extra source of guaranteed resources, but at present we have plenty and they only seem to generate administrative overhead.

Having to supply a passcode twice when logging in through the Internet, once to the gateway and once to ecgate, is annoying.

The accessibility of the documentation on the Member State Web server for everyone at the KNMI LAN is appreciated.

H. de Vries noted that changes to the postprocessing of the operational model had caused problems with the boundaries for the HIRLAM model.

KNMI users find parallelising computer code for the Fujitsus difficult, as is debugging. They would like NETCDF to be available on the Fujitsus. ECMWF replied that NETCDF had recently been installed on both VPPs accessible to Member State users, so this information will be passed to Member States.

KNMI users also find the double passcode requirement for access via the Internet a great inconvenience. ECMWF replied that, as yet, no acceptable solution had been found, but the use of ssh is being investigated.

KNMI's access link to the Internet will shortly be upgraded to 1Gbps. Once this has occurred, they will request that ECMWF's Internet access link be upgraded from its current 8Mbps bandwidth.

Finally, H. de Vries passed on his users' appreciation of the ever-increasing range of documentation now available on the Member State web server.

NORWAY NORWAY

The computing environment at DNMI

Rebecca Rudsar, DNMI, Oslo, Norway, May 2001

Computer Resources

The software (NORCOM) which manages the communication for data acquisition and routing of observations has been further developed.

Observation data is transferred to the SGI Origin 2000 for decoding. The decoded observations are stored in an internal DNMI format and temporarily in BUFR format for input to the 3D-VAR analysis program that became operational in December 2000.

VAX4000-200 is used for running the Nordic Radar system, NORDRAD, which is a communication system for the distribution and collection of radar data between Nordic countries.

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

Two Sun UltraSparc10 computers are connected to a radar unit (Hægebostad) covering the very south of Norway. These are used for acquisition, for product generation and monitoring and for display.

Processing of data from NOAA satellites is done by the MEOS system (Multi Mission Earth Observation System). The MAPP (MEOS Advanced Product Presentation Facility) is installed on five SGI workstations.

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

Oracle software is used for the Climate database and a Verification database.

The total number of drives in the StorageTek tape robot is now three. In addition to being used for archiving observations and model results for DNMI the tape robot is heavily used by several research projects.

The SGI Origin 200 receives the disseminated data from ECMWF and transfers it to the operational suite. Data from jobs run regularly at ECMWF and transferred using eccopy is also processed on this computer.

DNMI is connected to the University network, Uninett, via a 10 Mbps connection for Internet and a 100 Mbps connection for access to the supercomputer in Trondheim. Supernet (ATM) is a part of Uninett and at present the theoretical transmission rate between the University of Oslo and the University of Trondheim (NTNU) is 123 Mbps. The Supercomputing Project at NTNU operates and supports High Performance Computing equipment for use by Norwegian universities and the Norwegian Meteorological Institute. At present there are two computers a Cray T3E and a SGI Origin 3800.

Cray T3E has 96 DEC Alpha EV5 RISC processors and 12.5 Gbytes total memory. Peak Performance is 600 Mflops per processor / 57.6 Gflops total and the Operating System is UNICOS/mk (Cray MPP UNIX).

An acceptance test is, at this moment, being run on the SGI Origin 3800. It has 160 400 MHz R12000S MIPS processors and 160 GB of memory. It is planned that the system will be upgraded in October to 220 500 MHz processors and 220 GB of memory. The theoretical performance will then be 220 Gflops.

The Norwegian version of the HIRLAM 50 km model has been the Operational Numerical Weather Prediction model since June 1995. MPP versions of the HIRLAM 50 km model (version 2.6) with a nested 10 km model are run on the Cray T3E. As stated earlier the 3D-VAR code was made operational in December 2000. It is now planned to upgrade to HIRLAM v 5.0 as soon as the necessary parallel runs have been performed on the new supercomputer.

The Maritime Prediction models for ocean waves and storm surge are also run on the Cray T3E as part of the operational suite.

The computers running the operational suite are SGI Origin 2000 and Origin 200. All pre- and post- processing is at present performed on the SGI Origin 2000. The Supervisor Monitor Scheduler (SMS) and the X Command and Display program (XCDP), developed at ECMWF, are used to control and monitor the operational suite.

The RAID disk system connected to the Origin 2000 and to the Origin 200 computers was upgraded to a 220 Gbytes Fibre channel disk in December 2000. The file system for the operational suite and data is mounted on Origin 2000. The High Availability Software which ensured automatic switch over of the RAID disk to the Origin 200 is no longer used. Bugs in the latest version of the software caused a great deal of trouble and it was decided to change the disk mounting manually.

NORWAY

NORWAY

The telecommunication links to the forecasting centres at Bergen and Tromsø are 384 and 256 Kbps respectively. An upgrade to at least twice this rate has been ordered. Operational products are distributed to two fileservers at each centre using the TCP/IP protocol. ISDN links (128 Kbps) are used as backup.

The satellite distribution system (Infosat), the automatic fax distribution system (Autofax), the system for processing data from automatic observing stations and the customer database for the distribution of products via a WEB interface are run on the IBM RS6000 computers.

A new interactive DIgital ANAlysis application originally written for Irix OS has been ported to Linux. Following the recommendations of a project which evaluated system architecture S.G. workstations will gradually be replaced by Linux PCs.

A Linux Cluster consisting of 10 nodes, where each node has 2 800 MHz processors, 512 Mbytes memory and 30 Gbytes disk, is undergoing acceptance tests now. This computer has been acquired for running the MM5 model (1 km resolution) in connection an Air Pollution project (Bedre Byluft). During the winter season the air pollution forecasts are calculated for four towns, Oslo, Drammen, Bergen and Trondheim.

ECMWF Products

Disseminated data from the operational forecast model, the global wave model and the Ensemble Prediction System are received from ECMWF. This data amounts to approx. 64.5 Mbytes per day.

12Z_Based_products:	34.0 Mbytes
00Z_Based_products:	23.0 Mbytes
EF_T159:	3.5 Mbytes
WAVE_Models:	3.0 Mbytes

Boundary Condition data amounting to 85 Mbytes is generated each day. Dissemination data received from ECMWF is converted from GRIB format and placed in our present fields' database. The data is then accessible by the graphics packages that have been developed at DNMI.

The data is also used

1. for general forecasting by the forecasting department.
2. as boundary values for the Norwegian limited area models.
3. as backup for the Norwegian limited area models.
4. as input to the maritime and air pollution models.
5. as input to a ship routing program for the Pacific.
6. the Norwegian Institute for Air Research still receives ECMWF data on a regular basis. The data is utilised in the European Arctic Stratospheric Ozone Experiment.
7. by a commercial weather forecasting company.

Data retrieval from MARS is used for research projects.

Projects at ECMWF

The following are registered as Special Projects in 2000/2001:

- Parametrization of clouds in general circulation models.
- Ozone as a climate gas.
- Targeted ensembles providing boundary values for limited area models.
- The HIRLAM Project.

Experiments include:

- The generation of climatological fields.
- Testing of a new coupled biogeochemical model

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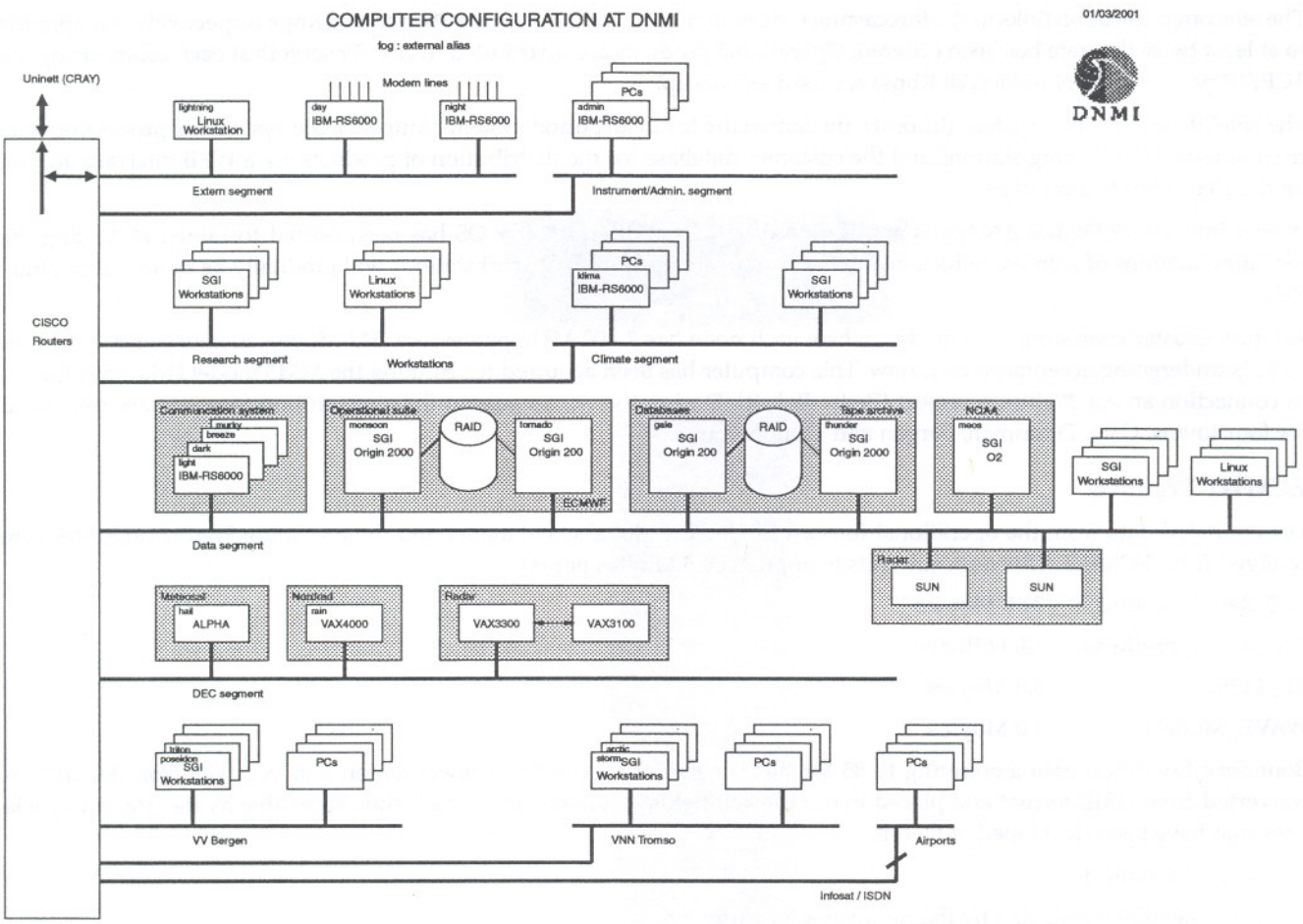


Computers:

- 2 x IBM RS6000 (Communication) – Disk system: Serial Storage Architecture (SSA) 21 Gbytes
- SGI Origin 2000 (File server/Tape archive/Databases) – 2 x 180 MHz R10000 CPUs, memory 512 Mbytes, disk storage capacity 3 x 34 Gbytes Raid
- SGI Origin 200 (Databases/File server) – 2 x 225 MHz R10000 CPUs, memory 768 Mbytes, disk storage capacity 2 x 34 Gbytes Raid
- StorageTek 9710 (Tape Robot) – 3 DLT 7000 drives, 588 cassettes, Storage Capacity 35 Gbytes per cassette (max, capacity 20 Tbytes)
- SGI Origin 2000 (Operational suite) – 4 (R12000) CPUs, memory 2048 Mbytes, disk storage capacity 14 Gbytes
- SGI Origin 200 (Mail Server/Backup for Operational suite) – 2 (R10000) CPUs, memory 768 Mbytes, disk storage capacity 26 Gbytes
- RAID disk system for operational suite – 225 Gbytes
- SGI O2 (NOAA) – 1 (R10000) CPUs, memory 320 Mbytes, disk storage capacity 8 Gbytes
- VAX3300 (Radar) – Memory 20 Mbytes, disk storage capacity 570 Mbytes
- VAX-station 3100 (Radar Display Unit) – Memory 24 Mbytes, disk storage capacity 330 Mbytes
- Sun UltraSparc10 x 2 (Radar Control/Display) – Memory 128 Mbytes, disk storage capacity 9 Gbytes
- VAX4000-200 (Nordrad) – Memory 32 Mbytes, disk storage capacity 1.9 Gbytes
- Alpha-200 (Meteosat) – Memory 64 Mbytes, disk storage capacity 2.1 Gbytes
- Workstations x 140 – SGI O2 and Indys, IBM RS6000
- PCs with Linux OS x 25
- Terminals / PCs – Approx. 330
- Graphical Devices: pen plotters and laser printers.

NORWAY

NORWAY

Networks:

- Ethernet
  - Connecting all computers and workstations and several PCs. Most of the network is Switched Ethernet giving 10 Mbps to each machine.
  - Connecting the four main SGI Origin 2000/200 computers is a 100 Mbps net.

Users' experiences

Total number of users = 28. Computer Rep., Operations = 2. In response to a request for feedback for this talk 5 of the remaining 26 users replied. Four of these replies represented the four projects that are the main users of the Fujitsu. The other active users are those using MARS.

There is large increase in the use of the ECMWF computers. The total usage in 2000 was 47% of our quota. For 2001 we have so far used 31%.

The users are very enthusiastic about using the Fujitsu. This may partly be due to the lack of supercomputing resources in Norway at present. This is a situation that will continue until the new supercomputer passes the acceptance tests. Also it seems that the users haven't had a great deal of problems running jobs on the Fujitsu.

The users are also very enthusiastic about User Support and mention fast response and very good service.

The connection via RMDCN is still a bottleneck. Nearly all users use Internet for data transfer.

R. Rudsar noted that DNMI had an outstanding problem in that they wished to be able to select areas from the BC products. ECMWF replied that this request was in hand.

PORTUGAL

PORTUGAL

Connection to ECMWF

Our connection to the ECMWF, GTS and TOULOUSE are now made through the RMDCN network. These connections are operational since October 1999.

Meteorological pre and post-processing

- ECMWF-WMO decoding software on ALPHA/OpenVMS, interfaced with our Message Database.
- All operational archives and handling are done using ECMWF BUFR and GRIB decoding and encoding packages.

National Meteorological Database

- Our national meteorological information (daily and Hourly) is, organised using a Relational Database engine from INFORMIX on a dedicated server.

Graphics

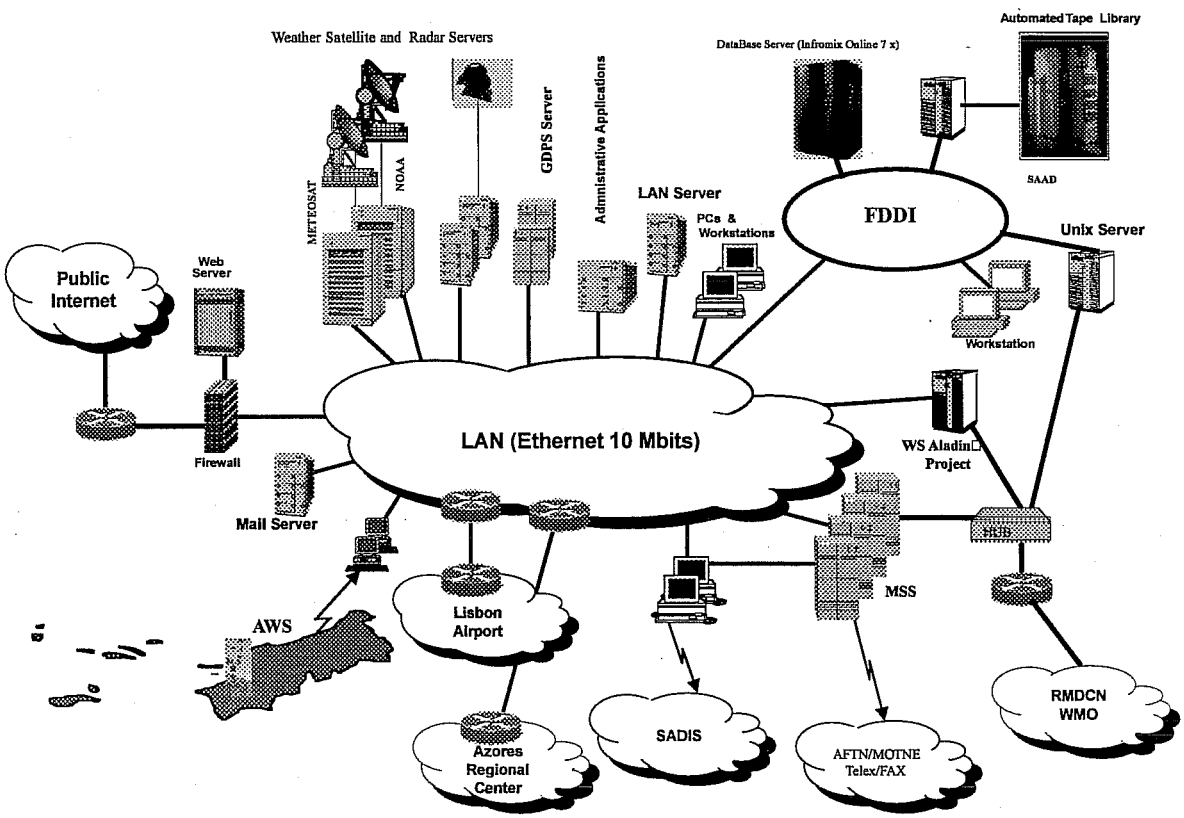
- ECMWF MAGICS and METVIEW are used on DEC Alpha WS.

Radar

- C-band Doppler weather radar systems. One system is operational since summer 1998 near Lisbon. Another one is on the way, to be installed in the south (Faro)

NWP

- IM is part of the ALADIN community for the development and running of a mesoscale atmospheric model. Our operational version of ALADIN runs twice a day up to 48 h (resolution 12.7 km) 31 levels, covering an area from 35.1°N–44.8°N and 12.2°W–1.7°W.
- Our main usage of ECMWF resources is to access the meteorological archives, users are familiarly with the procedures and turnaround of jobs is quite good.
- Access to Fujitsu VPP is now used by graduated students of the Lisbon University to run experiments with the French model MESONH (CNRM).



SPAIN

SPAIN

E. Monreal, Instituto Nacional De Meteorología, Spain

1 Computer equipment and connection to ECMWF

The main computing environment at INM is shown in figure 1. The following main changes since the previous meeting concerned the Wide Area Network:

- Enhancement of the connection to Regional Centres (CMTs) and Airport Meteorological Offices (OMAs)
- A new firewall implementation
- Operational connections to Météo-France and DWD moved to RMDCN

Main computer

The main computer system is an 8 years old CRAY C94A configured with 4 processors, 1 Gbyte of memory, 1 Gbyte SSD and 85 Gbytes of disk storage. It is used for numerical weather prediction and climate research. The HIRLAM weather prediction model runs 4 times a day with 0.5° and 0.2° resolution in a nested configuration.

Data archiving and retrieval system

It comprises two subsystems, a data handling system and a data management system:

Data handling system: Acts as the central repository for user files and all operational data. It is based on AMASS software running on a 2 processor HP 9000 K570 server configured with 2 Gbytes of memory and 300 Gbytes of disk storage, used as cache space for AMASS, which controls an IBM3494 tape library with 10 3590 drives and a total capacity of 17 Tbytes. At present, the system is storing about 3.5 Tbytes in 900,000 files.

Data management system: Designed to provide access at the atomic level (fields) to model and observational data with an user access interface rather similar to MARS, is partially in production. There are four Relational Data Bases: observations, NWP model fields, satellite images and products, that were developed using ORACLE 8. The system comprises a cluster of two HP 9000 K460, configured with 2 processors, 1 Gbytes of memory each and 220 Gbytes of shared disk (in RAID 5) running Service Guard High Availability software.

Main UNIX servers

Sun SPARCserver 1000E

- 2 processors, 64 Mbytes of memory, 52 Gbytes of disk storage (36 Gbytes in RAID 5).
- NIS master server and file server for SUN workstations.

2 Sun ULTRA-250

- 2 processor, 512 Mbytes of memory, 36 Gbytes of disk each.
- This two systems handle the data pre-processing and Report DB as well as the reception of ECMWF dissemination, most of graphics production and post-processing.

Sun Ultra Server Enterprise 3000

- 2 processors, 512 Mbytes of memory, 8 Gbytes of disk storage.
- Applications development and testing.

Sun SPARCserver 1000E

- 2 processors, 512 Mbytes of memory, 24 Gbytes of disk storage.
- Climate database based on ADABAS DBMS.

Sun Enterprise-10

- 1 processor, 128 Mbytes of memory, 4 Gbytes of disk.
- Intranet Webserver and anonymous ftp server, secondary NIS server, MarsCache server.

Sun SPARCstation 20/150

- 1 processor, 160 Mbytes of memory, 2 Gbytes of disk.
- NQE server for job submission to the CRAY C94A and used as a gateway to ECMWF for non-operational usage.

SPAIN SPAIN

Sun Enterprise-450

- 1 processor, 256 Mbytes of Memory, 8 Gbytes of disk storage.
- Internet Webserver.

McIdas servers

The McIdas production system that deals with satellite image processing and serves as operational WS for forecasters runs on a distributed environment. The main McIdas servers, handling data ingestion, are:

3 Sun ULTRAstation 1 170E

- 1 processor, 256 Mbytes of memory each and 16 Gbytes 4 Gbytes of disk storage each.
- GOES images, model grids and observation data ingestion.

2 Sun SPARCstation 20/712

- 2 processors, 256 Mbytes of memory and 4 Gbytes of disk storage each.
- TIROS and METEOSAT images ingestion.

Other computers

Message switching. A dual DECsystem 5900, running Ultrix. Based on UMS software deals with GTS, AFTN, MOTNE, etc.

Graphics dissemination. A high availability cluster, comprising two HP9000 k200 configured with 2 processors, 128 Mbytes of memory each and 2 x 8 Gbytes of shared disk storage (disk mirroring) replaced the facsimile dissemination.

Radar Network. A VAX 4500, running open VMS, handles radar images reception and composition from the 14 meteorological radar currently in operation.

Network

All the computers in the central office are connected through a local area network (see figure 1). The LAN is basically Switched Ethernet, with an ATM backbone at 622 Mbps linking the data archiving and retrieval systems and a small FDDI ring on which the CRAY C94A is connected. A number of Cisco Catalyst switches manage the Ethernet giving 100 Mbps to each of the main UNIX servers and 10 Mbps to the rest of the systems.

All the subsidiary offices, 15 regional centres (CMTs) and 60 airport's Meteorological Offices (OMAs), are connected via Frame Relay to the central LAN in a wide area network. The current configuration is as follows:

	Access lines: number x speed	PVCs to Madrid (central office): number x C.I.R. (In/Out)
Central office	8 x 2 mbps (channels)	N.A.
11 CMTs (forecasting activities)	1 x 512 kbps	2 x 192/32 1 x 32/32 (non meteorological data)
4 CMTs (no forecasting activities)	1 x 256 kbps	2 x 96/32 1 x 32/32 (non meteorological data)
60 OMAs	1 x 128 kpbs	2 x 48/16

The central office is linked to two different Points of Presence (PoP) through two diversely routed lines, whereas subsidiary offices have single access lines and ISDN as backup.

Connection to RMDCN is shown in figure 2. The ISDN connection for backup purposes and the access line are now diversely routed. Links to ECMWF, Météo-France and DWD have already been moved to RMDCN, while operational links to UKMO and Portugal are still through leased lines.

The two connections to the Internet (a 2 mbps leased line to REDIRIS, the Spanish academic and research network, and a 64 kbps link to IBERNET, a commercial provider) are protected by a new firewall implementation based on Firewall-1 software.

SPAIN

SPAIN

Connection to ECMWF

Figure 3 shows the data flow through INM connection to ECMWF. ECMWF dissemination is received in GRIB code on a Sun ULTRA-250 server via ftp, where is decoded and plotted as well as sent to the C94A to be used as boundary conditions for the HIRLAM model, to the data management system to be archived and to the McIdas grid server where is again decoded and ingested. The other Sun ULTRA-250 server is used as backup.

The Sun SPARCstation 20/150 is acting as gateway of the non-operational usage; interactive work, file transfers -ftp and eccopy-, etc.

Submission of operational jobs to ECMWF computers is done, for the most part, in ecgate1 through SMS. Ecbatch software runs on the Sun SPARCstation 20/150 for user's job submission and on the two Sun ULTRA-250 servers for operational jobs. Use of MARS remote client software, with the Sun Enterprise-10 acting as cache server, is allowed to any user Workstation within the LAN.

Access to ECMWF computing resources through the Internet is limited, for the moment, to three users outside INM.

2 Projects run at ECMWF

The majority of our users access the Centre's computing resources to extract data from MARS for both operational and research work. As mentioned before, some of them access ECMWF data transparently via the MARS client software, while MARS access via the MS Web is mainly used to browse the content of the archive. We also run Metview in batch mode on ecgate1 to produce derived products from EPS.

Concerning the usage of the Centre´s High Performance Computing Facilities, it is basically due to the following projects:

- Experimental runs of the HIRLAM model using the reference system
- Isentropic trajectory computation in the stratosphere for an international project that extended the "Stratospheric Climatology using Ultraviolet-Visible Spectroscopy (SCUV)" project already finished.
- Trajectory computations with KNMI model.

We only used a 13% of our 2000 allocation of FUJITSU VPPs units, but until April 30 a 20% of our 2001 allocation units has already been used. This remarkable increase is due to the better turnaround on the VPP5000 and to the preparation and test of benchmark versions of the HIRLAM model for the replacement of the CRAY C94A.

3 Experience using ECMWF computers

Spanish users are in general very satisfied with ECMWF computer services and the assistance and help we get from User Support is very much appreciated. They also noticed the effort made in the MS Web server development, in particular the access to MS Web without the need for a certificate is regarded as very useful for INM staff who do not require access to computing resources.

Users of the HIRLAM model reference system have been warned about the waste of VPP's resources, specially when it is run in multiprocessor mode. Initial tests of the new mini SMS shows that it may alleviate this problem.

4 Future plans

There are two relevant projects for years 2001-2002:

- A new message switching is being developed in-house to replace the current system in 2002
- The procurement of a new system to replace the CRAY C94A. The plan is to issue an ITT by June 2001 and to install the new system by mid 2002.

The use of the VPPs over next couple of years will depend on the in-house computing resources available and the start of the following projects:

- Limited Area Model seasonal forecasting within the frame of project DEMETER.
- EUROCS.

Both projects will use the RCA model, a climate version of HIRLAM from the Rossby Centre. For the rest of the use of ECMWF resources no changes are envisaged in the immediate future.

SPAIN

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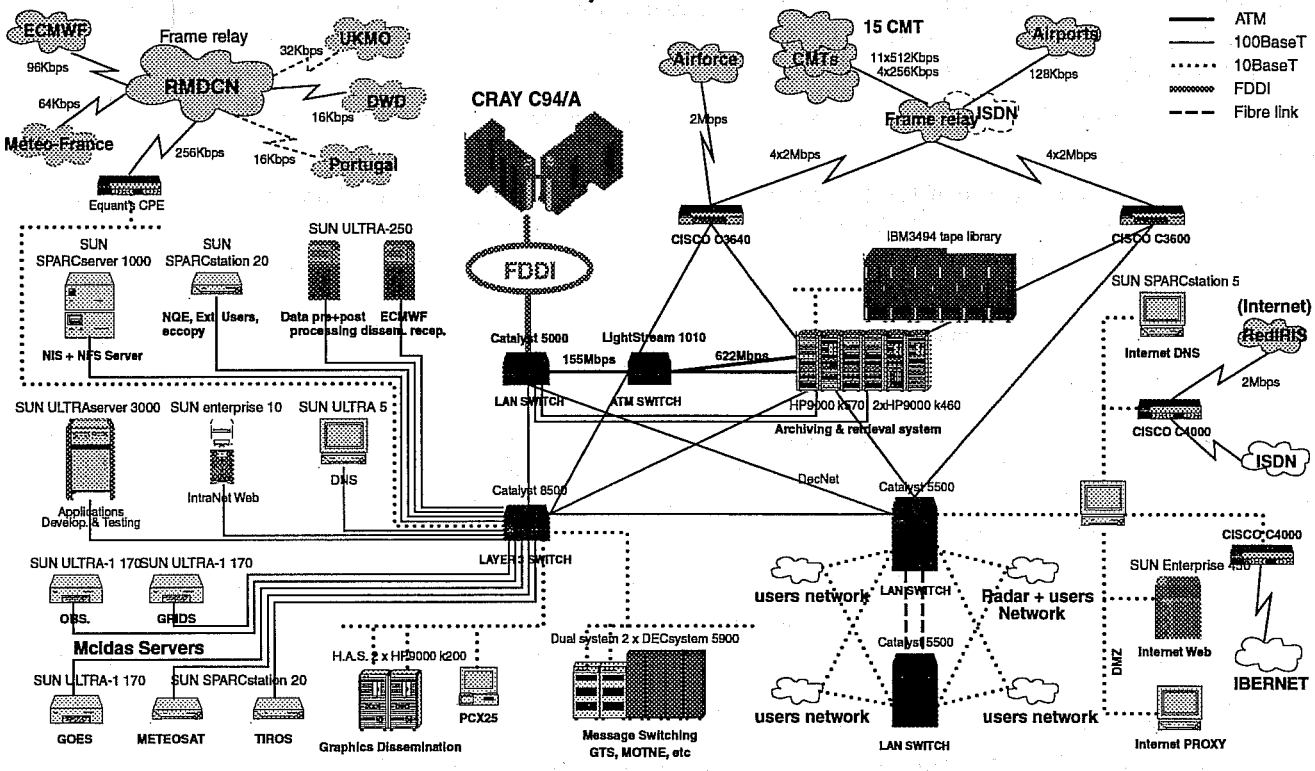
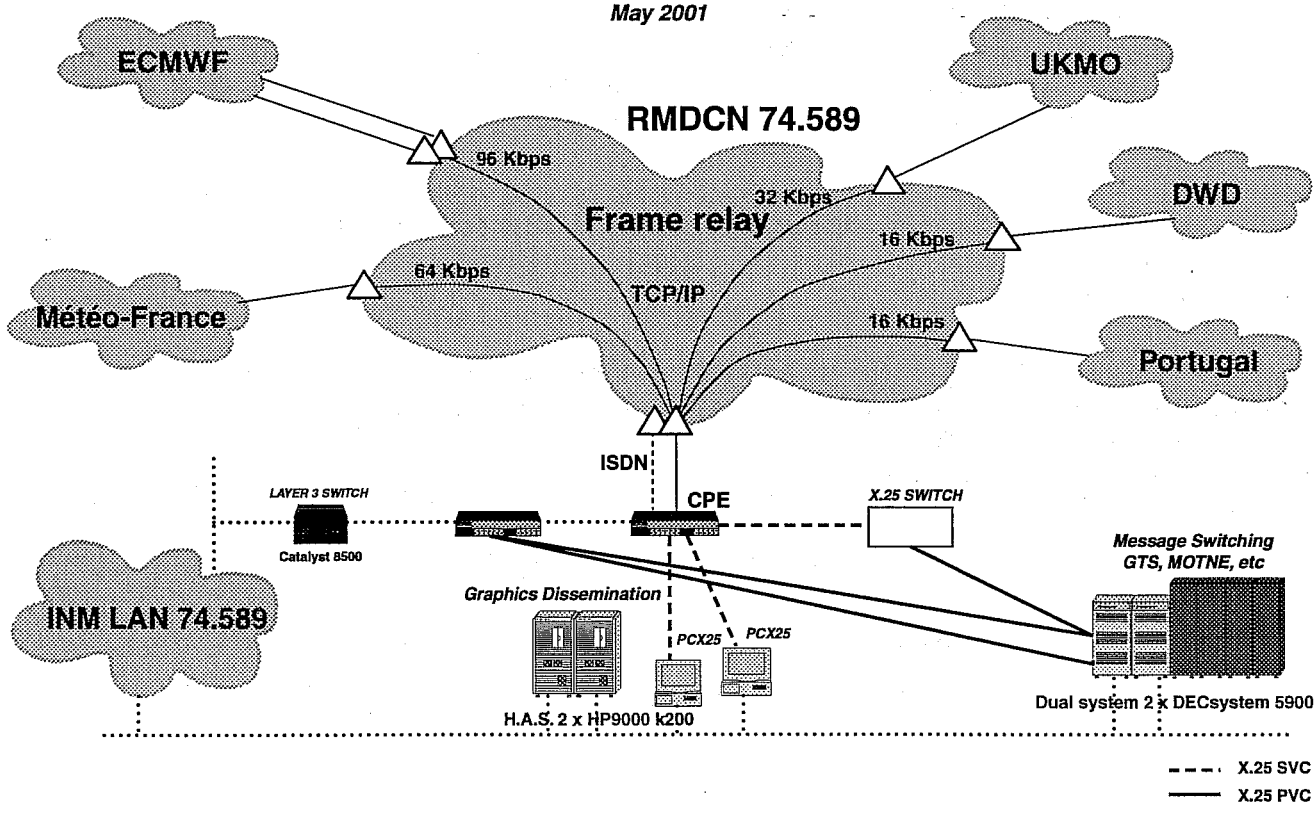
INSTITUTO NACIONAL DE METEOROLOGÍA
COMPUTER AND NETWORK CONFIGURATION
May 2001



INSTITUTO NACIONAL DE METEOROLOGÍA
CONNECTION TO RMDCN
May 2001



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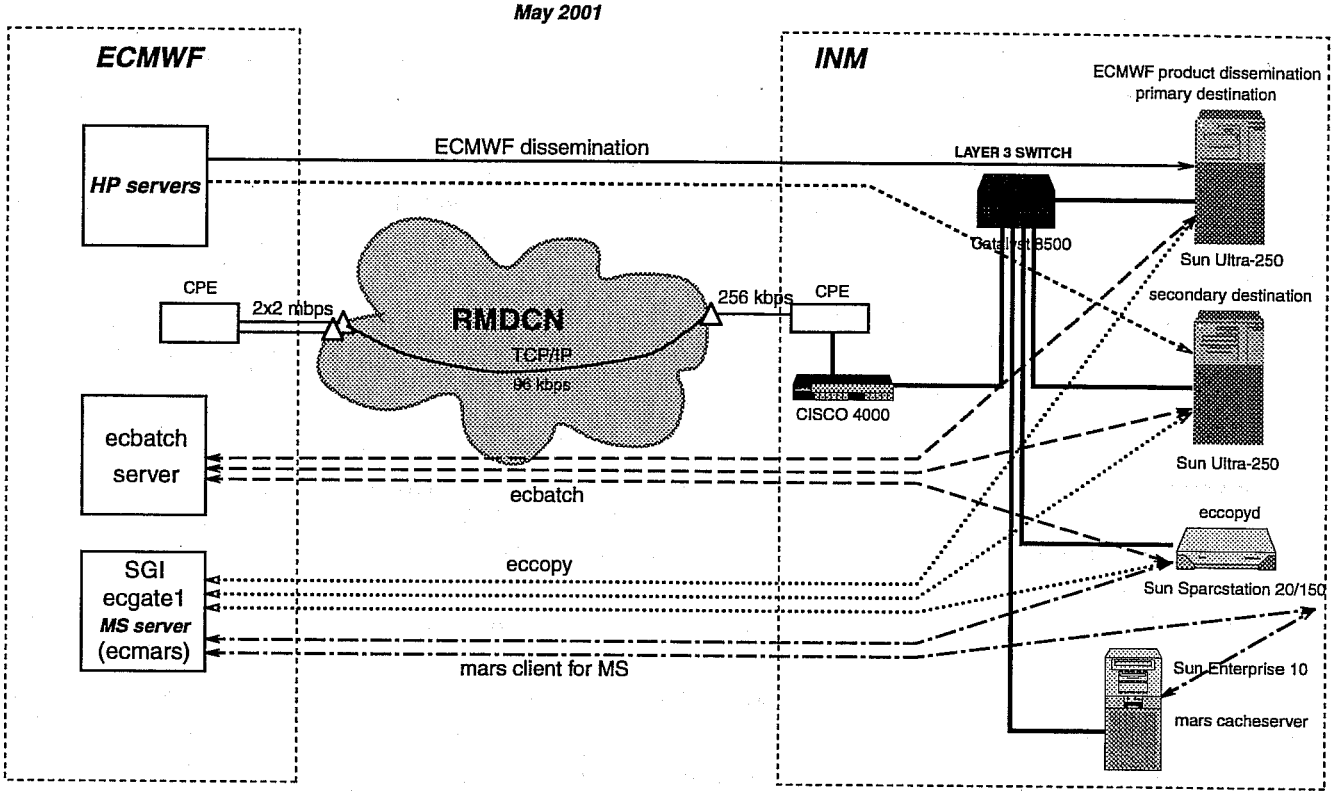
INSTITUTO NACIONAL DE METEOROLOGÍA
ECMWF – INM LINK
May 2001



SWEDEN SWEDEN

Rafael Urrutia, SMHI, Sweden

The computer equipment at SMHI

Our equipment and IT-Infrastructure has been described before on these meetings and no many big changes have been done. But . . . we are working to realise a new IT architecture and this means big changes in our network, renew servers platforms, security routines/platform and updated IT-policy.

The Cray system, provided by the National Supercomputer Centre in Sweden (NSC), is used to run operational models such as the local implementation of the HIRLAM model and HIROMB (High Resolution Operational Model of the Baltic Sea Area), and also climate models. It is still connected to SMHI by means of a 2 Mb line, and also a 34/100 Mb line, used for research, development and backup.

Our Internet platform is based on Netscape Enterprise and Apache on Solaris. The firewall era based on Alta Vista Firewall 98. Our Intranet is running on Netscape Enterprise and Apache for Unix. Dedicate web-servers are also running IIS on Windows NT. We are connected to the Internet via a 2 Mbit/s line. The platforms for both the firewall and the web-servers will be upgraded and renewed.

The main computer system is based on Unix environment at SMHI, then we have important system based on OpenVMS and minor systems are based on Windows NT. The migration work from VAX/VMS to OpenVMS or Unix/Windows NT is mainly done. The office environment is mainly provided by MS Office on Windows platforms. Windows platform (NT) is also used for file and print services. For Unix users MS Windows Terminal server provides the MS Office environment with a configuration for 30-40 users license. Samba is used to provide PC users file services from both Unix and VAX/Alpha systems.

The mail services are done by MS Exchange. We are also doing standardisation for mail on Unix and OpenVMS to use the Exchange server.

The satellite receiving system comprises two AlphaStation 200 4/166 running OpenVMS, one system for Meteosat data and one system for NOAA data.

The system for satellite image processing and for production of various image products is based on two AlphaServers DS10 466 MHz, 512 Mb memory with a total of 52 Gb disk space in an Available Server environment (TruCluster).

Important SMHI products are provided by system based on SGI and HP UNIX station.

Two AlphaServers DS10 provides distribution of data to around 1200 clients with 28000 products per day. The servers are of 466 MHz 512 Mb memory with external disk controller. One of the servers is standby. We try to provide the same the same development environment as we have in our production one. This means Unix, OpenVMS and Windows platforms. The Unix systems are of type Sparc Solaris, Alpha Tru64, Alpha OpenVMS and Intel Linux.

SMHI has the responsibility for running the Swedish system connecting to the GTS. We are today using a powerful Tandem CLX740 system installed called Metcom. SMHI has just signed an agreement about buying a new MSS application, MESSIR-COMM, for installation and start of operations later this year (2001). This system is planned to be a High Availability system (with software-managed automatic fallover) on two Compaq Proliant DL380 servers, with Windows 2000.

We are still supporting a system for distribution of meteorological data to the Baltic countries. The communication is to Riga from which the products are distributed onwards to identical systems in Tallinn and Vilnius. The presentation is done by PC-based systems.

A local system is used to monitor and supervise applications and equipment. The system is called Karo.

We are still working with ORDMS Informix Universal Server to replace our systems for data storage and archiving.

SMHI has put distributed techniques such as CORBA (ObjectBroker & Orbix) and OSF/DCE into operation. New developments are using Java, Servlet, JRE, and JDBC.

Many Internet tools and freeware are used. Example Phyton, Apache, Perl, Gimp, Ghostscript, ghostview, ImageMagick, Jakarta-Tomcat, and more . . .

There are presently five VAX systems supporting weather-radar, one in Norrköping, one in Stockholm, one in Göteborg, one on the island of Gotland and one in Leksand. There are also connections between Norrköping and the military weather radar. The radar in Sweden, Norway and Finland are connected using concentrator nodes in the three countries, which in turn will be connected to the computers of each radar system.

SWEDEN

SWEDEN

Experience using ECMWF computers

In Sweden we have around 58 ECMWF users. 45 of them at the SMHI office and the ones are coming from the outside, for example the Swedish University and the Swedish armed forces.

The assistance, help and other relation we have to the ECMWF is very good.

What are the users doing?

We have registered about 10 projects at the ECMWF. These projects are related to the following areas:

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

I asked the Swedish users what they were working with and here you have some of the answers I got:

Karl-Ivar Ivarsson, smi@ecmwf.int

Get observations and lateral boundaries for running HIRLAM (from MARS). To some extent also to run that model on ECMWF computers and to get new versions of it.

Magnuz Engardt, snb@ecmwf.int

I have been using my account on ECMWF mainly for accessing the mars facility and retrieving two and three-dimensional meteorological data (both analyses, and forecasts) for usage in our off-line transport/chemistry model MATCH. From time to time I have also used Ray McGrath trajectory software and private programs that utilise the GRIB reading/writing libraries of ECMWF.

Johan Karlsson, smu@ecmwf.int

I will mainly work with the Dissemination-system, to retrieve GRIB and BUFR-data. These "streams" are divided into several different files (for different purposes) when they arrive at SMHI. Later on, they are used in the HIRLAM forecast model, as well as to create products (maps). At SMHI we use Metview to create maps, but we also use our own similar system: Metgraf.

Magnus Lindskog, smx@ecmwf.int

Impact studies and verification with the 3-dimensional variational data assimilation scheme developed for HIRLAM.

Hans-Georg Scherneck, sub@ecmwf.int

The ECMWF data archive is used to copy global surface pressure fields. From these fields, the loading effect on the solid earth surface is computed. The effect is due to the elasticity of the earth crust and mantle. The displacement amounts to several centimetres in the vertical. This kind of effect is significant in precise space geodetic work, e.g. positioning with the satellites of the Global Positioning System.

Anders Ullerstig, sma@ecmwf.int

Retrieve data from MARS, monthly means data and 6h-data used as boundary data to be used locally or transferred to SMHI to be used at NSC. Simulation of HIRLAM in a climate mode created by Rossby Centre at SMHI, both short-range test and soon several years' simulations.

Lars Johansson, snt@ecmwf.int

We are planning to extract data from the global wave model (WAM) via MARS. We will use both integral parameters, such as HS and TM02, and the full directional spectra. Extracts from the gridded fields will be further processed by us for delivery to end-users.

Erik Kjellström, sud@ecmwf.int and Kim Holmén, suk@ecmwf.int

We are using the resources at ECMWF basically to retrieve data from the MARS archive. The data we extract are used as meteorological input for tracer transport models or post-processing of the MARS data on the ECMWF computers to calculate three-dimensional trajectories. The transport models and trajectories are compared to tracer data to elucidate weaknesses in how circulation features are modelled.

Lars Meuller, smz@ecmwf.int

MARS requests and running HIRLAM.

SWEDEN SWEDEN

Gunnar Pettersson, smt@ecmwf.int

Local support concerning the Metview application.

Annica Ekman, sue@ecmwf.int

I use ECMWF resources to extract boundary data for the regional weather forecast model HIRLAM. I have also used ECMWF-analysis of T, RH and geopotential to evaluate model simulations.

Ove Akesson, smo@ecmwf.int

Looking at the contents on page http://wms.ecmwf.int/forecasts/ and also extracted some MARS-data.

Lennart Wern, snc@ecmwf.int

I retrieve long time series of SYNOP from different stations.

Per Kållberg, smk@ecmwf.int

I use my ECMWF resources for three purposes:

1. *MARS access to the ECMWF operational forecasts. Retrieved forecasts are used locally at SMHI for the development and testing of application software at SMHI in e.g. the SMHI RiPP project and other production applications.*
2. *Access to the HIRLAM reference system.*
3. *Access to the member state server for further access (as ECMWF staff user) to my work at ECMWF (ERA-40 reanalysis project)*

Stefan Gollvik, smd@ecmwf.int

I use the computer facilities at ECMWF, almost exclusively when I do experiments with the HIRLAM system.

Rolf Stycket, smv@ecmwf.int

I sometimes order or cancel dissemination products from ECMWF's web-site, and very occasionally order some products from MARS. That's it.

IT infrastructure – activities in progress

- Move into new computer room
- Reconfiguration / upgrading of backbone
- Storage consolidation (NAS)
- Centralised back-up
- Standardization of Linux WS
- New FireWall coming in soon
- New VPN system
- Centralised mail services
- Windows 2000 - the new windows platform for SMHI?
- Next generations www and ftp - Internet services
- Introducing Focal Point – security services

SMHI – The running projects at ECMWF

- The loading effect on the solid earth surface is computed from in-data from ECMWF
- Dissemination-system, to retrieve GRIB- and BUFR-data
- Get lateral boundaries for running HIRLAM
- Simulation of HIRLAM in a climate mode created by Rossby Centre
- Running model on ECMWF
- Retrieving two- and three-dimensional meteorological
- Accessing the mars facility
- Extract data from the global wave model (WAM) via MARS
- 3-dimensional variational data assimilation scheme developed HIRLAM.
- ECMWF-analysis of T, RH and geopotential to evaluate model simulations

SWEDEN **SWEDEN**

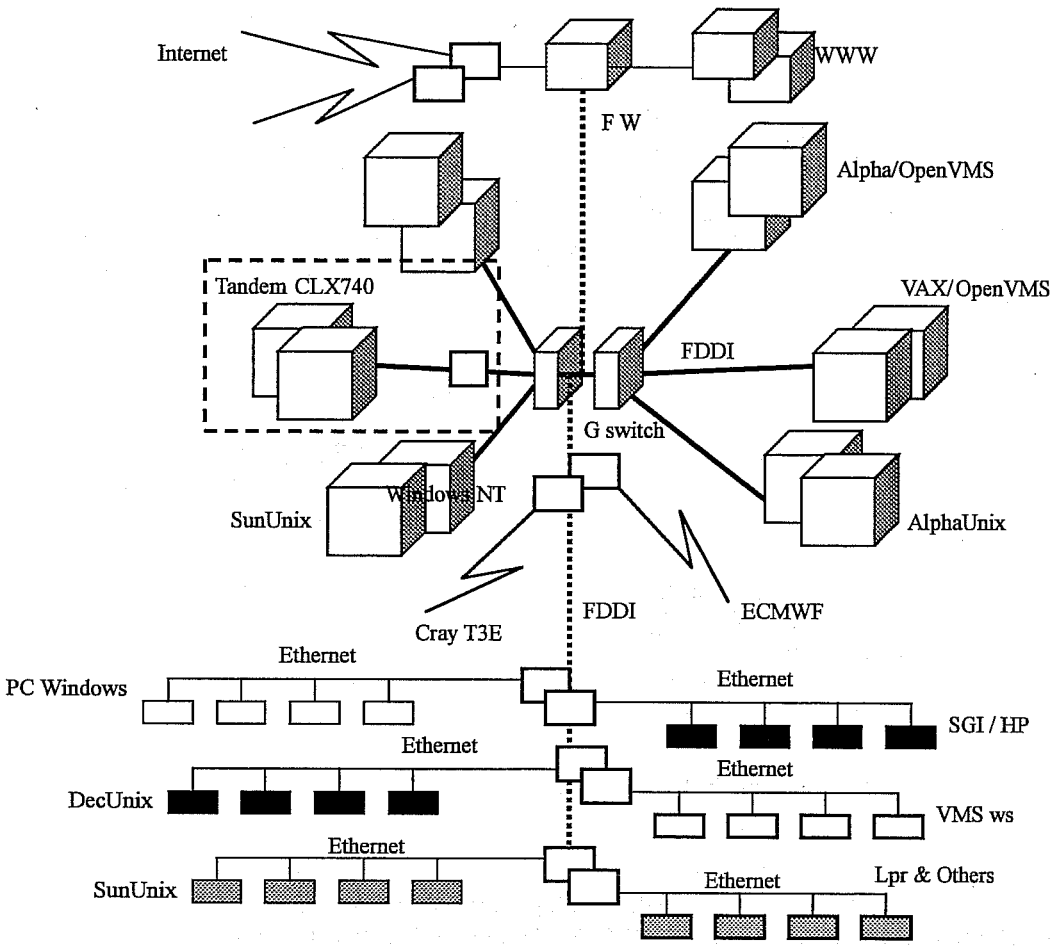
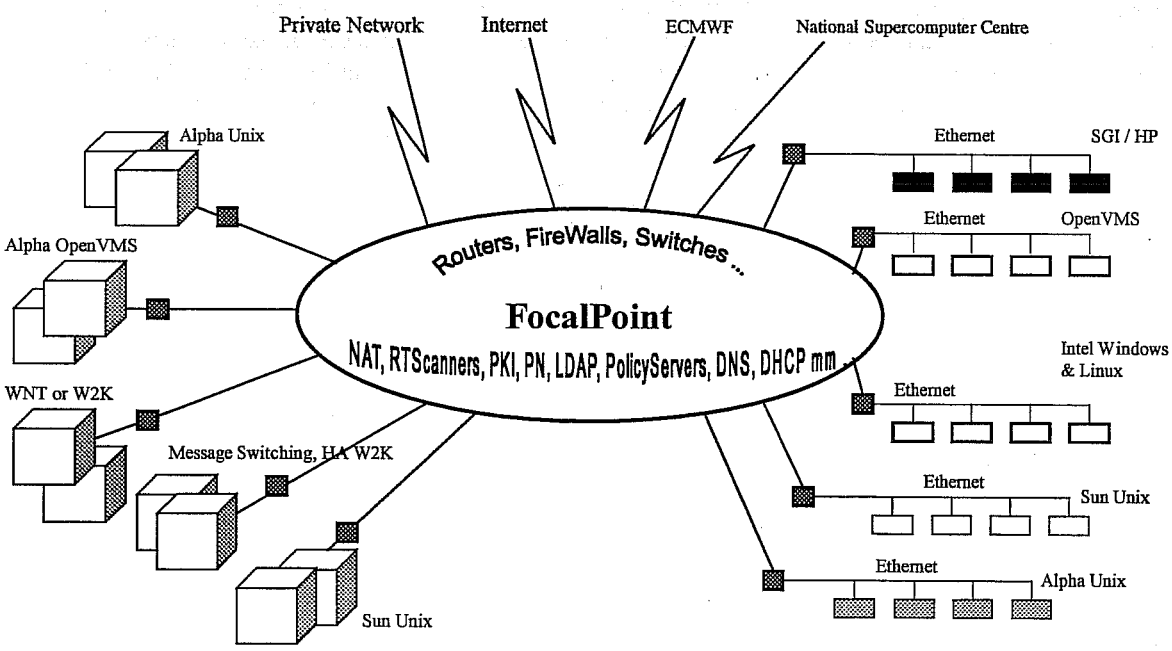


Figure 1 SMHI computer configuration, the old scheme . . . *Rafael Urrutia.*



File-, www-, ftp-, printer-, back-services and more Different kind of users on different kind of platforms

Figure 2 SMHI computer configuration, the vision for the future . . . *Rafael Urrutia.*

SWEDEN **SWEDEN**

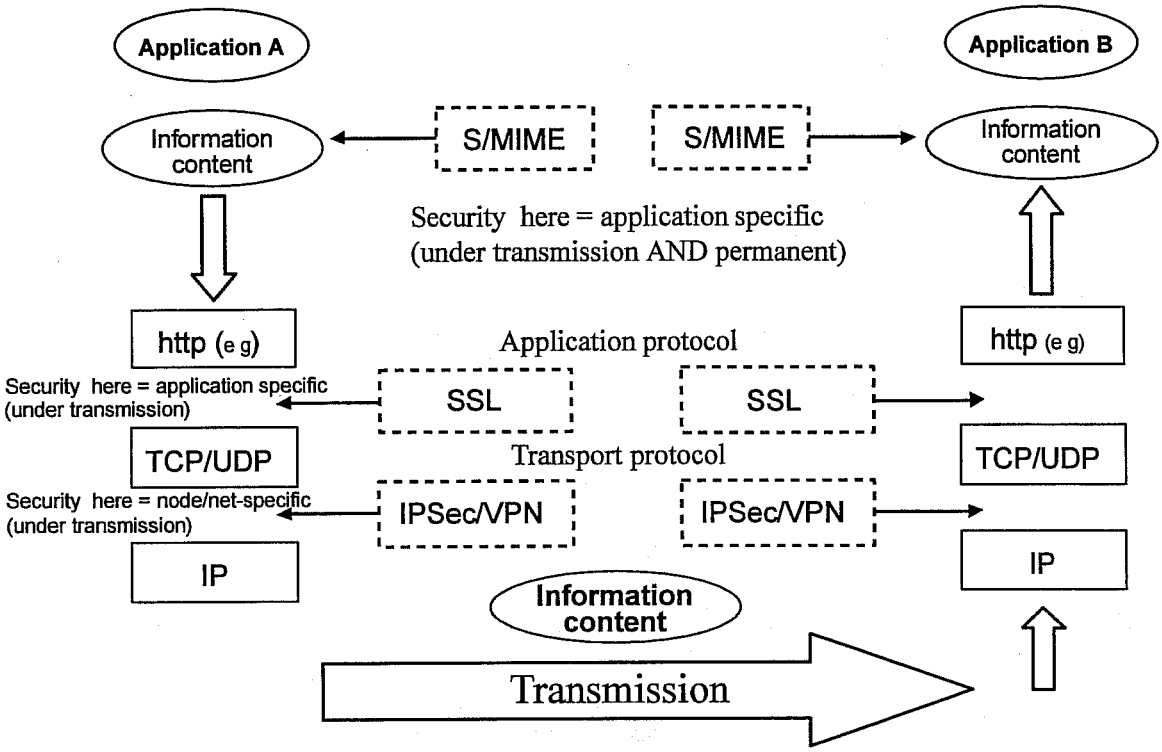


Figure 3 SMHI security needs and layered technologies by IT-sec project 2000/2001 at SMHI.

G. Wihl (Austria) asked whether SMHI had any experience with running Windows 2000 on a PC in a SUN network environment. Austria had experienced problems with dynamic DNS. R. Urrutia replied that they had 3 or 4 laptops and workstations installed for user testing with Windows 2000. They had discovered that with the default installation, Windows 2000 would attempt to write to the DNS server; this had to be manually disabled. This was the only problem they had experienced; Windows 2000 is otherwise very stable. G. Wihl also asked whether SMHI had had problems in printing large jobs. R. Urrutia replied that they had experienced problems with routers or the way print servers communicated with the client. They had had to ensure that configurations were identical. W. Zwieflhofer noted that SMHI intended to standardise on LINUX. Did they also intend to standardise hardware? R. Urrutia replied that the only standardisation is to run on INTEL; they are unable to bulk buy, so have many different PC and workstation models.

SWITZERLAND

SWITZERLAND

MeteoSwiss

Actual Computer Environment

No important changes on our computer equipment have been done since the last meeting (the slides shown last year are more or less still valid). The most remarkable change is the replacement of the LAN with an increase of the CIR from 10 Mb/s to 100 Mb/s.

The major figures of our equipment are:

- Servers
  - 40 SUN (of different types) / Solaris 2.5, 2.6
  - 3 VAX/ VMS
  - 2 Alpha 1 VMS
  - 2 PDP 11 / VMS (will be replaced this year by a system in the actual SUN environment)
  - 2 HP 90001 HP-OS (Unix)
  - 2 Siemens 1 Unix
  - 4 NT-Servers
- Workstations
  - approximate 250 SUN workstations (of different types) / Solaris 2.7
  - a PC board is installed in 75% of the workstations / Windows NT
- Network
  - LAN: 100 Mb/s
  - WAN: 2 Mb/s (no backup-lines!)
  - ETH/CSCS: 10 Mb/s
  - Internet: 1 Mb/s
  - RMDCN – ECMWF: 96 kb/s (will be increased this year to 128 or 256 kb/s); DWD: 128 kb/s (last year: 64 kb/s); Météo France: 16 kb/s

Plans

Last year, we started the project 'Server & Storage Consolidation'. The major points of the project are:

- Goals
  - replacing old systems (some of them are out of five)
  - extending the storage capacity (some systems are one its limit)
  - Optimising the resources (CPU and storage); reducing the maintenance (particularly manpower)
  - simplifying the management
  - **Overall:** increasing the availability and the scalability of the whole system and reducing the costs
- Mandatories
  - Sparc architecture
  - Operation System Solaris
  - maximal storage capacity required: 6 TB (start with 600 GB),
  - the integration of Windows systems into the storage system must be possible
- Possible solution (actual most favourite)
  - Server Consolidation (one or a few scalable servers) Storage Area Network (SAN)
  - 'Thin clients' with a large size of memory and if necessary a powerful graphics card
  - 'Fat clients' with its own disks and a copy of the OS for special tasks (like development, etc.)
  - extension of the WAN (CIR and backup-line)
  - optional: a second system designed as a 'Disaster-Recovery-System'
  - known 'bottleneck': It could be that the necessary CIR for the WAN will be very high and therefore the costs could be too expensive *(must be tested)*. If so, a server consolidation / SAN will be done at Zurich and at each regional office as well.

SWITZERLAND

SWITZERLAND

Experience using ECMWF Computer/Services

MeteoSwiss makes use of:

- the dissemination system, MARS, 'eccopy', MAGICS applications running at ECMWF,
  support of installing METVIEW at CSCS and at MeteoSchweiz

The users are very satisfied of the user support and the services from ECMWF Once installed, the certificate system for the web access causes no problems.

W. Zwieflhofer asked what software their thin clients run and what kind of thin clients they are considering. P. Roth replied that all the operating systems, applications etc. ran on the servers. Currently they have 50 servers, which is an impossible number to maintain and support well. The current ITT process is intended to reduce the number of servers by the year 2004.

TURKEY

TURKEY

Meral Demirtaş, Weather Forecasting Department, Turkish State Meteorological Service

Contents of the Presentation

- Infrastructures of
  - NWP
  - Telecommunication
  - Internet Groups
- Experience of using ECMWF computers, services, etc..
- Plans for the future . . .

Infrastructure of Numerical Weather Prediction (NWP) group

Sonbahar: SGI ORIGIN 2200 Server, R12000 MIPS, 300 Mhz x 2 CPU, 1GB memory, 60 GB HDD

Ilkbahar: SGI ONYX2 Workstation, R10000 MIPS, 180 Mhz x 2CPU, 256 MB memory, 43 GB HDD

(TSMS is connected to ECMWF with these machines.)

Operating system: UNIX (IRIX 6.5)

Infrastructure of Telecomunication Division

SGI ORIGIN 200 two data-servers (Master and Slave)

- 2 x MIPS RISC R-10000 64 bit CPU
- 2 x 9.1 GB HDD
- 128 Mb memory
- UNIX (IRIX 6.5)
- MESSIR software package is used.

Features of the MSS computer

Front-end processors

- Intel Pentium II 350 MHz,
- 80 MB RAM, 4 GB HDD, CD-ROM drive x 12,
- 10/100 Mb Ethernet,
- DIGIBOARD (card providing 80 asynchronous ports,
- EICON (Card providing 1 synchronous port),
- MEGAPAC (Switch providing 8 synchronous ports).

Telecommunication

Some information about Internet services (www.meteor.gov.tr)

- 40,000 average daily hit,
- 310 Internet users,
- 400 Computers connected to the net
- 1024 Bandwidth (Kbps),

Experience using ECMWF computers, services, etc

- In general services are good . . .
  However there are some questions:
- Does one need to be a registered user if one only needs to look at the documents or the products on the web page of the Centre? (User certificates...)
- Would it be possible to share the certificates at Met. Services? (instead of having a certificate for each user?)
- Is the new version of the Metview available for the use of met. Services?

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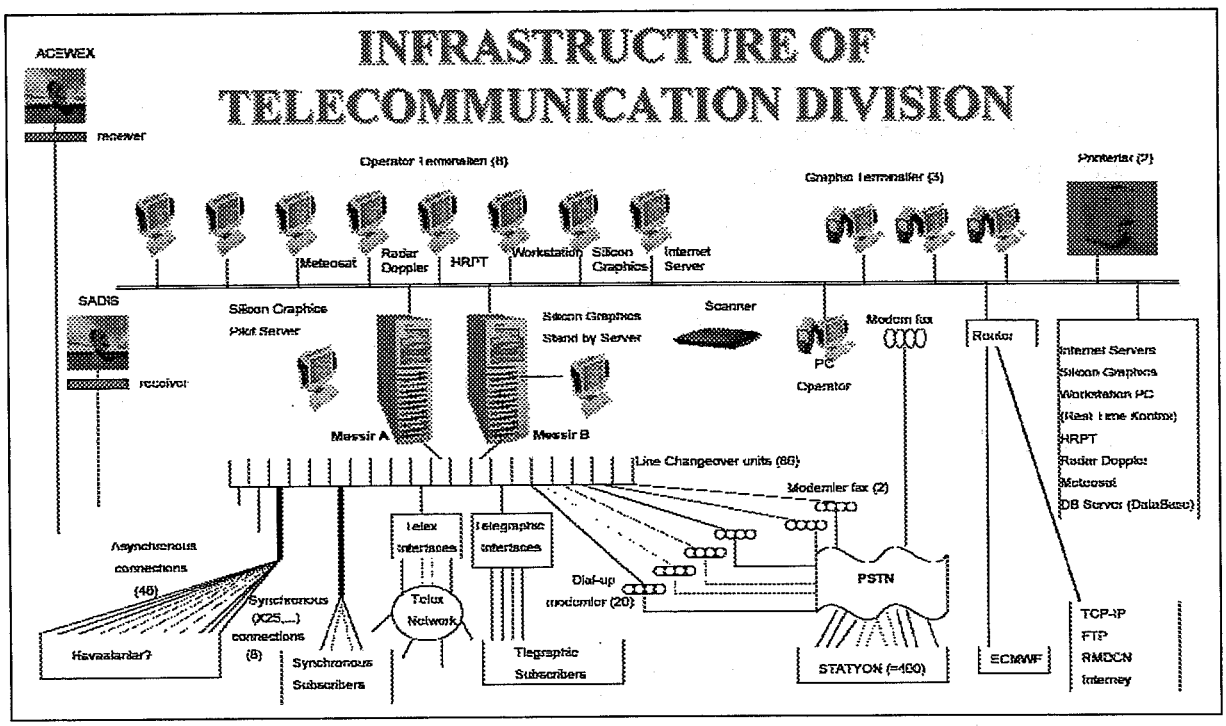
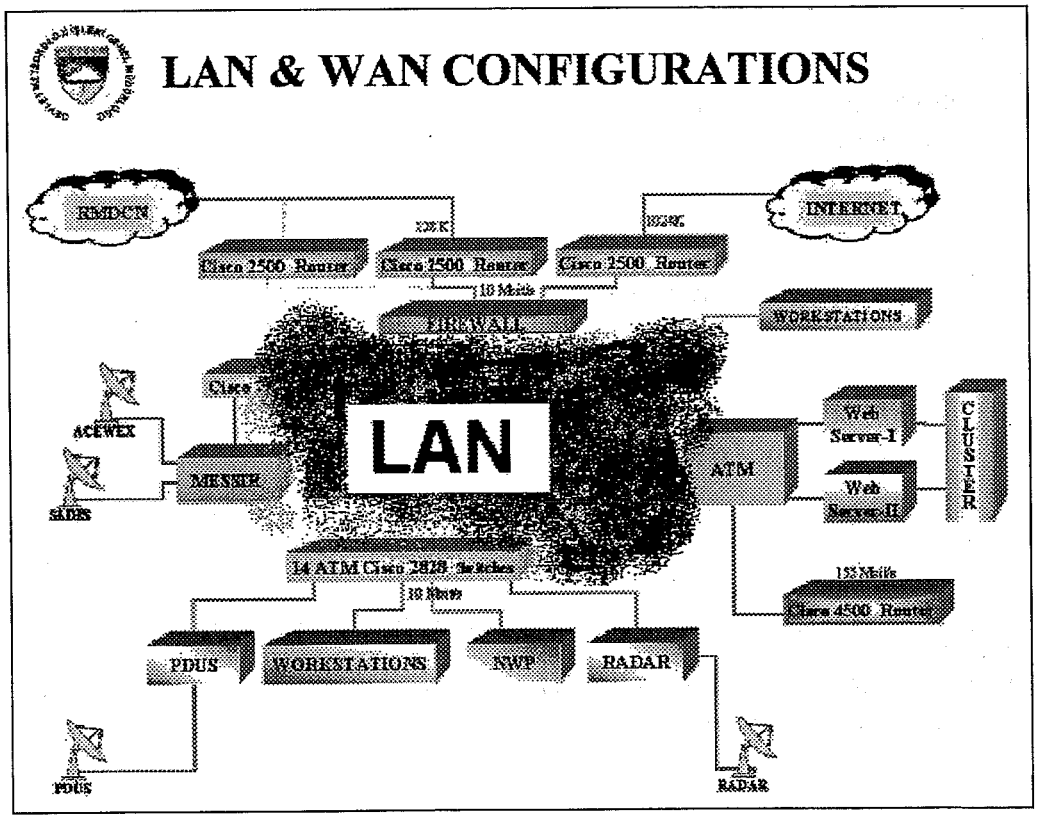
Plans for the Future . . .

- Making more use of the web-based documents and products,
- Well defined projects and model arrangements to run on the supercomputer (which we have not been doing effectively . . .),
- Re-organise all our users.





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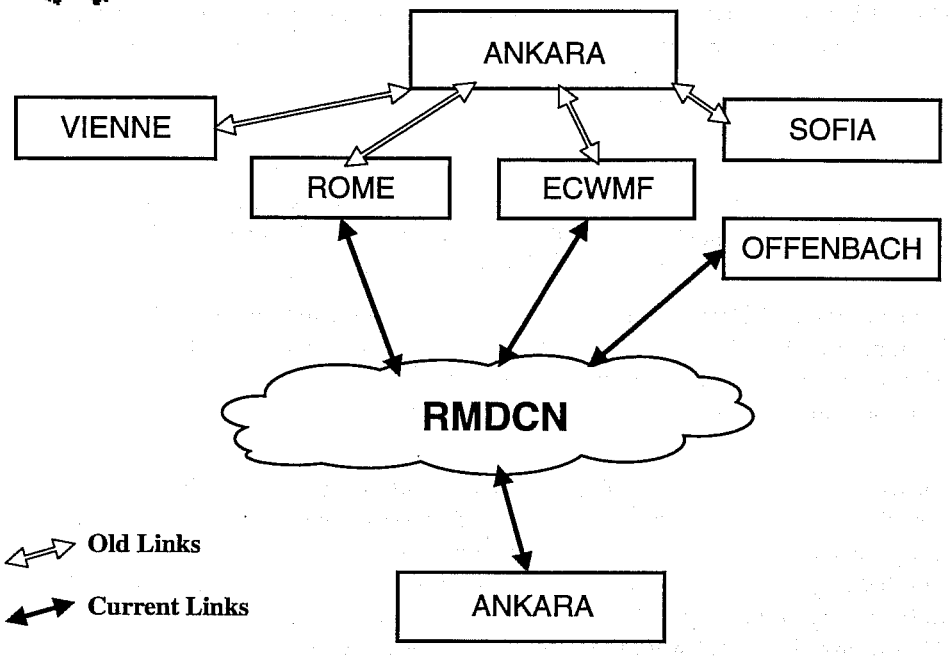
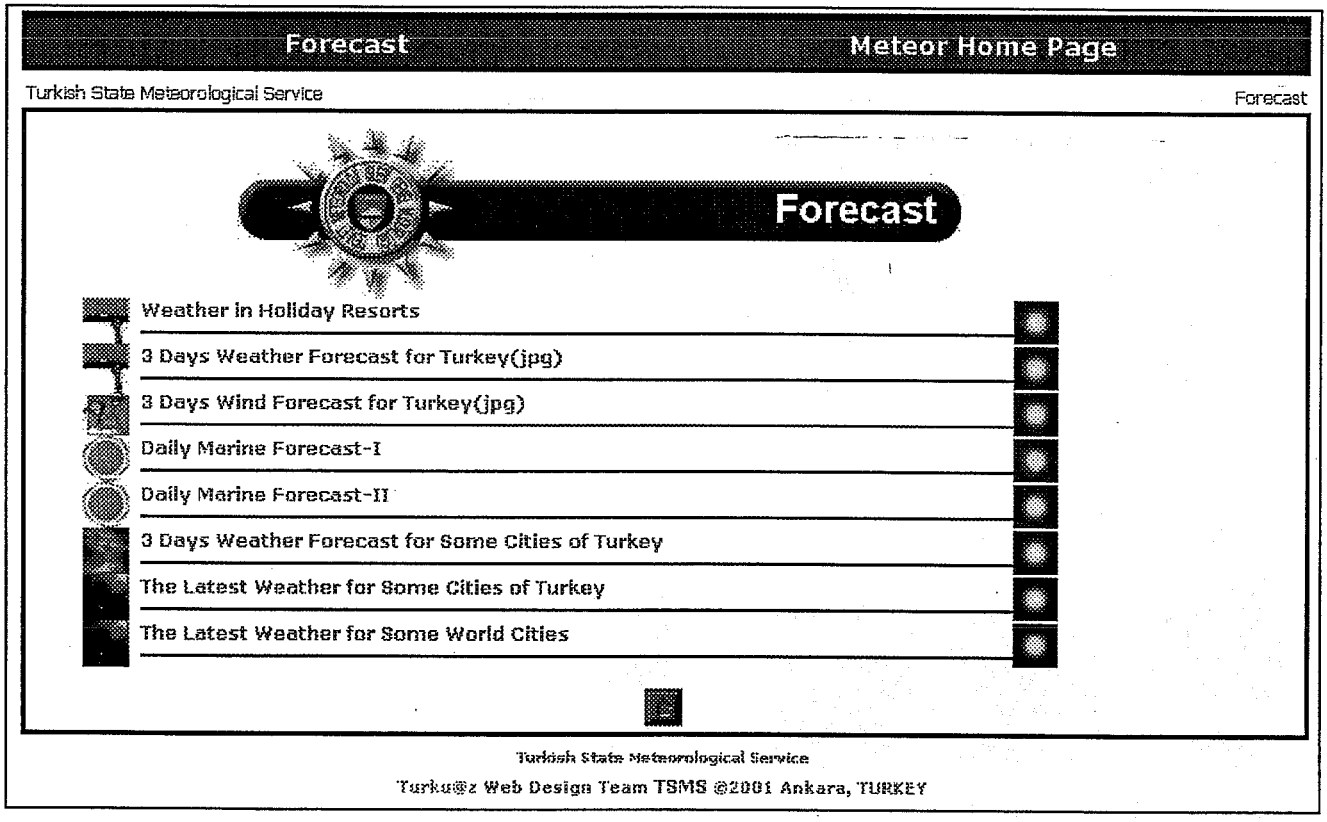
Old and New GTS Links at TSMS

April-2001





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A. Dickinson, the Met Office, UK, presented at the meeting by D. Matthews

1. Mainframe computer equipment

The computing environment at the Met Office is shown in Figure 1. There have been no significant changes to our computer systems since the previous meeting. The computer configuration currently consists of three mainframe computers:

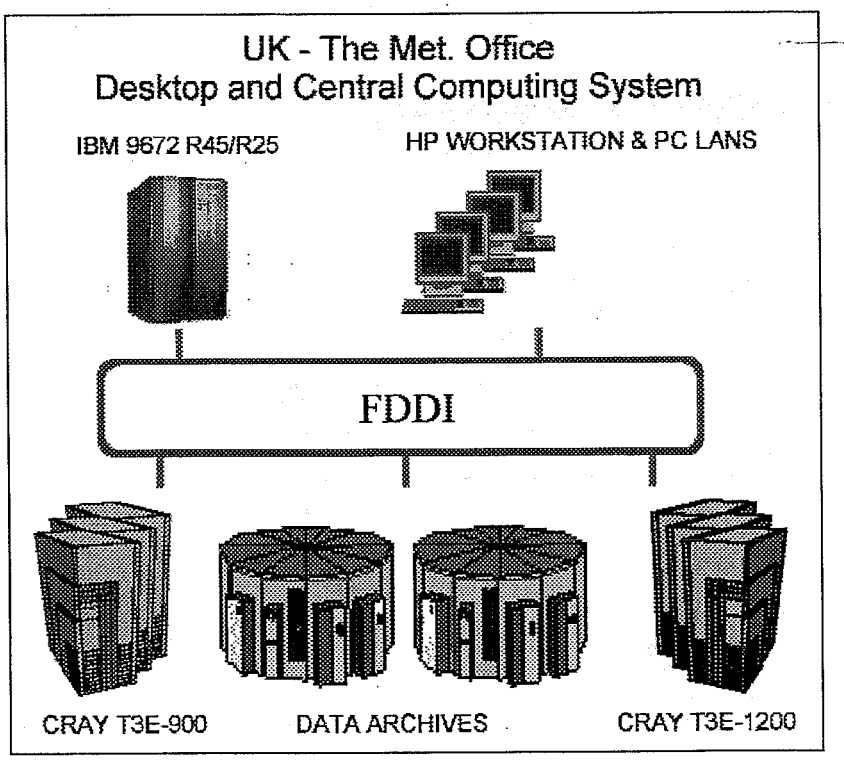
- IBM 9672 R45 / R25
- CRAY T3E-900
- CRAY T3E-1200

The IBM 9672 acts as the database server for observations and forecast products and controls the flow of data between the CRAY T3E and the GTS message switch. The R45 module has four CPUs and is split into MVS and UNIX partitions. The R24 module has 2 CPUs and is dedicated to the pre and post-processing of operational forecast information.

The two CRAY T3Es are distributed memory parallel computers. The T3E-900 was installed in October 1997 and contains 880 processing elements (PE) each running at 450 MHz. The T3E-1200, installed in November 1999, has 560 PEs each running at 600 MHz. All of our climate modelling and numerical weather prediction software is run on the T3Es. Approximately 60% of the capacity of these machines is devoted exclusively to climate prediction and 40% to numerical weather prediction.

Our data handling system, known as MASS, has now passed its initial acceptance tests and its functionality is being developed for wider use. The system uses relational database technologies to provide access to model and observational data at the atomic (field, observation group) level. It can also act as the central repository for user files and other data. The amount of data to be managed is expected to grow from 80 Terabytes in 2001 to in excess of 400 Terabytes by mid 2003. By 2005 it is estimated that MASS will be managing nearly a Petabyte of data. The system comprises a SUN E6500 multi-processor computer running StorHouse proprietary software to control the storage and retrieval of data; software to administer the system; and a StorageTek Powderhorn tape silo with up to 32 StorageTek 9840 tape drives.

The MASS system replaces and significantly enhances the functionality and capacity provided via the current computer tape storage facility of a GRAU Automatic Tape Library and the IBM 9672 mainframe.



Figue 1

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2. Telecommunications connections to ECMWF

We do not use RMDCN for our telecommunications link to ECMWF. Instead we continue to use a local link as shown in Figure 2. This is based around a 2 Mbits/sec IP connection between CISCO routers.

Data is sent to and from an ALPHA SERVER 1200 on the Central Data Network (CDN) at Bracknell with a second ALPHA SERVER 1200 acting as backup. The connection supports the receipt of observational data and the dissemination of ECMWF products. Along with Offenbach, the UK provides one of the connections between ECMWF and the GTS. Telnet, FTP, eccopy and ecqsub are available from the HP workstation network and from both T3Es.

The message switch is based on an 8 processor Tandem Himalaya K2000 system. Other Tandem systems act as back-up, provide data to commercial customers, and provide facilities for system development.

All of our prime intra-regional links are now connected via RMDCN. We will continue to use the existing 2 Mbit/sec link for the exchange of data and products with the Centre as well as for user access to the Centre's computing facilities.

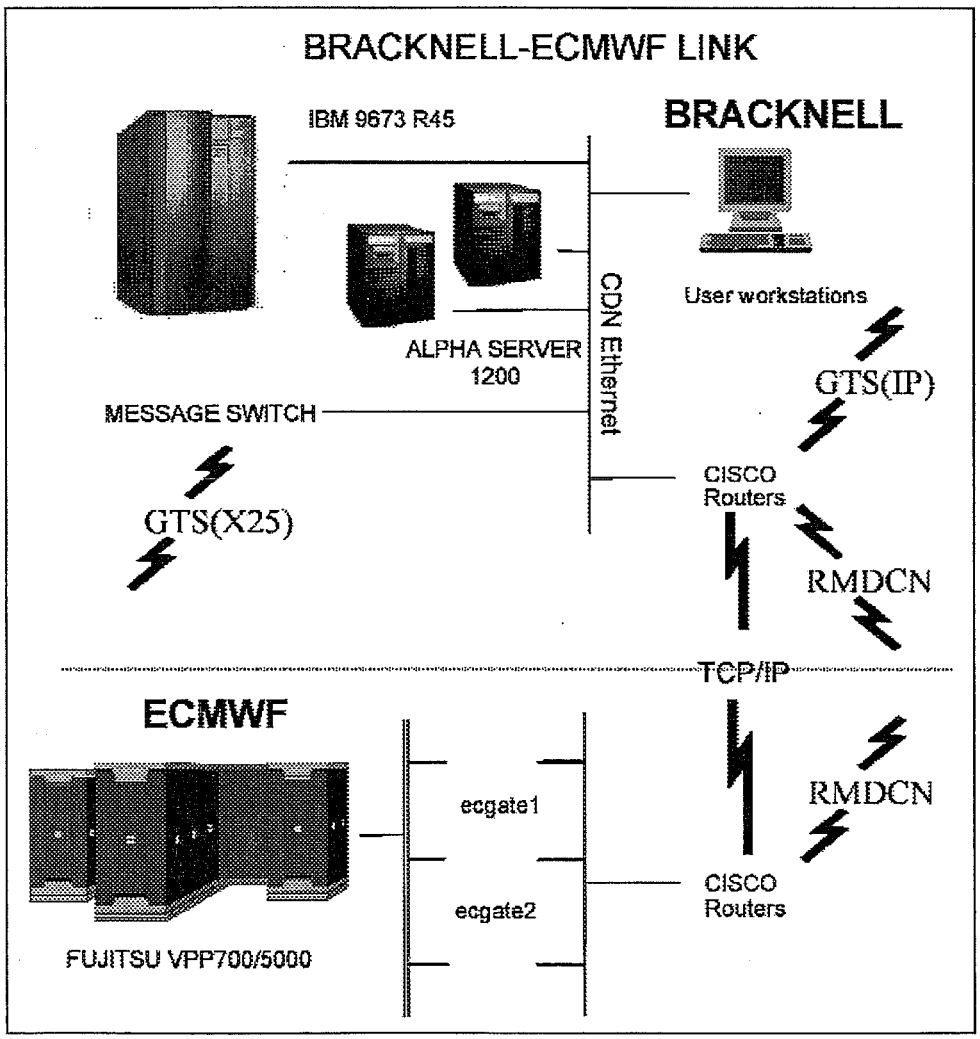

Figure 2

3. Relocation

The Met Office has announced that it will be relocating its headquarters from Bracknell to a new purpose-built facility in Exeter. The timetable calls for all of the computer equipment and staff to be re-housed at the new site by March 2003. Planning for the move is well advanced and involves consideration of ways to facilitate more-effective ways of working, as well as to ensure the continuity of our production and delivery services. A number of significant changes to our computing environment are likely to occur as part of this transition. These include:

- Upgrade of our networks to bandwidths of 1 Gb/s centrally and 100 Mb/s locally
- Replacement of our IBM mainframes by Unix servers or clusters
- Use of Linux for the scientific Desktop and Windows 2000 for the administrative/technical Desktop
- Replacement of our Tandem message switch by a Unix based system using proprietary message switching software. The new system will be sized to cope with an expected doubling in traffic over the next 3-5 years.
- Move to a "paperless office" including full electronic document management

In addition we are planning to replace our two Cray T3Es with a new supercomputer of at least 10 times their capacity by early 2003 with the option of a further upgrade in 2006. Depending on the timing of this procurement and the difficulty in decommissioning the IBM mainframes, it is possible that there will be no need to move the Cray T3Es or the IBM mainframes to Exeter. For the time being, until things become clearer, our current plans continue to assume that the Cray T3Es and the IBM mainframes will be moved to Exeter.

4. Projects

The majority of our users access the Centre to extract data from MARS to aid in the validation of our climate and forecast models. Work is currently taking place to interface our data assimilation system to the MARS observational archive to facilitate re-runs of past cases and to carry out re-analyses of periods of particular meteorological interest.

We currently have 92 registered users (excluding special projects) of which 26 were registered in 2000 and a further 8 by April 2001. The trend continues to show an increase in the number of users but also an increase in their turnover. Indeed many users register in order to make one-off retrievals of data. It is noticeable that the administrative load on the Computing Representative (and presumably Centre staff carrying out user registration) has increased in recent years.

We used only a small fraction of our allocation of Fujitsu units last year. We plan to devote the majority of this computing resource to ensemble forecasting and in particular to exploiting the benefits of using multi-model ensembles. Later this year we hope to begin regular running of seasonal ensembles using the coupled ocean-atmosphere version of the Unified Model. Once the seasonal ensemble system is in place, we expect to use a large fraction of our allocation.

We have installed Metview on our HP workstation system and many users now access ECMWF data transparently via the MARS client software. A MARS interface to a variety of UK Met Office data has also been established using a local installation of the server software on the Unix partition of our IBM mainframe and also on our HP workstation system. The system includes automatic conversion between local floating-point formats and GRIB since many of our files are stored in native format. As yet we have been unable to upgrade to Metview 3 because of problems encountered with running OpenGL under HP UX-11.

ANNEX 1

ANNEX 1

Participants

Austria	Gunter Wihl
Belgium	Bart Vetters
Denmark	Niels Olsen
Finland	Timo Hopeakoski
France	Marion Pithon
Germany	Elisabeth Krenzien
Greece	Nikos Kamberakis
Iceland	Halla-Bjorg Baldursdottir
Italy	Giuseppe Tarantino
Netherlands	Hans de Vries
Norway	Rebecca Rudsar
Portugal	Conceicao Santos
Spain	Eduardo Monreal
Sweden	Rafael Urrutia
Switzerland	Peter Roth
Turkey	Meral Demirtas
United Kingdom	Dave Matthews
EUMETSAT	Rafael Zarza
ECMWF	Jens Daabeck
	Richard Fisker
	Laurent Gougeon
	John Greenaway
	John Hennessy
	Norbert Kreitz
	Dominique Lucas
	Carsten Maass
	Umberto Modigliani
	Pam Prior
	Heinz Richter
	Neil Storer
	Walter Zwieflhofer

ANNEX 2

ANNEX 2

Programme

Thursday, 3 May

10.00 *Coffee*

10.30 Welcome

ECMWF's computer status and plans ..... *W. Zwieflhofer*

Member States and Co-operating States presentations

Each representative is 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 *(if applicable)*
- experience using ECMWF computers/services, including suggestions and queries regarding the present service
- plans (involving ECMWF usage over next couple of years)

12.30 *Lunch*

Member States and Co-operating States presentations (continued)

16.00 *Coffee*

User Support services ..... *U. Modigliani*

Web developments and ECBATCH ..... *H. Richter/L. Gougeon*

17.30 *Cocktails, followed by an informal dinner*

Friday, 4 May

09.00 High performance facility update ..... *N. Storer*

Graphics update ..... *J. Daabeck*

MARS and dissemination update ..... *J. Hennessy*

10.30 *Coffee*

LINUX experience ..... *R. Fisker*

Discussion

12.30 **End of meeting**