

Developer's Guide for
NetWare SFT III v3.11
Mirrored Server Link Drivers

MSL Specification Version 1.00

Part Number: 107-000027-001
Document Version 1.00
February 5, 1993

Disclaimer

Novell, Inc. makes no representations or warranties with respect to the contents or use of this manual, and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. Further, Novell, Inc. reserves the right to revise this publication and to make changes to its content, at any time, without obligation to notify any person or entity of such revisions or changes.

© Copyright 1992 and 1993 by Novell, Inc. All rights reserved. No part of this publication may be reproduced, photocopied, stored on a retrieval system, or transmitted without the express prior written consent of the publisher.

Novell, Incorporated
122 East 1700 South
Provo, Utah 84606

Trademarks

Novell has made every effort to supply trademark information about company names, products, and services mentioned in this document. Trademarks indicated below were derived from various sources.

Ethernet is a trademark of Digital Equipment Corporation, Intel Corporation, and Xerox Corporation.

IBM, Micro Channel, and Token-Ring are trademarks of International Business Machines Corporation.

Intel is a trademark of Intel Corporation.

Novell, NetWare, and RX-Net are registered trademarks of Novell, Inc.

Phar Lap is a trademark of Phar Lap Software, Inc.

Table of Contents

Chapter 1: NetWare SFT III Mirrored Servers

Introduction	1-1
The Mirrored Server Link	1-2
MSL Communications	1-2
MSL Design Criteria	1-4
Other considerations	1-6
Dual Mirrored Server Links	1-7

Chapter 2: MSL Driver Overview

Introduction	2-1
MSL Driver Functionality	2-1
MSL Drivers are NLMs	2-1
MSL Driver Components	2-2
Driver Procedures	2-2
Data Structures and Variables	2-4
Message Packet Format	2-5
MSL Driver Environment	2-6
Multi-Tasking, Non-Preemption OS	2-6
32-Bit Protected Mode	2-6
Reentrancy	2-6
Execution Times	2-6
C Calling Conventions	2-9

Chapter 3: Data Structures, Tables, and Variables

Data Structures and Tables	3-1
DriverStatistics Table	3-2
IOConfiguration Structure	3-5
AdapterOptionStructure	3-9
AESEventStructure	3-10
TimerDataStructure	3-11
Global Data Variables	3-12
MaximumCommDriverDataLength: dword	3-12
PacketSizeNowAvailable: dword	3-12
PacketSizeDriverCanNowHandle: dword	3-12
ServerCommACKTimeOut: dword	3-13
Indirect OS Calls	3-13
GetNextPacketPointer: dword	3-13
ReceiveServerCommPointer: dword	3-13
SendServerCommCompletedPointer: dword	3-14

Chapter 4: MSL Driver Procedures

DriverInitialize	4-1
DriverControl	4-12
DriverSend	4-16
DriverBuildSend	4-19
DriverEmergencySend	4-22
DriverISR	4-25
DriverHoldOff	4-32
DriverIntHoldOff	4-32
DriverTimeout	4-35
DriverRemove	4-38

Chapter 5: NetWare SFT III Support Routines

Introduction	5-1
Conventions	5-1
Support Routines	5-2
AddPollingProcedureRtag	5-4
Alloc	5-5
AllocateMappedPages	5-6
AllocateResourceTag	5-8
AllocBufferBelow16Meg	5-10
AllocSemiPermMemory	5-12
CancelInterruptTimeCallBack	5-13
CancelNoSleepAESProcessEvent	5-14
CancelSleepAESProcessEvent	5-15
CCheckHardwareInterrupt	5-16
CDisableHardwareInterrupt	5-17
CDoEndOfInterrupt	5-18
CEnableHardwareInterrupt	5-19
ClearHardwareInterrupt	5-20
CPSemaphore	5-21
CRescheduleLast	5-22
CVSemaphore	5-23
DeAllocateMappedPages	5-24
DelayMyself	5-25
DeRegisterHardwareOptions	5-26
DeRegisterServerCommDriver	5-27
DisableHardwareInterrupt	5-28
DoEndOfInterrupt	5-29
DoRealModeInterrupt	5-30
EDXCallBackProcedure	5-32
EnableHardwareInterrupt	5-33
Free	5-34
FreeBufferBelow16Meg	5-35
FreeSemiPermMemory	5-36
GetCurrentTime	5-37
GetHardwareBusType	5-38
GetNextPacketPointer	5-39

GetProcessorSpeedRating	5-41
GetRealModeWorkSpace	5-42
GetServerPhysicalOffset	5-44
GetSharedMemoryLinearAddress	5-45
OutputToScreen	5-46
ParseDriverParameters	5-48
QueueSystemAlert	5-52
ReadEISACConfig	5-54
ReadRoutine	5-55
ReceiveServerCommPointer	5-57
RegisterForEventNotification	5-62
RegisterHardwareOptions	5-65
RegisterServerCommDriver	5-67
RemovePollingProcedure	5-69
ReturnSharedMemoryLinearAddress	5-70
ScheduleInterruptTimeCallBack	5-71
ScheduleNoSleepAESProcessEvent	5-73
ScheduleSleepAESProcessEvent	5-75
SendServerCommCompletedPointer	5-77
ServerCommDriverError	5-78
SetHardwareInterrupt	5-80
UnRegisterEventNotification	5-82

Appendix A: Building the MSL Driver

Development Process	A-1
Creating the Source Files	A-1
Assembling the Source Files	A-1
Linking the Object Files	A-1
Loading and Unloading Drivers	A-6

Appendix B: The NetWare Debugger

Introduction	B-1
Invoking the Debugger	B-2
Debug Commands	B-3
Help	B-3
"." Commands	B-3
Breakpoints	B-3
Memory Manipulation	B-5
Register Manipulation	B-7
Input/Output	B-8
Miscellaneous	B-9
Debug Expressions	B-11
Grouping Operators	B-12
Conditional Evaluation	B-12
Symbolic Information	B-13

Appendix C: Getting Hardware Configuration Information

Obtaining ISA Configuration Information	C-1
Obtaining EISA Configuration Information	C-2
Getting the Real Mode Workspace	C-2
Locking the Memory	C-3
Making a Real Mode BIOS Call	C-3
Accessing the Configuration Information	C-6
Unlocking the Memory	C-6
Obtaining MCA Configuration Information	C-7
Scanning Slots for the Adapter's ID	C-7
Determining the Slot to Use	C-8
Accessing the Configuration Information	C-10
Deselecting the Card	C-10
Register the Configuration Information	C-11

Appendix D: MSL Include File

Appendix E: MSL Driver Template

Preface

This document provides developers with the information necessary to write a Mirrored Server Link Driver for NetWare SFT III.

This document is divided into the following chapters.

Chapter 1 provides a general NetWare SFT III Mirrored Server overview.

Chapter 2 provides an introduction to the MSL driver and its required functions.

Chapter 3 describes data structures and variables that are used by the driver.

Chapter 4 contains detailed descriptions of the required MSL driver routines.

Chapter 5 contains detailed descriptions of the OS support routines available to the MSL driver.

Appendix A describes the process of assembling, linking, and loading an MSL driver.

Appendix B contains information on using the NetWare integrated debugger.

Appendix C describes methods used to obtain configuration information.

Appendix D contains a listing of the MSL.INC file.

Appendix E contains a listing for an MSL Driver template.

Manual Conventions

All numbers in this document are decimal unless otherwise specified. Hexadecimal numbers are identified by a trailing 'h' (i.e. FFh). Where bit fields within a byte are specified, bit 0 is assumed to be the low-order bit.

The following data types are defined:

byte	1 byte unsigned integer
char	1 byte ASCII character
offset	32-bit non-segmented address

Note that numeric fields composed of more than 1 byte can be in one of two formats: high-low or low-high. High-low numbers contain the most significant byte in the first byte of the field, the next most significant byte in the second byte, and so on, with the least significant byte appearing last. Low-high numbers are stored in exactly the opposite order. The Intel microprocessors store numbers in low-high order.