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To: All Eurex members and vendors

Date: Frankfurt, 22nd March 1999

Eurex Release 3.0 New Front End Architecture
Further Information on Migration to the new Front End (MISS)

Dear Sir or Madam,

In Eurex circular 15 of 25th February 1999 we gave you an overview of the key dates for Release 3.0 and the associated roll-out of the new front end. As announced, we are now providing further information and documents to help with preparation for your migration planning.

1. Migration Recommendations

Eurex would like to see the advantages of the new front end taken up quickly in the market. In order to integrate the new front end (which, in our opinion, provides all of the required functionality and interfaces, as well as a modern graphical trading interface) as smoothly as possible into the member's specific system environment and business processes, the member is requested to conduct a detailed analysis of the migration process, including internal Year 2000 requirements. In particular, this includes critical assessment of the timely availability of Year 2000 compliant in-house or 3rd party developed software applications based on the new interface.

The attached document "Eurex Release 3.0 – Member Migration Recommendations" describes two recommended migration scenarios compared from the cost and risk perspective. Both variants include a transition phase in which User Devices and MISSs are installed in parallel. This transition phase can be timed so that the connection of the new interfaces to in-house or 3rd party applications can be fully and safely carried out. Only after that should the full decommissioning of the User Device technology take place.

2. Connection to the Year 2000 Simulation

The Deutsche Börse Group and Eurex offer the following simulations to support your preparations for the year end and leap-day

- Overall Simulation I in May and June 1999:

  All Eurex members are requested to test their existing User Device configurations under Release 2.0 for Year 2000 compliance in one of the four offered simulation cycles (see Circular 91/98).

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- Eurex Release 3.0 simulation in July and August 1999:

  As part of the release simulation Eurex members have the opportunity to test the change of the year, and

  To simulate the leap-day and to test any subsequent processing in your in-house systems.
- Overall simulation II in October 1999:

  All Eurex members are required to undertake outstanding and previously unsuccessful tests for Year 2000 and leap-day compliance with User Devices and MISS front ends.

Please note that these simulations are additional to other required measures, or those that you consider necessary, concerning Year 2000 compliance and do not replace them.

3. **Sizing Guidelines**

We would ask you to replace the document „Eurex Release 3.0 – Sizing Guidelines“ distributed with circular 15/99 with the current Version 2, attached. The following changes and additions have been included:

- Completion of the sizing information on Compaq AXP/OpenVMS
- Updated patch levels

4. VALUES API Developer's Kit for Compaq AXP/OpenVMS

The Eurex 3.0 VALUES API Developer's Kit for the Compaq AXP/OpenVMS platform is now available on the Eurex web-site "http//www.eurexchange.com". A corresponding developer's kit is thus now available for all supported Release 3 platforms.

5. Document „Detailed Member Network Set-up“

The document "Eurex 3.0 – Detailed Member Network Set-up" supplements the information provided in the document "Eurex 3.0 – Technical Overview (MISS-based Front End)" distributed with circular 15/99. Please would you forward this description to your network specialists to prepare the network side of the MISS introduction.

6. Registration for User Device /MISS Migration

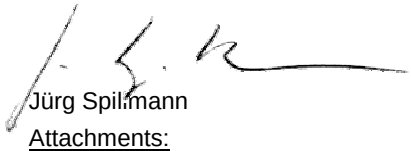
We would ask you to make us aware of your migration plans as soon as possible, using the attached form "Eurex Registration for User Device/MISS Migration". Using this information we will carry out a classification of your configuration according to the description in the "Technical Overview (MISS-based Front End". The results of the classification will be made known to you immediately afterwards. Please take the result of the classification into account in your future hardware and software arrangements. Following the completed classification, we will make the appropriate definitions for your configuration in our network nodes and back end systems in line with your announced timescale.

7. Technical and Functional Training for the new Front End and the Graphical User Interface

Eurex is offering technical and functional training for the new front end in May and June this year. Attendance at these training courses is a pre-requisite for participation in the later simulation with a MISS configuration. To apply for registration, please complete the appropriate part of the attached form “Eurex Registration for User Device/MISS Migration“.

If you have any questions or require further support the Member Readiness team will be pleased to assist you on +49-(0)69-2101-1700.

Yours sincerely,



Jürg Spillmann



Hartmut Klein

Attachments:

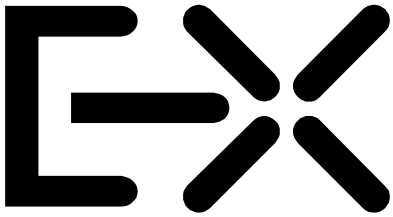
- Eurex Release 3.0 – Member Migration Recommendations
- Eurex Release 3.0 – Sizing Guidelines – Version 2
- Eurex Release 3.0 – Detailed Member Network Set-up
- Registration for User Device/MISS Migration
- Information on Member Training

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Eurex Release 3.0

Member Migration Recommendations

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1 Introduction

This document contains the recommendations for members migrating from the current User Device architecture to the new MISS-based front end architecture of Eurex Release 3.0. It should be read in conjunction with the related Eurex Release 3.0 documents:

- 'Technical Overview - MISS-based Front End'
- 'Sizing Guidelines – MISS-based Front End - Version 2', and
- 'Detailed Member Network Set-up'.

The simulation and release schedule for Eurex 3.0 and the intentions for future releases have been outlined in various member communications, and are also important factors in the migration process. The most significant dates are shown in the diagram in section 3, but timescales shown for Release 4 are provisional only.

The Release 3.0 introduction will take place in two stages. The first will deal with the upgrade of existing User Device environments from Eurex Release 2.0 to Release 3.0. Two weeks later, Release 3.0 will be introduced on the new MISS/Workstation architecture. As usual, both these installations will take place over a weekend. From then, both architectures will be supported in parallel. Simulation in each environment will be available from mid-July1999.

1.1 Migration Considerations

Considerations which may influence the migration process or its timing are outlined below, but are not in any order of importance.

- Eurex has already advised members that support for the current User Device will be discontinued by mid 2001, which means that members will be required to migrate to the new architecture between now and then. However, the availability of the trading application GUI, and the flexibility provided through the VALUES API may encourage members to migrate as soon as possible. This document therefore deals primarily with the migration processes for members intending to install the new architecture for the beginning of Release 3.0 in August/September 1999.

- All members installing or migrating to the new architecture during 1999 must participate in the Release 3.0 Year 2000 simulations which include a year change and Year 2000 leap-day simulation. Members relying on in-house or 3rd-party applications will need to ensure that testing of such products in the chosen migration environment includes Year 2000 compliance.

- Members wishing to make use of Eurex's backwards compatibility for interfaces, in order to leave in-house or 3rd-party applications unchanged after installing Eurex Release 3.0 software on the User Device, are urged to ensure that such applications are Year 2000 compliant.

- Details on Year 2000 simulation can be found in the 'Year 2000 Specials' issued by the Year 2000 project of Deutsche Börse, and in the Eurex Release 3.0 Simulation Guide to be published in June 1999.

- The new MISS/Workstation architecture is supported on two additional platforms which are new to the Eurex environment, giving members the opportunity to change their hardware platform.

- In the medium term, it is the intention that access to multiple exchanges will be provided from the MISS/Workstation by implementing multiple BESSs on the server. Members should note, however, that there are no plans to support access to Xetra from the Compaq AXP/OpenVMS platform.

- VAX Support will be discontinued with the introduction of Eurex Release 3.0. It will not be possible to participate in Release 3.0 simulation on VAX configurations.

- **The GUI on the new front end in Release 3.0 supports the trading functions only. Clearing functions are supported by emulated clearing screens on the new architecture. Members may also choose to carry out their clearing functions on a Release 3.0 User Device.**

- Due to bandwidth considerations between Eurex and the member site (two 64 Kbps lines per location are assumed) the following combination of active production servers can be set up:

  1) Two User Devices.

  2) One User Device and one active MISS (an active MISS is a MISS receiving the public broadcast data stream) or MISS group.

  3) Two active MISSs or MISS groups. (However, one MISS group is recommended.)

- It is possible to define different Reporting Nodes for the trading and clearing reports, making it possible to direct the appropriate reports to either the User Device or the MISS if both architectures are not running on the same physical server.

Special considerations for VMS Users

The following describes VMS specific items which are independent of the migration scenario and the type or size of the member site.

- VMS-Clusters are not required within the MISS Architecture.
- TOFF-Clusters do not exist within this environment; they are replaced by the MISS group concept.
- User Devices and (DUA)-Satellites on VMS machines currently use the DECnet protocol. However, the MISS Application running on OpenVMS will require TCP/IP and UDP protocols. During the transition period, Compaq users will need to support TCP/IP for the MISS/Workstation architecture, in addition to DECnet for their User Devices.

2 Supported MISS /Workstation Platforms and Operating Systems

Different combinations of servers (MISS) and trader workstations (clients) are possible for the Eurex front end configuration. With the introduction of Eurex Release 3.0, support will not only be provided for homogeneous hardware configurations but 3 mixed-hardware configurations will also be supported, providing members with considerably more flexibility when selecting hardware.

Homogeneous platforms supported are: SUN/Solaris, IBM/AIX, Compaq AXP/OpenVMS, Windows/NT (Intel)

Additionally, for the Workstation, Windows/NT (Intel) is supported as the Client on all Server platforms.

The following diagram reflects the supported combinations of front end Client/Server platforms for the new architecture within the Eurex environment.

Detailed information with regard to required operating systems, versions and patch levels is contained in Version 2 of the Eurex Release 3.0 Sizing Guidelines.

Front End Platforms Release 3

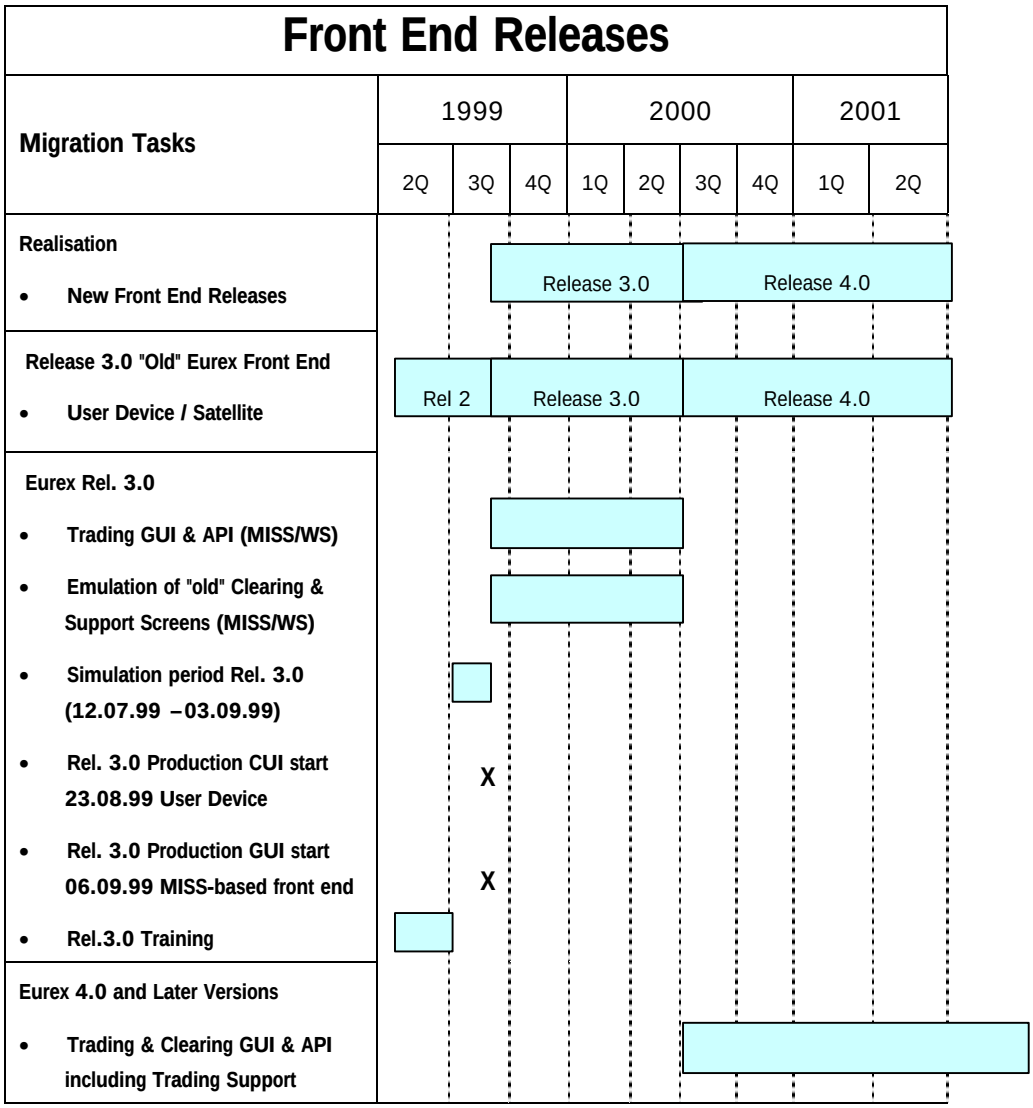
- Support of homogeneous client/server combinations on
  - IBM RS/6000 AIX
  - Microsoft Windows/NT (Intel)
  - Sun Solaris
  - Compaq AXP, OpenVMS
- Support of heterogeneous client/server combinations on
  - Windows NT Client and IBM/AIX server
  - Windows NT Client and Sun Solaris Server
  - Windows NT Client and Compaq AXP / OpenVMS Server

Workstation Platforms

Server Platform MISS (Member Integration System Server)	IBM AIX RS/6000	Microsoft Windows NT (Intel)	Sun Solaris	Compaq Open VMS AXP
IBM AIX RS/6000	✓	✓		
Microsoft Windows NT (Intel)		✓		
Sun Solaris		✓	✓	
Compaq Open VMS AXP		✓		✓

3 Release Schedule

The following diagram shows the Eurex software releases and the phasing-in of the GUI to the trading and clearing functions on the new architecture over two releases. Other significant events in the Release 3.0 roll-out are also shown.



4 Migration Scenarios

This section describes the two potential migration strategies which can be adopted by the majority of members. The assumed starting position is a configuration with two User Devices, and the target configuration is assumed to be a two-MISS installation in one MISS group.

The major activities for each migration path are described, assuming that migration will take place between now and release of Eurex 3.0 in August/September 1999. For members wishing to delay migration until after the initial release of Eurex 3.0, the scenarios are still valid, but the steps dealing with the upgrade of User Device Release 2.0 to 3.0 can be omitted.

The advantages and disadvantages associated with each migration option are described in comparative terms of cost and risk or difficulty.

The recommended migration scenarios each follow a multi-phase migration path (start, transition phases, and target) and provide the basis for decisions on the migration tasks to be performed.

The migration scenarios can be summarised as follows:

- In scenario 1, additional hardware for two MISS servers is configured on the same LAN as the current User Devices.
- In scenario 2, existing User Devices are upgraded to MISS specifications and are gradually migrated to the new MISS architecture.

Scenario 2 is only recommended for institutions with experienced system administration and operations units.

4.1 Pre-Migration Activities

All member configurations need to be classified and approved by Eurex according to the implementation regulations applying to the connection of technical equipment. The migration from the User Device architecture to the MISS/Workstation architecture is regarded as a major configuration modification that requires Eurex approval. Therefore, all members will need to submit details of their proposed network and hardware/software configurations before joining the new environment.

The procedure is outlined in the Technical Overview, and will be led by the Customer Service group at Eurex via the Technical Help-desk Tel.+49-(0)69-2101-1200, FAX.+49-(0)69-2101-1391.

Following approval of the proposed installation as ‘Supported’ or ‘Possible’, members should place orders for any additional hardware/software and prepare for the installation of the software.

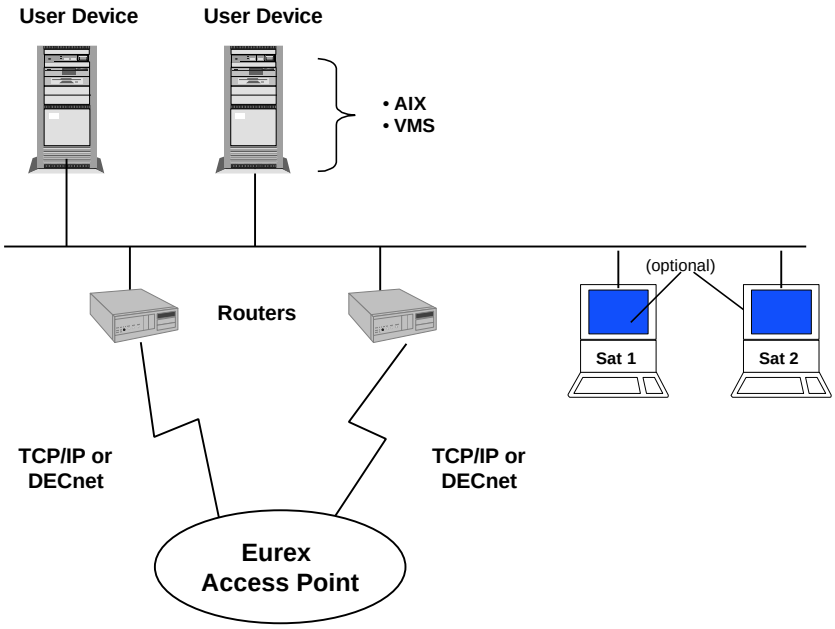
4.2 Scenario 1

Additional MISSs configured with User Devices on the same Local Area Network

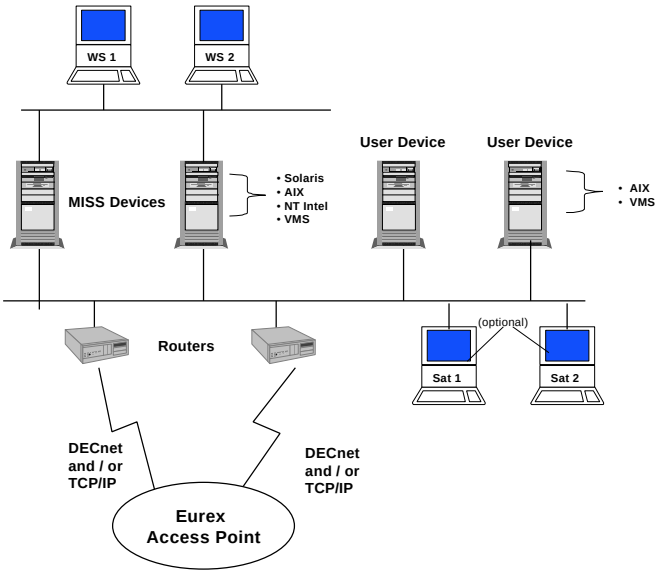
Scenario 1 is recommended for medium sized configurations and it is the only recommend migration path for members who wish to take the opportunity to change their existing hardware platform during the migration. Investments in additional hardware to run the two new MISS Servers will retain the failover capability and minimise the risk of service interruptions during the migration process. In this example, the target configuration is a high-availability two-address space installation.

When migrating VMS installations, TCP/IP and DECnet protocols must be used simultaneously from the start of the Simulation activities until the final User Device migration to MISS has been completed. Therefore, multi-protocol support must be enabled on all routers (both at Members' sites and at Access Points).

Scenario 1 - Starting Point



Scenario 1 - Transition Phase



1. The member applies to Eurex for the network node addresses (for Simulation and Production) for the MISS/Router LAN, and sets up the operating system and network configuration accordingly.

2. Eurex sets up the new node addresses in the back end.

3. The member invests in two new MISS devices (each with 2 LAN cards) and the required number of Workstations. The two MISSs are configured as a MISS group.

4. The member installs trader workstations on the MISS/Workstation LAN as required. The member controls the IP addressing on this LAN.

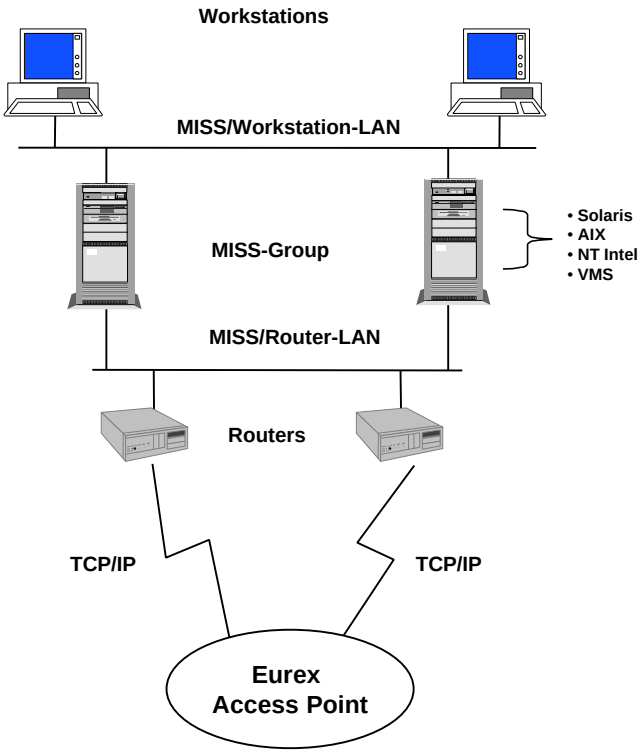
5. The member joins Release 3.0 Simulation with two MISSs and one or two User Devices.

6. The member performs the production Release 3.0 User Device update on both devices.

7. The member performs the Production Release 3.0 MISS installation on the new MISSs, sets up a MISS group and deactivates one of the User Devices which is not a reporting node.

8. The member requests Eurex, via the Technical Help-desk Tel.+49-(0)69-2101-1200, FAX.+49-(0)69-2101-1391 to re-route the reporting node from the User Device to the MISS.

Scenario 1 - Target Configuration



Finally, the member decommissions the User Devices (including support for DECnet if appropriate) and informs Eurex via the Technical Help-desk, who will remove related definitions from the Access Point and back end.

4.2.1 Advantages

- If the two MISSs are set up as a MISS group, two MISSs and one User Device are available for production during the transition period.
- The MISS group provides failover support.

4.2.2 Disadvantages

- Initial hardware investment.
- There is no User Device fault tolerance after step 7 of the migration process.
- Increased effort will be required to simultaneously support both User Device and MISS environments.

4.3 Scenario 2

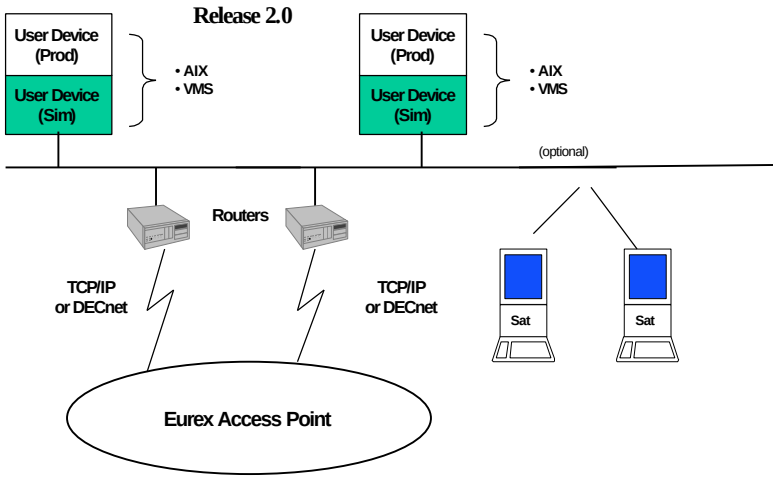
This example uses the existing User Devices and Local Area Network with gradual migration of User Devices to the new MISS architecture

Scenario 2 is suitable for members who wish to migrate to a MISS installation with the same platform as their current User Device. Additionally, this scenario is recommended for configurations with two User Devices where the member wishes to avoid the purchase of additional systems during the transition period. Members should be aware that in nearly all cases their User Device systems will need to be upgraded to conform to the sizing guidelines of the new front end architecture.

For Compaq AXP/OpenVMS users, TCP/IP and DECnet Protocols must be used simultaneously from the start of the Simulation activities until the final User Device migration to the MISS has been completed. Therefore, multi-protocol support must be enabled on all routers.

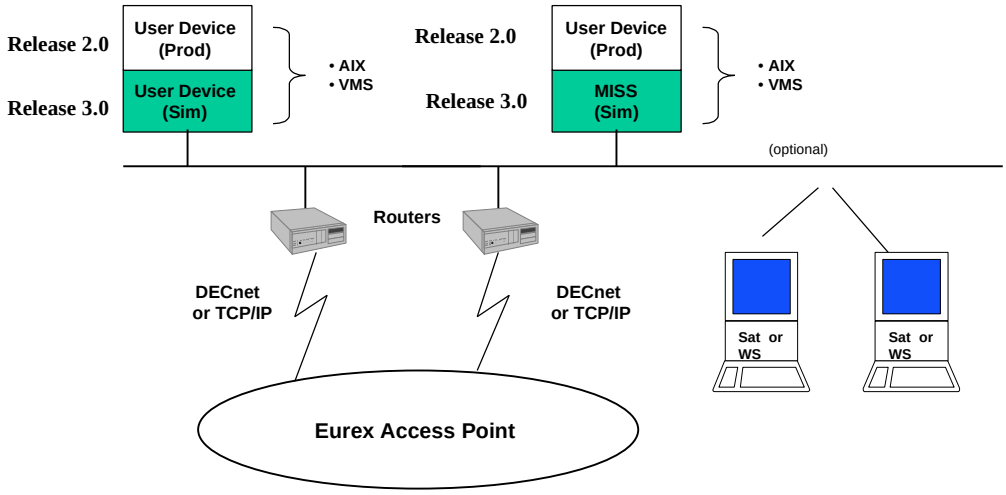
The target configuration in the example is a single LAN high-availability installation. In cases where members wish to avoid investing in additional servers during the transition period, but wish to move to a two-LAN solution with Workstations, the member will need to add 2 additional LAN cards (one per existing User Device) and set up the MISS – Workstation LAN before the Release 3.0 Simulation has been started.

Scenario 2 - Starting Point



1. The member applies for the set-up of the MISS servers

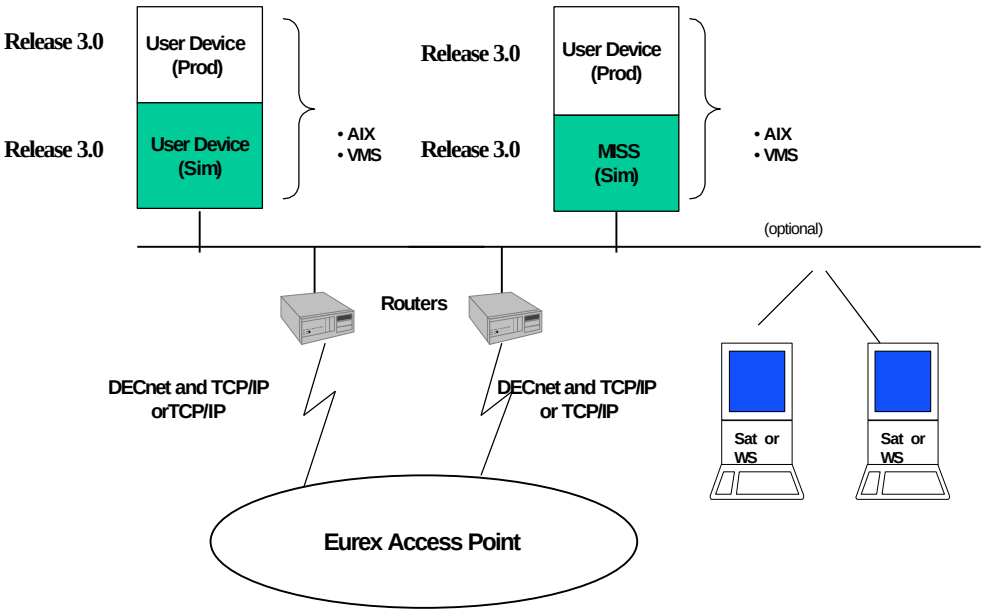
Scenario 2 - Transition Phase A



2. Eurex configures the new node addresses for MISS Simulation and Production
3. One server stays in Release 2.0 User Device Production and can join Release 3.0 User Device Simulation after installation of Release 3.0 Simulation software (the server shown on the left of the diagram above). The Release 3.0 MISS Simulation software should also be installed on that server, but not activated at this stage. The other server stays in Release 2.0 User Device Production and can join the Release 3.0 Simulation as a MISS after the installation of the Release 3.0 MISS Simulation software.

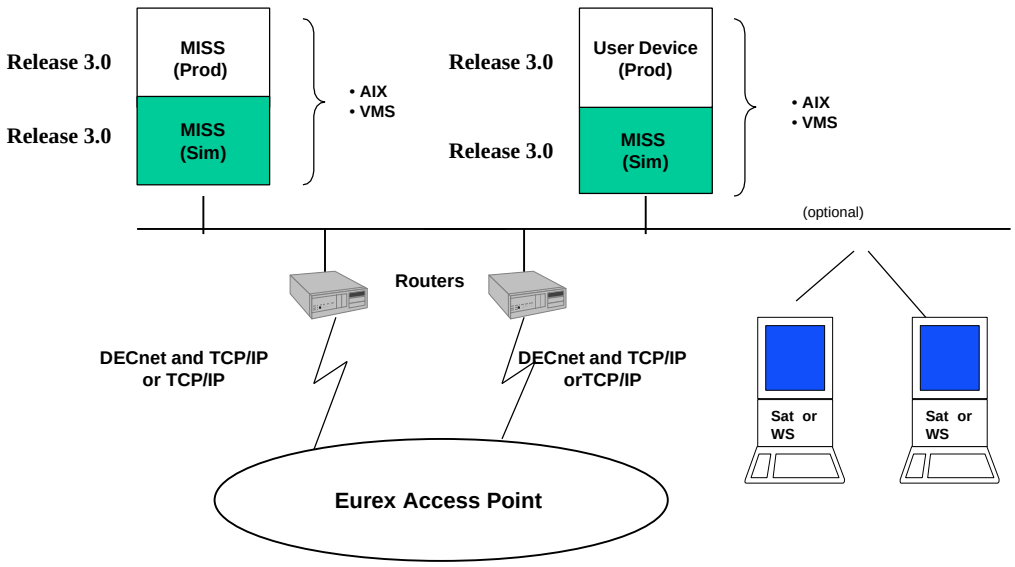
The diagram below depicts the two week period when Release 3 is in production on the User Devices but not yet in production on the MISS/Workstation architecture.

Scenario 2 - Transition Phase B



4. The Release 3.0 User Device software should be installed on both servers. The member is now running two User Devices in the Release 3.0 Production environment and can still join the Release 3.0 User Device Simulation environment on one server and the Release 3.0 MISS Simulation environment with the other.

Scenario 2 - Transition Phase C



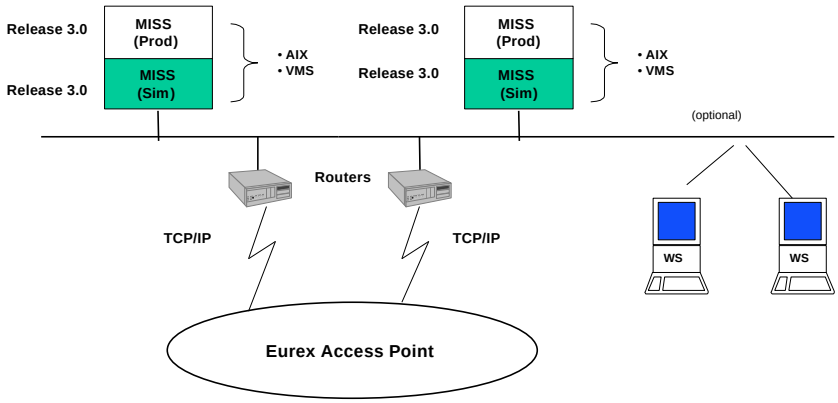
5. When the new front end software is released into production, the member installs the Release 3.0 MISS Production software on the server shown on the left, above. In addition to the software installation, the IP address has to be changed on this server. This server can no longer be used as a User Device because it is not possible to run the Production User Device and Production MISS software on the same system simultaneously. The other server remains unchanged in User Device Release 3.0 Production.

6. Workstation assignment to the appropriate server and installation of the appropriate software on the workstation must be managed by the member according to the operational environment selected.

7. The member requests Eurex, via the Technical Help-desk,
   - (Tel. +49-(0)69-2101-1200, Fax +49-(0)69-2101-1391)

to re-route the reporting nodes as necessary from the User Device to the active MISS in production and to re-route the reporting node in simulation.

Scenario 2 - Target Configuration



8. The member de-activates the User Device software on the second server and installs and activates the Release 3.0 MISS Production software. In addition, the IP address has to be changed on this server. The member has to inform Eurex in advance of this change so that the corresponding changes can be made in the back end. The member now has two MISSs (or a MISS group) in Release 3.0 Production.

9. The member decommissions the User Device software, and the DECnet protocol support as appropriate, and informs Eurex, via the Technical Help-desk, who will remove related definitions from the Access Point and the back end.

4.3.1 Advantages

- Smaller initial hardware investment than Scenario 1.

4.3.2 Disadvantages

- Additional effort is required for setting up and tracking of two environments and IP/DECnet addresses on the same server.
- No failover in Production is possible during the transition period when one User Device and one MISS are in production.
- Complexity caused by switching workstations to different environments .

5 Other Configurations

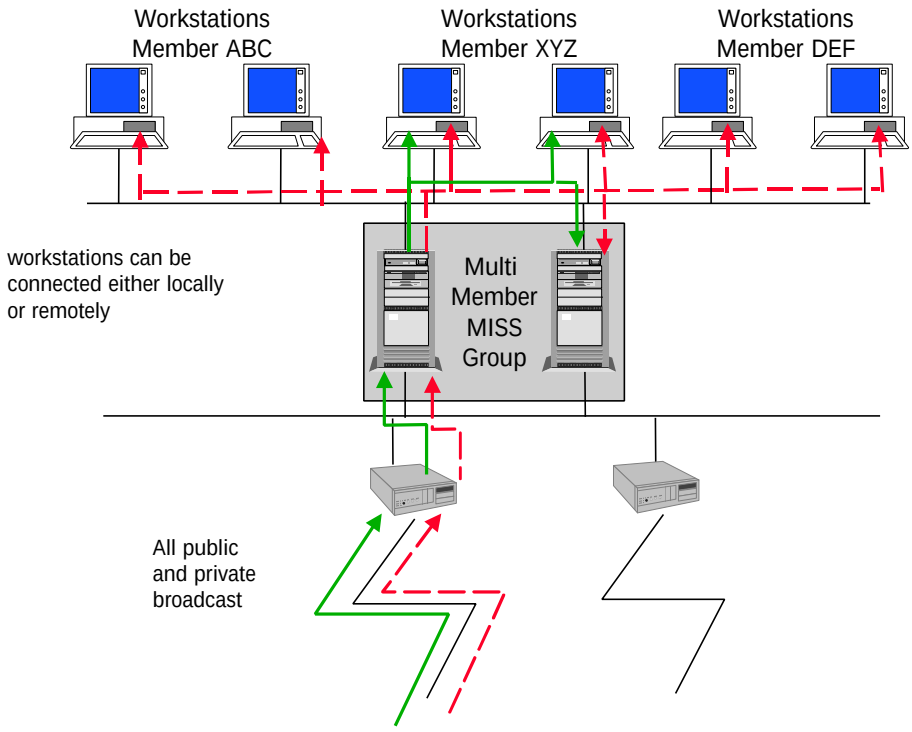
5.1 Multi-Member MISS Target Configurations

As for any multi-member configuration, the requirements for availability and support will be much higher and the recommended strategy would be an extrapolation of Scenario 1, targeted at a two-address space topology. It is not possible to give a general set of detailed recommendations for migration of multi-member configurations owing to the large number of differences in configuration.

All multi-member configurations are recommended to be two-address space installations and may have multi-segment LAN configurations including support for remote workstations at member locations.

Co-ordination of member migration activities in a multi-member environment will be the responsibility of the administrator of the installation.

The following diagram shows a high availability extended multi-member Front end installation with a single MISS group responsible for distribution of all public and private broadcasts to a group of members.



5.2 Single System Configurations

These configurations consist of one User Device only and one or more trading workstations. The member uses the same machine to run simulation and production simultaneously.

It is not possible to run the Production Release 3.0 User Device application on the same hardware system as the Production Release 3.0 MISS application. The member would therefore be obliged to adopt the ‘big-bang’ approach to migration, without the possibility for parallel operation of the User Device and MISS architectures.

This already being a high risk configuration means that a recommended migration scenario cannot be offered to these members without further investment in additional hardware. The member is advised to:

- Invest in an additional machine following the published sizing guidelines.
- Upgrade the current machine to the required capacity in order to match the newly acquired configuration
- Follow Scenario 2 to arrive at the target configuration of two MISSs in one MISS group

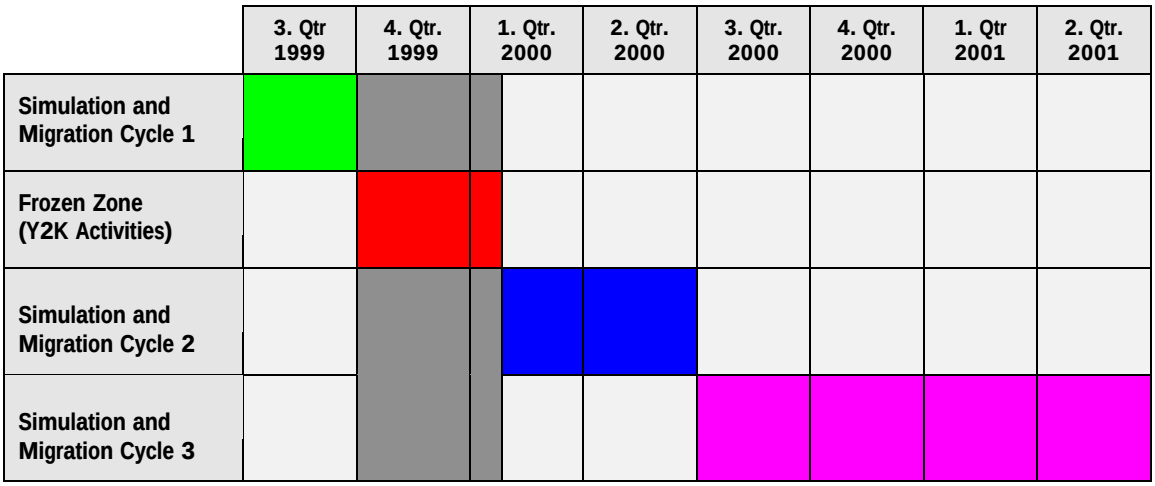
6 Future Migration Opportunities

The document to date has dealt with migration in the period from now until the beginning of the Year 2000 Frozen Zone.

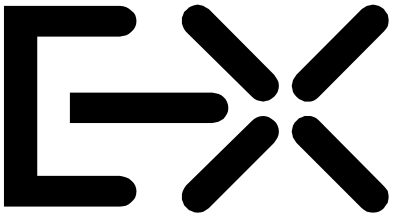
The next opportunity to migrate to Release 3.0 will arise at the end of the Frozen Zone foreseen for mid-January 2000. Simulation of Release 4.0 will probably begin during the 2nd Quarter of 2000, giving the opportunity to make use of the full clearing and trading support functions on the GUI after release into production.

The third and final migration cycle begins after the Production Release of Eurex 4.0. Support for the User Device architecture will be withdrawn in mid-2001, requiring all members who have not migrated to do so some time during this cycle.

The following diagram illustrates the planned migration schedules



X-pand into the **Future**



Eurex Release 3.0

Sizing Guidelines

Version 2.0

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1 INTRODUCTION

1.1 Purpose

This document explains the sizing guidelines for users of the new Eurex MISS (Member Integration System Server) based front end. Existing UD (User Device) based front end sizing guidelines are not covered by this document. These guidelines were developed based on test installations for Eurex. The document is based on Eurex Release 3 software.

The sizing guidelines are preliminary recommendations only for members. They are not binding.

The document is intended to support the network and system administrators of Eurex members in planning their network, hardware and Eurex software configuration.

1.2 Scope

These guidelines cover Release 3 of Eurex and are focused on a single MISS group installation. A MISS group consists of one or two MISSes and optionally connected workstations. The guidelines do not cover UD-based front ends.

Eurex members are strongly urged to test their own configurations as differences in hardware, software and settings can have a material impact on the system's performance and capacity behavior.

This document is not intended to give information about the general technical concepts implemented with Eurex Release 3. It also does not provide installation or operation procedures. Installation procedures are described in the documents "Front-End Installation Guide". Operation procedures are described in "Front-End Operations Guide".

1.3 Contents

Section 2 TECHNICAL ENVIRONMENT contains short definitions of the hardware and software components used to build a Eurex front end configuration. It describes the basic front end configurations in relation to the Eurex member's requirements for availability and throughput. It is possible to set up other configurations using different components but these other configurations have not been examined regarding their sizing.

Section 3 SIZING GUIDELINES gives figures for sizing the supported front end hardware components. The approach for determining the recommendations is focused on the number of processing requests and broadcasts. CPU, memory, disk and network recommendations are covered. The numbers given relate only to the software provided by Eurex. Additional software installed on the Eurex front end may affect sizing requirements and performance and are purely the end user's responsibility.

The Eurex Release 3 software continues to support the ability to run multiple environments (e.g. parallel execution of the software). The sizing guidelines provide recommendations only for one environment.

Section 4 APPENDIX describes the required operating system software versions.

2 TECHNICAL ENVIRONMENT

2.1 Overview

This section describes the hardware, software and network configuration to be used to access the derivative market trading systems of Eurex.

The Eurex front end must be able to run the Eurex Release 3 software components necessary to establish and maintain a connection with the Eurex back end applications. The configuration components of a Eurex front end configuration are shown in Figure 1 and are defined in the following sections. Note that the configuration shown in Figure 1 is a high availability configuration provided through redundancy of MISSes, routers and WAN lines.

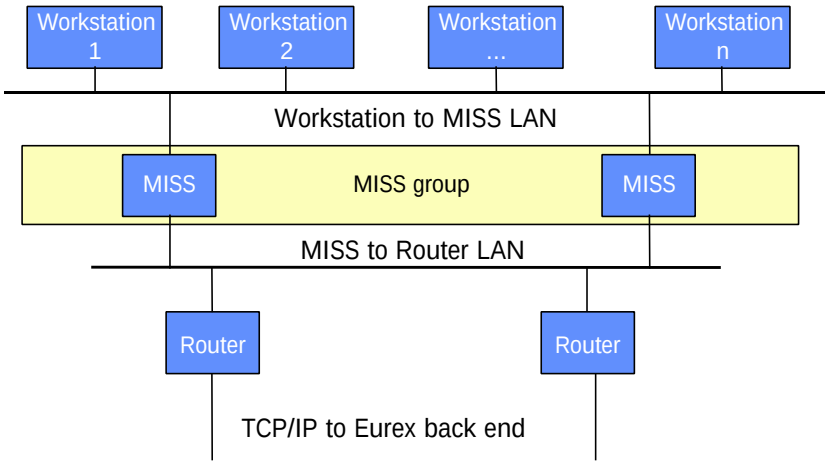


Figure 1 Eurex front end configuration

2.2 Workstation

A workstation is a computer system, which is connected to a MISS via a local area network (LAN). The workstation has the Eurex workstation software installed.

The workstation is responsible for the presentation of market information and handling of Eurex member requests for the Eurex back end applications. Eurex provided software, which runs on the workstation, are Eurex Trading Application using the VALUES API (Virtual Access Link Using Exchange Services Application Programming Interface) and the front end architecture services that support the applications.

Eurex member as well as third-party developed applications may also run on the workstation in addition to or instead of the Eurex Trading Application. However, this document provides no information about sizing for these types of applications, as they are the responsibility of the end-user organizations.

2.2.1 Workstation Platforms

The following workstation platforms are supported:

- IBM AIX 4.3.1
- Microsoft Windows NT Workstation (Intel) 4.0 English Service Pack 3
- Sun Solaris 2.6
- OpenVMS 7.1-2

Detailed information about required patch levels is contained in section 4.1.1 Detailed Requirement Specification.

Note: For Eurex Release 3 homogeneous front end configurations (MISSes and workstations of the same platform) were tested by Eurex as well as the combination of AIX or Solaris based MISSes with Windows NT (Intel) workstations.

Note: The number of computers accessing and using services of the Windows NT Workstation software is limited from a license perspective on the Microsoft Windows NT Workstation 4.0 platform. In case that a specific installation exceeds the license regulation, Microsoft Windows NT Server (Intel) 4.0 English Service Pack 3 must be installed instead.

2.2.2 Workstation Software

The software that the Eurex members will be expected to run on a workstation consists of:

Eurex software:

- Electronic Trading Application

Architecture software:

- Architecture services

System software:

- Window manager corresponding to the operating system (Solaris, AIX and OpenVMS: CDE, Windows NT (Intel): Win32)
- Communication software (TCP/IP, UDP/IP)
- Operating system software (IBM AIX, Sun Solaris, Windows NT (Intel) or OpenVMS)

2.2.3 Workstation to MISS LAN

Communication between the MISS and Eurex workstation is done via a local area network (LAN). Communication protocols required within the communication architecture are TCP/IP and UDP/IP. The MISS and the workstations should be connected to the same LAN segment or to bridged LAN segments. The only LAN type, which has been tested by Eurex, is Ethernet.

2.3 MISS

A MISS is a computer system, which enables connection to the Eurex back end and has installed the MISS software.

The MISS can be used as a standalone machine running the Eurex front end application for the presentation of market information and capture of the Eurex member requests for the Eurex back end applications. Additionally, it can serve connected workstations. In this case, the MISS coordinates Eurex workstation communications.

2.3.1 MISS Platforms

The following MISS platforms are supported:

- IBM AIX 4.3.1
- Microsoft Windows NT Server (Intel) 4.0 English Service Pack 3
- Sun Solaris 2.6
- OpenVMS 7.1-2

Detailed information about required patch levels is contained in section section 4.1.1 Detailed Requirement Specification.

Note: For Eurex Release 3 homogeneous front end configurations (MISSes and workstations of the same platform) were tested by Eurex as well as the combination of OpenVMS, AIX or Solaris based MISSes with Windows NT (Intel) workstations.

2.3.2 MISS Software

The software that the Eurex members will be expected to run on a MISS consists of:

Architecture software:

- Architecture services

System software:

- Window manager corresponding to the operating system (Solaris, AIX and OpenVMS: CDE, Windows NT (Intel): Win32)
- Communication software (TCP/IP, UDP/IP)
- Operating system software (IBM AIX, Sun Solaris, Windows NT (Intel) or OpenVMS)

2.3.3 MISS to Router LAN

Communication between the MISS and the router is done via a local area network (LAN). The communication protocol required for the MISS to the router is TCP/IP.

The only LAN type, which has been tested by Eurex, is Ethernet.

2.4 Router

Routers maintain the TCP/IP connections from the MISS to the Eurex back ends. In Release 3 communication is done via TCP/IP to the Eurex back end. Fault tolerance is achieved by providing multiple routing paths to the Eurex back end applications.

The router platform approved by Eurex for the use with Eurex are CISCO models. Detailed information about model series and operating software is contained 4.1.1 Detailed Requirement Specification.

2.5 Basic Eurex MISS-based Front End Configuration

To participate in Eurex, the Eurex member can choose to use a UD- or a MISS-based front end. Using a MISS-based front end, there are many possible configurations, ranging from a standalone MISS to large configurations with several MISSes and workstations arranged in logical MISS groups. In a MISS group, all MISSes must be on the same LAN segment. If the active MISS fails then automatic switchover takes place. For disaster recovery, an additional MISS or MISS group may be established. However, failover to the disaster recovery site must be managed by the Eurex member organization.

Release 3 supports more than one MISS per Eurex member. Two MISSes in one MISS group support dynamic failure recovery between them. For disaster recovery, an additional MISS or MISS group may be established. However, failover to the disaster recovery site must be managed by the Eurex member. Splitting of MISSes of a MISS group across different physical locations has not been tested.

There are several possibilities for the set up of the Eurex front end configuration. The drivers for choosing one of the described configurations are:

- Number of Eurex end users entering requests to the Eurex back end applications.
- Member's availability requirement.

Figure 2 Availability-Size-Relation shows four configuration alternatives that are a function of the number of Eurex end users and availability requirement. Configurations for normal availability contain single points of failure. High availability configurations have no single points of failure or have stand-by equipment available for recovery purposes.

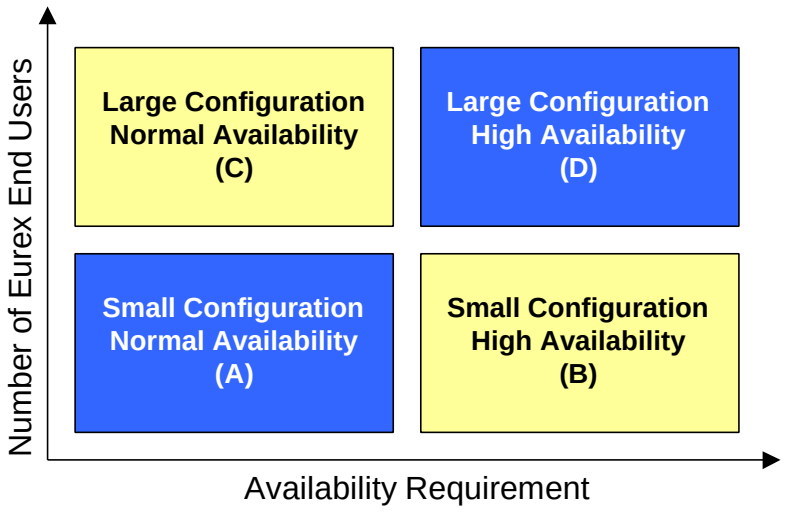


Figure 2 Availability-Size-Relation

Each of the next four sections depicts one of the proposed configurations.

2.5.1 Small Configuration, Normal Availability (A)

Figure 3 shows a Eurex front end configuration that provides normal availability for one user. The user runs the Eurex Trading Application directly on the MISS.

Note that failover is not supported if any of the components fail.

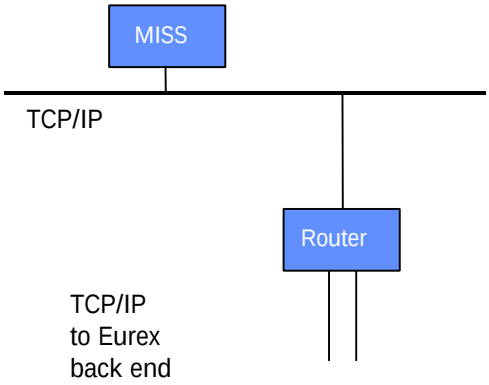


Figure 3 Small configuration for normal availability

2.5.2 Small Configuration, High Availability (B)

In Figure 4 a Eurex front end configuration is shown that provides high availability (no single point of failure) for one user. The user runs the Eurex Trading Application directly on the MISS. If any individual configuration component fails, there is a parallel component available to support continuing Eurex operations.

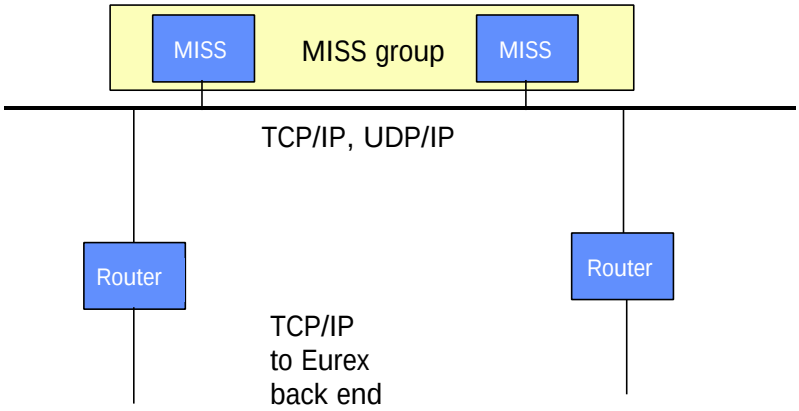


Figure 4 Small configuration for high availability

2.5.3 Large Configuration, Normal Availability (C)

Figure 5 shows a Eurex front end configuration that provides normal availability for multiple users. Each user runs the Eurex Trading Application on their own workstation. Note that failure of any component other than a workstation will terminate all user access to the Eurex back end. Failure of any individual workstation will affect only the individual user of that workstation. The presented configuration supports a large number of workstations for multiple users. It is recommended to have the routers and MISSes in one separate LAN segment and the MISSes and workstations in another. This type of front end configuration allows to be independent from the Eurex network addressing in the workstation MISS LAN.

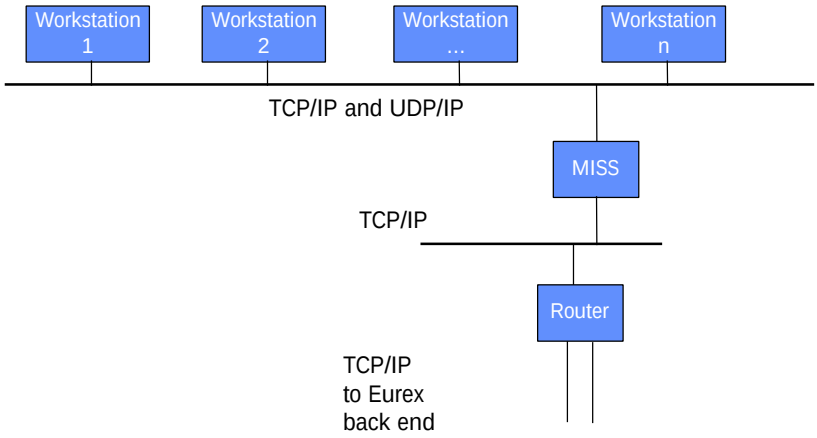


Figure 5 Large configuration for normal availability

2.5.4 Large Configuration, High Availability (D)

Figure 6 shows a Eurex front end configuration that provides high availability for multiple users. Each user runs the Eurex Trading Application on its own workstation. Failure of any individual component other than a workstation is recovered via the remaining components. Failure of any individual workstation will affect only the individual user of that workstation.

If a MISS fails, requests from the workstations can be routed via the other MISS. Broadcasts and responses are sent from the other MISS to the workstations. If a router fails the request can be routed via the other router and the broadcasts and responses are sent from that router to the MISSes. Depending on the sizing of the configuration, operation following a failure may occur at degraded levels of performance.

It is recommended to have the routers and MISSes in one separate LAN segment and the MISSes and workstations in another. This type of front end configuration allows to be independent from the Eurex network addressing in the workstation MISS LAN.

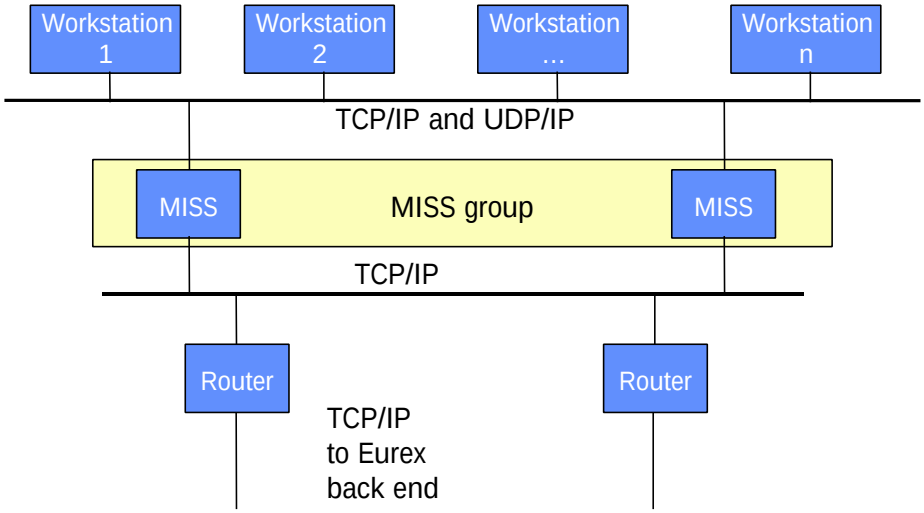


Figure 6 Large configuration for high availability

3 SIZING GUIDELINES

3.1 Introduction

This chapter provides guidelines to support Eurex members in sizing CPU, memory, disk and network resources of their Eurex Release 3 MISS-based front end installations.

The sizing parameters are separated into base resource recommendations and incremental recommendations. The base resource recommendations are necessary to run the software without entering requests but processing the data generated by the general market activity (broadcasts). The incremental recommendations depend on the number of requests entered by the users of a MISS group.

The following sizing guidelines cover only the MISS and workstation software recommendations. They do not include MISS and workstation requirements caused by the operating system, layered products (e.g. NFS or NIS) or other application software.

3.2 Assumptions

The guidelines are based on the following assumptions:

1. Each workstation will run only one instance of the Eurex Trading Application (using the VALUES API) and the architecture services.
2. On the MISS no instance of the Eurex Trading Application is running, if it is not stated explicitly (as in 3.6. Sizing Information – MISS running the Eurex Trading Application) i.e. the sizing guidelines described in sections 3.4 Sizing Information – Workstation and 3.5 Sizing Information – MISS relate only to large front end configurations (see 2.5.3 Large Configuration, Normal Availability and 2.5.4 Large Configuration, High Availability).
3. There are no remote workstations connected to the LAN. No processes to support remote workstations (e.g. broadcast bridge forwarder) run on either the workstations or the MISSes.
4. No third party products using VALUES are running on either the workstations or the MISSes; e.g. quote machines etc.

3.3 Sizing Drivers

Front end sizing recommendations are driven by the level of activity to be supported. The front end key activities are the processing of requests and responses (order entry, inquiries, etc.), and the general level of activity in the market (broadcast data processed by the front end).

The aggregate number of orders, inquiries, etc. entered by a front end's users determines the level of processing on a MISS that is directly under control of the Eurex member. Additional processing by a MISS is driven by the total activity in the market as market activity generates broadcasts, which are delivered to front ends.

The number of users drives the sizing of the front end only in terms of the number of workstations required and the total number of orders that may be entered into the system.

One slow workstation or one slow MISS can slow down the performance of the whole front end connected to a MISS group.

3.4 Sizing Information - Workstation

The recommendations for CPU, memory and network are dependent on the activity on the machine. The tables present the sizing recommendations for Eurex Release 3.

3.4.1 CPU - Workstation

CPU load is caused by running the Eurex Trading Application and architecture services. The majority of the load on the workstations is generated by market activity (e.g. own order overview updates).

Statistical data gathered from current Eurex operations shows that at peak times there are approximately 100 to 150 broadcasts per second sent out to the front ends by the Eurex back end. The duration of the peak can be more than one minute. This peak is assumed to be generated by market makers entering mass quote entries (e.g. via quote machines).

In addition to the public broadcasts, each workstation needs to handle the traffic generated by orders/quotes entered by the traders in the same group. One order/quote generates approximately 2.5 broadcasts on average. In the case of 10 orders/quotes per second this results in a total of 25 additional broadcasts per second.

The following table shows the CPU recommendations of the Eurex workstation software for each platform:

Visualized broadcasts per second to this machine (market activity)	**IBM AIX [SPECint95]**	**Microsoft Windows NT (Intel) [SPECint95]**	**SUN Solaris [SPECint95]**	**COMPAQ OpenVMS [SPECint95]**
50	9	11	9	9
75	10	14	10	11
100	11	16	11	13
150	14	21	14	15
200	17	26	17	18
250	20	29	20	21

If 30-50% of the market activity is visualized in the trading application, it is recommended to choose at least a CPU size in the light grey area. Eurex members should account for their private orders/quotes rates in addition.

Note: One slow workstation on a front end can slow down the performance of the whole front end connected to the same MISS group.

3.4.2 Physical Memory - Workstation

The main memory required, which is provided in the next table, should be used as minimum recommendation. It is important that on workstations paging should be avoided as much as possible for maximum performance.

IBM AIX [MByte]	**Microsoft Windows NT (Intel) [MByte]**	**SUN Solaris [MByte]**	**COMPAQ OpenVMS [MByte]**
128	128	128	128

3.4.3 Disk Space - Workstation

Local disk space is required for each environment (production/simulation) of a workstation. The space must be provided on the disk where the corresponding workstation file tree is located. The following table shows the disk space recommendations for one environment (production or simulation).

	IBM AIX [MByte]	**Microsoft Windows NT (Intel) [MByte]**	**SUN Solaris [MByte]**	**COMPAQ OpenVMS [MByte]**
Workstation software	150	150	150	150
Swap area	500	500	500	500
Internal data files [per day]	50	50	50	50

3.4.4 Workstation to MISS LAN

The following table shows the usage of the workstations to MISS LAN. The left column displays the maximum broadcast rate received by the workstations that are connected to a MISS group.

Broadcasts per second to this machine (market activity)	**Usage of 10 Mbps Ethernet [%]**
50	6
100	12
150	18
200	24
250	30

3.5 Sizing Information - MISS

The recommendations for CPU, memory and network are dependent on the activity on the machine. No instance of the Eurex Trading Application is running on the MISS. The tables present the sizing recommendations for Eurex Release 3.

3.5.1 CPU - MISS

CPU load is caused by running the MISS processes and architecture services. The majority of the load on the MISSes is generated by market activity (orders, quotes etc.).

Statistical data gathered from current Eurex operations shows that at peak times there is approximately 100 to 150 broadcasts per second sent out to the front ends by the Eurex back end. The duration of the peak can be more than one minute. This peak is assumed to be generated by market makers entering mass quote entries (e.g. via quote machines). In addition to the public broadcasts, each MISS needs to handle the traffic generated by orders/quotes entered by the traders connected to it. One order/quote generates approximately 2.5 broadcasts on average. In the case of 10 orders/quotes per second this results in a total of 25 additional broadcasts per second.

The following table shows the CPU recommendations of the Eurex MISS software for each platform:

Broadcasts per second to this machine (market activity)	**IBM AIX [SPECint95]**	**Microsoft Windows NT (Intel) [SPECint95]**	**SUN Solaris [SPECint95]**	**COMPAQ OpenVMS [SPECint95]**
50	4	5	4	6
100	6	9	6	9
150	8	13	8	11
200	11	17	11	13
250	14	21	14	15

It is recommended to choose at least a CPU size in the light grey area. Eurex members should account for their private orders/quotes rates in addition.

Note: One slow MISS on a front end can slow down the performance of the whole front end connected to the same MISS group.

3.5.2 Physical Memory - MISS

The main memory required, which is provided in the next table, should be used as minimum recommendation. It is important that on MISSes paging should be avoided as much as possible for maximum performance.

IBM AIX [MByte]	**Microsoft Windows NT (Intel) [MByte]**	**SUN Solaris [Mbyte]**	**COMPAQ OpenVMS [MByte]**
128	128	128	128

3.5.3 Disk Space - MISS

Local disk space is required for each environment (production/simulation) of a MISS. The space must be provided on the disk where the corresponding MISS file tree is located. The following table shows the disk space recommendations for one environment (production or simulation). The Eurex member can select which reports he wants to be delivered via the network to the MISS, therefore the space requirements for the reports depend on the trading volume and the reports selected by the Eurex member. These are estimates for one trading day.

	IBM AIX [MByte]	Microsoft Windows NT (Intel) [MByte]	SUN Solaris [MByte]	COMPAQ OpenVMS [MByte]
MISS software	350	350	350	350
Swap area	500	500	500	500
Report files and internal files [per day]	200	200	200	200
Static data files	500	500	500	500

If reports of more than one trading day are to be stored on the MISS, additional disk space is required. It is the system administrator's responsibility to maintain the file system where the reports are stored and to provide the required disk space.

3.5.4 MISS to router LAN

The usage of a 10 Mbps Ethernet to connect the MISSes with their routers to the access points is recommended. Its load is less than the one on the workstation to MISS LAN as the traffic is less and compressed.

3.6 Sizing Information – MISS running the Eurex Trading Application

The recommendations for CPU, memory and network are dependent on the activity on the machine. One instance of the Eurex Trading Application is running on the MISS. There are no workstations connected to the MISS. The configuration corresponds to the ones described in 2.5.1 Small Configuration, Normal Availability (A) and 2.5.2 Small Configuration, High Availability (B). The tables present the sizing recommendations for Eurex Release 3.

3.6.1 CPU – MISS running the Eurex Trading Application

CPU load is caused by running the MISS processes, the Eurex Trading Application and the architecture services. The majority of the load on the MISS is generated by market activity (orders, quotes etc.).

The following table shows the CPU recommendations of the Eurex MISS software for each platform:

IBM AIX [SPECint95]	Microsoft Windows NT (Intel) [SPECint95]	SUN Solaris [SPECint95]	COMPAQ OpenVMS [SPECint95]
13	18	13	15

The table assumes that the user visualizes 30-50% of the market activity in the trading application and enters no more than 3 orders/quotes per second.

3.6.2 Physical Memory – MISS running the Eurex Trading Application

The main memory required, which is provided in the next table, should be used as minimum recommendation. It is important that on MISSes paging should be avoided as much as possible for maximum performance.

IBM AIX [MByte]	Microsoft Windows NT (Intel) [MByte]	SUN Solaris [MByte]	COMPAQ OpenVMS [MByte]
256	256	256	256

3.6.3 Disk Space – MISS running the Eurex Trading Application

Local disk space is required for each environment (production/simulation) of a MISS. The space must be provided on the disk where the corresponding MISS file tree is located. The following table shows the disk space recommendations for one environment (production or simulation). The Eurex member can select which reports he wants to be delivered via the network to the MISS, therefore the space requirements for the reports depend on the trading volume and the reports selected by the Eurex member. These are estimates for one trading day.

	IBM AIX [MByte]	Microsoft Windows NT (Intel) [MByte]	SUN Solaris [MByte]	COMPAQ OpenVMS [MByte]
MISS software	200	200	200	200
Swap area	1000	1000	1000	1000
Report files and internal files [per day]	200	200	200	200
Static data files	500	500	500	500
Internal data files [per day]	50	50	50	50

If reports of more than one trading day are to be stored on the MISS, additional disk space is required. It is the system administrator's responsibility to maintain the file system where the reports are stored and to provide the required disk space.

3.6.4 MISS to router LAN

See 3.5.4 MISS to router LAN.

4 APPENDIX

4.1 Configuration for Release 3

4.1.1 Detailed Requirement Specification

4.1.1.1 Operating System

The next tables show the software versions and patches supported by Eurex for the Eurex front end configuration of Release 3. The PAL (Portable Abstraction Layer) run time library required by the Eurex front end architecture and GUI as well as a Perl interpreter required for the operations procedures are contained in the installation kits for the MISS and workstation software. Eurex supports the software only with the given versions.

Workstation and MISS Software Release 3	**IBM AIX**	**Microsoft Windows NT (Intel)**	**SUN Solaris**	**COMPAQ OpenVMS**
Operating System	AIX 4.3.1 (English version)	MS Windows NT (Intel) Workstation 4.0 (English version)	Solaris 2.6 (English version)	OpenVMS 7.1-2

4.1.1.2 Patch levels for IBM AIX

Based on the IBM AIX Release 4.3.1 and depending on the individual hardware and software system configuration the subset, applicable for the individual system configuration, of the patches listed below is to be installed.

Package	Version
Java.adt.includes	1.1.4.3
Java.adt.src	1.1.4.4
Java.rte.Dt	1.1.4.1
Java.rte.bin	1.1.4.4
Java.rte.classes	1.1.4.4
Java.rte.lib	1.1.4.4
Java.samples.AIXDemos	1.1.4.1
Java.samples.demos	1.1.4.3
Java.samples.jni_example	1.1.4.1
OpenGL.GL32.dev.mca.8ee3	4.3.1.1
OpenGL.OpenGL_X.dev.buc.00004002.PPC	4.3.1.1
OpenGL.OpenGL_X.dev.mca.8f61	4.3.1.1
OpenGL.OpenGL_X.dev.pci.14105400.PPC	4.3.1.1
OpenGL.OpenGL_X.dev.pci.14105400.PPC_mp	4.3.1.1
OpenGL.OpenGL_X.dev.pci.14105e00.PPC	4.3.1.1
OpenGL.OpenGL_X.dev.pci.14105e00.PPC_mp	4.3.1.1
OpenGL.OpenGL_X.dev.vfb	4.3.1.1
OpenGL.OpenGL_X.rte.base	4.3.1.3
OpenGL.OpenGL_X.rte.base_mp	4.3.1.1

OpenGL.OpenGL_X.rte.soft	4.3.1.4
OpenGL.OpenGL_X.tools.debugger	4.3.2.0
OpenGL.OpenGL_X.tools.debugger	4.3.2.1
PEX_PHIGS.dev.buc.00004002	4.3.2.0
PEX_PHIGS.dev.buc.00004002	4.3.2.2
PEX_PHIGS.dev.mca.8ee3	4.3.2.0
PEX_PHIGS.dev.mca.8ee3	4.3.2.2
PEX_PHIGS.dev.mca.8f61	4.3.2.0
PEX_PHIGS.dev.mca.8f61	4.3.2.2
PEX_PHIGS.dev.mca.8fbc	4.3.2.0
PEX_PHIGS.dev.mca.8fbc	4.3.2.2
PEX_PHIGS.dev.pci.14103c00	4.3.2.0
PEX_PHIGS.dev.pci.14103c00	4.3.2.1
PEX_PHIGS.dev.pci.14105400	4.3.2.0
PEX_PHIGS.dev.pci.14105400	4.3.2.2
PEX_PHIGS.dev.pci.14105e00	4.3.2.0
PEX_PHIGS.dev.pci.14105e00	4.3.2.2
PEX_PHIGS.dev.pci.14108e00	4.3.2.2
PEX_PHIGS.graPHIGS.rte.base	4.3.2.0
PEX_PHIGS.graPHIGS.rte.base	4.3.2.2
PEX_PHIGS.graPHIGS.rte.pipe	4.3.2.0
PEX_PHIGS.graPHIGS.rte.pipe	4.3.2.2
PEX_PHIGS.graPHIGS.rte.plot	4.3.1.1
PEX_PHIGS.graPHIGS.rte.rnuc	4.3.1.1
PEX_PHIGS.graPHIGS.rte.soft	4.3.2.0
PEX_PHIGS.graPHIGS.rte.soft	4.3.2.1
X11.Dt.ToolTalk	4.3.1.2
X11.Dt.adt	4.3.1.1
X11.Dt.lib	4.3.1.2
X11.Dt.rte	4.3.1.3
X11.adt.ext	4.3.1.2
X11.adt.motif	4.3.1.1
X11.apps.aixterm	4.3.1.1
X11.apps.clients	4.3.1.1
X11.apps.pm	4.3.1.1
X11.apps.rte	4.3.1.1
X11.apps.xdm	4.3.1.1
X11.apps.xterm	4.3.1.2
X11.base.lib	4.3.1.4
X11.base.rte	4.3.1.4
X11.base.rte	4.3.2.0
X11.base.smt	4.3.1.1
X11.compat.lib.X11R5	4.3.1.3
X11.fnt.fontServer	4.3.1.1

X11.man.en_US.Dt.rte	4.3.1.1
X11.motif.lib	4.3.1.3
X11.samples.apps.clients	4.3.1.1
X11.samples.apps.demos	4.3.1.1
X11.samples.ext	4.3.1.2
X11.samples.fnt.util	4.3.1.2
X11.samples.lib.Core	4.3.1.1
X11.vsm.lib	4.3.1.2
X11.vsm.rte	4.3.1.2
bos.64bit	4.3.2.0
bos.64bit	4.3.2.1
bos.adt.base	4.3.1.1
bos.adt.debug	4.3.1.3
bos.adt.include	4.3.2.0
bos.adt.include	4.3.2.2
bos.adt.prof	4.3.2.0
bos.adt.prof	4.3.2.1
bos.adt.samples	4.3.1.2
bos.adt.sccs	4.3.1.1
bos.adt.syscalls	4.3.1.2
bos.alt_disk_install.rte	4.3.1.1
bos.atm.atmle	4.3.1.2
bos.cns.com.asw	4.3.0.1
bos.cns.p10.asw	4.3.0.1
bos.cns.p10.rte	4.3.1.1
bos.cns.p10.tools	4.3.1.1
bos.cns.s20.asw	4.3.1.1
bos.compat.NetInstl	4.3.1.1
bos.diag.com	4.3.1.2
bos.diag.com	4.3.2.0
bos.diag.rte	4.3.2.0
bos.diag.rte	4.3.2.1
bos.dlc.8023	4.3.1.1
bos.dlc.ether	4.3.1.1
bos.dlc.fddi	4.3.1.1
bos.dlc.qllc	4.3.1.1
bos.dlc.sdlc	4.3.1.1
bos.dlc.token	4.3.1.1
bos.docsearch.rte	4.3.1.2
bos.loc.adt.locale	4.3.1.1
bos.loc.adt.unicode	4.3.1.1
bos.loc.com.JP	4.3.1.1
bos.loc.iso.hu_HU	4.3.1.1
bos.loc.iso.is_IS	4.3.1.1

bos.loc.pc_compat.Is_IS	4.3.1.1
bos.mh	4.3.1.3
bos.mp	4.3.2.0
bos.mp	4.3.2.2
bos.msg.en_US.docsearch.client.com	4.3.0.1
bos.msg.en_US.net.tcp.client	4.3.1.3
bos.msg.en_US.rte	4.3.1.2
bos.net.ipsec.rte	4.3.1.1
bos.net.nfs.cachefs	4.3.1.2
bos.net.nfs.client	4.3.2.0
bos.net.nfs.client	4.3.2.3
bos.net.nis.client	4.3.1.5
bos.net.nis.client	4.3.2.0
bos.net.nis.server	4.3.1.2
bos.net.nis.server	4.3.2.0
bos.net.ppp	4.3.1.1
bos.net.tcp.adt	4.3.1.1
bos.net.tcp.client	4.3.2.0
bos.net.tcp.client	4.3.2.2
bos.net.tcp.server	4.3.2.0
bos.net.tcp.server	4.3.2.1
bos.net.tcp.smit	4.3.1.1
bos.net.uucp	4.3.1.1
bos.powermgt.rte	4.3.1.1
bos.rte	4.3.1.1
bos.rte	4.3.2.0
bos.rte.ILS	4.3.1.1
bos.rte.SRC	4.3.1.1
bos.rte.aio	4.3.1.2
bos.rte.archive	4.3.1.1
bos.rte.bind_cmds	4.3.1.3
bos.rte.boot	4.3.1.2
bos.rte.bosinst	4.3.1.2
bos.rte.commands	4.3.1.3
bos.rte.compare	4.3.1.1
bos.rte.console	4.3.1.1
bos.rte.control	4.3.1.3
bos.rte.control	4.3.2.0
bos.rte.cron	4.3.1.2
bos.rte.date	4.3.1.1
bos.rte.devices_msg	4.3.1.1
bos.rte.diag	4.3.1.1
bos.rte.edit	4.3.1.1
bos.rte.filesystem	4.3.1.1

bos.rte.ifor_ls	4.3.1.1
bos.rte.im	4.3.1.1
bos.rte.install	4.3.1.3
bos.rte.libc	4.3.2.0
bos.rte.libc	4.3.2.2
bos.rte.libcur	4.3.1.1
bos.rte.libpthreads	4.3.1.4
bos.rte.loc	4.3.1.1
bos.rte.lvm	4.3.2.0
bos.rte.lvm	4.3.2.2
bos.rte.man	4.3.1.1
bos.rte.misc_cmds	4.3.1.1
bos.rte.net	4.3.1.1
bos.rte.net	4.3.2.0
bos.rte.odm	4.3.2.0
bos.rte.odm	4.3.2.1
bos.rte.printers	4.3.1.3
bos.rte.security	4.3.1.3
bos.rte.security	4.3.2.0
bos.rte.serv_aid	4.3.2.0
bos.rte.serv_aid	4.3.2.2
bos.rte.shell	4.3.1.3
bos.rte.streams	4.3.1.3
bos.rte.tty	4.3.2.0
bos.rte.tty	4.3.2.1
bos.sysmgt.nim.client	4.3.1.1
bos.sysmgt.nim.master	4.3.1.2
bos.sysmgt.nim.spot	4.3.1.1
bos.sysmgt.serv_aid	4.3.1.4
bos.sysmgt.serv_aid	4.3.2.0
bos.sysmgt.smit	4.3.1.2
bos.sysmgt.sysbr	4.3.1.2
bos.sysmgt.trace	4.3.1.1
bos.sysmgt.trace	4.3.2.0
bos.terminfo.ibm.data	4.3.0.1
bos.txt.spell	4.3.1.1
bos.txt.tfs	4.3.1.2
bos.txt.tfs.data	4.3.0.2
bos.txt.xpv.rte	4.3.1.1
bos.up	4.3.2.0
bos.up	4.3.2.2
dce.cds.rte	2.2.0.1
dce.client.core.rte	2.1.0.11
dce.client.core.rte.admin	2.2.0.1

dce.client.core.rte.cds	2.2.0.1
dce.client.core.rte.config	2.2.0.1
dce.client.dfs.rte	2.1.0.24
dce.client.dfs.rte	2.2.0.2
dce.dfs_server.rte	2.1.0.16
dce.dfsnfs.rte	2.1.0.7
dce.edfs.rte	2.1.0.19
dce.edfs.rte	2.2.0.2
dce.msg.en_US.client.core.rte	2.1.0.3
dce.msg.en_US.client.core.rte	2.2.0.1
dce.pthreads.rte	2.1.0.1
dce.security.rte	2.1.0.8
devices.base.diag	4.3.1.1
devices.buc.00004001.X11	4.3.1.1
devices.buc.00004001.rte	4.3.1.1
devices.buc.00004002.X11	4.3.1.2
devices.buc.00004005.rte	4.3.1.1
devices.buc.00004006.rte	4.3.1.1
devices.buc.00004007.rte	4.3.1.1
devices.chrp.base.diag	4.3.1.3
devices.chrp.base.rte	4.3.2.0
devices.chrp.base.rte	4.3.2.1
devices.chrp.pci.rte	4.3.1.1
devices.chrp.pci.rte	4.3.2.0
devices.common.IBM.atm.rte	4.3.1.4
devices.common.IBM.cx.rte	4.3.1.1
devices.common.IBM.hdlc.sdlc	4.3.1.1
devices.common.IBM.ssa.diag	4.3.1.3
devices.common.IBM.ssa.rte	4.3.1.3
devices.common.IBM.ssa.rte	4.3.2.0
devices.common.base.diag	4.3.1.1
devices.graphics.com	4.3.1.2
devices.isa.IBM0010.rte	4.3.1.1
devices.isa.PNP80CC.rte	4.3.1.1
devices.isa.cxia.com	4.3.1.3
devices.isa.cxia.com	4.3.2.0
devices.isa.cxia.rte	4.3.0.1
devices.isa.cxia128.rte	4.3.0.1
devices.isa.mm2.mpqp	4.3.1.1
devices.isa.pc8s.rte	4.3.0.1
devices.isa_sio.IBM0005.IBM8301.rte	4.3.2.0
devices.isa_sio.IBM001F.rte	4.3.2.0
devices.isa_sio.PNP0501.rte	4.3.1.3
devices.isa_sio.PNP0501.rte	4.3.2.0

devices.isa_sio.PNP0600.rte	4.3.2.0
devices.isa_sio.PNP0E00.rte	4.3.2.0
devices.isa_sio.chrp.ecp.rte	4.3.1.1
devices.isa_sio.chrp.ecp.rte	4.3.2.0
devices.isa_sio.pnpPNP.501.rte	4.3.2.0
devices.mca.61fd.rte	4.3.1.1
devices.mca.8ee3.X11	4.3.1.1
devices.mca.8ee3.rte	4.3.1.1
devices.mca.8ee3.ucode	4.3.1.1
devices.mca.8ee4.X11	4.3.1.1
devices.mca.8f61.X11	4.3.1.4
devices.mca.8f61.diag	4.3.1.2
devices.mca.8f61.rte	4.3.1.2
devices.mca.8f67.com	4.3.1.1
devices.mca.8f67.diag.com	4.3.1.1
devices.mca.8f95.rte	4.3.1.1
devices.mca.8f9a.X11	4.3.1.2
devices.mca.8fa2.rte	4.3.1.1
devices.mca.8fbc.X11	4.3.1.3
devices.mca.edd0.com	4.3.1.2
devices.mca.edd0.com	4.3.2.0
devices.mca.ffe1.rte	4.3.1.3
devices.mca.ffe1.rte	4.3.2.0
devices.msg.en_US.diag.rte	4.3.1.2
devices.msg.en_US.rspc.base.com	4.3.0.1
devices.msg.en_US.sys.mca.rte	4.3.1.1
devices.pci.00100100.rte	4.3.2.0
devices.pci.00100300.diag	4.3.2.0
devices.pci.00100f00.rte	4.3.1.1
devices.pci.00100f00.rte	4.3.2.0
devices.pci.0e100091.X11	4.3.1.2
devices.pci.0e100091.diag	4.3.1.1
devices.pci.0e100091.rte	4.3.1.1
devices.pci.0e100091.rte	4.3.2.0
devices.pci.14101800.diag	4.3.1.2
devices.pci.14101800.rte	4.3.1.1
devices.pci.14101800.rte	4.3.2.0
devices.pci.14101b00.X11	4.3.1.1
devices.pci.14101b00.rte	4.3.1.1
devices.pci.14101b00.rte	4.3.2.0
devices.pci.14102e00.rte	4.3.1.1
devices.pci.14103c00.X11	4.3.1.2
devices.pci.14103c00.com	4.3.1.2
devices.pci.14103c00.diag	4.3.1.1

devices.pci.14103c00.rte	4.3.1.1
devices.pci.14103e00.rte	4.3.2.0
devices.pci.14105300.diag	4.3.1.1
devices.pci.14105300.rte	4.3.1.2
devices.pci.14105300.rte	4.3.2.0
devices.pci.14105400.X11	4.3.1.2
devices.pci.14105400.diag	4.3.1.1
devices.pci.14105400.rte	4.3.1.1
devices.pci.14105e00.X11	4.3.1.4
devices.pci.14105e00.diag	4.3.1.1
devices.pci.14105e00.rte	4.3.1.2
devices.pci.14107c00.com	4.3.1.1
devices.pci.14107c00.com	4.3.2.0
devices.pci.14107c00.diag	4.3.1.2
devices.pci.14107c00.diag	4.3.2.0
devices.pci.22100020.rte	4.3.2.0
devices.pci.23100020.rte	4.3.1.1
devices.pci.23100020.rte	4.3.2.0
devices.pci.2b101a05.X11	4.3.2.0
devices.pci.2b101a05.X11	4.3.2.1
devices.pci.2b101a05.diag	4.3.1.1
devices.pci.2b101a05.rte	4.3.1.2
devices.pci.2b101a05.rte	4.3.2.0
devices.pci.331121b9.com	4.3.1.1
devices.pci.331121b9.rte	4.3.1.1
devices.pci.331121b9.rte	4.3.2.0
devices.pci.33531188.diag	4.3.1.1
devices.pci.33531188.rte	4.3.1.1
devices.pci.3353c088.X11.com	4.3.1.2
devices.pci.3353c088.com	4.3.1.2
devices.pci.3353c088.rte	4.3.1.1
devices.pci.3353c188.rte	4.3.1.1
devices.pci.3353c288.rte	4.3.1.1
devices.pci.3353c388.rte	4.3.1.1
devices.pci.4f111100.com	4.3.1.3
devices.pci.4f111100.com	4.3.2.0
devices.pci.4f111100.diag	4.3.1.2
devices.pci.4f111b00.diag	4.3.1.2
devices.pci.4f111b00.rte	4.3.0.1
devices.pci.86808404.rte	4.3.2.0
devices.pci.isa.rte	4.3.2.0
devices.pcmcia.serial.com	4.3.1.2
devices.pcmcia.serial.com	4.3.2.0
devices.rs6ksmp.base.rte	4.3.1.1

devices.rspc.base.diag	4.3.1.4
devices.rspc.base.rte	4.3.2.0
devices.scsi.disk.rte	4.3.1.1
devices.serial.tablet1.X11	4.3.1.1
devices.sio.fda.diag	4.3.0.1
devices.sio.sa.rte	4.3.2.0
devices.ssa.IBM_raid.rte	4.3.1.1
devices.ssa.disk.rte	4.3.1.2
devices.ssa.network_agent.rte	4.3.1.2
devices.ssa.tm.rte	4.3.1.1
devices.sys.pci.rte	4.3.2.0
devices.tty.rte	4.3.1.1
devices.tty.rte	4.3.2.0
ifor_ls.base.cli	4.3.1.1
ifor_ls.base.gui	4.3.1.1
perfagent.tools	2.2.31.3
printers.lex4049.rte	4.3.0.1
printers.lexOptraC.rte	4.3.0.1
printers.lexOptraE.rte	4.3.0.1
printers.lexOptraEp.rte	4.3.0.1
printers.lexOptraN.rte	4.3.0.1
printers.lexOptraS.rte	4.3.0.1
printers.lexOptraSC.rte	4.3.0.1
printers.rte	4.3.1.1
sysmgt.websm.apps	4.3.1.1
sysmgt.websm.framework	4.3.1.2
sysmgt.websm.rte	4.3.1.1
xlC.cpp	4.3.0.0
xlC.rte	3.6.4.0

4.1.1.3 Patch levels for SUN Solaris

The supported version of the Sun Solaris operating system is version 2.6 Final Customer Shipment with the following patches installed additionally:

Package	Patch ID#
SunOS 5.6: kernel update patch	105181-11
SunOS 5.6: libc & watchmalloc patch	105210-17
SunOS 5.6: /usr/sbin/rpcbind patch	105216-03
SunOS 5.6: sbus driver patch	105222-03
SunOS 5.6: pln/soc drivers & ssafirmware patch	105223-05
SunOS 5.6: /kernel/drv/ssd patch	105356-07
SunOS 5.6: /kernel/drv/ses patch	105357-02

SunOS 5.6: BCP patch	105377-03
SunOS 5.6: /kernel/misc/nfssrv patch	105379-05
SunOS 5.6: SGML Manual Pages Patch	105390-02
SunOS 5.6: at & cron utility patch	105393-07
SunOS 5.6: /usr/lib/sendmail patch	105395-03
SunOS 5.6: /usr/sbin/passmgmt patch	105397-02
SunOS 5.6: Greek keyboard layout incorrect on Sparc	105400-02
SunOS 5.6: libnsl and NIS+ commands patch	105401-16
SunOS 5.6: ypbind/ypserv patch	105403-02
SunOS 5.6: libcurses.a & libcurses.so.1 patch	105405-02
SunOS 5.6: /usr/bin/volrmmount patch	105407-01
SunOS 5.6: /usr/lib/acct/acctdisk patch	105416-01
SunOS 5.6: /etc/init.d/asppp patch	105421-01
SunOS 5.6: /usr/lib/libtnfprobe.so.1 patch	105426-01
SunOS 5.6: /usr/lib/autofs/automountd patch	105472-06
SunOS 5.6: /kernel/fs/hsfs patch	105486-04
SunOS 5.6: linker patch	105490-07
SunOS 5.6: cgsix driver patch	105492-02
SunOS 5.6: /usr/lib/fs/ufs/fsck patch	105516-01
SunOS 5.6: /kernel/drv/be patch	105528-01
SunOS 5.6: /kernel/drv/tcp patch	105529-05
SunOS 5.6: /usr/sbin/rpc.nisd_resolv patch	105552-02
SunOS 5.6: chkey and keylogin patch	105562-03
SunOS 5.6: /kernel/misc/rpcsec patch	105564-03
SunOS 5.6: /usr/lib/libthread.so.1 patch	105568-12
SunOS 5.6: /kernel/fs/ufs patch	105572-07
SunOS 5.6: /kernel/drv/glm patch	105580-08
SunOS 5.6: Shared library patch for C++	105591-02
SunOS 5.6: /kernel/drv/isp patch	105600-07
SunOS 5.6: ebus/pci/rootnex driver patch	105604-05
SunOS 5.6: /usr/lib/nfs/mountd patch	105615-04
SunOS 5.6: libbsm patch	105621-09
SunOS 5.6: /usr/bin/fncreate_printer patch	105623-01
SunOS 5.6: /usr/lib/power/powerd patch	105637-01
SunOS 5.6: prtdiag patch	105642-05

SunOS 5.6: ac/environ/fhc/sysctrl driver patch	105651-08
SunOS 5.6: driver_aliases/driver_classes/name_to_major patch	105654-03
SunOS 5.6: /usr/bin/login patch	105665-03
SunOS 5.6: /usr/bin/rdist patch	105667-02
SunOS 5.6: Cachefs patch	105693-05
SunOS 5.6: /usr/kernel/drv/audiocs patch	105705-02
SunOS 5.6: /usr/bin/su patch	105718-02
SunOS 5.6: /kernel/fs/nfs patch	105720-06
SunOS 5.6: /usr/lib/fs/ufs/ufsdump patch	105722-01
SunOS 5.6: /usr/lib/fs/ufs/ufsrestore patch	105724-01
SunOS 5.6: /kernel/drv/ecpp patch	105741-05
SunOS 5.6: /kernel/drv/le patch	105742-03
SunOS 5.6: /usr/lib/libxfn.so.2 patch	105743-01
SunOS 5.6: /usr/bin/cpio patch	105746-01
SunOS 5.6: libresolv, in.named, named-xfer, nslookup, nstest patch	105755-07
SunOS 5.6: /usr/bin/echo patch	105757-01
SunOS 5.6: /kernel/fs/specfs patch	105778-01
SunOS 5.6: /kernel/fs/fifofs patch	105780-01
SunOS 5.6: /kernel/drv/ip patch	105786-07
SunOS 5.6: /usr/sbin/tar patch	105792-03
SunOS 5.6: /kernel/drv/hme patch	105795-05
SunOS 5.6: /kernel/drv/sd patch	105797-05
SunOS 5.6: sun4m, sun4u & sun4u1 cprboot patch	105798-03
SunOS 5.6: /usr/bin/admintool, y2000 patch	105800-05
SunOS 5.6: /kernel/drv/qe patch	105836-03
SunOS 5.6: /kernel/drv/st.conf patch	105847-01
SunOS 5.6: /usr/sbin/tapes patch	105867-01
SunOS 5.6: libspmisoft.so.1 patch for upgrade	105874-01
SunOS 5.6: devlink.tab/iu.ap/minor_perm & se driver patch	105924-05
SunOS 5.6: /usr/sbin/static/tar patch	105926-01
SunOS 5.6: /usr/bin/xargs patch	105953-01
SunOS 5.6: /usr/kernel/strmod/ppp patch	105959-01
SunOS 5.6: /usr/sbin/rwall patch	105988-01
SunOS 5.6: vi/ex/edit/view/vedit patch	105990-01
SunOS 5.6: POINT PATCH: 4074114 - bugfix for /kernel/strmod/ms	106017-01

SunOS 5.6: /usr/ccs/bin/make patch	106029-01
SunOS 5.6: /usr/bin/getopt patch	106035-01
SunOS 5.6: X Input & Output Method patch	106040-10
SunOS 5.6: /usr/lib/nss_nisplus.so.1 patch	106044-01
SunOS 5.6: /usr/sbin/in.telnetd patch	106049-01
SunOS 5.6: sgml patch	106123-02
SunOS 5.6: Patch for patchadd and patchrm	106125-05
SunOS 5.6: /usr/bin/mkdir patch	106141-01
SunOS 5.6: in.dhcpd and pntadm patch	106150-02
SunOS 5.6: Jumpstart install fails searching for profile()	106152-01
SunOS 5.6 HW398: Jumpstart install fails searching for profile()	106154-01
SunOS 5.6: dma driver patch	106168-02
SunOS 5.6: sbusmem driver patch	106169-02
SunOS 5.6: /kernel/drv/esp patch	106170-03
SunOS 5.6: /kernel/drv/lebuffer patch	106171-01
SunOS 5.6: /kernel/drv/fas patch	106172-04
SunOS 5.6: /kernel/misc/scsi patch	106173-03
SunOS 5.6: cfgadm utility & libraries	106183-04
SunOS 5.6: y2000 sysid unzip patch	106193-03
SunOS 5.6: /platform/sun4u/kernel/drv/envctrl patch	106216-02
SunOS 5.6: luxadm.1m Manual Page Patch	106219-02
SunOS 5.6: /usr/sbin/format patch	106226-01
SunOS 5.6: lp patch	106235-02
SunOS 5.6: /usr/lib/libpam.so.1 patch	106257-04
SunOS 5.6: Manual Pages Patch for ffbconfig.1m	106260-01
SunOS 5.6: Manual Pages Patch cfgadm.1m config_admin.3x libcfgadm.4	106261-01
SunOS 5.6: Manual Pages Patch for qfe.7d	106262-01
SunOS 5.6: /usr/lib/security/pam_unix.so.1 patch	106271-04
SunOS 5.6: /kernel/sys/msgsys patch	106285-01
SunOS 5.6: pkgadd/pkginstall & related utilities	106292-02
SunOS 5.6: /usr/sbin/in.ftpd patch	106301-01
SunOS 5.6: /usr/lib/netsvc/yp/rpc.yppasswdd patch	106303-01
SunOS 5.6: upgrade_script terminated abnormally during upgrade	106317-01
SunOS 5.6: /etc/inet/services patch	106323-01
SunOS 5.6: csh/jsh/ksh/rksh/rsh/sh patch	106361-04

SunOS 5.6: /platform/sun4u1/kernel/drv/cvc patch	106381-03
SunOS 5.6: /usr/bin/localedef patch	106388-01
SunOS 5.6: patch for ide and atapi misc. fixes	106407-03
SunOS 5.6: /kernel/drv/mm patch	106429-01
SunOS 5.6: /usr/kernel/drv/pm patch	106435-01
SunOS 5.6: /usr/sbin/syslogd patch	106439-02
SunOS 5.6: /usr/sbin/ping patch	106448-01
SunOS 5.6: /usr/sbin/df & /usr/xpg4/bin/df patch	106466-01
SunOS 5.6: /kernel/fs/autofs patch	106471-01
SunOS 5.6: truss & truss support library patch	106495-01
SunOS 5.6: Manual Pages Patch for ldap	106497-01
SunOS 5.6: /platform/SUNW,Ultra-250/kernel/drv/envctrltwo patch	106504-01
SunOS 5.6: /usr/bin/cat patch	106507-01
SunOS 5.6: /usr/bin/ftp patch	106522-01
SunOS 5.6: bad iso-2022-cn string cause crash in iconv problem	106556-01
SunOS 5.6: /usr/sbin/aspppd patch	106561-01
SunOS 5.6: libauth.a & libauth.so.1 patch	106569-01
SunOS 5.6: /usr/lib/nfs/statd patch	106592-01
SunOS 5.6: Japanese UTF-8 iconv patch	106613-01
SunOS 5.6: bad iso-2022-cn string cause crash in iconv problem	106618-01
SunOS 5.6: /kernel/strmod/rpcmod patch	106639-02
SunOS 5.6: /usr/lib/fs/nfs/mount patch	106641-01
SunOS 5.x: rpc.pcnfsd accepting "." as printer name fix	106646-01
SunOS 5.6: /usr/lib/netsvc/rstat/rpc.rstatd patch	106651-01
SunOS 5.6: /usr/lib/sa/sadc patch	106653-01
SunOS 5.6: iostat/mpstat/vmstat patch	106655-01
SunOS 5.6: /usr/lib/libposix4.so.1 patch	106797-01
SunOS 5.6: /usr/bin/dc patch	106808-01
SunOS 5.6: /usr/sbin/sar patch	106818-01
SunOS 5.6: /usr/bin/date patch	106828-01
SunOS 5.6: Feature patch for Euro currency support	106842-03
SunOS 5.6: /etc/cron.d/logchecker patch	106863-01
SunOS 5.6: /usr/lib/nfs/nfsd patch	106882-01
The PC Card are not recognized in Ultra5_10	106901-01
SunOS 5.6: /usr/sbin/uadmin patch	106929-01

SunOS 5.6: /usr/ucb/ucblinks patch	106994-01
SunOS 5.6: Ejecting a cdrom when still accessing causes panics	107068-01
SunOS 5.6: /usr/lib/fs/ufs/quota patch	107099-01
SunOS 5.6: multiple xterm fixes	105464-01
OpenWindows 3.6: printtool patch	105497-01
OpenWindows 3.6: Xcms patch	105618-01
OpenWindows 3.6: Xsun patch	105633-14
OpenWindows 3.6: ToolTalk patch	105802-07
OpenWindows 3.6: mp fails to set correct A4 paper size information	106138-01
OpenWindows 3.6: filemgr (ff.core) fixes	106222-01
OpenWindows 3.6: Xview Patch	106331-03
OpenWindows 3.6: libXext patch	106404-01
OpenWindows 3.6: w returns wrong login user number in xdm	106415-01
OpenWindows 3.6: libce suid/sgid security fix	106648-01
OpenWindows 3.6: libdeskset patch	106649-01
OpenWindows 3.6: mailtool attachment security patch	106650-03
OpenWindows 3.6: Keytables patch	106841-01
OpenWindows 3.6: fstobdf core dumps with 2-byte fonts	106957-01
CDE 1.2: dtterm libDtTerm.so.1 patch	105160-07
CDE 1.2: dtmail patch	105338-14
CDE 1.2: dtpad patch	105558-03
CDE 1.2: calendar manager patch	105566-05
CDE 1.2: libDtWidget patch	105630-01
CDE 1.2: dtwm patch	105634-05
CDE 1.2: libDtSvc Patch	105669-04
CDE 1.2: dtlogin patch	105703-07
CDE 1.2: dtappgather Patch	105837-02
CDE 1.2 sdtfprop: patch for group permissions	106025-01
CDE 1.2 dtsession: patch for screenlock	106027-02
CDE 1.2: dtfile patch	106112-02
CDE 1.2: libDtHelp.so.1 fixes	106242-01
CDE 1.2: sdtimage fixes	106267-02
CDE 1.2: Print Manager Patch	106437-01
CDE 1.2: Actions patch	106660-02
Creator 2.6: FFB Graphics Patch	105360-20

VIS/XIL 2.6: Graphics Patch	105361-07
PGX 2.6: M64 Graphics Patch	105362-16
Motif 1.2.7: Runtime library patch	105284-18

4.1.1.4 Patch levels for Windows NT (Intel)

The supported version of the Microsoft Windows NT (Intel platform) operating system is Version 4 Service Pack 3 with the following patches installed additionally:

Package	Patch ID#
User Manager Does Not Recognize February 2000 As a Leap Year	Q175093
Control Panel Date/Time applet	Q180122
Custom date properties on Word documents	Q183125
Find File entry fields	Q183123

4.1.1.5 Patch levels for OpenVMS

No patches are needed for OpenVMS 7.1-2.

4.1.1.6 Router

The table shows the router recommended by Eurex.

Router Recommendations Release 3	Product Number	Product Name
Router for IP protocol support	Cisco2610 S26C-12.0.2 ***or higher*** WIC-1T CAB-X21MT	1 Ethernet Modular Router with Cisco IOS IP Software Cisco 2600 Series IOS IP 1-Port Serial WAN Interface Card X.21 Cable, DTE, Male, 10 Feet

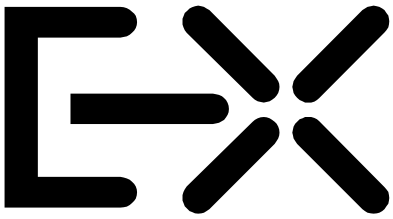
The router CISCO 2610 is the recommended router type for Eurex because of its improved failover functionality (HSRP, Hot Standby Routing Protocol).

The formerly recommended router CISCO Series 25nn and 36nn are also fully supported by Eurex.

Router also supported for Release 3	Product Number	Product Name
Router for IP protocol support	Cisco2501 S25C-11.3(6) ***or higher*** CAB-X21MT	Ethernet/Dual Serial Router Cisco 2500 Series IOS IP only Feature Set X.21 Cable, Male, 10 Feet
Router for IP protocol support	Cisco3620 S362C-11.3(6) ***or higher*** NM-1E2W WIC-1T CAB-X21MT	2-Slot Modular Router-AC Cisco 3620 Series IOS IP only Feature Set 1 Ethernet 2 WAN Card Slot Network Module 1-Port Serial WAN Interface Card X.21 Cable, Male, 10 Feet

CISCO Systems routers greater than Series 36nn are oversized (but allowed) for Eurex purposes.

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Eurex Release 3.0

Detailed Member Network Setup

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1 Introduction

The objective of this document is to describe the Eurex network as a basis for electronic trading in Eurex. The description is mainly focused on member related network topics covering the following aspects:

- General Overview of the Eurex network
- Member Network Configurations
- Addressing and Naming Conventions
- Security
- Router and MISS Network Set-up

This document is focused on Eurex.

Intended readership are member network administration and security representatives, responsible for the design and set-up of member network installations for Eurex front ends.

The correct set-up of the member front end installation including network aspects is a prerequisite for the technical admission to Eurex membership.

2 Eurex Network

2.1 Eurex Network Overview

The Eurex architecture is a four-tier client server architecture. The Eurex network consists of:

- Eurex Back End Host

  The Eurex back end host performs the major exchange functions, e.g. order processing/matching of the Eurex trading system.

- Eurex Back End Access Points

  Major functions of a Eurex access point are to route transactions (requests/responses) between the back end and a number (generally a geographic group) of member installations, to multiply and distribute public broadcasts, ensure fault tolerance and to shield the back end from direct member access. Access points consist of two halves which are (generally) installed at different locations for enhanced disaster tolerance. These halves are cross-connected and serve as a backup to each other. Each half is set up redundantly and consists (generally) of one communication server and two routers connecting the access point to the Eurex back end and to the connected member installations.

- Eurex Front End Server

  The Eurex front end server (MISS, Member Integration System Server) allows members access to the Eurex trading system. The MISS can either run as a stand-alone machine on which the entire set of Eurex front end applications are available or as a server for additional trader stations (workstations). The Eurex front end server is connected to its access point via a WAN network (serial lines) using a bandwidth of 64 Kbit/s.

- Eurex Front End Workstation

  The Eurex front end workstation acts as a client in relation to the MISS. A workstation provides the user with the Eurex front end applications (e.g. Graphical User Interface (GUI)) and the VALUES API. MISSes and workstations are connected to each other via a LAN.

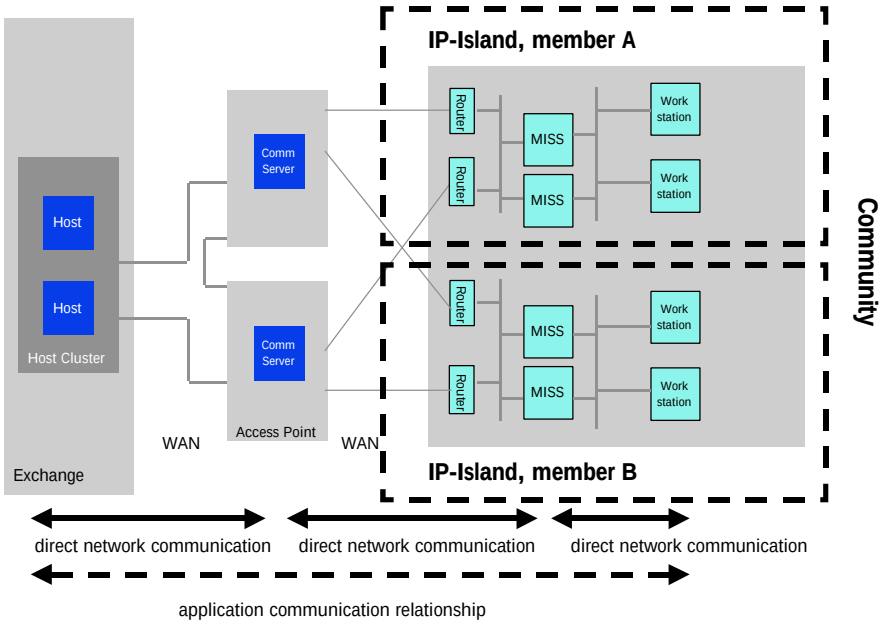


Figure 1 - Eurex network overview

Major requirements for the Eurex network as a technical infrastructure are:

- Availability
  - All components of the Eurex network are installed and set up redundantly:
    - back end systems and network
    - Lines between back end and access point
    - access point systems and network
    - lines between access points and member front ends
  - In addition, members are advised to set up their installation redundantly.
  - In case of failure of a component (e.g. access point, line, router), the Eurex application ensures a transparent fail over to the remaining components (for details see chapter 6.2 Network Fail Over).

- Throughput

  The Eurex network uses serial lines of 64 Kbit/s between access points and member installations. Members are advised to size their LAN for 10 Mbit/s or higher. See also the bandwidth requirements for a LAN defined in the Eurex Release 3 Sizing Guidelines (Version 2).

- Fairness

  Within the network, equal treatment of all members is ensured by using uniform network components (hardware/software) and network configuration. The Eurex network works according to the FIFO principle (first in first out).

- Security

  Eurex network has to observe high security standards. Requirements are:

  - Access to the Eurex network is limited to authorized staff.
  - Back end systems are not directly accessible by member systems.
  - Installations of different members can not access each other.
  - The integrity of all systems is ensured.

These requirements are implemented in the overall network setup which is described in more detail in chapter 4.2.

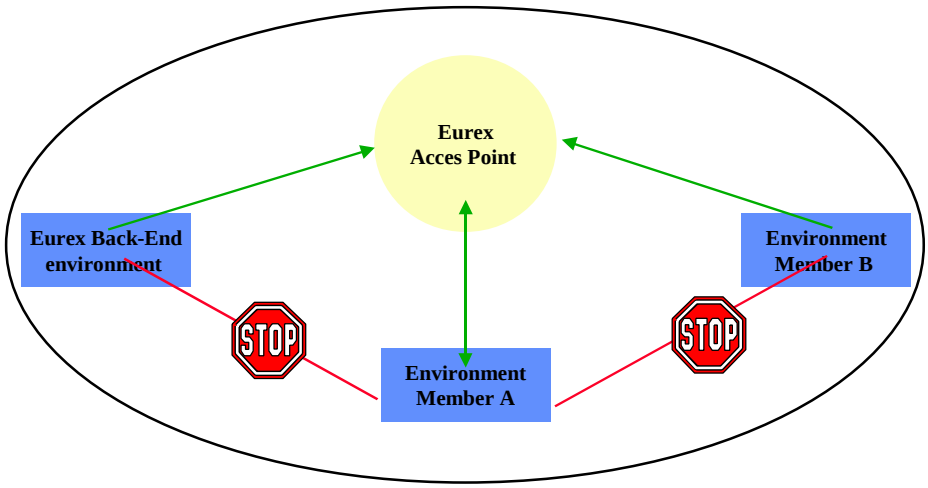


Figure 2 - Eurex network security policy

2.2 Eurex Network Responsibilities

The Exchange is responsible for administration and operation of the Eurex back end and access points systems including the connecting network.

In general, each Eurex member is provided two leased lines by the Exchange including an interface to connect their front end installation to the Eurex access point. Additional lines may be needed when Eurex is installed at several locations. Additional leased lines can be requested by members and will be ordered by the Exchange. The Exchange is responsible for administration and operation of these leased lines including the interface on the member side.

Members are responsible for purchase, installation, administration and operation of their front end installation including MISSes, workstations and routers (exemptions may exist). Currently, routers connecting MISSes to access points are used for Eurex exclusively.

Certain parts of the Eurex application are executed on the member front end systems resulting in requirements regarding front end configuration, hardware requirements, operating system version, network addressing etc.

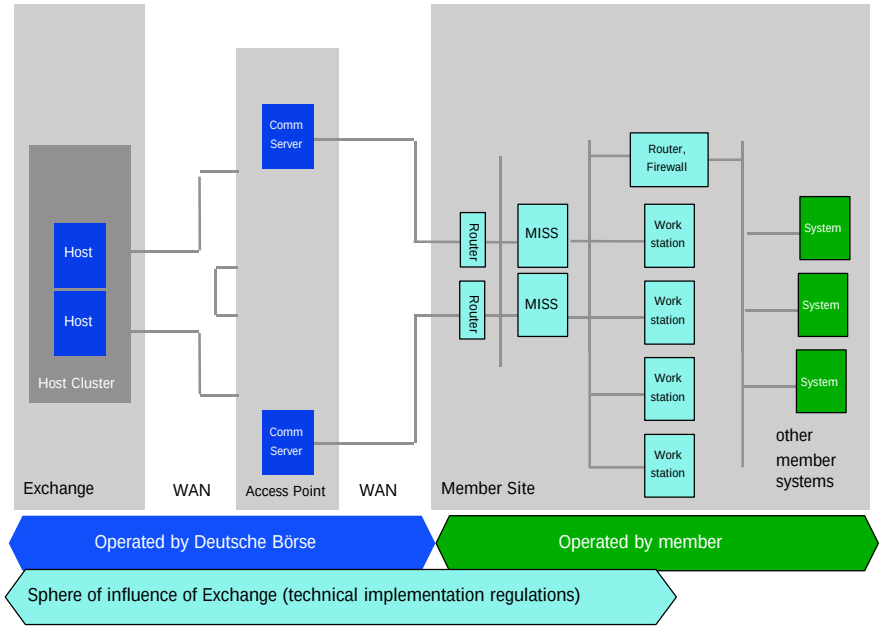


Figure 3 - Domains for operation and administration

Members are required to comply with the technical implementation regulations of the Exchange for front end installation, administration and operation.Technical admission to Eurex may be denied if the technical rules are violated.

3 Member Network Configuration

A member front end installation may consist of one or more Member Integration System Server (MISS) and separate workstations (optional).

In all cases the Eurex application requires the set-up of a LAN-based network within the member installation. Prerequisite is that the member LAN is able to transport protocols of the IP family and that the nominal bandwidth is 10 Mbit/s or higher. The LAN can also be implemented as an extended-LAN, i.e. with bridged connections between the segments (based on network layer 2).

Member configurations may be set up as:

- Two address spaces topology
- One address space topology

3.1 Two Address Spaces

The recommended configuration consists of two LANs, the MISS/router LAN and the MISS/workstation LAN. The main goal of this solution is to separate the member and the Exchange networks. This is achieved by installation of two separate LAN infrastructures and use of two separate IP addressing spaces (see figure 4).

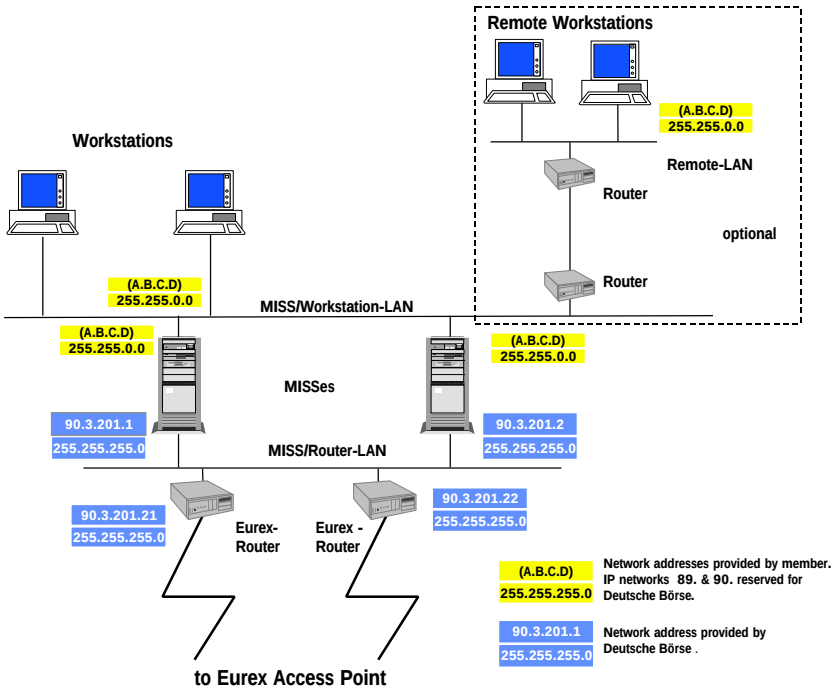


Figure 4 - Two-LAN configuration

The MISS/router LAN belongs to the exchange-owned address space. The MISS/workstation LAN belongs to member-owned address space.

The advantage of this solution is that a dedicated Eurex network segment is used. Conflicts, e.g. regarding IP addressing, can be prevented and member internal network configuration and setups are not affected when Eurex is installed. Data passed between MISS and access point do not affect the network load of existing member in house networks and vice versa. This configuration also shows an advantage regarding security. Since the MISS setup/configuration does not permit dynamic routing, it is not possible to exchange the *routes* (IP networks) known by the router connected to these different LANs for Eurex installation.

The MISS/router LAN may, in addition to the Eurex MISSes and Eurex routers contain other exchange application devices, for example Xetra. The Exchange assigns Network addresses for the components within the MISS/router LAN.

The MISS/workstation LAN connects the member MISSes to the workstations. Other member-defined components are allowed. Assignment of addresses within this LAN is the responsibility of the member.

The components of a Eurex member front end may be distributed on different LAN segments. If separate LANs are set up in different locations they may be connected to different access point halves to ensure a maximum of fault tolerance.

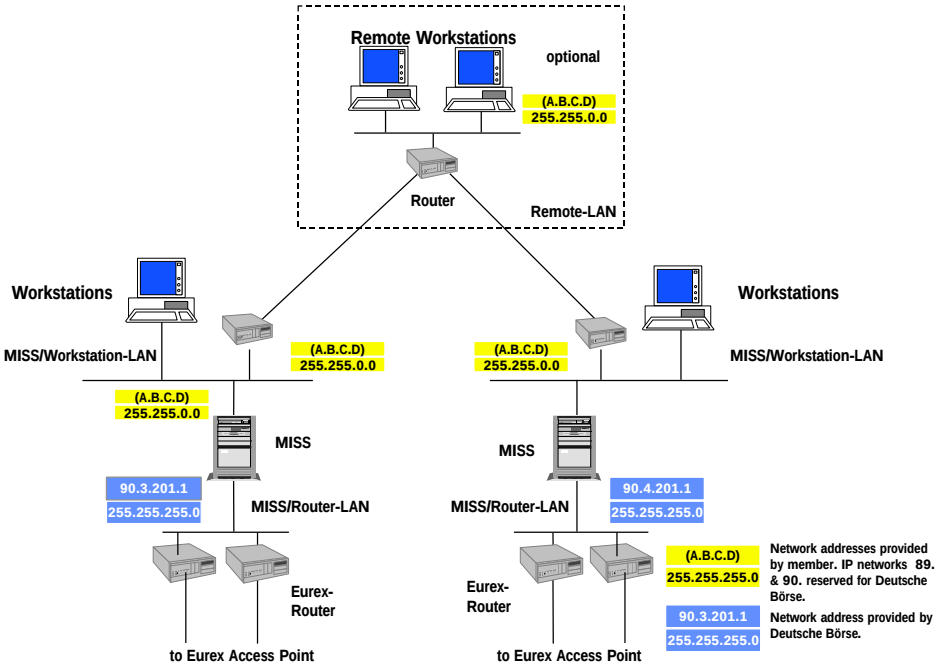


Figure 5 - One of several possible multiple-LAN configurations

In addition, the following points need to be considered:

- Front end installations may be configured using extended LANs. In this case it is important to make sure that sufficient bandwidth is provided within the network (i.e. 10 Mbit/s or more; see bandwidth requirements for a LAN defined in the Eurex Release 3 Sizing Guidelines –Version 2).

- It is recommended to achieve a redundant distribution of the workstations which have access to the distributed MISSes.

3.2 One Address Space

In this configuration all components (e.g. MISSes, workstations, routers) of a member front end installation are connected to one LAN. This configuration is a stand-alone set-up for a Eurex installation. All network components belong to exchange-owned address space.

IP addresses for MISSes and routers are assigned by the Exchange. The Exchange will also assign a range of addresses to be used for workstations (see chapter 4.1). The member may assign these addresses as desired

This configuration is classified as the minimum configuration for a Eurex front end installation.

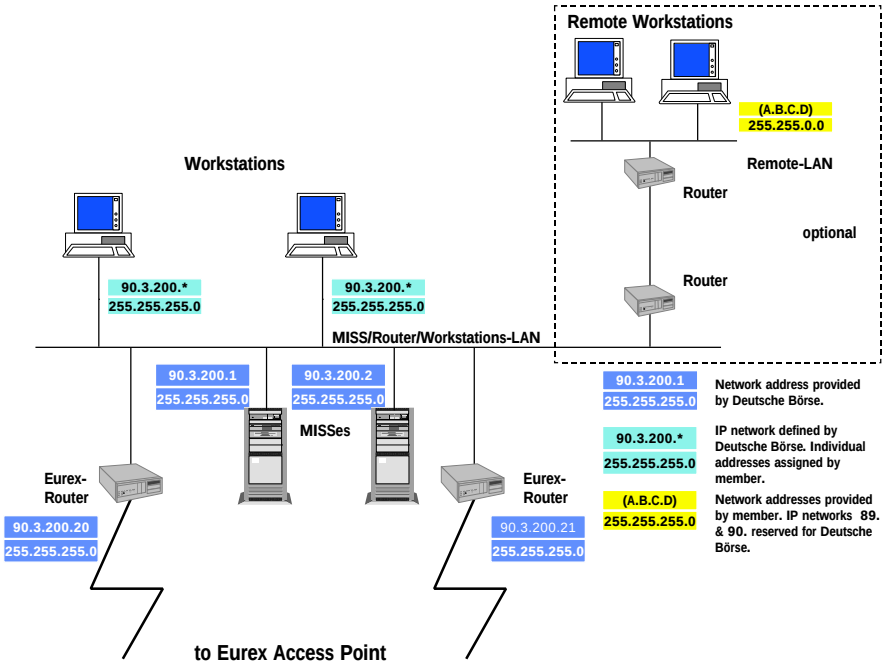


Figure 6 - One-LAN configuration

4 Member Networking and Security

4.1 Addressing and Naming Conventions

The Eurex network is a private network with private IP addressing rules and naming conventions. The private Eurex IP addresses will be assigned to router and MISS interfaces connected to the MISS/router LAN (see Figures 4 through 6).

4.1.1 Installations currently using class A/B addresses not subnetted

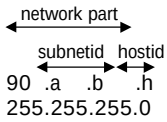
The early Eurex TCP/IP access points used a class A 89.0.0.0 addressing scheme in the access point. Members were given any valid IP address, for example 1.0.0.1.

4.1.2 Installations using class A subnetted as a class C network

Starting in 1997 new access points were given 89.0.0.0 or 90.0.0.0 addresses subnetted as a class C network. The connected member networks were given addresses in the same range and with the same subnetting, for example 89.1.201.1 with a class C network mask (255.255.255.0). Figure 7 shows the use of subnetting:

Eurex IP network class A with mask class C

- The network address is: 90.0.0.0 mask 255.255.255.0



- Octets ***a*** und ***b*** can be varied; this means that 64516 (254 x 254) IP Networks are available for the application.
- h = 1 ... 254; maximum number of hosts available in one network.

Figure 7 - Eurex network IP address

4.1.3 General rules for addressing

The addressing concept for the Eurex network is based on the following principles:

- Eurex is a self-contained private application.

- The networks 89.0.0.0 and 90.0.0.0 are reserved for usage by Eurex.
- Eurex addressing does not conform to internet conventions. There is no interface from Eurex to the Internet.
- The first 3 octets of any member addresses are fixed; the 4th octet is used for addressing different devices within the member installation.
- The individual IP networks for Eurex member installations and the addresses that have to be created within these networks are provided and distributed during the admission procedure for Eurex by the network administration group of the Exchange.

4.1.4 Individual host addresses

The individual hosts are assigned within the member installations as shown below:

1 - 20 range for MISSes

21 - 30 range for routers

> 30 and < 200 range for workstations in case of a one-LAN configuration. If HSRP (explained in chapter 5.2) is used, addresses must be allocated by the member using this range of addresses. In case of two-LAN configuration, the member is free to use its own addressing rules for workstations.

Examples of MISS addresses: 89.1.201.1, 90.53.203.1, 1.0.0.1, 121.3.0.1
Examples of router addresses: 89.1.201.21, 90.53.203.21, 1.0.0.21, 121.3.0.21

4.1.5 Network names

Network names for the member's front end components are allocated by the Exchange using the following conventions:

Position	Sign/Number	Meaning	Example
1	**E**	A Eurex system (constant)	**E**MABCFR2
2	**M, R**	MISS, router	E**M**ABCFR2
3 to 7	e.g. **ABCFR**	Application member name e.g. ABC in Frankfurt	ER**ABCFR**1
8 (to 9)	Number	Number of the system. If needed the number may use 2 digits.	EMABCFR**1** or EMABCFR**12**

The explicitness of the names for the member systems is protected by usage of member-specific abbreviations. The usage of names for systems and routers is not compulsory for the Eurex functionality but it facilitates the administration and communication between member system administration and the exchange in case of queries.

4.1.6 Protocols used

The TCP protocol is used for sending application requests/responses between a Eurex access point and member front end installation as well as for MISS-workstation communication. In addition, UDP is used for application broadcast distribution between MISSes and workstations.

The broadcast address of a MISS needs to be assigned by the member network administration. The masks assigned to the network address and to the broadcast address of a MISS have to correspond.

Example for a broadcast address using a 90.0.0.0 (subnetted as a class C network) address:

The address of the MISS (MISS/workstation LAN):	**A.B.C.H**
Network mask of the MISS address:	**255.255.255.0**
Broadcast address:	**A.B.C.255**

Example for a broadcast address using a 1.0.0.0 (not subnetted) address:

The address of the MISS (MISS/workstation LAN):	**A.0.0.H**
Network mask of the MISS address:	**255.0.0.0**
Broadcast address:	**A.255.255.255**

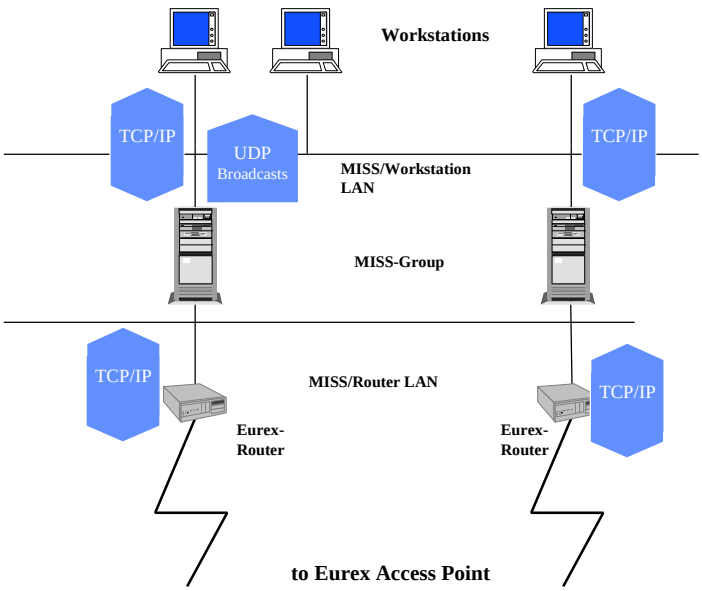


Figure 8 - Eurex network protocols

4.2 Technical Security Aspects

Security aspects are reflected in the Eurex application as well as in the set-up and configuration of the Eurex network. The following general principles apply:

- **Application communication in network application layer only**

  Application communication between the member front end and Eurex back end is performed by use of application requests, responses and broadcasts.

- **Logically functional segmentation of the systems**

  The MISS communicates with the communication server, which serves as a gateway to the back end hosts. Direct access to the Eurex back end environment is not possible for member hosts.

- **Eurex network segmentation by protocol change**

  The Eurex network is divided into two separate networks, which are connected by the access points. This connection is restricted to application communication only and is performed by communication servers. The communication between the member MISS and the communication server is based on the TCP/IP protocol, the communication between the communication server and back end systems is currently based on a different protocol.

- **Technical segmentation of IP reachability**

  The IP mutual reachability is restricted to the reachability between dedicated member networks and networks of the dedicated access point.

4.2.1 Access Point

In the topology of the Eurex network the access point has a key function in terms of security. The access point is the sole connecting part between Eurex back end hosts and member installations. The installations of different members are connected to access points. The functions and procedures implemented at the access point act as a firewall.

- The components of an access point are:
  - Router for connection to backend host
  - Communication Server
  - Routers for connection to member installation
  - Routers for cross connection
  - Cross connection

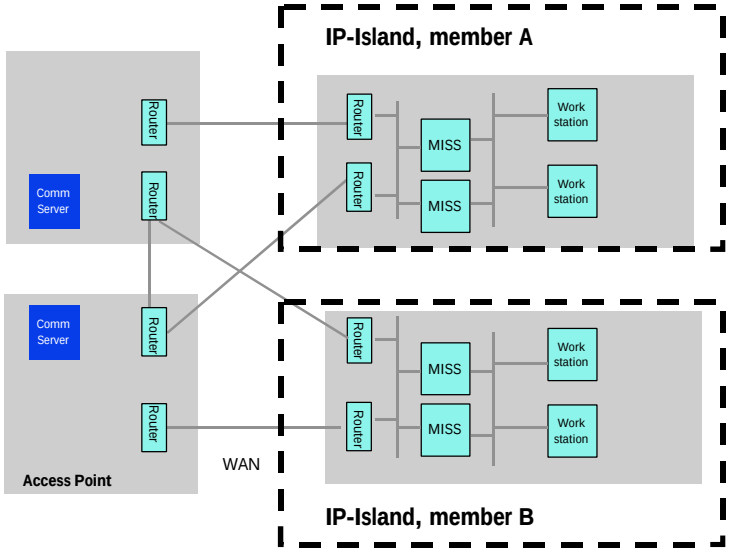


Figure 9 - Eurex network access point

A communication server is an application gateway for Eurex application services. A communication server can only be accessed by the application-specific connection.

A router within the access point ensures the communication to the member installation by use of serial connections (WAN network). Two security features are established on all Eurex routers within an access point:

- **Reachability control feature**

  The IP networks belonging to installations of different members are not reachable through the Eurex network.

- **Transport control feature**

  Only the data belonging to the Eurex application will be transported by the Eurex network.

4.2.2 Eurex Front End

As already described, there are several options to configure the Eurex front end. From the perspective of the Exchange, a front end installation implemented as a two-LAN configuration and the security features of the access point are adequate solutions to meet members 'high security requirements.

In addition, it is possible to use the firewall techniques within the front end installations. In general, the use of firewalls may affect Eurex front end performance. For a new installation the exchange requires the member to set up the initial installation without firewalls. When the connection test, fail over test and successful start of the application have been passed successfully, the member may install and configure the firewall. Except for a fail over test the exchange does not provide any kind of support for setting up and testing of the firewalls.

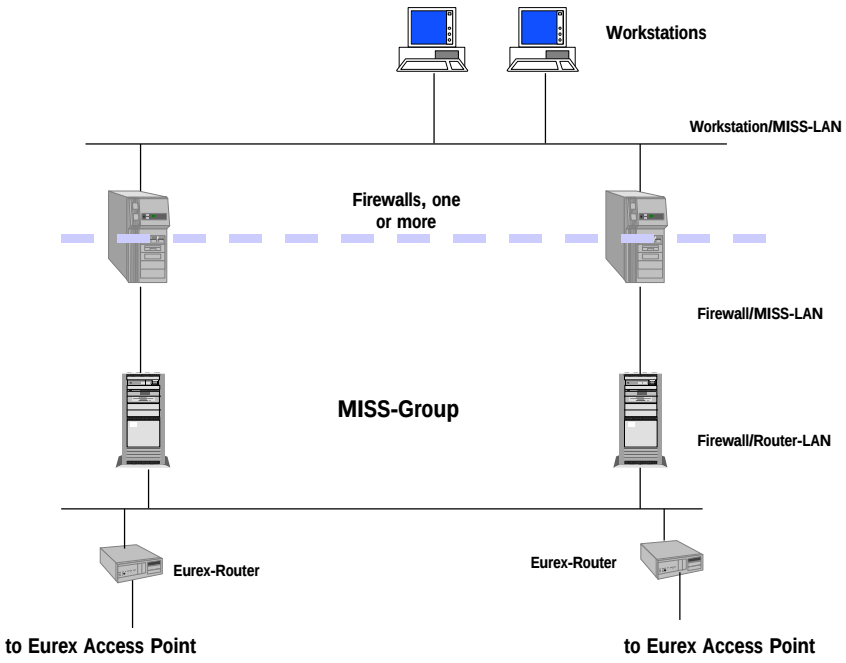


Figure 10 - Use of firewalls

There are different firewall requirements depending on which part of the configuration it is installed in. Figure 10 shows the standard configuration for the use of firewalls.

One of the typical techniques concerning the use of firewalls consists in filtering the data packets according to which application they belong to. Eurex specific *port numbers* are defined for the task-to-task communication of the different application components. The following table lists the *port numbers* for Eurex MISSes. The *port numbers* for the communication between communication server and MISS are fixed and cannot be changed by the member. However, the *port numbers* for the communication between MISSes and workstations may be assigned by the member. If the *port numbers* are not assigned by the member, the application values shown in the table below will probably be used as default values. This should be checked by reading the file configmbr.ini.

If several environments are used within a member installation simultaneously, it is important that the configurable *port numbers* are unique for the respective environment. In case the *port numbers* should not be unique in the given environment, the data streams of the respective environment will get mixed up. It has to be pointed out that the member himself holds the control and the responsibility on the usage of configurable port numbers. The Exchange recommends not to use the configurable *port numbers*.

Port-Number	Type	Configurable	Relationship
10003, 10005,10006 and 10007	TCP	No	MISS/CS production
10103, 10105, 10106 and 10107	TCP	No	MISS/CS simulation
19095, 19096 and 19097	UDP	Yes	MISS/WS LAN broadcast production
19195, 19196 and 19197	UDP	Yes	MISS/WS LAN broadcast simulation
19033	TCP	Yes	MISS/MISS, MISS/WS LAN transport server production
19133	TCP	Yes	MISS/MISS, MISS/WS LAN transport server simulation
19039	TCP	Yes	MISS/MISS, MISS/WS Broadcast bridge production
19139	TCP	Yes	MISS/MISS, MISS/WS Broadcast bridge simulation

The use of firewalls is subject to the security policy of the member institute. Configurations including firewalls are not tested and supported by the Exchange.

Security related features concerning operating systems and their administration as IP services, accounts, etc. will be described in a separate document.

5 Router Set-up

The Eurex network is built up on a homogeneous supplier platform. Equipment of Cisco Systems is used. Network security reasons and the uniform routing protocol used were essential criteria for choosing a homogeneous router platform.

5.1 Router Hardware and Software

Router types, IOS Version and IOS Feature Sets tested and recommended by the Exchange are:

- Cisco 2500 (no longer recommended (but still supported), use only if already in use)
- Cisco 2600 Ethernet/Dual Serial Port router (preferred because of improved fail over capabilities).
- Cisco 3620 2-Slot Modular Router-AC (1 Ethernet-, 2 WAN- Card Slot Network Module).
- Cisco IOS IP only feature set version 11.1 or higher

5.2 Routing Protocol

The EIGRP (Enhanced Interior Gateway Routing Protocol) is used for the routers connected to the Eurex network.

Characteristics of EIGRP are:

- Quick switching to alternate routes in case of topology changes.
- Small bandwidth requirements for routing updates.
- Small calculating requirements for topology calculations.

For all routers connected to an access point an *autonomous system number* will be defined for EIGRP. The *autonomous system number* is assigned by the network administration of the Exchange. When using 89.x.x.x or 90.x.x.x IP addresses the following rules apply:

- For 89.y.x.x addresses the second octet ('y ') defines the autonomous system number. If even, the number is used directly; if odd, the number is incremented by one. Example: for an IP address of 89.53.200.x the autonomous system number is 54.
- For 90.y.x.x addresses the second octet ('y ') defines the autonomous system number. If odd, the number is used directly; if even ,the number is decremented by one. Example: for an IP address of 90.53.200.x the autonomous system number is 53.

For members with other IP addresses the autonomous system number may be found from the IP network used in the access point to which the member connects combined with the above rules. These networks and their EIGRP numbers are listed in chapter 6.1.3.

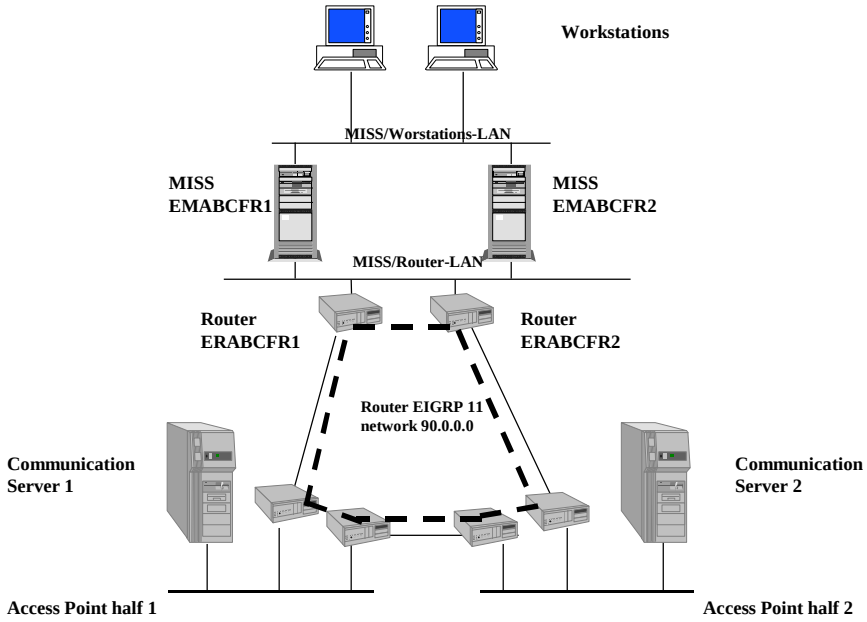


Figure 11 - Eurex network routing protocol

The Hot Standby Routing Protocol (HSRP) can be used on the Cisco routers supporting HSRP. HSRP allows the sharing of one or several virtual IP and MAC addresses by two or more routers. A 'hello' mechanism is used within a HSRP router group in order to recognise mutual existence. If one router fails, other routers will notice this failure and start to transport the data sent to the virtual address of the defect router. In this way the remaining router takes over the function of the defect router. This procedure is transparent for the sending host (MISS). To guarantee a symmetric communication to the respective access point halves, two HSRP groups are needed on Eurex routers. Addresses used for the HSRP feature must be allocated by the member using free addresses as explained in chapter 4.1.

5.3 Router Sample Configurations

5.3.1 Cisco router not supporting HSRP (i.e. 250x)

write terminal	
Building configuration...	
Current configuration:	
service password-encryption	
hostname ERABCFR1	router name ER=Eurex router , ABCFR=member abr. , 1=1st router
enable secret „enable-password“	free chosen password
!	
interface Ethernet0	
description “free text“	free description for interface, optional

```
ip address X.X.X.21 255.255.255.0          X.X.X.21=IP address of member LAN, provided by the Exchange
!
interface Serial0
 description „“free text“                   free description, e.g. leased line number, optional
 ip address Y.Y.Y.2 255.255.255.0           Y.Y.Y.2 = IP for serial line to access point, provided by the Exchange
 bandwidth 64
!
router eigrp ZZ                             number provided by the Exchange
 network 90.0.0.0
 distribute-list 99 out Serial0             please take the number of interface used for IP connection
!
no ip classless
access-list 99 permit X.X.X.0               X.X.X.0 = only this network shall be advertised by router

line con 0
 exec-timeout 120 0
 password „login-password“                  free chosen password for console access
 login
line aux 0
line vty 0 4
 exec-timeout 120 0
 password „login-password“                  free chosen password for Telnet access
 login
!
end
```

5.3.2 Cisco router supporting HSRP (i.e. 260x)

Using the HSRP protocol on Eurex routers, it has to be considered that the particular HSRP groups are to be defined with different priorities. Setting of *static routes* on a MISS, the correct *standby* address of the router has to be used. Using HSRP on Eurex routers, one *static default route* has to be defined on a MISS only (see chapter 6.1).

Two additional virtual IP addresses are necessary for the HSRP protocol. These addresses are assigned by the member using free addresses as defined in chapter 4.1.

```
write terminal
Building configuration...
Current configuration:
!
service password-encryption
!
hostname ERABCFR1                           router name ER=Eurex router , ABCFR=member abr. , 1=1st router
!
enable secret „enable-password“             free chosen password
```

```
!
interface Ethernet0/0
 description “free text“                  free description for interface, optional
 ip address X.X.X.21 255.255.255.0        X.X.X.21=IP address for member LAN, provided by the Exchange
 no ip redirects                          255.255.255.0=subnet mask for network
 standby 1 priority 100                   active HSRP router
 standby 1 preempt
 standby 1 ip X.X.X.31                    IP address for default gateway, to be set on 1st MISS
 standby 1 track Serial0/0 40
 standby 2 priority 80                    passive HSRP router
 standby 2 preempt
 standby 2 ip X.X.X.32                    IP address for default gateway, to be set on MISS 2
!
interface Serial0/0
 description „“free text“                 free description ,e.g. leased line number, optional
 ip address Y.Y.Y.2 255.255.255.0         Y.Y.Y.2 = IP address for serial line to access point,
                                          provided by the Exchange
 bandwidth 64
!
router eigrp ZZ                           number provided by the Exchange
 network 90.0.0.0
 distribute-list 99 out Serial0/0         please take the number of interface used for IP connection
!
no ip classless
access-list 99 permit X.X.X.0             X.X.X.0 = only this network shall be advertised by router
!
line con 0
 exec-timeout 120 0
 password „login-password“                free chosen password for console access
 login
!
line aux 0
line vty 0 4
 exec-timeout 120 0
 password „login-password“                free chosen password for Telnet access
 login
!
end
```

The HSRP part of the configuration for the second Eurex router (ERABCFR2) has to correspond to the configuration of the first router and shall be as follows:

```
interface Ethernet0/0
 description “free text“                  free description for interface, optional
 ip address X.X.X.22 255.255.255.0        X.X.X.22=IP address for member LAN provided by the Exchange
 no ip redirects                          255.255.255.0=subnet mask
```

standby 1 priority 80	passive HSRP router
standby 1 preempt	
standby 1 ip X.X.X.31	IP address for default gateway, to be set on 1st MISS
standby 2 priority 100	active HSRP router
standby 2 preempt	
standby 2 ip X.X.X.32	IP address for default gateway, to be set on MISS 2
standby 2 track Serial0/0 40	

5.3.3 Cisco routers and Class A/B addresses.

Some of the Eurex access points uses class A addresses for member devices and class B/C for serial lines. For customers installing MISSes while still using User devices the old addressing scheme must be maintained. The set-up will be like the two shown above but with class A/B/C addresses and added networks to the routing set-up. HSRP may be used as shown above with the corresponding IP addresses.

write terminal	
Building configuration...	
Current configuration:	
service password-encryption	
hostname ERABCFR1	router name ER= Eurex router , ABCFR= member abr. , 1=1st router
enable secret „“enable-password“	free chosen password
!	
interface Ethernet0	
description “free text“	free description for interface, optional
ip address X.0.0.21 255.0.0.0	X=IP address of member LAN, provided by the Exchange
!	
interface Serial0	
description „“free text“	free description, e.g. leased line number, optional
ip address Y.Y.Y.2 255.255.255.0	Y.Y.Y.2 = IP for serial line to access point, provided by the Exchange. May be a Class B or C address.
bandwidth 64	
!	
router eigrp ZZ	number provided by the Exchange
network X.0.0.0	as used for Ethernet address
network Y.Y.Y.0	as used for serial line address
distribute-list 99 out Serial0	please take the number of interface used for IP connection to Exchange
!	
no ip classless	
access-list 99 permit X.0.0.0	X.0.0.0 = only this network shall be advertised by router
!	

```
line con 0
 exec-timeout 120 0
 password „login-password“          free chosen password for console access
 login
line aux 0
line vty 0 4
 exec-timeout 120 0
 password „login-password“          free chosen password for Telnet access
 login
!
end
```

6 MISS Network Set-up

The topology of the Eurex network is strictly hierarchic and symmetric. The networks of the associated access point halves belong to different IP networks. For this reason and because the MISS/router LAN and MISS/workstation LAN should be separated, *static routes* only are used on a MISS as the routing mechanism. Dynamic routing is not to be configured on a MISS.

6.1 Relationship MISS - Access Point

As already mentioned, an access point is split into two halves. The leased lines between a member installation and an access point are assigned to different access point halves. There is a primary and a secondary access point half in the relationship of a MISS to the Eurex access point. During normal operation, the Eurex application establishes a logical connection via TCP/IP to the primary access point half. In case of failure of one Eurex component the logical connection may be established to the secondary access point half.

To achieve a dedicated, symmetric and distributed traffic across the shortest path to the access point, a relationship is defined between the dedicated MISS, router, line and access point half. One part of this relationship is established in the configuration of the Eurex application. The other part of this relationship is to be realised within the network set-up.

As the serial links lead to geographically separate access point halves and the requirement of the dedicated path for traffic are important for the performance of the system, the router to which the member lines are connected cannot be chosen freely. Initially, the relationship of a given *MISS to a given router, the router to a given line number and the line number to a given access point half* is fixed. For existing addresses the relationship between router and access point is specified in the configuration sheet issued by the exchange. A MISS is given a production primary application area (PPAA) pointing to an access point half. The router connecting to this access point half may be found on the configuration sheet too. The static route(s) are to be entered according to the examples in 6.1.1. and 6.1.2.

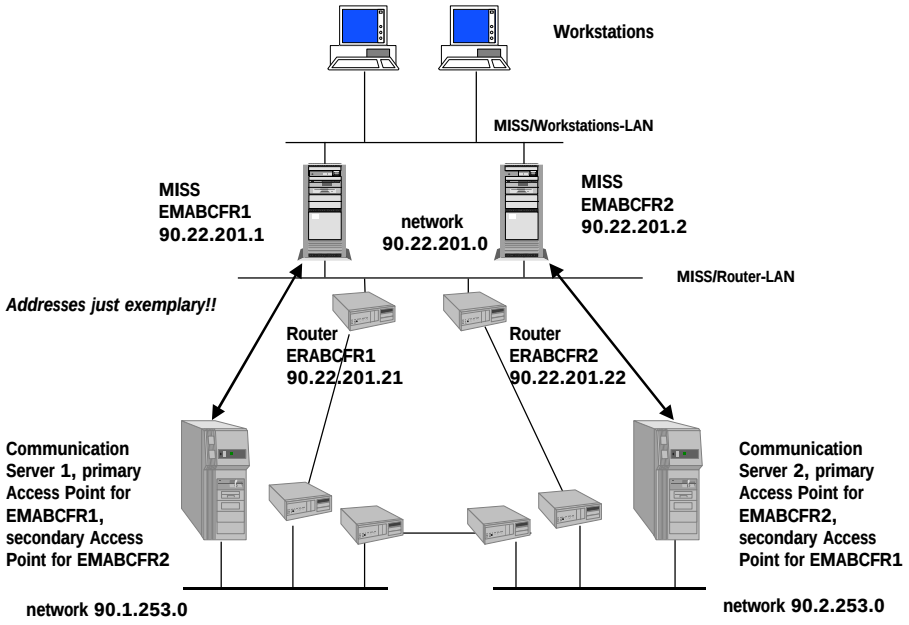


Figure 12 - Relationship of MISS to access point

6.1.1 Set-up with Cisco routers without HSRP

Using a Cisco router type without HSRP it has to be considered that two *static routes* need to be defined. The *route* to the network of the access point half 1 is to be defined by the router *(gateway)* leading to the first access point half. The *route* to the network of the access point half 2 is to be defined with the router (gateway) leading to the second access point half.

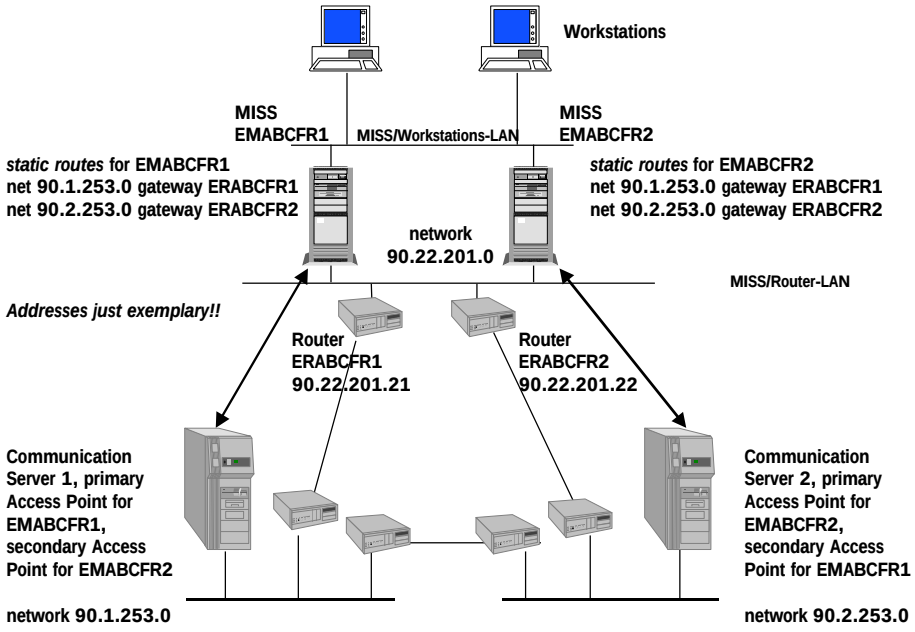


Figure 13 - Route set-up using Cisco router without HSRP

The MISSes belonging to the same LAN have the same set of *static routes.*

The syntax for the setting of *static routes* for the particular MISS platforms for the use of Cisco router without HSRP is as shown in the following:

- **Compaq OpenVMS** Platform:

  mc ucx set route *network-destination* /gateway= *gateway-address* /permanent

  Example with addresses of Figure 13:

  mc ucx set route 90.1.253.0 /gateway=90.22.201.21 /permanent
  mc ucx set route 90.2.253.0 /gateway=90.22.201.22 /permanent

  The routes defined in this way are set up permanently and are available after a new start of the system.

- **IBM AIX** Platform:

  route add -net *network-destination gateway-address* metric 1

  Example with addresses of Figure 13:

  route add -net *90.1.253.0 90.22.201.21* 1
  route add -net *90.2.253.0 90.22.201.22* 1

  The *static routes* are set under AIX within tool SMIT permanently.

- **Microsoft Windows/NT (Intel)** Platform:

  Establishing of **Command Prompt** by using menu **Start** and **Programs/Program**

  route -p add *network-destination* mask 255.255.255.0 *gateway-address* metric 1

  Example with addresses of Figure 13:

  route -p add *90.1.253.0* mask 255.255.255.0 *90.22.201.21* metric 1
  route -p add *90.2.253.0* mask 255.255.255.0 *90.22.201.22* metric 1

  The routes defined in this way are set up permanently and are available after a new start-up of the system.

- **Sun Solaris** Platform:

  route add net network-destination gateway-address metric 1

  Example with addresses of Figure 13:

  route add net 90.1.253.0 90.22.201.21 1
  route add net 90.2.253.0 90.22.201.22 1

  Usually the static routes are permanently set under Sun Solaris with the corresponding entry in /etc/rc2.d/S70add_routes file. It is within the discretion of the system administration to draw up their own scripts for the start-up of the systems.

6.1.2 Set-up with Cisco routers with HSRP

Using a CISCO router type with HSRP it has to be considered that one *default static* route is to be defined. The route to the network of access point half 1 is to be defined by the router *(gateway)* leading to the first access point half. The *route* to the network of the access point half 2 is to be defined with the router *(gateway)* leading to the second access point half.

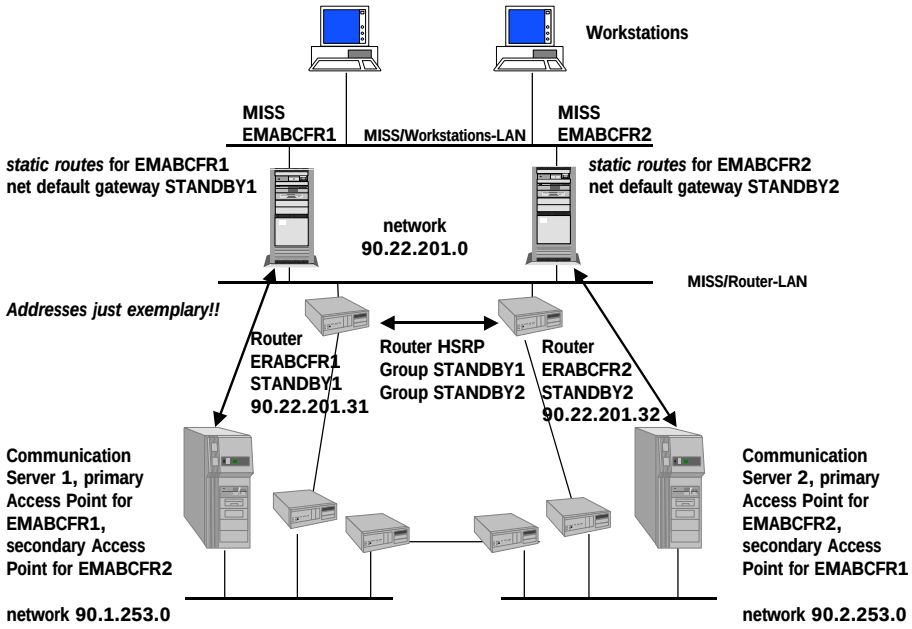


Figure 14 - Route set-up for HSRP

The MISSes have one *default static route* only. On different MISSes this *route* points to different *standby addresses* of the router. Member multi-LAN solutions have to be discussed separately. To use the HSRP protocol, Eurex routers have to be connected to the same LAN. The syntax for the setting of *static routes* for the particular MISS platforms is shown in the following:

- **Compaq OpenVMS** Platform:

  mc ucx set route /default /gateway=*gateway-address* /permanent

  Example with addresses of Figure 14:

  MISS XMABCFR1: mc ucx set route /default /gateway=90.22.201.31 /permanent
  MISS XMABCFR2: mc ucx set route /default /gateway=90.22.201.32 /permanent

  The routes defined in this way are set up permanently and are available after a new start-up of the system.

- **IBM AIX** Platform:

  route add -net default standby-gateway-address metric 1

  Example with addresses of Figure 14:

  MISS XMABCFR1: route add -net default 90.22.201.31 1
  MISS XMABCFR2: route add -net default 90.22.201.32 1

The static routes are set permanently using tool SMIT.

- **Microsoft Windows/NT (Intel)** Platform:

  Establishing of **Command Prompt** by use of menu **Start** and **Programs/Program**

  route -p add *network-destination* mask 255.255.255.0 *standby-gateway-address* metric 1

  Example with addresses of Figure 14:

  MISS XMABCFR1: route -p add default mask 255.255.255.0 *90.22.201.31* metric 1
  MISS XMABCFR2: route -p add default mask 255.255.255.0 *90.22.201.32* metric 1

  The routes defined in this way are set up permanently, i.e. they are also available after a new start-up of the system.

- **Sun Solaris** Platform**:**

  route add net default standby-gateway-address metric 1

  Example with addresses of Figure 14:

  MISS XMABCFR1: route add net default 90.22.201.31 1
  MISS XMABCFR2: route add net default 90.22.201.32 1

  Usually the static routes are permanently set under Sun Solaris with the appropriate entry in /etc/rc2.d/S70add_routes file. It is within the discretion of the system administration to draw up their own scripts for the start-up of the systems.

6.1.3 Access points and IP networks.

The following table shows the 'access point name to IP network 'relation as of March 1999. The access point names are found on the configuration sheets issued by the exchange. The IP network for the access points is used when configuring static routes on MISSes.

Name	IP-Network	EIGRP Number
AP-FR1	89.55.253.0	56
AP-FR2	89.56.253.0	56
AP-FA1	90.53.253.0	53
AP-FA2	90.54.253.0	53
AP-FB1	89.51.253.0	52
AP-FB2	89.52.253.0	52
AP-AU1	89.53.253.0	54
AP-AU2	89.54.253.0	54
AP-PA1	89.3.253.0	4
AP-PA2	89.4.253.0	4
AP-LO1	89.59.253.0	60
AP-LO2	89.60.253.0	60
AP-LA1	90.51.253.0	51
AP-LA2	90.52.253.0	51
AP-AM1	89.57.253.0	58
AP-AM2	89.58.253.0	58
AP-CH1	89.1.253.0	2
AP-CH2	89.2.253.0	2
AP-ZÜ1	90.55.253.0	55
AP-ZÜ2	90.56.253.0	55
AP-MD1	90.57.253.0	57
AP-MD2	90.58.253.0	57
AP-HE1	90.59.253.0	59
AP-HE2	90.60.253.0	59

6.2 Network Fail Over

A line failure within the redundant Eurex network is compensated by the re-routing mechanism established on the Eurex routers. A line failure is transparent to the application. The TCP/IP connection between the MISS and the dedicated communication server remains established.

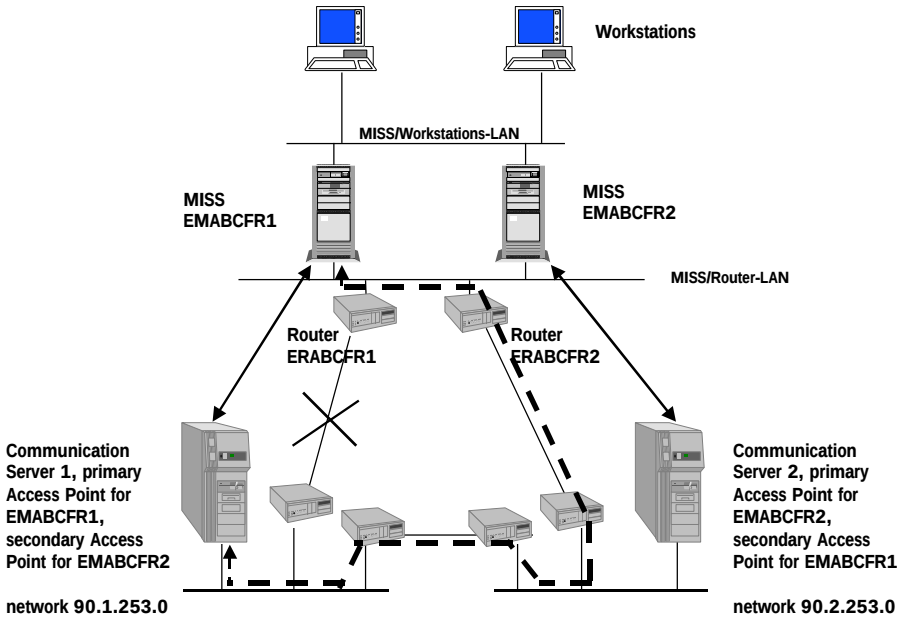


Figure 15 – Fail over in case of a line failure

A router failure is transparent to the application. The connection to the access point remains established if a router fails. A fail over mechanism inherent to the application re-establishes the connection to the other access point half.

In addition, using the HSRP protocol the failure of a router is compensated for by the remaining router.

The fail over mechanism in case of a router failure is shown in Figures 16 and 17.

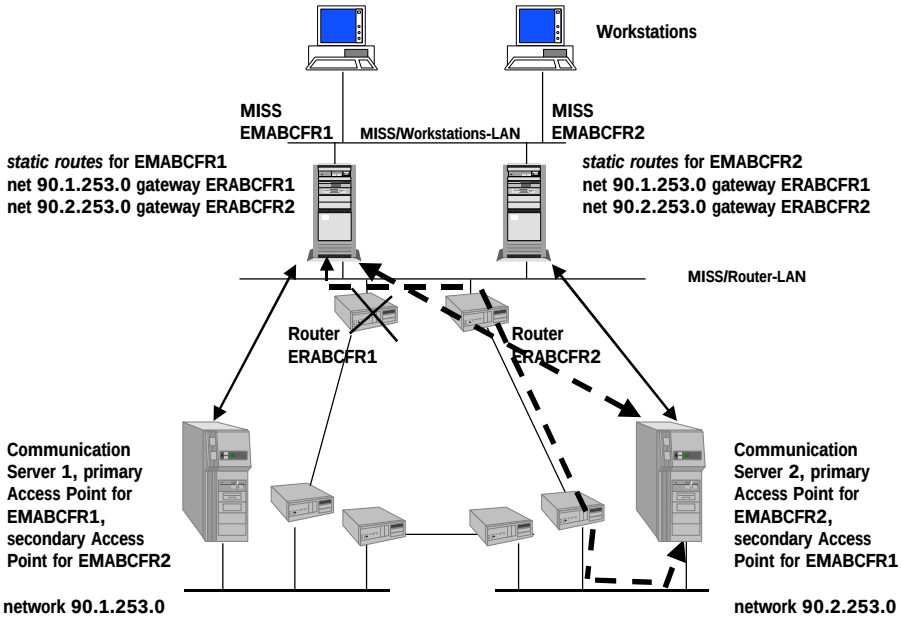


Figure 16 – Fail over behaviour of router without HSRP.

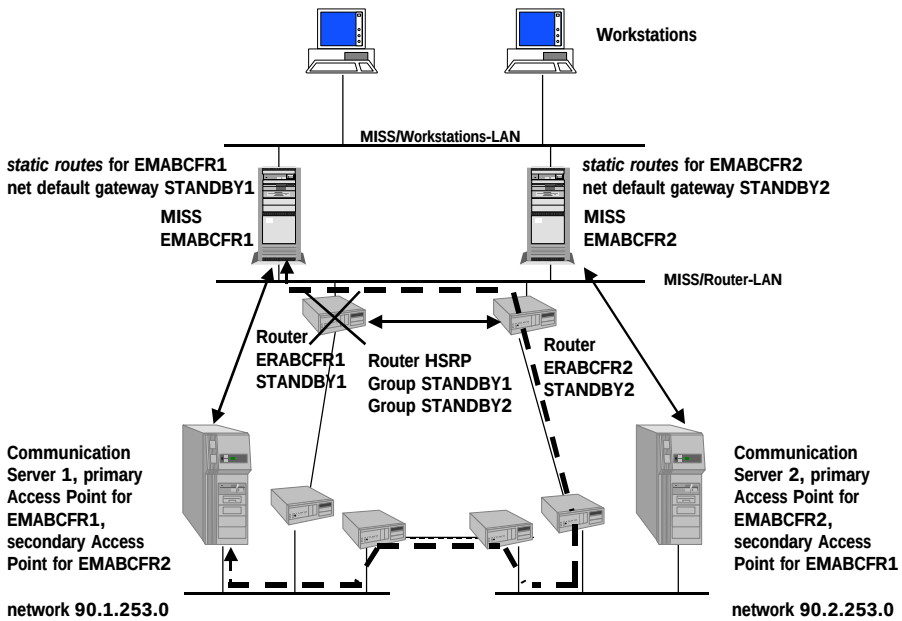


Figure 17 – Fail over behaviour of router with HSRP

Technical and Functional Training for Eurex Release 3.0

Eurex Release 3.0 offers a new Front End Architecture and a new graphical trading interface. As a pre-requisite for participation in the simulation and later practical use after introduction of Release 3.0, Eurex will offer technical training for system administrators and functional training for traders during the period 10th May 1999 to 2nd July 1999.

The corresponding registration forms and the training dates for all locations will be forwarded to you in the second week of April.

The following training sessions will be offered:

Training:	Eurex Release 3.0 Functional Training on the new graphical trading interface
Duration:	1 Day
Language:	German / English

Training:	Eurex Release 3.0 Complete Technical Training of the new Front End Architecture (Basics and Advanced)
Duration:	2 Days
Language:	German / English

Training:	Eurex Release 3.0 Update Technical Training of the new Front End Architecture (Advanced, for experienced system administrators)
Duration:	1 Day
Language:	German / English

A descriptions of the training contents can be found in the following pages.

Due to the anticipated limited availability of training capacity the training is based on the Train-the-Trainer principle. At the end of the training, participants will be able pass the acquired knowledge on to colleagues in their member firm. Participation in the training is a prerequisite for participation in the Release 3.0 Simulation.

To achieve optimal transfer of knowledge we would ask you to take the following aspects into account for effective in-house training.

- Selection of employees with appropriate technical business qualifications
- Preparation of personal and adequate room capacity
- Development of a training plan in line with the Eurex project plan
- Creation of the required technical infrastructure for participation in the simulation

We would also like to emphasize that participation in the exchange's training provides a solid basis on which to start the simulation phase. Your institution's representatives on the courses will achieve the necessary level of expertise.

If you have any questions, the Eurex Member Training group will be pleased to assist you on +49 (0)69-2101-3767.

Functional Member Training Eurex Release 3.0 on the new Graphical User Interface

Training content and structure:
The Participants will be introduced to the new Eurex Release 3.0 graphical user interface. The system will be shown using the new windows and the logical process flow between them. In addition, extensive exercises will be performed by the Participants to deepen the knowledge. The Participants will be provided with all necessary technical equipment, system documentation and training material (Windows/NT Platform).

Goal of the Training:
After attending the training the participants will be able to trade on the new graphical user interface of Eurex Release 3.0 and pass on their knowledge to their trading colleagues.

Participants and Requirements:
The training will take place on the Windows/NT Platform. The differences between Windows/NT and Sun Solaris, Compaq AXP/OpenVMS and IBM AIX, will be discussed explicitly.

The training is aimed at employees of exchange member firms who will be responsible for the Eurex Release 3.0 trading. Knowledge of Eurex products, as well as trading and clearing at Eurex is beneficial. The number of participants is limited to one to two person per member. Attendance is a prerequisite for participation in the Eurex Release 3.0 Simulation.

Prerequisites in detail are:
- Experience in Eurex trading and Eurex market model
- Experience in Training conduct

Speakers:
The Training will be conducted by members of the Customer Service Xetra® / Eurex team.

Date:
The Training dates will be published during the second week of April 1999.

Place:
The training will take place in Frankfurt, Zurich, London, Paris and Chicago.

Time:
Eurex Functional Training (1 day)
The training will start at 09:30 a.m. and end at approximately 05:30 p.m.

Technical Member Training Eurex Release 3.0 for the new Front End Architecture

Training content and structure:
The training consists of a combination of Online-Presentations, and exercises. The Participants will be provided with all necessary technical equipment, system documentation and training material. Member specific configurations and sizing' will not be part of the technical training. The training is based on the Train-the-Trainer principle.

The training deals only with the new Front End Architecture and the Eurex-specific part:

- Introduction to the new Front End Architecture
- Installation and Configuration of the new Front End Architecture
- Operation of the new Front End Architecture
- Eurex specific operation
- Backup and File transfer
- Monitoring and Reporting
- Exception Handling

Type of Technical Training:

The Training will be offered in two different versions:

Eurex Release 3.0 Technical Training for the new Front End Architecture / Basic and Advanced (2 days)

This training course is for participants who are not familiar with the new Front End Architecture from Xetra Release 3.0. The first training day deals with the "common" part of the new Front End architecture including a new installation of the system. The second day deals with details of the technical system administration for the Eurex specific part.

Eurex Release 3.0 Update Technical Training for the new Architecture / Advanced (1 day)

Administrators with prior Xetra Release 3.0 experience and who have attended the Xetra Release 3.1 update or complete training are advised to participate in the Eurex Release 3.0 update training which focuses on the Eurex specific parts.

Goal of the Training:
After attending the training the participants will be able administrate the new Front End Architecture of Eurex Release 3.0 and pass on their knowledge to system administration colleagues. To reach this goal daily system administration tasks will be explained step by step and are simulated through exercises.

Participants and Requirements:
The training is aimed at employees of exchange member firms who will be responsible for the Eurex Release 3.0 system administration. Prior experience with Eurex system administration is beneficial. Exchange member firms can send an employee from their service provider instead. The participants should have knowledge of the target MISS-Platform which is planned for their installation. In addition, network setup and network management know-how is necessary. The training will take place on the WindowsNT platform. The differences between WindowsNT and Sun Solaris, Compaq AXP/OpenVMS and IBM AIX, will be discussed explicitly. The number of participants is limited to one person per member. Attendance is a prerequisite for participation in the Eurex Release 3.0 Simulation.

Speakers:
The Training will be conducted by members of the Customer Service Xetra / Eurex team.

Dates:
The Dates will be published during the second week of April 1999.

Place:
The training will take place in Frankfurt, Zurich, London, Paris and Chicago.

Time:
All training starts at 9:30 a.m. and ends at approximately 5:00 p.m. each day.

X-pand into the **Future**

eurex *registration*

for User Device/MISS Migration

Please return this form by Fax to Eurex Member Readiness +49(0)69-2101-1701

To

Eurex
Functional Member Readiness

D-60284 Frankfurt

Fax:+49-(0)69-2101-1701
Tel: +49-(0)69-2101-1700

From

Member name:
_____

Contact name:
_____

Member ID: __ __ __ __ __

Fax: _____

Tel: _____

Hereby we would like to register for the migration to the new Eurex front end (MISS-based).

1. Early Migration

☐ We plan to participate in the release 3.0 simulation (14/07/99 – 03/09/99) from its beginning on the basis of the new MISS-configuration.

☐ We intend to use the MISS system in production from its start on Sept 6 th 1999 or shortly afterwards.

- ☐ We plan to migrate our existing platform ☐ IBM ☐ COMPAQ

  to ☐ NT ☐ IBM ☐ COMPAQ ☐ SUN
- ☐ Migration according to scenario 1 (see "Eurex 3.0 – Member Migration Recommendations")
- ☐ Migration according to scenario 2 (see "Eurex 3.0 – Member Migration Recommendations")
- ☐ Other scenario: _____
- ☐ Migration scenario has not yet been decided

It would be helpful if you could provide us with a diagram of the planned hardware infrastructure on a separate sheet

2. Future Migration

☐ We plan to carry out simulation and production on the new MISS-configuration at a future point of time. Planned start in production: _____

About three months prior to your planned start of production, you will need to fill out and remit the form “Eurex Systems Configuration Questionnaire”, available from customer services.

3. Training

☐ We plan to participate in the technical and functional training offered by Eurex in May and June 1999.
If ticked: Eurex will immediately send you a registration form.

Yours sincerely,

_____

Place Date Signature